U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF BOTANY.

CONTRIBUTIONS

FROM

THE U. S. NATIONAL HERBARIUM.

Vol. II.

BOTANY OF WESTERN TEXAS.

A MANUAL OF THE PHANEROGAMS AND PTERIDOPHYTES OF WESTERN TEXAS.

BY

JOHN M. COULTER.

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NOTE.

The three numbers of Vol. II. of the Contributions were issued as follows:
No. 1, Polypetalæ, pp. 1 to 152, June 27, 1891.
No. 2, Gamopetalæ, pp. 153 to 346, July 1, 1892.
No. 3, Apetalæ, Monocotyledonæ, Pteridophyta, pp. 347 to 588, May 10, 1894.

PREFATORY NOTE.

The purpose of this manual is to bring together and make easily accessible our scattered information concerning the flora of western Texas. It will be considered a mark of appreciation if all omissions or mistakes be reported to the writer. The present work being necessarily a compilation, many recorded facts have doubtless escaped notice, and some species may have been admitted which do not fairly come within the limits chosen. It is intended to include all Texan plants west of the ninety-seventh meridian. The desirability of presenting this manual in parts has prevented the arrangement of the orders in a sequence more in accordance with our present knowledge of their affinities. No attempt has been made to give synonymy, except when necessary to a clear understanding of the species under consideration. It should be stated further that the work has been prepared not merely as a convenient reference book for botanists, but also as a handbook for Texan students. The latter purpose explains the introduction of analytical keys and of local names and uses, together with the simplicity of description, which would not have been necessary for the professional botanist. In the third part of the work it was thought best to conform as far as possible to the rules of nomenclature adopted by American botanists at the Rochester meeting of the American Association for the Advancement of Science in 1892, although doubtless not all the required changes have been made. In this work Dr. Elmon M. Fisher has rendered great assistance. Mr. Frederick V. Coville has prepared the manuscript of the Juncaceæ, Prof. L. H. Bailey the genus Carex, Mr. L. H. Dewey the Gramineæ, and Prof. L. M. Underwood the Pteridophyta. The metric system of measurements is followed throughout the work, and to those not accustomed to its use the following table, in addition to that given on page 5, may be helpful.

Table for converting metric and English linear measures.

	Metric to English.			English to metric.		
	Millimeters to inches.	Meters to feet.	Kilometers to miles.	Inches to millimeters.	Feet to meters.	Miles to kilometers.
1 =	.03937	3.28083	0.62137	25.4	0.3048	1.60935
2 =	.07874	6.56167	1.24274	50.8	0.6096	3.21869
3 =	.11811	9.84250	1.86411	76.2	0.9144	4.82804
4 =	.15748	13.12333	2.48548	101.6	1.2192	6.43739
5 =	.19685	16.40417	3.10685	127.0	1.5240	8.04674
6 =	.23622	19.68500	3.72822	152.4	1.8288	9.65608
7 =	.27559	22.96583	4.34959	177.8	2.1336	11.26543
8 =	.31496	26.24667	4.97096	203.2	2.4384	12.87478
9 =	.35433	29.52750	5.59233	228.6	2.7432	14.48412

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Elmer D. Merrill

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LETTER OF TRANSMITTAL.

SIR: I have the pleasure of transmitting herewith for publication the first part of a Manual of the Plants of Western Texas, which has been prepared by Prof. John M. Coulter by the instruction of this Department, and mainly as the result of investigations which have been prosecuted in Texas under direction of the Botanical Division, by Mr. G. C. Nealley, of Houston, Tex.

Dr. GEORGE VASEY,
Botanist.

Hon. J. M. RUSK,
Secretary of Agriculture.

MARCH 2, 1891.

PREFATORY NOTE.

The purpose of this manual is to bring together and make easily accessible our scattered information concerning the flora of western Texas. It is one of the richest regions in plant display, containing a flora particularly interesting on account of the intermingling of Mexican species, and very poorly provided with accessible information. It has been deemed advisable to publish the manual in parts, in order that their successive appearance may call forth additional information that can be embodied in a final supplement. It will be considered a mark of appreciation if all omissions or mistakes in species or their range be reported to the writer. Such a work is necessarily a compilation, and many recorded facts have doubtless escaped notice, while it is to be hoped that a vast amount of unrecorded information will thus be brought to light. In many cases, on account of meager information, the range of a species has been given in a very indefinite and unsatisfactory way, and doubtless species have been admitted that do not fairly come within the limits chosen. It is intended to include all Texan plants west of the ninety-seventh meridian. In reporting the geographical range of a plant it is very desirable to give some notion of its altitude and soil distribution as well, stating whether it frequents valleys, or plateaus, or mountains, and whether it is a plant that affects a certain kind of soil. The desirability of presenting this manual in parts has prevented the arrangement of the sequence of orders more in accordance with the present knowledge of affinities. No attempt has been made to present synonymy, except when necessary to a clear understanding of the species under consideration. It should be stated further that the work has been prepared not only as a convenient reference book for botanists, but also as a handbook for Texan students, and the latter purpose explains the introduction of analytical keys, local names and uses, and simplicity of description, which would not have been necessary for the professional botanist.

JOHN M. COULTER.

STATE UNIVERSITY,
Bloomington, Ind.

MANUAL OF THE PLANTS OF WESTERN TEXAS.

ANYLYTICAL KEY TO THE ORDERS.

Series I. PHANEROGAMS or FLOWERING PLANTS: those producing true flowers and seeds.

Class I. ANGIOSPERMS: those in which the ovules are contained in a closed ovary.

Subclass I. DICOTYLEDONS: those whose embryos have a pair of opposite cotyledons; the fibro-vascular bundles of the stem form a more or less complete hollow cylinder; the leaves are net-veined, and the flowers usually 4 or 5-merous.

Division I. POLYPETALÆ: those that have usually both calyx and corolla, the latter of separate petals.

A. *Stamens numerous, at least more than ten, and more than twice the sepals or lobes of the calyx.*

1. *Calyx entirely free and separate from the pistil or pistils.*

Pistils numerous, separate, but concealed in a hollow receptacle. Rosa, in ROSACEÆ, 106
Pistils several, immersed in hollows of the upper surface of a large top-shaped receptacle ..... Nelumbo, in NYMPHÆACEÆ, 11
Pistils more than one, separate, not inclosed in the receptacle.
  Stamens inserted on the calyx, distinct ..... ROSACEÆ, 101
  Stamens united with the base of the petals, monadelphous ..... MALVACEÆ, 35
  Stamens inserted on the receptacle.
    Flowers diœcious; twiners with alternate leaves ..... MENISPERMACEÆ, 10
    Flowers perfect; if climbers, the leaves opposite ..... RANUNCULACEÆ, 6
Pistils several-lobed, the ovaries united below the middle ..... RESEDACEÆ, 23
Pistils several, their ovaries cohering in a ring around an axis ..... MALVACEÆ, 35
Pistils strictly one as to the ovary; the styles or stigmas may be several.
  Leaves punctate under a lens with transparent dots ..... HYPERICINEÆ, 34
  Leaves not punctate with transparent dots.
    Ovary simple, 1-celled, 2-ovuled ..... ROSACEÆ, 101
    Ovary compound, 1-celled, with a central placenta ..... PORTULACEÆ, 31
    Ovary compound, 1-celled, with two or more parietal placentæ.
      Calyx caducous; juice milky or colored ..... PAPAVERACEÆ, 12
      Calyx deciduous, of 4 sepals ..... CAPPARIDEÆ, 22
      Calyx persistent, of 3 or 5 sepals ..... CISTINEÆ, 23
    Ovary compound, several-celled.
      Calyx valvate in the bud, and
        Persistent; stamens monadelphous; anthers 1-celled. MALVACEÆ, 35
        Deciduous; anthers 2-celled ..... TILIACEÆ, 45
      Calyx imbricated in the bud, persistent.
        Shrubs; ovary 3-celled ..... BIXINEÆ, 25
        Aquatic or marsh herbs; ovary many-celled ..... NYMPHÆACEÆ, 11

2. *Calyx more or less coherent with the surface of the compound ovary.*

Ovary 8–30-celled; aquatic.....NYMPHÆACEÆ, 11
Ovary 2–5-celled.
Leaves alternate, with stipules.....Pomeæ, in ROSACEÆ, 102
Leaves opposite, without stipules.....Some SAXIFRAGACEÆ, 107
Ovary 1-celled, with the ovules parietal.
Fleshy plants with no true foliage; petals many.....CACTACEÆ, 125
Rough-leaved plants; petals 5 or 10.....LOASACEÆ, 119
Ovary 1-celled, with the ovules rising from the base.....PORTULACEÆ, 31

B. *Stamens of the same number as the petals and opposite them.*

Pistils 2–6, separate or more or less united.
Flowers dicœcious; stamens distinct; woody vines.....MENISPERMACEÆ, 10
Flowers perfect; stamens more or less monadelphous; shrubs or trees.
Carpels 4 or 5.....STERCULIACEÆ, 44
Carpels 3.....MALPIGHIACEÆ, 47
Pistil only one.
Ovary 1-celled.
Sepals 6; stigma 1; anthers opening by uplifted valves....BERBERIDEÆ, 10
Sepals 2; stigmas 3; anthers not opening by uplifted valves.PORTULACEÆ, 31
Ovary 2–4-celled.
Calyx-lobes minute or obsolete; petals valvate.....AMPELIDACEÆ, 61
Calyx 4–5 cleft, valvate in the bud; petals involute.....RHAMNEÆ, 57
Sterculiaceæ (p. 00) and Malpighiaceæ (p. 00) may be looked for here.

C. *Stamens not more than twice as many as the petals, when just the number then alternate with them.*

1. *Calyx free from the ovary, i. e., the ovary wholly superior.*

* *Ovaries 2 or more separate.*

Stamens free from the calyx.
Leaves punctate with pellucid dots.....RUTACEÆ, 52
Leaves not pellucid-punctate.
Low shrub with rigid entire leaves.....Castela, in SIMARUBACEÆ, 55
Herbs, not fleshy.....RANUNCULACEÆ, 6
Herbs with thick fleshy leaves.....CRASSULACEÆ, 109
Stamens inserted on the calyx.
Just twice as many as the pistils (fl. symmetrical).....CRASSULACEÆ, 109
Not just the number or twice the number of the pistils.
Leaves without stipules.....SAXIFRAGACEÆ, 107
Leaves with stipules.....ROSACEÆ, 101

* * *Ovaries 2–5, somewhat united at base, separate above.*

Leaves punctate with pellucid dots.....RUTACEÆ, 52
Leaves not pellucid-punctate.
Shrubs or trees with opposite leaves and distinct stamens.....SAPINDACEÆ, 64
Shrubs or trees with opposite leaves and monadelphous stamens.....MALPIGHIACEÆ, 47
Terrestrial herbs; the carpels fewer than the petals.....SAXIFRAGACEÆ, 107

* * * *Ovaries or lobes of ovary* 3–5, *with a common style*.....GERANIACEÆ, 50

* * * * *Ovary only one, and*

† *Simple, with one parietal placenta*.....LEGUMINOSÆ, 68

†† *Compound, as shown by the number of cells, placentæ, styles, or stigmas.*

Ovary 1-celled.
Corolla irregular; petals 4; stamens 6.....FUMARIACEÆ, 13
Corolla irregular; petals and stamens 5.....VIOLARIEÆ, 24
Corolla regular or nearly so.
Ovule solitary; shrubs or trees; stigmas 3.....ANACARDIACEÆ, 67
Ovules 1 or 2; fruit a cartilaginous follicle; low spinescent shrubs..... Glossopetalon, in SAPINDACEÆ, 67
Ovules more than 1, in the center or bottom of the cell.
Petals not inserted on the calyx.....CARYOPHYLLEÆ, 28
Petals on the throat of a bell-shaped or tubular calyx.LYTHRARIEÆ, 111
Ovules several or many, on two or more parietal placentæ.
Seeds comose or long-hairy; shrubs or small trees...TAMARISCINEÆ, 33
Seeds not comose or long-hairy.
Leaves punctate with pellucid and dark dots....HYPERICINEÆ, 34
Leaves not punctate.
Sepals 5, very unequal or only 3.....CISTINEÆ, 23
Sepals and petals 4 or 5; stamens 6.....FRANKENIACEÆ, 28
Sepals and petals 5; stamens 5 or 10.
Styles 3 or 4, with flabellate many-cleft stigmas.....TURNERACEÆ, 120
Styles 3 or 4, club-shaped; ovary and stamens raised on a stalk.....PASSIFLORACEÆ, 121
Styles with simple stigmas; ovary sessile.SAXIFRAGACEÆ, 107
Ovary 2-several-celled.
Flowers irregular.
Anthers opening at top, 1-celled; ovary 2-celled .....POLYGALEÆ, 26
Anthers opening lengthwise, 2-celled; ovary 3-celled .....SAPINDACEÆ, 64
Flowers regular or nearly so.
Stamens neither just as many nor twice as many as the petals.
Triadelphous; petals 5 ..... HYPERICINEÆ, 34
Tetradynamous (rarely only 2 or 4); petals 4.....CRUCIFERÆ, 13
Distinct and more numerous than the petals .....SAPINDACEÆ, 64
Stamens just as many or twice as many as the petals.
Ovules and seeds only 1 or 2 in each cell.
Herbs; flowers perfect and symmetrical.
Cells of the ovary as many as the sepals, etc...GERANIACEÆ, 50
Cells of the (divided) ovary twice as many as the styles, sepals, etc.....LINEÆ, 46
Shrubs or trees.
Leaves bipinnate and alternate .....MELIACEÆ, 55
Leaves pinnate or 2-foliolate, opposite, not dotted.....ZYGOPHYLLEÆ, 49
Leaves 3-foliolate, pellucid-punctate..Ptelea, in RUTACEÆ, 54
Leaves palmately veined and fruit 2-winged, or pinnate and fruit a berry .....SAPINDACEÆ, 64
Leaves pinnately veined, simple, not punctate.
Calyx not minute; pod colored, dehiscent; seeds inclosed in a pulpy aril.....CELASTRINEÆ, 56
Calyx minute; fruit a berry-like drupe .....ILICINEÆ, 56

Ovary 2-several-celled—Continued.
Flowers regular or nearly so—Continued.
Stamens just as many or twice as many as the petals—Continued.
Ovules (and usually seeds) several or many in each cell.
Stipules between the opposite and simple leaves.....ELATINEÆ, 33
Stipules none when the leaves are opposite.
Stamens 10, monadelphous at base;
leaflets 3, inversely heart-shaped..Oxalis, in GERANIACEÆ, 51
Stamens distinct, free from the calyx.
Style 1, undivided; leaves very small and scale-like.....Kœberlinia, in SIMARUBACEÆ, 55
Styles 2–5, separate.....CARYOPHYLLEÆ, 28
Stamens distinct, inserted on the calyx.
Styles 2 (or 3), or splitting into 2 in fruit.SAXIFRAGACEÆ, 107
Style 1, pod in the calyx, 1-celled.....LYTHRARIEÆ, 111

2. *Calyx-tube adherent to the ovary, at least to its lower half.*

Tendril-bearing and often succulent herbs.....CUCURBITACEÆ, 122
Not tendril-bearing.
Ovules and seeds more than one in each cell.
Ovary 1-celled, many-ovuled from the base.....PORTULACEÆ, 31
Ovary 1-celled, with 2 or 3 parietal placentæ .....SAXIFRAGACEÆ, 107
Ovary 2–several-celled.
Stamens on a flat disk which covers the ovary.....CELASTRINEÆ, 56
Stamens inserted on the calyx.
Stamens 8 or 4 (rarely 5); style 1.....ONAGRARIEÆ, 113
Stamens 5 or 10; styles 2 or 3, distinct.....SAXIFRAGACEÆ, 107
Ovules and seeds only one in each cell.
Stamens 2 or 8; style 1; stigma 2–4 lobed; herbs.....ONAGRARIEÆ, 113
Stamens 4 or 8; styles or sessile stigmas 4; aquatics.....HALORAGEÆ, 110
Stamens 4; style and stigma 1; shrubs .....CORNACEÆ, 150
Stamens 5; styles 2; flowers in umbels, or rarely in heads.UMBELLIFERÆ, 138

GAMOPETALOUS FORMS IN POLYPETALOUS ORDERS.

The following orders contain forms which have their petals more or less united into one piece:

A. *Stamens more numerous than the lobes of the corolla.*

Ovary 1-celled, with one parietal placenta.....LEGUMINOSÆ, 68
Ovary 2-celled, with a single ovule in each cell .....POLYGALEÆ, 26
Ovary 3-many celled.
Stamens free from the corolla; styles 5.....Oxalis, in GERANIACEÆ, 51
Stamens inserted on the base or tube of the corolla; filaments monadelphous.....MALVACEÆ, 35

B. *Stamens as many as the lobes of the corolla.*

Ovary adherent to the calyx-tube; tendril-bearing herbs .....CUCURBITACEÆ, 122
Ovary free from the calyx, 4–8 celled; style none ..... ILICINEÆ, 56

APETALOUS FORMS IN POLYPETALOUS ORDERS.

The following orders contain forms which have no corolla, although the calyx is frequently petal-like. When there is but one set of floral envelopes this is considered to be the calyx.

1. *Ovary or its cells containing many ovules.*

Ovary and pod inferior, 4-celled; stamens 4 .....Ludwigia, in ONAGRARIEÆ, 113
Ovary and pod superior,
3-celled and 3-valved, or 3–5-celled and circumscissile.....FICOIDEÆ, 137
2-celled or 1-celled; placentæ central.
Stamens inserted on the tube or throat of the calyx.....LYTHRARIEÆ, 111
Stamens inserted on the receptacle or base of the calyx.CARYOPHYLLEÆ, 28
1-celled, with one parietal placenta } .....RANUNCULACEÆ, 6
Ovaries two or more, separate, simple }

2. *Ovary, or its cells containing only* 1 *or* 2 (*rarely* 3 *or* 4) *ovules.*

* *Pistils more than one, and distinct or nearly so.*

Stamens inserted on the calyx; leaves with stipules.....ROSACEÆ, 101
Stamens inserted on the receptacle; calyx present and usually
colored or petal-like .....RANUNCULACEÆ, 6

* * *Pistil one, either simple or compound.*

Ovary wholly inferior (in perfect or pistillate flowers).
Aquatic herbs; ovary 3 or 4-celled, or (in Hippuris) 1-celled...HALORAGEÆ, 110
Trees; ovary 1-celled .....Nyssa, in CORNACEÆ, 151
Ovary plainly free from the calyx, which is sometimes wanting.
Aquatic herbs, submerged or nearly so .....HALORAGEÆ, 110
Shrubs or trees.
Ovules a pair in each cell of the ovary; fruit
2-celled, a double samara .....Acerineæ, in SAPINDACEÆ, 64
Ovules single in each cell of the 3-celled ovary.....RHAMNEÆ, 57

As it has been thought best to use the metrical system in all measurements, the following table may be found useful:

	mm.	cm.	dm.	m.
One line	2	.....	.....	.....
One inch.....	25	2.5	.....	.....
One foot	.....	30	3	.....
Four feet	.....	.....	12	1.2

RANUNCULACEÆ. (CROWFOOT FAMILY.)

Herbs (sometimes woody) with the few or numerous sepals, petals, stamens, and pistils all distinct and free: flowers regular or irregular: sepals often petal-like, and petals wanting in some genera: fruits consisting of achenes, pods, or berries: leaves varying from simple to much compounded, with petioles dilated at base.

* Sepals 4, petal-like: petals none (or small): fruit consisting of long-tailed achenes: leaves all opposite.

1. **Clematis.** Climbing by leafstalks or erect.

* * Sepals often petal-like: petals none: fruit consisting of numerous or several achenes in a head or spike: leaves compound, alternate or radical (upper sometimes opposite or whorled).

2. **Thalictrum.** Flowers panicled: leaves alternate: achenes few.

3. **Anemone.** Peduncles 1-flowered: stem-leaves opposite or whorled, forming an involucre remote from the flower: achenes numerous.

* * * Petals evident: leaves simple or compound, alternate or radical: achenes numerous.

4. **Myosurus.** Flowers solitary on a scape: sepals spurred at base: petals slender: achenes in a long slender spike.

5. **Ranunculus.** Petals generally broad and with a scale or gland at base: achenes in a head.

* * * * Petals and sepals both conspicuous and colored, one or both prominently spurred: fruit consisting of a few pods: leaves alternate, compound.

6. **Aquilegia.** Sepals 5: petals 5, large, spur-shaped.

7. **Delphinium.** Sepals 5, the upper one spurred: petals 4, the upper pair with long spurs inclosed in the calyx spur.

1. CLEMATIS L. (VIRGIN'S BOWER.)

Perennial herbs or vines, mostly a little woody, climbing by the leafstalks (rarely low and erect), with 4 colored valvate sepals, no petals, opposite leaves, and numerous achenes with the persistent styles forming naked, hairy, or plumose tails.

* *Flowers cymose-paniculate, rather small and diœcious: sepals thin, white.*

1. **C. Drummondii** Torr. & Gray. Leaves pinnate and long-petioled, villous beneath and somewhat hirsute above; leaflets lanceolate to broadly ovate, 3-lobed, the lobes acute to long-acuminate: sepals narrowly oblong, villous outside: achenes pubescent, the plumose tails very slender and 5 to 10 cm. long.—The Texan "Virgin's bower," a characteristic and beautiful climber abundant in valleys throughout the State, and even occurring on the prairies in straggling forms.

* **Flowers solitary (usually nodding) on long peduncles, large and perfect: sepals thick and mostly dull purple.*—LEATHER FLOWERS.

2. **C. Viorna** L., var. **coccinea** James. Leaflets glaucous, coriaceous, obtuse, reticulated, 2 to 3-lobed or entire: sepals very thick and leathery, scarlet or purplish red, wholly connivent or only the tips recurved: long tails of the fruit very plumose.—Apparently found only between the Colorado and the Rio Grande. The stations reported are near Austin, New Braunfels, San Angelo, and in Gillespie County.

3. **C. reticulata** Walt. Leaflets ovate or oval, entire or lobed, obtuse and mucronate (rarely acute), rigidly coriaceous and conspicuously reticulated on both sides: sepals pale purple and velvety outside: tails of the fruit long and very plumose.—In the valleys of southern and western Texas, but not abundantly collected. Easily recognized by its very rigid and conspicuously reticulated leaves, although in certain Texan forms the leaves are thinner than usual.

4. **C. Pitcheri** Torr. & Gray. Leaflets thickish, ovate, acute, reticulated, entire or 2 to 3-lobed: sepals dull purple, with narrow and slightly margined recurved points: tails of the fruit slender and naked or shortly villous.—In the valleys of southern and western Texas; the most common "leather flower."

5. **C. crispa** L. Leaflets thin, from lanceolate to ovate or cordate, entire or 3 to 5-parted: sepals bluish purple, the upper half dilated and widely spreading with broad and wavy thin margins: tails of the fruit silky or glabrate.—From the coast (Brazos Santiago and northward) westward to the 100th meridian (Runnels Co.).

2. THALICTRUM Tourn. (MEADOW-RUE.)

Perennial herbs, with panicled (rarely racemed) apetalous flowers (perfect, dicecious, or polygamous), 4 or 5 (sometimes petaloid) sepals, numerous (rarely few) tailless ribbed achenes, and alternate ternately decompound leaves.—Our species are dicecious or polygamo-dicecious.

1. **T. purpurascens** L. Glabrous or pubescent, stout, tall, leafy: leaflets remote, short-stalked, large, oblong or oblong-cuneate, with 3 commonly entire pointed lobes above: flowers in a pyramidal panicle: stamens numerous, the long filaments widened to the linear-oblong cuspidate anthers: achenes numerous, short-stipitate, ovoid, thin-walled, with 6 to 8 sharp ridges, tapering into the slender persistent style.—A very common "meadow-rue" elsewhere, and reported to occur throughout Texas.

2. **T. debile** Buckley. Glabrous, weak and decumbent, 10 to 35 cm. high, few-leaved: leaflets remote, long-stalked, thin, rotund, 3-lobed at apex, the rounded lobes entire or lobed again: flowers long-pedicelled and remote in an elongated almost simple strict panicle: stamens about 10, the filaments short but slender, with oblong-linear mucronate anthers: achenes 2 to 5, subsessile, oblong, terete, 8 to 10-ribbed, nearly beakless.—Sparingly collected and of unknown distribution in the State. A Texan form, with more rigid stem and smaller thicker nearly sessile leaflets is var. TEXANUM Gray (Hall Pl. Tex. 3).

3. **T. Fendleri** Eng. Granular or glandular-pubescent, erect, sometimes tall: leaflets remote, stalked, small, round, often cordate at base, with 3 divergent lobes, the central or all of them again lobed, their divisions mostly pointed: stamens numerous, with slightly dilated filaments (often papillose-roughened above) and linear mucronate anthers: achenes 10 or less, substipitate, large, obliquely oval and flattened, with 8 to 10 prominent nearly parallel ribs (occasionally reticulated).—In the mountains of western Texas.

3. ANEMONE Tourn. (WIND FLOWER.)

Perennial herbs with radical leaves, those of the stem opposite or whorled and forming an involucre remote from the apetalous solitary or umbellate flowers, few or numerous petaloid sepals, and pointed flattened (but not ribbed) achenes.

1. **A. Caroliniana** Walt. Stem 7.5 to 15 cm. high, single from a small tuber: root leaves once or twice 3-parted or cleft: involucre 3-parted, its wedge-shaped divisions 3-cleft: sepals 10 to 20, oblong-linear, purple or whitish: achenes densely long-woolly, in an oblong head. (*A. decapetala* of Am. authors, not L.)—One of the earliest bloomers in the valleys of Texas, blossoming in February. Var. HETEROPHYLLA Torr. and Gray has the radical leaves 3-parted, 3-lobed, or almost undivided, the segments undivided or 3-lobed, roundish-oval, crenately serrate. (*A. heterophylla* Nutt. *A. decapetala*, var. *heterophylla* Britt. & Rusby)—Growing with the type.

4. MYOSURUS L. (MOUSE-TAIL.)

Very small annuals, with tufted narrowly linear spatulate root-leaves, naked 1-flowered scapes, spurred sepals, narrow petals, and numerous achenes crowded on a very long and slender spike-like receptacle.

1. **M. minimus** L. Flowers small and greenish: fruiting spike 2.5 to 5 cm. long.—Along the low bottoms of the Rio Grande, and probably other Texan rivers.

5. RANUNCULUS Tourn. (CROWFOOT. BUTTERCUP.)

Annual or perennial herbs, with alternate stem-leaves, solitary or corymbed yellow (rarely white) flowers, petals with a pit or scale at base inside, and a head of numerous mostly flattened and pointed akenes.

* *Achenes thin-walled, striate, in an oblong head: scapose and spreading by runners.*

1. **R. Cymbalaria** Pursh. Glabrous: scapes 2.5 to 15 cm. high, 1 to 7-flowered: leaves clustered at root and on joints of the runners, roundish-heart-shaped or kidney-shaped, crenate, long petioled.—Sandy bottoms of the Rio Grande and other streams.

* * *Achenes crustaceous or coriaceous, nerveless.*

+ *Growing in very wet places, with entire or barely toothed leaves, glabrous or nearly so.*

++ *Petals* 1 *to* 3 *or* 5, *not over* 2 *mm. long: stamens* 3 *to* 10.

2. **R. trachyspermus** Eng. Branching: lower leaves round-ovate, obtuse: upper ones lanceolate or linear-lanceolate: achenes compressed, obtuse, everywhere tuberculate, in an oblong or cylindrical head.—Prairies of western Texas.

3. **R. pusillus** Poir. Stem weak and loosely branching: lower leaves round-ovate or heart-shaped; upper ones oblong or lanceolate: achenes very turgid, smooth, or slightly papillose, in a globular head.—Marshy ground, especially in eastern Texas. A small form, with achenes more papillose-roughish, is var. LINDHEIMERI Gray (Proc. Am. Acad. 21. 367).

++ ++ *Petals* 5, *surpassing the calyx,* 2 *to* 6 *mm. long: stamens numerous.*

4. **R. oblongifolius** Ell. Stem often pubescent below, slender, 3 to 6 dm. high, diffusely branched above and many-flowered: leaves ovate or oblong, serrate or denticulate, uppermost linear: achenes minute, almost globular, and in a globular head. (*R. Texensis* Eng.)—Margins of ponds, etc. The abundant and conspicuous bright yellow flowers easily distinguish this from the other subaquatic species of Texas.

+ + *Terrestrial species, with variously cleft or divided leaves, and flattened smooth achenes surrounded by a firm or indurated margin.*

++ *Style short-subulate, stigmatic the whole length, mostly persistent.*

5. **R. repens** L. In habit and foliage closely resembling the next species: leaves frequently white-variegated or spotted.—Generally only in low waste grounds near

the coast, where it is probably naturalized from Europe, but occasionally occurring as an apparently indigenous plant in the interior.

++ ++ *Style long and attenuate, stigmatic at the tip, persistent or the upper part deciduous.*

= *Petals* 5 : *early root-leaves only* 3-*parted, later ones* 3 *to* 5-*foliolate.*

6. **R. septentrionalis** Poir. Low, hairy or nearly glabrous: stems ascending, or in wet ground some of them procumbent or forming runners: leaves 3-divided, the divisions all stalked, broadly wedge-shaped or ovate, unequally cleft and cut: petals obovate: achenes strongly margined, with a stout straightish beak. (*R. repens* of most American authors)—Moist or shady places.

7. **R. fascicularis** Muhl. Low, pubescent, with close-pressed silky hairs: root a cluster of thickened fleshy fibers: radical leaves appearing pinnate, the long-stalked terminal division remote from the (usually) sessile lateral ones and 3 to 5-divided or parted into oblong or linear lobes: petals (often 6 or 7) spatulate-oblong: achenes scarcely margined, with a slender, straight, or rather curved beak.—Our earliest "buttercup," and occurring throughout the State.

= = *Petals* 7 *to* 16 : *no creeping or procumbent stems.*

8. **R. macranthus** Scheele. Hirsute: stems erect or declining, 3 to 9 dm. long: leaves nearly as in *R. septentrionalis*, but many 5-divided: petals 8 to 25 mm. long, obovate to oblong: achenes numerous in a large head, ovate or orbicular, conspicuously thin-edged, at length with a rather short and broad flat-subulate beak.—Low ground throughout Texas, where it seems to be the most characteristic and common "buttercup."

6. AQUILEGIA Tourn. (Columbine.)

Perennial herbs, with ternately compound leaves and lobed leaflets, large and showy flowers terminating the branches, sepals and petals colored alike, the latter produced backward into large hollow spurs much longer than the sepals, and erect many-seeded pods.

1. **A. chrysantha** Gray. Tall, 6 to 12 dm. high, many-flowered: flowers bright yellow throughout: sepals lanceolate-oblong, hardly exceeding 2.5 cm. in length, a little longer and not broader than the limb of the petals: spurs very slender, over 5 cm. long.—In the mountains of western Texas, where it is the most abundant "columbine" and one of the showiest of flowers.

2. **A. longissima** Gray. Somewhat pubescent, with silky hairs, 9 dm. high: flowers "lake, white, and straw color:" sepals lanceolate, broadly spreading, 2.5 to 3 cm. long: petals narrower than in the last, spatulate, about 18 mm. long, the claw opening by a narrow orifice into the very slender elongated spur, which is 12 cm. long or more.—A Mexican columbine, but discovered by Dr. Havard in the upper cañons of the Chisos Mountains.

7. DELPHINIUM, Tourn. (Larkspur.)

Perennial herbs (our species), with palmately divided or cut leaves, a terminal raceme of blue flowers, 5 irregular petal-like sepals (the upper one prolonged into a spur), 4 irregular petals (the upper pair with long spurs which are included in the calyx spur), and many-seeded pods.

1. **D. Carolinianum** Walter. Stem 3 to 6 dm. high, slender, often softly pubescent: leaves deeply 3 to 5-parted, the divisions 2 to 3 times cleft; the lobes all narrowly linear: raceme strict: flowers sky-blue or whitish: spur ascending: pods erect. (*D. azureum* Mx.)—In the valleys of southern and western Texas.

MENISPERMACEÆ. (MOONSEED FAMILY.)

Woody climbers, with diœcious flowers, sepals and petals similar, stamens of the same number or more numerous, pistils 2 to 6 becoming drupes with a single flattened strongly incurved stone (in ours), and palmate or peltate alternate leaves without stipules.

1. COCCULUS DC.

Leaves palmate, flowers in axillary racemes or panicles, sepals, petals, and stamens 6, alternating in threes, anthers 4-celled, pistils 3 to 6 in the fertile flowers.

1. **C. Carolinus** DC. Minutely pubescent: leaves downy beneath, ovate or cordate, entire or sinuately or hastately lobed, variable in shape: flowers greenish: fruit red, as large as a small pea.—A very common climber along streams, with small edible red berries.

2. **C. diversifolius** DC. Glabrous throughout, or nearly so: leaves very variable, cordate, ovate, or oblong (sometimes even linear-oblong), mucronate. (*C. oblongifolius* DC.)—With the last, from which it can easily be distinguished by its usually narrower and glabrous leaves.

BERBERIDEÆ. (BARBERRY FAMILY.)

Shrubs or herbs, with sepals and petals usually in two rows of 3 each, stamens as many as the petals and opposite to them, anthers opening by valves, a single pistil becoming a berry or pod, and alternate leaves.

1. BERBERIS L. (BARBERRY.)

Shrubs with yellow flowers and wood, 1 to 9-foliolate leaves, flowers in drooping racemes, 6 obovate concave petals with a pair of glandular spots on the base of each, irritable stamens, a circular depressed stigma, and fruit a 1 to few-seeded berry.

* *Filaments with two salient teeth at apex: leaves comparatively thin, and spinulosely dentate.*

1. **B. repens** Lindl. A low shrub less than a foot high: leaflets 3 to 7, ovate, acute: racemes few, terminating the stems: berries globose, dark blue.—A common Rocky Mountain barberry, and found in the Gaudalupe Mountains of extreme western Texas.

* * *Filaments without appendages: leaves very coriaceous and rigid, with spinescent teeth.*

2. **B. trifoliolata** Moric. An evergreen shrub 6 to 15 dm. high, often forming large thickets: leaves glaucous, palmately trifoliate, the leaflets sinuately 3 to 5-lobed and spiny: berries red, aromatic and acid, about as large as peas.—On gravelly slopes and foothills from the Gulf coast to the Limpia Mountains. The red berries ripen in May, are often called "currants," and are used for tarts, jellies, etc.

3. **B. Fremonti** Torr. A shrub 15 to 30 dm. high: leaflets 2 or 3 pairs, the lowest pair close to the base of the petiole, repand-dentate and spiny: berries somewhat ovate, about the size of currants, dark blue.—A rare shrub in the mountain cañons of extreme western Texas.

4. **B. Swaseyi** Buckley. An evergreen shrub 6 to 9 dm. high: leaflets 5 to 9, the basal smallest, glaucous and reticulate veiny beneath, repand-dentate and spiny:

berries nearly globose, about 12 mm. in diameter, "subtransparent," yellowish-white tinged with red.—Discovered along the Perdinales River and not recorded since. Very near to the last species, but a smaller shrub, with usually more leaflets, and larger berries of a different color.

NYMPHÆACEÆ. (WATER-LILY FAMILY.)

Aquatic perennial herbs, with horizontal rootstocks, peltate (or sometimes cordate) leaves floating or emersed, and solitary axillary flowers.

* Sepals and petals each 3 (rarely 4): stamens 3 or 4: pistils (2 or 3) free and distinct: stems slender, leafy, coated with mucilage: flowers small.

1. **Cabomba.** Submersed leaves capillary-multifid.

* * Sepals and petals numerous in several rows, passing gradually into each other: stamens indefinitely numerous: pistils separately immersed in an obconical receptacle which is much enlarged and broadly top-shaped at maturity, the imbedded nut-like fruits resembling small acorns.

2. **Nelumbo.** Leaves centrally peltate and flowers large.

* * * Sepals 4 to 6, and petals numerous in many rows, either free from or adnate to the surface of the compound many-celled ovary, which contains numerous ovules attached over the whole inner face of the cells: fruit berry-like, with a firm rind.

3. **Castalia.** The large petals adnate to the ovary, and the stamens on its summit.

4. **Nymphæa.** The very small and stamen-like petals and stamens inserted under the ovary.

1. CABOMBA Aublet.

Slender mainly submersed plants, with opposite or whorled capillary-dissected leaves, a few floating alternate and centrally peltate ones, and single small flowers on long axillary peduncles.

1. **C. Caroliniana** Gray. Floating leaves linear-oblong or obovate, often with a basal notch: flowers 12 to 16 mm. broad, white with yellow spots at base.—Common in ponds and creeks.

2. NELUMBO Tourn. (SACRED BEAN.)

The only genus in the suborder, and sufficiently described in the generic key.

1. **N. lutea** Pers. Leaves usually raised high out of water, circular with the center depressed or cupped, 3 to 6 dm. in diameter: flowers pale yellow, 12.5 to 25 cm. broad. (*Nelumbium luteum* Willd.)—Along the lower Rio Grande. Called by various local names, such as "yellow nelumbo," "water chinquapin," etc., but none are as good as the original Ceylonese name "nelumbo."

3. CASTALIA Salisb. (WATER-NYMPH. WATER-LILY.)

Flowers very showy (white, pink, yellow, or blue), sepals 4 and green outside, petals numerous, the innermost gradually passing into stamens, the many-celled ovary concave at summit and with radiate stigmas, fruit depressed-globular, maturing under water.

1. **C. ampla** Salisb. Leaves large, cordate with a deep narrow sinus and a little peltate, sinuate-dentate, usually purple beneath, and the sepals with purple lines: petals white or creamy-white. (*Nymphæa ampla* DC.)—A Mexican species, but col-

lected along the Rio Grande by Wright in 1848, somewhere above Presidio de Rio Grande, and probably to be found on the Texan side.

2. **C. elegans** Greene. A slender species: leaves not as large as in the last, with broader sinus, entire or obscurely crenate, apt to be purple beneath, and the sepals with purple lines: petals acute or acuminate, tinged with blue. (*Nymphæa elegans* Hook.)—A beautiful blue water-lily, found in lagoons, etc., along the Brazos and Rio Grande, and presumably in intermediate localities.

3. **C. Mexicana**. Leaves more nearly round and thicker, with narrow sinus, entire or crenate, and conspicuously reticulated beneath: sepals not streaked, and petals light yellow, obtuse or acute. (*Nymphæa Mexicana* Zucc.)—In lagoons along the lower Rio Grande. This yellow water-lily is very near the *C. flava* Greene of Florida, of which it may be but a form.

4. NYMPHÆA Tourn. (YELLOW POND-LILY. SPATTER-DOCK.)

Flowers yellow, sepals 5 or 6 or more, colored (or partly green outside) and roundish or concave, petals numerous but small and stamen-like and inserted with the very numerous short stamens under the ovary, and not surpassing the disk-like radiate sessile stigma.

1. **N. advena** Ait. Floating or emersed and erect leaves thick, from roundish to ovate or oblong, the sinus open or closed or narrow; thin submersed leaves seldom present: sepals 6, unequal: petals shorter than the stamens: stigma 12 to 24-rayed, pale red: fruit ovate, about 3.7 cm. long. (*Nuphar advena* Ait. *f.*)—Common in still or stagnant waters.

PAPAVERACEÆ. (POPPY FAMILY.)

Herbs with milky or colored juice, regular 2 or 4-merous flowers, fugacious sepals, early deciduous showy petals, numerous stamens, a dry many-seeded pod-like fruit, and alternate leaves without stipules. Our two genera are annuals.

1. **Argemone.** Leaves simple, prickly-toothed: sepals distinct: capsule oblong or ovoid, prickly: juice yellow.

2. **Eschscholtzia.** Leaves finely dissected: sepals united into a narrow pointed cap: capsule linear, grooved: juice colorless.

1. ARGEMONE L. (PRICKLY POPPY.)

Stout glaucescent annuals, with sinuately pinnatifid prickly toothed leaves, large brightly colored flowers, 2 or 3 spinosely beaked sepals, 4 to 6 petals, and a prickly 1-celled pod opening at the top.

1. **A. platyceras** Link & Otto. Erect, 3 to 7.5 dm. high, hispid throughout or armed with rigid bristles or prickles: leaves 7.5 to 15 cm. long, the lower attenuate to a winged petiole, the upper sessile or auriculate-clasping: flowers white, 5 to 10 cm. in diameter. (*A. hispida* Gray).—Abundant in the valleys and along dry hillsides. Var. ROSEA Coulter has bright rose-purple petals: so far reported only from near the coast (vicinity of Corpus Christi) and from adjoining Mexico.

2. **A. Mexicana** L. Similar, but smoother, having leaves blotched with white, and petals usually yellow.—Dry hillsides and valleys throughout southern Texas and southward.

2. ESCHSCHOLTZIA Cham. (CALIFORNIA POPPY.)

Smooth slender glaucous annuals, with finely dissected leaves, bright orange or yellow flowers, sepals coherent into a pointed hood which speedily falls off entire from a dilated top-shaped receptacle, 4 petals, and elongated strongly 10-nerved pods which open their whole length.

1. **E. Mexicana** Greene. Dwarf and rather stout: leaves with crowded lobes: peduncles 5 to 25 cm. long, mostly scapiform: petals orange-yellow, broad, 12 to 25 mm. long. (*E. Douglasii*, var. *parvula* Gray.)—The most eastern species, barely entering extreme western Texas along the Rio Grande.

FUMARIACEÆ. (FUMITORY FAMILY.)

Delicate smooth herbs, with compound dissected leaves, irregular flowers, 2 small scale-like sepals, 4 petals in 2 pairs, the outer with spreading tips and one or both spurred or saccate at base, the inner with callous crested tips united over the stigma, 6 stamens in 2 sets of 3 each, and 1-celled few to many-seeded pods.

1. CORYDALIS Vent.

Ours are biennial leafy-stemmed pale plants, with yellow flowers in racemes, corolla 1-spurred at base, and pod with many-crested seeds.

* *Hood or saccate tip of outer petals crestless, the back at most carinate: flowers golden-yellow.*

1. **C. aurea** Willd. Commonly slender and with spreading pedicels: spur of corolla barely half the length of the body, somewhat decurved: pods pendulous or spreading, terete, torulose when dry: seeds turgid, with obtuse margin.—One of the early bloomers, on sandy ground throughout Texas. Var. OCCIDENTALIS Engelm. is more erect and cespitose, stouter, with rather larger flowers in a stouter erect raceme, spur almost as long as the body and commonly ascending, pods thicker, less torulose, mostly incurved, ascending on short spreading pedicels, and seeds less turgid, with acutish margins. (*C. montana* Eng.)—Southern and western Texas.

2. **C. curvisiliqua** Engelm. Habit of preceding variety, and with spiciform raceme of rather larger flowers, the spur as long as the body: pods quadrangular, incurved and ascending or straightish on very short and stout diverging pedicels: seeds turgid-lenticular, with acute margins.—Southern (near New Braunfels) and western Texas. Well marked by its tetragonal pods.

** *Hood or saccate tip of outer petals dorsally wing-crested: flowers pale yellow and short-spurred.*

3. **C. micrantha** Gray. Stems diffuse and slender: flowers short-pediceled and small-bracted, when full-developed 8 mm. long, with spur 2 to 4 mm. long: often with only cleistogamous and much smaller flowers, which are spurless and crestless, or only slightly crested: pods linear and slender, torulose, ascending on short or very short pedicels: seeds turgid, with obtuse margin. (*C. aurea* var. *micrantha* Engelm.)—A species of the Gulf States extending into Texas, possibly as far west as our eastern limit.

CRUCIFERÆ. (MUSTARD FAMILY.)

Herbs, with a pungent watery juice, alternate leaves without stipules, flowers (mostly bractless) in terminal racemes or corymbs, 4 sepals and petals, 6 (rarely 4 or 2) stamens (2 of which are shorter than

the remaining 4), and a long or short pod, which is usually 2 celled by a thin partition which bears the seeds, and from which the valves separate when ripe (in one group the pods indehiscent and continuous or jointed).—No attempt should be made to name the plants of this family without mature pods. The following generic key is artificial:

I. Pod 2-celled, dehiscent by 2 valves.

* Pod terete, turgid, or 4 angled.

\+ Pod long-linear (2.5 to 10 cm.): seeds in 1 row.

\+\+ Valves 1-nerved (except one species of *Thelypodium*).

1. **Thelypodium.** Flowers white or rose-color: anthers sagittate at base, curved: pod terete or nearly so: stigma mostly entire.

2. **Erysimum.** Flowers yellow: anthers sagittate, not coiled: pod 4-angled: stigma 2-lobed.

\+\+ \+\+ Valves 3-nerved.

3. **Dryopetalon.** Petals white and pinnately lobed: pod terete and very slender: leaves runcinate.

One species of Thelypodium may be looked for here.

\+ \+ Pod linear, shorter (mostly less than 2.5 cm. long), nearly terete: valves 1 to 3-nerved: seeds in 1 row (except in one species of *Sisymbrium*): flowers yellow or white.

4. **Brassica.** Pod with a long stout beak: seeds globose.

5. **Sisymbrium.** Pod short-pointed or obtuse: seeds oblong: mostly annuals, with toothed or finely dissected leaves.

\+ \+ \+ Pod oblong-cylindric to globose: valves strongly convex, nerveless: seeds in 2 rows.

6. **Nasturtium.** Pod oblong or short-linear: flowers white or yellow: smooth or somewhat hispid.

7. **Lesquerella.** Pod globose (in ours): flowers mostly yellow: with stellate often dense pubescence.

* * Pod flattened parallel to the broad partition.

\+ Pod short: flowers white or yellow.

8. **Draba.** Pod ovate to oblong or linear: low plants with racemose flowers.

\+ \+ Pod elongated: flowers white to purple.

9. **Arabis.** Anthers short, scarcely emarginate at base: petals with a flat blade and claw: calyx short or narrow, rarely colored.

10. **Streptanthus.** Anthers elongated, sagittate at base: petals more or less twisted or undulate, the claw channeled: calyx dilated and usually colored.

* * * Pod more or less flattened contrary to the narrow partition.

\+ Pod linear, becoming elongated (2.5 cm. or more) and more or less arcuate: flowers white or purple.

11. **Greggia.** Low stellately pubescent plants, with rather large flowers and pubescent pods.

\+ \+ Pod short, from oblong to orbicular.

\+\+ Flowers white.

12. **Capsella.** Pod obcordate or oval, many-seeded: nearly smooth or pubescent annuals.

13. **Thlaspi.** Pod cuneate-oblong, with sharply keeled valves, and cells 2 to 4-seeded: smooth alpine perennial with entire or toothed leaves.

14. **Lepidium.** Pod orbicular or obovate, 2-winged at the summit, and cells 1 or 2-seeded.

\+\+ \+\+ Flowers purple or yellow (rarely white).

PLATE I.



THELYPODIUM VASEYI, n. sp.

15. **Synthlipsis.** Pod oblong-elliptical, emarginate, with acutely keeled winged valves, and many seeds.

II. Pod of 2 indehiscent cells, separating at maturity from the persistent axis.

16. **Biscutella.** Cells flat, nearly orbicular: flowers rather large: stigma dilated or conical.

III. Pod indehiscent, continuous or of 1-celled joints.

17. **Cakile.** Pod short, 2 jointed: joints 1-seeded.

18. **Raphanus.** Pod elongated, several-seeded, continuous or constricted between the seeds.

1. THELYPODIUM Endl.

Mostly stout and coarse biennials, with white or rose-colored flowers, sagittate curved anthers, long-linear mostly terete pods with mostly 1-nerved valves and oblong seeds in one row. The cotyledons are more or less incumbent (◦||).

** Leaves all entire and attenuate at base.*

1. **T. linearifolium** Watson. Glabrous, 3 dm. or more high: leaves linear, the lowermost lanceolate, acutish, sessile, 3.5 to 5 cm. long: flowers showy, 12 mm. or less high, rose-purple: pods erect, on spreading pedicels, very slender, 5 to 6 cm. long, with very short style.—In the mountains of extreme western Texas.

** * Leaves toothed or pinnatifid (at least the radical ones).*

+ Leaves attenuate to a petiole.

2. **T. micranthum** Watson. More or less stellate-pubescent (or even quite glabrous), 3 to 9 dm. high: lower and stem leaves oblanceolate, sinuately pinnatifid, stellate-pubescent, the upper linear, entire, usually glabrous: flowers small, 2 to 3 mm. long: calyx glabrous or pubescent: pod slender, about 2.5 cm. long, sessile, with a very short thick style. (*T. longifolium* of most authors, but not of Watson, which seems to be a Mexican species.)—In the mountains of extreme western Texas.

3. **T. Wrightii** Gray. Glabrous or nearly so, 6 to 9 dm. high: leaves broadly lanceolate or lanceolate-oblong, all pinnatifid, repand-toothed, or denticulate: flowers larger and rose-color: pod slender, elongated, becoming 5 to 7.5 cm. or more long, very shortly stipitate.—In the mountains of extreme western Texas.

+ + Leaves auriculate clasping.

4. **T. Vaseyi** Coulter. Glaucous and glabrous throughout, 6 to 9 dm. high: leaves thin, oblanceolate, narrower above, entire or lower leaves somewhat repand-denticulate, clasping by roundish auricles: flowers very small, about 3 mm. high, white: pod very slender, becoming distant and ascending or erect, 3.5 to more than 5 cm. long. (See Plate I.)—Near Rio Grande City and also in the mountains of New Mexico. Doubtless to be found at intermediate stations in the neighborhood of the Rio Grande.

5. **T. auriculatum** Watson. Sparingly pilose, 6 to 9 dm. high: leaves lyrate-pinnatifid, somewhat runcinate, stem leaves with two round stipuliform clasping auricles remote from the lower proper lobes: flowers 6 mm. long, white: pod slender, widely spreading, or ascending on divaricate pedicels, 3.5 cm. long, with 3-nerved valves, but the midnerve more prominent (*Sisymbrium auriculatum* Gray).—In the mountains of extreme western Texas.

2. ERYSIMUM Tourn.

Mostly pubescent biennials, with leaves not clasping, yellow flowers, sagittate (but not coiled) anthers, linear 4-sided pods, oblong seeds in one row, and broadly lobed stigma.

1. **E. asperum** DC. (WESTERN WALL-FLOWER.) Minutety roughish hoary, stout, 3 to 6 dm. high, simple: leaves lanceolate to linear, entire or somewhat toothed: flowers crowded and showy, bright orange-yellow: petals orbicular, on very slender claws: pods nearly erect or widely spreading on short pedicels, elongated, 7.5 to 10 cm. long.—Common in western Texas, along streams, on rocky bluffs and foothills, and on the plains.

3. DRYOPETALON Gray.

An annual or biennial plant, with runcinate clustered radical leaves, few and smaller stem leaves, many-flowered racemes crowded even in fruit, white flowers with petals lobed like a common oak-leaf, and very slender terete pods with sessile stigma and 3-nerved valves.

1. **D. runcinatum** Gray. Stem 3 to 6 dm. high, branching, glabrous: radical leaves 7.5 to 10 cm. long, short-petioled, oblong or obovate, pubescent or villous, especially beneath; stem leaves successively smaller, not auriculate or dilated at base: petals 6 mm. long, the limb incisely pinnatifid into 5 or 7 lobes, being one of the few members of this family with lobed petals.—In the mountains of extreme western Texas and northern Mexico.

4. BRASSICA L.

The *B. Rapa* L., or common turnip, seems to have escaped extensively from cultivation in Texas. It should at once be recognized by its rough lyrate radical leaves and characteristic roots.

5. SISYMBRIUM Tourn.

Pubescent annuals or biennials, with toothed or finely dissected leaves, very small yellow or white flowers, linear nearly terete pods, and oblong seeds.

1. **S. canescens** Nutt. (TANSY MUSTARD.) Leaves twice pinnatifid, often hoary or downy, the divisions small and toothed: flowers yellowish: pods in long racemes, oblong-club-shaped or oblong-linear.- -Throughout Texas, and one of the most common of western mustards.

2. **S. diffusum** Gray. Diffusely and divergently branching and canescent with minute pubescence: leaves oblong, obtuse, attenuate at base, sinuate-dentate or pinnatifid: flowers white, the petals scarcely longer than the sepals: pods in short racemes, almost subulate, scarcely thicker than their pedicels, canescent, tipped with a manifest style.—Growing on rocky ledges in the mountains of extreme western Texas.

6. NASTURTIUM R. Br. (WATER-CRESS.)

Aquatic or marsh plants, usually glabrous, with commonly pinnate or pinnatifid leaves, yellow or white flowers, oblong-linear to globular pods, and strongly convex nerveless valves.

* *Petals white, twice the length of the calyx: pods linear: leaves pinnate: perennial.*

1. **N. officinale** R. Br. (TRUE WATER-CRESS.) Escaped from cultivation into brooks and ditches which it rapidly fills with its spreading and rooting stems: leaflets 3 to 11, roundish or oblong, nearly entire: pods 12 to 16 mm. long, ascending on slender widely spreading pedicels.—This native of Europe is said to have taken possession of most of the streams in western Texas.

** *Petals yellow or yellowish, seldom much longer than the sepals: leaves mostly pinnatifid: pods various: annual or biennial.*

2. **N. sessiliflorum** Nutt. Stems erect, rather simple: leaves obtusely incised or toothed, obovate or oblong: flowers minute, nearly sessile: pods elongated-oblong, thick.—Reported as yet only from northeastern and central Texas, but probably much more widely distributed.

3. **N. obtusum** Nutt. Stems much branched and diffusely spreading: leaves pinnately parted or divided, the divisions roundish and obtusely toothed or repand: flowers minute, short-pediceled: pods longer than the pedicels, varying from linear-oblong to short oval.—In wet sandy places throughout western and southern Texas.

4. **N. palustre** DC. (MARSH CRESS.) Stems erect, smooth to hirsute: leaves pinnately cleft or parted, or the upper laciniate, the lobes oblong and cut-toothed: pedicels about as long as the small flowers and mostly longer than the oblong or ovoid pods.—Western Texas, in wet places or in shallow water. The length of the pods is very variable.

5. **N. tanacetifolium** Hook. & Arn. Stems much branched and somewhat decumbent or diffuse: leaves smooth, pinnately divided, the segments sinuate-pinnatifid or toothed: flowers very small, on pedicels about one-third as long as the oblong-linear nearly erect pods.—Near Corpus Christi Bay (*Palmer*) and in northern Mexico.

7. LESQUERELLA Watson.

Low herbs, more or less hoary with stellate hairs or lepidote, entire or repandly toothed leaves, mostly yellow flowers, and turgid globose pods with nerveless valves and a hyaline septum nerved from apex to middle.—A large southwestern genus, formerly referred to the old world genus *Vesicaria.*

* *Not canescent or scarcely so, the pubescence loosely stellate: filaments somewhat dilated at base.*

+ *Stem-leaves auriculate: seeds margined.*

1. **L. grandiflora** Watson. Rather finely pubescent: lower leaves oblanceolate, sinuate or sinuate-pinnatifid, the upper oblong to oblong-lanceolate: petals obovate: filaments narrowed gradually above the base: pods glabrous, sessile, suberect on divaricate pedicels: style 2 mm. long or less.—Middle Texas, from the Gulf to Red River.

2. **L. auriculata** Watson, found a little east of our range, in Austin County, may be found further west. It is more hirsute, with spreading hairs, has narrower petals, filaments abruptly and broadly dilated at base, and pods slightly narrowed at base.

+ + *Leaves not auriculate: seeds marginless.*

3. **L. lasiocarpa** Watson. Finely pubescent: leaves coarsely toothed or pinnatifid, oblanceolate to oblong: petals obovate: pods hirsute, sessile, the stout style half as long.—From Trinity River to northern Mexico.

4. **L. densiflora** Watson. Finely pubescent and somewhat canescent: leaves entire or sparingly repand, oblanceolate: petals broadly spatulate: fruiting raceme often short and crowded: pods glabrous, substipitate, the very slender style as long.—Central Texas.

** *Canescent throughout with fine appressed and often compact stellate pubescence or lepidote: leaves not auriculate-clasping: filaments filiform: seeds marginless: pods glabrous* (or pubescent in var. of No. 9).

+ *Pods pendent on recurved pedicels, sessile.*

5. **L. purpurea** Watson. Biennial or perennial, the pubescence fine, scattered, or more or less compact on the lower leaves: leaves oblanceolate, the lower often coarsely repand or subpinnatifid: flowers white or rose-colored: pods rarely ascending, 3 to 6 mm. broad; style 2 mm. long or less.—Western Texas to Arizona and northern Mexico.

6. **L. recurvata** Watson. Annual, thinly pubescent: leaves entire, oblong-oblanceolate or spatulate, short: flowers yellow: pods 2 to 4 mm. broad, with style about as long.—Central Texas.

+ + *Pods suberect on ascending or curved pedicels.*

++ *Annuals: pods often stipitate.*

7. **L. Lindheimeri** Watson. Pubescence very fine or compactly lepidote: stems erect or ascending: leaves oblong to narrowly oblanceolate, repand or dentate: pods 4 mm. broad, with a short stipe and style rather shorter than the pod; cells 6 to 8-ovuled.—On "black stiff prairie soil" on the lower Guadalupe (Victoria County).

8. **L. gracilis** Watson. Pubescence very fine, usually scanty: stems slender and usually lax: leaves narrowly oblanceolate, entire or sparingly repand: pods stipitate, 3 to 4 mm. broad, on slender often elongated pedicels, and with style nearly or quite as long; cells 4 to 6-ovuled.—From the lower Rio Grande northward through central Texas. Var. SESSILIS Watson, with sessile pods, is found in western Texas.

9. **L. Gordoni** Watson. Often low, pubescence somewhat coarser: leaves linear-oblanceolate, entire or rarely repand: pods stipitate, 4 mm. broad, with shorter style; cells 6-ovuled.—An early bloomer in the valleys of southern and western Texas. Var. SESSILIS Watson has pods sessile or nearly so and often pubescent.—With the species.

++ *Biennials or perennials: pods sessile or nearly so, on ascending or spreading pedicels.*

= *Pubescence evidently stellate.*

10. **L. Engelmanni** Watson. Pubescence dense, caudex usually much branched: stems often dwarf, usually simple: leaves ovate and petiolate to linear-oblanceolate, or the upper linear-spatulate, entire or slightly repand: raceme usually short: pods substipitate, 6 mm. broad, style as long.—Central and western Texas. Very variable in its leaves, some extreme forms having very narrow and entire leaves and others broad and sinuate-dentate leaves.

11. **L. argyrea** Watson. Pubescence more or less dense, caudex often simple: leafy stems decumbent or procumbent: leaves ovate and petiolate to narrowly oblanceolate, entire or repand: petals often turning purple: pods sessile, in a long raceme, 4 to 5 mm. broad, style as long or shorter.—From the lower Rio Grande to the mountains of western Texas.

= = *Pubescence compactly lepidote, rarely evidently stellate.*

12. **L. Fendleri** Watson. Caudex much branched, often dwarf, stems simple: leaves numerous, entire, mostly narrowly linear-oblanceolate: pods in a dense usually short raceme, 4 to 6 mm. long, sometimes ellipsoidal or acutish, with style usually as long.—Western Texas.

8. DRABA Dill. (WHITLOW-GRASS.)

Low herbs, with stellate pubescence, entire or toothed leaves, small white flowers (in ours), and short ovate to oblong or linear pods flattened parallel to the broad partition.—Our species belong to § DRABELLA, and are winter annuals, with short leafy stems, oblong or obovate hairy sessile leaves, and no style.

1. **D. Caroliniana** Walt., var. MICRANTHA Gray. Branches often decumbent, the peduncles scape-like: leaves entire: pedicels clustered or approximate: flowers very small: pods linear, subappressed-hispid.—Stony places, western Texas.

2. **D. cuneifolia** Nutt. Leaves cuneate-obovate to oblanceolate, coarsely few-toothed or entire: pedicels more remotely racemose and raceme pedunculate: pods linear-oblong, usually acutish, shortly subappressed-hispid.—One of the earliest bloomers in the valleys of southern and western Texas. Var. PLATYCARPA Watson has oblcng-oval usually obtuse pods.—With the type, and perhaps the commoner form.

9. ARABIS L. (Rock cress.)

Low or tall herbs, with white or purple flowers, short anthers scarcely emarginate at base, petals with flat blade and claw, and elongated pods flattened parallel to the broad partition.

1. **A. Ludoviciana** Meyer. Low, diffuse or spreading from the base, nearly glabrous: leaves all pinnately parted into oblong or linear few-toothed or entire divisions, those of the lower leaves numerous: flowers small, white: pods rather broadly linear, spreading, flat; seeds winged.—One of the earliest bloomers in the valleys of southern and western Texas.

2. **A. petiolaris** Gray. Mostly simple, 6 to 9 dm. high, wholly glabrous except the base of the stem and the lowest leaves: leaves ample, 7.5 to 17.5 cm. long, on petioles about half as long; the lower with a hastate-lanceolate or triangular outline; the upper broadly lanceolate, with a truncate, rounded, or even tapering base, all more or less lyrately cut or lobed (or the uppermost entire): flowers white, tinged with purple: pods numerous, broadly linear, 7.5 cm. long; seeds very broadly winged.—In thickets and shady woods from the Colorado to the Rio Grande and to the mountains of western Texas.

10. STREPTANTHUS Nutt.

Mostly glabrous and glaucous annuals or biennials, with cordate or sagittate-clasping toothed or entire leaves, broad and usually colored sepals, twisted or undulate petals (rose-purple in ours), elongated sagittate anthers, and elongated pods flattened parallel to the broad partition.

* *Petals with a broad and ample plane blade.*

1. **S. bracteatus** Gray. Lower leaves from entire to lyrate-pinnatifid; all deeply cordate-clasping, merging gradually into the persistent bracts which subtend all the flowers: pods elongated-linear, 15 cm. long or more, spreading.—Sand bars of the Colorado and Guadalupe, and undoubtedly along other rivers of southern and western Texas.

2. **S. platycarpus** Gray. Leaves clasping by rather short and rounded lobes, the lower and radical ones lyrate-pinnatifid: flowers (or all but the lowest) bractless: pods oblong-linear, 5 to 6 mm. broad and 5 to 7.5 cm. long, very flat, erect.—On stony hills, valleys of the Pecos and San Antonio, and doubtless other rivers of southwestern Texas.

* * *Petals undulate-crisped, the blade narrow or attenuate, scarcely if at all broader than the claw.*

3. **S. carinatus** Wright. Radical and lower stem leaves runcinate, the upper ones sagittate-clasping, all very glaucous: calyx urceolate and carinately 5-saccate: filaments distinct: pedicels of the flowers and of the broadly linear and flat (half-grown) pods erect.—Cañons and rocky hills near the Rio Grande in extreme western Texas, extending into New Mexico and northern Mexico.

4. **S. hyacinthoides** Hook. Cauline leaves oblong-linear, acuminate, scarcely sagittate-clasping or not at all: one pair of the longer filaments connate: pods narrow.—Indian Territory, and extending into northeastern Texas, probably within our range at the north.

11. GREGGIA Gray.

Low stellately pubescent plants, with rather large white or purple flowers, sagittate coiled anthers (at maturity), and linear elongated

more or less curved pubescent pods which are flattened contrary to the narrow partition.

1. **G. camporum** Gray. Low and suffruticose: leaves spatulate, rather broad (sometimes becoming as much as 2.5 cm.), repand to sinuate-dentate or even pinnatifid, tapering to a petiole: pods narrowly linear, becoming elongated (2.5 cm. or more) and arcuate at maturity, tipped by a conspicuous style.—High prairies and limestone hills in mountains of extreme western Texas. Var. ANGUSTIFOLIA Coulter has very narrow leaves but 2 to 4 mm. broad, mostly entire but occasionally sinuate-toothed.—Mountains of western Texas.

2. **G. linearifolia** Watson. With the habit of the last, but the leaves linear, attenuate at base, entire, 2.5 to 5 cm. long: pods narrower, 12 mm. long or less, and not 2 mm. broad: style shorter.—Bluffs of the Rio Grande and the Pecos and their tributaries in extreme western Texas.

12. CAPSELLA Medic.

Smooth or pubescent annuals, with abundant small white flowers, toothed or pinnatifid leaves, and short obcordate or oval many-seeded pods which are flattened contrary to the narrow partition.—The genus to which belongs the exceedingly common "shepherd's purse" (*C. Bursa-pastoris* Mœnch.), which must have found its way into Texas, though not yet reported.

1. **C. pubens** Watson. From 3 to 5 dm. high including the fully developed fruiting racemes which are from 15 to 25 cm. long, rather stout and strict and loaded with pods: leaves glabrate, lanceolate or oblong, somewhat dentate, the lower inclined to be more sinuate-toothed and spatulate: racemes subcinereous with stellate pubescence: pods oval, inflated, cinereous with stellate pubescence, tipped by a short style.—In wet ground from the Pecos to the Rio Grande.

13. THLASPI L. (PENNYCRESS.)

Low glabrous herbs, with simple stems, rosulate entire or toothed lower leaves, oblong auricled and clasping upper ones, white or pinkish flowers, and cuneate-oblong usually emarginate pods with sharply keeled valves.

1. **T. alpestre** L. Radical leaves petioled, ovate or obovate: pods acutely margined but not winged.—In the mountains of extreme western Texas.

14. LEPIDIUM Tourn. (PEPPERWORT. PEPPERGRASS.)

Annuals or biennials, with pinnatifid or toothed or entire leaves tapering at base, small white or greenish flowers, and roundish much flattened pods, 2-winged at summit, and with seeds solitary in each cell.—The wings at summit give the pod the appearance of being notched.

* *Petals conspicuous: stamens* 6.

1. **L. alyssoides** Gray. Stems diffuse, branches minutely puberulent: leaves narrowly linear, mucronulate, very entire, lowest often pinnately lobed: racemes dense, corymbose: pods ovate, shortly winged above with acutish teeth, scarcely emarginate, with a very short style.—In the valleys of the Rio Grande and its western tributaries.

** *Petals very minute or wanting: stamens* 2 *or* 4.

2. **L. intermedium** Gray. Erect and branching, puberulent or glabrous: lower leaves toothed or pinnatifid, upper often entire, oblanceolate or linear: stamens 2:

pods smooth or rarely puberulent, very shortly winged with somewhat divergent obtuse teeth, on spreading pedicels.—Ravines throughout southern and western Texas.

3. **L. sordidum** Gray. Low, with stems diffusely branching from the base, branches somewhat granulose-viscid: stem leaves small, spatulate, incised-pinnatifid, glabrous: racemes numerous, elongated and dense in fruit: flowers very small: stamens 4: pods ovate, emarginate, winged, smooth, as long as the erect crowded pedicels.—In mountain valleys of western Texas.

4. **L. lasiocarpum** Nutt. Low, 15 cm. or less high, pubescent throughout with short spreading hairs: stem leaves spatulate, dentate or incised, the lowest and radical ones often pinnatifid: petals wanting: stamens 2: the straight pedicels stout and much flattened, shorter than the pods which are round, hispidulous, and emarginate at apex with a narrow sinus.—In alluvial and sandy soil, western Texas. This species includes *L. Wrightii* Gray. Associated with it is var. TENUIPES Watson, which is taller, more slender, less pubescent, with narrower and more slender pedicels, which are as long as or exceed the glabrous pod.

15. SYNTHLIPSIS Gray.

Diffusely branching herbs, more or less canescent with stellate pubescence, with pinnatifid leaves, purple or yellow (rarely white) flowers, and oblong-elliptical emarginate many-seeded pods flattened contrary to the narrow partition and with acutely keeled winged valves.

1. **S. Greggii** Gray. Canescent or subcinereous: leaves obovate or oblong, coarsely sinuate-toothed or pinnatifid, mostly narrowed into a petiole: flowers rose-color or white: pods elliptical or oval, 8 to 14 mm. long, canescent, strongly emarginate, the compressed acutely keeled valves margined and produced at apex.—Hillsides along the lower Rio Grande.

2. **S. Berlandieri** Gray, var. HISPIDA Watson. More or less villous, with little stellate pubescence: leaves oblong, laciniately pinnatifid and toothed, those of the stem sessile: flowers yellow: ovary densely hairy, the pod more loosely so, orbicular, 6 mm. in diameter, slightly retuse at apex (or at both ends), the valves barely acute on the back, which is not produced into a margin at apex.—Near Corpus Christi Bay and Brazos Santiago; extending into Mexico with the type.

16. BISCUTELLA L.

Erect hispid or tomentose branching herbs, with entire or pinnatifid leaves, yellowish or white flowers (in ours), and laterally flattened pods in which the 1-seeded cells are indehiscent and nearly orbicular, separating at maturity from the persistent axis.

1. **B. Wislizeni** Watson. Leaves ovate-lanceolate, tapering into short petioles, repand-dentate: pedicels filiform, 10 to 16 mm. long, longer than flower or fruit; flowers about 6 mm. in diameter: pods 10 to 12 mm. in width and about half as high, broadly truncate above, deeply cordate at base: stigma conical.—Prairies and sandy banks along the upper Rio Grande and the "Staked Plains." Dr. Havard aptly speaks of this as "spectacle-fruited." It is the *Dithyræa Wislizeni* Engelm.

17. CAKILE Tourn.

Fleshy sea-side annuals, with pinnatifid or lobed leaves, white or purple flowers in racemes opposite the leaves, and 2-jointed pods, the joints 1-seeded.

1. **C. maritima** Scop., var. ÆQUALIS Chapman. Stem much branched and prostrate: leaves oblong, irregularly toothed or pinnatifid, narrowed into a petiole: pods linear, 8-ribbed, the upper joint ovate-lanceolate, slightly compressed, beaked, a third longer than the lower cylindrical one.—Drifting sands along the coast, near Brazos Santiago. A species common in Florida and the West Indies.

18. RAPHANUS L. (RADISH.)

Coarse introduced annuals or biennials, with elongated several-seeded beaked pods, which are either continuous or constricted between the seeds.

1. **R. Raphanistrum** L. is known as "wild radish," and is becoming a troublesome weed. It may be known by its yellow petals, which are veined and become whitish or purplish, and its necklace-shaped pods, which are long-beaked, 1 to 9-seeded, and break easily between the seeds.—Said to be abundantly naturalized along the lower Rio Grande.

CAPPARIDEÆ. (CAPER FAMILY.)

Ours are herbs, with alternate mostly compound leaves, racemose flowers, 4 sepals and petals, 6 or more (nearly equal) stamens, a single style and stigma, and a 1 or 2-celled pod with kidney-shaped seeds.

* Fruit pod-like, 1-celled, several to many-seeded.

1. **Cleomella.** Stamens 6: petals yellow, entire: pod very short, rhomboidal, long-stipitate.

2. **Cristatella.** Stamens 6 to 14: petals white or yellow, fimbriate-toothed or laciniate: pod linear, stipitate.

3. **Polanisia.** Stamens 8 to 32: petals whitish or purple, notched at apex: pod elongated, shortly stipitate or not at all.

* * Fruit didymous, 2-celled, the cells separating as small 1-seeded nutlets.

4. **Wislizenia.** Stamens 6: flowers yellow: nutlets open at the scar.

1. CLEOMELLA DC.

Erect branching annuals, with 3-foliolate leaves, small yellow racemose flowers, 6 stamens, and stipitate few-seeded rhomboidal pods with more or less distended or even conical valves.

1. **C. angustifolia** Torr. Glabrous, 3 to 6 dm. high: leaflets and simple bracts linear to linear-lanceolate, acute: valves of the rhomboidal pod bluntly conical: stipe shorter than the pedicel.—In gravelly soil and on high prairies, reported from near Houston to extreme western Texas.

2. CRISTATELLA Nutt.

Minutely viscid-glandular annuals, with 3-foliolate leaves and linear leaflets, fimbriate-toothed white or yellow petals, 6 to 14 stamens, and linear stipitate pods.

1. **C. Jamesii** Torr. & Gray. Strict, somewhat branched, 3 dm. or more high: leaflets longer than the petiole: sepals obtuse: petals pale yellow, the blade of the lower ones palmately fimbriate-cleft.—Gravelly soil, between the Brazos and Pecos Rivers: said to be common on the "Staked Plains."

2. **C. erosa** Nutt. Rather slender and branching: sepals acute: petals white, the blade of the lower ones laciniately parted: flowers larger and pods longer than in the last.—At Lamar, on Copano Bay, and northeastward through Texas to Arkansas.

3. POLANISIA Raf.

Fetid annuals with glandular or clammy hairs, petioled mostly 3-foliolate leaves with lanceolate leaflets, rose-colored or white flowers in leafy-bracted racemes, 8 to 32 stamens, and elongated many-seeded pods erect on spreading pedicels.

1. **P. trachysperma** Torr. & Gray. Erect, 1.5 to 6 dm. high: leaflets 1 to 5 cm. long, acute, about equaling the petioles: petals 6 to 10 mm. long: stamens 12 to 16: style 4 to 8 mm. long: pod 2.5 to 6.2 cm. long, very rarely on a short slender stipe: seeds finely pitted and often warty.—In sandy soil, apparently common throughout the State.

2. **P. uniglandulosa** DC. Very near the last, but differs in its much larger flowers, greatly elongated style, larger pods upon a stout terete stipe, and smooth seeds.—A Mexican and New Mexican species, but reported on the hills near El Paso.

4. WISLIZENIA Engelm.

Smooth erect branching annuals, with (in ours) 3-foliolate leaves, yellow racemose flowers, 6 stamens, elongated style, and didymous pods with nutlike nerved or reticulated cells.

1. **W. refracta** Engelm. Widely branching, 3 to 6 dm. high: leaflets oblanceolate to obovate, 10 to 18 mm. long: flowers in dense racemes: petals 2 mm. long: stamens and ovary exserted: fruit 3 mm. broad or more, the divergent obovate reticulated valves separated by a perforated partition: stipe 4 to 6 mm. long, strongly refracted upon the rather longer pedicel.—Alluvial soils near El Paso.

RESEDACEÆ. (Mignonette Family.)

Herbs, with alternate leaves, glands for stipules, terminal bracteate racemes or spikes of small flowers, which are irregular and unsymmetrical, stamens not covered in bud, and a 1-celled 3 to 6-beaked pod.—An Old World family, containing the well-known "dyer's weed" or "weld" (*Reseda Luteola* L.), and the common "sweet mignonette" (*R. odorata* L.). Our only genus is

1. OLIGOMERIS Cambess.

Low branching herbs, with numerous linear entire leaves, small white flowers in terminal spikes, 4 lateral sepals, 2 entire or lobed petals, 3 to 8 stamens, and a 4-angled 4-beaked pod opening at the summit.

1. **O. subulata** Boiss. Annual, glabrous, 12.5 to 25 cm. high, branching from the root: leaves somewhat succulent, often fascicled, 12 to 25 mm. long: pods in long loose spikes, depressed globose, about 3 mm. in diameter.—Common along the Rio Grande.

CISTINEÆ. (Rock-rose Family.)

Low shrubs or herbs, with simple and mostly entire opposite or alternate leaves, regular flowers, 5 unequal sepals, 3 or 5 petals, distinct and mostly indefinite stamens, and a 1-celled 3 to 5-valved pod.

1. **Helianthemum.** Petals 5, fugacious (or none): stigma nearly sessile: stamens and ovules numerous in the petal-bearing flowers.

2. **Lechea.** Petals 3, persistent: stamens 3 to 12: style none: pod partly 3-celled, few-seeded.

1. HELIANTHEMUM Tourn. (Rock-rose.)

Low branching herbs or somewhat woody, with yellow often showy flowers (opening only once, in sunshine), fugacious petals, 3-lobed stigma, and a strictly 1-celled capsule.—Flowers mostly of two kinds, viz, earlier ones with large petals and many-seeded pods, and later ones with small petals (or none) and much smaller few-seeded pods.

1. **H. Carolinianum** Michx. Nearly herbaceous, 12.5 to 30 cm. high, hirsute: leaves oblong or oval, slightly denticulate, the lower ones crowded and obovate: flowers on long solitary peduncles, axillary and terminal: sepals villous-hirsute, the outer ones linear and shorter, the inner ovate-lanceolate, acuminate and much longer than the pod.—In dry soils, western Texas.

2. **H. capitatum** Nutt. Stem 2 to 3 dm. high, minutely canescent: leaves linear or linear-oblong, tomentose-canescent beneath (as are also sepals and peduncles): petaliferous flowers small, terminating the slender stem and numerous short branches; secondary flowers very small, clustered at first in lateral glomerate nearly sessile clusters.—In eastern Texas and extending within our range.

H. Canadense Mx., the common "frost-weed" of the Atlantic States, occurs in eastern Texas and may be found within our eastern limit. It much resembles *H. capitatum*, but the petaliferous flowers are much larger and the whole plant more hoary.

2. LECHEA Kalm. (Pinweed.)

Perennial herbs, with very small greenish or purplish flowers, 5 unequal sepals (2 small and bract-like, 3 concave or boat-shaped), 3 withering-persistent petals, 3 plumose stigmas, and a globular partly 3-celled few-seeded pod.

1. **L. Drummondii** Torr. & Gray. Decumbent and much branched at base, slightly pubescent: leaves linear-subulate, scattered: racemes filiform, terminating the numerous branches: flowers unilateral, on capillary spreading and at length reflexed pedicels.—Dry places, reported as yet only as far west as Gillespie County.

VIOLARIEÆ. (Violet Family.)

Herbs, with (mostly) alternate stipulate leaves, 5 persistent sepals, a somewhat irregular 1-spurred corolla of 5 petals, 5 stamens conniving over the pistil, usually club-shaped style with stigma turned to one side, and a 1-celled 3-valved many-seeded pod.

1. **Viola.** Sepals auricled: lower petals spurred: stamens distinct, the 2 lower spurred.

2. **Ionidium.** Sepals not auricled: petals very unequal: filaments distinct, the anthers connivent.

1. VIOLA Tourn. (Violet. Heart's-ease.)

Mostly perennials, with alternate leaves, foliaceous persistent stipules, 1-flowered axillary peduncles, auricled sepals, and a spurred lower petal containing spurs from the two lower stamens.—Besides the conspicuous flowers, later and much smaller ones are usually produced usually concealed under the leaves, which never open or develop petals, but are very fertile (cleistogamous flowers). Very few violets

occur in Texas, and those included here are probably (with one exception) only to be found in that part of Texas east of our range.

** Stipules never leaf-like, the lower more or less scarious.*

+ Stemless, the leaves and scapes directly from a rootstock or from runners.

1. **V. palmata** L., var. CUCULLATA Gray. (COMMON BLUE VIOLET.) Rootstock fleshy and thickened: glabrous to villous-pubescent: leaves roundish-cordate or reniform, crenate, the sides rolled inward when young: flowers variable in size and color, from deep violet-blue or purple to white: lateral petals bearded. (*V. cucullata* Ait.)—In low ground, common almost everywhere, and reported within our range as far west as Gillespie County.

2. **V. lanceolata** L. Rootstock long and filiform, extensively creeping: smooth; leaves lanceolate, erect, blunt, tapering into a long margined petiole, almost entire: flowers white: petals beardless.—A common northeastern violet and extending into Texas, where its western limit is unknown.

+ + Leafy-stemmed.

3. **V. canina** L., var. MULTICAULIS Gray. Depressed and stoloniferous, mostly glabrous: leaves small, suborbicular to reniform; stipules lanceolate, fringe-toothed: flowers mostly cleistogamous, but when developed the petals are light violet, the lateral ones slightly bearded.—A violet of the south Atlantic States and extending into Texas.

** * Stipules large and leaf-like, lyrate-pinnatifid.*

4. **V. tricolor** L., var. ARVENSIS DC. (PANSY. HEART'S-EASE.) Stem angled and branched, leafy throughout: leaves roundish, oval, or heart-shaped, crenate or entire: petals variable in color or variegated (yellow, white, blue, or purple), shorter or little longer than the calyx.—Dry or sandy soil, and apparently indigenous, at least in Texas. It is the wild representative of the common garden pansy.

2. IONIDIUM Vent.

Branching and leafy perennials, with alternate and opposite leaves, small axillary flowers, sepals not auricled at base, very unequal petals (the two upper shorter), distinct filaments, and merely connivent anthers.

1. **I. polygalæfolium** Vent. Stems low, from a woody base: leaves linear to oblanceolate, or the lower obovate, entire, the stipules leaf-like or small or none: flowers solitary, nodding, 4 mm. long, white. (*I. lineare* Torr.)—An apparently common species throughout Texas, varying greatly in its leaves, stipules, and pubescence, and including several forms that were formerly considered distinct species and varieties.

BIXINEÆ.

Trees or shrubs, with alternate leaves (palmately lobed in ours), showy flowers in terminal panicles, 5 sepals and petals, indefinite unequal stamens, anthers opening by chinks near the apex, single style, and a 1 to 3-celled pod.

1. AMOREUXIA Moç. & Sess.

Shrubs, with showy yellow flowers in few-flowered panicles, completely 3 celled and loculicidal many-seeded pods, the valves coriaceous and separating from the endocarp and scarious partitions, and obovoid seeds with a membranaceous loose fragile outer integument and a bony inner one.

1. **A. Wrightii** Gray. Leaves 5-parted (or the lower lobes incised on the lower margin), the segments obovate, cuneate at base: fruit pendulous, oblong-ovoid, about 5 cm. long: seeds obovoid, straight, the external loose arilliform integument smooth. —A very remarkable and beautiful plant, on the hills of southern and western Texas.

POLYGALEÆ. (MILKWORT FAMILY.)

Herbs or shrubs, with simple entire leaves, no stipules, remarkable for the papilionaceous-looking flowers (but not papilionaceous in structure), monadelphous or diadelphous stamens coherent with the petals, and 1-celled anthers opening at top by a pore or chink.

1. **Polygala.** Petals 3, united to each other and to the stamen-tube: stamens 6 to 8: pod flat and 2-celled.

2. **Krameria.** Petals 5: stamens 4: pod globose, spinose or muricate, indehiscent, 1-seeded.

1. POLYGALA Tourn. (MILKWORT.)

Herbaceous or somewhat shrubby plants, with racemose or spicate flowers, 5 very unequal sepals (the 2 lateral ones large and petal-like, called *wings*), 3 petals united to each other and the stamen-tube (the middle one, or *keel*, hooded above and often crested or beaked), 6 to 8 stamens with filaments united below into a split sheath, 1-celled often cup-shaped anthers opening at apex, membranaceous 2-celled pods flattened contrary to the narrow partition and rounded and often notched above, and seeds with an excrescence (*caruncle*) at the hilum.

* *Leaves all narrowly linear or subulate: flowers white or greenish-white.*

1. **P. scoparia** HBK., var. MULTICAULIS Gray. The slender numerous stems fascicled from a woody base, much angled: leaves linear-subulate, thickish, rigid, pointed, 6 to 10 mm. long, and scarcely 1 mm. wide: flowers greenish-white, in lax spikes or racemes: wings obovate; crest of four 2-parted thickish filiform processes which are simple or 2-lobed: caruncle narrow, with 2 linear lobes, half the length of the cylindrical hairy seed.—In the mountains near El Paso, and also reported as far east as Coryell County.

2. **P. hemipterocarpa** Gray. Stems erect, sparingly branched above, slender, striate-angled: leaves mostly erect, rather rigid, acute, 14 to 20 mm. long, or the lower cauline ones much shorter, hardly 1 mm. wide: flowers white, in rather dense racemes, with subulate-lanceolate very caducous bracts: wings and crest nearly as in the last: pod with one cell larger and appendaged with a crenulate double wing, dehiscent between the lamellæ and the valves outspread and forming a broad obcordate wing about the other indehiscent unappendaged cell: caruncle and hirsute seed as in the last.—A north Mexican species, but reported from rocky hills in extreme western Texas.

3. **P. alba** Nutt. Stems several from a hard rootstock: leaves narrowly linear, acute, 6 to 24 mm. long: flowers white, in long-pedunculate close racemes: wings oblong-obovate; crest small: lobes of the caruncle half as long as the oblong-obovate appressed-silky seed.—Sandy soil, throughout Texas; apparently the most common *Polygala*.

4. **P. verticillata** L. Slender and much-branched: leaves linear, acute, those of the stem whorled, of the branches scattered: flowers greenish-white (or barely tinged with purple), in a peduncled usually short and dense spike or raceme: wings round, clawed: lobes of the caruncle half as long as the seed.—A common northern species of dry soils, and reported from Tom Green County.

** *Leaves lanceolate to oblong or ovate: flowers (so far as known) not white.*

5. **P. puberula** Gray. With short cinereous pubescence: stems erect from a woody base: leaves linear or lanceolate or the lowest oblong, mucronate, short-petioled: flowers "purple," pendulous in elongated loose racemes: wings broadly obovate and ciliolate; no crest: pods oval, smooth, slightly ciliate on the margins: a somewhat lacerate or lobed scarious short bonnet-shaped caruncle capping the summit of the retrorsely-hairy seed.—In the mountains of extreme western Texas and reported as far east as Coleman County and the Leona River.

6. **P. macradenia** Gray. Low and shrubby, cinereous with soft pubescence, and thickly beset with leaves which are oblong or oblong-lanceolate, obtuse, nerveless, pellucid punctate with conspicuous glands, and but 4 to 6 mm. long: flowers solitary, extra-axillary, short-peduncled: no crest: pod ovate, cinereous and often dotted with glands: seed very villous and capped by a short pubescent caruncle.—On stony hills, reported from scattered stations throughout southern and western Texas.

7. **P. ovalifolia** DC. Soft pubescent, diffusely branching from a woody base: leaves thickish, broadly ovate or ovate-oblong, obtuse, or acutish above, with revolute margins, 10 to 20 mm. long: flowers greenish-yellow, in short loose-flowered racemes: wings oblong, pubescent; the ample conspicuous keel with no crest: pod nearly round, with smooth face and conspicuously ciliate margins: caruncle short and bonnet-shaped.—Hills of southern and western Texas.

8. **P. Lindheimeri** Gray. Pubescent: stems branching, a little woody at base, from a long woody red root: leaves coriaceous, minutely pubescent but shining, conspicuously reticulated on both surfaces, the lowest obovate, becoming ovate, oblong, or lanceolate above, 10 to 20 mm. long: racemes loosely flowered, with a zigzag rhachis and 3 small persistent bracts at each joint: keel with a conspicuous straight spur in place of a crest: pod elliptical, puberulent: caruncle 2-spurred, half as long as the sericeous seed.—Rocky hills and cliffs of southern and western Texas.

2. KRAMERIA Linn.

Small shrubs or woody perennial herbs, silky-tomentose and often prostrate, with alternate and entire narrow leaves, solitary purplish flowers on axillary bracted peduncles, 5 more or less petal-like sepals, 5 unequal petals (3 upper long-clawed and approximate, 2 lower short, sessile and fleshy), 4 stamens united below, 2-celled anthers dehiscing obliquely near the apex, and a globose coriaceous indehiscent spinose or muricate 1-seeded pod.

1. **K. parvifolia** Benth. A rigid diffusely branched shrub 3 to 6 dm. high, with silky appressed pubescence, the slender divaricate branchlets often spinose: leaves linear, 8 to 16 mm. long, the lower obtuse, the upper spiny-tipped: flowers 4 to 8 mm. long: peduncles with 2 or 3 pairs of leaf-like bracts: the ovate silky sepals purple within: fruit with numerous very slender prickles retrorsely barbed their whole length, cordate-globose, 8 mm. long.—Common in southern and western Texas.

2. **K. ramosissima** Watson. Like the last: shrubby and divaricately much branched, canescent: leaves linear-lanceolate, 2 to 4 mm. long, often fascicled in the axils: flowers "light maroon": fruit ovate, silky-pubescent, with slender very acute naked spines about 1 mm. long. (*K. parvifolia*, var. *ramosissima* Gray.)—Common in southern and western Texas.

3. **K. canescens** Gray. Similar in habit to the two preceding species: pubescence short and tomentose: leaves lanceolate to linear: peduncles shorter, 2-bracted: sepals lanceolate, the smaller one linear: fruit ovate-globose, tipped with the stout curved style, and armed with slender prickles barbed at apex.—Common in southern and western Texas, and said to be particularly abundant in the "Great Bend" of the

Rio Grande. "Called 'chacate' by the Mexicans, who use an infusion of the bark of the root to dye leather brownish-red" (Havard).

4. **K. secundiflora** DC. A decumbent silky-villous herb only ligneous at base: leaves narrowly linear (or the lower cauline ones oblong-lanceolate or obovate-lanceolate), about 18 mm. long, those of the branches usually longer: peduncles 2-bracted: sepals ovate-lanceolate, nearly equal: fruit armed with stout and straight retrorsely scabrous spines. (*K. lanceolata* Torr.)—Common in southern and western Texas.

FRANKENIACEÆ.

Low perennial herbs or undershrubs, with opposite entire leaves, no stipules, 4 or 5 sepals and petals, 6 stamens, a 2 to 4-cleft style, and oval or oblong seeds with parietal placentation.

1. FRANKENIA L.

Leaves small, mostly crowded and also fascicled in the axils, flowers small, solitary and white, calyx tubular or prismatic, petals clawed and bearing a crown, style 2 to 4-cleft into filiform divisions, and a 1-celled pod included in the persistent calyx.

1. **F. Jamesii** Torr. Much branched from a woody base, 15 to 25 cm. high: leaves linear, strongly revolute on the margins, the fascicled ones shorter: flowers sessile in the forks of the stem or becoming cymose-clustered on the branches: petals erose-denticulate at tip.—About the salt lakes of El Paso County.

CARYOPHYLLEÆ. (Pink Family.)

Herbs (sometimes woody at base), with opposite entire leaves, persistent calyx, 4 or 5 petals (sometimes wanting), usually twice as many distinct stamens, 2 to 5 mostly distinct styles, and several to many seeds attached to the base or central axis of a 1-celled pod.—Flowers terminal or in the forks, or in cymes.

* Sepals united into a 4 or 5-toothed or lobed calyx: petals with a crown and conspicuous claw: stipules none: styles distinct.

1. **Silene.** Styles 3: pod dehiscent at summit by 6 (rarely 3) short teeth.

* * Sepals distinct to the base or nearly so: petals without crown or distinct claw.

+ Stipules none.

2. **Cerastium.** Petals emarginate or bifid: styles 5 (rarely 3 or 4): pod cylindric, dehiscent with twice as many equal teeth as styles.

3. **Stellaria.** Petals bifid: styles 3 (rarely 2, 4, or 5): pod globose to oblong, with as many valves as styles: valves bifid or 2-parted.

4. **Arenaria.** Petals entire or wanting: styles 3 (rarely 2, 4, or 5): pod as in the last, except that the valves are sometimes entire.

+ + Stipules scarious or setiform.

5. **Tissa.** Petals conspicuous: the distinct styles and valves of the pod 3: stipules scarious.

6. **Lœflingia.** Petals inconspicuous or minute: styles united below: sepals rigid and with a setiform tooth on each side: stipules setiform and rigid, adnate to each margin.

1. SILĔNE L. (CATCHFLY CAMPION.)

Annuals or perennials, with cylindrical 4 or 5-toothed calyx, 4 or 5 petals with narrow claws and a crown (2 scales at the base of each blade), 10 stamens, 3 styles, and a pod dehiscent by 6 (rarely 3) short teeth.

1. **S. antirrhina** L. Glabrous annual, with a part of each joint viscid, erect, slender, 3 to 7.5 dm. high: leaves lanceolate or linear: flowers small, pink, in a naked dichotomous panicle, on long pedicels: petals obcordate, minutely appendaged, equaling the calyx: pod ovoid, very shortly stipitate, 6 to 8 mm. long.—Collected in western Texas and as far east as Gillespie and Bexar Counties; doubtless throughout the State. Known as "sleepy catchfly."

2. **S. laciniata** Cav., var. GREGGII Watson. Pubescent perennial, erect, 3 to 4.5 dm. high: leaves oblong-lanceolate to ovate: flowers very large, bright scarlet, in a naked usually spreading panicle: petals deeply 4-cleft, the lateral lobes spreading and shorter: pod oblong, shortly stipitate.—On the summits and upper slopes of the mountains of extreme western Texas.

2. CERASTIUM L. (MOUSE-EAR CHICKWEED.)

Mostly pubescent or hirsute low herbs, with white flowers in terminal leafy or scariously bracted dichotomous cymes, 5 sepals, 5 emarginate or bifid petals, 10 stamens, 5 (rarely 4 or 3) styles, and a cylindric often incurved many-seeded pod, which is dehiscent by twice as many equal teeth as there are styles.

1. **C. vulgatum** L. Stems clammy-hairy and spreading: leaves oblong: upper bracts scarious-margined: flowers at first clustered: earlier fruiting pedicels mostly much longer than the obtuse sepals: petals equaling the calyx.—A very common and perhaps indigenous plant in the Atlantic States, and reported from Gillespie County. This is the species heretofore called *C. viscosum* L., the names of the two species having been transposed by mistake in the herbarium of Linnæus.

2. **C. Texanum** Britton. Stem slender, 15 to 20 cm. high, pilose, especially toward the base: leaves 2 to 4 pairs on the lower part of the stem, spatulate with an acute apex, sparingly pilose on both surfaces, 8 to 15 mm. long: flowers few, small, terminating the branches: petals slightly longer than the ovate acute sepals: teeth of the pod revolute.—"Hills, Blanco, March, April" (*Wright*). It is to be hoped that this plant, collected many years ago by the Mexican Boundary Survey, will be rediscovered.

3. STELLARIA L. (CHICKWEED. STARWORT.)

Low mostly diffuse herbs, with white solitary or cymose terminal (or becoming lateral) flowers, 4 or 5 sepals, 4 or 5 deeply 2-cleft petals, 10 stamens (or fewer), 3 styles (in ours), and an ovoid several to many-seeded pod, which is dehiscent to below the middle by twice as many valves as there are styles.—Ours are both annuals.

1. **S. media** Smith. (COMMON CHICKWEED.) Stems spreading, flaccid, marked with one or two pubescent lines: leaves ovate or oblong, the lower ones on hairy petioles: petals shorter than the sepals: stamens 3 to 10.—A very common introduced plant, and reported from the San Antonio Valley, though doubtless common enough elsewhere.

2. **S. prostrata** Baldw. Stems forking and prostrate, smooth or nearly so: leaves ovate, acute, all on slender petioles, the lower ones often cordate: petals twice as long as the sepals.—In shady places along streams throughout southern and western

Texas, from the Gulf to New Mexico. Blooming from early spring until late fall. Quite variable in size, some of the forms from the mountain region of western Texas being very small.

4. ARENARIA L. (SANDWORT.)

Low tufted herbs, with no stipules, white solitary or cymosely-paniced flowers, 4 or 5 sepals, 1 to 5 entire petals (or none), 10 stamens, 3 styles, and a globose or short-oblong few to many-seeded pod, which is dehiscent into 3 entire, 2-cleft, or 2-parted valves.

** Leaves lanceolate or linear-oblong, cuspidate-acute, punctate under a lens.*

1. **A. alsinoides** Willd. Downy: stems prostrate, elongated (becoming sometimes several feet long), much branched: leaves lanceolate, attenuate at base: peduncles solitary, axillary, 1-flowered, longer than the leaves, reflexed in fruit: petals none or 1 to 5, about equaling the sepals or shorter: seeds smooth. (*A. diffusa* Ell. *A. lanuginosa* Rohrb.)—A species of the South Atlantic States and Mexico, and reported from Gillespie county. Doubtless to be found quite widely distributed in Texas. Very variable, sometimes developing a diffuse dichotomous inflorescence.

2. **A. Benthamii** Fenzl. Nearly glabrous, branched from the base: stems slender, short, few-flowered: leaves linear-oblong, much shorter than the internodes, the lowest spatulate, attenuate at base: petals shorter than the sepals: seeds tuberculate.—On rocky hills, central Texas, between the Brazos (just within our eastern limit) and the Rio Grande.

** * Leaves small, rigid, awl-shaped or bristle-shaped.*

3. **A. Michauxii** Hook. f. Smooth, erect or usually diffusely spreading: leaves with many others clustered in the axils: cyme diffuse, naked, many-flowered: petals twice as long as the rigid, pointed, ovate, 3-ribbed sepals. (*A. stricta* Michx.).—A dry or rocky ground species of the Atlantic States and Mexico, and reported from Comanche's Peak (*Reverchon*).

5. TISSA Adans. (SAND SPURREY.)

Low herbs, mostly on or near the sea-coast, with filiform or linear somewhat fleshy leaves (smaller ones often clustered in the axils), scaly-membranaceous stipules, 5 sepals, 5 entire petals, 2 to 10 stamens, 3 styles, and a 3-valved pod.—A genus variously known as BUDA Adans., SPERGULARIA Presl, and LEPIGONUM Wahlb. Ours are fibrous-rooted annuals. The following is Dr. N. L. Britton's preliminary arrangement:

** Species of the sea-beaches or salt-marshes or borders of salt lakes: leaves very fleshy: petals pink.*

1. **T. marina** Britton. Stout, erect or ascending, smooth or glandular-pubescent: leaves very fleshy, often much clustered in the axils: pedicels short: capsule 5 to 8 mm. long at maturity: seeds smooth or rough.—Along the whole coast, and presumably to be found along the Texan coast.

** * Species of non-saline distribution.*

2. **T. diandra** Britton. Glandular-pubescent, spreading or bushy branched from the base: stipules ovate, acute: peduncles leafless or nearly so: petals pink.—Galveston, and the Rio Brazos.

3. **T. gracilis** Britton. Plants small and delicate, 4 to 8 cm. high: petals none: pods 2 to 4 mm. long, slightly exceeding the calyx: seeds tuberculate.—Wet sands near Dallas.

6. LŒFLINGIA L.

Low rigid dichotomous annuals, with subulate leaves, adnate and connate setaceous stipules, small flowers sessile in the axils, 5 rigid keeled scarious-margined sepals (the 3 outer with a narrow tooth upon each side), very small petals or none, 3 to 5 stamens, and a 3-valved several-seeded pod.

1. **L. squarrosa** Nutt. Glandular-pubescent, much branched, the stems 5 to 15 cm. long: leaves and sepals subulate-setaceous, rigid and squarrose, the leaves 4 to 6 mm. long, exceeding the flowers: pod triangular, at length exserted.—Sandy roadsides near Austin, and doubtless westward through the State.

PORTULACEÆ. (PURSLANE FAMILY.)

More or less succulent herbs, with entire leaves (either opposite or alternate), 2 sepals, 2 to 5 or more petals, opposite stamens of the same number or numerous (in ours), 2 to 8-cleft styles, and a 1-celled pod with a free central placenta.—Stipules none, or scarious, or reduced to hairs.

* Sepals united below and adherent to the ovary, the free upper portion at length deciduous.

1. **Portulaca.** Stamens 7 to 20: flowers solitary, red or yellow: pod opening by a lid.

* * Sepals distinct, free from the ovary.

2. **Talinopsis.** Shrubby: sepals membranaceous and persistent: seeds hooked.

3. **Talinum.** Herbaceous: sepals herbaceous and deciduous (sometimes tardily so): seeds not hooked.

1. PORTULACA Tourn. (PURSLANE.)

Fleshy diffuse or ascending annuals (a few perennial), with entire leaves, axillary or terminal ephemeral yellow or rose-colored flowers, 2 sepals coherent at base and adnate to the ovary, 4 to 6 petals, 7 to 20 stamens, a deeply 3 to 8-cleft style, and pod opening by a lid.

* *Leaves flat.*

1. **P. oleracea** L. Prostrate, glabrous, purplish: stem terete: leaves obovate to spatulate, rounded at summit: sepals acute, keeled: petals yellow, 3 to 4 mm. long: stigmas 5: pod 6 to 10 mm. long: seeds black, dull, finely tuberculate.—The common purslane, naturalized from Europe, and abundant in the valleys of southern and western Texas.

2. **P. retusa** Engelm. Like the last, but greener and the stems more ascending, sometimes covering a space several feet in diameter: leaves usually smaller, retuse or emarginate: sepals obtuse, broadly keel-winged: petals yellow: stigmas 3 or 4: capsule 5 to 6 mm. long: seeds more strongly tuberculate.—Sandy soil, southern and western Texas.

3. **P. lanceolata** Engelm. Suberect, glabrous, stem angled: upper leaves lanceolate and acute, lower ones spatulate and obtuse: sepals scarcely keeled: petals red or yellow or both: stigmas 3 to 6: pod with a broad wing: seeds echinate-tuberculate.—Sandy soil, southern and western Texas.

* * *Leaves terete.*

4. **P. stelliformis** Moç. & Sess. Perennial by creeping tuberous-thickened and sometimes moniliform rootstocks: leaves 2.5 cm. long, those about the flower clus-

ter radiating and much surpassing it: axillary clusters of hairs short and soft: petals copper-colored or buff: seeds blackish, granulate-tuberculate, with metallic luster.—Plains of western Texas.

5. **P. pilosa** L. Annual, the base often hardening with age: leaves linear-subulate, 6 to 12 mm. long, with copious axillary hairs: petals carmine, crimson, or purple, 2 to 4 mm. long: seeds blackish, muriculate-granulose, with metallic luster.—Throughout Texas, and by far the commonest species.

6. **P. parvula** Gray. Annual, but sometimes fleshy-rooted, depressed and diffuse: leaves oblong-linear, obtuse, 4 to 10 mm. long, with copious axillary hairs: petals yellow and copper-colored, barely 2 mm. long: seeds pale red, minutely granulate.—Plains of western Texas, where it has been mistaken for *P. pilosa*.

2. TALINOPSIS Gray.

Shrubby and smooth, with slender branches, fleshy linear nearly terete leaves, a few-flowered terminal cyme of purple flowers, 2 ovate membranaceous persistent sepals, 5 petals, numerous stamens, a short 3-cleft style, a fusiform 3-valved pod, and numerous hooked seeds.

1. **T. frutescens** Gray. About 6 dm. high, smooth except the minute axillary hairs: leaves 12 to 24 mm. long, scarcely 2 mm. wide: cyme few-flowered, with short angled articulated branches: flowers closely sessile in the forks and readily falling away in dried specimens: pod nearly 24 mm. long, covered except the tapering summit by the persistent (becoming) scarious calyx.—Bluffs and high mesas along or near the Rio Grande to New Mexico.

3. TALINUM Adans.

Low glabrous herbs (sometimes suffrutescent), with mostly fleshy leaves, 2 herbaceous ovate concave deciduous sepals, 5 ephemeral petals, 5 to 30 stamens, a 3-lobed style, and a subglobose 3-valved pod with numerous shining carunculate seeds.

* *Leafy plants with flat leaves and flowers in an ample panicle.*

1. **T. patens** Willd. Stem slender, erect: leaves oblanceolate-spatulate, shortly cuspidate, 5 to 7.5 cm. long: flowers rose-colored or yellow: bracts small, ovate and cuspidate: seeds tuberculate. (*T. reflexum* Cav. *T. spathulatum* Engelm.)—Rocky banks, hillsides, or dry prairies, along or near the Rio Grande from the 100th meridian westward. Var. SARMENTOSUM Gray (*T. sarmentosum* Eng.) is a procumbent form apparently more common than the species.

* * *Leafy plants with flattish leaves and solitary axillary flowers.*

2. **T. lineare** HBK. Stem ascending, much branched: leaves lanceolate or linear-lanceolate, 3.5 to 7.5 cm. long: peduncles reflexed in fruit: flowers orange to red: seeds beautifully marked with curved ridges and transverse striæ. (*T. aurantiacum* Engelm.)—On rocky soil or prairies, abundant everywhere west of the Pecos and extending through southern Texas to the Gulf. The tuberous root is edible when cooked.

* * * *Flowers in mostly naked cymes on terminal slender naked peduncles much surpassing the terete linear leaves.*

3. **T. calycinum** Engelm. Stems at length branching: leaves elongated, 3.5 to 5 cm. long: flowers 20 to 30 mm. in diameter: sepals ovate-orbicular, cuspidate, tardily deciduous: petals pink, twice as long as the calyx: stamens 30 or more: style twice longer than the stamens, declined.—In sandy soil, western Texas (Gillespie County and northward).

4. T. parviflorum Nutt. Resembling the last, but smaller, the leaves narrower, flowers smaller and paler, and stamens only 5.—In rocky places throughout southern Texas, but more abundant in the extreme west.

TAMARISCINEÆ. (TAMARISC FAMILY.)

A small Old World family of trees and shrubs, with alternate small (sometimes scale-like) leaves, 3 to 5 distinct styles, free ovary, and comose or long-hairy seeds.

1. **Fouquiera.** Petals united into a tube: seeds surrounded by a dense fringe of long white hairs or a membranous wing: flowers showy, in terminal spikes or panicles.

2. **Tamarix.** Petals free (or nearly so): seeds comose at apex: flowers racemose or spicate.

1. FOUQUIERA HBK. (CANDLEWOOD.)

Smooth shrubs or small trees, with soft fragile wood, alternately spinose-tubercled branches with single or fascicled thick entire leaves in the axils, and brilliant crimson flowers.

1. **F. splendens** Engelm. Branching near the base and sending up simple slender spiny stems 3 to 8 m. or more high, leafy only near the summit, strongly grooved and ridged by the decurrent bases of the spines: leaves spatulate to obovate, 12 to 24 mm. long: flowers on short pedicels in narrow nearly simple racemes 5 to 15 cm. long.—Common on rocky mesas from the Colorado to the Pecos and westward. "A most remarkable looking plant, usually standing out on open sun-exposed slopes, with its strict striated almost leafless stems crowned by a mass of beautiful scarlet flowers" (Rothrock). Known as "Jacob's staff" or "ocotillo."

2. TAMARIX L. (TAMARISC.)

Shrubs with slender branches covered with small green scale-like leaves, and small flowers in terminal spikes or racemes.

1. **T. Gallica** L. A beautiful shrub 9 to 18 dm. high, with slender erect or slightly pendulous branches, numerous scale-like pointed leaves scarcely 2 mm. long, and very small pink or white flowers crowded in spikes, forming frequently branching terminal panicles, the petals persisting till the fruit ripens.—A common European Mediterranean shrub, which seems to have escaped from cultivation in many places in Texas.

ELATINEÆ.

Low annuals, with membranous stipules between the opposite leaves, regular and symmetrical axillary flowers, distinct styles with capitate stigmas, and a 2 to 5-celled many-seeded pod.

1. BERGIA L.

Branching and often pubescent, nearly erect, with entire or serrate leaves, fascicled or solitary 5-merous flowers, and a globose capsule.

1. **B. Texana** Seubert. Leaves oblanceolate, acute, serrulate, 12 to 36 mm. long, attenuate to a short petiole: flowers fascicled, shortly pediceled: sepals keeled, about 3 mm. long, exceeding the petals and stamens: seeds smooth and shining.—Southern and western Texas.

HYPERICINEÆ. (St. John's-wort Family.)

Herbs or shrubs, with opposite entire dotted leaves, no stipules, regular yellow flowers, many or few stamens, persistent styles distinct or united, and a 1 to several-celled pod with numerous small seeds.

1. **Ascyrum.** Sepals 4, very unequal, the 2 outer very broad and flat, the inner much smaller: petals 4.

2. **Hypericum.** Sepals 5, similar: petals 5.

1. ASCYRUM L. (St. Peter's-wort.)

Low suffruticose leafy plants, with small black-dotted leaves, nearly solitary flowers, bibracteolate pedicels, 4 unequal sepals, numerous distinct stamens, 2 to 4 styles distinct or united below, and an ovoid 1-celled capsule.

1. **A. hypericoides** L. Diffuse, branching above, 3 to 6 dm. high: leaves linear to linear-oblong, narrowed at base, 6 to 20 mm. long, conspicuously biglandular at base: pedicels bibracteolate close to the flower: inner sepals very small (or obsolete) and petaloid.—A species of the Gulf States and extending through Texas into Mexico. This is the *A. Crux-Andreæ* of many southern authors.

2. **A. stans** Michx. Erect, stouter, 3 to 6 dm. high: leaves oblong to oval, closely sessile and somewhat clasping, 2.5 to 5 cm. long: pedicels bibracteolate near the middle: inner sepals 6 to 12 mm. long, sometimes as long as the outer, seldom petaloid.—A sandy ground species of the Atlantic and Gulf States, and extending to western Texas. The lower leaves sometimes become tapering at base and almost obovate.

2. HYPERICUM Tourn. (St. John's-wort.)

Herbs or shrubs, with cymose yellow flowers, 5 somewhat equal sepals, stamens usually numerous and united at base into 3 or 5 clusters, and a 1 to 5-celled pod.—Several species of *Hypericum* belong to the Gulf States and extend into eastern Texas. The following have either been found within our range or are likely to occur there, and all have 3 distinct styles with capitate stigmas:

* *Styles long: pod 3-celled: petals much longer than the sepals: whole plant (including petals and anthers) more or less black-dotted.*

1. **H. perforatum** L. Much branched, 3 to 12 dm. high: leaves linear to oblong, obtuse, with pellucid dots, 12 to 25 mm. long: flowers numerous in loose cymes, about 2.5 cm. in diameter: sepals linear-lanceolate, very acute or acuminate: petals bright yellow, black-dotted along the margin: pod conical-ovate, 4 to 6 mm. long.—A common and pestiferous introduced weed, reported from Wilson County, and doubtless in many other places in Texas.

2. **H. formosum** HBK., var. Scouleri Coulter. From running rootstocks, simple or branching, 1 to 5 cm. high: leaves ovate-oblong, obtuse, more or less clasping, about 2.5 cm. long (those of the branchlets much smaller), usually black-dotted along the margin of the under surface: flowers in loose cymes: sepals lanceolate to ovate, obtuse or acute: petals bright yellow often tinged with purple and with a few black dots along the margin: pod 3-lobed, 6 to 8 mm. long.—Throughout all the western mountain systems, and merging into the species in Mexico, so that it must occur in the mountains of western Texas, either as the variety or as the Mexican species *H. formosum*, which may be known by its acuminate sepals.

* * *Styles short: pod* 1*-celled: petals shorter than the sepals.*

3. **H. mutilum** L. Often somewhat erect and diffuse: leaves narrowly oblong to somewhat ovate, obtuse, clasping, 12 to 25 mm. long, 5-nerved at base: flowers very small, in very loose leafy cymes: sepals linear to lanceolate, usually shorter than the ovate pod which is but 2 to 4 mm. long: stamens 6 to 12.—Extends from the Atlantic and Gulf States into eastern Texas and adjacent Mexico. Reported as far west as San Saba County.

4. **H. gymnanthum** Engelm. & Gray. Almost simple, with strict stem and branches, 3 to 9 dm. high: leaves clasping, heart-shaped, acute or obtuse: cyme naked, the floral leaves reduced to small awl-shaped bracts.—Reaching Texas from the north and east and probably within our range.

MALVACEÆ. (MALLOW FAMILY.)

Herbs or shrubs, with alternate stipulate mostly palmate leaves, 5 persistent sepals united at base and often involucellate with a whorl of bractlets, 5 petals, numerous stamens monadelphous in a column, 1-celled kidney-shaped anthers, more or less united styles, and pistil either a ring of ovaries around a projection of the receptacle or a 3 to 10-celled ovary becoming a pod.—The cultivated cotton-plant (*Gossypium herbaceum* L.) belongs to this family.

I. Stamen-column bearing anthers at summit: carpels closely united into a ring around the axis from which they separate after ripening, and just as many as the styles (5 to 20 or more).

* Styles stigmatic on the inner side: carpels indehiscent: ovules solitary.

1. **Malva.** Bractlets 3: petals obcordate: carpels numerous, rounded, beakless.
2. **Callirhoë.** Bractlets 1 to 3 or none: petals truncate: carpels numerous, beaked.
3. **Sidalcea.** Bractlets none: filaments in a double series: carpels fewer (5 to 9).

* * Stigmas capitate: carpels mostly dehiscent, 1 to few-ovuled.

\+ Seeds kidney-shaped.

4. **Malvastrum.** Bractlets 3 or none: seed solitary, filling the cell.
5. **Sphæralcea.** Bractlets 3: cells 2 or 3-seeded, or when 1-seeded with an empty terminal portion.

\+ \+ Seeds turgid: bractlets mostly none.

++ Carpels 1-ovuled.

6. **Sida.** Carpels 5 to 15, erect, with conniving or erect tips or points.
7. **Anoda.** Carpels numerous, united into a depressed star-shaped pod.

++ ++ Carpels 2 or more-ovuled.

8. **Abutilon.** Carpels 3 to 9-ovuled, naked within.
9. **Wissadula.** Carpels 2 to 5-ovuled, with a transverse plate or ridge within.

II. Stamen-column more or less anther-bearing along the side: carpels 5, in a ring around the axis, 1-ovuled: styles just twice as many.

10. **Malachra.** Proper bractlets none, but flowers in an involucrate head: carpels ripening dry.
11. **Pavonia.** Bractlets 5 to 15: flowers not capitate: carpels ripening dry.
12. **Malvaviscus.** Bractlets 7 to 12: carpels ripening fleshy, connate into a berry.

III. Stamen-column anther-bearing for a considerable part of its length: fruit a few-celled loculicidal many-seeded pod.

13. **Hibiscus.** Bractlets 5 to many, distinct: style-branches at length spreading: pod 5-celled.
14. **Fugosia.** Bractlets 3 to many: style club-shaped, undivided, or with short erect branches: pod 3 or 4-celled,

1. MALVA L. (MALLOW.)

Herbs, with rounded and mostly lobed leaves, axillary fascicled flowers, a 3-bracted calyx, obcordate petals, numerous styles stigmatic down the inner side, and a depressed fruit separating at maturity into as many 1-seeded indehiscent round kidney-shaped blunt carpels as there are styles.

1. **M. borealis** Wallm. Annual, erect or somewhat decumbent, hairy or nearly glabrous: leaves round-cordate, crenate, more or less strongly 5 to 7-lobed: peduncles (solitary or clustered) 2 to 6 mm. long: calyx-lobes becoming very broad and enlarged in fruit: petals 4 to 6 mm. long, whitish: carpels transversely reticulate-rugose.—An Old World plant, apparently naturalized throughout the southern border of Texas.

2. **M. rotundifolia** L. (COMMON MALLOW.) Stems procumbent from a biennial root: leaves round-cordate, on very long petioles, crenate, obscurely lobed: peduncles elongated and flowers larger: petals twice as long as calyx, whitish: carpels pubescent, even.—The most common introduced mallow of the Atlantic States and reported from Gillespie County. Doubtless abundant enough throughout eastern Texas.

3. **M. sylvestris** L. Biennial: stem erect and branched, 6 to 9 dm. high: leaves sharply 5 to 7-lobed: petals thrice the length of the calyx, large, purple and rose-color: carpels wrinkled-veiny.—Introduced from Europe, usually along waysides, and reported from Gillespie County.

2. CALLIRHOË Nutt.

Herbs, with mostly lobed or divided leaves, showy axillary or racemed flowers, a 3-bracted or naked calyx, wedge-shaped and truncate petals, styles as in *Malva*, and 10 to 20 straightish beaked carpels (indehiscent or partly 2-valved).

* *Involucel of 3 bractlets.*

1. **C. involucrata** Gray. Hirsute or hispid, procumbent: leaves rounded, 5 to 7-parted or -cleft, the segments incisely lobed: peduncles elongated, 1-flowered: the lanceolate 3 to 5-nerved sepals twice as long as the involucel: petals red or purplish: carpels rugose-reticulated.—Common in river valleys west of the Colorado. Var. PALMATA Britton has 3 to 5-parted leaves and mostly white flowers. (*C. palmata* Buckley.) Tom Green County (*Tweedy*).

2. **C. lineariloba** Gray. Resembling the last, of which it has been considered a variety: but little hirsute, sometimes glabrous: stems ascending: leaves once or twice pedately parted, segments or lobes linear or lanceolate: involucral leaves smaller and erect: carpels smoothish.—A Mexican species, found in the adjacent southeastern counties of Texas.

* * *Involucel none.*

3. **C. alcæoides** Gray. Strigose-pubescent: stems slender, 3 dm. high, erect from a perennial root: lower leaves triangular-cordate, incised, the upper 5 to 7-parted, laciniate, the uppermost divided into linear segments: flowers rose-color to white, corymbose, on slender peduncles: carpels strongly rugose.—A gravelly soil species of the southwest, and reported from Gillespie County.

4. **C. digitata** Nutt. Sparsely hirsute or glabrous, erect: leaves few, round-cordate, 5 to 7-parted, the cauline commonly with linear divisions: peduncles subracemose, long and filiform: flowers red-purple to white: carpels pilose on the back and rugose-reticulated.—Common on the prairies and in the valleys.

5. **C. pedata** Gray. Closely resembling the last species, but more leafy, with a smaller head of fruit, and smooth carpels with a very large and thick beak.—A very abundant prairie mallow, with showy cherry-red flowers.

3. SIDALCEA Gray.

Herbs, with rounded and mostly lobed or parted leaves, usually purple flowers in a narrow terminal spike or raceme, naked calyx, a double column of stamens, styles as in *Malva*, and 5 to 9 1-seeded indehiscent beakless carpels.

1. **S. Neo-Mexicana** Gray. Stems slender, 3 to 9 dm. high, pubescent or glabrous, at first simple, soon producing axillary flowering branches: radical leaves orbicular, 5 to 9-lobed or incisely crenate, lower stem leaves deeply 7 to 9-parted, upper 3 to 5-parted, segments 3-lobed or those of the uppermost leaves entire: racemes many-flowered, with strict pedicels longer than the hirsute calyx, which has deltoid-ovate lobes: petals lilac, about 12 mm. long: carpels smooth and glabrous.—In the mountains of western Texas. The *S. malvæflora* of most authors, from which species, however, it is distinct.

4. MALVASTRUM Gray.

Herbaceous tufted perennials or shrubby, with flowers in narrow naked or leafy subpaniculate racemes, a 1 to 3-bracted or naked calyx, capitate stigmas, and 5 or more usually dehiscent carpels which are completely filled by the solitary seed.

** Flowers yellow: calyx with 3 bractlets.*

1. **M. tricuspidatum** Gray. Suffrutescent and strigose-pubescent: leaves ovate-lanceolate or (below) deltoid-ovate, sometimes narrower and more oblong, serrate, acute, petioled: flowers in leafy spicate racemes or fascicled in the axils: bractlets linear: fruit depressed, of 10 or more reniform carpels with very deep sinus and tricuspidate (2 short cusps on the back and a much longer apical one).—Throughout southern and western Texas (south and west of the Colorado).

2. **M. spicatum** Gray. Suffrutescent, subcanescent with close and minute stellular pubescence (but no strigose pubescence on the stems): leaves deltoid or ovate, crenate-serrate above the base, petioled: flowers in oblong spikes, or the axillary ones reduced: bractlets lanceolate: carpels like the last, but with no cusps.—A Mexican species, but collected near Brazos Santiago.

3. **M. Wrightii** Gray. Stems rigid from a more or less woody base, cinereous with lepidote-stellular pubescence: leaves oblong-ovate, dentate, obtuse, rounded or truncate at base, petioled: the foliaceous bracted flowers solitary and subsessile in the upper axils, and with rather large deep yellow petals: carpels coriaceous, smooth, hirsute at top where they are dorsally bigibbous and ventrally subulate-pointed.—. In southeast Texas, south of the Colorado.

** * Flowers brick-red or copper-red: carpels pointless.*

4. **M. leptophyllum** Gray. Whole plant silvery canescent with a fine close lepidote (peltate scales) pubescence: stems slender, numerous from a woody base: lower leaves 3-parted and petioled, their segments and the sessile upper leaves narrowly linear or filiform: flowers few, racemose, brick-red: calyx with 2 or 3 setaceous caducous bractlets: fruit depressed, of 9 or 10 tomentulose reniform beakless and pointless carpels coarsely reticulated on the sides.—Southwestern Texas.

5. **M. coccineum** Gray. Herbaceous and low: both herbage and calyx canescent with close and fine almost scurfy stellular pubescence: leaves 5-parted or pedate: flowers in short spikes or racemes, with copper-red petals: carpels 10 or more, tomentulose-pubescent, rugose-reticulated, tardily and incompletely dehiscent.—In gravelly soil throughout western Texas, and extending down the Rio Grande.

5. SPHÆRALCEA St. Hilaire.

Differing from *Malvastrum* only in the carpels being 2 or 3-seeded, or when 1-seeded with an empty terminal portion.

* *Carpels* 1 *or* 2-*ovuled, upper ovule* (*when present*) *abortive, more or less reniform at maturity, deciduous directly from axis* (*no retaining thread*).

+ *Leaves all or mainly palmately parted: carpels very blunt:* species greatly resembling *Malvastrum coccineum.*

1. **S. pedatifida** Gray. Low and suffruticose, slender and diffusely branching, 1 to 2.5 cm. high: leaves deeply 3 to 5-lobed or divided, sparsely stellate-hirsute, segments more or less mucronate-lobed and incised, often almost pinnatifid: flowers axillary and loosely racemose or in strict naked racemes: petals "between a buff and a brick-color": carpels blunt and with no tubercles, 1 or 2-seeded (*Malvastrum pedatifidum* Gray).—Dry soil, all along the southern border of Texas.

2. **S. pedata** Torr. Resembling the last, but tall, 6 dm. high: leaves very variable in the degree of dissection: flowers large, petals often 18 mm. long, more orange-red: carpels always 1-seeded.—Western Texas. Forms with very narrow leaf-divisions are var. ANGUSTILOBA Gray.

+ + *Leaves undivided, mostly cordate* (*occasionally obtusely lobed*).

3. **S. ambigua** Gray. Canescent throughout with short and close stellate pubescence (no loose woolliness): leaves ovate-cordate, merely crenulate-toothed: petals rose-color varying to white, 12 to 25 mm. long: fruit depressed, of wholly pointless carpels, surpassed by the acute or acuminate calyx-lobes. (*S. Emoryi* of many authors, but not of Torr.)—Abundant over the arid plains of Arizona, and found recently in Duval County. It should be found in arid places west to New Mexico.

4. **S. Lindheimeri** Gray. Densely pannose-tomentose and calyx very woolly, decumbent at base: leaves cordate or more rounded, coarsely crenate: petals rose-red: ovules 2 or 3 in each cell: carpels when mature much constricted in the middle, surpassed by the acuminate calyx-lobes.—On the Guadalupe River and southward into Mexico.

+ + + *Leaves undivided, ovate or oblong-lanceolate, rarely subhastately* 3-*lobed.*

5. **S. hastulata** Gray. Low: pubescence close and canescent: leaves oblong-lanceolate, coarsely and irregularly toothed or sinuate: petals orange-red: carpels ovate, deeply reniform, tipped with a small and deciduous cusp, often 2-seeded.—Prairies throughout southern and western Texas.

6. **S. subhastata** Coulter. Low, 7.5 to 25 cm. high, fruticose and branching, covered throughout with coarse almost scurfy stellate pubescence: leaves shorter, ovate to oblong, mostly obtuse and subhastate, more or less serrate: flowers mostly solitary and axillary, on very short pedicels: petals purplish: carpels densely stellate-pubescent, without cusp or point.—In southwestern Texas and adjacent New Mexico and Mexico.

* * *Carpels* 2 *or* 3-*ovuled* (1 *to* 3-*seeded*), *mostly oblong, when separating from the axis cohering by a thread.*

+ *Leaves lanceolate to linear, not lobed.*

7. **S. angustifolia** Spach, var. CUSPIDATA Gray. Stems branching, 3 to 6 dm. high: densely clothed with a grayish stellate pubescence: leaves rugose, serrate: petals red: carpels tipped with an erect sometimes persistent cusp.—Western Texas.

+ + *Leaves of oblong or roundish outline, often cordate, mostly* 3 *to* 5-*lobed, sometimes dissected.*

8. **S. Fendleri** Gray. Herbaceous, much-branched, subcinereous with minute stellate-pubescence: leaves generally green or greenish, or only lower face canescent, ovate-oblong or subhastate, incised or lobed (but not dissected): flowers small, soli-

tary or fascicled in the axils, the upper spicate-racemose: carpels prominently cuspidate.—Mountains of extreme western Texas.

9. **S. incana** Torr. Suffruticose, 6 to 9 dm. high, white-velvety throughout with minute appressed pubescence: leaves ovate, obtusely 3-lobed and crenulate, sometimes subcordate: flowers small, axillary-fascicled and racemose paniculate: carpels cuspidate.—In extreme southwestern Texas and adjacent New Mexico and Mexico. A form with small deeply 3 to 5-cleft or parted leaves, the divisions and lobes commonly narrow, is var. DISSECTA Gray.

6. SIDA L.

Plants with yellow or whitish flowers, mostly naked calyx, capitate stigmas, and 5 to 15 erect 1-ovuled carpels with conniving or erect tips or points and turgid seeds.

**Calyx with 1 to 3 setaceous bractlets.*

1. **S. hederacea** Torr. Spreading and branching, 3 to 6 dm. high, covered with a close scurfy stellate pubescence: leaves thick, ovate, mostly obtuse, more or less dentate, very oblique at base: flowers solitary and axillary, mostly on short lateral branchlets: calyx stellate-pubescent, deeply cleft, about half as long as the petals, which are parti-colored, half (the exposed part in bud) purplish and with stellate hairs, the other yellowish and glabrous: carpels with 2 more or less prominent dorsal cusps and reticulated sides.—Abundant in dry valleys and hillsides of western Texas.

2. **S. lepidota** Gray. Lower, silvery with close lepidote scurf (instead of loose stellate pubescence): leaves triangular-cordate or lanceolate and hastate, oblique at base, laciniate dentate or entire towards the apex: flowers smaller, with light yellow or red petals but little longer than the calyx: carpels apiculate with a very short obtuse beak.—Sandy ground, in the valleys of western Texas.

3. **S. cuneifolia** Gray. Much branching and procumbent, white tomentose: leaves small, round-cuneiform, crenate-dentate or repand, about 12 mm. broad and long: flowers small, solitary or clustered in the axils, sometimes scarcely exceeding the petioles: petals yellow, twice the length of the calyx: carpels ovate, pubescent, membranaceous and turgid, short-beaked, with globose seeds.—"In subsaline soil," along the Rio Grande in Maverick County.

***Calyx naked, not enlarging in fruit.*

+ Sessile or short-peduncled flowers mainly at summit of low stems or branches and involucrate by petioled leaves: petals reddish-purple.

4. **S. ciliaris** L., var. FASCICULATA Gray. Stems low, branching from the base, somewhat hairy: leaves linear, denticulate-serrate above, cordate at base, those at summit crowded, nearly glabrous above, stellate-hirsute beneath: carpels 5 to 7, scarcely beaked, strongly reticulate and muricate. (*S. fasciculata* Torr. & Gray.)—Southeastern Texas, south of the Colorado.

+ + Flowers not involucrate, either solitary or clustered in most of the axils, or barely paniculate at summit: calyx 5-angled and petals mostly yellow.

++ Stems diffusely decumbent and filiform: petioles and peduncles long and slender: leaves somewhat cordate, small.

5. **S. diffusa** HBK. Stems very slender and hispid: leaves ovate-oblong, cordate at base, serrate, 10 to 14 mm. long: carpels 5, pubescent, 2-beaked. (*S. filiformis* Moric. *S. filicaulis* Torr. & Gray.)—Valleys and prairies of southern and western Texas.

++ ++ *Stems erect: leaves mainly linear or linear-lanceolate, obtuse at both ends and short-petioled or sessile.*

6. **S. Neo-Mexicana** Gray. Minutely puberulent, not cinereous, 1 to 3 dm. high: diffusely many-stemmed from a woody base: peduncles not articulated, all short or very short: petals orange-yellow often changing to red: carpels without beak or cusps, or barely mucronulate. (*S. Elliottii*, var.? Gray.)—Extreme western Texas and adjacent New Mexico and Mexico.

7. **S. Lindheimeri** Engelm. & Gray. Cinereous-puberulent, at least the lower leaf-surface: slender peduncles about equaling the leaves, articulated above the middle: petals yellow: carpels bicuspidate.—Southern and eastern Texas, from the Rio Grande to the Colorado and Louisiana.

8. **S. longipes** Gray. Somewhat scabrous-pubescent: peduncles very long and strict, becoming 7.5 to 15 cm. long, 3 or 4 times longer than the leaves, articulated a little below the summit: petals orange: carpels without beak or cusp.—All along the southern border of Texas. Discovered many years ago in southwestern Texas, its range has been recently extended eastward by its discovery in Duval County.

+ + + *Calyx not at all angled: flowers long-peduncled and petals violet.*

9. **S. filipes** Gray. Canescent, 6 to 9 dm. high: leaves lanceolate, cordate at base, dentate-serrate, velvety-pubescent above, tomentose beneath: peduncles long and slender, 5 to 7.5 cm. long, a little longer than the leaves, articulated near the small pendulous flower: carpels reticulate-rugose and without beak or cusp.—Hills, between the Colorado and the Pecos.

* * * *Calyx naked, enlarging much around or under the fruit, membranaceous or scarious.*

10. **S. physocalyx** Gray. Stems numerous from a thick base, decumbent, strigose: leaves thickish, ovate-oblong, crenate-dentate, subcordate at base: calyx 5-parted, membranaceous-inflated, winged, with broadly ovate or cordate divisions: corolla inconspicuous, yellow: carpels 10, thin-walled, reticulated, and with a beak-like apex.—Abundant in the valleys and prairies of southern and western Texas.

7. ANODA Cav.

Similar to *Sida*, except that the carpels are combined into a radiate-spreading fruit, subtended by the spreading persistent calyx.

1. **A. hastata** Cav. Commonly with some hispid (but no stellate) pubescence: leaves hastate or deltoid: peduncles slender and axillary, exceeding the leaves: petals violet or purple (varying to white), 6 to 12 mm. long: the much depressed fruit mostly surpassed by the widely spreading calyx, the top beset by scattered simple bristles; carpels 15 to 20, rather conspicuously beaked: seeds naked (including *A. cristata* Schlecht).—A Mexican species found in the mountains of extreme southwestern Texas.

2. **A. Wrightii** Gray. Pubescence minute and stellate, with some simple soft-hirsute hairs above, viscidulous: lowest leaves ovate and coarsely crenate, the others oblong-ovate or triangular-lanceolate: peduncles exceeding the leaves, upper flowers naked-racemose: calyx shorter-lobed, less widely spreading, and hardly surpassing the densely and stellately hirsute much depressed fruit: petals yellow, about 10 mm. long: carpels 8 to 10, beaked: seeds barely puberulent (wrongly referred to *A. parviflora* Cav.).—Dry ravines and rocky places along the upper Rio Grande and the Limpia.

3. **A. pentaschista** Gray. Slender, 3 to 6 dm. high, minutely puberulent and more or less cinereous with stellate-pubescence: lower leaves ovate or subcordate, somewhat 3-lobed: upper hastate or lanceolate, uppermost linear: calyx 4 mm. long, ascending or appressed to and seldom surpassing the little depressed puberulent fruit, little shorter than the yellow corolla: carpels 5 (rarely 6 to 10), obscurely beaked:

seeds puberulent.—In the mountains of southwestern Texas. In many cases the leaf variation in passing up the stem is very great: the lower leaves may be triangular and as much as 5 cm. long; others are 3-lobed, becoming narrower and hastate upwards, finally narrowing to linear.

8. ABUTILON Tourn. (INDIAN MALLOW.)

Herbs or shrubs, often tomentose or velvety, with mostly cordate leaves, naked calyx, yellow flowers, and carpels with 2 to 9 ovules and naked (unappendaged) within.—A large and difficult tropical genus, represented in Texas by several Mexican species which are, as yet, in considerable confusion, in consequence of which the following specific descriptions are made fuller than usual and with no attempt at an analytic key.

1. **A. Jacquini** Don. Herbaceous, stems 6 to 12 dm. high, branching, white-tomentose: leaves deeply cordate at base, elongated-ovate and gradually acuminate or cordate-lanceolate, erose-serrate, very soft white tomentose beneath, scabrous-pubescent or somewhat velvety above, 5 to 7.5 cm. long: axillary peduncles mostly 1-flowered and exceeding the petioles: calyx white-tomentose, 5-parted and angled, of seemingly cordate acuminate sepals about equaling the yellow petals and the numerous subulately erect-awned and villous-hirsute carpels which are over 12 mm. long. (*A. hypoleucum* Gray.)—A Mexican species found in adjacent Texas as far as the Pecos. Reported from near New Braunfels.

2. **A. Wrightii** Gray. Herbaceous, with stems 3 to 6 dm. long, decumbent, branching, viscid-pubescent and villous with fine spreading hairs: leaves ovate-cordate, obtusish, sharply dentate above, 8 to 36 mm. long, greenish and scabrous velvety above, very soft white-tomentose beneath: axillary peduncles mostly 1-flowered, equaling the petioles, or the upper ones exceeding the leaves: calyx tomentose, 5-parted, with very acuminate divisions about equaling the golden corolla and the tomentulose subulate-beaked carpels, which are 12 mm. long.—Throughout southern and especially western Texas.

3. **A. Berlandieri** Gray. Rather stout and branching (half woody) perennials, covered throughout with coarse stellate pubescence: leaves cordate-ovate (with shallow sinus), long-acuminate, dentate, the blade often over 10 cm. long, longer than the petioles, greener above: peduncles axillary, often several-flowered, much shorter than the leaves: calyx hoary with a close and coarse stellate pubescence, its lobes broadly ovate and acuminate: corolla yellow or orange, 6 to 10 mm. long, a little shorter than the calyx: carpels about 9, acuminate, coarsely stellate pubescent, about 12 mm. long.—A Mexican species, collected in Texas from Nueces to Webb County and southward.

4. **A. Nealleyi** Coulter. Stem slender and erect, 6 to 12 dm. high, soft puberulent above, becoming glabrous below: leaves broadly cordate, long acuminate, entire or slightly crenate, green and soft puberulent (becoming glabrous) above, white with fine dense stellate pubescence beneath, 6 to 10 cm. long, smaller above, on long petioles: flowers in loose, few-flowered, long-peduncled, upper-axillary and terminal panicles, very small, not more than 4 mm. high: calyx stellate-pubescent, the ovate acute lobes about half as long as the yellow or orange petals and very much shorter than the carpels, which are 5, puberulent, with a short acuminate beak, becoming 6 to 8 mm. long, 2 or 3 seeded: seeds usually with a tuft of white hairs.—Hidalgo County. A large-leaved, rather naked-paniculate and small-flowered species, related to a small Mexican group.

5. **A. malacum** Watson. Tall, suffrutescent and branching, very finely and closely velvety pubescent throughout: leaves cordate, acute, acutely and somewhat unequally dentate, 3.5 to 10 cm. long and broad, about equaling the petiole: panicles

axillary and terminal: calyx-lobes lanceolate, 6 to 8 mm. long, half as long as the orange petals: carpels 5, acutish, coarsely stellate-pubescent, equaling the erect calyx.—Collected in southern Texas from Wilson County to El Paso.

6. **A. incanum** Don. Herbaceous, more or less branched above, 3 to 6 dm. high, minutely tomentose: leaves cordate or cordate-ovate, acute or acuminate, softly pubescent, irregularly serrate, 2.5 to 5 cm. long: peduncles axillary, 1-flowered, somewhat racemose at the upper part of the branches: calyx-lobes ovate, acuminate, usually reflexed in fruit, not half as long as the orange or pinkish petals, which are 6 to 8 mm. long: carpels 8, pubescent, obtuse or acute and pointless. (*A. Texensis* Torr. & Gray.)—Common throughout southern and western Texas. Very variable as to the size of the leaves.

7. **A. parvulum** Gray. Stems slender and spreading or trailing, from a woody root, paniculate above: cinereous-tomentose with a lax minute pubescence, and branchlets pilose with spreading hairs: leaves small, 12 to 25 mm. broad, cordate and dentate, sometimes 3-lobed, usually obtuse: peduncles axillary, 1-flowered, longer than the leaves: calyx-lobes ovate, acuminate, reflexed in fruit, shorter than the pinkish or red petals which are about 4 mm. long, and much shorter than the 5 somewhat tomentose carpels, which are erect and acute, becoming 8 mm. long.—Common throughout southern and western Texas.

8. **A. holosericeum** Scheele. Stout and leafy, 9 to 18 dm. high, remarkably velvety throughout with fine soft stellate pubescence, the young leaves and lower surfaces of older ones white, larger leaves sometimes nearly 3 dm. in diameter and on long petioles: upper leaves broadly cordate, with usually a deep sinus, acuminate, more or less toothed and often somewhat 3-lobed: peduncles axillary, several to many-flowered, becoming rather closely paniculate above: calyx-lobes ovate, cuspidate, densely pubescent, shorter than the deep orange-yellow petals which are 12 mm. or more long, but inclosing the 5 densely pubescent and beaked carpels, which are peculiar in having a pair of seeds in the upper part and but one in the lower.—Throughout southern and western Texas.

9. **A. crispum** Don. Suffrutescent and slender, 3 to 6 dm. high, more or less branching, with velvety leaves, which are round-cordate, acuminate, and finely crenate, upper ones nearly sessile: peduncles axillary, 1-flowered, elongated and filiform, refracted after flowering: petals whitish, 6 to 8 mm. long, exceeding the calyx: carpels 10, beakless, inflated and wrinkled, hispid, 8 to 12 mm. long.—All along the southern frontier of Texas. Well marked by its inflated carpels.

9. WISSADULA Medik.

Differs from *Abutilon* only in the carpels having a partition across the cell above the lower seed.

1. **W. mucronulata** Gray. Suffrutescent: leaves cordate, entire, green and smoothish above, paler and somewhat velvety beneath: peduncles paniculately several-flowered: flowers very small, with obovate petals: carpels obovate, smoothish, with 2 short horns, 4 to 5-seeded.—On the Mexican side of the Rio Grande, and more than likely to occur within our boundaries.

10. MALACHRA L.

Herbs, hispid with sharp bristly hairs, with long-petioled, rounded, usually palmately lobed leaves, axillary peduncles terminated by a head of 5 or more sessile flowers inclosed by an involucre of 3 or more cordate floral leaves, yellow or whitish petals, 10 styles, and 5 one-ovuled obtuse and pointless dry carpels.

1. **M. palmata** Mœnch. Floral leaves usually more or less white with purplish veins: calyx-lobes ovate-lanceolate: carpels glabrate, nearly equaling the connivent calyx.—Collected near Brazos Santiago by Mr. Nealley, and somewhere in southern Texas by Charles Wright.

11. PAVONIA Cav.

Shrubs or rarely herbaceous, with petioled leaves, usually solitary flowers on axillary peduncles, a 5 to 15-bracted calyx, 10 styles, and 5 one-ovuled dry crustaceous obtuse carpels.

1. **P. lasiopetala** Scheele. A low shrubby plant with velvety pubescence: leaves cordate-ovate, sharply and irregularly dentate, 2.5 to 3.5 cm. long, the petiole nearly as long: flowers handsome, rose-colored, 3 to 4 cm. in diameter, the petals sparingly pubescent: carpels barely united at base, obovate or rounded, naked or sometimes with 3 awns. (*P. Wrightii* Gray.)—Throughout southern and western Texas. A beautiful and showy plant, producing an abundance of rose-colored blossoms throughout the season.

12. MALVAVISCUS Dill.

Shrubs, with usually rounded and obscurely lobed leaves, axillary peduncles bearing single showy blood-red or scarlet flowers, calyx with 7 to 12 persistent linear bractlets, a long-exserted stamen-tube, 10 styles, and 5 one-ovuled carpels connate into a depressed-globose grooved berry-like fruit.

1. **M. Drummondii** Torr. & Gray. Stem tall and branching, minutely tomentose (as are the somewhat velvety lower leaf-surfaces): leaves broadly cordate, somewhat 3-lobed, coarsely and crenately toothed, 5 to 6.5 cm. long and about as broad: flowers solitary on axillary peduncles or several together on short flowering branches: bractlets somewhat spatulate, nearly as long as the calyx and erect: stamen-column twice as long as the corolla: fruit scarlet.—From the Rio Grande to the Colorado and northeastward. A very handsome plant, known as "may-apple." The scarlet fruit, produced in late summer, is eaten both raw and cooked.

13. HIBISCUS L. (Rose-mallow.)

Stout herbs or often shrubby, with large and showy axillary and solitary flowers, a many-bracted calyx, a stamineal column antheriferous much of its length and naked at summit, 5 capitate and spreading stigmas, and a 5-celled loculicidal many-seeded pod.

1. **H. cardiophyllus** Gray. Low and rather stout, 25 to 50 cm. high, tomentose, from a woody perennial root: leaves broad cordate, crenulate-dentate, obtuse or acutish, velvety above, very densely white-tomentose beneath, 3.5 to 5 cm. or more broad: peduncles equaling or exceeding the leaves: bractlets 9 or 10, conspicuous, spatulate-lanceolate, tomentose, about as long as the broadly lanceolate calyx-lobes: petals over 2.5 cm. long, spreading, deep rose-purple, exceeding the stamen-column: pod glabrous, shorter than the calyx, with puberulent seeds.—Rocky hill-sides, on or near the Rio Grande, from near its mouth to the Pecos and perhaps further west. San Diego is the station most distant from the river so far as reported.

2. **H. denudatus** Benth., var. INVOLUCELLATUS Gray. Stems suffruticose, 3 to 6 dm. high, much branched, very tomentose: leaves broadly ovate or nearly orbicular, rounded or obtuse and dentate above: peduncles shorter, 6 to 24 mm. long: bractlets 5 to 7, inconspicuous, setaceous, about the length of the calyx-tube: calyx-lobes lanceolate: petals light purple, about 2.5 cm. long: pod shorter than the calyx, with

densely silky seeds.—Bluffs and mesas along the upper Rio Grande, mostly above the Pecos.

3. **H. Coulteri** Gray. Low, 10 to 30 cm. high, strigose with appressed stellate hairs: leaves strigose, 3-lobed or 3-cleft, the lobes oblong or lanceolate and irregularly toothed, or the lowest leaves ovate and undivided: peduncle much exceeding the leaf: involucel, calyx, and young pod strongly hispid: bractlets 10, linear-setaceous, about equaling the lanceolate-acuminate calyx-lobes, and about half as long as the showy sulphur-yellow broadly obvoate petals: pod globose, at length glabrate: seeds clothed with long woolly hairs.—Hills and mountains of western Texas, west of the 100th meridian.

14. FUGOSIA Juss.

Like *Hibiscus*, except that the style is club-shaped and undivided, or with short erect branches, and the pod 3 or 4-celled: flowers yellow.

1. **F. Drummondii** Gray. Glabrate: stems decumbent, from a perennial root: leaves oval, coarsely and irregularly mucronate-dentate, 2.5 to 5 cm. long, on rather long petioles: bractlets 7 to 9, linear, but little shorter than the calyx: corolla sulphur-yellow or pale yellow, over 2.5 cm. in diameter: pod subglobose, glabrous, equaling the calyx: seeds with short wool.—Found in Gonzales County many years ago by Drummond, but, so far as known, not since found.

STERCULIACEÆ.

A large tropical and polymorphous family chiefly of shrubs and trees, closely related to *Malvaceæ* and *Tiliaceæ*, distinguished from the former by the 2-celled (rarely 3-celled) anthers, from the latter by the stamens being opposite to the petals, and more or less monadelphous.—The stamens in ours are 5, with the filaments connate at base, and with interposed teeth (*staminodia*) representing abortive filaments.

* Petals flat and erect or spreading: anthers 2-celled.

1. **Hermannia.** Filaments monadelphous at base around the stipe of the ovary; anthers sagittate, with acuminate cells; staminodia none: pod 5-lobed, many-seeded.

2. **Melochia.** Filaments monadelphous at base into a tube adnate to the claws of the petals and which bears 5 alternating tooth-like staminodia; anthers oblong, with cells obtuse at both ends: pod sessile, with 5 salient angles and 1-seeded cells.

* * Petals hooded and inflexed at apex: anthers 3-celled.

3. **Ayenia.** Filaments united into a pedicellate 5-lobed cup, the anthers sessile in the sinuses (the lobes representing staminodia) and of 3 parallel ovoid cells: pod warty, with 1-seeded cells.

1. HERMANNIA Tourn.

Shrubs (or nearly herbaceous), usually hoary or hirsute with stellate pubescence, with alternate stipulate leaves, axillary 1 to many-flowered peduncles of yellow or purple flowers, a 5-cleft persistent calyx, spatulate or obovate erect petals with hollow claws, and stamens and pod as in generic key.

1. **H. Texana** Gray. Leaves roundish to oblong, truncate or cordate at base, irregularly toothed: stem, leaves, calyx, ovary, and pod densely stellate pubescent, the pod developing also subulate pubescent appendages: anthers more or less pubescent.—Ravines or stony prairies between the Colorado and the Rio Grande, and especially abundant along or near the upper Rio Grande to the extreme western border.

2. MELOCHIA L.

Shrubby plants, with alternate serrate leaves, several-flowered peduncles terminal, axillary, or opposite the leaves, a 5-cleft persistent calyx, spreading violet, purple, or white petals, and stamens and pod as in generic key.

1. **M. pyramidata** L. Branches marked with a broad pubescent longitudinal line from base of each petiole: leaves ovate-lanceolate, toothed, glabrous: peduncles as long as the petioles or longer, and usually opposite to them: pods pyramidal, 5-angled, the angles compressed and outwardly cuspidate at base.—In western Texas, on or near the Rio Grande, and as far down as Laredo; also on the upper Guadalupe.

2. **M. tomentosa** L. is near the last, but has leaves usually tomentose, flower fascicles mostly terminal on short branches, larger flowers, and a trapezoid-pyramidal pod with angles not so pointed.—A species found on the Mexican side of the lower Rio Grande, and apt to occur within our border.

3. AYENIA L.

Low shrubby plants, with small leaves, minute axillary flowers, a 5-parted calyx, petals with long capillary claws and connivent over the stigma, peculiar stamen structure as in generic key, and rough pods.

1. **A. pusilla** L. Stems mostly simple, prostrate, with minute stellate pubescence: leaves roundish or oblong, coarsely serrate, 8 to 16 mm. long: flowers solitary or few in a cluster, purple, reflexed in fruit: pod stipitate, depressed-globose, lobed, muricate.—Rocky places, western Texas, and reported as far down the Rio Grande as Eagle Pass.

2. **A. microphylla** Gray. Low and shrubby, very branching: leaves very small, 4 to 6 mm. long, roundish-cordate, obtuse, coarsely toothed, on short petioles: flowers smaller: petals dark red, with shorter claws, the blade more or less lobed and glandular and with a recurved acumination from the broad shallow terminal notch: pod not stipitate, cinereous-pubescent and warty echinate.—Rocky and gravelly hills near El Paso, and extending down the Rio Grande to the "Great Bend."

TILIACEÆ. (LINDEN FAMILY.)

Trees, rarely herbs, chiefly tropical, differing from *Malvaceæ* in the deciduous calyx, distinct or polyadelphous stamens, and by the 2-celled anthers; and from our *Sterculiaceæ* by the indefinite stamens.

1. **Corchorus.** Herbaceous or shrubby, with short 1 to few-flowered peduncles opposite the ovate or lanceolate serrate leaves.

2. **Tilia.** Trees, with ample cordate leaves, and axillary peduncles connate to the middle with the axis of a large membranaceous bract.

1. CORCHORUS L.

Mostly herbaceous, with alternate leaves, yellow flowers on short peduncles opposite the leaves, 4 or 5 sepals and petals, the latter somewhat shorter, indefinite distinct stamens, and a silique-like elongated 2 to 5-celled pod with numerous seeds in two series.

1. **C. pilolobus** Link. Glabrous or somewhat pubescent: leaves ovate or lanceolate, acute, equally serrate: sepals and petals commonly 4: pod linear, 2-valved, nearly glabrous, conspicuously acuminated by the undivided style.—Along the upper Guadalupe, the San Pedro, and the lower Rio Grande, and probably most of the streams of the southeastern border.

2. TILIA Tourn. (Linden. Basswood.)

Large trees, with soft white wood, very fibrous and tough inner bark, more or less heart-shaped and serrate alternate leaves (oblique and often truncate at base), small cymes of cream-colored fragrant flowers hung on an axillary peduncle united to a large strap-shaped bract, 5 sepals and petals, numerous stamens in 5 clusters, and a dry and woody indehiscent globular fruit becoming 1-celled and 1 or 2-seeded.

1. **T. Americana** L. (Basswood.) Leaves large, green and glabrous or nearly so, thickish: floral bract usually tapering at base: fruit ovoid.—A large and handsome tree of the Atlantic States, extending in Texas to the valley of the San Antonio River.

LINEÆ. (Flax Family.)

Herbs (rarely shrubs), with sessile mostly entire leaves, usually ephemeral flowers, regular and symmetrical flowers 5-merous throughout, imbricated calyx, convolute petals, 5 stamens united at base, and a 10-seeded 5-celled pod (or 10-celled by false partitions).

1. LINUM Tourn. (Flax.)

Herbs, with tough fibrous bark, alternate (sometimes opposite) leaves without stipules or with glands in their place, persistent sepals and ephemeral petals, and a 5-celled pod with 2 seeds hanging from the summit of each cell, which is partly or completely divided into two by a false partition projecting from the back of the carpel, the pod thus becoming 10-celled.

* *Flowers large, blue: sepals not glandular-margined: carpels not cartilaginous at base: styles distinct.*

1. **L. perenne** L., var. Lewisii Eat. & Wright. Perennial: glabrous and glaucous, 3 to 9 dm. high: stems mostly cespitosely clustered: leaves often somewhat crowded, oval-linear, acute: flowers few on rather long peduncles: sepals obtuse or acutish, the petals thrice as long: pod ovoid, obtuse. (*L. perenne* of most American authors.)—Very common among the hills of western Texas, especially west of the Pecos.

* * *Flowers rather small, yellow: sepals more or less glandular-ciliate or serrulate.*

– *Pod 2 to 3 mm. long, 10-valved: carpels not cartilaginous at base.*

++ *Leaves and bracts entire: no stipular glands.*

2. **L. Virginianum** L. Perennial, glabrous, 4.5 to 6 dm. high, erect, rather loosely branched, the flowering branches recurved-spreading or corymbose: leaves remote or somewhat approximated, some of the lowest usually opposite, oblong or oblong-lanceolate, mostly acute: sepals ovate, taper-pointed, keeled: pod depressed-globose, very obtuse, about 2 mm. long, the false partitions essentially complete.—Dry soil, throughout the Atlantic States and extending into Texas, and perhaps as far west as our eastern limit.

3. **L. Greggii** Engelm. Like the last, but lower, more strict and ascending, 25 cm. high, with smaller leaves, more contracted cymes of scattered flowers, distinct styles with coherent stigmas, and the false partitions of the pod incomplete.—A Mexican species, reported by Dr. Havard from the mountains (Guadalupe and Chisos) of western Texas. Altogether a smaller, stricter, smaller-leaved species than *L. Virginianum*. The leaves are apt to be quite closely imbricated at the base of the stem.

++ ++ *Upper leaves and bracts glandular-ciliate or serrulate: stipular glands usually present.*

4. **L. sulcatum** Riddell. Annual and glabrous, corymbose above: leaves alternate, lanceolate, very acute, 3-nerved (lateral veins marginal): sepals lanceolate, very acute, keeled and conspicuously glandular-serrulate: styles distinct to or below the middle: pod ovoid, rather acute, about 3 mm. long, rather shorter than the calyx, its false partitions incomplete.—Dry soil, throughout northern and central Texas.

5. **L. rupestre** Engelm. Perennial and somewhat puberulent-roughened: leaves more or less opposite below, alternate above, linear-acute, 1-nerved, sparingly hairy on the margins and midrib below, the upper remote and appressed: sepals ovate, very acute or almost bristle-pointed, keeled and glandular-serrulate: styles distinct: pod globose-ovoid, about equaling the calyx, its false partitions incomplete.—Southwestern Texas.

+ + *Pod 4 to 5 mm. long, 5-valved: carpels with triangular cartilaginous insertions at base: false partitions complete.*

++ *Leaves rather remote on the branches, never imbricated: false partitions more or less thickened outwardly.*

6. **L. aristatum** Engelm. Green or somewhat gray, often puberulent-roughened, with slender branches: leaves rather rigid, erect, narrow, tapering to an awn-tipped point: sepals rather narrow, lanceolate, broadly scarious and very slender-pointed, mostly twice as long as the pod, in which the false partitions are thickened for a very small distance at the back.—Valley of the Rio Grande near El Paso.

7. **L. rigidum** Pursh. Glaucous, glabrate or slightly puberulent, stouter: leaves rather rigid, erect, narrowly lanceolate or linear, mostly mucronate and 1-nerved: sepals broader, slender-pointed and more or less awned, strongly 1 to 3-nerved, only about a third longer than the pod, in which the false partitions are thickened for about one-third their extent.—Apparently throughout the State.

8. **L. Berlandieri** Hook. Green: leaves less rigid, broader and more spreading, nearly all entire, pointed, more or less 3-ribbed: sepals lanceolate, tapering to a very acute awned tip, usually strongly 3-ribbed, about a third longer than the pod, in which the false partitions are thickened for about one-half their extent.—In sandy ground throughout Texas.

+ ++ *Leaves crowded and overlapping on the slender branches: false partitions entirely membranaceous.*

9. **L. multicaule** Hook. Glaucous, the slender rough-angled stems simple below: leaves imbricate-appressed over the entire stem, minute, narrowly triangular, bristle-pointed, more or less scarious-margined, 1-nerved: sepals broadly ovate, almost equaled by the globose-ovoid pod.—Throughout Texas.

MALPIGHIACEÆ. (MALPIGHIA FAMILY.)

Trees or shrubs, rarely herbaceous, often climbing, with opposite entire or barely serrulate leaves, pubescence (when present) appressed and fixed by the middle, 5 sepals, 5 petals which are conspicuously clawed and pinnately veined, usually 10 monadelphous stamens, 3 distinct or united styles, and 3 carpels more or less connate into a 3-celled ovary with solitary suspended ovules.

* Stamens 10, all perfect: styles 3.

1. **Malpighia.** Calyx with 6 to 10 glands: flowers mostly in axillary umbel-like clusters: leaves without glands: fruit a stony 3-celled 3-lobed drupe, with carpels crested or winged on the back and indehiscent.

2. **Galphimia.** Calyx without glands: flowers in terminal racemes: leaves biglandular on or near the petiole: fruit a 3-lobed capsule, the carpels separating and dehiscent.

* * Stamens 5 or 6, all perfect or some without anthers: style 1.

3. **Aspicarpa.** Erect shrubs: stamens 5, only 2 perfect: fruit a solitary crested nut.

4. **Janusia.** Shrubby and often climbing: stamens 6, all perfect or some without anthers: fruit of 2 or 3 samaras (winged as in the maple).

1. MALPIGHIA L.

Shrubs, with opposite short-petioled leaves, small stipules, small reddish or purple flowers in axillary umbels with slender articulated bracteolate pedicels, and fruit as in generic key.

1. **M. glabra** L. Shrub, 3 to 12 dm. high: leaves ovate, acute or acuminate, glabrous, 2.5 to 3.5 cm. long.—A Mexican plant of the lower Rio Grande and extending to Corpus Christi Bay in Texas.

2. GALPHIMIA Cav.

Shrubby or barely suffruticose, with opposite leaves biglandular near the base or at apex of the short petioles, yellow or orange (reddish with age) flowers in terminal racemes and on articulated bracteolate pedicels, and fruit as already given.

1. **G. angustifolia** Benth. Low, 3 to 6 dm. high, mostly glabrous, with slender stems herbaceous above the base: leaves glaucescent, oblong to lanceolate or linear: racemes loose, the small yellow flowers quickly turning red and refracted in fruit on the articulated pedicels. (*G. linifolia* Gray.)—Rocky hills and prairies between the Colorado and the Rio Grande.

3. ASPICARPA Lag.

Slender, erect and branching, shrubby, with 2 forms of flowers: *normal*, with glandular calyx, fimbriate-ciliate petals, 5 stamens and 2 of them perfect; but the fruit chiefly from the *abnormal* and more precocious flowers which have no glands on the calyx, are apetalous, have a single rudimentary anther and a single more or less crested nut.

1. **A. hyssopifolia** Gray. Stems erect, numerous from a woody base, 12.5 to 30 cm. high: leaves linear-lanceolate or lowest oblong, hispid-ciliate, otherwise mostly glabrous, veinless: flowers axillary and solitary, petaliferous ones peduncled, apetalous ones closely sessile in the lower axils: carpels reticulate, acutely crested on the back.—River valleys between the Colorado and the Rio Grande, and extending west of the Pecos.

2. **A. longipes** Gray. Stems numerous from a woody base, very hirsute with appressed centrally fixed hairs, diffusely decumbent or procumbent, 3 to 9 dm. long: leaves ovate or ovate-oblong, cordate at base, pubescent both sides, primary veins conspicuous underneath: apetalous fertile flowers on long peduncles (1.5 to 3 cm. long) with 2 small leaf-like bracts at apex: petaliferous flowers 3 or 4 together on slender pedicels terminating similar but longer and more foliaceous-bracteate peduncles or axillary filiform branches: carpels smoothish.—Rocky hills west of the Pecos.

4. JANUSIA A. Juss.

Slender twining or trailing plants, with 2 forms of yellow flowers in axillary umbellate clusters, the *normal* with a gland-bearing calyx, conspicuous clawed petals, a 3-angled style and 3 ovaries, the *abnormal* with an eglandular calyx, often rudimentary petals, no style and 2 ova-

ries, both forming a corresponding number of samaras (fruits with maple-like wings).

1. **J. gracilis** Gray. Stems and branches very slender, twining or trailing: leaves lanceolate-linear, 2.5 cm. long, 2 to 4 mm. wide, mostly acute at both ends, the margin with 2 or 3 tooth-like glands near the base, both surfaces (as well as the stem) silky with close-pressed hairs: peduncles mostly dichotomously 2-flowered; bracts linear, as long as the pedicels, which are minutely bibracteolate in the middle.—Apparently common throughout Texas south of the Colorado and west to New Mexico.

ZYGOPHYLLEÆ. (BEAN-CAPER FAMILY.)

Herbs, shrubs, or trees, with opposite pinnately compound dotless stipulate leaves, symmetrical 4 or 5-merous flowers solitary on lateral or terminal naked peduncles, stamens as many or twice as many as petals, and a single style terminating a 2 to 12-carpeled ovary which ripens dry.

1. **Tribulus.** Leaves abruptly pinnate, 6 to 10-foliolate: fruit tuberculate: herbs.
2. **Larrea.** Leaves 2-foliolate: fruit densely hairy: heavy-scented shrub.
3. **Guiacum.** Leaves abruptly pinnate, 8 to 16-foliolate: fruit smooth, with 2 to 5 acute or wing-like angles: trees (or shrubs) with very hard wood.

1. TRIBULUS L.

Loosely branched hairy prostrate herbs, with abruptly pinnate opposite leaves (alternate ones smaller or wanting), solitary axillary white or yellow flowers, 5 mostly persistent sepals, 5 fugacious petals, 10 stamens, and a lobed fruit separating from the persistent axis into 5 to 12 indehiscent 1-seeded tuberculate or winged or spinose carpels.

1. **T. maximus** L. Stems at length elongated: leaflets 3 or 4 pairs, ovate-oblong, 6 to 12 mm. long, more or less oblique: peduncles 12 to 25 mm. long: sepals very hairy, linear, acuminate, 4 mm. long: petals a half longer: fruit 4 mm. high, beaked by a stout style about as long, the carpels roughly tuberculate. (*Kallstræmia maxima* Torr. & Gray.)—Common in dry soils through southern and western Texas.
2. **T. grandiflorus** Watson. Hispid with usually longer and more spreading hairs: leaflets 4 to 6 pairs: peduncles more elongated: sepals 6 to 12 mm. long, the petals usually twice longer: fruit rather more sharply tuberculate, the beak 6 to 10 mm. long. (*Kallstræmia grandiflora* Torr.)—Valleys of the upper Rio Grande and its tributaries, to New Mexico.

2. LARREA Cav. (CREOSOTE BUSH.)

Evergreen heavy-scented shrubs, with nodose branches, opposite 2-foliolate leaves, solitary yellow flowers, 5 deciduous sepals, 5-clawed petals, 10 stamens with filaments winged below, and a globose shortly stipitate densely hairy fruit of 5 indehiscent 1-seeded carpels.

1. **L. Mexicana** Moric. Diffusely branched, 12 to 30 dm. high, densely leafy, of a yellowish hue: leaves nearly sessile, the thick resinous leaflets inequilateral, oblong, 6 to 12 mm. long, with a broad attachment to the rhachis, somewhat curved: sepals ovate, obtuse, silky: petals bright yellow, 6 to 8 mm. long: fruit 5 mm. in diameter, beaked by the slender style.—Very common on gravelly mesas and bluffs west of the Pecos. The leaves are sticky with a strongly scented gum or resin, and with the green branches burn with a bright blaze. It has various reputed medicinal properties.

3. GUIACUM Plum. (LIGNUM-VITÆ TREE.)

Trees or shrubs, with very hard wood, alternate commonly knotty branches, opposite abruptly pinnate leaves with several pairs of coriaceous entire reticulate-veined smooth and shining leaflets, terminal peduncles with one or several rather large blue or purplish flowers, 5 deciduous sepals and petals, 10 stamens with naked filaments, and a smooth strongly 2 to 5-angled fruit.

1. **G. angustifolium** Engelm. A straggling shrub (on bluffs) or a small tree (in valleys), with very smooth branches and leaves: leaflets 8 to 16-reticulated: purple flowers 12 mm. in diameter: ovary 2-celled, forming an obcordate 2-lobed pod, with 2 yellow seeds as large as small beans. (*Porliera angustifolia* Gray.)—From the lower Rio Grande to the Colorado, and west to the Pecos and more sparingly beyond. Called "guayacan," and of considerable repute in various diseases.

GERANIACEÆ. (GERANIUM FAMILY.)

A family of such diverse habit and structure as to be very difficult of definition, but ours are mostly herbs, with toothed, lobed, or compound leaves with or without stipules, regular 5-merous flowers on axillary peduncles, 5 or 10 stamens, and a 5-lobed and 5-celled ovary with a central axis.

* Carpels 1-seeded, separating elastically from the long-beaked central axis from below upwards, the styles forming long tails which become revolute upwards or spirally twisted: stipules present.

1. **Geranium.** Fertile stamens 10: tails of the carpels not bearded.
2. **Erodium.** Fertile stamens 5: tails of the carpels bearded inside.

** Carpels combined into a 5-celled few to many-seeded loculicidal pod: stipules rare.

3. **Oxalis.** Sepals, petals, and styles 5: stamens 10: leaves mostly compound with leaflets entire or notched at the end.

1. GERANIUM L. (CRANESBILL.)

Annual or perennial herbs, with palmately lobed and mostly opposite leaves, scarious stipules, axillary peduncles bearing 1 to 3 violet or rose-colored or white flowers, and stamens and carpels as already given.

1. **G. cæspitosum** James. Perennial from a stout caudex, more or less decumbent spreading and cespitose, canescent but not glandular: leaves round-reniform, 3-parted with cuneate divisions, the lower once or, especially on the radical leaves, twice cleft on the lower side: sepals long-pointed: petals purple or white, 8 to 12 mm. long, villous within: filaments a third longer than the pistil: carpels more or less villous: seeds reticulate.—In the mountains west of the Pecos.

2. **G. Carolinianum** L. Annual or biennial, stout-stemmed, spreading when large, loosely gray-pubescent and mostly dirty-glandular: leaves incisely 3 to 5-parted, the cuneate divisions more or less deeply cut-toothed or dissected into linear lobes: peduncles and pedicels short, often densely crowded: sepals ovate, tapering to a prominent awn: petals rose-colored, about equaling the calyx: carpels villous-hispid: seed oblong and low-reticulate.—Throughout Texas, where it is associated with var. TEXANUM Trelease, in which the seeds are round and deeply pitted.—Collected near New Braunfels by Lindheimer in 1848.

2. ERODIUM L'Her. (STORKSBILL.)

Like the last, but with only 5 stamens, the carpel-tails long-bearded on the inner side and becoming spirally twisted, the terminal or lateral peduncles umbellately 2 to several-flowered with a 4-bracted involucre at the base of the pedicels, and flowers small.

* *Leaves cordate and lobed.*

1. **E. macrophyllum** Hook. & Arn. Pubescence with more or less of spreading glandular hairs: leaves reniform-cordate, 2.5 to 7.5 cm. broad; stipules small: peduncles elongated: sepals broad, 10 to 12 mm. long: carpels oblong, with the stout beak 3.5 cm. long.—"Texas to California," *fide* Trelease.

2. **E. Texanum** Gray. Pubescence appressed, not glandular: leaves ovate-cordate, smaller and more deeply lobed, usually about 2.5 cm. long: peduncles shorter: sepals narrower, 6 to 10 mm. long: carpels narrow, with the slender beak 3.5 to 7.5 cm. long.—Throughout southern and western Texas.

* * *Leaves pinnate or pinnatifid, the divisions lobed or toothed.*

3. **E. cicutarium** L'Her. Hairy, much-branched from the base: leaves pinnate, the leaflets laciniately pinnatifid with narrow acute lobes: peduncles exceeding the leaves, bearing a 4 to 8-flowered umbel: sepals 2 to 6 mm. long, acute: petals bright rose-color, a little longer: tails of the carpels 2.5 to 5 cm. long: pedicels slender, at length reflexed, the fruit still erect.—Introduced from Europe into the Western States, and reported as occurring in southern and western Texas. Known by various popular names, as "alfilaria," "pin-clover," "pin-grass," and valuable as a forage plant.

3. OXALIS L. (WOOD-SORREL.)

Low, often acaulescent herbs with a sour juice, alternate 1 to 3-foliolate leaves, few to many-flowered peduncles, 10 stamens, and a 5-celled columnar or ovoid loculicidal pod, with 2 to several seeds in each cell.—Several species produce small peculiar flowers precociously fertilized in bud and particularly fruitful. The ordinary flowers are often dimorphous or trimorphous in the relative length of stamens and styles.

* *Caulescent: flowers yellow (sometimes tinged with red-purple).*

\+ *Leaves unifoliate, with free setaceous stipules.*

1. **O. dichondræfolia** Gray. Perennial, appressed-pubescent, with spreading or procumbent branches: the single leaflet round-ovate, wavy-margined, cordate, abruptly depressed and mucronate at apex, 12 to 30 mm. long, petiole as long: flowers 12 mm. long, solitary on axillary peduncles equaling or surpassing the leaves, and with 2 setaceous bracts near the summit: sepals triangular-lanceolate, acute, dilated at base: petals half as long again as the calyx: pod round-ovoid, 10 mm. long, pubescent: seeds with prominent tubercles in transverse or oblique rows.—Common throughout southern and western Texas.

\+ \+ *Leaves pinnately 3-foliate, without stipules.*

2. **O. Berlandieri** Torr. Perennial, much branched, gray- or rusty-pubescent: leaves on petioles about 15 mm. long, terminal leaflet obovate-oblong, 10 to 15 mm. long, on a stalk half as long, lateral ones smaller, opposite, oblong, very short-stalked, all obliquely emarginate at apex and nearly glabrous above: flowers about 12 mm. long, umbellate at the ends of axillary peduncles about equaling the leaves: sepals lanceolate, acute, the petals thrice as long: pod ovoid, about 5 mm. long, pubescent: seeds fusiform, somewhat flattened, with 8 prominent longitudinal zigzag wings or rows of teeth.—Southeastern Texas, from the Nueces to the Rio Grande.

+ + + *Leaves palmately 3-foliolate, with subsessile more or less obliquely obcordate-cuneate leaflets, and with short adnate stipules or none.*

3. **O. Wrightii** Gray. Perennial from a stout conical subterranean caudex, at the apex of which the decumbent leafy branches are clustered; otherwise very similar to the next species.—In the mountains west of the Pecos.

4. **O. corniculata** L. Annual or perennial, erect or procumbent, gray or rusty strigose-pubescent, with slender stems not from a caudex: the 3 leaflets broader than long, obcordate, with round or truncate ciliate stipules: flowers 5 to 8 mm. long (sometimes longer), solitary or paired on 2-bracted peduncles equaling or exceeding the leaves: sepals oblong, rather obtuse: petals obscurely crenulate or emarginate, about twice as long as the calyx: styles about equaling the long stamens: pod erect, oblong, strigose, 10 to 20 mm. long: seeds ovate, acute, much flattened, with 1 to 3 deep marginal grooves and numerous transverse ridges.—Throughout Texas, as well as the entire country. A cosmopolitan and exceedingly variable plant. Var. (?) MACRANTHA Trelease is decumbent from a stout or slender horizontal rootstock, the branches erect, pilose with spreading pointed hairs: leaflets narrower: flowers pale, 10 to 15 mm. long, extremely variable in relative length of stamens.—Eastern and southern Texas. Var. STRICTA Sav. is an erect annual (sometimes perennial), subglabrous to villous: leaves without stipules: inflorescence a dichotomous cyme or umbellate: flowers about 8 mm. long: petals nearly entire. (*O. stricta* L. of most authors.)—With the type, but flowering later.

* * *Acaulescent: leaves and scapes from a scaly bud: flowers rose-violet: leaves palmately 3-foliolate.*

5. **O. violacea** L. Leaflets about 10 mm. long, broadly obcordate with an open sinus, the midrib tipped on the lower side with a pair of usually prominent confluent callosities: scapes several, longer than the leaves, umbellately 3 to 12-flowered: sepals ovate, obtuse, with 2 more or less confluent orange callosities on the outer side at tip: petals thrice as long as calyx: pod round-ovoid, about 5 mm. long, glabrous: seeds compressed ovoid, irregularly rugose-tuberculate.—A common species of the Atlantic States, only reported as yet west of the Pecos in Texas.

6. **O. vespertilionis** Torr. & Gray. Leaves few, the leaflets open V-shaped, more or less conspicuously calloused in the sinus, the linear blunt lobes 10 to 25 mm. long, usually 5 mm. or less wide: scape mostly solitary, longer than the leaves, umbellately about 6-flowered: sepals with 4 to 6 narrow callosities: pod ovoid-oblong, 10 mm. long, somewhat pubescent: seeds compressed, round-ovoid, longitudinally 8 to 10-creased and transversely wrinkled. (*O. Drummondii* Gray.)—Between the Colorado and the Rio Grande and west to New Mexico.

RUTACEÆ. (RUE FAMILY.)

Trees, shrubs, or herbs, with pellucid or glandular-dotted aromatic opposite or alternate leaves, generally regular and symmetrical flowers, 4 or 5 sepals and petals, as many or twice as many stamens inserted outside of an hypogynous disk, and the 2 to 5 carpels separate or combined into a compound ovary of as many cells and raised on a prolongation of the receptacle (*gynophore*) or disk.—Here belong oranges, citrons, lemons, etc.

* Ovary deeply 2 to 5-lobed or even quite distinct.

+ Herbs or shrubby only at base: leaves alternate.

1. **Peganum.** Herbs: leaves many-parted: fruit a globose 3-lobed nearly sessile pod: stamens 12 to 15.

2. **Thamnosma.** Shrubby at base: leaves simple and entire: fruit a 2-lobed coriaceous short-stipitate pod: stamens 8.

+ + Shrubs or trees.

3. **Choisya.** Low unarmed shrubs: leaves opposite (or nearly so), radiately 5 to 10-foliolate: stamens 8 to 10.

4. **Xanthoxylum.** Trees or shrubs, mostly prickly: leaves alternate and pinnate: stamens 3 to 5.

* * Ovary entire or slightly lobed.

5. **Ptelea.** Shrubs or small trees: leaves opposite and alternate, 3-foliolate: stamens 4 or 5: fruit orbicular and broadly winged.

6. **Helietta.** Shrubs: leaves opposite, 3-foliolate: stamens 3 or 4: fruit of 3 samaras (winged fruits).

7. **Amyris.** Shrubs: leaves mostly alternate, 3-foliolate: stamens 8: fruit a globose or ellipsoidal drupe.

1. PEGANUM L.

Branching herbs, with alternate many-parted leaves, pale yellow flowers on solitary axillary peduncles, conspicuous foliaceous and pinnatifid sepals, 12 to 15 stamens, and a globose 3-lobed nearly sessile pod.

1. **P. Mexicanum** Gray. Stems 20 to 30 cm. high, very leafy, pubescent: leaves with narrowly linear divisions: peduncle shorter than the flower: calyx and corolla 4-merous, the 3 to 5-parted leaf-like sepals twice as long as the petals.—Abundant in northern Mexico near the Rio Grande, and found in the Eagle Mountains of extreme western Texas.

2. THAMNOSMA Torr.

Low glandular desert more or less shrubby plants, strongly scented, with alternate linear leaves, solitary yellow or purple axillary flowers, 4 sepals, 4 erect petals, 8 stamens at the base of a cup-shaped lobed disk, and a more or less stipitate 2-lobed pod.

1. **T. Texanum** Torr. Woody only at base, the slender stems 7.5 to 40 cm. high: leaves scattered and soon deciduous: flowers small, on short naked pedicels, yellow tinged with purple: pod very short stipitate, lobed nearly to the middle. (*Rutosma Texanum* Gray.)—From the Colorado to the Rio Grande and west to New Mexico. Apparently abundant in the mountains west of the Pecos.

3. CHOISYA HBK.

Low unarmed shrubs, with opposite radiately 5 to 10-foliolate leaves, white mostly solitary long-pedicelled axillary and terminal flowers, small scale-like petals, 8 to 10 stamens, and a 5-lobed 5-beaked pod.

1. **C. dumosa** Gray. Low and much branched, pubescent, 9 to 18 dm. high: leaflets narrowly linear and coriaceous: flowers either solitary or 2 to 4 and umbellate: ovary 5-lobed, hairy, the cells produced above into a short incurved beak, with ventrally attached styles; but two of the carpels ripening, these becoming ovate, compressed and dotted. (*Astrophyllum dumosum* Torr.)—Mountain cañons in El Paso County and adjacent Mexico.

4. XANTHOXYLUM L. (Prickly ash.)

Shrubs or trees, with pinnate alternate leaves, more or less prickly stems and leafstalks, small greenish diœcious flowers, 4 or 5 stamens, 2 to 5 separate pistils but with conniving styles, and thick fleshy 1 to 2-seeded pods.

1. **X. Clava-Herculis** L. (PRICKLY ASH. TOOTHACHE-TREE.) Small tree, with bark armed with warty prickles: branches and (generally) petioles armed with long prickles: leaves 7 to 9-foliolate; leaflets ovate-lanceolate, crenate-serrulate: panicles terminal: stamens 5: carpels 3, nearly sessile. (*X. Carolinianum* Lam.)—A species of the Gulf States which extends into Texas to the 100th meridian. A form occurs in Texas with all the leaves 3-foliolate. Var. FRUTICOSUM Gray is shrubby, with shorter ovate or oblong more strongly crenate leaves, and 2 carpels.—From the Colorado to the Rio Grande.

2. **X. Pterota** HBK. Small tree or shrub, with zigzag branches armed with short curved prickles: petioles winged; leaflets 7 to 9, small, obovate, coriaceous, crenate above the middle: flowers in axillary clusters: stamens 4: ovaries 2, but ripening a solitary globose pitted and dotted distinctly stipitate carpel.—A very common shrub on the lower Rio Grande, where it is called "colima." Reputed to have considerable medicinal value.

5. PTELEA L. (SHRUBBY TREFOIL. HOP-TREE.)

Shrubs or small trees, with opposite and alternate 3-foliolate leaves, greenish-white small polygamous flowers in compound terminal cymes, 4 or 5 sepals, petals and stamens, and a broadly winged orbicular fruit, the wing embracing a slender stipe.

1. **P. angustifolia** Benth. Leaflets oblong-lanceolate, somewhat rhomboidal, 2.5 to 6.5 cm. long, acute or acuminate, entire: petals 4 to 6 mm. long: fruit 12 to 16 mm. broad, emarginate at base and often above; stipe narrow, 2 to 4 mm. long.—From the Guadalupe to the Rio Grande and extending to the region about El Paso and westward.

2. **P. trifoliata** L. (HOP-TREE.) Like the last, but often more of a tree, with broader (ovate) and larger leaves (downy when young), smaller flowers, more broadly winged fruit not emarginate at base, and a longer thicker stipe.—Throughout southern and western Texas. Var. MOLLIS Torr. & Gray has branchlets, petioles, and lower leaf-surfaces clothed with a soft tomentose pubescence even when old.—Throughout central and western Texas, where it is the common form.

6. HELIETTA Tulasne.

Shrubs with opposite 3-foliolate leaves, terminal and axillary panicles of small purplish-white flowers, 3 or 4 sepals, petals and stamens, a very small glandular warty ovary, and an obconical fruit which finally separates into 3 or 4 samaras (winged fruits).

1. **H. parvifolia** Benth. A smooth shrub with grayish bark: leaflets rather pale green, oblanceolate to obovate, obtuse, the terminal one much the largest, the lateral ones variable in size and sometimes one or both wanting.—A common shrub on the bluffs of the lower Rio Grande, known as "barreta."

7. AMYRIS P. Browne. (TORCH-WOOD.)

Shrubs or trees with mostly alternate 3-foliolate leaves, panicled white flowers, 4 sepals and petals, 8 stamens, and fruit a globose 1-seeded drupe.

1. **A. parvifolia** Gray. A low shrub: leaflets only 12 to 18 mm. long, rhombic-ovate or narrower, obtuse, nearly all crenate or crenulate, dull and with rather inconspicuous reticulation; lateral ones short-petiolate or subsessile, as is sometimes the terminal one also.—On the Rio Grande below Brownsville.

SIMARUBACEÆ. (QUASSIA FAMILY.)

Ours are spiny shrubs with small alternate entire coriaceous or scale-like leaves which soon or easily fall, differing essentially from *Rutaceæ* in the dotless leaves and bitter bark.

1. Castela. Ovary deeply 4-lobed, the fruit of 4 distinct and widely spreading short-stipitate 1-seeded drupes: leaves coriaceous.

2. Kœberlinia. Ovary entire, 2-celled, many-seeded, becoming a small subglobose berry: leaves scale-like, caducous, the plant appearing leafless.

1. CASTELA Turpin. (GOATBUSH.)

Low shrubs with spinescent branches and axillary spines, thick rigid leaves which are shining above and silvery canescent beneath and with revolute margins, small saffron-colored subsessile polygamo-diœcious flowers solitary or fascicled in the axils, 4 sepals and much larger petals, 8 stamens inserted on a fleshy disk, and fruit consisting of 4 distinct and widely spreading red drupes (by abortion fewer).

1. C. Nicholsoni Hook. Shrub 9 to 15 dm. high: leaves lanceolate or oblong-linear, mucronulate: stamens hirsute.—Common on gravelly bluffs of the lower Rio Grande from Eagle Pass downwards. The bark is intensely bitter and is much used in medicine by the Mexicans, who call it "amargoso."

2. KŒBERLINIA Zucc. (JUNCO.)

A curious shrub or sometimes arborescent, apparently destitute of leaves, with green stiff very intricate branches tapering into thorns, minute scale-like caducous leaves, small white flowers in short lateral or umbelliform racemes near the apex of the branchlets, 4 sepals and petals, no disk, 8 stamens, and a small subglobose berry.

1. K. spinosa Zucc. A shrub apparently consisting of nothing but thorns, near the ends of which are borne the clusters of small flowers.—Common in the vicinity of the Rio Grande from Brownsville to El Paso and throughout western Texas.

MELIACEÆ. (MELIA FAMILY.)

Trees, chiefly with pinnately compound dotless leaves, stamens twice as many as the petals and united up to or beyond the anthers into a tube and a several-celled ovary.

1. MELIA L.

Trees with alternate bipinnate leaves, flowers in large compound panicles, 5 to 6-parted calyx, 5 or 6 linear-spatulate petals, filaments united into a cylindrical tube with a 10 to 12-cleft mouth and inclosing as many anthers, and a globose berry-like drupe.

1. M. Azedarach L. (PRIDE OF INDIA. CHINA TREE.) A tree 9 to 12 m. high: leaflets ovate, pointed, toothed: flowers numerous, fragrant, lilac: fruit yellowish, the stone bony and 5-celled, with a single seed in each cell.—A favorite shade tree, and extensively naturalized in central and southern Texas. Introduced from Asia.

ILICINEÆ. (HOLLY FAMILY.)

Trees or shrubs, with simple mostly alternate leaves, small white or greenish axillary 4 to 9-merous flowers throughout, and a berry-like drupe.

1. ILEX L. (HOLLY.)

Shrubs or small trees, with short-petioled leaves and minute pointed stipules, persistent calyx, somewhat gamopetalous corolla with oblong and very obtuse lobes, and stamens adnate to the base of the short tube.

* *Leaves coriaceous, evergreen: flowers 4-merous: drupe red or occasionally yellow.*

1. **I. opaca** Ait. (AMERICAN HOLLY.) Tall shrub or tree as much as 12 to 15 m. high: leaves broad, 5 to 10 cm. long, elliptical to obovate-oblong, pungently acuminate, mostly spinosely dentate: flowers in loose clusters along the base of the young branches and in the axils: calyx-segments acute, ciliate: drupes spheroidal or ovoid, 8 to 10 mm. long.—A holly of the Atlantic and Gulf States, extending into Texas to the valley of the Colorado.

2. **I. Cassine** Walt. (CASSENA. YAUPON.) Shrub or occasionally arborescent: leaves 12 to 36 mm. long, elliptical or elliptical-oblong, very obtuse, coarsely crenate-serrate: flower clusters nearly sessile: calyx-segments rounded, scarcely ciliate: drupes round, 4 to 6 mm. in diameter.—A holly of the Southern States, extending into Texas to the valley of the Colorado.

* * *Leaves deciduous: flowers 4 to 6-merous: drupe red or purple, about 6 mm. in diameter.*

3. **I. decidua** Walt. Shrub or small tree with glabrous gray twigs: leaves 5 to 6.5 mm. long, wedge-oblong or lance-obovate, obtusely serrate, glossy above, downy on the midrib beneath: calyx-segments broadly triangular, mostly dark-pointed and scarcely ciliate.—A species of the Southern States and extending in Texas to the valley of the San Antonio.

4. **I. Caroliniana** Trelease. Shrub or small tree: leaves 2.5 to 5 cm. long, ovate or lanceolate, acute or acuminate, sparingly serrate with low sharp teeth, slightly glossy, glabrous or with a few scattered hairs: calyx-segments rounded, usually strongly ciliate. (*I. ambigua* Chapman.)—A species of the Gulf States, and extending into Texas, but whether as far west as our eastern limit is uncertain.

CELASTRINEÆ. (STAFF-TREE FAMILY.)

Shrubs, with simple and undivided leaves, no stipules (or hardly any), small dull-colored or white (chiefly perfect) regular flowers, imbricated calyx and corolla, stamens as many as petals and alternate and inserted on the surface or margin of a broad disk, and mostly arillate seeds.

* Fruit dehiscent.

1. **Euonymus.** Leaves opposite: filaments very short, with didymous anthers having subglobose cells: ovary immersed in the disk: pod more or less lobed, colored, the seeds enclosed in a scarlet or orange aril.

2. **Maytenus.** Leaves alternate: filaments longer than the round-cordate anthers: ovary confluent with the disk below and narrowed to the slightly lobed stigma: pod obovoid, triquetrous, the seeds with a red aril open above.

* * Fruit indehiscent: leaves alternate or opposite: seeds not arillate.

3. **Schæfferia.** Flowers dicœcious, 4-merous: calyx shallow: anthers round-oval: stigma 2-cleft, with large incised or fimbriate divisions: ovary 2-celled, becoming a spheroidal (compressed or grooved when immature) 2-celled 2-seeded drupe.

4. Mortonia. Flowers perfect, 5-merous: calyx obconic: anthers subglobose and mucronulate: style 5-lobed: ovary 5-celled, becoming an oblong dry 1-celled 1-seeded fruit.

1. EUONYMUS Tourn. (SPINDLE-TREE.)

Shrubs or small trees, with incurved-serrate ample leaves, rather few-flowered dichotomous axillary cymes on elongated peduncles, and in ours greenish flowers and fruit rough with crowded acute warts.

1. **E. Americanus** L. (STRAWBERRY BUSH.) Low shrub: leaves 3.5 to 7.5 cm. long, ovate or ovate-lanceolate, acuminate, crenate-serrate, mostly glabrous: peduncles 1 to 3-flowered: flowers 6 to 12 mm. in diameter: fruit not deeply lobed.—An Atlantic and Gulf State species extending into Texas, but whether it reaches our eastern limit is uncertain.

2. MAYTENUS Molina.

Shrub or small tree, with coriaceous entire leaves, and small flowers solitary or clustered in their axils.

1. **M. phyllanthoides** Benth. Glabrous: leaves thick, dull, short-petioled, obovate-cuneate or cuneate-spatulate, rounded or emarginate at apex: flowers very short-stalked: fruit contracted at base or substipitate.—Along the Mexican side of the lower Rio Grande and presumably in adjacent Texas.

3. SCHÆFFERIA Jacq.

Shrubs or small trees, with firm glabrous leaves, and small flowers clustered in their axils.

1. **S. cuneifolia** Gray. Shrub with rigid somewhat spinescent twigs: leaves coriaceous, 12 mm. long, spatulate-cuneate, subsessile, rounded or emarginate at apex, entire or slightly crenate-lobed above, rugose-veiny: flowers sessile: fruit 4 mm. long, flattened, grooved on each side.—From the Nueces to the Rio Grande and west to the Pecos.

4. MORTONIA Gray.

Shrubs, with small thick entire crowded leaves, and small flowers clustered at the ends of the branches.

1. **M. sempervirens** Gray. Twigs and inflorescence pubescent: leaves small, 4 to 6 mm. long, smooth and glabrous, elliptical, obtuse to subacute, very short-petioled: pedicels bibracteate close to the flowers, the bracts obtuse: fruit oblong, 2 by 6 mm.—From the San Felipe to the Pecos.

2. **M. scabrella** Gray. Like the last, but leaves often twice as large, elliptical or round-elliptical, obtuse or stout-pointed, papillate-roughened.—On craggy limestone hillsides from the San Pedro to New Mexico.

3. **M. Greggii** Gray. Twigs and inflorescence pubescent: leaves longer, 12 to 25 mm. long, spatulate to oblong, tapering to a short petiole, mucronate or acuminate, glabrous: bracts acute: fruit shorter and thicker.—A Mexican species of limestone hills and extending into Texas.

RHAMNEÆ. (BUCKTHORN FAMILY.)

Shrubs or small trees, with simple undivided leaves, small and often caducous stipules, small flowers that are sometimes polygamo-diœcious and often apetalous, a conspicuous disk lining the calyx-tube, valvate

calyx, stamens as many as its lobes and alternate with them (opposite the petals when present), and a 2 to 4-celled ovary with mostly solitary ovules.

* Fruit mostly fleshy and edible, with a single 1 to 3-celled hard stone.

\+ Petals wanting.

1. **Condalia.** Style somewhat 2 or 3-lobed: ovules solitary in each carpel.

\+ \+ Petals present.

2. **Zizyphus.** Petals hooded and clawed: flowers umbellately clustered: style bifid: ovules solitary.

3. **Microrhamnus.** Petals hooded and clawed: flowers solitary: style notched: ovules solitary: leaves minute and revolute to the broad midrib.

4. **Berchemia.** Petals clawless, acute, with incurved margins: style slightly 2-lobed: ovules solitary.

5. **Karwinskia.** Petals hooded, very short clawed: style slightly 2 or 3-lobed: ovules 2 in each carpel.

* * Fruit berry-like or dry, containing 2 to 4 separating seed-like nutlets.

\+ Fruit fleshy, free from the calyx.

6. **Rhamnus.** Tube of calyx rather deep: petals small and clawless, sometimes wanting: style notched.

7. **Sageretia.** Calyx shallow: petals hooded and clawed: style short and 3-lobed.

\+ \+ Fruit dry or nearly so.

8. **Ceanothus.** Calyx-lobes petaloid: petals hooded and clawed: style elongated, mostly 3-lobed with spreading divisions: fruit partly inferior: inflorescence usually compound and thyrsoid.

9. **Colubrina.** Chiefly differing from *Ceanothus* in habit and the collection of its less showy flowers in axillary umbel-like clusters.

10. **Adolphia.** Nearly leafless green-stemmed plants: petals hooded: disk investing but free from the lower half of the ovary: nutlets 3, perforate at base.

1. CONDALIA Cav.

Rigidly branching mostly spiny shrubs or small trees, with alternate rather small pinnately-veined leaves, and small flowers solitary or clustered in the axils.

1. **C. obovata** Hook. Small tree, velvety-pubescent or at length glabrate: leaves often fascicled, 12 to 18 mm. long, petioled, spatulate to obovate-cuneate, mostly mucronate and entire: flowers few in each axil, very short-stalked: drupe subglobose, deep red, about 4 mm. in diameter, the short stout style disarticulating at about the middle: stigma 3-lobed.—From the Guadalupe to the Rio Grande and west to New Mexico. Known as "brasil" and "logwood," and one of the common "chaparral" plants of western Texas, forming dense impenetrable thickets. Becomes small on the lower Rio Grande and along the coast.

2. **C. spathulata** Gray. Shrub, glabrous or velvety: leaves less than 12 mm. long, short-petioled, spatulate-cuneate, acute to emarginate: pedicels 2 mm. long: drupe obliquely obovoid, 4 mm. long: style slender, slightly 2-lobed, disarticulating near the top.—From the upper Colorado and Eagle Pass on the Rio Grande westward to New Mexico. A very spinose plant.

3. **C. Mexicana** Schl. Shrub, somewhat intermediate between the last two: leaves spatulate-obovate, acuminate: drupe ellipsoidal, 6 mm. long, with a thicker stone.—On the lower Rio Grande.

2. ZIZYPHUS Juss.

Spiny shrubs, with alternate leaves 3-nerved or their principal veins confluent toward the margin, and small flowers in umbel-like clusters.

1. **Z. obtusifolia** Gray. Rigid and spinose, somewhat pubescent to glabrate: leaves mostly glabrate, 6 to 25 mm. long, typically thin and green, spatulate to elliptical or on long shoots ovate-deltoid, acute to emarginate, entire or the broader forms unequally coarse-serrate or lobed: peduncle and pedicels each about 2 mm. long, mostly villous like the calyx: drupe subglobose, about 8 mm. in diameter, black.—One of the most widespread and abundant shrubs in western and southern Texas, on gravelly mesas, slopes, and bluffs, and known as "lote-bush," or "Texas buckthorn."

2. **Z. lycioides** Gray. Very rigid and spinose, the striate zigzag branches mostly velvety and whitened: leaves pale, 12 mm. long or less, short petioled, subglabrous, oblong or occasionally ovate, obtuse or emarginate, usually entire: drupe globose or somewhat elongated, about 8 mm. in diameter.—Said to occur along the Rio Grande in extreme western Texas.

3. MICRORHAMNUS Gray.

Spiny shrub, with fascicled heath-like leaves, and small solitary flowers.

1. **M. ericoides** Gray. Minutely puberulent or mostly glabrous: leaves 2 to 6 mm. long, acute, with strongly revolute margins, the enclosed grooves densely short-tomentose: stipules broadly triangular, ciliate: pedicels about 2 mm. long: drupe oblong, 6 to 8 mm. long, the slender style disarticulating from its abruptly-pointed summit.—Valleys and bluffs from the Pecos westward.

4. BERCHEMIA Neck. (Supple-Jack.)

Twining shrub, with alternate slender-petioled conspicuously pinnately-veined leaves, with minute flowers in rather loose panicles.

1. **B. scandens** Trelease. Glabrous throughout: leaves ample, 2.5 to 5 cm. long, ovate, acute, or acuminate, with slightly revolute undulate margins: drupe ellipsoidal, about 8 mm. long: style deciduous near the base. (*B. volubilis* DC.)—A species of the Southern States and extending into Texas, where its western limit is uncertain.

5. KARWINSKIA Zucc. (Coyotillo.)

Unarmed shrub, with mostly opposite pinnately-veined leaves, and small flowers in short peduncled axillary clusters.

1. **K. Humboldtiana** Zucc. Twigs more or less puberulent: leaves inconspicuously pellucid-punctate and sometimes dark-dotted, slender petioled, 2.5 to 7.5 cm. long, elliptical-ovate, obtuse to acute or mucronate, rounded or subcordate at base, entire or undulate, the conspicuous mostly simple veins ending in a marginal nerve: peduncle few-flowered: drupe ovoid, apiculate, 12 mm. long: style articulated near the top.—Common on the Pecos near its mouth and thence eastward to the coast. The leaves are beautifully pinnate-veined, and the brownish-black berries are said to be very poisonous.

6. RHAMNUS L. (Buckthorn.)

Shrubs or small trees (ours unarmed), with alternate or more or less opposite pinnately-veined leaves, and small flowers in sessile or short-peduncled axillary umbels.

* *Flowers mostly diœcious, appearing with the leaves, 4-merous, without a common peduncle: leaves deciduous: carpels* 2.

1. **R. lanceolata** Pursh. Tall shrub: branchlets puberulent or glabrate: leaves 2.5 to 7.5 cm. long, short-petioled, golden-pubescent, upper surface at length glabrate, lanceolate or ovate-lanceolate, serrulate with incurved gland-tipped teeth: flowers 2 or 3 together in the lower axils.—A species of the Eastern States and extending into Texas, possibly not reaching our eastern limit.

** *Flowers mostly perfect, appearing after the leaves, in usually peduncled umbels.*

+ *Leaves deciduous: flowers* 5*-merous: carpels* 3.

2. **R. Caroliniana** Walt. Tall shrub or small tree, with more or less puberulent twigs: leaves 5 to 12.5 cm. long, on petioles 12 to 18 mm. long, elliptical-oblong to broadly elliptical, acute or acuminate, remotely and obscurely low-serrate or crenulate: peduncle mostly 6 to 8 mm. long.—A common buckthorn of the Atlantic and Gulf States, extending into Texas as far west as the Pecos.

3. **R. Purshiana** DC. Small tree with some pubescent twigs: leaves 5 to 15 cm. long, on short downy petioles, broadly elliptical, very obtuse to abruptly blunt-pointed, irregularly and closely serrulate or denticulate: peduncle mostly 8 to 30 mm. long.—A buckthorn of the Rocky Mountains found in the mountains of extreme western Texas.

+ + *Leaves mostly evergreen: flowers* 4 *or* 5*-merous: carpels* 2 *or* 3.

4. **R. Californica** Esch. Tall shrub, with more or less tomentose twigs: leaves 2.5 to 10 cm. long, on short petioles, mostly somewhat puberulent, elliptical-oblong or the smallest obovate, obtuse or acutish, the slightly revolute margin serrulate or denticulate to nearly entire: peduncle mostly 4 to 16 mm. long. Var. TOMENTELLA Brewer & Watson is rather low and spreading, with leaves densely short-tomentose below.—In the mountains of extreme western Texas.

7. SAGERETIA Brongn.

Shrubs with rigidly spreading spiny twigs, mostly obliquely opposite pinnately-veined glossy leaves, and very small flowers scattered along slender loosely branched axillary and terminal spikes.

1. **S. Wrightii** Watson. Spreading shrub 6 to 15 dm. high: leaves 6 to 16 mm. long, elliptical to obovate, cuneate, entire or serrulate: inflorescence small and inconspicuous, the few axillary spikes seldom exceeding the leaves.—On Capote Creek, west of the Chenate Mountains, in extreme western Texas (*Havard*).

8. CEANOTHUS L. (New Jersey tea. Red-root.)

Shrubs or occasionally arborescent, spinose or unarmed, with alternate or opposite pinnately-veined or 3-nerved leaves, and small but showy white or blue flowers in often long-peduncled and dense axillary or terminal clusters.—Flowers in our species are mostly white.

* *Leaves alternate and* 3*-nerved: fruit not crested.*

+ *Branches not rigidly divaricate or spiny: inflorescence thyrsoid: leaves usually large and serrate.*

1. **C. Americanus** L. Low, 3 to 9 dm. high, more or less villous-pubescent: leaves thin, ovate or oblong-ovate, 3.5 to 6.5 cm. long, on short petioles 4 to 12 mm. long: peduncles elongated.—Throughout the Atlantic States and extending into Texas.

2. **C. ovatus** Desf. Like the last, but nearly glabrous or somewhat pubescent: leaves narrowly oval or elliptic-lanceolate, 2.5 to 5 cm. long: peduncles usually short.—From the Colorado to the western border.

+ + *Branches mostly spinose: flowers in simple racemes: leaves rather small, somewhat coriaceous and entire.*

3. **C. Fendleri** Gray. Silky pubescent: leaves narrowly oblong to elliptic, 8 to 24 mm. long, usually small, somewhat narrowed and cuneate at base, obtuse or acute above: flowers in short terminal racemes.—"A very thorny and spreading bush in foothills beyond the Pecos" (*Havard*).

* * *Leaves mostly opposite, 1-ribbed, with numerous straight parallel veins, very thick and coriaceous, entire or spinosely-toothed: flowers in sessile or short-pedunculate axillary clusters: fruit with 3 horn-like or warty prominences below the summit.*

4. **C. Greggii** Gray. Erect, 15 dm. high, tomentose: leaves obovate or oblong, rounded or retuse above, on rather slender petioles, entire or very rarely few-toothed: flowers white or occasionally blue, in rather loose clusters.—In the mountains west of the Pecos.

9. COLUBRINA Richard.

Shrubs or trees with rigidly divaricate but scarcely spinose branches, alternate more or less 3-nerved leaves, and tomentose flowers in axillary umbel-like clusters.

1. **C. Texensis** Gray. Shrub as much as 45 dm. high: leaves usually less than 2.5 cm. long, pubescent or at length glabrate, elliptical to spatulate-obovate, glandular denticulate: fruit 8 mm. in diameter, short-beaked by the persistent style, on recurved pedicels.—From the Colorado to the Rio Grande and west to New Mexico.

10. ADOLPHIA Meisn.

Small-leaved or nearly leafless shrubs, with opposite divaricate green branches articulated with the stem and ending in spines, and small flowers in sparse axillary clusters.

1. **A. infesta** Meisn. Mostly puberulent or villous, with often reflexed short hairs: leaves short-petioled, 2 to 10 mm. long, 1-nerved, sublanceolate, entire or low serrate: fruit subglobose, crowned with a beak 1 mm. long, formed by the persistent base of the style.—In the mountains west of the Pecos, and apparently very abundant along the Limpia. Dr. Havard speaks of it as a "horridly spinose" plant.

AMPELIDACEÆ. (Vine Family.)

Shrubs usually climbing by tendrils, with alternate palmately veined or compound leaves, tendrils and clusters of small greenish flowers opposite the leaves, a minute or truncated calyx, 4 or 5 very deciduous valvate petals, stamens as many and opposite them, and a 2-celled usually 4-seeded berry.

* Ovary surrounded by a nectariferous or glanduliferous disk: plants climbing by the coiling of naked-tipped tendrils.

1. **Vitis.** Corolla caducous without expanding: hypogynous glands 5, alternate with the stamens: fruit pulpy: leaves simple.

2. **Cissus.** Corolla expanding: disk cupular: berry with scanty pulp, inedible: leaves simple or pinnately compound.

* * No distinct hypogynous disk: plants climbing by the adhesion of the dilated tips of the tendril-branches.

3. **Ampelopsis.** Corolla expanding: leaves digitate.

1. VITIS Tourn. (GRAPE.)

Plants climbing by the coiling of naked-tipped tendrils, with simple rounded and heart-shaped leaves, a compound thyrsus of very fragrant flowers, small green petals which cohere at the top and fall off together without expanding, and a pulpy berry with pyriform seeds beak-like at base.—We have not attempted to follow Planchon's presentation of our grape-vines, but give that of Engelmann, from the Bushberg Catalogue of 1883. Our species are all true grape-vines, with loose shreddy bark, climbing by the aid of forked tendrils, or sometimes almost without tendrils. The seed characters are quite important.

* *Leaves pubescent or floccose, especially on the under side and when young, often becoming glabrous with age.*

\+ *Rhaphe on seed indistinct.*

1. **V. candicans** Engelm. (MUSTANG GRAPE.) Tall climber, with rather large rounded almost toothless leaves, on young shoots usually deeply many-lobed, deep green above and white cottony beneath: berries large, greenish, claret, or bluish-black.—Along streams from the Colorado to the Rio Grande and west to the Pecos. Said to be the best of the wild grapes of Texas, maturing late in June.

2. **V. monticola** Buckley. (MOUNTAIN GRAPE.) Usually a small bushy vine, rarely climbing over high trees, with angled branchlets: young stems, petioles and leaves cottony, downy, the down gradually disappearing, remaining only here and there in floccose bunches: leaves deeply cordate, with a rounded sinus, very shortly 3-lobed, with small but broad teeth, older ones very smooth and often conspicuously shining below, usually small, not more than 7.5 to 10 cm. across: bunches of fruit compact and short: berries 8 to 10 mm. in diameter. (*V. æstivalis*, var. *monticola* Eng. *V. Berlandieri* Planchon.)—Peculiar to the hilly limestone region of western Texas, not extending to the low country nor to the granitic mountains. Common about Austin, New Braunfels, San Antonio, etc.

3. **V. Arizonica** Engelm. (ARIZONA GRAPE.) Closely related to the last, with angular branchlets: leaves cordate, with a rather open rounded sinus, not lobed (or with 2 short latent lobes); when young, floccose, cottony; when older, glabrous, thick, very rigid and (especially upper surface) rough: berries small or middle-sized.—An Arizona species that extends into western Texas, being found in Gillespie County. Said to trail over rocks and bushes.

\+ \+ *Rhaphe on back of seed very conspicuous.*

4. **V. æstivalis** Michx. (SUMMER GRAPE.) Branchlets terete: leaves large, entire or more or less deeply and obtusely 3 to 5-lobed, with short broad teeth, very woolly and mostly red and rusty when young: berries middle-sized, black with a bloom, in compact bunches.—A grape-vine of the Atlantic and Gulf States and extending into Texas to the Pecos. Usually on uplands in dry open woods or thickets. Abounding in the sandy post-oak woods of eastern Texas it is called "post-oak grape" or "sand-grape." Ripening in September.

5. **V. cinerea** Engelm. (DOWNY GRAPE.) Branchlets angular: pubescence whitish or grayish, persistent: leaves entire or slightly 3-lobed: inflorescence large and loose: berries small, black without bloom. (*V. æstivalis*, var? *cinerea* Eng.)—In rich bottom lands, eastern and southern Texas, from Arkansas to the Rio Grande, commoner northward.

* * *Leaves glabrous, or sometimes short-hairy, especially the ribs beneath, mostly shining.*

6. **V. cordifolia** Michx. (FROST OR CHICKEN GRAPE.) Leaves 7.5 to 10 cm. wide, not lobed or slightly 3-lobed, cordate with a deep acute sinus, acuminate, coarsely and

sharply toothed; stipules small: inflorescence ample, loose: berries small, black and shining, very acid, ripening after frost: seeds 1 or 2, rather large, with a prominent rhaphe.—Thickets and stream-banks. A common grape of the Atlantic States, extending into Texas at least as far west as Gillespie County.

7. **V. riparia** Michx. (RIVERSIDE GRAPE.) Differing from the last in the larger and more persistent stipules (4 to 6 mm. long), more shining and more usually 3-lobed leaves with a broad rounded or truncate sinus and large acute or acuminate teeth, smaller compact inflorescence, and berries (8 to 10 mm. broad) with a bloom, sweet and very juicy: seeds very small, with indistinct rhaphe.—Stream-banks or near water, common in most of the watered cañons of western Texas. Berries maturing in October. Also known as "arroyo grape."

8. **V. rupestris** Scheele. (ROCK, OR SAND, OR SUGAR GRAPE.) Usually low and bushy, often without tendrils: leaves rather small, shining, broadly cordate, abruptly pointed, with broad coarse teeth, rarely slightly lobed: berries rather small, sweet, in very close bunches.—In the valley of Devil's River and westward into the mountains west of the Pecos. Berries ripening in June. Also called "mountain grape."

2. CISSUS L.

Like the last, but petals expanding, leaves simple or pinnately compound, berries with scanty pulp and inedible, flowers in broad flat-topped clusters, and tendrils few and mostly in the inflorescence.

1. **C. stans** Pers. Nearly glabrous, bushy and rather upright: leaves twice pinnate or ternate, the leaflets cut-toothed: flowers cymose: calyx 5-toothed: disk very thick, adherent to the ovary: berries black, obovate. (*Vitis bipinnata* Torr. & Gray.)—Rich soils, extending from the north to central and southern Texas.

2. **C. incisa** Desmoul. Glabrous, with climbing warty stem: leaves 3-foliolate, very thick and fleshy: the leaflets stalked, wedge-shaped and entire near the base, lateral ones 2-lobed, middle one 3-lobed, all mucronate-toothed or serrate: flowers cymose: berries purple, globose-ovate. (*Vitis incisa* Nutt.)—In shady places from the Colorado to the Rio Grande and westward. An ornamental vine, known as "yerba del buey."

3. **C. Ampelopsis** Pers. Nearly glabrous: leaves heart-shaped or truncate at the base, coarsely and sharply toothed, acuminate, not lobed: panicle small and loose: style slender: berries bluish or greenish, 1 to 3-seeded, as large as a pea. (*Vitis indivisa* Willd.)—River-banks, extending from the Southern States to central and southern Texas.

3. AMPELOPSIS Michx. (VIRGINIAN CREEPER.)

A woody vine climbing by tendrils that fix themselves to trunks or walls by dilated sucker-like disks at their tips, with digitate leaves, and cymose flower-clusters.

1. **A. quinquefolia** Michx. A common woody vine in low or rich ground, climbing extensively, sometimes by rootlets as well as by its disk-bearing tendrils: leaflets mostly 5 (3 to 7), oblong-lanceolate, sparingly serrate: berries small and blackish, ripening in late fall when the leaves turn a bright crimson.—Apparently throughout Texas. Also called "American ivy" and "woodbine." Blooming the middle or end of June.

2. **A. heptaphylla** Buckley is very much like the last, but the leaves are all 6 or 7-foliolate, the leaflets are smaller, subsessile, narrow and shining, few-toothed at apex, and the panicles are smaller, blooming at the end of April. (*Vitis heptaphylla* Britton.)—Apparently throughout southern and western Texas. Usually considered but a form of the last species.

SAPINDACEÆ. (SOAPBERRY FAMILY.)

Trees, shrubs, or even herbs, mostly with compound or lobed leaves, usually with unsymmetrical or irregular flowers, and ovules few but seldom solitary.—An order with such diverse characters as to be almost impossible to define as a whole. The essential characters are given under the suborders.

I. SAPINDEÆ. Flowers polygamous, irregular or unsymmetrical (regular in *Sapindus*): stamens more numerous than the petals, seldom twice as many: leaves alternate (opposite in *Æsculus*).

* Flowers irregular.

+ Shrubby or herbaceous climbers, with 4 petals and solitary ovules.

1. **Urvillea.** Fruit consisting of 3 indehiscent samaras (winged fruits) seed-bearing in the middle: leaves stipulate, 3-foliolate.

2. **Serjania.** Fruit consisting of 3 indehiscent samaras seed-bearing at apex: leaves without stipules, 3-foliolate or pinnate.

3. **Cardiospermum.** Fruit 3-lobed and inflated, membranaceous, dehiscent: leaves without stipules, twice ternate.

+ + Trees or erect shrubs, with 4 or 5 petals, and 2 ovules in each cell.

4. **Æsculus.** Calyx 5-lobed: petals not appendaged: ovary sessile: leaves opposite and digitate.

5. **Ungnadia.** Calyx 5-parted: petals fimbriate-crested: ovary stipitate: leaves alternate and pinnate.

* * Flowers regular.

6. **Sapindus.** Calyx 5-parted: petals 5: ovary 3-lobed, but ripening into a berry formed of a single globose carpel: leaves abruptly pinnate.

II. ACERINEÆ. Flowers polygamous or diœcious, regular, often without petals leaves opposite, without stipules: fruit consisting of a double samara, divaricately 2-winged above: mostly trees.

7. **Acer.** Leaves palmately lobed or rarely divided: flowers polygamous.

8. **Negundo.** Leaves pinnate: flowers diœcious, apetalous.

III. STAPHYLEÆ. Flowers perfect and regular: fruit a pod, mostly several-seeded.—Here has been placed the following anomalous genus:

9. **Glossopetalon.** Lobes of the calyx and slender spreading petals 5: stamens 10: fruit a cartilaginous 1 or 2-seeded follicle: leaves alternate, simple and entire, with small adnate stipules.

1. URVILLEA HBK.

Shrubby climbers, with alternate stipulate 3-foliolate leaves, entire or coarsely toothed leaflets, axillary racemes of small whitish flowers on more or less elongated peduncles which bear 2 coiled tendrils (cirrhi) at apex, and fruit consisting of 3 broadly winged membranaceous samaras which are seed-bearing in the middle.

1. **U. Mexicana** Gray. Somewhat tomentose: leaflets ovate, acute or acuminate, doubly serrate, somewhat incised, softly tomentose beneath, on margined petiolules: racemes elongated: scales of the petals very long barbate-ciliate at apex and hooded.—In Cameron and Hidalgo Counties and adjacent Mexico.

2. SERJANIA Plum.

Shrubby climbers, with alternate exstipulate ternate or pinnate leaves, axillary racemes or panicles of small yellowish flowers often bicirrhose, and fruit consisting of 3 broadly-winged membranaceous samaras, which are seed-bearing at apex.

1. **S. incisa** Torr. Leaves with two pairs of 3-foliolate pinnæ; leaflets ovate-rhomboidal, incised-serrate, pubescent on both sides, acute at each end, 2.5 to 3.5 cm. long: flowers in racemiform panicles: fruit 3.5 cm. long, at first pubescent, at length nearly smooth, the outline from obovate-oblong to cuneate, obtuse at base: seed-bearing portion reticulately veined: wings 6 to 10 mm. wide, rather obtuse at base.—Along the lower Rio Grande. This species has also been referred to the Mexican *S. racemosa* Schum.

2. **S. brachycarpa** Gray. Leaves biternate; terminal leaflets ovate-lanceolate and attenuate into a petiole; laterals ovate and sessile, all mucronulate and with a few serrations, or teeth, more or less shortly hirsute above and softly (sometimes rusty) tomentose beneath, 1.5 to 3.5 cm. long: flowers in a thyrsus: fruit much smaller, scarcely over 1 cm. long, puberulent, the outline very shortly cordate-ovate with dilated base: seed-bearing portion lenticular, obscurely veined: wings about 3 mm. wide.—Near the coast, from Corpus Christi Bay southwards.

3. CARDIOSPERMUM L. (HEART-SEED. BALLOON-VINE.)

Mostly an herbaceous climber, with alternate exstipulate twice ternate leaves, incised leaflets, axillary racemose-paniculate clusters of small white flowers, with the peduncle bicirrhose at apex, and a membranaceous 3-lobed 3-celled inflated pod.

1. **C. Halicacabum** L. (COMMON BALLOON-VINE.) Annual and nearly glabrous: leaflets ovate-lanceolate, incisely lobed and toothed: fruit large, roundish pear-shaped, 2.5 cm. in diameter.—From the Guadalupe to the Rio Grande.

2. **C. molle** L. Resembling the last, but the whole plant with soft pubescence, which is spreading on the stem and more or less appressed on the thicker coarsely and almost regularly serrate leaflets: fruit subglobose, pubescent.—A north Mexican species, found in the mountains west of the Pecos.

4. ÆSCULUS L. (HORSE-CHESTNUT. BUCKEYE.)

Trees or shrubs, with opposite digitate exstipulate leaves, serrate pinnately-veined leaflets, showy flowers in a large terminal thyrsus or panicle, a large leathery 3-valved pod, and seeds with a thick shining coat and large round scar.

1. **Æ. flava** Ait. (SWEET BUCKEYE.) A large tree or shrub: leaflets 5 or 7, glabrous or often minutely downy underneath: calyx oblong-campanulate: petals 4, conniving, the 2 upper smaller and longer than the others, with a small rounded blade on a very long claw: stamens included in the yellow corolla: fruit smooth.—Extending from the Atlantic States to the valley of the Brazos. Var. PURPURASCENS Gray has calyx and corolla tinged with flesh-color or dull-purple, and leaflets commonly downy underneath.—Mostly an arborescent shrub, apparently not extending south or west of the Guadalupe and its tributaries.

2. **Æ. arguta** Buckley. Shrub 9 to 15 dm. high: leaflets 7, narrowly lanceolate, mostly long acuminate, glabrous, sharply serrate, 5 to 10 cm. long: stamens erect or slightly curved, much longer than the pale yellow corolla: flowers sometimes in

dense often in loose inflorescence: fruit covered with prickles when young.—In various places in east and south Texas, such as Dallas, Larissa, and in Gillespie County (*Jermy*). Resembles very much a low shrubby form of *Æ. glabra*.

5. UNGNADIA Endl.

Shrub or small tree, with alternate odd-pinnate exstipulate leaves, 3 to 7 ovate-lanceolate acuminate pinnately-veined reticulated serrate leaflets, fascicles of rather large and showy rose-colored flowers appearing with the leaves from the axils of the preceding season, fimbriate-crested petals, a large coriaceous stipitate 3-lobed smooth pod, and large nearly spherical dark-brown smooth and shining seeds.

1. **U. speciosa** Endl. (MEXICAN BUCKEYE.)—A shrub or very small tree common along rocky valleys and in the mountains from the valley of the Trinity through western Texas to New Mexico. The seeds or "beans" are in shape and size much like small chestnuts and poisonous.

6. SAPINDUS Tourn. (SOAPBERRY.)

Trees, with alternate abruptly pinnate exstipulate leaves, small and regular white or whitish flowers in axillary racemes or panicles, or even ample terminal compound panicles, and a berry-like fruit formed of a single carpel.—Sometimes 2 carpels ripen, and rarely all 3, when the fruit is 3-lobed.

1. **S. marginatus** Willd. Leaflets 9 to 18, opposite or alternate, ovate-lanceolate, unequal-sided, strongly veined above: panicles large and dense-flowered: fruit globose.—Common along creeks throughout Texas, from Louisiana to New Mexico and Mexico, smaller west of the Colorado. A tree rarely 9 m. high west of the Colorado, but reaching 15 to 18 m. in the river bottoms of eastern Texas.

7. ACER Tourn. (MAPLE.)

Trees or shrubs, with opposite palmately lobed exstipulate leaves, small polygamous flowers in terminal racemes, umbel-like corymbs, or fascicles, 3 to 12 (usually 8) stamens, and a double samara divaricately 2-winged above.—The "sugar maple" (*A. saccharinum* Wang.) and the "red" or "swamp maple" (*A. rubrum* L. and a var. *Drummondii* Sargent) occur in eastern Texas, but probably not within our eastern limit.

1. **A. grandidentatum** Nutt. Leaves cordate or truncate at base, rather deeply 3-lobed, with broad round sinuses, lobes rather acute, coarsely sinuate-dentate: the umbel-like corymb nearly sessile, few-flowered, the pedicels long and nodding.—A small maple of the Rocky Mountains, and found in Texas in the mountains west of the Pecos.

8. NEGUNDO Mœnch. BOX-ELDER.

Trees, with pinnate leaves, diœcious apetalous flowers, sterile ones on clustered capillary pedicels, fertile in drooping racemes, 4 or 5 stamens, and fruit as in *Acer*.

1. **N. aceroides** Mœnch. A small tree with light-green twigs and very delicate drooping clusters of small greenish flowers appearing rather earlier than the leaves:

leaves pinnate, of 3 or 5 leaflets which are smoothish when old, very veiny, ovate, pointed, toothed: fruit smooth, with large rather incurved wings.—On streams east of the Pecos.

9. GLOSSOPETALON Gray.

Low and rigid shrubs, with slender spinescent branches, small alternate simple and entire stipulate leaves, small solitary white flowers terminating short axillary branches or spur-like fascicles, slender spreading petals, 8 or 10 stamens, and a cartilaginous 1 or 2-seeded follicle.

1. **G. spinescens** Gray. Smooth: leaves narrowly oval, separating in age from a dilated scale-like minutely 2-stipulate base: flowers 5-merous: stamens 10: follicle ovoid, oblique, acute, many-striate, opening down the ventral suture.—Mountains and rocky places near El Paso.

ANACARDIACEÆ. (Cashew or Sumach Family.)

Shrubs or trees, with alternate simple or compound exstipulate leaves, small regular polygamous or dicœcious flowers, stamens as many or twice as many as the petals, and a free 1-celled 1-ovuled ovary becoming a dry drupaceous fruit.

1. **Pistacia.** Small trees: petals none: stamens 5: leaves pinnate.
2. **Rhus.** Shrubs or small trees: petals 4 to 9 (usually 5): stamens as many or twice as many: leaves simple or pinnate.

1. PISTACIA L.

Small tree, with pinnate leaves, dicœcious flowers, no petals, 5 stamens, and a dry somewhat compressed drupe.

1. **P. Mexicana** HBK. Leaflets 5 to 10 pairs, on a somewhat winged rhachis oblong-obovate or cuneate, glabrate, 12 mm. long: flowers in axillary or paniculate spikes: fruit smooth, 4 mm. in diameter.—A small Mexican tree, with an edible nut, said to occur near the mouth of the Pecos.

2. RHUS L. (Sumach.)

Shrubs or small trees, with simple or pinnate leaves, small flowers in axillary and terminal bracteate panicles or sometimes in racemes or spikes, 4 to 9 (usually 5) sepals and petals, stamens as many or twice as many, and fruit a small dry drupe.

* *Fruit symmetrical, with the styles terminal.*

← *Flowers in a terminal thyrsoid-panicle: fruit globular, clothed with acid crimson hairs: stone smooth: leaves odd-pinnate.*

1. **R. copallina** L. (Dwarf sumach.) Shrub 24 to 36 dm. high: branches and stalks downy: petioles wing-margined between the 9 to 21 oblong or ovate-lanceolate (often entire) leaflets, which are oblique or unequal at base, smooth and shining above.—A sumach of the Atlantic States, extending through eastern and southern Texas to the Rio Grande. Var. LEUCANTHA DC. has lanceolate leaves and white flowers. Var. LANCEOLATA Gray, the more common form of southern and western Texas, has lanceolate subfalcate often elongated very entire or subserrate leaves, and yellow flowers.

+ + *Flowers in loose and slender axillary panicles: fruit globular, glabrous, whitish or dun-colored: stone striate: leaves 3-foliolate, thin: poisonous.*

2. **R. Toxicodendron** L. (POISON IVY. POISON OAK.) Climbing by rootlets over rocks, etc., or ascending trees, or sometimes low and erect: the 3 leaflets rhombic-ovate, mostly pointed, rather downy beneath, variously notched, sinuate, or cut-lobed.—A species of the Atlantic States, very common on all the streams of southern and western Texas.

+ + + *Flowers usually in small solitary or clustered spikes or heads which develop in spring before the leaves: leaves 3-foliolate or pinnate: fruit as under +.*

3. **R. Canadensis** Marsh. A straggling bush: leaves soft-pubescent when young, becoming glabrate, 3-foliolate; leaflets rhombic-obovate or ovate, unequally cut-toothed, 2.5 to 7.5 cm. long, the terminal one cuneate at base and sometimes 3-cleft: flowers pale yellow. (*R. aromatica* Ait.)—A common eastern species extending into Texas, but more abundantly represented throughout the State by var. TRILOBATA Gray, which has smaller leaflets, 12 to 25 mm. long, crenately few-lobed or incised toward the summit.

4. **R. microphylla** Engelm. A large shrub, with numerous small warty branchlets: leaves odd-pinnate with 7 to 9 leaflets and a winged rhachis; leaflets sessile, small, 6 to 8 mm. long, oval, obtuse or mucronate, very entire or indistinctly crenulate: flowers in scaly spikes 3-bracteolate at base.—Abundant on bluffs and slopes between the Colorado and the Rio Grande.

5. **R. virens** Lindh. Leaves evergreen, odd-pinnate with 7 to 9 leaflets and a naked rhachis; leaflets ovate or oblong, obtuse or obtusely acuminate, very entire, thick and rigidly coriaceous, shining above, pale or minutely tomentulose under a lens beneath, 2.5 cm. or more long: flowers in axillary or apparently terminal rather open panicles, the fruit clusters more evidently axillary and spicate-racemose.—From the Colorado to the Rio Grande and westward. The leaves, mixed with tobacco, are smoked by Mexicans and Indians.

* * *Ovary becoming very gibbous in fruit, with the remains of the style lateral: flowers in loose ample panicles, the pedicels elongating and becoming plumose: leaves simple, entire.*

6. **R. cotinoides** Nutt. A tree 9 to 12 m. high, glabrous or nearly so: leaves thin, oval, 7.5 to 15 cm. long. —A sumach of the Indian Territory, but collected by Reverchon in Bandera County.

LEGUMINOSÆ. (PULSE FAMILY.)

Plants with alternate stipulate usually compound leaves, papilionaceous or sometimes regular flowers, 10 (rarely 5 or many) monadelphous, diadelphous, or rarely distinct stamens, and a single simple free pistil becoming a legume in fruit.—A very large order, well represented in Texas, and divided into the three following suborders:

I. PAPILIONACEÆ. Leaves simple or simply compound, leaflets almost always entire, flowers perfect, solitary and axillary, or in spikes, racemes, or panicles, calyx of 5 sepals more or less united (often unequally so), corolla of 5 irregular petals (rarely fewer), more or less *papilionaceous*, i. e., with the upper petal (*standard*) largest and inclosing the others in bud, usually turned backward or spreading, the two lateral ones (*wings*) oblique and exterior to the two lower, which last are connivent or coherent by their anterior edges and form the *keel* which usually incloses the stamens and pistil.

A. Stamens 10 and distinct.

1. **Baptisia.** Leaves palmately 3-foliolate: calyx 4 or 5-lobed: pod inflated.

2. **Sophora.** Leaves pinnate: calyx-teeth short: pod terete, necklace-shaped (moniliform).

B. Stamens monadelphous or diadelphous (9 and 1, rarely 5 and 5), nearly distinct in *Amorpha*.

* Anthers of two forms: stamens monadelphous: leaves digitate and leaflets entire.

3. **Crotalaria.** Calyx 5-lobed: pod inflated: leaves 3-foliolate or simple: flowers yellow.

4. **Lupinus.** Calyx deeply 2-lipped: pod flat: leaves 5 or 7-foliolate: flowers blue or purple.

* *Anthers uniform (except in *Psoralea* and *Zornia*).

+ Leaves palmately or pinnately 3-foliolate; leaflets denticulate or serrulate: stamens diadelphous: pods small, 1 to few-seeded, often inclosed in the calyx or curved or coiled.

5. **Medicago.** Flowers racemed or spiked: pods curved or coiled, 1 to few-seeded.

6. **Melilotus.** Flowers racemed: pods coriaceous, wrinkled, 1 or 2-seeded.

7. **Trifolium.** Flowers capitate: pods membranaceous, 1 to 6-seeded: petals adherent to the stamen-tube.

+ + Leaves unequally pinnate (or palmate in *Psoralea* and some *Daleas*): pod not jointed: not twining or climbing (except *Wistaria*).

++ Flowers solitary or few on axillary peduncles.

8. **Hosackia.** Leaves 1 to 5-foliolate: peduncle leafy-bracteate: pod linear.

++ ++ Flowers in spikes, racemes, or heads.

= Herbage glandular-dotted: stamens mostly monadelphous: pod small, indehiscent, mostly 1-seeded.

9. **Psoralea.** Corolla truly papilionaceous: stamens 10, half of the anthers often smaller or less perfect: leaves mostly palmately 3 to 5-foliolate.

10. **Eysenhardtia.** Corolla scarcely at all papilionaceous, petals all free and of nearly equal length: stamens 10, diadelphous (9 and 1): pod more or less falcate.

11. **Amorpha.** Corolla of one petal: stamens 10, monadelphous at base.

12. **Dalea.** Corolla imperfectly papilionaceous: stamens 9 or 10, the cleft tube of filaments bearing 4 of the petals about its middle.

13. **Petalostemon.** Corolla scarcely at all papilionaceous: stamens 5, the cleft tube of filaments bearing 4 of the petals on its summit.

= = Herbage not glandular-dotted (except in *Glycyrrhiza*): stamens mostly diadelphous: pod 2-valved, several-seeded: flowers racemose.

a. Hoary perennial herbs: wings cohering with the keel: pod flat or 4-angled.

14. **Tephrosia.** Standard broad: pod flat: leaflets veiny.

15. **Indigofera.** Calyx and standard small: pod more or less 4-angled: leaflets obscurely veined.

b. Trees, shrubs, or woody twiners: wings free; standard broad.

16. **Brongniartia.** Erect shrubs, with numerous small leaflets and herbaceous stipules but no stipels: flowers solitary and axillary: pod flat.

17. **Peteria.** Shrubby and rigid branching, with numerous very minute leaflets and small spiny stipules but no stipels: racemes terminal or opposite the leaves: pod flat.

18. **Robinia.** Trees or shrubs: leaflets stipellate: pod flat, thin, margined on one edge.

19. **Coursetia.** Trees or shrubs: leaflets obscurely stipellate: pod linear, flat, not margined.

20. **Wistaria.** Woody twiners: leaflets obscurely stipellate: pod swollen, marginless.

c. Smooth herbs or shrubby: standard broad, spreading or reflexed: pod flat, 4-angled, or 4-winged.

21. **Sesbania.** Leaflets with or without stipels: flowers in axillary loose racemes: pod usually stipitate.

d. Perennial herbs: standard narrow and erect: pod turgid or inflated.

22. **Astragalus.** Keel not tipped with a point or sharp appendage: pod with one or both the sutures turned in, sometimes dividing the cell lengthwise into two.

23. **Oxytropis.** Keel tipped with an erect point: otherwise as *Astragalus.*

24. **Glycyrrhiza.** Flowers, etc., of *Astragalus*: anther-cells confluent: pod prickly or muricate, short, nearly indehiscent.

+ + + Herbs with pinnately 1 to 3-foliolate leaves (digitately 2 or 4-foliolate in *Zornia*): no tendrils: pod transversely 2 to several-jointed, the reticulated 1-seeded joints indehiscent, or sometimes reduced to one such joint.

25. **Zornia.** Leaves digitately 2 to 4-foliolate: flowers yellow: stamens monadelphous, anthers of 2 sorts: pod 2 to 5-jointed.

26. **Desmodium.** Flowers white or purplish: stamens diadelphous (9 and 1) or monadelphous below, anthers uniform: leaflets stipellate: pod several-jointed.

27. **Lespedeza.** Flowers white or purplish: stamens diadelphous (9 and 1), anthers uniform: leaflets not stipellate: pod 1 (rarely 2)-jointed.

+ + + + Herbs with abruptly pinnate leaves terminated by a tendril or bristle: stamens diadelphous: pod continuous, 2-valved, few to several-seeded.

28. **Vicia.** Wings adherent to the keel: style filiform, bearded with a tuft or ring of hairs at the apex.

29. **Lathyrus.** Wings nearly free: style somewhat dilated and flattened upwards, bearded down the inner face.

+ + + + + + Twining or trailing herbs: leaves pinnately 3 (rarely 1, or 5 to 7)-foliolate: no tendrils: peduncles or flowers axillary: pod not jointed, 2-valved.

++ Leaves 3 to 7-foliolate: flowers brown-purple.

30. **Apios.** Herbaceous twiner: keel slender and much incurved or coiled.

++ ++ Leaves usually 3-foliolate: flowers not yellow.

31. **Centrosema.** Calyx short, 5-cleft: standard with a spur at the base: keel broad and merely incurved: style minutely bearded next the stigma.

32. **Clitoria.** Calyx tubular, 5-lobed: standard erect and spurless: keel scythe-shaped: style bearded down the inner face.

33. **Cologania.** Calyx tubular, 4-toothed: pod stipitate: style beardless: bracts prominent and persistent.

34. **Galactia.** Calyx 4-cleft, the upper lobe broadest and entire: pod subsessile: style beardless: bracts minute and deciduous.

35. **Phaseolus.** Calyx 5-toothed or cleft: keel strongly incurved or coiled; standard recurved spreading: style bearded lengthwise.

++ ++ ++ Leaves 1 to 3-foliolate: flowers yellow.

36. **Vigna.** Calyx 4-toothed: keel straight: style bearded above: pod terete and torulose, several-seeded.

37. **Rhynchosia.** Calyx 4 or 5-parted: keel scythe-shaped or incurved: style beardless: pod short and flat, 1 or 2-seeded.

II. CÆSALPINIEÆ. Corolla imperfectly or not at all papilionaceous, sometimes nearly regular, the upper petal inclosed by the others in bud: stamens 10 or fewer, commonly distinct, inserted on the calyx.

* Flowers imperfectly papilionaceous, perfect: trees.

38. **Cercis.** Calyx campanulate, 5-toothed: pod flat, wing-margined: leaves simple.

* * Flowers not at all papilionaceous, perfect: calyx 5-parted.

+ Herbs (occasionally shrubby).

39. **Cassia.** Leaves simply and abruptly pinnate, not glandular-punctate.

40. **Hoffmanseggia.** Leaves bipinnate, with or without black glands.

+ + Shrubs or trees with twice pinnate leaves.

41. **Parkinsonia.** Somewhat spinescent shrubs or trees: sepals equal and mostly valvate: pod short-stipitate: leaflets small.

42. **Cæsalpinia.** A prickly shrub: sepals unequal and imbricate: pod sessile: leaflets larger.

* * * Flowers inconspicuous and not at all papilionaceous, polygamous: trees.

43. **Gleditschia.** Thorny, with leaves simply and doubly pinnate: calyx-tube short, its lobes, petals, and the stamens 3 to 5.

III. MIMOSEÆ. Flower regular, small: corolla valvate in bud, often united into a 4 or 5-lobed cup: stamens exserted, often very numerous: leaves twice pinnate.

* Stamens 10 or 5, distinct.

+ Flowers 5-merous: anthers crowned with a deciduous gland.

44. **Prosopis.** Trees or shrubs, mostly spiny: pod linear, straight or variously curved, partitioned between the seeds and indehiscent: flowers greenish and mostly in axillary cylindrical spikes.

45. **Neptunia.** Prostrate or aquatic herbs (or more or less woody): pod obliquely oblong, deflexed from the stipe, 2-valved: flowers yellow and in globose heads.

+ + Flowers 4 or 5-merous: calyx sometimes pappiform or wanting: anthers not gland-bearing.

46. **Desmanthus.** Herbs or shrubby: flowers in globose heads: pod linear, straight or curved, acute, flat, membrano-coriaceous, 2-valved.

47. **Mimosa.** Herbs, shrubs, or trees: flowers in globose heads or cylindrical spikes: valves of the pod entire or jointed, separating from and broader than the persistent partition.

48. **Schrankia.** Herbs or shrubby: flowers in globose heads or cylindrical spikes: valves of the somewhat 4-sided pod entire, separating from and usually narrower than the persistent partition.

49. **Leucæna.** Trees or shrubs: flowers in globose heads: pod broadly linear, flat, membrano-coriaceous, 2-valved.

* * Stamens usually very numerous.

+ Flowers 4 or 5-merous (rarely 3 or 6-merous): stamens distinct.

50. **Acacia.** Trees or shrubs: flowers in globose heads or cylindrical spikes: pod straight or curved, thin or thick, flat or terete, 2-valved or indehiscent.

+ + Flowers 5-merous: stamens monadelphous.

51. **Calliandra.** Very low shrubs or herbaceous: flowers in globose heads: pod straight or slightly curved, the valves in dehiscing elastically revolute from apex to base.

52. **Pithecolobium.** Trees or shrubs: flowers in globose heads or loose spikes: pod straightish or variously curved or contorted, the valves often twisted in dehiscing, but not elastically revolute.

1. BAPTISIA Vent. (FALSE INDIGO.)

Perennial herbs, with palmately 3-foliolate leaves, racemes of showy flowers, 10 distinct stamens, and an inflated many-seeded roundish or oblong pod stalked in the persistent calyx.

1. **B. leucophæa** Nutt. Hairy, about 3 dm. high, with divergent branches: leaflets narrowly oblong-obovate or spatulate; stipules and bracts large and leafy, persistent: flowers cream-color, on elongated pedicels in long reclined racemes: pod pointed at both ends, hoary.—Northern and central Texas.

2. **B. sphærocarpa** Nutt. Glabrous, 6 to 9 dm. high, with erect branches: leaflets obovate-oblong, obtuse (minutely pubescent when young); stipules and bracts mi-

nute or almost none: flowers deep yellow, in elongated spicate racemes: pod subglobose or oval, glabrous.—Extending from Arkansas and Indian Territory into northern and eastern Texas.

2. SOPHORA L.

Trees, shrubs or herbs, with unequally pinnate leaves, small or obsolete stipules, terminal or axillary racemes, 10 distinct stamens, and a terete (or somewhat compressed) thick or coriaceous mostly indehiscent several-seeded stipitate necklace-like (constricted between the seeds) pod.

** Herbaceous perennial.*

1. **S. sericea** Nutt. Silky-canescent, erect, 30 cm. high or less: leaves with subulate stipules and numerous small oblong-obovate leaflets 6 to 12 mm. long: flowers white: pods few-seeded.—Only recorded west of the Pecos, but doubtless in northwestern Texas as well.

*** Shrubs or trees.*

2. **S. tomentosa** L. Shrub 12 to 18 dm. high, hoary-tomentose: leaflets 11 to 17, oblong, coriaceous, becoming smooth above: showy yellow flowers in elongated racemes: calyx minutely 5-toothed: pod 10 to 15 cm. long, glabrate.—A species of the West Indies and Florida found in the vicinity of Brazos Santiago.

3. **S. affinis** Torr. and Gray. A small tree, 3 to 6 m. high, nearly glabrous: leaflets 13 to 15, elliptical, retuse or very obtuse, mucronulate, less than 2.5 cm. long, nearly the same color both sides: flowers in simple axillary racemes: calyx very short, campanulate, abruptly attenuate at base, obscurely 5-toothed: pod somewhat pubescent.—Extending from Arkansas into Texas as far south as the valley of the San Antonio and west as far as the upper Colorado.

4. **S. secundiflora** Lag. (FRIJOLILLO. CORAL BEAN.) A stout shrub or small tree, with deep green leaves of about 9 elliptical-oblong obtuse coriaceous leaflets, terminal racemes of showy violet fragrant flowers, and large woody pods 5 to 10 cm. long, containing 3 or 4 round red beans as large as small marbles and very poisonous.—Common from the Gulf coast to the Pecos and less abundant in mountain cañons to New Mexico. It is mostly shrubby, but becomes a tree 30 feet high and forms groves in the vicinity of Matagorda Bay. The beans are sometimes used by the Indians as an intoxicant. The flowers are variously described as "sweet-scented, exhaling the odor of violets," and as "giving off a strong, nauseating, and very offensive smell."

3. CROTALARIA L. (RATTLE-BOX.)

Annuals, with simple or 3-foliolate leaves, racemes of yellow flowers opposite the leaves, a 5-cleft (scarcely 2-lipped) calyx, a large heart-shaped standard, monadelphous stamens with 5 of the anthers smaller and roundish, and an inflated pod.

** Leaves simple and scarcely petioled.*

1. **C. sagittalis** L. Hairy, 7.5 to 15 cm. high: leaves oval or oblong-lanceolate; stipules united and decurrent on the stem, so as to be inversely arrow-shaped: peduncles few-flowered: corolla not longer than the calyx: pod blackish.—The common "rattle-box" of sandy soils in the Atlantic and southwestern States, and also found in Mexico, hence presumably of more or less abundant occurrence in Texas.

*** Leaves 3-foliolate and long-petioled: corolla comparatively large: keel with a conspicuous horizontal beak.*

2. **C. lupulina** DC. Glabrous or nearly so, diffuse: leaflets ovate, oblanceolate, or obcordate; stipules minute, deciduous: racemes few-flowered: pod short, oblong, sessile, puberulent, 12 to 16 mm. long.—Along the southern boundary of Texas, from Brazos Santiago to El Paso.

3. **C. incana** L. Pubescent, more erect and usually much larger and somewhat woody: leaflets obovate or oval, hairy beneath or glabrate; stipules minute, deciduous: racemes few to many-flowered: pod subsessile, oblong, pendulous, pilose with spreading hairs, 24 to 36 mm. long.—A Mexican and West Indian species, found by Nealley in the vicinity of Brazos Santiago. The Texan specimens are low and with very villous-hirsute stems.

4. LUPINUS L. (LUPINE.)

Herbaceous annuals or perennials, with palmately 1 to 16 (5 or 7 in ours)-foliolate leaves, racemes of blue or purple flowers, a deeply 2-lipped calyx, a broad standard with sides reflexed, monadelphous stamens with dissimilar anthers, and a flat coriaceous pod.

1. **L. subcarnosus** Hook. Rather stout, 3 dm. high, silky-pubescent: leaflets 5, cuneate-obovate, acute or rounded or retuse at apex, usually glabrous above, 2 to 3.5 cm. long, the petioles 2 to 3 times longer: racemes 5 to 7.5 cm. long, with scattered flowers, elongating in fruit: petals blue, 8 to 10 mm. long, the standard with a white or yellow center: pod 3.5 cm. long, 4 to 6-seeded. (Including *L. Texensis* Hook.)—The common lupine of southern and western Texas, "covering fertile slopes with a carpet of purple blue" (Havard), as early as March.

2. **L. Havardi** Watson. Apparently perennial, the herbaceous stems 3 to 4.5 dm. high, leafy, at length branched, loosely appressed silky-villous throughout: leaflets 7, oblanceolate, glabrous above, 8 to 20 mm. long, short-petioled: racemes elongated: petals purple, with a light spot on the standard, 12 mm. long: pod narrowly linear, 2.5 to 3.5 cm. long, 6 to 8-seeded.—Hills near Presidio, western Texas.

5. MEDICAGO Tourn. (MEDICK.)

Annual or perennial herbs, with pinnately 3-foliolate leaves, toothed leaflets, small flowers in spike-like racemes, and curved or coiled 1 to few-seeded pods.

1. **M. sativa** L. (LUCERNE. ALFALFA.) Upright and smooth perennial: leaflets obovate-oblong: flowers purple, racemed: pod spirally twisted.—An extensively cultivated forage plant, which has long been an introduced plant in southern and western Texas.

2. **M. maculata** Willd. (SPOTTED MEDICK.) Spreading or procumbent annual, somewhat pubescent: leaflets obcordate, with a purple spot, minutely toothed: peduncles 3 to 5-flowered: flowers yellow: pod compactly spiral, of 2 or 3 turns, compressed, furrowed on the thick edge and fringed with a double row of curved prickles.—Said to be introduced in the San Antonio Valley.

3. **M. denticulata** Willd. Nearly glabrous: pod loosely spiral, deeply reticulated, and with a thin-keeled edge, otherwise like the last.—Naturalized in western Texas.

6. MELILOTUS Tourn. (MELILOT. SWEET CLOVER.)

Annual or biennial herbs, with pinnately 3-foliolate leaves, usually serrulate leaflets, small yellow or white flowers in slender axillary pedunculate racemes, and an ovoid coriaceous wrinkled pod which is 1 or 2-seeded and scarcely dehiscent.

1. **M. Indica** All. Smooth and erect, often 6 to 9 dm. high, branching: leaflets mostly cuneate-oblong, obtuse, denticulate, 2.5 cm. or less long: flowers yellow, 2 mm. long, nearly sessile. (*M. parviflora* Desf.)—Naturalized along the southern border of Texas.

2. **M. alba** Lam. Leaflets truncate: corolla white, the standard longer than the other petals.—Commonly introduced in the Atlantic States in waste or cultivated grounds, and reported from Gillespie County; doubtless elsewhere in the State.

7. TRIFOLIUM L. (CLOVER.)

Tufted or diffuse herbs, with palmately (or sometimes pinnately) 3-foliolate leaves, toothed leaflets, stipules united with the petiole, flowers in heads or spikes, a persistent calyx with bristle-form teeth, and small membranous indehiscent pods often included in the calyx.—The common "red clover" (*T. pratense* L.) of cultivation, and the "white clover" (*T. repens* L.), which seems to be introduced almost everywhere, may both be found wild in Texas, and hardly need any description for recognition.

* *Perennial or biennial: heads not involucrate, terminal.*

1. **T. reflexum** L. (BUFFALO CLOVER.) Stems ascending, downy, not stoloniferous: leaflets obovate to cuneate-oblong, finely toothed: flowers large, on slender pedicels, umbellate on the summit of the peduncle, reflexed when old: standard rose-red, wings and keel whitish: pod stipitate, 3 to 5-seeded.—The common "buffalo clover" of the Atlantic States and extending into Texas, where its western limit is unrecorded.

** *Low decumbent annuals: heads not involucrate, axillary and small: flowers at length reflexed: leaflets obcordate or obovate.*

2. **T. Carolinianum** Michx. More or less pubescent: corolla 4 mm. long, purplish, scarcely exceeding the green subulate calyx-teeth.—An eastern species extending into Texas.

3. **T. amphianthum** Torr. and Gray. Stoloniferous, very slender, nearly glabrous: flowers few, 8 mm. long: calyx-teeth slender, much shorter, equaling the tube: small solitary fertile flowers often borne underground.—Extending from Louisiana into Texas, with an unrecorded western limit. Collected in Gonzales County (*Chrisman*).

4. **T. Bejariense** Moric. Slightly hairy: calyx herbaceous, unequally lobed, nearly equaling the corolla; upper tooth nearly distinct, narrow; the rest broad, acute, reticulated: standard and wings broad, toothed, 6 mm. long.—The most common clover of southern and western Texas.

*** *Slender annuals: axillary heads subtended by a gamophyllous deeply lobed involucre: flowers not reflexed.*

5. **T. involucratum** Willd. Glabrous: leaflets mostly oblanceolate and acute at each end: involucral lobes laciniately and sharply toothed: flowers 12 mm. long, in close heads: calyx-teeth thin, long and narrow, entire.—A common species from British America to Mexico and doubtless occurring in western Texas.

8. HOSACKIA Dougl.

Herbaceous or rarely somewhat woody plants, with pinnately 1 to 5-foliolate leaves, usually minute and gland-like stipules, yellow or reddish flowers solitary or few in pedunculate umbels, and a linear flat or somewhat terete sessile several-seeded pod.

1. **H. rigida** Benth. More or less appressed silky-pubescent: leaflets 3 to 5, from obovate or oblong to narrowly linear, 6 to 16 mm. long: peduncles short or long, 1 to 5-flowered, with a sessile 1 to 3-foliolate bract or naked: flowers 12 mm. long, yellow turning to brown: calyx-teeth equaling the tube or shorter: pod 2.5 cm. long, rather broad, pubescent. (Incl. *H. puberula* Benth. and *H. Wrightii* Gray.)—In the mountains west of the Pecos.

2. **H. Purshiana** Benth. More or less silky-villous or sometimes glabrous: leaflets 1 to 3, from ovate to lanceolate, 6 to 18 mm. long: peduncles 1-flowered, usually exceeding the leaves and mostly bracteate with a single leaflet: flowers 4 to 6 mm. long: calyx-teeth linear, much longer than the tube, about equaling the corolla which scarcely exceeds the calyx: pod about 2.5 cm. long, narrow, linear, glabrous.—A very common western species, reported from Gillespie County, and doubtless abundant enough in northern and western Texas.

9. PSORALEA L.

Perennial herbs, usually sprinkled all over or roughened (especially the calyx, pods, etc.) with glandular dots or points, mostly palmately 3 to 5-foliolate leaves, blue-purplish or white flowers in spikes or racemes, diadelphous or monadelphous stamens with half the anthers often smaller or less perfect, and a small thick often wrinkled indehiscent 1-seeded pod.

* *Leaves pinnately 3-foliolate.*

1. **P. rhombifolia** Torr. and Gray. Sparingly pubescent: leaflets rhombic-ovate, 12 to 18 mm. long, shorter than the petiole, dotted with scarcely visible glands: peduncles longer than the leaves, at length recurved, having a few-flowered capitate spike: bracts ovate, acuminate: calyx hirsute, with lanceolate teeth: corolla purplish, small.—In eastern Texas, and extending as far west as Gillespie County and up the Rio Grande to Eagle Pass.

** *Leaves palmately 3 to 5-foliolate: roots not tuberous: flowers in loose racemes.*

2. **P. tenuiflora** Pursh. Slender, erect, much branched and bushy, 6 to 12 dm. high, minutely hoary-pubescent when young: leaflets 3 to 5, varying from linear to obovate-oblong, 12 to 36 mm. long, glandular-dotted: flowers 4 to 6 mm. long: lobes of the calyx and bracts ovate, acute: pod glandular. (*P. floribunda* Nutt.)—Throughout western Texas, and abundant on the "Staked Plains."

3. **P. linearifolia** Torr. & Gray. Tall and slender, divaricately branched, slightly pubescent with appressed hairs: leaflets 3, narrowly linear, elongated, mucronate, the upper surface dotted with black glands, lower surface scarcely dotted, 5 to 7.5 cm. long and 2 to 4 mm. wide; stipules minute, subulate, deciduous: racemes few-flowered, much longer than the leaves: calyx-lobes and bracts lanceolate.—A species of Arkansas and eastern Texas, possibly not within our range, but represented by var. ROBUSTA Coulter, in which the whole plant is more robust: leaves linear-oblong (4 to 6 cm. long and 5 to 6 mm. wide) and thickly black-dotted above and below: flowers mostly in clusters of 3, distant along the rhachis.—Collected in Donley County, northwestern Texas, by Nealley.

*** *Leaves palmately 2 to 5-foliolate: roots tuberous: flowers in dense spike-like racemes.*

4. **P. esculenta** Pursh. Roughish hairy all over: stem stout, 12 to 40 cm. high, erect from a tuberous or turnip-shaped farinaceous root: leaflets obovate or lanceolate-oblong: spikes oblong, long-peduncled: calyx-lobes and bracts lanceolate, nearly equaling the corolla which is 12 mm. long.—Extending from the northern prairie States to the Brazos and the high plains of western Texas and the upper Rio Grande. The "pomme blanche" or "pomme de prairie" of the voyageurs.

5. **P. hypogæa** Nutt. Tuber small: nearly acaulescent, hoary with appressed hairs: leaflets linear: spikes short-capitate, on peduncles 1 to 5 cm. long: calyx narrow, 6 to 12 mm. long.—Stony bluffs of southern and western Texas.

6. **P. cuspidata** Pursh. Stout and tall, from a deep-seated tuber, hoary with appressed hairs: leaflets usually broadly oblanceolate, obtuse: flowers large, the petals 12 to 16 mm. long, exceeding the lanceolate-lobed calyx.—South to the San Antonio and west to the Pecos.

7. **P. cyphocalyx** Gray. Simple or sparingly paniculate at summit, 6 to 9 dm. high, strigulose-subcinereous, the caudex dilated below the summit into a large globular tuber: leaflets 3 to 5, linear, the larger 7.5 cm. long, the lower petioles nearly as long; stipules subulate: racemes rather long-peduncled, with many-flowered approximate fascicles: bracts ovate, acuminate: calyx-tube very one-sided, the upper side being strongly gibbous-saccate, the lobes lanceolate and acuminate.—Rocky prairies between the Colorado (above Austin) and the Rio Grande (below the Pecos).

8. **P. Reverchoni** Watson. Tall and branching, 6 dm. high, canescent with short appressed pubescence: leaflets 2 to 5, linear-oblong, acute at each end, 12 to 24 mm. long; stipules usually equaling the petiole, 2 to 6 mm. long: flowers few, in short close racemes: bracts very broadly ovate and concave, abruptly acuminate: calyx 8 mm. long, nearly equaling the petals; the long-acuminate lobes exceeding the tube.—Rocky prairies in Hood and Johnson Counties.

10. EYSENHARDTIA HBK.

Shrubs or small trees, glandular-punctate, with odd-pinnate leaves, numerous small stipellate leaflets, small white flowers in terminal more or less densely spicate racemes, corolla hardly at all papilionaceous, 10 diadelphous stamens, and a more or less falcate pod.

1. **E. amorphoides** HBK. Shrub 12 to 21 dm. high, more or less pubescent: leaflets 5 to 14 (usually 10) pairs, oblong, very obtuse or retuse, about 5 mm. long: style with a large oval gland at apex: pod 6 to 8 mm. long, erect and curved.—Throughout southern and western Texas south of the Colorado.

2. **E. orthocarpa** Watson. A tree 30 to 45 dm. high, distinguished from the last by the more numerous leaflets (10 to 23 pairs), which are also larger, 10 to 16 mm. long, and by the larger pods, 10 to 16 mm. long, which are straight and pendent.—Extending from Mexico and New Mexico into the mountains west of the Pecos.

11. AMORPHA L. (False indigo.)

Shrubs with odd-pinnate leaves, dotted and usually stipellate leaflets, violet or purple flowers crowded in clustered terminal spikes, corolla of a single petal (the standard) which is wrapped around the stamens and style, 10 stamens monadelphous at base, and oblong roughened 1 or 2-seeded pod exceeding the calyx.

1. **A. fruticosa** L. Pubescent or nearly glabrous: leaflets 8 to 12 pairs, oblong to broadly elliptical, scattered: calyx somewhat pubescent, the lower tooth acuminate and longest, the others commonly obtuse: standard purple, deeply emarginate: pod 2-seeded.—River banks, apparently throughout Texas. A tall shrub, sometimes arborescent, and very variable.

2. **A. lævigata** Nutt. Glabrous and very smooth: leaves large, the leaflets large, distant, elliptical-oblong, very obtuse, attenuated below: flowers in long (20 to 25 cm.) clustered spikes: calyx very glandular, nearly glabrous except the margin, the 3 lower teeth longer and acuminate, the others acute: standard deep blue: pod 1-seeded.—Extending from Arkansas into Texas as far as the San Antonio.

3. **A. paniculata** Torr. & Gray. Whole plant canescently tomentose except the upper leaf-surface, which is nearly glabrous and shining: leaves 20 to 30 cm. long or more; the leaflets 7 or 8 pairs, elliptical-oblong, 3.5 to 7.5 cm. long, very obtuse, often retuse at each end: spikes numerous, virgate, in a large nearly naked exserted branching panicle: calyx tomentose and glandular, the 3 lower teeth longer and triangular-subulate: standard purple, broadly cuneiform.—On the Rio Grande in extreme western Texas.

12. DALEA L.

Glandular-punctate herbs or shrubs, with odd-pinnate (rarely-palmate) leaves, small entire leaflets, flowers in terminal pedunculate spikes, 9 or 10 monadelphous stamens, the cleft tube of filaments bearing 4 of the petals about its middle (the cordate standard being free), and an ovate flat usually indehiscent 1 or 2-seeded pod included in the calyx.

* *Calyx very villous, with setaceous or subulate teeth.*

+ *Low glabrous shrubs : spikes few-flowered.*

1. **D. formosa** Torr. Much branched: leaflets about 5 pairs, very small, about 4 mm. long, thick and very narrow, cuneate-oblong, retuse: spikes loose, 6 to 10-flowered, on short peduncles; bracts ovate, shorter than the flower, silky-villous on the margin: calyx-teeth subulate, plumose: corolla large and showy, bright-purple.—From Eagle Pass and the upper Colorado to New Mexico.

+ + *Glabrous herbs : spikes many-flowered.*

++ *Leaflets* 5 *or* 6 *pairs : perennials, with concave scarious-margined very smooth and persistent bracts.*

2. **D. laxiflora** Pursh. Stem tall, 9 to 12 dm. high, erect, branched above: leaflets linear-oblong, 4 to 6 mm. long: spikes panicled, interrupted, with distant white flowers; bracts very broad, almost orbicular, coriaceous, black glandular, embracing the flower: calyx with long setaceous plumose teeth: stamens 9.—A species of the western plains and reported from central Texas as far south as the San Antonio.

3. **D. pogonathera** Gray. Low, with depressed stems: leaflets oblong-linear: spikes oblong, densely-flowered, about 2.5 cm. long; bracts ovate, mucronate-acuminate, not so coriaceous or glandular as in the last: calyx with long setaceous plumose teeth, longer than the tube: petals purple: stamens 10.—Throughout Texas south of the Colorado and west to New Mexico.

4. **D. lasiathera** Gray. Stouter and larger in all parts than the last, the stems from 15 to 30 cm. high: leaflets oblong-linear: spikes cylindrical, densely-flowered, becoming 5 to 7.5 cm. long; bracts orbicular-ovate, cuspidate-acuminate: calyx-teeth subulate, shorter than the tube, thickly villous with shorter and rather appressed hairs: corolla showy, considerably larger and purple-red: stamens 10.—Common on the prairies south of the Colorado and west to New Mexico.

++ ++ *Leaves with many pairs of leaflets : annuals with slender elongated dense spikes.*

5. **D. alopecuroides** Willd. Erect and much branched, 3 to 6 dm. high: leaflets 10 to 20 pairs, linear-oblong: flowers light rose-color or whitish, in cylindrical spikes: bracts ovate-lanceolate, acuminate, deciduous: calyx with long slender teeth.—Alluvial soils, common in the Mississippi Valley States, but reported from Texas only west of the Pecos.

+ + + *Herbaceous or shrubby, pubescent, tomentose, or sericeous.*

++ *Spikes very dense, thick, and very villous.*

= *Leaflets appressed-sericeous,* 2 *to* 4 *pairs, rarely pinnately* 3*-foliolate.*

6. **D. aurea** Nutt. Stem about 6 dm. high, pubescent, virgate and erect: leaflets oblong-obovate and linear-oblong, more or less silky pubescent, 8 to 12 mm. long: flowers yellow, in thick oblong very compact long-peduncled spikes; bracts rhombic ovate, as long as the calyx: calyx-teeth subulate, broad at base, plumose.—In dry ground, apparently common throughout Texas, especially in the mountains west of the Pecos.

7. **D. nana** Torr. Like the last, but low, 10 to 15 cm. high, diffusely spreading and repeatedly branched, leafy to the spikes: leaflets oblong or obovate: spikes smaller, much less dense, on very short peduncles: flowers and bracts as in the last.—Throughout southern and western Texas.

8. **D. rubescens** Watson. With the simple tall erect stems and dense oblong spikes of *D. aurea*, but more slender, the leaves pinnately 3-foliolate, flowers smaller, and the yellow petals becoming purplish. (*D. nana*, var. *elatior* Gray.)—In the mountains west of the Pecos; also reported by Reverchon at "head of South Llano."

9. **D. Wrightii** Gray. Low, white-sericeous and glandless: stems very many from a woody root, 5 to 15 cm. high: leaflets 5, lanceolate, acute: flowers yellow, in oblong sessile spikes: bracts membranaceous, lanceolate, acuminate: calyx-teeth subulate, very long plumose, much longer than the tube, equaling the corolla.—Hillsides and mountains west of the San Pedro, and especially beyond the Pecos.

= = *Leaflets appressed-sericeous, palmately 3-foliolate.*

10. **D. Jamesii** Torr. & Gray. Whole plant silky and glandless: leaflets obovate, very obtuse; stipules spiny: spikes dense and broad, oblong, sessile; bracts ovate, acuminate, longer than the calyx, which has setaceous and plumose teeth: flowers purple with a yellowish standard.—Stony hills west of the Pecos.

= = = *Leaflets loosely villous, 4 to 8 pairs.*

11. **D. lachnostachys** Gray. Covered with tuberculate (mostly conical) glands, much branched, rather diffuse, 3 dm. or more high: leaflets 4 or 5 pairs, about 12 mm. long, oval or obovate, villous on both sides, beset beneath close to the repand or subcrenulate margins with a row of very large flat glands: spikes thick and densely barbate-woolly, on short peduncles; bracts ovate, scarious, produced into a long acumination about equaling the flower: calyx very villous, its aristate teeth as long as the purple corolla.—Hills west of the Pecos.

12. **D. mollis** Benth. Low and branching, 7.5 to 15 cm. high, silky villous with more or less spreading hairs: leaflets 4 to 8 pairs, obovate to cuneate-oblong, 2 to 8 mm. long: flowers white or rose-colored, in oblong, shortly-pedunculate spikes: bracts lanceolate, acuminate, villous: calyx very villous, the filiform plumose teeth much longer than the tube and exceeding the corolla.—Along the Rio Grande and west of the Pecos.

++ ++ *Spikes rather lax: corolla purple.*

13. **D. lanata** Spreng. Decumbent and whole plant clothed with a soft almost woolly pubescence: leaflets 4 to 6 pairs, obovate-cuneate, emarginate, 10 to 12 mm. long: spikes elongated, rather loose, many-flowered, on rather long peduncles; bracts ovate, with a long acumination: calyx-teeth subulate, plumose, dilated at base, as long as the tube: petals deep-purple.—Very common in sandy soil along the upper Rio Grande and on the "Staked Plains."

14. **D. Domingensis** DC. Erect and more or less pubescent: leaflets 6 to 7 pairs, obovate, obtuse or emarginate: spikes somewhat capitate, shortly peduncled; bracts ovate, acute, shorter than the villous calyx: calyx-teeth subulate.—Var. PAUCIFOLIA Coulter has the whole plant more hairy: leaflets but 3 or 4 pairs and larger: inflorescence becoming more or less compact-clustered in the upper axils, and the calyx-tube nearly glabrous, making very prominent the large amber-colored glands.—Along the lower Rio Grande and in adjacent Mexico.

* * *Calyx pubescent or canescent, with short teeth: shrubby plants.*

15. **D. argyræa** Gray. Stems 3 to 6 dm. high, stout, corymbosely branched above, the branches canescent, glandular-tuberculate, leafy: leaflets 7 to 13, obovate-oblong, silvery-sericeous and shining: spikes short, densely flowered, at first capitate, on short peduncles: calyx cinereous-pubescent, somewhat longer than the ovate acuminate bract: corolla showy, yellowish purple.—Rocky hills between the Nueces and the Rio Grande, and west of the Pecos.

16. **D. scoparia** Gray. A "broom-like" plant, with rigid slender branching stems, naked below and roughened all over with large pustulate glands, the diffuse branchlets terminated by small globular heads of deep violet flowers: leaves mostly simple on the branches and linear, the lower ones with 3 linear leaflets: bracts very small and ovate.—Sandy bottom of the Rio Grande west of the Pecos.

* * * *Calyx smooth except the margins, with short teeth.*

17. **D. frutescens** Gray. Shrubby and very smooth, 3 to 6 dm. high: leaflets 6 to 8 pairs, obovate, retuse or obcordate, petiolulate, conspicuously glandular beneath: spikes paniculate, short and few-flowered; bracts coriaceous, ovate, pointless, scarcely equaling the calyx, which is covered with large waxy glands and with short triangular-subulate teeth villous on the margin: corolla violet.—Common from the Colorado to the Rio Grande and west to New Mexico.

13. PETALOSTEMON Michx. (PRAIRIE CLOVER.)

Perennial upright glandular-dotted herbs, with crowded odd-pinnate leaves, minute stipules, small flowers in very dense terminal and pedunculed heads or spikes, 5 stamens with the cleft tube of filaments bearing 4 of the petals on its summit, and a membranaceous indehiscent 1 or 2-seeded pod inclosed in the calyx.

* *Corolla white: glabrous plants.*

1. **P. candidus** Michx. Stems firm and erect: leaflets 7 or 9, lanceolate or linear-oblong, sparingly dotted beneath: heads oblong, cylindrical when old; bracts awned, longer than the nearly glabrous calyx.—Common on the prairies of northern and western Texas.

2. **P. gracilis** Nutt. Stems slender, decumbent or assurgent: leaflets 7 or 9, linear-elliptical, slightly dotted beneath: heads oblong-cylindrical, shorter than in the last; bracts acute, as long as the calyx.—A species of eastern Texas, and found within our range near San Diego.

3. **P. multiflorus** Nutt. Stem erect and with fastigiate branches: leaflets 3 to 9, linear-oblong, with black dots on both surfaces: heads globose, the subulate-setaceous bracts much shorter than the acutely-toothed calyx.—On prairies throughout Texas.

* * *Corolla purple or rose-color* (*yellowish in No.* 5, *or fading white in No.* 7).

4. **P. violaceus** Michx. Smoothish: leaflets 5, narrowly linear: heads globose-ovate, or oblong-cylindrical when old; bracts pointed, not longer than the silky-hoary calyx: corolla rose-purple.—Dry prairies throughout the western prairie States and extending into Texas.—Var. PUBESCENS Gray is pubescent, and with 3 to 7 leaflets.—Prairies in the region of the Colorado.—Var. TENUIS Coulter is a slender, low form, with round or roundish-oblong small often few-flowered heads on long slender peduncles, and shorter pointed bracts (not equaling the calyx and hence not very apparent in the head).—Coleman County.

5. **P. obovatus** Torr. & Gray. Very tomentose: leaflets 5 to 9, large, obovate, obtuse, silky-lanuginous beneath, less so above: head ovate, or becoming much elongated, very thick, subsessile or pedunculate; bracts ovate, acuminate, larger than the calyx, both densely villous, almost concealing the yellowish flowers.—In eastern Texas, and found within our range near San Antonio.

6. **P. emarginatus** Torr. & Gray. Glabrous: leaflets about 15 or 17, cuneiform, deeply emarginate, dotted beneath: spikes cylindrical, on very long peduncles; bracts broadly obovate, acuminate, silky-villous, longer than the bright rose-purple flowers: calyx very villous.—In eastern Texas and also between the Nueces and the Rio Grande. The leaves become verdigris-green when dry.

7. **P. Sabinalis** Watson. Glabrous throughout: leaves yellowish-green; leaflets 11 to 15, linear, obtuse: spikes rather slender, pedunculate; bracts very narrow and attenuate, equaling the calyx: calyx with short triangular acute teeth, pubescent on the inner side, about half as long as the rose-colored (fading to nearly white) petals.—Bandera County (*Reverchon*).

8. **P. Reverchoni** Watson. Low, 15 cm. high or less, finely pubescent: leaves glabrous; leaflets 5 to 11, linear, acutish: spikes sessile or nearly so, very short or some-

what elongating: calyx covered with a fine appressed pubescence, the acuminate teeth nearly equaling the tube: petals deep pink or red, half longer.—On the rocky top of Comanche Peak (*Reverchon*).

14. TEPHROSIA Pers. (HOARY PEA.)

Hoary perennial herbs, with odd-pinnate leaves, mucronate and veiny leaflets, white or purplish racemed flowers, a broad and usually silky standard, coherent wings and keel, diadelphous or monadelphous stamens, and a flat linear several-seeded pod.

1. **T. Lindheimeri** Gray. Stems rather stout, prostrate or ascending, flexuose branching, tomentulose-pubescent: leaflets 7 to 13, roundish-obovate or cuneate, often retuse, sericeous especially beneath, 16 to 36 mm. long: the large purple flowers in lax many-flowered racemes exceeding the leaves: pod densely soft pubescent.—Prairies and hills between the Colorado (as far up as the San Saba) and the lower Rio Grande.

15. INDIGOFERA L. (INDIGO.)

Herbs or shrubs, mostly canescent with appressed hairs fixed by the middle, with odd-pinnate leaves and obscurely veined leaflets, pink or purplish flowers in naked axillary spikes, small roundish standard, coherent wings and keel, diadelphous stamens, and a 4-angled or teretish 1 to several-seeded pod septate between the seeds.

1. **I. leptosepala** Nutt. A perennial herb, 1.5 to 6 dm. high: leaflets 5 to 9, oblanceolate: spikes very loose, longer than the leaves: pods linear, 6 to 9-seeded, obtusely 4-angled, reflexed, 2.5 cm. long.—A species of the Southern and Western States and apparently extending throughout Texas.

2. **I. Lindheimeriana** Scheele. A cinereous erect perennial herb: leaflets 7 to 15, larger, oval or obovate: spikes shorter than the leaves: pods longer, linear, obscurely if at all angled, thickened at each suture, reflexed and arcuate.—Between the Colorado and the Rio Grande.

16. BRONGNIARTIA HBK.

Erect shrubs, with odd-pinnate leaves, numerous small leaflets, herbaceous stipules but no stipels, solitary and axillary rather conspicuous violet or flesh-colored flowers and a flat oblong or broadly linear pod.

1. **B. minutifolia** Watson. A low shrub 3 to 9 dm. high, much branched, the slender glaucous-green branchlets nearly glabrous: leaves 2.5 to 5 cm. long, with slender rhachis; leaflets 10 to 20 pairs, linear, revolute, 2 to 3 mm. long: flowers on short naked peduncles: pod glabrous, oblanceolate, 18 mm. long, attenuate to a stipe.—Foothills south of the Chisos Mountains, Western Texas (*Havard*).

17. PETERIA Gray.

Shrubby and rigid branching, smooth, with odd-pinnate leaves, numerous very minute leaflets, small subulate spiny stipules and no stipels, terminal racemes of scattered yellowish flowers, and a flat linear straight pod.

1. **P. scoparia** Gray. Stems 6 to 9 dm. high, glaucescent, much branched and bushy: stipules a pair of divaricate prickles; persistent petioles filiform and slender, all the upper ones often leafless, the others with 9 to 15 small elliptical or lanceolate

leaflets: racemes slender, 20 to 30 cm. long, very sparsely flowered: pods linear, pendulous, 5 cm. or more long.—In the foothills of the mountains west of the Pecos. Said to have a small edible tuberous rootstock, and known as "camote del monte."

18. ROBINIA L. (LOCUST TREE.)

Trees or shrubs, with odd-pinnate leaves, often prickly spines for stipules, the ovate or oblong leaflets stipellate, showy flowers in hanging axillary racemes, and a flat thin pod margined on one edge.

1. **R. Neo-Mexicana** Gray. Shrub 12 to 18 dm. high: stipular prickles subrecurved, sharp and stout: peduncles and the short crowded racemes hispid with straight glanduliferous hairs: calyx finely hispid: corolla rose-color: pods glandular-hispid.—In mountain cañons west of the Pecos.

19. COURSETIA DC.

Trees or shrubs, with odd-pinnate leaves, setaceous stipules, orbicular or obovate leaflets, axillary (mostly solitary) flowers (in ours), and a flat linear marginless pod.

1. **C. axillaris** Coulter & Rose. Shrub or small tree, the younger parts pubescent: leaflets 3 to 5 pairs, reticulated, somewhat pubescent beneath, the lower pair orbicular, the others obovate: axillary flower on peduncle 4 to 10 mm. long: calyx pubescent, with 5 broad equal teeth, the 2 upper high-connate: reflexed vexillum 12 mm. broad: style very hairy above the middle: pod glabrous, 3.5 cm. long, with lobed margin and on a broad stipe.—Near San Diego (*Nealley*).

20. WISTARIA Nutt.

High climbing woody twiners, with odd-pinnate leaves of 9 to 13 ovate-lanceolate leaflets, minute stipules and stipels, dense racemes of large and showy lilac-purple flowers, and elongated thickish knobby stipitate many-seeded pods.

1. **W. frutescens** Poir. Downy or smoothish when old: wings of the corolla with one short auricle and an awl-shaped one as long as the claw.—Alluvial grounds throughout the Southern States and reported from Gillespie County.

21. SESBANIA Pers.

Herbs or shrubs, with abruptly pinnate leaves, many pairs of very entire leaflets, yellowish flowers in axillary loose racemes shorter than the leaves, a broad spreading or reflexed standard, and flat or 4-angled or 4-winged pods.

1. **S. Cavanillesii** Watson. Shrub or even small tree: leaflets 11 or 12 pairs, obtuse and mucronate: flowers bright yellow: pod long-stipitate, oblong, compressed, with 4 wings rising from the margins of the valves and produced beyond the sutures, the seeds separated by transverse partitions. (*Daubentonia longifolia* DC.)—Abundant on the Lower Rio Grande, and also near San Antonio. A very graceful shrub or small tree, with showy racemes of bright yellow flowers in August; seeds used as a substitute for coffee (*Havard*).

2. **S. macrocarpa** Muhl. An annual glabrous herb or shrub: leaflets 15 to 25 pairs, oblong-linear, obtuse and mucronate: racemes 1 to 4-flowered: flowers yellow and red, dotted with purple: pod curved, compressed, 4-sided, elongated and slender, knotted, pendulous, many-seeded, the seeds separated by transverse partitions.—Along the Guadalupe and San Antonio, extending into Texas from the Gulf States.

3. **S. vesicaria** Ell. A tall smooth-branching annual: leaflets numerous, oblong-linear: racemes 4 to 8-flowered, often compound: flowers yellow: pod elliptical-oblong, compressed, acute at each end, stipitate, 1-celled and 2-seeded, the outer coriaceous portion at length falling away and leaving the seeds inclosed in the thin white inner membrane. (*Glottidium Floridanum* Desv.)—Extending from the Gulf States into southern Texas.

22. ASTRAGALUS Tourn. (MILK VETCH.)

Chiefly herbs, with odd-pinnate leaves, spiked or racemed flowers, a narrow and erect standard, keel not tipped with a point or sharp appendage, and turgid or inflated pods with one or both the sutures turned in, sometimes dividing the cell lengthwise into two.—A very large and difficult western genus, not very numerously represented in Texas. Mature pods are usually necessary for certain identification of the species.

I. *Pod turgid, completely or imperfectly 2-celled by the intrusion of the dorsal suture, the ventral suture being not at all or less deeply inflexed.*

* *Pod plum-shaped, succulent, becoming thick and fleshy, indehiscent, not stipitate, completely 2-celled.*

1. **A. caryocarpus** Ker. (GROUND PLUM.) Pale and minutely appressed-pubescent: leaflets narrowly oblong: flowers in a short spike-like raceme: corolla violet-purple: pod glabrous, ovate-globular, more or less pointed, about 16 mm. in diameter, very thick-walled, cellular or corky when dry.—A species of the western plains and extending into Texas as far south as the San Antonio.

2. **A. Mexicanus** A. DC. Smoother, or pubescent with looser hairs, larger: leaflets roundish, obovate, or oblong: flowers larger, 20 to 24 mm. long: calyx softly hairy: corolla cream-color, bluish only at tip: pod globular, very obtuse and pointless, 2.5 cm. or more in diameter: otherwise like the last.—Prairies throughout Texas.

3. **A. Plattensis** Nutt. Loosely villous: stipules conspicuous: leaflets oblong, often glabrous above: flowers crowded in a short spike or oblong head, cream-color often tinged or tipped with purple: pod ovate, pointed, and villous (as is the calyx).—A species of the plains extending into northern Texas.

* * *Pod dry, coriaceous, cartilaginous or membranous, dehiscent.*

\+ *Pod completely 2-celled.*

++ *Pod sessile.*

4. **A. mollissimus** Torr. Stout, decumbent, densely silky-villous throughout and tomentose: leaflets 19 to 29, ovate-oblong: peduncles elongated: spikes dense, with rather large violet flowers, 12 to 24 mm. long: pod narrow-oblong, 10 to 18 mm. long, glabrous, somewhat obcompressed and sulcate at both sutures, at length incurved.—High prairies and mesas in northwestern Texas and west of the Pecos. The most common "loco" plant, and said to be very poisonous to cattle.

5. **A. Bigelovii** Gray. Very near the last, but more strictly acaulescent, more villous, and especially distinguished by its turgid and very woolly pods in which the sutures are not sulcate.—West of the San Pedro, and extending into Mexico and New Mexico.

6. **A. giganteus** Watson. Stems stout and erect, 6 to 9 dm. high or more, tomentose: leaflets 11 to 21, oblong-ovate, acute, villous-pubescent and subtomentose, 12 to 18 mm. long; stipules broad: racemes short and rather few-flowered, erect, peduncle: pod coriaceous, ovate, acuminate, somewhat compressed and the ventral suture impressed, erect, 18 mm. long.—At Fort Davis, western Texas (*Havard.*)

7. **A. reflexus** T. & G. Slender and branching, assurgent, 3 dm. or more high, pilose-pubescent: leaflets 13 or 15, cuneate-obovate, emarginate, 12 mm. long: flowers nearly sessile, few, subcapitate, bluish-white, spreading, 8 mm. long: pod thick-coriaceous, deflexed, ovate-triangular, glabrous, very deeply sulcate dorsally (section obcordately 2-lobed), 8 mm. long.—In eastern Texas and possibly within our range.

8. **A. Wrightii** Gray. Low and villous-hirsute: leaflets 7 to 11, oblong, acutish: the few capitate flowers violet or whitish, with subulate-linear calyx-teeth equaling the corolla: pod coriaceous, oblong, hirsute, straight, subcompressed, bicarinate, acute, erect, half longer than the calyx.—In dry ground, central Texas between the Brazos and the Rio Grande.

9. **A. Nuttallianus** DC. Stems ascending or erect, 7.5 to 45 cm. high, minutely pubescent: leaflets 11 to 15, elliptical or oblong, obtuse or retuse: flowers few, subcapitate or sometimes solitary on slender peduncles, light purple, small, 4 mm. long: pod coriaceous, linear, glabrous, subcompressed, incurved near the base, sulcate dorsally, reticulated.—Apparently throughout Texas, where it seems to be the most common Astragalus. Var. TRICHOCARPUS T. & G. is a low form with hispid calyx and slightly hairy pods.—Quite common near Brazos Santiago.

10. **A. leptocarpus** T. & G. Almost glabrous: leaflets 13 to 17, cuneate-elliptical, retuse: flowers few, as in the last, but deep purplish blue and larger, 8 to 10 mm. long: pod membranaceous, linear, glabrous, subcompressed, straight, spreading, less reticulated, about 2.5 cm. long.—From Arkansas through eastern Texas to San Antonio and the lower Rio Grande.

++ ++ *Pod stipitate.*

11. **A. Brazoensis** Buckl. Rather small and sparingly pubescent: leaflets emarginate: the small violet or whitish flowers in rather loose short spikes: pod thin-coriaceous, strongly obcompressed and nearly disk-like, 6 mm. broad, incurved, glabrous, transversely nerved, at length separating into two 1 or 2-seeded divisions, mostly deflexed: stipe equaling the calyx.—In southern Texas, between the Brazos and the lower Rio Grande.

+ + *Pod not completely 2-celled, and sessile (substipitate in the first species).*

12. **A. Lindheimeri** Eng. Many-stemmed, diffuse and glabrous: leaflets 13 to 17, narrow-oblong, mostly emarginate: raceme of violet flowers subcapitate: calyx-teeth subulate-setaceous, about twice longer than the tube: pod ascending upon a spreading pedicel, oblong-linear, 2.5 cm. or more long, glabrous, subfalcate, compressed, transversely reticulate-veined, substipitate, bicarinate on the back and 2-celled to the middle, ventral suture acute.—In central Texas from the Brazos to the San Antonio.

13. **A. distortus** Torr. & Gray. Low, diffuse, many-stemmed, subglabrous: leaflets 17 to 25, oblong, emarginate: flowers in a short spike, pale-purple: calyx-teeth broad subulate, half shorter than the dark puberulent tube: pod ovate or lance-oblong, 12 to 18 mm. long, thick-coriaceous, glabrous, arched, subterete, minutely reticulated, somewhat grooved on the back, the ventral suture nearly flat.—Extending from the Mississippi States to the Colorado.

14. **A. lotiflorus** Hook. Hoary or cinereous with appressed hairs: stems very short: leaflets 7 to 13, lance-oblong: flowers yellowish, in few-flowered heads, with peduncles exceeding the leaves or very short: calyx campanulate, the subulate teeth exceeding the tube: pod oblong-ovate, 18 to 24 mm. long, acuminate, acute at base, canescent, the back more or less impressed, the acute ventral suture nearly straight.—Extending from the plains into northern and western Texas.

15. **A. Reverchoni** Gray. Sparingly pilose-canescent, with many leaves and peduncles from a very short stem: leaflets 13 to 17, ovate-lanceolate: flowers yellowish, capitate, with peduncles about equaling the leaves: calyx densely pilose, with long attenuate teeth: pod ovate-lanceolate, 2.5 to 3.5 cm. long, acuminate, canescent, broadly falcate or straight. (*Phaca cretacea* Buckley).—In northern and central Texas. Intermediate between the last and the next.

16. **A. Missouriensis** Nutt. Short-caulescent, hoary with a closely appressed silky-pubescence: leaflets 5 to 15, oblong, elliptic, or obovate: flowers few, capitate or spicate, 10 to 16 mm. long, violet: calyx oblong, the teeth very slender: pod oblong, 2.5 cm. long, acute, obtuse at base, pubescent, nearly straight, obcompressed or obcompressed-triangular, depressed on the back and the ventral suture more or less prominent, transversely rugulose.—Extending from the plains into northern and western Texas.

17. **A. amphioxys** Gray. Very similar to the last except in the pods which are acute at both ends, the base so much narrowed that it often seems stipitate in the calyx, texture much thinner, fore-and-aft compression greater, and moderately curved in the shorter pods, but strongly so in the longer ones: leaflets more apt to be oblong and acute. (*A. Shortianus*, var.? *minor* Gray.)—Extending from New Mexico into extreme western Texas.

18. **A. Parryi** Gray. Stems short and prostrate: villous with loose spreading hairs: leaflets oblong, elliptic or obovate: flowers few, loosely subcapitate on rather short peduncles, whitish or yellowish tinged with purple, 12 to 16 mm. long: calyx-teeth half shorter than the cylindric tube: pod pubescent, oblong lanceolate, 2.5 cm. long or more, arched or at length circinate, strongly obcompressed and rugulose, both sutures sulcately impressed, contiguous.—Extending from Colorado into northwestern Texas.

II. *Pod 1-celled, neither suture being inflexed or the ventral more intruded than the dorsal.*

19. **A. triflorus** Gray, Low, very much branched from the base, gray with strigulose hairs: leaflets linear or linear-oblong: flowers 3 to 15, small, yellowish-white or purplish: pod membranous, inflated, glabrous or glabrate, sessile, oval, obtuse or acutish, 14 to 24 mm. long.—Sandy plains and hills along the upper Rio Grande in El Paso County.

23. OXYTROPIS DC.

Low and nearly acaulescent perennials, with tufts of numerous very short stems from a hard and thick root or rootstock covered with scaly adnate stipules, pinnate leaves of many leaflets, scape-like peduncles bearing a head or short spike of flowers, and keel tipped with a sharp projecting point or appendage.—The pointed keel is the chief distinguishing mark separating this genus from *Astragalus*.

1. **O. Lamberti** Pursh. Silky with fine appressed hairs: leaflets mostly linear: flowers rather large, purple, violet, or sometimes white: pod cartilaginous or firm-coriaceous in texture, silky-pubescent, strictly erect, cylindraceous-lanceolate and long-pointed, almost 2-celled by intrusion of the ventral suture.—Extending from the plains into northern and western Texas. Reputed to be a "loco" plant.—Var. SERICEA Gray is a robust form, with broader leaflets (from lanceolate to oblong), cylindraceous pods about 2.5 cm. long, and the pubescence of the leaflets very silky. (*O. sericea* Nutt.)—In the mountains of western Texas.

24. GLYCYRRHIZA Tourn. (LIQUORICE.)

Perennial plants with long sweet roots, glandular-viscid herbage, odd pinnate leaves with minute stipules, white or bluish flowers in axillary spikes, and ovate or oblong compressed often curved pods clothed with rough glands or short prickles.

1. **G. lepidota** Nutt. (WILD LIQUORICE.) Tall, 6 to 9 dm. high: leaflets 15 to 19, oblong-lanceolate, mucronate-pointed, sprinkled with little scales when young, and with corresponding dots when old: spikes peduncled, short: flowers whitish: pod oblong, beset with hooked prickles so as to resemble a "cocklebur" on a smaller scale.—Along or near the Rio Grande in El Paso County.

25. **ZORNIA** Gmelin.

Perennial herbs, with palmately 2 or 4-foliolate leaves, sagittate stipules, yellow flowers in axillary large-bracted racemes, monadelphous stamens alternately shorter, and a compressed pod with 2 to 5 roundish hispid joints.

1. **Z. tetraphylla** Michx. Prostrate, smooth or downy: leaflets 4, lanceolate or oblong-obovate: racemes 3 to 9-flowered, much longer than the leaves, the flowers distant and almost concealed by the large ovate bracts.—Extending from the Gulf States through eastern and southern Texas to the Rio Grande. The most western station recorded is in Gillespie County.

26. **DESMODIUM** Desv. (TICK-TREFOIL.)

Perennial herbs, with pinnately 3-foliolate (rarely 1-foliolate) leaves with both stipules and stipels, white or purplish (often turning green) flowers in axillary or terminal often panicled racemes and 2 or 3 from each bract, diadelphous (9 and 1) stamens or monadelphous below, and a flat pod deeply lobed on the lower margin and separating into few or many flat reticulated joints (mostly roughened with minute hooked hairs, by which they adhere to animals or clothing).

* *Pod stipitate: leaves* 1*-foliolate.*

1. **D. Wrightii** Gray. Stems slender, branching, puberulent, 3 to 6 dm. high: leaves short-petioled, the single leaflet membranaceous, veiny, oblong-ovate, subcordate at base, pale and minutely pubescent beneath, mucronulate, the larger 5 cm. long; stipules and stipels very small and subulate: racemes loose: pod 3 or 4-jointed, the joints inequilateral and oval, on a stipe as long as the stamineal tube.—From the Colorado near Austin to New Mexico.

* * *Pod slightly if at all stipitate: leaves* 3*-foliolate.*

2. **D. Neo-Mexicanum** Gray. Slender, erect and branching, pubescent annual: leaflets linear, strongly and coarsely reticulated beneath, acutish and mucronulate, pilose beneath, especially at the margins, 2.5 to 3 cm. long; stipules subulate aristate: flowers small: joints of the pod small (little over 2 mm. in diameter), round and puberulent.—Mountain valleys near El Paso. Nearly glabrous forms occur in contiguous New Mexico.

3. **D. Grahami** Gray. Procumbent and slender, branching from a perennial root: leaflets round-ovate, bright green above, 2.5 to 3.5 cm. long, clothed with a fine appressed pubescence, which is shorter and sparse underneath; stipules fuscous, subulate-acuminate and persistent: the numerous racemes at length elongated (the principal terminal one very much so) and sparsely flowered: pod deflexed, 4 or 5-jointed, the joints inequilateral and scabrous-puberulent.—On the mountains of the Limpia and westward into New Mexico.

4. **D. paniculatum** DC. Nearly smooth throughout: stem slender, erect, and tall: leaflets oblong-lanceolate or narrowly lanceolate, tapering to a blunt point, thin, 7.5 to 12.5 cm. long: racemes much panicled: pod 3 to 5-jointed, the joints inequilateral, triangular or half-rhombic or very unequal-sided rhomboidal.—San Pedro Valley and westward: doubtless elsewhere in Texas.

5. **D. spirale** DC. Pubescent or glabrate: stem slender, angular and weak, rooting at base: leaflets ovate or lanceolate: racemes lax: flowers very small, greenish, and variegated with purple: pod 2 to 8-jointed, the joints rhomboid-orbicular, hooked pubescent, very tortuous.—A Mexican species recently found in extreme western Texas, Limpia Cañon (*Nealley*).

6. **D. Tweedyi** Britton. Minutely scabrous-pubescent: stem stout, ascending, 9 dm. or more high: leaflets ovate, truncate at base, obtuse and mucronulate, upper surface glabrate, lower scabrous-pubescent and strongly reticulated, 9 cm. long: panicle large and few-flowered: pod 3-jointed (in the only specimen seen), joints rhombic, minutely canescent.—Tom Greene County (*Tweedy*).

27. LESPEDEZA Michx. (Bush clover.)

Herbs with pinnately 3-foliolate leaves, not stipellate, diadelphous (9 and 1) stamens, and a 1-jointed 1-seeded oval or roundish flat reticulated pod.—Ours have flowers of two sorts, the larger (violet-purple) pertect but seldom fruitful, panicled or clustered, with smaller pistillate and fertile but mostly apetalous ones intermixed or in small subsessile clusters.

1. **L. procumbens** Michx. Slender, trailing and prostrate, minutely appressed-hairy to soft-downy: leaflets oval or obovate-elliptical, 6 to 18 mm. long: peduncle very slender, few-flowered: pod small, roundish, obtuse or acute. (Including *L. repens* Bart.)—Found in Gillespie and Wilson Counties, and doubtless throughout the eastern part of the State.

2. **L. Stuvei** Nutt., var. INTERMEDIA Watson. Stems upright, spreading, very leafy: leaflets oval to oblong, usually with fine appressed-pubescence: flowers clustered on peduncles much shorter than the leaves: pod ovate, acute or acuminate, appressed-pubescent or downy. (*L. violacea*, var. *sessiliflora* Torr. & Gray.)—"Central Texas" (*fide* Mex. Bound Report).

28. VICIA Tourn. (Vetch. Tare.)

Herbs, mostly climbing more or less by the tendril at the end of the pinnate leaves, with half-sagittate stipules, axillary flowers on peduncles, a filiform style bearded with a tuft or ring of hairs at the apex, and a flat several-seeded pod.

* *Annuals, with mostly solitary flowers.*

1. **V. Reverchoni** Watson. Pubescent with spreading hairs, the decumbent stem angled and narrowly winged, 3 dm. high: leaflets 3 or 4 pairs on a broad rhachis, cuneate-oblong or the lower obovate, rounded or truncate and mucronate at apex, 8 to 14 mm. long: flowers solitary, small, 6 mm. long, light blue, the narrow acuminate calyx-teeth about equaling the tube: pod pubescent, shortly pedicellate upon a peduncle 2.5 cm. long or more, 20 to 30 mm. long by 4 mm. broad, 10 to 15-seeded.—Sandy prairies near Dallas (*Reverchon*).

2. **V. exigua** Nutt. Pubescent, somewhat cespitose: leaflets 3 or 4 pairs, linear, acute, 12 to 24 mm. long; stipules narrow, entire or incisely serrate: peduncles filiform, 1 (rarely 2)-flowered, shorter than the leaves: calyx-teeth lanceolate, nearly equaling the tube: pod linear-oblong, glabrous, 4 to 6-seeded.—A western species reported from near El Paso and San Diego.

3. **V. micrantha** Nutt. Glabrous: leaflets usually 2 pairs, linear, obtuse or acute, about 2.5 cm. long; stipules lanceolate: peduncles 1 or 2-flowered, shorter than the leaves: calyx-teeth lanceolate, shorter than the tube: pod saber-shaped, slightly pubescent, 7 to 10-seeded.—In eastern Texas, and very likely within our range.

* * *Perennials, with 2 to 6-flowered peduncles.*

4. **V. Leavenworthii** Torr. & Gray. Pubescent: stem 3 to 6 dm. long, strongly angled: leaflets 5 to 7 pairs, oblong-linear, obtuse or emarginate, 12 mm. long; stipules minute, entire: peduncles 2 to 4-flowered, shorter than the leaves: calyx-teeth sub-

ulate, longer than the tube: pod oblong, 6-seeded.—In Gillespie and Comal Counties, and probably general between the Colorado and the Rio Grande.

5. **V. Ludoviciana** Nutt. Glabrous (except the young shoots): stem rather stout, 6 to 9 dm. long, strongly angled and climbing: leaflets 5 to 6 pairs, elliptical or obovate, obtuse or emarginate, 12 to 16^{mm} long; stipules subulate, very small: peduncles 2 to 6-flowered, at length longer than the leaves: calyx-teeth broad, acuminate, shorter than the tube: pod broadly saber-shaped, glabrous, 5 or 6-seeded.—Through eastern and southern Texas to Pt. Isabel, and as far west as San Antonio.

29. LATHYRUS Tourn. (Vetchling. Everlasting pea.)

Mostly smooth plants, like *Vicia* except that the style is somewhat dilated and flattened upwards and is bearded down the inner face.—Our species have the leaves tendril-bearing, the peduncles equaling or exceeding the leaves, and the pods sessile.

1. **L. pusillus** Ell. Annual, glabrous: stem winged: leaflets 2, narrow: racemes 1 or 2-flowered: flowers small, purple: pod linear: seeds minutely tuberculate.—A species of the Gulf States extending into Texas.

2. **L. palustris** L. Perennial, glabrous or somewhat pubescent: stem often winged: leaflets 4 to 8, narrowly oblong to linear, acute, 2.5 to 5 cm. long; stipules mostly narrow, often small: peduncles 2 to 6-flowered: flowers purple, 12 mm. long.—Var. ANGUSTIFOLIUS Watson has elongated, narrow and grass-like leaflets, and smaller stipules.—Extreme western Texas and adjacent New Mexico.

30. APIOS Boerhaave. (Ground-nut. Wild bean.)

A perennial herb, twining and climbing over bushes, bearing edible tubers on underground shoots, pinnately 3 to 7-foliolate leaves, ovate-lanceolate leaflets, flowers in dense and short often branching racemes, a strongly incurved and at length coiled keel, and a straight or slightly curved linear elongated thickish many-seeded pod.

1. **A. tuberosa** Mœnch. Flowers brown-purple or chocolate-color, violet-scented.—An eastern species, extending into Texas to Gillespie and Wilson Counties.

31. CENTROSEMA DC. (Spurred butterfly-pea.)

Twining perennials, with 3-foliolate stipellate leaves, large showy flowers, striated stipules, bracts and bractlets (the latter longer than the calyx), a short 5-cleft calyx, the standard spurred at base, a broad and merely incurved keel, style minutely bearded next the stigma, and a long linear flat pod pointed with the awl-shaped style, many-seeded and thickened at the edges.

1. **C. Virginiaum** Benth. Rather rough with minute hairs: leaflets varying from oblong-ovate to lanceolate and linear, very veiny, shining: peduncles 1 to 4-flowered: calyx-teeth linear-awl-shaped: corolla violet, 2.5 cm. long: pod straight, 10 to 12.5 cm. long.—A species of the Southern States extending into Texas and down the coast to Brazos Santiago.

32. CLITORIA L. (Butterfly-pea.)

Erect or twining perennials, with mostly pinnately 3 foliolate stipellate leaves, very large flowers on 1 to 3-flowered peduncles, opposite striate bractlets, a tubular 5-lobed calyx, erect and spurless standard,

a scythe-shaped keel, style bearded down the inner face, and a linear-oblong flattish knotty several-seeded pod pointed with the base of the style.

1. **C. Mariana** L. Low, ascending or twining, smooth: leaflets oblong-ovate or ovate-lanceolate; stipules and bracts awl-shaped: peduncles short: the showy pale blue flowers 5 cm. long.—A species of the Atlantic and Gulf States and extending into Texas to the Perdinales.

33. COLOGANIA Kunth.

Twining herbs, with pinnately 3 (rarely 4 or 5)-foliolate stipellate leaves, small striate stipules, prominent and persistent bracts and bractlets, violet or red flowers, a tubular 4-toothed calyx, but little incurved keel, beardless style, and a linear flat straight or incurved stipitate pod.

1. **C. angustifolia** Kunth. Stems slender and branching from a deep perennial root, striate-angled, cinereous-hirsute as is the foliage, etc.: petioles 12 to 18 mm. long; leaflets linear, very obtuse at both ends, mucronate, 2.5 to 5 cm. long, about 4 mm. wide: flowers in pairs or solitary, on peduncles 12 mm. long, which are bibracteate at base and minutely bibracteolate next the villous-hirsute calyx: bracts and bractlets subulate: corolla violet-purple: pod narrowly linear, flat, falcate, 2.5 to 3.5 cm. long, 7 to 9-seeded.—Mountains west of the Pecos.

2. **C. longifolia** Gray. Leaflets sometimes 4 or 5, elongated linear, acute or obtuse, very smooth above, beneath reticulate and with fine close pubescence (also upon stem, calyx and pod): pod narrowly linear, straight, less flat, about 5 cm. long, 10 to 14-seeded: otherwise as in *C. angustifolia*.—In the mountains west of the Pecos. Very variable in its leaves, which may be rigid or thin, 3.5 to 10 cm. long, 4 to 16 mm. broad, the narrowest ones often being the longest.

3. **C. pulchella** HBK. Leaflets elliptical-oblong, obtuse, rounded or subcordate at base, pale and cinereous on both sides: calyx pilose-hispid.—In the mountains west of the Pecos. Known chiefly from its leaf-characters, but distinct enough in that particular from the other two species.

34. GALACTIA P. Browne. (Milk-pea.)

Low mostly prostrate or twining perennial herbs, with usually 3 (rarely 1 or 4 or 5) stipellate leaflets, purplish flowers in somewhat interrupted or knotty racemes, minute and deciduous bracts, a 4-cleft calyx with the upper lobe broadest and entire, beardless style, and a linear flat subsessile several-seeded pod.

* *Leaves* 1-*foliolate.*

1. **G. marginalis** Benth. Suffruticose, with prostrate, somewhat silky-pubescent, at length glabrous branches: the single leaflet oblong-lanceolate or linear, narrowed at base, coriaceous, glabrous, with a marginal nerve beneath, 5 to 7.5 cm. long: peduncles very short, axillary, 1 to 3-flowered: calyx pubescent, its teeth as long as the tube: pod villous, 2.5 to 3.5 cm. long.—Eastern Texas and extending through the lowland counties to the lower Rio Grande.

* * *Leaves* 3-*foliolate.*

2. **G. canescens** Benth. Creeping, somewhat twining, canescent: leaflets broadly ovate, retuse, slightly hirsute above, silky-pubescent beneath, 3.5 cm. long and over 2.5 cm. wide: peduncles slender (some of them abortive), fasciculate, elongated, few-

flowered: calyx silky-villous: many racemes becoming subterranean and bearing globular membranaceous pods filled by a single large seed; pods above ground linear-oblong, canescent, 4 or 5-seeded.—Sandy ground, between the Guadalupe and the lower Rio Grande.

3. **G. Texana** Gray. Procumbent, somewhat twining, cinereous-tomentose: leaflets oval, retuse, setaceous-mucronate, cinereous-puberulent above, sericeous-canescent beneath (less whitened than in the former species), 2.5 to 3.5 cm. long: racemes few-flowered, shorter than the leaves and rarely exceeding the petioles: pod linear, strongly falcate, densely silky, 6 cm. long, 9 or 10-seeded.—From the Guadalupe, near New Braunfels, to the Leona and Rio Grande.

4. **G. Wrightii** Gray. Stems branched from the base, slender, suberect with branches somewhat twining, cinereous with fine appressed pubescence: leaflets oblong, obtuse at both ends, mucronulate, green above, beneath veiny and silvery with a very fine and close whitish pubescence, 3.5 cm. long, 16 to 18 mm. wide: racemes strict, not interrupted, many-flowered, exceeding the leaves: calyx and bracts canescent, the calyx-teeth nearly twice the length of the tube.—Hills near the Limpia, in extreme western Texas.

5. **G. tephrodes** Gray. Stems numerous from a lignescent root, whitened or cinereous (as are also the leaves), with very fine and close pubescence: leaflets oblong-linear, very obtuse at both ends, mucronulate, less canescent above than beneath, 20 to 30 mm. long: peduncles many-flowered, the lower ones longer, the upper ones shorter, than the leaves: calyx minutely cinereous-pubescent, its lobes oblong and obtuse: pod straight, canescent, 20 to 30 mm. long, 4 mm. wide, 4 to 7-seeded.—In extreme western Texas and adjacent New Mexico and Mexico.

* * * *At least some of the leaves* 4 *or* 5*-foliolate.*

6. **G. heterophylla** Gray. Canescent or sericeous: stems slender and decumbent from a woody base: leaflets either 3 (the lateral ones somewhat distant from the terminal) or 4 or 5 (the accessory ones inserted with the lateral pair), oblong, subcuneate, obtuse or retuse, mucronulate, silky-canescent (especially underneath) with a closely appressed and silvery pubescence, 12 mm. long: racemes short and few-flowered: pod puberulent, straight, narrowed below, 3.5 cm. long, 3 to 6-seeded.—Known as yet from four stations, viz: Llano River (*Lindheimer*), San Diego (*Miss Croft*), Pena and Chenate Mountains (*Nealley*).

35. PHASEOLUS L. (KIDNEY BEAN.)

Twining or prostrate herbs, with pinnately 3-foliolate stipellate leaves, flowers racemose or clustered on mostly long peduncles, 5-toothed or cleft calyx, recurved spreading standard, strongly incurved or coiled keel, style bearded lengthwise, and a linear or oblong straight or falcate several to many-seeded pod tipped with the hardened base of the style.

* *Pods more or less falcate.*

1. **P. acutifolius** Gray. Twining, with very slender puberulent branches: leaflets ovate-lanceolate to lanceolate, tapering from base to apex, acute, very entire, rough-puberulent, 2.5 to 5 cm. long: peduncles 2 or 3-flowered, shorter than the leaves: flowers purple or purplish: pod flat, broadly linear, pubescent, 8 or 9-seeded, 5 cm. long, 6 mm. wide, not much curved.—Mountain valleys west of the Pecos, and in adjacent New Mexico and Mexico.

2. **P. angustissimus** Gray. Smooth, with very slender diffuse or twining stems: leaflets very narrowly linear, obtusish, thickish, smooth, 3.5 to 5 cm. long, 2 to 3 mm. wide, longer than the petiole and shorter than the filiform loosely 2 to 5-flowered peduncle, which is 5 to 12.5 cm. long: flowers with purple standard and wings and

yellow keel: pod flat, oblong, nearly glabrous, 3 or 4-seeded, 16 to 20 mm. long, 6 mm. wide, narrowed toward the base.—Ravines and cañons west of the Pecos.

3. **P. Wrightii** Gray. Prostrate or twining, puberulent, with slender branches: leaflets hastately 3-lobed, lobes very obtuse, the lateral ones sometimes angulate and shorter than the oblong terminal one: peduncles few to many-flowered, longer than the leaves: pod pendulous, flat, pubescent, 6 to 8-seeded, over 2.5 cm. long.—Mountains near El Paso, and possibly down the Rio Grande to Eagle Pass.

4. **P. retusus** Benth. Prostrate (often trailing for many feet) from a very large root, rough-puberulent: leaflets rhombic, obtuse and retuse, rough-puberulent both sides: peduncles rigid, loosely many-flowered, scarcely longer than the leaves: flowers purple: pod flat, broadly oblong, somewhat pendulous and subfalcate. –Along the upper Rio Grande and mountain streams west of the Pecos.

5. **P. macropoides** Gray. Decumbent or diffusely spreading, flexuose, thickly villous-hirsute, from a tuberous root: leaflets oval or subrhombic, mucronate, entire, or angled or lobed above the middle on one side, pubescent both sides, 18 to 36 mm. long: peduncles many-flowered above the middle, minutely pubescent, many times longer than the leaves, 10 to 25 cm. long: flowers with purple standard and wings and yellowish keel: pod subcompressed, torulose, deflexed, linear, puberulent, 4 to 6-seeded, 16 to 18 mm. long, 4 mm. wide.—A rare plant in the mountains west of the Pecos.

6. **P. atropurpureus** Moç. Stems twining and retrorsely pubescent: leaflets pubescent on both sides, lanceolate, dilated at base and tapering to a long narrow point, 3.5 to 6.5 cm. long; lateral ones with large acute lobe on outer side at base; terminal one usually 3-lobed, sometimes obscurely so: peduncles 6 to 10-flowered, 20 to 30 cm. long, still more elongated in fruit: flowers dark purple: pod deflexed, linear, 7 to 9-seeded, 7.5 cm. long, 4 mm. wide.—In mountain ravines west of the Pecos.

* * *Pods straight, terete or flattish.*

7. **P. helvolus** L. Prostrate or climbing, branching: leaflets ovate to oblong-ovate or linear-oblong, with a more or less prominent rounded lobe toward the base, terminal leaflet 2-lobed, or some or all often entire, 12 to 40 mm. long: corolla greenish-white and purplish: pod terete, nearly glabrous, 4 to 8-seeded, 5 to 7.5 cm. long, 6 mm. wide. (*P. diversifolius* Pers. *Strophostyles angulosa* Ell.)—Sandy river banks in eastern Texas, and reported also from the Llano and near Laredo.

8. **P. umbellatus** Britton. Stems more slender: leaflets ovate to oblong-linear, rarely at all lobed, 2.5 cm. long or less: pod 3.5 to 5 cm. long, scarcely 4 mm. wide. (*P. helvolus* of Amer. authors, not L. *Strophostyles peduncularis* Ell.)—Sandy ground, extending from the Gulf States through the lowlands of eastern and southern Texas to Corpus Christi.

9. **P. pauciflorus** Benth. Slender, low-climbing, pubescent: leaflets oblong-lanceolate or ovate-oblong to linear, not lobed, 2.5 cm. long: pod pubescent, flattish, 2.5 cm. long. (*Strophostyles pauciflorus* Watson).—River banks, "western Texas."

36. **VIGNA** Savi.

Twining herbs, with 3-foliolate leaves, racemose axillary yellow flowers, a 4-toothed calyx, straight keel, style bearded above, and a terete torulose several-seeded pod.

1. **V. luteola** Benth. Annual, hirsute: leaflets ovate or ovate-lanceolate: racemes on stout peduncles longer than the leaves: flowers crowded: pod hirsute. (*V. glabra* Savi.)—Along the lower Rio Grande. Var. ANGUSTIFOLIA Watson has lanceolate or linear-lanceolate leaves.

37. RHYNCHOSIA Lour.

Usually twining or trailing perennial herbs, with 1 to 3-pinnately foliolate leaves, yellow racemose or clustered flowers, a 4 or 5-parted calyx, scythe-shaped or incurved keel, and a short flat 1 or 2-seeded pod.

1. **R. menispermoidea** DC. Stem twining or prostrate, retrorsely pubescent: leaflet solitary, reniform, pubescent on both surfaces, 2.5 to 3.5 cm. in diameter: peduncles very short, 1 to 3-flowered: pod oval-lanceolate, acute, scarcely pubescent, 1 or 2-seeded.—Low sandy ground, eastern Texas and extending to Corpus Christi.

2. **R. Texana** Torr. & Gray. Minutely velvety pubescent: stems decumbent, scarcely twining, diffuse, much branched from the base: leaves 3-foliolate; leaflets rhombic-ovate or ovate-lanceolate, obtuse, rounded or slightly cordate at base, pubescent and dotted with minute glands beneath, the upper surface reticulated and nearly glabrous, about 12 mm. long: peduncles one to several-flowered, much shorter than the petioles: pod oblong, narrowed at base, pubescent.—Throughout southern Texas, from the Gulf to New Mexico. Var. ANGUSTIFOLIA Gray has elongated and somewhat climbing branches, with lanceolate, linear-oblong, or even linear-lanceolate leaflets. Prairies of western Texas.

38. CERCIS L. (RED-BUD. JUDAS-TREE.

Small trees, with simple cordate to reniform entire palmately-veined leaves, red or purplish flowers on slender pedicels in axillary fascicles and appearing before the leaves, and an oblong flat and thin shortly-stipitate many-seeded pod.

1. **C. occidentalis** Torr. A small tree or shrub, glabrous: leaves round-cordate, very obtuse and not at all produced above, sometimes emarginate, about 5 cm. in diameter: petals 8 mm. long, rose-colored: pod about 5 cm. long, 16 mm. broad, acute at each end, on a pedicel about 12 mm. long.—A far western and north Mexican species, extending into western Texas.

2. **C. reniformis** Eng. Resembling the last, but with the leaves somewhat produced above (though still obtuse) and somewhat pubescent beneath (at least when young), and pedicels often shorter. (*C. occidentalis*, var. *Texensis* Watson.)—Western Texas.

39. CASSIA L. (SENNA.)

Herbs or shrubs, with simply and abruptly pinnate leaves (not glandular-punctate), mostly yellow flowers (usually in terminal or axillary racemes or clusters), a 5-parted calyx, 5 to 10 stamens with anthers dehiscing at the apex, and a terete or flattened thick-coriaceous to membranaceous many-seeded usually curved pod.

* *The three upper anthers deformed and imperfect.*

1. **C. pumilio** Gray. Dwarf, subcaulescent from a woody caudex which scarcely rises out of the ground, strigulose: leaves crowded; leaflets 1 pair, linear or lanceolate, cuspidate, as long as the petiole, with an interposed subulate gland, 2.5 cm. or less long, 2 to 4 mm. wide; petiole produced into a setaceous appendage; stipules setaceous-subulate, persistent: peduncles 1-flowered, longer than the leaf: corolla 16 mm. in diameter, pale yellow: pod inflated, ovoid or oblong, very obtuse, membranaceous, puberulent.—Throughout southern and western Texas.

2. **C. Rœmeriana** Scheele. Stems 3 to 6 dm. high, herbaceous nearly or quite to the base, from a very thick ligneous root, cinereous-pubescent: leaflets 1 pair, lance-

olate and gradually tapering from the rounded inequilateral base (sometimes a little falcate), puberulent above, strigose-pubescent beneath, with an interposed subulate gland, about 5 cm. long; stipules setaceous, caducous: racemes few-flowered, exceeding the leaf: corolla yellow with brownish veins: pod linear-oblong, attenuate at base, subfalcate, minutely and sparsely strigose, 2.5 cm. or more long.—From the Colorado near Austin to the San Antonio and westward to the Pecos.

3. **C. bauhinioides** Gray. Suffruticose and sericeous-canescent: stems from 7.5 to 30 cm. high, from a thick lignescent root: leaflets 1 pair (rarely 2 pairs), oblong or subovate, rounded at both ends, inequilateral, with interposed gland; stipules setaceous, persistent: peduncles 2 or 3-flowered, equaling the leaf: pod membranaceous, turgid, oblong or linear-oblong, straightish or subfalcate, hirsute, 8 to 15-seeded, 2.5 cm. long.—Throughout southern and western Texas.

4. **C. Wislizeni** Gray. A much branched and spreading shrub 12 to 18 dm. high, with spinescent puberulent branches very leafy to the top and bearing a corymb or panicle of numerous and large flowers: leaves often fasciculate; leaflets 2 or 3 pairs, obovate, retuse and mucronate, thickish, 4 to 6 mm. long: pod linear, very flat and thin (the surface appearing as if varnished), 10 to 15 cm. long, 6 mm. wide.—A Mexican species extending into the mountains west of the Pecos, where it is frequently found with acute leaflets.

5. **C. Lindheimeriana** Scheele. Clothed throughout with a dense white velvety tomentum: stems 12 to 15 dm. high: leaflets 6 to 8 pairs, oblong, aristate-mucronate, silky above, silvery-sericeous beneath, a stipitate setiform gland between each pair, 2.5 to 5 cm. long; stipules subulate, caducous: racemes many-flowered, equaling the leaves: corolla golden-yellow: pod broadly linear, sparsely pilose, 5 cm. long, over 4 mm. wide.—From the Colorado (near Austin) to the Rio Grande and west to the Pecos.

6. **C. occidentalis** L. Erect, branching and glabrous, 12 to 18 dm high: leaflets 4 to 6 pairs, ovate-lanceolate, acute; an ovate gland at the base of the petiole: racemes 3 to 5-flowered, much shorter than the leaves: pod long-linear, with a tumid border, glabrous, 12.5 cm. long.—Reported from near San Antonio.

* * *Anthers all perfect.*

7. **C. Chamæcrista** L. (PARTRIDGE PEA.) Stems spreading: leaflets small, 10 to 15 pairs, linear-oblong, oblique at base, a cup-shaped gland beneath the lowest pair; stipules persistent: flowers large, on slender pedicels, often some of the yellow petals purple-spotted at base: anthers 10, elongated, unequal (4 yellow, the others purple): pods flat.—In eastern Texas, and extending to Gillespie County and the lower Rio Grande.

8. **C. nictitans** L. (WILD SENSITIVE-PLANT.) Like the last, but with 10 to 20 pairs of linear-oblong leaflets, very small flowers on very short pedicels, and 5 nearly equal anthers.—A common eastern species, but reported from our range only west of the Pecos.

9. **C. procumbens** L. Prostrate, hirsute-pubescent: leaflets 4 to 6 pairs, linear, mucronate, with a short-pedicelled gland at base of petiole: peduncles solitary and 1 flowered, longer than the leaf, bibracteate above the middle: pod somewhat pubescent.—A variable tropical American species occurring in Texas between the lower Nueces and the lower Rio Grande.

40. HOFFMANSEGGIA Cav.

Low perennial herbs or woody at base, with bipinnate leaves with or without black glands, naked racemes of yellow flowers opposite the leaves or terminal, a 5-parted calyx, nearly equal petals, 10 distinct stamens with anthers dehiscing longitudinally, and a flat oblong often falcate few to several-seeded pod.

* *Leaves punctate with black glands.*

1. **H. Jamesii** Torr. & Gray. Herbaceous and finely pubescent: pinnæ 2 or 3 pairs and an odd one; the small oblong leaflets 5 to 9 pairs: pods broad, more or less lunate, 2.5 cm. long, 2 or 3-seeded, sprinkled (as well as the leaves, calyx, and petals) with sessile black glands.—Throughout southern and western Texas.

2. **H. melanosticta** Gray. Somewhat shrubby at base: branchlets and racemes canescent with short villous retrorse hairs: pinnæ 2 pairs and an odd one; leaflets 3 or 4 pairs, obliquely elliptical, together with the rhachis loosely villous, black glandular beneath (as are the calyx and pod): pod 2 or 3-seeded, muriculate, the short muriculations stellate-pilose at apex.—A very rare species, reported from Texas only "in the valley of the Rio Grande below Donna Ana" (*Mex. Bound. Surv.*), and in the Chisos Mountains (*Nealley*). Resembling *H. Jamesii*, but with fewer, larger, and more distant leaflets, the whole plant more villous, the calyx more densely black-glandular, and the pods larger and much more muricate and glandular.

3. **H. brachycarpa** Gray. Stems ascending from a lignescent root, slender, leafy to the top, minutely pubescent or nearly glabrous: pinnæ 2 pairs and an odd one; leaflets 4 or 5 pairs, elliptical, minutely pubescent or glabrate, lower surface sprinkled with large flat black glands: pod oval, nearly equilateral, 2-seeded, 16 to 18 mm. long, 8 to 10 mm. broad, the sides puberulent or glabrate, the sutures beset with scattered stipitate black glands and with rigid setose-muricate projections.—High prairies between the upper Nueces and the Pecos.

** *Leaves destitute of black glands.*

4. **H. stricta** Benth. Branches sparsely glandular and foliage puberulent or glabrate: pinnæ 4 to 6 pairs and an odd one; leaflets 6 to 10 pairs, crowded, obliquely oval-oblong, blunt and nerveless: raceme strict: claws of the petals long and with copious stipitate glands: pod falcate, blunt, glandular, many-seeded.—Common in the valleys throughout southern and western Texas. Probably the most common Texan *Hoffmanseggia*, with an esculent tuberous rootstock, and known as "camote del raton." Var. DEMISSA Gray is low, with lax short-peduncled racemes, pedicels spreading in flower and recurved in fruit, and pod little if at all falcate.—In the mountains west of the Pecos.

5. **H. oxycarpa** Benth. Low and slender, from a suffrutescent base: stems and petioles villous-pubescent, often with stipitate glands intermixed: pinnæ 3 to 5 pairs and an odd one; leaflets oblong, nerveless: petals very short-stipitate and nearly naked: pod broadly falcate, very acute, stipitate-glandular, 4 to 6-seeded, 2.5 cm. or more long, 6 to 8 mm. wide.—High stony prairies from Eagle Pass to the Pecos and beyond.

6. **H. Drummondii** Torr. & Gray. Low and much branched, suffrutescent, glabrous and with a few scattered stipitate glands: pinnæ 1 pair and an odd one; leaflets 4 to 6 pairs, elliptical, obtuse or retuse: pod ovate-oblong, strongly falcate, acute, glabrous, about 2-seeded.—Between the Colorado (near Austin) and the Rio Grande.

7. **H. caudata** Gray. Shrubby and very glabrous (petioles, branchlets and calyx with a few small stipitate glands): pinnæ 2 or 3 pairs, each with 4 to 7 pairs of leaflets, and an elongated terminal one with 9 to 15 pairs; leaflets crowded, thickish, rounded, oblique, subcordate, veiny: pod reticulated, acute, furfuraceous-glandular and roughened with blackish glands, the upper suture straight except the incurved apex, about 5 cm. long.—Sandy ground, between the Nueces and the Rio Grande.

8. **H. drepanocarpa** Gray. Low, with many short (2.5 to 5 cm.) slender stems rising from a thick ligneous root and terminating in the slender peduncle of the elongated and loosely flowered raceme (with the peduncle 15 cm. long), everywhere entirely destitute of glands, but minutely cinereous-puberulent: pinnæ 3 to 5 pairs and an odd one; leaflets 9 or 10 pairs, oblong, subfalcate, nerveless, crowded, about 6 mm. long: pod broadly linear, rounded at base and apex, strongly falcate, glabrous (or minutely puberulent under a lens), reticulated, impressed between the 9 or 10 seeds, about 3.5 cm. long and 6 mm. wide.—From the Pecos to New Mexico.

41. PARKINSONIA L.

Somewhat spinescent shrubs or trees, with bipinnate leaves, 1 or 2 pairs of pinnæ, small leaflets, yellow or whitish flowers on slender pedicels in short loose axillary or terminal racemes, equal sepals, and a short-stipitate flat linear to linear-oblong veined thin coriaceous pod, which is usually more or less torulose and compressed between the seeds.

** Leaflets usually very numerous upon a much-elongated flattened rhachis.*

1. **P. aculeata** L. A small tree, glabrous throughout, the slender branches often pendulous: spiny petioles 12 to 24 mm. long or less, bearing 1 or 2 pairs of pinnæ near the base or these wanting; leaflets very small, oblong, scattered upon a broad rhachis 15 to 45 cm. long; stipules spinescent: racemes axillary, 7.5 to 15 cm. long: petals yellow: pod attenuate at each end and contracted between the distant seeds, 1 to 5-seeded, 5 to 25 cm. long.—Throughout southern and western Texas. Often cultivated for ornament and known as "retama."

*** Pinnæ short and leaflets few on a terete rhachis.*

2. **P. Torreyana** Watson. A small tree, 6 to 9 m. high, with light green and smooth bark; younger branches and leaves sparingly pubescent: leaflets 2 or 3 pairs, oblong, obtuse, narrower towards the scarcely oblique base, glaucous, 4 to 6 mm. long: racemes terminating the branches, with rather long pedicels jointed near the middle: petals bright yellow, a prominent gland on the upper one: pod acute, scarcely or decidedly contracted between the very thick seeds, 2 to 8-seeded, 5 to 7.5 cm. long, with a double groove along the broad ventral suture.—A species of the Arizona region, found by *Nealley* in Hidalgo County. The "palo verde" of the Mexicans. Usually naked, as the leaves are early deciduous.

3. **P. florida** Watson. A species of the Mexican side of the Rio Grande Valley, and undoubtedly to be found as well in Texas. It very much resembles *P. Torreyana*, but can be easily distinguished by its sessile axillary racemes, pods with a narrow acute margin on the ventral side, and somewhat smaller leaflets.

4. **P. Texana** Watson. A much branching shrub 6 to 15 dm. high, with very rigid divaricate and flexuose branches which are usually armed throughout with short and spreading axillary spines: leaflets 1 or 2 pairs, oblong-obovate, retuse, 4 to 6 mm. long: flowers solitary in the axil of a spine or somewhat racemose at the extremity of some of the branches: pod pubescent, about 2-seeded.—Abundant along the Rio Grande from El Paso down, often forming dense thickets.

42. CÆSALPINIA L.

Usually prickly shrubs or trees, with abruptly bipinnate leaves, racemose or corymbose flowers, unequal sepals, and sessile unarmed flat pods.

1. **C. pulcherrima** Swartz is common in cultivation in Texas, said to have been introduced from Mexico. It is a prickly shrub with obovate leaflets and very showy orange-colored and variegated flowers, the petals having long stipe-like claws and being handsomely fringed.

43. GLEDITSCHIA L. (Honey-locust.)

Thorny trees, with abruptly once or twice pinnate leaves, inconspicuous greenish and polygamous flowers in small spikes, 3 to 5 calyx-lobes, petals and stamens, and a flat 1 to many-seeded pod.

1. **G. triacanthos** L. Thorns stout, often triple or compound: leaflets lanceolate-oblong, somewhat serrate: pods linear, elongated, 30 to 45 cm. long, often twisted, filled with sweet pulp between the seeds.—An Atlantic species, extending at least to the valley of the Brazos in Texas, and common in cultivation.

44. PROSOPIS L. (MEZQUIT. SCREW-BEAN.)

Trees or shrubs, often armed with axillary spines or spinescent stipules, with bipinnate leaves, 1 or 2 pairs of pinnæ, usually numerous small entire leaflets, small greenish flowers in cylindrical or globose axillary pedunculate spikes, and a linear pod which is compressed or terete, straight or falcate or twisted, coriaceous and indehiscent, and with thick partitions between the seeds.

* *Pod elongated, straight or falcate: spines axillary: spikes cylindrical.*

1. **P. juliflora** DC. (MEZQUIT.) Shrub or tree, glabrous or puberulent, with stout axillary spines or unarmed: leaflets 6 to 30 pairs, short-oblong to linear, obtuse or acute, 6 to 36 mm. long: spikes 5 to 10 cm. long, usually dense, 1 to 3-fruited: pod stipitate, 10 to 15 cm. long or more, acuminate, at length sweet and pulpy within.—The chief woody plant of the wooded table-lands and high valleys throughout southern and western Texas, often forming impenetrable thickets. Exceedingly useful for fuel, for a gum it yields, and also as an article of food, the ripe bean being one of the staple foods of Mexicans, Indians, and grazing animals.

** *Pod thick and spirally twisted in numerous turns: stipules spinescent: spikes globose to cylindrical.*

2. **P. pubescens** Benth. (SCREW-BEAN. TORNILLO.) A shrub or small tree, resembling the last, canescently puberulent or glabrate: leaflets 5 to 8 pairs, oblong, acutish, 6 to 8 mm. long: spikes lax, 3.5 to 5 cm. long, on peduncles about equaling the leaves: pod twisted into a narrow straight cylinder 2.5 to 5 cm. long, pulpy within, nearly sessile.—Abundant along the Rio Grande and many of its tributaries from El Paso to Devil's River. The pod used as food by Mexicans and Indians.

3. **P. cinerascens** Gray. A similar species with similar fruit, but with the leaves and leaflets much smaller, the common petiole nearly obsolete, the slender spines usually exceeding the leaves, and the flowers in long peduncled globose heads.—Along or near the Lower Rio Grande.

45. NEPTUNIA Lour.

Perennial herbs or shrubby plants, diffuse, prostrate, or floating, with bipinnate leaves, small leaflets, yellow flowers in globose heads on solitary axillary peduncles, anthers crowned with a stipitate gland, and an obliquely-oblong, flat, two-valved pod deflexed from the stipe.

1. **N. lutea** Benth. Pubescent and prostrate, with elongated branches: pinnæ 3 to 5 pairs; leaflets 15 to 20 pairs, linear-oblong, mucronate, ciliate, much crowded, veiny beneath: peduncles longer than the leaves: heads many-flowered, nodding: pod 3 to 8-seeded, very obtuse, on a rather long stipe.—In eastern and southern Texas, extending as far up the Rio Grande as Eagle Pass.

2. **N. pubescens** Benth. Closely resembling the last, but pinnæ 2 or 3 pairs, leaflets 20 to 30 pairs, flower-heads much smaller, and the stipe of the pod scarcely ever over 2 mm. long.—Between the Guadalupe and Rio Grande as far up as Eagle Pass.

3. **N. tenuis** Benth. Almost glabrous, diffuse, with slender branches: pinnæ 2 to 4 pairs; leaflets 10 to 15 pairs, oblong-linear, about 4 mm. long: pod long-stipitate.—In eastern Texas, and possibly within our range.

46. DESMANTHUS Willd.

Herbs or somewhat shrubby plants, with twice-pinnate leaves of numerous small leaflets, axillary peduncles bearing a head of small greenish-white flowers, calyx sometimes pappiform or wanting, 5 or 10 stamens with anthers not gland-bearing, and a flat acute straight or curved pod which is mostly linear. The following is Dr. Watson's synopsis:

* *Stamens* 5: *pinnæ* 2 *to* 8 (*usually* 5) *pairs on a rhachis* 1 *to* 7.5 *cm. long: leaflets linear: pod not attenuate at base: glabrous or nearly so.*

1. **D. brachylobus** Benth. Stout: heads many-flowered: peduncles 2.5 to 7.5 cm. long: pod oblong, 4 to 6 mm. broad, falcate.—Usually in wet soil, throughout Texas (excepting perhaps the southern border).

2. **D. leptolobus** Torr. & Gray. Slender: heads small: peduncles 12 to 24 mm. long: pod elongated-linear, 2 mm. broad, straight, acuminate.—Extending from Arkansas into northeastern Texas and probably within our range.

** *Stamens* 10: *leaflets oblong: pod linear.*

\+ *Pinnæ* 2 *to* 6 (*usually* 4 *or* 5) *pairs on a rhachis* 1 *to* 3.5 *cm. long: leaflets veinless.*

3. **D. Jamesii.** Torr. & Gray. Rather stout, glabrous or slightly pubescent and the leaves ciliate: heads many-flowered, on short peduncles which are usually approximate at summit and occasionally in pairs: pod 3.5 to 7.5 cm. long, 3 to 4 mm. broad, acuminate, obtuse or but slightly narrowed at base.—In southern and western Texas.

4. **D. velutinus** Scheele. Pubescent or rarely nearly glabrous: heads smaller, on peduncles 2.5 to 6.5 cm. long: pod 2.5 to 6.5 cm. long, 2 to 3 mm. broad, acuminate, attenuate at base, straight or nearly so.—In southern and especially extreme western Texas.

\+ \+ *Pinnæ* 1 *to* 4 *pairs: heads small.*

\++ *Peduncles short* (12 *to* 24 *mm.*): *rhachis short* (12 *mm. or less*): *pinnæ usually* 1 *or* 2 *pairs: leaflets veinless: pod* 2.5 *to* 6.5 *cm. long, acuminate, attenuate at base.*

5. **D. depressus** Humb. & Bonpl. Usually glabrous, low and depressed, very slender: leaflets small and narrow: pod straight or nearly so.—A species of the Gulf States, extending through Texas near the coast into Mexico.

6. **D. acuminatus** Benth. More pubescent, stouter and more erect: leaflets mostly larger and broader: peduncles rarely over 12 mm. long: pod 20 to 40 mm. long, more or less curved.—In the San Antonio valley and southward.

\++ \++ *Peduncles elongated* (2.5 *to* 10 *cm.*): *leaflets veined: pod* (2.5 *to* 3.5 *cm.*) *long, obtuse or slightly narrowed at base.*

7. **D. reticulatus** Benth. Glabrous or nearly so: rhachis 12 to 36 mm. long: peduncles usually 7.5 to 10 cm. long: pod acuminate.—Southern Texas.

8. **D. obtusus** Watson. Pubescent: rhachis usually very short (12 mm. or less): peduncles 2.5 to 6.5 cm. long: pod obtuse, apiculate.—Western Texas (*Havard*).

47. MIMOSA L. (Sensitive plant.)

Mostly shrubby plants or trees, sometimes herbaceous, usually more or less thorny or prickly, with bipinnate leaves which are often sensitive to the touch, flowers in globose heads or cylindrical spikes, usually 10 distinct stamens, and flat entire or jointed sometimes prickly pods whose valves separate from and are broader than the persistent partition,

* *Pods more or less prickly (rarely unarmed in No. 4).*

\+ *Pinnæ 1 or 2 pairs.*

1. **M. borealis** Gray. Erect and smooth shrub, the branches armed with very stout and slightly hooked and scattered infrastipular spines: leaflets 4 or 5 pairs, oval and scarcely inequilateral, thickish and glabrous, about 2 mm. long: pod oblong, stipitate, 2 to 4-seeded and breaking up into as many joints, glabrous, the margin sparsely spiny.—Said to be a common bush on the Pecos and westward. On dry gravelly soil. Var. TEXANA Gray is a form with 5 or 6 pairs of oblong leaflets.

\+ \+ *Pinnæ 4 to 7 pairs.*

2. **M. flexuosa** Benth. A much branched minutely pruinose-puberulent shrub, the white rigid flexuous branches armed with conical straight usually paired infrastipular spines: pinnæ 5 to 7 pairs; leaflets 7 to 10 pairs, oblong, obtuse, thickish, puberulent, very small, 1 mm. long: pod linear, straight or slightly falcate, minutely whitish puberulent, little more than 2.5 cm. long, scarcely 4 mm. broad, the marginal spines irregular and straight.—Mountain valleys west of the Pecos.

3. **M. Lindheimeri** Gray. A smooth or minutely puberulent shrub, the branches armed with very stout compressed infrastipular spines (solitary, in pairs, or in threes): pinnæ 4 to 6 pairs; leaflets 8 to 12 pairs, oblong; stipules spinescent: pod linear-oblong or falcate, glabrous, the margin sparsely armed with stout somewhat hooked spines.—Apparently throughout southern and western Texas. Forms occur with the pinnæ reduced to 2 or 3.

4. **M. biuncifera** Benth. A shrub with divaricate pubescent branches and hooked usually paired infrastipular spines: pinnæ 4 to 6 pairs; leaflets 10 to 15 pairs, small and oblong, glabrous above, pubescent beneath: pod narrowly linear, falcate-incurved or sickle shaped, glabrous or nearly so, 2.5 to 3.5 cm. long, less than 4 mm. wide, the margin more or less beset with hooked prickles or sometimes naked.—In western Texas, most common on dry gravelly soil west of the Pecos. Dr. Havard reports that this species and *M. borealis*, noted for the abundance and stoutness of their prickles, are known as "uña de gato."

* * *Pods unarmed (rarely armed in Nos. 5 and 7).*

\+ *Pinnæ 1 to 3 pairs.*

5. **M. fragrans** Gray. An erect very smooth shrub, with solitary short and stout somewhat recurved infrastipular spines: leaflets 5 or 6 pairs, linear-oblong, 4 mm. long or shorter: pod linear, falcate, very smooth, with 6 to 8 thin-chartaceous joints, usually much constricted between the seeds.—From the Colorado near Austin southwestward to the Rio Grande and westward to New Mexico. Not at all abundant.

\+ \+ *Pinnæ 4 to 10 pairs.*

\+\+ *Leaflets 5 to 14 pairs.*

6. **M. malacophylla** Gray. A suffrutescent plant, canescent with a fine and very soft down, with procumbent stems beset (as well as the petioles) with numerous short hooked prickles: pinnæ 4 to 7 pairs; leaflets 5 to 8 pairs, ovate or oval-oblong, mucronate and veiny, 6 to 10 mm. long: pod broadly linear, acute, rather long stipitate, very smooth and shining, 6 to 8-seeded, 5 cm. or more long.—In the region of the lower Rio Grande.

7. **M. dysocarpa** Benth. A shrub with reddish-villous branches and petioles, and sparse strong spines: pinnæ 6 to 10 pairs; leaflets 8 to 10 pairs, crowded, oblong, acute, sericeous-villous, scarcely 4 mm. long: pod linear-falcate, rigidly almost pungently acuminate, densely clothed with a reddish tomentum, 3.5 to 5 cm. long, 6 mm. broad, occasionally sparsely armed, at length breaking up into joints.—A species of western Texas, west of the Pecos, and extending into contiguous Mexico and New Mexico and Arizona.

8. **M. strigillosa** Torr. & Gray. Herbaceous, the stems diffuse and extensively procumbent, usually unarmed (occasionally with a very few short prickles), the young

branches, petioles, and peduncles very densely strigose with long whitish scaly hairs (sparsely strigose or even glabrous when old): pinnæ about 5 pairs; leaflets 10 to 14 pairs, oblong-linear, obtuse, inequilateral and slightly falcate, nearly glabrous: pod ovate or oblong, very hispid, 1 to 3-jointed.—A species of the low alluvial lands of the Gulf States and extending through the low coast lands of Texas to the lower Rio Grande.

++ ++ *Leaflets* 20 *to* 40 *pairs.*

9. **M. Berlandieri** Gray. An erect shrub, with branches and sometimes petioles sparsely armed with short straight prickles: pinnæ 4 to 6 pairs, strigose on the ribs beneath; leaflets linear, acutish, smooth: pod short-stipitate, oblong-linear, somewhat pubescent, 8 to 10-jointed.—Along or near the lower Rio Grande towards its mouth: reported also by *Reverchon* from the Sabinal.

48. SCHRANKIA Willd. (SENSITIVE BRIAR.)

Herbaceous or somewhat shrubby plants, with recurved-prickly procumbent stems and petioles, twice-pinnate sensitive leaves of many small leaflets, axillary peduncles bearing globose heads or cylindrical spikes of small flowers, and a long narrow rough-prickly somewhat 4-sided pod whose valves separate from and are usually narrower than the persistent partition.

1. **S. uncinata** Willd. Prickles hooked: pinnæ 4 to 6 pairs; leaflets elliptical, reticulated with strong veins beneath: pod oblong-linear, nearly terete, short-pointed, densely prickly, 5 cm. long.—An eastern species of dry sandy soils, extending into Texas at least to Gillespie County and the lower Rio Grande.

2. **S. angustata** Torr. & Gray. Leaflets oblong-linear, scarcely veined: pod slender, 4-sided, taper-pointed, sparingly prickly, about 10 cm. long.—Another eastern species, found in Texas as far as San Diego and probably in the San Antonio region.

3. **S. platycarpa** Gray. Leaflets oblong and more ciliate: pod broadly linear, flat, acuminate, about 7.5 cm. long, the sides sparsely and the thickened margin densely echinate with very short prickles.—Dry stony prairies near New Braunfels.

4. **S. aculeata** Willd. Apparently a form of this Mexican species is reported from Sutherland Springs (Wilson County), with densely pubescent long-beaked pods.

49. LEUCÆNA Benth.

Trees or shrubs, with bipinnate leaves, white flowers in globose heads, and broadly-linear flat membrano-coriaceous 2-valved pods.

1. **L. retusa** Benth. A glabrate shrub: pinnæ 2 to 5 pairs; leaflets 6 to 8 pairs, obliquely obovate or broadly oblong, obtuse or retuse, membranaceous and veiny: pod 15 to 25 cm. long, about 12 mm. broad, more rigid and with thicker margin than in the next.—Throughout Texas south of the Colorado and west to New Mexico.

2. **L. glauca** Benth. A small unarmed and glabrous tree: pinnæ 4 to 8 pairs; leaflets 10 to 20 pairs, linear, distant, acute, glaucous beneath: pod 12.5 to 15 cm. long, 16 to 20 mm. broad.—From San Saba to Devil's River and adjacent Mexico (*fide* Sargent).

3. **L. pulverulenta** Benth. Branches pulverulent-tomentulose: pinnæ 15 to 18 pairs; leaflets about 60 pairs, linear: pod 15 cm. long, 14 to 18 mm. broad.—Southern Texas and valley of the lower Rio Grande.

50. ACACIA Willd.

Shrubs or trees, often spinose or prickly, with bipinnate leaves, small leaflets, small flowers in globose heads or cylindrical spikes on axillary peduncles, numerous exserted stamens, and (usually more or less stipitate) pod straight or curved, thin or thick, flat or terete, 2-valved or indehiscent.

* *Pods terete or nearly so, indehiscent, at length pulpy or fleshy: flowers in globose heads.*

1. **A. Farnesiana** Willd. (HUISACHE.) A small spreading tree, with straight slender stipular spines, pubescent or glabrous: pinnæ 4 or 5 pairs; leaflets 10 to 25 pairs, oblong-linear, crowded, 2 to 4 mm. long: pod oblong, cylindrical, and more or less acuminate, straightish or curved, at length turgid and pulpy, longitudinally veined and more or less nodulose, glabrous, 3.5 to 7.5 cm. long, becoming 12 to 18 mm. thick.—From San Antonio to the Gulf coast and the lower Rio Grande. Said also to occur along the whole Mexican frontier. Produces a great profusion of very fragrant heads of yellow flowers in February or March. The hard rose-colored wood is of considerable value. Very common in cultivation.

2. **A. tortuosa** Willd. Very much resembling the last species and in flower readily mistaken for it, but well distinguished by the pod, which is elongated-linear, 7.5 to 12.5 cm. long, narrow, nearly terete, curved, moniliform, fleshy, and tomentose.—Plains of the Rio Grande near Eagle Pass. A Mexican species.

* * *Pods flat or flattish.*

+ *Leaflets 10 to 50 or more pairs (rarely less in No. 5).*

3. **A. Emoryana** Benth. A glabrous or minutely puberulent unarmed shrub (or with a few minute prickles): pinnæ 3 to 6 pairs; leaflets 10 to 25 pairs, oblong-linear, strongly oblique, acutish or obtuse: flowers in oblong or cylindrical spikes, which are more or less elongated and loosely-flowered: pod broadly-linear, flat, covered with a minute down, at least 7.5 cm. long, and nearly 2.5 cm. broad. (*A. Coulteri* Benth.)—From the high plains near the headwaters of the Leona River to Eagle Pass on the Rio Grande.

4. **A. Berlandieri** Benth. A cinereous-puberulent shrub, with sparse prickles or none: pinnæ 5 to 9 pairs; leaflets 25 to 45 pairs, oblong-linear, oblique, acutish, veiny, 4 to 6 mm. long: flowers in globose heads: pod broadly-linear, usually straight, obtuse, narrowed at base into a stipe, velvety-canescent with a very soft short pubescence, 10 to 15 cm. long, about 2.5 cm. broad, the valves perfectly flat and coriaceous with somewhat thickened margins. (*A. tephroloba* Gray.)—From the Nueces to the Rio Grande and west to Devil's River; common on the dry bluffs of the lower Rio Grande.

5. **A. filicina** Willd. A glabrous or somewhat pubescent or even hirsute unarmed shrub (sometimes herbaceous): pinnæ 2 to 15 pairs; leaflets 20 to 50 or more pairs (rarely but 5 to 10 pairs), very small, oblong-linear, obtuse or acute, with a few scattered hairs: flowers in globose heads: pod linear, usually straight, acute or acuminate, very flat and membranaceous, with more or less sinuate margin, the reticulated sides impressed about the seeds, often by abortion few or even 1-seeded, pubescent or glabrate, stipitate, 2.5 to 5 cm. long or more, 6 to 12 mm. broad, becoming reddish or brown at maturity.—Throughout southern and western Texas. Apparently a very abundant species and exceedingly variable in its foliage and pubescence, but with very characteristic pods.

+ + *Leaflets 2 to 10 pairs.*

++ *Flowers in globose heads.*

6. **A. constricta** Benth. A nearly glabrous or somewhat viscidulous shrub, with prominent divaricate stipular spines (straight or somewhat curved): pinnæ 2 to 7 pairs; leaflets 6 to 10 pairs, small (rarely over 2 mm. long), oblong, obtuse, thick,

nerveless: pod narrowly linear, straightish or falcate, constricted between the seeds, glabrous, stipitate, with coriaceous valves, 5 to 12.5 cm. long, 3 to 4 mm. broad.—Throughout southern Texas, from the lower Rio Grande region to New Mexico.

7. **A. Schottii** Torr. A glabrous shrub, with straight stipular spines: leaves fascicled; pinnæ 1 pair; leaflets 3 to 5 pairs, filiform-linear and thick, alternate, 4 mm. long: pod linear, curved into a semicircle or even a nearly complete circle, constricted between the seeds, short-stipitate, with coriaceous valves, 5 to 7.5 cm. long, 6 mm. broad.—Cañon of the San Carlos crossing of the Rio Grande. Discovered by the Mexican Boundary Survey, and rediscovered recently at the same station by Dr. Havard.

8. **A. Rœmeriana** Schlecht. A stout smooth shrub with stout more or less curved prickles: pinnæ 2 or 3 pairs; leaflets 2 to 6 pairs, obliquely oblong or obovate, obtuse or retuse, very veiny, 8 to 10 mm. long: pod linear-oblong or oblong, obtuse, more or less falcate, continuous within, flat, 6.5 to 10 cm. long, 2.5 cm. or less broad, on a short stipe, the valves somewhat coriaceous and transversely veiny.—Throughout Texas south of the Colorado and west to El Paso.

9. **A. malacophylla** Benth. A softly pubescent (somewhat climbing?) shrub, with sparse somewhat recurved prickles: leaflets 2 or 3 pairs, oblique, obovate or oblong, obtuse, softly pubescent both sides, 6 to 12 mm. long, obscurely veiny: pod broadly linear, falcate, acute at base and shortly stipitate, subcoriaceous and with a slightly thickened margin, glabrous, 10 cm. long, 18 mm. broad.—"Uplands of the Leona River." Var. GLABRATA Benth. is a glabrate form found near San Diego (*Miss Croft*).

++ ++ *Flowers in more or less elongated spikes.*

10. **A. amentacea** DC. A smooth shrub, with prominent stout straight stipular spines: pinnæ 1 pair; leaflets 2 pairs, obliquely oblong or obovate, obtuse or retuse, shining, with very prominent veins: pod narrowly linear, arcuate (often strongly so), constricted between the seeds, more or less pubescent, acute or acuminate, tapering below into a prominent stipe, 7.5 to 10 cm. long, 4 to 6 mm. wide.—From the Guadalupe to the lower Rio Grande and west to the Pecos.

51. CALLIANDRA Benth.

Ours are very low unarmed shrubs or even herbaceous, with bipinnate leaves, flowers in globose heads with elongated tubular corolla and long-exserted stamens, and straight or slightly curved pods with valves in dehiscing elastically revolute from apex to base.

1. **C. conferta** Benth. A very low shrub, about 15 cm. high, with pubescent branches and petioles: pinnæ 1 pair; leaflets 8 to 12 pairs, crowded, scarcely 4 mm. long, obliquely oblong, subcoriaceous, sericeous-villous beneath: pod sessile with a long-tapering base, appressed-villous, about 3.5 cm. long and 6 mm. broad, the valves rather membranaceous on the sides and with thick margins.—High ground, from the headwaters of the San Felipe to the Rio Grande at Eagle Pass and westward into the mountains west of the Pecos.

2. **C. eriophylla** Benth. A low stout much branched shrub 7.5 to 30 cm. or more high, with pubescent branches and petioles: pinnæ 1 to 4 pairs; leaflets 6 to 12 pairs, minute (1 to 5 mm. long or less), ovate or oblong, glabrous above, pilose beneath, soon glabrate and reticulate: pod linear-lanceolate, tapering from the middle to the base, acuminate, strigosely silky-canescent, with strongly thickened almost naked margins, 5 to 10 cm. long, 6 mm. broad (*C. Chamædrys* Engelm.).—From head of Leona River and Eagle Pass on the Rio Grande to the mountains west of the Pecos and of New Mexico.

3. **C. humilis** Benth. Stems herbaceous nearly to the base, 15 to 25 cm. high, copiously pubescent to almost glabrate, from a very long horizontal lignescent root: pinnæ 3 to 6 pairs; leaflets 20 to 30 pairs, obliquely oblong, ciliate, glabrous above,

loosely appressed pilose and reticulate beneath: pod hirsute-puberulent or glabrate, with rather membranaceous valves and very thick margins (*C. herbacea* Engelm.)—In the mountains west of the Pecos, especially near the Limpia.

52. PITHECOLOBIUM Martius.

Trees or shrubs, often spiny, with bipinnate leaves, flowers in globose heads or loose spikes, tubular corolla and long-exserted stamens, and a straight or falcate pod transversely partitioned within, the valves not elastically revolute.

1. **P. brevifolium** Benth. (HUAJILLO.) Shrub, with puberulent branchlets, inflorescence and young leaves, and stipular spines: pinnæ 3 to 5 pairs; leaflets 10 to 20 pairs, oblong-linear, pale beneath, 4 to 6 mm. long: pod straight, very acute, stipitate, somewhat membranaceous, 7.5 to 10 cm. long, 12 mm. wide.—Along the lower Rio Grande. "The permanent foliage readily eaten by sheep and goats in winter" (*Havard*).

2. **P. flexicaule** Coulter. A shrub or small tree, with puberulent inflorescence and branchlets, and short stout stipular spines: pinnæ 1 or 2 pairs (the lower pair, if present, much the smaller); leaflets 3 or 4 pairs in the upper pair of pinnæ, 1 or 2 pairs in the lower, obliquely elliptical, 6 to 10 mm. long, 4 to 6 mm. wide: pod coriaceous, becoming very hard and more or less arcuate, with the thickened edges somewhat impressed between the seeds, 10 to 15 cm. long, 18 to 25 mm. wide, about 8 seeded. (*Acacia flexicaulis* Benth. *P. Texense* Coulter.)—In the valley of the Rio Grande, and an abundant species in northern Mexico.

ROSACEÆ. (ROSE FAMILY.)

Herbs, shrubs, or trees, with alternate mostly stipulate leaves, regular flowers, mostly numerous stamens inserted on the calyx, and one to many pistils distinct and free or coherent with each other and the calyx-tube.

I. Ovary superior and not inclosed in the calyx-tube at maturity.

* Calyx deciduous, without bractlets: pistil solitary, becoming a drupe.

TRIBE I. Trees or shrubs, with simple mostly serrate leaves, 2 ovules (but usually a solitary seed), and a terminal style.—PRUNEÆ.

1. **Prunus.** Flowers perfect: lobes of calyx and corolla 5: stone of drupe bony.

* * Calyx mostly persistent: pistils few to many (rarely solitary).

+ Calyx without bractlets: ovules 2 to many.

TRIBE II. Shrubs or perennial herbs, with mostly 5 pistils which become 2 to several-seeded pods.—SPIRÆFÆ.

2. **Eriogynia.** Low cespitose perennials, with small entire leaves, racemose or spicate inflorescence, and 2 to 4-seeded coriaceous pod more or less dehiscent by both sutures.

3. **Spiræa.** Usually erect and more or less diffuse shrubs, with serrate or lobed corymbose or paniculate inflorescence, and a 1 to several-seeded pod, which may be very tardily dehiscent.

4. **Physocarpus.** Shrubs, with palmately lobed leaves, corymbose flowers, and inflated membranaceous dehiscent pods.

TRIBE III. Perennials, herbaceous or with biennial soft woody stems, with the several or numerous pistils becoming drupelets in fruit.—RUBEÆ.

5. **Rubus.** Pistils numerous, fleshy in fruit, crowded upon a spongy receptacle.

++ Calyx-lobes mostly with bractlets: ovule solitary.

TRIBE IV. Herbs, shrubs, or trees, with few to many 1-ovuled pistils becoming dry achenes.—POTENTILLEÆ.

a. Trees or shrubs: styles elongated and plumose in fruit: calyx imbricated, without bractlets (except in No. 8).

6. **Cercocarpus.** Leaves simple, entire or toothed: small flowers axillary and solitary: calyx-tube long-cylindrical: petals none: carpels solitary, rarely 2.

7. **Cowania.** Leaves entire or toothed: showy flowers short-peduncled and terminal: calyx-tube short and turbinate: petals 5: carpels 5 to 12.

8. **Fallugia.** Leaves with linear lobes: showy flowers on long peduncles and somewhat panicled: calyx-tube turbinate: petals 5: carpels numerous.

b. Herbs: calyx valvate in bud, bracteolate: carpels few to many: stamens and achenes numerous, the latter heaped on a dry receptacle.

9. **Geum.** Styles persistent and elongated after blooming, often plumose or jointed, strictly terminal.

10. **Potentilla.** Styles not elongated after blooming, mostly deciduous, and commonly more or less lateral.

II. Ovaries inferior or inclosed in the calyx-tube.

TRIBE V. Prickly shrubs, with pinnate leaves: petals conspicuous: stamens numerous: pistils many, becoming bony achenes and inclosed in the globose or urn-shaped fleshy calyx-tube which resembles a pome.—ROSEÆ.

11. **Rosa.** The only genus.

TRIBE VI. Trees or shrubs with stipules free from the petiole: carpels 2 to 5, inclosed in and coalescent with the fleshy or berry-like calyx, in fruit becoming a 2 to several-celled pome.—POMEÆ.

12. **Pyrus.** Pome containing 2 to 5 papery or cartilaginous carpels.

13. **Cratægus.** Pome drupe-like, with 1 to 5 bony stones: usually thorny.

1. PRUNUS Tourn. (PLUM, CHERRY, ETC.)

Small trees or shrubs, with a deciduous bell-shaped or urn-shaped 5-cleft calyx, 5 spreading petals, 15 to 20 stamens, solitary 2-ovuled pistil, and a fleshy drupe (with bony stone) which is mostly edible.

* *Flowers from separate lateral scaly buds in early spring, preceding or coetaneous with the leaves.*

\+ *Flowers several in umbel-like clusters: leaves ample: drupe oblong, smooth, and fleshy: shrubs or trees.*

1. **P. Americana** Marshall. (WILD YELLOW OR RED PLUM.) A thorny tree 3 to 12 m. high: leaves ovate or obovate, conspicuously pointed, coarsely or doubly serrate, very veiny, glabrous when mature: fruit nearly without bloom, roundish-oval, yellow, orange or red, 12 to 16 mm. in diameter, with the turgid stone more or less acute on both margins, or when cultivated with a larger fruit and flatter more broadly margined stone.—Common in the Atlantic States, and extending in Texas to the valley of the Concho. Var. MOLLIS Torr. & Gray has the leaves and pedicels pubescent, especially when young. Occurring sparsely on the San Antonio and its tributaries, where the fruit is said to be yellow and smaller than in the species (*Havard.*)

2. **P. rivularis** Scheele. (CREEK PLUM.) A small shrub 6 to 18 dm. high, with the foliage of the last, but with fruit the size of a cherry, or a little larger, and cherry red.—Not uncommon on the Colorado and its tributaries and extending to the upper Guadalupe and the Leona. Said by Lindheimer to grow on the "banks of streams and margins of bottom-woods, forming thickets near the water, rarely on higher places." The fruit is said to be excellent.

\+ + *Flowers solitary or in pairs: leaves small and often fascicled: drupe subglobose, velvety-pubescent, thin-fleshed: very low branching shrubs.*

3. **P. glandulosa** Torr. & Gray. A low somewhat thorny shrub with pubescent and very crooked branches, 3 dm. or so high: leaves small, scarcely 2.5 cm. long pubescent, oval, obtuse, often narrowed at base, the serrations (as well as those of the calyx segments) spreading and very glandular: umbels 1 or 2-flowered.—Eastern Texas, and extending to Gillespie County.

4. **P. minutiflora** Engelm. A low intricately branching shrub, 3 to 6 dm. high, forming dense masses, glabrous: leaves fascicled, oblong or elliptical, very obtuse and usually entire and glandless, petioled, veiny, 6 to 10 mm. long: flowers solitary, subsessile, very small (3 mm. long).—Hills and dry slopes south of the Colorado and west into the mountains beyond the Pecos.

* * *Flowers in racemes terminating leafy branches, therefore appearing after the leaves, late in spring.*

5. **P. Virginiana L.** (CHOKE-CHERRY.) A tall shrub: leaves oval, oblong, or obovate, abruptly pointed, very sharply (often doubly) serrate with slender teeth, thin: fruit red, turning to dark crimson.—River banks of the Atlantic States and west to Texas and the Rocky Mountains. Its range in Texas is unknown.

6. **P. serotina** Ehrh. (WILD BLACK CHERRY.) A large tree: leaves oblong or lanceolate-oblong, taper-pointed, serrate with incurved short and callous teeth, thickish, shining above: racemes elongated: fruit purplish-black.—Southward through Texas to the San Antonio.

7. **P. salicifolia** HBK. A tree 6 to 9 m. high: leaves lanceolate or oblong-lanceolate, acuminate or often long-acuminate, frequently more or less attenuate at base, the blade often 7.5 to 10 cm. long: fruit round and black. (*P. Capuli* Cav. *P. Capollin* DC.)—Apparently only a Mexican tree, the form extending into southern and western Texas (in the mountains), as well as into New Mexico and Arizona, and which has been referred to the synonyms just quoted, being var. ACUTIFOLIA Watson, having smaller leaves (rarely 7.5 cm. long), which are acute or rarely subacuminate, and often shrubby.

* * * *Flowers in racemes from the axils of the persistent leaves of the former season.*

8. **P. Caroliniana** Ait. (WILD OR MOCK ORANGE.) A tree 10 to 12 m. high: leaves oblong-lanceolate, acuminate, mucronate, entire or sometimes spinulose-serrate, coriaceous, veinless, smooth and shining above: racemes dense, shorter than the leaves: fruit black, juiceless, persistent.—A species of the Gulf States extending in Texas to the Guadalupe.

2. ERIOGYNIA Hook.

Low cespitose perennials, with small and entire rosulate or imbricate leaves, racemose or spicate flowers, and mostly **5** pistils which become 2 to 4-seeded coriaceous pods which are more or less dehiscent by both sutures.

1. **E. cæspitosa** Watson. Cespitose on rocks, woody at base: leaves rosulate on the short tufted branches of the woody spreading rootstock, oblanceolate or linear-spatulate, silky on both sides, those of the scape scattered and narrower: flowers in dense cylindrical spikes on scape-like stems: calyx-lobes silky: filaments and styles exserted: carpels 3 to 8, somewhat villous or glabrous, 2-seeded. (*Spiræa cæspitosa* Nutt.)—In the mountains west of the Pecos.

3. SPIRÆA L.

Usually erect and more or less diffuse shrubs, with serrate or lobed leaves, corymbose or paniculate inflorescence, and (in ours) a membranous woolly 1-seeded carpel which is very tardily if at all dehiscent.

1. **S. discolor** Pursh, var. DUMOSA Watson. A diffuse pubescent shrub, 3 to 9 dm. high: leaves usually small, ovate, cuneate into a short margined petiole, nearly smooth above, often white tomentose beneath, pinnatifidly toothed or lobed: panicle somewhat diffuse and tomentose. (*Holodiscus discolor*, var. *dumosa* Maxim.)—Mountains west of the Pecos.

4. PHYSOCARPUS Maxim.

Diffuse shrubs, with palmately lobed leaves, corymbose flowers, and 1 to 5 divergent inflated membranaceous dehiscent 2 to several-seeded carpels.

1. **P. monogyna.** A small shrub: leaves ovate or often cordate, 3-lobed and toothed, sometimes densely white-tomentose beneath: flowers on short pedicels in simple umbel-like corymbs: ovaries densely tomentose and but 1 or 2. (*Spiræa monogyna* Torr. *Neillia Torreyi* Watson. *Physocarpus Torreyi* Maxim.)—In the Guadalupe Mountains.

5. RUBUS Tourn. (BRAMBLE.)

Perennial herbs or somewhat shrubby, with prickly stems, compound leaves and serrate leaflets (in ours), a 5-parted calyx without bractlets, 5 deciduous petals (usually white), numerous stamens, and numerous pistils becoming fleshy drupelets and crowded upon a spongy receptacle, forming an edible fruit.

1. **R. occidentalis** L. (BLACK RASPBERRY. THIMBLEBERRY.) Glaucous all over: stems recurved, armed with hooked prickles, not bristly: leaflets 3 (rarely 5), ovate, pointed, coarsely and doubly serrate, whitened-downy underneath: petals shorter than the sepals: fruit separating in a mass from the dry oblong receptacle, hemispherical, purple-black.—A common northern raspberry, reported from Gillespie County (*Jermy*).

2. **R. trivialis** Michx. (LOW BUSH-BLACKBERRY.) Shrubby, procumbent, bristly and prickly: leaves evergreen, coriaceous, nearly glabrous; leaflets 3 (or pedately 5), ovate-oblong or lanceolate, sharply serrate: petals large: fruit not separating from the juicy prolonged receptacle, blackish.—A southern blackberry, apparently common in eastern, southern, and western Texas.

6. CERCOCARPUS HBK. (MOUNTAIN MAHOGANY.)

Small trees or shrubs, with simple entire or toothed evergreen leaves, small axillary and solitary flowers, calyx without bractlets, a long-cylindrical calyx-tube, no petals, and usually a solitary carpel which becomes a coriaceous linear terete villous fruit included in the enlarged calyx-tube and tailed with the elongated and plumose style.

1. **C. parvifolius** Nutt. A shrub 6 to 30 dm. high (sometimes twice as high): leaves cuneate-obovate, coriaceous, serrate towards the obtuse or rounded summit, more or less silky above, densely hoary-tomentose beneath: flowers on short slender pedicels: limb of calyx with short teeth: tail of achene often 10 cm. long.—Mountains and bluffs west of the Pecos. Var. PAUCIDENTATUS Watson is a Mexican form extending into the mountains west of the Pecos, in which the leaves are smaller and entire, or sparingly toothed at summit.

7. COWANIA Don. (Cliff rose.)

Shrubs, with small coriaceous entire or toothed leaves, showy, short-peduncled and terminal flowers, a short turbinate calyx-tube, 5 petals, 5 to 12 densely villous carpels becoming coriaceous narrowly-oblong striated fruits nearly included in the dilated calyx-tube, and tailed with the elongated plumose styles.

1. **C. ericæfolia** Torr. A straggling bush 3 to 6 dm. high, with very branching stem and heath-like leaves, which are linear and entire, 4 to 6 mm. long, cuspidate, whitish hairy beneath, with strongly revolute margins: flowers white.—Crevices of limestone rocks on the Rio Grande above the mouth of the Pecos.

2. **C. Havardi** Watson. A much branched shrub 6 to 9 dm. high, with rough grayish brown bark and very near the last: leaves distichously fascicled at the ends of the numerous very short branchlets, entire, revolute-terete, white-tomentose below, glabrous above, spinulose-apiculate, 4 to 6 mm. long: flowers solitary on the branchlets, shortly pedicellate: calyx-lobes glandular-hispid: petals white or yellowish, 6 to 8 mm. long: carpels 8, with the plumose tails 2.5 cm. long or less.—"On a rocky mountain west of Tornillo Creek, western Texas" (*Havard*).

8. FALLUGIA Endl.

A low undershrub, with pinnately lobed leaves with revolute margins, showy white solitary or panicled flowers terminating slender elongated naked peduncles, bracteolate calyx with a short-hemispherical tube, 5 petals, and numerous densely villous carpels becoming narrowly oblong exserted achenes tailed with the elongated plumose styles.

1. **F. paradoxa** Endl. Much branched, 6 to 9 dm. high, with white persistent epidermis: leaves scattered or fascicled, somewhat villous and thick, 6 to 20 mm. long, sessile, cuneate and attenuate into a linear base, pinnately 3 to 7-cleft above, the segments linear and obtuse: flowers few, 2.5 cm. or more in diameter: calyx-lobes ovate, the apex linear or trifid: bractlets linear, entire, bifid or 2-parted: achenes very numerous, 3 mm. long, the slender plumose tail 2.5 to 5 cm. long.—Common in the mountains west of the Pecos. An easily recognized plant by its feathery appearance from the numerous long plumose persistent styles.

9. GEUM L. (Avens.)

Perennial herbs, with pinnate or lyrate leaves, valvate bracteolate calyx, persistent strictly terminal styles which are elongated after blooming and often plumose or jointed, and numerous stamens and achenes, the latter heaped on a dry receptacle.

1. **G. album** Gmelin. Smoothish or softly pubescent: stem slender, 6 dm. high: root-leaves of 3 to 5 leaflets, or simple and rounded, with a few minute leaflets on the petiole below; those of the stem 3-divided or lobed, or only toothed: calyx lobes reflexed: petals small, white or pale greenish-yellow: styles jointed and bent near the middle, the upper part deciduous and mostly hairy, the lower naked and hooked, becoming elongated: head of fruit sessile in the calyx, the receptacle densely bristly-hirsute.—A common eastern species, extending into Texas to the valley of the San Antonio.

10. POTENTILLA L. (CINQUE-FOIL. FIVE-FINGER.)

Herbs or rarely shrubs, with compound leaves, solitary or cymose flowers, valvate bracteolate calyx, mostly deciduous and commonly more or less lateral styles which are not elongated after blooming, and numerous stamens and achenes, the latter heaped on a dry receptacle.

1. **P. supina** L. Stems decumbent at base or erect, often stout, leafy, subvillous: leaves pinnate, with 5 to 11 obovate or oblong incisely-serrate leaflets: cyme loose and leafy, with small yellow flowers: stamens 20: style terminal: achenes glabrous, strongly gibbous on the ventral side. (*P. paradoxa* Nutt.)—Along the upper Rio Grande above the Pecos.

11. ROSA Tourn. (ROSE.)

Usually spiny or prickly shrubs, with odd-pinnate leaves and stipules cohering with the petiole, conspicuous obovate or obcordate petals, numerous stamens, and many pistils becoming bony achenes and inclosed in the globose or urn-shaped fleshy calyx-tube which resembles a pome.

** Sepals connivent and persistent after flowering.*

1. **R. Arkansana** Porter. Very prickly, but without infrastipular spines: stipules narrow; leaflets 7 to 11, subcuneate at base, simply toothed, not resinous: flowers corymbose, the pedicels (as well as receptacles) naked: sepals not hispid, the outer lobed: fruit globose.—Common in the mountains west of the Pecos; also in Gillespie County and northward.

2. **R. Fendleri** Crepin. Infrastipular spines straight or recurved; often with scattered prickles: stipules short and narrow; leaflets 5 or 7, cuneate at base, usually glaucous, the teeth usually simple: flowers small, often solitary, the short pedicels, receptacles, and entire sepals glabrous (or the last subpubescent): fruit globose.—West of the Pecos.

** * Sepals spreading after flowering and deciduous: infrastipular spines present, often with scattered prickles.*

3. **R. foliolosa** Nutt. Stems low, with short straight or curved spines: stipules narrow; leaflets 7 to 11, narrow, glabrous or nearly so, with simple teeth: flowers solitary, on very short pedicels which (as well as calyx and receptacle) are hispid: outer sepals lobed, the base of the calyx persistent on the globose fruit: styles distinct, numerous and persistent.—Throughout eastern and central Texas.

4. **R. setigera** Michx. (CLIMBING or PRAIRIE ROSE.) Stems very tall and climbing, with stout recurved scattered spines and no prickles: stipules very narrow; leaflets 3 or 5, oblong-ovate to lanceolate, coarsely and simply serrate, smooth above and usually more or less tomentose beneath: flowers corymbose, the slender pedicels and sepals hispid, the latter usually with 1 or 2 lateral lobes and the base of the calyx persistent: styles persistent and connate into a smooth slender column: fruit oblong to globose.—A common eastern species extending into northern Texas.

12. PYRUS L. (PEAR. APPLE.)

Trees or shrubs, with showy flowers in corymbed cymes, free stipules and urn-shaped calyx-tube which becomes fleshy and incloses and coalesces with the 2 to 5 papery or cartilaginous 2-seeded carpels.

1. **P. coronaria** L. (AMERICAN CRAB-APPLE.) A small and somewhat thorny tree, with large rose-colored very fragrant blossoms few in a simple umbel-like

cyme: leaves simple, ovate, cut-serrate or lobed, soon glabrous: styles woolly and united at base: fruit fleshy, globular, fragrant and greenish, sunk in at the attachment of the stalk.—A common crab-apple of the Eastern States, extending to the northern border of Texas, and reported from Gillespie County.

13. CRATÆGUS L. (HAWTHORN. WHITE THORN.)

Thorny shrubs or small trees, with simple and mostly lobed leaves, white corymbed flowers, free stipules, and an urn-shaped calyx-tube which becomes fleshy and incloses and coalesces with the pistils in fruit, which is drupe-like, containing 1 to 5 bony 1-seeded stones.

* *Fruit small (not larger than peas), bright red: flowers mostly small: styles 5: glabrous and glandless.*

1. **C. spathulata** Michx. Shrub or tree, 3 to 9 m. high: leaves thickish, shining, deciduous, spatulate or oblanceolate, with a long tapering base, crenate above, rarely cut-lobed, nearly sessile.—A species of the Gulf States and extending to the lower Colorado in Texas.

2. **C. arborescens** Ell. A small tree, 6 to 9 m. high: leaves thin, oval or elliptical, acute at both ends, finely serrate, sometimes obscurely toothed near the apex, on slender petioles: corymbs very numerous.—Same range as the last.

* * *Fruit large (12 to 25 mm. long), red: flowers large: styles 1 to 3: stipules, calyx-teeth, bracts, etc., often beset with glands.*

3. **C. coccinea** L., var. MOLLIS Torr. & Gray. A small tree, 6 to 9 m. high, with densely pubescent shoots and stout chestnut-brown spines: leaves large, slender-petioled, cuneate, truncate or cordate at base, usually with acute narrow lobes, often subscabrous above, more or less densely pubescent beneath: fruit bright scarlet with a light bloom, 2.5 cm. broad. (*C. tomentosa*, var. *mollis* Gray. *C. subvillosa* Schrad.)—A species of the Eastern States, extending in Texas to the valley of the San Antonio and its tributaries.

4. **C. Crus-galli** L. (COCKSPUR THORN.) A small tree 3 to 12 m. high, with horizontal branches and slender thorns often 10 cm. long, glabrous: leaves thick, dark green, shining above, wedge-obovate and oblanceolate, tapering into a very short petiole, serrate above the middle: fruit globular, dull red, 8 mm. in diameter.—Extending into Texas to the Colorado and its tributaries.

SAXIFRAGACEÆ. (SAXIFRAGE FAMILY).

Herbs or shrubs, of various aspect, distinguished from *Rosaceæ* by having opposite as well as alternate leaves, usually no stipules, the stamens mostly definite, and the carpels commonly fewer than the sepals, either separate or partly so, or all combined into one compound pistil.

TRIBE I. Herbs, with alternate leaves, distinct styles or carpel-tips, and a dry capsular fruit.—SAXIFRAGEÆ.

1. **Heuchera.** Flowers paniculate: leaves chiefly radical: calyx bell-shaped, coherent with the ovary below: petals small and entire: stamens 5: ovary 1-celled, with 2 parietal placentæ alternate with the stigmas.

2. **Lepuropetalon.** Very small herbs, with solitary flowers: capsule half-superior: stamens 5, included: ovary 1-celled, with 3 parietal placentæ opposite the stigmas.

TRIBE II. Shrubs, with opposite simple leaves, and a 2 to 5-celled capsular fruit.—HYDRANGEÆ.

* Stamens 20 or more: ovary inferior: seeds numerous.

3. **Philadelphus.** Ovary 4 or 5-celled: petals convolute in bud.

* * Stamens fewer: ovary superior or nearly so.

4. **Fendlera.** Calyx-tube half-adherent to the 4-celled ovary and capsule: petals 4, ovate-deltoid: stamens 8, the filaments 2-lobed: styles 4.

5. **Whipplea.** Calyx nearly free from the 3 to 5-celled ovary: petals 5 or 6: stamens 4 to 12: styles 3 to 5, distinct: seeds and ovules solitary in the cells.

TRIBE III. Shrubs, with alternate simple leaves, and fruit a berry.—RIBESIEÆ.

6. **Ribes.** Calyx-tube adnate to the 1-celled ovary: placentæ 2, parietal, many-seeded.

1. HEUCHERA L. (ALUM-ROOT.)

Perennials, with the round heart-shaped leaves principally from the rootstock, greenish or purplish flowers in small clusters disposed in a prolonged and narrow panicle, a bell-shaped calyx coherent with the ovary below, small entire petals, 5 stamens, 2 slender styles, and a 1-celled 2-beaked capsule opening between the beaks.

1. **H. rubescens** Torr. Scape usually naked, glabrous or somewhat scabrous, 2 to 4 dm. high: leaves nearly glabrous, slightly lobed, crenate-dentate, the teeth ciliate: panicle loosely many-flowered, often somewhat reddish: petals linear, more or less rose-colored or white: stamens and styles exserted.—Mountains west of the Pecos.

2. LEPUROPETALON Ell.

A very small tufted annual herb, with alternate spatulate leaves, solitary terminal white flowers, a turbinate calyx cohering with the ovary below, minute spatulate petals, 5 very short stamens, 3 styles, and a globular 1-celled many-seeded capsule loculicidally 3-valved at apex.

1. **L. spathulatum** Ell. Only 12 mm. or so high.—A very early bloomer; in damp places in the Gulf States, and extending into the low grounds of eastern and southern Texas.

3. PHILADELPHUS L. (SYRINGA. MOCK ORANGE.)

Branching shrubs, with opposite (in ours entire) leaves, showy white flowers, a 4 or 5-parted calyx-limb, large rounded or obovate petals convolute in bud, 20 or more stamens, 3 to 5 united styles, and an inferior 4 or 5-celled many-seeded ovary becoming a capsular fruit.

1. **P. microphyllus** Gray. Branches slender and erect: leaves small, 12 to 18 mm. long, ovate-lanceolate or oblong, shining above, pale and minutely pilose beneath, narrowed at base into a very short petiole: calyx 4-cleft, glabrous without, tomentulose within; styles united to the apex.—In the mountains west of the Pecos.

2. **P. serpyllifolius** Gray. A low much branching bush with rigid crowded branches: leaves smaller, 6 to 10 mm. long, much crowded, oval or ovate oblong, obtuse, green and pubescent or puberulent above, white with a dense covering of appressed villous hairs beneath: flowers smaller, very numerous, mostly solitary and subsessile at the apex of the spurs or short leafy branchlets: calyx silky-pubescent: styles very short, united to the apex.—In the mountains west of the Pecos, and extending east of it to the Sabinal (*Reverchon*).

4. FENDLERA Engelm. & Gray

An erect branching shrub, with opposite entire leaves, white flowers, an 8-ribbed calyx-tube half-adherent to the 4-celled ovary and capsule, 4 ovate-deltoid clawed emarginate petals, 8 stamens with filaments 2-forked at apex and the lobes divaricate and extended beyond the cuspidate anther, and a crustaceous capsule with reticulated seeds winged below.

1. **F. rupicola** Engelm. & Gray. Pubescent or glabrate, with terete striate branches: leaves deciduous, subsessile, oblong, very entire, 3-nerved at base: flowers 1 to 3, peduncled, terminal on the short branchlets.—Sparingly from the Sabinal to the Pecos, and common in the mountains beyond.

5. WHIPPLEA Torr.

Small and low diffuse pubescent shrubs, with opposite slightly-petioled leaves, small white cymose-clustered flowers on a terminal naked peduncle, a calyx nearly free from the 3 to 5-celled ovary, 5 petals, 4 to 12 stamens, 3 to 5 distinct styles, and a septicidal capsule dehiscent into 3 to 5 cartilaginous 1-seeded portions.

1. **W. Utahensis** Watson. An upright much-branched little shrub: leaves thickish, 6 to 12 mm. long, elliptical or linear-oblong, very obtuse and entire: cyme rather short-peduncled, 3 to 7-flowered: calyx-tube elongated-turbinate, adnate to the lower half of the cylindraceous 3-celled capsule: styles 3.—In the mountains west of the Pecos.

6. RIBES L. (Currant. Gooseberry.)

Shrubs, with alternate palmately-veined and lobed leaves, racemose flowers (in ours), calyx-tube adnate to the 1-celled ovary, and fruit a many-seeded berry.—Ours have neither thorns nor prickles.

1. **R. viscosissimum** Pursh. From 3 to 9 dm. high, pubescent and viscid-glandular: leaves cordate-rounded and moderately lobed, 2.5 to 10 cm. in diameter: raceme somewhat corymb-like and few-flowered, the flowers dull white or greenish or sometimes purplish-tinged: calyx-tube at first campanulate, its lobes oblong and at least half the length of the tube: berry black and more or less glandular.—Sparingly in the mountains west of the Pecos, and apparently the only gooseberry of western Texas.

2. **R. aureum** Pursh. (Buffalo currant). Shrub 15 to 36 dm. high, glabrous or almost so and glandless: leaves 3 to 5-lobed, rarely at all cordate, the lobes usually few-toothed or incised: racemes short, 5 to 10-flowered, the flowers golden-yellow and spicy-fragrant: tube of the salver-form calyx 3 or 4 times longer than the oval lobes: berry small, yellowish turning blackish, naked and glabrous.—In shady ravines in western Texas, chiefly beyond the Pecos. Often also cultivated for ornament.

CRASSULACEÆ. (Orpine Family).

Succulent or fleshy and mostly herbaceous plants, with completely symmetrical as well as regular flowers, the sepals, petals, stamens, and pistils all of the same number (3 to 12) and usually distinct, or the stamens twice as many, and the carpels becoming follicles.

1. **Tillæa.** Parts of the flower each 3 to 5, with the stamens just as many: small annuals, with opposite leaves and minute axillary flowers.

2. **Sedum.** Parts of the flower each 4 to 7, with the stamens twice as many, and petals dstinct: low annual or perennial herbs, with cymose conspicuous flowers.

3. **Cotyledon.** Parts of the flower in fives, with stamens 10, and petals somewhat united: stout perennial herbs, or fleshy-woody at base, with showy spicate or racemose flowers.

1. TILLÆA L.

Small slender somewhat succulent glabrous annuals, with opposite entire leaves, minute axillary white or reddish flowers, 3 to 5 sepals and petals and just as many stamens.

1. **T. Drummondii** Torr. & Gray. Stems dichotomous and diffuse: leaves oblong-linear, rather obtuse, somewhat connate: flowers mostly solitary, on pedicels at length as long as the leaves: the reddish petals and obtuse carpels twice as long as the sepals.—In eastern Texas, and extending to Gillespie County.

2. SEDUM L. (Stone-crop.)

Mostly perennial and glabrous herbs, with fleshy leaves, cymose and often secund flowers, 4 or 5 sepals and petals, the latter distinct and twice as many stamens.

1. **S. Torreyi** Don. Branched from the base, erect or decumbent, 5 to 10 cm. high: leaves all scattered, oblong, about 4 mm. long: cyme compound, the flowers sessile, small, scattered along the circinate branches: petals yellow, lanceolate, acute, rather longer than the ovate sepals: styles short. (*S. sparsiflorum* Nutt.)—Extending from Arkansas to the upper Colorado and upper Guadalupe in Texas.

2. **S. Wrightii** Gray. Stems diffusely spreading or at first erect: leaves few, thick-fleshy, obovate, or those of the flowering branches oblong, 6 to 8 mm. long: flowers very short-pedicelled, in a very compact, compound cyme: petals white, tinged with rose, spatulate, obtuse, and mucronate, twice as long as the oblong obtuse sepals.—Among rocks, from Devil's River to the hills near El Paso.

3. **S. Liebmannianum** Hemsl. Low and branching, 5 to 7.5 cm. high: leaves fleshy, approximate or imbricate, ovate-oblong or elliptical, obtuse or rounded, 2 to 4 mm. long: flowers few and small at the summits of the branches, short-pedicelled: petals rosy-white, linear-lanceolate, mucronulate, dorsally-keeled, thrice longer than the oblong obtuse sepals.—A Mexican species, found in the Chisos Mountains of western Texas (*Havard*).

3. COTYLEDON L.

Herbs, or soft-woody at base, with very thick and fleshy entire leaves (the lower rosulate), often large and showy spicate or racemose flowers, parts of the flower in fives, the petals more or less united, and 10 stamens.

1. **C. strictiflora** Baker. Radical leaves spatulate-lanceolate, cauline lanceolate and small, the similar floral ones shorter than the flower: flowers scarlet, 16 mm. long, short-pedicelled, in a very strict and close secund raceme or spike, 15 to 20 cm. long: petals long attenuate-acuminate, much longer than the oblong sepals. (*Echeveria strictiflora* Gray.)—Rocky cañons in the mountains west of the Pecos.

HALORAGEÆ. (Water-milfoil Family.)

Aquatic or marsh plants, with the inconspicuous symmetrical flowers sessile in the axils of leaves or bracts, the calyx-tube coherent with the ovary, which consists of 2 to 4 more or less united carpels, the styles or sessile stigmas distinct.

1. **Myriophyllum.** Flowers monœcious or polygamous, the parts in fours, with or without petals: stamens 4 or 8; leaves often whorled, the immersed ones pinnately dissected.

2. **Proserpinaca.** Flowers perfect, the parts in threes: petals none: leaves alternate, the immersed ones pinnately dissected.

1. MYRIOPHYLLUM Vaill. (WATER-MILFOIL.)

Perennial aquatics, with crowded, often whorled leaves (those under water pinnately dissected into capillary divisions), sessile monœcious or polygamous flowers in the axils of the upper leaves, and a nut-like 4-celled deeply 4-lobed fruit.

1. **M. heterophyllum** Michx. Stem stout: leaves whorled in fours and fives; floral ones ovate and lanceolate, thick, crowded, sharply serrate; lowest pinnatifid: stamens 4: fruit obscurely roughened.—Reported from streams between the Perdinales and Eagle Pass, but doubtless widely distributed.

2. PROSERPINACA L. (MERMAID WEED.)

Low perennial herbs, with stems creeping at base, alternate leaves, small perfect flowers sessile in the axils (solitary or 3 or 4 together) with parts in threes, and a bony 3-angled 3-celled 3-seeded nut-like fruit.

1. **P. palustris** L. Leaves lanceolate, sharply serrate, the lower pectinate when under water: fruit sharply angled.—Reported from the Nueces and its tributaries.

2. **P. pectinacea** Lam. Leaves all pectinate, the divisions linear-awl-shaped: fruit rather obtusely angled.—On the Perdinales.

LYTHRARIEÆ. (LOOSESTRIFE FAMILY.)

Mostly herbs, with mostly opposite entire leaves, no stipules, axillary or whorled flowers, calyx inclosing but free from the 1 to 4-celled many-seeded ovary and membranous capsule and bearing the 4 to 7 deciduous petals and 4 to 14 stamens on its throat, solitary style with capitate or 2-lobed stigma.

* Flowers solitary or clustered in the axils of the leaves, sessile or nearly so.

1. **Rotala.** Calyx short, the sinuses appendaged: petals and stamens 4: capsule septicidal, with 3 or 4 valves.

2. **Ammannia.** Calyx as in the last: petals generally 4 or none: stamens 4; capsule bursting irregularly.

* * Flowers solitary, but on distinct, often very long pedicels.

3. **Nesæa.** Petals generally 6: stamens 12 or 13.

* * * Flowers in 3 to many-flowered axillary cymes.

4. **Lythrum.** Calyx tubular: petals usually 6: stamens mostly 6 or 12.

1. ROTALA L.

Low and smooth herbs, with short-campanulate or semiglobose calyx having tooth-like appendages at the sinuses, 4 petals, 4 short stamens, and a globular 4-celled septicidal capsule with the valves transversely and densely striate under a lens.

1. **R. ramosior** Koehne. Leaves tapering at base or into a short petiole, linear-oblanceolate or somewhat spatulate: flowers solitary (rarely 3) in the axils and sessile: accessory teeth of calyx as long as the lobes or shorter. (*Ammannia humilis* Michx.)—A species of the Eastern States and extending into Texas to San Saba County.

2. AMMANNIA Houston.

Low and inconspicuous smooth herbs, with opposite narrow leaves, small axillary flowers (sessile or nearly so), 4-angled and 4-toothed calyx usually with a little horn-shaped appendage at each sinus, 4 purplish petals (or sometimes wanting), 4 or 8 stamens, and a globular 2 to 4-celled capsule which bursts irregularly.

1. **A. coccinea** Rottb. Leaves linear-lanceolate, 5 to 7.5 cm. long, with a broad auricled sessile base: cymes subsessile, dense: petals purplish: stamens 4 or 8, more or less exserted: style usually slender: capsule included. (*A. latifolia* of American authors, not L.)—Reported from the upper Guadalupe and San Antonio, but doubtless throughout eastern and southern Texas.

2. **A. auriculata** Willd. Resembling the last, but distinguished by its decidedly pedunculate flowers and rather loose cymes, 4 (rarely 3) stamens, and half-exserted capsule. (*A. Wrightii* Gray)—Along the tributaries of the upper Rio Grande, especially above the Pecos.

3. NESÆA Comm.

Slender herbs or shrubs, with opposite leaves, solitary axillary flowers on very long peduncles, generally 6 petals, 12 or 13 stamens, and septicidal or septifragal capsule.

1. **N. longipes** Gray. A slender much branching glabrous herb, diffuse or ascending, 3 to 9 dm. long: leaves linear, subsessile, auriculate at base, with revolute margins, 2.5 to 5 cm. long, 2 to 4 mm. wide: peduncles filiform, elongated, about as long as the leaves, bibracteolate near the purple flower: capsule opening by a little lid and then splitting septifragally.—Wet places along the Rio Grande.

2. **N. salicifolia** HBK. A glabrous shrub: leaves lanceolate, tapering into a short petiole, sometimes whorled: peduncles short: calyx-lobes connivent-closed above the septicidal capsule. (*Heimia salicifolia* Link)—Along the Lower Rio Grande.

4. LYTHRUM L. (Loosestrife).

Slender herbs, with opposite or scattered mostly sessile leaves, purple flowers in 3 to many-flowered axillary cymes, a tubular striated calyx appendaged in the sinuses, 5 to 7 petals, as many or twice as many stamens, and an oblong 2-celled capsule.

1. **L. alatum** Pursh. Tall and wand-like perennial, the branches with margined angles: leaves oblong-ovate to linear-lanceolate, acute, with a cordate or rounded base, the upper mostly alternate: calyx 4 to 8 mm. long: petals rather large, deep purple: stamens of the short-styled flowers exserted: fleshy hypogynous ring prominent.—In low ground throughout southern and western Texas. The following species have a similar range, are very closely related, and have usually been regarded as but varieties of *L. alatum*, but have been recently set apart by Koehne as species.

2. **L. lanceolatum** Ell. Leaves oblong-linear or lanceolate, with an acute or cuneate base: the fleshy hypogynous ring as prominent as in the last (as high as broad). (*L. breviflorum* Wats.)

3. **L. ovalifolium** Engelm. Leaves suborbicular or oblong: the fleshy hypogynous ring small. (*L. alatum*, vars. *ovalifolium* and *pumilum* Gray.)

4. **L. album** HBK. Leaves linear, or the cauline ones linear-lanceolate: the fleshy hypogynous ring very small. (*L. alatum*, vars. *linearifolium* and *lanceolatum* Gray.)

ONAGRARIEÆ. (EVENING-PRIMROSE FAMILY.)

Herbs, with usually 4-merous perfect and symmetrical flowers, opposite or alternate leaves, mostly no stipules, calyx-tube cohering with the 2 to 4-celled ovary, petals convolute in bud (sometimes wanting), stamens as many or twice as many as the petals or calyx-lobes and inserted on the summit of the calyx-tube, a single slender style and a 2 to 4-lobed or capitate stigma.

* Fruit a many-seeded usually loculicidal pod.

+ Calyx-limb divided to the summit of the ovary, persistent.

1. **Jussiæa.** Petals 4 to 6: stamens twice as many: capsule elongated.
2. **Ludwigia.** Petals 4 or none: stamens 4: capsule short.

+ + Calyx-tube prolonged beyond the ovary (but slightly so in No. 3) and deciduous from it: flowers 4-merous.

3. **Epilobium.** Seeds silky-tufted: flowers small, not yellow: lower leaves often opposite.
4. **Œnothera.** Seeds naked: flowers mostly yellow: leaves alternate.

* * Fruit dry and indehiscent, 1 to 4-seeded: leaves alternate.

5. **Gaura.** Calyx-tube obconical: filaments appendaged at base.
6. **Stenosiphon.** Calyx-tube filiform: filaments not appendaged.

1. JUSSIÆA L.

Herbs, with mostly entire and alternate leaves, axillary yellow flowers, elongated calyx-tube not at all prolonged beyond the ovary and with 4 to 6 persistent herbaceous lobes, 4 to 6 petals, twice as many stamens, and a long 4 to 6-celled capsule opening between the ribs.

1. **J. repens** L. Stem creeping, or floating and rooting: leaves oblong, tapering into a slender petiole: flowers large, long-peduncled: calyx-lobes and obovate petals 5: pod woody, cylindrical, with a tapering base.—In streams, from the San Antonio northward and eastward.

2. LUDWIGIA L. (FALSE LOOSESTRIFE.)

Perennial herbs, with alternate or opposite leaves, axillary flowers, calyx-tube not at all prolonged beyond the ovary and with 4 usually persistent lobes, 4 petals (often small or wanting), 4 stamens, and a short or cylindrical many-seeded capsule.

1. **L. palustris** Ell. (WATER-PURSLANE.) Smooth, the stems creeping or floating: leaves all opposite, ovate or oval, tapering into a slender petiole: petals none, or small and reddish when the plant grows out of water: calyx-lobes very short: capsules oblong, 4-sided, not tapering at base, 4 mm. long, sessile in the axils.—Apparently throughout eastern and southern Texas and beyond the Pecos.
2. **L. natans** Ell. Like the last, but with larger flowêrs, yellow petals (or none), and a much larger conspicuously bibracteolate capsule which is attenuate from the middle to the base, turbinate when young, at length 4-sided.—A species of the Gulf States and extending through central and southern Texas to beyond the Pecos.

3. EPILOBIUM L. (WILLOW-HERB.)

Mostly perennials, with nearly sessile leaves, violet or purple or white flowers, calyx-tube scarcely prolonged beyond the ovary and with a 4 or 5-lobed deciduous limb, 4 petals, 8 stamens with short anthers, and a linear capsule containing numerous seeds with a tuft of long hairs at the end.

1. **E. adenocaulon** Haussk., var. (?) PERPLEXANS Trelease. Simple or nearly so, almost smooth below, mostly canescent with incurved hairs in the inflorescence: leaves 2.5 to 5 cm. long, divergent, lanceolate, rather obtuse and sparingly undulate-serrulate, more or less tapering into a short petiole: flowers small, with rose-colored petals: seeds obovoid, with a tuft of white hairs. (*E. coloratum* of Contr. Nat. Herb. I., 37)—Somewhat abundant west of the Pecos.

4. ŒNOTHERA L. (EVENING PRIMROSE.)

Plants of diverse habit, with alternate leaves, yellow or white or rose-colored flowers, deciduous calyx-tube prolonged beyond the ovary and with 4 reflexed lobes, 4 petals, 8 stamens with mostly linear and versatile anthers, and a 4-valved capsule containing many naked seeds.

§ 1. *Stigma-lobes linear, elongated* (very short in No. 10): *calyx tube linear, slightly dilated at the throat: petals never lilac or purple: anthers linear.*

* *Caulescent: flowers erect before opening, yellow, the calyx-tips free: capsules sessile, coriaceous, straight or nearly so: seeds in 2 rows in each cell.*

+ *Flowers in a leafy spike: capsules oblong, slightly attenuate above: seed with more or less margined angles, nearly smooth.*

1. **Œ. biennis** L. Rather stout, erect, 3 to 15 dm. high, usually simple, canescently puberulent and more or less hirsute or strigose: leaves lanceolate to oblong, or rarely ovate-lanceolate, 5 to 15 cm. long, acute or acuminate, repandly denticulate, the lowest petioled: calyx-tube 2.5 to 6.5 cm. long: capsule 18 to 25 mm. long.—Throughout Texas. Var. GRANDIFLORA Lindl. has petals equaling the calyx-tube.

2. **Œ. Jamesii** Torr. & Gray. Resembling the last, but much stouter and larger-flowered, the stem 15 to 30 dm. high, becoming thick and woody at base: pubescence appressed, canescently puberulent, with scattered substrigose hairs: calyx-tube 7.5 to 12.5 cm. long: capsule 2.5 to 5 cm. long.—On stream banks, from the Colorado west to the mountains beyond the Pecos and New Mexico.

+ + *Flowers in a leafy spike: capsules linear: seeds not margined, minutely tuberculate.*

3. **Œ. heterophylla** Spach. Erect, often branched above, 3 to 6 dm. high, pubescence usually sparse, strigose or hirsute: leaves lanceolate, acute, the lower attenuate at base and occasionally sinuate-pinnatifid, the upper repand-denticulate, the uppermost oblong to ovate-lanceolate or subcordate: spike rather loose and few-flowered: calyx-tube slender, 2.5 to 3.5 cm. long, sparing villous: petals roundish: capsule 18 to 25 mm. long—Plains of western Texas.

+ + + *Flowers axillary: capsules linear.*

4. **Œ. Drummondii** Hook. Stems decumbent or ascending, 3 to 6 dm. long, simple or branched: pubescence more or less dense, short, strigose, appressed, longer and more spreading on the calyx and ovary: leaves oblong-lanceolate or oblanceolate, 1.5 to 6.5 cm. long, acute, attenuate to the base, entire or sparingly repand-denticulate, or subsinuate-toothed at base: flowers large: capsule 2.5 to 5 cm. long: seeds obscurely

pitted.—Along the coast; reported from Galveston to Corpus Christi, but probably farther south.

5. **Œ. sinuata** L. Stems ascending or decumbent, simple or branched, 3 dm. or more high, more or less strigose-pubescent and puberulent: leaves oblong or lanceolate, 2.5 to 3.5 cm. long, sinuately toothed or often pinnatifid, the lower petioled: calyx and ovary subvillous: capsule 2.5 to 3.5 cm. long: seeds strongly pitted.—Throughout Texas. The following forms have been recognized as varieties: Var., MINIMA Nutt. is a slender reduced form, 1-flowered and often nearly glabrous. Var. HIRSUTA Torr. & Gray is densely hirsute, with appressed and spreading hairs, and the seeds less strongly pitted. Var. GRANDIFLORA Watson has larger flowers, the petals 2.5 to 3 cm. long, and is often decumbent.

* * *Caulescent: flowers nodding in the bud, white turning rose-color: capsules sessile mostly linear: seeds in a single row.*

6. **Œ. pinnatifida** Nutt. Annual or biennial: stem decumbent at base and diffusely branched, or subsimple and erect, 7.5 to 30 cm. high, canescently puberulent or subhirsute: leaves oblanceolate or linear-lanceolate, 2.5 to 7.5 cm. long, mostly deeply sinuate-pinnatifid with linear lobes, the lower spatulate and long-petioled, less deeply pinnatifid or entire: calyx-tips not free, the throat naked: seeds oval. not angled, finely pitted—Western Texas, from Indian Territory to the upper Rio Grande.

7. **Œ. trichocalyx** Nutt. Annual: stems mostly stout, 15 to 30 cm. high, white and shining: glabrous or canescently puberulent or subvillous: leaves linear to oblong-lanceolate or rhomboidal, 5 to 10 cm. long, acute or acuminate, attenuate into a long petiole, repandly denticulate or sinuate-pinnatifid with irregularly unequal segments, or the lowest entire: calyx very villous: tips not free, throat naked: seeds smooth, lance-linear, subangled.—Sandy plains and hills west of the Pecos.

8. **Œ. albicaulis** Nutt. Stems from a perennial subterranean rootstock, erect, 15 to 120 cm. high, white and often shreddy: glabrous or puberulent: leaves linear to oblong-lanceolate, 2.5 to 7.5 cm. long, sessile or attenuate at base or abruptly petioled, entire or repand-denticulate, or sinuate-pinnatifid towards the base: calyx-tips free, throat naked: seeds smooth, lance-linear, subangled.—Sandy ground, west of the Pecos. A very variable species.

9. **Œ. coronopifolia** Torr. & Gray. Stems from a perennial subterranean rootstock, erect, branched, 15 to 45 cm. high: canescently puberulent, often more or less hispid: leaves narrowly oblanceolate, 2.5 to 5 cm. long, sinuately pinnatifid or more usually pectinate-pinnatifid, the linear segments as broad as the rhachis: calyx tips short, free, throat very villous: seeds ovate, angled, tuberculate.—Valley of the Pecos and westward.

* * *Caulescent: capsules obovate or clavate, often pedicelled, quadrangular, the valves ribbed and the angles more or less strongly winged (except in No. 10).*

\+ *Flowers yellow, erect in bud.*

10. **Œ. linifolia** Michx. Erect, very slender, simple or diffuse, 15 to 40 cm. high, glabrous, the branchlets and capsules puberulent: radical leaves oblanceolate, the cauline linear-filiform, 12 to 24 mm. long, numerous and fascicled: petals 2 to 6 mm. long: stigmas short: capsules 4 to 6 mm. long, sessile.—Extending into Texas from Louisiana and Indian Territory, and probably within our range at the north.

11. **Œ. Spachiana** Torr & Gray. Erect, simple or branched, 15 to 40 cm. high, puberulent: leaves linear to oblanceolate, 2.5 to 5 cm. long, obtuse, entire: flowers axillary, small: capsules pubescent, nearly sessile, slightly winged toward the apex.—In the valleys of the Brazos and Colorado.

\+ \+ *Flowers white or purple, nodding in the bud.*

12. **Œ. speciosa** Nutt. Stems from a perennial subterranean rootstock, erect or ascending, 15 to 60 cm. high, branching: puberulent or canescently pubescent, rarely subvillous: leaves oblong-lanceolate to linear, 2.5 to 10 cm. long, acute, attenuate at

base, repand-denticulate, sinuate-dentate, or more or less deeply sinuate-pinnatifid, especially at base, or the lower lyrately pinnatifid: calyx-tube as long as the ovary: petals white, large, obcordate.—From Indian Territory to the lower Rio Grande and westward beyond the Pecos.

13. Œ. **tetraptera** Cav. Very near the last, but always more or less villous, with the capsule larger and more broadly winged and more abruptly contracted at top, the capsule with its pedicel often 2.5 to 3.5 cm. long: calyx-tube usually shorter in proportion to the ovary.—A Mexican species reported from the San Antonio and lower Rio Grande valleys (*Havard*).

14. Œ. **rosea** Ait. Puberulent or sometimes villous, the stems ascending, 3 to 6 dm. high, branching from the base: leaves lanceolate, 2.5 to 5 cm. long, acute or acuminate, attenuate to a petiole, repandly denticulate or entire, frequently sinuate-pinnatifid toward the base: calyx-tube shorter than the ovary: petals purple, small, entire.—In the lower Rio Grande region of extreme southeastern Texas. Var. PARVIFOLIA Coulter is low and diffusely branching, 7.5 to 15 cm. high and villous, with leaves very much smaller, seldom 12 mm. long, and purple calyx.—Limpia cañon (*Nealley*). The red-purple of the calyx and the lilac-purple of the corolla give a fuchsia-like look to the flowers.

* * * * *Acaulescent or nearly so: flowers white or rose-color (often yellow in No.* 16), *erect in the bud: capsule ovate or ovate-oblong, obtusely or sharply angled, mostly sessile, large and rigid.*

15. Œ. **primiveris** Gray. Often very small, more or less villous with spreading substrigose hairs: leaves 2.5 to 10 cm. long, lyrate-pinnatifid or the lower oblanceolate and entire, narrowed into a petiole: calyx-tube 2.5 to 5 cm. long: petals 8 to 18 mm. long: capsule ovoid-conical, not crested, scarcely angled, net-veined.—Extreme western Texas beyond the Pecos, and extending into New Mexico.

16. Œ. **triloba** Nutt. Very rarely with a short stem, glabrous: leaves 10 to 50 cm. long, somewhat ciliate, long-petioled, runcinate pinnatifid or oblanceolate and only sinuately toothed, the segments usually repandly denticulate: calyx-tips free, the tube 5 to 10 cm. long: petals 12 to 25 mm. long: capsule ovate, persistent, strongly winged, net-veined.—Throughout central and western Texas.

17. Œ. **brachycarpa** Gray. Pubescence canescent, short, usually dense, subtomentose: leaves rather thick, ovate to linear-lanceolate, 7.5 to 20 cm. long, long-petioled, usually lyrately pinnatifid, the lower (or sometimes all) entire or more or less deeply sinuate-toothed: calyx-tube 5 to 10 cm. long: petals 3.5 cm. long, purplish: capsule ovate, winged, more or less corky, smooth. (Incl. *Œ. Wrightii* Gray.)—In the mountains west of the Pecos.

* * * * * *Caulescent: flowers axillary, yellow: calyx slightly dilated: capsule ovate to orbicular, strongly angled or broadly winged.*

18. Œ. **Havardi** Watson. Numerous short slender simple or branching stems rising from a branching caudex: canescent with short close pubescence: leaves linear-lanceolate, attenuate at each end, irregularly sinuate-pinnatifid, 1 to 5 cm. long: flowers sessile, erect in bud: calyx-tube 3.5 to 5 cm. long, the attenuate tips coherent: petals orange-yellow turning red, 12 to 24 mm. long: capsule oblong-ovate, 4-angled and the valves strongly ribbed.—"Prairies near Morfa, western Texas" (*Havard*).

19. Œ. **Missouriensis** Sims. Stems decumbent or ascending, simple or somewhat branched, very short or 3 dm. or more long and subwoody at base: pubescence canescent, short and silky, closely appressed, sometimes dense or wholly wanting: leaves thick, oval to linear, mostly narrowly lanceolate, 5 to 12.5 cm. long, acuminate, attenuate to a usually slender petiole, entire or repand-denticulate: calyx-tube 5 to 12.5 cm. long, the slender tips free: petals 2.5 to 6.5 cm. long: capsule 2.5 to 7.5 cm. long, with wings nearly as broad: seeds strongly crested.—Throughout Texas east of the Pecos.

§2. *Stigma discoid: calyx-tube more broadly dilated above: anthers oblong-linear: capsule mostly sessile, linear-cylindric: mostly perennial, somewhat woody, with axillary yellow flowers erect in bud.*

20. **Œ. Hartwegi** Benth. Suffruticose, usually low, 7.5 to 37.5 cm. high, decumbent or ascending, branched, more or less canescent or glabrous: leaves numerous, often crowded, linear to lanceolate, 1 to 5 cm. long, obtuse or acutish, entire or sometimes sparingly repand-denticulate: calyx-tube 2.5 to 5 cm. long, the tips free and linear: petals 8 to 24 mm. long: capsule 16 to 20 mm. long.—Throughout the whole Rio Grande region of Texas, and northward to Indian Territory. The following well-marked varieties are chiefly in western Texas: Var. LAVANDULÆFOLIA Watson. Low, 7.5 to 15 cm. high, pubescent throughout, the leaves mostly linear, 6 to 24 mm. long, the calyx-segments less attenuated above. (*Œ. lavandulæfolia* Torr and Gray.) Var. FENDLERI Watson. Stouter, mostly glabrous, with oblong-lanceolate leaves and large flowers with a broad throat. (*Œ. Fendleri* Gray.)

21 **Œ. Greggii** Gray. Very near the last, but more shrubby and diffuse, low, viscidly pubescent or more or less hirsute: leaves ovate to oblong, 2 to 6 mm. long, acute, mostly sessile: flowers smaller: capsules 12 mm. long.—Sandy plains and stony hills west of the Pecos; also reported by Reverchon from prairies near the Lampasas.

22. **Œ. tubicula** Gray. Usually subwoody, diffusely branched, 10 to 30 cm. high, minutely glandular-puberulent: leaves linear to oblong-lanceolate, 12 to 24 mm. long, acute, entire, the lower petioled: calyx-tube 8 to 14 mm. long, the free tips short: petals 8 to 10 mm. long: capsules 8 to 14 mm. long, subpedicellate.—Prairies and gravelly places on the Pecos and westward; also extending through northwestern Texas.

23. **Œ. serrulata** Nutt. Slender, 7.5 to 37.5 cm. high, simple or branched, canescent with short appressed hairs or nearly glabrous: leaves linear to lanceolate, 2.5 to 7.5 cm. long, mostly acute or acutish, attenuate to the base, irregularly and sharply denticulate: calyx-tube 4 to 8 mm. long, the free tips short: capsules 18 to 30 mm. long.—Throughout Texas. The following varieties have almost equal range in Texas: Var. SPINULOSA Torr. & Gray. Usually nearly glabrous, the stems rather stout, subdecumbent, sometimes 6 to 9 dm. long: flowers larger, the tube 12 to 20 mm. long, with a slender base and equaling the petals: stigma and throat of the calyx occasionally very dark-purple or orange. Var. PINIFOLIA Engelm. has leaves very narrowly linear and subrevolute and flowers as in the former variety.

§ 3. *Stigma capitate: calyx-tube obconic or short-funnelform: anthers oblong: capsule linear, sessile, attenuated above, curved and contorted: flowers in bracteate spikes.*

24. **Œ. chamenerioides** Gray. Slender, erect, branching, 10 to 30 cm. high, somewhat viscidly puberulent: leaves distant, lanceolate, 2.5 to 5 cm. long, the uppermost sessile, the lower petioled, obscurely repand-denticulate: flowers small, petals 2 mm. long, yellow, usually turning red: calyx-tube very short: capsule elongated, very narrowly linear, 3 to 5 cm. long, 1 mm. thick.—Stony hills, beyond the Pecos in extreme western Texas.

5. GAURA L.

Herbs, with mostly sessile alternate leaves, white or rose-colored flowers in spikes or racemes, an obconical deciduous calyx-tube much prolonged beyond the ovary and with 4 reflexed lobes, clawed petals, mostly 8 stamens with a small scale-like appendage before the base of each filament, a 4-lobed stigma surrounded by a ring or cup-like border, and a hard nut-like 3 to 4-ribbed or angled fruit which is indehiscent or nearly so and usually becoming 1-celled and 1 to 4-seeded.

* *Fruit sessile or nearly so.*

1. **G. parviflora** Dougl. Soft-villous and puberulent, 6 to 15 dm. high: leaves ovate-lanceolate, repand-denticulate, soft-pubescent: spikes dense: fruit oblong-clavate, narrowed to both ends, 4-nerved, obtusely angled above, 6 to 8 mm. long.—Throughout Texas.

2. **G. coccinea** Nutt. Canescent, puberulent or glabrate, very leafy, 15 to 30 cm. high: leaves lanceolate, linear-oblong or linear, repand-denticulate or entire: flowers in simple spikes, rose-color turning to scarlet: fruit terete below, 4-sided and broader above, 4 to 6 mm. long.—Throughout Texas.

3. **G. Drummondii** Torr. & Gray. Stem suffruticose at base, a little hairy below, virgately branched above: leaves somewhat canescently puberulent, lanceolate, acute, denticulate or somewhat sinuate: spikes slender, few and loosely flowered: fruit very abruptly narrowed at the base and terete when mature, ovate-pyramidal above, acute, with 4 strong carinate angles.—Between the Colorado and lower Rio Grande west to the Pecos.

4. **G. tripetala** Cav. Stem erect, fastigiately branched above, somewhat hirsute, leafy: leaves lanceolate, the radical ones spatulate-lanceolate and on long petioles, repand or denticulate, acute, clothed with appressed pubescence: spikes slender: sepals and petals usually 3: fruit triquetrous (rarely 4-angled), the sides 1-ribbed and plicate-rugose.—From the Brazos to the lower Rio Grande.

5. **G. suffulta** Engelm. Stem villous with long spreading hairs, but the inflorescence very glabrous: leaves somewhat pilose, glabrate, lanceolate, attenuate at both ends, somewhat repand-toothed, the lower oblong-lanceolate and petioled: fruit 4-wing-angled, ovate-pyramidal, closely sessile and not narrowed at base, smooth, the concave faces slightly 1-ribbed or sparsely tuberculate at base.—From the Colorado to the lower Rio Grande, west to the Pecos and New Mexico.

6. **G. Nealleyi** Coulter. Similar to the last, but lower part of stem sparingly hirsute and the inflorescence glandular-pubescent: leaves rather crowded below, linear, acute, entire, closely sessile or somewhat tapering at base, glabrous except the minute and rigid more or less hooked hairs on the margins and midrib beneath: spike rather loosely few-flowered: fruit as in *G. suffulta*, but with a tapering base or short stipe.—In the mountains west of the Pecos (*Nealley*).

* * *Fruit slender-pedicelled.*

7. **G. sinuata** Nutt. Stem suffruticose, diffuse or decumbent, branching and very leafy at base, sending off slender and naked flowering branches, glabrous or hairy: leaves lanceolate-linear, acute, remotely and acutely sinuate-toothed, glabrous: flowers loose, pedicelled: fruit lanceolate or ovate, tapering at both ends.—Throughout Texas.

8. **G. villosa** Torr. Stems suffruticose and with numerous short, very leafy branches at base, canescently puberulent with villous hairs intermixed, and sending up naked and elongated glabrous and often paniculate flowering branches: leaves tomentose-canescent on both sides, lanceolate, remotely and acutely toothed or rarely entire: raceme loosely-flowered: fruit slender, 4-sided, tapering at both ends, on a filiform pedicel, at length reflexed.—On the sandy plains west of the Pecos.

9. **G. macrocarpa** Rothrock. Stems and branches scabrous with hirsutish pubescence: leaves small, rather thick and obtuse, with revolute margins hispidly ciliate, the lower ones 20 mm. long by 2 to 4 mm. wide (with 1 or 2 strong teeth), the upper ones entire and gradually reduced to bracts: raceme (or contracted panicle) rather loose: fruit canescent-puberulent, fusiform, obtusely angled and strongly ribbed between the angles.—In the mountains west of the Pecos. Reported also by Reverchon from the Llano Valley.

6. STENOSIPHON Spach.

Like *Gaura*, but calyx prolonged beyond the ovary into a filiform tube, the filaments not appendaged at base, and the fruit 1-celled and 1-seeded.

1. **S. virgatus** Spach. Slender, 6 to 12 dm. high, glabrous, leafy: leaves narrowly lanceolate to linear, pointed, entire, much reduced above: flowers numerous in an elongated spike, white, 12 mm. long: fruit pubescent, oblong-ovate, 8-ribbed, small.—Extending from the north as far south as Wilson County.

LOASEÆ. (LOASA FAMILY).

Herbs, with either stinging or jointed and rough-barbed hairs, no stipules, calyx-tube adnate to a 1-celled ovary, perfect often showy flowers, usually very numerous stamens, and a single style.

1. **Mentzelia.** Stamens many, inserted below the petals: style 3-cleft at apex: seeds few to many, on 3 parietal placentæ.

2. **Eucnide.** Stamens many, adnate to the united bases of the petals and deciduous with them in a ring: style 5-cleft: seeds minute, very numerous, covering 5 expanded placentæ.

3. **Cevallia.** Stamens 5, adnate to base of calyx-segments and persistent, the connective prolonged into a linear tubular petaloid appendage: style short, with a capitate stigma: seed solitary, suspended.

1. MENTZELIA Plumier.

Annual or biennial erect herbs, with stems becoming white and shining, alternate leaves very adhesive by the barbed pubescence, terminal solitary or cymose-clustered yellowish or white flowers, cylindrical or club shaped calyx-tube with a 5-parted persistent limb, 5 or 10 regular spreading flat deciduous petals, usually indefinite stamens inserted with the petals on the throat of the calyx, a 3-cleft style, and a dry few to many-seeded capsule opening by valves or irregularly at summit.

* *Seeds few or many, not winged: petals* 5, *not large: filaments all filiform.*

1. **M. oligosperma** Nutt. Rough and adhesive, 3 to 9 dm. high, much branched, branches brittle: leaves ovate and oblong, cut-toothed or angled, petioled: petals yellow, wedge-oblong, pointed: capsule about 9-seeded, seeds oblong.—Throughout western Texas.

2. **M. albicaulis** Dougl. Slender, 7.5 to 30 cm. or more high: leaves linear-lanceolate, pinnatifid with numerous narrow lobes, sessile, upper leaves broader: flowers mostly approximate near the ends of the branches: petals spatulate or obovate: capsules linear-clavate, with numerous seeds, which are rather strongly tuberculate and irregularly angled with obtuse margins.—In the mountains west of the Pecos.

* * *Seeds numerous, suborbicular-winged or narrowly margined: petals* 5 *or* 10, *often large and showy: outer filaments often petaloid: capsule broad, oblong: leaves sessile, sinuately-toothed or pinnatifid.*

3. **M. nuda** Torr. & Gray. Rough with minute barbed pubescence: leaves somewhat lanceolate, the segments obtuse: flowers vespertine, yellowish-white, rather large, not bracteolate: petals 10: outer filaments petaloid and often sterile: capsule 3-valved at summit: seeds plainly winged.—Sandy plains of southern and western Texas.

4. **M. multiflora** Gray. Stems scabrous, pubescent, 7.5 to 30 cm. high: leaves lanceolate, attenuate below: flowers numerous, opening only in bright sunshine, subtended by 1 or 2 bracts: petals deep yellow, abruptly pointed, 12 to 18 mm. long. (Incl. *M. Wrightii* Gray.)—Throughout southern and western Texas. Very variable in foliage, size and color of flowers, and length of capsule.

2. EUCNIDE Zuccarini.

Annual or biennial herbs, armed with stinging hairs and barbed pubescence, with alternate cordate or ovate petioled lobed and serrately toothed leaves, yellow pedicelled flowers in terminal cymes, oblong calyx-tube with 5-lobed persistent limb, 5 petals united at base and inserted on the throat of the calyx, numerous stamens with filiform filaments adnate to the base of the petals and deciduous with them in a ring, 5-cleft and angled style, and a many-seeded obovate capsule with 5 expanded placentæ and opening by 5 valves at the short-conical summit.

1. **E. bartonioides** Zucc. A tender succulent plant, branching and usually spreading on the ground, with ovate cut-toothed or slightly lobed leaves on slender petioles, and flowers mostly on still longer simple peduncles (7.5 to 15 cm. long), the 5 ovate petals and very many slender filaments fully 2.5 cm. long.—From the Colorado to the Rio Grande and westward beyond the Pecos. The large showy yellow flowers open only in the bright sunshine.

3. CEVALLIA Lagasca.

Branching canescent-pubescent stinging herbs, with larger simple bristles rising from glands, smaller ones short and thick, white and shining bark, alternate sessile sinuate-pinnatifid leaves, silky-hirsute flowers terminating the peduncles and aggregated in hemispherical heads, tube of the plumose calyx short and with 5 linear erect lobes, 5 plumose erect petals as long as and similar to the sepals, 5 erect stamens with very short filaments, pilose linear-oblong anthers 2-lobed at base, connective produced beyond the anther-cells into an elongated tubular process, and a dry indehiscent oblong or obovoid fruit crowned by the plumose calyx and corolla and with a solitary suspended seed.—The single species, so far as known, is

1. **C. sinuata** Lag.—Extending throughout the Rio Grande region and westward to Arizona.

TURNERACEÆ.

Shrubby or herbaceous plants, with often hispid but not stinging pubescence, simple alternate leaves, yellow flowers, 5 united sepals, 5 equal petals inserted on the calyx, 5 distinct stamens alternate with the petals and inserted below them, 3 or 4 commonly branched or many-cleft styles, free 1-celled ovary with 3 parietal placentæ and numerous ovules, and a 3-valved loculicidal capsule with numerous arillated crustaceous and reticulated seeds.

1. TURNERA Plum.

Mostly suffrutescent plants, with petals longer than the calyx, 3 or 4 simple styles with flabellate many-cleft stigmas, and capsule 3-valved from apex to middle.

1. **T. diffusa** Willd., var. APHRODISIACA Urban. Low branching strigose-pubescent shrub: leaves thickish, small, narrowly oblong, tapering to a short slender petiole, regularly dentate, more or less rugose, the regular pinnate viens impressed above and prominent beneath, green above, whitish beneath, 12 to 25 mm. long, 4 to 6 mm. broad: flowers rather small and axillary, the calyx and twisted petals tardily deciduous and broken loose at base by the enlarging capsule.—A Mexican species discovered by Nealley in Starr County. This is a well known medicinal plant, first distinguished by Prof. Lester F. Ward, and long known as "Damiana." Occurring in abundance throughout northern and western Mexico, where it is extensively collected for medicinal purposes, its discovery within our own borders is an interesting fact. Known in Mexico as "Yerba de Venulo."

PASSIFLORACEÆ. (PASSION-FLOWER FAMILY.)

Herbs or woody plants, climbing by tendrils, with perfect flowers, 5 monadelphous stamens, and a stalked 1-celled ovary free from the calyx, with 3 or 4 parietal placentæ and as many club-shaped styles.

1. PASSIFLORA L. (PASSION-FLOWER.)

Climbing plants, with alternate generally palmately-lobed leaves, axillary jointed peduncles, 5 sepals united at base into a short cup (usually colored like the petals, at least within) and the throat crowned with a double or triple fringe, 5 petals on the throat of the calyx, 5 stamens with the filaments united into a tube which sheathes the long stalk of the ovary and separate above, and fruit a many-seeded (often edible) berry.

* *A conspicuous 3-bracted involucre close to the flower.*

1. **P. incarnata** L. Pubescent: leaves 3 to 5-cleft, the lobes serrate, the base bearing 2 glands: flower large, 5 cm. broad, nearly white, with a triple purple and flesh-colored crown: peduncle with a 3-bracted involucre near the flower, the bracts obovate and glandular: fruit as large as a hen's egg.—A species of the Southern States and extending into Texas to Gillespie County and the San Antonio valley. Fruit called "maypops."

2. **P. fœtida** L. Villous and glandular: leaves roundish, 3-lobed or angular, usually cordate at base, ciliate with hairs and glands on the denticulate or subentire margin: flowers white, with a triple rosy crown: involucre 3-leaved, the leaves 2 or 3 times pinnately-parted, the ultimate filiform divisions excurrent into a gland: fruit large, ovoid.—Along the lower Rio Grande, from Eagle Pass downwards.

* * *Involucre minute or none.*

3. **P. affinis** Engelm. Glabrous: leaves 3-lobed, glaucous beneath and petioles without glands, the lower subcordate, the upper subacute at base, the lobes about equal, obovate, obtuse, entire, and setaceous-mucronate: peduncles with 2 or 3 small setaceous bracts: flower smaller, about 3 cm. broad, yellowish, the fringe of the crown as long as the sepals: fruit bluish-black, 12 mm. in diameter and on a stipe as long.—From the Colorado to the Rio Grande and west to the Pecos.

4. **P. inamœna** Gray. Hirsute-pubescent with barbed hairs: leaves very thin, cordate at base, deeply 3-cleft, the lobes oval-oblong, subserrate, the terminal one narrowed at base, the lateral ones a little shorter and often 2-lobed or coarsely 2 or 3-toothed; the petioles with 2 glands towards the apex: peduncles with 2 small setaceous bracts: flower greenish: fruit ovoid, 3.5 cm. in length.—A Mexican species, found by Nealley in Hidalgo County.

5. **P. tenuiloba** Engelm. Slender and suberect: leaves rather rigid, with revolute margins, subscabrous above with short hairs, smoothish and reticulated beneath, biglandular at base, subcordate, 3-lobed: the lateral lobes lanceolate-linear, elongated, cuspidate, horizontally divergent or recurved; the middle lobe very short and entire in the lower leaves, shortly 3-lobed in the upper: flowers greenish, 16 to 18 mm. in diameter, with no involucre: fruit small.—Very abundant between the Colorado and the lower Rio Grande and west to the Pecos.

CUCURBITACEÆ. (Gourd Family.)

Mostly succulent herbs with tendrils, alternate palmately lobed or veined leaves, diœcious or monœcious (often gamopetalous) flowers, calyx-tube cohering with the 1 to 3-celled ovary, the 5 or usually $2\frac{1}{2}$ stamens (*i. e.*, 1 with a 1-celled and 2 with 2-celled anthers) commonly united by their often tortuous anthers and sometimes also by the filaments, and a fleshy fruit (known as a *pepo*) or sometimes membranaceous.—A large tropical order, represented in cultivation by such plants as the gourd, pumpkin, squash, muskmelon, cucumber, and watermelon.

* Ovary 1-celled, with 3 to 5 placentæ and numerous horizontal ovules.

\+ Anther-cells contorted or conduplicate.

\+\+ Corolla rotate or campanulate, 5-parted to the base or of 5 distinct petals.

1. **Lagenaria.** Calyx-tube of the sterile flower elongated: anthers cohering in an oblong head and mostly included in the calyx-tube: flowers monœcious: petioles 2-glandular at apex.

2. **Cucumis.** Calyx-tube of the sterile flower short: anthers distinct or but lightly cohering and mostly exserted; the connective produced beyond the cells: tendrils simple.

3. **Citrullus.** Like the last, but the connective not produced and the tendrils mostly 2 or 3-forked.

\+\+ \+\+ Corolla campanulate, 5-lobed to the middle or a little below: anthers coherent.

4. **Cucurbita.** Flowers monœcious: filaments distinct, with staminodia inserted at the bottom of the calyx: stigmas 3 to 5 and 2-lobed.

\+ \+ Anther-cells straight or curved, not contorted.

\+\+ Style inserted on a cup-shaped disk or ring.

5. **Apodanthera.** Calyx-tube subcylindrical: anthers distinct, sessile, dorsally fixed: stigma solitary, 3-lobed: ovary with 3 placentæ: sterile flowers racemose.

6. **Melothria.** Calyx-tube campanulate: anthers mostly straight and sessile, basally fixed.

\+\+ \+\+ Disk at base of style none or obscure: stamens inserted in the throat of the calyx.

7. **Maximowiczia.** Flowers diœcious: calyx-tube narrowly campanulate or cylindrical: stamens 3: stigma solitary, 3-lobed: ovary with 2 or 3 placentæ: fruit globose.

* * Ovary usually 2-celled, with the few ovules erect or ascending.

8. **Echinocystis.** Fruit not gibbous, bladdery, bursting at the top: anthers 3.

9. **Cyclanthera.** Fruit oblique, gibbous, bursting elastically: calyx-tube rotate or cup-shaped: anther 1.

* * * Ovary 1-celled, with a solitary pendulous ovule.

10. **Sicyos.** Corolla of the sterile flowers flat and spreading, 5-lobed: fruit indehiscent.

1. LAGENARIA Seringe. (Calabash. Bottle-gourd.)

A climber, with 2-forked tendrils, biglandular petioles, musk-scented flowers solitary in the axils (sterile on long, fertile on shorter peduncle), funnel-form or bell-shaped calyx-tube, 5 obcordate or obovate and mucronate white petals, the narrow anther-cells contorted or conduplicate, 3 stigmas each 2-lobed, 1-celled ovary with mostly 3 placentæ with numerous horizontal seeds, and a fruit with a hard or woody rind and soft flesh.

1. **L. vulgaris** Seringe. Climbing freely, rather clammy-pubescent and musky-scented: leaves rounded, cordate: flowers long-stalked: white petals greenish-veiny: fruit of very various shapes, usually club-shaped, or long and much enlarged at the apex, the hard rind used for vessels, etc.—Cultivated by the Indians from the earliest discovery of North America, and naturalized in southern Texas.

2. CUCUMIS L. (Melon. Cucumber.)

Twining or trailing plants, with simple tendrils, sterile flowers clustered and with short calyx-tube, fertile ones solitary in the axils, 5 almost distinct acute petals, distinct stamens, anthers with only one bend and the connective produced beyond the cells, 3 blunt stigmas, and fruit with a fleshy rind.

1. **C. Anguria** L. Hirsute: leaves deeply 3 to 7 (usually 5)-lobed, lobes obovate or spatulate, blunt, denticulate, the 3 larger separated by a rounded sinus: flowers small, yellow: fertile peduncles slender: fruit ovoid, muricate with rigid spinules.—A tropical species, found by Palmer near Uvalde.

3. CITRULLUS Neck. (Watermelon.)

Resembling the last, but with tendrils 2 or 3-forked, connective not produced, and seeds imbedded in the enlarged pulpy placentæ.

1. **C. vulgaris** Schrad. Prostrate: leaves deeply 3 to 5-lobed, the divisions again lobed or sinuate-pinnatifid, pale or bluish: corolla deeply 5-cleft, widely open, pale yellow.—Said by Dr. Havard to be found wild in many places west of the Pecos.

4. CUCURBITA L.

Prostrate scabrous vines rooting at the joints, with large yellow flowers which are monœcious and mostly solitary, campanulate calyx-tube, campanulate corolla 5-lobed to the middle, distinct filaments, linear united anthers contorted, short thick style with 3 to 5 2-lobed stigmas, 3 to 5 parietal placentæ, and an indehiscent smooth fleshy fruit with a hard rind.

1. **C. fœtidissima** HBK. Root very large, fusiform: leaves thick, triangular-cordate, rough and whitish: flowers 7.5 to 10 cm. long: fruit globose or obovoid, 5 to 7.5 cm. in diameter. (*C. perennis* Gray.)—Abundant in the valleys of southern and western Texas. "The fruit, when ripe, is about the color and size of an orange" (Havard). Known as "calabacilla."

2. **C. Pepo** L., the common pumpkin, has a naturalized variety in southern and western Texas, the habit, foliage, and fruit of which is too well known to need description. (*C. Texana* Gray.)

5. APODANTHERA Arn.

Climbing or prostrate pubescent or hispid herbs, with round-reniform entire or somewhat lobed leaves, rather large yellow monœcious or diœcious flowers, subcylindrical calyx-tube, distinct sessile dorsally-fixed nearly straight anthers, style inserted on a cup-shaped disk or ring, solitary 3-lobed stigma, ovary with 3-placentæ, and a fleshy ovoid fruit.—Sterile flowers racemose.

1. **A. undulata** Gray. Prostrate vine, 9 to 24 dm. long, from an exceedingly large deep root (thick as a man's leg): leaves undulate and somewhat crisped, strigose-cinereous, 5 to 15 cm. in diameter: sterile flowers from the lowest axils and racemose-corymbed; the fertile ones solitary in the upper axils: fruit 7.5 to 10 cm. in diameter.—In rocky valleys, from Eagle Pass to the mountains west of the Pecos. Known as "melon loco."

6. MELOTHRIA L.

Slender and climbing, with simple tendrils, very small, polygamous or monœcious flowers (sterile campanulate and with a 5-lobed corolla, fertile with calyx-tube constricted above the ovary and then campanulate), more or less united straight and sessile basally-fixed anthers, and a small pulpy berry filled with many flat and horizontal seeds.

1. **M. pendula** L. Leaves small, roundish, and heart-shaped, 5-angled or lobed, roughish: sterile flowers few in small racemes; fertile ones solitary, greenish, or yellowish: berry oval, green, 8 to 12 mm. long.—Extending from the Gulf States through the lowlands of Texas to the lower Rio Grande, thence up the river to the Pecos.

7. MAXIMOWICZIA Cogn.

Climbing very glabrous herbs from a perennial root, with simple tendrils, deeply 3 to 5-parted leaves with the divisions often lobed or dissected, small yellow diœcious flowers (sterile ones racemose, fascicled or solitary, fertile ones solitary), narrowly campanulate or cylindrical calyx-tube, 3 stamens inserted in the throat of the calyx, single 3-lobed stigma, ovary with 2 or 3 placentæ, and a globose red fruit.

1. **M. Lindheimeri** Cogn. Leaves succulent, subreniform, 3 to 5-lobed or -parted, and sinuate-dentate, 2.5 to 7.5 cm. in diameter, scabrous beneath: calyx-tube of sterile flower tubular-funnelform: berry scarlet, somewhat ovoid, 2.5 cm. or more in diameter: seeds 6 mm. long, roundish-oval, turgidly lenticular. (*Sicydium Lindheimeri* Gray.)—Common in the valleys of southern and western Texas.

2. **M. tripartita** Cogn. Like the last, but with more narrowly lobed leaves, shorter campanulate calyx-tube, smaller and more obtuse fruit, and narrower seeds. (*Sicy-*

dium tripartium Naudin.)—Found at Uvalde and Laredo. Var. TENUISECTA Watson has leaves 5-parted, the segments laciniately lobed with linear or even filiform lobes. (*Sicydium Lindheimeri*, var. *tenuisectum* Gray.)—Chiefly from the Leona River and Eagle Pass to the Pecos and westward.

8. ECHINOCYSTIS Torr. & Gray. (WILD BALSAM-APPLE.)

Tall climbing annual, with 3-forked tendrils, small greenish-white monœcious flowers (sterile in racemes, fertile in small clusters or solitary), lanceolate or oval petals, 3 more or less united anthers, and a fleshy at length dry and prickly (not gibbous) fruit bursting at the summit and containing few large erect or ascending seeds.

1. **E. Wrightii** Cogn. Stems pubescent: leaves reniform-cordate, subangulate, triangular-acuminate at apex, puberulent, scarcely denticulate: fruit oblong, 2.5 to 3.5 cm. long, apiculate-beaked and armed with long soft-hirsute prickles 12 mm. long. (*Elaterium? Wrightii* Gray.)—Mountains near El Paso.

9. CYCLANTHERA Schrad.

Slender glabrous climbers, with very small racemose or panicled white sterile flowers and a solitary fertile one in the same axil, rotate deeply 5-parted corolla, stamens united into a central column and with solitary annular anthers, 1 to 3 (usually 2)-celled ovary with few erect or ascending ovules, and a spiny obliquely ovoid and gibbous beaked fruit bursting irregularly.

1. **C. dissecta** Arn. Leaves digitately 3 to 7-foliolate, the oblong divisions somewhat lobed or toothed: tendrils simple or bifid: fruit 2.5 cm. long, on a short peduncle.—Throughout Texas.

10. SICYOS L. (ONE-SEEDED BUR-CUCUMBER.)

Climbing annuals, with 3-forked tendrils, small whitish monœcious flowers, sterile and fertile mostly from the same axils (the former corymbed, the latter in a capitate cluster, long-peduncled), 5 petals united below into a bell-shaped or flattish corolla, anthers cohering in a mass, slender style with 3 stigmas, 1-celled ovary with a single suspended seed, and a dry and indehiscent ovate fruit filled by the single seed and covered with barbed prickly bristles.

1. **S. angulatus** L. Leaves roundish heart-shaped, 5-angled or lobed, the lobes pointed: plant clammy-hairy.—River-banks, throughout eastern and southern Texas.

CACTACEÆ. (CACTUS FAMILY.)

Green fleshy and thickened persistent mostly leafless plants of peculiar aspect, globular or columnar, tuberculated or ribbed, or jointed and often flattened, usually armed with bundles of spines from the *areolæ* which constitute the axils of the (mostly absent) leaves: with flowers having numerous sepals, petals, and stamens, usually in many series, the cohering bases of all of which coat the inferior 1-celled many-ovuled

ovary, and above it form a tube or cup, nectariferous at base; single style with several or numerous stigmas, and fruit a pulpy or rarely dry 1-celled berry.

I. No leaves proper: spines never barbed: flower-bearing and spine-bearing areolæ distinct: tube of the sessile solitary flowers well developed, often long.

1. **Mamillaria.** Globose or oval plants, covered with spine-bearing tubercles, (except in one group): flowers (usually small) from between the tubercles: ovary naked.

2. **Echinocactus.** Globose or oval plants, stouter than the last, usually ribbed, with bundles of spines on the ribs: flowers mostly larger, from the youngest part of the ribs close above the nascent bunches of spines: ovary covered with sepals.

3. **Cereus.** Oval or columnar plants, sometimes tall, ribbed or angled, with bundles of spines on the ribs: flowers usually larger, close above the bundles of full grown (older) spines: ovary covered with sepals.

II. Leaves small, subulate, early deciduous: sessile and solitary flowers from the same areolæ as the always barbed spines: tube of the flowers short, cup-shaped.

4. **Opuntia.** Branching or jointed plants: joints flattened or cylindrical.

1. MAMILLARIA Haworth.

Small, more or less globose or oval simple or cespitose plants, the spine-bearing areolæ borne on cylindric, oval, conical, or angular tubercles which cover the body of the plant, with flowers about as long as wide, the tube campanulate or funnel-shaped, from a distinct woolly or bristly areola at the base of the tubercles, fully open in sunlight and only for a few hours, and ovary often hidden between the bases of the tubercles and naked, as is also the exsert succulent berry.—In one group the tubercles are unarmed.

* *Flowers lateral from the axils of older or full-grown tubercles which are never grooved: ovary generally immersed but becoming exserted towards maturity.*

+ *No central spines.*

1. **M. micromeris** Eng. Simple and globose, 12 to 36 mm. in diameter: tubercles very small, 1 to 2 mm. long, crowded: younger areolæ only clothed with loose wool: spines slender, ash-gray, in many series, 1 to 3 mm. long, in younger plants about 20 and equal, in flower-bearing tubercles 30 to 40, all stellate-spreading, the uppermost (6 to 8) 2 to 4 times as long as the others and strongly clavate: flowers nearly central, 6 mm. in diameter, light pink.—From the San Pedro to El Paso.

2. **M. lasiacantha** Eng. Simple and globose, 12 to 36 mm. in height and scarcely less in diameter: tubercles terete, 4 to 6 mm. long: spines slender, from densely pilose to almost naked, in many series, 40 to 80, all radiating, 3 to 5 mm. long: flowers lateral, 12 mm. long, whitish or very pale pink.—On the Pecos and westward.

+ + *Central spines mostly longer and hooked.*

3. **M. pusilla** DC., var. TEXANA Eng. Ovate-globose, proliferous, cespitose, 2.5 to 6.5 cm. high: tubercles terete, 7 to 9 mm. long, long-woolly in the axils: spines in many series, the outermost 30 to 50 hairlike and crisped or twisted, the interior 10 to 12 more rigid, shorter and white, the innermost 5 to 8 central ones straight, rigid and longer, dusky towards the apex: flowers lateral, 14 to 20 mm. long, reddish.—On the Rio Grande near Eagle Pass and southward.

4. **M. Grahami** Eng. Subglobose, simple or at length branched from the base, 2.5 to 7.5 cm. high: tubercles ovate, 6 mm. long, with naked axils: radial spines 20 to 30 in one series, 6 to 12 mm. long, thin and whitish, a single central much longer and

stouter brown one strongly hooked (hook usually turned upwards), with often 1 or 2 straight upper ones in addition: flowers below the top, 18 to 24 mm. long, rose-colored: berry elongated and clavate, scarlet, 18 to 24 mm. long.—In the mountains near El Paso, its most eastern limit.

5. **M. Wrightii** Eng. Depressed-globose, simple, 3.5 to 7.5 cm. in diameter: tubercles terete, 10 to 12 mm. long, with naked axils: radial spines about 12, white, 8 to 12 mm. long: central spines 1 to 3 (mostly 2 side by side), scarcely longer, divergent, with brownish and hooked tips (hooks usually turned downwards): flowers lateral, fully 2.5 cm. broad, bright-purple, with narrow acuminate petals: berry subglobose-ovate, purple, about 2.5 cm. long.—Near El Paso, which seems to be its eastern limit, and on the upper Pecos.

+ + + *A single straight shorter central spine.*

6. **M. Heyderi** Muhlenpf. Globose with a flat or depressed top, simple: tubercles elongated, pyramidal, subquadrangular: radial spines 10 to 22, straight, the lower ones longer; a single shorter central stout and straight spine: flowers lateral, reddish: berry elongated-clavate.—From near Austin to Matamoras and westward to El Paso. Var. HEMISPHÆRICA Eng. has a convex top and 9 to 12 spines.

7. **M. meiacantha** Eng. Very similar to the last, but with larger, more compressed, more loosely arranged tubercles, and fewer (5 to 9) stouter spines.—Common at San Antonio, southwestward into the great bend of the Rio Grande and westward into New Mexico. The central spine is often wanting. "The oblong scarlet berries, an inch or less long, are very good to eat" (*Havard*).

8. **M. sphærica** Dietr. Proliferous and cespitose, single specimens clavate, but often forming dense hemispherical masses: tubercles elongated-ovate, acute, 12 to 16 mm. long: radial spines slender, 12 to 14, 6 to 10 mm. long; a single straight central one which is somewhat shorter and scarcely stouter; flowers 3.5 to 5 cm. long, with yellow aristate-acuminate petals.—From Corpus Christi to Eagle Pass. Remarkable in this division on account of its exsert ovary and large flower.

* * *Flowers larger and vertical, from the base of a groove on the young or nascent and spine-bearing tubercles: ovary exsert.*

\+ *Flowers yellow.*

9. **M. Missouriensis** Sweet. Simple or cespitose, proliferous, 2.5 to 5 cm. in diameter: radial spines 10 to 17, slender, straight, frequently puberulent, white, 6 to 16 mm. long; a single central stouter spine (often wanting): flowers 2.5 to 5 cm. long and wide, the fimbriate sepals and sparingly denticulate petals lanceolate or linear-lanceolate and acute: stigmas 2 to 8, erect or spreading: berry subglobose, scarlet, shorter than the tubercles. (*M. Nuttallii* Eng.)—A northern species, extending from the upper Missouri to the San Antonio in Texas. Apparently not extending into the mountainous region of western Texas. The following varieties are the ordinary Texan forms: Var. CÆSPITOSA Watson is cespitose (forming masses often a foot broad), with 12 to 15 puberulent radial spines, central one generally wanting, 5 spreading stigmas, and larger flowers and berries. (*M. Nuttallii*, var. *cæspitosa* Eng.) Var. ROBUSTIOR Watson is almost simple, with longer and more loosely arranged tubercles, stouter and smooth spines, 10 to 12 radial spines and a solitary central one, larger flowers, and 7 or 8 spreading stigmas. (*M. Nuttallii*, var. *robustior* Eng.)

10. **M. Scheerii** Muhlenpf., var. VALIDA Eng. Almost simple, ovate-globose, glaucescent, large, 17.5 cm. high: tubercles remote and spreading, large, subcylindrical, from a broad base, 2.5 to 3.5 cm. long: groove very deep, with a few depressed or hemispherical warts or glands: younger areolæ densely woolly: radial spines 9 to 16, very stout (especially the lower ones), straight, bulbous at base, white or yellowish, dark at apex, 20 to 36 mm. long; central ones 1 to 5, stouter and angled: flowers 5 cm. long, from very tomentose young axils.—From Eagle Pass to El Paso, and on prairies at the head of the Limpia. "A stately plant, by far the largest of our northern *Mamillariæ*" (*Engelmann*).

11. **M. pectinata** Eng. Simple, globose, 2.5 to 6.5 cm. in diameter: lower tubercles short conical, 4 to 6 mm. long, the uppermost flower-bearing ones terete, longer, sulcate, 10 to 12 mm. long: areolæ oblong: spines all radiating, 16 to 24, rigid, recurved, about equal, 6 to 10 mm. long, horny or white, those on the uppermost tubercles with the upper ones fascicled and longer, 12 to 18 mm. long: flowers 5 to 7.5 cm. in diameter.—On the Pecos.

12. **M. Echinus** Eng. Simple, globose, 3.5 to 6.5 cm. in diameter: tubercles round-conical, 10 to 12 mm. long: areolæ orbicular: spines straight or a little curved, white; radial ones 16 to 30, 8 to 12 mm. long, the uppermost a little longer, 12 to 20 mm. long; central ones 3 or 4, the lower one very stout, subulate from a very thick base and perpendicular to the center of the plant, the upper ones erect as are the radial: flowers large, about 3.5 to 5 cm. long.—On the Pecos. "A very striking plant, characterized by the unusually stout and subulate lower central spine, which, together with the globular shape, gives it the appearance of some echinoid" (*Engelmann*).

13. **M. scolymoides** Scheidw. Nearly simple, globose or ovate, 5 to 7.5 cm. high: tubercles conical, 10 to 16 mm. long, the upper elongated, incurved, imbricate: radial spines 14 to 20, straight or often recurved, white or horny, 10 to 20 mm. long; central ones 1 to 4, darker, longer, 18 to 32 mm. long, the upper ones turned back with the radials, the lower stouter, longer and bent downwards: flowers 5 cm. long.—On the Pecos.

14. **M. calcarata** Eng. Globose, proliferous, cespitose, larger heads 5 to 6.5 cm. in diameter, the cespitose masses a foot or more large: tubercles ovate-conical from a dilated base, spreading (or in older flowering plants often somewhat appressed and imbricate), 14 to 18 mm. long: spines white, 8 to 16 mm. long; radial ones 8 to 12, rigid, subulate, straight or a little recurved; single central one stouter, subulate, recurved (wanting in younger plants); 3 to 5 fascicles of more slender adventitious spines often occuring in addition from the top of the areola: flowers large, 5 to 6.5 cm. long and broad, sulphur yellow and reddish at base within.—From the Brazos to the Nueces.

++ *Flowers red or reddish: sepals fimbriate.*

15. **M. Pottsii** Scheer. Cylindrical and somewhat branching: tubercles ovate, obtuse, slightly sulcate, with somewhat woolly axils: radial spines very numerous, slender, white; central ones 6 to 12, stouter, from an enlarged base, nodulose: flowers large: berries rose-color.—On the Rio Grande below Laredo.

16. **M. strobiliformis** Scheer. Ovate or ovate-cylindrical, simple or sparingly proliferous at base, 5 to 12.5 cm. high: tubercles ovate from a rhomboidal base, short, obtuse, deeply grooved, in age losing the spines and covering the lower part of the plant like corky protuberances, with very villous axils: outer spines 20 to 30, rigid, white, 4 to 8 (rarely 10 to 12) mm. long; inner ones 5 to 9, stouter, 8 to 18 mm. long, grayish-purple, the upper ones longer and erect, the lowest one shorter, stout, perpendicular or deflexed; interior spines of the upper tubercles forming a tuft of grayish-purple color on top of the plant: flowers central on the very densely tomentose summit, 2.5 cm. in diameter, very pale purple: berry red, 18 mm. long, 6 mm. thick. (*M. tuberculosa* Eng.)—Common from the San Pedro to El Paso. "The short corky tubercles, with very deep grooves, and very woolly when young, together with the long red fruit, distinguish this species from all the allied forms" (*Engelmann*).

17. **M. dasyacantha** Eng. Simple, nearly globose, 3.5 to 6.5 cm. high: tubercles terete, loosely arranged, slightly grooved, 8 to 10 mm. long, with somewhat villous axils: spines straight, more slender and soft than usual (often capillary), spreading but not radiating, 12 to 24 mm. long, the exterior 25 to 35 white, the interior 7 to 13 dusky-purple and longer; central spine single, erect, often wanting: berry central, ovate.—Eagle Pass to El Paso.

18. **M. vivipara** Haw. Simple or cespitose, 2.5 to 12.5 cm. high: tubercles terete, loosely arranged, slightly grooved, 8 to 12 mm. long: spines straight, rigid; the exterior widely radiate, white, 12 to 36, 6 to 20 mm. long; the central 3 to 12, stouter,

longer, darker, a single more robust one perpendicular or deflexed, the others divergent: flowers subcentral, beautifully purple, large, 3.5 to 6.5 cm. in diameter: berry sublateral, ovate, green.—A species of wide range and exceedingly variable, found throughout southern and western Texas. The shape of the heads, number and color of the spines, etc., vary so much as to have given rise to descriptions of numerous varieties and subvarieties, but they all intergrade completely. "The large, deep rose-colored or purple flowers, with fringed sepals and lance-linear acuminate petals, green oval berries, with light brown pitted seeds, readily distinguish the species" (*Engelmann*).

19. **M. macromeris** Eng. Simple or branching from the base, ovate, 5 to 10 cm. high: tubercles large and spreading, loose, grooved beyond the middle, 12 to 30 mm. long: spines slender, elongated, straight or a little curved; radial ones 10 to 17, white, 12 to 36 mm. long; central ones about 4, longer, often 3.5 to 6 cm. long, stouter, subangular, fuscous or even black: flowers 6.5 to 7.5 cm. in diameter, rose-colored or purple: berry subglobose, green.—In the Rio Grande valley from New Mexico to below Eagle Pass.

* * * *Flowers from the base of a groove on the young or nascent and unarmed tubercles: ovary exsert.*

20. **M. fissurata** Eng. Simple, depressed-globose or flattish, 5 to 12 cm. in diameter: tubercles entirely unarmed, flattened from the base, thin below, thick and warty above, with a deep central woolly groove and smooth lateral ones: flowers central, from long sericeous wool, rose-color, about 2.5 cm. long and wide: berry ovate, greenish, hidden in dense wool. (*Anhalonium fissuratum* Eng.)—On rocky highlands from the San Pedro and Pecos westward, especially in Presidio County. "Napiform cactus, with flat fissured top, hardly rising above the ground, producing a handsome pink flower in early summer" (*Havard*). Known as "peyote," and somewhat noted as an intoxicant, being sometimes called "dry whisky" from the fact that when chewed it produces more or less inebriation.

21. **M. Williamsii** (*Echinocactus Williamsii* Lem. *Anhalonium Williamsii* Eng), a Mexican species, with the flattened tubercles arranged in ribs, is reported by Dr. Havard to occur along the upper Rio Grande.

2. ECHINOCACTUS Link & Otto.

Mostly larger plants, sometimes gigantic, globose or depressed, or ovate, or rarely subcylindric, simple or very rarely cespitose, with bunches of spines on the more or less vertical ribs, flowers contiguous to and above the spines (on the latest growth of the plant, often from the nascent woolly areolæ and therefore more or less vertical), ovary covered with sepaloid scales which are naked or woolly in their axils, and a succulent (edible) or sometimes dry fruit covered with the persistent calyx scales, sometimes enveloped in copious wool, and usually crowned with the persistent remnants of the flower.

1. **E. Scheerii** Salm. Globose or ovate, 3.5 to 5 cm. high: ribs 13, obtuse and interrupted: tubercles grooved above to the middle: radial spines 15 to 18, setaceous, 6 to 12 mm. long; central ones 3 or 4-angled, black and white variegated, 12 to 24 mm. long, the upper ones straight, longer, divaricate backward, the lower one stouter, shorter, and hooked: flowers yellowish-green, about 2.5 cm. long and much less in diameter: berry greenish.—About Eagle Pass.

2. **E. brevihamatus** Eng. Very similar, but larger, 7.5 to 10 cm. high, with fewer spines, the lower central usually hardly longer than the upper radial ones, about 2.5 cm. long, lower radials shorter and upper centrals longer: flowers rose-colored, 24 to 32 mm. long, much less wide.—From Eagle Pass to the San Pedro.

3. **E. uncinatus** Hopf., var. WRIGHTII Eng. Glaucescent, ovate, 7.5 to 15 cm. high: ribs 13, interrupted: tubercles grooved to the base: radial spines 8, the 3 lower grayish-brown, hooked, and about 2.5 cm. long, the remaining 5 a little longer and straight; central one angled, flexuous, hooked, elongated, erect, straw-color with a grayish-brown tip, 5 to 10 cm. long: flowers brownish-purple, 2.5 to 3.5 cm. long: berry fleshy.—From Eagle Pass to El Paso.

4. **E. setispinus** Eng. Globose, ovate or subcylindrical: ribs 13, compressed and acutely angled: tubercles with very short grooves: radial spines 10 to 16, setaceous; the usually single central one more robust, terete, grayish-brown, hooked or flexuous curled: flowers large, yellow, scarlet within: berry scarlet.—From the Brazos to the Rio Grande and west to the San Pedro. Var. SETACEUS Eng. is a smaller form, with more spines, and the 1 to 3 central ones more slender and scarcely hooked.

5. **E. sinuatus** Dietr. Globose: ribs 13, compressed, acutish, interrupted: radial spines setaceous, the 3 upper and 3 lower straightish and grayish-brown, the 2 to 6 laterals slenderer, white and flexuous (very rarely hooked); central ones 4, stouter, the 3 upper straight and variegated-purple, the lower flattened, elongated, flexuous or hooked, straw-colored: flowers large, yellow: berry ovate.—Along the Pecos, San Pedro, and Rio Grande, at least to Eagle Pass, probably further east. Intermediate between the preceding species and the following. Distinguished from *E. setispinus* by its larger size, thicker ribs, flattened central spine, and shining finely dotted seeds; from *E. longihamatus* by the more compressed and less strongly tuberculated ribs, the smaller number of stigmas (8 to 12), smaller fruit, and much more finely dotted seeds.

6. **E. longihamatus** Gal. Subglobose, 15 to 60 cm. high, the larger ones ovate: ribs 13 to 17, obtuse, tuberculate-interrupted: tubercles shortly grooved: radial spines rigid, subterete, 2.5 to 8.5 cm. long, the upper and lower in threes, the 2 to 6 laterals longer; central 4 stout, angled and ringed, 3.5 to 16.5 cm. long, the lowest of which is hooked, straight, or flexuous; 2 to 4 additional upper ones fascicled with the radials: flowers large, 6.5 to 8.5 cm. long, yellow: stigmas 15 to 18: berry oblong, red when ripe.—Along the Rio Grande west to the Limpia, and especially in the region of the "Great Bend." Easily recognized by its large heads and very long hooked spines, and known as "Turk's head," the fruit being considered delicious. Exceedingly variable in the size of its spines. Var. GRACILISPINUS Eng. has 16 to 20 more slender spines, radials 12 to 14, centrals 4 to 8, the lowest elongated and hooked. Var. BREVISPINUS Eng. has more slender (8 to 11) radial spines and the 4 centrals terete and (as well as the lower hooked one) scarcely exceeding the radials.

7. **E. Wislizeni** Eng. Globose-ovate, very large, 6 to 12 dm. high: radial spines 2.5 to 5 cm. long, upper and lower ones in sixes, stout, straight, or curved, laterals 14 to 20 (often with shorter fascicled ones in addition), slender, elongated and flexuous; central ones 4, 3.5 to 7.5 cm. long, stout, angled, ringed, reddish, the 3 upper straight, the lower hooked downward and channeled: flowers yellow, 6.5 cm. long: berry ovate.—On the upper Rio Grande, from El Paso upwards.

8. **E. Parryi** Eng. Simple, globose or depressed, the largest from 20 to 30 cm. high: ribs 13, acute: spines stout, angled, ringed, white; radials 8 to 11, straight or a little curved, the upper more slender, the lowest one wanting; the 4 central ones a little longer and stouter, the lowest longer and decurved: dry berry densely woolly.—The eastern limit seems to be El Paso.

9. **E. horizonthalonius** Lem., var. CENTRISPINUS Eng. Glaucous, depressed or at length ovate, 5 to 20 cm. high: ribs 8, very obtuse and very broad: areolæ orbicular with truncate base: spines nearly equal, 2 to 3.5 cm. long, stout, flattened, ringed, recurved, reddish at length gray; radials 5 to 7, the upper weaker, the lowest one wanting; a solitary stouter decurved central one: flowers purple, densely woolly, 6.5 cm. long: dry berry woolly.—From the Pecos to El Paso. Dr. Havard says that this species, under the name of "bisagre," is sliced, candied in Mexican sugar, and kept as confections.

10. **E. Texensis** Hopf. Heads 20 to 30 cm. in diameter, flat, or very old ones sometimes globose: ribs 13 to 27, acute and undulate: areolæ cordate: spines 1 to 5 cm. long, stout, ringed, more or less curved, reddish; radials 6 to 7, the lowest wanting; a solitary stouter flattened decurved central one: flowers rose-color, densely woolly, about 5 cm. long: petals laciniate and aristate: berry scarlet and woolly.—From the Colorado southward, but apparently not westward beyond the Pecos.

11. **E. bicolor** Gal., var. SCHOTTII Eng. Ovate, 10 to 15 cm. high: ribs 8, obtuse and interrupted: radial spines 15 to 17, straight, the upper 2 to 4 longer (2.5 cm.), broader and flattened; central ones 4, the uppermost one broader and longer (3.5 cm.); lower radial and central ones reddish variegated: flower 5 to 7.5 cm. long, bright purple or rose-colored.—On the lower Rio Grande.

12. **E. intertextus** Eng. Smaller, ovate-globose, 2.5 to 10 cm. high: ribs 13, acute and interrupted: tubercles sulcate: spines rigid, reddish with grayish-brown tip; radials 4 to 12 mm. long, 16 to 25, closely appressed, the upper 5 to 9 more slender and subfasciculate, the lowest one short and stout; central ones 4, the 3 upper exceeding the upper radials and intermixed with them, the single lower one short and perpendicular to the plant: flowers small, about 2.5 cm. long, rose-color, closely clustered on the densely woolly apex: dry berry scarcely scaly, 8 mm. in diameter.—From the Limpia to El Paso. Var. DASYACANTHUS Eng., more common about El Paso, is ovate, with longer setaceous purplish-gray spines, radials spreading, and the lower central one shorter than the rest.

3. CEREUS Haworth.

Plants of all sizes, low or climbing or erect, sometimes enormous, with spine-bearing areolæ on vertical ribs, usually larger flowers close above the bundles of full grown (older) spines, scales of ovary distinct with naked or woolly axils or almost obsolete, and the axils spiny, and a succulent often edible sometimes very large berry which is covered with spines or scales or almost naked.

§ 1. *Low and usually cespitose plants, mostly with numerous oval or cylindric heads, short flowers, green stigmas, and spiny fruit: seeds subglobose, covered with confluent tubercles.*

* *Ribs numerous* (10–21): *areolæ very crowded, often elongated: spines numerous* (12 *to* 30), *rigid, short* (1–10 *mm.*), *pectinate.*

+ *Flowers greenish.*

1. **C. viridiflorus** Eng. Ovate or at length cylindrical, simple or sparingly branched, 2.5 to 5 cm. high: ribs about 13: areolæ ovate-lanceolate: spines rarely more than 4 mm. long, closely radiate, 12 to 18, with 2 to 6 setaceous upper ones, remaining laterals longer, lower often purplish-brown, remainder white; central often wanting, sometimes a single longer stouter variegated one: flowers lateral and towards the apex, about 2.5 cm. long: berries elliptical, small.—Between the Pecos and El Paso. The more common form is var. CYLINDRICUS Eng., which is larger and elongated, 7.5 to 15 cm. high or more, with more rigid and longer spines, 4 to 12 mm. long.

2. **C. chloranthus** Eng. Cylindrical, simple or sparingly branched, 7.5 to 25 cm. high and 3.5 to 5 cm. in diameter: ribs 13 to 18: areolæ ovate: spines loosely radiate, 12 to 20, 4 to 10 mm. long, with 5 to 10 setaceous upper ones, mostly white; central ones 3 to 5, 18 to 30 mm. long, the upper 2 shorter and purplish, the lower 1 to 3 longer, deflexed and white: flower lateral and on the lower part of the stem, very similar to the last: berries small.—Common about El Paso.

+ + *Flowers yellow.*

3. **C. dasyacanthus** Eng. Subcylindrical, simple or branching from the base, 12.5 to 30 cm. high, densely covered with numberless spines: ribs 16 to 21: areolæ ovate:

spines 20 to 30, spreading, ash-colored and often reddish at tip, the inner 3 to 8 a little stouter and deflexed: flowers subterminal, large, 7.5 cm. across: berry subglobose, 2.5 cm. in diameter.—On rocky hills, common about El Paso and down to the cañon of the Rio Grande. "Fruit green or greenish-purple, when fully ripe delicious to eat, much like a gooseberry."

4. **C. ctenoides** Eng. Subsimple, ovate, 5 to 10 cm. high: ribs 15: areolæ lanceolate: like the last, but with white spines 2 to 8 mm. long, the radial 14 to 20 pectinate, the central 2 or 3 in one series and short.—Eagle Pass.

\+ + + *Flowers red.*

5. **C. cæspitosus** Eng. Ovate-cylindrical: ribs 12 to 18: areolæ lanceolate: radial spines 20 to 30, straight or somewhat recurved, pectinate, white; central wanting, or rarely 1 or 2 very short ones: flower-tube with 80 to 100 pulvilli, each bearing 6 to 12 capillary dusky spines and long cinereous wool.—Throughout Texas as far west as the Pecos.

6. **C. Rœtteri** Eng. Similar to *C. dasyacanthus*, but distinguished by the fewer ribs (10 to 12), fewer (12 to 20) and stouter spines, purple flowers, smaller fruit, and larger seed.—Near El Paso.

* * *Ribs fewer* (5-13): *areolæ less crowded or remote: spines fewer* (3 *to* 12), *longer* (6-32 *mm.*), *not pectinate.*

\+ *Flowers purple, diurnal.*

7. **C. Fendleri** Eng. Ovate-cylindrical, 7.5 to 20 cm. high: ribs 9 to 12: areolæ somewhat crowded: spines from a bulbous base, radials 7 to 10, straight or curved, some white, some grayish-brown, some variegated, 1 to 2.5 cm. long, the lower ones stouter; central one solitary, stout, curved, blackish-brown, often elongated (2.5 to 4 cm.): flowers lateral and near the apex, 6.5 to 8.5 cm. across, deep purple: berry 25 to 30 mm. long.—From the Upper Pecos to El Paso.

8. **C. enneacanthus** Eng. Ovate-cylindrical, very cespitose, with a wrinkled or withered appearance, 7.5 to 15 cm. high: ribs 7 to 10: spines straight, radials 7 to 12 (mostly about 8), white, upper 6 to 10 mm. long, lower 16 to 32 mm. long, laterals intermediate; central one solitary (rarely 2 or 3), bulbous at base, white or straw-color, extremely variable, in smaller specimens terete, in more perfect ones elongated and flattened, 16 or 20 to 30 or even 40 mm. long: flowers 5 to 7.5 cm. long and wide, the ovary and tube covered with numerous bunches of spines: berry about 2.5 cm. long.—In the Rio Grande Valley from El Paso to Laredo.

9. **C. stramineus** Eng. Ovate-cylindrical, cespitose-glomerate, often from 100 to 200 heads in one hemispherical mass, each 12.5 to 22.5 cm. high: ribs 11 to 13: radial spines 7 to 10 (mostly 8), straight or curved, white, about equal, 1.5 to 3 cm. long; central ones 3 or 4, angled, elongated, often flexuose, 5 to 8.5 cm. long; younger ones dirty yellow and brown, like old straw: flowers 7.5 to 10 cm. long, very full, bright purple, with spiny ovary: berry 3.5 to 5 cm. long, luscious, with bunches of elongated spines.—Common between the Pecos and El Paso, rarer in southeastern Texas. Known as the "strawberry cactus," or "pitahaya." "The ripe fruit is red, with thin skin, bearing but few spines and easily peeled off. It is equal or superior, in quality and flavor, to the best strawberry. Whenever the traveler notices the pink fruit, glowing through the long spiny straws besetting the stem, he seldom fails to dismount and secure it, even at the risk of getting his hands badly punctured" (*Havard*).

10. **C. dubius** Eng. Ovate-cylindrical, cespitose, 12.5 to 20 cm. high, of a pale green color and a soft flabby texture: ribs 7 to 9: radial spines 5 to 8, white, 12 to 30 mm. long, the upper often wanting; central ones 1 to 4, angled, often curved, more or less elongated, 3.5 to 7.5 cm. long: flowers 6.5 cm. long, pale purple and with fewer and narrower petals: berry smaller (2.5 to 3.5 cm.), covered with bunches of spines.—From El Paso down to the lower Rio Grande.

+ + *Flowers scarlet, open day and night.*

11. **C. phœniceus** Eng. Globose or oval obtuse heads 5 to 7.5 cm. high, cespitose (several to over 100 from same base, often forming dense hemispherical masses): ribs 8 to 11: areolæ ovate to orbicular: spines slender and straight, the radials 8 to 12, white, 6 to 24 mm. long, the upper a little shorter than the rest; central ones 1 to 3, bulbous at base, terete, a little stouter, 10 to 30 mm. long: flowers deep red, 3.5 to 6.5 cm. long and half as wide. (*C. Rœmeri* Eng.)—In the granitic regions of western Texas, from the Llano westward.

12. **C. conoideus** Eng. Ovate-conical acutish heads, 7.5 to 10 cm. high, few of unequal height from a common base: ribs 9 to 11: radial spines 10 to 12, slender and rigid, upper ones 4 to 10 mm. long, laterals 12 to 30 mm.; central ones 3 to 5, the upper hardly longer than the radials, the lowest one 4-angled and often compressed, 2.5 to 7.5 cm. long, at length deflexed.—Rocky places along the upper Pecos and probably within the Texan boundary.

13. **C. polyacanthus** Eng. Ovate-cylindrical, cespitose, 12.5 to 25 cm. high, 6.5 to 10 cm. in diameter: ribs 9 to 13: spines stout, rigid, straight, white or ashy-red, upper radials 12 mm. long, lateral and lower ones 18 to 24 mm.; central spines 3 or 4, hardly longer, or the lower sometimes 3.5 to 6.5 cm. long, a little stouter; younger ones often variegated grayish-brown: flowers 5 to 7.5 cm. long, profusely covering the plant.—Common about El Paso.

14. **C. paucispinus** Eng. Ovate-cylindrical, sparingly branching or simple, 12.5 to 22.5 cm. high, 5 to 7.5 cm. in diameter: ribs 5 to 7: areolæ remote: 3 to 6 stout radiating dark-colored spines, 18 to 32 mm. long, the central one almost always wanting or rarely a stout subangled one 30 to 40 mm. long.—From the San Pedro to the mouth of the Pecos.

* * * *Low and spreading usually articulated plants, with cylindrical simple or very branching stems and few short or even minute slender spines.*

15. **C. Berlandieri** Eng. Low and very green, the stems diffuse, subterete, articulated and very branching, 3.5 to 15 cm. long and 2.5 cm. thick: tubercles conical: spines 6 to 8, slender, short, the radials white and 8 to 10 mm. long, the single central one grayish-brown, much longer (12 to 24 mm.): flowers 5 to 10 cm. long, with narrow recurved petals: seeds tuberculate.—On the Nueces.

16. **C. procumbens** Eng. Similar to the last, but stems more slender and 4 or 5-angled: spines 4 to 6, the radials white, 2 to 4 mm. long, central one, if present, dark and 4 to 6 mm. long: flowers over 7.5 cm. long, with obovate-spatulate spreading or somewhat recurved petals: seeds very delicately warty.—On the Rio Grande near and below Matamoras.

17. **C. tuberosus** Poselger. Very slender from a tuberous root, terete, thickened upward, at length articulated: ribs 8: spines minute and slender, the 9 to 12 radial ones hardly 2 mm. long, the solitary central one longer (4 to 6 mm.) and appressed upwards: flowers subterminal.—On the lower Rio Grande.

§ 2. *Stem elongated, prismatic or cylindric, mostly branching, with longer flowers and whitish stigmas: seeds obovate, usually smooth or pitted.*

18. **C. princeps** Hort. Würzb. Erect, 3 or 4-angled, 9 to 30 dm. high, 5 cm. in diameter: areolæ remote: radial spines 4 to 6, short; 2 to 4 interior ones stout, elongated, unequal, divaricate, central one deflexed; larger spines 24 to 36 mm. long: flowers large, white, nocturnal: berry scarlet, 5 to 7.5 cm. long, spiny. (*C. variabilis* Pfeiff.)—On the lower Rio Grande.

19. **C. Greggii** Eng. Slender, erect from a large fleshy napiform root, 6 to 9 dm. high, 18 to 24 mm. thick: branches 3 to 6-angled, reddish: areolæ crowded: spines abruptly subulate from a bulbous base, very short (1 to 2 mm. long), blackish; radials 6 to 9; centrals 1 or 2: flowers elongated, 15 to 20 cm. long, 5 to 6.5 cm. wide, the white tube armed with capillary flexuous spines: berry sessile, obovate, beaked, 2.5 to 3.5 cm. long.—From the San Pedro westward and southward.

4. OPUNTIA Tourn.

Articulated much branched plants of various shapes, low and prostrate or erect and shrub-like, with young branches bearing small terete subulate early deciduous leaves and in their axils an areola with numerous short easily detached bristles and (usually) stouter spines (all barbed), mostly large diurnal flowers with very short cup-shaped tubes on joints of the previous year and on the same areolæ with the spines, spreading or rarely erect petals, ovary with bristle-bearing areolæ in the axils of small terete deciduous sepals, and a succulent or dry truncate berry marked with bristly or spiny areolæ.—Ours all have broad obovate or obcordate petals.

§ 1. *Joints compressed (glabrous except in No.* 11*): fruit fleshy (except in No.* 12*): seed with a prominent bony margin.*

**Suberect: spines very numerous, colored: berry small, subglobose.*

1. **O. Strigil** Eng. Plant 6 dm. high: joints ovate or orbicular, 10 to 12.5 cm. long: pulvilli crowded; spines 5 to 8, 2.5 cm. long or less, radiate and deflexed, reddish-brown with yellow tip: berry 12 to 14 mm. long, red, broadly umbilicate.—Between the Pecos and El Paso.

* * *Erect or procumbent: joints large: spines few, stout, compressed, mostly colored: berry larger, mostly ovate.*

2. **O. Englemanni** Salm. Erect, 12 to 18 dm. high: joints obovate, 3 dm. long or less: pulvilli remote, bearing unequal rigid straw-colored bristles and 1 to 3 compressed straw-colored spines reddish at base and 2.5 to 3.5 cm. long: flowers yellow (reddish within), 6.5 to 7.5 cm. across, with globose ovary: berry obovate, broadly umbilicate, usually 5 cm. long. (Incl. *O. dulcis* Eng.).—Common throughout southern and western Texas. This seems to be the common "prickly pear" of Texas, though all the flat-jointed Opuntias bear that name. The joints are commonly spoken of as "leaves," and form an important food for grazing animals, under the name of "nopal." The "nopal leaf" is also much used for poultices, etc. Var.? CYCLODES Eng., on the upper Pecos, has orbicular joints, stouter and mostly single spines, and a small globose berry.

3. **O. macrocenta** Eng. Ascending, 6 to 9 dm. high: joints suborbicular, thin, 12.5 to 20 cm. in diameter: pulvilli somewhat remote, bearing short, slender, fulvous bristles, the uppermost only having 1 or 2 very long (5 to 7.5 cm.) blackish subcompressed spines: flowers yellow, with ovate ovary.—Sand-hills of the Rio Grande near El Paso.

4. **O. phæacantha** Eng. Diffuse, ascending: joints obovate, thick, glaucescent, 10 to 15 cm. long: pulvilli somewhat remote, bearing longer slender straw-colored or grayish-brown bristles, and almost all with 2 to 5 more or less compressed grayish-brown spines 2.5 to 5 cm. long: flowers yellow, about 5 cm. in diameter, with a short ovary: berry cuneate, pear-shaped, 3 to 3.5 cm. long, slender, much contracted at base so as to appear almost stipitate.—Sandy places near El Paso.

5. **O. Camanchica** Eng. Prostrate and extensively spreading: joints ascending, suborbicular, 15 to 17.5 cm. long: pulvilli remote, mostly bearing few straw-colored or fulvous bristles, and 1 to 3 compressed grayish-brown (paler at tip) spines, the upper ones elongated, suberect, the rest deflexed, 3.5 to 7.5 cm. long: berry ovate, large, broadly umbilicate.—On the Llano Estacado.

6. **O. tortispina** Eng. Similar in size and habit to the last: pulvilli subremote, with the 3 to 5 spines larger, angled, often twisted, white, with 2 to 4 slenderer ones.—On the Camanche plains, east of the Llano Estacado.

* * * *Ascending: joints mostly smaller: spines few, slender, pliable, terete or scarcely angled, pale: berry smaller.*

7. **O. tenuispina** Eng. About 3 dm. high: joints rather large, obovate, attenuate at base, bright green, 7.5 to 15 cm. long, 5 to 10 cm. wide: pulvilli somewhat approximate, bearing short slender fulvous bristles, and mostly armed with 1 or 2 elongated (3.5 to 6.5 cm.) white spines, and 1 to 4 shorter lower ones: flowers yellow, 6.5 to 7.5 cm. in diameter, with obovate retuse petals and clavate ovary: berry oblong, deeply umbilicate.—Sand hills near El Paso.

8. **O. filipendula** Eng. Plant 1.5 to 3 dm. high, glaucous: roots long and knotted: joints orbicular or obovate or oblanceolate, thin, 3.5 to 7.5 cm. long, 2.5 to 5 cm. wide: pulvilli approximate, bearing numerous slender greenish-yellow bristles, armed or unarmed; the spines, when present, 1 or 2 elongated (2.5 to 5 cm.) ones with 1 or 2 smaller ones: flowers purplish, 6.5 cm. in diameter, with slender ovary.—Alluvial bottoms from the Pecos to El Paso. "The long knotted roots, small bluish joints, very small leaves, very long bristles, and purple flowers distinguish this species from all others" (*Engelmann*).

* * * * *Procumbent or ascending: joints mostly smaller: spines stout, subterete or none, white or dark: berry clavate.*

9. **O. Rafinesquii** Eng. Diffuse and with fibrous root: joints obovate or suborbicular, very green, 7.5 to 12.5 cm. long, with elongated spreading leaves (6 to 8 mm. long): pulvilli somewhat remote, bearing slender reddish-brown bristles, mostly unarmed; spines (when present) few, marginal, stout, straight, a single erect or spreading one 18 to 24 mm. long, and 1 or 2 smaller deflexed ones, variegated reddish-brown: flowers yellow, often with a red center, 6.5 to 8.5 cm. in diameter.—A common species of the plains, and probably extending into the northern border of Texas. The following varieties, sometimes considered distinct species, are more southern and properly belong to the Texan flora: Var. GRANDIFLORA Eng. Somewhat ascending, with larger joints (often 12.5 to 15 cm. long), remote pulvilli (nearly 2.5 cm. apart), very slender bristles, mostly no spines, large flowers (10 to 12.5 cm. in diameter) red in the center and with about 10 very broad petals, 5 stigmas, and an elongated-clavate berry.—On the Brazos.—Var. CYMOCHILA Eng. Diffuse, with orbicular joints (6.5 to 7.5 cm. in diameter), less remote pulvilli bearing straw-colored or fulvous bristles and mostly armed with 1 to 3 stouter spines (2.5 to 5 cm. long) which are white with fulvous base and spreading or deflexed and often 2 or 3 additional smaller ones, 8 stigmas, and an obovate berry.—On the Llano Estacado.—Var. MACRORHIZA Eng. Prostrate, often ascending, with tuberous roots, obovate-orbicular very green joints (6.5 to 8.5 cm. long), somewhat remote pulvilli bearing reddish-brown bristles and only the upper armed, single stout often variegated spreading spines with 1 or 2 more slender deflexed additional ones, about 8 sulphur yellow petals reddish at base, 5 stigmas, and an obovate green or pale-purple berry clavate at base and broadly umbilicate.—Sterile rocky places between the Colorado and the San Antonio, especially on the upper Guadalupe.

10. **O. fusco-atra** Eng. Diffuse: joints orbiculate-ovate, tuberculate, 6.5 to 7.5 cm. long: pulvilli somewhat remote, large, grayish-tomentose, only the lower armed; bristles numerous, stout, rather long (4 to 6 mm.), grayish-brown; spines usually a single stout brownish-black suberect one (2.5 to 3 cm. long) and often another shorter deflexed one: flowers yellow, nearly 7.5 cm. in diameter, with a conical ovary bearing pulvilli covered with long grayish-brown wool.—Sterile places in prairies west of Houston. "The stout brown, or above almost black spines, and the thick bunches of unusually stout brown bristles on the small joints, give this plant a very distinct appearance" (*Engelmann*).

* * * * * *Erect or procumbent: joints pubescent: leaves minute: mostly no spines.*

11. **O. rufida** Eng. Erect-spreading, 6 to 12 dm. high, much branched: joints broadly obovate or suborbicular, 7.5 to 15 cm. long: leaves long acuminate, 5 mm.

long: pulvilli crowded, bearing very numerous slender reddish bristles and no spines: flowers yellow, 6.5 cm. in diameter, with an obovate ovary covered with numerous pulvilli.—Common along the Rio Grande near Presidio del Norte.

* * * * * * *Diffuse: joints swollen: spines very numerous: fruit dry and spiny.*

12. **O. arenaria** Eng. Ascending, spreading 6 to 9 dm., 15 to 30 cm. high: roots stout, creeping horizontally: joints obovate, teretish or somewhat compressed, tuberculate, 3.5 to 7.5 cm. long, 2.5 to 5 cm. wide: pulvilli somewhat crowded, very bristly with pale bristles; 1 to 4 stouter spines white or grayish-brown (18 to 30 mm. long), with 2 to 6 white and shorter lower ones: flowers sulphur-yellow, 5 to 6.5 cm. in diameter, with emarginate petals and an obovate ovary: fruit oblong, spinose, about 2.5 cm. long, with a funnelform umbilicus.—Sandy bottoms of the Rio Grande near El Paso.

§ 2. *Joints cylindrical, more or less tuberculated: fruit dry or but little fleshy: seed not margined, or scarcely so.*

* *Low plants, with clavate joints, without a firm woody skeleton: flowers yellow: fruit dry and very bristly.*

13. **O. Emoryi** Eng. Joints long (12.5 to 22.5 cm. long and 2.5 to 3.5 cm. thick), clavate-cylindrical, with linear-oblong and very prominent tubercles (2.5 to 3.5 cm. long): spines numerous (15 to 30) in the upper bundles, the 5 to 9 inner ones stouter, angular-compressed, the longest 3.5 to 6.5 cm. long: flowers yellow, reddish without: fruit 5 to 6.5 cm. long.—Dry soil, about El Paso, which seems to be its eastern limit.

14. **O. Schottii** Eng. Joints 5 cm. long, with elongated tubercles 16 to 18 mm. long: pulvilli with few bristles; spines less numerous (10 to 14), usually 4 inner ones stouter and broader (3.5 to 5 cm. long), the upper one being triangular in section, the others plano-convex, the 8 to 10 outer ones more slender and radiate (8 to 18 mm. long), all dirty-red and very rough: fruit ovate.—Dry hills near the mouths of the San Pedro and Pecos. "Distinguished by the broad and very rough dirty-red spines (larger ones with a white margin) and by the smaller number of bristles on the pulvilli of both joints and fruit" (*Engelmann*).

15. **O. Grahami** Eng. Roots fusiform: joints 3.5 to 5 cm. long, with oblong tubercles 12 to 14 mm. long, and ovate-cuspidate leaves rarely 4 mm. long: spines 8 to 13, slender and reddish, the inner 4 to 7 teretish or angled, the outer 4 to 6 short.—Sandy bottoms of the Rio Grande, from El Paso downwards, but probably not below the "Great Bend."

* * *More or less erect and much-branched plants, with cylindric joints having a solid or tubular and reticulated woody skeleton.*

+ *Spines more or less numerous: joints prominently tuberculate.*

16. **O. Davisii** Eng. Spreading and somewhat procumbent, about 45 cm. high, divaricately much branched, with dense wood: younger joints erect, elongated, attenuate at base, rather slender, 10 to 15 cm. long, with oblong-linear tubercles 14 to 16 mm. long: spines 9 to 13, the interior 4 to 7 subtriangular, reddish and coated with a loose straw-colored sheath, 2.5 to 3.5 cm. long, the lower 5 or 6 slender (6 to 12 mm. long): flowers yellow: fruit ovate, dry and spiny, 2.5 cm. or more long.—On the Llano Estacado.

17. **O. arborescens** Eng. Tree-like, 15 to 18 dm. (further south 30 to 60 dm.) high, with verticillate horizontal or pendulous branches and reticulate-tubular wood: joints verticillate, cylindrical, with prominent crested tubercles: spines 8 to 30, stellate-divaricate: flowers large, purple: fruit nearly hemispherical, tuberculate-cristate, yellow, unarmed, and almost dry.—Prairies and highlands of western Texas. The so-called "skeleton" (wood) of this handsome purple-flowered species forms a "heavy, hollow cylinder, with rhombic holes or meshes corresponding to the tubercles and spine-bunches of the plant" (*Rothrock*).

+ + *Spines mostly solitary: joints more slender and obscurely tuberculate.*

18. **O. Kleiniæ** DC. Shrubby, erect, 6 to 12 dm. high, with dense wood: joints cylindrical, slender (8 mm. in diameter), with depressed tubercles 14 to 18 mm. long: spines mostly solitary, perpendicular to the plant or somewhat deflexed, 16 to 20 mm. long: flowers cinnabar-red, 2.5 to 3 cm. in diameter. (*O. Wrightii* Eng.)—On steep mountain sides, from the Limpia to the Pecos.

19. **O. leptocaulis** DC. Shrubby, erect, 9 to 15 dm. high, with dense wood and rather erect branches: joints terete, very slender (only 4 to 6 mm. in diameter), with indistinct tubercles 6 to 10 mm. long: spines mostly solitary, loosely sheathed, 2.5 to 5 cm. long: flowers small, 14 to 18 mm. in diameter, greenish-yellow: fruit obovate, scarlet, fleshy, 10 to 18 mm. long. (*O. frutescens* Eng.)—From the Colorado westward. Var. BREVISPINA Watson has more slender, shorter, and closely sheathed spines, 8 to 12 mm. long. "The slenderest of all *Opuntiæ*, with long branches scarcely larger than a goose-quill, small yellow flowers, and a small pulpy scarlet fruit" (*Engelmann*).

FICOIDEÆ.

A miscellaneous group, chiefly of fleshy or succulent plants, with mostly opposite leaves and no stipules.—Our genera are apetalous and with the calyx free from the ovary.

1. **Sesuvium.** Succulent: calyx-lobes 5, colored within: stamens 5 to 60: pod circumscissile, 3 to 5-celled, many-seeded.

2. **Trianthema.** Not succulent: calyx-lobes 5, colored within: stamens 6 to 10: pod circumscissile, 1-celled, with few seeds.

3. **Mollugo.** Not succulent: sepals 5: stamens 3 or 5: pod loculicidal, 3-celled, many-seeded.

1. SESUVIUM L. (SEA PURSLANE.)

Usually prostrate saline herbs, with succulent stems, opposite leaves, axillary or terminal purplish flowers, persistent and free 5-parted calyx, the lobes apiculate below the top, 5 to 60 stamens inserted on the calyx, 3 to 5 separate styles, and a 3 to 5-celled many-seeded pod whose upper part falls off as a lid.

1. **S. Portulacastrum** L. Stems prostrate or ascending, often 3 dm. long or more: leaves linear to oblong-lanceolate, 1 to 3.5 cm. long, acute or obtuse: flowers solitary or clustered, sessile or pedicellate: calyx 6 to 10 mm. long, the lobes apiculate on the back and more or less purple: stamens numerous.—In saline or alkaline localities from the Gulf coast to El Paso.

2. TRIANTHEMA L.

Like the last, but with a single style, and a 1-celled few-seeded pod.

1. **T. monogynum** L. Leaves roundish-obovate, the pair of unequal size, the petiole enlarged into a sheath: flowers usually solitary, sessile, half-concealed within the broad sheath: pod 1-celled, with 6 to 8-seeded parietal placenta, the lid prominent and concave at top and nearly closed at base.—Fields and plains west of the Pecos.

3. MOLLUGO L. (INDIAN CHICK-WEED.)

Low and much-branched annuals, with 5 sepals whitish inside, 5 hypogynous stamens, 3 stigmas, and a 3-celled 3-valved loculicidal pod, the partitions breaking away from the many-seeded axis.

1. **M. verticillata** L. (CARPET-WEED.) Prostrate, forming patches: leaves spatulate, clustered in whorls at the joints, where the 1-flowered pedicels form a sort of sessile umbel: stamens usually 3.—Sandy river banks and cultivated grounds throughout southern Texas.

2. **M. Cerviana** Seringe. Like the last, but with very narrow glaucous leaves.—Collected by Palmer near Bluffton (Llano County); probably occurring farther westward, as it has been found in New Mexico and Arizona.

3. **M. Cambessidesii** has very short and broadly obovate leaves, but in other respects resembles *M. verticillata* (for which it was mistaken in Contr. Nat. Herb., ii. 39) (*Glinus Cambessidesii* Fenzl.).—West of the Pecos. Seed characters and others have been used to place this species in a separate genus, *Glinus*, but Bentham & Hooker have reduced it to *Mollugo*.

UMBELLIFERÆ. (PARSLEY FAMILY.)

Herbs, with alternate mostly compound leaves whose petioles are expanded or sheathing at base, small flowers usually in compound umbels (rarely in heads), the calyx (its limb obsolete or a mere 5 toothed border) entirely adhering to the 2-celled 2-ovuled ovary, the 5 petals and 5 stamens inserted on the disk that crowns the ovary and surrounds the base of the 2 styles, and fruit consisting of 2 seed-like dry carpels. A large and difficult order, as the flowers are much alike in all, and the chief characters must be obtained from examination of the surface and cross-sections of the mature fruit. No attempt should be made to name most of the species without mature fruit. The following special terms are used: *commissure*, the inner face of the carpels; *ribs*, 5 of which occur on each carpel lengthwise, some or all of which may be winged, and consisting of 1 *dorsal* (in the middle of the carpel back), 2 *laterals* (at the margins of the carpels), and 2 *intermediates*; 4 *secondary ribs* occasionally occur intermediate between the 5 primary ones; *oil-tubes*, longitudinal canals containing aromatic oil and lodged in the fruit usually between the primary ribs and in the commissural face; *stylopodium*, the thickened and cushion-like base of the styles; *umbellets*, secondary umbels; *involucels*, involucres of the umbellets; *bracts* and *bractlets* are applied to the constituent leaves of the involucre and involucel respectively. The following is an artificial key to the genera:

I. Fruit bristly, prickly, or scaly.

* Fruit bristly or prickly along the ribs: umbels compound: leaves pinnately decompound.

1. **Daucus.** Stylopodium depressed or wanting: calyx-teeth obsolete: flowers white.

2. **Cuminum.** Stylopodium conical: calyx-teeth prominent and unequal: flowers rose-colored.

* * Fruit without ribs, prickly or scaly all over.

12. **Eryngium.** Flowers in a globose or oblong head: fruit with tuberculate scales: leaves mostly coriaceous and prickly.

13. **Sanicula.** Flowers in irregularly compounded umbels: fruit covered with hooked prickles: leaves mostly palmate, with toothed or incised lobes.

II. Fruit not prickly or scaly.

A. Fruit strongly flattened dorsally, with lateral ribs prominently winged.

* Oil-tubes solitary in the intervals.

6. **Heracleum.** Stylopodium conical: stout pubescent plants, with large and ternately compound leaves.

5. **Eurytænia.** Stylopodium depressed: slender caulescent branching plants, with pinnately dissected leaves, and white flowers.

7. **Pastinaca.** Stylopodium depressed: stout caulescent plants, with yellow flowers.

9. **Peucedanum.** Stylopodium depressed: plants acaulescent or nearly so.

* * Oil-tubes more than one in the intervals.

8. **Polytænia.** Caulescent and branching plants, with obsolete dorsal ribs, very thick corky lateral ones, and yellow flowers.

B. Fruit not strongly flattened dorsally (usually somewhat laterally flattened).

* Oil-tubes none.

4. **Bifora.** Stylopodium conical: seed-face concave: fruit of nearly distinct globose carpels: leaves pinnately dissected.

28. **Bowlesia.** Stylopodium depressed: seed-face plane: leaves simple and lobed.

* * Oil-tubes solitary in the intervals.

+ Stylopodium conical.

++ Leaflets (at least the upper) linear to filiform.

= Involucre wanting: flowers yellow.

15. **Fœniculum.** Leaves dissected into filiform segments.

= = Involucre present: flowers white.

14. **Ammoselinum.** Low and diffuse plants, with ternately divided leaves.

3. **Trepocarpus.** Leaves finely dissected: involucral bracts few and linear: fruit linear-oblong.

25. **Discopleura.** Leaves finely dissected: involucre foliaceous: fruit ovate, the lateral ribs very thick and corky.

26. **Ammi.** As in the last (or the leaflets sometimes broader), but with all the ribs filiform.

24. **Leptocaulis.** Leaves finely dissected: fruit ovate and tuberculate.

11. **Cynosciadium.** Leaves with few leaflets: fruit ovoid, with thick and corky lateral ribs.

++ ++ Leaflets broader.

17. **Chærophyllum.** Fruit linear-oblong, with concave seed-face: calyx-teeth obsolete: leaves ternately decompound.

22. **Cicuta.** Fruit oblong to orbicular, with plane seed-face: calyx-teeth rather prominent: leaves pinnately compound.

23. **Cryptotænia.** Fruit linear-oblong, with plane seed-face: calyx-teeth obsolete: leaves 3-foliolate.

+ + Stylopodium depressed.

++ Flowers white.

10. **Cymopterus.** Fruit with all the ribs conspicuously winged.

20. **Apium.** Fruit very small, with equal, broad and corky ribs.

16. **Apiastrum.** Fruit with obscure or obsolete ribs.

++ ++ Flowers yellow.

21. **Zizia.** Tall and branching plants, with broad leaflets, and fruit with filiform ribs.

* * * Oil-tubes more than one in the intervals.

+ Stylopodium conical.

27. **Berula.** Fruit round, with globose carpels and very slender inconspicuous ribs.

+ + Stylopodium depressed.

18. **Museniopsis.** Acaulescent: fruit with filiform ribs and plainly concave seed-face: flowers yellow.

19. **Sium.** Stout and caulescent: fruit with prominent equal corky ribs and plane or but slightly concave seed-face: flowers white.

C. Fruit strongly flattened laterally.

29. **Hydrocotyle.** Marsh or aquatic plants with simple leaves.

1. DAUCUS Tourn. (Carrot.)

Bristly annuals or biennials, with pinnately decompound leaves, foliaceous and cleft bracts, entire or toothed bractlets, white flowers in concave umbels, obsolete calyx-teeth, oblong dorsally flattened fruit with bristly primary ribs and winged secondary ones each bearing a single row of prominent barbed prickles, depressed stylopodium (or none), and solitary oil-tubes.

1. **D. pusillus** Mx. Stems retrorsely-hispid, from 2.5 to 60 cm. high: leaves finely dissected into narrowly linear segments: umbels unequally few to many-rayed; rays 1 to 3.5 cm. long; pedicels very unequal, from 16 mm. to almost wanting: fruit 3 to 5 mm. long.—Throughout Texas. Very variable in its pubescence characters.

2. **D. Carota** L., the common cultivated carrot, has become extensively naturalized. The stems are bristly, leaves more coarsely divided (the ultimate segments lanceolate and cuspidate), umbels with more numerous and elongated rays and more prominent involucres, and fruit generally larger.

2. CUMINUM L. (Cumin).

The common "cumin" of the Mediterranean region has been found growing spontaneously near El Paso.

1. **C. Cyminum** L. is a small slender annual, 7.5 to 25 cm. high, with long filiform leaflets and similar bracts and bractlets, awl-shaped sepals, rose-colored petals, fruit with long hairs and bristles, and oil-tubes solitary under the secondary ribs.

3. TREPOCARPUS Nutt.

Glabrous annuals, with thin pinnately decompound leaves and linear segments, lateral few rayed umbels opposite the leaves, involucre and involucels of few linear entire or divided bracts, white flowers, prominent unequal calyx-teeth, linear-oblong laterally flattened smooth crustaceous fruit, no primary ribs, 4 prominent corky secondary ribs, conical stylopodium, and solitary oil-tubes beneath the secondary ribs.

1. **T. Æthusæ** Nutt. From 1 to 9 dm. high: umbels 2 to 5-rayed; umbellets few-flowered, with very short pedicels: fruit 8 to 10 mm. long.—Prairies of northern and eastern Texas.

4. BIFORA Hoffm.

Slender smooth annuals, with leaves pinnately dissected into filiform segments, involucre and involucels of few small bracts, white flowers in

few-rayed umbels, evident calyx-teeth, laterally flattened smooth fruit with globose carpels in contact only by a narrow commissure, no primary ribs, 4 filiform secondary ribs, a thin very hard pericarp, conical stylopodium, no oil tubes, and a deeply concave seed-face.

1. **B. Americana** Gray. Branching above, 3 dm. or more high, rays and angles of stem (especially summit of internodes) roughened with minute callous points: umbels 5 to 8-rayed; rays 12 to 18 mm. long; pedicels about 2 mm. long: fruit 3 mm. long and 5 mm. broad.—Dry ground, throughout Texas east of the Pecos.

5. EURYTÆNIA Torr. & Gray.

Glabrous branching herbs, with pinnately dissected leaves, involucre and involucels of cleft bracts, white flowers, prominent calyx-teeth, ovate glabrous dorsally flattened fruit, filiform dorsal and intermediate ribs, very prominent thick-winged lateral ribs, depressed stylopodium, and solitary very broad oil tubes.

1. **E. Texana** Torr. & Gray. From 3 to 8 dm. high: leaflets long, narrowly linear to oblong, serrate or toothed: umbels 8 to 15-rayed; rays 2.5 to 5 cm. long; pedicels very short: fruit 4 mm. long.—Eastern Texas.

6. HERACLEUM L. (Cow-parsnip.)

Tall stout perennials, with large ternately compound leaves, deciduous involucres, involucels of numerous bractlets, large many-rayed umbel of white flowers, small or obsolete calyx-teeth, obcordate petals (the outer ones often dilated and 2-cleft), broadly obovate very much dorsally flattened somewhat pubescent fruit, dorsal and intermediate ribs filiform, the laterals broadly winged, thick-conical stylopodium, and solitary oil-tubes (about half as long as the carpel).

1. **H. lanatum** Mx. Very stout, 12 to 24 dm. high, pubescent or woolly above: petioles much dilated; leaflets petiolulate, round-cordate, 10 to 25 cm. broad, irregularly cut-toothed: rays 5 to 15 cm. long: fruit 8 to 12 mm. long, somewhat pubescent.—Undoubtedly occurring in Texas in wet ground.

7. PASTINACA L. (Parsnip).

Tall stout biennial, with pinnately compound leaves, mostly no involucre, yellow flowers, obsolete calyx-teeth, oval very much dorsally flattened glabrous fruit, filiform dorsal and intermediate ribs, broad lateral wings, depressed but prominent stylopodium, and small solitary oil-tubes.

1. **P. sativa** L., the common parsnip, with ovate to oblong cut-toothed leaflets, is naturalized almost everywhere.

8. POLYTÆNIA DC.

Perennial mostly glabrous herbs, with twice pinnate leaves, no involucre, involucels of narrow bractlets, bright yellow flowers, conspicuous calyx-teeth, obovate to oval much dorsally flattened glabrous fruit, dorsal and intermediate ribs small or obscure in the depressed

often corky back, laterals forming broad thick corky wings, no stylopodium, and 12 to 18 oil-tubes about the seed besides many scattered through the thick corky pericarp.

1. **P. Nuttallii** DC. Mostly glabrous except the pubescent pedicels and involucels, 6 to 9 dm. high: leaf-segments cuneate and incised; upper leaves opposite and 3-cleft: umbel 6 to 12-rayed; rays about 25 cm. long; pedicels 2 to 4 mm. long: fruit 6 to 10 mm. long.—Apparently throughout eastern and northern Texas.

9. PEUCEDANUM L.

Short-caulescent or acaulescent dry ground perennials, with fusiform or tuberous roots, ternate or pinnate to dissected leaves, no involucre, involucels mostly present, yellow or white flowers, obsolete or evident calyx-teeth, oblong to suborbicular glabrous to tomentose dorsally flattened fruit, filiform dorsal and intermediate ribs, lateral wings broad and thin, no stylopodium, and 1 to 8 oil-tubes in the intervals.—A very large and perplexing genus of western United States, but scantily represented in Texas.

1. **P fœniculaceum** Nutt. Acaulescent, tomentose or glabrous, with peduncles 20 to 30 cm. long: leaves finely dissected, ternate then pinnate, with short filiform segments: umbel rather equally 3 to 12-rayed, with gamophyllous involucels 5 to 7-cleft and with conspicuously hairy margins; rays 2.5 to 6.5 cm. long; pedicels 6 to 10 mm. long: flowers yellow: fruit broadly oblong, 5 to 6 mm. long, 4 mm. broad, with wings half as broad as body, and prominent dorsal and intermediate ribs: oil-tubes 1 to 3 in the intervals.—A species of the western plains, extending into northern and eastern Texas.

2. **P. nudicaule** Nutt. Acaulescent or shortly caulescent, with peduncles 7.5 to 20 cm. high, pubescent from a thick elongated (often tuberous) root: leaves bipinnate, the small oblong segments entire or toothed: umbel unequally 5 to 8-rayed, with involucels of scarious-margined (often purplish) lanceolate bractlets; rays 1 to 3.5 cm. long; pedicels 5 to 7 mm. long: flowers white or pinkish: fruit almost round, emarginate at base, glabrous, 5 mm. long, 4 mm. broad, with wings not as broad as body, and indistinct or obsolete dorsal and intermediate ribs: oil-tubes mostly solitary.—A very early bloomer of the plains west and north of Texas, and doubtless in northern Texas.

10. CYMOPTERUS Raf.

Mostly low and glabrous perennials (often cespitose) from a thick elongated root, with more or less pinnately compound leaves, mostly no involucre and prominent involucels, white, purple or yellow flowers, more or less prominent calyx-teeth, usually globose fruit with 6 to 10 broad thin and equal wings, depressed stylopodium, and oil-tubes one to several in the intervals.

1. **C. montanus** Torr. & Gray. Leaves clustered at the summit of the very short stem, glaucous and glabrous (rarely slightly puberulent), pinnate or bipinnate; pinnæ oblong, pinnatifid with oblong obtuse entire or toothed lobes: peduncles 2.5 to 15 cm. high; rays 6 to 18 mm. long; pedicels very short; involucre and involucels of mostly broad membranaceous usually green-veined bracts, more or less united: flowers white: fruit oblong in outline, 6 to 12 mm. long, the 6 to 10 wings broad and thin (thick at base): oil-tubes 1 to 3 in the intervals.—Northern and western Texas.

2. **C. Fendleri** Gray. Low, subcaulescent: leaves oblong or ovate-lanceolate in

outline, exceeding the peduncles, 2 or 3-pinnate; pinnæ and segments 5 or 7, oblong and incised: umbels few-rayed, with no involucre, and involucels of oblong or lanceolate bractlets united at base and exceeding the yellow flowers: fruit about 6 mm. long, with 6 or 8 thin wings: oil-tubes several in the intervals.—Gravelly hills, western Texas.

11. CYNOSCIADIUM DC.

Glabrous annuals, with pinnately divided cauline leaves (leaflets linear), mostly undivided lower and radical leaves, involucre and involucels of linear bracts, white flowers, persistent calyx-teeth, ovoid glabrous fruit, prominent corky ribs (the laterals much the largest and forming a broad corky margin), conical stylopodium, and solitary oil-tubes.

1. **C. digitatum** DC. Slender, 3 to 6 dm. high: radical leaves linear-lanceolate, entire; cauline leaves palmately 3 to 5-parted: umbels irregular, mostly 3 to 8-rayed; rays about 2.5 cm. long; pedicels very unequal, 6 to 20 mm. long: fruit 2 mm. long, contracted into a neck at summit, with very prominent ribs and minute calyx-teeth.—Wet ground, northeastern Texas.

2. **C. pinnatum** DC. Smaller: cauline leaves pinnately divided into a few distant segments (terminal one much the largest); radical leaves similar or often entire: umbels 5 to 10-rayed; rays 1 to 2.5 cm. long; pedicels 2 to 8 mm. long: fruit 3 mm. long, not beaked at summit, with less prominent ribs and very prominent calyx-teeth.—Wet ground, central and northern Texas. Var. PUMILUM Eng. is a cespitose form.

12. ERYNGIUM L.

Glabrous perennials, with mostly rigid coriaceous spinosely-toothed or divided leaves, white or blue flowers in dense bracteate heads, very prominent rigid and persistent calyx-lobes, ovoid fruit covered with hyaline scales or tubercles, ribs obsolete, no stylopodium, and oil-tubes mostly 5 (3 dorsal and 2 commissural).—The outer *bracts* form the involucre, the inner ones, *bractlets*, intermixed with the flowers, represent the involucels. Care must be taken not to confuse the prominent rigid calyx-lobes with the bractlets.

* *Stout, with parallel-veined elongated linear coriaceous leaves, which are mostly entire or with margin sparingly bristly.*

1. **E. yuccæfolium** Mx. From 3 to 18 dm. high, branching above: leaves broadly linear (from 4 mm. to over 25 mm. wide), tapering to a point, with remotely bristly margins, the lower sometimes becoming 6 to 9 dm. long: heads pedunculate, ovate-globose (18 mm. long), with ovate-lanceolate mostly entire cuspidate-tipped bracts shorter than the head, similar bractlets, and short ovate calyx-lobes.—A common northern species of dry or damp soil and extending into northern and eastern Texas. Exceedingly variable as to height and size of leaves.

* * *Tall and slender, with thick linear to oblong entire or somewhat toothed (not spiny) leaves on long fistulous petioles.*

2. **E. Virginianum** Lam. Slender, 3 to 9 dm. high, branching above: radical and lower cauline leaves linear to oblong-lanceolate (petioles sometimes 3 dm. long), entire or with remote small hooked teeth; upper cauline leaves sessile, spiny-toothed or laciniate: heads ovate-oblong (12 mm. long), with lanceolate spiny-toothed or entire reflexed bracts mostly as long as the head, bractlets with 3 spiny cusps (the middle one largest), and prominent lanceolate acuminate-cuspidate calyx-lobes equaling or exceeding the bractlets.—A species of the Gulf States, margins of ponds and streams, and extending into eastern Texas, probably within our range.

** * * Weaker, with thin toothed to laciniate leaves (sometimes bristly tipped).*

3. **E. virgatum** Lam. Erect, 3 to 9 dm. high, branching above: leaves oblong or oblong-ovate, often subcordate, on short petioles; lower ones entire or crenately toothed; upper ones becoming sharply serrate or even laciniately toothed: bracts linear and entire or with a few bristly teeth, longer than the subglobose heads; bractlets equally 3-cuspidate, little longer than the flowers; calyx-lobes lanceolate and acuminate.—In damp pine barrens of the Gulf States, and extending into eastern Texas. Var. LUDOVICIANUM Morong has linear-lanceolate or even linear leaves.

4. **E. nasturtiifolium** Juss. Low and rather diffusely branching: leaves sessile, from lyrately pinnatifid below to laciniately cleft or toothed above, more or less bristle-tipped: heads ovate or oblong (9 to 12 mm. long), with conspicuous rigid entire narrowly lanceolate-acuminate spinose-tipped bracts (becoming reflexed) equaling or exceeding the heads, and similar bractlets much exceeding the flowers and mostly a cluster of terminal ones conspicuously crowning the head.—A Mexican species, found by Nealley in Cameron County.

** * * * Simple to diffuse, with coriaceous lobed or parted spinosely-tipped leaves.*

5. **E. Hookeri** Walp. Stem erect, branching above, 3 to 6 dm. high: radical leaves petioled, somewhat dentate; lower stem leaves almost sessile, lanceolate, laciniately-toothed and spinulose, with a pair of small laciniate segments at base; upper leaves palmately 5 to 7-parted, with narrow pinnatifid-laciniate spinose-tipped segments: heads ovate-oblong (8 to 12 mm. long), with numerous narrowly lanceolate spiny-toothed bracts longer than the head, lanceolate entire spiny-tipped bractlets (the terminal ones leafy and crowning the head), and ovate spiny-tipped calyx-lobes.—Low grounds of central and southern Texas.

6. **E. Leavenworthii** Torr. & Gray. Stout, 3 to 9 dm. high, branching above: lowest stem-leaves broadly oblanceolate, spinosely-toothed, gradually becoming more or less palmately-parted above to the ordinary stem-leaves, which are sessile and deeply palmately-parted into narrow incisely-pinnatifid spreading pungent segments: heads pedunculate, ovate-oblong (2.5 to 3.5 cm. long), with involucre of incisely-pinnatifid spinose bracts about as long as the head, narrow 3 to 7-cuspidate bractlets (the terminal ones very prominent, resembling the bracts, and crowning the head), and oblong pinnatifid 3 to 5-cuspidate calyx-lobes.—Dry soil, chiefly in central and western Texas.

7. **E. Wrightii** Gray. Glaucous: stem erect, branching, 3 to 6 dm. high: leaves rigid; radical ones oblanceolate, pectinate-dentate or pinnatifid with triangular teeth tipped with long bristles; stem-leaves sessile, from laciniately-toothed to pinnately cut into linear-lanceolate cuspidate divisions: heads ovate to oblong (about 12 mm. long), with involucre of numerous linear-lanceolate entire to remotely toothed spiny-tipped bracts (whitish within, green without) twice as long as the head, subulate rigid spiny-tipped bractlets longer than the flowers (the terminal ones very prominent and crowning the head), and short ovate mucronate calyx-lobes.—Hills and plains, from eastern Texas to Arizona.

8. **E. diffusum** Torr. Stem low and diffusely branching from the base, with thick rigid branches: leaves sessile, palmately parted, coriaceous, midrib very prominent beneath and margins cartilaginous; segments oblong, incisely serrate and spinose: heads subglobose, about 12 mm. long, on very short peduncles in the forks of the stem, with involucre of leaf-like bracts longer than the head, lanceolate entire spinosely-tipped bractlets, and ovate long-pointed calyx lobes.—Sandy ground, eastern and central Texas, and extending into Mexico.

** * * * * Low, slender, mostly prostrate, with small thin unarmed leaves, and very small heads.*

9. **E. prostratum** Nutt. Prostrate, rooting at the joints, diffusely branched: lower leaves long-petioled, oblong, entire, few-toothed, or lobed at base; upper leaves smaller, clustered at the rooting joints, ovate, few-toothed or entire, with some additional trifid ones: heads narrowly oblong (about 6 mm. long), with invo-

lucre of reflexed lanceolate bracts longer than the heads, and very small bractlets.—Extending into eastern Texas from the Gulf and lower Mississippi States, and probably within our range. In wet ground.

13. SANICULA L. (SANICLE. BLACK SNAKEROOT.)

Smooth perennials, with almost naked or few-leaved stems, palmately divided leaves (in ours), greenish-yellow or purple flowers in irregularly compound few-rayed umbels, prominent and persistent calyx-teeth, and subglobose fruit densely covered with hooked prickles.

1. **S. Marylandica** L. Mostly simple, 3 to 9 dm. high: root-leaves long-petioled, palmately 3 to 7-parted, the divisions mostly sharply cut and serrate, the teeth more or less mucronate-tipped; cauline leaves similar, short-petioled or sessile: umbels irregular, 1 to few-rayed, with a few leaf-like bracts and small bractlets: flowers greenish-yellow, the sterile ones numerous and long-pediceled, and the styles longer than the prickles.—Common throughout the United States east of the Rocky Mountains, without doubt to be found in Texas.

14. AMMOSELINUM Torr. & Gray.

Low diffuse annuals, with ternately divided leaves (the small ultimate segments linear to spatulate), involucre and involucels of entire or dissected bracts, white flowers in small sessile or short-pedunculate unequal umbels, obsolete calyx-teeth, ovate hard fruit with prominent equal more or less scabrous ribs (the laterals of the two carpels closely contiguous), conical stylopodium, and solitary oil-tubes.

1. **A. Popei** Torr. & Gray. From 7.5 to 30 cm. high, with stem-angles, rays, pedicels, and ribs of fruit rough scabrous: leaf-segments narrowly linear: fruit ovate-oblong, 4 to 5 mm. long, with thick corky commissure. (*Apium Popei* Gray).—In sandy soil throughout our range.

2. **A. Butleri** Coult. & Rose. Smaller and nearly glabrous: leaf-segments narrowly oblong or spatulate: fruit ovate, about 2 mm. long, with ribs smooth or minutely scabrous, and a much less prominent corky commissure. (*Apium Butleri* Watson).—In wet ground, eastern Texas, and doubtless within our range.

15. FŒNICULUM Adans. (FENNEL.)

Stout glabrous aromatic herb, with leaves dissected into numerous filiform segments, no involucre or involucels, large umbels of yellow flowers, obsolete calyx-teeth, oblong glabrous fruit with prominent ribs, conical stylopodium, and solitary oil-tubes.

1. **F. vulgare** Gærtn., the cultivated fennel, from Europe, seems to have become naturalized near Brazos Santiago.

16. APIASTRUM Nutt.

Very slender smooth branching (somewhat dichotomously) annuals, with finely dissected leaves having filiform or linear (sometimes a little broader) segments, small white flowers in naked unequally few-rayed umbels, obsolete calyx-teeth, ovate or cordate more or less tuberculate fruit with obscure or obsolete ribs, minute depressed stylopodium, and oil-tubes solitary in the intervals and beneath the ribs.

1. **A. patens** Coult. & Rose. From 3 to 6 dm. high, branching above: leaves 2.5 to 5 cm. long, ternately or biternately divided, with long filiform segments: umbels long-peduncled; rays from 2.5 cm. long to wanting; pedicels 1 cm. long to wanting: fruit ovate, 1 mm. long. (*Leptocaulis patens* Nutt.)—Throughout Texas.

17. CHÆROPHYLLUM L.

Moist ground annuals, with ternately decompound leaves, pinnatifid leaflets with oblong obtuse lobes, usually no involucre, involucels of many bractlets, white flowers, obsolete calyx-teeth, narrowly-oblong to linear fruit notched at base and with equal ribs, conical stylopodium, and mostly solitary oil-tubes.

1. **C. procumbens** Crantz. More or less hairy: stems slender, spreading, 1 to 6 dm. high: umbel sessile or peduncled, few-rayed; rays 2.5 cm. to 5 cm. long; pedicels from 8 mm. long to almost wanting: fruit narrowly oblong, 5 to 8 mm. long, glabrous, contracted but not tapering at summit, the intervals broader than the ribs.—An exceedingly polymorphous species of the Eastern States, the typical form probably not reaching Texas, but represented throughout eastern and central Texas by two varieties: Var. TAINTURIERI Coult. & Rose, with fruit tapering at summit or beaked, and very prominent ribs much broader than the intervals; Var. DASYCARPUM Coult. & Rose, differing from the other variety in having pubescent fruit, with ribs prominent but narrower than the intervals.

18. MUSENIOPSIS Coult. & Rose.

Glabrous acaulescent perennials from thick elongated roots, with pinnate leaves, no involucre, involucels of few small bractlets, yellow flowers, obsolete calyx-teeth, oblong glabrous fruit with equal filiform ribs (the intermediates somewhat distant from the laterals), depressed stylopodium, and 3 or 4 oil tubes in the intervals.

1. **M. Texana** Coult. & Rose. Scape to 20 cm. high, longer than the leaves, somewhat scabrous at base of umbels: leaves 5 to 7-pinnate; lower pinnæ petiolulate, pinnately parted; segments cuneiform, 3 to 5-cleft: umbel 5 to 8-rayed: fruit 3 mm. long. (*Tauschia Texana* Gray.)—Western Texas, and extending into Mexico.

19. SIUM L. (WATER PARSNIP.)

Smooth perennials growing in water or wet places, with pinnate leaves and serrate or pinnatifid leaflets, involucre and involucels of numerous narrow bracts, white flowers, minute calyx-teeth, ovate to oblong glabrous fruit with prominent corky nearly equal ribs, depressed stylopodium, and 1 to 3 oil-tubes in the intervals.

1. **S. cicutæfolium** Gmelin. Stout, 6 to 18 dm. high: leaflets 3 to 8 pairs, linear to lanceolate, sharply serrate and mostly acuminate, 5 to 12.5 cm. long (lower leaves sometimes submersed and finely dissected): umbel many-rayed; rays 2.5 to 3.5 cm. long; pedicels 2 to 6 mm. long: fruit 3 mm. long, with prominent ribs. (*S. lineare* Mx.)—Apparently throughout North America.

20. APIUM L.

Erect or prostrate glabrous herbs, with pinnately or ternately divided leaves, umbels of white flowers opposite the leaves, obsolete calyx-teeth,

ovate or broader glabrous fruit with prominent obtuse nearly equal ribs, depressed stylopodium (or wanting), and solitary oil-tubes.

1. **A. leptophyllum** F. Muell. From 5 to 60 cm. high: leaves ternately divided into filiform segments: umbels sessile or short-pedunculate: fruit 2 mm. long. (*Helosciadium leptophyllum* DC.)—A species of the Gulf States and extending to Brazos Santiago.

21. ZIZIA Koch.

Smooth perennials (3 to 9 dm. high), with ternately divided leaves and broad serrate or toothed leaflets (or lower leaves simple), no involucre, involucels of small bractlets, yellow flowers, prominent calyx-teeth, oblong or ovate glabrous fruit with equal and prominent ribs, stylopodium wanting, and large solitary oil-tubes.

1. **Z. aurea** Koch. Radical leaves very long-petioled, all but the uppermost leaves 2 to 3-ternate; leaflets ovate to lanceolate, sharply serrate: rays 8 to 25, stout, 2.5 to 5 cm. long: fruit oblong, about 4 mm. long. (*Thaspium aureum*, var. *apterum* Gray.)—A species of the Atlantic States extending into Texas.

2. **Z. cordata** Koch. Radical leaves mostly long-petioled, cordate or even rounder, crenately toothed, very rarely lobed or divided; stem-leaves simply ternate or quinate, the leaflets ovate to lanceolate, serrate, incised, or even parted: fruit ovate, 3 mm. long. (*Thaspium trifoliatum*, var. *apterum* Gray.)—Same range as the last.

22. CICUTA L. (WATER-HEMLOCK.)

Smooth poisonous marsh perennials, with pinnately compound leaves and serrate leaflets, few bracts or none, several slender bractlets, white flowers, rather prominent calyx-teeth, oblong to nearly orbicular glabrous fruit with strong flattish corky ribs (laterals largest), conical stylopodium, and solitary oil-tubes.

1. **C. maculata** L. (SPOTTED COWBANE. MUSQUASH ROOT. BEAVER POISON.) Stem stout, 6 to 18 dm. high, streaked with purple: leaves 2 to 3-pinnate, the lower on long petioles; leaflets lanceolate to oblong-lanceolate, 2.5 to 12.5 cm. long, acuminate, coarsely serrate, the veins passing to the notches: pedicels numerous and very unequal: fruit broadly ovate to oval, 2 to 3 mm. long.—Throughout the United States.

23. CRYPTOTÆNIA DC. (HONEWORT.)

Glabrous perennials, with thin 3-foliolate leaves, no involucre, involucels of minute bractlets or none, white flowers, calyx teeth obsolete, linear-oblong glabrous fruit with obtuse equal ribs, slender conical stylopodium, and solitary oil-tubes beneath each rib as well as in the intervals.

1. **C. Canadensis** DC. From 3 to 9 dm. high: leaflets large, ovate, 5 to 10 cm. long, pointed, doubly serrate, often lobed: umbels irregular and unequally few-rayed; pedicels very unequal, from 2 to 25 mm. long: fruit 4 to 6 mm. long, often becoming curved.—A species of the Atlantic States and extending into Texas.

24. LEPTOCAULIS Nutt.

Very slender smooth branching annuals, with finely dissected leaves having filiform or linear segments, small white flowers in involucellate

very unequally few-rayed pedunculate umbels, calyx-teeth obsolete, ovate bristly or tuberculate fruit with prominent or obsolete ribs, somewhat prominent conical stylopodium, and solitary oil-tubes.

1. **L. echinatus** Nutt. From 1 to 3 dm. high: fruit about 1 mm. long, with rather narrow commissure, echinate with spreading hooked bristles; ribs obsolete.—Throughout Texas.

2. **L. divaricatus** DC. From 3 to 6 dm. high, with spreading branches: umbels more diffuse than in the last and usually with fewer rays: fruit 1 mm. long, with broader commissure, tuberculate; ribs somewhat prominent.—A species of the Gulf States, and extending into Texas.

25. DISCOPLEURA DC.

Smooth branching annuals, with finely dissected leaves (filiform or lanceolate divisions), foliaceous bracts, prominent or minute bractlets, white flowers, small or obsolete calyx-teeth, ovate glabrous fruit, with filiform to ovate and obtuse dorsal and intermediate ribs, and very thick and corky laterals (forming a dilated obtuse or acute corky band about the fruit), conical stylopodium, and solitary oil-tubes.

1. **D. capillacea** DC. From 3 to 18 dm. high: leaves finely dissected into filiform divisions: umbel 5 to 20-rayed, with involucre of filiform bracts usually cleft or parted, and involucels more or less prominent; rays 6 to 25 mm. long; pedicels 3 to 6 mm. long: fruit 1 to 2 mm. long, with filiform or thick dorsal and intermediate ribs, the laterals forming a broad flat band about the fruit.—Wet ground throughout the Atlantic States and doubtless extending into Texas. Var. NUTTALLII Coult. & Rose (*D. Nuttallii* DC.) is usually stouter, with more numerous rays, entire involucral bracts and minute involucels. The variety belongs to the lower Mississippi Valley, and extends into Texas.

2. **D. laciniata** Watson. From 6 to 9 dm. high: leaves dissected into lanceolate divisions, or the uppermost linear-setaceous: umbel nearly equally many-rayed, with involucre and involucels of numerous 3 to 5-parted setaceous bracts; rays 1 to 3 cm. long; pedicels 4 to 6 mm. long: fruit about 4 mm. long, with broad and flattish dorsal and intermediate ribs, the laterals forming a prominent acute ridge about the fruit. (*Daucosma laciniatum* Eng. & Gray.)—Throughout southern and western Texas.

26. AMMI L.

Probably a ballast plant, possibly an introduced weed, the following species being collected by Nealley near Brazos Santiago:

1. **A. majus** L., with fusiform roots, pinnately divided leaves, with linear or lanceolate serrate segments, compound many-rayed umbels of white flowers, and small oblong fruit, with filiform ribs and solitary oil-tubes.

27. BERULA Koch.

Smooth aquatic perennial, with simply pinnate leaves and variously cut leaflets, usually conspicuous involucre and involucels of narrow bracts, white flowers, minute calyx-teeth, nearly round glabrous fruit emarginate at base, the nearly globose carpels with very slender inconspicuous ribs, conical stylopodium, and numerous almost contiguous oil-tubes closely surrounding the seed-cavity.

1. **B. angustifolia** Koch. Erect, 1 to 9 dm. high: leaflets 5 to 9 pairs, linear to oblong or ovate, serrate to cut-toothed, often laciniately lobed, sometimes crenate, 1 to 7.5 cm. long: umbel many rayed; rays 5 cm. long or less; pedicels 4 to 6 mm. long: fruit scarcely 2 mm. long. (*Sium angustifolium* L.)—Throughout North America, but not abundant.

28. BOWLESIA Ruiz & Pav.

Slender branching annuals, with stellate pubescence, opposite simple (lobed) leaves, scarious lacerate stipules, simple few-flowered umbels of white flowers on axillary peduncles, rather prominent calyx-teeth, broadly ovate stellate-pubescent fruit, the turgid carpels being nearly distinct and depressed on the back, no ribs or oil-tubes, and a depressed stylopodium.

1. **B. lobata** Ruiz & Pavon. Weak, 5 to 60 cm. long, dichotomously branching: leaves thin, cordate to reniform, 12 to 25 mm. or more broad, 3 to 5-lobed (lobes entire or toothed), on long slender petioles: umbels 1 to 4-flowered, on short peduncles: fruit about 2 mm. long, sessile or nearly so.—A species of the Mexican border, extending from the Gulf to California.

29. HYDROCOTYLE L. (WATER PENNYWORT.)

Low herbaceous perennials, growing in or near water, with slender creeping stems, orbicular-peltate or reniform leaves, small white flowers in simple or proliferous umbels, minute or obsolete calyx-teeth, more or less orbicular very much laterally flattened fruit with broad or filiform more or less unequal ribs, depressed stylopodium, and no distinct oil-tubes.

* *Leaves orbicular-peltate, crenate: peduncles as long as the petioles, both from slender creeping rootstocks.*

1. **H. umbellata** L. Descending branches of the rootstock with round tubers: umbels many-flowered, simple (sometimes proliferous); pedicels 4 to 12 mm. long: fruit strongly notched, 2 mm. long, about 3 mm. broad, with dorsal ribs prominent but obtuse.—A species of the Atlantic States, extending through Texas into Mexico.

2. **H. prolifera** Kellogg. Tuberous as in the last: umbels mostly proliferous, with 5 to 20-flowered whorls; pedicels 2 to 6 mm. long: fruit but slightly notched, 2 mm. long and slightly broader, with dorsal ribs prominent and more obtuse than in the last. (*H. interrupta* T. & G. in part.)—Throughout southern Texas.

3. **H. verticillata** Thunb. Umbels few-flowered, proliferous, forming an interrupted spike; pedicels very short or none: fruit not at all notched, 2 mm. long, 3 to 4 mm. broad, with dorsal and lateral ribs very prominent, the former acute. (*H. interrupta* Muhl.)—Throughout Texas.

4. **H. Bonariensis** Lam., var. TEXANA Coult. & Rose. Petioles and peduncles 15 to 20 cm. long: inflorescence 5 to 10 cm. long, irregularly or 3 to 5-umbellately branched: fruit obtuse at base, 2 mm. long, 3 mm. broad.—Collected probably along the southern seacoast of Texas by Mr. Nealley.

* * *Leaves not peltate: peduncles much shorter than petioles.*

5. **H. ranunculoides** L. f. Usually floating: leaves thickish, round-reniform, 3 to 7-cleft, with crenate lobes: peduncles 2.5 to 7.5 cm. long, reflexed in fruit: capitate umbel 5 to 10-flowered, the involucral bracts small or wanting: fruit 2 to 3 mm. broad, with rather obscure ribs and no secondary ribs or reticulations. (*H. natans* Torr. & Gray.)—Extending from the Gulf States into Texas.

6. **H. Asiatica** L. Smooth or somewhat pubescent: petioles (7.5 to 10 cm. or even

30 cm. long) and peduncles (5 cm. or less long) clustered on creeping stems or runners: leaves ovate-cordate, repand-toothed, thickish: the 2 to 4-flowered umbel subtended by an involucre of two conspicuous bracts: fruit larger, 4 to 5 mm. broad, with prominent secondary ribs and reticulations. (*H. repanda* Pers.)—Extending into Texas from the Gulf States.

CORNACEÆ. (Dogwood Family.)

Shrubs or trees (rarely herbs), with opposite or alternate simple leaves, calyx-tube coherent with the 1 or 2-celled ovary and its limb minute, petals and as many stamens borne on the margin of an epigynous disk in the perfect flowers, 1 or 2 styles, and fruit a 1 or 2-seeded drupe.

1. **Cornus.** Flowers perfect, in cymes or a head-like cluster: petals 4: style 1, stigma terminal: ovary 2-celled: leaves mostly opposite.

2. **Nyssa.** Flowers dicciously polygamous, 5-merous, in a cluster of fascicles or solitary: petals very small or none: style 1, stigmatic down one side: ovary 1-celled: leaves alternate.

3. **Garrya.** Flowers diœcious, in catkin-like spikes, 4-merous: petals none: styles 2, stigmatic down one side: ovary 1-celled: leaves opposite.

1. CORNUS Tourn. (Cornel. Dogwood.)

Shrubs or perennial herbs, with opposite entire leaves, small flowers in open naked cymes or in close heads surrounded by a corolla-like involucre, perfect flowers, minutely 4-toothed calyx, 4 oblong spreading petals, 4 stamens with slender filaments, slender style with terminal stigma, and a small drupe with a 2-celled and 2-seeded stone.

§ 1. *Flowers greenish, in a head or close cluster, surrounded by a large and showy 4-leaved corolla-like white or rarely pinkish involucre: fruit bright red.*

1. **C. florida** L. (Flowering dogwood.) In our range a tree 9 to 12 m. high: leaves ovate or elliptical (rarely somewhat obovate), acuminate, mostly acute at base, minutely appressed-pubescent above, whitish beneath and with sparse mostly appressed pubescence, 6 to 14 cm. long, 3.5 to 9 cm. wide: involucral bracts obcordate or with callous notch at apex: fruit ovoid, crowned with a narrow persistent calyx: stone ovoid, smooth, 6 to 8 mm. high, 4 to 5 mm. broad.—A common species of the Atlantic States, and extending in Texas to the valley of the Brazos.

§ 2. *Flowers white, in open flat spreading cymes: involucre none: fruit spherical, white, lead-color, or blue.*

2. **C. sericea** L. (Silky cornel. Kinnikinnik.) Shrub 10 to 35 dm. high, with branches mostly purplish: branchlets and inflorescence silky-downy: leaves very variable, from lanceolate and narrowly ovate to broadly ovate and elliptical, mostly long-acuminate, rounded or acute at base, nearly glabrous above, whitish and silky (often rusty) pubescent beneath (rarely glabrate), 2.5 to 12.5 cm. long: flowers in broad rather compact cymes: calyx-teeth conspicuous: style abruptly and conspicuously swollen at tip: fruit pale blue: stone oblique and irregular, more or less pointed at base, irregularly sharp-ridged, mostly broader than high (5 to 6 mm. high, 4 to 7 mm. broad).—Wet ground, common in the Atlantic States and extending into eastern and northern Texas.

3. **C. asperifolia** Michx. Erect shrub 10 to 45 dm. high, with reddish-brown mostly pubescent branches: branchlets and inflorescence rough-pubescent: leaves from narrowly ovate to round-ovate and oblong, from short to conspicuously acuminate, acute or obtuse at base, rough pubescent above, whitish and roughish woolly

beneath, 3.5 to 12.5 cm. long: flowers in loose, mostly broad, often paniculate cymes: calyx-teeth small: fruit white on red stalks: stone globular or nearly so, mostly not at all ridged, but little broader than high, about 4 mm. in diameter.—Var. DRUMMONDII Coult. & Evans has harsher and usually more crowded leaves and a smaller stone. (*C. Drummondii* C. A. Meyer.)—An eastern species, extending to central Texas, where the variety is the common form.

4. **C. candidissima** Marsh. Erect shrub 25 to 45 dm. high, with smooth mostly grayish branches: leaves lanceolate to ovate, acuminate, acutish at base, minutely appressed pubescent or glabrous on either or both sides, the lower surface from whitish to scarcely paler than the upper, 3.5 to 10 cm. long: flowers in numerous loose paniculate cymes: calyx-teeth from small to prominent: anthers more or less blue along the connective: fruit white to pale blue: stone small, nearly globular, not furrowed or very slightly so, 3 to 5 mm. in diameter. (*C. stricta* Lam. *C. paniculata* L'Her.)—An Atlantic species extending into Texas.

2. **NYSSA** L. (TUPELO. PEPPERIDGE. SOUR-GUM TREE.)

Trees with entire or angulate-toothed leaves which are alternate but mostly crowded at the ends of the branchlets, greenish dicciously polygamous flowers clustered or rarely solitary at the summit of axillary peduncles and appearing with the leaves, and an ovoid or oblong drupe with a bony and grooved or even winged 1-celled 1-seeded stone. The *staminate flowers* are numerous in a simple or compound dense cluster of fascicles, with a small 5 parted calyx, petals as in the pistillate flowers or none, 5 to 12 (mostly 10) stamens inserted on the outside of a convex disk with slender filaments and short anthers, and no pistil. The *pistillate flowers* are solitary or 2 to 8, sessile in a bracted cluster and much larger than the staminate flowers, with a very short repand-truncate or minutely 5-toothed limb, very small and fleshy deciduous petals (or none), 5 to 10 stamens with perfect or imperfect anthers, and an elongated revolute style stigmatic down one side.

1. **N. aquatica** L. A tree becoming 15 to 36 m. high: leaves from linear-oblong or lanceolate to oval or obovate, acute or acuminate, entire, smooth and shining above (when old), more or less hairy along the veins beneath, or almost woolly when young, 5 to 17.5 cm. long: Staminate flowers numerous in loose or somewhat dense clusters; pistillate flowers 2 to 14 at the apex of a more or less elongated peduncle, mostly developing 1 to 3 fruits: fruit ovoid, acid, bluish-black, 8 to 13 mm. long: stone ovoid, smooth or scarcely ridged. (*N. sylvatica* Marsh. *N. multiflora* Wang.)—An eastern species extending into Texas to the valley of the Brazos.

2. **N. uniflora** Wang. A large tree 18 to 30 mm. high: leaves long-petioled, ovate or oblong, mostly obtuse or even cordate at base, acute or acuminate, entire or angulate-toothed, becoming smooth above, pale and downy pubescent beneath (especially when young), 7.5 to 25 cm. long: staminate flowers numerous, in rather dense clusters; pistillate flowers solitary on slender elongated peduncles: fruit olive-shaped, becoming dark blue, 16 to 30 mm. long: stone narrowly obovate, flattened, and with prominent acute almost winged ridges.—Extending from the Gulf States to the valley of the Neches, and possibly within our range.

3. **GARRYA** Dougl.

Evergreen shrubs, with 4-angled branchlets, opposite entire coriaceous leaves with the short petioles connate at base, dicecious flowers in axillary aments, no petals, and a blue or purple fruit.—The *staminate*

flowers have a 4-parted calyx with linear segments, 4 stamens with distinct filaments, and no ovary. The *pistillate flowers* have the calyx-limb shortly 2-lobed or obsolete, no stamens, 2 persistent styles stigmatic on the inner side, and a 1-celled ovary with 2 pendent ovules.—Our species all have the fertile aments with more or less distant flowers and more or less foliaceous bracts.

1. **G. ovata** Benth. A shrub 5 to 20 dm. high, with branchlets and inflorescence more or less silky-pubescent: leaves narrowly lanceolate to ovate, mostly acute and mucronate (sometimes obtuse), clothed on both surfaces with a silky pubescence (or glabrate above), 2.5 to 6 cm. long, with thickened muriculate margins: sterile aments with small connate bracts; fertile aments 2.5 to 7.5 cm. long, with usually foliaceous and distinct bracts: fruit globose to ovoid, becoming glabrous, sessile or short-pedicellate, 4 to 8 mm. in diameter.—A Mexican species, represented in the Guadalupe Mountains of Western Texas (*Havard*) by forms with narrow leaves and small ovoid fruits. Var. LINDHEIMERI Coult. & Evans has branchlets and both leaf-surfaces more or less clothed with kinky wool (or upper leaf-surface glabrate with age), and oblong or obovate mostly obtuse and mucronate leaves with margins not thickened or muriculate. (*G. Lindheimeri* Torr.) Throughout central and western Texas.

2. **G. Wrightii** Torr. Shrub 5 to 10 dm. high, becoming glabrate: leaves light green (drying bluish), oblong-lanceolate to elliptical or obovate, acute at each end, mostly mucronate, with thickish slightly muriculate margins, glabrous (or nearly so) on both sides, 1.8 to 5 cm. long: aments more or less branching and distant-flowered; sterile ones with smaller but distinct bracts; fertile ones 3.5 to 8.5 cm. long, the upper bracts rather small, becoming more foliaceous and distinct downwards, until the lowest resemble the ordinary leaves (giving the appearance of sessile axillary flowers): fruit globose, becoming glabrous, sessile, 4 to 7 mm. in diameter.—Counties of extreme western Texas.

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Elmer D. Merrill

U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF BOTANY.

CONTRIBUTIONS

FROM

THE U. S. NATIONAL HERBARIUM.

Vol. II. No. 2.

ISSUED JUNE 1, 1892.

MANUAL OF THE PHANEROGAMS AND PTERIDOPHYTES OF WESTERN TEXAS.

BY

JOHN M. COULTER.

GAMOPETALÆ.

PUBLISHED BY AUTHORITY OF THE SECRETARY OF AGRICULTURE.

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LETTER OF TRANSMITTAL.

SIR: I have the honor of transmitting for publication the second part of a Manual of the Plants of Western Texas, which has been prepared by Prof. J. M. Coulter, by the instruction of the Secretary, mainly as the result of investigations which have been prosecuted in Texas, under the direction of the Botanical Division, by Mr. G. C. Nealley, of Houston, Tex.

Respectfully,

Dr. GEORGE VASEY,
Botanist.

Hon. J. M. RUSK,
Secretary of Agriculture.
FEBRUARY 12, 1892.

PREFATORY NOTE.

The present part is a continuation of "Contributions from the U. S. National Herbarium," Vol. II, No. 1, issued June 27, 1891, and contains the Gamopetalæ of Western Texas. As is well known to botanists, the materials for the compilation of this part are far more accessible than for any other, as it has to do with the only completed portion of Gray's Synoptical Flora, of which, naturally, very free use has been made. So far as the sixth edition of Gray's Manual has been available for a simplified presentation of the Texan flora it has been used. The evident appreciation with which the first part has been received not only testifies to its usefulness, but also encourages the writer again to invite the pointing out of all sins of omission and commission in which such a tentative work must abound.

JOHN M. COULTER.

STATE UNIVERSITY,
Bloomington, Ind.

MANUAL OF THE PLANTS OF WESTERN TEXAS.

ANALYTICAL KEY TO THE ORDERS.

Division II. GAMOPETALÆ: those with both calyx and corolla, the latter with its petals more or less united.

A. *Stamens more numerous than the lobes of the corolla.*

Ovary 1-celled.....STYRACEÆ, 258
Ovary 3 to many-celled.
Stamens free or nearly free from corolla.....ERICACEÆ, 253
Stamens inserted on base or tube of corolla.
Filaments 1 to 5-adelphous at base; anthers 2-celled.....STYRACEÆ, 258
Filaments wholly distinct.....EBENACEÆ, 257
Filaments in pairs at each sinus; anthers 1-celled.....CAPRIFOLIACEÆ, 155

B. *Stamens (fertile ones) as many as the lobes of the corolla and opposite them.*

Ovary 5-celled; corolla appendaged with scales inside.....SAPOTACEÆ, 256
Ovary 1-celled; pod several to many-seeded; style 1.....PRIMULACEÆ, 255
Ovary 1-celled; utricle 1-seeded; styles 5.....PLUMBAGINEÆ, 254

C. *Stamens as many as the lobes of the corolla and alternate with them or fewer.*

1. *Ovary adherent to the calyx-tube (inferior).*

Stamens united by anthers into a ring or tube.
Flowers in an involucrate head.....COMPOSITÆ, 164
Flowers separate, not involucrate; corolla irregular.....LOBELIACEÆ, 250
Stamens separate, free from corolla or nearly so, as many as its lobes; stipules none.....CAMPANULACEÆ, 252
Stamens separate, inserted on corolla,
1 to 3, always fewer than corolla-lobes.....VALERIANEÆ, 163
4 or 5; leaves opposite or whorled.
Leaves whorled and without stipules
Leaves opposite or whorled, and with stipules } .....RUBIACEÆ, 157
Leaves opposite, without stipules (petioles sometimes with stipule-like appendages).....CAPRIFOLIACEÆ, 155

2. *Ovary free from the calyx (superior).*

* *Corolla irregular; stamens (with anthers) 4 and didynamous, or only 2.*

Ovules and seeds solitary in the (1 to 4) cells.
Ovary 4-lobed, the style rising from between the lobes.....LABIATÆ, 330
Ovary not lobed, the style from its apex.....VERBENACEÆ, 326
Ovules numerous or at least as many as 2 in each cell.
Ovary and pod 1-celled,
With free central placenta; stamens 2.....LENTIBULARIEÆ, 317
With 2 or more parietal very many-seeded placentæ; stamens 4.....OROBANCHACEÆ, 316
Ovary and fruit more or less 4 or 5-celled.....PEDALINEÆ, 319
Ovary and pod 2-celled, but the 2 placentæ parietal.....BIGNONIACEÆ, 318
Ovary and pod 2-celled; placentæ in the axis.
Seeds rarely few, not on hooks.....SCROPHULARINEÆ, 304
Seeds few, borne on hook-like or other projections.....ACANTHACEÆ, 319

**Corolla somewhat irregular; stamens (with anthers) 5.*

Stamens free from corolla; anther-cells opening by hole or chink at top.....Rhododendron, in ERICACEÆ, 253
Stamens inserted on corolla; pod many-seeded; filaments or some of them woolly.....Verbascum, in SCROPHULARINEÆ, 306

** * * Corolla regular.*

+ Stamens as many as lobes of corolla.

Ovaries 2, separate; their
Styles and stigmas also wholly separate....Dichondra, in CONVOLVULACEÆ, 289
Stigmas and sometimes styles united into one.
Filaments distinct; pollen in ordinary grains.....APOCYNACEÆ, 261
Filaments monadelphous; pollen in masses.....ASCLEPIADEÆ, 263
Ovary 1, but deeply 4-lobed around style (or 2-lobed in Heliotropium).
Leaves alternate.....BORAGINEÆ, 282
Leaves opposite.....LABIATÆ, 330
Ovary 1, pod 2-lobed or 2-horned at summit.....LOGANIACEÆ, 270
Ovary 1, not deeply lobed,
1-celled, 1-ovuled, becoming an achene.....PLANTAGINEÆ, 344
1-celled, with ovules parietal or on 2 parietal placentæ.
Leaves entire.....GENTIANEÆ, 273
Leaves toothed, lobed, or pinnately compound.....HYDROPHYLLACEÆ, 278
2 to 10-celled.
Leafless parasitic twining plants.....Cuscuta, in CONVOLVULACEÆ, 294
Leaves opposite, their bases or petioles connected by stipules or a stipular line.....LOGANIACEÆ, 270
Leaves when opposite without stipules.
Stamens free from corolla or nearly so.....ERICACEÆ, 253
Stamens inserted on corolla-tube,
4; pod 2-celled, circumscissile.....PLANTAGINEÆ, 344
4; ovary 2 to 4-celled; ovules solitary.....VERBENACEÆ, 326
5 or rarely more.
Fruit of 2 or 4 seed-like nutlets.....BORAGINEÆ, 282
Fruit a few-seeded pod.
Calyx 5-cleft; style 3-lobed or cleft....POLEMONIACEÆ, 276
Sepals 5; styles 1 or 2, entire or 2-cleft.CONVOLVULACEÆ, 288
Fruit a many-seeded pod or berry.
Styles 2.....Hydrolea, in HYDROPHYLLACEÆ, 282
Style single.....SOLANACEÆ, 296

+ + Stamens fewer than lobes of corolla.

Stamens 4, didynamous.
Ovary 2-celled; cells several-seeded.....ACANTHACEÆ, 319
Ovary 2 to 4-celled; cells 1-seeded.....VERBENACEÆ, 326
Stamens only 2 with anthers; ovary 4-lobed.....Some LABIATÆ, 330
Stamens 2, rarely 3; ovary 2-celled.
Low herbs; corolla scarious, withering on pod.....PLANTAGINEÆ, 344
Herbs; corolla rotate or somewhat funnelform, and slightly irregular.....Veronica, in SCROPHULARINEÆ, 312
Shrubs or trees; corolla perfectly regular.....OLEACEÆ, 258

POLYPETALOUS FORMS IN GAMOPETALOUS ORDERS:

The following orders contain forms which have their petals separate:

A. *Stamens at least more than 10.*

Calyx more or less coherent with the 2 to 5-celled ovary; leaves alternate ..... STYRACEÆ, 258

B. *Stamens not more than twice as many as the petals, when of just the number alternate.*

Ovaries 2 or more, separate; stamens united with each other and with a large and thick stigma common to the 2 ovaries ..... ASCLEPIADEÆ, 263

Ovary only 1 and compound.

Stamens distinct and fewer than the 4 petals ..... OLEACEÆ, 258

Stamens just as many or twice as many as the petals ..... ERICACEÆ, 253

APETALOUS FORMS IN GAMOPETALOUS ORDERS.

Shrubs or trees; fruit a 1-celled and 1-seeded samara or a drupe ..... OLEACEÆ, 258

CAPRIFOLIACEÆ. (HONEYSUCKLE FAMILY.)

Shrubs, or rarely herbs, with opposite leaves, no (genuine) stipules, calyx-tube coherent with the 2 to 5-celled ovary, stamens as many as lobes of tubular or rotate corolla and inserted on its tube, and fruit a 1 to several-seeded berry, drupe, or pod.—Ours are all shrubs.

*Corolla rotate or urn-shaped, regular, deeply 5-lobed: stigmas 3 to 5, sessile or nearly so: flowers terminal and in broad compound cymes.

1. **Sambucus.** Fruit berry-like, containing 3 small seed-like nutlets: leaves pinnate.

2. **Viburnum.** Fruit a 1-celled 1-seeded drupe with a compressed stone: leaves simple.

**Corolla tubular, often irregular, sometimes 2-lipped: style slender and stigma capitate.

3. **Symphoricarpos.** Stamens 4 or 5, as many as the lobes of the bell-shaped regular corolla: berry 4-celled but only 2-seeded, 2 cells being sterile.

4. **Lonicera.** Stamens 5, as many as the lobes of the tubular and more or less irregular corolla: berry several-seeded, all the 2 or 3 cells fertile.

1. SAMBUCUS Tourn. (ELDER.)

Shrubby plants, with pinnate leaves, serrate-pointed leaflets, numerous small and white flowers in compound cymes, minute or obsolete calyx-lobes, open urn-shaped corolla with broadly spreading 5-cleft limb, 5 stamens, 3 stigmas, and fruit a berry-like juicy drupe containing 3 small seed-like nutlets.

1. **S. Canadensis** L. Suffrutescent, 15 to 30 dm. high, glabrous except some fine pubescence on midrib and veins of leaves beneath: leaflets (5 to 11) mostly 7, ovate-oval to oblong-lanceolate, acuminate, the lower not rarely bifid or with a lateral lobe: fruit dark-purple, becoming black.—Moist grounds throughout Texas.

2. **S. Mexicana** Presl. Arborescent, with trunks sometimes 15 cm. in diameter: leaves and young shoots pubescent (sometimes slightly so, sometimes cinereous or tomentulose-canescent): leaflets 5 to 9, thickish, ovate to narrowly oblong, the lower ones rarely 3-parted.—From the valley of the Nueces, westward across the continent along the Mexican border.

2. VIBURNUM L. (Arrow-wood.)

Shrubs with simple leaves, white flowers in flat compound corymbs, 5-toothed calyx, spreading deeply 5-lobed corolla, 5 stamens, 1 to 3 stigmas, and fruit a 1-celled 1-seeded drupe with soft pulp and a thin-crustaceous stone.—Our species are not radiant, and have blue or blackish drupes.

1. **V. molle** Michx. A tall shrub: leaves broadly oval, obovate or ovate, rather slender-petioled, scarcely pointed, prominently pinnately veined, coarsely crenate or repand-toothed, the lower surface, branchlets, and cymes soft-downy, the latter with stellate pubescence: fruit ovoid, 6 to 8 mm. long; stone deeply sulcate ventrally.—Atlantic species, extending into Texas and probably within our limits.

2. **V. prunifolium** L. (Black haw.) A tall shrub or small tree (6 to 9 m. high), glabrous: leaves oval, obtuse or slightly pointed, finely and sharply serrate, bright green, the veins not prominent, 2.5 to 5 cm. long: cymes compound, 3 to 5-rayed and sessile: fruit oval, 10 to 12 mm. long; stone very flat and even, broadly oval or orbicular.—An Atlantic species, extending westward into Texas as far as the valley of the Guadalupe and probably the San Antonio.

3. SYMPHORICARPOS Dill. (Snowberry.)

Low and branching upright shrubs, with small short-petioled leaves which are downy underneath and entire (or wavy toothed or lobed on young shoots), white or rosy-tinged flowers in close short spikes or clusters, short persistent calyx-teeth, bell-shaped regularly 4 or 5-lobed corolla with as many short stamens inserted on its throat, a 4-celled ovary but only 2 of the cells with a fertile ovule, and a 4-celled but 2-seeded berry.

**Short-flowered, the corolla urn-shaped or open-campanulate, 4 mm. long: style bearded: fruit red.*

1. **S. vulgaris** Michx. (Coral-berry. Indian currant.) Soft-pubescent or glabrate: leaves oval, seldom over 2.5 cm. long, exceeding the (1 to 4) glomerate or at length spiciform dense flower-clusters in their axils: corolla sparingly bearded inside: fruit very small, dark red.—An Atlantic species, extending into Texas. Var. spicatus Gray is a form with fructiferous spikes more elongated, sometimes equaling the leaves.—Near New Braunfels (*Lindheimer*).

** * Longer-flowered, the corolla oblong-campanulate to salverform: fruit white: flowers mostly axillary.*

2. **S. rotundifolius** Gray. Tomentulose to glabrate: leaves from orbicular to oblong-elliptical, thickish, 12 to 18 mm. long: corolla elongated-campanulate, 6 to 8 mm. long; its tube pubescent within below the stamens and twice or thrice the length of the broad and short slightly spreading lobes: style glabrous.—Mountains west of the Pecos.

3. **S. longiflorus** Gray. Glabrous or rarely minutely pubescent, glaucescent: leaves spatulate-oblong varying to oval, thickish, 6 to 12 mm. long: corolla white, salverform, slender; its tube 8 to 12 mm. and oblong widely-spreading lobes 3 mm. long, very glabrous within: style bearded.—Mountains west of the Pecos.

4. LONICERA L. (Honeysuckle. Woodbine.)

Either upright or twining shrubs, with entire leaves, often showy and fragrant flowers, very short calyx-teeth, tubular or funnel-form corolla

often gibbous at base and irregularly or almost regularly 5-lobed, 5 stamens, 2 or 3-celled ovary, and a several-seeded berry.

1. **L. sempervirens** L. (TRUMPET HONEYSUCKLE.) Twining glabrous shrubs: leaves oblong, smooth, the lower petioled, the uppermost pairs connate: flowers in sessile somewhat distant whorls in the axils of the upper leaves forming interrupted terminal spikes, trumpet-shaped, almost regular, nearly 5 cm. long, deep red outside, yellowish within or rarely throughout: stamens and style little exserted: calyx-teeth persistent on the red or orange berry.—An Atlantic species, reported in Texas as far west as Gillespie County. Very commonly cultivated.

2. **L. albiflora** Torr. & Gray. Wholly glabrous or with minute soft pubescence, bushy, also disposed to twine, 12 to 24 dm. high: leaves oval, 2.5 cm. long or more, glaucescent on both sides, usually only the upper pair connate into a disk and subtending the simple sessile glomerule: corolla white or yellowish-white, glabrous: the tube 6 to 10 mm. long, hardly at all gibbous: style and filaments nearly naked (Incl. *L. dumosa* Gray).—Abundant throughout western Texas, and especially so in the mountains west of the Pecos.

RUBIACEÆ. (MADDER FAMILY.)

Shrubs or herbs, with opposite entire leaves connected by interposed stipules or in whorls without apparent stipules, calyx coherent with the 2 to 4-celled ovary, and the stamens as many as the lobes (4 or 5) of the regular corolla and inserted on its tube.

I. Ovules numerous in each cell.

* Seeds numerous, flat, winged all round: leaves often in whorls: low and shrubby.

1. **Bouvardia.** Corolla tubular or salverform, with 4 or 5 short lobes: fruit a didymous-globose pod, with peltate seeds imbricated on the globular placentæ.

* * Seeds several or numerous, wingless: leaves opposite: low herbs.

2. **Houstonia.** Corolla salverform or funnelform, 4-lobed: seeds rather few, thimble-shaped or saucer-shaped.

3. **Oldenlandia.** Corolla rotate (in ours), 4-lobed: seeds very numerous and minute, angular.

II. Ovules solitary in the cells: leaves mostly opposite.

* Flowers in a close and globose long-peduncled head: fruit dry: shrubs.

4. **Cephalanthus.** Corolla tubular, with 4 lobes: fruit inversely pyramidal, 2 to 4-seeded.

* * Flowers twin, their ovaries united into one: fruit a 2-eyed berry.

5. **Mitchella.** Corolla funnelform, with four lobes: a creeping herb.

* * * Flowers axillary, separate: fruit dry when ripe: herbs.

← Fruit separating when ripe into 2 to 4 carpels, the calyx-limb gamophyllous at base and circumscissile-deciduous as a whole at or before dehiscence.

6. **Richardia.** Flowers (4 to 8-) commonly 5 or 6-merous; corolla funnelform: carpels separating from apex to base, with no persistent axis.

7. **Crusea.** Flowers (3 to 5-) commonly 4- merous: corolla salverform to narrow funnelform: fruit 2 to 4-lobed, the carpels separating from a persistent axis.

← ← Fruit separating into 2 (rarely 3) carpels which bear persistent and quite or nearly distinct calyx-teeth.

8. **Spermacoce.** Corolla funnelform or salverform, with 4 lobes: fruit separating when ripe into 2 carpels, one or both of them opening.

9. **Diodia.** Fruit separating into 2 or 3 closed and indehiscent carpels: otherwise as no. 8.

III. Ovules solitary: leaves in whorls, without stipules.

10. **Galium.** Corolla rotate, 4- (rarely 3-) parted: calyx-teeth obsolete: fruit twin, separating into 2 indehiscent 1-seeded carpels.

1. BOUVARDIA Salisb.

Low shrubs or perennial herbs, with mostly whorled leaves, subulate interposed stipules, handsome tubular flowers in terminal cymes, calyx with a turbinate or campanulate tube and 4 subulate persistent lobes, tubular or salverform corolla with 4 or 5 short lobes, 4 or 5 stamens inserted on or near the throat of the corolla, filiform style, 2 stigmas, 2-celled ovary, and a didymous-globose coriaceous pod, with peltate seeds imbricated on the globular placentæ.

1. **B. triphylla** Salisb. Suffruticose or more shrubby, scabro-puberulent, 6 to 15 dm. high: leaves in 3s or 4s (or in pairs on branchlets), from oblong-ovate to broadly lanceolate, usually hispidulous-scabrous, 3 or 4-veined each side of the mid-rib: corolla scarlet, about 2.5 cm. long, pubescent outside.—A species of southern Arizona, represented in Texas by var. ANGUSTIFOLIA Gray, which is cinereous-puberulent or hirtellous, with smaller leaves (16 to 36 mm. long), which are subsessile, less veiny, from oblong-lanceolate to almost linear. (*B. hirtella* Gray, Pl. Wright.)—In the mountains west of the Pecos.

2. HOUSTONIA L.

Low herbs (a few suffruticulose), with short entire stipules connecting the petioles or narrowed bases of the leaves, cymose or solitary and peduncled dimorphous flowers, 4-lobed persistent calyx, salverform or funnelform 4-lobed corolla, 4 stamens, single style and 2 stigmas, 2-celled ovary, and a top-shaped, globular, or didymous thin pod with rather few peltate and saucer-shaped or thimble-shaped pitted seeds.

§ 1. *Low herbs, with leaves not rigid.*

* *Small and delicate: corolla salverform: anthers or stigmas included or only partially emerging: peduncles single, elongated and erect in fruit: seeds globular, with a very deep round cavity occupying the inner face.*

1. **H. patens** Ell. From 2.5 to at length 15 cm. or so high, with ascending branches and erect peduncles: leaves spatulate to ovate: corolla small, violet-blue or purplish, the tube more or less longer than the lobes and twice the length of the calyx-lobes.—Dry or sandy soil, in the low grounds of eastern Texas, and probably within our limit at the south. Var. PUSILLA Gray is 2.5 cm. or so high, more diffuse in age, with leaves narrowly spatulate, the upper ones nearly linear.—Texas (*Drummond*), possibly east of our range.

2. **H. minima** Beck. More diffuse, commonly scabrous: stems at length much branched and spreading (2.5 to 10 cm. high): lowest leaves ovate or spatulate, the upper oblong or nearly linear: earlier peduncles elongated and spreading in fruit, the later ones short: tube of the purplish corolla not longer than its lobes or the ample calyx lobes (3 mm. long).—Dry hills, throughout eastern Texas, and as far west as Gillespie County.

* * *Slender leafy-stemmed annual, with lateral horizontal peduncles and very small flowers: corolla short-salverform: seeds crateriform, with a medial ridge.*

3. **H. subviscosa** Gray. Minutely viscidulous-pubescent, with rather simple spreading branches: leaves narrowly linear, 12 mm. long: peduncle in first fork and

from all following nodes, rather shorter than leaves, horizontally refracted in fruit: corolla about 2 mm. long, white: pod didymous, only the summit free.—On the Colorado and southward.

* * * *Depressed or low-tufted species: corolla salverform or funnelform: filaments as well as anthers or style summit exserted (reciprocally) quite out of the throat: fructiferous peduncles all short and recurved: pods about ¾ free: seeds crateriform.*

4. **H. humifusa** Gray. Annual, much branched from the root, repeatedly dichotomous, forming a depressed tuft, puberulent and viscid: leaves linear-lanceolate, thickish (12 mm. or more long), mucronate, with setulose-ciliate scarious stipules: flowers in all the forks, crowded with the leaves at the ends of branchlets: calyx 4-parted into long setaceous-subulate spreading lobes: corolla pale-purple or nearly white, open-funnelform, 6 mm. long, hardly twice the length of the calyx.—Sandy or gravelly plains and hills throughout Texas, but especially on the "Staked Plains" and in western Texas generally.

5. **H. Croftiæ** Britton & Rusby. Annual, depressed-spreading, with stems about 2.5 cm. long, simple or dichotomously branching, minutely scabrous: leaves oblanceolate (5 to 10 mm. long), tapering into a very short petiole, revolute, obtuse: flowers white, minute (about 3 mm. long) sessile in the axils: fruit short-stalked, about 2 mm. high, clothed with short hairs.—Near San Diego (*Miss Croft*).

6. **H. Wrightii** Gray. Many-stemmed from a deep lignescent root, erect or spreading, glabrous or very obscurely pruinose: leaves thickish, linear or lowest rather lanceolate (1 to 2.5 cm. long), with naked stipules: flowers in terminal glomerate leafy cymes: corolla purplish or nearly white, between salverform and funnelform, 4 to hardly 8 mm. long.—Hills and mountains throughout our range, especially west of the Pecos.

* * * * *Erect perennials, with stem-leaves sessile, and flowers in small terminal cymes or clusters: corolla funnelform, purplish, often hairy inside: stamens and style as in the previous subdivision: fructiferons peduncles erect: seeds meniscoidal, with a ridge across the hollowed inner face.*

7. **H. purpurea** L. Pubescent or smooth, 2 to 4 dm. high: leaves varying from roundish-ovate to lanceolate, 3 to 5-ribbed: calyx-lobes longer than the half-free globular pod.—A wonderfully variable species of the Atlantic States, extending to Texas, and doubtless represented within our limit by some of its numerous forms.

8. **H. angustifolia** Michx. Stems tufted from a hard or woody root: leaves narrowly linear, acute, 1-ribbed, many of them fascicled: flowers crowded, short-pedicelled: lobes of the corolla densely bearded inside: pod obovoid, acute at base, only its summit free.—Throughout Texas. Var. FILIFOLIA Gray is diffuse, with cauline leaves mostly filiform, and flowers and pods smaller and more pedunculate.—Especially in the eastern half of Texas. Var. RIGIDIUSCULA Gray is stouter, with leaves from linear to lanceolate and mostly rigid, and flowers disposed to be glomerate and sessile.—Southern and western Texas.

§ 2. *Fruticose or fruticulose, with setaceous or acerose-linear rigid and fascicled leaves.*

9. **H. fasciculata** Gray. From 7.5 to 30 cm. or more high, decidedly shrubby, with rigid and tortuous spreading branches, glabrous or hirtello-puberulent: leaves subulate-linear, 4 to 8 mm. long, much fascicled: flowers short-pedicelled: corolla 4 to 6 mm. long, between salverform, and funnelform, the tube sometimes hardly or sometimes twice longer than the lobes: pod barely 2 mm. long, about one-third free: seeds 4 or 5 in each cell, elongated-oblong, barely concave on ventral face.—West of the Pecos.

10. **H. acerosa** Gray. From 7.5 to 15 cm. high, fruticulose, tufted, with slender ascending branches: minutely hispidulous-pubescent or glabrate, very leafy throughout: leaves acicular-setaceous, 6 to 10 mm. long: calyx-lobes similarly setaceous: flowers sessile: corolla salverform with slightly dilated throat, its slender tube 6 to 8 mm. long, much exceeding the ovate lobes: pod over 2 mm. long, globular, about

one-fourth free, much overtopped by the acicular calyx-lobes: seeds 12 to 20 in each cell, roundish, with small ventral excavation.—High plains and hills west of the Pecos.

3. OLDENLANDIA Plum.

Low herbs, with small stipules united to the petioles, 4-lobed persistent calyx, rotate 4-parted corolla, 4 stamens, style 1 or none, 2 stigmas, and a thin 2-celled pod, with very numerous minute and angular seeds.

1. **O. Boscii** Chapman. Diffusely spreading, slender and glabrous: leaves linear with an attenuate base, 2.5 cm. or less long, obscurely 1-nerved: flowers few or solitary and nearly sessile at the axils: calyx-teeth broadly subulate, rather shorter than the pod.—A species of the Gulf States in low or wet ground, and extending into Texas.

2. **O. glomerata** Michx. Erect or soon diffuse, freely branching, somewhat hirsutulous-pubescent: leaves from ovate to oblong, thinnish, 12 mm. long, contracted at base as if petioled: flowers in terminal or lateral sessile glomerules (rarely solitary): calyx-lobes ovate or oblong, foliaceous, longer than the subglobose or hemispherical hirsute pod.—Low grounds, near the coast, throughout the Atlantic and Gulf States, and extending along the Texan coast.

4. CEPHALANTHUS L. (Button-bush.)

Shrubs, with the white flowers densely aggregated in spherical peduncled heads, inversely pyramidal calyx-tube with 4-toothed limb, tubular 4-toothed corolla, thread-form much protruded style, capitate stigma, and dry hard small inversely pyramidal 2 to 4-celled fruit.

1. **C. occidentalis** L. Smooth or pubescent: leaves petioled, ovate or lanceolate-oblong, pointed, opposite or in whorls of 3, with short intervening stipules.—Swamps and along streams, throughout Texas.

5. MITCHELLA L. (Partridge-berry.)

A smooth and trailing small evergreen herb, with round-ovate and shining petioled leaves, minute stipules, white fragrant flowers (often tinged with purple) in pairs with their ovaries united, 4-toothed calyx, funnelform 4-lobed corolla (the lobes spreading and densely bearded inside), 4 stamens, 1 style with 4 linear stigmas, and a scarlet berry-like fruit crowned with the calyx-teeth of the two flowers, with 4 small seed-like bony nutlets to each flower.

1. **M. repens** L. Leaves often variegated with whitish lines.—Dry woods, creeping about the foot of trees, throughout the Atlantic States and extending into Texas.

6. RICHARDIA Houst., L.

Hispid or hirsute perennials or annuals, with broadish subsessile leaves, setiferous stipules, leafy-bracted terminal glomerules of whitish 4 to 8-merous flowers, ovate-lanceolate or narrower-calyx-lobes, funnelform corolla, 2 to 4 linear or spatulate stigmas, and the 2 to 4 coriaceous roughish carpels separating from apex to base, closed or nearly so and with no persistent axis.

1. **R. scabra** L. Loosely branching and spreading: leaves ovate to lanceolate-oblong, 2.5 to 5 cm. long, roughish: stipules with rather few setiform appendages: glomerules of flowers and fruit depressed: corolla 4 to 6 mm. long.—Low or sandy ground, extensively naturalized in the low country of all the Gulf States. Often called "Mexican clover," and relished by cattle.

7. **CRUSEA** Cham.

Perennials or annuals with the habit of *Diodia*, 3 to 5-merous flowers, calyx-lobes subulate to triangular-lanceolate (sometimes very unequal), salverform to narrow funnelform corolla, 2 to 4 linear to spatulate-oval stigmas, and a 2 to 4-lobed fruit separating from a persistent axis into obovoid or globular chartaceous carpels, which either open at the commissure or sometimes remain closed.

1. **C. allococca** Gray. Hirsute or hispidulous to almost glabrous, diffusely branched from a perennial root, low and much spreading or depressed, flowering from summit and uppermost axils: leaves from linear to oblong-lanceolate, 12 to 24 mm. long: corolla funnelform, 3 or 4-lobed: calyx-lobes 3 to 5, lanceolate, longer than the ovary and fruit: fruit obovate-globose, more or less hispidulous or glabrous. (*Diodia tricocca* T. & G. *D. tetracocca* Hemsl.)—Prairies of Texas.

8. **SPERMACOCE** Dill. (BUTTON-WEED.)

Small herbs or suffrutescent, with bases of the leaves or petioles connected by a bristle-bearing stipular membrane, small whitish flowers crowded into sessile axillary whorled clusters or heads, short calyx-tube with limb parted into 4 teeth, funnelform or salverform corolla, 4 stamens, 2-cleft style or stigma, and a small dry 2-celled 2-seeded fruit splitting when ripe into 2 carpels.

1. **S. glabra** Michx. Spreading or decumbent, smooth and glabrous: leaves oblong-lanceolate and oblong, 2.5 to 5 cm. long, not prominently veined: corolla more campanulate than funnelform, very villous in the throat, little surpassing the large calyx-teeth: fruit somewhat turbinate, crowned by the 4 conspicuous at length triangular-lanceolate spreading calyx-teeth: but one of the carpels ventrally dehiscent. —River banks and low ground throughout the Atlantic States, and extending into Texas to Brazos Santiago.

2. **S. podocephala** Gray. Suffrutescent tufted perennial, glabrous or sometimes obscurely puberulent: stipular bristles few; leaves numerous, about the length of the internodes and axillary-fascicled, narrowly linear (2.5 cm. or less long), seldom over 2 mm. wide, veinless, not rarely with revolute margins, 2 to 6 uppermost raised on a long peduncle-like internode and involucrating the solitary globose glomerule: corolla short funnelform: fruit obovate and didymous, each carpel surmounted by a subulate or obtuse calyx-tooth (the intermediate teeth rudimentary or wanting), and both ventrally dehiscent. (*Borreria podocephala* DC.)—Southern Texas.

9. **DIODIA** Gronov. (BUTTON-WEED.)

Resembling *Spermacoce*, but flowers 1 to 3 in each axil, calyx-teeth 2 to 5 (often unequal), and fruit 2- (rarely 3-) celled, the crustaceous carpels into which it splits all closed and indehiscent.

1. **D. Virginiana** L. Smooth or hairy perennial: stems spreading, 3 to 6 dm. long: leaves lanceolate or oblong-lanceolate, sessile: corolla white, 12 mm. long, the slender tube abruptly expanded into the large limb: style 2-parted: fruit oblong,

strongly furrowed, crowned mostly with 2 slender calyx-teeth.—Low grounds along streams, South and East Texas.

2. **D. teres** Walt. Hairy or minutely pubescent annual: stem spreading, 7.5 to 22.5 cm. long, nearly terete: leaves linear-lanceolate, closely sessile, rigid: corolla funnelform (4 to 6 mm. long and whitish), with short lobes, not exceeding the long bristles of the stipules: style undivided: fruit obovate-turbinate, not furrowed, crowned with 4 short calyx-teeth.—Sandy soil, low grounds of Texas to the mouth of the Rio Grande.

10. **GALIUM** L. (Bedstraw. Cleavers.)

Slender herbs, with square stems, whorled leaves, small cymose flowers, obsolete calyx-teeth, 4-parted rotate corolla, 4 (rarely 3) short stamens, 2 styles, dry or fleshy globular twin fruit separating when ripe into the 2 seed-like indehiscent 1-seeded carpels.

§1. *Fruit a berry: leaves in whorls of 4.*

1. **G. microphyllum** Gray. Diffusely spreading or ascending, smooth and glabrous: leaves shorter than the internodes, rigid and narrowly linear (or small, broader, and crowded at base of stems), usually mucronate, with a narrow midrib prominent beneath and callous naked margins, mostly 4 to 8 (rarely 10 to 12) mm. long: flowers solitary on a very short or on a longer and peduncle-like axillary branchlet and sessile in its whorl of involucriform leaves, or this proliferous: ovary and young fruit scabro-puberulous.—Rocky ravines, etc., west of the Pecos.

§ 2. *Fruit dry.*

* *Perennials with suffrutescent base: leaves in whorls of 4, their margins, midrib, and angles of stem destitute of any roughness: fruit hirsute with long straight (not at all hooked) bristles.*

2. **G. Wrightii** Gray. Stems numerous in tufts, hirsute-pubescent throughout and diffuse: leaves linear to narrowly oblong, hardly at all rigid, 4 to 8 mm. long, 1-nerved and pointless: flowers paniculate and short-pedicelled: corolla only 2 mm. in diameter, brown-purple: bristles of fruit generally as long as its diameter.—Crevices of rocks in the mountains west of the Pecos.

* * *Wholly herbaceous perennials: bristles of fruit short and hooked or none.*

3. **G. trifidum** L. Weakly erect and branching, 12.5 to 50 cm. high, glabrous except the retrorsely scabrous stem-angles and the usually roughish midrib (beneath) and leaf-margins: leaves in whorls of 4 to 6, linear or oblanceolate, or lanceolate-oblong, obtuse, 8 to 14 mm. long: peduncles slender, scattered, 1 to several-flowered: flowers very small, white, 3 or 4-merous: fruit glabrous.—Wet ground, throughout Texas. Var. LATIFOLIUM Torr. is a larger and broader-leaved form, the leaves being 12 to 14 mm. long and often 4 mm. wide.—Occurs with the type.

4. **G. circæzans** Michx. About 3 dm. high, hirsutulous-pubescent or glabrate: leaves in fours, oval or oblong-ovate, distinctly 3-nerved, obtuse, the largest 3.5 to 4 cm. long: flowers short-pedicelled or subsessile in the fork and along the simple branches of the cyme: corolla greenish, hirsutulous outside: fruit hispid, at length deflexed.—A species of the Atlantic States, extending to central Texas.

5. **G. pilosum** Ait. Commonly hirsutulous-pubescent: stems ascending, 6 dm. long, paniculately branched above: leaves in fours, oval, callous-mucronulate, puncticulate, 1-nerved (with usually an obscure pair of lateral veins at base), the largest hardly 2.5 cm. long: cymules few-flowered, the flowers all short-pedicelled, yellowish-white to brown-purplish: fruit hispid.—Extending from the Atlantic States into Texas Along with the type occurs var. PUNCTICULOSUM T. & G., which is almost glabrous, the leaves varying to elliptical-oblong and hispidulous-ciliate.

* * * *Annuals: fruit more or less hooked hispidulous or hirsute* (naked in one var.): *corolla white or whitish.*

+ *Coarse, reclining: leaves in whorls of 6 to 8.*

6. **G. Aparine** L. (CLEAVERS. GOOSE-GRASS.) Stems 3 to 12 dm. long, retrorsely spiny-hispid on the angles, as also on the margins and midribs of the oblanceolate or almost linear cuspidate-acuminate leaves: peduncles rather long, 1 to 3 in upper axils or terminal, bearing either solitary or 2 or 3 pedicellate flowers: fruit rather large, granulate-tuberculate and the tubercles tipped with bristles.—Shaded ground throughout the United States. A Texan and western form is var. VAILLANTII Koch, which is smaller and more slender, with leaves seldom 2.5 cm. long, usually more numerous flowers, and smaller hirsute or hispidulous fruit.

+ + *Small and low, more erect: leaves mostly in whorls of 4.*

++*Flowers on solitary naked peduncles.*

7. **G. Texense** Gray. Hispidulous-hirsute, or glabrous above, weak and slender, 3 dm. or less high: leaves broadly oval, thin, 1-nerved, only 6 to 8 mm. long, the sides and margins equally beset with straight bristly hairs: peduncles terminal and 1-flowered, the primary ones naked and filiform, 8 to 20 mm. long, single axils proliferous into a similar shoot which bears an unequally 4-leaved small whorl and a short peduncle, bristles of fruit much shorter than carpels, barely hooked.—Throughout central and southern Texas.

++++ *Flowers and fruit solitary and sessile between a pair of bracteal leaves, which resemble the cauline ones: stem and leaves hispidulous, or sometimes nearly glabrous.*

8. **G. virgatum** Nutt. Simple or with simple and strict branches from the base: leaves oblong-linear or oblong, thickish, 4 to 6 mm. long, most of the axils floriferous: peduncles exceedingly short, reflexed in fruit, not proliferous: carpels copiously hooked-hispid, shorter than the erect bracteal leaves, which often appear as if belonging to the whorl itself.—Prairies of eastern and central Texas to Brazos Santiago. With the ordinary form occurs var. LEIOCARPUM T. & G., which has smooth and glabrous fruit, and herbage usually almost so.

9. **G. proliferum** Gray. More branching, less hispidulous or glabrate, weaker: leaves thinner, oval or oblong, alternate ones rather smaller: flowers solitary terminating a pedunculiform axillary branch of twice or thrice the length of the whorled leaves, and the fruit barely surpassed by its pair of bracts, or one or even two more by prolification from the bracts: fruit as in the preceding.—Stony hills, along the Upper Rio Grande.

VALERIANEÆ. (VALERIAN FAMILY.)

Herbs, with opposite leaves and no stipules, flowers in panicled or clustered cymes, coherent calyx-tube, tubular or funnelform often irregular mostly 5-lobed corolla, 1 to 3 distinct stamens inserted on its throat, slender style, 1 to 3 stigmas, ovary with one fertile 1-ovuled cell and 2 abortive or empty ones, and an indehiscent 1 or 3-celled fruit.

1. VALERIANELLA Tourn. (CORN SALAD. LAMB LETTUCE.)

Annuals and biennials, usually smooth, with forking stems, tender and rather succulent leaves (from obovate to oblong and spatulate, entire or cut-lobed towards the base), white or whitish cymose-clustered and bracted small flowers, obsolete calyx-limb (in ours), funnelform rather equally 5-lobed corolla, 3 (rarely 2) stamens, and 3-celled fruit (2 of the cells empty and sometimes confluent into one, the other 1-seeded).—The

species are so much alike in aspect, flowers, leaves, etc., that safe characters are only to be obtained from the fruit.

**Fertile cell broader than empty ones: cross-section of fruit triangular.*

1. **V. amarella** Krok. Amply corymbose-branched above, bearing numerous and rather open cymes: bracts lanceolate-linear, small: fruit very small (about 1 mm. long), densely white-hirsute. (*Fedia amarella* Lindh.)—Low grounds, in eastern and southern Texas.

** * Fertile cell as broad as the empty ones, beaked: cross-section quadrate.*

2. **V. radiata** Dufr. Fruit ovate-tetragonal, downy-pubescent (sometimes glabrous); empty cells as thick as the oblong-ovate fertile one or thicker, a broad shallow groove between them. (*Fedia radiata* Mx.)—An Atlantic species extending into Texas.

3. **V. stenocarpa** Krok. Fruit oblong-tetragonal, commonly glabrous; oblong fertile cell thicker than the linear-oblong approximate empty ones. (*Fedia stenocarpa* Engelm.)—Eastern and southern Texas.

** * * Fertile cell much the narrowest, dorsally 1-nerved: cross-section roundish.*

4. **V. Woodsiana** Walp. Fruit 2 mm. long or more: fertile cell ovate, tipped with a tooth; empty ones inflated, with oblong depression (sometimes an open cavity in the middle). (*Fedia Woodsiana* T. & G.)—An Atlantic species extending into Texas.

COMPOSITÆ. (Composite Family.)

Flowers in a close head on a common receptacle, surrounded by an involucre, with 5 (rarely 4) stamens inserted on the corolla with their anthers united into a tube, calyx-tube united with the 1-celled ovary (the limb, called a *pappus*, crowning its summit in the form of bristles, awns, scales, teeth, etc., or cup-shaped, or even entirely absent), corolla either strap-shaped or tubular (in the latter chiefly 5-lobed), style mostly 2-cleft at apex, and fruit dry and seed-like (an *achene*) containing a single erect seed.—The largest order of Phanerogams, with the following special terms: *ligule*, the strap-shaped limb of certain corollas, the flowers being then called *ligulate* flowers; *rays* or *ray-flowers* are marginal ones that are ligulate, and such a head is said to be *radiate;* the *disk* is composed of the tubular flowers, and a head with only tubular flowers (there being no ray-flowers) is said to be *discoid;* a head is *homogamous* when the flowers are all alike in sex, *heterogamous* when they are unlike; the *scales* are the leaves of the involucre; *chaff* is a name applied to the bracts which often grow on the receptacle among the flowers, and when these are wanting the receptacle is said to be *naked.*—A very large and difficult family, the study of which requires ripe fruiting specimens.

Series I. Tubulifloræ. Corolla tubular in all the perfect flowers, ligulate only in the marginal or ray flowers, which when present are either pistillate only or neutral.

Tribe I. Vernoniaceæ. Heads discoid; the flowers all alike, perfect and tubular, never yellow: style-branches elongated filiform-subulate, hispidulous throughout: leaves alternate or scattered.

1. **Elephantopus.** Heads 3 to 5-flowered, several crowded together into a compound head: involucre of 8 scales: pappus of several chaffy bristles.

2. **Vernonia.** Heads several to many-flowered, separate: involucre of many scales: pappus double, the inner capillary, the outer of minute chaffy scales.

Tribe II. EUPATORIACEAE. Heads discoid; the flowers all alike, perfect and tubular, never yellow: style-branches elongated, more or less thickened upward and obtuse, minutely papillose, or puberulent, or glabrous: leaves either opposite or alternate.

* Achenes 5-angled, destitute of intervening ribs.

\+ Pappus never wholly capillary.

3. **Stevia.** Heads 3 to 5-flowered, cylindrical, with 5 or 6 mostly equal rather rigid involucral bracts: corolla narrow: pappus a crown of scales or awns, or composed of both.

4. **Trichocoronis.** Heads many-flowered, with 12 to 18 lax herbaceous or submembranaceous equal and nerveless involucral bracts: corolla abruptly much dilated above the narrow tube: pappus minute or small, a crown of numerous bristles.

\+ \+ Pappus wholly of capillary and mostly uniserial bristles.

++ Bristles of pappus merely scabrous, indefinitely numerous.

5. **Mikania.** Flowers and involucral bracts only 4: stems twining.

6. **Eupatorium.** Involucral bracts more than 4, and flowers few or many: stems not twining.

++ ++ Bristles of pappus long-plumose, rather few.

7. **Carminatia.** Involucre several-flowered, cylindraceous, of several lanceolate-linear 3 to 5-striate thin imbricated bracts, the outer shorter: achenes slender, narrowish at apex: pappus-bristles 10 to 18, plumose with long arachnoid hairs.

* * Achenes 10-ribbed or striate: involucral bracts regularly imbricated, the outer successively shorter.

\+ Involucral bracts not herbaceous, striate-nerved (conspicuously so when dry): pappus a single series of capillary bristles.

8. **Kuhnia.** Pappus conspicuously plumose. involucral bracts few.

9. **Brickellia.** Pappus from barbellate to merely scabrous: involucral bracts in several series.

\+ \+ Involucral bracts somewhat herbaceous or partly colored, inconspicuously when at all striate (even when dry): leaves punctate and entire.

10. **Carpochæte.** Heads 4 to 6-flowered, cylindrical, with acuminate rather few involucral bracts: achenes barely puberulent: pappus of long slender erose-denticulate scarious scales continued into a scabrous awn and with 1 to 5 small pointless scales: leaves opposite.

11. **Liatris.** Heads 4 to many-flowered, with a spirally imbricate involucre: achenes pubescent: pappus about a single series of firm and mostly equal bristles, from plumose to barbellate: leaves alternate.

Tribe III. ASTEROIDEÆ. Heads either discoid or radiate (the ray pistillate): anthers not cordate at base: style-branches of fertile flowers flattened and with a distinct hispid or papillose appendage: leaves mostly alternate, and receptacle mostly naked.

* Ray flowers yellow, or sometimes none at all.

\+ Pappus of not numerous slender bristles, or wanting: heads radiate: involucre of firm bracts with greenish tips.

12. **Gymnosperma.** Heads several-flowered, very small and numerous: ligules very small, not surpassing the disk-corollas: flowers all fertile: pappus wanting: heads in glomerate terminal cymes.

13. **Gutierrezia.** Heads small and numerous: ray and disk flowers 3 or 4 each, all fertile: pappus of several short chaffy scales: suffrutescent, with very narrow leaves.

14. **Amphiachyris.** Heads small: ray-flowers 5 to 10, with coroniform pappus: disk-flowers infertile, with pappus of several bristle-like scales: annuals with very narrow leaves.

15. **Grindelia.** Heads large, many-flowered: flowers all fertile; pappus of 2 to 8 rigid caducous awns: coarse herbs with toothed leaves.

+ + Pappus of numerous slender or capillary bristles.

++ Pappus double.

16. **Heterotheca.** Resembling Chrysopsis, but achenes of the ray thicker than those of the disk and without pappus or nearly so.

17. **Chrysopsis.** Heads many-flowered, with numerous rays: outer pappus of very small chaffy bristles, much shorter than the inner of copious capillary bristles.

18. **Xanthisma.** Heads many-flowered, radiate: receptacle alveolate-fimbrillate: pappus of 10 to 12 rigid bristles becoming chaffy below and longer than the disk-corolla, as many more one-half shorter, and usually 5 still smaller and shorter external ones.

++ ++ Pappus simple.

19. **Bradburia.** Heads with about 12 fertile ray-flowers and about as many infertile disk-flowers: involucre campanulate: pappus of the ray of numerous unequal rigid capillary bristles little longer than the 3-angled achene: of the abortive disk-achenes of very few (usually 2) bristles, which are somewhat chaffy at base.

20. **Aplopappus.** Heads many-flowered, many-radiate: involucre hemispherical: pappus of many unequal bristles.

21. **Bigelovia.** Heads 3 or 4-flowered; rays none: receptacle awl-shaped: pappus a single row of capillary bristles.

22. **Solidago.** Heads few to many-flowered; rays 1 to 6: pappus of numerous slender and equal capillary bristles.

* * Ray flowers white, blue, or purple, never yellow.

+ Pappus of both disk and ray none or coroniform.

++ Involucre broad, many-flowered: rays numerous, fertile, conspicuous.

23. **Bellis.** Involucral bracts equal: achenes marginless, flattened: pappus none.

24. **Aphanostephus.** Outer involucral bracts shorter: achenes prismatic: pappus coroniform.

+++ Involucre narrower and flowers less numerous.

25. **Keerlia.** Involucral bracts oblong, imbricated in few series of unequal length: rays 5 to 15: pappus minute and coroniform or evanescent from the mature achenes.

+ + Pappus usually with awns.

26. **Chætopappa.** Achenes fusiform, without wings or callous margins: pappus of 5 or fewer thin scales and alternating awns: receptacle flat or nearly so.

27. **Dichætophora.** Involucral bracts somewhat uniserial and equal: achenes surrounded by an almost orbicular firm wing, its edge and the body of the achene glochidiate-hispid: pappus of 2 divergent awns and several minute scales: receptacle strongly convex: low annual.

28. **Boltonia.** Involucre imbricated and appressed: achenes obovate, very flat, with callous or winged margin, glabrous or minutely hispidulous: pappus of several short chaffy bristles and usually 2 (rarely 3 or 4) elongated rigid awns: receptacle strongly convex: leafy-stemmed perennials.

+ + + Pappus of numerous long and capillary bristles: receptacle flat.

++ Pappus of the ray-flowers none or a mere vestige.

29. **Psilactis.** Involucre hemispherical; its bracts imbricated in 2 or 3 series (with herbaceous tips): ray-flowers often sterile but style-bearing: achenes pubescent and narrow; those of the ray sometimes with an obscure ring in place of pappus; those of the disk with a single series of soft capillary bristles.

++++ Pappus present and mostly similar in ray and disk.

30. **Aster.** Heads many-flowered, on leafy peduncles: involucral bracts unequal, loosely or closely imbricated: achenes flattish: pappus simple (rarely double), copious.

31. **Erigeron.** Heads many-flowered, on naked peduncles: involucre of narrow equal bracts, little imbricated: achenes flattened: pappus simple and rather scanty, or with some outer minute scales.

* * * Corolla of the numerous female flowers reduced to a filiform or short and narrow tube, wholly destitute of ligule.

32. **Conyza.** Heads small and many-flowered, with narrow involucral bracts in 1 to 3 series: achenes small and compressed: pappus a single series of soft capillary bristles, sometimes an added outer series.

* * * * Rays none: heads diœcious (all pistillate or all staminate).

33. **Baccharis.** Heads many-flowered: pappus capillary: smooth glutinous shrubs.

Tribe IV. INULOIDEÆ. Heads discoid, the pistillate flowers mostly filiform and truncate: anthers sagittate, the basal lobes attenuate into tails: style-branches with unappendaged obtuse or truncate naked tips: pappus capillary or none.

* Receptacle naked: involucre not scarious, imbricated: not woolly.

34. **Pluchea.** Heads containing a few perfect but sterile flowers in the center, and many pistillate fertile ones around them: involucre imbricated, the outer bracts broad, all but the innermost persistent: pappus capillary: heads cymosely clustered or scattered.

35. **Pterocaulon.** Heads and flowers as in Pluchea, but involucre of fewer and linear or subulate bracts, which are deciduous with the matured flowers: heads glomerate and the glomerules spicate.

* * Receptacle chaffy: involucral bracts few, mostly scarious: low floccose-woolly annuals.

36. **Evax.** Flowers as in Pluchea: achenes obcompressed: pappus none.

* * * Receptacle naked: involucral bracts many and scarious: floccose-woolly herbs.

37. **Antennaria.** Heads diœcious: pappus of sterile flowers club-shaped, of the fertile united at base and deciduous together.

38. **Gnaphalium.** Heads all fertile throughout: pappus all capillary.

Tribe V. HELIANTHOIDEÆ. Heads radiate or discoid: involucre not scarious: receptacle chaffy: pappus never capillary, sometimes none: anthers not caudate: style-branches truncate or hairy-appendaged.

* Heads radiate, the ray pistillate and fertile, the disk perfect but sterile.

+ Involucral bracts in 2 rows, the inner embracing or inclosing the turgid or but little compressed achenes: pappus none.

39. **Polymnia.** Involucre of about 5 outer loose leaf-like bracts, and as many or more numerous smaller and thinner inner ones embracing and half inclosing the thick and turgid obovoid achenes.

40. **Melampodium.** Involucre strongly dimorphous, the outer of 4 or 5 leaf-like plane bracts, the inner of a single series of small bracts which completely and permanently inclose the obovate or oblong more or less compressed achenes with a pericarp-like accessory covering.

+ + Involucral bracts not inclosing or embracing the achenes.

++ Involucre of 3 or 4 narrow bracts: achenes dimorphous, little if at all compressed.

41. **Dicranocarpus.** Ray-flowers 3 or 4, with very small ligules: 1 or 2 achenes elongated to twice or thrice the length of the involucre, from subulate to oblong-linear, tipped with 2 diverging stout naked awns or horns; the others shorter, the truncate apex bearing a pair of very short divaricate horns or hardly any.

++ ++ Involucre broad: achenes mostly much flattened.

42. **Silphium.** Achenes wing-margined, in several rows: pappus none or 2 teeth: involucral scales thick, in several rows.

43. **Berlandiera.** Achenes wingless, 5 to 12 in one row, without pappus: inner involucral scales obovate, outer smaller and more leaf-like.

44. **Lindheimera.** Achenes wing-margined, 4 or 5 in one row, the wings confluent at apex with 2 triangular teeth, and a smaller tooth projecting from the prominent rib: outer involucral bracts (4 or 5) leaf-like, inner larger and herbaceous becoming chartaceous: upper leaves opposite.

45. **Engelmannia.** Achenes wingless, 8 to 10 in one row: pappus a scarious hispid crown: outer involucral bracts (about 10) leaf-like, inner coriaceous with green tips: leaves alternate.

46. **Parthenium.** Rays 5, very short, persistent: pappus of 2 small scales: involucral bracts short, roundish, in 2 rows.

* * Fertile flowers 1 to 5, the corolla none or reduced to a tube: staminate corolla funnelform: pappus none.

\+ Heads with 1 to 5 pistillate flowers: receptacle chaffy.

47. **Iva.** Achenes short and thick: involucre of few roundish bracts.

\+ \+ Heads of two sorts on the same plant, the staminate with an open cup-shaped involucre, the pistillate of 1 to 4 flowers in a closed bur-like involucre.

++ Bracts of staminate involucre united: receptacle low.

48. **Hymenoclea.** Anther-tips blunt: involucre of the solitary fertile flower beaked at apex, the lower part with 9 to 12 dilated and silvery-scarious persistent transverse wings.

49. **Ambrosia.** Anther-tips setiferous-acuminate: involucre of the solitary fertile flower nut-like, beaked at apex, usually armed with 4 to 8 tubercles or short spines in a single series below the beak.

50. **Franseria.** Anther-tips setiferous-acuminate: fertile involucre 1 to 4-flowered, 1 to 4-beaked, more or less bur-like, being armed over the surface with several or numerous prickles or spines in more than one series.

++ ++ Bracts of staminate involucre distinct: receptacle cylindraceous.

51. **Xanthium.** Fertile heads a closed bur-like 2-flowered involucre 1 or 2-beaked at apex, the surface clothed with hooked prickles, the 2 thick ovoid achenes permanently inclosed in the indurated prickly involucre.

* * * Ray-flowers ligulate and fertile; the ligule persistent on the achene and becoming papery: the numerous disk-flowers perfect and fertile, subtended or embraced by chaffy bracts: corolla cylindraceous: leaves opposite, and heads singly terminating stems or branches.

52. **Zinnia.** Involucre campanulate or cylindraceous: rays showy: lobes of disk-corolla mostly velvety-villous: achenes wingless or nearly so; of the ray 3-sided, of the disk much compressed: pappus (when present) of erect awns or chaffy teeth: leaves mostly sessile.

53. **Sanvitalia.** Involucre short and broad: ligules often short and small: disk-corollas with glabrous lobes: achenes of ray commonly 3-sided, the angles produced into as many rigid divergent awns; of the disk often heterogeneous, from compressed-quadrangular to flat, some usually wing-margined, the pappus of 1 or 2 slender awns or teeth or none: leaves commonly petioled.

**** Heads radiate or rarely discoid, the disk-flowers all perfect and fertile: anthers blackish: pappus none, or a crown or cup, or of 1 or 2 chaffy awns, never capillary nor of several uniform chaffy scales.

\+ Involucre double, the outer forming a cup.

54. **Tetragonotheca.** Outer involucre 4-leaved: achenes obovoid: pappus none.

+ + Involucre of one or more rows of separate bracts.

++Chaff of the convex or conical receptacle permanently investing the achenes as an indurated accessory covering.

55. **Sclerocarpus.** Ray-flowers several and neutral: involucral bracts more or less herbaceous, the outer loose and spreading: pappus a short crown or ring, or none: branching herbs.

++++ Chaff of the flat receptacle bristle-shaped.

56. **Eclipta.** Ray short: involucral bracts 10 to 12 in 2 rows, herbaceous: pappus none, or sometimes 2 to 4 teeth or short awns.

++++++ Chaff scale-like, embracing or subtending the achenes.

=Rays none, the flowers all perfect and fertile: involucre dry or partly so: achenes not flat or margined: pappus of slender awns or none.

57. **Varilla.** Achenes linear-oblong, terete, 8 to 15-nerved, with setulose pappus or none: shrubby or suffruticose.

58. **Isocarpha.** Achenes 4 or 5-angled, small, destitute of pappus: herbaceous.

==Rays present (occasionally wanting in some genera): involucre commonly herbaceous, or partly so.

a. Receptacle from conical to columnar or subulate (at least in fruit).--A species of Gymnolomia may be sought here.

(1) Rays fertile (not rarely wanting): leaves opposite.

59. **Spilanthes.** Involucre of few somewhat herbaceous loosely appressed bracts: achenes of ray 3-sided or compressed; of disk more or less compressed with acute or nerve-like margins: pappus a slender awn from one or more of the angles, or none.

(2) Rays sterile: leaves mostly alternate.

60. **Echinacea.** Rays rose-colored, pistillate, sterile: achenes short, 4-sided: chaff spinescent.

61. **Rudbeckia.** Rays neutral: achenes 4-sided, flat at top, marginless.

62. **Lepachys.** Rays few, neutral: achenes flattened laterally and margined.

b. Receptacle from flat to convex (in some species conical): achenes not winged or very flat, when flattened not margined or sharp-edged.

(1) Rays fertile: pappus a toothed cup or crown.

63. **Borrichia.** Achenes acutely 3 or 4-angled: chaff concave and rigid: shrubby.

(2) Rays sterile (rarely wanting): chaff strongly concave or conduplicate and embracing the achenes.

64. **Gymnolomia.** Pappus none or a minute denticulate ring.

65. **Viguiera.** Pappus of two chaffy awns or scales (occasionally 1 or 2 more), and 2 or more intermediate truncate scales, either persistent or deciduous; achenes commonly pubescent.

66. **Helianthus.** Pappus promptly deciduous, of two scarious and pointed scales, mostly no intermediate scales: achenes usually glabrous or glabrate.

(*c*) Receptacle flat or convex (sometimes becoming conical): achenes of disk either flat and margined or thin-edged, or if turgid some of them winged: pappus not caducous.

(1) Shrubby, rayless, alternate-leaved; achenes wingless.

67. **Flourensia.** Involucre of 2 or 3 series of oblong or lanceolate bracts: receptacle flat: its chaff conduplicate around the achenes, which are compressed, callous-margined, very villous: pappus a slender somewhat chaffy awn from each angle of the truncate summit; and commonly some intermediate smaller ones.

(2) Herbaceous (sometimes shrubby): rays neutral, rarely wanting: mature achenes wingless, the margins either villous-ciliate or naked.

68. **Encelia.** Pappus none, or an awn or its rudiment, with no intermediate scales.

(3) Herbaceous (rarely suffruticose): rays fertile (sometimes neutral in Verbesina) or occasionally wanting: achenes (or some of them) with winged margins, none villous ciliate.

69. **Zexmenia.** Receptacle flat or convex: achenes 3-sided or flat, 1 to 3-awned, the awns connected by dilated bases or with intermediate and separate or confluent persistent scales.

70. **Verbesina.** Receptacle from convex to conical: achenes 3-sided or flat, 1 to 3-awned, with no intermediate scales, and even the awns sometimes obsolete; leaves apt to be decurrent.

* * * * * Rays few, neutral or wanting: achenes obcompressed (flattened parallel with the bracts of the involucre): chaff flat or hardly concave: receptacle flat: leaves mostly opposite.

\+ Involucre single.

71. **Synedrella.** Chaff scarious: achenes (or some of them) wing-margined, the wings commonly lacerate or undulate, in the ray often 3-sided, the angles or wings surmounted each by a rigid naked awn.

\+ \+ Involucre double.

= Rays always neutral (rarely wanting): achenes never beaked nor with retrorsely barbed awns.

72. **Coreopsis.** Pappus of 2 (rarely more) scales, teeth, or awns, which are naked or barbed upward, sometimes obsolete or a mere crown.

= = Rays fertile or neutral, or wanting: awns of pappus when present retrorsely barbed or hispid.

a. Involucral bracts distinct, or united only at base.

73. **Bidens.** Achenes neither winged nor beaked, 2 to 5-awned: awns mostly persistent: rays neutral, yellow or white, sometimes wanting.

74. **Cosmos.** Achenes slender and beaked; rays white or rose-color: awns apt to be deciduous.

75. **Heterospermum.** Achenes dimorphous; the outer with winged or callous margin: the inner narrower, attenuate upward and marginless, these and sometimes the outer with two awns: rays fertile.

b. Inner involucral bracts united into a cup.

76. **Thelesperma.** Chaff white-scarious: rays neutral or wanting: achenes terete, marginless and beakless, the abrupt summit crowned with a pair of persistent stout awns or scales, or sometimes pappus obsolete.

* * * * * * Heads radiate or discoid: disk-flowers all perfect and fertile: achenes turbinate, 5-angled: pappus of several chaffy scales.

77. **Marshallia.** Rays none: involucre of narrow equal leafy bracts: disk-flowers purplish: leaves alternate, entire.

Tribe VI. HELENIOIDEÆ. Nearly as in tribe V, but receptacle not chaffy, and herbage often punctate.

*Involucre of broad bracts imbricated in two or more series: ligules not persistent: achenes terete and several-nerved: heads many-flowered and radiate, the ray-flowers fertile: no oil-glands.

78. **Clappia.** Involucre hemispherical: rays 12 to 15, linear: achenes equaled by the very slender fimbrillæ of the receptacle: pappus of numerous rigid hispidulous bristles: fruticulose, with alternate fleshy leaves.

* * Involucre of narrow equal erect bracts: ligules persistent and becoming papery on the usually striate-nerved achenes: herbage more or less white-woolly: no glands.

79. **Riddellia.** Involucre cylindraceous-campanulate, of 4 to 10 coriaceous woolly bracts: ligules as broad as long, abruptly contracted at base into a short tube: pappus of 4 to 6 hyaline pointless scales.

80. **Baileya.** Involucre hemispherical, of numerous thin-herbaceous bracts very woolly on the back: ligules narrower, tapering into a narrow but not tubular base: pappus none.

* * * Involucre of equal and narrow erect bracts, in 1 or 2 series: ray-flowers female or none, the ligule deciduous: disk-corollas 4-toothed: achenes flat, with only marginal callous nerves, usually much ciliate: plants not floccose-tomentose, and with no oil-glands.

81. **Laphamia.** Margin of achenes naked or not much ciliate: pappus none, or of 1 or 2, or sometimes about 20 bristles: suffruticose perennials.

82. **Perityle.** Achenes at maturity with or without cartilaginous-margin, usually strongly ciliate: pappus a scaly or cupulate crown, and commonly a slender awn from one or both angles: mostly annuals.

* * * * Involucre hardly at all imbricated, its bracts when broad nearly equal or in a single series: ligules not persistent: disk-flowers numerous, 5- (rarely 4-) lobed: achenes few-nerved or angled, or more numerously striate-angled only when turbinate or pyriform: no oil-glands.

+ Receptacle flat or convex: achenes from linear to obpyramidal, rarely 5-angled, occasionally with intermediate nerves: flowers all fertile.

++ Involucre many-flowered; its bracts wholly herbaceous and plane: corolla-lobes or teeth short.

83. **Bahia.** Involucre lax or open in fruit: achenes narrow, quadrangular: pappus (rarely wanting) of several scarious scales.

++ ++ Involucre 3 to 9-flowered; its bracts broad and with roundish more or less scarious-petaloid summit, carinate-concave: corollas 5-toothed: herbage minutely punctate.

84. **Schkuhria.** Heads effusely paniculate: involucre of 4 or 5 erect bracts: female flowers only 1 or 2, with a short or obsolete ligule: achenes obpyramidal-tetragonal: pappus of 8 scarious paleæ: leaves or their divisions filiform.

++++ ++ Involucre many-flowered; its bracts mostly appressed, with scarious-membranaceous and usually colored tips and sometimes margins: ray-flowers none (except in no. 87): disk-corollas deeply 5-cleft: leaves alternate.

85. **Hymenothrix.** Pappus about the length of the achene, of 12 to 20 narrow lanceolate hyaline scales traversed by a strong rib which is excurrent into a scabrous awn: disk-corollas with narrow tube and lobes.

86. **Hymenopappus.** Pappus of 10 to 20 thin-scarious and mostly hyaline obtuse scales, sometimes very short and small or obsolete: disk-corollas with narrow tubes, dilated throat, and ovate reflexed or spreading lobes.

87. **Florestina.** Pappus of 6 to 8 obovate pointless scales, hyaline-scarious from a callous-thickened base or axis: disk-corollas widely dilated above the short narrow tube, deeply 5-cleft into oblong spreading lobes.

84. **Polypteris.** Pappus of 6 to 12 equal scales, with a strong percurrent costa, otherwise hyaline-scarious, rarely wanting: disk-corollas with filiform tube abruptly dilated into a 5-parted limb with long linear lobes.

+ + Receptacle convex to oblong: achenes short, obpyramidal or turbinate, 5 to 10-ribbed or angled, mostly silky-villous or hirsute: disk-flowers all fertile, the corolla 4 or 5-toothed: leaves alternate, in many minutely impressed-punctate.

++ Receptacle destitute of awn-like fimbrillæ.

= Involucre not spreading or reflexed.

89. **Actinella.** Heads radiate: receptacle from conical to convex: rays fertile: pappus of 5 to 12 thin and mostly hyaline scales, with more or less manifest costa or

none, sometimes truncate, more commonly acuminate or aristate at tip: mostly low herbs.

= = Involucre spreading or soon reflexed.

90. **Helenium.** Involucral bracts subulate or linear: rays fertile or sterile, rarely none: disk-corollas with short or almost obsolete tube, the teeth of the limb obtuse and glandular-pubescent: pappus of 5 or 6 thin scarious scales: leaves commonly impressed-punctate, mostly decurrent.

91. **Amblyolepis.** Principal involucral bracts foliaceous and lanceolate; an inner hyaline series resembling the conspicuous blunt nerveless scales of the pappus: rays fertile, ample: disk-corollas glabrous throughout, with a distinct tube as long as the ampliate throat, the lobes attenuate-acute: leaves neither punctate nor decurrent.

++ ++ Receptacle beset with setiform or subulate fimbrillæ among the flowers.

92. **Gaillardia.** Involucre broad, largely foliaceous and lax: ray-flowers neutral, sometimes none: lobes of disk-corollas beset with jointed hairs: pappus conspicuous, longer than the achene, of 5 to 10 hyaline scarious awned scales.

* * * * * Involucre of the small heads composed of a few equal connivent bracts in a single series: ligules small: achenes terete, oblong or linear, 8 to 10 striate-costate: leaves opposite: no oil-glands.

93. **Sartwellia.** Heads with about 5 ligulate female and rather numerous perfect tubular flowers: disk-corollas 4 or 5-toothed: involucral bracts 5: pappus a deep cupule with fimbriolate edge, or of 4 or 5 narrowly oblong fimbriolate-truncate scales alternating with as many awns.

94. **Flaveria.** Heads 1 to several-flowered, the flowers all fertile and tubular, or one female and short-ligulate: disk-corollas 5-toothed: involucral bracts 2 to 5: pappus none, or rarely of 2 to 4 thin scales.

* * * * * * Involucre a series of equal bracts, either distinct or united into a cup or tube, dotted or striped with oil-glands: rays when present fertile: achenes mostly narrow and striate: herbage like the involucre commonly dotted with some oil-glands.

+ Style-branches of perfect flowers more or less elongated, appendiculate or truncate.

= Pappus simple, of copious capillary scabrous bristles: receptacle naked and smooth: involucral bracts distinct.

95. **Porophyllum.** Ray-flowers none; involucral bracts 5 to 10: achenes slender.

96. **Chrysactinia.** Ray-flowers conspicuous: involucral bracts 10 or more: achenes short-linear, not attenuate upward: flowers all yellow.

= = Pappus double, of distinct bristles and scales: receptacle naked: involucral bracts distinct.

97. **Nicolletia.** Involucre oblong or cylindraceous: achenes filiform-linear, with tapering base: pappus double, outer of numerous capillary bristles, inner of 5 lanceolate long hyaline awned scales.

= = = Pappus either wholly of scales, or some or all of the scales bearing or largely resolved into awns or capillary bristles: receptacle variously fimbrillate, dentate, or naked: involucral bracts united or sometimes distinct.

98. **Dysodia.** Proper bracts of the involucre generally united at base, rarely quite separate, rarely united to near the summit: pappus a row of chaffy scales dissected into as many bristles.

99. **Hymenatherum.** Involucre cupulately gamophyllous high up: pappus of chaffy scales, either awned or pointed, or partly resolved into bristles, or some or all of them entire and even truncate.

+ + Style-branches of perfect flowers very short, obtuse and inappendiculate.

100. **Pectis.** Heads radiate: involucre of few or several equal keeled bracts in a

single series: pappus of few or numerous bristles or awns, sometimes chaffy at base: or of scales, or reduced to a chaffy crown, rarely obsolete: opposite-leaved herbs.

Tribe VII. ANTHEMIDEÆ. Distinguished from Tribes V and VI by the more or less dry and scarious imbricated involucral bracts: heads radiate or discoid, the perfect flowers sometimes sterile and the pistillate rarely tubular: achenes small: pappus a short crown or none: leaves alternate.

* Receptacle chaffy, at least in part: heads radiate (rarely discoid).

+ Involucre of comparatively few broad thin bracts.

101. **Leucampyx.** Involucral bracts with white-scarious margins: ray-flowers 8 to 10, fertile, the ligule ample: achenes obovate, 3-angled: pappus an obscure chaffy crown, soon obsolete.

+ + Involucre of comparatively small imbricated bracts, the outer successively shorter.

102. **Anthemis.** Achenes terete, angled or ribbed: heads hemispherical, rather large.

103. **Achillea.** Achenes obcompressed: head small, campanulate or obovate.

* * Receptacle naked.

104. **Matricaria.** Heads rather large, pedunculate: rays pistillate or none: pappus crown-like or none.

105. **Artemisia.** Heads mostly small, discoid, in panicled spikes or racemes: pappus none.

Tribe VIII. SENECIONIDEÆ. Heads radiate or discoid, the involucre little or not at all imbricated, not scarious: receptacle naked: anthers tailless: pappus capillary: in ours the style-branches are truncate or capitellate at tip.

* Involucre lax, commonly of much overlapping or unequal bracts: pappus of rather rigid bristles.

+ Leaves alternate.

106. **Psathyrotes.** Flowers all perfect and fertile: corollas with extremely short proper tube: achenes terete, obscurely striate, villous or hirsute: pappus shorter than corolla, of very unequal bristles.

107. **Bartlettia.** Flowers all fertile but not all perfect: corollas with long and slender pubescent tube: achenes compressed (at maturity), with a salient nerve to each margin and usually on the middle of one face, these densely long-hirsute, the faces glabrate: pappus equalling the disk-corollas, of somewhat unequal bristles.

+ + Leaves opposite.

108. **Haploesthes.** Heads radiate and the flowers all fertile: involucre of 4 or 5 nearly equal rather fleshy roundish bracts: achenes terete, striate-costate, glabrous.

* * Involucre of connivent-erect herbaceous equal bracts: pappus of copious soft-capillary bristles: leaves alternate.

109. **Senecio.** Heads usually radiate: corollas yellow, 5-toothed.

110. **Cacalia.** Heads discoid: corollas white or cream-colored, 5-cleft.

Tribe IX. CYNAROIDEÆ. Flowers all tubular and perfect (the outer ray-like and neutral in no. 113): involucre much imbricated: anthers caudate, long-appendaged at tip: style-branches short or united, obtuse, smooth, with often a pubescent ring below: pappus mostly bristly: leaves alternate.

* Achenes attached by the base: flowers all alike.

111. **Arctium.** Leaves not prickly: pappus of short rough bristles: involucral bracts hooked at tip.

112. **Cnicus.** Leaves prickly: pappus-bristles plumose: receptacle densely bristly.

* * Achenes attached obliquely: marginal flowers often enlarged and ray-like.

113. **Centaurea.** Involucral bracts appendaged: pappus double and bristly, or very short or none.

Series II. LABIATIFLORÆ. Corollas of all or only of the perfect flowers bilabiate (except in no. 114).

Tribe X. MUTISIACEÆ. Receptacle naked: anthers conspicuously tailed at base: style-branches short, smooth, not appendaged: leaves alternate.

* Corollas almost or quite regularly and deeply 5-cleft into linear lobes: shrubs.

114. **Gochnatia.** Heads fasciculately-paniculate or cymose: involucre of dry or coriaceous imbricated bracts: achenes oblong, silky-villous: pappus of copious rigid capillary bristles.

* * Corollas either all bilabiate, or marginal ones simply ligulate.

+ Heads radiate, the ray-flowers female and simply ligulate.

115. **Chaptalia.** Involucre of narrow appressed-imbricated bracts: achenes oblong or fusiform, 5-nerved, attenuate or beaked at apex, bearing a copious pappus of very soft and fine capillary bristles: scapigerous and monocephalous herbs.

+ + All the corollas bilabiate.

116. **Perezia.** Involucral bracts imbricated in few to several series: achenes elongated-oblong, sometimes narrowed at apex, but not beaked: pappus of copious capillary scabrous bristles, rather rigid or soft: flowers never yellow.

117. **Trixis.** Proper involucral bracts 8 to 12, equal in a single series, or in two unequal series, little if at all imbricated: achenes more slender, with a tapering or beaked summit: pappus soft: flowers yellow.

Series III. LIGULIFLORÆ. Corollas all ligulate and the flowers hermaphrodite.

Tribe XI. CICHORIACEÆ. Receptacle naked or chaffy: anthers not caudate: style-branches filiform, naked: herbs with milky juice and alternate leaves.

* Pappus none: receptacle naked.

118. **Apogon.** Achenes terete, obovoid, rounded at summit, 10-ribbed, rarely an obsolete vestige of pappus: low annuals.

* * Pappus of scales and bristles or plumose: receptacle naked.

119. **Krigia.** Involucre simple, not calyculate: pappus of both scales and bristles, flowers yellow.

120. **Stephanomeria.** Involucre double, calyculate: pappus plumose: flowers pink or rose-color.

* * * Pappus composed entirely of capillary bristles, not plumose.

+ Receptacle chaffy: corollas rose-color.

121. **Pinaropappus.** Involucral bracts imbricated, the outer successively shorter: chaff attenuate-linear: achenes slender, terete, 10 to 15-ribbed, tapering from base into a short slender beak.

+ + Receptacle naked.

++ Achenes not flattened, columnar or terete.

= Achenes not beaked.

122. **Hieracium.** Flowers yellow or orange: achenes short, oblong, or columnar: involucre imbricated: pappus tawny.

123. **Lygodesmia.** Flowers rose-purple: achenes long and tapering: involucre cylindrical, in a single series: pappus white.

= = Achenes beaked: flowers yellow: involucre calyculate.

124. **Taraxacum.** Scapose: pappus white and copious.

125. **Pyrrhopappus.** Scapose or branched: pappus reddish, the base surrounded by a soft villous ring.

++ ++ Achenes flat or flattish: pappus white, fine and soft: involucre imbricated: leafy-stemmed, with panicled heads.

126. **Lactuca.** Achenes more or less beaked: flowers yellow or purplish.

127. **Sonchus.** Achenes flattish, not at all beaked: flowers yellow.

1. ELEPHANTOPUS L. (ELEPHANT'S FOOT.)

Perennials, with alternate leaves, purplish flowers, discoid 2 to 5-flowered heads several together clustered into a compound pedunculate head, perfect flowers, narrow involucre of 8 oblong dry bracts, 10-ribbed achenes, and pappus of stout bristles chaffy-dilated at base.

1. **E. Carolinianus** Willd. Somewhat hairy, corymbose, leafy: leaves ovate-oblong, thin, upper and basal leaves much alike.—An Atlantic species, extending into Texas.

2. VERNONIA Schreb. (IRON-WEED.)

Perennial herbs, with leafy stems, alternate and acuminate or very acute leaves, mostly purple flowers, discoid 15 to many-flowered heads in corymbose cymes, perfect flowers, much imbricated involucre, naked receptacle, cylindrical ribbed achenes, and a double pappus (the outer of minute scale-like bristles, the inner of copious capillary bristles).

* *Leaves narrowly linear, without revolute margins, glabrous, veinless, mostly entire.*

1. **V. Jamesii** Torr. and Gray. Low, nearly glabrous: heads few-flowered: involucral bracts obtuse or acute.—Extending from the northern plains into western Texas.

* * *Leaves slightly or not at all scabrous, without revolute margins, mostly sharply denticulate or rigidly serrate, linear-lanceolate to oblong-ovate, veiny.*

2. **V. fasciculata.** Michx. Leaves linear to oblong-lanceolate: heads many, crowded: involucral bracts close, obtuse or the uppermost mucronate: achenes smooth.—A species of the Mississippi Valley, extending into Texas at least as far west as Gillespie County.

3. **V. altissima** Nutt. Usually tall: leaves lanceolate or lance-oblong: cyme loose: involucral bracts close, obtuse or mucronate: achenes hispidulous on the ribs.—An Atlantic and Gulf species, extending into Texas as var. GRANDIFLORA Nutt., with large heads, and the involucre of 35 to 40 bracts in many ranks.

4. **V. Baldwinii** Torr. Tomentulose: heads small, at first globose: leaves lance-oblong or lance-ovate: involucre hoary-tomentose, greenish, squarrose, the bracts acute or acuminate: achenes hispidulous on the ribs.—Prairies and barren hills, from western Texas to eastern Missouri.

* * * *Leaves with upper face scabrous and margins often revolute (then entire), not canescent.*

5. **V. angustifolia** Michx. Slender, from roughish-hirsute to nearly glabrous: leaves from narrowly linear (or almost filiform) to lanceolate, the broader ones sparsely denticulate and veiny: cyme loose: involucral bracts (or most of them) mucronate, sometimes cuspidate-acuminate: achenes minutely hirsute, at least on the ribs.—A Gulf species of the pine barrens, extending into Texas. Var. TEXANA Gray has the lower leaves large and lanceolate, the upper ones small and linear or subulate, and the involucral bracts all pointless or merely mucronate.—Extends into western Texas.

* * * * *Leaves with revolute entire margins, not scabrous, veinless, woolly beneath.*

6. **V. Lindheimeri** Gray & Engelm. Excessively leafy up to the corymbiform cyme, lanose-canescent even to the obtuse and pointless involucral bracts: leaves narrowly linear, glabrate and green above: achenes glabrous: pappus purple.—Rocky hills and plains of central and western Texas.

3. STEVIA Cav.

Herbaceous or shrubby plants, with mostly opposite and 3-nerved leaves, small and narrow discoid heads usually crowded in terminal naked cymes or fascicles, white or rose-colored perfect flowers, 3 to 5 flowered cylindrical involucre of 5 or 6 mostly equal rather rigid bracts, naked receptacle, narrow corolla, linear slender 5-angled achenes, and a variable pappus.—Ours have subsessile and fasciculate heads.

1. **S. serrata** Cav. Herbaceous, pubescent or somewhat hirsute, leafy up to the dense fastigiate clusters of heads: leaves often alternate, subsessile, spatulate-linear to oblong-spatulate, irregularly and sometimes coarsely serrate or some entire, strongly punctate: flowers white or pale rose: pappus 1 to 5-awned or in some flowers reduced to a crown of short obtuse scales.—West of the Pecos.

2. **S. salicifolia** Cav. Shrubby, low and nearly glabrous: leaves mostly opposite, subsessile, coriaceous, linear or linear-lanceolate, mostly entire (occasionally serrate), commonly glutinous-lucid: heads in small and rather open fascicles: flowers white: pappus 1 to 3-awned, or sometimes of obtuse scales.—Southern border of Texas.

4. TRICHOCORONIS Gray.

Fibrous-rooted aquatic or paludose herbs, with branching leafy pubescent stems creeping at base or spreading, opposite (or upper alternate) sessile and partly clasping glabrate leaves, slender-peduncled discoid heads terminating the branches, flesh-color or rose purple perfect flowers, many-flowered involucre of 12 to 18 lax and equal bracts, naked convex receptacle, abruptly much dilated corolla, 5-angled-achenes, and pappus a minute crown of numerous bristles.

1. **T. Wrightii** Gray. Stems assurgent: leaves undivided, sparingly serrate, 12 mm. or more long; the lower opposite and oblong; the upper alternate and cordate-lanceolate: heads diffusely panicled, only 4 mm. high and wide: pappus a minute but evident crown.—Wet grounds in the prairies of Texas.

2. **T. rivularis** Gray. Stems floating (in shallow water rooting), and flowering branches emersed and ascending: leaves succulent, mostly opposite, 2.5 to 5 cm. long, cuneate-obovate, sparingly incised or palmately 3-lobed, contracted into a narrow connate-clasping auriculate base: heads fewer or solitary, 6 to 8 mm. in diameter: pappus a minute and evanescent or obscure crown.—In springs and streamlets, southwestern Texas.

5. MIKANIA Willd. (Climbing hemp-weed).

Mostly twining perennials, with opposite commonly heart-shaped and petioled leaves, corymbose-panicled flesh-colored perfect flowers, discoid 4-flowered heads, 4 involucral bracts, naked receptacle, the flowers, achenes, etc., as in Eupatorium.

1. **M. scandens** Willd. Smooth or nearly so, with high-twining herbaceous stems: leaves somewhat triangular, heart-shaped or halberd-form, pointed, toothed

at base: heads about 6 mm. long: involucral bracts acuminate or slender-apiculate: achenes 2 mm. long, resinous-atomiferous.—An Atlantic species, extending throughout Texas in moist ground along streams. Var. PUBESCENS Torr. & Gray is from slightly to densely puberulent, extending from the Gulf States into Texas.

2. **M. cordifolia** Willd. Puberulent or pubescent, frutescent at base: leaves broadly cordate: inflorescence more compound: heads 8 to 10 mm. long: involucral bracts obtuse or pointless: achenes 3 to 4 mm. long, glabrous.—A species extending from western Louisiana into Mexico.

6. EUPATORIUM Tourn. (THOROUGHWORT.)

Erect perennial herbs (sometimes shrubby), often sprinkled with bitter resinous dots, with commonly opposite leaves, generally corymbose discoid 3 to many-flowered heads, white, bluish or purple perfect flowers, cylindrical or bell-shaped involucre of more than 4 bracts, flat or conical naked receptacle, 5-toothed corolla, 5-angled achenes, and pappus a single row of slender capillary barely roughish bristles.

§ 1. *Involucre cylindrical, of scale-like coriaceous or firm striate bracts closely imbricated in many series: receptacle flat or rarely convex.*

1. **E. ivæfolium** L. Herbaceous or nearly so, somewhat hirsute or pubescent, 6 to 15 dm. high: leaves lanceolate or the upper ones linear, hardly petioled, sparsely and often coarsely serrate at middle, mostly obtuse, 2.5 to 5 cm. long: cymes small and loose: tips of involucral bracts purple or greenish and slightly squarrose-spreading: flowers light purplish-blue or reddish.—From Louisiana through Texas to Mexico.

2. **E. conyzoides** Vahl. Shrubby, with herbaceous flowering branches, villous-pubescent to glabrate, 12 to 30 dm. high: leaves ovate-lanceolate to ovate, slender-petioled, sparsely and acutely serrate or sometimes entire, acuminate, mostly cuneate at base, 2.5 to 12.5 cm long: heads numerous in the open cymes: involucral bracts without appendage and appressed: flowers pale blue or white.—Along the Rio Grande.

§ 2. *Involucre various, the bracts from thin-membranaceous or scarious to herbaceous, nerveless or few-nerved, mostly lax, either imbricated or equal and nearly in one series; receptacle flat.*

* *Involucre cylindrical, the purplish bracts numerous and closely imbricated in several rows of unequal length, slightly striate.*

3. **E. purpureum** L. (JOE-PYE WEED. TRUMPET WEED). Stout and tall simple stems, 6 to 36 dm. high: leaves 3 to 6 in a whorl, oblong-ovate or lanceolate, pointed, very veiny, roughish, toothed: corymbs of flesh-colored flowers very dense and compound.—Low or wet ground. Var. MACULATUM Darl. is 9 to 12 dm. high, often roughish-pubescent, with commonly purple stem and somewhat rugose leaves, and more compact and depressed inflorescence.

* * *Involucre imbricated, rather lax, the bracts of at least 3 (seldom only 2) lengths, the outer successively shorter.*

– *Heads 20-flowered or more, large (about 12 mm. long): involucral bracts of 4 or 5 lengths, striate-nervose.*

4. **E. Parryi** Gray. Hirsutely pubescent, loosely branched: leaves alternate, broadly ovate and rather deeply cordate, crenately dentate, acute or acuminate, slender-petioled: heads of white flowers rather few in an open panicle: involucral bracts thin, oblong-lanceolate, acuminate, the innermost produced into a setiform tip: achenes minutely pubescent.—On the Mexican side of the Rio Grande, and probably also in Texas.

+ + *Heads 3 to 6-flowered, small (4 to 6 mm. long): leaves (at least the lowest) pinnately dissected: involucral bracts 6 to 10, nerveless.*

5. **E. coronopifolium** Willd. Puberulent or pubescent, somewhat glutinous, very leafy herbs, 9 to 12 dm. high: lower leaves mostly opposite, twice 3 to 7-parted into linear entire or sparingly incised lobes; upper less compound, uppermost often entire, from broadly to narrowly linear: the very numerous heads of white flowers racemosely and thyrsoidly paniculate: involucral bracts acute or abruptly pointed, narrowly scarious-margined.—Dry soil, extending into Texas from the Gulf States.

+ + + *Heads 3 to 15-flowered, 6 to 10 mm. long: leaves undivided: flowers mostly white: involucre of rather few (8 to 15) bracts.*

++ *Suffruticose: inflorescence thyrsoid-paniculate: involucral bracts 13-nerved.*

6. **E. solidaginifolium** Gray. Glabrate or minutely pubescent, 3 to 6 dm. high: leaves opposite, very short-petioled, oblong- or narrowly ovate-lanceolate from a rounded base, acute, entire or obscurely dentate, 2 to 3.5 cm. long: thyrsus usually small (5 to 7.5 cm. long), sometimes large (15 to 20 cm. long and equally broad at base), leafy at base: heads 3 to 5-flowered: involucral bracts linear-lanceolate, acute: achenes pubescent.—Dry hills, west of the Pecos.

++ ++ *Herbaceous perennials: inflorescence cymose or fastigiate: involucral bracts nerveless or nearly so.*

= *Leaves conspicuously petioled from a mostly truncate or abrupt base, strongly serrate.*

7. **E. serotinum** Michx. Puberulent: stems 15 to 20 dm. high: leaves oblong- or ovate-lanceolate, acute or acuminate, 7.5 to 15 cm. long, many of the upper alternate: heads 7 to 15-flowered, very numerous: involucral bracts linear-oblong, very obtuse, cinereous-pubescent.—Low grounds, extending into Texas at least as far west as Gillespie County.

= = *Leaves from linear to oblong, sessile or some short-petioled from a narrowed base, chiefly opposite: heads mostly 5-flowered: involucre canescently pubescent.*

8. **E. hyssopifolium** L. Merely puberulent: stems about 6 dm. high, very leafy, commonly with axillary fascicles: leaves occasionally verticillate, linear, obtuse, entire or sparingly dentate, 2 to 5 cm. long: involucre 6 mm. long.—Dry soil, in eastern and southern Texas.

9. **E. semiserratum** DC. Tomentulose-pubescent: stems 6 to 9 dm. high: leaves oblong-lanceolate, mostly acute or acuminate, 5 to 7.5 cm. long, serrate with numerous unequal teeth above or below the middle to the apex, 3-nerved, rather veiny: involucre 4 mm. long, the longer bracts linear-oblong.—A species of the Southern States, extending into Texas. Var. LANCIFOLIUM Gray is glabrate, with lanceolate to linear rather rigid leaves 3-nerved from near the base.

10. **E. altissimum** L. Pubescent: stems 12 to 20 dm. high, very leafy: leaves lanceolate, tapering gradually to both ends, acuminate, acutely serrate above the middle, 5 to 10 cm. long, with 3 conspicuous parallel nerves; uppermost entire: involucre 6 mm. long, the bracts oblong.—Eastern and southern Texas.

= = = *Leaves sessile or very short-petioled with a broad base: involucre pubescent.*

11. **E. rotundifolium** L. Stem strict, corymbose at summit, 3 to 9 dm. high, herbage roughish-pubescent: leaves round-ovate, obtuse or abruptly acute, with a truncate or obscurely cordate base, regularly and closely crente-dentate, veiny (larger 5 cm. long): cymes dense.—Extending from the barrens of the Gulf region into Texas. Var. SCABRIDUM Gray is a form with smaller and more scabrous or cinereous leaves, the upper and sometimes all with cuneate base.

+ + + + *Heads 24 to 30-flowered, hardly over 4 mm. long: involucral bracts of 3 lengths, obtuse, thin, conspicuously few-nerved.*

12. **E. pycnocephalum** Less. Pubescent or nearly glabrous: stems slender, 3 to 6 dm. high: leaves thin, deltoid-ovate or subcordate, acute or acuminate, coarsely

serrate or dentate, slender-petioled: cymes small and compact, solitary or clustered at the end of naked branches: involucral bracts mostly glabrous, very obtuse.—Along the Mexican border.

* * * *Involucre (campanulate or oblong) of bracts all of the same length or nearly so, in 1 or 2 series, or with only a few accessory and shorter ones at base: leaves mainly opposite and petioled.*

\+ *Shrubby, freely branched: flowers white or purplish.*

13. **E. Wrightii** Gray. Puberulent, 3 to 6 dm. high, with very leafy branches: leaves small (12 mm. long), ovate, obtuse, entire or obscurely few-toothed, thickish, scabrous, abruptly contracted into a short margined petiole: heads 6 to 8 mm. long, about 12-flowered: involucral bracts oblong-lanceolate, obscurely 3-nerved.—Guadaloupe and Chisos Mountains.

14. **E. ageratifolium** DC. Shrub 9 to 20 dm. high, with slender and spreading mostly herbaceous branches, green and nearly glabrous: leaves deltoid-ovate, obtusish or obtusely acuminate, coarsely and rather obtusely dentate, 5 to 7.5 cm. long, slender-petioled: heads 10 mm. long, 10 to 30-flowered: involucral bracts narrowly lanceolate or linear, nerveless above, somewhat 2-ribbed at base.—Rocky shaded hills and ravines, central and western Texas. Var. ACUMINATUM Coulter has the branchlets, lower leaf-surface, and involucral bracts finely and often densely pubescent, and the leaves smaller and sharply acuminate.—Point Isabel.

\+ \+ *Herbaceous perennials.*

15. **E. incarnatum** Walt. More or less pubescent: leaves deltoid, or ovate-lanceolate with broad truncate or cordate base, coarsely crenate or serrate, 2.5 to 5 cm. long, slender-petioled: cymes small: heads about 20-flowered: corolla pale-purple or white, wholly glabrous even in bud: involucral bracts unequal.—Extending westward into Texas at least to Gillespie County.

16. **E. ageratoides** L. f. Nearly glabrous, sometimes pubescent: leaves ovate with truncate or subcordate or broadly cuneate base, coarsely and rather sharply dentate-serrate, 7.5 to 12.5 cm. long, long-petioled: cymes ample: heads 15 to 30-flowered: corolla pure white and more or less bearded outside: involucral bracts nearly equal.—A common species of the Atlantic States, which reaches central and western Texas as var. ANGUSTATUM Gray, which is smaller, with leaves from ovate-lanceolate to broadly lanceolate, much acuminate, coarsely serrate with only 3 to 6 teeth on each margin, commonly cuneate at base, and heads only 8 to 12-flowered.

§ 3. *Receptacle conical or hemispherical: otherwise as in * * * of § 2: perennial herbs.*

17. **E. cœlestinum** L. (MIST-FLOWER.) Somewhat pubescent: stems erect, branched at summit: leaves deltoid-ovate or subcordate, obtuse or acutish, obtusely serrate (or with some coarser salient teeth), slender-petioled: cymes rather compact: receptacle obtusely conical. (*Conoclinium cœlestinum, DC.*)—Extending from the Gulf States into Texas.

18. **E. betonicum** Hemsl. From tomentose-villous to glabrate: stems lax, loosely branching: branches naked and pedunculiform at summit, bearing some small corymbose or paniculate cymes: leaves oblong, mostly obtuse, crenate, petioled: receptacle low-conical. (*Conoclinium betonicum* DC.)—Mexican border of Texas. Var. SUBINTEGRUM Gray has the leaves sometimes truncate, commonly obtuse or cuneate at base, obscurely crenate, denticulate, repand or entire, from villous to nearly glabrate. (*C. betonicum*, var. *integrifolium* Gray.)—Mexican border of Texas.

19. **E. Greggii** Gray. Minutely puberulent: stems erect, 3 to 6 dm. high, bearing one or few small and dense cymes at the naked pedunculiform summit: leaves nearly sessile, palmately 3 to 5-cleft or parted, the divisions laciniate-pinnatifid into narrow lobes: receptacle low-conical. (*Conoclinium dissectum* Gray.)—Along the southern border of Texas.

7. CARMINATIA Moçino.

An annual, with opposite or partly alternate broad and long-petioled thin leaves, racemiform-paniculate heads of whitish perfect flowers, discoid heads, naked receptacle, cylindraceous involucre of lanceolate-linear striate thin imbricated bracts, slender 5-angled achenes, and pappus of 10 to 18 bristles which are plumose with long arachnoid hairs and deciduous together.

1. **C. tenuiflora** DC. Sparsely pubescent or hirsute: stems 3 to 9 dm. high, terminating in a leafless virgate panicle: leaves broadly deltoid-ovate, as wide as long, repand-dentate, veiny: heads 12 mm. long: soft pappus bright white.—Limpia Cañon. Some specimens collected by Nealley are not more than 1.5 dm. high, with leaves proportionally reduced in size.

8. KUHNIA L.

Perennial resinous-dotted herbs, with mostly alternate leaves, paniculate corymbose heads of perfect whitish or at length purple flowers, discoid 10 to 25-flowered heads, few thin striate narrow loosely imbricated involucral bracts, slender 5-toothed corolla, cylindrical 10-striate achenes, and pappus a single row of very plumose white bristles.

1. **K. eupatorioides** L. Stem wholly herbaceous, 6 to 9 dm. high: leaves from oblong- (or ovate-) lanceolate to linear, irregularly few-toothed or upper ones entire, the lower ones narrowed at base and sometimes short-petioled: pubescence minute or soft and cinereous, or hardly any: heads more or less cymose-clustered.—An exceedingly variable and widely distributed species. Var. CORYMBULOSA Torr. & Gray is stouter, somewhat cinereous-pubescent or tomentulose, with rather rigid and sessile coarsely veiny oblong to lanceolate leaves, and rather crowded heads.—Extending from the western plains southward into Texas.

2. **K. rosmarinifolia** Vent. Perhaps more woody at base, 3 to 6 dm. high: leaves all entire, linear or linear-lanceolate, mostly with revolute margins, and the upper almost filiform, somewhat scabrous: heads more scattered or paniculate.—Rocky open ground from western Texas to Arizona.

9. BRICKELLIA Ell.

Characters as in *Kuhnia*, but the leaves often all opposite, the involucral bracts more numerous, and the bristles of the pappus merely scabrous or at the most barbellate or subplumose.—Our species have 9 to 25-flowered heads not over 12 mm. long.

* *Leaves distinctly petioled, all or mostly alternate: stems shrubby at base: inflorescence thyrsiform and leafy.*

+ *Leaves mainly with truncate or subcordate base, crenate or dentate* (but not laciniate.)

1. **B. Wrightii** Gray. Usually much branched from a woody base, 6 to 12 dm. high, puberulent or a little scabrous: leaves broadly deltoid-ovate, or rounded-cordate and obtuse, or at most acute, more or less crenate-dentate: heads glomerate-paniculate: involucre often purple.—West of the Pecos. Var. RENIFORMIS Gray has thin sometimes quite reniform (broader than long) coarsely crenate leaves, surpassing the glomerules of heads.—"Mountain valley near the western border of Texas" *(Wright)*.

+ + *Leaves cuneate at base, tapering into the petiole, very numerous and incised or deeply toothed, the upper about equaling the glomerate clusters in their axils: much branched and shrubby.*

2. **B. baccharidea** Gray. Leaves coriaceous, resinous-atomiferous and very glutinous, rhombic-ovate or oblong, and with 2 to 5 strong teeth on each margin, much reticulated: heads 15 to 18-flowered.—Mountains west of the Pecos.

3. **B. laciniata** Gray. Leaves thin, puberulent and somewhat scabrous, ovate-cuneate and oblong, laciniate-toothed or lobed, obscurely veiny: heads 9 to 12-flowered.—Mountains west of the Pecos.

* * *Leaves sessile, subsessile, or the lower short-petioled* (all petioled in no. 4, var.)

+ *Leaves mainly opposite: pappus-bristles merely scabrous or serrulate under a lens.*

4. **B. oliganthes** Gray. Cinereous-puberulent, 3 to 6 dm. high, woody at base: leaves coriaceous, oblong to linear, obtusely and often obscurely serrate, 2.5 to 5 cm. long, canescent and the veins very prominently reticulated beneath: peduncles mostly elongated, with 1 to 3 heads 12 mm. long.—A species of southern Arizona and Mexico, but represented in the Chenate Mountains of western Texas by var. CREBRA Gray, which has petioled more broadly oblong or ovate rather coarsely toothed less canescent leaves.

5. **B. parvula** Gray. Minutely scabro-puberulent, low, woody at base: leaves deltoid-ovate, coarsely few-toothed, green both sides, barely 12 mm. long; the upper oblong, sparse and much smaller: peduncles few and slender, with a single head 10 mm. long.—Mountains west of the Pecos.

6. **B. cylindracea** Gray and Eng. Cinereous-pubescent, somewhat scabrous: stem herbaceous to the base, mostly stout and strict, 6 to 12 dm. high: leaves oblong-ovate to ovate-lanceolate, mostly obtuse at both ends, obtusely serrate, thickish, about 5 cm. long: heads 12 to 16 mm. long, numerous in a virgate racemiform thyrsus: involucre cylindrical, closely imbricated.—Hillsides and thickets of central and western Texas, varying into var. LAXA Gray, which is paniculately branched, the branches bearing numerous smaller (10 to 12 mm.) loosely disposed heads, and the leaves of the branches either subsessile or abruptly petioled.

+ + *Leaves alternate: pappus barbellate: stems herbaceous.*

7. **B. Riddellii** Gray. Minutely cinereous or puberulent, glabrate: stem strict and stout, 6 to 12 dm. high, exceedingly leafy to the summit: leaves oblong-lanceolate, sparingly denticulate, often entire, 16 to 36 mm. long: heads numerous, crowded in a leafy spiciform thyrsus, 15 to 20-flowered, 8 to 10 mm. long: pappus barbellulate under a lens.—River banks, central and southern Texas.

8. **B. brachyphylla** Gray. Minutely puberulent: stems slender, 3 to 6 dm. high, bearing a few racemosely paniculate slender-pedunculate heads: leaves oblong-lanceolate, entire or sparingly serrate, 12 mm. (or the larger 25 mm.) long: heads 9 to 12-flowered, 10 mm. long: pappus-bristles almost plumose under a lens.—Rocks and ravines west of the Pecos.

10. CARPOCHÆTE Gray.

Perennial herbs or suffrutescent plants, glabrous or nearly so, with opposite and entire sessile 1 to 3-nerved but nearly veinless leaves, solitary or somewhat clustered discoid 4 to 6-flowered heads terminating leafy or pedunculiform branches, rose-colored (perfect) flowers and involucre, naked receptacle, few acuminate and imbricate involucral bracts, slender 10-striate achenes, and pappus of long subulate erose scarious scabrous-awned scales, with 1 to 5 small nearly nerveless and pointless ones.

1. **C. Bigelovii** Gray. Woody at base, fasciculately branched: lower leaves spatulate-oblong, 2.5 cm. long, and fascicles of smaller ones in the axils; upper oblong or linear: heads sessile or very short-peduncled, mostly terminating very leafy somewhat paniculate short branchlets: awn-bearing scales of the pappus 11 to 14, and a few very small exterior scales.—Southwestern Texas.

11. **LIATRIS** Schreb. (Button snakeroot. Blazing star).

Perennial often resinous-dotted herbs, with simple stems from a roundish tuber, rigid alternate narrow entire leaves, spicate or racemed discoid heads of handsome rose-purple perfect flowers, well imbricated appressed involucral bracts, naked receptacle, corolla 5-lobed with long and slender lobes, slender 10-ribbed achenes tapering to the base, and pappus of 15 to 40 capillary bristles which are manifestly plumose or only barbellate.

* *Pappus very plumose: bracts of the 5-flowered involucre with ovate or lanceolate spreading petal-like (purple or white) tips, exceeding the flowers.*

1. **L. elegans** Willd. Stem (6 to 9 dm. high) and involucre hairy: leaves linear, short and spreading: spike or raceme compact, 7.5 to 50 cm. long.—Extending into Texas from the pine barrens of the Gulf States.

* * *Pappus very plumose: bracts of the cylindrical many-flowered involucre imbricated in many rows, the tips rigid, not petal-like: corolla-lobes hairy within.*

2. **L. squarrosa** Willd. (Blazing star). Often hairy, 1.5 to 6 dm. high: leaves rigid, linear, elongated: heads usually few, 2.5 cm. long: involucral bracts mostly with elongated and leaf-like spreading tips.—Dry soil, extending into Texas from the Atlantic States, and passing into var. INTERMEDIA DC., with narrow heads and shorter scales erect or nearly so.

* * * *Pappus very plumose: heads 3 to 6-flowered: involucral bracts acuminate: corolla-lobes naked.*

3. **L. punctata** Hook. Stout, 2.5 to 7.5 dm. high, from a branching or globose rootstock: leaves narrowly linear or the upper acerose, rigid; heads usually many in a dense spike.—Dry prairies and plains, throughout Texas.

4. **L. acidota** Eng. & Gray. Stem 3 to 6 dm. high, from a globose or at length elongated tuber: leaves very slender: heads numerous in a slender and strict naked spike: pappus shorter-plumose.—Prairies of Texas. Var. MUCRONATA Gray has smaller heads and flowers, with the involucral bracts abruptly mucronate-pointed.

* * * * *Pappus not obviously plumose to the naked eye: corolla-lobes smooth inside.*

5. **L. scariosa** Willd. Stem stout, 6 to 15 dm. high, pubescent or hoary: leaves (smooth, rough, or pubescent) lanceolate; the lowest oblong-lanceolate or obovate-oblong, tapering into a petiole: heads few or many, large, 25 to 40-flowered: bracts of the broad or depressed involucre obovate or spatulate, very numerous, with dry and scarious often colored tips or margins.—Dry soil, extending into Texas from the Atlantic States. Var. SQUARRULOSA Gray is comparatively small and slender, with heads only 12 to 16 mm. long and 14 to 20-flowered, and narrower involucral bracts (the innermost sometimes linear or lanceolate).

6. **L. pycnostachya** Michx. Hairy or smoothish: stem stout, 9 to 15 dm. high, very leafy: leaves linear-lanceolate, the upper very narrowly linear: spike thick and dense, 1.5 to 5 dm. long: heads about 5-flowered, 12 mm. long: bracts of the cylindrical involucre oblong or lanceolate, with recurved or spreading colored tips,—Extending from the northern prairies into Texas.

12. GYMNOSPERMA Less.

Perennial herbaceous or suffrutescent erect glabrous mostly glutinous plants, with alternate entire narrow leaves, numerous small radiate heads of yellow flowers in fastigiately corymbose glomerate cymes, closely imbricated ovoid or oblong involucre with thick obtuse concave bracts, naked receptacle, very small ligules not surpassing the disk-corollas, oblong slightly compressed 4 to 5-ribbed glabrous achenes, and no pappus.

1. **G. corymbosum** DC. Woody at base, 6 to 9 dm. high: leaves from oblong-lanceolate to linear: lower ones distinctly 3-nerved: flowers of the ray 5 to 9, of the disk mostly fewer and fertile.—Rocky soil, apparently throughout southern and western Texas.

13. GUTIERREZIA Lag.

Herbs or suffrutescent glabrous and often glutinous plants, with narrowly linear entire alternate leaves, small radiate heads of yellow flowers in fastigiate or paniculate cymes, closely imbricated oblong-clavate or turbinate to campanulate involucre with coriaceous green-tipped bracts, naked receptacle, short obovate or oblong terete or 5 to 10-ribbed achenes, and pappus of numerous chaffy scales, which are shorter in the ray-flowers and sometimes wanting.

* *Pappus of ray and disk similar, or in the former shorter: ligules mostly short.*

\+ *Suffruticose: heads fastigiately or paniculately cymose, mostly clavate-oblong: receptacle plane or small: pappus-scales conspicuous, from narrowly oblong to linear-subulate: achenes sericeous-pubescent.*

1. **G. Sarothræ** Britt. & Rusby. Bushy and low, 1.5 to 4.5 dm. high: leaves numerous, 2.5 to 5 cm. long: heads usually crowded, the disk- and short ray-flowers usually 3 or 4 each. (*G. Euthamiæ* Torr. & Gray)—Throughout Texas on arid plains and rocky hills. Var. MICROCEPHALA Gray (*G. microcephala* Gray) has smaller narrower fewer-flowered mostly oblong-cylindraceous heads (the flowers of disk and ray reduced to 1 or 2 each), and narrowly linear or nearly filiform leaves.—Southern Texas.

\+ \+ *Annual herbs: heads singly terminating the branchlets and paniculate, hemispherical or obscurely obovate, about 4 mm. in diameter: rays 9 to 15, disk-flowers 20 to 30: receptacle more or less elevated and hirsute-fimbrillate: achenes very short, 10-ribbed, the ribs very silky-villous.*

2. **G. sphærocephala** Gray. Low: receptacle obtusely conical or hemispherical: pappus of 5 or 6 ovate short coroniform-concreted scales, barely half the length of the achene.—Southwestern Texas.

3. **G. eriocarpa** Gray. Low or taller (3 to 6 dm. high): receptacle obtusely high-conical: pappus of 12 or more linear-lanceolate or subulate and mostly distinct scales, about half the length of the achene.—Plains and prairies of southern and western Texas.

* * *Pappus wanting in the ray-flowers: ligules comparatively long.*

4. **G. Texana.** Torr. & Gray. Annual, effusely much branched, 6 to 9 dm. high: branches slender, bearing the very numerous pedunculate heads in open compound panicles: involucre turbinate-campanulate, 2 to 4 mm. long: rays 8 or 10 (6 to 8 mm. long); disk-flowers as many: achenes minutely pubescent; those of the disk with a minute pappus of ovate or subulate scales not as long as the breadth of the achene.—Sterile plains throughout Texas.

14. AMPHIACHYRIS Nutt.

A diffusely much-branched annual, with narrowly linear entire alternate leaves, heads solitary on the branchlets and radiate, perfect but infertile disk-flowers, and pappus of the ray minute and coroniform, of the disk-flowers of almost bristle-like scales more or less dilated and united at base: otherwise as *Gutierrezia*.

1. **A. dracunculoides** Nutt. Rather low and slender: leaves narrowly linear, the upper filiform: disk-flowers 10 to 20, their pappus of 5 to 8 bristle-like scales united at base and slightly dilated upward.—Plains of Kansas and Texas.

15. GRINDELIA Willd.

Coarse perennial or biennial herbs, with sessile or clasping alternate and spinulose-serrate or laciniate rigid leaves, large radiate many-flowered heads terminating leafy branches, yellow disk and ray (the latter pistillate), hemispherical involucre with bracts imbricated in several series and with slender more or less spreading green tips, short and thick compressed or turgid truncate glabrous achenes, and pappus of 2 to 8 caducous awns.

* *More or less pubescent.*

1. **G. inuloides** Willd. Pubescence minute or short: leaves from oblong to lanceolate or almost ovate, serrate down to the partly clasping or broad base with close-set and often gland-tipped salient teeth: involucre glabrous, at length squarrose: achenes short and turgid, with rounded-truncate summit, smooth or becoming transversely corky-rugose: awns of pappus 1 to 3.—Common on the plains of Texas. In southern Texas is found var. MICROCEPHALA Gray, which is smaller and more branching, with heads only half as large (6 mm. or so in diameter), achenes more commonly rugose-thickened.

* * *Whole herbage glabrous.*

2. **G. squarrosa** Dunal. Leaves spatulate to linear-oblong: involucre squarrose: achenes not toothed: pappus awns 2 or 3.—Plains and prairies of Texas, said to be particularly abundant west of the Pecos. A common Texan form is var. GRANDIFLORA Gray, with larger heads and very numerous rays (2.5 cm. long), taller simpler stems, and ovate to oblong upper leaves which are more numerously and equally serrate either with obtuse or spinulose teeth.

3. **G. lanceolata** Nutt. Leaves lanceolate or linear: involucral bracts erect or the lower tips spreading: achenes with 1 or 2 short teeth at summit: awns 2.—Prairies and barrens of Texas.

16. HETEROTHECA Cass.

Characters as in *Chrysopsis*, but the achenes of the ray thickish or triangular, without pappus or obscurely crowned, and those of the disk compressed, with a double pappus, the inner of numerous long bristles, the outer of many short and stout bristles.

1. **H. subaxillaris** Britt. & Rusby. Annual or biennial, 3 to 9 dm. high, bearing numerous small heads: leaves oval or oblong, the lower with petioles auricled at base, the upper mostly subcordate-clasping (*H. Lamarckii* Cass.)—Sandy or barren soil near the coast and throughout central and western Texas.

17. CHRYSOPSIS Nutt (Golden Aster).

Chiefly perennial low woolly or hairy herbs, with rather large often corymbose radiate many-flowered heads terminating the branches, yellow disk and ray-flowers (the latter numerous and pistillate), linear imbricated involucral bracts without herbaceous tips, flat receptacle, obovate or linear-oblong flattened hairy achenes, and pappus double in all the flowers, the outer of very short and somewhat chaffy bristles, the inner of long capillary bristles.

** Leaves narrowly lanceolate or linear, elongated, nerved; achenes linear.*

1. **C. graminifolia** Nutt. Silvery-silky, with long close-pressed hairs: stems slender, often with runners from the base, naked above, bearing few heads: leaves elongated, grass-like, shining, entire.—Dry sandy soil, extending into Texas from the Gulf States.

** * Leaves oblong or lanceolate, entire or slightly serrate, mostly sessile, not nerved: achenes obovate.*

2. **C. villosa** Nutt. Hirsute and villous-pubescent: stem corymbosely branched, the branches terminated by single short peduncled heads: leaves narrowly oblong, hoary with rough pubescence (as also the involucre), bristly-ciliiate towards the base.—Prairies and plains of Texas. An excessively variable species with numerous varieties, the following known to occur in Texas, chiefly in the western part: var. HISPIDA Gray is a low hirsute and hispid, not canescent form, with small heads: var. STENOPHYLLA Gray is a low and rough-hispid rigid form, with spatulate-linear leaves (only 2 to 4 mm. wide), and small heads: var. CANESCENS Gray is wholly canescent with short appressed pubescence, and narrow mostly oblanceolate leaves: var. FOLIOSA Eaton is canescent with appressed sericeous pubescence (mostly soft and destitute of hispid bristles), but the stem often hirsute or villous, short oblong or elliptical leaves, and small rather numerous and clustered flowers. The last variety has only been reported from the mountains of extreme western Texas.

3. **C. pilosa** Nutt. Annual, soft-hirsute or villous: leaves oblong-lanceolate: involucre viscid: outer pappus chaffy and conspicuous.—Extending from western Arkansas.

18. XANTHISMA DC.

A single species near *Aplopappus*, with showy many-flowered radiate heads, all the flowers fertile and yellow, closely imbricated and appressed involucral bracts coriaceous below and herbaceous above, fimbrillate receptacle, turbinate 4 or 5-angled sericeous-pubescent achenes, and pappus of 10 or 12 rigid bristles scabrous above and chaffy-dilated below, longer than the disk-corolla, as many more half shorter, and usually 5 still smaller exterior ones.

1. **X. Texanum** DC. Nearly glabrous, 3 to 12 dm. high, with virgate branches terminated mostly by solitary large heads: leaves from narrowly oblong to lanceolate, the lower sometimes laciniate-pinnatifid or even bipinnately parted, to serrate or denticulate, or even entire above.—Open woods.

19. BRADBURIA Torr. & Gray.

An annual branching hispid plant, with about 12 fertile ray-flowers, about the same number of infertile disk-flowers, campanulate involucre of rather broad and thin scariously margined and mucronate-acuminate

appressed bracts, achenes of the ray sparsely villous, 3-angled with a strong rib at each angle, and pappus of numerous unequal rigid capillary bristles, those of the disk abortive, with pappus of very few (usually 2) bristles somewhat chaffy below.

1. **B. hirtella** Torr. & Gray. Slender branches terminated by single rather small heads of yellow flowers: radical and lower cauline leaves narrowly spatulate; those of the flowering branches small, spatulate-linear to nearly filiform, mucronate-pointed: rays 6 to 12 mm. long.—Dry ground, throughout Texas.

20. APLOPAPPUS Cass.

Mostly herbaceous perennials (some more or less shrubby), with alternate leaves, usually radiate and always yellow flowers, many-flowered heads, hemispherical involucre of many usually closely imbricated bracts in several series, flat receptacle, short turbinate to linear achenes, and a simple pappus of numerous unequal bristles.

* *Heads very large, 2.5 cm. or more in diameter.*

1. **A. ciliatus** DC. Annual or biennial, glabrous, 6 to 15 dm. high, leafy: leaves oval (or lower obovate), obtuse, dentate with bristle-pointed teeth: heads few and clustered, with very numerous rays, and the outer involucral bracts spreading: achenes glabrous, the central abortive.—Hillsides and river banks throughout Texas as far west as the Pecos.

2. **A. Nealleyi** Coulter. Glabrous or nearly so, somewhat branching above, 3 to 6 dm. high, terminated by long mostly naked peduncles which are enlarged beneath the large solitary heads: leaves narrowly linear or almost filiform, entire or pinnatifid with 2 or 3 linear lobes: involucral bracts loosely imbricated: rays 10 to 15: achenes with rugulose sparsely pubescent striæ.—Near Santa Maria, Cameron County.

* * *Heads smaller, 6 to 12 mm. high.*

\+ *Leaves more or less pinnatifid, with teeth and tips commonly bristle-tipped: involucral bracts narrow and well-imbricated.*

++ *Leaves not deeply cleft.*

3. **A. aureus** Gray. Minutely scabrous-glandular, 1 to 3 dm. high: leaves all narrowly linear, sparingly pinnatifid-dentate: heads 8 mm. high, the outer involucral bracts with short deltoid-ovate green tips: rays 18 to 25: achenes sericeous.—Low plains near Houston (*Wright*). Said not to have been collected since.

4. **A. rubiginosus** Torr. & Gray. Viscid-glandular and more or less pubescent, 3 to 9 dm. high: leaves lanceolate or narrowly oblong, incisely pinnatifid or dentate with salient narrow teeth: heads somewhat paniculate, 10 to 12 mm. high, usually naked-pedunculate, the involucral bracts with slender spreading green tips: rays and achenes as in the last.—Low grounds, throughout southern and western Texas. Along the sea-beaches of southern Texas occurs var. PHYLLOCEPHALUS Gray, which is a lower spreading form, leafy up to the heads which singly terminate the branches and are larger and more or less leafy-involucrate.

++++ *Leaves 1 to 2-pinnatifid.*

5. **A. gracilis** Gray. Annual or becoming woody at base, canescently-pubescent (occasionally glabrate and scabrous), much branched: leaves linear or the lowest spatulate, pinnatifid, or the upper few-toothed or entire, tipped or also sparsely fringed with long and slender bristles: heads 8 to 10 mm. high, with 15 to 30 rays, and involucral bracts wholly appressed and mostly setaceous-tipped: achenes compressed.—Plains of western Texas.

6. **A. spinulosus** DC. Perennial, canescent to glabrate, branched at summit: leaves broader in outline than in the last, pinnately and lower often bipinnately

parted into rather numerous lobes, the lobes and teeth being mucronate-bristly: heads, involucre, and achenes of the preceding.—Common on plains throughout Texas. It varies to nearly glabrous throughout, and also with the leaf-divisions sometimes nearly filiform.

+ + *Leaves entire (sometimes few-toothed in one species) and narrow: heads 6 to 8 mm. high.*

++ *Annual herbs: rays 5 to 15.*

7. **A. divaricatus** Gray. Scabrous-pubescent or glandular (sometimes glabrate), 3 to 6 dm. high, slender and effusely paniculate: leaves rigid, linear-lanceolate or lower spatulate-lanceolate, mucronate-acute or cuspidate, entire or beset with a few spinulose teeth, more or less setose-ciliate toward the base: the upper small and subulate, and in the diffuse naked panicle minute: involucral bracts subulate-attenuate.—Dry and sandy soil, extending from the Gulf States into Texas as far as Gillespie County.

8. **A. Hookerianus** Gray. Low, loosely branched from the base, barely hirsute, not glandular: leaves not rigid, entire; upper linear or attenuate-lanceolate, sparingly hispidly ciliate; lower spatulate, short and naked: involucral bracts subulate-lanceolate, with less attenuate points.—Gonzales (*Drummond*). Said not to have been found since.

+++ *Perennials, woody at base or shrubby: rays 3 to 6.*

9. **A. laricifolius** Gray. A shrub about 3 dm. high: leaves linear-acerose, rigid, mucronate, conspicuously resinous-punctate and becoming viscid, crowded but seldom axillary-fascicled, 12 mm. or less long: heads in close cymose clusters terminating fastigiate branchlets: involucral bracts subulate-linear, acute, appressed in 2 or 3 series: rays 3 to 6, with rather conspicuous ligules: achenes villous.—Western border of Texas.

A. Texanus Coulter is *Haxloesthes Greggii* Gray.

21. BIGELOVIA DC. (RAYLESS GOLDEN-ROD.)

Perennial herbaceous or suffrutescent plants, with mostly narrow entire leaves (in some species toothed or pinnatifid), discoid heads of yellow flowers, involucre of rigid somewhat glutinous closely imbricated and appressed bracts, narrow receptacle, slender or somewhat obconical achenes, and pappus a single row of capillary bristles.

* *Heads 3 to 5-flowered.*

1. **B. pulchella** Gray. Shrubby, glabrous and green, 6 to 9 dm. high, very branching and leafy up to the factigiate-cymose heads: leaves narrowly linear: heads 16 to 18 mm. high, 5-flowered, with rigid keeled involucral bracts which are acute and cuspidate-mucronate and so imbricated as to form five conspicuous vertical ranks with 5 or 6 in each rank. (*Linosyris pulchella* Gray)—West of the Pecos.

2. **B. nudata** DC. Perennial herb, glabrous, 3 to 6 dm. high, strict and simple up to the compound-fastigiate and corymbose cyme of numerous small heads: leaves spatulate to nearly filiform, the uppermost small and bract-like: heads barely 6 mm. high, 3 or 4-flowered, with obtuse chartaceous bracts so imbricated as to form indistinct vertical ranks with about 3 in each rank: receptacle with an awl-shaped prolongation in the center.—A Gulf species of the pine-barrens, represented in Texas by var. VIRGATA Torr. & Gray, in which the cauline leaves are linear-filiform, or the lowest and radical linear-spatulate.

* * *Heads 7 to 30-flowered, 8 to 12 mm. high.*

3. **B. Wrightii** Gray. Herbaceous to the woody base, the stems rather strict and slender, 3 to 6 dm. high: leaves narrowly linear, entire (sometimes lower ones sparingly laciniate-dentate): heads 7 to 15-flowered, usually numerous and crowded in a corymbiform cyme; involucral bracts greenish at or near the apex, but with no defi-

nite tip (*Linosyris Wrightii* and *L. heterophylla* Gray).—Banks of streams and saline soil, western Texas. Var. HIRTELLA Gray has leaves cinereous-hirtellous or hirsute-pubescent and roughish (*L. hirtella* Gray).

4. **B. coronopifolia** Gray. Suffrutescent, the stems freely branching and slender, leafy, 3 to 6 dm. high: leaves linear-filiform and pinnately parted into 3 to 9 divisions not thicker than the filiform rhachis and setulose-mucronate: heads 10 to 12-flowered, somewhat thyrsoid-glomerate; involucre as in the last. (*Linosyris coronopifolia* Gray)—Along the Rio Grande.

5. **B. Drummondii** Gray. With many erect or ascending partly herbaceous branches or stems from a woody base, about 3 dm. high: leaves all narrowly linear and entire, with tapering base: heads 18 to 30-flowered, rather numerous in a corymbiform cyme: involucral bracts with short green or greenish tips. (*Linosyris Drummondii* Torr. & Gray)—Coast of Texas and the Lower Rio Grande.

22. SOLIDAGO L. (GOLDEN-ROD.)

Perennial herbs, with mostly wand-like stems, nearly sessile (never heart-shaped) stem leaves, small racemed or clustered radiate heads (flowers of both disk and ray yellow), pistillate rays, appressed involucral bracts mostly destitute of herbaceous tips, small naked receptacle, many-ribbed nearly terete achenes, and a simple pappus of equal capillary bristles.

§ 1. VIRGAUREA. *Rays mostly fewer than the disk-flowers: heads all more or less pedicelled.*

* *Bracts of the much imbricated and rigid involucre with abruptly spreading herbaceous tips: heads in clusters or glomerate racemes disposed in a dense somewhat leafy and interrupted wand-like compound spike.*

1. **S. petiolaris** Ait. Minutely hoary or downy: stem strict, simple, 3 to 9 dm. high: leaves small, 1 to 5 cm. long, oval or oblong, mucronate, veiny, rough-ciliolate; the upper entire and abruptly very short-petioled; the lower often serrate and tapering to the base: heads few, in a wand-like raceme or panicle, on slender bracted pedicels: rays about 10, elongated: bracts of the pubescent involucre lanceolate or linear-awl-shaped, the outer loose and spreading, more or less foliaceous.—Extending from the Gulf States into Texas. Var. ANGUSTA Gray has greener glabrate narrower leaves, nearly all entire, the lower sometimes 7.5 to 10 cm. long and tapering into a margined petiole.—Near Fredericksburg, Gillespie County (*Thurber*).

* * *Involucral bracts without green tips and wholly appressed.*

+ *Heads small (not over 6 mm. long), clustered along the stem in the axils of the feather-veined leaves, or the upper forming a thyrsus: achenes pubescent.*

2. **S. cæsia** L. Smooth: stem terete, mostly glaucous, at length much branched and diffuse: leaves lanceolate or oblong-lanceolate, serrate, pointed, sessile: heads in very short clusters or somewhat racemose-panicled on the branches.—A common species of the Atlantic States, extending into Texas. Var. PANICULATA Gray is paniculately branched above, smaller-leaved, and with copious flowers, the clusters of heads becoming racemose-paniculate toward the end of the branches.

+ + *Heads mostly large, many-flowered, forming an erect terminal thyrsus: leaves feather-veined, numerous, short, sessile, entire, uniform in size and shape.*

3. **S. Bigelovii** Gray. Cinereous-puberulent, 6 dm. high: leaves oval and oblong, mostly obtuse at both ends: thyrsus rather loose: involucre broad: achenes minutely pubescent or glabrate.—Mountains of western Texas. Var. WRIGHTII Gray has sometimes narrower leaves, and a simple short thyrsus of comparatively few heads.

4. **S. Lindheimeriana** Scheele. Less puberulent: leaves lanceolate or oblong, more acute: heads narrower and more densely clustered: achenes glabrous.—On rocky bluffs and dried out stream beds, central and southern Texas.

+++ *Heads small or middle-sized (large in no. 6), panicled or somewhat thyrsoidal, not in a terminal corymbiform cyme.*

++ *Leaves veiny, not 3-ribbed, but sometimes obscurely triple-nerved.*

= *Heads small, in a narrow virgate panicle: involucral bracts thin, acute: leaves nearly entire.*

5. **S. stricta** Ait. Very smooth throughout: stem strict, simple, wand-like, 6 to 12 dm. high, slender, beset with small and entire appressed lanceolate-oblong thickish leaves, gradually reduced upwards to mere bracts; the lowest oblong-spatulate: heads crowded in a very narrow compound spicate raceme: rays 5 to 7. (*S. virgata* Michx.)—A species of the Gulf States, represented along the Texan coast by var. ANGUSTIFOLIA Gray, which has narrower (and the lower longer) leaves, and the clusters of the strict panicle often more racemiform and secund.

= = *Heads middle-sized, in a thyrsoid panicle: involucral bracts rather firm, obtuse: leaves entire or little serrate, smooth.*

6. **S. speciosa** Nutt. Stem stout, 9 to 18 dm., smooth: leaves thickish, smooth with rough margins, oval or ovate, slightly serrate, the uppermost oblong-lanceolate, the lower contracted into a margined petiole: heads somewhat crowded in numerous erect racemes, forming an ample pyramidal or thyrsiform panicle: peduncles and pedicels rough-hairy: bracts of the cylindrical involucre oblong: rays about 5, large.—A moist or fertile ground woodland species of the Atlantic States, represented on the sandy open and dry ground of Texas by the following varieties: var. ANGUSTATA Torr. & Gray, a dwarf form, with the racemes short and clustered, forming a dense interrupted or compound spike; and var. RIGIDIUSCULA Torr. & Gray, a form of the preceding variety, with more rigid and rougher-edged small leaves.

= = = *Heads very small, in slender spreading secund clusters forming a mostly broad and short panicle: leaves entire or nearly so.*

7. **S. odora** Ait. (SWEET GOLDEN-ROD.) Smooth or nearly so throughout: stem slender, 6 to 9 dm. high, often reclined: leaves linear-lanceolate, entire, shining, pellucid-dotted: racemes spreading in a small one-sided panicle: rays 3 or 4, rather large.—Dry or sandy soil, eastern and southern Texas.

8. **S. tortifolia** Ell. Stem scabrous-puberulent, 6 to 9 dm. high: leaves linear, short, commonly twisted, roughish-puberulent or glabrate: rays very short.—Dry sandy soil, extending from the Gulf States into Texas.

= = = = *Heads small or middle-sized, racemosely paniculate: leaves broad or ample, veiny, at least the lower serrate: involucral bracts obtuse.*

9. **S. patula** Muhl. Stem strongly angled, smooth, 6 to 12 dm. high: leaves 10 to 20 cm. long, ovate, acute, serrate, pale, very smooth and veiny underneath, but the upper surface very rough, like shagreen: racemes rather short and numerous on the spreading branches: heads rather large.—In wet soil extending into Texas from the Atlantic States.

10. **S. rugosa** Mill. Rough-hairy, especially the very leafy stem, 3 to 18 dm. high: leaves ovate-lanceolate, elliptical or oblong, often thickish and very rugose: racemes spreading: involucral bracts linear: rays 6 to 9; the disk-flowers 4 to 7. (*S. altissima* Torr. & Gray, not L.)—In moist or dry ground, extending into Texas from the Atlantic States.

11. **S. ulmifolia** Muhl. Stem smooth, the branches hairy: leaves thin, elliptical-ovate or oblong-lanceolate, pointed, tapering to the base, loosely veined, beset with soft hairs beneath: racemes panicled, recurved-spreading: involucral bracts lanceolate-oblong: rays about 4.—Moist woodlands and copses, extending into Texas from the

Atlantic States. A Texan form is var. MICROPHYLLA Gray, which is reduced and rather rigid, with lower leaves 5 cm. long, and upper reduced to 1 cm., obtuse, obscurely serrate.

12. **S. Boottii** Hook. Smooth or scabrous-pubescent or below hirsute, slender, often branched, 6 to 15 dm. high: leaves rather finely serrate, ovate to oblong-lanceolate, pointed; the upper small, oblong to narrowly lanceolate, often entire: heads loosely racemose: rays 1 to 5 or none.—Dry ground, extending into Texas from the Southern States.

++++ Leaves more or less plainly 3-ribbed (lateral ribs almost obsolete in no. 18): heads in one-sided spreading or recurved racemes, forming an ample panicle.

=Smooth and glabrous, at least the stem and bright green leaves.

13. **S. Missouriensis** Nutt. Smooth throughout, 3 to 9 dm. high: leaves firm and rather rigid, linear-lanceolate, or the lower broadly lanceolate, tapering to both ends, with very rough margins, the teeth (if any) sharp and rigid: heads and dense crowded racemes forming a crowded and flat corymb-like panicle: involucral bracts thickish.—Dry prairies throughout the State.

14. **S. serotina** Ait. Stem stout, 6 to 21 dm. high, smooth, often glaucous: leaves thinner, quite smooth both sides, lanceolate, taper-pointed, very sharply serrate (except the narrowed base), rough-ciliate: the ample panicle pubescent: involucral bracts thin, chiefly linear.—Moist or rich soil throughout the State, passing into var. GIGANTEA Gray, which is commonly tall, 15 to 24 dm. high, with leaves more or less pubescent or hispidulous beneath.

==Pubescent (at least the stem) or hispidulous-scabrous.

15. **S. Canadensis** L. Stem rough-hairy, tall and stout, 9 to 18 dm. high: leaves lanceolate, pointed, sharply serrate (sometimes almost entire), more or less pubescent beneath and rough above: heads small: rays very short.—Common throughout the State. Exceedingly variable in the roughness and hairness of the stem and leaves, the latter oblong-lanceolate or elongated linear-lanceolate. Var. PROCERA Torr. & Gray has leaves whitish-woolly beneath; var. SCABRA Torr. & Gray has leaves very rough above, often entire, rugose-veined; var. CANESCENS Gray, of southwestern Texas, has the stem and both surfaces of the narrow and commonly entire leaves canescent with soft and fine pubescence.

16. **S. nemoralis** Ait. Clothed with a minute and close grayish-hoary (soft or roughish) pubescence: stem simple or corymbed at summit, 1.5 to 7.5 dm. high: leaves oblanceolate or spatulate-oblong, the lower somewhat crenate-toothed and tapering into a petiole: racemes numerous, dense, at length recurved, forming a large and crowded compound raceme or panicle which is usually turned to one side: involucral bracts linear-oblong, appressed: rays 5 to 9.—Dry hills or sterile soil, throughout Texas.

17. **S. radula** Nutt. Stem and oblong or obovate-spatulate leaves rigid and very rough, not hoary, the upper sessile: involucral bracts oblong, rigid: rays 3 to 6: otherwise nearly as in the last.—Dry hills and prairies, extending into Texas from the western Mississippi States.

18. **S. sparsiflora** Gray. Scabro-puberulent, somewhat cinereous, leafy into the narrow and strict branches of the panicle: leaves all small (the larger hardly 2.5 cm. long), lanceolate-linear, rather acute at both ends, rigid, entire, with lateral ribs and veins almost obsolete: heads somewhat scattered or few in the short imperfectly racemiform and somewhat secund clusters, 6 mm. long: rays to 6 to 10, little surpassing the disk.—Llano Estacado, northwestern Texas.

+++++ Heads in a compound terminal corymb, not at all racemose: leaves mostly with a strong midrib.

++ Leaves not 3-nerved.

19. **S. rigida** L. Rough and somewhat hoary with a minute pubescence: stem stout, 6 to 15 dm. high, very leafy: corymb dense: leaves oval or oblong, copiously

feather-veined, thick and rigid: the upper closely sessile by a broad base, slightly serrate, the uppermost entire: heads large, over 30-flowered: the rays 7 to 10.—Dry soil throughout Texas. Varies with smaller heads, looser inflorescence, and greener more scabrous leaves.

20. **S. corymbosa** Ell. Stem and leaves (except their margins) quite smooth and glabrous, green: heads 6 to 10 mm. long, in looser inflorescence: otherwise as in the last.—A rather local species of the Gulf States, and said to occur in Texas.

++ ++ *Leaves more or less 3-nerved, linear or linear-lanceolate, rigid and punctate.*

21. **S. nitida** Torr. & Gray. Stem 6 to 9 dm. high, very smooth except the minutely hirsute summit and inflorescence: heads numerous in the corymbiform cyme, about 14-flowered: rays 2 or 3, large: involucral bracts narrowly oblong: achenes 10-nerved.—Dry pine woods and barrens of western Louisiana and Texas.

22. **S. pumila** Torr. & Gray. Dwarf, many-stemmed from a woody branching and cespitose caudex, glabrous throughout; cyme glomerate-fastigiate: heads narrowly oblong, 5 to 8-flowered: rays 1 to 3, short: involucral bracts rigid, somewhat keeled, and with small green tips: achenes 5-nerved.—Rocky dry places, northwestern Texas.

§ 2. EUTHAMIA. *Corymbosely much branched: heads small, sessile, in little clusters crowded in flat-topped corymbs; the losely appressed involucral bracts somewhat glutinous: rays 6 to 12, short, more numerous than the disk-flowers: leaves narrow, entire, sessile.*

23. **S. tenuifolia** Pursh. Slender, smooth but resinous-atomiferous and glutinous: leaves very narrowly linear, mostly 1-nerved, dotted: heads obovoid-club-shaped, in numerous clusters of 2 or 3, disposed in a loose corymb: rays 6 to 12: disk-flowers 5 or 6.—Extending into Texas from the Atlantic States.

24. **S. leptocephala** Torr. & Gray. With more simple branches, wholly smooth and glabrous except the margins of the leaves, which have a prominent midrib, very obscure lateral veins, and no apparent veins: involucral bracts and heads narrower: rays 8 to 10: disk-flowers 3 or 4.—Low grounds, western Louisiana and Texas.

23. BELLIS Tourn. (DAISY.)

Low herbs, our native species leafy-stemmed, with many-flowered radiate heads, numerous pistillate rays, herbaceous equal involucral bracts in about 2 rows, conical naked receptacle, and obovate flattened wingless achenes without any pappus.

1. **B. integrifolia** Michx. (WESTERN DAISY.) Diffusely branched, 1 to 3 dm. high, smoothish: leaves lanceolate or oblong, the lower spatulate-obovate: heads on slender peduncles: rays pale violet-purple.—Low grounds, extending into Texas (at least as far west as Gillespie County) from the southern Mississippi States.

24. APHANOSTEPHUS DC.

Leafy-stemmed branching pubescent herbs, with solitary terminal daisy-like heads, white to violet-purple rays, broadly lanceolate involucral bracts in few series (the outer shorter), and prismatic achenes, the broad truncate apex bearing a short coroniform pappus; otherwise as *Bellis*.

* *Pappus a very short crown with a ciliate-fringed edge: base of corolla-tube seldom thickened.*

1. **A. ramosissimus** DC. Erect or at length diffuse, slender, hispidulous-pubescent: upper leaves linear or lanceolate, entire or few-toothed; lower laciniate-pinna-

tifid or incised: achenes mostly terete and even, the ribs or nerves few and mostly obscure.—Rocky and sandy prairies of eastern and southern Texas.

2. **A. humilis** Gray. Low and diffuse, soft-pubescent and cinereous: leaves rarely entire, often pinnatifid: achenes shorter and more distinctly costate-angulate.—Southern and western borders of Texas.

* * *Pappus more conspicuous and dentate or laciniate: base of corolla-tube in age prominently thickened and indurated, long-persistent on the strongly angulate-costate achene.*

3. **A. Arkansanus** Gray. Diffuse, 3 dm. high: leaves oblong-spatulate to broadly lanceolate, the lower often toothed or lobed: rays about 12 mm. long: pappus mostly obtusely 4 or 5-lobed.—Plains of eastern and southern Texas. A Texan form is var. HALLII Gray, which is somewhat smaller, with leaves varying from entire to pinnately parted, and the pappus-crown more conspicuous and deeply cleft into 4 or 5 unequal subulate-acuminate lobes.

25. KEERLIA Gray.

Diffusely and slenderly branched leafy-stemmed herbs, with small paniculate heads on almost capillary peduncles, white or purple rays, oblong entire sessile leaves, narrowly campanulate or turbinate involucre with thin membranaceous scarious-margined bracts imbricated in a few series and of unequal length, flat receptacle, obovate and compressed 2 or 3-nerved achenes, and minute coroniform pappus (or evanescent from the mature achenes).

1. **K. bellidifolia** Gray & Engelm. Annual, pubescent, effusely branched from near the base: lower leaves obovate or spatulate; uppermost somewhat linear: involucre only 2 lines long: rays 4 to 15, blue.—Fertile soil, central Texas.

2. **K. effusa** Gray. Perennial, taller (often 6 dm. high), with simple stem branching above into an effuse panicle: leaves hispid (as well as the stem), rigid and scabrous, oblong, mostly with broad sessile base: heads very numerous: rays 4 to 7, white.—Hillsides, central Texas.

26. CHÆTOPAPPA DC.

Low branching annuals, with narrow entire leaves, solitary terminal heads, white or purple rays, several-flowered heads (disk-flowers often sterile), involucral bracts imbricated in 2 or more rows (the outer shorter), flat naked receptacle, fusiform or compressed achenes, and pappus of 5 or fewer thin nerveless scales alternating with rough bristly awns, or these wanting.

1. **C. asteroides** DC. Slender, 5 to 25 cm. high, pubescent: involucre 4 mm. long, rather narrow: rays 5 to 12: disk-flowers 8 to 12: achenes slender, little compressed, obscurely few-nerved, pubescent, all the central ones sterile and often awnless: scales of the pappus very thin and hyaline, narrowly oblong, not rarely lacerate or cleft.—Dry ground, eastern and central Texas. In eastern Texas is var. IMBERBIS Gray, with awns of the pappus wanting in all the flowers, and the pappus-scales rather broader and sometimes more or less united.

2. **C. Parryi** Gray. More rigid, 20 cm. or more high: leaves hispidulous and glabrate: involucre 6 mm. long, turbinate: rays 6 or 7: achenes quite glabrous; the fertile ones fusiform and somewhat compressed, 4-nerved, with a pappus of 4 or 5 cuneiform-quadrate scales which are laciniately fimbriate at the truncate apex, and of a few or sometimes solitary more delicate awns, these occasionally longer than the scales, sometimes wanting; disk achenes mostly awnless.—On the Rio Grande.

3. **C. modesta** Gray. Less slender and pubescence more hirsute than in no. 1: involucre broadly campanulate: rays 9 to 20: disk-flowers 40 to 60, all but the central fertile: achenes oblong or linear, much compressed, pubescent when young, with merely marginal nerves: pappus of 5 oblong erose-truncate at length subcoriaceous scales, alternating with as many rigid awns.—Dry ground, southern Texas.

27. DICHÆTOPHORA Gray.

A small daisy-like winter-annual, with white or rose-colored fertile rays, somewhat uniserial many-flowered involucre with lanceolate bracts of equal length, strongly convex or low conical receptacle, achenes surrounded by an almost orbicular firm wing, its edge and the body of the achene glochidiate-hispid, and pappus of 2 divergent awns about half the length of the achene, and of several minute scales shorter than and concealed by the bristly hairs of the achene.

1. **D. campestris** Gray. At first acaulescent with a scapiform peduncle (2.5 to 7.5 cm. high), at length with leafy branches terminated by a slender single-headed peduncle: leaves spatulate, entire, somewhat hirsute: head 4 to 6 mm. high: rays 16 to 20.—Southern border of Texas.

28. BOLTONIA. L'Her.

Perennial and bushy-branched smooth herbs, pale green and Aster-like, with thickish chiefly entire leaves, white or purplish pistillate rays and yellow disk, many-flowered heads, bracts of the hemispherical involucre appressed and imbricated somewhat in two rows (with narrow membranaceous margins), conical or hemispherical naked receptacle, and very flat obovate or inversely heart-shaped achenes margined with a callous wing (or in the ray 3-winged) and crowned with a pappus of several minute bristles and usually 2 to 4 longer awns.

1. **B. diffusa** L'Her. Stem diffusely branched: leaves lance-linear, those on the branchlets very small and awl-shaped: heads small, panicled on the slender branches: rays short, mostly white: pappus of several very short bristles and two short awns.—Low grounds, extending into Texas from the Gulf States.

29. PSILACTIS Gray.

Minutely pubescent or glandular or glabrate annuals, with slender and loosely paniculate-branching stems, pinnatifid or incised lower leaves tapering into a petiole, narrow often entire upper ones, small heads terminating the branches and with violet or purplish or white usually infertile rays, bracts of the hemispherical involucre imbricated in 2 or 3 series with herbaceous tips or the outer herbaceous, pubescent narrow achenes, those of the ray sometimes with an obscure ring in place of pappus, those of the disk bearing a single series of soft capillary bristles.

1. **P. asteroides** Gray. Scabro-puberulent, 3 to 9 dm. high: lower leaves spatulate or oblong, sometimes laciniate-pinnatifid, sometimes barely dentate; upper mostly linear and entire: involucral bracts lanceolate or linear.—Southwest Texas.

30. ASTER L. (STARWORT. ASTER.)

Mostly perennial herbs, with corymbed, panicled, or racemose heads, white, purple or blue fertile rays and yellow disk often changing to purple, many-flowered heads, involucral bracts more or less imbricated and usually with herbaceous or leaf-like tips, flat receptacle, more or less flattened achenes, and a (usually) simple pappus of capillary bristles.

§ 1. MEGALASTRUM. *Head very large (2.5 cm. in diameter exclusive of the large and numerous rays): involucral bracts imbricated in two or three unequal series, somewhat herbaceous: achenes 2 to 4-nerved: pappus-bristles unusually coarse and rigid (white in ours).*

1. **A. Wrightii** Gray. Viscous-pubescent, 3 dm. or more high: leaves oblong-spatulate, setiferous-mucronate, entire, or with one or two teeth, 3.5 cm. long including the margined petiole: heads pedunculate and solitary, terminating rigid branches: involucral bracts ovate-lanceolate or the inner narrower, rather lax, viscid, the caudate-acuminate tips surpassing the disk: rays purple, narrowly oblong, 30 to 40, 16 to 18 mm. long: pappus of unequal strongly denticulate bristles, the larger almost aristiform. (*Townsendia Wrightii* Gray.)—Rocks and stony hills on the Rio Grande in southwestern Texas.

§ 2. HELEASTRUM. *Heads smaller: involucral bracts rigid, more or less leafy, nearly equal: achenes 8 to 10-nerved: pappus simple, coarse and rigid, the stronger bristles somewhat clavate, ferruginous or tawny.*

2. **A. paludosus** Ait. Glabrous or nearly so: stems 3 dm. high: leaves linear, entire: heads 12 mm. high, rather few, racemose or spicate: outer involucral bracts lax, leafy: rays purple.—Wet pine barrens, extending into Texas from the Gulf States.

§ 3. ASTER proper. *Involucral bracts imbricated in various degrees, with herbaceous or leaf-like summits, or the outer entirely foliaceous: rays numerous: pappus simple, soft and nearly uniform: achenes flattened.*

* *Involucre and usually the branchlets viscidly or pruinose-glandular, well-imbricated or loose: pubescence not silky: leaves entire (or the lower with few teeth), the cauline all sessile or clasping: rays showy, violet to purple.*

3. **A. Fendleri** Gray. Rigid, 3 dm. high or less: leaves firm, linear, 1-nerved, hispid-ciliate, 2.5 cm. long or mostly much less: heads scattered, 6 mm. high: involucral bracts linear-oblong, obtuse or the inner acute, not squarrose.—Plains and sand-hills of northwestern Texas.

4. **A. oblongifolius** Nutt. Minutely glandular-puberulent, much branched above, rigid, paniculate-corymbose, 3 to 6 dm. high: leaves narrowly oblong or lanceolate, mucronate-pointed, partly clasping, thickish, 2.5 to 5 cm. long by 4 to 10 mm. wide: involucral bracts nearly equal, broadly linear, spreading above, appressed at base: rays violet-purple: achenes canescent.—Rocky banks and bluffs, extending into Texas from the Atlantic States. Extending to the western borders of Texas, in drier and more exposed places, is var. RIGIDULUS Gray, a low form, with more rigid and hispidulous scabrous leaves.

* * *Leaves whitened, silvery-silky both sides, all sessile and entire, mucronulate: involucre imbricated in 3 to several rows: rays showy, purple-violet.*

5. **A. sericeus** Vent. Stems slender, branched: leaves silver-white, lanceolate or oblong: heads mostly solitary, large, with 20 to 30 rays, terminating the short branchlets: bracts of the globular involucre similar to the leaves, spreading except the short coriaceous base: achenes smooth, many-ribbed.—Prairies and dry banks, extending into Texas from the Mississippi States.

6. **A. phyllolepis** Torr. & Gray. More slender and with long simple branches, merely canescent: leaves small; lower cauline 2.5 cm. long or more, oblong; those

of the branches elliptical to oblong-lanceolate, 6 to 12 mm. long; uppermost and the large ovate or ovate-lanceolate foliaceous portion of the involucral bracts cuspidate-acuminate, glabrate, conspicuously hirsute.—Prairies of western Louisiana and Texas.

* * * *Leaves entire, the lower not heart-shaped, the cauline all with sessile and cordate-clasping base, the auricles generally meeting around the stem.*

7. **A. patens** Ait. Rough-pubescent: stem loosely panicled above, 3 to 9 dm. high, with widely spreading branches, the heads mostly solitary, terminating slender branchlets: leaves oblong-lanceolate or ovate-oblong, often contracted below the middle, rough, especially above and on the margins: heads 12 mm. broad, with showy deep blue-purple rays: bracts of the minutely roughish involucre with spreading pointed tips: achenes silky.—Dry ground, extending from the Atlantic States into Texas at least as far west as Gillespie County. A common Texas form is var. GRACILIS Hook., which is lower and more slender, and with heads and oblong to oval leaves smaller and more scabrous.

* * * * *Lower leaves heart-shaped and petioled: no glandular or viscid pubescence: heads with short and appressed green-tipped bracts, mostly numerous, racemose or panicled.*

8. **A. azureus** Lindl. Stem rather rough, erect, racemose-compound at summit, the branches slender and rigid: leaves rough, entire or slightly serrate; the lower ovate-lanceolate or oblong, heart-shaped, on long often hairy petioles; the others lanceolate or linear, sessile, on the branches awl-shaped: heads middle-sized: involucre inversely conical: rays bright blue.—Prairies and border of woods, extending from the Atlantic States into Texas, where there are forms with hardly a cordate leaf.

9. **A. Drummondii** Lindl. Pale with fine gray pubescence: leaves conspicuously serrate, cordate to cordate-lanceolate, mostly on margined petioles, the uppermost lanceolate and sessile: heads small: involucral bracts acute or acutish: rays pale blue or nearly white.—Open grounds and borders of woods, extending from the Mississippi States to western Texas.

* * * * * *Without heart-shaped petioled leaves, the radical and lower all acute or alternate at base: not glandular, or viscid, or silky-canescent.*

\+ *Smooth and glabrous throughout (or nearly so), and usually pale and glaucous: involucral bracts closely imbricated, firm and whitish-coriaceous below, green-tipped: leaves firm, usually entire.*

10. **A. lævis** L. Rather stout, 6 to 12 dm. high: leaves thickish, lanceolate or ovate-lanceolate, chiefly entire, the upper more or less clasping by an auricled or heart-shaped base, those on the branchlets reduced to rigid subulate bracts: heads in a close panicle: bracts of the short-oboyoid or hemispherical involucre with short abrupt green tips: rays sky-blue.—Borders of woodlands throughout Texas.

11. **A. virgatus** Ell. Slender, strict and simple, with few or several racemose or terminal heads like those of the last: leaves lanceolate or linear, the lower usually long and narrow, the uppermost reduced to rigid subulate bracts.—Extending from the Gulf States into Texas.

\+\+ *Hoary-pubescent or hirsute: herbaceous tips of the involucral bracts squarrose or spreading: cauline leaves small, linear, entire, scarcely narrowed at the sessile or partly clasping base: heads numerous, small, racemose.*

12. **A. multiflorus** Ait. Pale or hoary with minute close pubescence, 3 dm. high, much branched and bushy: the heads much crowded on the spreading racemose branches: leaves rigid, crowded, spreading, with rough or ciliate margins, the uppermost passing into the spatulate obtuse bracts: heads 4 to 6 mm. long: rays white or rarely bluish, 10 to 20.—Dry or sterile ground, common throughout Texas.

\+\+\+ *Bracts glabrous, closely imbricated (the outer regularly shorter), not coriaceous, with short appressed green tips: branches slender, divaricate or divergent: leaves lanceolate to subulate: heads small, 4 to 6 mm. high, numerous.*

13. **A. dumosus** L. Smooth or nearly so, 3 to 9 dm. high, the heads scattered and terminating minutely foliose slender branchlets: leaves linear or the upper oblong, crowded, entire, with rough margins: involucral bracts linear-spatulate, obtuse, in 4 to 6 rows: rays pale purple or blue.—Border of woods, extending from the Atlantic States into Texas. A variable species, in the Southern States passing into var. SUBULÆFOLIUS Torr. & Gray, a rather rigid form, with ascending flowering branches, on which the somewhat large heads are often subracemosely paniculate and bearing erect or little spreading subulate-linear or linear-oblong very small leaves.

14. **A. lateriflorus** Britton. More or less pubescent, much branched: leaves lanceolate or oblong-lanceolate, tapering or pointed at each end, sharply serrate in the middle: heads racemosely unilateral upon very short minutely leafy branchlets: involucral bracts linear, acute or rather obtuse, imbricated in 3 or 4 rows. (*A. diffusus* Ait. *A. miser* of most American authors.)—Extending from the Atlantic States into Texas.

15. **A. racemosus** Ell. Minutely scabrous-pubescent along the numerous slender erect or ascending branches: leaves rigid, linear, small, acute, entire: heads small, little over 4 mm. high, somewhat spicately or more loosely racemose and unilateral: rays purplish, only 2 to 4 mm. long.—A species of the Gulf States, probably collected in Texas by Lindheimer.

++++ *Bracts narrow, in several lengths, the erect green tips not dilated: branches loosely paniculate: stem leaves sessile, but the base not cordate or auriculate.*

16. **A. salicifolius** Ait. Glabrous or nearly so: stem 6 to 24 dm. high, much branched: leaves long-oblong to narrowly lanceolate, firm, pointed, serrate or entire, often scabrous: heads about 8 mm. high, disposed to be thyrsoid or racemose-clustered: involucre of rather firm linear well-imbricated bracts with acute or obtusish green tips: rays purplish, rarely white. (*A. carneus* of many authors.)—A low ground species of the Atlantic States, extending to western Texas. Var. SUBASPER Gray, is a rigid scabrous form, with contracted leafy inflorescence, the broad heads usually leafy-bracteate and the broader involucral bracts often obtuse, which extends from the Mississippi States into Texas. An exclusively Texan form, on rocky banks, is var. CÆRULESCENS Gray, which is strict and rigid, with the rather large heads in a more naked inflorescence, the leaves all entire, and the involucral bracts with narrower acute or acutish tips.

§ 4. DŒLLINGERIA. *Pappus manifestly double, the inner of long capillary bristles (some thickened at top), the outer of very short and rigid bristles: involucral bracts short, without herbaceous tips: heads small, corymbose or solitary: rays rather few, white: leaves not rigid, veiny.*

17. **A. umbellatus** Mill. Smooth, leafy to the top, 6 to 21 dm. high: leaves lanceolate, elongated, taper-pointed and tapering to the base, 7.5 to 15 cm. long: heads very numerous in compound flat corymbs: involucral bracts rather close, obtusish, scarcely longer than the achenes. (*Diplopappus umbellatus* Torr. & Gray.)—A species of the Atlantic States, represented in the low pine-barrens of Texas by var. LATIFOLIUS Gray, which has the shorter leaves ovate-lanceolate to ovate, less narrowed or even rounded at base (*D. amygdalinus* Torr. & Gray.)

§ 5. IANTHE. *Pappus less distinctly double, the inner bristles not thickened at top, the outer shorter: involucral bracts well imbricated, appressed, without herbaceous tips: rays violet: achenes narrow, villous: leaves numerous, rigid, small, linear, 1-nerved and veinless.*

18. **A. linariifolius** L. Stems 7.5 to 50 cm. high, puberulent, several from a woody root: heads solitary or terminating simple branches, 12 mm. high: leaves about 2.5 cm. long, rough-margined, passing above into the rigid acutish involucral bracts: achenes flat, with strong marginal nerves and sometimes a single lateral nerve. (*Diplopappus linariifolius* Hook.)—Dry soil, common in the Atlantic States, and extending into Texas. **Rays rarely white.**

19. **A. ericæfolius** Rothrock. Low, strigosely canescent or hispidulous and glandular-scabrous, much branched: branches erect or diffuse, terminated by somewhat pedunculate smaller and narrower heads (6 to 8 mm. high): leaves commonly hispid-ciliate, erect or little spreading, 6 to 12 mm. long; the lowest spatulate, the upper from linear to nearly filiform: involucral bracts lanceolate, acute or apiculate, thinnish: achenes less compressed, lightly few-nerved. (*Diplopappus ericoides* Torr. & Gray.)—Dry hills, throughout Texas. Rays sometimes white.

§ 6. ORTHOMERIS. *Pappus simple: involucral bracts imbricated, appressed, without herbaceous tips, often scarious-edged or dry.*—Involucre and herbage smooth and glabrous, and plants more or less woody.

20. **A. spinosus** Benth. Base of stem usually persistent and woody, sending up (9 to 24 dm. long) slender and lithe striate green branches, resolved into paniculate branchlets, terminated by small heads: stem leaves small, more or less fleshy, linear or spatulate-lanceolate, entire, mostly few and fugacious, some of them with soft subulate spines in or above their axils; those of the branchlets reduced to subulate scales or wanting: involucre 4 mm. high, of subulate-lanceolate bracts: rays white, 4 mm. long: achenes glabrous.—Apparently very common in southwestern Texas. Dr. Havard speaks of it as "that most common of bushy weeds."

21. **A. Palmeri** Gray. Decidedly shrubby, 9 to 12 dm. high, very much branched throughout: branchlets slender, striate-angled, terminated by the small heads: leaves apparently not fleshy, narrowly linear, entire: involucre barely 6 mm. high, of narrowly oblong obtuse bracts: rays white, 2 mm. long: achenes sericeous-pubescent.—About Corpus Christi Bay; also reported from Eagle Pass on the Rio Grande.

§ 7. OXYTRIPOLIUM. *Involucre as in § 6: pappus simple, fine and soft: glabrous annuals, bearing numerous small heads and narrow entire leaves.*

22. **A. exilis** Ell. Mostly slender and diffusely branched above: principal stem leaves linear, 7.5 to 10 cm. long, 2 to 4 mm. wide; the lowest sometimes broader and lanceolate, rarely with a few serratures: heads 6 mm. high: involucral bracts linear-subulate or more lanceolate and acuminate: rays bluish or purple, rather conspicuous.—Throughout Texas in subsaline or moist soil.

§ 8. MACHÆRANTHERA. *Involucre imbricated in many rows, the bracts linear, coriaceous below, with foliaceous spreading tips: rays numerous and conspicuous, violet or bluish-purple: pappus copious and simple, of rather rigid and unequal bristles.* In ours the involucre is from nearly glabrous to canescent, and the achenes densely pubescent.

* *Leaves at most incisely dentate.*

23. **A. gymnocephalus** Gray. Stem erect, simple or branched, commonly hirsute or hispidulous, equally leafy to the top: branches bearing solitary usually naked-pedunculate heads: leaves spatulate-oblong to lanceolate; cauline short, usually obtuse, copiously serrate or denticulate with spinulose-setigerous teeth: involucral bracts linear-subulate with squarrose tips: rays purple.—Dry ground, extreme southwestern Texas.

24. **A. canescens** Pursh. Commonly 3 to 6 dm. high and loosely much branched, bearing numerous paniculate heads, sometimes dwarf and with simple contracted inflorescence, pale and cinereous-puberulent or minutely canescent, or greener and glabrate: leaves lanceolate to linear or the lower spatulate, from entire to irregularly dentate, or occasionally laciniate, the rigid teeth mostly with mucronate-setulose tip: heads from 8 to 12 mm. high: involucral bracts with the green tips short and spreading: rays violet. (*Machæranthera canescens* Gray.)—Open and sterile ground and sandy stream-banks, extending from the northern Great Plains to W. Texas. An exceedingly variable species. A common western Texan variety is var. VIRIDIS Gray, a green hardly rigid form, of less arid situations, either sparsely scabro-puberulent or almost glabrous, with looser involucral bracts, either with short and ascending or longer and squarrose-spreading tips. (*M. canescens*, var. *glabra* Gray.)

* * *Leaves 1 to 3-pinnately cleft or parted.*

25. **A. tanacetifolius** HBK. Pubescent, often rather viscid, very leafy, 3 to 6 dm. high: lowest leaves 2 to 3-pinnately parted; uppermost simply pinnatifid, or on the flowering branchlets entire; lobes short, setulose-mucronate: heads 12 mm. high: involucral bracts narrowly linear, with slender spreading foliaceous tips, or the outermost almost wholly foliaceous: rays numerous, 12 mm. long or more, bright violet: achenes villous. (*Machæranthera tanacetifolia* Nees.)—Moist ground, throughout central and western Texas.

31. ERIGERON L. (FLEABANE.)

Herbs, with entire or toothed and generally sessile leaves, solitary or corymbed naked-pedunculate heads, yellow disk, white or purple very numerous and slender pistillate rays, narrow mostly equal and little imbricated involucral bracts which are never coriaceous, foliaceous, or green-tipped, flat or convex naked receptacle, flattened usually pubescent and 2-nerved achenes, and pappus a single row of capillary bristles, with minuter ones intermixed, or with a distinct short outer pappus of little bristles of chaffy scales.

§ 1. CÆNOTUS. *Rays inconspicuous, in several rows scarcely longer than the simple pappus: annuals.*

1. **E. Canadensis** L. (HORSE-WEED. BUTTER-WEED.) Bristly-hairy: stem erect wand-like, 3 to 15 dm. high: leaves linear, mostly entire, the radical cut-lobed: heads very numerous and small, cylindrical, panicled: rays white.—A common weed everywhere in open or waste grounds.

2. **E. divaricatus** Michx. Diffuse and decumbent, 7.5 to 30 cm. high: leaves linear or awl-shaped, entire: heads loosely corymbed: rays purple: otherwise like the last.—Open grounds and river-banks, extending from the western Mississippi States to Texas.

§ 2. ERIGERON proper. *Rays elongated, crowded in one or more rows.*

* *Perennial and low from a rootstock or caudex: leaves entire, narrow: involucre somewhat hispidulous: pappus plainly double.*

3. **E. Bigelovii** Gray. Cinereous-hispidulous, diffusely branched from the base, leafy up to the short-pedunculate scattered heads: leaves small, spatulate-lanceolate or upper linear, lowest more spatulate and petioled: involucral bracts rather rigid, lanceolate, acuminate, obviously of 2 or 3 lengths: rays 40 to 50, purple or violet, 6 mm. long: outer pappus of slender subulate scales, about $\frac{1}{3}$ as long as the inner bristles.—On the Rio Grande at the western border of Texas.

* * *Perennial by rosulate offsets borne on apex of creeping rootstocks: leaves commonly serrate or dentate: involucre glabrate: pappus quite simple: rays very narrow and numerous (much over 100).*

4. **E. Philadelphicus** L. Soft-hirsute, 3 to 6 dm. high: leaves oblong, or lowest spatulate or obovate; upper cauline half-clasping, obtuse, sparingly and coarsely serrate or entire: rays pink, about 6 mm. long.—Throughout Texas.

5. **E. quercifolius** Lam. Pubescent with short spreading hairs, sometimes cinereous, about 3 dm. high: radical and lowest cauline leaves obovate or spatulate, from repand to sinuate-pinnatifid: heads smaller: rays barely 4 mm. long, from bluish or purplish to white.—Low grounds, extending from the Gulf States into Texas.

* * * *Perennial by rooting from decumbent or creeping leafy stems: rays very numerous and narrow; heads solitary, slender-peduncled.*

6. **E. repens** Gray. Cinereous-pubescent: stems prostrate or ascending from the slender root; prostrate ones rooting at the nodes: leaves obovate ro broadly spatu-

late with cuneate base tapering into a petiole, obtusely and deeply 5 to 9-toothed or almost lobed: peduncles scapiform, 10 to 20 cm. long: involucre 8 mm. high: rays 6 mm. long, white: pappus simple. (*E. scaposus* Torr. & Gray, not DC.)—Sandy seacoast of southern Texas.

7. **E. flagellaris** Gray. More or less cinereous with fine appressed pubescence: stems slender, diffusely decumbent and flagelliform but leafy, some prostrate, many at length rooting at the apex and proliferous: leaves small, entire; radical spatulate and petioled; those of the branches passing to linear: peduncles 4 to 12.5 cm. long: head barely 6 mm. high: rays white or purplish: pappus double, the outer subulate-setulose.—Banks of streams west of the Pecos.

* * * * *Annuals (sometimes biennials), leafy-stemmed and branching: heads conspicuously radiate: pappus more or less double: leaves entire, sometimes dentate or lower incisely lobed.*

\+ *Rays only 30 or 40, white, not very narrow, barely 6 mm. long, and with pappus as in the disk-flowers: leaves narrow, entire.*

8. **E. modestus** Gray. Much branched from the base, 3 dm. high or less, slender, rigid, cinereous-hirsute or hispid: branches terminated by the small (4 mm. high) slender-pedunculate heads: upper leaves linear and lower narrowly spatulate, about 2.5 cm. long.—Dry and sterile rocky plains, western Texas.

\+ \+ *Rays very numerous (about 100), narrow, with pappus like the disk-flowers: leaves from entire to sparingly lobed.*

9. **E. divergens** Torr. & Gray. Diffusely branched and spreading, cinereous-pubescent or hirsute: leaves linear-spatulate or the upper linear and the lowest broader (these 4 to 8 mm. wide and sometimes laciniately toothed or lobed): heads 4 to 6 mm. high, the white or purplish or sometimes violet rays equally long: involucre hirsute.—Low plains and river-banks, central and western Texas.

10. **E. tenuis** Torr. & Gray. Branched from the root, ascending or erect, somewhat hirsute or pubescent: leaves oblong-spatulate or lanceolate, and the lowest obovate (8 to 12 mm. wide), occasionally few-toothed or sinuate-lobed: heads little over 4 mm. high: involucre nearly glabrous: rays white and purplish.—Extending in low ground from Arkansas and Louisiana to the Lower Rio Grande.

\+ \+ \+ *Rays not excessively numerous or very narrow (4 to 6 mm. long), white or barely purplish-tinged: outer pappus a crown of minute scales, the inner of deciduous fragile bristles, usually wanting in the ray.*

11. **E. strigosus** Muhl. (DAISY FLEABANE.) Stem panicled-corymbose at the summit, roughish like the leaves with minute appressed hairs, or almost smooth: leaves entire or nearly so, the upper lanceolate, scattered, the lowest oblong or spatulate, tapering into a slender petiole: rays white, twice the length of the minutely hairy involucre.—Dry open grounds throughout Texas. Var. BEYRICHII Gray is a slender form, with minute and sometimes almost cinereous pubescence, smaller heads, and rays from white to pale rose-color.

A form from near Pena (Duval County) seems to be intermediate between this species and *E. annuus*. It is low and slender, with a cluster of spatulate more or less dentate or lobed leaves tapering into a long petiole, and long filiform branches bearing small and narrowly linear entire leaves and long-pedunculate solitary heads. The involucre is about as bristly as in *E. annuus*, and much of the pubescence is not appressed.

32. CONYZA Less.

Herbaceous, with small many-flowered heads, narrow involucral bracts in 1 to 3 series, corolla of the female flowers (much more numerous than the perfect ones) reduced to a filiform or short and narrow

tube wholly destitute of ligule, small compressed achenes, and pappus of a single series of soft capillary bristles (sometimes an added outer series of short bristles or scales).

1. **C. Coulteri** Gray. Commonly branched, 3 to 6 dm. high, bearing numerous small heads in a mostly crowded thyrsoid leafy panicle, viscidly pubescent or partly hirsute: stem leaves linear-oblong, the lower spatulate-oblong and with partly clasping base, from dentate to laciniate-pinnatifid: involucre 2 to 4 mm. high, hirsute, considerably shorter than the soft pappus: flowers whitish: perfect flowers only 5 to 7.—Throughout western Texas, in river bottoms, etc.

33. BACCHARIS L. (Groundsel-tree.)

Commonly smooth and resinous or glutinous shrubs, with whitish or yellow diœcious flowers (all tubular), imbricated involucre, corolla of the pistillate flowers very slender and thread-like, of the staminate larger and 5-lobed, tailless anthers, ribbed achenes, and pappus of capillary bristles (scanty and tortuous in the sterile plant, very long and copious in the fertile).

* *Pappus of the fertile flowers very copious and pluriserial, elongated in fruiting, soft: achenes 5 to 10-costate: 3 to 6 dm. high.*

1. **B. Wrightii** Gray. Very smooth and glabrous, diffusely branching, sparsely leaved: slender branches terminated by solitary heads: leaves linear, 1-nerved, small, the uppermost linear-subulate: involucre 8 to 10 mm. high, its bracts lanceolate, gradually acuminate, conspicuously scarious-margined, with a green back: pappus fulvous or sometimes purplish, 4 times the length of the scabrous-glandular 8 to 10-nerved achene.—Western Texas.

2. **B. Texana** Gray. Glabrous, with many nearly simple rigid stems from a woody base, leafy to the top, where it bears a few corymbosely disposed heads: leaves 2.5 to 5 cm. long, linear, 1-nerved, rather rigid: involucre 6 mm. long, of firmer and narrower merely acute bracts: achenes smoother.—Forming large patches in dry prairies.

* * *Pappus of the fertile flowers more or less copious, but uniserial or nearly so, conspicuously elongating in fruit, soft and fine, mostly flaccid and bright white: achenes 10-nerved: shrubs 9 to 36 dm. high.*

3. **B. halimifolia** L. Cauline leaves from dilated-obovate to oblong with cuneate base, attenuate into a petiole, laciniately or angulately 3 to 9-toothed, those of the flowering branchlets becoming lanceolate and mostly entire: heads in pedunculate and paniculate glomerules (3 to 5 together): involucre of male heads only 4 mm. long, of oblong-ovate obtuse bracts; of the female rather longer and narrower, the inner bracts linear-lanceolate and acute.—Along the seacoast from New England to the Rio Grande.

4. **B. salicina** Torr. & Gray. Leaves mostly subsessile, from oblong to linear-lanceolate, sparingly toothed, rarely entire: heads or glomerules pedunculate: involucre of both sexes nearly 6 mm. long, of mainly ovate and acutish bracts.—On the Rio Grande near El Paso.

5. **B. angustifolia** Michx. Rather strict: leaves narrowly linear (larger 5 to 8 cm. long, 2 to 4 mm. wide), entire or with few denticulations; some lower ones broadly lanceolate and more serrate: heads or glomerules short-pedunculate, amply paniculate: involucre 4 mm. long, of oblong-ovate or lanceolate bracts, the outer obtuse, innermost acute.—Brackish marshes along or near the Rio Grande.

** * Pappus of the fertile flowers not flaccid, little if at all elongated in fruit, not very copious: achenes only 5-nerved (occasionally 4-nerved).*

+ Involucral bracts from oblong to linear, rather firm and with green center or costa.

6. **B. Bigelovii** Gray. Stems copiously and loosely branched, 3 to 6 dm. high: leaves somewhat rigid, from linear to oblong and the broader ones sometimes petioled, irregularly serrate, commonly obtuse: heads over 4 mm. high, numerous in a cymose panicle: bristles of the male pappus thickened and barbellate at the tip.—In the Chenate Mountains.

7. **B. Havardi** Gray. Stems copiously branched, slender: leaves hardly at all rigid; lower linear-oblanceolate and tapering into a slender petiole, laciniate-pinnatifid into several irregular slender-subulate lobes; those of the branchlets narrowly linear, 2 or 3-toothed or entire: heads loosely paniculate, only the male known, these barely 4 mm. high: involucral bracts oblong: pappus-bristles rigid, clavellate.—Guadalupe Mountains.

+ + Involucral bracts broader, thin-chartaceous, destitute of green center or distinct costa.

8. **B. glutinosa** Pers. Stems herbaceous above but woody towards the base, 9 to 30 dm. high: leaves elongated-lanceolate, serrate with few or scattered teeth on each side: heads mostly 6 mm. long (or the male smaller), numerous and corymbosely cymose at the summit of comparatively simple stems or branches: involucre yellowish.—Along streams and in moist ground, western Texas.

34. PLUCHEA Cass. (Marsh-fleabane.)

Herbs or shrubs, with alternate pinnately veined leaves, cymosely clustered heads of purplish flowers, flowers all tubular, the central perfect but sterile (with 5-cleft corolla), all the others pistillate and fertile and with a thread-shaped truncate corolla, imbricated involucre, flat naked receptacle, tailed anthers, grooved achenes, and a simple pappus of capillary bristles.

** Pappus of sterile flowers of more rigid bristles thickened at tip: involucre coriaceous: very leafy sericeous-canescent shrubs.*

1. **P. borealis** Gray. (Cachimilla. Arrow-wood.) Much branched shrub, willow-like, with cymulose-glomerate heads, silvery with the very close and fine appressed pubescence: leaves entire, linear-lanceolate, sessile, acute at both ends: outer involucral bracts ovate, obtuse, tomentose.—Sandy banks of streams, along the Upper Rio Grande.

** * Pappus of both kinds of flowers fine and similar, none of the bristles at all thickened at tip: involucral bracts thin: heavy-scented herbs, somewhat pubescent and glandular.*

2. **P. bifrons** DC. Perennial, 6 to 9 dm. high: leaves closely sessile or half-clasping, oblong to lanceolate, sharply denticulate, veiny, 5 to 7.5 cm. long: heads clustered in a corymb: involucral bracts lanceolate.—Wet soil, extending in the low coast country from New Jersey to southern Texas.

3. **P. camphorata** DC. Annual, pale, 6 to 15 dm. high: leaves scarcely petioled, oblong-ovate or lanceolate, thickish, obscurely veiny, serrate: corymb flat: involucral bracts ovate to lanceolate (*P. fœtida* DC.).—In salt marshes or moist saline soil throughout Texas.

35. PTEROCAULON Ell. (Black-root.)

Perennial herbs, tomentose-canescent except the upper face of the sessile pinnately veined leaves (these decurrent on the whole stem, forming wings), small sessile whitish heads spicate at the summit of the

stem and virgate branches, heads and flowers as in *Pluchea*, but involucre of fewer and linear or subulate bracts.

1. **P. virgatum** DC. Root fusiform and fibrose: stem slender, simple or with virgate branches: leaves linear and very acute, entire, or the lower cauline lanceolate and obscurely serrulate: heads narrow, in separated glomerules, forming a virgate and elongated interrupted spike-like inflorescence: involucre appressed-tomentose.—Open pine woods near Houston (*Lindheimer*), and Sutherland Springs, Wilson County (*Palmer*).

36. EVAX Gærtn.

Low densely floccose-woolly annuals, with many-flowered discoid heads, flowers as in *Pluchea* (the central usually sterile), few woolly involucral bracts, convex to subulate chaffy receptacle, the scarious chaff not embracing the smooth dorsally compressed achenes, anthers with tails or acutely sagittate, and no pappus.

* *Chaff of the female flowers naked; of the staminate flowers woolly-tipped and somewhat embracing the flowers: heads aggregated in terminal foliose-involucrate glomerules.*

1. **E. prolifera** Nutt. Rather stout, simple or branching from the base: leaves numerous, small and spatulate: heads cylindraceous or oblong-fusiform, in dense proliferous clusters: staminate flowers each on a filiform stipe representing an abortive ovary.—Dry ground, throughout Texas.

2. **E. multicaulis** DC. Rather slender, diffusely branched from the base: leaves oblanceolate or spatulate: heads globular or ovoid, the capituliform glomerules much smaller and less foliose-involucrate: staminate flowers sessile, without vestige of ovary.—Low ground, throughout Texas. In eastern Texas is var. DRUMMONDII Gray, a slender form with some long woolly hairs on the limb or on the tube of the staminate corollas.

* * *Chaff of the female flowers externally villous-lanate; of the 5 central flowers very woolly and involute around the lower half of the flower: heads axillary.*

3. **E. candida** Gray. Slender, and with commonly simple branches, silvery white throughout with appressed wool: heads usually few in a foliose-involucrate cluster and sessile or nearly so in the axils of the spatulate or lanceolate leaves.—Alluvial or sandy ground, from eastern Texas to the central and northwestern part of the State.

37. ANTENNARIA Gærtn. (EVERLASTING.)

Perennial white-woolly herbs, with entire leaves, corymbed diœcious and discoid heads of yellowish flowers, dry and scarious white or colored imbricated involucre, convex or flat naked receptacle, tailed anthers, terete or flattish achenes, and pappus a single row of bristles (in the fertile flowers capillary, united at base so as to fall in a ring, and in the sterile thickened and club-shaped or barbellate at summit).

1. **A. plantaginifolia** Hook. (PLANTAIN-LEAVED EVERLASTING.) Spreading by offsets and runners, low, 7.5 to 45 cm. high: leaves silky-woolly when young, at length green above and hoary beneath; those of the simple and scape-like flowering stems small, lanceolate, appressed; the radical obovate or oval-spatulate, petioled, ample, 3-nerved: heads in a small crowded corymb: involucral bracts of the (mostly white) involucre obtuse in the sterile, and acutish and narrower in the fertile plant.—Common on sterile knolls and banks.

38. GNAPHALIUM L. (CUDWEED).

Woolly herbs, with sessile or decurrent leaves, clustered or corymbed heads of tubular whitish or yellowish flowers and fertile throughout, dry and scarious white or colored imbricated (in several rows) involucral bracts, flat naked receptacle, tailed anthers, terete or flattish achenes, and pappus a single row of capillary rough bristles.

* *Bristles of the pappus united at the very base into a ring and falling off all together.*

1. **G. purpureum** L. (PURPLISH CUDWEED.) Annual, simple or branched from the base, ascending, 15 to 50 cm. high, silvery-canescent with dense white wool: leaves oblong-spatulate, obtuse, not decurrent, green above: heads in sessile clusters in the axils of the upper leaves, and spiked at the wand-like summit of the stem: involucral bracts tawny, the inner often marked with purple.—Sandy or gravelly soil, throughout Texas.

* * *Bristles of the pappus distinct.*

\+ *Involucre more or less involved in wool, the scarious tips of the bracts inconspicuous: heads glomerate and leafy-bracteate, about 2 mm. long: low and branching annuals rarely 3 dm. high.*

2. **G. palustre** Nutt. Loosely floccose with long wool, erect, at length diffuse or weak: leaves (6 to 10 mm. wide) spatulate or the uppermost oblong or lanceolate: tips of the linear involucral bracts white, obtuse.—In moist ground, southern and western Texas.

\+ \+ *Involucre woolly only at base, the bracts mainly scarious and from white to brownish straw-color (rarely tinged with rose): heads paniculately or corymbosely cymose or glomerate at the summit of the leafy stem and branches: erect herbs 3 to 9 dm. high.*

\+\+ *Leaves not at all decurrent, narrowed at base.*

3. **G. polycephalum** Michx. (COMMON EVERLASTING). Erect woolly annual (wool more or less caducous) 3 to 9 dm. high, fragrant: leaves lanceolate, with undulate margins, soon bare and green: heads in numerous rather close paniculately or cymosely disposed glomerules: involucre dull white, soon with a rusty tinge, its bracts oblong, obtuse.—Open woods and dry grounds extending from the Atlantic States through Texas to Mexico.

4. **G. Wrightii** Gray. Diffusely much branched from an apparently perennial root, persistently white-woolly, not glandular: leaves from spatulate to lanceolate: heads 4 to 6 mm. long, very numerous in small cymosely paniculate glomerules on loose spreading or diverging branchlets: involucre grayish-white, very woolly at base, its bracts oblong and obtuse, but most of them (at least the inner) with an acute apiculation.—Dry ground, central and western Texas.

\+\+ \+\+ *Leaves more or less adnate-decurrent at base.*

5. **G. Sprengelii** Hook. & Arn. Stems usually stout, 15 to 75 cm. high from an annual or biennial root: leaves lanceolate or linear, or the lowest narrowly spatulate, densely and persistently white-woolly (sometimes more thinly floccose), slightly if at all glandular or heavy-scented, the short decurrent bases or adnate auricles rather broad: involucre white or with barely greenish-yellowish tinge, becoming slightly rusty in age. Moist or dry ground west of the Pecos.

6. **G. decurrens** Ives. Stem stout, corymbosely branched at summit, 6 to 9 dm. high from an apparently annual or biennial root: leaves very numerous, strongly balsamic-scented, lanceolate or the upper linear, obviously adnate-decurrent, white-woolly beneath or rarely glabrate, the upper face becoming naked and green in age and with the stem glandular: involucre white, usually becoming rusty-tinged.—Western Texas.

7. **G. leucocephalum** Gray. Very white with close wool, except the upper surface of the leaves: stems 3 to 6 dm. high, strict, mostly simple, very leafy and bal-

samic-scented, from a woody perennial root: stem-leaves all narrowly linear, small, attenuate-acute, commonly erect, hardly broader at the short-decurrent base, viscid-glandular above: involucre much-imbricated, pure pearly white, the bracts thin-papery.—Dry water courses, extreme western Texas.

39. POLYMNIA L. (Leaf-cup.)

Tall branching viscid-hairy perennial herbs (exhaling a heavy odor), with large thin opposite (or uppermost alternate) lobed leaves with dilated stipular-like appendages at base, broad many-flowered radiate heads in panicled corymbs, pistillate rays and perfect but sterile disk-flowers, involucral bracts in 2 rows (the outer about 5, leaf-like, large and spreading; the inner small and membranaceous, partly embracing the thick triangular-obovoid achenes), flat membranous-chaffy receptacle, and no pappus.

1. **P. Uvedalia** L. Roughish-hairy, stout, 12 to 30 dm. high: leaves broadly ovate, angled and toothed, nearly sessile; the lower palmately lobed, abruptly narrowed into a winged petiole: outer involucral bracts very large: rays 10 to 15, linear-oblong, much longer than the inner involucral bracts, yellow: achenes strongly striate.—Fertile or moist ground, extending from the Atlantic States into Texas.

40. MELAMPODIUM L.

Branching herbs, with opposite mostly sessile leaves, pedunculate heads terminating the branches or in the forks, short or conspicuous fertile rays, perfect but sterile disk-flowers, a double strongly dimorphous involucre (exterior of 4 or 5 leafy plane bracts; interior of a single series of small bracts which completely and permanently inclose the obovate more or less compressed and incurved smooth and glabrous achenes with a pericarp-like indurated accessory covering), convex or conical chaffy receptacle, and no pappus.

1. **M. cinereum** DC. Branched from the base, cinereous or even silvery canescent with a fine and mostly close pubescence, or greener and becoming strigulose: leaves linear or the lower lanceolate or spatulate, entire or undulate or even sinuate-pinnatifid: ligules 5 to 9, cuneate-oblong, 2 or 3-lobed at apex, conspicuously exserted, white: fructiferous bracts nearly terete, somewhat incurved, muricate with sharp tubercles, the truncate and usually even margin of its hood commonly incurved.—Open ground throughout Texas. Var. RAMOSISSIMUM Gray (*M. ramosissimum* DC.) is more loosely pubescent, with mostly smaller heads, and the hood of the fructiferous bracts with less thickened margin little or not at all involute, sometimes erose or denticulate and bearing a mucro or short cusp.—Southern borders of Texas.

41. DICRANOCARPUS Gray.

Branching nearly glabrous annual, with opposite ternately divided leaves, 3 or 4 narrow involucral bracts, 3 or 4 fertile ray-flowers with very small ligules, 3 or 4 perfect but sterile disk-flowers, flat and scarious-chaffy receptacle, and dimorphous achenes (1 or 2 elongated to twice or thrice the length of the involucre, subulate to oblong-linear, nearly smooth, puberulent, long-persistent, tipped with 2 divaricate

stout persistent naked rigids awns or horns; the others shorter, thicker, often tuberculate-rugose, the truncate apex bearing a pair of very short divaricate horns or hardly any).

1. **D. parviflorus** Gray. Leaves 1 to 2-ternately divided into filiform lobes, or the uppermost nearly simple: heads more or less pedunculate and paniculate, terminating slender branches, in flower 2 mm. long, yellowish: longest achenes 8 mm. and their horns often 6 mm. long. (*Heterospermum dicranocarpum* Gray.)—Western Texas, near the Pecos.

42. SILPHIUM L. (Rosin-weed.)

Coarse and tall rough perennial herbs, with resinous juice, large corymbose-panicled yellow and many-flowered radiate heads, numerous pistillate and fertile, perfect but sterile disk-flowers, involucral bracts imbricated in several rows (thickish, broad, with loose leaf-like summits, except the innermost, which resemble the linear chaff of the flat receptacle), broad and flat achenes surrounded by a wing notched at top, without pappus, or with 2 teeth confluent with the winged margin.

* *Stem from quadrangular to terete: leaves all or some of them opposite, entire or serrate: achenes with a broad wing.*

+ *All but lower leaves sessile: stems 6 to 12 dm. high, very leafy to the top: achenes with a deep narrow notch.*

1. **S. integrifolium** Michx. Stem smooth or scabrous, sometimes rough-hispidulous: leaves entire or denticulate, lanceolate-ovate or ovate-lanceolate; all the upper ones closely sessile by a broad and roundish or subcordate partly clasping base, and tapering from below the middle to an acute apex, scabrous above, from nearly glabrous and smooth to cinereous-pubescent beneath, 7.5 to 12.5 cm. long: heads somewhat corymbose, nearly all short-peduncled: involucre over 12 mm. high: achenes broadly obovate, the body 8 mm. long, the scarious wing 2 mm. or so wide (at least toward the summit.)—Prairies of Texas, at least as far west as Gillespie County.

2. **S. asperrimum** Hook. Commonly taller: stem rough-hispid: leaves of the preceding but more scabrous: heads generally larger: achenes with broader wings, the triangular apical portions 4 to 6 mm. high.—Plains of Texas.

3. **S. scaberrimum** Ell. Stem and commonly both sides of the leaves hispid: leaves in remoter pairs, oblong or ovate, all but the uppermost rather coarsely serrate and with narrowed or even short petiole-like base (the larger 10 to 15 cm. long): heads fewer, more pedunculate: rays 2.5 cm. long: achenes (including broad wing) nearly orbicular in outline, 12 mm. in diameter.—Extending from Louisiana into Texas as far west as Gillespie County.

+ + *Leaves rather few on the slender stem, the lower slender-petioled, often alternate: achenes with a comparatively shallow notch.*

4. **S. gracile** Gray. Hispidulous: stem 3 to 7.5 dm. high, rather naked, terminated by solitary or few mostly long-pedunculate heads: leaves membranaceous, ovate-oblong or oblong-lanceolate, acute at both ends, denticulate; radical and lower cauline ample (12.5 to 22.5 cm. long); upper cauline from 1 to 5 cm. long: achenes orbicular or very broadly oval.—Prairies of central Texas. Sometimes the leaves are all alternate.

* * *Stem terete, with alternate deeply pinnatifid or bipinnatifid coriaceous leaves: achenes with a narrow wing.*

5. **S. laciniatum** L. (Compass-plant.) Rough-bristly throughout: stem stout, 9 to 36 dm. high, leafy: leaves pinnately parted, petioled, but dilated and clasping

at the base; their divisions lanceolate or linear, acute, cut-lobed or pinnatifid, rarely entire: heads few, 2.5 to 5 cm. broad, sessile or short-peduncled along the naked summit: rays bright yellow: involucral bracts ovate, tapering into long and spreading rigid points: achenes glabrous or nearly so, broadly winged and deeply notched, with no awns.—Prairies of Texas. The lower and root-leaves are vertical (3 to 7.5 dm. long), and on wide open prairies disposed to present their edges north and south, hence called "compass-plant."

6. **S. albiflorum** Gray. Low, 3 to 9 dm. high, very scabrous: leaves rigid, as broad as long, more disposed to pedate division, the dilated base of petiole entire: rays white: achenes puberulent; the narrow wing produced and dilated at summit into somewhat triangular teeth which are adnate to a pair of subulate and more or less projecting awns; the notch narrow.—On rocks, northern and western Texas.

43. BERLANDIERA DC.

Alternate-leaved perennials, with pedunculate heads, and characters of *Silphium*, but the 5 to 12 fertile ray-flowers in a single series, thinner involucral bracts in about 3 series (the inner dilated-obovate, exceeding the disk, the outer smaller and more foliaceous), obovate achenes not winged or notched at apex, and no pappus.

* *Stems leafy to the inflorescence of rather numerous and short-peduncled heads: leaves crenate, some or all the cauline cordate.*

1. **B. Texana** DC. Hirsute-tomentose or villous, 6 to 9 dm. high, very leafy: cauline leaves from oblong-cordate to subcordate-lanceolate, greenish, merely cinereous beneath, somewhat scabrous above; upper closely sessile, lower short petioled: heads usually fastigiate-cymose.—Margins of woods and hillsides, eastern and central Texas.

2. **B. tomentosa** Nutt. Canescent throughout with soft and close tomentum, no hirsute or villous hairs, when glabrous hardly at all scabrous, 3 to 6 dm. high: leaves all obtuse, green above, generally whitish beneath; radical and lower cauline elongated-oblong and petioled; upper cauline usually ovate-oblong or oval, sometimes cordate-ovate, short-petioled or sessile: heads fewer.—Dry pine barrens of the Gulf States, but represented in eastern and central Texas by var. DEALBATA Torr. & Gray, which is more robust and leafy, 6 to 9 dm. high, branching at summit and bearing more numerous and shorter-peduncled heads, broader and more sessile cauline leaves densely white-tomentose beneath, broadly cordate lower leaves, and often deltoid upper ones.—Varies from very soft canescent to less canescent and leaves scabrous above.

* * *Stems mostly low and with long monocephalous peduncles (earliest often scapiform; the later from leafy stems or branches): leaves all attenuate at base, pinnatifid.*

3. **B. lyrata** Benth. Canescent with minute white or gray tomentum: leaves at length greenish above, variously lyrate-pinnatifid; the lateral lobes oblong or narrower, obtusely dentate, sometimes incised: achenes obovate, the costa of the inner face strongly carinate.—Plains and hills of western Texas.

44. LINDHEIMERA Gray & Engelm.

Erect annual, with sessile leaves, 4 or 5 radiate fertile flowers and rather numerous sterile ones, double involucre (outer of 4 or 5 loose and foliaceous narrow lanceolate bracts; inner of as many larger ovate-oblong herbaceous bracts), small chaffy receptacle (its inner scales chaffy and nearly plane; the outer more herbaceous and inclosing the filiform abortive ovary which forms a long pedicel to the sterile flower),

oval or oblong almost entire ligules, obovate flat achenes costate on the middle of each face and surrounded by a cartilaginous entire wing which is confluent at apex with two triangular-subulate rigid teeth or horns, a similar but smaller and naked tooth projecting from the summit of the ventral costa.

1. **L. Texana** Gray & Engelm. Hirsute or hispid, branching above, bearing loosely cymose usually slender-pedunculate heads: lower leaves spatulate to cuneate-ovate, alternate, coarsely sinuate-dentate; upper ovate to ovate-lanceolate, with a broad closely sessile base, acuminate, commonly entire, mainly opposite, thin edges and also the peduncles usually beset with some small tack-shaped glands.—Open woods and river bottoms, western Texas.

45. ENGELMANNIA Torr. & Gray.

A coarse hispid perennial, with alternate deeply pinnatifid leaves, somewhat paniculately disposed heads of yellow flowers on slender naked peduncles, pistillate and fertile ray-flowers and perfect but sterile disk-flowers, involucre of about 10 outer loose foliaceous bracts (more or less dilated and coriaceous at base) and several firm-coriaceous oval or obovate concave inner ones with short abrupt green tips, flat receptacle with firm and persistent chaff, flat obovate wingless achenes, and pappus a firm scarious more or less lobed hispid crown.

1. **E. pinnatifida** Torr. & Gray. Stems 3 to 6 dm. high: heads 12 mm. broad: rays 12 mm. long.—Prairies and rocky hills throughout Texas. "Common on the high prairies of western Texas, said to be poisonous" (Havard).

46. PARTHENIUM L.

Shrubs or herbs, with alternate leaves, small corymbed inconspicuously radiate heads of whitish flowers, 5 pistillate and fertile ray-flowers with very short and broad obcordate ligules not projecting beyond the woolly disk, sterile disk-flowers, hemispherical involucre of 2 ranks of short ovate or roundish scales, conical chaffy receptacle, and obcompressed achenes (only in the ray) surrounded by a slender callous margin and crowned with the persistent ray-corolla and a pappus of 2 small chaffy scales.

* *Herbaceous, with membranaceous once or twice pinnatifid leaves.*

1. **P. Hysterophorus** L. From an annual root, 3 to 6 dm. high, diffuse, strigosely pubescent (sometimes also hirsute), generally green: heads in a loose and open naked panicle: cauline leaves of broadly ovate outline, pinnately parted into 5 to 9 mostly narrow again pinnatifid lobes; of the flowering branches linear or lanceolate and entire or few-lobed: pappus of 2 rather large and roundish scales.—Throughout eastern and central Texas. Dr. Havard remarks that it is "one of the commonest weeds about the streets of San Antonio."

2. **P. lyratum** Gray. From a perennial root, 3 dm. high, canescent or cinereous with fine and close sometimes also loose hirsute pubescence, erect: heads corymbosely crowded, more pubescent: leaves of obovate or oblong outline, lyrately pinnatifid, the lobes short and oblong. (*P. Hysterophorus* var. *lyratum* Gray.)—Southern and western Texas.

** *More or less shrubby, with firmer and more simply lobed leaves.*

3. **P. incanum** HBK. Shrubby, 3 to 9 dm. high, much branched, canescent with fine tomentum: leaves mostly obovate in outline, sinuately-pinnatifid into 3 to 7 oblong or roundish and obtuse lobes: heads numerous, paniculate-cymose: ligules commonly longer than broad: pappus a pair of short-subulate erect or at length spreading awns.—Dry hills of extreme western **Texas.**

4. **P. argentatum** Gray. Suffrutescent, 3 dm. high, silvery-canescent with close tomentum: branches erect, rather leafless above, bearing comparatively large and few heads: leaves lanceolate to spatulate in outline, some entire or incisely 2 or 3-toothed; the larger incisely pinnatifid into 2 to 7 acute lateral lobes: pappus a pair of lanceolate chaffy awns.—Southwestern borders of Texas.

*** *Perennial herb, with larger heads and leaves, the latter undivided and thickish.*

5. **P. integrifolium** L. Rough-pubescent, 3 to 9 dm. high: leaves oblong or ovate, crenate-toothed, or the lower (7.5 to 15 cm. long) cut-lobed below the middle: heads many in a very dense flat corymb.—Dry ground, extending into Texas from the Eastern States.

47. IVA L. (MARSH ELDER. HIGHWATER-SHRUB.)

Herbaceous or shrubby coarse plants, with thickish leaves (lower opposite), small nodding greenish-white discoid heads, the pistillate fertile and staminate sterile flowers in the same heads (the former few and marginal), nearly separate anthers, few and roundish involucral bracts, small receptacle with narrow chaff, obovoid or lenticular achenes, and no pappus.

* *Heads in panicled spikes, scarcely bracteate: corolla of the 5 fertile flowers a mere rudiment or none.*

1. **I. dealbata** Gray. Canescent with floccose wool except the elongated and narrow terminal panicle, 3 to 6 dm. high: leaves mostly alternate, soft-tomentose, from obscurely angulate-toothed to laciniately pinnatifid, cuneately or abruptly contracted at base into a short winged petiole: heads nearly sessile: involucre of 5 obovate concave somewhat herbaceous bracts.—Valleys of southwestern Texas.

2. **I. ambrosiæfolia** Gray. Hirsute or villous-hispid, paniculately branched, 3 to 6 dm. high: leaves almost all alternate, thin, twice or thrice pinnately parted into small oblong lobes: heads pedicellate, in looser panicles: involucre of 5 broadly ovate herbaceous outer bracts, and as many smaller obovate thin-scarious inner ones. (*Euphrosyne ambrosiæfolia* Gray.)—Western borders of Texas.

** *Heads spicate or racemose in the axils of leaves or leaf-like bracts: fertile flowers with evident corolla.*

3. **I. ciliata** Willd. Annual, 6 to 18 dm. high, rough and hairy: leaves ovate, pointed, coarsely toothed, downy beneath, on slender ciliate petioles: heads in dense spikes, with conspicuous ovate-lanceolate rough-ciliate bracts: involucral bracts and fertile flowers 3 to 5.—In alluvial ground throughout Texas.

4. **I. frutescens** L. Shrubby at base, nearly smooth, 9 to 24 dm. high: leaves oval or lanceolate, coarsely and sharply toothed, rather fleshy, the upper reduced to linear bracts in the axils of which the heads are disposed in leafy panicled racemes: involucral bracts and fertile flowers 5.—Salt marshes, from the New England coast to Texas.

5. **I. angustifolia** Nutt. Slender erect annual, strigulose-scabrous or somewhat hirsute, 6 to 12 dm. high: lower leaves lanceolate (some of them sparingly serrate); those of the branches from linear to filiform, the bracteal ones ascending and surpassing the numerous small 3 to 6-flowered subsessile heads which are rather crowded and spicate: involucral bracts united by scarious edges into a cup: fertile flowers usually solitary.—Gravelly banks or beds of streams throughout eastern and central Texas.

6. **I. asperifolia** L. Low, 1.5 to 3 dm. high: leaves narrowly lanceolate, narrowed towards the base, strigose, very entire: heads small, spicate, exceeded by the bracteal leaves: involucre gamophyllous, obpyramidal, 3-angled, 3-toothed.—A Mexican species, extending from the vicinity of Vera Cruz to Galveston (*J. E. Bodin*).

48. HYMENOCLEA Torr. & Gray.

Low and much-branched shrubby minutely canescent or glabrous plants, with slender diffuse branches bearing profuse scattered or glomerate paniculate small heads (the two sexes intermixed or the female in lower axils), alternate and linear-filiform leaves (the lower sparingly and irregularly pinnately parted), sterile involucre gamophyllous and saucer-shaped, involucre to the solitary fertile flower ovoid or fusiform (beaked at apex and the lower part furnished with 9 to 12 dilated and silvery-scarious persistent transverse wings), turgid achenes, and no pappus.

1. **H. monogyra** Torr. & Gray. Fructiferous involucre 4 mm. long, winged only at the middle by a whorl of obovate or rhombic-reniform radiating scales.—West of the Pecos.

49. AMBROSIA Tourn. (Ragweed).

Coarse homely weeds, with opposite or alternate lobed or dissected leaves, inconspicuous greenish flowers, sterile and fertile flowers in different heads on the same plant, the fertile 1 to 3 together and sessile in the axil of leaves or bracts at the base of the racemes or spikes of sterile heads, sterile involucres flattish or top-shaped (of 7 to 12 bracts united into a cup), almost separate anthers, fertile involucre (fruit) oblong or top-shaped (closed, pointed, resembling an achene and usually with 4 to 8 tubercles or horns near the top in one row) and inclosing a single flower consisting of a pistil only, ovoid achenes, and no pappus.

* *Sterile heads sessile in a dense spike, the top-shaped involucre extended on one side into a large lanceolate hooded bristly-hairy tooth or appendage: fertile involucre oblong and 4-angled.*

1. **A. bidentata** Michx. Hairy, 3 to 9 dm. high, very leafy: leaves alternate, lanceolate, partly clasping, nearly entire except a short lobe or tooth on each side near the base: fruit with 4 stout spines and a central beak.—Prairies and alluvial ground, from the prairie States throughout Texas to Mexico.

* * *Sterile heads in single or panicled racemes or spikes, the involucre regular.*

– *Leaves opposite, ample, palmately cleft: sterile involucre 3-ribbed on one side.*

2. **A. trifida** L. (Great ragweed.) Stem stout, 9 to 50 dm. high, rough-hairy, as are the large deeply 3-lobed leaves, the lobes oval-lanceolate and serrate; petioles margined: fruit obovate, 8 to 10 mm. long, 5 or 6-ribbed, terminating above in spinous tubercles around the conical beak.—Moist river banks, throughout eastern and central Texas.

3. **A. aptera** DC. Like the preceding, but petioles not margined, larger leaves commonly 5-lobed (the middle lobe often 3-cleft), sterile racemes more numerous and paniculate, fruit smaller (4 to 6 mm. long), 4 to 8-ribbed and with 4 to 6 short or obsolete tubercles.—Low grounds in southern and western Texas.

++ *Leaves many of them alternate, all once or twice pinnatifid.*

4. **A. artemisiæfolia** L. (ROMAN WORMWOOD. HOG-WEED. BITTER-WEED.) Much branched, 3 to 9 dm. high, hairy or roughish-pubescent: leaves thin, twice-pinnatifid, smoothish above, paler or hoary beneath: fruit obovoid or globular, armed with about 6 short acute teeth or spines.—A common weed of waste grounds. Extremely variable.

5. **A. psilostachya** DC. Paniculate-branched, 6 to 15 dm. high, rough and somewhat hoary with short hispid hairs: leaves once-pinnatifid, thickish, the lobes acute, those of the lower leaves often incised: fruit obovoid, without tubercles or with very small ones, pubescent.—Moist prairies and beds of streams, central and western Texas.

50. FRANSERIA Cav.

Herbs or shrubby plants, with chiefly alternate leaves, male heads as in *Ambrosia* (or sometimes intermixed with the female), fertile involucre 1 to 4-flowered, 1 to 4-celled (a single pistil to each cell), 1 to 4-beaked, more or less bur-like (being armed over the surface with several prickles or spines in more than one series), turgid achenes, and no pappus.

1. **F. tenuifolia** Gray. Herbaceous, erect, 3 to 15 dm. high, leafy to the top, hispid, variously pubescent, or glabrate: leaves mostly 2 or 3-pinnately parted or dissected into narrowly oblong or linear lobes, and the narrow primary rhachis often with some interposed small lobes, the terminal elongated: fruiting involucre seldom over 2 mm. long (1 or 2-flowered), armed with 6 to 18 short and stout incurving spines with tips almost always hooked.—Moist grounds, southern and western Texas.

2. **F. Hookeriana** Nutt. Herbaceous and low, diffusely spreading, freely branched, hirsute-pubescent or hispid, sometimes canescent when young: leaves of ovate or roundish outline, bipinnatifid, or the upper oblong and pinnatifid: fruiting involucre 6 to 8 mm. long (1-flowered), armed with flat and thin long and straight spines.—Plains and along streams, western Texas.

51. XANTHIUM Tourn. (COCKLEBUR. CLOTBUR.)

Coarse weeds, with low and branching stout stems, alternate toothed or lobed petioled leaves, sterile and fertile flowers in different heads (the latter clustered below, the former in short spikes or racemes above), sterile involucres and flowers as in *Ambrosia*, but the bracts separate and the receptacle cylindrical, fertile involucre closed, coriaceous, clothed with hooked prickles (so as to form a rough bur), 2-celled and 2-flowered, oblong flat achenes, and no pappus.

* *Leaves attenuate to both ends, with triple spines at the base.*

1. **X. spinosum** L. (SPINY CLOTBUR.) Hoary-pubescent: stems slender, with slender yellow 3-parted spines at the axils: leaves lanceolate, or oblong-lanceolate, tapering to a short petiole, white-downy beneath, often 2 or 3-lobed or cut: fruit 8 mm. long, pointed with a single short beak.—A tropical American weed, introduced into eastern and southern Texas.

* * *Leaves cordate or ovate, 3-nerved, dentate and often lobed, long-petiolate: axils unarmed: fruit 2-beaked.*

2. **X. Strumarium** L. Low, 3 to 6 dm. high: fruit 12 to 16 mm. long, glabrous or puberulent, with usually straight beaks and rather slender spines.—A common weed of cultivated grounds.

3. **X. Canadense** Mill. Stouter, the stem often brown-punctate: fruit about 2.5 cm. long, densely prickly and more or less hispid, the stout beaks usually hooked or incurved.—Alluvial shores and waste grounds. Var. ECHINATUM Gray is usually low, with still denser and longer conspicuously hirsute or hispid prickles. Reported not only from the seacoast, but from Gillespie County.

52. ZINNIA L.

Herbaceous or slightly shrubby plants, with opposite and mostly sessile entire leaves, single and showy heads terminating the branches, ligulate and fertile ray-flowers (the ligule persistent on the achene and becoming papery), perfect and fertile disk-flowers, involucre of closely appressed-imbricated dry and firm broad bracts, chaff of the (at length) conical or cylindraceous receptacle conduplicate around the disk-flowers, disk-achenes compressed, and pappus (when present) of erect awns or chaffy teeth.

* *Annual herb: leaves from ovate to lanceolate: ray-flowers usually without pappus.*

1. **Z. pauciflora** L. Leaves commonly with subcordate base, scabrous: ligules from obovate to narrowly spatulate, red, purple, or yellow: disk-achenes 1-awned, sometimes with a rudiment of a second awn or tooth.—Apparently throughout Texas.

* * *Somewhat woody and tufted perennials: leaves narrow and rigid, connate-sessile: ray-achenes 2 to 4-aristate.*

\+ *Ligules shorter than or little surpassing the disk, sometimes wanting: stems mainly herbaceous.*

2. **Z. anomala** Gray. Scabrous hispid: stems or branches very numerous from a woody base, 10 to 20 cm. high: leaves linear (1 to 2.5 cm. long, less than 4 mm. wide), 1-nerved (obscurely 3-nerved at base): peduncle shorter than the uppermost leaves: involucre 12 mm. long: ligules oval or oblong, 2 to 6 mm. long, yellow or orange (occasionally the whole corolla wanting).—Southwestern Texas.

\+ \+ *Ligules ample, dilated obovate or roundish, light yellow (becoming white in age): stems or branches from a stout woody base or branching caudex.*

3. **Z. grandiflora** Nutt. Scabro-hispidulous: leaves linear, 3-nerved at base: involucre usually 8 mm. long: ligules (at maturity) 10 to 16 mm. long.—Plains and bluffs southwestern Texas.

4. **Z. pumila** Gray. Cinereous-puberulent: leaves very narrowly linear (12 mm. or less long, hardly 1 mm. wide), 1-nerved: involucre 4 to 6 mm. long: ligules 4 to 8 mm. long.—High plains and table lands of western Texas.

5. **Z. acerosa** Gray. Cinereous-pubescent or glabrate: leaves acerose-filiform, very obscurely 1-nerved, 12 mm. or more long: ligules 6 to 12 mm. long.—Mountains west of the Pecos.

53. SANVITALIA Lam.

Mostly low and branching herbs, with opposite mostly entire and petioled leaves, small heads terminating the branches, fertile ray and disk-flowers, persistent ligules (becoming papery), short and broad (dry or partly herbaceous) involucral bracts, flat to subulate-conical receptacle with concave or partly conduplicate chaffy bracts, ray-achenes commonly 3-sided with the angles produced into as many thick and rigid divergent awns or horns, disk achenes various (ours compressed-quadrangular and wingless), with pappus of 1 or 2 slender awns or teeth or none.

1. **S. ocymoides** DC. Diffusely spreading, hispidulous or hirsute: leaves oval, obtuse, abruptly contracted into the petiole: involucral bracts in 2 or 3 series, their tips commonly herbaceous: chaff soft or shorter than the flowers: disk commonly dark: rays yellow (turning whitish), their achenes mostly triangular and with 3 slender-subulate diverging awns: disk achenes sometimes 1 or 2-awned.—Along the Rio Grande.

2. **S. Aberti** Gray. Erect with ascending branches, minutely pubescent or hispidulous, glabrate: leaves lanceolate or nearly linear, narrowed into a margined petiole: involucre a single series of dry bracts: chaff conspicuous, with rigid cuspidate tips: disk pale: rays white, their achenes almost terete and with 3 very short and stout nearly conical awns or tubercles: disk-achenes awnless, or sometimes minutely 1-awned.—Southwestern Texas.

54. TETRAGONOTHECA Dill.

Erect perennial herbs, with opposite coarsely-toothed leaves (their sessile bases sometimes connate), large single radiate heads of pale yellow flowers on terminal peduncles, double involucre (the outer of 4 large and leafy ovate bracts united below into a 4-angled or winged cup; the inner of small chaffy bracts as many as the ray-flowers and partly clasping their achenes), convex or conical receptacle with narrow and membranaceous chaff, 4-sided achenes with truncate summit, and pappus of numerous small chaffy scales or wanting.

1. **T. Texana** Gray & Engelm. Minutely pubescent or glabrate: stems slender, 3 to 6 dm. high: cauline leaves laciniately pinnatifid or incised, 5 to 7.5 cm. long; the lower tapering into margined connate petioles; upper with winged petioles or bases dilated at insertion and usually connate around the stem into a toothed disk: peduncles elongated (10 to 25 cm. long): rays 7 to 9: pappus none, or very minute, or sometimes of numerous subulate chaffy scales almost as long as the breadth of the achene.—Rocky ground, throughout southern Texas.

2. **T. Ludoviciana** Gray. Glabrous or nearly so: stem rather stout, 6 to 12 dm. high: leaves ovate or oblong, ample (the larger 10 to 20 cm. long), saliently and acutely dentate, the lowest on winged petioles, upper all connate by mostly broad bases into a large perfoliate disk: peduncles mostly longer than the leaves: rays 10 to 12: achenes crowned with a conspicuous pappus of rigid oval or oblong chaffy scales as long as the breadth of the truncate summit.—Sandy soil, extending from Louisiana to western Texas. A depauperate or dwarf form of the southern coast of Texas and extending west of San Antonio is var. REPANDA Gray, which flowers sometimes from near the ground, the leaves therefore petioled, and the upper with perfoliate disk of united bases of the petioles.

55. SCLEROCARPUS Jacq.

Strigose-pubescent herbs, with branching stems, alternate or opposite leaves, terminal pedunculate radiate heads of yellow flowers, neutral ray and fertile disk-flowers, involucre of rather few distinct and more or less herbaceous bracts (the outer loose and spreading), convex or conical receptacle with its coriaceous or cartilaginous chaff closely investing the achenes as a permanent accessory covering, and pappus a short crown or ring or none.

1. **S. uniserialis** Gray. Annual, 3 to 6 dm. high, loosely branched: leaves all alternate, slender-petioled, deltoid- or rhombic-ovate, or uppermost lanceolate,

coarsely dentate, the strigose pubescence of the lower face canescent: loose involucral bracts nearly in a single series: fructiferous bracts cartilaginous or bony, terete, in age often tuberculate. (*Gymnopsis uniserialis* Hook. *Aldama uniserialis* Gray).—Moist or shady ground, southern and western Texas.

56. ECLIPTA L.

An annual rough herb, with slender stems, opposite leaves, solitary small radiate heads of white flowers, perfect and fertile (4-toothed) disk-flowers, 10 to 12 leaf-like ovate-lanceolate involucral bracts in 2 rows, flat receptacle with almost bristle-form chaff, short 3 or 4-sided (or latterally flattened in the disk) achenes hairy at summit, and pappus none or an obscure denticulate crown.

1. **E. alba** Hassk. Rough with fine appressed hairs: stems procumbent or ascending, 3 to 6 dm. high: leaves lanceolate or oblong, acute at each end, mostly sessile, slightly serrate: rays equaling the disk. (*E. procumbens* Michx.)—Shores and river banks, throughout Texas.

57. VARILLA Gray.

Shrubby glabrous plants, with linear and narrow entire and sessile thickish or fleshy leaves, pedunculate rather small discoid heads of yellow flowers (solitary in ours), all the flowers perfect and fertile, short involucre of few small linear-lanceolate appressed-imbricate bracts similar to those of the (at length) high conical or oblong receptacle, narrow linear-oblong terete 8 to 15-nerved achenes, and no pappus (in ours).

1. **V. Texana** Gray. Low, suffrutescent, much branched and very leafy at base: leaves very succulent, terete, mostly alternate, obtuse: head solitary on a long terminal and minutely bracteate peduncle.—Saline soil, from the Nueces to the Rio Grande (as far up as Eagle Pass).

58. ISOCARPHA R. Br.

Herbs, with opposite leaves, small discoid heads of white or whitish flowers (solitary or glomerate at the summit of a naked peduncle), all the flowers perfect and fertile, involucre, receptacle and dry bracts nearly of *Varilla*, and small 4 or 5-angled little compressed achenes destitute of pappus.

1. **I. oppositifolia** R. Br. Pubescent: stems slender, 3 to 9 dm. high, paniculately branched: leaves lanceolate, narrowed to both ends, 3-nerved, entire or sparingly denticulate: heads commonly in threes, in fruit 8 to 10 mm. long: bracts of involucre and receptacle pointed, becoming rigid and the receptacle columnar.—Along the Rio Grande.

59. SPILANTHES Jacq.

Usually spreading or creeping herbs, with opposite serrate leaves, small heads with yellow rays on peduncles terminating the stem and branches, ray and disk-flowers fertile, involucre of few loosely appressed herbaceous bracts, chaff of the (at length) subulate-conical receptacle soft and more or less embracing the achenes, ray-achenes 3-sided or

obcompressed, disk-achenes more or less compressed, and pappus a setiform awn from one or more of the angles or none.

1. **S. repens** Michx. From hirsute-pubescent to almost glabrous: stems slender, 3 to 6 dm. long: leaves from lanceolate to oblong-ovate, 2.5 to 5 cm. long, from sparsely denticulate to serrate, abruptly or gradually contracted at base into a petiole: peduncles 5 to 10 cm. long: rays 8 to 12, shorter than the obtusely ovoid disk: achenes oblong, less than 2 mm. long, not flat: pappus none or occasionally 1 or 2 minute awns.—Low or wet ground, extending from the Gulf States into Texas.

60. ECHINACEA Mœnch. (PURPLE CONE-FLOWER.)

Perennial herbs, with the stout and nearly simple stems naked above and terminated by a single large head, very long and drooping rose-purple sterile rays, lanceolate spreading imbricated involucral bracts, conical receptacle with lanceolate keeled spiny-tipped chaff longer than the purplish disk-flowers, thick and short 4-sided achenes, and pappus a small toothed border.

1. **E. angustifolia** DC. Leaves, as well as the slender simple stem, bristly-hairy, lanceolate and linear-lanceolate, attenuate at base, 3-nerved, entire: rays 12 to 15, 5 cm. long, rose-color or red.—Prairies and barrens, extending from the northern plains into northern and central Texas.

61. RUDBECKIA L. (CONE-FLOWER.)

Chiefly perennial herbs, with alternate leaves, showy terminal heads with mostly long yellow neutral rays, leaf-like spreading involucral bracts in about 2 rows, conical or columnar receptacle with short concave chaff (not rigid), mostly 4-angular achenes, and pappus none or a minute crown-like border.

** Achenes nearly terete, not angled, minutely striate, destitute of pappus, and subtended by keeled bracts which are more or less deciudous.*

1. **R. amplexicaulis** Vahl. Smooth and glabrous, leafy, 3 to 6 dm. high from an annual root: leaves strictly 1-ribbed, reticulate-veiny, from entire to sparingly serrate; lower oblong-spatulate and sessile by a tapering base; upper oblong and ovate with cordate-clasping base: rays oblong, 12 mm. or more long, often with a brown-purple base: disk brownish. (*Dracopis amplexicaulis* Cass.)—Low grounds of Louisiana and Texas.

** * Achenes prismatic-quadrangular: bracts persisting on the receptacle.*

+ Disk columnar in fruit, greenish-yellow: leaves entire or barely dentate: chaff pubescent at tip: herbage glabrous: stems simple or nearly so: rays drooping, pure yellow.

2. **R. nitida** Nutt. Stem 6 to 12 dm. high: leaves bright green, thin-coriaceous, nervose-ribbed, mostly acute, denticulate or entire; radical and lower cauline ovate-spatulate to lanceolate-oblong, tapering into long margined petioles; upper cauline sessile, oblong to lanceolate, 7.5 to 15 cm. long.—Wet ground, extending from the Gulf States into Texas.

3. **R. maxima** Nutt. Stem 12 to 27 dm. high, and whole plant smooth and glaucous: leaves from broadly ovate to oblong, mostly obtuse, repand-denticulate or entire, with numerous pinnate veins, the larger 30 cm. or less long; upper cauline subcordate-clasping.—Moist pine woods and plains, extending into Texas from the Gulf States.

+ + *Disk hemispherical to oblong-ovoid in fruit, dark-purple or brown.*

++ *Lower leaves 3-lobed or parted.*

4. **R. subtomentosa** Pursh. Stem branching above, 9 to 12 dm. high, downy, as well as the petiolate ovate or ovate-lanceolate serrate leaves beneath: heads short-peduncled: disk globular, dull-brown: chaff downy at the blunt apex.—Extending from the northern prairies into Texas.

++ ++ *Leaves undivided, rarely laciniately toothed.*

= *Style-tips slender-subulate: achenes wholly destitute of pappus: chaff hairy at tip.*

5. **R. bicolor** Nutt. Hispid with spreading bristly hairs, rather slender, 3 to 6 dm. high: leaves from lanceolate to oblong or the lower obovate, nearly entire, 2.5 to 5 cm. long, nearly all sessile: rays 12 to 20 mm. long, pure yellow, or with brown purple spots at base, or the lower half deep blackish-purple: disk black.—Pine woods or sandy soil, eastern and southern Texas.

6. **R. hirta** L. Rough-hispid and hirsute, stouter, 3 to 9 dm. high: leaves from oblong to lanceolate, sparingly serrate or nearly entire, 5 to 12.5 cm. long, the lower narrowed into margined petioles: rays 2.5 to 5 cm. long, golden yellow, sometimes deeper-colored toward the base: disk at first nearly black, in age dull brown.—Dry and open ground, throughout Texas.

= = *Style-tips short and thickened: pappus evident.*

7. **R. fulgida** Ait. Hispid or hirsute, 3 to 6 dm. high: leaves from narrowly to oblong-lanceolate, mostly entire; lowest and radical spatulate-lanceolate and tapering into slender petioles: rays about 12, golden yellow, equalling or exceeding the ample involucre: chaff of the dark purple disk nearly smooth: pappus a very short commonly 4-toothed crown.—Dry soil, extending into Texas from the Atlantic States.

8. **R. alismæfolia** Torr. & Gray. Glabrous or minutely scabrous, usually simple, 6 to 9 dm. high: leaves oval, obtuse or sometimes acute, obscurely repand-dentate or entire, 7.5 to 15 cm. long, abruptly contracted into the petiole: involucre rather small: rays 10 to 15, light yellow and soon drooping, 2.5 to 5 cm. long: chaff of the browner disk pubescent at tip: pappus a conspicuous cup-shaped irregularly dentate or crenate crown.—Plains and open pine woods of Eastern Texas.

62. LEPACHYS Raf.

Perennial herbs, with alternate pinnately divided leaves, the stems or branches naked above and bearing single showy heads with yellow or particolored drooping neutral rays, grayish disk, few small spreading involucral bracts, oblong or columnar receptacle with truncate chaff thickened and bearded at tip and partly embracing the flattened and margined achenes, and pappus none or of 2 teeth.

* *Achenes with convex or obscurely angled faces, commonly with a scarious and more or less ciliate margin.*

1. **L. Tagetes** Gray. Strigulose-cinereous, 3 dm. high, branching, leafy: leaves thickish, mostly with 3 to 7 narrowly linear rather rigid lobes: heads rather short-peduncled: rays 6 to 12 mm. long: disk globose to barely oblong, 12 mm. high: pappus of 1 or 2 subulate or awn-like deciduous teeth, and no intermediate scales. (*L. columnaris*, var. *Tagetes* Gray.)—Alluvial plains, western Texas.

2. **L. columnaris** Torr. & Gray. Strigose-scabrous, 3 to 6 dm. high, branching from the base, terminated by long peduncles bearing a showy head: divisions of the cauline leaves 5 to 9, from oblong to narrowly linear, sometimes 2 to 3-cleft: rays commonly 2.5 cm. long or more, normally all yellow: disk at length columnar, 2.5 cm. long or more: pappus of the preceding, but usually with a series of minute and

delicate scales around the broad flat summit.—Plains and prairies of central and western Texas, where the most common form is var. PULCHERRIMA Torr. & Gray, with a part or even the whole upper face of the ray brown-purple.

* * *Achenes completely flat.*

3. **L. peduncularis** Torr. & Gray. Strigose-scabrous or pubescent and somewhat cinereous, 6 to 9 dm. high including the naked peduncle of 3 dm. or more: leaves rather large, irregularly bipinnately parted or pinnately parted, and some of the lobes incisely pinnatifid or toothed: rays obovate, 2.5 cm. or less long and pure yellow, or sometimes only 6 mm. long and particolored: disk cylindrical, the largest 3.5 cm. long: achenes broadly obovate, from narrowly to broadly winged and deeply notched at summit by an extension into 2 unequal chaffy teeth, the notch fringed with small irregular scales.—Low ground. Near the coast, and in sandy woods, is var. PICTA Gray, with more cinereous pubescence, simply and lyrately pinnately parted leaves with incised divisions, and rays barely 12 mm. long and brown-purple with a yellow edge.

63. BORRICHIA Adans. (SEA OX-EYE.)

Shrubby low coriaceous or fleshy maritime plants, with opposite nearly entire leaves, solitary peduncled terminal heads of yellow flowers, fertile rays, hemispherical involucre with imbricated bracts, flat receptacle covered with lanceolate rigid persistent chaff, wedge-shaped 3 or 4-angled achenes, and pappus a short 4-toothed crown.

1. **B. frutescens** DC. Whitened with a minute silky pubescence, 1.5 to 9 dm. high: leaves obovate to spatulate-oblong or lanceolate, often toothed near the base: chaff rigidly pointed.—Sandy seacoast of Texas.

64. GYMNOLOMIA HBK.

Herbs or shrubby plants, with erect branching stems, alternate or opposite leaves, heads of yellow flowers on peduncles terminating the branches, sterile rays, convex or conical receptacle with chaff either strongly concave or conduplicate and embracing the more or less compressed but not margined short and smooth achenes, the truncate apex of which is commonly at length covered by the base of the corolla (the tube of which is usually pubescent), and pappus none or a minute denticulate ring.

1. **G. multiflora** Rothrock. Annual, 3 to 9 dm. high, strigulose-pubescent or scabrous (sometimes also hispid), often much branched: leaves from narrowly linear to lanceolate, either alternate or mainly opposite, entire or obscurely denticulate: achenes compressed, with convex or obtusely angulate sides. (*Heliomeris multiflora* Nutt).—Abundant in western Texas. Very polymorphous.

2. **G. tenuifolia** Benth. & Hook. Shrubby, much branched, 6 to 9 dm. high, scabrous-puberulent, very leafy: branches terminated by solitary long-peduncled heads: leaves alternate and the lower opposite, canescent beneath, pinnately or pedately parted into 3 to 7 narrow linear lobes, or the uppermost narrow and entire, the margins mostly revolute: achenes quadrangular-compressed. (*Heliomeris tenuifolia* Gray).—Throughout southern and southwestern Texas.

65. VIGUIERA HBK.

Herbaceous or somewhat lignescent plants, with only the lower or rarely all the leaves opposite, yellow-flowered heads on peduncles ter-

minating the branches, sterile rays, convex or conical receptacle with chaff either strongly concave or conduplicate and embracing the commonly pubescent achenes, and pappus of 2 chaffy awns or scales, one to each principal angle of the achene (occasionally 1 or 2 more), and of 2 or more intermediate commonly truncate scales on each side, either persistent or deciduous.

1. **V. helianthoides** HBK. Minutely hispidulous-pubescent or scabrous, green: stem 6 to 20 dm. high, paniculately branched above: leaves mostly alternate, slender-petioled, ovate, acuminate, sometimes very broadly ovate (the larger 10 to 15 cm. long and 7.5 to 10 cm. wide), sometimes ovate-lanceolate, from slightly to coarsely serrate: heads paniculate, usually slender-peduncled: involucre only 6 mm. high, shorter than the strongly convex disk, nearly simple, of subulate or linear bracts: chaff somewhat cuspidately mucronate or acuminate: pappus a pair of scales on each side between the chaffy awns, erose at the truncate summit.—Shady or more open grounds, central and western Texas.

2. **V. cordifolia** Gray. Hispid or hispidulous and scabrous: stem rather stout, 6 to 9 dm. high, leafy to the top, commonly branched above: leaves mostly opposite, subcordate-ovate or deltoid, acute, serrate or denticulate, either sessile or short-petioled, rough: heads mostly corymbose and short-peduncled: involucre fully 12 mm. long, equaling the barely convex disk, of lanceolate and acuminate erect bracts in 2 or 3 series: chaff gradually acuminate: achenes narrowly cuneate-oblong, almost equaled by the chaffy awns, the intermediate scales narrowly oblong and rigid, equaling the breadth of the achene.—Near water courses, western Texas.

V. longipes Coulter is *Zexmenia hispida* Gray.

66. HELIANTHUS L. (SUNFLOWER.)

Coarse and stout herbs, with solitary or corymbed heads, yellow neutral rays, imbricated herbaceous or foliaceous involucre, flat or convex receptacle with persistent chaff embracing the 4-sided and laterally compressed smooth achenes (which are neither winged nor margined), and a very deciduous pappus of 2 thin chaffy scales on the principal angles and sometimes 2 or more small intermediate scales.

* *Annuals: leaves mostly alternate, petiolate: receptacle flat: disk brownish.*

+ *Stem erect and commonly robust.*

1. **H. argophyllus** Torr. & Gray. White with soft and silky wool (sometimes floccose, and more or less deciduous with age): leaves slightly serrate: otherwise like the next.—Apparently confined to Texas.

2. **H. annuus** L. (COMMON SUNFLOWER.) Tall and rough: leaves ovate or the lower cordate, serrate: involucral bracts broadly ovate to oblong, long-pointed, ciliate: disk usually 2.5 cm. broad or more. (Incl. *H. lenticularis* Dougl.)—Abundant in all valleys. "Seeds used for food by Indians and to fatten poultry by Mexicans, yielding by expression a fair quantity of oil" (Havard).

3. **H. petiolaris** Nutt. More slender, 3 to 9 dm. high: leaves oblong- or ovate-lanceolate, smaller (2.5 to 7.5 cm. long), mostly entire: involucral bracts lanceolate or oblong-lanceolate, seldom ciliate: disk 1 cm. broad or more.—A species of the dry northern plains, extending into the valleys and cañons of southern and western Texas. Var. CANESCENS Torr. & Gray, of southwestern Texas, has leaves whitened with a fine and close strigulose-sericeous pubescence, the lowest ovate.

+ + *Stems branched from the base, diffuse or decumbent, slender.*

4. **H. debilis** Nutt. Scabrous to hispid: leaves from ovate to deltoid or even hastate, 2.5 to 7.5 cm. long, repand-denticulate to sparingly lobed-dentate, slender-

petioled: involucral bracts lanceolate, gradually subulate-acuminate: disk 1 cm. broad or more.—Sandy shores of eastern Texas, but represented in southern and western Texas, in sandy soil, by var. CUCUMERIFOLIUS Gray, which is a larger form, with usually purple-mottled stems, leaves irregularly serrate with salient teeth, more commonly subcordate, the larger 10 to 12.5 cm. long.

* * *Perennials: lower leaves usually opposite: receptacle convex or at length low-conical.*

\- *Involucral bracts loose, becoming squarrose, narrowly lanceolate, pointed, 2.5 cm. long: disk usually purple or brownish: leaves linear, 1-nerved.*

5. **H. orgyalis** DC. Stem glabrous, tall, very leafy: leaves mostly alternate, linear to filiform and entire, or the lowest lanceolate and serrulate: involucral bracts filiform-attenuate.—Extending from the dry northern plains into Texas.

6. **H. angustifolius** L. Stem slender, 6 to 18 dm. high, usually scabrous: leaves long and linear, sessile, entire, with revolute margins: heads loosely corymbed, long-peduncled: involucral bracts acute or pointed.—Extending from the wet pine-barrens of the Gulf coast into Texas.

\- \- *Involucral bracts closer, more imbricated, short, unequal and not foliaceous: leaves lanceolate to ovate, mostly opposite and 3-nerved.*

\+\+ *Disk dark.*

7. **H. ciliaris** DC. Glaucous and glabrous, 3 to 6 dm. high, very leafy: leaves nearly all opposite and sessile, lanceolate (varying to ovate-lanceolate or to linear), either very smooth or with some scattered bristles, with undulate or repand margins: involucral bracts ovate or oblong, obtuse or abruptly mucronulate, hirsutely ciliate: rays few or several, not surpassing the disk, sometimes none.—Low ground, southern and western Texas.

8. **H. rigidus** Desf. Rough, 6 to 18 dm. high or more: leaves very thick and rigid, rough both sides, oblong-lanceolate, usually pointed at both ends, nearly sessile, entire or serrate, the lowest oval: involucral bracts ovate or oblong, obtuse or mostly acute, ciliate: rays numerous (20 to 25) and long (3 cm. long or more).—Extending from the northern plains and prairies into northern Texas.

\+\+ \+\+ *Disk yellow.*

9. **H. occidentalis** Riddell. Somewhat hairy, stem slender, simple, naked above, bearing 1 to 5 small heads on long peduncles: lowest leaves oval or lanceolate-ovate, entire or obscurely serrate, roughish-pubescent beneath, abruptly contracted into long hairy petioles; the upper small and remote.—A species of the northern dry prairies and oak barrens, but represented in eastern and southern Texas by the var. PLANTAGINEUS Torr. & Gray, which is minutely puberulent and slightly or not at all scabrous, with rather more rigid leaves and obscurely ciliolate or naked involucre.

\- \- \- *Involucre looser, the bracts more acuminate or elongated or foliaceous: disk yellow (anthers dark).*

\+\+ *Leaves all opposite, sessile, serrulate: pubescence rather soft.*

10. **H. cinereus** Torr. & Gray. Barely cinereous throughout: stem simple, somewhat equally leafy, bearing 1 or 2 slender-peduncled small heads: leaves coriaceous, lanceolate-oblong; the lower contracted into a narrow base; uppermost ovate-lanceolate with a broad sessile base: heads 1.2 cm. high; bracts lanceolate-subulate, canescent: rays 10 or 12, 1.6 cm. long.—Reported only from Texas (*Drummond*).

11. **H. mollis** Lam. Canescent throughout: stem simple, very leafy to the top, with solitary or few rather large heads: leaves ovate to lanceolate, with broad cordate clasping base, pointed: heads 1.6 cm. high; bracts lanceolate, villous or sericeous: rays 15 to 25, 2.5 cm. long or more.—Extending into Texas from the dry barrens north and east.

++ ++ *Leaves narrow, chiefly alternate, not 3-nerved, scabrous both sides: heads rather small: bracts loose attenuate.*

12. **H. grosse-serratus** Martens. . Stem smooth and glaucous, 18 to 30 dm. high: leaves elongated-lanceolate or ovate-lanceolate, taper-pointed, sharply serrate or denticulate, acute or attenuate at base, petioled, often whiter and finely pubescent beneath: involucral bracts lance-awl-shaped, slightly ciliate.—Extending from the dry plains of the north into Texas. Var. HYPOLEUCUS Gray is a Texan form with leaves almost silvery-canescent with fine and dense soft tomentum, the larger with either cuneate or truncate base.

13. **H. giganteus** L. Stem hairy or rough, 9 to 30 dm. high, branched above: leaves lanceolate, pointed, minutely serrate or nearly entire, green both sides, narrowed and ciliate at base, but nearly sessile: involucral bracts long, linear-lanceolate, pointed, hairy or strongly ciliate.—Moist or wet ground of the northern and Gulf States, and reported from Gillespie County, Texas.

14. **H. Maximiliani** Schrad. Resembling the last; stout, often simple, 3 to 30 dm. high: leaves becoming rigid and very scabrous, entire or sparingly denticulate: heads rather large, usually short-peduncled, terminal and in the upper axils; bracts longer attenuate and more rigid.—Extending from the northern prairies into Texas,

++ ++ ++ *Leaves all or most of them opposite, 3-nerved.*

15. **H. hirsutus** Raf. Stem simple or forked above, stout, 3 to 12 dm. high, bristly-hairy: leaves all shortly petioled, ovate, lanceolate, gradually pointed, slightly serrate, rounded or obtuse at base, very rough above, usually rough-hairy beneath: involucral bracts ovate-lanceolate, pointed: rays about 12.—Extending from the northern States into Texas. Var. STENOPHYLLUS Torr. & Gray is a small form of Louisiana and Texas, with narrow lanceolate leaves almost sessile by a somewhat contracted base.

67. FLOURENSIA DC.

Almost glabrous resiniferous-viscid much branched shrub, with alternate entire leaves, corymbed or paniculate short-peduncled heads from the upper axils, whitish or yellowish rayless heads, flat receptacle with scarious chaff conduplicate around the compressed callous-margined very villous achenes, and a nearly persistent pappus of a subulate awn from each angle of the truncate summit, and commonly some intermediate smaller ones or scales.

1. **F. cernua** DC. Very branching and leafy, with the aromatic bitterness and odor of hops, 9 to 18 dm. high: leaves obovate and oblong, acute at both ends, obscurely veiny: heads seldom over 1 cm. high, subsessile in the axils or terminating paniculate branchlets, soon nodding: involucral bracts lanceolate and erect, with some outer and spreading foliaceous ones passing into leaves.—Dry hills and plains of western Texas.

68. ENCELIA Adans.

Ours are herbs, with opposite or alternate broad usually serrate leaves, rather showy radiate heads (rays mostly yellow and neutral) on naked peduncles, soft or mainly scarious chaff, wingless emarginate or truncate mostly naked achenes, and pappus none or an awn or its rudiment at each margin.

* *Root annual: petioles all naked at base: some uppermost leaves alternate.*

1. **E. exaristata** Gray. Stem rather slender, minutely puberulent or sparsely villous, naked at summit and bearing loosely paniculate heads: leaves ovate and oblong-ovate, barely serrate, rarely somewhat incised, on narrowly margined petioles: outer

series of involucral bracts villous-hirsute, inner ones narrower and granulose-glandular: rays 4 to 9: achenes wholly glabrous, obovate, slightly emarginate, destitute of pappus, or not rarely with 2 minute vestiges of awns. (*Simsia lagascæformis* and *S. exaristata* of Gray Pl. Wright.)—In the valleys of western Texas.

* * *Root fleshy-tuberous: leaves all opposite, the margined petioles united at base on each side by a foliaceous appendage, the two often connate into an amplexicaul disk.*

2. **E. calva** Gray. Scabrous-pubescent and often hispidulous: stem with opposite branches, terminating in long and naked 1-headed peduncles: leaves deltoid-ovate and subcordate, often hastately 3-lobed, irregularly dentate: involucral bracts hirsute and hispid, the outer foliaceous and somewhat squarrose: rays 15 to 20: achenes wholly glabrous, obcordate-oval, without vestige of pappus. (*Simsia calva* Gray, Pl. Lindh.)—Rocky hills and edges of oak woods, southern and western Texas.

3. **E. subaristata** Gray. Much like the preceding, often more canescently hispid: achenes minutely pilose-pubescent, ciliolate toward the summit, bearing 2 rigid hispidulous awns, which are half the length of the achenes, or often reduced to mere rudiments. (*Simsia subaristata* Gray, Pl. Fendl.)—Southwestern Texas.

69. ZEXMENIA Llave & Lex.

Perennial herbs or somewhat shrubby, with mostly opposite leaves, yellow radiate heads solitary on slender peduncles terminating the branches, 3-angled and 3-awned ray-achenes, compressed disk-achenes with winged or bordered margins and awned from one or more of the margins (the awns either connected by dilated bases or with intermediate separate or confluent persistent scales).

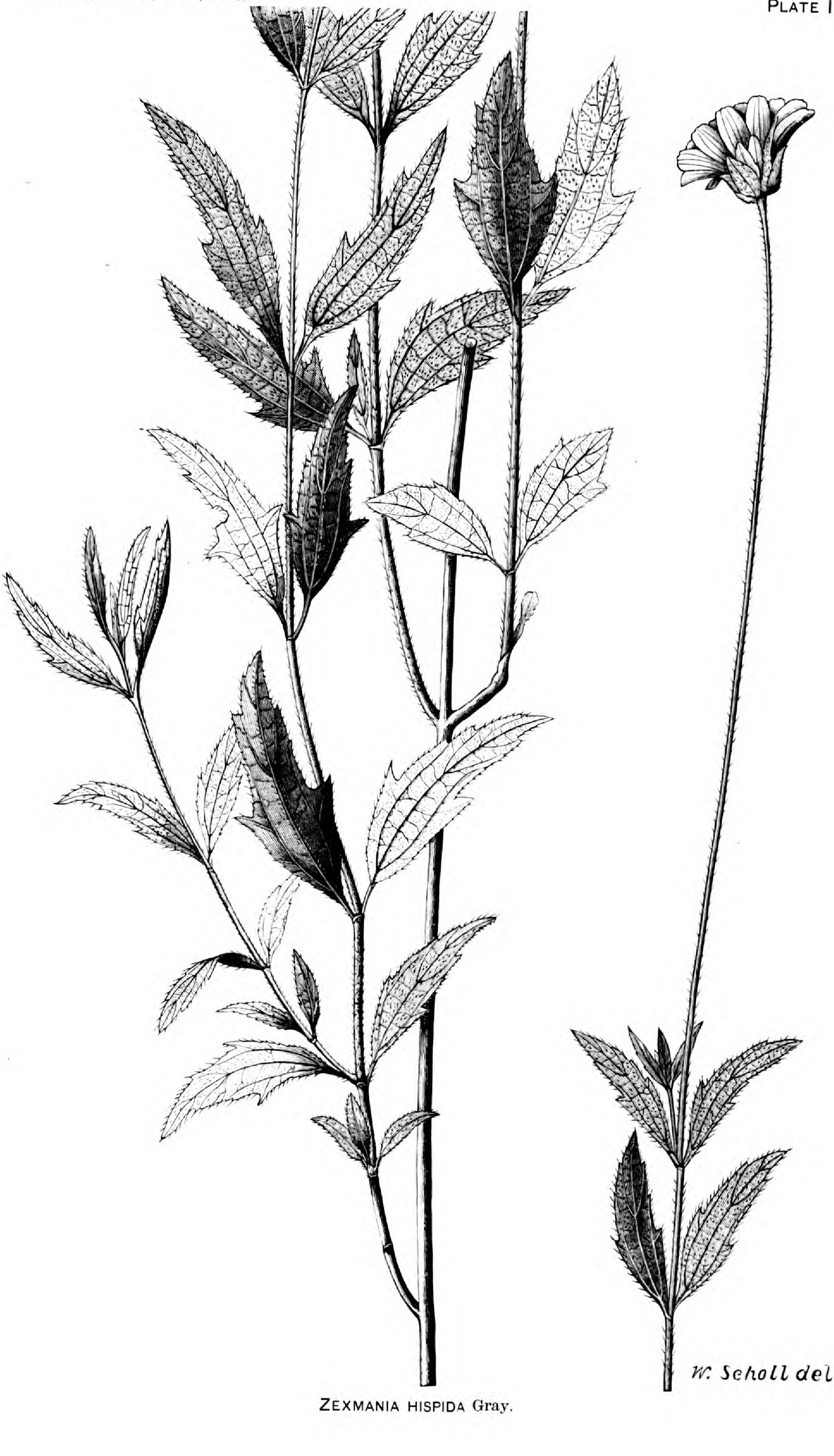
1. **Z. brevifolia** Gray. Much branched and below shrubby, strigose-scabrous: leaves small (less than 2.5 cm. long), ovate and oval, mostly entire, short-petioled: involucral bracts broad, mostly ovate: rays 5 to 9, small: corolla-lobes glabrous: achenes nearly marginless, some at maturity conspicuously callous-winged, slightly narrowed at summit between the wings or margin and the subulate-attenuate awns, between the bases of which the free or partly united scales are conspicuous (sometimes obsolete in age).—Rocky banks, southwestern Texas.

2. **Z. hispida** Gray. Herbaceous and branched from a barely woody base or root, strigose-hispid: leaves sessile or nearly so, lanceolate or the lower rhomboid-lanceolate, irregularly more or less serrate, sometimes with a pair of coarser salient teeth or lobes above the base: involucre in 2 or 3 series; the outer bracts more loose and foliaceous, lanceolate, as long as the oblong inner ones: rays 7 to 9, orange-yellow, about 1 cm. long: corolla-lobes puberulent-ciliolate: achenes narrowly or broadly winged, or sometimes winged only near the summit, appearing obcordate, the pappus in the center of the notch consisting of a cupule of united firm scales and 1 or 2 (in the ray 3) variable awns. (*Lipochæta Texana* Torr. & Gray, Fl., and Gray, Pl. Lindh. *Z. Texana* Gray, Pl. Wright. *Viguiera longipes* Coulter.)—Common in dry ground.

70. VERBESINA L. (Crownbeard.)

Mostly perennial herbs, with toothed leaves decurrent on the stem, several to many-flowered heads, mostly yellow pistillate (sometimes neutral and sterile) few rays or sometimes none, involucral bracts imbricated in 2 or more rows, rather convex or even conical receptacle with concave chaff, and flat winged or wingless 2-awned achenes.

PLATE II.



ZEXMANIA HISPIDA Gray.

**Heads narrow, small, cymosely paniculate: rays few, pistillate, usually fertile: involucre erect.*

1. **V. Virginica** L. Stem narrowly or interruptedly winged, downy-pubescent like the lower surface of the ovate-lanceolate feather-veined alternate leaves: heads in compound corymbs: receptacle convex: flowers white: rays 3 or 4, oval: achenes winged.—Rich dry soil, from the Mississippi and Gulf States through Texas to Mexico.

** * Heads broader, solitary or few.*

+ Involucre appressed: perennials.

2. **V. Wrightii** Gray. Scabrous and mostly hispidulous: stems wholly wingless: leaves ovate to oblong, sessile, mostly opposite, thickish: involucral bracts oval or oblong: rays about 12, not rarely pistillate: achenes with either broad or narrow wings, and only minute callous teeth for pappus (or some of the inner with short awns). (*Actinomeris Wrightii* Gray, Pl. Fendl. and Pl. Lindh.)—Rocky ground, western Texas.

3. **V. helianthoides** Michx. Stem hairy, widely winged by the ovate to ovate-lanceolate sessile alternate leaves, which are rough above and soft-hairy beneath: involucral bracts lanceolate: rays 8 to 15, pistillate or neutral, usually sterile: achenes winged, tipped with 2 fragile awns. (*Actinomeris helianthoides* Torr. & Gray, Fl.)—Extending into Texas from the prairies and open woods of the northeast.

+ + Involucre of spreading linear and foliaceous equal bracts: annual.

4. **V. encelioides** Benth. & Hook. Branching, cinereous: leaves alternate, ovate or cordate to deltoid-lanceolate, the petioles mostly winged and auriculate at base: rays numerous and fertile: achenes mostly broadly winged and with short awns (the outermost often awnless). (*Ximenesia encelioides* Torr. & Gray, Fl.)—In low grounds throughout Texas.

71. SYNEDRELLA Gærtn.

Diffuse or procumbent annual, with branching stems, opposite and more or less-serrate petioled leaves, small heads of yellow flowers with short fertile rays, involucre of few bracts (outer larger than inner and mostly foliaceous), scarious flat or hardly concave chaff, and some or all the achenes wing-margined, the angles or wings surmounted each by a rigid naked awn.

1. **S. vialis** Gray. Slender, strigulose-hirsute or more hairy: leaves ovate, about 2.5 cm. long: heads only 6 mm. long, solitary or scattered, some subsessile, others slender-peduncled: rays 5 to 8, with oblong exserted ligule: achenes (or many of them) tuberculate-scabrous, some of the outer 3-angled, with or without a coriaceous undulated wing-like border, the central ones narrower and marginless: pappus of 2 or 3 rigid diverging awns, with occasionally 1 or 2 additional teeth or scales. (*Oligogyne Tampicana* Gray, Pl. Wright. *Zexmenia hispidula* Buckley, Proc. Philad. Acad.)—Waysides and waste grounds, throughout the southern borders of Texas.

72. COREOPSIS L. (Tickseed.)

Herbs, generally with opposite leaves, many-flowered radiate heads, mostly 8 (rarely wanting) neutral rays (yellow or parti-colored, rarely purple), double involucre (each of about 8 bracts; the outer rather foliaceous and somewhat spreading; the inner broader and appressed, nearly membranaceous), flat receptacle with membranaceous deciduous chaff, and flat obcompressed often winged achenes which are not nar-

rowed at top, 2-toothed or 2-awned, or sometimes naked at summit, the awns not barbed downwardly.

* *Style-tips truncate or nearly so: outer involucre small and short* (except in no. 4): *rays yellow or yellow with brown base.*

\+ *Achenes straight, with fimbriate border or dissected wings and a pair of slender awns: perennial.*

1. **C. angustifolia** Ait. Wholly glabrous: stem slender, mostly quadrangular, the summit or flowering branches naked and rush-like, their leaves being reduced to small subulate bracts: lower leaves spatulate-lanceolate, upper spatulate-linear, sometimes all opposite: rays yellow, about 1 cm. long,—Extending into Texas from the moist pine barrens or swamps of the Gulf States.

\+ \+ *Achenes incurved at maturity, with entire scarious wings or none: pappus none or minute: leaves all 1 to 2-pinnately divided: annuals.*

++ *Achenes winged.*

2. **C. cardaminefolia** Torr. & Gray. Stem 1.5 to 6 dm. high: lobes of the 1 to 2-pinnately divided leaves oval to lanceolate or above linear: rays yellow with brown purple base: achenes short, smooth or papillose, with moderately broad wing, with which is sometimes connected 2 obscure teeth.—Low grounds, throughout Texas.

++ ++ *Achenes wingless: pappus none or an obscure border.*

3. **C. tinctoria** Nutt. Glabrous, 6 to 9 dm. high: lobes of the leaves lanceolate to linear: outer involucre short and close: rays 1 to 2 cm. long, sometimes base only, sometimes nearly all crimson-brown: achenes oblong, thinnish, moderately incurved.—In low ground, throughout Texas.

4. **C. Drummondii** Torr. & Gray. Low, pubescent with many-jointed lax hairs sometimes glabrous: lobes of the radical and lower stem leaves from roundish-ovate to oblong-lanceolate, of the uppermost sometimes linear: outer involucre of loose and spreading more foliaceous bracts, little shorter than the inner: rays broad, sometimes 2.5 cm. long, brown-purple only at base: achenes oval or obovate, thick, much incurved at maturity, a cartilaginous margin bordering the inner face.—Sandy soil, eastern and southern Texas. Var. WRIGHTII Gray, of rocky hills on the San Pedro and reported from Gillespie County, has lobes of the leaves narrower, linear and the broadest linear-oblong, heads smaller, and achenes circinately incurved.

* * *Style-tips abruptly cuspidate, hispid: involucres nearly equal: achenes roundish, winged, incurved, often papillose and with a callus inside at base and apex: pappus 2 small teeth or none: rays mostly yellow and palmately lobed: heads long-pedunculate.*

5. **C. coronata** Hook. Sparsely hirsute-pubescent or glabrous: leaves long-petioled, entire or the lower 3 to 5-parted, obovate and spatulate-oblong, the lateral divisions when present small: rays 2.5 cm. or less long, bright yellow, deeper or orange at base, above which are delicate or brownish-purple markings forming a sort of corona: achenes with a rather broad wing and a pappus of 2 minute chaffy teeth.—Eastern Texas, south to Brazos Santiago.

6. **C. grandiflora** Nutt. Glabrous except the hirsute-ciliate petioles, rather sparsely pilose: radical and some lower cauline leaves lanceolate, spatulate or entire; upper or sometimes all the cauline 3 to 5-parted or divided, the divisions lanceolate or linear, or even filiform, sometimes again 2 or 3-parted: rays about 2.5 cm. long, yellow throughout: achenes with thin-scarious outspread wing and chaffy pappus.—Extending into Texas from the low grounds of the Gulf and Lower Mississippi States.

* * * *Style-tips cuspidate: achenes oblong, nearly straight, without callus, the wing narrow or none: rays yellow, mostly entire or slightly toothed.*

+ *Outer involucral bracts narrow, all more or less united at base: pappus 2-toothed or none: leaves opposite, sessile, 3-cleft, appearing as if whorled.*

7. **C. palmata** Nutt. Nearly smooth, simple: leaves broadly wedge-shaped, rigid; the lobes broadly linear, entire, or the middle one 3-lobed.—Extending from the northern plains and prairies to western Texas.

+ + *Bracts mostly distinct, the outer leafy, reflexed or spreading: achenes flat, obovate or cuneate-oblong, 1-nerved on each face, 2-toothed or 2-awned: leaves petiolate, usually pinnately 3 to 7-divided, the lobes serrate.*

8. **C. involucrata** Nutt. Somewhat pubescent or glabrous: leaves all 3 to 7-divided or parted; the divisions serrate, incised, or some again cleft: heads radiate, with conspicuous golden-yellow rays: outer involucral bracts 12 to 20, mostly exceeding the inner, slender and hispid: achenes obovate, very flat, with thin ciliate margins and 2 short acute teeth.—Extending into Texas from the Mississippi Valley States.

9. **C. discoidea** Torr. & Gray. Glabrous and diffusely branched: leaves ternately divided, slender-petioled; leaflets ovate-lanceolate, pointed, coarsely serrate: rays none or rarely rudimentary: outer involucral bracts usually 3 to 5, mostly surpassing the heads: achenes linear-wedge-shaped, bearing a pair of short and stout upwardly-barbed awns as long as the corolla.—Wet banks and swamps, extending from the Atlantic States into Texas.

73. BIDENS L. (Bur-marigold.)

Annual or perennial herbs, with opposite various leaves, many-flowered heads, 3 to 8 neutral yellow rays (or none), double involucre (the outer commonly large and leafy), flattish receptacle with deciduous chaff, and obcompressed or slender and 4-sided achenes crowned with 2 or more rigid and persistent awns which are downwardly barbed.

* *Achenes flat, not tapering at summit: outer involucre foliaceous and spreading.*

1. **B. frondosa** L. (Common beggar-ticks. Stick-tight.) Smooth or hairy, 6 to 18 dm. high: leaves mostly petiolate, 3 to 5-divided; leaflets mostly stalked, lanceolate, pointed, coarsely-toothed: heads erect, nearly rayless: outer involucre much longer than the head, ciliate below: achenes wedge-obovate, 2-awned, ciliate (the bristles ascending except near the summit.)—A coarse weed, common everywhere.

2. **B. chrysanthemoides** Michx. (Large bur-marigold.) Smooth, erect or reclining at base, 1.5 to 6 dm. high: leaves sessile, lanceolate, tapering at both ends, more or less connate, regularly serrate: outer involucre mostly shorter than the showy golden-yellow rays (2.5 cm. long): heads somewhat nodding: achenes wedge-shaped, with almost prickly downwardly barbed margins, 2, 3, or 4-awned.—Wet grounds, from Canada to South America.

* * *Achenes linear: 4-sided, the inner longer and tapering upward: outer involucre seldom foliaceous or enlarged: leaves all once to thrice 3 to 5-nately parted or divided into oblong or linear ultimate lobes.*

3. **B. Bigelovii** Gray. Lobes of the leaves linear-oblong, mostly obtuse: heads narrow, slender-peduncled: rays inconspicuous and yellowish or none: achenes long and slender (at least the central ones much surpassing the involucre); the innermost 10 to 12 mm. long, 2 or 3-awned; outermost half as long or less, stouter, 2-horned, or with a pair of short awns, or even with none.—"Common in the foot-hills of Presidio County, and valued by the Mexicans as one of their best tea plants. The leaves are collected during the time of inflorescence, parboiled and then dried in the sun, when they are ready for use" (Havard). It is more than probable that the most nearly allied species, the common and disagreeable weed known as "Spanish needles," occurs in Texas. It is characterized as follows:

4. **B. bipinnata** L. Primary and secondary divisions of the leaves rather ovate or deltoid-lanceolate in circumscription, and the lobes mostly acute: achenes all

slender, the inner ones 10 to 18 mm. long, outermost moderately shorter and thicker: awns 3 or 4, sometimes only 2.

5. **B. procera** Don. Erect and tall, glabrous: lobes of the narrow leaves linear: heads broader, corymbosely paniculate: outer involucre small and inconspicuous: rays oval, comparatively large and deep yellow: outer achenes narrowly cuneate-oblong and only 4 mm. long; innermost 6 mm. long and cuneate-linear: awns 2, strongly barbed, one-half or one-third as long as the achene. (*B. fœniculifolia* Gray, Pl. Wright.)—A species of Arizona and Mexico, reported from Gillespie County (*Jermy*).

74. COSMOS Cav.

Like *Bidens*, except that the rays are purple or rose color (sometimes white), and the achenes slender and beaked.

1. **C. bipinnatus** Cav. Leaves pinnately divided into narrowly linear or almost filiform lobes: heads very showy, the deep rose-colored rays commonly 2.5 cm. or more long: achenes smooth and glabrous throughout, with abrupt beak very much shorter than body: awns 1 to 3, short.—A Mexican species, represented in southern Texas, near Marfa, by the introduced var. EXARISTATUS DC., in which the awns are wholly wanting.

2. **C. parviflorus** HBK. Slender: heads smaller, with either white or rose-colored rays 6 to 12 mm. long: beak of achenes slender, usually half as long as body, scabrous, 2 or 3 (even 4)-awned; otherwise like the preceding. (*C. bipinnatus*, var. *parviflorus* Gray, Pl. Wright.) Extreme southwestern Texas.

75. HETEROSPERMUM Cav.

Small mainly glabrous branching annuals, with opposite pinnately or ternately dissected or sometimes undivided leaves, small rather few-flowered heads of yellow flowers, fertile rays, and dimorphous achenes (the outer with winged or callous margin, mostly cymbiform; inner narrower, attenuate upward, marginless; these and sometimes the outer with two retrosely barbed awns).

1. **H. pinnatum** Cav. Leaves pinnately 3 to 7-parted into linear divisions, which are either all entire or some of them again 2 or 3-parted: heads slender-peduncled, about 6 mm. high: outer involucre of 3 to 5 linear foliaceous bracts overtopping the thin and oval striate inner bracts. (*H. tagetinum* Gray, Pl. Fendl. & Pl. Wright.)—Extreme southwestern Texas.

76. THELESPERMA. Less.

Perennial glabrous herbs, with opposite usually finely dissected leaves, pedunculate many-flowered heads, yellow neutral rays or none, double involucre (the inner connate to the middle and scarious-margined), flat receptacle with white-scarious deciduous chaff, nearly terete wingless and beakless achenes, and pappus of 2 stout subulate retrorsely hispid awns (sometimes obsolete or wanting).

**Lobes of disk-corollas linear or lanceolate, longer than the short campanulate throat: pappus evident.*

1. **T. filifolium** Gray. Loosely branching and leafy: leaves not rigid, bipinnately divided into filiform lobes no wider than the rhachis: bracts of outer involucre 8, subulate-linear, equaling or more than half as long as the inner which are connate

only to the middle: rays broad, over 12 mm. long: disk usually purple: the stout triangular-subulate pappus-scales not longer than the width of the achenes.—Dry uplands and plains, northern and central Texas.

2. **T. ambiguum** Gray. Rather rigid, usually more naked above or with longer peduncles: cauline leaves less compound, the lobes from filiform to narrowly linear: bracts of inner involucre connate to or above the middle: rays rarely wanting: otherwise as in the last.—Plains and hills of western Texas.

3. **T. gracile** Gray. More rigid, less branched, naked above: leaves once or twice 3 to 5-nately divided or parted into filiform-linear or broader lobes, or some upper ones filiform and entire: bracts of outer involucre 4 to 6, very short, ovate or oblong; of the inner connate to above the middle: rays usually none, sometimes present and 4 to 6 mm. long: disk mostly yellow: the lanceolate-subulate retrorsely hispid awns of the conspicuous pappus often nearly as long as the corolla-tube.—Plains, throughout southern and western Texas.

* * *Lobes of disk-corollas ovate to oblong, decidedly shorter than the cylindraceous throat: pappus shorter and more coroniform, destitute of retrorse bristles or hairs, or wanting.*

4. **T. subsimplicifolium** Gray. Leafy-stemmed and branching, herbaceous to the ground: stems slender and rigid: leaves sometimes all entire and filiform, sometimes 3 to 5-parted into filiform entire lobes: outer involucral bracts oblong to linear, short: rays 12 mm. long: pappus 2 minute slightly hairy teeth, or obsolete.—Rocky prairies of southern and western Texas.

5. **T. longipes** Gray. Fastigiately much branched and very leafy at the woody base, sending up long filiform simple peduncles 12.5 to 25 cm. long: leaves 3 to 5-parted into filiform divisions which are usually no wider than the rhachis: heads small and rayless; outer involucre short and small: achenes barely 4 mm. long, arcuate at maturity: pappus obsolete.—Dry hills and banks of western Texas.

77. MARSHALLIA Schreb.

Smooth and low perennials, with alternate entire 3-nerved leaves, long-pedunculate many-flowered heads terminating the simple stem or branches, flowers (purplish) all tubular and perfect, linear-lanceolate foliaceous involucral bracts, convex or conical receptacle with narrowly linear rigid chaff, top-shaped 5-angled achenes, and pappus of 5 or 6 membranaceous and pointed chaffy scales.

1. **M. cæspitosa** Nutt. Stem commonly leafy only at base: leaves narrowly oblanceolate to linear or the radical spatulate, obtuse.—Extending from Arkansas into northern and western Texas.

78. CLAPPIA Gray.

Fruticulose plant, with alternate fleshy leaves, pedunculate heads, broad and very obtuse involucral bracts imbricated in 2 or 3 series, convex fimbrillate naked receptacle, 12 to 15 linear 3-toothed fertile rays, oblong-turbinate terete 8 to 10-nerved achenes (hirtellous on the nerves), and pappus of 20 to 25 rigid scabrous distinct chaffy bristles longer than the achene.

1. **C. suædæfolia** Gray. Low and widely branching, not punctate or glandular: leaves terete, linear, entire, or the lower pinnately 3 to 5-parted, sessile.—Southern Texas. On the Rio Grande at Laredo (*Berlandier*), and flats of the Pecos (*Havard*).

79. **RIDDELLIA** Nutt.

Low and corymbosely branched woolly herbs, with alternate and spatulate or linear leaves, small heads of yellow flowers (the ligules large and becoming pale or whitish and thin-papery with age), involucre of linear-oblong coriaceous woolly bracts (a few small scarious ones within), small flat naked receptacle, disk-corollas with glandular-bearded teeth, narrow terete obscurely striate or angled achenes, and pappus of 4 to 6 hyaline nerveless and pointless scales.

1. **R. tagetina** Nutt. Loosely or somewhat villously woolly (sometimes glabrate in age), rather widely branched: radical and even lower cauline leaves often laciniate-pinnatifid: heads numerous, mostly cymosely clustered and short-peduncled: rays at maturity 12 mm. long: achenes and pappus glabrous (or the former with few and short scattered hairs): scales of the pappus oblong-lanceolate, entire, usually obtuse, one-half or three-fourths as long as disk-corolla.—Western Texas.

2. **R. arachnoidea** Gray. Loosely woolly: stem and branches rather strict: foliage of the last: heads clustered, short-peduncled: rays at maturity only 6 mm. long: arachnoid hairs even longer than the somewhat turbinate achenes: scales of the pappus subulate-lanceolate, their margin and apex more or less deliquescent into long and arachnoid hairs.—Southwestern Texas, beyond the Pecos.

80. **BAILEYA**. Harvey & Gray.

Soft and densely floccose-woolly annuals, with alternate leaves (the lower once or twice pinnatifid), terminal long-pedunculate solitary heads of yellow flowers, large persistent rays (becoming scarious-papery) deflexed in age, numerous thin-herbaceous linear involucral bracts very woolly on the back, flat or barely convex naked receptacle, disk-flowers with glandular-bearded teeth, oblong-linear or clavate somewhat angled striate achenes, and no pappus.

1. **B. multiradiata** Harv. & Gray. Densely floccosely white-tomentose, at length much branched from the base and leafy: radical and lower leaves spatulate or broader, mostly laciniate-pinnatifid or sparingly bipinnatifid; uppermost small, spatulate-linear, entire: heads on slender often long peduncles: ligules 25 to 50, 10 to 12 mm. long: achenes oblong-prismatic and obscurely striate, broadest at the truncate apex, minutely scabrous.—Plains of western Texas. Var. NUDICAULIS Gray is more simple-stemmed or branched only from a stout base, with more divided leaves, elongated sometimes scapiform peduncles, and larger heads.

81. **LAPHAMIA** Gray.

Low suffruticulose perennials growing in crevices of rocks, mostly with petioled and dentate or laciniate small leaves (the upper alternate, rarely all opposite), small heads of yellow flowers either cymosely disposed or singly terminating the branches, involucre of equal narrow more or less overlapping bracts, female ray-flowers (with deciduous ligule) or none, 4-toothed disk-corollas, flat achenes with naked or not much ciliate margins, and pappus none or of 1 or 2 or sometimes about 20 bristles.

PERITYLE VASEYI Coulter.

* *Pappus of about 20 unequal rigid bristles: rays none: disk-flowers 12 to 15: leaves mostly opposite, as broad as long, abruptly slender-petioled.*

1. **L. rupestris** Gray. Pubescent, slightly viscid, leafy to summit: leaves 12 mm. long, sometimes crenately sometimes strongly and acutely dentate or almost laciniate: pappus much exceeding short proper tube of corolla.—Southwestern Texas.

2. **L. cinerea** Gray. Tomentose-canescent: leaves more orbicular, almost entire: pappus hardly surpassing proper tube of corolla, which is more than half as long as the short-cylindraceous throat: achenes sometimes 4-nerved.—Rocks along Escondido creek, southwestern Texas (*Bigelow*).

* * *Pappus a solitary very slender bristle or none: disk-flowers 15 to 20: heads commonly cymose and pedunculate.*

3. **L. halimifolia** Gray. Stems crowded on a thick woody caudex: leaves coriaceous, resinous-punctate or atomiferous, somewhat viscid, broadly ovate or rhombic, seldom 2.5 cm. long, laciniately dentate, abruptly long-petioled: rays 4 to 6, with broad and short ligules little longer than the tube: pappus none.—Southwestern Texas.

4. **L. angustifolia** Gray. Leaves lanceolate or rhombic-lanceolate, tapering into margined petioles, laciniately 1 to 5-toothed or lobed: heads less numerous, scattered: rays none: otherwise much like the last.—Southwestern Texas, on high and rocky hills of the Pecos and Rio Grande.

5. **L. Lindheimeri** Gray. Stems from a thick woody base: leaves thinner, oblong or ovate, glabrous, few-toothed or some entire, contracted at base into a short petiole: heads loosely cymose: rays 3 to 6, very short, sometimes none: pappus a single slender bristle equaling the proper tube of the corolla.—Rocky banks of the Guadalupe, near New Braunfels (*Lindheimer*).

* * * *Pappus a pair of stouter naked bristles, one from each angle of the achene: head only 6 to 8-flowered.*

6. **L. bisetosa** Torr. Hispidulous-puberulent, minutely resinous-atomiferous and punctate: stems 2.5 to 7.5 cm. high: leaves mostly alternate, coriaceous, spatulate-ovate, obscurely few-toothed: heads solitary and sessile: rays none: involucral bracts broadly linear, carinate-concave at base: achenes puberulent, rather longer than the rigid awns.—In a cañon on the Rio Grande, below Presidio del Norte (*Parry*).

82. PERITYLE Benth.

Mostly annuals, with petiolate dentate or palmately-lobed leaves (lower opposite, upper alternate), small or middle-sized pedunculate heads terminating the branches, yellow or white rays (when present), 4-toothed disk-corollas, narrow and distinct involucral bracts, flat cartilaginous-margined usually strongly ciliate achenes, and pappus a scaly or cupulate crown and commonly a slender awn from one or both angles.

* *Crown of the pappus an entire or undulate firm and shallow border: achene hardly ciliate: suffruticulose.*

1. **P. dissecta** Gray. Dwarf, 7.5 to 10 cm. high, cinereous-pubescent, very leafy: leaf-blades equaled by petiole, round-cordate in outline, pedately cleft and parted and dissected into short linear lobes: heads subsessile, 6 to 8 mm. high: rays none: achenes minutely cinereous-hirsute, a short scabrous awn from one angle (or this wanting). (*Laphamia dissecta* Torr. Pl. Wright.)—Rocks at Presidio del Norte.

* * *Pappus rather a conspicuous crown of scales and one long and delicate awn: achenes densely ciliate with long beard: herbaceous.*

– *Rays 4 to 6 mm. long, deep yellow: disk-corollas funnelform.*

2. **P. Vaseyi** Coulter. Minutely glandular pubescent: leaves 3.5 to 6.5 cm. long, with broad outline, palmately or pinnately divided into 3 long-stalked broadly cuneate

divisions which are 3 to 5-parted, the ultimate segments mostly cuneate and 3-lobed: achenes pubescent on the faces, hispid-villous on the margins: awn of the pappus as long as the achene.—Chisos Mountains, southwestern Texas (*Nealley*).

+ + *Rays barely 4 mm. long or none: disk-corollas slender, with long and narrow throat.*

3. **P. Parryi** Gray. Minutely pubescent and obscurely viscid: leaves reniform-cordate, crenately dentate and often lobed: rays barely 4 mm. long: achenes strongly hirsute-ciliate: awn of pappus nearly equaling disk-corolla.—Cañons of southwestern Texas (*Parry* and *Havard*).

4. **P. aglossa** Gray. Somewhat puberulent, obscurely viscid: leaves roundish, with subcordate or truncate base, mostly 3 to 5-cleft and coarsely dentate: involucral bracts very narrowly linear: rays none: achenes with rather short and dense hirsute ciliation: awn of pappus equaling disk-corolla.—With or near the preceding (*Parry*).

83. BAHIA Lag.

Suffruticose or mostly herbaceous plants, with opposite or sometimes alternate leaves, small or middle-sized pedunculate heads of yellow flowers (all fertile) terminating the branches, many- (at least 12 to 20-) flowered involucre with herbaceous uncolored bracts lax or open in fruit, small mostly flat receptacle, narrow quadrangular achenes, and pappus (rarely wanting) of several scarious scales with thickened base which is sometimes extended into a strong midnerve.

* *Leaves mainly opposite, pedately (sometimes pinnately) dissected or cleft: pappus of broad very obtuse scales scarious above and thickened at base.*

1. **B. absinthifolia** Benth. Diffusely branched tomentulose-canescent perennial, with sparsely corymbose-paniculate heads on slender peduncles: leaves 3 to 5-parted into narrowly linear or lanceolate divisions and lobes: rays 9 to 12: achenes slender, pubescent: pappus nearly equaling the proper corolla tube.—A species of Mexico and Arizona, collected near Rio Grande City (*Nealley*). Var. DEALBATA Gray, of the dry plains of western Texas, is more whitened with fine pannose tomentum, and with less divided leaves commonly only 3-cleft into lanceolate or linear-oblong lobes, or some lower ones oblong-lanceolate and entire.

2. **B. Bigelovii** Gray. Diffuse strigose-puberulent annual: leaves 3-parted and the divisions sometimes 2 or 3-parted into linear-filiform segments and lobes: peduncles elongated and filiform: involucral bracts viscidly hirsute: rays 8 or 9: achenes mostly hirsute along the slender attenuate base: pappus half the length of the corolla-tube.—In the valley of the Limpia, southwestern Texas.

* * *Leaves all or mostly alternate, 2 or 3-ternately divided or parted: heads loosely cymose-paniculate at the naked summit of the erect stems: pappus of oblong to narrowly lanceolate scales with a distinct midrib (costa).*

3. **B. pedata** Gray. Cinereous-puberulent: leaves pedately divided, commonly into 3 petiolulate obovate or cuneate segments, of which the lateral are 2-parted and the middle 3 to 7-lobed; lobes obovate or broadly oblong: heads 10 mm. high: involucral bracts oblong: rays about 12, oblong: scales of pappus 10 to 12, spatulate-oblong, with costa vanishing near the obtuse or retuse summit.—Southwestern Texas, beyond the Pecos.

4. **B. biternata** Gray. More pubescent and slender: leaves biternately dissected into linear and obtuse (or spatulate) segments, the primary ones slightly petiolulate: heads 8 mm. high: involucral bracts obovate: rays 8 or 10, broadly obovate: scales of pappus 12 to 14, longer and narrower; those of outer flowers obovate and with costa vanishing below the apex; of inner ones longer, elongated-lanceolate and with costa excurrent into an awn-like cusp.—Borders of western Texas.

84. SCHKUHRIA Roth.

Slender and paniculately much branched annuals, with alternate (or lower opposite) pinnately 3 to 7-parted (or uppermost entire) impressed-punctate leaves with filiform divisions and rhachis, small pedunculate effusely paniculate 3 to 5-flowered heads of yellow (rarely purplish) flowers, clavate involucre of 4 or 5 erect bracts with scarious purple-tinged tips, single ray-flower or none, obpyramidal achenes with very densely long-villous angles, and pappus of 8 scarious scales.

1. **S. Wrightii** Gray. Pappus shorter than the corolla, its scales all obovate and obtuse or erose-truncate, destitute of costa.—Limpia Cañon, southwestern Texas (*Nealley*).

85. HYMENOTHRIX Gray.

Glabrous or somewhat pubescent herbs, with alternate leaves once to thrice parted into linear divisions, numerous corymbosely cymose many-flowered heads, no rays (in ours), 7 to 10 obovate or lanceolate-oblong thin involucral bracts half or more scarious-petaloid, small naked receptacle, top-shaped achenes with a slender base, and pappus of 12 to 20 narrow lanceolate very thin scales traversed by a strong costa which is excurrent into a scabrous awn.

1. **H. Wrightii** Gray. Leaves with very narrow linear or almost filiform divisions, the lower cauline hirsute: involucre of obovate-oblong and very obtuse purple-tinged bracts (a few smaller narrow accessory ones): disk-corollas white or purplish: achenes villous.—Chenate Mountains, southwestern Texas (*Nealley*).

86. HYMENOPAPPUS L'Her.

Biennial or perennial herbs, with alternate mostly dissected leaves, corymbed small many-flowered heads of usually whitish flowers, no rays, 6 to 12 loose and broad thin involucral bracts with the upper part petal-like (usually white), small naked receptacle, top-shaped striate achenes with slender base, and pappus of 15 to 20 very thin blunt scales in a single row.

* *Pappus of very small roundish nerveless scales: involucre partly white-petaloid.*

1. **H. scabiosæus** L'Her. Somewhat flocculent-woolly when young, leafy to the top: leaves 1 to 2-pinnately parted into linear or oblong lobes: involucral bracts roundish, mainly whitish. Extending into Texas from the sandy pine-barrens of the Gulf States.

2. **H. corymbosus** Torr. & Gray. More slender, glabrate, naked above: involucral bracts obovate-oblong, petaloid at apex.—Extending into Texas from the northern prairies.

* * *Pappus of larger spatulate-obovate scales partly traversed by a thickened axis or obscure costa: involucre half whitish.*

3. **H. artemisiæfolius** DC. Pannosely or somewhat floccosely white-tomentose: leaves from simply pinnatifid or lyrately few-lobed (sometimes entire) to bipinnately parted into linear-oblong lobes.—Southern Texas.

* * * *Pappus of conspicuous spatulate 1-nerved scales: involucre greener: stems leafy.*

4. **H. flavescens** Gray. Densely white-tomentose: divisions of the leaves narrowly to rather broadly linear: heads 8 to 10 mm. high: involucral bracts roundish-obovate or ovate, with greenish-white or yellowish margins: corolla yellow: achenes rather short-villous.—Sandy plains and valleys of western Texas.

5. **H. tenuifolius** Pursh. Slightly tomentose or glabrate: divisions of the leaves narrowly linear or filiform, revolute: heads 6 to 8 mm. high: involucral bracts obovate-oblong, greenish with whitish apex and margins: corolla dull white: achenes long-villous.—Extending into Texas from the northern plains.

87. FLORESTINA Cass.

Slender leafy-stemmed loosely branched annual (pubescent and above beset with stipitate glands), with alternate (except lowest) petiolate simply palmately divided or rarely entire leaves, loosely paniculate 15 to 25-flowered heads of white or flesh-colored flowers, no rays, small naked receptacle, 6 to 8 obovate-spatulate equal involucral bracts with scarious-colored rounded tips, narrowly obpyramidal 4 or 5-angled pubescent achenes, and pappus of 6 to 8 obovate pointless scales which are very thin scarious from a thickened narrow base or axis.

1. **F. tripteris** DC. Lowest leaves commonly ovate or oblong and entire; others of 3 oval or oblong or the upper linear leaflets: tips of involucral bracts and flowers usually dull white.—Southeastern Texas, in the Lower Rio Grande region.

88. POLYPTERIS Nutt.

More or less scabrous-pubescent herbs, with undivided and mostly entire petiolate mostly alternate leaves, loosely corymbose or paniculate heads of rose-purple or flesh-colored flowers, rays wanting (except in one species), spatulate to linear-lanceolate involucral bracts with small colored tips, small naked receptacle, slender to narrowly obpyramidal 4-sided minutely pubescent achenes, and pappus of 6 to 12 equal scales with a strong percurrent costa (rarely wanting).

* *Heads 6 to 10 mm. high, rayless.*

1. **P. callosa** Gray. Slender, paniculately branched: leaves linear, slightly petioled: involucre 10 to 12-flowered, 6 mm. high, of linear-oblong bracts: pappus-scales all short, obovate or roundish, the costa seldom reaching the obtuse or erose and retuse apex, occasionally minute or wholly wanting. (Has been variously placed under *Stevia*, *Florestina*, and *Palafoxia*.)—Low or dry ground, extending from Arkansas into northern and central Texas.

2. **P. Texana** Gray. Stouter: leaves from lanceolate-linear to lanceolate-oblong, distinctly petioled: involucre 20 to 30-flowered, 6 to 10 mm. high, of spatulate-oblong bracts: pappus-scales oblong-ovate to oblong-lanceolate, with slender nearly complete or slightly excurrent costa. (*Palafoxia Texana* DC.)—River banks of Texas.

* * *Heads 12 mm. or more high, with palmately 3-lobed rays.*

3. **P. Hookeriana** Gray. Above glandular-pubescent and somewhat viscid: leaves from narrowly to broadly lanceolate: involucre many-flowered, of lanceolate bracts in 2 series (outer looser, inner with purplish tips): ray-flowers 8 to 10, with deeply 3-cleft rose-red rays: ray-pappus a crown of 6 to 8 short and obtuse rather rigid scales; disk-pappus of narrowly lanceolate thin scales traversed by an excurrent costa and attenuate at apex into a slender point or short awn. (*Palafoxia Hookeriana* Torr. & Gray.)—Extending from the sandy plains of the north through Texas into Mexico.

89. ACTINELLA Pers., Nutt.

Low herbs, with narrow alternate leaves dotted with resinous atoms, solitary many-flowered heads terminating scapes or slender naked peduncles, wedge-oblong 3 toothed yellow pistillate rays, ovate or lanceolate membranaceous or coriaceous nearly equal involucral bracts appressed in 2 or 3 rows, hemispherical or conical naked receptacle, top-shaped densely silky-villous achenes, and pappus of 5 or more ovate or lanceolate very thin chaffy scales.

* *Involucre of numerous distinct not rigid bracts: leaves entire* (except in a form of no. 2).

1. **A. linearifolia** Torr. & Gray. Annual or biennial, villous or glabrate, 3 dm. high or less, simple or branched: leaves linear: peduncles filiform.—In sandy soil, throughout southern and western Texas.

2. **A. scaposa** Nutt. Perennial, rather sparsely cespitose, the branches of the caudex slender and often ascending, with scape-like peduncles, loosely villous and glabrate: leaves linear to lanceolate, not rarely laciniate-lobed.—Rocky prairies, throughout Texas. Associated with the species is var. LINEARIS Nutt., in which the leaves are all narrowly linear and entire and more rigid.

* * *Involucral bracts rigid, in 2 rows, the outer connate at base.*

3. **A. Texana** Coulter & Rose. A small annual 5 to 15 cm. high: leaves mostly radical, oblong and tapering at base, entire or few-toothed; those of the stem narrower and toothed, becoming linear and entire above: heads small, 4 to 6 mm. high, with minute rays not projecting beyond the bracts.—Harris County (*Thurow*) and southwestern Texas (*Palmer*).

4. **A. odorata** Gray. Annual, 3 to 6 dm. high, branching, leafy, somewhat floccose-woolly: heads small and scattered: leaves 1 to 3-pinnately divided, the lobes filiform.—Open ground, throughout southern Texas. Called "limonillo" and used as a perfume plant (Havard).

90. HELENIUM L. (SNEEZE-WEED.)

Erect branching herbs, with alternate (impressed-punctate) leaves mostly decurrent on the angled stem and branches which are terminated by single or corymbed (yellow rarely purple) many-flowered heads, wedge-shaped 3 to 5-cleft fertile (rarely sterile) rays, small reflexed linear or awl-shaped involucral bracts, globose or oblong naked receptacle, top-shaped ribbed achenes, and pappus of 5 to 8 thin 1-nerved chaffy scales, the nerve usually extended into a bristle or point.

* *Rays fertile (rarely sterile, occasionally wanting): scales of pappus not dissected.*

– *Root annual: leaves all filiform-linear, not decurrent on the stem or branches: scales of pappus tipped with prominent awn.*

1. **H. tenuifolium** Nutt. Glabrous, slender, much branched, very leafy up to the slender peduncles: leaves mostly entire: rays much surpassing the globular disk: pappus scales ovate, abruptly tipped with a longer awn which equals the villous achene.—River bottoms, etc., extending from the Gulf and Mississippi States to western Texas. Associated with the species in Texas is var. BADIUM Gray, with dull purplish brown (instead of yellow) disk, and lower leaves sometimes pinnately parted.

+ + *Root annual (or biennial): leaves broader, at least some of them decurrent on stem and branches: rays occasionally parti-colored with brownish red: scales of pappus obtuse or at least pointless.*

+ *Disk and receptacle elongated in fruit.*

2. **H. quadridentatum** Labill. Loosely paniculate: lower leaves incisely pinnatifid; upper lanceolate and entire: disk becoming 12 mm. long, surpassing the rays: disk-corollas mostly 4-toothed: pappus of very short roundish-oval scales.—Low ground, near the coast, extending from the Gulf States.

++ ++ *Disk globular.*

3. **H. elegans** DC. Strict, slender: leaves narrowly lanceolate and entire (or lowermost broader and sometimes slightly toothed): heads 4 to 6 mm. high, with brownish or purplish disk, equaled or surpassed by the pure yellow or parti-colored or largely brownish-purple rays: pappus minute, the roundish-ovate scales decidedly shorter than the breadth of the achene. (*H. microcephalum* var. *bicolor* Torr. & Gray Fl.).—Moist ground, from Louisiana to western Texas.

4. **H. microcephalum** DC. Freely branching: leaves lanceolate or oblong, the lower denticulate or repand-toothed: heads 6 to 8 mm. high, with yellow or fuscous disk much surpassing or sometimes equaled by the rays: pappus scales ovate, short, but nearly half the length of the achene.—Moist ground, southern Texas and adjacent Mexico.

5. **H. amphibolum** Gray. Stouter, freely branching: upper leaves lanceolate to linear and entire; lower varying to oblong and toothed or laciniate-pinnatifid: heads 6 to 8 mm. in diameter, with fuscous-purplish disk equaled or surpassed by the yellow rays: pappus scales roundish and very small (as in no. 3).—Southern borders of Texas, on or near the Rio Grande.

6. **H. ooclinium** Gray. Rather stout, freely branching: leaves lanceolate, usually more or less dentate or denticulate: heads 10 to 12 (rarely 8) mm. high, with yellowish and fuscous disk longer than the yellow rays: pappus scales rather large, ovate, obtuse, often almost as long as the achene.—Southern borders of Texas, along the Rio Grande.

+ + + *Root perennial: leaves lanceolate to oblong: scales of pappus aristate-acuminate.*

7. **H. nudiflorum** Nutt. Somewhat puberulent, 3 to 9 dm. high: leaves narrowly lanceolate or oblong to linear, entire, or the radical spatulate and dentate: heads mostly small: disk brownish: ray yellow or partly brown-purple, sterile, shorter than or exceeding the disk.—Low ground, extending into Texas from the Gulf and Mississippi States.

8. **H. autumnale** L. Nearly smooth, 3 to 18 dm. high: leaves mostly toothed, lanceolate to ovate-oblong: heads larger, about 12 mm. broad: disk yellow: ray fertile, yellow.—Wet ground, throughout Texas.

* * *Rays neutral, very numerous: scales of pappus dissected: leaves narrowly or not at all decurrent.*

9. **H. fimbriatum** Gray. Nearly glabrous: stem virgate, with somewhat elongated-lanceolate mostly entire stem-leaves, but no conspicuous radical tuft, continued into long solitary peduncle bearing a head with disk 16 to 18 mm. broad, equaled by the rays: scales of pappus broad, dissected from summit to beyond the middle into many capillary bristles. (*Gaillardia fimbriata* Michx. Fl. *Leptopoda fimbriata* Torr. & Gray. Fl.)—Extending from the pine barrens of the Gulf States into Texas.

91. AMBLYOLEPIS DC.

Annual, with entire leaves neither punctate nor decurrent, principal involucral bracts foliaceous and lanceolate, an inner thin-scarious se-

ries resembling the conspicuous blunt nerveless scales of the pappus, fertile ample rays, and broadly top-shaped achenes with 10 thick ribs.

1. **A. setigera** DC. Sometimes glabrous, sometimes villous with very long hairs (especially along the leaf-margins): stem branching below, terminated by long 1-headed peduncles: radical leaves oblong-spatulate with long tapering base; cauline oblong or ovate, with rounded or subcordate half-clasping base and mucronate-acuminate tip: head large, flowers all yellow, rays almost 2.5 cm. long, 3 or 4-lobed: pappus scales 5, broadly ovate, silvery-scarious, very obtuse.—Prairies of Texas and extending into Mexico. The species is referred by some to Helenium, as *H. setigera*.

92. GAILLARDIA Foug.

Erect herbs, with alternate leaves, large showy heads of yellow or purplish fragrant flowers on terminal or scapiform peduncles, cleft or toothed neutral or fertile rays (sometimes none), outer involucral bracts larger and loose and foliaceous, convex to globose receptacle beset with bristle-like or subulate or short and soft chaff, top-shaped 5-ribbed villous achenes, and pappus of 5 to 10 long thin scales which are awn-tipped by the excurrent nerve.

* *Style-branches tipped with short naked appendage: rays sometimes fertile, often none: achenes villous all over.*

1. **G. simplex** Scheele. Annual: leaves all radical, usually spatulate, pinnatifid to entire: head globose on a naked scape, usually rayless.—Rocky prairies of Texas. Probably to be called *G. suavis* Britton, on account of the priority of *Agassizia suavis* Gray & Engelm.

* * *Style-branches tipped with a long hispid or hispidulous filiform appendage: rays neutral* (sometimes wanting in no. 2): *villous hairs covering the achene mainly at its base or below the broad summit: leafy-stemmed plants.*

\+ *Chaff of the receptacle obsolete or reduced to very short soft teeth: corolla-lobes tailed-acuminate from a short broadish base.*

2. **G. lanceolata** Michx. Annual, branched, finely pubescent, 3 to 6 dm. high: leaves oblanceolate to linear, entire or sparsely serrate: rays rather few or none.—Extending from the dry pine barrens of the Gulf States into eastern and southern Texas. In some Texan forms the leaves are all more or less toothed or even lobed.

\+ \+ *Chaff of the receptacle bristly or subulate, mostly surpassing the achenes.*

++ *Lobes of disk-corolla subulate-acute and usually tipped with a seta or cusp, externally clothed with long hairs.*

3. **G. aristata** Pursh. Perennial, hirsute, often 6 dm. or more high: leaves lanceolate or broader (or lower spatulate), from entire to coarsely pinnatifid: rays all yellow, sometimes 3.5 to 4 cm. long: chaff bristly or subulate, sometimes little shorter than disk-corollas.—Extending from the northern plains to those of northern and western Texas.

4. **G. pulchella** Foug. Annual, hirsute, lower: leaves softer, from entire to pinnatifid: rays two-colored, lower part red-purple (or darker), the upper or teeth yellow, at most 2.5 cm. long: chaff rather stouter, hardly surpassing the mature achenes.—Extending from the plains of Arkansas and Louisiana through Texas to those of Arizona and Mexico. Var. PICTA Gray is a form of the low grounds of Texas, with somewhat fleshy leaves (when growing near the seashore), and shorter and stouter (more or less subulate) chaff.

++ ++ *Teeth of disk-corolla short and broad, obtuse, pointless or obscurely so.*

= *Achenes destitute of villous hairs at the upper part: leaves undivided.*

5. **G. amblyodon** Gay. Mostly hirsute, leafy to the top: leaves oblong or the lower spatulate, sessile by an auriculate base, denticulate or upper entire: rays numerous and contiguous, throughout brownish-red, 2.5 cm. or less long.—Sandy prairies of eastern and southern Texas.

6. **G. Mexicana** Gray. Minutely pubescent, naked above, with long rather rigid peduncles: leaves lanceolate, rather small, entire, or the lowest sparingly toothed: rays rather sparse and narrow, 1.5 cm. or less long, yellow and brownish. (*G. pulchella*, var. Gray, Pl. Wright.)—Hills of southwestern Texas and adjacent Mexico.

= = *Achenes densely long-villous all over: some or all the leaves pinnatifid.*

7. **G. pinnatifida** Torr. Cinereous-pubescent: peduncles scapiform or from short leafy stems, 10 to 25 cm. long: leaves sometimes linear or with linear lobes, sometimes spatulate and sinuate or even entire: pappus scales lanceolate.—Plains of southern and western Texas. Nealley's specimens from the Chenate Mountains have almost all the leaves narrowly linear and entire.

93. SARTWELLIA Gray.

Glabrous leafy fastigiately branched annuals, with narrowly linear or filiform entire opposite leaves, very numerous small heads of yellow flowers in corymbiform cymes, 5 oval or oblong somewhat fleshy involucral bracts subtending as many ray-achenes, convex naked receptacle, terete oblong or linear 8 to 10-striate achenes, and pappus a deep chaffy cup with fimbriolate edge (in ours).

1. **S. Flaveriæ** Gray. Leaves nearly filiform.—Southwestern Texas, on the Pecos and westward.

94. FLAVERIA Juss.

Glabrous mostly annual herbs, with opposite sessile leaves, small and fascicled or glomerate 1 to several-flowered heads of yellowish or yellow flowers which are all fertile and tubular or one female and ligulate, 2 to 5 mostly carinate-concave involucral bracts, terete and striate achenes, and no pappus (excepting in one species).

* *Involucre 4 to 15-flowered, composed of 3 to 5 principal bracts.*

+ *Involucre of 5 bracts: heads clustered in broad and open naked-pedunculate compound terminal cymes: no ray.*

1. **F. chloræfolia** Gray. Glaucous, 3 to 9 dm. high: leaves entire, ovate-oblong to lanceolate, broadest (from 1 to 5 cm. broad) and connate or connate-perfoliate at base, sometimes as much as 7.5 cm. long: heads about 12-flowered: pappus occasionally present, and consisting of 2 to 4 thin scales which are all on one side, leaving the other side naked.—Low grounds, southwestern Texas. Nealley's abundant and fine specimens from "Screw Bean" all show pappus.

2. **F. longifolia** Gray. Rather stout: leaves from linear to lanceolate, broadest or not narrowed at the closely sessile base, 5 to 12.5 cm. long, entire or with few spinulate denticulations: heads 10 to 15-flowered.—Along the Mexican side of the Rio Grande, and likely to be found on the Texan border.

+ + *Involucre of (mostly) 3 bracts: heads in closer subsessile or leafy chiefly terminal glomerules, commonly with one ligule.*

3. **F. angustifolia** Pers. Erect: leaves linear to lanceolate, serrulate or entire, sessile by broadish or little contracted base.—Alkaline ground, southwestern Texas.

** * Involucre 1 or 2-flowered, of 1 to 3 unequal bracts: heads densely glomerate.*

4. **F. repanda** Lag. Divergently branching: leaves obovate to oblong-lanceolate, with narrowed petiole-like base, acutely serrate: glomerules of many confluent heads, sessile in the forks and involucrate at ends of branches; outermost heads commonly of a single short-ligulate flower. (*F. Contrayerba* Gray, Pl. Wright.)—Southern and western Texas.

95. POROPHYLLUM Vaill.

Usually glaucous and herbaceous or suffrutescent plants, with alternate or opposite undivided leaves, pedunculate heads of yellow or purplish flowers, 5 to 10 equal and distinct involucral bracts dotted or striped with oil-glands (as often are the leaves also), small naked receptacle, no ray-flowers, linear achenes, and simple pappus of copious capillary scabrous bristles.

** Annual, with broad crenate-repand leaves on slender petioles: involucral bracts 5: corollas purplish: achenes slender.*

1. **P. macrocephalum** DC. Leaves roundish-oval to oblong, about as long as the petiole: peduncles enlarged above: heads 2.5 cm. long: involucral bracts obtuse: achenes much longer than pappus.—Rocky hills and ravines, Limpia Cañon, southwestern Texas (*Nealley*). A species of Arizona and Mexico.

** * Perennial, with narrow entire sessile leaves: much branched, 3 to 9 dm. high.*

2. **P. gracile** Benth. Lignescent at base, with slender striate branches: odor pungent ("fennel-like"): leaves narrowly linear to filiform: involucre cylindraceous, of 5 oblong obtuse scarious-margined bracts: corollas dull white and purple: achenes attenuate at apex, rather longer than the pappus.—Arid plains of southwestern Texas.

3. **P. scoparium** Gray. Shrubby at base, with slender rush-like branches: leaves thick and firm, linear-subulate and filiform, mucronate: involucre campanulate, of 7 to 9 broadly lanceolate greenish bracts: corollas yellow: achenes not attenuate at apex, fully equaled by the pappus.—Rocky banks and plains of southwestern Texas.

96. CHRYSACTINIA Gray.

A much branched very leafy fruticulose plant, with alternate heath-like leaves, slender-pedunculate heads with golden yellow rays terminating the branches, involucre of 10 or more short and distinct bracts, numerous yellow disk-flowers, small naked receptacle, short-linear achenes not attenuate upward, and simple pappus of copious capillary scabrous bristles.

1. **C. Mexicana** Gray. Leaves thick or almost terete, short-linear or filiform, cuspidate-muconate, entire, with abundant round oil-glands: involucral bracts lanceolate and usually bearing a single large and prominent oil-gland just below the apex: achenes shorter than pappus.—Rocky ground, western Texas. "One of the Damianas of the Mexicans; exhaling a strong resinous aromatic odor" (Havard).

97. NICOLLETIA Gray.

Low annuals, with alternate irregularly pinnately parted leaves, leafy branches terminated by large heads of purple or flesh-colored flowers, 8 to 12 thinnish distinct involucral bracts, naked receptacle, filiform-linear achenes with tapering base, and double pappus (the outer of in-

definitely numerous capillary bristles; inner of 5 lanceolate long very thin scales with rib extended into a scabrous awn).

1. **N. Edwardsii** Gray. Leaves attenuate-linear, few-lobed: heads somewhat naked pedunculate: involucre 12 mm. long, of 8 or 9 bracts: ligules much exserted, elongated-oblong, toothed at the truncate summit.—Sandy banks and plains of southwestern Texas.

98. DYSODIA Cav. (Fetid marigold.)

Annual or biennial herbs dotted with large pellucid glands (which give a strong odor), with heads of yellow flowers terminating the branches, pistillate rays, one row of involucral bracts united into a firm cup (with some loose bractlets at base), flat receptacle (not chaffy but) beset with short chaffy bristles, slender 4-angled achenes, and pappus a row of chaffy scales dissected into numerous rough bristles.

1. **D. chrysanthemoides** Lag. Nearly smooth, diffusely branched: leaves opposite, pinnately parted, the narrow lobes bristly-toothed or cut: rays few, scarcely exceeding the involucre.—Alluvial soil, extending from the Mississippi Valley across Texas to Arizona.

99. HYMENATHERUM Cass.

Low herbs or shrubby plants (mostly pleasant-scented), with alternate or opposite leaves, usually radiate heads of yellow flowers, involucral bracts united high up into a cup (glandular-dotted or striped), mostly terete and striate achenes, and pappus of several or numerous scales (either 1 to 5-aristate or pointed, or partly resolved into as many bristles, or some or all of them entire and even truncate).

* *Pappus simple, of 18 to 20 scales, resolved above into about 5 or the alternate ones into 3 capillary bristles: heads sessile (or nearly so) at the end of woody branchlets: leaves opposite, entire.*

1. **H. acerosum** Gray. Shrubby, low, rigid, exceedingly branched: leaves filiform-acerose, usually with axillary fascicles of shorter ones: heads 6 to 8 mm. high: involucre with copious large oil-glands: rays oblong. (*Aciphyllæa acerosa* Gray, Pl. Fendl.)—Western borders of Texas.

* * *Pappus simple, of 10 rigid scales not longer than the thickish achene and much shorter than the disk-corolla, some of them entire with a single awn, others with 3 aristate-subulate tips: heads loosely calyculate: leaves alternate.*

2. **H. tagetoides** Gray. Rigid glabrous annual, fastigiately branched at summit: leaves narrowly linear, laciniately and spinulosely dentate or almost pinnatifid: heads less than 12 mm. high: involucre rigid, with bracts imbricated but connate almost to the tip: rays oblong, conspicuous. (*Dysodia tagetoides* Torr. & Gray, Fl.) —Low prairies of Texas.

* * * *Pappus-scales 10 to 20, all or the inner ones 1 to 3-awned, the awns about equaling or surpassing the disk-corolla: heads naked at base (or with some small and scanty subulate bracts): rays oblong, conspicuous.*

\+ *Scales of pappus mostly alike and 3-awned (lateral awns shorter): glabrous leafy-stemmed herbs.*

3. **H. polychætum** Gray. Low and diffusely much branched, leafy to near the numerous short-peduncled heads: leaves pinnately parted into several short-filiform obtuse and pointless divisions: involucre 10 to 16-toothed: scales of pappus 18 or 20,

very narrow, the smaller attenuate into a short single awn, the larger into a longer capillary awn with a delicate short one at each side.—Prairies of southwestern Texas.

4. **H. Wrightii** Gray. Erect or diffuse, with branches bearing few or solitary heads on peduncles 2.5 to 7.5 cm. long: leaves narrowly linear to filiform, setulose-mucronate, many entire, some with 1 to 3 small subulate lobes: involucre 16 to 20-toothed: scales of pappus 10, all slenderly 3-awned, the lateral ones half the length of middle one.—Prairies of southern Texas.

5. **H. tenuilobum** DC. Diffusely branched and spreading: heads on filiform peduncles 2.5 to 10 cm. long: leaves all pinnately parted into 7 to 11 subulate-filiform setulose-mucronate divisions: involucre about 12-toothed: scales of pappus 10, all nearly similar and bearing 2 lateral and a middle longer stouter awn. (*H. tenuifolium* Gray, Pl. Wright.)—Southeastern Texas, along or near the Rio Grande.

+ + All 10 pappus scales nearly similar and tapering into a single short awn, the larger mostly 2-setulose.

6. **H. Thurberi** Gray. Suffruticulose, low and diffuse, cinereous-puberulent or glabrate: leaves rigid and acerose: pappus scales all narrowly lanceolate, alternate shorter ones subulate-awn-pointed, the others with awn and pair of obscure or manifest teeth at base.—In extreme southwestern Texas about El Paso.

+ + + Scales of pappus 10 and of 2 forms, the 5 outer obtuse and pointless, the inner bearing a single awn between a pair of cusps or teeth.

++ Low and diffuse suffruticulose perennials, cinereous-pubescent or glabrate: leaves rigid, pinnately parted into filiform or acerose entire mucronate or subulate-tipped divisions: heads on elongated filiform peduncles.

7. **H. Hartwegi** Gray. Nearly herbaceous and glabrous: leaves chiefly opposite, of few rather long filiform-acerose divisions: heads numerous, 4 mm. high: outer pappus scales subcoriaceous, with truncate obscurely denticulate summit.—Southwestern Texas.

8. **H. pentachætum** DC. Decidedly suffruticulose, cinereous-puberulent to glabrate (sometimes the foliage canescent): upper leaves alternate, the divisions slender subulate-acerose: involucre 4 to 6 mm. high: outer pappus scales thinnish, usually erose at summit.—Dry hills of southern and western Texas.

9. **H. Treculii** Gray. Diffuse, nearly herbaceous, almost glabrous, with loose elongated leafy branches and very scattered heads: leaves pectinately parted into linear-subulate equal short divisions, which are rather narrower than the rhachis: involucre 6 mm. high: pappus of the preceding.—Southeastern Texas.

++ ++ Low and densely floccose-lanate and soft-leaved annual.

10. **H. Gnaphaliopsis** Gray. Depressed or diffusely spreading, clothed even to the involucre with dense white wool, leafy up to the sessile or short-peduncled solitary heads: leaves alternate, spatulate, entire: involucre 6 mm. high: scales of inner pappus narrowly lanceolate.—Hills and plains of southern Texas. Called "lepiana" by the Mexicans, and used by them and the Indians as a remedy for catarrh (Havard).

** * * * Pappus scales 5 to 12, truncate and pointless, somewhat coriaceous, distinct or cupulately connate.*

11. **H. Greggii** Gray. Fruticulose and in dense tufts: branches thickly leafy up to the filiform glabrate peduncles: leaves white-tomentose, short, heath-like; lower 3 to 7-parted, upper entire and setaceous: rays short, sometimes wanting: pappus scales united into an entire truncate cup. (*Thymophylla Greggii* Gray, Pl. Fendl. & Pl. Wright.)—Southwestern Texas, on the Pecos, etc.

12. **H. aureum** Gray. Wholly glabrous much branched annual, erect or diffuse, bearing numerous short-peduncled heads: leaves pinnately parted into 7 to 9 linear-filiform pointless divisions: rays 6 mm. long: pappus of 6 or 8 quadrate or oblong and erose-truncate scales. (*Lowellia aurea* Gray, Pl. Fendl. & Pl. Wright.)—Plains of western Texas.

100. PECTIS L.

Mostly low and spreading usually glabrous heavy-scented herbs, with narrow opposite leaves conspicuously dotted with round oil-glands, and usually with copious slender rigid bristles at base, radiate heads of yellow flowers, equal keeled involucral bracts in a single series, small naked receptacle, linear terete or angled achenes, and pappus of bristles or awns (sometimes chaffy at base), or of scales, or coroniform, or obsolete.

* *Pappus of a few scales, or slender awns, or reduced to a chaffy crown, or obsolete.*

\+ *Pappus of conspicuous scales which are prolonged into awns: involucral bracts broad.*

1. **P. prostrata** Cav. Procumbent or prostrate: leaves oblanceolate or spatulate-linear: heads sessile or nearly so: disk-flowers 5 or 6: pappus-scales ovate-lanceolate, often unequal, short-awned.—Southwestern Texas.

\+ \+ *Pappus of 1 to 6 scabrous awns, or reduced to a chaffy crown, or obsolete: involucral bracts linear, at length with involute margins partly surrounding outer achenes: low and much branched.*

\+ \+ *Heads subsessile or short-peduncled, more or less fastigiate or cymose at the end of branches.*

2. **P. tenella** DC. Pappus of 3 to 6 slender awns not much shorter than the achene; no scales or crown.—Southern Texas.

3. **P. angustifolia** Torr. Lemon-scented: pappus a crown of 4 or 5 mostly connate scales, and sometimes 1 or 2 slender usually short awns. (Incl. *P. fastigiata* Gray, Pl. Fendl.)—Dry hills and plains of southern and western Texas. Dr. Havard says that this species and nos. 5 and 6 are lemon-scented, "with abundant star-like yellow blossoms, filling the air with their fragrance."

\+ \+ \+ \+ *Heads scattered or solitary, on filiform peduncles terminating stem and diffuse branches.*

4. **P. filipes** Gray. Lemon-scented: involucral bracts 5: pappus of 2 or 3 (rarely 1) rigid subulate awns, with thickened bases and usually very short interposed scales, sometimes all united into a crown, or some disk-flowers destitute of pappus.—Mountains west of the Pecos.

* * *Pappus of numerous capillary bristles and no scales.*

5. **P. papposa** Gray. Diffusely or divaricately much branched: leaves very narrow and elongated, with very few bristles at base: peduncles once to thrice the length of the heads: involucral bracts 7 to 9: pappus of 12 to 18 unequal barbellate bristles in one series, occasionally reduced to a scaly crown, or quite obsolete.—Southwestern Texas, beyond the Pecos. (See note under no. 3.)

6. **P. longipes** Gray. Forming spreading or depressed tufts: leaves crowded, conspicuously bristly at base: peduncles elongated, often scape-like, 7.5 to 10 cm. long: involucral bracts 12 or 13: pappus of ray-flowers setosely 2-awned; of the disk of 20 to 30 scabrous bristles, and of some small more attenuate outer ones.—Southwestern Texas. (See note under no. 3.)

101. LEUCAMPYX Gray.

Perennial flocculent-woolly (becoming glabrate) herbs, with pinnately dissected leaves, conspicuously radiate heads, broad equal involucral bracts in 2 or 3 series and with white-scarious margins, scarious chaff partly infolding the disk-achenes, 3-angled glabrous achenes with narrowed base and rounded summit, and pappus an obscure scaly soon obsolete crown.

1. **L. Newberryi** Gray. Leaves 2 to 3-pinnately parted into filiform-linear segments: heads few or several at the naked summit of the stem: rays 18 mm. long, obscurely 3-lobed, at first yellow, soon changing to cream-color or white: achenes turning black.—Guadalupe Mountains, extreme southwestern Texas (*Havard*).

102. ANTHEMIS L. (Chamomile.)

Branching strong-scented herbs, with finely pinnately dissected leaves, solitary terminal many-flowered heads with white rays and yellow disk, numerous small imbricated dry and scarious involucral scales, conical receptacle with slender chaff at least near the summit, terete or ribbed glabrous truncate achenes, and pappus none or a minute crown.

1. **A. Cotula** DC. (May-weed.) Acrid annual: leaves finely 3-pinnately dissected: rays mostly neutral: receptacle without chaff near the margin: pappus none. (*Maruta Cotula* DC.)—A very common weed, introduced from Europe. Known in many places as "dog-fennel."

103. ACHILLEA Vaill. (Yarrow.)

Perennial herbs, with small corymbose many-flowered radiate heads, few and fertile rays, imbricated involucral bracts with scarious margins, chaffy flattish receptacle, oblong flattened margined achenes, and no pappus.

1. **A. Millefolium** L. Stems simple: leaves twice-pinnately parted; the divisions linear, 3 to 5-cleft, crowded: corymb compound, flat-topped: rays 4 or 5, short and white (sometimes rose-color).—Commonly introduced throughout all North America. Known both as "milfoil" and "yarrow."

104. MATRICARIA Tourn. (Wild chamomile.)

Smooth and branching herbs, with finely divided leaves, single or corymbed many-flowered heads, pistillate rays or none, imbricated involucral bracts with scarious margins, conical naked receptacle, 3 to 5-ribbed wingless achenes, and pappus a membranaceous crown or border or none.

1. **M. Chamomila** L. Aromatic annual, resembling "mayweed": heads 6 mm. high and rays as long: involucral bracts oblong and fuscous: achenes with an obscure border and usually no distinct pappus.—Introduced in some of the Atlantic States, but represented in cultivated fields of central and southern Texas by var. CORONATA Gray, in which the ray achenes and mostly those of the disk are furnished with a conspicuous thin scarious cleft and toothed (sometimes unilateral) pappus.

105. ARTEMISIA L. (Wormwood. Sage-brush. Mugwort.)

Bitter and aromatic herbs or shrubby plants, with small commonly nodding discoid heads in panicled spikes or racemes, small and flattish naked receptacle, obovoid achenes with a small summit, and no pappus.

* *Receptacle smooth: marginal flowers pistillate and fertile: disk-flowers perfect but sterile.*

† *Leaves dissected or divided.*

1. **A. caudata** Michx. Smooth, 6 to 15 dm. high: upper leaves pinnately, the lower 2 to 3-pinnately divided, the divisions filiform and diverging: heads small, the racemes in a wand-like elongated panicle.—Sandy ground, near the coast.

2. **A. Canadensis** Michx. Smooth, or hoary with silky down, 3 to 6 dm. high: lower leaves twice-pinnately divided, the upper 3 to 7-divided, the divisions linear, rather rigid: heads rather large, in panicled racemes.—A far northern and Rocky Mountain species, found in Texas on the "Staked Plains."

3. **A. redolens** Gray. Radical branches whitish tomentulose, otherwise green and glabrous (or nearly so): leaves 3 to 5-parted into linear subentire segments: heads 3 mm. high, in a long erect panicle: involucre glabrous.—A species of the Chihuahua Mountains (*Pringle*), "on cool slopes under cliffs," and discovered in the Chisos Mountains of southwestern Texas (*Nealley*). Said to have "a powerful odor, like that of *A. Absinthium* but stronger, which burdens the air of the whole hillside" (Pringle, in Gray, Proc. Am. Acad., 21).

\+ \+ *Leaves entire or some 3-cleft.*

4. **A. dracunculoides** Pursh. Tall, 6 to 15 dm. high, somewhat woody at base, slightly hoary or glabrous: leaves linear and entire, or the lower 3-cleft: heads small and numerous, panicled.—A common and polymorphous species of the northern plains, extending into northern and western Texas.

5. **A. filifolia** Torr. Suffruticose, finely canescent, 3 to 9 dm. high: leaves all filiform, the lower commonly 3-parted: heads very small and numerous, crowded in a long leafy panicle.—A species of the northern plains, extending to New Mexico and the western borders of Texas.

* * *Receptacle smooth: flowers all fertile, a few pistillate, the others perfect: branching perennials 3 to 15 dm. high.*

6. **A. Ludoviciana** Nutt. Whitened woolly throughout: leaves lanceolate, the upper mostly entire, the lower usually cut-lobed, toothed or pinnatifid, the upper surface sometimes glabrate and green: heads mostly sessile in narrow panicles.—Extending from the northern plains through Texas to Mexico.

7. **A. Mexicana** Willd. Less woolly-tomentose, and the involucre canescent or glabrate: leaves narrow-lanceolate to linear, some 3 to 5-cleft or parted, the lower (radical) cuneate, incisely pinnatifid or trifid: heads very numerous in an ample loose panicle, many pedicellate.—Extending from the dry plains of Arkansas through Texas to Arizona and Mexico. Variously referred to *A. Ludoviciana* and *A. vulgaris*.

* * * *Receptacle hairy: flowers all fertile, the marginal ones pistillate.*

8. **A. frigida** Willd. Low, 15 to 50 cm. high, in tufts, slightly woody at base, white-silky: leaves pinnately parted and 3 to 5-cleft, the divisions narrow-linear: heads globose, racemose.—Mountains and plains of western Texas.

106. PSATHYROTES Gray.

Low and pubescent annuals (scapose in ours), with round-cordate or ovate petioled leaves, rather small many-flowered discoid heads of yellowish perfect and fertile flowers, lax involucral bracts in 2 series, flat naked receptacle, terete obscurely striate villous or hirsute achenes, and pappus of copious very unequal rather rigid obscurely denticulate bristles shorter than the corolla and fuscous or rusty at least in age.

1. **P. scaposa** Gray. Leaves all at or near the base, ovate or roundish, almost entire, at first loosely white-tomentose, at length glabrate: scapes or naked peduncles several, 7.5 to 10 cm. high, bearing 3 to 7 corymbosely disposed heads, glandular-pubescent: achenes hirsute: pappus about half as long as corolla.—Borders of Texas near El Paso.

107. BARTLETTIA Gray.

Slender almost glabrous annual, with slender-petioled roundish leaves, many-flowered radiate heads with yellow flowers all fertile, lax involucral bracts in 2 or 3 series (the inner and larger membranaceous),

convex tuberculate naked receptacle, compressed wedge-oblong achenes with a strong salient nerve to each margin and (usually) on the middle of one face (these densely long-hirsute, the faces glabrate), and pappus of numerous somewhat unequal barbellate fuscous bristles in a single series and equaling the disk-corolla.

1. **B. scaposa** Gray. Flowering almost from the base by 1-headed scapes 15 to 25 cm. high, and later by similar peduncles terminating sparsely leafy branching stems: leaves roundish or subcordate, repand-dentate, some 3 to 5-lobed: involucre pubescent.—Near El Paso in Mexico and New Mexico, and very probably within the Texan border.

108. **HAPLOESTHES** Gray.

Somewhat fleshy herbaceous or suffrutescent fastigiately branched glabrous leafy plants, with opposite very narrow leaves, many-flowered radiate heads with yellow flowers all fertile, 4 or 5 nearly equal orbicular or broadly oval strongly overlapping involucral bracts, flat naked receptacle, linear terete striate-ribbed glabrous achenes, and pappus a single series of rather rigid and scabrous whitish bristles about equaling the disk-corolla.

1. **H. Greggii** Gray. Leafy up to the loose cymes of a few slender-pedunculate naked heads: leaves very narrowly linear or filiform, entire, the lower connate at base: heads 4 to 6 mm. high, with yellowish-tinged bracts: ligules 2 to 4 mm. long or none. (*Aplopappus Texanus* Coulter).—Saline soil, in western Texas.

109. **SENECIO** Tourn. (Groundsel.)

Herbs (in U. S.), with alternate leaves, solitary or corymbed many-flowered heads of chiefly yellow flowers, pistillate rays or none, cylindrical to bell-shaped simple involucre (or with a few bractlets at base) of erect-connivent bracts, flat naked receptacle, and pappus of numerous very soft and slender capillary bristles.—Heads conspicuously radiate in all ours.

* *Root annual or biennial: herbage glabrous or soon becoming so.*

1. **S. ampullaceus** Hook. Lightly floccose when young, becoming smooth: stem stout, 3 to 6 dm. high, leafy to near the summit: leaves all undivided, repand-dentate or entire, ovate or oblong, 2.5 to 15 cm. long; lowest obovate, with tapering wing-petioled base; upper mostly clasping with broad base: heads rather numerous in loose naked cymes: rays 7 to 9: achenes canescent.—Sandy prairies of Texas.

2. **S. multilobatus** Torr. & Gray. Early glabrate and smooth, 3 to 6 dm. high, naked and often branching above, bearing numerous corymbed heads: radical and lower stem-leaves lyrate, with dentate divisions; upper pinnately parted, their mostly numerous narrowly cuneate divisions incised or 2 or 3-lobed at apex. (*S. Tampicanus* Gray Pl. Wright.)—Western borders of Texas.

3. **S. lobatus** Pers. Lightly floccose when young, early glabrous and very smooth, 3 to 9 dm. high, bearing a naked corymb of small heads: leaves somewhat fleshy, lyrate or pinnate, the divisions or leaflets from roundish to cuneate or oblong, crenate or cut-lobed, irregular and variable: rays 6 to 12, conspicuous.—Common in wet grounds, in the low country from the Gulf States through Texas to Mexico. Commonly known as "butter-weed."

* * *Root perennial.*

+ Stems numerously or somewhat equably leafy to the top: leaves or their divisions narrowly linear.

4. **S. Douglasii** DC. More or less woody at base, many-stemmed, 3 to 18 dm. high, white-tomentose or glabrate and green: leaves sometimes all entire and elongated-linear, more commonly pinnately parted into 3 to 7 linear or nearly filiform entire divisions: heads cymose: rays 8 to 18, 8 to 12 mm. long. (*S. longilobus* Benth.)—Extending from the open plains and hills of the north to western Texas.

+ + Stems either few-leaved or the upper leaves reduced in size: none with leaves or their divisions narrow linear.

5. **S. aureus** L. Smooth, or floccose-woolly when young, 3 to 9 dm. high: leaves thin, the radical simple and rounded, the larger ones mostly heart-shaped, crenate-toothed, long-petioled; lower stem-leaves lyrate; upper ones lanceolate, cut-pinnatifid, sessile or partly clasping: corymb umbel-like: rays 8 to 12.—Usually in damp shaded ground, throughout all North America east of the Sierra Nevada. Known as "golden ragwort" and "squaw-weed." Immensely variable. Var. OBOVATUS Torr. & Gray occurs in more open grounds, and has thicker root-leaves, which are round-obovate with a cuneate or truncate base, or the earliest almost sessile in rosulate tufts. Var. BALSAMITÆ Torr. & Gray is found in rocky or nearly dry ground, is less glabrate, with oblong, spatulate, or lanceolate root-leaves narrowed to the petiole and serrate, the upper lyrate-pinnatifid, and heads rather small and numerous. Var. COMPACTUS Gray occurs mostly in saline soil in northwestern Texas, and is low, in close rather rigid tufts, with oblanceolate or attenuate-spatulate radical leaves entire or 3-toothed at apex or pinnatifid-dentate, lanceolate or linear entire or pinnatifid stem-leaves, and rather numerous small and crowded heads.

6. **S. lugens** Richards. Woolly pubescent when young, soon glabrate and green: leaves oblong-lanceolate or oblong, usually repand or callous-denticulate, the upper bract-like and attenuate from a broad base: heads about 10 mm. high, with mostly black-tipped involucral bracts: rays 10 or 12.—A species of the Rocky Mountains, and reported from Gillespie County (*Jermy*).

110. CACALIA L. (INDIAN PLANTAIN.)

Smooth and tall perennial herbs, with alternate often petioled leaves, rather large 5 to many-flowered discoid heads in flat corymbs, white or whitish flowers all tubular and perfect, erect-connivent involucral bracts in a single row (with a few bractlets at base), naked receptacle, deeply 5-cleft corolla, oblong smooth achenes, and pappus of numerous soft capillary bristles.

1. **C. tuberosa** Nutt. Stem angled and grooved, 6 to 18 dm. high, from a thick or tuberous root: leaves green both sides, thick, strongly 5 to 7-nerved; the lower lance-ovate or oval, nearly entire, tapering into petioles; the upper on short margined petioles, sometimes toothed at apex: involucre 5-leaved and 5-flowered: receptacle with a pointed appendage in the center.—A plant of the wet prairies of the northern and Gulf States, and reported from Gillespie County (*Jermy*).

111. ARCTIUM L. (BURDOCK.)

Coarse biennial weeds, with large unarmed and petioled leaves, small solitary or clustered many-flowered discoid heads of purple (rarely white) flowers (which are all tubular and perfect), globular involucre with imbricated coriaceous bracts appressed at base and attenuate to long stiff points with hooked tips, bristly receptacle, oblong flattened

transversely-wrinkled achenes, and short pappus of numerous rough separate and deciduous bristles.

1. **A. Lappa** L. Stout, 3 to 9 dm. high: leaves roundish or ovate and mostly cordate, or lanceolate with cuneate base, smooth above, somewhat floccose-tomentose beneath, mostly sinuate-denticulate. (*Lappa officinalis* All.)—A common European weed of waste or manured ground.

112. CNICUS Tourn. (Common or Plumed Thistle.)

Mostly biennial herbs, with sessile alternate often pinnatifid and prickly leaves, usually large terminal heads of reddish-purple (rarely white or yellowish) flowers (which are all tubular, perfect and similar, rarely imperfectly diœcious), ovoid or spherical involucre of bracts imbricated in many rows and tipped with a point or prickle, receptacle thickly clothed with soft bristles or hairs, oblong flattish (not ribbed) achenes, and pappus of numerous bristles united into a ring at base, plumose to the middle and deciduous. (Mostly known formerly as *Cirsium*.)

** Heads leafy-bracteate at base: proper bracts of the involucre not prickly.*

1. **C. horridulus** Pursh. Stem stout, webby-haired when young, 3 to 9 dm. high: leaves partly clasping, green, soon smooth, lanceolate, pinnatifid, the short toothed and cut lobes very spiny with yellowish prickles: heads 2.5 to 3.5 cm. broad, surrounded by leaf-like and very prickly bracts, which usually equal the narrow involucral bracts: flowers pale yellow or purple.—Sandy or gravelly soil, near the coast.

*** Scales appressed, the inner not at all prickly.*

+ Leaves white-woolly beneath, and sometimes also above: outer involucral bracts successively shorter, and tipped with short prickles.

++ Principal involucral bracts with more or less rigid and pungent prickles: leaves mostly persistently tomentose above as well as below.

2. **C. ochrocentrus** Gray. Often tall, from 3 to 9 dm. or even 18 to 25 dm. high: leaves commonly but not always deeply pinnatifid and armed with long yellowish prickles: heads 2.5 to 5 cm. high: involucral bracts rather broad and flat, the viscid line on the back narrow or not rarely obsolete, tipped with a prominent spreading yellowish prickle: corolla purple, rarely white.—Plains of western Texas.

3. **C. undulatus** Gray. Usually lower, 3 to 9 dm. high: leaves rarely pinnately parted, moderately prickly: heads mostly 3.5 cm. high: principal involucral bracts mostly thickened on the back by the broader glandular-viscid ridge, smaller and narrower, and tipped with an evident spreading short prickle: corollas rose-color, purple or white.—A variable species of the northern plains, represented in Texas by the var. MEGACEPHALUS Gray, which is a stouter usually broader-leaved form, with broad heads 5 cm. or more high.

++ ++ Involucral bracts tipped with weak bristle-like prickles, or sometimes hardly any: upper leaf face soon glabrate and green.

4. **C. altissimus** Willd. Stem downy, branching, 9 to 30 dm. high, leafy quite to the heads: leaves roughish-hairy above, whitened with close wool beneath, oblong-ovate to narrowly lanceolate, undivided, sinuate-toothed, undulate-pinnatifid, or twice pinnatifid, the lobes or teeth weakly prickly: flowers chiefly purple.—Borders of woods and open ground, common in the Atlantic States and extending into Texas. On the prairies and in the live-oak thickets is found var. FILIPENDULUS Gray, which is smaller (6 to 9 dm. high), with tuberiferous roots, mostly deeply pinnatifid leaves,

and few heads. Reported from Gillespie County (*Jermy*) is the northern var. DISCOLOR Gray, which is 6 to 18 dm. high, and with leaves nearly all deeply pinnatifid into lanceolate or linear lobes.

5. **C. Virginianus** Pursh. Stem woolly, slender, simple or sparingly branched, 3 to 9 dm. high, the branches or long peduncles naked: leaves lanceolate, whitened with close wool beneath, ciliate with prickly bristles, entire or sparingly sinuate-lobed, sometimes the lower deeply sinuate-pinnatifid: heads small: outer involucral bracts scarcely prickly: flowers purple.—Pine woods and dry banks, extending from the Atlantic States into Texas.

+ + *Leaves green both sides, or only with loose cobwebby hairs beneath: involucral bracts scarcely prickly-pointed.*

6. **C. Wrightii** Gray. Robust and tall, with thin cobwebby wool tardily deciduous from the ample (3 dm. or more long) sinuate or pinnatifid weakly prickly leaves: heads in a naked panicle: involucral bracts small, the principal ones conspicuously viscid-glandular on the back, outer ones subulate and cuspidate-tipped: corollas white (?).—Near springs, southwestern Texas (*Wright*).

113. CENTAUREA L. (STAR-THISTLE.)

Herbs, with alternate leaves, single many-flowered heads, flowers all tubular (the marginal often much larger, as it were radiate, and sterile), bristly receptacle, ovoid or globose involucre with margined or appendaged imbricated bracts, obovoid or oblong achenes attached obliquely at or near the base, and setose or partly chaffy pappus or none.

* *Achenes terete, 10-dentate: pappus of 10 long bristles and 10 short inner ones.*

1. **C. benedicta** L. Low branching annual, with clasping scarcely pinnatifid cut leaves, large sessile leafy-bracted heads, and yellow flowers (*Cnicus benedictus* L).—Introduced into waste grounds, at seaports and elsewhere. Rare.

* * *Achenes compressed or 4-angled: pappus of copious similar but unequal bristles.*

2. **C. Americana** Nutt. Nearly glabrous annual: stem stout, mostly simple, 6 to 18 dm. high, thickened under the naked head: leaves entire or mostly so, oblong-lanceolate, mucronate: involucre 2.5 to 3.5 cm. broad, its very numerous bracts all with conspicuously fringed scarious appendages: flowers rose or flesh-color, the neutral marginal ones forming an ample ray: pappus bristles longer than the achene.—Extending from the plains of Arkansas and Louisiana through Texas to Arizona and adjacent Mexico.

114. GOCHNATIA HBK.

Shrubby plants, with alternate coriaceous leaves which are usually entire and tomentose beneath, heads of white flowers in sessile paniculate fascicles, dry or coriaceous regularly imbricated involucral bracts, flat naked receptacle, corollas all alike and deeply 5-cleft into linear revolute lobes, oblong silky-villous achenes, and pappus of copious rather rigid capillary scabrous or barbellulate bristles.

1. **G. hypoleuca** Gray. Rigid shrub, 18 to 24 dm. high: leaves oblong or oval, very short-petioled: glabrous and bright green above, finely white-tomentose beneath (as also the branchlets): involucre 5 to 7-flowered, the flowers all perfect.—Southern Texas, between the Rio Frio and the Nueces, and at Laredo (*Palmer*), and in adjacent Mexico.

115. CHAPTALIA Vent.

Low floccose-tomentose chiefly stemless perennial herbs, with leaves in a radical tuft (persistently canescent beneath, glabrate above), naked elongated scapes bearing solitary radiate heads of white or purplish flowers (ray-flowers pistillate and fertile, simply ligulate; disk-flowers perfect and all or some of them sterile, more or less bilabiate), narrow appressed-imbricated involucral bracts (the outer successively shorter), naked receptacle, oblong or fusiform 5-nerved achenes attenuate or beaked at apex, and pappus of copious very fine and soft capillary bristles.

1. **C. tomentosa** Vent. Leaves spatulate or oblanceolate, thickish, entire or retrorsely denticulate, white beneath with dense matted tomentum: rays broadly linear: achenes glabrous, merely attenuate into a neck.—Extending from the pine barrens of the Gulf States into eastern Texas, but with unrecorded western limit.

2. **C. nutans** Hemsl. Leaves obovate or oblong, sometimes lyrate-sinuate, thin, white beneath with more cottony or even webby tomentum: rays small and narrow, little exserted: achenes pubescent or glabrate, with slender filiform beak as long as the body.—Wooded grounds of Texas, to Arizona and Mexico.

116. PEREZIA Lag.

Perennial herbs (usually a tuft of wool at base of stem), with coriaceous or papery reticulated leaves, solitary or paniculate or cymose heads of fragrant rose-purple to white perfect and fertile scarcely bilabiate flowers, dry and firm involucral bracts imbricated in few to several series, flat mostly naked receptacle, puberulent elongated-oblong terete or obscurely angled achenes sometimes narrowed but not beaked, and pappus of copious capillary scabrous bristles (either rather rigid or soft).

** Low: heads single or few, 12 to 24 mm. long, 20 to 30-flowered.*

1. **P. runcinata** Lag. Acaulescent, scabrous-puberulent or glabrate: rootstocks short, sending down tuberous-thickened fascicled roots: radical leaves runcinate-pinnatifid, 10 to 20 cm. long, thin; lobes rounded, copiously fringed with spinulose teeth, margined-petioled: scapes naked, equaling the leaves, bearing solitary or a few pedunculate heads: involucral bracts setaceous-acuminate: pappus rather sordid.—Dry ground, eastern and southern Texas.

2. **P. nana** Gray. Leafy-stemmed and glabrous: rootstocks slender, creeping: first leaves small and scale-like; principal stem-leaves firm, orbiculate, dilated-obovate, or ovate (2.5 to 5 cm. long), coarsely spinulose-dentate, sessile or partly clasping: heads mostly sessile, solitary and terminal: involucral bracts acutish: pappus white.—Dry plains and rocky bluffs, throughout southern Texas (and adjacent Mexico) to Arizona.

** * Taller (3 to 9 dm. high), branching, leafy up to the corymbose many-headed inflorescence: heads 8 to 12-flowered, 12 mm. or less long.*

3. **P. Wrightii** Gray. Mostly glabrous throughout: leaves thin, oblong to nearly ovate, densely spinulose-dentate, often unequally or doubly so, closely sessile by sagittate-cordate (or truncate) base: involucral bracts all pointless and obtuse.—Rocky hills and ravines, along the Pecos and westward.

117. TRIXIS P. Browne.

Suffruticose plants, with entire or denticulate leaves, rather few-flowered heads of perfect and fertile bilabiate yellow flowers, 8 to 12

equal involucral bracts in a single series (subtended by a few bracteiform leaves), villous receptacle, slender achenes with a tapering or beaked summit, and soft pappus.

1. **T. angustifolia** DC. Much branched, 3 to 6 dm. high, sericeous-puberulent to glabrate, leafy up to the heads: leaves sessile, rather rigid, from broadly to very narrowly lanceolate: heads simply fascicled or singly terminating leafy branchlets, 9 to 12-flowered: involucral bracts gibbous and indurated at base in age: pappus barely fulvous.—Hills and cañons of southwestern Texas, west of the Pecos.

118. APOGON Ell.

Low glaucescent mostly glabrous annuals branching from the base, with lanceolate (or lower oblong) leaves from entire or repand to dentate or the radical lyrate-pinnatifid (uppermost closely sessile, often seemingly opposite), rather small scattered heads of yellow flowers on slender peduncles, usually 8 oblong-lanceolate herbaceous involucral bracts (becoming concave and with tips conniving in fruit), naked receptacle, terete obovoid 10-ribbed somewhat scabrous achenes, and rarely an obsolete vestige of pappus.

1. **A. humilis** Ell. Peduncles naked, or rarely obscurely hispid under the head: head 4 mm. high in fruit: corollas pure yellow, little longer than involucre: achenes oblong-obovate.—Open ground, extending from the Gulf States into Texas.

2. **A. gracilis** DC. Sometimes slender and strict, not rarely stouter than the preceding, often some bristly hairs on stem and lower leaves: peduncles usually glandular-hispid some way below the head, which is commonly 6 mm. high in fruit: corollas orange, conspicuously exserted, twice as long as the involucre: achenes thicker and obtuser at apex, with sometimes an obscure vestige of pappus.—Rocky prairies of Texas.

3. **A. Wrightii** Gray. Resembling slender and narrow-leaved forms of preceding, rather diffuse: heads equally small: achenes larger and thicker, little contracted at either end, and with comparatively large areola, which is bordered by obscure vestige of pappus.—Eastern Texas (*Wright*). Dr. Gray suggests that this may be a hybrid between *A. gracilis* and *Krigia occidentalis*.

119. KRIGIA Schreb. (Dwarf dandelion.)

Small herbs branching from the base, with chiefly radical lyrate or toothed leaves, small heads of yellow flowers terminating the naked scapes or branches, thin involucral bracts in about 2 rows, short and truncate top-shaped or columnar terete or angled achenes, and double pappus (the outer of thin pointless chaffy scales, the inner of delicate bristles.)

1. **K. occidentalis** Nutt. Annual, commonly somewhat glandular: leaves obovate to lanceolate, entire, lyrately lobed or pinnatifid: heads 4 to 6 mm. high, with 5 to 8 oblong-lanceolate involucral bracts (becoming firmer, erect and keeled in fruit, with a conspicuous midnerve): achenes turbinate: pappus of 5 conspicuous rounded-obovate scales with as many alternating bristles or awns.—Prairies of Texas.

2. **K. Virginica** Willd. Annual, often sparsely hispidulous, with stems or scapes several and becoming branched and leafy: earlier leaves roundish and entire, the others narrower and often pinnatifid: heads 6 to 8 mm. high, with 9 to 18 thin and narrow involucral bracts (reflexed after the fall of the achenes): achenes turbinate and 5-angled: pappus of 5 to 7 short roundish scales and as many alternating capillary bristles.—Sandy ground, extending from the Atlantic and Gulf States into Texas, at least as far west as Gillespie County (*Jermy*).

3. **K. Dandelion** Nutt. Perennial, and glaucescent with slender tuberiferous roots, and leafless scapes: leaves varying from spatulate-oblong to linear-lanceolate, entire or few-lobed: head about 12 mm. high: achenes more slender: pappus of 10 to 15 small oblong scales and 15 to 20 bristles. (*Cynthia Dandelion* DC).—Moist ground, extending from the Southern States into Texas.

120. STEPHANOMERIA Nutt.

Mostly smooth and glabrous annuals or perennials, with branching and often rigid or rush-like stems, small or merely scale-like leaves on the flowering branches, usually paniculate heads of 3 to 20 pink or rose-colored flowers, cylindrical or oblong involucre of several appressed and equal flat membranaceous bracts (and some short calyculate ones), 5-angled or ribbed achenes (sometimes with intermediate ribs), and pappus a series of plumose bristles or rarely chaffy awns.—In ours the heads are 3 to 9 (mostly 5)-flowered.

* *Pappus plumose to base (except in No. 1), and not at all chaffy-dilated below.*

1. **S. runcinata** Nutt. A comparatively stout and rigid perennial, branching from thick roots, with spreading striate and rush-like branches which are small-leaved or nearly leafless above: heads mostly 8 to 10 mm. high and scattered along the branches: lower leaves runcinate-pinnatifid, commonly lanceolate; upper linear or reduced to scales: pappus plumose only to near the base.—Extending from the northern plains to those of northwestern Texas.

2. **S. minor** Nutt. Like the last, but more slender, and with ascending branches bearing usually terminal and smaller heads: stem-leaves all slender, often filiform: pappus very plumose down to base.—"Staked Plains" and westward.

3. **S. Wrightii** Gray. Slender, with single paniculate stems, and long slender subterranean shoots: stem-leaves mostly filiform and entire; those of the radical tuft linear to spatulate and laciniate-pinnatifid: heads nearly 12 mm. high, sparse, pedunculate, terminating slender branches: pappus long-plumose.—"In pebbly bed of Howard's Creek," western Texas (*Wright*).

* * *Pappus plumose above, naked below the middle, chaffy-dilated at base.*

4. **S. exigua** Nutt. Paniculately branching (not rarely robust) stems with slender branches and branchlets: radical and lower stem-leaves pinnatifid or bipinnatifid, those of the branches mostly reduced to short scales: heads 6 to 10 mm. high: pappus-bristles 9 to 18, their dilated bases commonly a little connate.—Western border of Texas.

121. PINAROPAPPUS Less.

Deep-rooted perennial, with scapiform stems, solitary many-flowered campanulate heads of rose-tinged (or almost white) flowers, thinnish imbricated involucral bracts (the outer successively shorter), attenuate-linear chaff of the receptacle deciduous with the achenes, glabrous slender terete 10 to 15-ribbed achenes tapering from the callous base into a short slender beak, and sordid pappus of copious soft-capillary bristles.

1. **P. roseus** Less. Glabrous and glaucescent: stems with a few minute bracts and 1-headed, or leafy below with a few naked branches, slender, rather rigid: leaves lanceolate and entire, and some pinnatifid: head over 12 mm. high, with conspicuous ligules.—High and rocky prairies of southern Texas.

122. HIERACIUM Tourn. (HAWKWEED.)

Hispid or hirsute and often glandular perennials, with entire or toothed leaves, single or panicled 12 to many-flowered heads of mostly yellow flowers, more or less imbricated involucre, naked receptacle, short oblong or columnar striate not beaked achenes, and pappus a single row of tawny and fragile capillary rough bristles.

1. **H. longipilum** Torr. Stem wand-like, simple, stout, 6 to 9 dm. high, very leafy toward the base, naked above, and bearing a small racemed panicle; the lower portion and both sides of the oblong-lanceolate or spatulate entire leaves thickly clothed with very long and upright bristles (often 2.5 cm. long): peduncles and involucre (10 to 12 mm. high) glandular-bristly: achenes narrowed at apex.—Open woods and prairies, extending into Texas from the northern States.

2. **H. Rusbyi** Greene. Leafy-stemmed, bearing numerous compound-paniculate heads: stem hirsute below, smooth and glabrous above: leaves elongated-oblong, entire, mostly half-clasping at base: involucre (6 mm. high) barely puberulent: achenes columnar, not at all tapering upward: pappus sordid.—A species of New Mexico, but represented on the western borders of Texas (between the Limpio and the Rio Grande) by var. WRIGHTII Gray, which is more robust and branching, with hispid stem-bristles (from papilliform base), hispidulous branches and even peduncles, and sometimes a few bristles near tips of involucral bracts: pappus dull white.

123. LYGODESMIA Don.

Smooth, often glaucous low perennials, with single erect heads of (5 to 10) rose-purple flowers terminating almost leafless or rush-like stems or branches, elongated cylindrical involucre of linear scales in a single row, naked receptacle, long and slender achenes tapering at summit, and copious soft whitish pappus.

1. **L. juncea** Don. Much branched from the deep-rooted base: leaves small; lower lanceolate-linear from a broadish base, 2.5 to 5 cm. long; upper reduced to small subulate scales: heads 5-flowered, at most 12 mm. long: ligules 6 to 8 mm. long.—Plains of western Texas.

2. **L. grandiflora** Torr. & Gray. Stems separate or few from the root, simple below; the larger plants leafy, corymbosely branched above and bearing few or numerous heads: leaves all entire, linear-attenuate, 5 to 10 cm. long, only the very uppermost reduced to scales: heads 5 to 10-flowered, fully 18 mm. long: ligules of equal length, showy, rose-red.—Southern Texas (*Palmer*).

3. **L. aphylla** DC. Stems mostly solitary from the root, slender and rush-like, naked or nearly so, once or twice forked above, and bearing solitary long-peduncled heads: leaves filiform, elongated, entire or rarely with 1 or 2 teeth; upper reduced to mere scales at forks: heads mostly 10-flowered, 16 to 18 mm. long: ligules of equal length.—A species of the Gulf States barrens, but represented on rocky hills and plains throughout Texas by var. TEXANA Torr. & Gray, which is stouter, with more numerous leaves from filiform and usually with 2 or 3 lateral lobes to linear and sparingly pinnately lobed.

124. TARAXACUM Haller. (DANDELION.)

Perennials or biennials, with radical pinnatifid or runcinate leaves, many-flowered large heads of yellow flowers solitary on a slender hollow scape, double involucre (outer of short bracts, inner of long linear bracts erect in a single row), oblong-ovate to fusiform 4 or 5-ribbed

achenes, the apex prolonged into a very slender beak which bears the copious soft and white capillary pappus.

1. **T. officinale** Weber. Smooth, or at first pubescent: outer involucre reflexed. (*T. Dens-leonis* Desf.)—Common everywhere, an introduction from Europe. The pappus, finally displayed in an open globular head, is familiar to all.

125. PYRRHOPAPPUS DC. (False dandelion.)

Mostly annual or biennial herbs scapose or often branching and leafy below, with solitary heads of deep yellow flowers terminating the naked summit of stem or branches, heads, etc., like *Taraxacum*, except the soft pappus is reddish or rusty-color and surrounded at base by a soft-villous ring.

* *Scapose and with solitary head.*

1. **P. scaposus** DC. Low and simple perennial by roundish tubers: leaves all radical and pinnatifid.—Extending from the plains of Arkansas and Kansas to those of Texas.

* * *More or less leafy-stemmed and branching.*

2. **P. Carolinianus** DC. Annual or biennial, freely branching, 6 to 15 dm. high: leaves oblong or lanceolate, entire, cut or pinnatifid, those of the stem partly clasping: fruiting heads fully 25 mm. high: calyculate involucral bracts loose, half or a third the length of the principal ones.—Extending from the Gulf States into Texas.

3. **P. multicaulis** DC. Lower, from a thickened apparently perennial root, less leafy, at length many-stemmed from base and diffuse or ascending: fruiting heads 16 to 18 mm. high: calyculate involucral bracts short.—Throughout southern Texas and adjacent Mexico.

126. LACTUCA Tourn. (Lettuce.)

Leafy-stemmed herbs, with panicled heads of variously colored flowers, cylindrical or conical imbricated involucre of 2 or more sets of bracts of unequal length, and flat achenes abruptly contracted into a beak which is dilated at apex and bears a copious fugacious very soft and white capillary pappus (its bristles falling separately).

* *Achenes very flat, orbicular to oblong, with a filiform beak: stem-leaves sagittate-clasping.*

1. **L. hirsuta** Muhl. Rather few-leaved, 6 to 9 dm. high, commonly hirsute at base: leaves hirsute on both sides or only on the midrib, mostly runcinate-pinnatifid: heads in a loose open panicle: achenes oblong-oval, about as long as the beak: flowers yellow-purple, rarely whitish. (*L. Canadensis* var. *sanguinea* Torr. & Gray.)—Dry and open ground, extending from the Atlantic States into Texas, at least as far west as Gillespie County (*Jermy*).

2. **L. graminifolia** Michx. Stem slender, 6 to 9 dm. high, terminating in a naked loose panicle: glaucescent and glabrous, or merely hispid on the midrib beneath, or hirsute as in the last: leaves elongated-linear or linear-lanceolate (10 to 30 cm. long), entire or with spreading or deflexed lobes, or the radical pinnatifid: achenes elliptical-oblong, longer than the beak: flowers purple or pale blue (varying to white or yellow).—Dry and fertile soil, extending from the Gulf States through Texas to Arizona.

3. **L. Ludoviciana** DC. Glabrous, leafy, 6 to 15 dm. high: leaves oblong, sinuate-pinnatifid and spinulosely dentate, ciliate: heads in an open panicle: involucre more imbricate: achenes oblong-oval, about equaling the beak: flowers yellow.—Along the Limpia (*Bigelow*).

* * *Achenes thickish, oblong, contracted into a short thick beak or neck: flowers light blue.*

4. **L. Floridana** Gærtn. Tall (9 to 21 dm. high), with many small heads in a loose panicle, on diverging peduncles: leaves all lyrate or runcinate, the upper often with a heart-shaped clasping base: pappus bright white.—Along streams, extending from the Atlantic States into Texas.

127. SONCHUS L. (Sow-thistle.)

Leafy-stemmed chiefly smooth and glaucous coarse weeds, with corymbed or umbellate many-flowered yellow heads, more or less imbricated involucre, compressed ribbed or striate beakless achenes, and copious pappus of very white exceedingly soft and fine bristles mainly falling together.

1. **S. oleraceus** L. Stem-leaves runcinate-pinnatifid, or rarely undivided, slightly toothed with soft spiny teeth, clasping by a heart-shaped base, the auricles acute: involucre downy when young: achenes striate, also wrinkled transversely.—A common introduced weed about dwellings and waste places.

2. **S. asper** Vill. Stem-leaves less divided and more spiny-toothed, the auricles of the clasping base rounded: achenes margined, 3-nerved on each side, smooth.—With the last; naturalized from Europe.

LOBELIACEÆ. (Lobelia Family).

Herbs, with alternate simple leaves, scattered flowers, irregular 5-lobed corolla, 5 alternate stamens free from the corolla and usually united into a tube both by their filaments and anthers, solitary style, and calyx-tube adherent to the many-seeded pod.

1. **Nemacladus**. Anthers entirely separate; filaments partly or almost wholly monadelphous: lower lip of corolla 3–, upper 2-lobed or parted.

2. **Lobelia**. Anthers united; filaments monadelphous except near the base: corolla open down to the base on one side.

1. NEMACLADUS Nutt.

Small annual, at length excessively branched and diffuse, with minute leaves (radical obovate, cauline reduced to subulate bracts), capillary pedicels racemose on zigzag branches, bilabiately irregular flesh-colored corolla, filaments monadelphous above the middle, distinct anthers, and a 2-celled 20 to 40-seeded pod 2-valved (from top).

1. **N. ramosissimus** Nutt. Rarely a little puberulent: calyx-tube adnate to lower third of ovary: the very small white corolla little surpassing the calyx: filaments usually monadelphous for most of their length: seeds roundish.—A species of the far western deserts, but represented on the southwestern border of Texas by var. Montanus Gray, which is more erect, with larger flowers and fruit on less divaricate or ascending pedicels, and seeds from short-oval to oblong-oval.

2. LOBELIA L.

Herbs, with flowers axillary or chiefly in bracted racemes, somewhat 2-lipped corolla split down on the (apparently) upper side (upper lip of 2 rather erect lobes, the lower lip spreading and 3-cleft), syngenesious anthers and filaments monadelphous except near the base, and 2-celled many-seeded pod opening at the top. In ours the stems are leafy.

* *Flowers bright red, large.*

1. **L. cardinalis** L. Minutely pubescent or glabrous, 6 to 12 dm. high: leaves oblong-lanceolate, slightly toothed: raceme elongated, rather 1-sided, the pedicels much shorter than the leaf-like bracts: seeds rugose-tuberculate.—The common "cardinal flower" of the Atlantic States, and occurring more or less throughout the valleys of Texas.

2. L. **splendens** Willd. Much like the preceding, but more slender, glabrous or nearly so, leaves lanceolate or almost linear and glandular-denticulate (all but the lower sessile), and seeds less tuberculate.—Wet grounds throughout Texas.

* * *Flowers blue, or blue variegated with white.*

+ *Flowers rather large (corolla-tube 10 to 12 mm. long), spicate-racemose.*

3. **L. puberula** Michx. Finely soft-pubescent: leaves ovate to lanceolate, thickish, obtuse, 2.5 to 5 cm. long, with small glandular teeth: spike rather 1-sided: bracts ovate: sinuses of calyx with short and rounded or often inconspicuous auricles, the hairy tube top-shaped.—Damp sandy grounds, extending from the Atlantic and Gulf States into Texas. Passing into var. GLABELLA Hook., which is a greener form, with slender more glabrous usually more naked virgate spike, glabrous calyx, etc., and flowers more secund.

+ + *Flowers smaller (corolla-tube not more than 4 to 6 mm. long).*

++ *Stem mostly simple and strict, continued into a naked spike-like raceme: leaves barely denticulate or repand.*

4. **L. Ludoviciana** Gray. Glabrous: leaves lanceolate, acute, or the lowest spatulate and obtuse, merely denticulate, thickish, all with tapering base and the lower petioled: raceme loosely 5 to 20-flowered: corolla 12 mm. long: calyx-lobes ovate-lanceolate, rounded auriculate at the sinuses: larger anthers densely hirsute at and near the summit.—Wet prairies of western Louisiana and eastern Texas, possibly within our range.

5. **L. appendiculata** A. DC. Nearly glabrous, or the strong angles of the slender stem above scabrous: leaves oval or oblong, obtuse, or the lowest obovate, mostly denticulate or repand, thin, all but the lowest sessile by a broad base: raceme spike-like, very slender: corolla 8 mm. long: calyx-lobes linear-acuminate from a broader base, their bases sagittately extended into deflexed auricles: larger anthers slightly hirsute on the back.—Moist ground in eastern Texas and probably within our range.

++ ++ *Stems simple and strict, continued into a very leafy-bracted spike: leaves and bracts laciniate-toothed.*

6. **L. fenestralis** Cav. Nearly glabrous, or the sharp decurrent angles of the stem hairy: leaves oblong or lanceolate, all the upper partly clasping and acuminate, passing into the similar bracts of the long spicate inflorescence: calyx-lobes linear and mostly with some slender teeth: corolla-tube 4 mm. long: larger anthers short-bearded at tip.—Southwestern Texas.

++ ++ ++ *Stems branching: flowers loosely racemose: sinuses of calyx not appendaged.*

7. **L. Cliffortiana** L. Glabrous or slightly hairy: leaves ovate or slightly cordate, obtusely toothed or repand, petioled, or the upper lanceolate and sessile: pedicels filiform, longer than the flowers: pod with nearly the upper half free: seeds very smooth and shining.—A tropical species, occasionally met as an introduced plant in the South Atlantic States, and represented in southwestern Texas by var. BRACHYPODA Gray, with cauline leaves from obovate-spatulate to lanceolate, and pedicels (4 to 6 mm. long) rather shorter than the flower or the capsule, which is that of the species.

8. **L. Berlandieri** A. DC. is an uncertain species, forms collected near Brazos Santiago having a rosulate tuft of root-leaves and a low sparsely leafy or almost naked branching stem, a habit entirely unlike *L. Cliffortiana,* but with the long filiform

pedicels and smooth shining seeds of the latter species. Dr. Gray suggested that it might be a depauperate form of *L. Cliffortiana;* but if not entitled to specific rank it might better be considered a variety of *L. Feayana.*

CAMPANULACEÆ. (CAMPANULA FAMILY.)

Herbs, with alternate leaves, scattered (generally blue and showy) flowers, adherent calyx, regular 5-lobed bell-shaped or rotate corolla, 5 stamens usually free from the corolla and distinct, single style, 2 or more stigmas, and 2 to several-celled many-seeded pod.

1. **Specularia.** Calyx 3 to 5-lobed: corolla rotate: flowers dimorphous and axillary.

2. **Campanula.** Calyx 5-cleft: corolla generally bell-shaped: flowers all alike, terminal or axillary.

1. SPECULARIA Heister. (VENUS'S LOOKING-GLASS.)

Low annuals, with axillary blue or purplish flowers dimorphous (the earlier cleistogamous), 3 to 5-lobed calyx, rotate 5-lobed corolla, 5 separate stamens with membranaceous hairy filaments shorter than the anthers, 2 to 4 stigmas, and a prismatic or elongated-oblong pod which is 2 to 4-celled and opens by small lateral valves.

1. **S. leptocarpa** Gray. Minutely hirsute or nearly glabrous: stems mostly simple or branched from base: leaves lanceolate: flowers closely sessile in their axils: stigmas 2 or 3: cells of ovary as many (or only one in the lower cleistogamous flowers): pods nearly cylindrical, inclined to curve and rarely to twist, opening by 1 or 2 uplifted valves near the summit: seeds oblong.—Throughout Texas.

2. **S. Lindheimeri** Vatké. Larger: stems erect or diffuse, paniculately branched above: leaves oblong-lanceolate or lower oblong or spatulate: flowers subsessile or short-peduncled (commonly terminating branchlets): stigmas 3 or 4: cells of ovary as many: pods angular, narrowed to base, mostly straight, not twisted, opening by 2 or 3 downwardly turned or irregularly bursting small valves below the summit: seeds almost orbicular, flattened.—Southern and western Texas.

3. **S. biflora** Gray. Stem slender, mostly simple or branched from base, minutely and retrorsely serrulate-hispid on the angles: leaves sessile, ovate or oblong, sparingly somewhat crenate: flowers sessile, single or in pairs in the axils: pod oblong and cylindraceous, the 2 or 3 valvular openings close under the calyx: seeds lenticular.—Open grounds, throughout Texas.

4. **S. perfoliata** A. DC. Stems commonly stouter and simple, very leafy throughout, hirsute or hispid on the angles: leaves round-cordate and clasping, mostly crenate, veiny: flowers sessile, single or clustered in the axils: pod oblong or somewhat obconical, the 2 or 3 valvular openings at or below the middle: seeds lenticular.—Open gravelly ground throughout Texas.

2. CAMPANULA Tourn. (BELL-FLOWER. HARE-BELL.)

Herbs, with terminal or axillary (usually blue) flowers, 5-cleft calyx, generally bell-shaped 5-lobed corolla, 5 separate stamens with filaments broad and membranaceous at base, 3 stigmas and as many cells of the ovary, and a short pod opening on the sides by as many valves or holes.

1. **C. rotundifolia** L. Slender, branching, 10 to 30 cm. high, 1 to 10-flowered: root-leaves round-cordate or ovate, mostly toothed or crenate, long-petioled, early withering away; stem-leaves numerous, linear or narrowly lanceolate, entire, smooth: calyx-lobes awl-shaped: pod nodding, opening at or near the base.—In the mountains of extreme southwestern Texas.

2. **C. Reverchoni** Gray. Hirsutulous below, glabrous above: stem slender, erect, cymosely and effusely much-branched: leaves sparingly dentate, 12 mm. long; radical spatulate, lower cauline spatulate, those of upper branches almost filiform and entire: flower and fruit erect on almost capillary peduncles: pod ovate, crowned with the somewhat shorter narrowly linear-lanceolate erect calyx-lobes, opening towards the summit.—On rocks, central and western Texas.

ERICACEÆ. (Heath Family.)

Trees, shrubs, or herbs, with flowers regular or nearly so, stamens as many or twice as many as the 4 or 5-lobed or 4 or 5-petaled corolla and free from but inserted with it, 2-celled anthers commonly appendaged or opening by terminal chinks or pores, single style, and 3 to 10-celled ovary.

* Shrubs or small trees.

1. **Arbutus.** Flowers small, in a terminal cluster of racemes or panicles: corolla from globular to ovate, 5-toothed: stamens twice as many as corolla-lobes, included: anthers with a pair of reflexed awns on back, each cell opening at apex anteriorly by a terminal pore: leaves evergreen and coriaceous.

2. **Rhododendron.** Flowers large and showy, in umbellate clusters: corolla bell-shaped or funnel-formed, 5-lobed or parted: stamens mostly 5, more or less exserted and declined (as also the style): anthers destitute of awns or appendages, each cell opening by a terminal pore: leaves (in ours) deciduous.

* * Herbaceous scaly root-parasites, destitute of all green foliage.

3. **Monotropa.** Corolla of 4 or 5 separate narrow petals: calyx imperfect or bract-like: anthers kidney-shaped, opening across the top.

1. ARBUTUS Tourn.

Trees or shrubs, with evergreen and coriaceous alternate petiolate leaves, white or flesh-colored small flowers in a terminal cluster of racemes or panicles, scaly bracts and bractlets, small 5-parted calyx, globular to ovate 5-toothed corolla, included stamens twice as many as the corolla-lobes, compressed anthers bearing a pair of reflexed awns on back and each cell opening by a terminal pore, and a 5-celled ovary ripening into a granular-coated many-seeded berry.

1. **A. Xalapensis** HBK., var. **Texana** Gray. A shrub or small tree, with older bark mostly deciduous: leaves from lanceolate-oblong to oval or ovate, 5 to 7.5 cm. long: ovary pubescent: berries yellowish-red. (*A. Texana* Buckley)—Foothills of the mountains west of the Pecos, and known as "madrona." Yellowish-red berries, the size of currants, rather pleasant-tasted (Havard).

2. RHODODENDRON L. (Rose bay, Azalea, etc.)

Shrubs or small trees, with chiefly alternate entire leaves (deciduous and glandular-mucronate in ours), large and showy 5-merous flowers in umbelled clusters from large scaly-bracted terminal buds, mostly small or minute calyx, bell-shaped or funnel-form lobed or cleft corolla, stamens as few as the corolla-lobes or twice as many (along with the style more or less exserted and declined in ours), anther-cells opening by a round terminal pore, and a 5-celled 5-valved many-seeded pod.

1. **R. nudiflorum** Torr. A shrub 9 to 30 dm. high: leaves obovate to oblong-oblanceolate, downy underneath: flowers showy, flesh-color to pink and purple, appearing before or with the leaves: corolla with conspicuous funnel-form tube scarcely

longer than the ample lobes, slightly glandular: stamens (chiefly 5) and style long-exserted. (*Azalea nudiflora* L.)—A species of the Atlantic and Gulf States, extending into Texas, and reported as far west as Tom Green County (*Tweedy*).

3. MONOTROPA L. (INDIAN PIPE. PINE-SAP.)

Low and fleshy (tawny, reddish, or white) herbs parasitic on roots or saprophytic, with scales in place of leaves, one to several flowers, deciduous calyx of 2 to 5 lanceolate bract-like scales, 4 or 5 separate erect spatulate scale-like petals which are gibbous or saccate at base and tardily deciduous, 8 or 10 stamens with awl-shaped filaments, kidney-shaped anthers becoming 1-celled and opening across the top, columnar style with disk-like 4 or 5-rayed stigma, and an ovoid 8 to 10-grooved 4 or 5-celled loculicidal pod with innumerable minute seeds covering the very thick placentæ.

1. **M. uniflora** L. (INDIAN PIPE. CORPSE PLANT.) Smooth, waxy-white (turning blackish in drying), 1-flowered inodorous plant, 7.5 to 20 cm. high: calyx of 2 to 4 irregular scales or bracts: anthers transverse, opening equally by 2 chinks: style short and thick; stigma naked.—Damp woods, throughout the continent.

2. **M. Hypopitys** L. (PINE-SAP. FALSE BEECH-DROPS.) Somewhat pubescent or downy, tawny, whitish, or reddish commonly fragrant plants, 10 to 30 cm. high: flowers several in a scaly raceme; the terminal one usually 5-merous, the rest 3 or 4-merous: bract-like sepals mostly as many as the petals: anthers opening by a continuous line into 2 very unequal valves: style longer than the ovary, hollow; stigma ciliate: pod globular or oval.—Under amentaceous and coniferous trees.

PLUMBAGINEÆ. (LEADWORT FAMILY.)

Herbs, with regular 5-merous flowers, a plaited calyx, 5-stamens opposite the separate petals or lobes of the corolla, and a free 1-celled ovary with a solitary ovule hanging from a long cord which rises from the base of the cell.

1. STATICE Tourn. (SEA-LAVENDER. MARSH-ROSEMARY.)

Seaside or salt-marsh perennials, with thick and stalked radical leaves, naked flowering stems or scapes branched into panicles with the flowers scattered or loosely spiked and 1-sided on the branches, funnelform dry and membranaceous persistent calyx, 5 nearly or quite distinct petals with long claws to the bases of which the 5 stamens are severally attached, 5 (rarely 3) separate styles, and a membranous and indehiscent fruit in the bottom of the calyx.

1. **S. Limonium** L. Root thick and woody, very astringent: leaves oblong, spatulate or obovate-lanceolate, 1-ribbed, tipped with a deciduous bristly point, petioled: scape much-branched, corymbose-panicled, 3 to 6 dm. high: spikelets 1 to 3-flowered: flowers lavender-color: calyx-tube hairy on the angles, the lobes ovate-triangular, with as many teeth in the sinuses.—A cosmopolitan species, represented in southwestern Texas by var. CALIFORNICA Gray, with thinnish, retuse or obtuse, pointless leaves, branches of the ample panicle densely flowered at summit, and spikelets almost imbricated in short cymose spikes. On the coast of Texas is var. CAROLINIANA Gray, with more erect branches, rather panicled inflorescence with at length scattered flowers, and very acute or acuminate calyx-lobes.

PRIMULACEÆ. (PRIMROSE FAMILY.)

Herbs, with simple leaves, regular perfect flowers, calyx usually free from the ovary, stamens as many as the lobes of the gamopetalous (rarely polypetalous) corolla and inserted opposite them (on tube or base), single style and stigma, and a 1-celled ovary with a central free placenta rising from the base and bearing several or many seeds.

* Ovary wholly free.

+ Stemless, leaves all in a cluster from the root.

1. Dodecatheon. Corolla reflexed, 5-parted: stamens exserted, connivent in a cone: capsule dehiscent by valves or teeth.

+ + Stems leafy: corolla rotate.

2. Steironema. Corolla 5-parted: 5 slender staminodia between the fertile stamens: capsule mostly globose, dehiscent vertically by valves or irregularly: leaves opposite.

3. Centunculus. Corolla 4 or 5-cleft, shorter than calyx: globose capsule with top falling off as a lid: flowers axillary: leaves alternate.

* * Ovary connate at base with the base of the calyx.

4. Samolus. Corolla bell-shaped, with 5 staminodia in the sinuses: flowers racemose.

1. DODECATHEON L. (AMERICAN COWSLIP.)

Perennial smooth herb, with a cluster of oblong or spatulate leaves, simple naked scape involucrate with small bracts at summit and bearing an ample umbel of showy rose-color or white flowers nodding on slender pedicels, deeply 5-cleft calyx with reflexed lanceolate divisions, corolla with very short tube, thickened throat and 5-parted reflexed limb (the divisions long and narrow), short filaments monadelphous at base, and long and linear anthers approximate in a slender cone.

1. **D. Meadia** L. (SHOOTING-STAR.) A handsome Atlantic species, extending into Texas.

2. STEIRONEMA Raf.

Leafy-stemmed perennials (glabrous except the ciliate petioles), opposite leaves, slender axillary peduncles bearing yellow flowers, 5-parted calyx, rotate deeply 5-parted corolla (with no proper tube) with ovate cuspidate-pointed divisions (erose-denticulate above) each separately involute around its stamen, distinct filaments (or nearly so) on the ring at base of corolla and alternating with 5 subulate staminodia, linear anthers, and a 10 to 20-seeded pod.

1. **S. ciliatum** Raf. Stem erect, 6 to 12 dm. high: leaves lanceolate-ovate, 5 to 15 cm. long, tapering to an acute point, rounded or heart-shaped at base, all on long and fringed petioles: corolla longer than calyx. (*Lysimachia ciliata* L.)—Low grounds and thickets, Atlantic and Gulf States and west to New Mexico; hence presumably in Texas, but as yet not reported.

3. CENTUNCULUS Dill. (Chaffweed.)

Small annuals, with alternate entire leaves, solitary inconspicuous axillary flowers, 4 or 5-parted calyx, 4 or 5-cleft rotate corolla (shorter than the calyx) with an urn-shaped short tube and usually withering on the summit of the many-seeded circumscissile pod, 4 or 5 stamens, and beardless filaments.

1. **C. minimus** L. Stems ascending, 5 to 15 cm. long: leaves ovate, obovate, or spatulate-oblong: flowers nearly sessile, the parts mostly in fours.—A species of the Mississippi and Gulf States and extending into Texas.

4. SAMOLUS Tourn. (Water pimpernel. Brook-weed.)

Smooth herbs, with alternate entire leaves, small white racemed flowers, 5-cleft calyx with tube adherent to the base of the ovary, somewhat bell-shaped 5-cleft corolla commonly with 5 sterile filaments in the sinuses, 5 true stamens on the corolla-tube and included, and globose many-seeded pod 5-valved at summit.

1. **S. Valerandi** L. Stem erect, 15 to 30 cm. high, leafy: leaves obovate or spatulate, the basal rosulate: bracts none: slender pedicels ascending, bracteolate in the middle: corolla hardly 2 mm. long, the sinuses bearing inflexed sterile filaments.—A European species, represented throughout the United States, in wet places, by var. Americanus Gray, which is more slender, becoming diffuse, with racemes often panicled, the pedicels longer and spreading.

2. **S. ebracteatus** HBK. Leafy stems short: leaves fleshy, obovate or spatulate, the lower tapering into a winged petiole and decurrent: racemes long-peduncled or as if on a scape: pedicels without bract or bractlet: corolla about 4 mm. long, bearing no sterile filaments.—Saline and brackish soil, extending from the Gulf States through Texas into Mexico.

SAPOTACEÆ. (Sapodilla Family.)

Trees or shrubs, with simple and entire alternate leaves, small and perfect regular flowers usually in axillary clusters, free and persistent calyx, fertile stamens commonly as many as the lobes of the hypogynous short corolla and opposite them (inserted on its tube along with one or more rows of appendages and scales or sterile stamens), anthers turned outward, single pointed style, and a 4 to 12-celled ovary with a single ovule in each cell.

1. BUMELIA Swartz.

Shrubs or small trees, with very hard wood, small white flowers in axillary fascicles, leaves often fascicled on short spurs, often spiny branches, 5-parted calyx, 5-cleft corolla with a pair of internal appendages at each sinus, 5 fertile stamens with arrow-shaped anthers, 5 petal-like sterile stamens alternate with the corolla-lobes, 5-celled ovary, and a small black cherry-like fruit containing a large ovoid and erect seed.

1. **B. lanuginosa** Pers. Spiny, 3 to 18 m. high: leaves oblong-obovate or wedge-obovate, rusty-woolly beneath, obtuse, 3.5 to 7 cm. long: clusters 6 to 18-flowered, pubescent: fruit 8 to 10 mm. long, oval.—Extending from the Gulf States and Lower Missis-

sippi Valley States to the Rio Grande (Eagle Pass). Known variously as "gum elastic" and "shittim wood." In southern Texas and adjacent Mexico is var. RIGIDA Gray, which is more spiny, with coriaceous leaves little over 2.5 cm. long and from obovate to cuneate-oblanceolate. (*B. spinosa* Wats., not DC.)

2. **B. lycioides** Pers. Spiny, 3 to 12 m. high: leaves wedge-oblong varying to oval-lanceolate, with a tapering base, often acute, reticulated, nearly glabrous, 2.5 to 5 cm. long: clusters densely many-flowered, glabrous: fruit 6 to 10 mm. long, short-ovoid.—Extending from the Gulf States to the Lower Rio Grande and the Concho River. Known as "iron-wood" and "southern buckthorn." "Called 'coma' by the Mexicans on the Lower Rio Grande where it becomes a tree with stem a foot thick. Wood tough and compact, making excellent axe handles. The black berries are edible but not very palatable" (Havard.)

3. **B. angustifolia** Nutt. Glabrous throughout, rarely over 4 m. high: leaves from spatulate or linear-oblanceolate to broadly obovate-cuneate, very obtuse, fleshy-coriaceous, small, 1 to 3.5 cm. long: clusters few to many-flowered: fruit 12 to 18 mm. long, oblong-oval. (*B. parvifolia* Chapm., not A. DC. *B. reclinata* Torr., not Vent. *B. cuneata* Gray, not Swartz.)—Valley of the Lower Rio Grande.

EBENACEÆ. (EBONY FAMILY.)

Trees or shrubs, with alternate entire leaves, polygamous regular flowers, calyx free from the 3 to 12-celled ovary, stamens 2 to 4 times as many as the lobes of the corolla (often in pairs before them and their anthers turned inward), 1 or 2 ovules suspended from summit of each cell, and fruit a several-celled berry.

1. DIOSPYROS L. (DATE-PLUM. PERSIMMON.)

Trees or shrubs, with diœciously polygamous flowers (fertile axillary and solitary, sterile smaller and often clustered), 4 to 6-lobed calyx, 4 to 6-lobed corolla, mostly 16 stamens in sterile flowers and 8 (imperfect ones) in fertile, and a large globular 4 to 8-celled 4 to 8-seeded berry surrounded at base by the thickish calyx.

1. **D. Virginiana** L. (COMMON PERSIMMON.) Tree 6 to 20 m. high (exceptionally 30 to 35 m.), with very hard blackish wood: leaves thickish, ovate-oblong, smooth or nearly so: peduncles very short: calyx 4-parted: corolla pale yellow, thickish, glabrous, between bell-shaped and urn-shaped (12 to 16 mm. long in fertile flowers, much smaller in sterile): styles 4, two-lobed at apex: plum-like fruit 2.5 cm. in diameter, yellow when ripe.—A common tree of the Atlantic States, extending into Texas to the valley of the Colorado. The fruit, exceedingly astringent when green, yellow and luscious when ripe, is well known.

2. **D. Texana** Scheele. (MEXICAN PERSIMMON.) Shrub or tree, 3 to 10 m. high, widely much branched and with heavy white wood: leaves cuneate-oblong or obovate, rounded at apex, almost sessile, tomentose (as also the branchlets): flowers silky-tomentose outside: calyx 5 or 6-parted: fruit globose, black, luscious (ripe in August.)—Woods along streams, Matagorda Bay to the Concho River and southward. The "chapote" of the Mexicans; also known as "black persimmon." "Often found on rocky mesas but thrives best in cañons and on the edges of ravines. The black globose fruit, smaller than its congener of the Eastern States, is about as astringent when green and as sweet when ripe. Stains black everything it touches, and Mexicans use it to dye sheep skins by boiling." (Havard.)

STYRACEÆ. (STORAX FAMILY.)

Shrubs or trees, with alternate simple leaves destitute of stipules, perfect regular flowers, calyx either free or adherent to the 2 to 5-celled ovary, corolla of 4 to 8 petals commonly more or less united at base, stamens twice as many as the petals or more numerous (monadelphous or polyadelphous at base), single style, and a dry or drupe-like 1 to 5-celled fruit (the cells commonly 1-seeded).

1. STYRAX Tourn. (STORAX.)

Shrubs or smalls trees, with commonly deciduous leaves, scurfy or stellate pubescence, axillary or leafy-racemed white and showy flowers on drooping peduncles, truncate somewhat 5-toothed calyx (the base coherent with the base of the 3-celled many-ovuled ovary), large 5-parted corolla with mostly soft-downy lobes, stamens twice as many as the lobes of the corolla with flat filaments united at base into a short tube, linear adnate anthers, and a globular 1-celled mostly 1-seeded dry often 3-valved fruit with base surrounded by the persistent calyx.

1. **S. pulverulenta** Michx. Low shrub, 3 to 12 dm. high: leaves small (2.5 to 5 cm. long), oval or obovate, commonly entire, mostly acute at both ends, often acuminate, pubescent or scurfy and hoary beneath, rarely 5 cm. long on flowering stems: flowers 1 to 3 together in the axils and at the tips of the branches, fragrant: calyx and inflorescence more or less canescent.—Extending into Texas from the pine-barren swamps of the Gulf States.

2. **S. platanifolia** Engelm. Shrub 36 dm. high, green and glabrous or nearly so: leaves roundish, with subcordate or truncate broad base and slender petiole, undulate or angulate-toothed, or even sinuate-lobed, sometimes abruptly acuminate, reticulate-veiny, 5 to 10 cm. in diameter: even the pedicels and calyx glabrous or nearly so.—Wooded bottoms of southern and central Texas.

OLEACEÆ. (OLIVE FAMILY.)

Trees or shrubs, with opposite and pinnate or simple leaves, a 4-cleft (or sometimes obsolete) calyx, a regular 4-cleft or nearly or quite 4-petalous corolla, sometimes apetalous, only 2 stamens (rarely 3 or 4), and a 2-celled ovary with 2 (rarely more) ovules in each cell.

* Fruit dry, indehiscent, winged, a samara: leaves pinnate.

1. **Fraxinus**. Flowers diœcious, mostly apetalous, sometimes also without calyx.

* * Fruit a drupe, or rarely a berry: leaves simple.

2. **Forestiera**. Flowers apetalous, diœcious or polygamous, from a scaly catkin-like bud: stamens 2 to 4.

3. **Chionanthus**. Flowers complete, sometimes polygamous: calyx and corolla 4-merous, the latter with long and linear divisions.

* * * Fruit a didymous or 2-parted pod: calyx and corolla 5-merous or more: leaves entire or pinnately lobed.

4. **Menodora.** Calyx 5 to 15-cleft, with mostly linear lobes and persistent; corolla from rotate to salverform: pod circumscissile.

1. **FRAXINUS** Tourn. (ASH.)

Light timber-trees, with petioled pinnate leaves of 3 to 15-toothed or entire leaflets, small polygamous or diœcious flowers in crowded panicles or racemes from the axils of last year's leaves, small calyx (4-cleft, toothed, entire, or obsolete), petals 4 or altogether wanting, 2 stamens (sometimes 3 or 4), large linear or oblong anthers, single style with 2-cleft stigma, and a 1 or 2-celled samara or key-fruit flattened, winged at the apex and 1 or 2-seeded.

* *Flowers 4-petalous, in loose panicles which mostly terminate short leaf-bearing branchlets.*

1. **F. cuspidata** Torr. Shrub 15 to 25 dm. high, glabrous: leaflets 5 to 7, lanceolate or ovate-lanceolate and gradually acuminate into a cuspidate tip, or some of them ovate or oval and obtuse or even emarginate, acutely and sparsely few-toothed and entire, petiolulate; petiole slightly margined between leaflets: stigma sessile: fruit 12 mm. long, spatulate-oblong or obovate-oblong.—"Small tree in the Chisos Mountains and some of the cañons of the Great Bend." (Havard.)

2. **F. Greggii** Gray. Shrub 15 to 27 dm. high, glabrous: leaflets 3 to 7, from narrowly spatulate to oblong-obovate, obtuse, obtusely few-toothed or entire, firm-coriaceous, veinless or nearly so, sessile: petiole wing-margined between the leaflets: fruit 12 to 16 mm. long, oblong-linear, the retuse apex tipped with a very short distinct style.—On limestone, southwestern Texas. "Stout shrub, noticed near the mouth of the Pecos and at Maxon's Spring." (Havard.)

* * *Flowers diœcious and apetalous, in mostly denser panicles which are developed from separate buds from upper axils of the preceding year, or on the leafless base of shoots of the season.*

– *Body of fruit terete or nearly so, marginless; the wing wholly terminal.*

3. **F. pistaciæfolia** Torr. Small tree, 10 to 12 m. high, either velvety-pubescent or nearly glabrous: leaflets 5 to 9, short-petiolulate (sometimes subsessile), from lanceolate to oval, entire or somewhat serrate: fruits small and crowded, spatulate, the terete body (6 to 10 mm. long) somewhat clavate, about equaling and sometimes exceeding the wing.—In the mountains of western Texas. "Frequently planted about El Paso and down the Rio Grande to San Elizario, on account of its quick growth." (Harvard.)

4. **F. Americana** L., var. **Texensis** Gray. Low tree, 10 to 12 m. high, glabrous throughout: leaflets mostly 5, slender-petiolulate, from ovate to broadly oval, either rounded at apex or slightly acuminate, entire or sparsely serrate or denticulate: fruit small, 16 to 24 mm. long, the body oblong and cylindraceous, completely terete, about half the length of the wing.—On rocky hills, from Dallas to Devil's River (near the Rio Grande).

– – *Body of fruit more slender, tapering gradually from summit to base, more or less margined upward by the decurrent wing.*

5. **F. pubescens** Lam. (RED ASH.) Branchlets and petioles velvety-pubescent: leaflets 7 to 9, ovate or oblong-lanceolate, taper-pointed, almost entire, pale or more or less pubescent beneath: fruit 3.5 to 5 cm. long, the edges gradually dilated into the linear or spatulate wing.—A tree of the eastern States, reported by Dr. Havard as having been seen "on the summit of the Gaudalupe Mountains, and nowhere else," but possibly some form of the next species.

6. **F. viridis** Michx. f. (GREEN ASH.) Glabrous throughout: leaflets 5 to 9, ovate or oblong-lanceolate, often wedge-shaped at the base and serrate above, bright green both sides: fruit much as in no. 5.—Along streams, throughout Texas. The most common ash west of the Colorado River is var. BERLANDIERIANA Gray, with 3 to 5 leaflets having more cuneate base, and with fruit-wing rather wider and more decurrent on the body. "Large tree in the Chenate Mountains, smaller in the Limpia and

Gaudalupe Mountains; found also as a medium-sized tree on the Pecos, Devil's River, and most streams further eastward to San Antonio; occurs sparingly on the Lower Rio Grande, the Gulf Coast, and the water courses of southeast Texas." (Havard.)

2. FORESTIERA Poir.

Shrubs, with opposite and often fascicled deciduous leaves, small diœcious flowers crowded in catkin-like scaly buds from the axils of last year's leaves, 4 minute sepals, no corolla, 2 to 4 stamens with oblong anthers, ovate 2-celled ovary with 2 pendulous ovules in each cell, slender style, somewhat 2-lobed stigma, and small ovoid 1-celled 1-seeded drupe.

* *Leaves membranaceous and deciduous, not porulose, mostly minutely serrate.*

1. **F. acuminata** Poir. Glabrous, somewhat spinescent, 2 to 8 m. high: leaves oblong-ovate or ovate-lanceolate, acuminate at both ends, slender-petioled, often serrulate, 3.5 to 10 cm. long: fertile flowers several in a fascicle, drupe elongated-oblong, usually pointed.—Wet and shady river banks, extending from the Gulf States to the Valley of the Colorado.

2. **F. Neo-Mexicana** Gray. Glabrous, 2 to 3 m. high: leaves spatulate-oblong, obtuse or obtusely acuminate, short-petioled, obtusely or obsoletely serrulate, 2.5 cm. long: fertile flowers in sessile fascicles: drupe obtuse, short-oblong or ovoid.—Western borders of Texas.

3. **F. pubescens** Nutt. Soft-pubescent: leaves obovate or oblong with narrowed base, short-petioled, appressed-serrulate, rounded at apex, usually 2.5 cm. long: fertile flowers and oblong drupes pedicellate.—Eastern and southern Texas.

* * *Leaves coriaceous, very small, not porulose.*

4. **F. sphærocarpa** Torr. Low shrub: leaves oblong or oval, obtuse, obscurely crenulate, minutely soft-pubescent, 12 mm. long, short-petioled, mainly crowded at tip of branchlets: drupe globular, very short-pedicelled.—Southwestern Texas, in dry ravines of the Limpia River.

* * * *Leaves coriaceous, porulose-punctate beneath.*

5. **F. reticulata** Torr. Glabrous throughout: leaves ovate or almost oblong, with rounded base and obtuse or acute mucronulate apex, lucid above, conspicuously venulose-reticulated, 2.5 cm. long or more, with margins plane and often serrulate: drupe short-ovoid.—Western borders of Texas. "Only seen in cañons near the mouth of the Pecos." (Havard.)

6. **F. angustifolia** Torr. Densely branched glabrous shrub: leaves linear or spatulate-linear (12 to 24 mm. long and 2 to 6 mm. wide), sometimes linear-oblong, very obtuse, veinless or nearly so, with narrowly revolute entire margins: drupe ovate, acute, very short-pediceled.—Throughout southern Texas. "Rather common on bluffs and in mountain arroyos, with a black, edible, but not very palatable berry." (Havard.)

3. CHIONANTHUS. (Fringe-tree.)

Low trees or shrubs, with deciduous and entire petioled leaves, delicate flowers in loose and drooping graceful panicles from lateral buds, 4-parted very small persistent calyx, corolla of 4 long and linear petals which are barely united at base, 2 (rarely 3 or 4) very short stamens on the very base of the corolla, notched stigma, and a fleshy globular drupe becoming 1-celled and 1 to 3-seeded.

1. **C. Virginica** L. Leaves oval, oblong, or obovate-lanceolate: flowers on slender pedicels: petals 2.5 cm. long, narrowly linear, acute, varying to 5 or 6 in number: drupe purple, with a bloom, ovoid.—Along streams, extending into Texas from the Eastern States.

4. MENODORA Humb. & Bonpl.

Low shrubby or nearly herbaceous plants, with simple entire or pinnately lobed leaves (many of them alternate), conspicuous flowers terminating the branches (or becoming lateral, or loosely cymose), 5 to 15-cleft persistent calyx with linear lobes, rotate to salverform yellow corolla with 5 or 6-parted limb, 2 (rarely 3) stamens with oblong or nearly linear anthers, emarginate ovary with slender style and capitate or 2-lobed stigma, and fruit a didymous or 2-parted pod circumscissile at or near the middle.

* *Corolla with very short tube commonly bearded within and blunt or hardly acute lobes: filaments filiform: anthers pointless: calyx with 7 to 15 linear or subulate lobes.*

1. **M. scabra** Gray. Herbaceous from a woody branching base, whole herbage or at least the lower part puberulent-scabrous: leaves mostly alternate, linear or the lower oblong, chiefly entire, 8 to 20 mm. long: flowers rather numerous: peduncles remaining erect: corolla bright yellow.—Western Texas, mostly west of the Pecos.

2. **M. heterophylla** Moricand. Nearly herbaceous, diffusely spreading, almost glabrous but roughish: leaves mostly opposite and pinnately 3 to 7-cleft or parted, the lobes and uppermost leaves linear: flowers sparse: short peduncles recurved in fruit: corolla light yellow.—Throughout Texas.

* * *Corolla salverform with long tube glabrous within and mucronate-acuminate lobes: anthers almost sessile in throat, apiculate: calyx with about 10 setaceous lobes.*

3. **M. longiflora** Gray. Glabrous with numerous almost simple herbaceous stems from a woody and branching base: leaves linear or lanceolate, smooth, entire (some of lowest rarely 3-cleft), the upper commonly alternate: corolla-tube 3.5 to 4 cm. long, the lobes 12 mm. long.—Southern and western Texas.

4. **M. pubens** Gray. Like the last, but pubescent throughout with soft and spreading hairs, and leaves rather broader.—Valley of the Pecos and westward.

APOCYNACEÆ. (Dogbane Family.)

Plants almost all with milky acrid juice, entire (chiefly opposite) leaves without stipules, regular 5-merous and 5-androus flowers, the 5 corolla-lobes convolute and twisted in bud, distinct filaments inserted on corolla, granular pollen, and calyx free from the two ovaries which are distinct (forming follicles) though their styles and stigmas are united into one.

1. **Amsonia.** Seeds naked: corolla-tube bearded inside: anthers longer than filaments: leaves alternate.

2. **Apocynum.** Seeds comose: corolla bell-shaped, appendaged within: filaments short, broad and flat: calyx not glandular: leaves opposite.

3. **Macrosiphonia.** Seeds comose: corolla salverform, with long tube, not appendaged: filaments short: calyx many-glandular inside: leaves opposite or verticillate.

4. **Trachelospermum.** Seeds comose: corolla funnelform, not appendaged: filaments slender: calyx 3 to 5 glandular inside: leaves opposite.

1. AMSONIA Walt.

Perennial herbs, with alternate leaves, pale blue flowers in terminal panicled cymes, 5-parted small calyx, corolla with narrow funnel-form tube bearded inside and limb divided into 5 long linear lobes, 5 stamens inserted on corolla-tube and included, anthers obtuse at both ends and longer than the filaments, 2 ovaries, single style, rounded stigma surrounded with a cup-like membrane, and 2 long and slender many-seeded pods with naked cylindrical seeds abrupt at both ends and packed in one row.

* *Stigma with depressed-capitate or truncate entire apex: corolla not constricted under limb.*

1. **A. Tabernæmontana** Walt. About 9 dm high, glabrate: leaves from ovate to lanceolate, acuminate, 5 to 12.5 cm. long, distinctly petioled, pale beneath: corolla-lobes becoming linear and as long as the tube: pods slender, 5 to 7.5 cm. long.—Low grounds, extending from the eastern States into Texas.

2. **A. ciliata** Walt. Stems (3 to 9 dm. high) and commonly inflorescence and leaves when young villous with loose deciduous hair: leaves much crowded, linear-lanceolate to narrowly linear (2.5 to 5 cm. long, 1 to 8 mm. wide), indistinctly petioled, the margins at length somewhat revolute: corolla-lobes at length linear-oblong and little shorter than the tube: pods slender and even, 2.5 to 12.5 cm. long. (*A. angustifolia* Michx.)—Dry soil, extending from the Gulf States into Texas. Represented in rocky prairies and at base of limestone hills by var. TEXANA, which is 3 to 6 dm. high from creeping woody subterranean shoots and completely glabrous, with lanceolate-oblong to linear leaves of firmer texture (*A. angustifolia*, var. *Texana* Gray).

* * *Stigma with two distinct obtuse lobes above the truncate body: corolla constricted (at least in bud) under the conspicuously shorter limb.*

3. **A. tomentosa** Torr. Cinereous-tomentose or puberulent, varying to glabrous: leaves from lanceolate to narrowly linear, sessile: corolla-lobes 4 to 6 mm. long, fully half the length of the tube: pods torose, inclined to break into thickish articulations.—Sandy plains and ravines, western border of Texas.

4. **A. longiflora** Torr. Minutely scabrous or even scabrous-pubescent, or above glabrous: leaves linear, sessile: corolla-lobes white, a quarter the length of the greenish-purple clavate tube which is over 2.5 cm. long: pods slender and continuous.—Rocky ravines, western Texas.

2. APOCYNUM Tourn. (DOGBANE. INDIAN HEMP.)

Perennial herbs, with upright branching stems, tough fibrous bark, opposite mucronate-pointed leaves, small and pale cymose flowers on short pedicels, 5-parted calyx with acute lobes, bell-shaped 5-cleft corolla bearing 5 triangular appendages below the throat opposite the lobes, 5 stamens on the very base of the corolla, flat filaments shorter than the sagittate anthers which converge around the stigma, no style, large ovoid stigma, and two long and slender pods with seeds comose with a tuft of long silky down at the apex.

1. **A. cannabinum** L. (INDIAN HEMP.) Glabrous or more or less soft-pubescent: stem and branches upright or ascending, terminated by erect and close many-flowered cymes, which are usually shorter than the leaves: leaves from oval to oblong and lanceolate, short-petioled or sessile, with rounded or obscurely cordate base: corolla (greenish-white) with nearly erect lobes, the tube not longer than the lanceolate divisions of the calyx.—Moist grounds and banks of streams, reported from Gillespie County (*Jermy*), though probably widely distributed in Texas.

A. ANDROSAEMIFOLIUM L. may occur within our range, and may be recognized by its divergently forking branches, ovate distinctly petioled leaves, loose spreading cymes, and pale rose-colored corolla with revolute lobes.

3. MACROSIPHONIA Muell. (Arg.)

Erect shrubby plants, with numerous opposite or verticillate leaves, comparatively large showy flowers which are either terminal or become lateral, 5-parted calyx many-glandular at base within, salverform corolla with long tube and enlarged throat, short filaments in the throat with oblong or sagittate anthers obtusely tipped and with obtuse basal appendages, thick 5-ribbed stigma with entire or 2-cleft small apex and base appendaged with 5 reflexed lobes or a 5-cleft membrane, and long and slender terete pods with numerous oblong seeds tufted at apex.

1. **M. Berlandieri** Gray. Shrubby, white-tomentose: leaves from oval or cordate-ovate to orbicular, becoming greenish and merely pubescent above, the diverging veins at length conspicuous: corolla merely puberulent outside, its slender tube (with throat) 7.5 to 12.5 cm. long, many times exceeding the calyx and the round-obovate (nearly 2.5 cm. long) lobes.—Rocky soil, western Texas.

2. **M. Wrightii** Gray. Slender, soft-puberulent: leaves narrowly lanceolate, acute, white-tomentulose beneath, glabrous or nearly so above: tube of corolla and throat each 12 mm. or more long, tomentulose, the lobes 12 mm. long.—Mountains beyond the Limpia.

4. TRACHELOSPERMUM Lemaire.

Twining more or less woody plants, with opposite leaves, small flowers in cymes, 5-parted calyx with 3 to 5 glands at base inside, funnelform corolla with 5-lobed limb, 5 included stamens, slender filaments, sagittate anthers with an inflexed tip, and 2 slender pods with numerous oblong tufted seeds.

1. **T. difforme** Gray. Nearly herbaceous and glabrous: leaves oval-lanceolate, pointed, thin: calyx-lobes taper-pointed: corolla pale yellow. (*Forsteronia difformis* A. DC.)—River banks, extending from the Gulf States into Texas.

ASCLEPIADEÆ. (MILKWEED FAMILY.)

Plants with milky juice, opposite or whorled (rarely alternate or scattered) entire leaves, follicular pods, seeds, anthers (connected with stigma) just as in last family from which they differ in the commonly valvate corolla, in the singular connection of anthers with stigma, and the cohesion of the pollen into wax-like or granular masses (*pollinia*) as explained under the typical genus *Asclepias*.

* Anthers tipped with an inflexed or sometimes erect scarious membrane, the cells lower than the top of the stigma; pollinia suspended.

+ Crown double: stems twining.

1. **Philibertia.** Corolla rotate: exterior crown a membranaceous ring adnate to base of corolla; interior of 5 scales adnate to base of the short stamen-tube or column.

+ + Crown single.

++ Stems erect or merely decumbent.

2. **Asclepiodora.** Corolla rotate, merely spreading: crown of 5 hooded fleshy bodies, with a salient crest in each: leaves alternate.

3. **Asclepias.** Corolla reflexed, deeply 5-parted: crown as in no. 2, but with an incurved horn rising from the cavity of each hood: leaves usually opposite.

4. **Acerates.** Corolla reflexed or merely spreading: crown as in no. 2, but with neither crest nor horn inside: leaves mainly alternate.

++ ++ Stems twining: leaves mostly opposite.

= Divisions of crown abruptly pointed or appendaged at apex.

5. **Enslenia.** Corolla erect-campanulate: crown of 5 thin flat bodies each terminated by a 2-cleft tail or awn.

6. **Roulinia.** Corolla rotate-spreading: crown of 5 simply and abruptly acuminate or ligulate-tipped divisions.

= = Divisions of crown not tipped with any appendage or prolonged middle lobe.

7. **Metastelma.** Corolla usually campanulate: crown of 5 flat or slender and distinct scales or processes.

8. **Vincetoxicum.** Corolla rotate, spreading: crown a fleshy 5 to 10-lobed ring or disk.

* * Anthers with short if any scarious tip, borne on the margin of or close under the disk of the stigma: pollinia horizontal.

9. **Gonolobus.** Corolla rotate: crown a wavy-lobed fleshy ring: stems twining.

1. PHILIBERTIA HBK.

Herbaceous or shrubby twining plants, with petiolate leaves, usually dull-colored or parti-colored fragrant flowers in pedunculate umbels, calyx minutely 5-glandular within, rotate corolla, double crown (exterior a membranaceous ring adnate to base of corolla, interior of 5 scales adnate to base of stamen-tube or column), and rather thick smooth acuminate pods.

* *Column evident, rather longer than the swollen scales of the inner crown on its summit.*

1. **P. undulata** Gray. Low twining, glabrous or puberulent, pale: leaves from lanceolate and gradually acuminate to linear from a hastately cordate base, 5 to 7.5 cm. long, the margins undulate-crisped: peduncle 6 to 10-flowered, longer than the petiole and pedicels: corolla dull purple, glabrous above, 12 mm. broad: outer crown saucer-shaped. (*Sarcostemma undulata* Torr.)—Western Texas.

* * *Column none or very short: peduncles equaling or surpassing the plane leaves.*

2. **P. Torreyi** Gray. Freely twining, densely pubescent with soft spreading hairs: leaves cordate-lanceolate and acuminate or sagittate, 2.5 cm. or more long: peduncle 10 to 15-flowered: corolla white (?), 16 to 18 mm. broad; the lobes strongly villose-ciliate: outer and inner crowns contiguous. (*Sarcostemma elegans* Torr., not Decaisne.)—Rocky hills, southwestern Texas.

3. **P. viridiflora** Britton & Rusby. Tall climbing, glabrous or glabrate: leaves from deeply cordate to sagittate or almost hastate, abruptly cuspidate or short-acuminate, 2.5 to 6.5 cm. long: peduncle 15 to 25-flowered: pedicels much longer than flowers: corolla white or whitish, scarcely 12 mm. broad; the lobes somewhat ciliate: crowns separated by a very short column. (*P. cynanchoides* Gray.)—Along rivers, throughout southern Texas and adjacent Mexico.

4. **P. linearis** Gray. Slender, low-twining (or erect when young), puberulent or glabrate: leaves narrowly linear, acute or nearly so at both ends, 2.5 cm. long: peduncle 8 to 10-flowered: corolla yellowish, purplish, or whitish, 8 mm. broad: crowns contiguous.—A species of southern Arizona, reported from western Texas (*Havard*).

2. ASCLEPIODORA Gray.

Nearly as in *Asclepias*, but with the greenish corolla-lobes ascending or spreading, the hoods destitute of a horn (widely spreading and some-

what incurved, slipper-shaped and laterally compressed, the cavity divided at apex by a crest-like partition), mainly alternate or scattered leaves, solitary and terminal or corymbed loosely-flowered umbels, and oblong or ovate pods (often with soft spinous projections).

1. **A. viridis** Gray. Almost glabrous: stems short, 3 dm. high: leaves short-petioled, ovate-oblong to lanceolate, 2.5 to 5 cm. wide: umbels several in a cluster, short-peduncled: flowers large (2.5 cm. broad), with purplish hoods. (*Acerates paniculata* Decaisne.)—Prairies and dry barrens, extending from north and east through Texas to New Mexico.

2. **A. decumbens** Gray. Scabrous-puberulent: leaves from lanceolate to linear, tapering to the apex: umbel solitary: flowers 8 to 10 mm. long, with yellowish or dark-purplish hoods.—Dry plains, throughout Texas.

3. ASCLEPIAS L. (Milkweed. Silkweed.)

Perennial upright herbs, with peduncles terminal or lateral (and between usually opposite petioles) bearing simple many-flowered umbels, 5-parted persistent calyx with small reflexed divisions, deeply 5-parted corolla with reflexed deciduous divisions, crown of 5 hooded bodies seated on the stamen-tube and each containing an incurved horn, 5 stamens inserted on base of corolla with filaments united in a tube which encloses the pistil, anthers adherent to the stigma (each with 2 vertical cells, tipped with a membranaceous appendage, each cell containing a flattened pear-shaped and waxy pollen-mass; the two contiguous pollen-masses of adjacent anthers forming pairs which hang by a slender prolongation of their summits from 5 cloven glands that grow on the angles of the stigma), 2 ovaries tapering into very short styles and with a large depressed 5-angled fleshy stigmatic disk in common, 2 pods (one often abortive), and flat margined seeds bearing a tuft of long silky hairs (*coma*) and downwardly imbricated all over the large placenta.

* *Hood sessile, broader or at least not attenuate at base; horn conspicuous: anther-wings broadest and usually angulate-truncate and salient at base.*

+ *Flowers orange-color: leaves mostly scattered.*

1. **A. tuberosa** L. (Butterfly-weed. Pleurisy-root.) Roughish-hairy, 3 to 6 dm. high: stems very leafy, branching at summit, and bearing usually numerous umbels in a terminal corymb: leaves from linear to oblong-lanceolate, sessile or slightly petioled: hoods narrowly oblong, bright orange, scarcely longer than the nearly erect and slender awl-shaped horns: pods hoary, erect on deflexed pedicels.—Dry and usually sandy soil, throughout Texas.

+ + *Flowers bright red or purple: pods naked, fusiform: leaves opposite.*

2. **A. paupercula** Michx. Glabrous: stem slender, 6 to 12 dm. high: leaves elongated-lanceolate or linear, transversely veined, tapering to both ends, slightly petioled: umbels 5 to 12-flowered: divisions of red corolla narrowly oblong; hoods bright orange, about 6 mm. long, exceeding the anthers and much exceeding the incurved horn: pods erect on deflexed pedicels.—Marshes near the coast.

3. **A. incarnata** L. (Swamp milkweed.) Smooth or nearly so, the stem with two downy lines above and very leafy: leaves oblong-lanceolate, acute or pointed, obtuse or obscurely heart-shaped at base, with ascending veins: flowers rose-purple; hoods 2 mm. long, equaling the anthers and scarcely equaling the slender needle-pointed horn: pods erect on erect pedicels.—A common swamp species of the Atlantic region, represented in Texas by var. longifolia Gray, which has glabrous or

minutely pubescent elongated or linear-lanceolate leaves (10 to 17.5 cm. long by 8 to 12 mm. broad), stems 12 to 18 dm. high, and paler flowers.

+ + + *Flowers greenish, yellowish, white, or merely purplish-tinged: leaves opposite or whorled, or the upper rarely scattered: pods wholly unarmed.*

++ *Pods erect or ascending on the deflexed or decurved fruiting pedicels.*

=*Umbel solitary, on a naked terminal peduncle: leaves sessile, broad, transversely veined, wavy: glabrous and pale or glaucous.*

4. **A. obtusifolia** Michx. Stem 6 to 9 dm. high: leaves oblong with a heart-shaped clasping base, very obtuse or retuse: peduncle 7.5 to 30 cm. long: corolla pale greenish-purple; hoods truncate, somewhat toothed at the summit, shorter than the slender awl-pointed horn.—Dry or sandy soil, extending into Texas from the Atlantic region.

= = *Umbels usually more than one and on peduncles overtopping or equaling the leaves: stem tall and simple: leaves as in no. 4.*

5. **A. elata** Benth. Glabrous up to the peduncles: umbels 2 to 4 or rarely solitary, many-flowered: pedicels pubescent or villous: corolla greenish-white; hoods obovate-truncate, with fleshy gibbous-incurved back, the whole length within occupied by a broad and thin crest, which is 2-lobed at summit, the outer lobe broad and rounded, the inner a short and nearly included horn. (*A. glaucescens* Gray, not H. B. K.).—Extreme southwestern Texas.

= = = *Umbels more than one, on peduncles longer than the orbicular leaves or than the much shortened stem.*

6. **A. nummularia** Torr. Clustered stems 2.5 to 5 cm. high: leaves in two or three approximated pairs, orbicular, mucronate, thickish, canescently tomentose, glabrate with age: peduncles 3.5 to 4 cm. long, many-flowered: corolla greenish-white; hoods ovate, a little longer than the anthers, with short and stout horn: pods tomentulose.—Extreme southwestern Texas.

= = = = *Umbels mostly more than one: peduncle (sometimes none) not overtopping the leaves.*

a. Leaves large, orbicular to oblong-lanceolate: hoods broad, little if at all exceeding the anthers.

7. **A. Jamesii** Torr. Glabrous or some minute pubescence on young parts: stem stout, 3 dm. or more high: leaves about 5 pairs, approximate, remarkably thick, rounded or broadly oval, often emarginate, subcordate at base, nearly sessile: umbels 2 or 3, densely many-flowered, on short peduncles: corolla-lobes ovate, greenish; hoods truncate, entire: pod barely acute.—Plains of western Texas.

8. **A. arenaria** Torr. Lanuginous-tomentose, glabrate in age: stems about 3 dm. high, stout, thickly leaved: leaves coriaceous when old, obovate or oval and retuse or the lower ovate, with rounded subcordate base, somewhat undulate, distinctly petioled: umbels densely many-flowered, on short peduncles: corolla-lobes oval, greenish; hoods truncate at base and summit, the latter notched on each side near the inner angle: pod long-acuminate, tomentulose.—Limpia cañon (*Nealley*).

b. Leaves narrow, lanceolate to linear, green and nearly glabrous: hoods obtuse, shorter than the anthers.

9. **A. brachystephana** Engelm. Stems 15 to 25 cm. high, very leafy, cinereous-puberulent or tomentose when young, the inflorescence more floccose: leaves 2.5 to 7.5 cm. long, much surpassing the 3 to 8 few-flowered umbels: flowers lurid-purplish; hoods only half as long as the anthers, strongly angulate-toothed at the front, the tip of the erect subulate horn exserted.—Dry sandy soil, western Texas.

c. Leaves very narrow and slender, sessile: hoods equaling or surpassing the anthers.

10. **A. macrotis** Torr. Glabrous or nearly so: filiform branches often 3 dm. or more long, numerous in diffuse tufts from a woody stem: leaves narrowly linear with revolute margins, almost filiform, 2.5 cm. or more long: umbels 3 to 5-flowered, ter-

minal and lateral, short-peduncled or sessile: flowers purplish or greenish; hoods with ovate erect base as long as the anthers, above contracted into a gradually attenuate twice longer subulate spreading portion with incurving apex; the broad horn short and blunt, with barely exserted apex: pods ovate-lanceolate, 2.5 cm. long.—Rocky hills along the Rio Grande, extreme western Texas.

11. **A. quinquedentata** Gray. Glabrous: leaves narrowly linear and elongated: umbels 4 to 10-flowered: corolla-lobes greenish-white; hoods white, about as long as the anthers, somewhat quadrate, the keeled back ending below in a truncate salient base, the truncate summit prominently and acutely 5-toothed; the horn falcate, adnate up to the summit, and with an inflexed moderately exserted subulate apex: pods slender-fusiform, 10 cm. long.—Prairies and rocky hills, western Texas.

d. Leaves from ovate to oblong, mostly pubescent or puberulent: hoods obtuse, entire, twice or thrice the length of the anthers.

12. **A. nyctaginifolia** Gray. Roughish-puberulent: leaves rhombic-ovate, 5 to 7.5 cm. long, rather long-petioled: umbels all lateral, very short-peduncled, 4 to 20-flowered: corolla-lobes greenish; hoods laterally much compressed, mainly solid, with a narrow dorsal keel and a broader ventral wing, the latter bearing 2 lamellæ, its broad upper part inclosing a crest which bears a short subulate exserted horn: pods short, ovate, cinereous-puberulent.—Extending from western Texas to southeastern California.

++ ++ Pods and fruiting pedicels erect: leaves often whorled: glabrous or nearly so.

13. **A. perennis** Walt. Stems 3 to 6 dm. high, persistent or somewhat woody at base: leaves lanceolate or lanceolate-ovate, tapering to both ends, thin, rather slender-petioled, 5 to 10 cm. long: flowers white, small; the small hoods shorter than the needle-shaped horn.—Extending from the Atlantic region to western Texas, where var. PARVULA Gray also occurs, which is barely 3 dm. high and with leaves 2.5 to 5 cm. long.

14. **A. verticillata** L. Stems slender, very leafy to the summit: leaves filiform-linear, with revolute margins, 5 to 7.5 cm. long, 3 to 6 in a whorl: umbels small: corolla-lobes greenish-white; hoods about half the length of the incurved claw-shaped horns.—A dry soil species of the Atlantic region, extending through Texas to New Mexico and Mexico. In southern and western Texas there also occurs var. SUBVERTICILLATA Gray, with leaves all opposite or barely in 3s, 7.5 to 12.5 cm. long, flatter, the margins less or little revolute.

** * Hoods long-stipitate, their stalks adnate to anther-column, exceeding the anthers; the crest-like process adnate to the nearly open-toothed blade: anther-wings broader and somewhat angulate about the middle.*

15. **A. longicornu** Benth. More or less pubescent: leaves all opposite, from ovate to oblong-lanceolate, obtuse, 5 to 10 cm. long, petioled: flowers yellowish-green: pods erect on the deflexed pedicel. (*A. Lindheimeri* Eng. & Gray.)—Throughout southern and western Texas.

** * * Hoods sessile, with a minute horn exserted from the 2-lobed apex: anther-wings broadly rounded at base and conspicuously auriculate-notched just above it.*

16. **A. stenophylla** Gray. Puberulent, but foliage glabrous: stems slender, 3 to 6 dm. high: leaves narrowly linear (7.5 to 17.5 cm. long, 2 to 5 mm. wide), upper alternate, lower opposite: umbels 10 to 15-flowered: corolla-lobes greenish; hoods whitish, equaling the anthers: pods erect on ascending pedicels.—Dry prairies, northern Texas.

4. ACERATES Ell. (GREEN MILKWEED.)

Nearly as in *Asclepias*, but hoods destitute of crest or horn.—Leaves opposite or irregularly alternate, short-petioled or sessile; greenish flowers in compact many-flowered umbels; pods smooth and slender.

** Crown upon a short column and shorter than the globular mass of anthers and stigma: leaves mainly alternate-scattered, very numerous.*

1. **A. auriculata** Engelm. Glabrous up to the inflorescence: stem 6 to 9 dm. high: leaves linear-filiform, 10 to 15 cm. long, with scabrous margins: pedicels short: hoods oval or quadrate, emarginately or sometimes 3-crenately truncate, the involute margins at base appendaged with a pair of remarkably large and broad auricles.—Prairies and rocky ground, from southern Texas to New Mexico and Colorado, likely to be confounded with *Asclepias stenophylla*.

2. **A. longifolia** Ell. Minutely roughish-hairy or smoothish: stem erect, 3 to 9 dm. high: leaves from linear to elongated-lanceolate, 7.5 to 20 cm. long: pedicels slender: hoods purple or purplish, oval, obtuse, entire, unappendaged.—Moist prairies and pine-barrens, extending from the Atlantic region into Texas.

*** Crown sessile, the oblong hoods nearly equaling the mass of anthers and stigma (which is longer than broad): leaves often opposite and broader.*

3. **A. viridiflora** Ell. Minutely soft-downy, becoming smoothish: stems ascending, 3 to 6 dm. high: leaves oval to linear, thick, 3.5 to 10 cm. long: umbels nearly sessile, lateral, dense, and globose: flowers short-pediceled.—Dry sterile soil, extending from the Atlantic region to southern Texas. Runs into var. LANCEOLATA Gray, with lanceolate leaves 6.5 to 10 cm. long; and var. LINEARIS Gray, with elongated linear leaves, low stems, and often solitary umbels.

5. ENSLENIA Nutt.

A smooth perennial twining herb, with opposite cordate-ovate and pointed long-petioled leaves, small whitish flowers in raceme-like clusters on slender axillary peduncles, 5-parted calyx, 5-parted corolla with erect ovate-lanceolate divisions, crown of 5 free membranaceous leaflets which are truncate or obscurely lobed at apex where they bear a pair of flexuous awns united at base, anthers nearly as in *Asclepias*, oblong pollinia obtuse at both ends and fixed below the summit of the stigma to the descending glands, and oblong-lanceolate smooth pods.

1. **E. albida** Nutt. Climbing high: leaves 7.5 to 12.5 cm. wide.—River banks, extending from the Atlantic region into Texas.

6. ROULINIA Decaisne.

Twining plants, with the aspect and growth of *Enslenia*, but with rotate-spreading corolla, 5-parted crown with divisions simply and abruptly acuminate or ligulate-tipped, and tuberculiform and short anther-wings.

1. **R. unifaria** Engelm. Leaves deeply cordate, abruptly slender-acuminate: cymes 10 to 20-flowered, somewhat paniculate or racemiform: flowers greenish-white: pods oblong, thick, 7.5 to 10 cm. long.—Along the streams of southern and western Texas.

7. METASTELMA R. Br.

Twining perennial glabrous herbs, with small opposite leaves, small white or greenish flowers in axillary umbelliform clusters, short calyx with obtuse lobes, campanulate 5-cleft or parted corolla with lobes commonly puberulent or bearded within, crown of 5 flat or slender distinct scales or subulate processes (not tipped with any appendage or prolonged middle lobe) born on corolla or column, and smooth pods.—In ours the crown is borne on the base of the corolla or of the short column.

1. **M. barbigerum** Scheele. Leaves from ovate-oblong to narrowly lanceolate, cuspidate-acuminate, rounded at base: peduncles shorter than petioles, often very short: corolla about 4 mm. long, its linear lobes strongly white-villous within: slender-subulate scales of the crown on base of corolla.—Open woods and rocky banks, southern and western Texas.

2. **M. Palmeri** Watson. Leaves lanceolate, acutish or obtuse at base: cymes subsessile or short-peduncled: corolla not over 3 mm. long, its oblong lobes merely puberulent within: lanceolate-acuminate or ovate-subulate scales of the crown inserted at base of extremely short column.—Southern and western borders of Texas.

8. VINCETOXICUM Mœnch.

Mostly twining herbs, with opposite leaves, small usually dull flowers in axillary umbellate clusters, 5-parted calyx, rotate 5-parted corolla, crown (in ours) of 5 thin or thinnish scales or processes either distinct or barely united at base, and anthers, smooth pods and seeds much as in *Asclepias*.

1. **V. palustre** Gray. Stems filiform, freely twining upon rushes and saline grasses: leaves linear, acute, fleshy, 2.5 to 5 cm. long, 2 to 4 mm. broad: peduncles longer than leaves: corolla greenish; scales of crown oblong-obovate, retuse or emarginate. (*Seutera maritima* Decaisne).—Salt marshes along the coast.

9. GONOLOBUS Michx.

Mostly twining herbs or shrubs, with opposite cordate leaves, usually corymbose-umbelled greenish or dark purple flowers on peduncles rising from between the petioles, 5-parted calyx, 5-parted rotate (sometimes reflexed-spreading) corolla, small and fleshy annular or cup-shaped crown in the throat of the corolla, horizontal anthers partly hidden under the flattened stigma and opening transversely, 5 pairs of horizontal pollinia, and swollen pods mostly muricate with soft warty projections.

* *Corolla reticulated and sometimes rugulose with a fine network of colored veins; the lobes commonly broad and roundish: crown single.*

1. **G. reticulatus** Engelm. Hirsute with spreading and reddish bristly hairs: leaves deeply cordate with incurved auricles, acute or acuminate: peduncles equaling or exceeding the slender petiole and sometimes larger than the leaf, 5 to 9-flowered: corolla lurid green, with purplish venation, glabrous within, hairy without; lobes broadly ovate or obovate: crown a narrow entire ring around the base of the distinct column: pods strongly muricate. (*G. granulatus* Torr. Mex. Bound., not Scheele.)—Thickets and rocky banks of southern and western Texas.

* * *Corolla not venulose-reticulated (at least not conspicuously); the lobes from ovate-acuminate to linear: crown simple, unappendaged within: pods smooth.*

2. **G. lævis** Michx. More or less pubescent or hairy: leaves oblong-cordate with a deep and narrow open sinus, conspicuously acuminate, 7.5 to 15 cm. long: umbels 5 to 10-flowered, barely equaling the petiole: corolla elongated-conical in bud, not twisted; lobes narrowly or linear-lanceolate, obtuse, glabrous inside, 3 or 4 times as long as the calyx: crown a low and undulately 10-lobed fleshy disk at base of short column.—Extending from the Gulf States into eastern Texas, and passing into var. MACROPHYLLUS Gray (*G. macrophyllus* Mx.), with larger broadly cordate leaves, the sinus often closed, finely pubescent beneath.

3. **G. sagittifolius** Gray. Barely puberulent, small and low: leaves rather fleshy, 6 to 12 mm. long, with petiole of half the length, sagittate, with auricles obtuse or roundish: flowers solitary and subsessile in the axils: crown at base of corolla, entire and saucer-shaped.—Mountain sides along the Limpia River.

** * * Corolla not conspicuously reticulated: crown appendaged or crested within, or else double (the internal appendages free): stems low, little or not at all twining.*

+ Peduncles none (or merely a terminal one by reduction of uppermost leaves to bracts).

4. **G. biflorus** Nutt. Hirsute-villous: procumbent or diffuse, not twining: leaves cordate, about 2.5 cm. long, on slender petioles much longer than the basal lobes; the upper triangular-cordate; uppermost sometimes reduced and bract-like: pedicels in pairs, sometimes solitary, nearly equaling the petiole: corolla dark dull-purple; lobes sparsely pubescent both sides: crown saucer-shaped, 5-lobed; the lobes with a salient crest within which at summit extends into a conspicuous callous acumination incurving over the edge of the stigma: pods muricate.—Extending from Arkansas into western Texas. In eastern Texas is var. WRIGHTII Gray, with more deeply parted corolla, shorter acumination of crown, and large stout pods hirsute as well as muricate.

5. **G. cynanchoides** Engelm. Pubescent and somewhat hirsute: procumbent or diffuse, not twining: leaves cordate, 2.5 to 5 cm. long, on short petioles mostly longer than the basal lobes; upper often ovate-lanceolate; uppermost not rarely reduced to bracts, the inflorescence thus becoming clustered at naked summit: pedicels also in pairs from a few axils below, rather longer than petiole: corolla dark greenish-purple; lobes pubescent outside, glabrous within: crown saucer-shaped, 5-lobed; lobes appendaged inside by a prominent crest or ligule which is free and obtuse at apex: pods sparsely muricate, pubescent.—Dry prairies, extending from Arkansas to western Texas.

6. **G. parvifolius** Torr. Puberulent, much branched, sparingly climbing: leaves thickish, deltoid or hastate, very small, 4 to 10 mm. long and rather long-petioled: flowers solitary (rarely 2) and nearly sessile in the axils: corolla small, dull yellow, glabrous throughout: crown fleshy, deeply 5-lobed; lobes appendaged by a broad and wholly adnate crest which at tip within is extended into a minute projecting tooth.—Southern and western Texas.

+ + Peduncles axillary and terminal, umbellately or racemosely flowered.

7. **G. productus** Torr. Minutely pubescent: stem twining or trailing, 6 to 12 dm. long: leaves sagittate-cordate, gradually tapering-acuminate above, with slender petiole: peduncles axillary, about as long as petioles and umbellately 3 to 5-flowered: corolla 8 mm. long, oblong-campanulate, dull greenish-purple: crown cup-shaped, crenately lobed: pods smooth.—Western Texas.

8. **G. parviflorus** Gray. Hirsute-pubescent: stems not twining, low, much branched from a tuberous base: leaves ovate (or lower almost orbicular), not cordate, often undulate, short-petioled: peduncles axillary and terminal, filiform, surpassing the leaves, somewhat racemosely flowered: corolla 2 mm. long, rotate, purplish: crown laciniate and double: pods pubescent, tuberculate-muricate. (*Lachnostoma? parviflorum* Torr. Mex. Bound.)—Southern and western Texas.

LOGANIACEÆ. (LOGANIA FAMILY.)

Herbs, shrubs or trees, with opposite (mostly) entire leaves and stipules or a stipular line or membrane between them, regular 4 or 5-merous 4 or 5-androus perfect flowers, and ovary free from calyx.

* Stigmas 4, apex of style being twice 2-cleft: woody twiners with evergreen leaves.

1. **Gelsemium.** Corolla large, the 5 lobes imbricated in bud: style slender.

* * Stigma single, entire or barely 2-lobed.

+ Corolla valvate in bud, 5-lobed: pod didymous or 2-lobed: herbs.

2. **Spigelia.** Style single, jointed in the middle: corolla tubular funnelform or salverform.

3. **Mitreola.** Styles 2, short, converging, united at summit and with a common stigma: corolla urn-shaped.

+- +- Corolla imbricated in bud, 4 sometimes 5-lobed.

++ Calyx deeply 4 or 5-parted: pod loculicidal: annual herb.

4. **Polypremum.** Corolla campanulate, shorter than the subulate foliaceous sepals.

++ ++ Calyx 4-toothed or cleft: pod septicidal: shrubs with leaves often dentate.

5. **Buddleia.** Corolla mostly rotate-campanulate: anthers sessile or nearly so in the throat.

6. **Emorya.** Corolla salverform: stamens exserted; filaments elongated, inserted on middle of tube.

1. GELSEMIUM Juss. (YELLOW JESSAMINE.)

Smooth and twining shrubby plants, with ovate or lanceolate leaves, minute deciduous stipules, showy yellow flowers, 5-parted calyx, open funnelform 5-lobed corolla, 5 stamens with oblong sagittate anthers, long slender style, each of the 2 stigmas 2-parted into linear divisions, elliptical 2-celled 2-valved pod flattened contrary to the narrow partition, and many or several winged seeds.

1. **G. sempervirens** Ait. Stem climbing high: leaves short petioled, shining, nearly persistent: flowers in short axillary clusters: pedicels scaly-bracted: flowers very fragrant, 2.5 to 3.5 cm. long.—Extending from woods and low grounds of the Gulf States through Texas to Mexico.

2. SPIGELIA L. (PINK-ROOT. WORM-GRASS.)

Chiefly herbs, with opposite leaves united by stipules, flowers spiked in one-sided cymes or solitary, 5-parted calyx with slender lobes, tubular funnelform corolla 5-lobed at summit, 5 stamens with linear anthers, solitary slender style hairy above and jointed near the middle, and a short 2-celled twin pod separating at maturity from a persistent base into two carpels.

* *Flowers showy, in one-sided spikes: corolla red or pink, elongated-tubular: anthers and style exserted.*

1. **S. Marilandica** L. (INDIAN PINK, etc.) Stems simple and erect, 15 to 45 cm. high: leaves sessile, ovate-lanceolate, acute: spike simple or forked, short: corolla 3.5 cm. long, red outside, yellow within; tube 4 times as long as the calyx.—Rich woods, extending from the Atlantic region into Texas.

* * *Flowers small, terminal and in the forks of leafy branches: corolla salverform, white or nearly so: anthers and style included.*

2. **S. Lindheimeri** Gray. Diffusely much branched from base, puberulent-scabrous: leaves from ovate-oblong to lanceolate, 2.5 cm. long or less, acutish at base: sepals linear, the scarious margins conspicuously dentate: corolla 8 mm. long.—Prairies of western Texas.

3. **S. Texana** A. DC. Nearly smooth and glabrous: leaves ovate to lanceolate-oblong, thinner and larger (2.5 to 5 cm. long), mostly acute at both ends: sepals setaceous-subulate, only 1-nerved, the margins very obscurely serrulate-scabrous: corolla 12 mm. long. (*Cœlostylis Texana* Torr. & Gray.—Eastern and southern Texas.

3. MITREOLA L. (MITREWORT.)

Annual smooth herbs, with small stipules between the leaves, small white flowers spiked along one side of the branches of a terminal petioled cyme, 5-parted calyx, somewhat funnelform 5-lobed corolla little larger than the calyx, 5 included stamens, 2 short styles converging and united above by a common stigma, and an exserted strongly 2-horned or mitre-shaped pod opening down the inner side of each horn.

1. **M. petiolata** Torr. & Gray. Leaves thin, oblong-lanceolate, petioled.—Damp soil, extending from the Gulf States through Texas to Mexico.

4. POLYPREMUM L.

A smooth diffuse much-branched small annual, with narrowly linear or awl-shaped leaves connected at base by a slight stipular line, inconspicuous white flowers solitary and sessile in the forks and at the ends of branches, 4-parted calyx with awl-shaped divisions from a broad scarious-margined base, almost wheel-shaped corolla not longer than calyx and bearded in the throat, 4 very short stamens with globular anthers, single very short style with entire stigma, and ovoid 2-celled loculicidal many-seeded pod notched at apex.

1. **P. procumbens** L.—Sandy soil, extending from the Atlantic region, through Texas to Mexico.

5. BUDDLEIA Houston.

Mostly shrubs, with canescent or tomentose stellate down, leaves sometimes dentate and with petioles connected by a transverse stipular line or more evident stipules, commonly small flowers crowded into capitate clusters which are variously disposed, 4-toothed campanulate calyx, rotate-campanulate corolla with ovate or orbicular lobes, 4 anthers sessile or nearly so in throat or tube of corolla, and globose or oblong septicidal pod.

* *Flowers in comparatively loose and very numerous clusters in an ample and naked terminal panicle.*

1. **B. Humboldtiana** Rœm. & Schult. Minutely ferrugineous-tomentose: leaves oblong or ovate-lanceolate, acuminate, denticulate, 7.5 cm. long, rounded at base, rather long-petioled, copiously pinnately-veined: flowers 3 mm. long.—Borders of southwestern Texas.

* * *Flowers in numerous and small dense pedunculate heads, in a virgate raceme.*

2. **B. racemosa** Torr. Stems loosely branching, nearly glabrous: leaves from ovate-oblong to oblong-lanceolate with a truncate or obscurely hastate base, irregularly crenate-dentate, mostly obtuse, 5 to 10 cm. long, short-petioled, green and glabrous above, puberulent-canescent beneath: raceme of heads from 1 to 3 dm. long: heads about 6 mm. broad: corolla little exceeding the tomentulose calyx.—Rocky banks, western Texas. Along the San Pedro occurs var. INCANA Torr., with leaves barely 2.5 cm. long and fulvous-canescent-tomentose beneath.

* * * *Flowers in solitary or geminate heads or capitate clusters: leaves, branches, and heads densely soft-tomentose throughout.*

3. **B. marrubiifolia** Benth. Canescent or ferrugineous: leaves obovate or oval with cuneate base, arcuate, about 12 mm. long, short-petioled, the dense tomentum

somewhat velvety: flowers in a globose terminal head (12 mm. broad), on a short peduncle: "corolla golden-yellow turning orange red."—Southern Texas, along the Rio Grande, and adjacent Mexico.

4. **B. scordioides** HBK. Ferrugineous-tomentose: leaves narrowly oblong or cuneate-linear, nearly sessile, obtuse, coarsely crenate, rugose, 2.5 cm. long or less: dense clusters of flowers sessile in the axils of all upper leaves, the pair combined around the stem into a globular head.—From southeastern Texas to Arizona and adjacent Mexico. Nealley's specimens from western Texas show the dense axillary flower clusters in contact with each other, giving the appearance of a long thick spike from which the upper leaves project as bracts.

6. EMORYA Torr.

A much branched somewhat pulverulent or puberulent shrub, with flowers in a narrow and pedunculate panicle, oblong 4-cleft calyx with linear-subulate lobes, salverform corolla, exserted stamens with filiform and elongated filaments inserted on the middle of the tube, very long and filiform style, and a septicidal globose or oblong pod.

1. **E. suaveolens** Torr. Leaves canescent beneath, somewhat deltoid or hastate, sinuate-dentate with a few coarse teeth, obtuse, petioled, 12 mm. or more long: flowers sweet-scented: corolla over 2.5 cm. long, "greenish-white or yellowish."—Cañons of the Rio Grande below Presidio.

GENTIANEÆ. (Gentian Family.)

Smooth herbs, with opposite and sessile entire and simple leaves (in ours) without stipules, regular flowers with stamens as many as the corolla-lobes, a 1-celled ovary with 2 parietal placentæ or nearly the whole inner face ovuliferous, and fruit usually a 2-valved septicidal many-seeded pod.

* Leaves sessile, never alternate.

\+ Lobes of corolla convolute in bud.

\+\+ Style filiform, usually deciduous: anthers mostly twisting or curving in age.

1. **Erythræa.** Parts of flower 5 or 4: corolla salverform: anthers twisting spirally.

2. **Sabbatia.** Parts of flower 5 to 12: corolla rotate: anthers recurved or revolute.

3. **Eustoma.** Parts of flower 5 or 6: corolla campanulate-funnelform: anthers versatile, straight or recurving: calyx-lobes long-acuminate.

\+\+ \+\+ Style stout and persistent: anthers remaining straight.

4. **Frasera.** Corolla 4-parted, rotate; a fringed glandular spot on each lobe.

\+ \+ Lobes of corolla imbricate in bud; no appendages.

5. **Obolaria.** Calyx of 2 foliaceous sepals: corolla 4-lobed, oblong-campanulate.

* * Leaves all alternate and mostly petioled: marsh or aquatic perennials.

6. **Limnanthemum.** Leaves simple, rounded: corolla bearded at base or margins only.

1. ERYTHRÆA Richard. (Centaury.)

Low and small branching annuals, chiefly with rose-purple or reddish flowers, 4 or 5-parted calyx with slender divisions, funnelform or salverform corolla with slender tube and 4 or 5-parted limb, exserted erect

anthers twisting spirally, single slender style with capitate 2-lipped stigma, and oblong-ovate to fusiform pod.

* *Flowers small: corolla-lobes 3 to 5 mm. long, much shorter than the tube: anthers oblong.*

1. **E. Texensis** Griseb. Slender, diffusely much branched above into a loose paniculate cyme: leaves linear or the lowest lanceolate and the uppermost reduced to subulate bracts: flowers all slender-pediceled: corolla (light rose color) with very slender tube 8 to 10 mm. long, and lanceolate-oblong lobes (4 mm. long) which become lanceolate-linear, longer, and acute.—Common on rocks and hills.

* * *Flowers larger: corolla-lobes 7 to 12 mm. long, but more or less shorter than the tube: anthers linear.*

2. **E. Beyrichii** Torr. & Gray. Slender, at length fastigiately much branched: leaves linear, the uppermost nearly filiform: flowers very numerous, fastigiate-cymose: corolla-lobes linear-oblong and becoming linear, 10 mm. long, in age by involution becoming acuminate.—From Arkansas to southern and western Texas.

3. **E. calycosa** Buckley. Paniculately or somewhat cymosely branched: leaves from narrowly oblong to lanceolate or linear: inflorescence loose; pedicels mostly as long as the calyx or the whole flower: corolla-lobes oval or oblong, obtuse, 7 to 10 mm. long; the tube usually equaled by the calyx.—Western Texas and adjacent Mexico. On the stony hills of western Texas is var. NANA Gray, which is lower, with leaves all linear and inflorescence corymbose.

2. SABBATIA Adans.

Biennials or annuals, with slender stems, cymose-panicled handsome (white or rose-purple) flowers, 5 to 12-parted calyx with slender divisions, 5 to 12-parted rotate corolla, 5 to 12 stamens with anthers soon recurved, 2-cleft or parted slender style, and globose or ovoid coriaceous pod.

* *Corolla 5-parted, rarely 6 or 7-parted.*

1. **S. calycosa** Pursh. Diffusely forking, pale, 3 dm. high or less: leaves oblong or lance-oblong, narrowed at base: calyx-lobes foliaceous, spatulate-lanceolate, exceeding the rose-colored or almost white corolla.—Seacoast and near it.

2. **S. campestris** Nutt. Divergently branched above: leaves ovate with subcordate clasping base, on the branches lanceolate: calyx equaling the lilac corolla, the lobes slender and tube short (nearly or quite inclosing the retuse pod).—Prairies of Arkansas and Texas.

* * *Corolla 8 to 12-parted, large and showy.*

3. **S. gentianoides** Ell. Stem strict: radical leaves in a rosulate tuft, obovate or oblong; cauline very narrowly linear; uppermost involucrating the terminal cluster of 3 to 5 (sometimes 1 or 2) nearly sessile flowers: calyx-lobes lanceolate-subulate, very much shorter than the spatulate corolla lobes.—Extending into Texas from the pine-barrens of the Gulf States.

3. EUSTOMA Salisb.

Glaucous large-flowered annuals, with more or less clasping and connate leaves, slender terminal and more or less paniculate 1-flowered peduncles, 5- (rarely 6-) parted calyx with long-acuminate lobes, campanulate-funnelform deeply 5 or 6-lobed corolla, oblong versatile anthers straight or recurving in age, filiform nearly persistent style with stigma of 2 broad lamellæ, and oval or oblong pod.

1. **E. Russellianum** Griseb. About 3 to 6 dm. high: leaves from ovate- to lanceolate-oblong: lobes of lavender-purple corolla obovate (3.5 cm. long), 4 times longer than the tube: anthers hardly curving in age: style elongated: pod oblong, usually pointed.—Extending from the northern plains to southern and western Texas. In southern Texas is var. GRACILE Gray, which is smaller, with leaves lanceolate and capsule not pointed.

2. **E. silenifolium** Salisb. Lower: leaves oblong: corolla-lobes nearly oblong (barely 2.5 cm. long), twice the length of the tube: style little longer than stigmas: pod elliptical-oblong, very obtuse. (*E. exaltatum* Griseb.)—Southern Texas and adjacent Mexico.

4. FRASERA Walt. (AMERICAN COLUMBO.)

Tall and showy herbs, with mostly simple stems bearing whorled leaves and numerous peduncled flowers in open cymes disposed in an ample elongated panicle, deeply 4-parted calyx, deeply 4-parted rotate corolla with each division bearing a glandular and fringed pit on the face, awl-shaped filaments usually somewhat monadelphous at base, persistent style with 2-lobed stigma, and oval flattened 4 to 14-seeded pod with large flat wing-margined seeds.

1. **F. speciosa** Dougl. Stem stout, 6 to 15 dm. high, very leafy: leaves in 4s and 6s; radical and lowest cauline obovate or oblong, 15 to 25 cm. long; upper lanceolate and at length linear: flowers very numerous in a long leafy thyrsus: lobes of greenish white or barely bluish dark-dotted corolla bearing the pair of contiguous and densely long-fringed glands about the middle, and a distant transversely inserted and setaceously multifid scale-like crown near the base.—A species of the western mountains, and reported from Guadalupe Mountains of western Texas.

5. OBOLARIA L.

Low and very smooth purplish-green perennial, with opposite wedge-obovate leaves, dull white or purplish flowers solitary or in clusters of three (terminal and axillary, nearly sessile), calyx of 2 spatulate spreading foliaceous sepals, tubular bell-shaped withering-persistent 4-cleft corolla, short stamens inserted at sinuses of corolla, short persistent style with 2-lipped stigma, and ovoid pod with seeds covering the whole wall.

1. **O. Virginica** L. Herbaceous and rather fleshy: lower leaves scale-like: flowers 8 mm. long.—Moist woods, extending into Texas from the Atlantic region.

6. LIMNANTHEMUM Gmelin. (FLOATING HEART.)

Perennial aquatics, with rounded floating leaves on very long petioles which bear near the summit the umbel of flowers (often along with a cluster of rootlets), 5-parted calyx, almost rotate 5-parted corolla with divisions fringed or bearded at base or margins only and bearing a glandular appendage near the base, no style, 2-lobed persistent stigma, and a few to many-seeded pod at length bursting irregularly.

1. **L. trachyspermum** Gray. Leaves cordate-orbicular, 5 to 15 cm. broad, with margins sometimes repand, of thick texture, the discolored lower surface reticulate-veined, spongy and pitted: umbel usually destitute of rootlets: expanded corolla 18 mm. broad: seeds roughened.—Ponds and streams, extending into Texas from the Atlantic region.

POLEMONIACEÆ. (POLEMONIUM FAMILY.)

Herbs with alternate or opposite leaves, regular 5-merous and 5-androus flowers, corolla-lobes convolute in bud, 3-celled ovary and 3-lobed style, and a 3-celled 3-valved loculicidal few to many-seeded pod, the valves usually breaking away from the triangular center column.

1. **Phlox.** Corolla salverform: calyx narrow: leaves mostly opposite, entire.
2. **Gilia.** Corolla tubular-funnelform or salverform to campanulate or rotate: calyx narrow, partly scarious: leaves mostly alternate, entire or variously divided.

1. PHLOX L.

Annuals or perennials, with opposite (alternate in no. 4) and sessile perfectly entire leaves (the floral often alternate), cymose flowers in open terminal or crowded axillary clusters, narrow somewhat prismatic or plaited and angled calyx, salverform corolla with long tube, included stamens very unequally inserted in the corolla-tube, and ovoid pod with sometimes 2 ovules but ripening only a single seed in each cell.

1. **P. pilosa** L. Herbaceous perennial: stems slender, nearly erect, 3 to 5 dm. high, usually hairy, as are the lanceolate or linear leaves (2.5 to 10 cm. long), which commonly taper to a sharp point: cymes at length open: calyx-teeth slender awl-shaped and awn-like, longer than the tube, loose or spreading: lobes of the pink-purple or rose-red (rarely white) corolla obovate, entire.—Extending into Texas from the Atlantic region. In the Gulf region and extending into Texas is var. DETONSA Gray, which is a smoother or almost glabrous plant, with corymb and calyx more or less pubescent.

2. **P. nana** Nutt. Glandular and roughish-pubescent, low and loosely and copiously branching from a somewhat woody base: leaves linear (2.5 to 5 cm. long): flowers scattered or somewhat corymbose: calyx-tube cylindraceous, the thin-membranous portion between the ribs not projecting into salient angles: corolla rose, "red," or "white," with tube exceeding the calyx; the ample and broadly cuneate-obovate or roundish lobes entire or nearly so.—Western borders of Texas.

3. **P. Drummondii** Hook. Annual, loosely branching, villous and glandular: leaves mostly oblong or lanceolate, mucronate-pointed; the upper commonly half-clasping by a broader somewhat cordate base: flowers mostly in crowded cymose clusters: calyx-lobes lanceolate-subulate, soon recurved: corolla red, varying to rose, purple, or white; lobes broadly obovate, entire or nearly so, about 12 mm. long: tube usually pubescent: ovules solitary in the cells.—Throughout Texas, especially in the eastern part, and everywhere cultivated. Along the Nueces occurs var. VILLOSISSIMA Gray, a very villous and viscous form, with more scattered flowers of large size; while common in eastern Texas is var. TENUIS Gray, a small and slender much less pubescent form, with mostly linear and almost glabrous leaves, and lobes of the pink or purple corolla only 4 to 8 mm. long.

4. **P. Rœmeriana** Scheele. Annual, loosely branched from the base, sparsely hirsute or glabrate: leaves lanceolate, or the oblong or spatulate lower ones often glabrous except the margins: flowers solitary or sparse: calyx-lobes linear: corolla pink or rose-colored: the glabrous tube not exceeding the calyx, shorter than the ample roundish obovate entire lobes: ovules in each cell 4 or 5.—High prairies, southern and western Texas. Commonly with most of the leaves alternate.

2. GILIA Ruiz & Pav.

Herbs or a few suffruticose, with narrow and acute calyx-lobes and tube scarious below the sinuses, corolla from salverform or funnel-

form to campanulate or almost rotate. equally or unequally inserted stamens, and pod with solitary to numerous wingless seeds.

* *Leaves opposite and palmately divided to the sessile base.*

1. **G. Bigelovii** Gray. Erect and slender glabrous annual: leaves filiform or nearly so, 3 to 5-divided, or the lower simple: flowers inconspicuous; the lobes of the salverform corolla not over 4 mm. long, hardly surpassing those of the calyx and only ½ or ⅓ as long as its tube: calyx-tube cylindrical, white-scarious except the ribs: ovules 20 to 40 in each cell: pod cylindraceous or oblong. (*G. dichotoma*, var. *parviflora* Torr., Mex. Bound.)—Western borders of Texas.

* * *Leaves alternate and pinnately incised, cleft, or divided, or rarely entire.*

\+ *Flowers capitate-congested or cymose-glomerate, more or less leafy-bracted: bracts and calyx-lobes cuspidate (but not pungent) and pubescent or ciliate: corolla (white or barely purplish) salverform, with tube little longer than calyx: stamens shorter than corolla-lobes, inserted in or near the sinuses.*

\+\+ *Leaves all entire, acerose-subulate or filiform.*

2. **G. Wrightii** Gray. Stems rigid, virgate, from an indurated or woody base: very leafy to the top: leaves rigid, cuspidate-tipped: flowers capitate-crowded: bracts ovate-lanceolate, larger ones sparingly laciniate, tipped with an awn-like cusp, as are the subulate calyx-lobes: ovules 3 or 4 in each cell.—Extreme southwestern Texas, near the Rio Grande.

\+\+ \+\+ *Leaves pinnatifid, trifid, or some entire: flowers cymose-glomerate: low annuals.*

3. **G. pumila** Nutt. Stems loosely woolly (at least when young), leafy: leaves narrowly linear, entire or most of them 2 to 4-parted into divergent linear lobes, mucronate: corolla-tube slender, about thrice the length of its lobes and twice the length of the calyx-lobes: filaments slender, exserted: ovules about 6 in each cell.—Western Texas.

4. **G. polycladon** Torr. Stems puberulent or sparsely pubescent, diffuse, very few-leaved: leaves pinnatifid or incised, with short oblong abruptly spinulose-mucronate lobes: corolla-tube hardly exceeding the calyx-lobes: filaments very short: ovules 2 in each cell.—Western Texas.

\+ \+ *Flowers thyrsoid-paniculate and either glomerate or open, with narrow if any bracts: these and calyx-teeth not pungent-tipped: corolla salverform or trumpet-shaped, mostly elongated: stamens inserted unequally in or below the throat: leaves pinnately parted into filiform or narrowly linear divisions.*

\+\+ *Corolla scarlet or red, with white varieties.*

5. **G. coronopifolia** Pers. (STANDING CYPRESS). Glabrous or barely pubescent: stem 6 to 18 dm. high, very leafy throughout: divisions of the leaves and rhachis nearly filiform: flowers very numerous in a long and narrow compact thyrsus or panicle, scentless: corolla 2.5 to 3.5 cm. long, scarlet (within yellowish and dotted with red); the lobes moderately spreading.—Dry sandy soil, extending from the Gulf States to western Texas.

6. **G. aggregata** Spreng. Somewhat pubescent: stem 6 to 12 dm. high, less leafy: leaves with narrowly linear divisions: thyrsoid narrow panicle loose or interrupted, the fragrant flowers sessile in small clusters: corolla from scarlet to pink-red (rarely white); the lobes widely spreading, soon recurved. (*Collomia aggregata* Porter.)—Western Texas.

\+\+ \+\+ *Corolla purple to white.*

7. **G. longiflora** Don. Annual, glabrous, loosely paniculately branched: leaf-divisions long and slender: flowers loosely somewhat corymbose on slender peduncles: corolla white, showy: tube often 3.5 cm. long; lobes orbicular or ovate: filaments very unequally inserted in upper part of tube: ovules 10 or 12 in each cell. (*Collomia longiflora* Gray.)—Western borders of Texas.

8. **G. Macombii** Torr. Puberulent, 3 to 6 dm. high, from a woody base: leaves rather rigid, pinnately 3 to 7-parted into lobes not wider than the rhachis, or entire and nearly filiform: glomerules of flowers in a narrow virgate thyrsus: corolla violet-purple, with tube 12 mm. and obovate lobes 4 mm. long: stamens unequally inserted, 2 to 4 of them barely exserted from the throat, with straight filaments: ovules 5 or 6 in each cell. (*G. multiflora* Torr. Mex. Bound. in part. *Collomia Cavanillesiana* Gray Syn. Fl. in part.)—A species of the mountains of Arizona, but apparently represented in extreme western Texas by var. LAXIFLORA Coulter, in which the flowers are very loosely cymose or scattered, corolla white (perhaps a little purplish-tinged) and with longer tube, and stamens all included.

9. **G. multiflora** Nutt. Many-stemmed, 3 to 6 dm. high, with paniculate or virgate branches; these cinereous puberulent and the calyx usually hirsute: inflorescence nearly as in the preceding: corolla purplish, with slender tube less than 12 mm. and lobes barely 4 mm. long: stamens equally or unequally inserted, conspicuously exserted, upper part of filaments incurved: ovules 2 to 4 in each cell. (*Collomia Cavanillesiana* Gray Syn. Fl. in part.)—Western borders of Texas.

10. **G. Havardi** Gray. Many-stemmed, low, much branched, villous-pubescent: leaves mostly pinnately parted into filiform rigid lobes no broader than rhachis: flowers scattered: calyx hirsute, its lobes almost spinulose: corolla-tube 6 mm. long and hardly longer than the limb: filaments equally inserted, conspicuously declined-incurved. (*Læselia Havardi* Gray.)—Beyond the Pecos.

+ + + *Flowers scattered or crowded, inconspicuously bracted or without bracts: corolla from funnelform to rotate: stamens usually inserted in or just below the sinuses of the corolla, not exceeding its lobes: leaves various.*

++ *Corolla funnelform: flowers sometimes crowded.*

11. **G. inconspicua** Dougl. Mostly low, usually with slight woolly pubescence when young, and viscid glandular: leaves mostly pinnatifid or pinnately parted, or the lowest bipinnatifid, with short mucronate-cuspidate lobes; uppermost becoming small and entire: flowers either somewhat crowded or at length loosely paniced: corolla violet or purplish, 6 to 10 mm. long.—Western border of Texas.

++ ++ *Corolla rotate: flowers scattered, blue or white.*

12. **G. incisa** Benth. Merely puberulent: stems slender and weak, diffusely branched from base, leafy: leaves thin; radical and lower cauline slender-petioled, roundish ovate or obovate, acutely and incisely toothed or lyrately cleft; upper lanceolate, sparsely laciniate; uppermost linear, more entire, sessile, and gradually reduced to bracts: pedicels 2.5 to 5 cm. long, rigid, loosely and effusely paniculate.—Shady banks and thickets, throughout Texas and adjacent Mexico.

13. **G. rigidula** Benth. Glabrous or viscid-glandular: stems slender and diffusely branched from a stout woody base: leaves rigid, mostly pinnately (or uppermost nearly palmately) parted or cleft into few or several lanceolate-linear or subulate lobes: pedicels 2.5 cm. long or less.—Rocky plains and hills. At the western border of Texas is var. ACEROSA Gray, which is more dwarf, rigid, and suffruticose, with very leafy branches, leaf-divisions all slender-subulate or acerose and somewhat pungent, and short pedicels.

HYDROPHYLLACEÆ. (WATERLEAF FAMILY.)

Commonly hairy herbs, with mostly alternate leaves, regular 5-merous and 5-androus flowers, in appearance between the foregoing and the next order, but with entire and 1-celled ovary with 2 parietal 4 to many-ovuled placentæ (rarely 2-celled by union of placentæ in axis), 2-cleft or 2 separate styles, and 2-valved 4 to many-seeded pod.

* Ovary and pod 1-celled: style 2-cleft: leaves cut-toothed, lobed or pinnate.

1. **Nemophila.** Calyx with appendages at the sinuses: ovary lined with the dilated and fleshy placentæ.

2. **Phacelia.** Calyx destitute of appendages: ovary with narrow parietal placentæ.

* * *Ovary and pod 2-celled: styles 2: leaves entire.*

3. **Nama.** Corolla funnelform or salverform: pod loculicidal, the valves seed-bearing.

4. **Hydrolea.** Corolla between rotate and bell-shaped: pod septicidal or bursting irregularly, leaving placentæ in the axis.

1. NEMOPHILA Nutt.

Diffuse and fragile annuals, with opposite or partly alternate pinnatifid or lobed leaves, 1-flowered peduncles (flowers white, blue, or marked with purple), 5-parted more or less accrescent calyx with a reflexed appendage in each sinus, bell-shaped to rotate corolla with tube mostly with 10 small folds or scales inside, included stamens, and spherical pod ripening 1 to 4 seeds.

1. **N. microcalyx** Fisch. & Meyer. Small, roughish-pubescent: stems diffusely spreading, 5 to 20 cm. long: leaves parted or deeply cleft into 3 to 5 roundish or wedge-obovate sparingly cut-lobed divisions, the upper leaves all alternate: peduncles opposite the leaves, shorter than the long petioles: flowers minute: corolla white, longer than the calyx, with no internal scales: placentæ each 2-ovuled: pod 1 or 2-seeded.—Moist woods, extending from the Southern States into Texas.

2. **N. phacelioides** Nutt. Sparsely hirsute, 3 to 6 dm. high: leaves (all but the earliest) alternate, with naked petioles, 5 to 9-parted; divisions oblong or oval, the larger ones 2 to 5-lobed: peduncles rarely exceeding the leaves: corolla large, blue, the internal appendages hairy outside: placentæ and pod as in the preceding.—Low grounds, from Arkansas to southern and western Texas.

2. PHACELIA Juss.

Perennial or mostly annual herbs, with simple lobed or divided leaves, often handsome (blue, purple, or white) flowers in scorpioid raceme-like cymes, 5-parted calyx with naked sinuses, open-bell-shaped 5-lobed corolla, slender often exserted filaments, and ovary with 2 narrow linear parietal placentæ usually projecting inward in fruit and forming an imperfect partition in the ovoid 4 to many-seeded pod.

* *Seeds and ovules 2 on each placenta: corolla campanulate, with narrow folds or appendages within, the lobes entire.*

← *Leaves all undivided, at most crenate-pinnatifid.*

1. **P. integrifolia** Torr. Strict, viscid-pubescent or hirsute, very leafy: leaves ovate-oblong or lanceolate, sessile or the lower short-petioled: spikes crowded, at first thyrsoid: stamens and style long-exserted: pod short-ovoid.—Western Texas.

← ← *Leaves mostly once or twice-pinnately parted or divided.*

2. **P. Popei** Torr. & Gray. Pubescent, but not glandular or viscid, erect and strict, very leafy: leaves interruptedly twice pinnately parted into small and short lobes: corolla-lobes entire, little surpassed by the stamens: sepals spatulate: pod globose.—High plains of western Texas. Wrongly referred to *P. glandulosa* in Synopt. Fl. ed. 1; and often confounded with *P. Neo-Mexicana.*

3. **P congesta** Hook. Pubescent and commonly cinereous: leaves pinnately 3 to 7-divided or parted, in the common form with comparatively few and broad lobes: stamens more or less exserted: sepals from linear to oblanceolate: pod ovoid.—Throughout Texas. Leaves very variable in the amount of dissection, passing from the common form as given above, through intermediate forms, to var. DISSECTA Gray, in which the leaves are more finely once or twice pinnately divided or parted into more numerous segments and lobes, with small interposed leaflets.

** Ovules and seeds 2 to 8 on each placenta: corolla rotate or campanulate, with no appendages.*

+ Ovules 2 to 4 on each placenta: slender and smoothish little annuals.

4. **P. glabra** Nutt. Glabrous except a few hirsute short hairs chiefly on the margins of the leaves and calyx: corolla 6 to 8 mm. broad: calyx-lobes in fruit little longer than pod: otherwise as in the next.—Low prairies, Arkansas and eastern Texas.

5. **P. parviflora** Pursh. Sparsely hirsute or glabrate: radical and lowest cauline leaves lyrately pinnate, with 3 to 5 roundish leaflets or divisions, or sometimes simple and entire; upper mostly sessile and 3 to 9-parted or cleft into oblong or linear-lanceolate lobes: raceme loose: corolla 8 to 12 mm. broad: calyx-lobes in fruit nearly twice the length of the pod.—Shaded places, extending from the Atlantic region to Texas, and passing into var. HIRSUTA Gray, which is more hirsute, and with larger corolla (10 to 14 mm. broad).

+ + Ovules about 8 on each placenta: stouter plants, with less divided leaves.

6. **P. patuliflora** Gray. Rather softly cinereous-hirsute or pubescent, and inflorescence somewhat glandular, erect or diffuse: leaves obovate or oblong; lowest lyrate-pinnatifid; upper commonly only pinnatifid-incised, sessile: racemes lax, at length elongated: pedicels spreading or nodding (especially in fruit), 8 to 14 mm. or more long: corolla deep blue with yellow base, the lobes somewhat erose: pod thin-walled. (*Eutoca patuliflora* Eng. & Gray.)—Low prairies and thickets, along and near the coast.

7. **P. strictiflora** Gray. Shorter and stouter, more cinereous-hirsute: leaves rather more pinnatifid: racemes in fruit strict and mostly dense, with pedicels erect and not longer than the pod (6 mm.): pod firm-coriaceous. (*Eutoca strictiflora* Eng. & Gray.)—Sandhills of eastern and central Texas.

** * Ovules and seeds 10 to 12 on each placenta: corolla almost rotate, with 10 transverse appendages in the throat remote from the stamens: seeds strongly corrugated transversely.*

8. **P. micrantha** Torr. Slender low annual, minutely hirsute-glandular: leaves pinnately parted into 5 to 9 obovate or oblong very obtuse and mostly entire lobes; lower with margined petiole, upper with dilated and sometimes auriculate partly clasping base: racemes geminate or panicled, very loose: corolla bright blue with yellowish tube, little exceeding the enlarging calyx-lobes, barely 4 mm. broad when expanded.—Along the Rio Grande near El Paso and westward.

3. NAMA L.

Chiefly low herbs (some few woody-based), with funnelform or somewhat salverform corolla (purple, bluish, or white), filiform filaments and (2 mostly distinct) styles (former commonly unequal and often unequally inserted), and membranaceous loculicidal pod with seeds borne on the valves.

** Low annuals: flowers terminal or lateral, or in the forks of the stem.*

+ Leaves decurrent on the stem.

1. **N. Jamaicense** L. Diffusely spreading or prostrate, soft-pubescent: leaves broadly obovate or spatulate, tapering into a petiole-like base which is continued

into wing-like margins of the stem: flowers mostly solitary, terminal and soon extra-axillary: corolla white.—Low grounds.

+ + Leaves not decurrent.

++ Stem leaves all sessile, the upper by a more or less clasping base: villous-pubescent and somewhat viscid.

2. **N. undulatum** HBK. Erect, diffusely branched, at length procumbent, leafy: leaves oblong, the upper with broad sessile base, the lower spatulate: flowers commonly subsessile: corolla somewhat longer than the sepals: pod oblong, more or less shorter than the sepals: seeds oval, smooth.—A Mexican species, collected near Brazos Santiago (*Nealley*), but mostly represented along the Rio Grande near its mouth by var. MACRANTHUM Chois., a looser and less leafy form, with flowers on pedicels (2 to 10 mm. long), corolla almost twice as long, and pod only about half as long as sepals.

3. **N. stenocarpum** Gray. Like the former, or sometimes with narrower leaves: pedicels, if any, short and rigid in fruit: styles united at base or even higher (occasionally 3): pod cylindrical, nearly linear (6 mm. long), nearly equaling the partly adherent sepals: seeds short, angled, strongly reticulated.—Near the mouth of the Rio Grande, westward through Mexico to southern California.

++ ++ Leaves not at all clasping, more or less tapering at base, at least the lower petioled.

4. **N. hispidum** Gray. Hispid or hirsute, repeatedly forked: leaves broadly or narrowly linear-spatulate, most of the cauline ones sessile: flowers lateral and solitary, or 3 to 5 in terminal unilateral clusters: sepals narrowly linear, very little if at all broadened upwards: corolla narrow-funnelform, mostly much longer than the calyx: pod narrowly oblong, 30 to 40-seeded: seeds smooth.—Plains and prairies throughout Texas.

5. **N. dichotomum** Ruiz & Pav. Erect, minutely pubescent, glandular: stem repeatedly forked and with a nearly sessile flower in each fork: leaves oval or oblong-lanceolate: sepals narrowly linear and slightly broadened upwards: corolla short-funnelform, hardly exceeding the calyx: pod oblong-oval: seeds coarsely pitted.—A Mexican species, collected near Corpus Christi and Roma (*Nealley*). Represented in extreme western Texas by the New Mexican var. ANGUSTIFOLIUM Gray, with narrow leaves (linear or nearly so).

** * Perennial, woody-stemmed at least at base.*

+ Flowers solitary in the forks.

6. **N. origanifolium** HBK. Herbaceous from a woody base, or suffruticulose, low and small: leaves oblong or spatulate-obovate, sessile by a narrowed base or short-petioled, soft-pubescent: flowers short-peduncled: corolla 6 mm. long, surpassing the calyx: seeds about 20, oblong, smooth.—Crevices of rocks, near the Rio Grande, from Roma (*Nealley*) to the Limpia and Guadalupe Mountains, and adjacent Mexico.

+ + Flowers cymulose: corolla 8 to 10 mm. long, salverform.

7 **N. Havardi** Gray. Herbaceous from a woody base, 3 dm. or more high, more or less cinereous with soft pubescence: stem erect and stout: leaves oblong or uppermost lanceolate: flowers short-pediceled: filaments membranaceous-margined, toothless: seeds 16 or more, globular or short oval.—Southwestern borders of Texas, on alkaline bank of Tornillo Creek (*Harard*).

8. **N. stenophyllum** Gray. Suffruticose, 3 dm. high or less, rather stout, strigulose-cinereous or more loosely hirsute: stems very leafy throughout: leaves from narrowly linear to almost filiform: flowers densely cymulose at summit of branches: margin of filaments on each side terminating above in a free short tooth: seeds about 40, globular and angulate.—Southern and western borders of Texas.

4. HYDROLEA L.

Herbs or scarcely shrubby, growing in water or wet places, with entire leaves (often with axillary spines), clustered blue flowers, 5-parted calyx, short-campanulate or almost rotate 5-cleft corolla, filaments dilated at base, 2 distinct styles, globular 2-celled thin-walled pod with very large and fleshy many-seeded placentæ (septicidal or bursting irregularly, leaving the seeds on the axis), and minute striate-ribbed seeds.

1. **H. affinis** Gray. More or less spiny, glabrous throughout: stems ascending: leaves lanceolate, somewhat petioled, 4 to 12.5 cm. long: flowers in small axillary leafy-bracted clusters: sepals ovate.—Extending into Texas from the Mississippi Valley States.

2. **H. ovata** Nutt. Spiny, minutely soft-pubescent and above slightly hirsute: stems 3 to 6 dm. high, paniculately branched above: leaves ovate or ovate-lanceolate, 16 to 40 mm. long: flowers clustered at end of branches: sepals lanceolate, very villous-hirsute.—Margins of ponds, extending from Arkansas and western Louisiana through Texas to the tropics.

BORAGINEÆ. (Borage Family.)

Chiefly rough-hairy herbs, with alternate entire leaves, flowers mostly imitating a 1-sided spike or raceme, 5-parted calyx, regular 5-lobed corolla, 5 stamens inserted on its tube, a single style, and a usually deeply 4-lobed ovary forming in fruit 4 seed-like 1-seeded nutlets or separating into two 2-seeded or four 1-seeded nutlets.

* Ovary undivided (or only laterally 4-lobed) and surmounted by the style.

+ Styles twice bifid: fruit drupaceous: trees or shrubs.

1. **Cordia.** Corolla funnelform or salverform: stigmas clavate or capitate.

+ + Styles once bifid or 2-parted: trees, shrubs, or low herbs.

2. **Ehretia.** Corolla from short-funnelform to rotate: fruit drupaceous: trees or shrubs.

3. **Coldenia.** Corolla short-funnelform or nearly salverform: fruit dry: herbaceous or suffruticulose.

+ + + Style entire (sometimes wanting): inflorescence more or less scorpioid.

4. **Tournefortia.** Fruit drupaceous: shrubs or woody twiners: otherwise as in no. 5.

5. **Heliotropium.** Corolla salverform: stamens included: fruit dry: low herbs or undershrubs.

* * Ovary deeply 4-parted, forming as many separate 1-seeded nutlets in fruit; style rising from the center between them.

+ Nutlets armed, attached laterally: corolla short, closed by 5 scales.

6. **Echinospermum.** Nutlets erect or ascending, the margin or back armed with barbed prickles.

+ + Nutlets not armed, attached more or less laterally.

7. **Krynitzkia.** Corolla short, white, with closed throat: nutlets attached along the inner angle.

+ + + Nutlets not armed, attached by the very base, ovoid, mostly smooth and shining.

8. **Myosotis.** Corolla short salverform to funnelform, its lobes rounded, and throat crested.

9. **Lithospermum.** Corolla salverform to funnelform, its rounded lobes spreading, the throat either naked or with low crests.

10. **Onosmodium.** Corolla tubular, unappendaged, its erect lobes acute.

1. CORDIA Plumier, L.

Trees or shrubs, with leaves sometimes dentate, tubular or campanulate calyx merely toothed or lobed, funnelform or salverform corolla with lobes and stamens sometimes more than 5, twice bifid style with clavate or capitate stigmas, and undivided ovary which becomes a 4-celled 4-seeded drupe.

1. **C. Boissieri** A. DC. Small tree, rarely 8 m. high: soft-tomentose: leaves oval or oblong-ovate: inflorescence open-cymose: corolla large (2.5 to 5 cm. long), funnelform, white with a yellow center, externally downy, the tube longer than the somewhat campanulate and striate calyx.—Valley of the Rio Grande and adjacent Mexico. Called "anacahuita" by the Mexicans, by whom its various parts are much used medicinally. "The fruit is nearly 2.5 cm. long, with a pointed stone and pulpy sweet mesocarp."

2. **C. podocephala** Torr. Woody only at base, 3 to 6 dm. high, minutely strigose-hirsute, scabrous: leaves varying from ovate-lanceolate to linear-lanceolate, coarsely serrate: peduncles filiform, 5 to 10 cm. long, bearing a small and very dense head of white or pale purple flowers: corolla broadly funnelform, its narrow tube (12 mm. or more long) hardly exceeding the short (not striate) calyx.—From the Lower Rio Grande to New Mexico and adjacent Mexico.

2. EHRETIA L.

Trees or shrubs, with small white flowers in open cymes or panicles, 5-parted or 5-cleft calyx, short-funnelform to rotate corolla, (once) bifid or 2-parted style with stigmas more or less capitate, and a drupaceous fruit usually containing two 2-celled 2-seeded nutlets.

1. **E. elliptica** DC. Tree 5 to 15 m. high: leaves oval or oblong, sometimes serrate, nearly glabrous or (with the branchlets and open cymes) minutely hirsute-pubescent and the upper face very scabrous: calyx-lobes acuminate, as long as the campanulate corolla-tube: drupes yellow, globose, of the size of small peas.—In the region of the Lower Rio Grande (Corpus Christi to New Braunfels and southward). Known as "knackaway" and "anaqua."

3. COLDENIA L.

Low herbaceous or suffrutescent canescent or hispid plants, with small and mostly white flowers sessile and usually in clusters, 5-parted calyx with narrow divisions, short-funnelform or nearly salverform corolla seldom much exceeding the calyx, included stamens, 2-cleft or 2-parted style, entire or laterally 4-lobed 4-celled ovary, and dry fruit separating at maturity into four 1-seeded nutlets (or in one species by suppression 1-celled and 1-seeded).

1. **C. canescens** DC. Prostrate or procumbent, with somewhat woody base, white-sericeous or tomentose: leaves 12 mm. long, ovate or oblong, entire, petioled: flowers solitary or in small clusters at the axils or forks: calyx-lobes linear-lanceolate: stamens equally inserted: fruit depressed-globose, the 4 thick-walled nutlets with plane contiguous sides and smooth and rounded on the back.—Southern and western Texas.

2. **C. Greggii** Gray. Suffruticulose, 3 to 6 dm. high, tomentose-canescent: leaves 4 to 8 mm. long, ovate or oval, short-petioled, almost veinless, entire, the margins revolute: flowers capitate-glomerate at summit of branches: calyx-lobes filiform from a broader base, elongated-plumose with long villous hairs: stamens equally or unequally inserted: ovary obscurely 4-lobed: fruit even, ovate-oblong, by abortion 1-celled and 1-seeded, the walls comparatively thin.—Rocky ravines, beyond the Pecos. The conspicuous and villous sepals give the flower-heads a strikingly plumose appearance.

3. **C. hispidissima** Gray. Suffruticulose, diffuse, soon procumbent, very setose-hispid, and with some minute cinereous pubescence: leaves fascicled, rigid, lanceolate, soon linear or acerose by strong revolution of the margins: the lower or primary ones petioled: flowers scattered: calyx-lobes linear, resembling the leaves: stamens unequally inserted: fruit deeply 4-lobed, the mature nutlets rounded and only ventrally united, rough-granulate.—Dry hills, western Texas.

4. TOURNEFORTIA L.

Shrubby, with small white flowers in one-sided spikes, and a drupaceous fruit; otherwise like *Heliotropium*.

1. **T mollis** Gray. Erect, 3 dm. or less high, canescently silky-tomentose: leaves deltoid or rhombic-ovate, obtuse, with undulate margins, rather long-petioled: flowers crowded in a pair of naked peduncled spikes: corolla-lobes broad, undulate or crenulate. (*Heliophytum molle* Torr. Mex. Bound.)—Arid plains of southwestern Texas.

5. HELIOTROPIUM Tourn. (Tournsole. Heliotrope.)

Herbs or low shrubby plants, with entire leaves, salverform or funnelform unappendaged corolla, nearly sessile anthers, short style with conical or capitate stigma, and 2 to 4-lobed fruit separating into 2 indurated 2-celled and 2-seeded closed carpels or more commonly into four 1 -seeded nutlets.

* *Fruit didymous, the 2 carpels each splitting into two 1-seeded nutlets: style elongated: flowers scattered, large.*

1. **H. convolvulaceum** Gray. Low annual, strigose-hirsute and hoary, much branched: leaves lanceolate, or ovate or even linear, short-petioled: flowers opposite the leaves and terminal: corolla 12 mm. broad, the strigose-hirsute tube about twice as long as the linear sepals.—Sandy plains of the north and extending to southern and western Texas. A showy plant with sweet-scented flowers.

* * *Fruit 4-lobed, separating into four 1-celled 1-seeded nutlets: style short.*

+ *Flowers in more or less bracteate spikes (which are little if at all scorpioid) or scattered.*

2. **H. Greggii** Torr. Diffusely spreading from a somewhat woody base, strigose-cinereous: slender branches leafy: leaves narrowly linear, flat, about 2.5 cm. long: flowers very fragrant, short-pediceled or nearly sessile in an at first crowded and short scorpioid spike, with or without bracts: calyx-lobes similar: corolla white, with an ample limb and naked and open throat: anther-tips minutely bearded, acuminate.—Sandy soil, western borders of Texas.

3. **H. angustifolium** Torr. Erect and densely branched from a woody base, strigose-canescent: branches rigid, very leafy: leaves very narrowly linear, with revolute margins, almost filiform when dry, 8 to 18 mm. long: spike few-flowered, at length slender, nearly straight, with or without bracts at base: calyx-lobes similar: corolla white, salverform, with narrow canescent tube, very small limb, and open throat: anther-tips glabrous, mucronate.—Southwestern borders of Texas.

4. **H. tenellum** Torr. Erect from an annual root, strigose-canescent: leaves narrowly linear, with more or less revolute margins, about 2.5 cm. long: flowers scattered, terminal, becoming lateral and axillary, on rather slender peduncles, many of them bractless: calyx-lobes very unequal: corolla white, with canescent tube, small limb and open throat: anther-tips nearly naked, blunt.—Open dry ground, throughout Texas.

5. **H confertifolium** Torr. Suffruticulose, very much branched and tufted, silvery-white with a dense silky-hirsute pubescence: leaves crowded throughout and imbricated along the upper part of the branches, from narrowly oblong to linear, 4 to 6 mm. long, equally white both sides: flowers sessile among the leaves, mainly glomerate with them at the ends of branches: calyx-lobes mostly unequal: corolla pale-purple, with silky hairy tube, and internal puberulent appendages: anthers cohering by minutely bearded tips. (*H. limbatum*, etc. Torr. Mex. Bound.)—Southern and western Texas.

+ + Flowers in bractless one-sided scorpioid spikes, which are commonly in pairs or forked.

6. **H. inundatum** Swartz. Strigose-cinereous, 3 to 6 dm. high, branching from base: leaves spatulate-oblong, varying to oblanceolate, not fleshy: spikes 2 to 4 in a cluster, filiform, hirsute: flowers very small, barely 2 mm. long.—Southern and western Texas.

7. **H. Curassavicum** L. Glabrous throughout, diffusely spreading: leaves lance-linear or spatulate, succulent: spikes in pairs or twice forked: corolla with limb 6 mm. broad.—Chiefly in saline soils, extending from the Atlantic region through Texas and southward.

** * * Fruit 2-lobed, separating into 2-celled 2-seeded carpels, with sometimes a pair of empty false cells: style very short: flowers in bractless scorpioid spikes.*

8. **H. parviflorum** L. More or less pubescent, 3 to 6 dm. high: leaves oblong-ovate or ovate-lanceolate, acute or acuminate at both ends, slender-petioled: spikes single or in pairs, filiform, 5 to 15 cm. long: flowers small and crowded, white, 2 mm. long: fruit commonly with no distinct empty cell. (*Heliophytum parviflorum* DC.)—Southern borders of Texas.

9. **H. glabriusculum** Gray. Minutely and sparsely strigulose-pubescent, diffusely branching: leaves green and glabrous (except the midrib beneath), rather obtuse, short-petioled: spikes rather short, solitary or forking: corolla white with green eye, about 4 mm. long: fruit pubescent, commonly with 3 empty cells. (*Heliophytum glabriusculum* Torr.)—Southern and western borders of Texas.

6. ECHINOSPERMUM Lehm. (STICKSEED.)

Rough-hairy and grayish herbs, with small blue to whitish flowers in racemes or spikes, short salverform corolla with throat closed by 5 short scales, included stamens, and triangular or compressed erect nutlets fixed laterally to the base of the style and with back armed all over or with 1 to 3 marginal rows of barbed prickles.

1. **E. Redowskii** Lehm., var. **occidentale** Watson. Hispid erect annuals, 3 to 6 dm. high, at length diffuse: leaves linear, lanceolate, or the lower spatulate: racemes leafy-bracteate: calyx becoming foliaceous: nutlets irregularly and minutely sharp-tuberculate, the margins armed with a single row of stout flattened prickles sometimes confluent at base.—Extending from the northern plains into Texas, where also occurs var. CUPULATUM Gray, with prickles of the nutlet broadened and thickened below and united into a wing or border which often hardens and enlarges, forming a cup with margin more or less incurved at maturity (sometimes only the tips of the prickles free). (*E. strictum* Torr. Mex. Bound., not Ledeb.)

7. KRYNITZKIA Fisch. & Meyer.

Usually hispid annuals or perennials, with small white flowers, 5-parted or deeply cleft calyx erect or little spreading in fruit, short corolla usually with more or less fornicate throat, and erect and straight unarmed nutlets attached to the gynobase (axis or receptacle) either at inner edge of base or ventrally from the base upward.

* *Nutlets ovate, with rounded back, attached next the base to the low and convex or depressed pyramidal gynobase: flowers racemose, white, mostly bracteate.*

1. **K. heliotropioides** Gray. Softly strigose-hirsute and (at least when young) canescent: leaves linear, the lower mainly opposite: flowers scattered, on filiform pedicels much longer than the calyx, the lobes of which are oblong-linear: corolla with conspicuous crests in the throat: scar of nutlets large and sessile. (*Eritrichium heliotropioides* Torr. Mex. Bound. *Antiphytum heliotropioides* A. DC.)—On the Mexican side of the Rio Grande (San Carlos), but doubtless also in Texas.

2. **K. floribunda** Gray. Cinereous with fine and close and with a coarser nearly hispid pubescence: leaves perhaps all alternate, narrowly linear, upper gradually diminished to bracts: flowers very short-pediceled, in short panicled racemes or spikes: calyx-lobes linear-lanceolate, acuminate: corolla not appendaged in the throat: scar of nutlets small and slightly stipitate. (*Eritrichium floribundum* Torr. *Antiphytum floribundum* Gray.)—Southwestern Texas, beyond the Pecos.

* * *Nutlets attached by ventral angle or groove from base up at least one-third or one-half or the whole length to an elevated gynobase, the back convex and not keeled, and sides wingless: corolla small and white, with tube not surpassing the calyx: flowers almost always sessile and scorpioid-spicate.*

\+ *Nutlets either dissimilar or only one maturing, strictly inclosed in the rigid fructiferous calyx, the midribs of which are much thickened and indurated: diffusely branched and rough-hispid.*

3. **K. crassisepala** Gray. Leaves oblanceolate and linear-spatulate: flowers short-pediceled, many or most of them bracteate: calyx-lobes greatly thickened below in fruit: nutlets dissimilar, 3 of them muricate and one larger and smooth or nearly so. (*Eritrichium crassisepalum* Torr. & Gray.)—Plains of western Texas.

4. **K. Texana** Gray. Leaves obovate-oblong or spatulate, or the uppermost linear: flowers nearly sessile: spikes mostly leafless: calyx in fruit separating by an articulation: but one nutlet usually maturing, which is smooth or nearly so. (*Eritrichium Texanum* A. DC.)—From near Austin and westward, at least to Gillespie County (*Jermy*).

\+ \+ *Nutlets all fertile and alike: midrib of calyx-lobes not thickened.*

5. **K. pusilla** Gray. Low and slender, 5 to 7.5 cm. high, rough-hispid: linear leaves mostly clustered at the root: flowers rather crowded in small spikes: crests in throat of corolla inconspicuous: nutlets attached at lower half, with strongly granulate rounded back bordered by acute angles and very smooth inner faces. (*Eritrichium pusillum* Torr. & Gray.)—Northwestern borders of Texas.

6. **K. ramosa** Gray. Larger and stouter, roughish-hispid, even the loose paniculate spikes mostly leafy: leaves linear: flowers rather scattered: crests in throat of corolla rather conspicuous: nutlets attached at lower half, coarsely granulate round to the deeply excavated scar and without lateral angles. (*Eritrichium ramosum* A. DC. *E. hispidum* Buckley.)—Plains and sandy banks of western Texas. Calyx closed at maturity and deciduous with the inclosed fruit, like a bur.

7. **K. micrantha** Gray. Slender, 5 to 12.5 cm. high, hirsute-canescent: leaves linear, only 4 to 8 mm. long: flowers in the forks, and much crowded in short leafy spikes: corolla barely 2 mm. high, obscurely appendaged at throat: nutlets attached for their whole length, smooth or minutely papillose, and with roundish margins. (*Eritrichium micranthum* Torr.)—Dry plains, western border of Texas.

** * * Nutlets all four or all but one scarious-winged at the margins, attached for their whole length: spikes bractless.*

8. **K. pterocarya** Gray. Slender, loosely branching, hirsute: leaves linear, or lowest spatulate, often hispid: inflorescence at first cymose-glomerate, usually developing a pair of short spikes: calyx-lobes erect: corolla very small: nutlets rough on the rounded back, one commonly wingless and rounded on the sides, the others with lateral angles extended into a broad radiately striate wing with toothed or crenulate margins. (*Eritrichium pterocaryum* Torr.)—Western borders of Texas.

** * * * Nutlets acutely triangular, wingless, attached for most of their length to a subulate gynobase.*

9. **K. Jamesii** Gray. Rather stout, branched from a woody base, canescently silky-tomentose, becoming strigose-hirsute or even hispid in age: leaves oblanceolate or upper-linear: spikes panicled or crowded, bracteate: corolla with prominent crests at throat: fruiting calyx neatly closing over the depressed-globular fruit, which consists of 4 closely-fitting very smooth and shining nutlets (which are almost exact quarters of a sphere). (*Eritrichium Jamesii* Torr.)—Plains and sandy shores, western borders of Texas.

8. MYOSOTIS L. (Forget-me-not. Scorpion-grass.)

Low and mostly soft-hairy herbs, with entire leaves, small flowers in naked racemes, salverform corolla with tube about as long as the 5-toothed or 5-cleft calyx and throat with 5 small and blunt arching appendages opposite the rounded lobes, included stamens on very short filaments, and smooth compressed nutlets fixed at base.

1. **M. verna** Nutt. Bristly-hirsute, branched from base, erect: leaves obtuse, linear-oblong, or lower spatulate-oblong: racemes leafy at base: corolla very small, white: pedicels in fruit erect and appressed at the base, rather shorter than the deeply 5-cleft unequal very hispid calyx.—Dry ground, extending from the Atlantic region into Texas, where also occurs var. MACROSPERMA Chapm., which is taller, with more spreading pedicels, larger flowers, and larger nutlets.

9. LITHOSPERMUM Tourn. (Gromwell. Puccoon.)

Herbs, with thickish and commonly red roots, sessile leaves, solitary (as if axillary) or spiked and leafy-bracted flowers, funnelform or salverform corolla with throat (in ours) with more or less evident appendages, almost sessile included anthers, and ovate smooth or roughened mostly bony or stony nutlets fixed by the base.

** Nutlets brownish and uneven, coarsely pitted (at length shining): corolla white or whitish, little longer than calyx.*

1. **L. Matamorense** DC. Hirsute or hispid: stems much branched from base, diffusely spreading, slender: leaves oblong, very obtuse: pedicels very short: corolla 4 mm. long.—Plains and river-banks of southern Texas.

** * Nutlets white, smooth and shining: corolla large, salverform or nearly so, yellow, somewhat pubescent, the tube much exceeding the calyx.*

– Corolla-tube half to twice longer than calyx, with appendages little if at all projecting: lobes entire.

2. **L. multiflorum** Torr. Minutely strigose-hispid: leaves linear or linear-lanceolate: flowers numerous, short-pediceled, the latter spicate: corolla light yellow, narrow, 10 to 12 mm. long, with very short rounded lobes and tube fully twice the length of the calyx, sparingly bearded at base inside.—Western Texas.

3. **L. Cobrense** Greene. Many-stemmed from a tap-root and a rosulate tuft of radical leaves, canescently strigulose or appressed-hirsute, and the spatulate lower leaves hispid; cauline leaves linear, obtuse, short: corolla orange-yellow, 12 mm. high, with ample equally broad limb, and naked at base within.—Western borders of Texas. Wrongly referred to *L. canescens*.

4. **L. hirtum** Lehm. Hispid with bristly hairs: stem-leaves lanceolate or linear, those of flowering branches ovate-oblong, bristly ciliate: flowers distinctly pedunculed, crowded, showy: corolla orange-yellow, woolly-bearded at base inside, limb 16 to 24 mm. broad.—Extending from the Atlantic region through Texas.

\+ + *Corolla-tube 2 to 4 times the length of the calyx, with appendages conspicuous and arching; lobes erose-toothed: later flowers small, cleistogamous.*

5. **L. angustifolium** Michx. Erect or diffusely branched from the base, minutely rough-strigose and hoary: leaves linear: flowers pediceled, leafy-bracted, of two sorts; earlier large and showy, bright yellow; the later and those of more diffusely branching plants with inconspicuous or small and pale corollas, without crests.—Dry and sterile or sandy soil, extending from the Atlantic region through Texas and westward. *L. longiflorum* Spreng. is the long-flowered form; and *L. breviflorum* Eng. & Gray Pl. Lindh. the short-flowered.

10. ONOSMODIUM Michx. (False Gromwell.)

Coarse and hispid chiefly perennial herbs, with oblong and sessile ribbed-veined leaves, flowers (white, greenish, or yellowish) in at length elongated and erect leafy raceme-like clusters, 5-parted calyx with linear erect divisions, tubular or tubular-funnelform not crested corolla with 5 acute converging or barely spreading lobes, oblong-linear or arrow-shaped mucronate anthers inserted in the throat, filiform much exserted style, and bony ovoid smooth erect nutlets fixed by the base.

1. **O. Bejariense** DC. Hispid with spreading bristles: stem rather stout, 3 to 9 dm. high: leaves oblong-lanceolate, lower obtuse, upper acutish; upper surface appressed strigose-hispid, lower more or less canescent with fine soft pubescence: flowers short-pediceled: corolla 12 to 18 mm. long, white; the lobes minutely pubescent outside and with some long hirsute hairs, about one-fourth the length of the tube. (*O. Carolinianum* Torr. Mex. Bound., not DC.)—Border of thickets, nearly throughout Texas.

2. **O. Carolinianum** DC. Shaggy all over with long and spreading bristly hairs: stem stout, upright, 6 to 12 dm. high: leaves ovate-lanceolate or oblong-lanceolate, acute, generally hairy both sides: flowers nearly sessile: corolla 8 to 10 mm. long, yellowish-white; the lobes thickly hirsute outside.—Alluvial grounds, extending from the Atlantic region to western Texas, along with var. MOLLE Gray, with shorter and less spreading or appressed pubescence, mostly smaller leaves (5 cm. long) when young softly strigose-canescent beneath. (*O. molle* Michx.)

CONVOLVULACEÆ. (Convolvulus Family.)

Chiefly twining or trailing herbs, with alternate leaves (or scales) and regular 5-androus flowers, 5-plaited or 5-lobed corolla, 2 (rarely 3)-celled ovary (in one tribe 2 separate pistils) with a pair of erect ovules in each cell (cells sometimes doubled by false partitions), and fruit a globular 2 to 6-seeded pod.

* Carpels 2 or 4, distinct or nearly so: styles 2, basilar: creeping herbs.

1. **Dichondra.** Corolla deeply 5-cleft: pistils two, 4-seeded.

* * Ovary entire: leafy plants, mostly twiners.

+ Corolla plicate at sinuses and the plaits convolute.

2. **Ipomœa.** Style undivided, with stigma capitate or 2 or 3-globose.

3. **Jacquemontia.** Style undivided, with 2 ovate or oblong thick but somewhat flattened stigmas.

4. **Convolvulus.** Style undivided or 2-cleft only at apex; stigmas 2, linear-filiform to subulate or ovate, when broad sometimes flattish.

5. **Breweria.** Style 2-cleft or 2-parted; divisions simple; stigmas capitate.

6. **Evolvulus.** Styles 2, each 2-cleft; stigmas linear-filiform: not twining.

+ + Corolla not plicate, but 5-cleft.

7. **Cressa.** Styles 2, distinct, entire; stigmas capitate: not twining.

* * * Ovary entire: leafless parasitic twining herbs, never green.

8. **Cuscuta.** The only genus.

1. DICHONDRA Forst.

Small and creeping pubescent perennial herbs, with kidney-shaped entire leaves, axillary bractless peduncles bearing a small yellowish or white flower, 5-parted calyx, broadly bell-shaped 5-cleft corolla, included stamens, and 2 distinct styles, ovaries, and utricular 1 or 2-seeded pods.

1. **D. repens** Forst. Soft-pubescent or slightly sericeous, but green or greenish: leaves mostly with deep sinus: corolla-lobes nearly glabrous.—Wet ground, near the coast and throughout southern Texas.

2. **D. argentea** Willd. Canescently sericeous and silvery: leaves mostly with shallow sinus or even truncate: corolla lobes villous outside.—Southern and western borders of Texas.

2. IPOMŒA L. (Morning glory.)

Mainly twining herbs (some prostrate, diffuse, or even erect), with calyx not bracteate at base (but outer sepals commonly larger), salverform or funnelform to nearly campanulate corolla with entire or slightly lobed limb, undivided style terminated by a single capitate or 2 or 3-globose stigma, and a globular 4 to 6-seeded 2 to 4-valved pod.

* *Corolla salverform, or with somewhat funnelform but narrow tube: stamens and style exserted: flowers red.*

1. **I. coccinea** L. Rather tall-climbing: leaves cordate, acuminate, entire or angled: sepals awn-pointed: corolla light scarlet, 2.5 cm. long. (*Quamoclit coccinea* Mœnch.)—River banks, etc, naturalized in Middle and Southern Atlantic States; probably indigenous in western borders of Texas and westward. In western Texas there also occurs var. HEDERIFOLIA Gray, with leaves from angulate to 3-lobed or even 3-parted, or sometimes pedately 5-parted.

* * *Corolla funnelform or nearly campanulate: stamens and style not exserted.*

+ *Lobes of stigma and cells 3: sepals long and narrow, attenuate upward, mostly hirsute below: corolla purple, blue, and white.*

2. **I. Mexicana** Gray. Root annual: leaves deeply 3-lobed and deeply cordate; lobes ovate or ovate-lanceolate, middle one broadest (sometimes narrowed) at base: peduncles 1 to 7.5 cm. long, 1 to 3-flowered: fruiting pedicels as long as calyx: sepals lanceolate, 12 mm. long: corolla violet-purple, 2.5 cm. long.—In the mountains west of the Pecos.

I. purpurea Lam. Root annual: leaves cordate, entire: peduncles 5 to 12.5 cm. long, 1 to 5-flowered: umbellate pedicels twice as long as calyx, usually refracted in fruit: sepals lanceolate, 12 mm. long: corolla violet, purple, or pink, varying to white and diversely variegated, about 5 cm. long.—The common and widely cultivated morning glory, naturalized in the Atlantic States, probably native in southern California, and reported from Texas by *Berlandier* and *Jermy* (Gillespie County).

4. **I. Lindheimeri** Gray. Root perennial: leaves deeply 5-cleft or 5-parted, all or the 3 interior lobes ovate or ovate-lanceolate with a much contracted base, the contracted portion often half the length of the dilated lobe: peduncle 2.5 to 7.5 cm. long, 1 or 2-flowered: pedicels 6 to 12 mm. long: sepals lanceolate-linear, fully 2.5 cm. long. (*I. heterophylla* Torr. Mex. Bound., not Ortega.)—Rocky soil, southern and western Texas.

+ + Stigma 2-lobed or entire: cells 2, each 2-seeded: sepals broader.

++ Creeping (not twining) perennials, glabrous or nearly so: flowers rather large.

5. **I. Pes-capræ** Sweet. Herbage succulent: leaves orbicular, mostly emarginate at both ends, 2-glandular at base, pinnately many-veined, 5 to 7.5 cm. long: sepals oval obtuse: corolla purple: mature pod 2-celled: seeds rusty-pubescent.—Drifting sands of the coast.

6. **I. carnosa** R. Br. Stem slender, extensively creeping: leaves slightly succulent, exceedingly various; earlier oblong or subcordate or emarginate at both ends, either entire or fiddle-shaped or 3-lobed; the others sometimes linear, sometimes deeply 3 to 5-lobed or parted and lobes narrowed at base: peduncles 1-flowered: sepals mucronate or acuminate: corolla white with yellowish throat: pod 4-celled: seeds densely villouswoolly. (*I. acetosæfolia* R. & S.)—Sandy seacoast.

++ ++ Twining (or at first trailing), but not creeping: leaves cordate or sagittate, or with divisions broader than linear.

= Perennials with immense roots: leaves cordate, entire or some 3 to 5-lobed: peduncles 1 to several-flowered: sepals oblong or ovate, obtuse or merely mucronate, over 12 mm. long: corolla over 5 cm. long.

7. **I. Jalapa** Pursh. Freely twining from a napiform or thick fusiform root (sometimes weighing 40 or 50 pounds), tomentulose-pubescent, at least the lower surface of the shallow-cordate plicate-veiny repand or lobed leaves: corolla 7.5 to 10 cm. long, white or light pink-purple; the narrow tube deep purple: ovary imperfectly 4-celled: seeds densely clothed with long villous wool.—A species of the Gulf States, in sandy soil along the coast, reported from southern Texas (*Havard*).

8. **I. pandurata** Meyer. Glabrous or nearly so, trailing or twining from a very long and large root (at length weighing 10 to 20 pounds): leaves usually cordate and entire, or some of the later angulate or fiddleform-cordate, occasionally hastate-3-lobed: corolla 5 to 7.5 cm. long, white with a dark-purple throat: ovary only 2-celled: seeds woolly on the angles.—Dry ground, extending from the Atlantic States into Texas.

= = Perennial with thick root: leaves all sagittate: peduncle mostly 1-flowered: sepals as in preceding, but barely 12 mm. long: corolla proportionally very large.

9. **I. sagittata** Cav. Glabrous: leaves deeply sagittate, otherwise entire; some with linear-lanceolate lobes; some larger and broader, with ovate-lanceolate outline and oblong obtuse basal lobes: corolla pink-purple, 5 to 7.5 cm. long.—Salt marshes on the coast, and in saline localities through southern Texas and west of the Pecos.

= = = Perennials with roots not very large, or annuals: corolla 3.5 cm. long or smaller.

a. Calyx almost 25 mm. long, large for size of corolla.

10. **I. sinuata** Ortega. Root perennial: stem and petioles hirsute with long spreading hairs: leaves nearly or quite glabrous, 7-parted; the divisions lanceolate or narrowly oblong, sinuately and laciniately pinnatifid or incised: calyx equaling throat of

corolla, which is white with purple eye: seeds glabrous.--Near the coast and throughout southeastern Texas (Lower Rio Grande region).

b. *Calyx in fruit over 12 mm. long, setose-hispid.*

11. **I. barbatisepala** Gray. Apparently annual, glabrous except calyx: leaves pedately 5 to 7-parted; the divisions lanceolate with narrowed base: peduncles 1 or 2-flowered: sepals attenuate-linear, in fruit 14 to 16 mm. long, a third longer than the 2-celled 4-seeded pod: seeds glabrous or minutely scurfy.--Western borders of Texas; mountain declivity near El Paso (*Wright*).

c. *Calyx 10 mm. long, completely glabrous: root perennial.*

12. **I. trifida** Don., var. **Torreyana** Gray. Nearly glabrous throughout, freely twining: leaves cordate (about 5 cm. long); some entire or merely angulate; most 3-cleft, with ovate lobes, the lateral externally rounded: peduncles longer than leaves, 3 to 10-flowered: sepals mucronate-acuminate, 10 mm. long: corolla pink or lilac-purple, over 2.5 cm. long: pod simply 2-celled: seeds glabrous and very smooth. (*I. commutata* Torr. Mex. Bound., not Rœm. & Sch.)--Southern and western Texas. At Bejar Berlandier collected var. BERLANDIERI Gray, which is perhaps a depauperate form, with smaller deeper cleft leaves (some almost 3-parted), the middle lobe lanceolate or ovate-lanceolate and longer (giving a somewhat hastate outline), lateral divisions often 2-lobed or 2 or 3-cleft; peduncles only 2.5 cm. long.

d. *Calyx 6 to 12 mm. long, pilose or at least ciliate with some long and soft hairs rising from the more rigid base: seeds glabrous: stems twining: root annual.*

13. **I. trichocarpa** Ell. Hirsute-pubescent or glabrate: leaves cordate, some entire, some strongly 3-lobed with middle lobe ovate-lanceolate and acuminate; lateral usually shorter and broader, sometimes again 2-lobed: peduncles 3.5 to 7.5 cm. long, 1 to 3-flowered: corolla 2.5 cm. or more long, purple or pink: pod sparsely pilose or glabrate. (*I. commutata* Rœm. & Sch.)—Dry or low grounds, extending from the Gulf States to Texas, at least as far west as Gillespie County (*Jermy*).

14. **I. lacunosa** L. Slightly pubescent or hirsute, or nearly glabrous: leaves as the preceding or less lobed, more commonly ovate-cordate and entire, conspicuously acuminate: peduncles shorter: pod more pilose.—River banks and low grounds, extending from the Atlantic States into Texas.

e. *Calyx only 4 mm. long, naked and glabrous: herbage glabrous throughout.*

15. **I. Wrightii** Gray. Leaves all digitately divided into 5 narrowly lanceolate entire leaflets (all 2.5 to 3.5 cm. long, or the lateral shorter): peduncles 1-flowered, not exceeding petiole: sepals very obtuse: corolla pink or purple, 12 mm. long: pod 8 mm. long: seeds globular, minutely and densely puberulent.—Probably from southern Texas (*Wright*).

16. **I. cardiophylla** Gray. Leaves broadly cordate and with basal lobes somewhat incurved, entire, acuminate: peduncles mostly 1-flowered and shorter than petiole: sepals acute, thickish but scarious-margined, more or less muricate-glandular on the back: corolla purple, 18 mm. long: pod 12 mm. long: seeds oval, brownish-puberulent.—Western borders of Texas, in mountains near El Paso (*Wright*).

++ ++ ++ *Stems erect or diffuse, feebly if at all twining, never creeping or even prostrate: leaves or their divisions all linear or narrower and entire.*

17. **I. leptophylla** Torr. Very glabrous: stems erect or ascending (6 to 12 dm. high), from an immense perennial root (weighing from 10 to 100 pounds): leaves linear, entire, 5 to 10 cm. long, 4 to 6 mm. wide, short-petioled, acute: peduncles short, 1 or 2-flowered: calyx 6 to 8 mm. long; sepals broadly ovate, very obtuse, outer ones shorter: corolla pink-purple, about 7.5 cm. long: pod 2.5 cm. long: seeds rusty-pubescent.—Plains of northern and western Texas.

18. **I. costellata** Torr. Erect and diffuse, at length procumbent or slightly twining, glabrous or minutely hirsute: leaves petiolate, pedately 7 to 9-parted into linear

or somewhat spatulate (or upper filiform) divisions of somewhat equal length: peduncles surpassing the leaf, 1 to 3-flowered: sepals acute, glabrous, somewhat keeled, outer ones salient and often undulate-cristate or tuberculate: corolla pink-purple or paler, 8 to 10 mm. long, with 5 short mucronate-pointed lobes: pod as long as calyx: seeds minutely puberulent.—Southern and western Texas.

++ ++ ++ ++ *Stems slender, freely twining: leaves pedately parted into filiform divisions.*

19. **I. tenuiloba** Torr. Glabrous: leaf-divisions 5 or 7, much longer but hardly broader than petiole: peduncle stouter and longer than petiole, 1-flowered: calyx-lobes oblong, mucronate-acuminate: corolla pink-purple, 5 to 7.5 cm. long.—"Hills near Puerto de Paysano, western Texas (*Bigelow*)."

Two new species of *Ipomœa*, described from Nealley's collections in Contrib. Nat. Herb. 1. 45, are disposed of as follows:

I. NEALLEYI was described from specimens of the Ipomœa-like *Antirrhinum maurandioides* Gray.

I. TEXANA, taken to be an indigenous Ipomœa, proves to be an escape from cultivation, and is the Brazilian *I. fistulosa* Mart.

3. JACQUEMONTIA Choisy.

Mostly with aspect of *Convolvulus*, with undivided style, and 2 ovate or oblong thick but somewhat flattened stigmas: otherwise as *Ipomœa* and *Convolvulus*, and intermediate between the two.

1. **J. tamnifolia** Griseb. Erect or at length twining, fulvous-hirsute: leaves cordate and ovate, long-petioled, pinnately veiny: peduncles elongated, capitately many-flowered: glomerate cluster involucrate with foliaceous bracts: sepals subulate-linear, ferrugineous-hirsute, 10 mm. long, nearly equaling the violet corolla.—Extending from the Gulf States through Texas to tropical America.

4. CONVOLVULUS Tourn. (BINDWEED.)

Herbs or somewhat shrubby plants (twining, erect, or prostrate), with funnelform to campanulate corolla, included stamens, style undivided or 2-cleft only at apex, 2 linear-filiform to subulate or ovate stigmas, and globose 2-celled pod (or imperfectly 4-celled by spurious partitions, or by abortion 1-celled).

* *Stigmas oval to oblong: calyx inclosed in 2 broad leafy bracts.*

1. **C. sepium** L., var. **repens** Gray. More or less pubescent: freely twining, but sterile and sometimes flowering stems extensively prostrate: leaves more narrowly sagittate or cordate than in type, the basal lobes commonly obtuse or rounded and entire: bracts commonly acute: corolla white or tinged with rose-color, 3.5 to 5 cm. long. (*Calystegia sepium*, var. *pubescens* Gray.)—On banks and shores, from Atlantic States through Texas to New Mexico.

* * *Stigmas filiform or narrowly linear: no bracts at or near the base of the calyx.*

2. **C. hermannioides** Gray. Sericeous-tomentulose: stems 9 to 15 dm. long, mainly procumbent: leaves oblong or oblong-lanceolate, obtuse, with sagittate or narrowly cordate base, 3.5 to 7.5 cm. long, repand or sinuate-dentate (sometimes obsoletely so), rather short-petioled: peduncles 1 or 2-flowered, rather longer than leaves: sepals about 12 mm. long: corolla white, 2.5 mm. long, the border merely angulate.—Dry prairies of central and southern Texas.

3. **C. incanus** Vahl. Cinereous or canescent with a short close silky pubescence: stems filiform, 3 to 9 dm. long, mainly procumbent: leaves polymorphous; some simply lanceolate or linear-sagittate or hastate (2.5 to 5 cm. long and 4 to 6 mm.

wide, entire, and with basal lobes entire or toothed); some pedate, having narrowly 2 or 3-cleft lateral lobes or divisions; some more coarsely 3 to 5-parted, with lobes entire or coarsely sinuate-dentate; some early ones ovate or oblong-cordate and merely sinuate-dentate: peduncles 1 or 2-flowered, as long as the leaf: sepals 6 mm. long: corolla white or tinged with rose, 12 mm. long, the angles salient-acuminate. (*C. lobatus* Eng. & Gray Pl. Lindh.)—Dry prairies and hills, throughout Texas.

5. BREWERIA R. Br.

Perennial prostrate or diffusely spreading herbs, with small flowers more or less hairy or silky outside, 2 or rarely 3 simple and distinct styles (or united into one below), and depressed-capitate stigmas: otherwise as *Convolvulus* and *Evolvulus*.

1. **B. ovalifolia** Gray. Sericeous-canescent: leaves ovate or oval, mostly subcordate, 2.5 cm. long: peduncles very short, 1-flowered: style 2-cleft above the middle: pod globose, 12 mm. in diameter, about as long as the broadly ovate sepals, by abortion 1-seeded. (*Evolvulus? ovalifolius* Torr. Mex. Bound.)—Southwestern borders of Texas. Corolla not seen.

2. **B. Pickeringii** Gray. Soft-pubescent or smoothish: leaves very narrowly linear or the lowest linear-spatulate, tapering to the base, nearly sessile: peduncles elongated, 1 to 3-flowered: bracts foliaceous and exceeding the flowers: sepals hairy: filaments and styles (united far above the middle) exserted from the open white corolla. (*Bonamia Pickeringii* Gray.)—Dry prairies, extending from Louisiana into Texas, but with unknown western limit.

6. EVOLVULUS L.

Low and small usually diffuse herbs or suffrutescent plants, with 5 sepals naked at base, open funnelform or almost rotate corolla, 2 styles each 2-cleft, obtuse stigmas, and 2-celled 4-seeded pod.

* *Peduncles filiform, 1 to 3-flowered, mostly longer than the leaves.*

1. **E. alsinoides** L. Villous or hirsute: stems slender, diffuse or decumbent, 3 to 6 dm. long: leaves from oval or oblong to lanceolate, somewhat petioled: pedicels at length nodding or refracted on the peduncle: corolla about 6 mm. broad.—Southern Texas.

* * *Peduncles or rather pedicels bibracteolate at base, solitary, and 1-flowered, short, usually very short.*

2. **E. sericeus** Swartz. Sericeous excepting the glabrous upper leaf-surface: stems slender or filiform: leaves subsessile, lanceolate or linear-lanceolate, 12 to 20 mm. long, erect or ascending, mucronate-acuminate or acute: silky pubescence fine and close-pressed, sometimes short, whitish or fulvous: sepals ovate-lanceolate: corolla white or pale-blue, 6 to 8 mm. in diameter. (*E. holosericeus* Torr. Mex. Bound. in part.)—Throughout Texas, especially in the southern part. Nealley's specimens from near Pena show flowers 10 to 12 mm. in diameter.

3. **E. argenteus** Pursh. Many-stemmed from a somewhat woody base, dwarf, silky-villous all over: leaves crowded, broadly lanceolate, sessile, or the lower oblong-spatulate and short-petioled, about 12 mm. long: flowers almost sessile in the axils: corolla purple, 6 mm. broad.—Extending from the northern plains and prairies through Texas to Mexico.

7. CRESSA L.

A low canescent or silky-villous erect or diffuse perennial, with entire leaves, 5 nearly equal sepals, oblong-campanulate corolla-tube and limb

5-parted into oblong-ovate lobes, filiform exserted filaments, and 2-celled 4-ovuled ovary often becoming by abortion a 1-seeded pod.

1. **C. Cretica** L., var. **Truxillensis** Choisy. Much branched from a woody base, very leafy: leaves from oblong-ovate to lanceolate, sessile, 4 to 8 mm. or more long: flowers subsessile or short-pedicelled in the upper axils, or the upper crowded as if in a leafy-bracteate spike: corolla white, 4 to 6 mm. long: pod 4 to 6 mm. long.—On or near the seashore or in saline soil, southern Texas.

8. CUSCUTA Tourn. (Dodder.)

Leafless annual parasitic herbs, with thread-like yellowish or reddish stems bearing a few minute scales in place of leaves and twining on herbs or shrubs to which they adhere by means of suckers, small cymose-clustered mostly white flowers, calyx 5 (rarely 4)-cleft or of 5 sepals, globular-urn-shaped (or bell-shaped or short-tubular) corolla with 5 or 4-cleft spreading border, stamens with a scale-like often fringed appendage at base, 2-celled 4-ovuled ovary with distinct (rarely united) styles, and mostly 4-seeded pod.—In ours the stigmas are capitate.

* *Styles distinct, more or less unequal.*

\+ *Capsule indehiscent.*

\+\+ *Calyx gamosepalous.*

= *Ovary and pod depressed-globose.*

a. *Flowers in dense or globular clusters: styles mostly shorter than the ovary.*

1. **C. obtusiflora** HBK., var. **glandulosa** Engelm. Stems orange-colored, coarse: flowers 2 to 2.5 mm. long, all parts dotted: lobes of calyx and corolla rounded, as long as tube: scales large, equaling or exceeding the tube, deeply fringed.—Wet places, extending from Gulf States into Texas. On *Polygonum*, etc.

2. **C. arvensis** Beyrich. Stems pale and slender, low: flowers smaller, scarcely 2 mm. long: calyx-lobes obtuse, mostly very broad: those of corolla acuminate, longer than tube, with inflexed points: scales large, deeply fringed.—Rather dry soil, on various low plants, throughout Texas.

b. *Flowers in paniculate often compound cymes: styles slender, mostly longer than the ovary.*

3. **C. tenuiflora** Engelm. Stems coarse and yellow: flowers (2 mm. or less long) on short thick pedicels, often 4-merous: lobes of calyx and corolla oblong, obtuse; latter mostly shorter than the slender deeply campanulate tube: scales shorter than tube, fringed: marcescent corolla capping the large pod.—On tall herbs or shrubs, in wet places, extending from the Northern States into Texas.

= = *Ovary and pod pointed; the latter enveloped or capped by the marcescent corolla.*

a. *Acute tips of corolla lobes inflexed or corniculate.*

4. **C. decora** Choisy. Stems coarse: flowers fleshy and more or less papillose: calyx-lobes triangular, acute: those of the broadly campanulate corolla ovate-lanceolate, minutely crenulate, spreading: scales large, deeply fringed: pod enveloped by remains of corolla: seeds usually 4.—Throughout the United States. Also extending from the north, in wet prairies, on herbs and low shrubs, principally *Leguminosæ* and *Compositæ*, is var. PULCHERRIMA Engelm., the larger form, with coarser stems, conspicuous flowers 3 to 5 mm. long and wide, and anthers and stigmas yellow or deep purple. Confined to Texas is var. INDECORA Engelm., with lower more slender stems, smaller flowers in looser paniculate clusters and often warty or papillose-hispid.

b. *Obtuse lobes of corolla spreading.*

5. **C. Gronovii** Willd. Stems coarse, often climbing high: corolla-lobes mostly shorter than the deeply campanulate tube: scales copiously fringed: pod globose, umbonate.—The most common Atlantic species, and extending into Texas. In Louisiana and Texas occurs var. CALYPTRATA Engelm., distinguished by the corolla eventually capping the pod.

++ ++ *Calyx of 5 distinct and largely overlapping sepals, surrounded by 2 to 5 or more similar bracts: scales of corolla large and deeply fringed: pod mostly 1-seeded, capped by marcescent corolla.*

= *Flowers on bracteolate pedicels, in loose panicles.*

6. **C. cuspidata** Engelm. Stems slender: flowers 3 to 4.5 mm. long, thin, membranaceous when dry: bracts and sepals ovate-orbicular and oblong: lobes of corolla cuspidate or mucronate, rarely obtuse, shorter than the cylindrical tube: styles many times longer than ovary, at length exserted.—Wet or dry prairies, throughout Texas and northward. On *Ambrosia, Iva,* some *Leguminosæ,* etc.

= = *Flowers closely sessile in densely compact clusters.*

a. *Bracts and sepals concave and appressed.*

7. **C. squamata** Engelm. Orange-colored stems slender: glomerules few-flowered, often contiguous: flowers white, membranaceous when dry, 5 to 6 mm. long: cuspidate or obtuse sepals and lanceolate acute corolla-lobes both shorter than the cylindrical upwardly widening tube: styles many times longer than ovary.—Western Texas. Common in bottom lands of Upper Rio Grande.

8. **C. compacta** Juss. Stems coarse: flowers (about 4 mm. long) at length in continuous and often very thick clusters: orbicular bracts and sepals crenulate, nearly equaling or shorter (and ovate-oblong lobes much shorter) than the cylindrical corolla-tube: styles little longer than ovary.—In damp woods, extending from the Atlantic region to Texas. Almost always on shrubs.

b. *Bracts (8 to 15) and sepals with recurved-spreading and crenate tips.*

9. **C. glomerata** Choisy. Stems coarse, orange-colored, soon withering away, leaving dense flower-clusters closely encircling in rope-like masses the stems of the host: sepals nearly equaling and its oblong obtuse lobes much shorter than the cylindrical upwardly widening corolla-tube: styles several times longer than ovary.—Wet prairies, extending from the north into Texas. Mostly on *Helianthus, Vernonia,* and other tall *Compositæ.*

+ + *Capsule more or less regularly circumscissile, usually capped by remains of corolla: styles capillary and mostly much longer than the depressed ovary.*

10. **C. leptantha** Engelm. Stems low and capillary: flowers (4 to 4.5 mm. long) 4-merous, on slender fascicled pedicels: papillose calyx and lanceolate corolla-lobes much shorter than the slender tube: scales incisely dentate and much shorter than tube.—Mountains of western Texas, on a prostrate *Euphorbia (Wright).*

11. **C. umbellata** HBK. Stems low and capillary: flowers (3 to 5 mm. long) few together in umbel-like clusters, shorter than their pedicels: acute calyx-lobes and lanceolate-subulate corolla-lobes larger than its shallow tube, the latter soon sharply reflexed: scales deeply fringed and exceeding the tube: styles mostly little longer than ovary. (*C. Californica,* var. *reflexa* Coulter.)—Dry places, southern Texas. On low herbs.

* * *Styles united into one: capsule circumscissile.*

12. **C. exaltata** Engelm. Stems thick, climbing high: lobes of fleshy calyx and corolla orbicular, the former covering and the latter half the length of the corolla-tube: anthers sessile: scales small, bifid or reduced to a few lateral teeth: styles two-thirds united.—Southern Texas, from the Colorado to the Rio Grande. On trees, such as *Diospyros Texana, Ulmus crassifolia,* Live Oak, etc.

SOLANACEÆ. (NIGHTSHADE FAMILY.)

Herbs (rarely shrubs), with alternate leaves, regular 5-merous and 5-androus flowers on bractless pedicels, imbricate and mostly plaited corolla, mostly equal stamens inserted on the corolla, single style and stigma, and a 2 (rarely 3 to 5) celled many-seeded pod or berry with placentæ in the axis often projecting far into the cells.

* Stamens (normally 5) all perfect: fruit a berry or at least indehiscent, sometimes nearly dry: seeds flattened: limb of corolla plicate or valvate (usually both).

+ Anthers longer than filaments, connivent or connate into a cone or cylinder: corolla rotate: calyx unchanged in fruit.

1. **Lycopersicum.** Anthers connate into a pointed cone: the cells dehiscent longitudinally within.

2. **Solanum.** Anthers connivent or lightly connate; the cells opening at apex by pore or short slit (sometimes also longitudinally dehiscent).

+ + Anthers unconnected, mostly shorter than filaments, destitute of terminal pores, longitudinally dehiscent.

++ Calyx not investing fruit, or much changing under it.

3. **Capsicum.** Corolla rotate: anthers oblong or cordate: berry girt only at base by nearly unchanged calyx.

++ ++ Calyx herbaceous and closely investing fruit or most of it, not angled.

4. **Chamæsaracha.** Corolla rotate, 5-angulate: summit of globose berry usually more or less naked.

++ ++ ++ Calyx becoming much enlarged and inflated, inclosing fruit, reticulate-veiny.

5. **Physalis.** Corolla rotate or rotate-campanulate, 5-angulate or obscurely 5-lobed: stamens not connivent.

6. **Margaranthus.** Corolla urceolate-globose and 5-angular-gibbous above short narrow base and with minutely 5-toothed contracted orifice, including the connivent stamens.

* * Stamens (4 or 5) perfect: berry and seeds as in preceding: limb of corolla imbricated in bud.

7. **Lycium.** Corolla funnelform or tubular: stamens often exserted: berry small: 2-celled.

* * * Stamens (5) all perfect: fruit a pod: seeds as before: limb of corolla plicate or imbricated in bud.

8. **Datura.** Calyx prismatic or tubular, 5-toothed: corolla funnelform: pod prickly, more or less 4-celled.

* * * * Stamens (mostly 5) all perfect: fruit a berry or pod: seeds little or not at all flattened: corolla (usually elongated) with limb induplicate-valvate or imbricated.

9. **Cestrum.** Fruit a rather dry globular berry: seeds few, with smooth coat.

10. **Nicotiana.** Fruit a pod: seeds very small and numerous, with granulate or rugose coat.

* * * * * Stamens (5) conspicuously unequal: fruit a pod: seeds globular or angular, not compressed: limb of corolla plicate or induplicate.

+ All 5 stamens perfect (rarely 5th wanting), inserted low down on funnelform or salverform corolla, included.

11. **Petunia.** Calyx 5-parted: anther-cells distinct: pod with 2 undivided valves.

12. **Bouchetia.** Calyx 5-cleft, with narrow lobes: anthers connivent, their cells somewhat confluent: pod at length 4-valved.

+ + Stamens 4, didynamous, the fifth a sterile filament, included in throat of long-tubed corolla.

13. **Leptoglossis.** Anthers somewhat reniform, confluent at summit: stigma or style under it petaloid-dilated.

1. LYCOPERSICUM Tourn. (Tomato, etc.)

Chiefly annuals, with once or twice pinnate leaves, rounded petiolulate leaflets, racemes of small flowers becoming lateral or opposite the leaves, articulated pedicels reflexed in fruit, rotate corolla, anthers connate in a cone and longitudinally dehiscent, and red or yellow pulpy berries.

1. **L. esculentum** Mill., var. **cerasiforme** Gray. (Cherry tomato.) Hirsute on branches and more or less glandular: leaves interruptedly 1 or 2-pinnate; larger leaflets incised and toothed, interposed smaller ones rounder and often entire: calyx little shorter than yellow corolla: inflorescence bractless: berry globose and even, small. (*L. cerasiforme* Dunal.)—Spontaneous on southern borders of Texas. Introduced from tropical America, and probably the normal form of the tomato of the gardens.

2. SOLANUM Tourn. (Nightshade.)

Herbs or shrubs, with larger leaves often accompanied by a smaller lateral one, mostly lateral and extra-axillary peduncles, 5-parted or cleft calyx and (rotate) corolla, exserted stamens with very short filaments and anthers converging around the style and opening at tip by two pores or chinks, and a usually 2-celled berry.

* *Fruit naked (not inclosed in the enlarging calyx, except no. 9): stamens all alike.*

+ *Never prickly: anthers blunt: pubescence when present simple (except in no. 4).*

++ *Leaves pinnate.*

1. **S. tuberosum** L., var. **boreale** Gray. Low, more or less pubescent: tubes about 12 mm. in diameter: leaflets 5 to 7, ovate or oval, with few interposed small ones or none at all: peduncle few-flowered: corolla blue or white, angulate-5-lobed. (*S. Fendleri* Gray.)—In the mountains west of the Pecos: Chenate mountains (*Nealley*). *S. tuberosum* is the potato-plant, a native of South America, from which our plant seems not specifically distinct.

++ ++ *Leaves simple.*

2. **S. nigrum** L. (Common nightshade.) Low annual, much branched and often spreading, nearly glabrous, rough on the angles: leaves ovate, wavy-toothed: flowers white, in small umbel-like lateral clusters, drooping: calyx spreading: filaments hairy: berries globular, black.—Common everywhere in damp or shady ground. In Texas and New Mexico, and extending southward, is var. nodiflorum Gray, which is slender and often tall, with entire (rarely few-toothed) acuminate leaves, glabrous filaments, generally exserted style, and calyx reflexed in fruit. (*S. nodiflorum* Jacq.)

3. **S. triquetrum** Cav. Nearly glabrous perennial, with suffruticose flexuous or sarmentose stems which are hardly climbing: branches angled but hardly triquetrous: leaves deltoid-cordate, varying to hastate, in smaller forms to hastate-3-lobed (or even 5-lobed) with the middle lobe lanceolate or linear and prolonged: cymes mostly umbellately few-flowered: corolla violet or purple (sometimes white): berries globose, red.—Low grounds and thickets, throughout southern and western Texas.

4. **S. verbascifolium** L. Erect shrub, very soft-tomentose throughout with stellate pubescence: leaves ovate, rounded at base (10 to 25 cm. long), entire, very

hoary beneath: peduncles usually terminal and erect, rather long and stout, bearing a many-flowered cyme: corolla white, downy outside, 5-parted, lobes ovate: ovary woolly.—A Mexican species found very near the Texan borders.

+ + More or less prickly: anthers more or less elongated and tapering at apex.

++ Corolla 5-parted: pubescence all of simple hairs.

5. **S. aculeatissimum** Jacq. Villous with scattered long and weak-jointed hairs, or soon glabrate, beset (even to calyx) with slender-subulate straight prickles: leaves rather large, membranaceous, ovate or slightly cordate, mostly sinuate-pinnatifid: corolla white: berry globose, becoming red or yellow.—An introduced weed near dwellings, native of the tropics, and extending through Texas into the Gulf States.

++ ++ Corolla 5-cleft or angulate-5-lobed: pubescence all or partly stellate.

= Fruiting pedicels recurved or reflexed: mature berries naked, merely subtended by calyx: corolla violet, rarely white.

6. **S. elæagnifolium** Cav. Silvery-canescent with dense scurf-like pubescence of many-rayed hairs: prickles small, slender, more or less copious or wanting: leaves lanceolate to oblong and linear, sinuate-repand or entire: calyx-lobes slender: berry seldom 12 mm. in diameter. (*S. Texense* Eng. & Gray Pl. Lindh.)—Prairies and plains, throughout Texas. The "trompillo" of the Mexicans. Commonest of weeds in valleys of southern and western Texas. The berries, first green, then yellow, finally black, the size of small marbles, are used for curdling milk by natives of northern Mexico and southern Texas. (Havard.)

7. **S. Torreyi** Gray. Cinereous with a somewhat close pubescence of about equally 9 to 12-rayed hairs: prickles small and stout, scanty or nearly wanting: leaves ovate with truncate or slightly cordate base, sinuately 5 to 7-lobed (10 to 15 cm. long): calyx-lobes short-ovate, abruptly long-acuminate: berry 25 mm. in diameter. (*S. mammæum?* Eng. & Gray Pl. Lindh.)—Prairies, throughout Texas.

8. **S. Carolinense** L. (HORSE-NETTLE.) Hirsute or roughish-pubescent with 4 to 8-rayed hairs: prickles stout, yellowish, copious (rarely scanty): leaves oblong or ovate, obtusely sinuate-toothed or lobed to sinuate-pinnatifid: racemes simple, soon lateral: calyx-lobes acuminate: berries about 12 mm. broad.—Sandy soil and waste ground, extending into Texas from the Atlantic region.

= = Fruiting pedicels merely spreading: berry wholly or partly enveloped by the loose calyx: pubescence partly simple.

9. **S. sisymbriifolium** Lam. Green, stout, villous-pubescent with simple more or less glandular and viscid hairs, mixed on the leaves with some few-rayed stellate hairs, much armed (even to calyx) with long-subulate straight prickles: leaves deeply pinnatifid and the oblong lobes sinuate or even again somewhat pinnatifid: flowers in terminal or lateral pedunculate racemes: corolla light blue or white, 2.5 cm. or more in diameter: berry red.—Adventive or escaped from cultivation. (Nat. of S. Am.)

** * Fruit inclosed by close-fitting and horridly prickly calyx: lowest anther much the longest: stamens and styles much declined: annuals armed with straight prickles.*

10. **S. heterodoxum** Dunal. Pubescent with glandular-tipped simple hairs, with a very few 5-rayed bristly ones on upper face of the irregularly or interruptedly bipinnatifid leaves; their lobes roundish or obtuse and repand: corolla violet: 4 anthers yellow, and large one tinged with violet.—Western Texas. Leaves watermelon-like in form and division (Gray).

11. **S. rostratum** Dunal. Somewhat hoary or yellowish with a copious wholly stellate pubescence: leaves nearly as in the preceding or less divided, some of them only once pinnatifid: corolla yellow.—Plains, throughout Texas.

3. CAPSICUM Tourn. (CAYENNE PEPPER.)

Herbs or shrubs, with ovate and entire or merely repand thin and usually acuminate leaves, small solitary or cymose flowers on slender pedicels, short truncate or merely toothed calyx, rotate deeply cleft usually white corolla, bluish unconnected anthers longitudinally dehiscent, and red or yellowish very pungent berries.

1. **C. baccatum** L. (BIRD PEPPER.) Shrubby, 3 to 6 dm. high, with slender divergent branches: leaves slender-petioled: calyx more or less toothed in flower, truncate in fruit: berry elliptical-globular or globose: peduncles in fruit erect.—Sparsely found in southern and southwestern Texas. The "chiltapin" of the Mexicans, who prize its exceedingly pungent berries as condiment. (Havard).

4. CHAMÆSARACHA Gray.

Perennials, with mostly narrow entire or pinnatifid leaves tapering into margined petioles, filiform naked pedicels solitary in the axils and refracted or recurved in fruit, herbaceous calyx closely investing the globose berry (or most of it) and obscurely if at all veiny, rotate 5-angulate corolla, and filiform filaments with separate oblong anthers.

1. **C. Coronopus** Gray. Green, almost glabrous, or beset with some short and roughish hairs, diffusely very much branched: leaves lanceolate or linear with cuneate-attenuate base, varying from nearly entire to laciniate-pinnatifid: peduncles elongated: calyx more or less hirsute (hairs often 2-forked at tip): corolla yellowish. (*Withania? Coronopus* Torr. Mex. Bound.)—Clayey soil, southern and western Texas.

2. **C. sordida** Gray. Much branched from root or base, somewhat cinereous with short viscid pubescence: leaves obovate-spatulate or cuneate-oblong to oblanceolate, repand to incisely pinnatifid: calyx when young villous-viscid: corolla pale yellow or violet-purple. (*Withania? sordida* Torr. Mex. Bound.)—Dry or clayey soil, throughout Texas.

5. PHYSALIS L. (GROUND CHERRY.)

Herbs, with leaves often unequally in pairs, 1-flowered nodding extra-axillary peduncles, 5-cleft calyx reticulated and enlarging after flowering at length much inflated and inclosing the 2-celled globular (edible) berry, rotate-funnelform corolla with the very short tube marked with 5 concave spots at base, and 5 erect stamens with separate longitudinally dehiscent anthers.

* *Young parts sparsely (or stalks and calyx densely) scurfy-granuliferous, otherwise quite glabrous: some leaves sinuate-pinnatifid: corolla flat-rotate.*

1. **P. lobata** Torr. Low and small, diffusely branched: leaves oblong-spatulate or obovate, from repand to sinuate-pinnatifid, the base cuneately tapering into a margined petiole: pedicels commonly in pairs: corolla violet, 12 to 18 mm. in diameter, the center with a 5 or 6-rayed white-woolly star: globular-inflated fruiting calyx strongly 5-angled.—Plains of southern and western Texas.

* * *Not granulose-scurfy: leaves never pinnatifid: corolla rotately spreading from somewhat campanulate throat or base.*

+ *Corolla pure white, wholly destitute of any dark center, tomentose at throat, widely rotate with almost entire border: pubescence simple.*

2. **P. Wrightii** Gray. Annual, widely branched, nearly glabrous: leaves oblong or lanceolate-oblong, sinuate-toothed or repand, acute at base, about 2.5 cm. long:

pedicels filiform: fruiting calyx 12 mm. long, nearly filled by the berry.—Southwestern Texas, on prairies of the San Pedro (*Wright*).

+ + *Corolla lurid greenish-white or yellow, mostly darker-colored or brownish at center.*

++ *Annuals, glabrous or nearly so: pubescence (if any) minute and neither viscid nor stellate: anthers violet.*

= *Corolla 6 to 12 mm. broad: berry greenish-yellow.*

3. **P. obscura** Michx. Branches widely diffuse: leaves broadly deltoid-ovate, mostly with truncate or subcordate base, unequally dentate, abruptly acuminate, 3.5 to 7.5 cm. long: slender pedicels about 12 mm. long: corolla pale yellow with a dark eye: calyx-lobes lanceolate-subulate: fruiting calyx with 5 strong keeled angles and 5 much less distinct intermediate nerves.—Near Houston (*Hall*).

4. **P. angulata** L. Erect, or at length declined or spreading: leaves mostly ovate-oblong, with somewhat cuneate base, coarsely and laciniately toothed, 5 to 12.5 cm. long: slender pedicels 25 mm. or more long: corolla greenish-white or yellowish, with no distinct eye: calyx-lobes triangular: fruiting calyx 10-angled, the 5 principal ones sharply keeled.--Extending from Atlantic region to southern Texas.

5. **P. æquata** Jacq. f. Erect, much branched, the younger stems and branches a little hairy: leaves ovate or oblong, repand or sinuate-toothed, 2.5 to 5 cm. or more long: pedicels very short, 2 to 4 mm. long: corolla light yellow with a brownish eye: calyx-lobes short and broadly ovate-triangular: fruiting calyx about equally 10-nerved.—Waste grounds, southern and western Texas.

= = *Corolla 14 to 25 mm. broad: berry reddish or purple.*

6. **P. Philadelphica** Lam. Erect stem and branches angled, 6 to 9 dm. high: leaves obliquely ovate or oblong, repand-angulate and sometimes few-toothed, 5 to 10 cm. long: corolla greenish or yellowish with a dark eye: calyx-lobes broadly ovate or triangular: fruiting calyx globular.—In fertile soil, extending from the Atlantic region into Texas.

+ + + + *Annuals or perennials, strong-scented, villous or pubescent with viscid or glandular simple hairs: fruiting calyx 5-angled and keeled: berry green at length yellow: leaves ovate or cordate.*

= *Root annual: anthers violet.*

7. **P. pubescens** L. Diffusely much branched or at length decumbent: leaves angulate- or repand-toothed or nearly entire: corolla spotted with brown purple at center, 10 to 12 mm. broad, obscurely 5 or 10-toothed.—Low grounds, throughout southern Texas.

= = *Perennial: anthers mostly yellow.*

8. **P. Virginiana** Mill. Diffusely much branched and widely spreading, or at first erect, pubescent or hirsute-villous: leaves sometimes oblong, repand or obtusely toothed, rarely entire: corolla 18 to 25 mm. broad, 5-angled or 5 or 10-toothed, dull sulphur-yellow with a brownish center: pedicels 12 to 25 mm. long. (*P. viscosa* Gray, Man., not L.)—Light or sandy soils, extending from the Atlantic States into Texas.

9. **P. hederæfolia** Gray. Erect or at length diffuse, densely viscid-pubescent or on young parts more or less villous: leaves roundish-cordate or almost reniform, or sometimes ovate, coarsely and obtusely angulate-toothed, 18 to 36 mm. in diameter: corolla 12 mm. broad: pedicels 4 to 8 mm. long.—Rocky hills, southwestern Texas. At the western borders of Texas is var. PUBERULA Gray, with short minutely glandular less viscid pubescence, stems inclined to be procumbent, and smaller leaves.

+ + + + + + *Perennials, not viscid, mostly low: anthers almost always yellow.*

= *Pubescence stellular or branching: leaves all or most of them cordate or ovate with abrupt base.*

10. **P. mollis** Nutt. Softly cinereous-tomentose or canescent throughout with stellate or many-branched woolly hairs: leaves varying from ovate (or some of the

lower obovate) to rounded-cordate, mostly obtuse, angulate-toothed or repand, on slender petioles: pedicels usually filiform and equaling the petiole: corolla 12 to 18 mm. broad.—Thickets and banks of streams, extending from Arkansas into Texas where also occurs var. CINERASCENS Gray, which is greenish, with much shorter and less dense pubescence, roundish leaves rarely at all cordate (some of the lower with cuneate base), and sometimes shorter pedicels.

= = *Pubescence stellular, or simple and rigid, or nearly none: leaves from oval to lanceolate-linear and tapering into the petiole.*

11. **P. viscosa** L. Cinereous or when young almost canescent with short stellate or 2 or 3-forked pubescence: stems ascending or spreading from slender creeping subterranean shoots: leaves ovate or oval, varying to oblong or obovate, entire or undulate: corolla greenish-yellow, with a more or less dark eye: fruiting calyx globose-ovate: berry yellow or orange.—In sands on or near the Atlantic coast, and represented along the Texan coast by var. SPATHULÆFOLIA Gray, with spatulate or oblong-lanceolate leaves gradually tapering into the petiole (*P. pubescens* Eng. & Gray, Pl. Lindh. *P. lanceolata*, var. *spathulæfolia* Torr. Mex. Bound.).

12. **P. lanceolata** Michx. More or less hirsute-pubescent with short stiff mostly simple hairs, varying to nearly glabrous: stems from rather stout subterranean shoots, angled, somewhat rigid: leaves oblong-ovate to narrowly lanceolate, sparingly angulate-toothed to undulate or entire: corolla ochroleucous, with a more or less dark eye: calyx commonly hirsute, in fruit pyramidal-ovate: berry reddish. (*P. Pennsylvanica* Gray, Man., in part, not L.)—Dry open ground and bottoms, throughout Texas. Associated with var. LÆVIGATA Gray, which is glabrous or almost so throughout, or with some very short hairs on young parts. In wet woods, in eastern Texas, represented by var. HIRTA Gray, with much of the hirsute-pubescence of the leaves 2 or 3-forked, as also are some of the abundant villous-hispid hairs of the stem.

6. MARGARANTHUS Schlecht.

Resembles an annual *Physalis* on a small scale, except in the globular (livid or violet-tinged) corolla: the small berry wholly included in the globular and vesicular fruiting calyx, rather dry, 20 to 30-seeded.

1. **M. solanaceus** Schlecht. Nearly glabrous, erect, divergently branched: leaves membranaceous, ovate and ovate-lanceolate, entire or somewhat repand, occasionally 1 or 2-toothed, 2.5 to 5 cm. long, slender-petioled: pedicels short, recurving: corolla barely 4 mm. long, and globular-conical fruiting calyx 8 to 12 mm. long.—Southern and western borders of Texas.

7. LYCIUM L. (MATRIMONY-VINE.)

Shrubby mostly spiny plants, with alternate and entire small leaves, mostly axillary small flowers, 3 to 5-toothed or cleft calyx not enlarging and persistent at base of berry, funnelform or salverform 5-lobed corolla, 5 stamens with anthers opening lengthwise, slender style with capitate stigma, and small 2-celled red or reddish berries.

1. **L. pallidum** Miers. Glabrous: leaves pale, spatulate and oblanceolate, 2.5 to 5 cm. long: pedicels about equaling the deeply 5-cleft calyx: corolla funnelform, nearly 25 mm. long, greenish tinged with purple, with broad and rounded lobes: filaments exserted.—Southwestern border of Texas.

2. **L. puberulum** Gray. Leaves obovate and oblong-spatulate, 6 to 12 mm. long, minutely and densely puberulent: flowers solitary and sessile in the fascicles of leaves: corolla tubular-funnelform, 8 to 10 mm. long, white, with the triangular-ovate recurved-spreading acute lobes not longer than the abruptly dilated throat

and tinged with greenish-yellow: stamens included, with glabrous filaments.—Southwestern border of Texas.

3. **L. Carolinianum** Walt. Glabrous: leaves fleshy, linear-spatulate or so thickened as to be clavate, 2.5 cm. or less long: pedicels slender: flower 4 or 5-merous: calyx short, irregularly cleft in age: corolla purple, with short tube (2 to 4 mm. long) and almost rotate limb deeply parted into oval lobes (nearly 12 mm. broad): slender filaments (woolly at base) and style elongated.—Salt marshes, near the coast and through southern Texas.

4. **L. Berlandieri** Dunal. Glabrous throughout: leaves spatulate-linear, 12 to 25 mm. long: pedicels filiform, as long as the commonly 4-merous rather short funnelform corolla (white, cream-color, or tinged with violet), which is 6 to 8 mm. long, mostly thrice the length of the campanulate calyx which nearly includes its narrow proper tube: stamens little if at all exserted; filaments villous at base.—Southern and western Texas.

5. **L. Torreyi** Gray. Glabrous throughout: leaves linear-spatulate or broader, sometimes over 2.5 cm. long and over 4 mm. wide: pedicels 4 to 6 mm. long: corolla 10 to 12 mm. long, tubular-funnelform, white, cream-color, or tinged with violet; limb about 8 mm. wide, and lobes tomentulose on the edges: stamens little if at all exserted; filaments woolly at base. (*L. barbinode* Torr. Mex. Bound.)—Western border of Texas, near El Paso.

8. DATURA L. (Stramonium. Thorn-apple.)

Rank narcotic-poisonous weeds, with ovate leaves, large showy flowers on short peduncles in the forks of the branching stem, prismatic or tubular 5-toothed calyx separating transversely above the base in fruit, funnelform corolla with a large and spreading 5 or 10-toothed plaited border, 2-lipped stigma, globular prickly 4-valved 2-celled pod with 2 thick placentæ projected from the axis into the middle of the cells, and rather large flat seeds.

1. **D. quercifolia** HBK. Green, and young parts commonly somewhat pubescent: leaves sparingly but mostly deeply sinuate-pinnatifid: calyx prismatic: corolla pale violet, about 7.5 cm. long: pod armed with large and unequal flattened prickles, some of the upper not rarely 2.5 cm. long, strictly erect: seeds thickish, with a dark-colored and more or less pitted or rugose coat.—Naturalized from Mexico on southwestern borders of Texas.

2. **D. meteloides** DC. Pruinose-glaucescent with minute puberulence or pubescence: leaves unequally ovate, merely repand or nearly entire: calyx cylindrical, about 7.5 cm. long: corolla white suffused with violet, sweet-scented, 17.5 to 20 cm. long when well developed: pod thickly muricate with short and equal prickles, nodding on short recurved peduncle: seeds flatter, with pale smoothish coat.—Along streams, southern and western Texas.

9. CESTRUM L.

Shrubs or low trees, with entire short-petioled pinnately veined leaves, variously clustered flowers on axillary peduncles or forming a terminal panicle or corymb, narrowly tubular-funnelform or clavate corolla, filiform filaments with anthers short and explanate after dehiscence, usually short-stipitate few-ovuled ovary, fruit a rather dry globular reddish or blackish berry, and few seeds or by abortion solitary.

1. **C. diurnum** L. Glabrous: leaves oblong, very bright green above: flowers sessile in a short close cluster on an axillary peduncle: corolla white, enlarging very

gradually from base to summit, not narrowed at throat, 12 mm. long, with lobes short and roundish.—A West Indian species, reported as introduced in Tom Green County (*Tweedy*).

2. **C. Parqui** L'Her. A very fetid more or less cinereous shrub: leaves narrowly lanceolate, acuminate, green on both sides or pale beneath: flowers subsessile in a crowded terminal panicle of spicate racemes: corolla yellow. (*C. multinervium* Watson Proc. Am. Acad. 18. 128.)—A South American species, cultivated in warm countries, and apparently spontaneous at San Antonio (*Palmer*).

10. NICOTIANA Tourn. (Tobacco.)

Rank acrid-narcotic mostly clammy-pubescent herbs (one arborescent), with ample leaves, racemed or panicled flowers, tubular-bell-shaped 5-cleft calyx, funnelform or salverform corolla usually with a long tube and 5-lobed plaited border, capitate stigma, 2-celled pod 2 to 4-valved from the apex, and numerous minute seeds.

* *Leaves undulate-crisped or repand or fiddle-shaped, all the upper more or less clasping: corolla-tube almost filiform, 3.5 to 6.5 cm. long: filaments very short: flowers loosely racemose.*

1. **N. plumbaginifolia** Viv. Somewhat scabrous-pubescent or glabrate: cauline leaves sessile and with partly clasping base, undulate and sometimes even crisped; lowest oblong or obovate-spatulate; the others oblong-lanceolate and acuminate, above passing into linear-subulate bracts: corolla greenish-white, less than 5 cm. long; lobes 4 to 6 mm. long, acute.—Damp grounds around Matamoras, and probably on the Texan side also.

2. **N. repanda** Willd. Minutely pubescent or glabrate above, with open racemose or somewhat paniculate naked inflorescence: leaves thin (7.5 to 15 cm.) long, and 2.5 to 10 cm. wide), ovate, or the lower obovate and sometimes fiddle-shaped, commonly repand; lowest contracted into a winged petiole; upper deeply cordate-clasping: bracts minute or often wanting: corolla with tube frequently 5 cm. long, the spreading limb white, or tinged with rose, 14 to 25 mm. broad, its lobes short and obtuse or acutish.—Low grounds, common from San Antonio to Devil's River.

* * *Leaves entire, or the margins sometimes obscurely undulate: filaments slender.*

3. **N. trigonophylla** Dunal. Viscid-pubescent, simple or virgately branched: leaves all sessile or only the lower tapering into a winged petiole, and obovate-oblong; upper oblong-lanceolate with a broader cordate half-clasping base, or some spatulate-lanceolate with a dilated auriculate-clasping base, 2.5 to 10 cm. long: inflorescence at length loosely paniculate-racemose: corolla greenish-white or yellowish, about 18 mm. long, somewhat pubescent, the sinuately-lobed limb about 8 mm. broad.—Southern and western Texas.

4. **N. Glauca** Graham. Arborescent, soft-woody below, glaucous and glabrous: leaves long-petioled, ovate and subcordate, entire or repand: flowers loosely paniculate: corolla greenish becoming yellow, 2.5 to 5 cm. long, tubular, contracted at throat, and with erect 5-crenate limb not longer than the orifice.—Native of South America, naturalized in southern Texas and frequently cultivated. "Coneton" and "tronadora" of the Mexicans.

11. PETUNIA Juss.

Viscid herbs, with entire leaves, scattered flowers becoming lateral, 5-parted calyx, 5 perfect but conspicuously unequal stamens (4 being didynamous and the fifth smaller) inserted low down on the funnelform or salverform corolla and included, distinct anther-cells, a fleshy

hypogynous disk, dilated-capitate unappendaged stigma, and pod with 2 undivided valves.

1. P. parviflora Juss. A small prostrate or diffusely spreading annual, more or less pubescent: leaves oblong-linear or spatulate, rather fleshy, seldom 12 mm. long, nearly sessile: peduncles very short: calyx-lobes resembling the smaller leaves: corolla purple with a pale or yellowish tube, 8 mm. long, funnelform.—Throughout southern and southwestern Texas.

12. BOUCHETIA DC.

Low and much branched from a perennial root, with entire leaves, oblong, campanulate 5-cleft calyx with narrow lobes, short funnelform corolla, 5 perfect but unequal stamens, connivent anthers with cells somewhat confluent at summit, no hypogynous disk or obscure, transversely dilated somewhat reniform stigma, and pod at length 4-valved.

1. **B. erecta** DC. Minutely appressed-pubescent: leaves oblong-spatulate, or the the lower oval and petioled, and the upper lanceolate and sessile, rather small: peduncles terminal or lateral and scattered: corolla white, 12 to 18 mm. long, about twice the length of the calyx, the broadly funnelform limb deeply 5-lobed. (*Nierembergia anomala* Torr. Mex. Bound.)—Moist prairies and rocky hills, southern and southwestern Texas.

13. LEPTOGLOSSIS Benth.

Low perennial diffusely much branched from a woody base, with 5-cleft or toothed calyx, salverform corolla with slender tube and swollen throat at base of which the stamens are inserted, 4 didynamous stamens (the fifth a sterile filament), somewhat reniform anthers confluent at summit, stigma or style under it petaloid-dilated, and 2-valved pod.

1. **L. Texana** Gray. Viscid-pubescent: leaves spatulate-obovate or oblong, acute, narrowed at base, the lower into a short margined petiole: corolla apparently white; filiform tube 16 to 18 mm. long, the almost regular broadly 5-lobed plane limb of about the same diameter: winged appendages under stigma narrower than wide: pod only half the length of the 10-nerved calyx. (*Nierembergia viscosa* and *Browallia Texana* Torr. Mex. Bound.)—Rocky hills, western Texas.

SCROPHULARINEÆ. (Figwort Family.)

Chiefly herbs (rarely trees), with didynamous stamens (or perfect stamens often only 2, rarely 5) inserted on the tube of the 2-lipped or more or less irregular corolla whose lobes are imbricated in the bud, and fruit a 2-celled and usually many-seeded pod with placentæ in the axis.

I. Upper lip or lobes of corolla covering the lower in bud: pod usually septicidal.

* Corolla campanulate or short-funnelform: leaves alternate: tomentose shrubs.

1. **Leucophyllum.** Corolla with rounded and spreading nearly equal lobes: stamens 4 and didynamous, or rarely 5 and fifth imperfect, included.

* * Corolla rotate: flowers racemose: leaves alternate.

2. **Verbascum.** Stamens 5, all with anthers, and 3 or all with bearded filaments.

* * * Corolla tubular, with spur or sac at base below, throat usually with palate: pod opening by chinks or holes: flowers in simple racemes or axillary: lower leaves usually opposite or whorled: stamens 4.

3. **Linaria.** Corolla spurred at base; palate seldom closing throat.

4. **Antirrhinum.** Corolla merely saccate at base; palate closing throat.

5. **Maurandia.** Corolla barely gibbous at base, with 2 longitudinal and commonly bearded intruded lines or plaits instead of palate.

* * * * Corolla tubular or 2-lipped, not spurred or saccate below: pod 2 to 4-valved: leaves opposite: inflorescence usually compound, of small axillary spiked or racemed clusters or cymes: stamens 4, with rudiment of the fifth.

6. **Pentstemon.** Sterile stamen about as long as the rest: seeds wingless.

* * * * * Corolla tubular, not saccate or spurred: pod 2-valved: flowers solitary in axils of bracts or leaves: leaves all or lower ones opposite: no trace of a fifth stamen.

\- Stamens 4, all anther-bearing and similar.

7. **Mimulus.** Calyx prismatic, 5-angled, 5-toothed: corolla elongated.

8. **Stemodia.** Calyx 5-parted, divisions equal: corolla short: anther-cells separate and stipitate.

9. **Conobea.** Calyx 5-parted, divisions equal: corolla short: anther-cells distinct but not stipitate.

10. **Herpestis.** Calyx 5-parted, unequal, upper division largest: corolla short.

\- \- Anther-bearing stamens 2; usually also a pair of sterile filaments.

11. **Gratiola.** Calyx 5-parted: stamens included, the sterile pair short or none.

12. **Ilysanthes.** Calyx 5-parted: stamens included, the sterile filaments protruded.

13. **Micranthemum.** Flowers minute: calyx 4-toothed or -cleft: upper lip of corolla short or none: filaments with an appendage; sterile pair none: dwarf aquatic.

II. Under lip or lateral lobes of corolla covering upper in bud: pod commonly loculicidal.

* Corolla rotate, salverform, or campanulate: stamens 2 or 4, not approaching in pairs or strongly didynamous: anthers 2-celled.

\- Stamens 4 (sometimes 5), nearly equal.

14. **Scoparia.** Corolla 4-cleft, densely hairy in throat: stamens 4; anther-cells distinct: leaves opposite or verticillate.

15. **Capraria.** Corolla 5-cleft: stamens often 5; anther-cells confluent at apex: leaves alternate.

\- \- Stamens 2.

16. **Veronica.** Calyx 4 (rarely 3 or 5)-parted: corolla rotate or salverform, almost regular: flowers racemed: leaves chiefly opposite or whorled.

* * Corolla with spreading and slightly unequal 5-lobed limb: stamens 4, approximate in pairs: leaves opposite or uppermost alternate.

\- Corolla salverform: anthers 1-celled: flowers in a spike.

17. **Buchnera.** Calyx tubular, 5-toothed: limb of elongated corolla 5-cleft.

\- \- Corolla bell-shaped to funnelform: anthers 2-celled.

18. **Seymeria.** Stamens nearly equal: tube of corolla broad, not longer than lobes.

19. **Gerardia.** Stamens strongly unequal, included.

* * * Corolla tubular, plainly 2-lipped; upper lip narrow, erect or arched, inclosing the 4 usually strongly didynamous stamens: anther-cells unequal and separated.

20. **Castilleia.** Calyx tubular, cleft down the lower (often also on the upper) side: upper lip of corolla elongated; lower short, often very small.

21. **Cordylanthus.** Calyx spathe-like, 2-leaved: corolla tubular, with lips commonly of equal length.

1. LEUCOPHYLLUM Humb. & Bonpl.

Low and much-branched shrubs which are densely scurfy-tomentose with usually silvery-white wool, with showy violet-purple flowers on short bractless peduncles in the axils of the small obovate or roundish and short-petioled entire leaves, corolla with 5 rounded and spreading nearly equal lobes, 4 didynamous included stamens (rarely 5), anther-cells confluent at apex, and a 2-valved pod.

1. **L. Texanum** Benth. Shrub 6 to 24 dm. high: leaves tomentose, obovate, 12 mm. or more long, almost sessile: calyx-lobes lanceolate-oblong: corolla almost campanulate; the limb 2.5 cm. in diameter, delicately soft-villous within.—Throughout the southern borders of Texas.

2. **L. minus** Gray. Lower, 3 to 6 dm. high: leaves minutely silvery-canescent, obovate-spatulate with long tapering base 12 mm. or less long: calyx-lobes linear: corolla with narrower and more funnelform tube and throat which much exceed the limb, which is 12 mm. in diameter and sparsely pubescent within.—Southern borders of Texas, perhaps the more abundant species westward.

2. VERBASCUM L. (Mullein.)

Tall and usually woolly biennial herbs, with alternate leaves (those of the stem sessile or decurrent), flowers in large terminal spikes or racemes, 5-parted calyx, 5-lobed rotate corolla with lobes broad and rounded and little unequal, 5 stamens with all the filaments (or the 3 upper) woolly, and a globular many-seeded pod.

1. **V. Thapsus** L. (Common mullein.) Densely woolly throughout: stem tall and stout, simple, winged by the decurrent bases of the oblong acute leaves: flowers yellow (rarely white), in a prolonged and very dense cylindrical spike.—One of the most common of introduced weeds in the Atlantic States. Reported only from Gillespie County (*Jermy*), but, of course, widely distributed in the cultivated parts of Texas.

3. LINARIA Tourn. (Toad-flax.)

Herb, with at least all the upper leaves alternate, 5-parted calyx, personate corolla with the prominent palate often nearly closing the throat and spurred at base on the lower side, 4 stamens, and thin pod opening below the summit by one or two pores or chinks.

1. **L. Canadensis** Dumont. Slender and glabrous: leaves linear, entire, 2 to 4 mm. wide: flowers small, blue, in a naked terminal raceme; pedicels erect, not longer than the filiform curved spur of the corolla.—Sandy or gravelly soil throughout Texas.

4. ANTIRRHINUM Tourn. (Snapdragon.)

Corolla merely saccate or gibbous at base; otherwise nearly as *Linaria*, or the palate in some species much less prominent.

1. **A. maurandioides** Gray. Climbing by the slender tortile petioles and axillary peduncles: leaves triangular-hastate or the lower cordate-hastate; the lateral lobes often with a posterior tooth: corolla purple or sometimes white, 12 to 25 mm. long, with a nearly closing palate: sepals lanceolate, very acute.—Throughout southern and western Texas; also common in cultivation.

5. MAURANDIA Ortega.

Herbs climbing mostly by the slender tortile petioles, with cordate-triangular or hastate leaves (only the lower opposite), showy purple or rose-colored (rarely white flowers), nearly funnelform ringent corolla barely gibbous at base and with two longitudinal and commonly bearded intruded lines or plaits instead of palate; otherwise as the two preceding genera.

1. **M. Wislizeni** Engelm. Glabrous: leaves hastate or some of them sagittate; lowest obtuse, the others acuminate and with pointed basal lobes: corolla pale blue, with lips about half the length of the ample tube: sepals becoming much enlarged and very veiny-reticulated and strongly saccate-keeled at base, inclosing the pod, and about the length of the sword-shaped indurated style.—Southern and western Texas.

6. PENTSTEMON Mitchell. (BEARD-TONGUE.)

Perennials, with opposite leaves (upper sessile and mostly clasping), mostly showy thyrsoid or racemose-panicled flowers, 5-parted calyx, tubular and more or less inflated or bell-shaped more or less 2-lipped corolla, 4 stamens declined at base and ascending above, and a fifth sterile-filament usually as long as the others and either naked or bearded.—Ours all belong to § EUPENSTEMON, in which the anther-cells are soon divaricate or divergent, united and often confluent at apex, and dehiscent for their whole length or nearly.

* *Anthers glabrous, reniform, not explanate in age, the line of dehiscence stopping a little short of the base of the cells: stems suffruticose and leaves thick-coriaceous.*

1. **P. baccharifolius** Hook. Glabrous, or the rigid branches puberulent, 6 dm. high, leafy below: leaves oblong, nearly sessile, rigidly and acutely dentate, 2.5 cm. long; uppermost abruptly reduced to small ovate bracts of the loose and racemose glandular inflorescence: corolla deep carmine-red, 2.5 cm. long: sterile filament naked.—Southwestern Texas, on the San Pedro and the Pecos.

* * *Anthers glabrous; the cells dehiscent from base towards but not to apex, hence not explanate after dehiscence: corolla red: glabrous herbs.*

2. **P. barbatus** Nutt. Usually tall, 6 to 18 dm. high: leaves lanceolate or the upper linear-lanceolate; the lowest and radical oblong or ovate: corolla strongly bilabiate, 2.5 cm. long, from light pink-red to carmine; base of the lower lip or throat usually bearded with long and loose or sparse yellowish hairs: sterile filament glabrous.—In the mountains west of the Pecos, where also occurs var. TORREYI Gray, a tall and usually deep scarlet-red-flowered form, with few or no hairs in the throat.

3. **P. Eatoni** Gray. Lower, 3 to 6 dm. high: leaves lanceolate to ovate; the upper partly clasping: thyrsus virgate and strict, the peduncles very short: corolla obscurely bilabiate, 2.5 cm. long, bright carmine-red, tubular, hardly enlarged at the naked throat: sterile filament sometimes minutely bearded at apex.—Reported from the Chisos Mountains, southwestern Texas (*Havard*).

* * * *Anthers from glabrous to hirsute; the diverging or divaricate and distinct cells dehiscent from base nearly or quite to (but not confluently through) apex, not peltately explanate after dehiscence: flowers showy, blue or violet, ampliate above.*

4. **P. glaber** Pursh. Stems 3 to 6 dm. high: leaves mostly oblong-lanceolate or the upper ovate-lanceolate: thyrsus elongated, the peduncles and pedicels very short: corolla 2.5 to 3.5 cm. long, bright blue to violet purple: anthers and apex of sterile

filament glabrous or sparsely hirsute.—A species of the Rocky Mountain region, but represented in the mountains west of the Pecos (*fide* Havard) by var. CYANANTHUS Gray, whose leaves are all broad, thyrsus dense, corolla bright blue, and anthers and sterile filament from hirsute to nearly glabrous.

* * * * *Anthers dehiscent from base to apex and through the junction of the two cells, glabrous, open after dehiscence, explanate in age, mostly confluently 1-celled.*

+ *Glabrous throughout, even to pedicels and calyx: leaves all entire, from linear to ovate: thyrsus virgate or contracted.*

++ *Corolla 16 to 25 mm. long, tubular or funnelform.*

5. **P. acuminatus** Dougl. Stem 1.5 to 5 dm. high, stout: leaves thick, the lower obovate or oblong, the upper lanceolate to broadly ovate or cordate-clasping, acute or acuminate: thyrsus leafy below, very narrow: corolla 16 to 18 mm. long, lilac or violet, the tube gradually and moderately dilated into the funnelform throat: sterile filament mostly bearded at the dilated tip.—Western borders of Texas.

6. **P. Wrightii** Hook. Stems rather stout, 3 to 6 dm. high: leaves oblong or the lowest obovate, upper partly clasping by a roundish base: thyrsus elongated, loosely flowered: corolla about 18 mm. long, bright rose-color, and with ampliate throat: sterile filament dilated at tip and retrorsely bearded down one side.—Western Texas.

7. **P. Havardi** Gray. About 6 dm. high: leaves coriaceous, oval or oblong, lower long-petioled, upper small and half-clasping, those of the elongated racemiform thyrsus reduced to small or minute bracts: corolla 25 mm. long, violet or blue, tubular (throat not over 6 mm. wide and lips only 4 mm. long): sterile filament filiform and naked.—Guadalupe Mountains, southwestern border of Texas (*Havard*).

++ ++ *Corolla showy, 35 mm. or more long, ventricose-funnelform: sterile filament hooked at apex: leaves glaucous, thickish, broad: the upper and floral rounded, all but the obovate radical ones clasping and perfoliate: stem 6 to 12 dm. high.*

8. **P. grandiflorus** Nutt. Leaves all distinct at base: pedicels short: corolla lilac or lavender-blue, abruptly ventricose above proper tube, which exceeds calyx: sterile filament minutely pubescent at the dilated apex.—A species of the northern prairies, reported from Gillespie County (*Jermy*).

9. **P. Murrayanus** Hook. Cauline leaves connate-clasping, and all the upper pairs united into an oval or orbicular concave disk: pedicels slender: corolla deep scarlet, gradually widening upward: sterile filament wholly glabrous.—Prairies of eastern Texas.

+ + *From puberulent to viscid-pubescent.*

++ *Leaves ovate to lanceolate-linear: corolla ample, purplish: sterile filament more or less long-bearded.*

10. **P. Cobæa** Nutt. Soft-puberulent: leaves ovate or oblong, or the lower broadly lanceolate and the upper subcordate-clasping, most of them acutely denticulate or serrate: thyrsus lax and short: corolla commonly 5 cm. long, abruptly campanulate-ventricose above the narrow tube, from dull reddish purple to whitish, glabrous within: slender sterile filament sparsely bearded.—Prairies of Texas.

11. **P. Jamesii** Benth. Pruinose-puberulent: leaves all narrowly or linear-lanceolate, mostly entire or the margins undulate: thyrsus strict, leafy below: corolla about 2.5 cm. long, abruptly dilated into a broadly cyathiform-campanulate throat, a little hairy within: sterile filament moderately bearded.—Prairies of western Texas.

12. **P. albidus** Nutt. Viscid-pubescent, 1.5 to 2.5 dm. high: leaves oblong-lanceolate or narrow, entire or sparsely toothed: clusters of the strict thyrsus few-flowered, approximate: sepals lanceolate, densely pubescent: corolla 18 mm. long, with short tube and sterile filament thinly short-bearded, dilated throat.—Extending from the northern plains into Texas.

13. **P. pubescens** Solander. Stem 3 to 6 dm. high, viscid-pubescent (at least the inflorescence): leaves oblong to lanceolate, 5 to 10 cm. long, lowest and radical ovate or oblong, usually denticulate: thyrsus narrow: corolla dull violet or purple (or partly whitish), very moderately dilated, the throat nearly closed by a villous-bearded palate: sterile filament densely bearded.—Extending from the Atlantic region into Texas.

++ ++ *Leaves all linear and entire, narrow at base: corolla funnelform: sterile filament wholly glabrous.*

14. **P. stenophyllus** Gray. Glabrous or obscurely puberulent, 6 to 9 dm. high: leaves 7.5 to 10 cm. long, and the larger only 4 mm. wide, attenuate-acute; uppermost and floral nearly filiform: corolla large (nearly 3.5 cm. long), purple or violet.—A species of southern Arizona and adjacent Mexico, but represented on the western borders of Texas by var. DASYPHYLLUS Gray (*P. dasyphyllus* Gray), a form with leaves and lower part of stem thickly beset with short retrorse pubescence.

15. **P. ambiguus** Torr. Glabrous, 3 to 6 dm. high, diffuse and often much branched: leaves filiform, or the lowest linear and floral linear-subulate: inflorescence loosely paniculate: corolla rose-color and flesh-color turning to white, with rotately expanded limb, throat or its lower side somewhat hairy, and tube 12 mm. or more long.—Reported from the "Staked Plains."

7. MIMULUS L. (MONKEY-FLOWER.)

Herbs, with opposite leaves, mostly handsome flowers on solitary axillary bractless peduncles, prismatic 5-angled 5-toothed calyx (upper tooth largest), tubular corolla with upper lip erect or reflex-spreading and 2-lobed and lower spreading and 3-lobed, 4 stamens, and 2-lobed stigma.

* *Erect from a perennial root, glabrous: leaves feather-veined: corolla violet-purple.*

1. **M. ringens** L. Stem square, 3 to 6 dm. high: leaves oblong or lanceolate, pointed, clasping by a heart-shaped base, serrate: peduncles longer than the flower: calyx-teeth taper-pointed, nearly equal: corolla personate.—Wet places, extending from the Atlantic States into Texas.

2. **M. alatus** Ait. Stem somewhat winged at the angles: leaves oblong-ovate, tapering into a petiole: peduncles shorter than the calyx, which has very short abruptly pointed teeth: otherwise like the last.—Wet places, same range as last.

* * *Leaves several-nerved and veiny, dentate, the upper sessile and ctasping: calyx oblique: corolla yellow, the lower lip bearded.*

3. **M. glabratus** HBK. Diffusely spreading, smooth and smoothish: stems creeping: leaves round-oval or ovate, mostly denticulate or dentate; lower with margined petioles, upper sessile by broad base: flowers mostly subtended by undiminished or little diminished leaves. (*M. Jamesii*, var. *Texensis* Gray.)—Southern and western Texas. From western Texas is also reported var. JAMESII Gray (*M. Jamesii* Torr. & Gray), with leaves mainly orbicular and almost entire, some approaching reniform, the upper ones hardly diminished and equaling the subtended peduncles.

4. **M. luteus** L. Probably occurs in the mountains of extreme western Texas, and may be known from the preceding by its more erect habit, ovate to roundish or subcordate leaves, and deep yellow corolla with brown-purple dots or blotches.

8. STEMODIA L.

Herbaceous or slightly shrubby plants, with 5-parted calyx, more or less bilabiate corolla with cylindraceous tube, 4 stamens inserted be-

low the throat and included, separate and stipitate anther-cells, 2-lobed stigma, valves of pod soon 2-parted, and placentæ left in the axis.

1. **S. durantifolia** Swartz. Annual with indurated base, viscid-pubescent: leaves either opposite or 3 to 4-nate, from oblong to linear-lanceolate, serrate or denticulate, narrowed below and with somewhat dilated partly clasping base: inflorescence spiciform, leafy below: calyx 2-bracteolate: corolla purplish, 6 mm. long.—Wet grounds, southern borders of Texas.

2. **S. lanata** Ruiz & Pavon. White-woolly, with prostrate stems: leaves oblong, dentate, sessile or cordate-amplexicaul.—Brazos Santiago (*Nealley*). A Mexican species that has extended northward along the Gulf coast.

9. CONOBEA Aublet.

Low branching herbs, with opposite leaves, small solitary flowers on axillary peduncles, 5-parted equal calyx, upper lip of corolla 2-lobed and lower 3-parted, 4 fertile stamens with approximate anthers, and 2-lobed stigma with the lobes cuneate.

1. **C. multifida** Benth. Annual, diffusely spreading, much branched, minutely pubescent: leaves petioled, pinnately parted, divisions linear-wedge-shaped: peduncles naked: corolla greenish-white, scarcely longer than the calyx.—Extending from the Atlantic region to southern and western Texas.

10. HERPESTIS Gærtn. f.

Low herbs, with opposite leaves, solitary axillary flowers, 5-parted calyx (upper division broadest, innermost often very narrow), upper lip of corolla entire, notched or 2-cleft and lower 3-lobed (or limb nearly equally 5-lobed), 4 stamens all fertile, and style dilated or 2-lobed at apex.

* *Corolla plainly bilabiate, the 2 upper lobes united to form the upper lip: leaves many-nerved.*

1. **H. nigrescens** Benth. Erect or ascending, very leafy, glabrous: leaves pinnately veined, oblong to cuneate-lanceolate (2.5 to 5 cm. long), serrate: pedicels equaling and the upper surpassing the leaves: corolla whitish or purplish.—Wet places, along and near the coast, extending from the coast of Maryland.

2. **H. chamædryoides** HBK. Lower and generally diffuse and decumbent: leaves pinnately veined, ovate or oblong (12 to 18 mm. long), serrate, mostly surpassed by the pedicels: corolla yellow.—Moist ground, throughout southern Texas, where also occurs var. PEDUNCULARIS Gray, with erect and simpler stems, smaller and narrower leaves, and filiform pedicels of thrice their length.

3. **H. rotundifolia** Pursh. Nearly smooth, creeping: leaves round-obovate, half-clasping, 12 to 25 mm. long, entire, basally nerved: peduncles twice or thrice the length of the calyx: corolla white or pale blue.—Margins of ponds, extending from the Mississippi Valley to southern Texas.

* * *Corolla obscurely bilabiate, the limb subequally 5-lobed: stamens almost equal.*

4. **H. Monniera** HBK. Glabrous, prostrate, and creeping: leaves spatulate to obovate-cuneate, entire or somewhat toothed, nearly nerveless, sessile: corolla pale blue.—Common in southern Texas.

11. GRATIOLA L. (HEDGE HYSSOP.)

Low herbs, with opposite sessile leaves, axillary 1-flowered peduncles (usually with 2 bractlets at base of calyx), 5-parted calyx with narrow

nearly equal divisions, upper lip of corolla entire or 2-cleft and lower 3-cleft, 2 fertile included posterior stamens (the anterior mere sterile filaments or wanting), style dilated or 2-lipped at apex, and a 4-valved pod.

* *Anthers with a broad connective, the cells transverse: stems mostly diffusely branched or creeping at base, soft viscid-pubescent or smooth: corollas 8 to 12 mm. long: bractlets foliaceous, equaling the calyx.*

\+ *Sterile filaments minute or none.*

++ *Pedicels filiform, equaling or exceeding the leaves.*

1. **G. pusilla** Torr. Minutely viscid, almost glabrous, slender, 5 to 7.5 cm. high: leaves oblong-linear, obtuse, entire, 3 to 8 mm. long: corolla golden yellow, 8 mm. long, the lobes retuse or emarginate: pod 4 mm. long, ovate-conical, acute, much exceeding the reflexed or spreading calyx.—Arkansas and adjacent Texas.

2. **G. gracilis** Benth. Glabrous or nearly so, small and slender, erect: leaves from oblong to linear-lanceolate, entire or sparingly dentate: corolla yellowish or whitish (commonly with a tinge of purple), 6 mm. long: pod globular but acutish, equaled by the calyx.—Eastern Texas.

3. **G. Virginiana** L. Stem clammy-puberulent above, 10 to 15 cm. high: leaves lanceolate with narrow base, acute, entire or sparingly toothed: corolla 8 to 10 mm. long, with yellowish tube and nearly white lobes.—Throughout the Atlantic and Gulf region and across the continent.

++ ++ *Pedicels short, mostly shorter than the calyx.*

4. **G. sphærocarpa** Ell. Smooth, rather stout, 12.5 to 25 cm. high: leaves lance-ovate to oblong or oval-obovate, 2.5 to 5 cm. long, toothed: corolla white: pod globose, large (4 mm. in diameter) and pointless.—Extending from the Atlantic region into Texas.

\+ \+ *Sterile filaments slender, tipped with a little head.*

5. **G. Drummondii** Benth. Puberulent and somewhat viscid: leaves lanceolate, acute, sparsely and acutely serrate, 12 to 20 mm. long, about equaling the pedicels: sepals and bractlets linear-subulate, much longer than the pod: corolla white or purplish-tinged, 10 to 12 mm. long: sterile filaments short.—Extending from the Gulf States into Texas.

* * *Anthers with no broad connective, the cells vertical: sterile filaments tipped with a head: hairy plants, with erect rigid and more simple stems.*

6. **G. pilosa** Michx. Leaves ovate or oblong, sparingly toothed, sessile, 12 mm. long: flowers nearly sessile: corolla white, 6 to 8 mm. long, scarcely exceeding the calyx.—Extending into Texas from the Atlantic and Gulf States.

12. ILYSANTHES Raf.

Small and smooth annuals, with opposite leaves, small axillary purplish flowers on filiform naked pedicels or the upper racemed, 5-parted nearly equal calyx, short upper lip of corolla erect and 2-lobed, the lower larger and spreading and 3-cleft, 2 included posterior fertile stamens (anterior pair sterile, inserted in the throat, 2-lobed, one of the lobes glandular, the other smooth, usually short and tooth-like), 2-lobed stigma and an ovate or oblong pod.

1. **I. riparia** Raf. (FALSE PIMPERNEL.) Much branched, diffusely spreading, 10 to 20 cm. high, or at first simple and erect, leafy: leaves ovate, rounded, or oblong, sparingly toothed or entire, the upper partly clasping: corolla 6 mm. long. (*I. gratioloides* Benth)—Extending into Texas from the Atlantic region.

13. MICRANTHEMUM Michx.

Small smooth depressed and tufted or creeping annuals in mud or shallow water, with opposite and entire rounded or spatulate sessile leaves, minute white or purplish flowers solitary in the axils of some of the middle leaves, 4-lobed or parted calyx, short 2-lipped corolla (upper lip much shorter than lower or obsolete; lower lip 3-cleft, middle lobe longest), 2 anterior stamens with short filaments having a glandular (usually basal) appendage, short style with 2-lobed stigma, and a globular thin pod.

1. **M. orbiculatum** Michx. Creeping freely: leaves roundish, 4 to 8 mm. long: pedicels shorter than calyx: corolla white, hardly equaling the 4-cleft calyx; its upper lip or lobe manifest.—Extending into Texas from the Gulf States.

14. SCOPARIA L.

Much branched undershrubs or herbs, with small and slender-pediceled flowers in the axils of opposite and verticillate leaves, 4 rather broad imbricated sepals, 4-cleft short-campanulate or nearly rotate corolla densely hairy in the throat, 4 stamens with distinct anther-cells, slightly clavate style with truncate stigma, and a septicidal pod.

1. **S. dulcis** L. Annual or suffrutescent, almost glabrous: leaves from oblong-spatulate to narrowly lanceolate, tapering at base, the larger serrate and incised: corolla white, 6 mm. wide.—Along the Mexican border.

15. CAPRARIA L.

Herbs or undershrubs, with rather small white or flesh-colored flowers on slender often geminate pedicels in the axils of alternate serrate leaves, 5 narrow hardly imbricated sepals, 5-cleft short-campanulate or nearly rotate corolla, often 5 stamens, sagittate or horseshoe-shaped anthers with cells confluent at apex, style with thickened apex and 2-lobed stigma, and a loculicidal pod.

1. **C. biflora** L. Suffruticose, 6 to 12 dm. high, pubescent or glabrous: leaves oblong-lanceolate, sharply serrate above the middle: sepals linear-subulate, equaling the pod.—Southern Texas, along the coast.

16. VERONICA L. (Speedwell. Brooklime.)

Chiefly herbs, with mostly opposite or whorled leaves, blue, flesh-color or white flowers, 4 (rarely 3 or 5)-parted calyx, rotate or salver-shaped corolla with 4-parted border, 2 exserted stamens (one each side of the upper lobe of the corolla), anther cells confluent at apex, entire style with single stigma, and a flattened pod obtuse or notched at apex.

1. **V. peregrina** L. (Neckweed. Purslane speedwell.) Glandular-puberulent or nearly smooth, erect, 10 to 25 cm. high, branched: lowest leaves petioled, oval-oblong, toothed, thickish, the others sessile, obtuse; the upper oblong-linear and entire, longer than the almost sessile whitish flowers: pod orbicular, slightly notched, many-seeded.—Low grounds, and a weed in damp cultivated soil, more or less throughout Texas.

17. BUCHNERA L. (BLUE-HEARTS.)

Perennial rough-hairy herbs (turning blackish in drying), with opposite leaves (or uppermost alternate), flowers opposite in a terminal spike, tubular obscurely nerved 5-toothed calyx, salverform corolla with a straight or curved tube and an almost equally 5-cleft limb, 4 stamens included and approximate in pairs, 1-celled anthers (the other cell wanting), and a club-shaped entire style.

1. B. elongata Swartz. Scabrous, but seldom hispid, slender, long-naked above: radical leaves obovate; lower oblong or lanceolate, obscurely or rarely dentate; upper linear: spike slender, often few-flowered: tube of purple corolla not twice the length of the calyx.—Extending from the pine-barrens of the Gulf States into Texas.

18. SEYMERIA Pursh.

Erect branching herbs, with leaves mostly opposite and dissected or pinnatifid (uppermost alternate and bract-like), yellow flowers interruptedly racemed or spiked, bell-shaped deeply 5-cleft calyx, corolla with short broad tube not longer than the 5 ovate or oblong nearly equal and spreading lobes, 4 somewhat equal stamens, 2-celled anthers approximate by pairs, and a many-seeded pod.

* *Style filiform and long: corolla glabrous within (except line at insertion of stamens): leaves small.*

\+ *Leaves filiformly dissected: corolla very deeply cleft.*

1. S. tenuifolia Pursh. Glabrous or branches puberulent, very slender, 6 to 12 dm. high: leaves 12 mm. long, copiously 1 or 2-pinnately parted: pedicels filiform: corolla about 6 mm. and pod 4 mm. long: calyx-lobes setaceous: anther-cells acutish; filaments minutely woolly at base.—Extending from the pine-barrens of the Gulf States into Texas.

\+ \+ *Leaves or their divisions linear or broader: corolla lobes about as long as tube and throat: pedicels short.*

++ *Pods ovate and gradually acuminate, 8 to 10 mm. long, glabrous or nearly so: anthers sagittate, the cells very acute.*

2. S. scabra Gray. Hispidulous-scabrous, not glandular, slender, 6 dm. high: leaves sparingly pinnately parted into few narrow linear divisions, or the upper few-lobed or entire: calyx-lobes subulate-linear: corolla glabrous.—Mountains of southwestern Texas, beyond the Pecos.

3. S. virgata Beuth. Viscid-puberulent, very slender: leaves pinnately cut into narrowly linear mostly incised lobes: calyx-lobes linear: pod nearly glabrous.—A Mexican species, discovered in the Chenate Mountains, southwestern Texas (*Nealley*).

++ ++ *Pod broadly ovate and merely acute, 4 mm. long, glandular-hairy: anthers very obtuse.*

4. S. pectinata Pursh. Minutely viscid-pubescent or glabrous, about 3 dm. high, slender: leaves pinnately parted into rather few short- or oblong-linear divisions, or the upper incisely few-toothed or entire: calyx-lobes linear: corolla hairy outside, especially in bud.—Dry sandy soil of Gulf States, and extending into Texas.

5. S. bipinnatisecta Seem. Very glandular-pubescent and viscid, 3 to 6 dm. high, stouter: leaves rather copiously 1 to 3-pinnately parted; the divisions from linear to oblong, small, often incisely toothed; even the bracts and sometimes the oblong-linear calyx-lobes lobed or incised: corolla somewhat glandular-pubescent outside.—Southern and western Texas.

* * *Style short, with enlarged and compressed tip: corolla densely woolly within above the insertion of the very woolly filaments: anthers oblong: leaves ample.*

6. **S. macrophylla** Nutt. Somewhat pubescent or glabrate: stems rather simple, 12 to 15 dm. high: lower leaves pinnately parted, the divisions lanceolate and incisely toothed or pinnatifid: upper leaves lanceolate or oblong, mostly entire: flowers very short pediceled in the axils of the upper leaves and bracts: corolla barely 12 mm. long.—River banks, etc., extending from the Mississippi valley States to Texas.

19. GERARDIA L.

Erect branching herbs, with stem-leaves opposite (or upper alternate), uppermost reduced to bracts and subtending 1-flowered peduncles which often form a raceme or spike of showy purple or yellow flowers, bell-shaped 5-toothed or 5-cleft calyx, campanulate-funnelform or somewhat tubular corolla swelling above, four strongly didynamous included hairy stamens, 2-celled anthers approximate by pairs and the cells parallel often pointed at base, elongated style mostly enlarged and flattened at apex, and globular or ovated pointed pod.

* *Corolla yellow, the tube woolly inside, as well as the anthers and filaments: anthers alike, awn-pointed at base: leaves rather large, more or less incised or pinnatifid.*

1. **G. grandiflora** Benth. Minutely downy: stem much branched, 6 to 12 dm. high: leaves ovate-lanceolate, coarsely toothed or cut, the lower pinnatifid: pedicels rather shorter than calyx: corolla glabrous outside, 5 cm. long, 4 times the length of the broadly lanceolate entire or toothed calyx-lobes.—Oak openings, etc., eastern Texas.

* * *Corolla purple, naked within as well as the very unequal filaments: anthers dissimilar, pointless, glabrous or sparingly hairy.*

2. **G. densiflora** Benth. Hispid and rough, very leafy: leaves rigid, pinnately parted into 3 to 7 narrowly linear acute divisions, those subtending the densely spicate flowers similar and crowded: corolla over 2.5 cm. long.—Prairies of Texas.

* * * *Corolla purple or rose-color: calyx-teeth short: anthers alike, nearly pointless, pubescent: cauline leaves linear or narrower, entire.*

† *Pedicels little if at all longer than calyx and pod.*

3. **G. heterophylla** Nutt. Nearly smooth, 3 to 6 dm. high, paniculately branched: leaves rather erect, thickish or rigid; lowest 3-cleft or laciniate; the others narrowly linear, mucronate-acute, scabrous on the margins; those of the branchlets short and somewhat subulate: pedicels very short, alternate: calyx-lobes subulately attenuate from a broad base, as long as the turbinate tube and with very acute sinuses: corolla 2.5 cm. long or less.—Prairies of Texas.

4. **G. asper** Dougl. Sparingly branched, 3 to 6 dm. high: leaves long and linear, rough: pedicels (most of them alternate) equaling or moderately exceeding the calyx, which has triangular-lanceolate acute lobes about half as long as the tube: corolla over 2.5 cm. long.—Plains of northern and western Texas.

5. **G. purpurea** L. Stem 3 to 6 dm. high, with long and rigid widely spreading branches: leaves linear, acute, rough-margined: flowers large (2.5 cm. long), bright purple, often downy: pedicels shorter than the calyx, mainly opposite: calyx-teeth sharp-pointed, from very short to about half as long as the tube.—Low moist grounds of southern and eastern Texas; where also occurs, usually in brackish soil, var. FASCICULATA Chapm., which is usually taller, 6 to 15 dm. high, with often alternate leaves (and branches), the cauline fascicled in the axils, very scabrous, narrowly linear or nearly filiform.

6. **G. maritima** Raf. Low, 1 to 3 dm. high, with shorter branches: leaves and short broad calyx-teeth rather fleshy and obtuse: pedicels about as long as calyx: corolla 12 mm. long.—Salt marshes on or near the coast.

+ + *Pedicels usually exceeding the corolla: woolly anthers cuspidate at base.*

7. **G. setacea** Walt. Mostly scabrous, at least the setaceous-filiform leaves: inflorescence more or less paniculate; pedicels ascending, 1 to 3 cm. long: calyx-teeth subulate, from minute to ¼ length of tube: corolla 18 to 25 mm. long, often pubescent outside, the margins of the lobes thickly lanose-ciliate: anther-cells short-aristate.—Pine-barrens, etc., extending at least as far west as Gillespie County (*Jermy*).

8. **G. strictiflora** Benth. Obscurely scabrous, excessively paniculate-branched, rigid, 3 dm. or more high: leaves filiform-linear passing on the branches into subulate; these erect and 6 to 12 mm. long, rigid, shorter than the erect or ascending (12 to 18 mm.) pedicels: calyx-teeth short but conspicuous, subulate, very acute: corolla 12 mm. long or more: anther-cells aristulate at base.—Eastern and southern Texas.

20. CASTILLEIA Mutis. (Painted cup.)

Herbs, with alternate entire or cut-lobed leaves (the floral ones usually dilated, colored, and more showy than the yellow or purplish spiked flowers), tubular flattened calyx cleft at summit on anterior and usualyl posterior side also (divisions entire or 2-lobed), corolla-tube included in calyx (its upper lip, *galea*, long and narrow, arched and keeled, flattened laterally, inclosing the 4 unequal stamens; lower lip short, 3-lobed), and oblong-linear unequal anther-cells (outer fixed by the middle, inner pendulous).

* *Annuals or some biennials with fibrous roots: floral leaves or bracts dilated: calyx equally cleft before and behind; galea shorter than corolla-tube, little surpassing calyx, much exceeding short lower lip.*

1. **C. coccinea** Spreng. Rosulate radical leaves mostly entire, obovate or oblong; cauline and bracts laciniate or 3 to 5-cleft; the middle lobe of latter dilated: calyx-lobes quadrate-oblong.—Low sandy ground, extending from the Atlantic States into Texas.

2. **C. indivisa** Engelm. Leaves lanceolate-linear and entire, or sometimes with 2 or 3 slender lateral lobes: bracts and calyx-lobes obovate-dilated, bright red.—Southern and western Texas.

* * *Perennials.*

+ *Calyx about equally cleft before and behind: floral leaves and bracts more or less dilated and petaloid colored* (red or crimson, varying to yellowish or whitish).

++ *Herbage white-woolly throughout: leaves linear and entire: bracts 3-parted: corolla almost included, 14 to 18 mm. long, slender; the narrow galea longer than tube; lip very short.*

3. **C. lanata** Gray. Apparently herbaceous to base, branching, white with appressed arachnoid wool: leaves 2.5 to 5 cm. long: galea longer than tube: flowers somewhat scattered in the spike.—Southwestern Texas.

++ ++ *Tomentulose or cinereous-puberulent, or stem only lanate-tomentose: bracts, etc., conspicuously petaloid: corolla more exserted, 25 mm. long or more; galea shorter than tube.*

= *Lip very short; its lobes not longer than the more or less callous saccate portion.*

4. **C. integra** Gray. Stem rather stout, tomentose: leaves cinereous-tomentulose, linear, 3.5 to 7.5 cm. long, 2 to 6 mm. wide, entire: bracts of the short spike linear or obovate-oblong, red or rose-color, entire or sometimes incised: corolla about 3 cm. long; galea rather broad; lip strongly tri-callous, its lobes very short.—Dry grounds, western Texas.

5. **C. Lindheimeri** Gray. Branched, cinereous-puberulent or the stem tomentulose: leaves narrowly linear, entire or sparingly laciniate, or the upper 3 to 5-cleft, as are the bracts of the dense spike; these mostly petaloid and dilated, from brick-

red to rose-color or sulphur-yellow: calyx equally colored: corolla (2.5 cm. or so long) rather slender; the lobes of the lip ovate.—Stony or fertile mountain prairies, southern and western Texas.

= = *Lip of corolla with longer and narrow lobes, and base less saccate.*

6. **C. purpurea** Don. Minutely cinereous-pubescent: leaves narrowly linear and entire, or mostly once or twice 3-cleft or laciniate, with divisions and lobes all narrowly linear: bracts similar or with cuneate-dilated base; the broader lobes of the upper and the calyx magenta-color or purple.—Hilly prairies of eastern Texas.

+ + *Calyx deeper cleft before than behind: bracts and calyx (if colored at all) yellowish.*

7. **C. sessiliflora** Pursh. Very leafy, cinereous-pubescent: leaves mostly 3 to 5-cleft, with narrow diverging sometimes cleft lobes; the floral similar or broader, not at all colored: the narrow calyx-lobes deeply 2-cleft: corolla 5 cm. long, the short galea but twice as long as the slender-lobed lip.—Prairies of western Texas.

21. CORDYLANTHUS Nutt.

Branching annuals, with alternate, narrow leaves, dull-colored flowers in small terminal clusters or more scattered, uncolored bracts and calyx, spathaceous 2-leaved calyx, tubular corolla with lips commonly of equal length, 4 stamens with the small anther-cell sometimes wanting, anther-cells either ciliate or minutely bearded at base and apex, and style hooked at tip.

1. **C. Wrightii** Gray. Loosely branched, almost glabrous, or above puberulent-scabrous, 3 to 6 dm. high: leaves setaceous-filiform, 3 to 5-parted; floral similar, the tips not dilated: flowers several in the mostly dense terminal heads: corolla purplish, 2.5 cm. long, with rather long lips: anthers villous.—Southwestern borders of Texas.

OROBANCHACEÆ. (Broom-rape Family.)

Low thick or fleshy herbs destitute of green foliage (root-parasites, and bearing scales in place of leaves), gamopetalous, didynamous, the ovary 1-celled with 2 or 4 parietal placentæ, a very many-seeded pod, and minute seeds.

1. APHYLLON Mitchell. (Naked broom-rape.)

Brownish or whitish plants, with the purplish or yellowish perfect flowers and naked scapes minutely glandular-pubescent, 5-cleft regular calyx, somewhat 2-lipped corolla (upper more or less spreading and 2-lobed, lower spreading and 3-lobed), included stamens, broadly 2-lipped or crateriform stigma, and pod with 4 placentæ.

* *Flowers solitary on long naked scapes or peduncles, without bractlets: corolla with a long curved tube and spreading 5-lobed limb.*

1. **A. uniflorum** Gray. Stem subterranean or nearly so, very short, scaly, often branched, each branch sending up 1 to 3 slender 1-flowered scapes 7.5 to 12.5 cm. high: divisions of calyx lance-awl-shaped, half as long as corolla, which is 2.5 cm. long, with 2 yellow bearded folds in throat and obovate lobes.—Damp woodlands.

* * *Caulescent: flowers densely spicate, with 1 or 2 bractlets at base of calyx: corolla 2-lipped, upper lip less or not at all 2-cleft.*

2. **A. Ludovicianum** Gray. Glandular-pubescent, branched, 7.5 to 30 cm. high: corolla somewhat curved, twice as long as the narrow lanceolate calyx-lobes; the lips

equal in length: anthers glabrous or nearly so. (*Phelipæa Ludoviciana* Walp.)—Throughout Texas.

3. **A. multiflorum** Gray. Somewhat more pubescent: calyx almost 5-parted, fully half the length of the ample (2.5 cm. or more long) purplish corolla: anthers very woolly.—Gravelly plains and pine woods of western Texas.

LENTIBULARIEÆ. (BLADDERWORT FAMILY.)

Small herbs (growing in water or wet places), with a 2-lipped calyx, a 2-lipped personate corolla, spurred at base in front, 2 stamens with confluently 1-celled anthers, and a 1-celled ovary with free central placenta.

1. UTRICULARIA L. (BLADDERWORT.)

Aquatic or immersed plants, with capillary dissected leaves bearing little bladders which float the plant at time of flowering (or rooting in the mud, and sometimes with few or no leaves or bladders), 1 to few-flowered scapes, lips of the 2-parted calyx entire or nearly so, personate corolla with palate on lower lip projecting (often closing the throat), and convergent anthers.

* *Upper leaves in a whorl on the otherwise naked scape, floating by means of large bladders formed of the inflated petioles; lower leaves dissected and capillary, bearing small bladders: rootlets few or none.*

1. **U. inflata** Walt. Swimming free: bladder-like petioles oblong, pointed at the ends and branched near the apex, bearing fine thread-like divisions: flowers 3 to 10, large, yellow: the appressed spur half the length of the corolla: style distinct.—Floating in still water, along or near the coast.

* * *Scapes naked (except some small scaly bracts), from immersed branching stems, which commonly swim free, bearing capillary dissected leaves with small bladders on their lobes: roots few and not affixed, or none: corolla yellow.*

2. **U. vulgaris** L. Immersed stems (3 to 9 dm. long) crowded with 2 or 3-pinnately many-parted capillary leaves, bearing many bladders: scapes 5 to 12-flowered, 15 to 30 cm. long: pedicels recurved in fruit: corolla closed, 12 to 18 mm. broad, the sides reflexed: spur conical, rather shorter than the lower lip, rather thick and blunt or acute.—Common in slow streams.

3. **U. biflora** Lam. Scape (5 to 12.5 cm. high) 1 to 3-flowered, at the base bearing somewhat elongated submerged branches with capillary root-like leaves and numerous bladders: pedicels erect in fruit, few and slender: corolla 8 to 12 mm. broad, the spur oblong, equaling the lower lip.—Ponds and shallow waters, at least as far west as Gillespie County (*Jermy*).

* * * *Scape solitary, slender and naked (or with a few small scales), the base rooting in the mud or soil: leaves small, awl-shaped or grass-like, often raised out of the water, commonly few or fugacious, rarely seen: air-bladders few on the leaves or rootlets, or commonly none: flowers 2 to 10, chiefly yellow..*

4. **U. subulata** L. Stem capillary, 7.5 to 12.5 cm. high: pedicels capillary: lower lip of corolla flat or with its margin recurved, equally 3-lobed, much larger than the ovate upper one; spur oblong, acute, straight, appressed to the lower lip, which it nearly equals in length.—Wet places, in pine barrens, near the coast.

5. **U. cornuta** Michx. Stem strict (7.5 to 30 cm. high), 1 to 5-flowered: pedicels not longer than calyx: corolla 2.5 cm. long, the lower lip large and helmet-shaped, its center very convex and projecting, while the sides are strongly reflexed; upper

lip obovate and much smaller; spur awl-shaped, turned downward and outward, about as long as the lower lip.—Sandy swamps.

6. **U. juncea** Vahl. Resembles the preceding: stem racemosely or rather spicately 4 to 10-flowered; lower flowers more or less distant: lips of corolla 6 to 8 mm. long, the lower mainly consisting of the high-arched palate; spur slender-subulate, soon deflexed.—Extending from the Gulf States into Texas.

BIGNONIACEÆ. (Bignonia Family.)

Woody plants, gamopetalous, didynamous or diandrous, calyx 2-lipped, 5-cleft or entire, showy tubular or bell-shaped 5-lobed somewhat irregular or 2-lipped corolla, stamens inserted on corolla (5th or posterior one, and sometimes shorter pair also, sterile or rudimentary), commonly 2-celled many-ovuled ovary, and fruit a dry pod with large flat winged seeds.

1. **Tecoma.** Pod flattish contrary to the partition: leaves compound, without tendrils.

2. **Catalpa.** Pod terete: fertile stamens only 2: trees: leaves simple, mainly opposite, ovate or cordate.

3. **Chilopsis.** Pod terete: fertile stamens 4: shrub or tree: leaves simple, oftener alternate or scattered, linear.

1. TECOMA Juss. (Trumpet-flower or Trumpet-creeper.)

Erect shrub or woody climber, with compound leaves, bell-shaped 5-toothed calyx, funnelform 5-lobed a little irregular corolla, 4 stamens, 2-celled pod with the partition at right angles to the convex valves, and transversely winged seeds.

1. **T. radicans** Juss. Climbing by aerial rootlets: leaves pinnate; leaflets 9 or 11, ovate, pointed, toothed: flowers corymbed: stamens not protruded beyond the tubular funnelform orange and scarlet corolla (6.5 to 7.5 cm. long): pod oblanceolate, 10 to 12.5 cm. long.—Moist soil, extending from the Atlantic and Gulf States into Texas, and common in cultivation,

2. **T. stans** Juss. Erect shrub: leaflets 5 to 11, narrower or lanceolate, more incisely serrate: flowers racemose or paniculate: corolla more campanulate, yellow, 3.5 cm. long: fifth stamen often with abortive anther: pod linear, elongated, sessile.—The common species of southern and western Texas.

2. CATALPA Scop., Walt. (Catalpa. Indian bean.)

Trees, with ovate or cordate and mainly opposite leaves, deeply 2-lipped calyx, bell-shaped swelling corolla (the undulate 5-lobed spreading border irregular and 2-lipped), 2 (sometimes 4) fertile stamens (the 1 or three others sterile or rudimentary), very long and slender nearly cylindrical pod, and seeds winged on each side (the wings cut into a fringe).

1. **C. bignonioides** Walt. Reported from Gillespie County (*Jermy*), though perhaps as a cultivated tree. It is a low much-branched tree, with thin bark, thickly spotted corolla (3.5 cm. long) with oblique limb and lower lobe entire. Its normal range is not west of Mississippi.

2. **C. speciosa** Warder is a large and tall tree, with thick bark, ample cordate acuminate leaves, nearly white and inconspicuously spotted corolla (5 cm. long) with lower lobe emarginate.—This species has a Mississippi Valley range, extending as far south as Arkansas, and also possibly cultivated in Texas.

3. CHILOPSIS Don. (Desert willow.)

Shrub or low tree, with mostly alternate or scattered linear leaves, white or purplish flowers in a short terminal raceme; in other respects like *Catalpa*, except the corolla is more funnelform with erose lobes, and the antheriferous stamens are 4.

1. **C. saligna** Don. Shrub or low tree, 3 to 6 m. high, with hardwood, pubescent when young, soon glabrous: leaves linear or linear-lanceolate, 10 to 15 cm. long, of firm texture; lower leaves often opposite or verticillate: corolla 2.5 to 5 cm. long: pod 15 to 25 cm. long.—Water-courses in dry districts throughout southern and western Texas.

PEDALINEÆ.

Herbs, with chiefly opposite simple leaves, and flowers as of the preceding order, except that the ovary is 1-celled and the fruit fleshy-drupaceous with wingless seeds.

1. MARTYNIA L. (Unicorn-plant.)

Low branching clammy-pubescent annuals, with thickish stems, simple rounded leaves, large racemed flowers, 5-cleft mostly unequal calyx, gibbous bell-shaped 5-lobed and somewhat 2-lipped corolla, 4 (or 2) fertile stamens, and fleshy fruit (the flesh at length falling away in 2 valves; the inner part woody, terminated by a beak, which at length splits into 2 hooked horns and opens at apex between the horns).

1. **M. proboscidea** Glox. Coarse and heavy-scented annual: leaves cordate, roundish, often oblique, entire or obscurely undulate-lobed, 10 to 30 cm. in diameter: bractlets oblong-linear: corolla 3.5 to 5 cm. long, dull white, yellowish or purplish spotted within, also varying to light yellow: endocarp crested on posterior suture only.—Throughout Texas.

2. **M. fragrans** Lindl. Less stout: leaves from roundish to oblong-cordate, somewhat lobed and sinuate-dentate, 7.5 to 12.5 cm. broad: corolla more campanulate, 2.5 to 5 cm. long and wide, sweet-scented, from reddish to violet-purple. (*M. violacea*, Bot. Mex. Bound., in part.)—Southern and western borders of Texas. Known as "toloache" to the Mexicans, who think it has the property of developing gradual and permanent insanity. (Havard.)

3. **M. altheæfolia** Benth. Low and small: leaves seemingly all alternate, long-petioled, roundish-ovate and cordate, sinuately 3 to 7-lobed, 2.5 to 5 cm. broad: bractlets linear-oblong or oval: corolla 3.5 cm. or less long, from buff to chrome yellow, or whitish, mottled or dotted with brown and orange: endocarp armed with teeth on both sutures. (*M. arenaria*, Bot. Mex. Bound.)—Southwestern Texas.

ACANTHACEÆ. (Acanthus Family.)

Chiefly herbs, with opposite simple leaves, didynamous or diandrous stamens inserted on the tube of the more or less 2-lipped corolla (the lobes of which are convolute or imbricated in the bud), and fruit a 2-celled few-seeded pod.

* Corolla imbricated in bud; upper lip exterior: seeds small and globular.

1. **Elytraria.** Bracts of the solitary or clustered spikes and the similar scales of the scape imbricated, glumaceous.

* * Corolla convolute in bud, either bilabiate or nearly regular: seeds flat: stamens didynamous, the long and short filament on each side contiguous or united at base by a membrane; anthers 2-celled, the cells equal and parallel.

+ Corolla deeply bilabiate: pod terete and 2-celled to the very base.

2. **Hygrophila.** Corolla narrow: anthers oblong, pointless: flowers sessile in the axils.

+ + Corolla only moderately bilabiate if at all: pod with base more or less contracted into a solid short stipe.

3. **Colophanes.** Calyx-lobes elongated setaceous or aristiform: anthers mucronate or aristate at base: ovules 2 in each cell.

4. **Ruellia.** Calyx-lobes linear or lanceolate: anthers pointless: ovules 3 to 10 in each cell.

* * * Corolla imbricated in bud; posterior lobes or lip interior: ovules 2 in each cell: seeds and pod of * *

+ Stamens 4, in the throat of the corolla; anthers 1-celled.

5. **Stenandrium.** Lobes of the salverform corolla all equally spreading: low herbs.

+ + Stamens 2 and no rudiments; anthers 2-celled: pod with a conspicuous stipe-like solid base.

++ Placentæ not separating from the valves of the pod.

= Anther-cells equal, parallel and contiguous, pointless: limb of corolla somewhat equally 4-parted: shrubby plants.

6. **Carlowrightia.** Corolla with narrow tube shorter than the lobes, almost rotate, purple.

7. **Anisacanthus.** Corolla with elongated tube, red.

= = Anther-cells unequal or unequally inserted, one lower than the other or oblique.

a. Lower anther-cell spurred or mucronate at base.

8. **Siphonoglossa.** Corolla with long-linear or filiform tube and short limb: anther-cells contiguous and parallel, but one higher.

9. **Justicia.** Corolla with short tube: anther-cells oblique and disjoined.

b. Anthers pointless, or both cells rarely mucronulate at base.

10. **Dianthera.** Corolla bilabiate: anther-cells not parallel, moderately or conspicuously disjoined on a dilated connective.

11. **Gatesia.** Corolla with slender tube and almost equally 4-lobed spreading limb: anther-cells contiguous and similar, but one a little lower and oblique.

++ ++ Placentæ at length separating and diverging or incurving: corolla with narrow tube.

12. **Tetramerium.** Flowers solitary (rarely 2 or 3), covered by a large and herbaceous primary bract, and subtended by 2 small and narrow bractlets: spikes strobilaceous.

13. **Dicliptera.** Flowers not covered by primary bracts, but involucrate (either singly or in a fascicle) by 2 opposed and nearly equal or 4 less dilated and unequal herbaceous bractlets: inflorescence various, not strobilaceous-spicate.

1. ELYTRARIA Michx.

Low perennial herbs, with leaves crowded at base of a naked scape or at summit of a short naked stem, small flowers solitary and sessile under the bracts (these and the scales of the scapes rigid-chartaceous

or glumaceous, alternate), 4-parted calyx, corolla with cylindraceous tube, 2 stamens with very short filaments, 2-lobed stigma, and ovules 6 to 10 in each cell.

1. **E. tridentata** Vahl. Acaulescent or with proliferous low stems: leaves lanceolate or oblong, 5 to 7.5 cm. long, clustered, as are the hardly longer peduncles or scapes, either at the root or at the summit of naked stems: spikes slender: bracts ovate, mostly scarious-margined; the upper commonly tricuspidate or aristate: corolla purple.—In the mountains west of the Pecos.

2. **E. bromoides** Œrsted. Like the last and often confused with it: leaves inclined to be more oblanceolate and obtuse, and often exceeded by the stouter larger-bracted scapes which bear longer and stouter spikes: bracts ovate, not scarious-margined or tricuspidate, but simply aristate-acuminate, giving a more wheat-like look to the spike.—A Mexican species, collected at Santa Maria (*Nealley*).

2. HYGROPHILA R. Br.

Swamp plant, with simple stem, flowers sessile in the axils, deeply and almost equally 5-cleft or parted calyx, narrowed deeply bilabiate corolla with lips erect at base and above spreading, oblong pointless anthers with equal and parallel cells, and terete pod 2-celled to the very base.

1. **H. lacustris** Nees. Nearly glabrous: stem 6 to 9 dm. high from a creeping base: leaves lanceolate, sessile, entire, about 10 cm, long, scabrous-ciliolate: flowers small, white: calyx-lobes and bracts subulate-lanceolate: anthers of the shorter stamens smaller.—Swamps.

3. CALOPHANES Don.

Low branching pubescent or hirsute perennials, with proportionally large axillary nearly sessile blue flowers, deeply 5-cleft or parted calyx with elongated setaceous-acuminate or aristiform lobes, funnelform corolla with ample limb and convolute in bud, 4 stamens with anthers mucronate or aristate at base, ovules a single pair in each cell, and an oblong-linear 2 to 4-seeded pod.

1. **C. linearis** Gray. Hirsute with somewhat rigid and short hairs, or glabrate, not cinereous: stems erect and strict or branched and diffuse: leaves from linear-oblanceolate to oblong-spatulate, 18 to 40 mm. long, rather rigid: flowers usually foliose-glomerate: corolla purple (?), 20 mm. long; the tube not longer than the abruptly ampliate throat: anther-cells aristulate. (*Dipteracanthus linearis* Torr. & Gray in Pl. Lindh. *C. oblongifolia*, var. *Texensis*, in Bot. Mex. Bound.)—Dry grounds, southern and western Texas. The "snake-plant" of northern Mexico and Lower Rio Grande, and used extensively by the Mexicans as an antidote for snake bites. (Havard).

2. **C. decumbens** Gray. Cinereous-puberulent throughout, not at all hirsute or scabrous: stems mostly spreading on the ground: leaves spatulate, or the lowest obovate and the uppermost oblanceolate, with attenuate base, 12 to 28 mm. long: flowers few in the foliose-bracteolate clusters: corolla purple, 16 to 20 mm. long; the tube double the length of the throat: anther-cells mucronate. (*C. oblongifolia* Torr. Mex. Bound., not Don.)—Dry soil, western borders of Texas.

4. RUELLIA Plumier.

Perennials, with rather large and showy blue or purple flowers mostly in axillary clusters, 5-parted calyx, funnelform corolla with spreading

ample border convolute in bud, 4 stamens with the cells of the somewhat arrow-shaped anthers parallel and nearly equal, and narrow pod contracted and seedless at base (8 to 12-seeded).

* *Flowers in open pedunculate cymes from upper axils and forming a terminal panicle: bracts and bractlets small, linear or subulate: pod 8 to 12-seeded.*

1. **R. tuberosa** L. Glabrescent or minutely pubescent, 3 to 6 dm. high, with somewhat tuberous-thickened roots: leaves (5 to 7.5 cm. long) with undulate or obscurely repand-dentate margins, ovate-oblong or elliptical, and with base cuneate-contracted or decurrent into a rather long petiole: calyx-lobes subulate-filiform, hardly equaling the slender tube of the (3.5 cm. long blue or white) corolla.—River bottoms, southern and western Texas; where is also found var. OCCIDENTALIS Gray, which is rather large and tall, with inflorescence and calyx viscid-pubescent, and leaves from glabrate to velvety-pubescent, mostly ovate and with more abrupt or even subcordate base, sometimes 15 to 18 cm. long.

* * *Flowers subsessile and commonly glomerate in the axils, when short-peduncled with foliaceous primary bracts or bractlets: pod at most 8-seeded.*

+ *Suffrutescent: leaves rigid: corolla white.*

2. **R. Parryi** Gray. Much branched from the woody base: leaves obovate-oblong, tapering into a distinct petiole, hispid-ciliate, 2.5 cm. or less long: flowers mostly solitary in the axils: tube of corolla 2.5 cm. long, slender. (*Dipteracanthus suffruticosus* Torr. Mex. Bound).—Southwestern borders of Texas.

+ + *Herbaceous: stems mostly simple: corolla usually blue or violet.*

++ *Calyx-lobes filiform-attenuate, longer than the pod.*

3. **R. ciliosa** Pursh. Usually hirsute with long spreading hairs, especially the calyx-lobes: leaves oblong, almost sessile: tube of blue corolla twice the length of calyx and of limb, the whole not rarely 5 cm. long.—A species of the Atlantic and Gulf States, represented in Texas by var. HUMILIS Britt. (*R. ciliosa*, var. *longiflora* Gray), in which the pubescence is sometimes cinereous, with or without long hirsute hairs, stems sometimes flowering when 5 to 7.5 cm. high, sometimes tall and slender, and leaves narrowly oblong, usually small.

4. **R. Drummondiana** Gray. Cinereous-puberulent, tall: leaves ovate, 7.5 to 15 cm. long, petioled: canescent calyx-lobes (commonly 2.5 cm. or more long) more or less shorter than the tube of the (3.5 cm. long) corolla.—Eastern and southern Texas.

++ ++ *Calyx-lobes lanceolate or linear, hardly surpassing the pod.*

5. **R. strepens** L. Green and almost glabrous or pubescent, 3 to 12 dm. high: leaves oblong-ovate or oblong, 5 to 20 cm. long, mostly contracted at base into a short petiole: calyx sparingly soft-hirsute or ciliate: well-developed corolla 3.5 to 5 cm. long.—Dry soil, extending from the Atlantic region into Texas. Along with the ordinary form occurs var. CLEISTANTHA Gray, with leaves commonly narrower and oblong, and flowers for most of the season cleistogamous. (*Dipteracanthus micranthus* Eng. & Gray in Pl. Lindh.)

5. **STENANDRIUM** Nees.

Low and small perennials, commonly with leaves all at base of scapiform flowering stems, rose-colored or purple spicate flowers, 5-parted calyx with narrow nearly equal divisions, lobes of salverform corolla all equally spreading, 4 stamens in the throat of the corolla with short filaments and 1-celled muticous anthers, and 2 ovules in each cell.

1. **S. dulce** Nees. Hirsute-pubescent or glabrate: leaves all radical, oval or oblong, 18 to 32 mm. long, either narrowed or abruptly contracted into a rather long naked

petiole: scape equaling or shorter than the leaves, capitately few-flowered.—Southern Texas (Palmer).

2. **S. barbatum** Torr. & Gray. Very hirsute with long and shaggy white hairs: leaves crowded, oblanceolate, attenuate at base into an indistinct petiole, above passing into the lanceolate and crowded foliaceous bracts of the rather many-flowered spike.—Hillsides, western borders of Texas.

6. CARLOWRIGHTIA Gray.

Much branched undershrubs, with small and narrow entire leaves, rather small loosely spicate or paniculate racemose purple flowers, small 5-parted or -cleft calyx, corolla with narrow tube shorter than the lobes and limb 4-parted down to the tube, 2 stamens (and no rudiments) nearly equaling the corolla-lobes and with equal anther-cells parallel and contiguous, pod on a slender clavate stipe, and very flat minutely scabrous seeds.

1. **C. linearifolia** Gray. Ericoid-leafy: leaves filiform-linear, 8 to 16 mm. long; uppermost passing into similar bracts and bractlets of the somewhat paniculate inflorescence: lobes of the purple and almost rotate corolla 5 mm. long, twice the length of the tube: stipe as long as the body of the pod. (*Shaueria linearifolia* Torr. Mex. Bound.)—Mountains and cañons west of the Pecos.

7. ANISACANTHUS Nees.

Suffruticose or shrubby plants, with mostly lanceolate and entire petioled leaves, usually loosely spicate or scattered red (2.5 cm. or more long) flowers, small 5-parted or -cleft calyx, corolla with elongated tube gradually somewhat wider at throat and 4 similar entire erectish recurving lobes, 2 stamens (and no rudiments) equaling or exceeding the corolla-lobes and with equal anther-cells parallel and contiguous, pod on long clavate stipe, and smooth or rugulose seeds.

* *Calyx-lobes attenuate, longer than the stipe and mostly about equaling the body of the pod: corolla dull red, funnelform above: flowers chiefly in axillary and mostly leafy fascicles.*

1. **A. Thurberi** Gray. Shrubby, 6 to 12 dm. high: young parts minutely hirsute: leaves oblong or lanceolate, 2.5 cm. or less long, subsessile (*Drejera Thurberi* and *D. puberula* Torr. Mex. Bound.).—Mountains of western Texas.

* * *Calyx shorter, not surpassing the stipe of the pod: flowers usually (at least the upper ones) spicately or racemosely disposed along the branchlets and secund.*

2. **A. insignis** Gray. Puberulent or nearly glabrous: leaves mostly linear-lanceolate to linear: flowers pedicellate, in lateral clusters from axils of fallen leaves and short-racemose on evolute small-bracted branchlets: calyx puberulent-glandular: corolla rose-red or even salmon-color, 5 cm. long: stipe when well developed longer than the body of the pod. (*A. pumilus* Wats., Proc. Am. Acad. 18, not Nees. *Drejera puberula* Torr. Mex. Bound. as to pl. Gregg.)—Chisos Mountains on western borders of Texas (*Havard*).

3. **A. Wrightii** Gray. Puberulent or the foliage glabrous, 6 to 12 dm. high: leaves oblong or ovate-lanceolate, acute or acuminate: spikes loosely paniculate, naked: calyx glabrous or nearly so, remarkably short, barely 4 mm. long: corolla purplish red, 3.5 cm. long: stipe 6 to 10 and body of pod 6 to 8 mm. long. (*Drejera Wrightii* Torr. Mex. Bound.)—Southern and western Texas.

8. SIPHONOGLOSSA Œrsted.

Herbaceous or barely suffrutescent, with small 5-parted calyx, bilabiate corolla with long-linear or filiform tube and short limb, and 2 stamens with anther-cells contiguous and parallel, but one lower than the other and spurred or mucronate at base.

1. **S. Pilosella** Torr. Low, branching from a suffrutescent base, hirsute with scattered spreading hairs: leaves ovate or oval, subsessile, 10 to 30 mm. long, flowers mostly solitary in the axils: corolla pale blue or purple, with tube 16 to 18 and limb 6 to 8 mm. long: lower anther-cell conspicuously mucronate-spurred at base; upper less so at apex.—Dry grounds, southern and western Texas.

9. JUSTICIA Houston, L.

Much branched from a suffrutescent base, with rigid leaves, solitary axillary purplish flowers, small 5-parted calyx, bilabiate corolla with short tube and rather ampliate throat seldom longer than the limb, and 2 stamens with anther-cells oblique and disjoined (the lower spurred or mucronate at base).

1. **J. Wrightii** Gray. Cinereous-puberulent: leaves rigid, 6 to 8 mm. long, sessile; lowest obovate; upper linear-lanceolate, mucronate-acute: flowers sessile in the upper axils: corolla 8 mm. long, upper lip with a broad emargination and two short narrow lobes, lower larger with oval-obovate lobes: lower anther-cell abruptly short-spurred, upper smaller and mucronate at base.—Calcareous hills along the San Felipe (*Wright*).

10. DIANTHERA Gronov. (Water-willow.)

Perennial herbs growing in water or wet places, with entire leaves, purplish flowers in axillary peduncled spikes or heads, 5-parted calyx, deeply bilabiate corolla (upper lip erect and notched, lower spreading and 3-parted), 2 stamens with anther-cells separated and somewhat unequal, and an obovate flattened pod contracted at base into a short stipe.

* *Glabrous: flowers capitate or spicate on a long and naked axillary peduncle.*

1. **D. Americana** L. Stem 3 to 9 dm. high, sulcate-angled: leaves narrowly lanceolate, 7.5 to 10 cm. long, tapering at base, subsessile: peduncles mostly exceeding the leaves, capitately several-flowered: corolla pale violet or whitish, less than 12 mm. long; base of lower lip rugose.—In water, extending from the Atlantic region to southern Texas.

2. **D. ovata** Walter. Stem lower, from a creeping base or rootstock, mostly slender: leaves from oblong or obovate-oblong to linear-lanceolate, sessile or slightly petioled, 2.5 to 7.5 cm. long: flowers at length scattered in slender spikes on a peduncle shorter than the leaf: corolla violet or pale purple, 8 to 10 mm. long (*D. humilis* Eng. & Gray).—Muddy borders of streams, from the Gulf States, near the coast, to Texas.

3. **D. parviflora** Gray is only known from an imperfect specimen, which indicates that it is like the preceding; but leaves shorter (2.5 cm. or so long), lanceolate from a broader and rounded subsessile base, the younger with a few hairs, and the inflorescence puberulent, with also some short-stipitate glands.—"Western Texas," (*Buckley*).

** *Cinereous-pubescent: flowers small, in the axils of ordinary leaves and in slender spikes terminating the branches.*

4. **D. parvifolia** Gray. Much branched from a somewhat woody base, erect or diffuse: leaves ovate, 6 to 16 mm. long, petioled; upper axils floriferous: flowering branches mostly extended into slender sparsely-flowered spikes: corolla white or purple, 8 mm. long. (*Shaueria parvifolia* Torr. Mex. Bound.)—Dry soil, southern and western Texas.

11. GATESIA Gray.

Perennial herb, with bright green membranaceous petioled leaves, white or flesh-colored flowers in oblong mostly short-peduncled spikes, deeply 5-parted calyx, corolla with slender tube and almost equally 4-lobed spreading limb, and 2 stamens with oblong contiguous and similar anther-cells, but one a little lower and oblique.

1. **G. læte-virens** Gray. Puberulent or almost glabrous: stem when dry with a contracted ring above each node, as if articulated: leaves ovate-lanceolate or oval and acuminate at both ends, 6.5 to 12.5 cm. long: spikes somewhat strobilaceous, both terminal and axillary; bracts hirsute-ciliate; bractlets similar but smaller: stipe-like base shorter than the body of the 4-seeded pod.—In the Gulf States, and reported from "eastern Texas" (*Wright*).

2. TETRAMERIUM Nees.

Low perennial herbs, with oblong or ovate petioled leaves, dense spike of white or purplish flowers terminating stem and branches (its 4-ranked bracts imbricated and little exceeded by the corollas), small dry 4 or 5-parted calyx, corolla with an almost equally 4-parted limb, 2 stamens, anther-cells equal and parallel or nearly so (either contiguous or separated by a slightly dilated connective), and placentæ at length separating and diverging or incurving.

1. **T. hispidum** Nees. Hirsute-pubescent, and the ovate or oblong strongly 3 to 5-nerved spinulose-pointed bracts hispid: leaves oblong, 2.5 to 5 cm. long: calyx 4-parted. (*T. nervosum*, var. Torr. Mex. Bound.)—Western borders of Texas.

2. **T. platystegium** Torr. Scabrous-puberulent, not at all hirsute: leaves oblong-lanceolate: bracts subcordate, mucronate-acuminate, lightly 3 to 5-plinerved and veiny: calyx 5-parted.—Southern borders of Texas.

13. DICLIPTERA Juss.

Chiefly herbs, with flowers not covered by primary bracts (of main axis) but involucrate (either singly or in a fascicle) by 2 valvately opposed and nearly equal bractlets, small dry 4 or 5-parted calyx, deeply bilabiate corolla, 2 stamens, anthers with a narrow connective, inflorescence various (not strobilaceous-spicate), and placentæ as in the preceding.

1. **D. brachiata** Spreng. From almost glabrous to pilose-pubescent: stem 6-angled, with numerous spreading branches: leaves oblong-ovate, mostly acuminate, 5 to 10 cm. long, slender-petioled: involucres clustered in the axils and more or less paniculate, short-peduncled and subsessile; the valves narrowed at base, 6 to 10 mm. long, from broadly obovate with rounded summit to spatulate-oblong, often unequal: lobes of purple or flesh-colored corolla elongated-oblong, 12 mm. or less

long.—Shady and moist ground, extending from the Gulf States into southern Texas. In eastern Texas is var. ATTENUATA Gray, a form with the involucral valves narrower, spatulate or oblong and cuspidate-acuminate, and attenuate-acuminate leaves on long petioles.

VERBENACEÆ. (VERVAIN FAMILY.)

Herbs or shrubs, with opposite leaves, more or less 2-lipped or irregular corolla, didynamous stamens, the 2 to 4-celled fruit dry or drupaceous and usually splitting when ripe into as many 1-seeded indehiscent nutlets.—Differs from *Labiatæ* in the ovary not being 4-lobed, the style therefore terminal.

* Ovules erect: inflorescence centripetal and simple.

+ Flowers spicate or capitate.

++ Calyx narrow, tubular, mostly inclosing the dry fruit: corolla salverform, with 5-lobed limb: achene-like nutlets 1-celled, 1-seeded.

1. **Bouchea.** Stigma 2-lobed, one lobe abortive, the other subclavate-stigmatose: fruit separating into 2 nutlets.

2. **Verbena.** Stigma mostly 2-lobed, anterior lobe larger, posterior smooth and sterile: fruit separating into 4 nutlets.

+++ Calyx small and short: cells of nutlets 2, 1-seeded.

3. **Lippia.** Calyx 2 to 4-cleft or toothed, inclosing the dry fruit, which separates into 2 nutlets: limb of corolla oblique or bilabiate, 4-lobed.

4. **Lantana.** Calyx very small, truncate or sinuate-toothed: limb of corolla not bilabiate, obscurely irregular, 4 or 5-parted: fruit drupaceous, merely girt at base by the calyx, fleshy or juicy.

++ Flowers in open racemes: corolla salverform: drupe juicy: shrubs or trees.

5. **Citharexylum.** Calyx in fruit girting the base of the drupe: stigmas 2: nutlets 2.

6. **Duranta.** Calyx in fruit ampliate and inclosing the drupe: stigma unequally 4-lobed: nutlets 4.

* * Ovules laterally affixed: inflorescence centrifugal, cymose.

7. **Callicarpa.** Flowers 4-merous, nearly regular: stamens 4, exserted: baccate drupe (containing 4 nutlets) subtended at base by calyx: cymes axillary.

1. BOUCHEA Cham.

More or less suffrutescent plants, with leaves (in ours) sessile or nearly so and entire, lax spikes of purple or white flowers, narrow tubular 5-angled 5-toothed calyx mostly inclosing the dry fruit, salverform corolla with 5-lobed limb, 4 perfect stamens with ovate anthers and parallel cells, 2-lobed stigma with one lobe abortive and the other subclavate-stigmatose, and fruit separating into 2 seed-like nutlets.

1. **B. spatulata** Torr. Suffrutescent, puberulent: branches terete, very leafy: leaves obovate, obtuse, mucronate, 18 mm. long; upper ones passing into similar leafy bracts; uppermost lanceolate, about equaling the calyx.—Southwestern Texas, cañons and hills of the Rio Grande.

2. **B. linifolia** Gray. Fastigiately branched from a perennial or suffrutescent base, glabrous: branches rigid, striate-angled and sulcate, very leafy: leaves linear-lanceolate, acute at both ends; uppermost passing into bracts of the loose spike; upper bracts subulate, much shorter than the slightly pedicellate calyx.—Southwestern Texas, dry bed or banks of the San Pedro and Rio Grande.

2. VERBENA Tourn. (VERVAIN.)

Herbs, with bracted flowers sessile in single or often panicled spikes, tubular 5-toothed calyx, tubular (often curved) salverform corolla with somewhat unequally 5-cleft border, 4 perfect and included stamens (upper pair occasionally without anthers) with ovate anthers and nearly parallel cells, mostly 2-lobed stigma with anterior lobe larger and posterior smooth and sterile, and fruit separating into 4 seed-like nutlets.

** Anthers not appendaged: flowers small, in narrow spikes.*

+ Spikes filiform, with flowers or at least fruits scattered, naked, the inconspicuous bracts mostly shorter than the calyx.

1. **V. officinalis** L. Annual, glabrous or nearly so, loosely branched, 3 to 9 dm. high: leaves pinnatifid or 3-cleft, oblong-lanceolate, sessile, smooth above, the lobes cut and toothed: spikes panicled: flowers purplish, very small.—Road sides and old fields. (Native from Europe.)

2. **V. xutha** Lehm. Stouter and taller, hirsute-pubescent: leaves more or less canescent, incisely pinnatifid or laciniate, or some of the lower 3-parted, the lobes coarsely toothed: flowers purple or blue, more crowded in the strict spikes and larger: bracts about equaling the calyx.—Extending from Louisiana through Texas to southern California and Mexico.

3. **V. urticæfolia** L. Perennial, from minutely pubescent to almost glabrous, rather tall, 9 to 15 dm. high: leaves oval or oblong-ovate, acute, coarsely serrate, petioled: spikes at length much elongated, loosely panicled: flowers very small, white.—Waste or open grounds extending from the Atlantic region through Texas to tropical America.

+ + Spikes thicker or densely flowered: fruits crowded, mostly overlapping each other: bracts inconspicuous, not exceeding the flowers: perennial.

4. **V. hastata** L. Tall, 12 to 18 dm. high: leaves lanceolate or oblong-lanceolate, taper-pointed, cut-serrate, petioled, the lower often lobed and sometimes halberd-shaped at base: spikes linear, erect, corymbed or panicled: flowers blue.—Extending from the Atlantic region through Texas to New Mexico and California.

5. **V. stricta** Vent. Downy with soft whitish hairs, erect, simple or branched, 3 to 6 dm. high: leaves sessile, obovate or oblong, serrate: spikes thick, somewhat clustered, hairy: flowers rather large, purple.—Extending from northern barrens and prairies to Texas and New Mexico.

+ + + Spikes thick, sessile and leafy-bracted: annual.

6. **V. bracteosa** Michx. Widely spreading or procumbent, hairy: leaves wedge-lanceolate, cut-pinnatifid or 3-cleft, short-petioled: spikes single, remotely flowered: bracts large, the lower pinnatifid, longer than the small purple flowers.—Prairies and open waste grounds. In western Texas occurs var. BREVIBRACTEATA Gray, with dense spikes, most of the bracts little longer than the flowers, the uppermost barely equaling them, and in fruit all ascending or appressed.

7. **V. canescens** HBK. Ascending or erect, canescent-hirsute: leaves oblong-lanceolate and wedge-obovate, contracted into a margined base, rigid, sharply toothed, incised or some of them pinnatifid: spikes solitary, filiform, mostly loosely flowered: bracts subulate, the lower almost filiform, and more or less exceeding the bluish flowers; the uppermost ovate-lanceolate and only equaling them.—Dry open grounds, southern and western Texas.

** * Anthers of the longer stamens glandular-tipped: flowers showy, from depressed-capitate becoming spicate.*

+ Gland of anthers small and short, sometimes inconspicuous, on the middle of the back.

8. **V. ciliata** Benth. Low or depressed, 7.5 to 25 cm. high, hirsute-pubescent or hispid, diffusely spreading: leaves once or twice 3-cleft or parted and variously

incisely lobed, 12 to 24 mm. long, with cuneate base and linear to oblong lobes: spikes short-peduncled or sessile, dense, at most oblong: limb of purple or bluish corolla 4 to 8 mm. broad.—Dry plains, southern and western Texas.

9. **V. bipinnatifida** Nutt. Hispid-hirsute, 15 to 30 cm. high: leaves 3.5 to 10 cm. long, bipinnately parted or 3-parted into more or less bipinnatifid divisions, the lobes commonly linear or broader: spikes elongated in age: bracts mostly surpassing the calyx: limb of bluish-purple or lilac corolla 8 to 10 mm. broad.—Plains and prairies throughout Texas.

10. **V. Aubletia** L. Slender, 3 dm. high or less, soft-pubescent and glabrate: leaves 2.5 to 5 cm. long, ovate or ovate-oblong in outline, with a wedge-shaped base, incisely lobed and toothed, often more deeply 3-cleft: spikes pedunculate, elongated in fruit: bracts shorter than or equaling the calyx: limb of reddish-purple or lilac (rarely white) corolla 12 to 16 mm. broad.—Open woods and prairies. Commonly cultivated and variously mixed.

+ + *Gland of anthers oval, as high and almost as large as one of the cells.*

11. **V. Wrightii** Gray. Stem simple below, 6 dm. high; hispidulous-pubescent: leaves pinnately 3 to 7-parted or deeply cleft, contracted at base into a margined petiole, with lobes mostly lanceolate and acute: fruiting pedunculate spikes dense and oblong: corolla light purple.—Near the western borders of Texas, and also at Brazos Santiago (*Nealley*).

3. LIPPIA Houst.

Herbs or shrubs, with spikes or heads of small flowers, short often flattened 2 to 4-toothed or 2-lipped calyx inclosing the dry fruit which separates into 2 nutlets, 2-lipped corolla (upper lip notched, lower much larger and 3-lobed), included stamens, and slender style with obliquely capitate stigma.

* *Flowers in slender naked spikes, with small and narrow bracts: calyx about equally 4-cleft, often densely hirsute, the tube not compressed: shrubs with foliage commonly sweet-aromatic.*

1. **L. ligustrina** Britton. Shrub 12 to 30 dm. high, sometimes spinescent, minutely puberulent: leaves 6 to 24 mm. long, lanceolate-oblong, obtuse, scabrous above, pale beneath, veinless, small and entire on flowering branches, larger and incised or few-toothed on strong sterile shoots: spikes axillary, racemose-panicled, filiform: flowers white or tinged with violet, with fragrance of vanilla. (*L. lycioides* Steud.)—Common on rocky slopes throughout Texas. "Long sprays of white flowers exquisitely fragrant. Foliage eaten by cattle, sheep and goats." (Havard.)

2. **L. Wrightii** Gray. Shrub 6 to 12 dm. high, minutely canescent-tomentose: leaves 8 to 16 mm. long, orbicular-ovate, crenate, rugose, abruptly short-petioled: spikes short-peduncled, densely flowered: corolla white, with odor of sage.—Mountains of southwestern Texas.

* * *Flowers capitate or in short and dense spikes, subtended and imbricated by broad bracts.*

+ *Bracts decussately 4-ranked, keeled.*

3. **L. graveolens** HBK. Shrubby, 6 to 12 dm. high, cinereous with close pubescence: leaves ovate-oblong to oval, crenate-reticulate-rugose, hirsute-pubescent above, canescent beneath, petioled: umbellate peduncles 3 to 6 in each axil, shorter than the leaves: bracts thin, ovate, acute, silky, shorter than the yellowish-white corolla. (*L. Berlandieri* Torr., not Schauer.)—Texas, along and near the Rio Grande.

+ + *Bracts several-ranked, concave or flatish: calyx more or less compressed and the sides keeled.*

++ *More or less shrubby, erect: heads on short axillary peduncles.*

4. **L. lantanoides**. Pubescent leaves ovate or oblong, closely serrate, pinnately veined and with rugose-reticulated veinlets, minutely strigose above, canescently to-

mentose-pubescent beneath, petioled: peduncles mostly solitary in the axils, hardly longer than the petiole: head globular, at length cylindraceous: bracts broadly ovate, abruptly cuspidate-acuminate, villous-canescent, a little shorter than the purple or violet corolla. (*L. geminata* HBK.)—Southern Texas, along the Rio Grande to Brazos Santiago.

++ Herbaceous, procumbent or creeping: peduncles chiefly axillary aud slender: calyx strongly flattened.

5. **L. nodiflora** Michx. Creeping extensively, cinereous or greenish: leaves cuneate-spatulate or oblanceolate, sessile or nearly so, obscurely veiny or almost veinless, the long tapering base entire, sharply serrate from above the middle to the apex: peduncles filiform, much exceeding the leaves: corolla rose-purple or nearly white.—Low grounds, extending from the Gulf States to western Texas.

6. **L. lanceolata** Michx. Like the last, but greener, minutely and sparsely strigulose: leaves thinner, mostly broader, varying from obovate and lanceolate-spatulate to ovate, narrowed at base mostly into a petiole, above sharply serrate, pinnately straight-veined: corolla bluish-white.—River banks, extending from the Atlantic region to western Texas.

4. LANTANA L.

Like the last, but with very small truncate or sinuate-toothed calyx merely surrounding the base of the fleshy or juicy drupaceous fruit, and limb of corolla not 2-lipped.

** Drupe thin-fleshed or somewhat dry, at least with nutlets contiguous and usually cohering more or less into a 2-celled stone: stems never prickly.*

1. **L. involucrata** L. Canescent: leaves obovate-oval or ovate, rounded at apex, crenate, rugulose and veiny, scabrous above, soft-tomentose beneath, cuneate at base, rather slender-petioled: peduncles equaling or exceeding the leaf: bracts silky, the outermost as long as the white or lilac flowers and forming an involucre. (*L. odorata,* var. *Berlandieri* Torr. Mex. Bound)—Southern borders of Texas.

2. **L. macropoda** Torr. Cinereous with minute strigulose pubescence: leaves ovate or oblong-ovate, acute, coarsely and sharply serrate, obtuse or somewhat cuneate at base, petioled, usually scabrous above and slightly canescent beneath, not at all rugose-reticulated, the primary veins conspicuous and running straight to the sinuses: peduncles twice or thrice the length of the leaf: bracts nearly equaling the white or purple corolla, the outermost gradually larger but hardly forming an involucre.—Southern and western Texas.

** * Drupe juicy, the 2 nutlets separated, at least at base: stems sometimes prickly or hispid.*

3. **L. Camara** L. Scabrous and more or less hirsute, 3 to 12 dm. high: leaves ovate or obvate-oblong, often subcordate, crenate-serrate, very scabrous above, scabrous-hirsute or softer-pubescent beneath: peduncles rigid, about the length of the leaf: bracts strigose-hirsute, about half the length of the yellow at length orange or even flame-colored corolla.—Extending from the Gulf States through southeastern Texas to tropical America. "Low bush, with dark green foliage and handsome golden-orange flowers, considered poisonous to sheep and cattle in southeastern Texas. It is noticed they always shun it, even where grass is scant." (Havard.)

5. CITHAREXYLUM L.

Shrubs or trees, with somewhat coriaceous leaves, small flowers solitary or on a filiform rhachis each subtended by a minute bract, calyx with truncate minutely 5-toothed border and in fruit girting the base

of the juicy drupe which contains 2 nutlets, salverform corolla, and 2 stigmas.

1. **C. villosum** Jacq. Soft-pubescent or glabrate: leaves oblong-obovate or oblong, entire or occasionally few-toothed above the middle, veiny and with finely reticulated veinlets, shining and barely scabrous above, pale and somewhat soft-canescent beneath, biglandular at the narrowed base, tapering into the petiole: racemes declining, loose, but spike-like: corolla white, glabrous externally.—Southern Texas and Mexico.

2. **C. brachyanthum** Gray. Puberulent: leaves from linear-spatulate to obovate, 6 to 12 mm. long, veinless, subsessile: flowers solitary or subsolitary in the center of axillary fascicles of leaves (which are remarkably small): tube of white corolla barely surpassing the calyx. (*Lycium brachyanthum* Gray in Hemsl.) Southern borders of Texas, at Laredo.

6. DURANTA L.

Like the last, but calyx in fruit ampliate and inclosing the drupe which contains 4 nutlets (hence 8 seeds), corolla commonly curved, and stigma unequally 4-lobed.

1. **D. Plumieri** Jacq. Minutely pubescent or glabrate: leaves obovate, oblong, or ovate, mostly entire, contracted at base into short petiole: racemes panicled, loose; lower bracts often leafy: corolla lilac: drupe yellow, the inclosing persistent calyx also yellow, closed into a straight or contorted beak.—Brazos Santiago (*Nealley*).

7. CALLICARPA L.

Shrubs, with scurfy pubescence, small flowers in axillary cymes, 4 or 2-toothed short calyx, tubular-bell-shaped 4 or 5-lobed nearly regular corolla, 4 nearly equal exserted stamens, anthers opening at apex, slender style thickened upward, and fruit a small berry-like drupe with 4 nutlets.

1. **C. Americana** L. (FRENCH MULBERRY.) Leaves ovate-oblong with a tapering base, acuminate, toothed, whitish beneath: cymes many flowered: calyx obscurely 4-toothed: corolla bluish: fruit violet-color.—Rich or moist grounds, extending from the Gulf States to southern Texas.

LABIATÆ. (MINT FAMILY.)

Chiefly herbs, with square stems, opposite aromatic leaves, more or less 2-lipped corolla, didynamous or diandrous stamens, and a deeply 4-lobed ovary which forms in fruit 4 little seed-like nutlets or achenes surrounding the base of the single style in the bottom of the persistent calyx.

I. Nutlets rugose-reticulated: ovary merely 4-lobed.

Tribe I. Stamens 4, ascending and parallel, mostly exserted from the upper side of the corolla: calyx 5 to 10-nerved.

* Limb of corolla merely oblique, of 5 nearly equal and similar lobes.

1. **Tetraclea.** Calyx regular: corolla-lobes similar and equally spreading: stamens exserted.

2. **Trichostema.** Calyx oblique: corolla lobes all declined: stamens exserted.

3. **Isanthus.** Calyx bell-shaped: corolla small, the lobes spreading: stamens included.

* * Limb of corolla irregular, seemingly unilabiate, the upper lip being split down: stamens exserted from the cleft.

4. **Teucrium.** Corolla deeply cleft between the 2 small lobes of the upper lip.

II. Nutlets smooth or granulate: ovary deeply 4-parted.

Tribe II. Stamens declined toward or resting on lower lip of corolla, didynamous, all fertile: lower lip of corolla apparently formed of anterior lobe only.

5. **Hyptis.** Corolla with lower lobe saccate, abruptly deflexed at contracted and callous base.

Tribe III. Stamens not declined, upper pair shorter or wanting; anthers 2-celled: upper lip of corolla not galeate or concave: flowers in more or less crowded clusters or whorls, axillary or spicate.

* Corolla not evidently 2-lipped, but almost equally 4-lobed, small: stamens erect distant.

6. **Mentha.** Fertile stamens 4, nearly equal.

7. **Lycopus.** Fertile stamens 2, and often 2 sterile filaments without anthers.

* * Corolla more or less 2-lipped.

+ Stamens distant and straight, often divergent, never convergent or curved.

8. **Pycnanthemum.** Calyx ovate or short-tubular, 10 to 13-nerved, hairy in the throat: stamens 4: flowers in dense heads or clusters.

+ + Stamens ascending or arcuate, often more or less converging and sometimes ascending parallel under the erect upper lip of the corolla: calyx 12 to 15-nerved.

++ Stamens 4, all antheriferous.

9. **Micromeria.** Calyx not gibbous, about equally 5-toothed: stamens arcuate, shorter than corolla.

10. **Calamintha.** Calyx often gibbous, 2-lipped: stamens ascending parallel under or beyond the upper lip, or conniving in pairs.

++ ++ Antheriferous stamens 2.

11. **Poliomintha.** Calyx terete and regular, equally 5-toothed or nearly so: corolla mostly with a hairy ring within the throat or tube: fruticulose.

12. **Hedeoma.** Calyx usually gibbous, more or less 2-lipped or unequally 5-toothed: tube of corolla naked: low herbs.

Tribe IV. Stamens 2, ascending and parallel; anthers apparently or really 1-celled: corolla strongly 2-lipped.

13. **Salvia.** Calyx 2-lipped: anthers with a long connective astride the filament, bearing a linear cell at the upper end, and none or an imperfect cell on the lower.

14. **Monarda.** Calyx tubular and elongated, equally 5-toothed: anthers of 2 cells confluent into one, the connective inconspicuous.

15. **Blephilia.** Calyx ovate-tubular, 2-lipped: anthers as in the last.

Tribe V. Stamens 4, the inner pair longer than outer, ascending or diverging: corolla 2-lipped, the upper lip concave or arched, the lower spreading: calyx mostly 15-nerved.

16. **Lophanthus.** Stamens divergent, exserted; upper pair declined, lower ascending.

17. **Cedronella.** Stamens all ascending, not exceeding the lip of the corolla.

Tribe VI. Stamens 4, ascending and parallel: calyx 2-lipped, closed in fruit, the rounded lips entire: corolla 2-lipped, the upper lip arched.

18. **Scutellaria.** Calyx with a helmet-like projection on the upper side, not inflated.

19. **Salizaria.** Calyx globular, not appendaged or gibbous on the back, becoming inflated or reticulated.

Tribe VII. Stamens 4, parallel and ascending under the galeate or concave upper lip, the outer pair longer: calyx 5 to 10-nerved or veiny, not 2-lipped (except in no. 20).

* Calyx reticulate-veiny, deeply 2-lipped, closed in fruit.

20. **Brazoria.** Calyx mostly declined in fruit, with broad lips, the upper somewhat recurved, the lowed turned upward in fruit.

* * Calyx thin, inflated in fruit, obscurely nerved, 3 to 5-lobed, open.

21. **Physostegia.** Calyx 5-toothed or 5-lobed: anther-cells parallel.

* * * Calyx of firmer texture, distinctly 5 to 10-nerved or striate, 5 to 10-toothed.

+ Stamens included in short corolla-tube, its upper lip merely concave.

22. **Marrubium.** Calyx tubular, 5 to 10-nerved, and with 5 or 10 awl-shaped teeth.

+ + Stamens ascending under the galeate upper lip of the corolla.

23. **Leonotis.** Calyx tubular, 10-nerved, at length incurved above, oblique at orifice, and with 5 or more unequal spinulose-tipped teeth, the upper one largest: stamens not deflexed after blooming.

24. **Stachys.** Calyx tubular-bell-shaped, 5 or 10-nerved, equally 5-toothed (sometimes the upper teeth larger and more or less united): stamens often deflexed or contorted after blooming.

1. TETRACLEA Gray.

Minutely puberulent herb, with deeply 5-cleft regular calyx, nearly salverform corolla with similar and equally spreading lobes, 4 exserted stamens with anther-cells permanently parallel and distinct, and a barely 4-lobed ovary.

1. **T. Coulteri** Gray. About 3 dm. high from a perennial root or suffrutescent base: leaves petioled, ovate, nearly entire: flowers 2 or 3 on the short axillary peduncles, short-pedicled, cream-colored.—Rocky hills, southern and western Texas.

2. TRICHOSTEMA Gronov. (Blue-curls.)

Low annuals, with entire leaves, mostly solitary 1-flowered pedicels terminating the branches, bell-shaped oblique deeply 5-cleft calyx (3 upper teeth elongated, 2 lower very short), 5-lobed corolla with declined nearly equal lobes, 4 curved much exserted stamens with divergent and at length confluent anther-cells, and a deeply 4-lobed ovary.

1. **T. dichotomum** L. Viscid with rather minute pubescence: leaves lance-oblong or rhombic-lanceolate, rarely lance-linear, short-petioled.—Sandy fields, extending from the Atlantic region into Texas. Known as "bastard pennyroyal."

3. ISANTHUS Michx. (False pennyroyal.)

Low much branched clammy-pubescent annual, with nearly entire lance-oblong 3-nerved leaves, small pale blue flowers on axillary 1 to 3-flowered peduncles, bell-shaped 5-lobed equal calyx enlarged in fruit, corolla little longer than calyx with bell-shaped border and 5 nearly equal and obovate spreading lobes, and 4 slightly didynamous incurved-ascending stamens scarcely exceeding the corolla.

1. **I. brachiatus** Britton. Corolla 4 to 6 mm. long, little exceeding the calyx. (*I. cæruleus* Michx.)—Dry or sterile ground, extending from the Atlantic region to southern Texas.

4 TEUCRIUM Tourn. (GERMANDER.)

Herbs or undershrubs, with 5-toothed calyx, corolla with the 4 upper lobes nearly equal and turned forward so that there seems to be no upper lip and lower lobe much larger, 4 stamens exserted from the deep cleft between the 2 upper lobes of the corolla, and confluent anther-cells.

** Erect perennial herbs: leaves undivided: flowers in naked terminal spikes or racemes.*

1. **T. Canadense** L. Downy, 3 to 9 dm. high: leaves ovate-lanceolate, serrate, rounded at base, short-petioled, hoary underneath, the floral scarcely longer than the oblique unequally-toothed calyx: whorls about 6-flowered, crowded in a long and simple wand-like spike: calyx carescent, the 3 upper lobes very obtuse or the middle one acutish: corolla purple, rose, or sometimes cream-color, 12 mm. long.—Low grounds, throughout Texas.

2. **T. occidentale** Gray. Loosely pubescent: calyx villous with viscid hairs, the upper lobes acute or middle one acuminate: corolla 8 to 10 mm. long: otherwise like the last.—Extending from the northern plains into Texas.

*** Low and diffuse herbs: leaves multifid or incised, having solitary pedicellate flowers in their axils.*

3. **T. Cubense** L. Glabrous or nearly so, branched from an annual root: leaves cuneate; lower obovate-cuneate or rhomboidal and short-petioled, crenately incised, sometimes 3 to 5-cleft to the middle; upper sessile, palmately 3-cleft or 3 to 5-toothed, exceeding the flowers: corolla pale blue or white, 6 to 8 mm. long, hardly exceeding the calyx.—Southern Texas, from Brazos Santiago westward.

4. **T. laciniatum** Torr. Glabrous or hirsute-pubescent, much-branched from a woody perennial root: leaves pinnately 3 to 7-parted into narrow linear entire or 2 or 3-lobed or toothed divisions, rather rigid; the floral much crowded, 3-parted; upper equaling the flowers: corolla pale blue or lilac, 12 to 20 mm. long, with spatulate lower lobe much surpassing the calyx.—Plains of southern and western Texas.

5. HYPTIS Jacq.

Ours is a minutely pubescent or smoothish herb, with slender-petioled leaves, capitate or spicate flowers, mostly equally 5-toothed calyx, corolla with the lower lobe saccate and abruptly deflexed at the contracted and callous base, and didynamous stamens (all fertile) declined toward or resting on the lower lip of the corolla.

1. **H. radiata** Willd. Stems tall: leaves ovate-lanceolate, toothed, with entire long-tapering base: axillary peduncles usually shorter than leaf, bearing a many-flowered soft-puberulent capitate glomerule which is mostly shorter than its involucre of whitish bracts: corolla white, purple-dotted.—Low ground, near the coast.

6. MENTHA Tourn. (MINT.)

Odorous perennial herbs, with small flowers mostly in close clusters forming axillary capitate whorls (sometimes approximated in interrupted spikes), bell-shaped or tubular 5-toothed calyx (equal or nearly so), corolla with short included tube and bell-shaped border somewhat equally 4-cleft, and 4 equal erect distant stamens.—Ours are all introduced plants.

* *Spikes narrow and leafless, densely crowded: leaves sessile or nearly so.*

1. **M. rotundifolia** L. Soft-hairy or downy: leaves broadly elliptical to round-ovate and somewhat heart-shaped, rugose, crenate-toothed: spikes slender, not canescent.—Maine to Texas.

2. **M. viridis** L. Nearly smooth: leaves oblong or ovate-lanceolate, unequally serrate: bracts linear-lanceolate and subulate, conspicuous.—Wet ground, reported from Gillespie County (*Jermy*). "Spearmint."

* * *Flowers pedicellate, less crowded, in interrupted leafless spikes, or some in the upper axils: leaves petioled.*

3. **M. piperita** L. Glabrous, very pungent-tasted: leaves ovate-oblong to oblong-lanceolate, acute, sharply serrate: spikes narrow, loose.—Along brooks, escaped everywhere. "Peppermint."

7. LYCOPUS Tourn. (WATER HOREHOUND.)

Perennial low glabrous or puberulent herbs, with sharply toothed or pinnatifid leaves, floral ones similar and much longer than the dense axillary whorls of small mostly white flowers, bell-shaped 4 or 5-toothed calyx naked in the throat, bell-shaped nearly equally 4-lobed corolla scarcely longer than the calyx, and 2 distant stamens (the upper pair either sterile rudiments or wanting).

1. **L. sinuatus** Ell. Stem erect, 3 to 9 dm. high, acutely 4-angled: leaves oblong or lanceolate, acuminate, irregularly incised or laciniate-pinnatifid, or some of the upper merely sinuate, tapering to a slender petiole: calyx-teeth short-cuspidate: sterile filaments slender, conspicuous, with globular or spatulate tips. (*L. Europæus*, var. *sinuatus* Gray.)—Extending from the Atlantic region into Texas.

8. PYCNANTHEMUM Michx. (MOUNTAIN MINT. BASIL.)

Perennial upright herbs, with a pungent mint-like flavor, floral leaves often whitened, whitish or purplish flowers (lips mostly dotted with purple) in many-flowered dense whorls crowded with bracts and usually forming terminal heads on close cymes, ovate-oblong or tubular equally 5-toothed or 2-lipped calyx naked in the throat, short more or less 2-lipped corolla (upper lip straight, nearly flat, entire or slightly notched; lower 3-cleft), 4 distant stamens with outer pair rather longer, and parallel anther-cells.

1. **P. linifolium** Pursh. Glabrous up to the canescent inflorescence, 6 dm. high: leaves linear, nearly sessile, entire, mostly glabrous, very numerous: capitate glomerules small and numerous, densely cymose, imbricated with many short appressed rigid bracts, these and the lance-awl-shaped calyx-teeth pungently pointed: calyx equally 5-toothed.—Dry ground, extending from the Atlantic region to Texas.

2. **P. albescens** Torr. & Gray. Stems slender, puberulent: leaves oblong or ovate-lanceolate, obscurely serrate, small, canescent beneath and the uppermost on both sides with a minute close pubescence, as also are the short and beardless calyx and bracts: calyx 2-lipped, with short triangular-ovate obtuse teeth.—Extending from the Gulf States into Texas.

9. MICROMERIA Benth.

Diffusely spreading or creeping perennial herbs, with rounded and petioled veiny thin leaves, 1 to 3 slender-pediceled purplish axillary

flowers, oblong or tubular terete not gibbous or declined calyx about equally 5-toothed, short 2-lipped corolla with straight tube usually shorter than calyx, and 4 antheriferous arcuate included stamens.

1. **M. Brownei** Benth. Glabrous or nearly so: leaves roundish, obscurely crenate: pedicels bractless: calyx villous in the throat; teeth lanceolate-ovate.—A species of Florida and the West Indies, but represented in southeastern Texas (San Antonio to Brazos Santiago and southward) by var. PILOSIUSCULA Gray, with leaves and sometimes stem and calyx sparsely pilose-pubescent.

10. CALAMINTHA Tourn., Mœnch. (CALAMINT.)

Perennials, with mostly purplish or whitish flowers, tubular 13-nerved 2-lipped calyx mostly hairy in the throat, distinctly 2-lipped corolla with straight tube and inflated throat (upper lip erect, flattish, entire or notched; lower spreading, 3-parted), and 4 mostly ascending stamens with anthers usually approximate in pairs.

1. **C. Nuttallii** Gray. Glabrous or nearly so, erect or ascending, copiously stoloniferous at base: leaves entire, thickish and veinless; cauline linear or the lower spatulate, sessile, 10 to 18 mm. long; those of the creeping stolons ovate and orbicular, short-petioled, 4 to 6 mm. long: flowers 1 to 3 in the axils.—On wet limestone river banks, extending into Texas from the north central States.

11. POLIOMINTHA Gray.

Low suffrutescent plants canescent throughout or nearly so, with entire leaves, rose-color or purple flowers (except in no. 3) in axillary cymes or glomerules, terete and regular equally 5-toothed calyx bearded in the throat, 2-lipped corolla mostly with a hairy ring within the throat or tube (upper lip erect, emarginate; lower 3-cleft and spreading, the broader middle lobe emarginate), and 2 antheriferous stamens ascending parallel under the upper lip (the posterior filaments mere subulate rudiments).

1. **P. incana** Gray. Silvery with very close and minute tomentum: leaves linear or the lower oblong, sessile, veinless and the midrib obscure: calyx 15-nerved, white-villous, with conspicuous subulate teeth half the length of the corolla whose tube is pilose-annulate at summit. (*Hedeoma incana* Torr. Mex. Bound.)—Western Texas.

2. **P. mollis** Gray. More tomentose, herbaceous nearly to the base: leaves ovate or oval, narrowed into a short petiole, 3 to 5-plinerved: calyx 13-nerved, with unequally spreading minute teeth hardly a tenth the length of the corolla whose tube is not annulate but sparsely pilose within. (*Hedeoma mollis* Torr. l. c.)—Southwestern Texas, in the cañons and mountains west of the Pecos.

3. **P. glabrescens** Gray. Frutescent, canescently puberulent, at length somewhat glabrate, very leafy: leaves linear-oblong, obtuse, veinless and glabrate above, conspicuously punctate: calyx-teeth short, erect: corolla white with purple dots on lower lip and tube pilose-annulate within and equaled by the calyx.—At Maxon Spring, western Texas, near the Rio Grande (*Havard*).

12. HEDEOMA Pers. (MOCK PENNYROYAL.)

Mostly odorous annuals or perennials, with small leaves, loose axillary clusters of flowers often forming terminal leafy racemes, ovoid or tubular 13-nerved 2-lipped calyx gibbous on lower side near the base

and bearded in the throat, 2-lipped corolla, and 2 fertile stamens (the upper pair reduced to sterile filaments or wanting).

* *Flowers pedicellate, cymulose or rarely subsolitary in the axils of the leaves.*

\+ *Calyx-teeth about equal in length, all erect or in fruit curved upward.*

1. **H. acinoides** Scheele. Minutely pubescent, slender: leaves nearly glabrous, slender-petioled, obscurely denticulate; lower ovate, upper oblong, or upper floral oblong-linear: upper flowers somewhat capitately, or spicately crowded: calyx barely hairy in throat, with setaceous-subulate minutely ciliate teeth: tube of purple corolla exserted.—Extending from Arkansas to southern and western Texas.

\+ \+ *Two lower calyx-teeth decidedly longer than the three upper.*

\++ *Leaves entire (rarely obscure denticulations in no. 2).*

2. **H. thymoides** Gray. Cinereous-pubescent or puberulent: leaves ovate, obtuse, petioled; lower little exceeding, upper shorter than the flowers: calyx-teeth of the upper lip recurved away from the straightish and moderately longer lower ones: corolla little exserted, only 6 mm. long. (*H. dentata*, var. *nana* Torr. Mex. Bound.)—In the mountains beyond the Pecos (*Nealley*).

3. **H. Drummondi** Benth. Cinereous-pubescent or puberulent: leaves from oblong to linear, obtuse, subsessile, or narrowed at base into a very short petiole, thickish; upper mostly rather shorter than the few flowers in their axils: subulate-setaceous calyx-teeth at length all connivent and slightly curved upward: the lower nearly twice the length of the upper: corolla from 6 to 8 mm. long and little exserted to 12 mm. long and twice as long as the calyx.—Common throughout Texas.

4. **H. Reverchoni** Gray. A rigid suffruticulose perennial, equably and closely leafy to the top, puberulent: leaves elliptical, coriaceous; the floral hirsute beneath and on the margins: corolla about twice as long as the strongly hirsute or hispid calyx. (*H. Drummondi*, var. *Reverchoni* Gray.)—Common in the mountains of western Texas.

\++++ *Leaves serrate with salient acute and callous teeth.*

5. **H. plicata** Torr. Minutely soft-pubescent: leaves approximate, rigid, rhombic-ovate or the lower roundish-ovate and uppermost floral oblong, numerously and coarsely callous-serrate, conspicuously lineate with the copious strong and straight mostly simple veins: lower calyx-teeth erect and moderately longer than the recurved-spreading upper ones: corolla pink, 4 to 6 mm. long.—Mountains along the Limpia and Rio Grande, southwestern Texas.

* * *Flowers sessile or subsessile, verticillastrate in a terminal interrupted spike.*

6. **H. ciliata** Benth. Erect stem retrorsely puberulent and above mostly hirsute: leaves oblong, obtuse, entire, veinless, glabrous or glabrate: bractlets and calyx-tube conspicuously white-hirsute; teeth more naked, similar and of equal length: tube of rose-purple corolla not exserted, throat hairy at insertion of short included stamens.—Sandy ground, eastern and southern Texas.

13. SALVIA L. (Sage.)

Annuals or perennials, with mostly large and showy flowers in spiked or racemed or panicled whorls, 2-lipped calyx, deeply 2-lipped ringent corolla (upper lip straight or scythe-shaped, entire or barely notched; lower spreading or pendent, 3-lobed, with middle lobe largest), and 2 stamens on short filaments jointed with the elongated transverse connective one end of which (ascending under the upper lip) bears a linear 1-celled (half-)anther and the other (usually descending) an imperfect or deformed (half-) anther or none at all.

* *Calyx-throat conspicuously bearded; the upper lip with 3 broad short teeth; all the teeth cuspidate: corolla pilose-annulate within: stamens separate, the lower anther-cells shorter, more or less polleniferous: leaves mostly narrow and entire: flowers racemose or spicate.*

1. **S. Texana** Torr. Stems with margins of leaves and calyx hirsute with long and spreading bristly hairs: flowers spicate, the upper floral leaves not exceeding the calyx, which equals the dilated throat of the widely ringent blue corolla.—Open rocky soils, southern and western Texas. On the hills of the Pecos and Rio Grande, southwestern Texas, occurs var. CANESCENS Gray, a form with leaves hoary-white with fine tomentum, all narrowly linear, with strongly revolute margins, and fewer flowers in the axils of the upper ones.

2. **S. Engelmanni** Gray. Minutely puberulent and glabrate, the setose hairs few and scattered or nearly wanting: lower leaves sometimes denticulate; floral mostly equaling the more scattered flowers: corolla with narrower tube and throat twice the length of the calyx, light purple.—Western Texas.

* * *Calyx-throat naked (exc. in no. 5); upper lip truncate and remotely 3-toothed: corolla elongated, mostly pilose-annulate within: stamens separate, the lower fork of the connective bearing a polleniferous anther-cell: leaves lyrately lobed or toothed or pinnately divided: flowers loosely racemose.*

\- *Corolla blue or violet: cauline leaves (if any) sessile or narrowed into wing-margined petioles.*

3. **S. lyrata** L. Low, 2.5 to 5 dm. high, somewhat hairy: stem nearly simple and naked: root-leaves lyre-shaped or sinuate-pinnatifid, sometimes almost entire; those of the stem mostly a single pair, smaller and narrower; the floral oblong-linear, not longer than the calyx: whorls loose and distant, forming an interrupted raceme; upper lip of pubescent corolla short, straight, not vaulted.—Woodlands and meadows, extending from the Atlantic region to Texas.

\- \- *Corolla scarlet-red: cauline leaves all slender-petioled, at least the lower ones 3 to 5-foliolate.*

4. **S. Rœmeriana** Scheele. Stems and petioles below often sparsely hirsute with long spreading hairs: leaves or terminal leaflet roundish or reniform-cordate, coarsely repand-toothed or crenately incised; lower usually with 2 or 3 similar but smaller lateral leaflets (these occasionally reduced to dentiform appendages on the petiole): raceme loose and elongated: calyx somewhat pubescent, naked within.—In light fertile soil, western Texas.

5. **S. Henryi** Gray. More slender, less soft-pubescent: leaves or mostly leaflets smaller, seldom cordate, angulate-lobed; lower floral ones often similar, all as long as the pedicels: calyx hirsute, ciliate-bearded or villous in the sinuses and throat: corolla apparently narrower and with shorter less notched lips; the bearded ring at base within obsolete.—Extreme western borders of Texas.

* * * *Calyx-throat naked: corolla not pilose-annulate: anterior portions of connectives deflexed, linear or gradually somewhat dilated downward, closely approximate or connate, and destitute of an anther-cell.*

\- *Corolla crimson, its tube villous-annulate towards base inside; upper lip conspicuously larger and longer than the lower: anterior fork of connectives free and spatulate-dilated downwards.*

6. **S. pentstemonoides** Kunth. Nearly glabrous, or sparsely hirsute below: stem 6 to 15 dm. high, leafy to the summit: leaves oblong-lanceolate, acute, mucronate, entire or obscurely denticulate and with ciliolate-scabrous margins, the lower on long margined petioles; upper gradually much smaller and sessile: cymules subsessile, 3 to 5-flowered: upper calyx-lip truncate, with 3 short and broad cuspidate-mucronate teeth: style glabrous.—Southern Texas, from the Pierdenales to the Rio Grande.

+ + Lower and sterile forks of the connectives mostly united with each other longitudinally, linear, oblong, or semihastate: corolla naked within throughout.

++ Corolla red or scarlet.

7. S. Greggii Gray. Shrubby, glabrous or obscurely farinaceous-puberulent: leaves coriaceous, 1-ribbed, almost veinless, oblong, very obtuse, entire, narrowed at base into a short petiole: corolla red or purplish-red, glabrous: style hairy along the upper side.—Southern borders of Texas.

8. **S. coccinea** L. Perennial or annual, canescently pubescent or glabrate, or hirsute towards the base with long spreading hairs: leaves membranaceous, veiny, cordate or ovate, mostly acute, crenate, slender-petioled, mostly soft-tomentulose beneath: corolla deep scarlet-red, pubescent or puberulent outside: style glabrous.—Extending from the Gulf States to southern Texas.

9. **S. Regla** Cav. Shrubby, minutely scabrous-puberulent: leaves broadly deltoid-ovate or subcordate, serrate, slender-petioled; floral ones similar: calyx becoming inflated and tinged with red: corolla nearly 5 cm. long, scarlet.—Chisos Mountains, southwestern Texas (*Havard*).

++ ++ Corolla blue or purplish, sometimes white, never red.

= Herbs.

a. *Flowers from near 25 mm. long to over 12 mm.: corolla with prominently exserted tube: style bearded above: perennials, 3 to 15 dm. high.*

10. **S. farinacea** Benth. Minutely and canescently puberulent, or glabrous below: lower leaves ovate-lanceolate or even ovate, with obtuse or cuneate or rarely subcordate base, coarsely and irregularly serrate, on slender petioles; upper lanceolate or linear-lanceolate, sometimes entire: calyx very densely and softly white-tomentose, truncate, the teeth 3, very broad and obtuse, exceedingly short: corolla violet-blue.—Common in rich soil.

11. **S. azurea** Lam. Glabrous or puberulent: lower leaves lanceolate or oblong, obtuse denticulate or serrate, tapering into a slight petiole; upper narrower, often linear, entire: calyx usually minutely puberulent, the very broad and obtuse upper lip distinct but short: corolla deep blue (sometimes varying to white).—Extending from the Gulf States to extreme western Texas. Associated with the species is var. GRANDIFLORA Benth., which is cinereous-puberulent, with denser inflorescence and calyx tomentulose-sericeous.

12. **S. angustifolia** Cav. Usually glabrous (except usually some scattered bristly hairs): leaves linear, entire or obscurely denticulate, acute, somewhat petioled: calyx with lips half the length of the tube; the upper ovate, entire, acute: corolla blue.—A Mexican species, but represented in southwestern Texas by var. GLABRA Gray, which is wholly glabrous, even the hairy ring at the nodes wanting or obsolete (*S. azurea* Torr. Mex. Bound. in part).

b. *Flowers barely 12 mm. long or shorter: corolla-tube hardly at all exserted: style glabrous or nearly so: leaves from linear to oblong-lanceolate, tapering into the slender petiole.*

13. **S. lanceolata** Willd. Puberulent or nearly glabrous: leaves lanceolate or linear-oblong, obtuse, irregularly serrate with obtuse appressed teeth or nearly entire; the inconspicuous floral ones lanceolate or subulate: calyx minutely hairy on the nerves: corolla 8 mm. long.—Plains throughout Texas.

14. **S. subincisa** Benth. More pubescent above: leaves oblong-lanceolate, incisely dentate: the floral minute, ovate: calyx glandular-pilose: corolla 12 mm. long.—Western borders of Texas.

= = Shrubby.

15. **S. chamædryoides** Cav. Low, much-branched, canescent and scabrous: leaves oblong or elliptical, more or less crenulate, obtuse, short-petioled: flowers in pairs or few in the clusters of the raceme: calyx hispidulous on the nerves: corolla blue, over 12 mm. long.—Cañons, etc., southwestern borders of Texas.

16. **S. Parryi** Gray. Low, much branched: leaves ovate-oblong, mostly with truncate base, obtuse, crenate, short-petioled, tomentulose-canescent, as are the branchlets: flowers interruptedly spicate, several in each cluster: calyx densely woolly with white branched hairs: corolla (blue?) short and small, slightly pubescent: connectives free (*S. spicata?* Torr. Mex. Bound., not Rœm. & Sch.).—"Apache Springs on the Rio Grande."

17. **S. spicata** Rœm. & Sch. Canescent with minute and dense pubescence, very leafy: leaves small, lanceolate-oblong, obtuse, minutely and closely crenulate, subsessile, upper face soon glabrate and rugose-venulose: calyx woolly-tomentose: corolla 6 to 8 mm. long, blue or purple.—Runnels County (*Nealley*).

18. **S. ballotæflora** Benth. Shrub 6 to 24 dm. high, tomentulose-canescent: leaves ovate or somewhat oblong, truncate-cuneate or subcordate at base, crenate, reticulate-veiny, mostly rugose, slender-petioled, glabrate and green above, white beneath: flowers in short and rather dense simple racemes in axils of upper ordinary leaves, 8 mm. long: calyx pendulous in fruit and with ampliate reticulate-veiny 2 or 3-lobed limb exceeding the tube of the small bluish or purple corolla.—Southern and western Texas. "Majorano" of the Mexicans.

14. MONARDA L. (HORSE-MINT.)

Odorous erect herbs, with entire or toothed leaves, rather large flowers in a few whorled heads closely surrounded with bracts, tubular elongated 15-nerved nearly equally 5-toothed calyx usually hairy in the throat, elongated strongly 2-lipped corolla (lips linear or oblong, somewhat equal; upper erect, entire or slightly notched; lower spreading, 3-lobed at apex, middle lobe narrowest and slightly notched), 2 elongated ascending stamens inserted in throat of corolla, and linear anthers with divaricate cells confluent at the junction.

* *Stamens and style exserted beyond the linear straight acute upper lip of the corolla: head solitary and terminal or sometimes 2 or 3: leaves acutely more or less serrate.*

1. **M. fistulosa** L. Smoothish or downy, 6 to 15 dm. high: leaves ovate-lanceolate, the uppermost and outer bracts somewhat colored (whitish or purplish): calyx very hairy in the throat: corolla 2.5 cm. long or more, purple or purplish dotted, smooth or hairy.—Dry soil, throughout Texas; where also occurs var. MOLLIS Benth., in which the corolla is flesh-color to lilac, glandular, its upper lip hairy outside or more bearded at tip; leaves paler, soft-pubescent beneath; calyx-throat mostly filled with dense beard. "Wild bergamot."

* * *Stamens not exceeding the falcate upper lip of the short corolla: head axillary or interrupted spicate: leaves lanceolate or oblong, sparsely serrate, tapering into the petiole.*

2. **M. punctata** L. Perennial, minutely downy, 6 to 9 dm. high: leaves lanceolate: bracts lanceolate, blunt, obtuse at base, sessile, yellowish and purple: teeth of the downy calyx short and awnless, rigid, soon spreading: corolla nearly smooth, yellowish, the upper lip spotted with purple, notched at apex, the tube scarcely exceeding the calyx.—Sandy ground, extending from the Atlantic region to southern and western Texas. "Horse-mint." A Texan form is var. LASIODONTA Gray, with throat and teeth of calyx densely villous.

3. **M. citriodora** Cerv. Annual, 3 to 9 dm. high: bracts narrowly oblong, whitened or purple-tinged, their slender awned tips spreading or recurving: calyx-teeth slender, usually spreading, the tube mostly glabrous: corolla white or pinkish, not spotted.—Plains of Texas.

4. **M. clinopodioides** Gray. Like the last, but bracts green or greenish, erect, rigid, strongly-nerved, hispid-ciliate: calyx-teeth always erect, aristiform-attenuate (tapering gradually from base), the tube hirsute and purplish.—Eastern and southern Texas.

15. **BLEPHILIA** Raf.

Perennial herbs, with nearly the foliage of the last, small pale bluish flowers crowded in axillary and terminal globose whorls, ovoid-tubular 13-nerved 2-lipped calyx naked in the throat (upper lip with 3 awned teeth, lower with 2 nearly awnless teeth), strongly and nearly equally 2-lipped corolla with inflated throat (upper lip erect and entire, lower spreading, 3-cleft, middle lobe smallest and notched), and 2 ascending exserted stamens.

1. **B. hirsuta** Benth. Hairy throughout: leaves long-petioled, ovate, pointed, rounded or heart-shaped at base: lower floral ones similar, uppermost and bracts linear-awl-shaped, shorter than the long-haired calyx: corolla smoothish, pale, with darker purple spots.—Moist shady places, extending from the Atlantic region into Texas.

16. **LOPHANTHUS** Benth. (GIANT HYSSOP.)

Perennial tall herbs, with petioled serrate leaves, small flowers crowded in interrupted terminal spikes, tubular-bell-shaped 15-nerved oblique 5-toothed calyx, 2-lipped corolla (upper lip nearly erect, 2-lobed; lower somewhat spreading, 3-cleft, middle lobe crenate), 4 exserted stamens with inner pair declined and outer shorter pair ascending (so that the pairs cross), and nearly parallel anther-cells.

1. **L. nepetoides** Benth. Stem stout, 6 to 18 dm. high, smooth or nearly so, sharply 4-angled: leaves ovate, somewhat pointed, coarsely crenate-toothed, 5 to 10 cm. long: spikes 5 to 15 cm. long, crowded with the ovate pointed bracts: calyx-teeth ovate, rather obtuse, little shorter than the pale greenish-yellow corolla.—Borders of woods, extending from the North Atlantic States into Texas.

17. **CEDRONELLA** Mœnch.

Sweet-scented perennials, with pale purplish flowers, rather obliquely 5-toothed many-nerved calyx (ours), slender 2-lipped corolla (upper lip flattish or concave, 2-lobed; lower 3-cleft, spreading, middle lobe largest), 4 ascending stamens with outer pair shorter, and parallel anther-cells.

1. **C. micrantha** Gray. Puberulent: leaves slender-petioled, coarsely crenate-dentate; lower cordate-ovate, obtuse; upper ovate-lanceolate or oblong: capitate clusters sessile, many-flowered, mostly approximate in a cylindrical naked spike: corolla (whitish, barely 4 mm. long) and stamens little exserted.—Extreme southwestern Texas.

2. **C. pallida** Lindl. Green and nearly glabrous: leaves broadly cordate-ovate or subcordate, mostly obtuse, crenate, slender-petioled: inflorescence compact: corolla dull rose-color, 12 mm. or more long, tube very little exserted from the small calyx.—Base of cliffs in the Chisos Mountains, southwestern Texas (*Havard*).

18. **SCUTELLARIA** L. (SKULLCAP.)

Bitter perennial not aromatic herbs, with the 1-flowered peduncles or pedicels axillary or spiked or racemed, bell-shaped (in flower) 2-lipped calyx with lips entire and closed in fruit (upper with a helmet-like at length concave and enlarged appendage on the back), 2-lipped corolla

with elongated curved ascending tube dilated at throat (upper lip arched, entire or barely notched; the lateral lobes mostly connected with this rather than the lower; lower lobe or lip spreading and convex, notched at apex), 4 stamens ascending under the upper lip, and ciliate or bearded anthers approximate in pairs (those of the outer stamens 1-celled, of the inner 2-celled and cordate).

* *Flowers in terminal single or panicled racemes, the floral leaves gradually reduced to bracts.*

+ *Stems-leaves all cordate, crenate-toothed, slender-petioled: lateral lobes of corolla almost equaling short upper lip.*

1. **S. versicolor** Nutt. Soft-hairy, the hairs of the inflorescence, etc., partly viscid-glandular: stem mostly erect, 3 to 9 dm. high: leaves ovate or round-ovate, very veiny, rugose; the floral reduced to broadly ovate entire bracts about equaling the glandular-hairy calyx: racemes mostly simple: corolla bright blue with lower side and lip whitish.—Banks of streams, extending from the Atlantic region to western Texas. A Texan form is var. BRACTEATA Benth., which is more robust, with larger and firmer floral leaves, many of the lower occasionally longer than the flowers, which thus appear axillary rather than racemose.

† † *Stem-leaves crenate-dentate or serrate (or nearly entire in no. 3), only the lowest if any cordate at base, more or less petioled: lateral lobes of blue corolla shorter than the galeate upper lip.*

2. **S. pilosa** Michx. Pubescent with spreading hairs: stem nearly simple, 3 to 9 dm. high: leaves rather distant, crenate, oblong-ovate, obtuse, varying to roundish-ovate; the lower abrupt or cordate at base and long-petioled; the upper on short margined petioles; bracts oblong-spatulate: racemes short, often branched: corolla 12 mm. long, rather narrow, the lower lip a little the shorter.—Dry or sterile ground, extending from the Atlantic region into Texas.

3. **S. integrifolia** L. Downy all over with a minute hoariness: stem commonly simple, 3 to 6 dm. high: leaves oblong-lanceolate or linear, mostly entire, obtuse, very short-petioled: corolla 2.5 cm. long, much enlarged above, the ample lips equal in length.—Dry ground, extending from the Atlantic region into Texas.

4. **S. brevifolia** Gray. Cinereous-puberulent throughout: stems numerous from a suffrutescent base, rigid, very leafy: leaves thickish, narrowly oblong, 12 to 16 mm. long by 4 to 6 mm. wide, all subsessile; floral similar, gradually smaller: corolla 18 mm. long. (*S. integrifolia*, var. *brevifolia* Gray).—Dry banks, Dallas.

* * *Flowers solitary in the axils of the upper mostly sessile leaves, which resemble the lower ones but are occasionally reduced.*

+ *Annual, loosely branched from base: corolla pubescent, 12 mm. or less long.*

5. **S. cardiophylla** Eng. & Gray. Puberulent, slender, with virgate branches: leaves cordate-ovate or deltoid-subcordate, mostly obtuse, veiny; principal cauline ones coarsely crenate, slender-petioled; floral gradually smaller and less toothed, uppermost entire and subsessile, barely exceeding the calyx: corolla slender, blue.—Open woods, Arkansas and Texas.

6. **S. Drummondii** Benth. Villous-pubescent, soon diffuse, leafy: leaves ovate or ovate-oblong, very obtuse, contracted at base, the lower into distinct petioles; floral subsessile, about equaling the flowers; all entire or nearly so: corolla violet purple or blue, lower lip violet-spotted.—Common throughout Texas in damp rich soil.

+ + *Perennials, from a woody stock or producing filiform stolon-like rootstocks.*

7. **S. Wrightii** Gray. Firm and woody at base, not stoloniferous or tuberiferous, low, many-stemmed in a tuft, minutely cinereous-puberulent, very leafy: leaves

ovate or spatulate-oblong, entire, subsessile, 12 mm. long, the upper floral shorter than the flowers: corolla pubescent, 12 mm. long, usually violet.—Throughout Texas.

8. **S. parvula** Michx. Herbaceous: stolon-like rootstocks moniliform-tuberiferous: minutely downy, dwarf, 7.5 to 15 cm. high, branched and spreading: all but the lower leaves sessile and entire; lowest round-ovate; others ovate or lance-ovate, slightly cordate, 12 to 16 mm. long: corolla 4 to 8 mm. long.—Sandy banks, extending from New England to Texas.

19. SALIZARIA Torr.

Shrubby, with purplish flowers in short terminal racemes, globular (or at first oblong) barely repand-2-lipped calyx not appendaged or gibbous on the back and much inflated after blooming becoming vesicular-inflated and reticulated; otherwise as in *Scutellaria*.

1. **S. Mexicana** Torr. With diffuse or sarmentose slender soft-canescent branches, 6 to 9 dm. high: leaves remote, glabrate, small, oblong or broadly lanceolate, short-petioled, mostly entire: flowers less than 2.5 cm. long: fructiferous vesicular calyx 12 mm. or more in diameter.—Hills of the upper Rio Grande (*Havard*), near the Great Cañon, and westward.

20. BRAZORIA Eng. & Gray.

Annuals, with oblong mostly sessile denticulate leaves (lowest tapering into a petiole), rose-purple flowers in virgate racemes or spikes, reticulate-veiny more or less inflated deeply 2-lipped calyx mostly declined in fruit (lips broad, upper 3-lobed and somewhat recurved, lower 2-lobed and turned upward in fruit), corolla with inflated throat and broad barely concave upper lip, 4 fertile parallel and ascending stamens with outer pair longer, and anther-cells somewhat divergent.

1. **B. truncata** Eng. & Gray. Somewhat pubescent, at least the raceme and calyx viscid-hairy: spike dense and strict: calyx much reticulated, truncate, its broad lips of equal length, obscurely lobed, mucronately denticulate: corolla 18 mm. long, all the lobes denticulate, tube pilose-annulate near the base: nutlets puberulent.—Sandy soil, plains and prairies of eastern and southern Texas.

2. **B. scutellarioides** Eng. & Gray. Almost glabrous: spike or racemes loose, mostly panicled: lips of calyx unequal; upper with 3 ovate-rounded, lower with 2 lanceolate lobes, all but uppermost cuspidate: corolla 8 mm. long, not pilose-annulate, its lobes entire or retuse: nutlets glabrous.—Rich prairie soil, southern and western Texas.

21. PHYSOSTEGIA Benth. (False dragon-head.)

Smooth perennials, with upright wand-like stems, sessile lanceolate or oblong mostly serrate leaves, large and showy (rose or flesh-color variegated with purple) flowers crowded in simple or panicled terminal leafless spikes, nearly equally 5-toothed short-tubular or bell-shaped calyx more or less enlarged and slightly inflated in fruit, funnelform 2-lipped corolla with much inflated throat, and 4 stamens ascending under the upper lip with approximate anthers and parallel cells.

1. **P. Virginiana** Benth. Stem 3 to 12 dm. high, terminated by a simple virgate or several panicled spikes: leaves thickish: calyx tubular-campanulate, its teeth half the length of the tube: corolla 2.5 cm. long.—Wet grounds, extending from the

Atlantic region to western Texas. A tall Texan form is var. SPECIOSA Gray, with very acutely serrate lanceolate leaves and dense and panicled spikes. Var. OBOVATA Gray is a form extending from the Gulf States through Texas to Arizona, with oblong or obovate and often obtuse leaves.

2. **P. intermedia** Gray. Slender, 3 to 9 dm. high, remotely leaved: leaves linear-lanceolate, repand-denticulate: spikes filiform, rather remotely flowered; calyx short and broadly campanulate, its teeth about as long as the tube: corolla 10 to 12 mm. long, much dilated upward.—Barrens, extending from the Lower Mississippi Valley into Texas.

22. MARRUBIUM Tourn. (HOREHOUND.)

Whitish-woolly bitter-aromatic perennials, with rugose and crenate or cut leaves, many-flowered axillary whorls, tubular 5 to 10-nerved nearly equally 5 to 10-toothed calyx with teeth more or less spiny-pointed and spreading at maturity, upper lip of corolla erect and notched, lower lip spreading and 3-cleft, and 4 stamens included in the tube of the corolla.

1. **M. vulgare** L. (COMMON HOREHOUND.) Stems ascending: leaves round-ovate, petioled, crenate-toothed: whorls capitate: calyx with 10 recurved teeth, the alternate ones shorter: corolla small, white.—A common escape into waste or open ground.

23. LEONOTIS R. Br.

Tall minutely soft-pubescent annual, with long-petioled ovate leaves, dense verticillastrate heads of showy scarlet or orange flowers, tubular 10-nerved (at length incurved above and oblique at orifice) calyx with 5 or more unequal spinulose-tipped teeth, slender 2-lipped corolla (upper lip erect or incurved and elongated, entire; lower short and spreading), and 4 stamens ascending under the upper lip with anthers approximate in pairs.

1. **L. nepetæfolia** R. Br. Leaves coarsely serrate or crenate, veiny; upper floral lanceolate: calyx about 8-toothed: corolla 2.5 cm. long, orange-red, densely hirsute.—Naturalized from Africa, recorded from the eastern Gulf States, and now reported from Gillespie County (*Jermy*).

24. STACHYS Tourn. (WOUNDWORT. HEDGE-NETTLE.)

Annuals or perennials, with purple or rose-red flowers in 2 to many-flowered whorls approximate in a terminal raceme or spike, tubular bell-shaped equally 5-toothed calyx (or upper teeth united to form a lip), strongly 2-lipped corolla (upper lip erect or rather spreading, often arched, entire or nearly so; lower usually longer and spreading, 3-lobed, with middle lobe largest and nearly entire), and 4 stamens ascending under the upper lip and with anthers approximate in pairs.

* *Root annual: corolla with short tube, mostly purplish or reddish.*

1. **S. agraria** Cham. & Schl. Low, hirsute-pubescent: leaves obtuse, crenate; lower subcordate and slender-petioled; upper subcordate or oval and subsessile; upper floral shorter than the small and several-flowered clusters; calyx even in fruit not over 4 mm. long, even lower corolla-lip hardly exceeding the subulate cuspidate-aristulate teeth.—Moist or shady places, common in southern Texas, from Brazos Santiago westward.

2. **S. Drummondii** Benth. Soft-hirsute: stem 3 to 6 dm. high: leaves ovate and oval, obtuse, crenate, all the lower cordate; upper pairs distant; floral with narrowe d base, uppermost lanceolate or subulate and shorter than the flowers, which are mostly in sixes: calyx 8 mm. long, lips of corolla surpassing the slender-subulate and ar istulate teeth.—Moist ground, eastern and southern Texas.

* * *Root perennial: corolla scarlet-red, with narrow cylindrical tube much exceeding the calyx and lips.*

3. **S. coccinea** Jacq. Leaves ovate-lanceolate with cordate base, or oblong-deltoid, obtuse, crenate; floral sessile; upper very small: spike interrupted: flowers generally distinctly pedicelled: calyx cylind raceous, with tube twice the length of the slender subulate teeth, $\frac{1}{3}$ to nearly $\frac{1}{2}$ the length of the (18 to 24 mm. long) corolla. —Western Texas.

4. **S. Bigelovii** Gray. Minutely cinereous-pubescent: foliage, etc., nearly of the preceding: flowers fewer in the clusters, almost sessile: calyx only 6 mm. long, oblong-campanula te; its teeth broader: tube of corolla only 12 mm. long.—Southwestern Texas, in crevices of rocks.

PLANTAGINEÆ. (Plantain Family.)

Chiefly stemless herbs, with regular 4-merous spiked flowers, stamens inserted on the tube of the dry and membranaceous veinless gamopetalous corolla and alternate with its lobes.

1. PLANTAGO Tourn. (Plantain. Ribwort.)

Annuals or perennials, with ribbed leaves, small whitish flowers in a bracted spike or head raised on a naked scape, calyx of 4 imbricated persistent mostly scarious-edged sepals, salverform or rotate corolla withering on the pod and with 4-parted border, 4 (rarely 2) stamens, 2-celled ovary with 1 to several ovules in each cell, single filiform style and long hairy stigma, and 2-celled 2 to several-seeded pod opening transversely so that the top falls off like a lid and the loose partition (bearing the peltate seeds) falls away.

* *Stamens 4: flowers all perfect: corolla not closed over fruit.*

+ *Flowers with style first projecting from unopened corolla, the anthers long exserted after corolla has opened: seeds not hollowed on the face: corolla glabrous: leaves broad and strongly ribbed.*

1. **P. major** L. (Common plaintain.) Smooth or rather hairy, rarely roughish: leaves ovate, oblong, oval, or slightly cordate, often toothed, abruptly narrowed into a channeled petiole: spike dense, obtuse: sepals round-ovate or obovate: pod ovoid, circumscissile near the middle, 8 to 18-seeded: seeds angled, reticulated.—Waysides and near dwellings.

2. **P. Rugelii** Decaisne. Leaves as in the last, but paler and thinner: spikes long and thin, attenuate at apex: sepals oblong, acutely keeled: pods cylindraceous-oblong, circumscissile much below the middle, 4 to 9-seeded: seeds oval-oblong, not reticulated.—Extending from the Atlantic region into Texas.

+ + *Flowers of two sorts (as respects length of anthers and filaments) on different plants, mostly cleistogamous: corolla-lobes broad, rounded, persistently spreading: seeds 2, boat-shaped: inflorescence and narrow leaves silky-pubescent or woolly.*

3. **P. Patagonica** Jacq., var. **gnaphalioides** Gray. White with silky wool: leaves 1 to 3-nerved, varying from oblong-linear to filiform: spike very dense, 6 mm. to 10 cm. long, woolly: bracts not exceeding calyx: sepals very obtuse, scarious, with thick

center.—Prairies and dry plains, abundant west of the Mississippi. Very variable. Var. NUDA Gray has sparse and loose pubescence, green and soon glabrate rigid leaves, and short bracts; var SPINULOSA Gray is a canescent form with aristately prolonged and rigid bracts; var. ARISTATA Gray is loosely hairy and green (or becoming glabrous), with narrowly linear bracts 2 to 3 times the length of the flowers.

** *Flowers subdiœcious or polygamo-cleistogamous: in fertile flowers corolla closed over maturing pod and forming a kind of beak: anthers not exserted: sterile flowers with spreading corolla and long-exserted filaments: seeds mostly flat.*

4. **P. Virginica** L. Hairy or hoary-pubescent, 10 to 25 cm. high: leaves oblong, varying to obovate and spatulate-lanceolate, 3 to 5-nerved, slightly or coarsely and sparingly toothed, short-petioled or subsessile, 2.5 cm. or so long: spikes mostly dense, 2.5 to 5 cm. long: stamens 4: seeds usually 2.—Sandy fields, etc., extending from the Atlantic region to southern and western Texas. Var. LONGIFOLIA Gray, a Texan form, is a coarser plant, with oblong-spatulate leaves 7.5 to 12.5 cm. long and tapering into a margined petiole, often with some coarse salient teeth; spikes 12.5 to 30 cm. long.

5. **P. heterophylla** Nutt. Leaves linear or filiform, rather fleshy, acute, entire, or some of them 2 to 4-lobed or toothed: flowers very small: spike slender: stamens 2: pod oblong-conoidal, 10 to 28-seeded, nearly twice the length of the calyx and bract.—Low sandy ground, extending from the interior and Gulf region into Texas.

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U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF BOTANY.

CONTRIBUTIONS

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BY

JOHN M. COULTER.

APETALÆ, MONOCOTYLEDONÆ, PTERIDOPHYTA.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF BOTANY,
Washington, D. C., December 5, 1893.

SIR: I have the honor to transmit herewith, for publication as Vol. II, No. 3, of Contributions from the U. S. National Herbarium, the third and final part of a Manual of the Phanerogams and Pteridophytes of Western Texas, by John M. Coulter. This brochure concludes Vol. II of the Contributions.

Respectfully,

FREDERICK V. COVILLE,
Botanist.

Hon. J. STERLING MORTON,
Secretary of Agriculture.

PREFATORY NOTE.

The present part completes the Manual of the Phanerogams and Pteridophytes of Western Texas, issued as the second volume of Contributions from the U. S. National Herbarium, and contains the Apetalæ, Monocotyledonæ, and Pteridophyta. The great assistance furnished by Watson's Bibliographical Index and Gray's Synoptical Flora in the preparation of the previous parts was entirely lacking in this, and scattered monographs and lists have supplied our only information. In consequence of these conditions it has been impossible to present the material as satisfactorily as before, and this part of the manual gives most evidence that the publication is simply a bringing together of material which will prove of immediate service to local botanists and a convenience to all students of the North American flora. It is a matter of regret that the ranges of Texan plants can not be more definitely given; but many records are so meager that detailed information could not be furnished. It was also thought best, in this part, to conform as far as possible to the Rochester rules, although doubtless not all needful changes have been made. In this revision of names Dr. Elmon M. Fisher, one of my assistants, has been of great service. Mr. Frederick V. Coville has prepared the manuscript of the Juncaceæ, Prof. L. H. Bailey that of the genus *Carex*, Mr. L. H. Dewey that of the Gramineæ, and Prof. L. M. Underwood that of the Pteridophyta.

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ANALYTICAL KEY TO THE ORDERS.

Division III. APETALÆ: those with corolla (and sometimes calyx) wanting.

A. *Flowers not in catkins.*

1. *Ovary or its cells containing many ovules.*

Calyx present; ovary and pod inferior, 6-celled ..... ARISTOLOCHIEÆ, 381
Calyx wanting; ovary and pod wholly naked, 2-celled ..... PODOSTEMACEÆ, 381

2. *Ovary or its cells containing only 1 or 2 (rarely 3 or 4) ovules.*

* *Pistils more than one, distinct or nearly so.*

Flowers naked, perfect ..... PIPERACEÆ, 382
Flowers naked, diœcious ..... BATIDEÆ, 372

** *Pistil one, either simple or compound.*

Ovary wholly inferior, 1-celled.
  Parasitic on the branches of trees; anthers sessile ..... LORANTHACEÆ, 384
  Not parasitic above ground; anthers on filaments ..... SANTALACEÆ, 385
Ovary really free from the calyx, but permanently invested by its tube (or the base of it) so as to seem inferior; herbs with corolla-like calyx ..... NYCTAGINEÆ, 350
Ovary plainly free from the calyx, which is sometimes wanting.
Stipules sheathing the stem at the nodes.
  Tree; calyx none; flowers monœcious in heads ..... PLATANACEÆ, 409
  Herbs; calyx present and commonly petal-like ..... POLYGONACEÆ, 372
Stipules not sheathing the stem, or none.
  Aquatic herbs, submerged or nearly so ..... CERATOPHYLLEÆ, 420
  Not aquatics, herbs.
    Ovary 10-celled; berry 10-seeded ..... PHYTOLACCACEÆ, 371
    Ovary 3 (rarely 1 or 2)-celled; juice usually milky ..... EUPHORBIACEÆ, 385
    Ovary 1-celled; juice not milky.
      Style (if any) and stigma only one; leaves simple; no scarious bracts around the flowers ..... URTICACEÆ, 405
      Styles 3; flowers involucrate ..... Eriogonum, in POLYGONACEÆ, 372
      Styles or stigmas 2 or 3.
        Stipules scarious; leaves opposite ..... ILLECEBRACEÆ, 356
        Stipules none; flowers with scarious bracts ..... AMARANTHACEÆ, 357
        Stipules and scarious bracts none ..... CHENOPODIACEÆ, 364
Shrubs or trees.
  Ovary 1 or 2-celled; styles or stigmas 2-cleft ..... URTICACEÆ, 405
  Ovary 1-celled; style and stigma single and entire.
    Anthers opening longitudinally ..... THYMELÆACEÆ, 383
    Anthers opening by uplifted valves ..... LAURINEÆ, 382

B. *Flowers monœcious or diœcious, one or both sorts in catkins.*

1. *Only one sort of flowers in catkins or catkin-like heads.*

Fertile flowers in a short catkin, head, or strobile.....URTICACEÆ, 405
Fertile flowers single or clustered; sterile in slender catkins (except in Fagus).
Leaves pinnate; fertile flowers and fruit naked.....JUGLANDEÆ, 410
Leaves simple; fertile flowers 1 to 3 in an involucre or cup.....CUPULIFERÆ, 412

2. *Both sterile and fertile flowers in catkins or catkin-like heads.*

Ovary and pod 1-celled, many-seeded; seeds furnished with a downy tuft at one end.....SALICINEÆ, 418
Ovary 1 or 2-celled, only one ovule in each cell; fruit 1-seeded.
Parasitic on trees; fruit a berry.....LORANTHACEÆ, 384
Trees or shrubs, not parasitic.
Calyx regular, in the fertile flower succulent in fruit.....URTICACEÆ, 405
Calyx none, or rudimentary and scale-like.
Style and stigma 1, simple; flowers in heads.....PLATANACEÆ, 409
Styles or long stigmas 2; fertile flowers 2 or 3 at each scale of the catkin.....CUPULIFERÆ, 412

Subclass II. MONOCOTYLEDONÆ: Those whose embryos have a single cotyledon; the fibro-vascular bundles of whose stems are distributed irregularly (thus forming no central pith); whose leaves are mostly parallel-veined, and flowers usually 3-merous (never 5-merous).

A. SPADICEOUS DIVISION. *Flowers aggregated on a spadix or fleshy axis, or sometimes scattered, mostly destitute of calyx and corolla, and also without glumes.*

Little floating aquatics, with no distinction of stem and foliage....LEMNACEÆ, 453
Immersed aquatics, branching and leafy.....NAIADACEÆ, 456
Reed or flag-like marsh herbs, with linear and sessile-nerved leaves; flowers in spikes or heads.....TYPHACEÆ, 452
Terrestrial plants, with petioled leaves.
Herbs; leaves net-veined.....ARACEÆ, 452
Trees; leaves fan-shaped.....PALMÆ, 452

B. PETALOIDEOUS DIVISION. *Flowers not collected on a spadix, furnished with floral envelopes (perianth) answering to calyx, or to both calyx and corolla, either herbaceous or colored and petal-like (except in Juncaceæ).*

1. *Perianth adherent to the whole surface of the ovary.*

Flowers diœcious (rarely perfect), regular.
Aquatics; ovules and seeds several or numerous.....HYDROCHARIDEÆ, 421
Twiners; ovules and seeds 1 or 2 in each cell.....DIOSCOREACEÆ, 430
Flowers perfect; ovules and seeds usually numerous.
Stamens only 1 or 2; flower irregular, gynandrous.....ORCHIDEÆ, 422
Stamens 3.
Anthers introrse, opening transversely.....BURMANNIACEÆ, 422
Anthers extrorse, opening lengthwise.....IRIDEÆ, 426
Stamens 6; flowers usually on a scape or from a bulb.....AMARYLLIDEÆ, 429

2. Perianth adherent only to the base or lower half of the ovary.

Perianth roughish-mealy.....HÆMODORACEÆ, 426
Perianth smooth; leaves grass-like.....Stenanthium, etc., in LILIACEÆ, 431

3. Perianth wholly free from the ovary.

Pistils numerous or few in a head or ring.....ALISMACEÆ, 454
Pistil one, compound (cells or placentæ mostly 3).
Perianth not glumaceous or chaffy; flowers not in dense heads.
Stamens 6, similar and perfect.
Scurfy-leaved (mostly epiphytic, with tufted seeds).....BROMELIACEÆ, 425
Terrestrial, not rush-like.
Perianth of similar divisions or lobes, mostly colored, / Perianth of 3 foliaceous and green sepals and 3 colored withering-persistent petals, Trillium in / Perianth of 3 persistent green sepals, and 3 ephemeral deliquescent petals } LILIACEÆ, 431
.....COMMELINACEÆ, 443
Stamens 6, dissimilar.
Sepals 3, herbaceous; ephemeral petals 3, unequal.....COMMELINACEÆ, 443
Perianth tubular, 6-lobed.....PONTEDERIACEÆ, 441
Stamens 3, similar; moss-like aquatic.....MAYACACEÆ, 442
Perianth wholly glumaceous, of 6 similar divisions.....JUNCACEÆ, 444
Perianth partly glumaceous or chaff-like; flowers in very dense heads; rush-like or aquatic.
Flowers perfect; inner perianth of 3 yellow petals; perfect stamens and plumose sterile filaments each 3; pod 1-celled, many-seeded on 3 parietal placentæ.....XYRIDEÆ, 441
Flowers monœcious or diœcious, whitish-bearded; stamens 4 or 3; pod 2 or 3-celled, 2 or 3-seeded.....ERIOCAULEÆ, 458

C. GLUMACEOUS DIVISION. *Flowers destitute of proper perianth, except sometimes small scales or bristles, but covered by scale-like bracts or glumes.*

Glume a single scale-like bract with a flower in its axil.....CYPERACEÆ, 459
Glumes in pairs, of two sorts.....GRAMINEÆ, 484

Class II. GYMNOSPERMS: Those in which naked ovules are borne on the margin or upper surface of an open scale; monœcious or diœcious trees or shrubs.

Male flowers in aments; female subsolitary; nearly naked diœcious shrubs.....GNETACEÆ, 552
Female flowers in aments, becoming dry cones or berry-like; shrubs or large trees with needle or scale-like leaves.....CONIFERÆ, 553

Series II. PTERIDOPHYTES or FERNS AND THEIR ALLIES: Those without true flowers or seeds, reproducing by spores, and with a distinct axis containing fibro-vascular bundles.

For key to the orders, see p. 557.

NYCTAGINEÆ. (FOUR-O'CLOCK FAMILY.)

Herbs, with mostly opposite and entire leaves, stems swollen at the joints, a delicate tubular or funnel-form corolla-like calyx, with its persistent base constricted above the 1-celled, 1-seeded ovary, which is indurated into a sort of nut-like pericarp, and a few slender hypogynous stamens.

* Involucre calyx-like, of united bractlets, 1 to 12-flowered: stigma capitate, granulate.

+ Involucre 5-lobed; fruit symmetrical, wingless.

1. **Mirabilis.** Involucre not changed in fruit; fruit not angled and scarcely or not at all ribbed; stamens usually 5.

2. **Allionia.** Involucre 1 to 5-flowered, becoming enlarged in fruit, thin and reticulated; fruit several-ribbed or angled; stamens usually 3.

+ + Involucre deeply 3-lobed, 3-flowered, not scarious-dilated in fruit.

3. **Wedelia.** Fruit with a double line of tubercles on the back, surrounded by a rigid winged margin, which is toothed and inflexed: stamens usually 3.

* * Involucre of 5 or more distinct bracts, subtending a many-flowered head: stigma capitate or linear-clavate.

4. **Nyctaginia.** Perianth tubular-funnelform, lobes entire: stamens long-exserted: fruit as in Mirabilis.

5. **Abronia.** Perianth salverform, with obcordate lobes, including the stamens and style: fruit wing-angled.

* * * Involucre imperfect, of 2 or 3 small bractlets to each flower or none: stigma smooth, peltate or cap-shaped.

6. **Selinocarpus.** Flowers 1 to 3: fruit broadly winged.

7. **Acleisanthes.** Flowers capitate: fruit ribbed.

8. **Boerhavia.** Flowers in loose panicles, verticels, or spikes: fruit with 5 (sometimes 10) ribs or angles.

1. MIRABILIS L. (FOUR-O'CLOCK.)

Perennial herbs, with opposite nearly equal leaves, peduncles solitary in the axils or paniculate, flowers nearly sessile in the 5-lobed involucre, stamens (usually 5) as long as the perianth, filaments united at base, and fruit not angled but sometimes ribbed.

* *Involucre 1-flowered: calyx long-tubular or funnelform: flowers large.*

1. **M. longiflora** L. Viscid-pubescent (or nearly smooth), diffuse: flowers sessile, clustered: involucral lobes linear: calyx-tube (white, border more or less tinged with rose) very long (10 to 15 cm.): stamens and style much protruding.—From San Antonio (rare) to Limpia Cañon and New Mexico. To this species has been referred

the plant of our Mexican border, which possibly should be kept distinct as *M. Wrightiana* Gray. In that case *M. longiflora* L. would disappear from our flora. Hemsley restricts it to southern Mexico.

2. **M. Jalapa** L., the common "four o'clock" of cultivation, is smooth, with short-stalked clustered many-colored flowers, thickish calyx-tube only about 5 cm. long, and stamens shorter than the spreading border.—Credited to Texas by Hemsley.

* * *Involucre 3 to 6-flowered.*

3. **M. multiflora** Gray. Stout and spreading: leaves broadly ovate to ovate-lanceolate, often somewhat cordate at base, but decurrent on the petiole: involucre mostly 6-flowered, glabrous, campanulate: flowers pale rose-color to purple (tube somewhat greenish), 4 to 5 cm. long: stamens 4 or 5: fruit marked toward the base by 10 shallow furrows and as many intermediate dark lines.—From the mountains east of El Paso to Duval County.

4. **M. coccinea** Benth. & Hook. Glabrous, with stems (3 to 5 dm. high) paniculately branched above: leaves narrowly linear, 5 to 7 cm. long, entire: involucre 3-flowered, with acute segments: limb of the bright crimson calyx with notched lobes: stamens usually 3: fruit pubescent, deeply sulcate between the stout ribs. (*Oxybaphus coccineus* Torr.)—Highlands between the Nueces and the San Pedro.

2. ALLIONIA Lœfl. (1758.)

Herbs, with very large and thick perennial roots, opposite leaves, mostly clustered small flowers in a broad and open 5-lobed involucre, which becomes enlarged and reticulated in fruit, calyx with very short tube and bell-shaped (rose or purple) deciduous limb which is plaited in the bud, usually 3 stamens, filiform style, and fruit usually several-ribbed or angled. (*Oxybaphus* Vahl, 1806.)

* *Fruit glabrous, usually tuberculate along the ribs (except in No. 3), and sometimes between them: involucre 1 to 5-flowered.*

1. **A. corymbosa** (Cav.) Kuntze. Glabrous, leaves cordate-acuminate, with sinuate margin; flowers terminal and crowded. (*Oxybaphus glabrifolius* Vahl.)—A South American and Mexican species, represented in Texas by var. TEXENSIS (var. nov.), in which the involucre is but 2 or 3-flowered.—Valleys near the Rio Grande, below El Paso.

2. **A. aggregata** (Vahl.) Spreng. Branches erect: leaves lanceolate, glabrous, short-petioled, with ciliate margin: peduncles solitary, axillary, villous, somewhat nodding. (*Oxybaphus aggregatus* Vahl.)—Prairies and mountains of Pecos and Presidio counties.

3. **A. oxybaphoides** (Gray.) Kuntze. Stems slender, diffuse-procumbent: leaves all deeply cordate, on rather long petioles; the lowest reniform; the upper acuminate and sometimes subangulate: involucre 3-flowered and together with the loosely paniculate peduncles very viscid-glandular: fruit subglobose-ovoid, glabrous, destitute of ribs or angles. (*Quamoclidion oxybaphoides* Gray. *Oxybaphus Wrightii* Hemsley.)—In the mountains near El Paso, and in northern Mexico.

* * *Fruit pubescent: involucre always 3 to 5-flowered.*

4. **A. nyctaginea** Michx. Nearly smooth: stems repeatedly forked, 3 to 9 dm. high: leaves all petioled (except the uppermost reduced ones), from broadly ovate to lanceolate, rounded or cordate or cuneate at base: inflorescence loose and but slightly pubescent, the peduncles slender (at first solitary in the axils): involucre pubescent: fruit oblong-obovate, 4 mm. long, rather acutely angled (*Oxybaphus nyctagineus*

Sweet.)—From San Antonio northward and westward. Var. CERVANTESII Lag., extending from Texas to New Mexico and Mexico, has viscid-pubescent or villous branches and involucre, and much smaller and thicker leaves cordate or subcordate at base. Var. LATIFOLIA Gray, extending from Texas and New Mexico to Wisconsin, has a glabrous or glabrate involucre, and ovate or cordate submembranaceous leaves.

5. **A. albida** Walt. Nearly glabrous, except the inflorescence: leaves all sessile, lanceolate or oblong-lanceolate, acute at base: fruit more hirsute than in the last, muriculate along or between the ribs. (*Oxybaphus albidus* Sweet.)—From the Chenate Mountains northward and eastward to Harris County.

6. **A. hirsuta** Pursh. More or less glandular-hirsute, especially about the nodes and the usually contracted inflorescence, 3 to 9 dm. high: leaves lanceolate to linear-lanceolate, sessile and cuneate at base or narrowed to a short petiole: stamens often 5: fruit with thickened obtuse angles. (*Oxybaphus hirsutus* Sweet.)—From the tributaries of the Red River to the Limpia.

7. **A. angustifolia** (Nutt.) Kuntze. Often tall, glabrous, except the more or less hirsute peduncles and involucres: leaves linear, thick and glaucous, often elongated (5 to 15 cm. long): fruit as in the last. (*Oxybaphus angustifolius* Sweet.)—From Tom Greene County northward and southwestward to the border.

3. WEDELIA Lœfl. (1758.)

Annual or perennial herbs, with opposite very unequal leaves, axillary pedunculate flowers, deeply 3-lobed 3-flowered involucre, perianth with an oblique 4 or 5-lobed limb, usually 3 stamens, and an ovate compressed fruit surrounded by a rigid winged margin, smooth and convex on the inner side and with a double line of tubercles on the back. (*Allionia* L., 1759.)

1. **W. incarnata** (L.) Kuntze. Stems slender, branching, prostrate: pubescence viscid, short or floccose: leaves ovate: lobes of the involucre concave, acute: perianth rose-colored or white. (*Allionia incarnata* L.)—Common on sandy river-banks and in valleys from the Staked Plains westward, and southward to Brazos Santiago.

4. NYCTAGINIA Chois.

Annual and prostrate herbs, with glandular pubescence, opposite leaves, many-bracted (many-flowered) involucre, tubular funnelform perianth with entire lobes, 5 long-exserted stamens equaling the style, small capitate stigma, and fruit as in *Mirabilis*.

1. **N. capitata** Chois. Leaves triangular-acuminate, undulate, attenuate into the petiole: involucre of 8 to 12 linear-lanceolate very acute bracts (8 to 12 cm. long): calyx villous, red, 2.5 cm. long, the limb plicate.—From Duval County to the Rio Grande, and northward to the Staked Plains.

5. ABRONIA Juss.

Low herbs (usually more or less viscid-pubescent), with thick opposite petioled unequal leaves, axillary or terminal peduncles, numerous showy and sessile flowers in a solitary head, salverform perianth with obcordate lobes, elongated calyx-tube with limb of 5 (or 4) segments, 5 unequal and included stamens adnate to the tube, and a coriaceous or indurated 1 or 2-winged fruit which incloses a smooth cylindrical achene.

**Fruit coriaceous, without a rigid body, the cavity extending through the entire wing: wings truncate or abruptly attenuate above.*

1. **A. fragrans** Nutt. Root perennial: stems ascending: leaves oblong or ovate: involucral bracts large, broadly ovate, white and scarious: flowers white: fruit not crested.—On sandy hills from the Rio Grande to the plains west of the Pecos. April to August.

2. **A. turbinata** Torr. Resembling the last, but annual: stems decumbent or ascending, 1 to 3 dm. high: leaves broadly ovate or oblong: involucral bracts mostly narrowly lanceolate, subherbaceous, 4 to 12 mm. long: flowers numerous, pink: wings of the fruit horizontally crested at apex, narrow.—Common on the prairies (west of the Pecos) between the Santiago Range and San Jacinto Peak.

** * Body of the fruit more rigid or woody, the wings consisting of a single lamina.*

+ Wings more or less attenuate above and terminating below the apex of the fruit, transversely veined.

3. **A. mellifera** Dougl. Leaves ovate or oblong, rounded or truncate at base: involucral bracts oblong-lanceolate, white and scarious, 6 to 12 mm. long: flowers white: fruit with wings laterally elongated and narrowed, 6 to 8 mm. long.—From the sand hills near El Paso to the Red River. April–June.

+ + Wings completely encircling the fruit (making an orbicular outline), membranaceous and strongly reticulated.

4. **A. micrantha** Torr. Annual, prostrate: peduncles shorter than the petioles: flowers small and inconspicuous, reddish-green, the limb scarcely 4 mm. broad: fruit with 3 thin wings, emarginate above and below, the body rather broad and with a light spongy exterior.—Western Texas. Often confounded with the next.

5. **A. cycloptera** Gray. Annual, stouter: flowers large and showy, upon elongated peduncles: fruit with firmer and more prominently veined wings, emarginate at neither end, the firm smooth narrow body usually 3-nerved.—Along the Rio Grande, from Dona Aña to below San Elizario. April–August.

6. SELINOCARPUS Gray.

Herbs, with many dichotomously branching stems (woody at base), white pubesence, opposite petiolate entire or sinuate leaves, short or elongated flowers, 2 to 5 unequal stamens, didynamous exserted anthers, peltate stigma, and fruit with 5 (or by abortion 3) veinless wings.

1. **S. diffusus** Gray. Scabrous and subviscid, depressed or diffuse spreading: leaves ovate or ovate-oblong: flowers usually in pairs, subsessile: calyx tube 4 cm. long: stamens 5.—Cañons of the Rio Grande and on the Presidio del Norte. August–October.

2. **S. chenopodioides** Gray. Grayish, puberulent, erect: leaves broadly ovate or subcordate: flowers cymulose-fascicled, pedicelled, small: calyx short, cup-shaped, with hardly any tube: stamens 2.—Gravelly hills and valleys of the Rio Grande, from El Paso to Presidio del Norte and Ixion County. August.

3. **S. angustifolius** Gray. Subviscid-puberulent, slender, 15 to 25 cm. high: leaves narrowly elliptic: flowers solitary, at length pendent: calyx funnelform, tube 2.5 to 5 cm. long: stamens 5.—Gravelly tablelands near Presidio del Norte and the Chenate Mountains.

7. ACLEISANTHES Gray.

Herbaceous (often woody below), with opposite entire leaves, terminal and axillary (often solitary) white flowers, an elongated perianth,

2 to 5 unequal stamens (with anthers exserted), and an oblong-cylindrical truncate fruit which is 5 or 15-ribbed or angled.—Much like *Selinocarpus*, but readily distinguished by perianth and fruit.

1. **A. crassifolia** Gray. Scabrous-puberulent, decumbent: leaves thick, ovate, rounded at base: calyx-tube 4 to 5 cm. long, the limb 12 mm.: fruit ovate, scarcely ribbed.—On the Rio Grande, from Los Moros to the Pecos. October.

2. **A. longiflora** Gray. Glabrous, trailing, divaricately branched and with whitish fragrant flowers: leaves deltoid-ovate or rhombic-lanceolate: calyx-tube 13 to 15 cm. long: fruit cylindrical, 5-angled.—Sandy soil, from San Antonio to El Paso and along both sides of the Rio Grande. June–October.

3. **A. Berlandieri** Gray. Glabrous, diffuse: leaves oval or ovate: calyx white and fragrant, 2.5 to 5 cm. long, the tube 2 to 3 times longer than the limb.—From the Nueces to the lower Rio Grande (from Laredo to Rio Grande City). June–October.

4. **A. anisophylla** Gray. Nearly glabrous, prostrate: leaves oval or ovate, oblique at base and very unequally paired: calyx-tube 4 to 5 cm. long, many times longer than the limb: fruit 4 mm. long, 10-ribbed.—In the alluvial soils of Turkey Creek and the San Pedro.

5. **A. Wrightii** Benth. & Hook. Scabrous, divaricately branched: leaves very rough, oblong with an attenuate base: calyx-tube 4 cm. long: fruit 6 to 8 mm. long, 5-ribbed, the ribs glandular and usually thickened towards the summit. (*Pentacrophys Wrightii* Gray.)—Stony prairies, from San Antonio to El Paso.

8. BOERHAVIA L.

Slender annual or perennial diffuse or procumbent herbs, with opposite more or less unequal leaves, usually very small flowers, a 5-lobed funnelform or campanulate perianth, 1 to 5 (?) stamens, peltate stigma, and a 5-ribbed clavate or obovate fruit (jointed upon the pedicel) truncate or rounded or acute at apex.

** Fruit scarcely sulcate, obconic.*

1. **B. decumbens** Vahl. Glabrous, ascending: leaves ovate, rounded at apex, subciliate, usually whitish beneath: fascicles arranged in an elongated spreading panicle: peduncles loose, filiform: calyx-tube at length clavate, angular, rounded at apex, with delicate glandular ribs: fruit rounded at apex. (*B. procumbens* Rich., not Lam.)—Western Texas, New Mexico, and southward.

** * Fruit 10-ribbed.*

+ Fruit gibbous, clavate: flowers spicate.

2. **B. gypsophiloides** (Mart. & Gal.). Erect and branching: leaves lanceolate or ovate, narrowed to a succulent petiole, entire or repand-undulate, glabrous, 4 to 5 cm. long: flowers red, the spike long-pedunculate: fruit 6 mm. long, curved, pendent on reflexed pedicels. (*Tinantia gypsophiloides* Mart. & Gal. *B. gibbosa* Pavon. *Senkenbergia annulata* Schauer.)—Borders of the Rio Grande, from El Paso to the mouth of the Pecos. April–October.

+ + Fruit linear-clavate: flowers in umbels.

3. **B. scandens** L. Perennial, glabrous: leaves cordate or ovate, acute or acuminate, 3 to 5 cm. long, on rather short petioles: pedicels 6 to 8-flowered, on simple axillary peduncles, or the inflorescence somewhat paniculate: pedicels slender, 4 to 12 mm. long: flowers greenish, 4 to 8 mm. long (including the base): stamens exserted: fruit glabrous, obscurely 10-ribbed, black-glandular toward the apex. (*B. Grahami*

Gray.)—Ravines and valleys, from the Pecos to the Cibola (Presidio County); rare. August.

\+ + + *Fruit turbinate: flowers fasciculate.*

4. **B. eriosolena** Gray. Annual, glabrous (glutinous above), erect, 9 dm. high: stems rather stout, with flowering branches naked: leaves fleshy, ovate or orbicular-subcordate, 3 to 6 cm. broad, denticulate: pedicels short (2 to 4 mm. long), 3 or 4 together at each node of the elongated branches of the cymosely-paniculate inflorescence: calyx-tube 3 mm. long, very villous with long and spreading or implexed hairs; the limb 8 to 10 mm. broad, rose-colored: fruit (immature) 4 mm. long, glabrous, with truncate apex.—Gravelly plains in the Great Bend of the Rio Grande, and below the Great Cañon; rare. September.

5. **B. leiosolena** Gray. Perennial: stem glabrous, naked above, erect, 6 to 9 dm. high: leaves 2 or 3 pairs near the base of the stem, round-cordate, 4 to 7 cm. broad, tuberculate-glandular on both sides: branches of panicle distant, naked, few-flowered toward the summit: calyx-tube elongated (2.5 cm. long), glabrous: fruit 5 mm. long, with conical apex.—Gypseous soils of the Great Cañon, and on tributaries of the Pecos. June.

* * * *Fruit 5-ribbed or 5-angled.*

\+ *Flowers spicate: stamens 3, exserted.*

6. **B. spicata** Choisy. Low erect pubescent annual: leaves lanceolate, acute, undulate and pubescent on the margin: flowers mostly solitary and scattered along the slender branches: calyx 4 mm. long: fruit very short-pediceled, glabrous, rounded at apex.—In the Great Cañon of the Rio Grande, and in a cañon leading to San Carlo Crossing; rare.

7. **B. bracteosa** Watson. Near the last: glandular-pubescent and viscid annual, 6 dm. high, leafy below; leaves ovate-lanceolate to lanceolate, undulate, acute or acutish, subcordate at base: flowers spicate on the slender branches of the panicle: bracts conspicuous, pink, oblong-lanceolate, acuminate, 3 mm. long, persistent as long as the fruit or longer: calyx small, 2 mm. long: fruit oblong-obovate, rather acutely ribbed.—In the Great Cañon of the Rio Grande. September.

\+ + *Flowers fasciculate.*

++ *Leaves linear.*

8. **B. linearifolia** Gray. Diffusely many-stemmed, glandular-viscid or villous: leaves very short-petioled, linear and lanceolate, mucronate-acute, thick, with revolute and scarcely hispid margin: flowers effusely cymose, short-pedicellate, with 3 to 5 persistent bractlets: perianth purple, the limb rotate when fully expanded and 13 mm. broad: stamens 5: fruit oblong-clavate, glabrous, obtuse, 3 mm. long.—Arid soils, from Tom Greene County to San Diego and the Lower Rio Grande. June–August.

9. **B. tenuifolia** Gray. Low, procumbent, with the very slender stems leafy below, viscid above: leaves subsessile, linear-lanceolate, mucronate-acute, 2 to 3 cm. long, thick, with revolute and smooth margin: inflorescence few-flowered, loose: bractlets 3 to 5, persistent, ciliate: calyx pubescent, rotate, 7 mm. broad: stamens 3: fruit oblong, 3 mm. long, smooth, obtuse.—Camp Charlotte (Ixion County).

++ ++ *Leaves broader.*

10. **B. purpurascens** Gray. Stems ascending, 15 to 30 cm. high, loosely branched, from an annual root: branches very glandular-viscid: lower leaves oval or oblong (12 to 36 mm. long), obtuse, pale below, often purplish, glabrous; upper leaves linear-lanceolate, slightly glandular: peduncles paniculate, with 5 to 8-flowered capitate fascicles: bracts purplish and very viscid, enveloping the fruit, at last deciduous:

calyx purple, campanulate, 3 mm. long, equaling the fruit: stamens 3; fruit obovate, glabrous, with narrow salient ribs.—Ravines and rocky hills, Presidio del Norte. July–August.

11. **B. Wrightii** Gray. Stems erect and slender from an annual root, loosely branched, with the branches glandular-viscid: leaves small, oblong-obovate, undulate, black-punctate, white below: peduncles paniculately spiked, bearing few flowers on very short pedicels: bracts and bractlets minute, purplish, deciduous, 3 to each flower: calyx smaller than in the last, and pale: fruit barely 3 mm. long, obovate, glabrous, wrinkled between the ribs.—Pebbly hills near El Paso and Chenate Mountains.

12. **B. erecta** L. Annual, often rather stout, scabrous-puberulent or nearly glabrous: leaves broadly ovate to oblong, usually acute, 2.5 to 5 cm. long, more or less exceeding the slender petioles, minutely black-dotted, paler beneath: panicle very open: bracts minute: fascicles usually 3 to 5-flowered: stamens 2: fruit sessile or short-pedicellate, nearly 4 mm. long, glabrous, truncate, rugulose between the ribs.—Chenate Mountains.

13. **B. anisophylla** Gray. Stems glabrate, diffuse: leaves ovate-cordate, unequal, short-petioled, undulate, glabrous, white beneath: flowers loosely subcymose, short-pedicelled: bractlets 3, persistent, lanceolate, acute: calyx purple, rotate, 1 cm. broad: stamens 5 to 8, much exserted together with the style: fruit obovate-oblong, glabrous, not truncate, narrow-ribbed, 3 mm. long.—Chenate Mountains and the Great Cañon.—Var. PANICULATA has larger and very diffuse panicles, smaller flowers mostly solitary at the extremity of the branchlets, calyx pubescent along the ribs, and purplish pubescent fruit (4 mm. long) rugose between the ribs.—Chenate Mountains (*Nealley* 405).

14. **B. hirsuta** Willd. Perennial, hirsute and glandular-pubescent, the branching stems 3 to 9 dm. long or more: leaves ovate, 2.5 to 5 cm. long, acutish, rounded at base, with undulate-sinuate margin and short petioles: panicle loose and divaricate: flowers nearly sessile in small clusters terminating slender peduncles: bractlets minute: calyx (red) and ovary 2 mm. long: stamens 3: fruit 2 to 4 mm. long, clavate, obtuse, glandular-viscid.—Texas (most probably in the southern part).

15. **B. obtusifolia** Lam. Viscid or minutely pubescent: stems straight, 6 to 12 dm. long: leaves ovate-oblong or ovate-lanceolate, mucronate, acute at base, smooth, whitish beneath, slender-petioled: peduncles axillary, solitary, 2-cleft, mostly shorter than the leaves: flowers capitate, minute: stamens 3: fruit clavate, acutish, with glandular ribs. (*B. viscosa* Lag.)—Pena (Duval County) and Limpia Cañon (Presidio County).

ILLECEBRACEÆ. (KNOTWORT FAMILY.)

Small diffuse or tufted herbs, with small greenish or whitish flowers in clusters or dichotomous cymes, scarious stipules, a 4 or 5-parted calyx, stamens as many as the calyx-lobes and opposite them (being attached at their bases), a 2-cleft style, and fruit a one-seeded utricle.

1. PARONYCHIA L. (WHITLOW-WORT.)

Tufted herbs, with silvery stipules, clustered flowers, linear or oblong and concave sepals hooded and bristle-pointed, and 5 stamens.—Occasionally there are bristle-like rudiments of petals (setæ).

* *Annuals: sepals dilated and fornicate at apex within, horned or awned.*

1. **P. Drummondii** T. & G. Minutely pubescent: stems stout, erect, 2.5 cm. high, branching above into numerous cymes: leaves (of the branches) linear-oblong,

short, the uppermost mucronate; stipules ovate, shorter than the leaves: calyx turbinate at base, with a ring of hooked hairs; sepals reddish-brown, broadly scarious and dilated above, the back produced into a short white and somewhat recurved horn: setæ very minute.—Texas.

2. **P. setacea** T. & G. Slender, 7 to 12 cm. high, nearly glabrous: stems erect, branching into the many times dichotomous diffuse cyme: leaves subulate-setaceous, erect; stipules shorter, lanceolate, attenuate: bracts similar to the leaves, cuspidate: sepals (as well as peduncles and leaves) brownish, hairy at base, minutely scarious on the margin, apex arched within, back produced into a slender whitish diverging awn: setæ as long as the filaments.—Gillespie County.

3. **P. Lindheimeri** Gray. Glabrous, erect, often 9 cm. high: stems diffusely much branched into many open dichotomous cymes: leaves and bracts setaceous, mucronate, shorter than the internodes: calyx minutely pubescent at base, the awn much shorter than the segments.—Middle and western Texas.

* * *Perennial: sepals cuspidate, the apex somewhat cucullate or concave within, but not dilated.*

4. **P. dichotoma** Nutt. Smooth, tufted, 12 to 30 cm. high, ascending from a rather woody base: leaves (12 to 36 mm. long) and bracts subulate: cymes open, many times forked: sepals short-pointed: setæ minute.—From the Chisos Mountains to Gillespie County.

5. **P. Jamesii** T. & G. Subcespitose, much branched from the somewhat woody base, minutely puberulent: leaves filiform-subulate, obtuse or mucronate: the forked cymes rather close: calyx narrowly campanulate, with turbinate base.—From Middle Fork of Red River to the San Pedro and El Paso. April–July.

AMARANTHACEÆ. (Amaranth Family.)

Chiefly herbs, with entire leaves destitute of stipules, small perfect or unisexual flowers usually subtended by scarious bracts and with a persistent calyx of 1 to 5 more or less scarious sepals (sometimes wanting in *Acnida*), hypogynous stamens as many as the sepals and opposite them or fewer, and a 1-celled ovary containing one to many ovules.

* Anthers 2-celled: ovary 2 to 8-ovuled: leaves alternate.

1. **Celosia.** Stamens united at base: utricle circumscissile.

* * Anthers 2-celled: ovary 1-ovuled: leaves alternate.

2. **Amaranthus.** Flowers monœcious, diœcious, or polygamous, all with a distinct calyx: utricle various.

3. **Acnida.** Flowers diœcious: calyx none in the fertile flowers: bracts small: utricle indehiscent.

4. **Acanthochiton.** Flowers diœcious: pistillate bracts large, cordate: utricle circumscissile.

* * * Anthers 1-celled: ovary 1-ovuled: leaves opposite (except in *Dicraurus*).

+ Stamens perigynous: flowers capitate.

5. **Guilleminea.** Stamens inserted on the throat of the calyx-tube.

+ + Stamens hypogynous.

++ Stigma mostly simple, capitate or emarginate, rarely 2-lobed: flowers axillary.

6. **Cladothrix.** White with stellate-tomentum: flowers not capitate.
7. **Alternanthera.** Flowers capitate.
8. **Gossypianthus.** Calyx densely lanate: flowers not capitate.

++ ++ Stigmas 2, subulate or filiform (except in *Frœlichia*).

9. **Gomphrena.** Flowers capitate.

10. **Frœlichia.** Flowers spicate: stigmas capitate.

11. **Iresine.** Flowers paniculate, perfect or diœcious: leaves opposite: herbaceous or nearly so.

12. Dicraurus. Flowers paniculate, diœcious: leaves alternate: shrubby.

1. CELOSIA L.

Smooth herbaceous or suffrutescent plants, with alternate leaves, the perfect and 3-bracted flowers crowded in axillary and terminal spikes or panicles, 4 sepals, 5 stamens united at base, 2-celled anthers, 3 recurved stigmas, and a circumscissile utricle.

1. **C. paniculata** L. Stem shrubby, erect: leaves deltoid-ovate, acute, abruptly petioled: spikes cylindrical, simple or branched: sepals oblong, rigid, several times longer than the bracts: seeds minute, lenticular, shining.—From San Antonio to San Pedro and southward.

2. AMARANTHUS L. (Amaranth.)

Annual weedy plants, with alternate setaceous-mucronate thin entire leaves decurrent on slender petioles, small green or purplish 1 or 3-bracted flowers in axillary or terminal spike-like clusters, 5 (sometimes 3) glabrous sepals, 2 or 3 linear sessile stigmas, and ovoid utricle opening transversely or bursting irregularly.

* *Utricle thin, the top falling away as a lid: flowers polygamous.*

+ *Flowers in terminal and axillary simple or mostly panicled spikes: stems erect (3 to 18 dm. high): sepals and stamens 5.*

++ *Pubescent plants.*

1. **A. retroflexus** L. Roughish, more or less pubescent: leaves dull green, long-petioled, ovate or rhombic-ovate, undulate: flowers green, in thick spikes crowded in a stiff or glomerate panicle: bracts awn-pointed, rigid, exceeding the acute or obtuse sepals.—Throughout Texas.

2. **A. chlorostachys** Willd. Very similar, but smoother and of a deeper green color, with more slender linear-cylindric more or less flexuous spikes, the lateral ones spreading or divaricate, and the sepals more frequently acute or acuminate. (*A. retroflexus*, var. *chlorostachys* Gray.)—From Laredo northward and eastward.

3. **A. obovatus** Watson. Pubescent, slender, 6 dm. high, reddish, sparingly branched: leaves small, lanceolate, on short petioles: spikes erect, narrow, the terminal ones 2.5 to 5 cm. long, the axillary shorter: bracts subulate, acuminate, and pungent, much exceeding the unequal narrowly oblong acute sepals: utricle equaling the calyx: seeds oblong-ovate.—On the Lower Rio Grande.

++ ++ *Glabrous or glabrate plants.*

4. **A. hybridus** L. Smooth or nearly so, green: stems 6 to 9 dm. high: leaves ovate-oblong, rather large, long-mucronate, the pale veins prominent beneath: spikes numerous, panicled, the terminal one elongated, the lower axillary ones short and roundish: sepals oblong, acuminate, rather shorter than the subulate bracts and equaling the slightly rugose utricle.—From Virginia to Mexico.

5. **A. Wrightii** Watson. Slender, reddish: leaves small and thin, oblong to nar-

rowly lanceolate: spikes (terminal compound) erect, narrow, and rather leafy: bracts solitary, subulate, rigid, attenuate into a pungent awn, exceeding the oblong-spatulate obtuse or emarginate sepals.—On the Lower Rio Grande, near the mouth.

+ + *Flowers crowded in close and small axillary clusters: stems low, spreading or ascending: sepals and stamens 3, or the latter only 2.*

6. **A. albus** L. Smooth, pale green: stems whitish, erect or ascending, diffusely branched: leaves small, obovate and spatulate-obong, very obtuse or retuse: flowers greenish: sepals acuminate, half as long as the rugose fruit, much shorter than the subulate rigid pungently pointed bracts: seed small, 1 mm. broad.—Central Texas and northward, the most common prairie tumbleweed.

7. **A. blitoides** Watson. Like the last, but prostrate or decumbent: spikelets usually contracted: bracts ovate-oblong, short-acuminate: sepals obtuse or acute: fruit not rugose: seed about 2 mm. broad.—From the valleys and plains of northern Texas to Gillespie County.

8. **A. Blitum** L. Resembling the last, but usually erect, with shorter and more scarious bracts, and a smaller seed more notched at the hilum.—Low places near Camp Bache. July.

* * *Utricle bursting or imperfectly circumscissile: flowers monœcious: leaves with spiny axils.*

9. **A. spinosus** L. (THORNY AMARANTH.) Smooth, bushy-branched: stem reddish: leaves rhombic-ovate or ovate-lanceolate, dull green, a pair of spines in the axils: upper clusters sterile, forming long slender spikes; the fertile globular and mostly in the axils: flowers yellowish-green.—From Tom Greene County to Laredo.

* * * *Utricle circumscissile or indehiscent: flowers monœcious or diœcious: sepals (5) of the fertile flowers more or less dilated above and spreading, deciduous with the fruit: no spines in the axils.*

+ *Fruit circumscissile.*

++ *Flowers monœcious and diœcious.*

10. **A. Torreyi** Benth. Leaves ovate-oblong or ovate-lanceolate: glomerules paniculate spiked and axillary: bracts and the sepals of the staminate flowers cuspidate-acuminate; sepals of the pistillate flowers united below, obovate-spatulate, rounded above and entire or retuse or emarginate.—Colorado to western Texas and southward.

++ ++ *Flowers monœcious: stems erect, slender: glabrous.*

11. **A. Pringlei** Watson. Stems 3 dm. high or more: leaves linear-oblanceolate, 2.5 to 5 cm. long: inflorescence leafy: bracts lanceolate, spinulose-acuminate, equaling the fruiting calyx: staminate flowers few, mingled with the pistillate ones, with narrow acute sepals; sepals of the pistillate flowers distinct, green with a broad scarious margin, obovate, obtuse or retuse, and somewhat denticulate, the broad claw becoming gibbously thickened in fruit: fruit circumscissile near the base.—Rocky hills of Limpia Cañon.

12. **A. fimbriatus** (Torr.) Benth. Stems 3 to 9 dm. high: leaves linear, 3 to 6 dm. long, attenuate into a slender petiole, obscurely nerved: flowers reddish, in rather loose clusters, scattered or approximate in a long terminal spike which is leafy below: bracts shorter than the calyx, narrow, acute: sepals of sterile flowers obtuse, oblong; of fertile flowers broadly fan-shaped, 2 to 3 mm. long, with a narrow thickened strongly nerved base, slightly united, the upper margin fimbriately incised. (*Sarratia Berlandieri*, var. *fimbriata* Torr.)—From the Chisos Mountains to San Diego.

++ ++ ++ *Flowers diœcious: stout, pubescent or glabrate.*

13. **A. Palmeri** Watson. Stems erect, 6 to 9 dm. high, branching: leaves oblong-rhomboid, equaling the petiole, the upper lanceolate: flowers in close elongated linear

spikes, leafy at base: bracts solitary, mostly twice longer than the flowers, spreading, subulate and rigid, narrowed into a stout awn: sepals (2 or 3) of the fertile flowers oblong and somewhat broader above, obtuse or retuse, setaceous-apiculate: stigmas usually 2: seed circular.—On the banks of the Rio Grande.

+ + *Fruit indehiscent.*

++ *Flowers monœcious.*

14. **A. polygonoides** L. Stem slightly pubescent, slender, branching from the base: leaves small, rhombic-ovate or obovate, obtuse, notched, tapering into a slender petiole: flowers crowded in short axillary clusters: calyx of the pistillate flowers twice as long as the subulate bracts, with a finely ribbed tube and spreading white border: utricle rugose above, 3-cleft at apex.—On the Guadalupe (Kendall County).

++ ++ *Flowers diœcious.*

15. **A. Greggii** Watson. Erect, glabrous or nearly so: upper leaves rhombic-ovate, scarcely 2.5 cm. long, on short petioles, rather thick and somewhat scabrous: spikes elongated, leafy and interrupted at base: bracts solitary, lanceolate, acuminate, scarious, erect, much shorter than the fruiting calyx: sepals distinct, oblong-spatulate, acute, inner one somewhat narrow below: stigmas 3: seed small.—Near the mouth of the Rio Grande.

3. CANIDA L. (WATER HEMP.)

Characters of *Amaranthus* (except that the flowers are completely diœcious and the pistillate ones without calyx), with flowers having 1 to 3 unequal bracts which are longer than the staminate calyx of 5 thin oblong mucronate sepals, 5 stamens, and 2 to 5 often long and plumose stigmas.

1. **A. tuberculata** Moq. Tall and erect, or sometimes low and decumbent: leaves lanceolate, acute or acutish (sometimes obtuse): sepals of sterile flowers lanceolate, acute or acuminate; pistillate flowers closely clustered in more or less dense naked or leafy axillary and terminal spikes (or the axillary capitate): bracts rather rigid, acuminate, equaling or exceeding the fruit which dehisces irregularly: stigmas slender, filiform, almost plumosely hairy. (*Montelia tamariscina* Gray, in part.)—River banks, etc., from San Antonio to the San Pedro.

2. **A. tamariscina** Gray. Like the last, but with a circumscissile fruit which is shorter than the bracts, pistillate flowers in slender virgate pedunculate less glomerate spikes, and stigmas similar or shorter. (*Montelia tamariscina* Gray, in part.)—From Arkansas through Texas to New Mexico.

4. ACANTHOCHITON Torr.

Annual slender smooth herb, with alternate elongated linear-lanceolate aristate-acuminate entire leaves, diœcious dissimilar flowers in axillary glomerate clusters, bractless staminate flowers with 5 lanceolate-acuminate sepals, pistillate flowers hidden by the large broadly cordate rigid spinulose-tipped bracts and with no sepals, and a flattened circumscissile utricle.

1. **A. Wrightii** Torr. Erect, slightly branching: leaves with prominent midrib and tapering to a slender petiole: bracts of the pistillate flowers imbricated towards the ends of the branchlets, interlocked, shining, reticulate-veiny, with crenulate membranaceous margins.—From the alkaline flats and sandy plains of the Pecos to the mouth of the Rio Grande.

5. GUILLEMINEA HBK.

Prostrate and branching lanate and leafy herbs from a perennial root, with opposite ovate entire leaves connate at base, minute perfect axillary lanate flowers, unequal bracts, campanulate calyx with obconic tube and 5-lobed limb, 5 stamens inserted at base of calyx lobes, minute anthers, short style with emarginate stigma, and an indehiscent utricle.

1. **G. densa** (Willd.) Moq. Stems articulated, subfuscous, with opposite flexuous branches: leaves spatulate-oblong or oblong-lanceolate, 8 to 12 mm. long, punctate, glabrous above, canescently pilose-pubescent below, reticulated, the upper subsessile and ovate or ovate-lanceolate: bracts white, the lower ovate, acute, the upper oblong-ovate and obtuse: flowers minute, white (*Illecebrum densum* Willd. *G. illecebroides* HBK.)—Plains, from the Limpia to the Rio Grande and San Diego.

2. **G. lanuginosa** (Poir.) B. & H. Stems slender, much branched: leaves sessile, 4 to 6 mm. long, elliptical: radical ones obovate-oblong, 16 to 24 mm. long, scarcely acute, appressed-pilose above and villous beneath: bracts subequal, ovate, mucronate, glabrous, white: sepals lanceolate-subulate, rigid, 3-nerved: fruit oblong-ovate, glabrous, pale green (*Paronychia lanuginosa* Poir.)—From the flats of the Pecos to Laredo.

6. CLADOTHRIX Nutt.

Low annual or erect and woody at base, with small round entire petiolate leaves, very small axillary flowers (solitary or few) having 3 concave hyaline bracts, calyx of 5 erect equal oblong rigid-scarious sepals which are somewhat pilose with verticillately branching hairs, large oblong anthers, and an ovate-globose indehiscent utricle.

1. **C. lanuginosa** Nutt. Annual, prostrate or ascending, 3 to 6 dm. high, diffusely branched: leaves round-obovate to rhomboidal, more or less attenuate at base, often in 3's, two of them smaller: flowers mostly in pairs: sepals obtuse, twice longer than the broader hairy-tipped bracts: utricle glabrous, shorter than the sepals. (*Alternanthera lanuginosa* Moq.)—From the flats of the Pecos westward and southward along the Rio Grande.

2. **C. suffruticosa** (Torr.) Watson. Somewhat woody at base, erect and much branched, 1 to 1.5 dm. high: leaves smaller than in the last, rounded or ovate, truncate or usually rounded at base, with very short petiole. (*Alternanthera* (?) *suffruticosa* Torr.)—Valley of the Rio Grande.

7. ALTERNANTHERA Forsk.

Herb, with perfect 3-bracteate flowers, 5 sepals, 5 stamens united into a short cup at base, minute and tooth-like sterile filaments, short style, capitate stigma, and an indehiscent utricle.

1. **A. repens** (L.) Kuntze. Stems prostrate, forking, pubescent, 15 to 30 cm. long: leaves smoothish, oval or obovate, narrowed into a petiole: heads dense, oval, white: sepals lanceolate, spine-pointed, woolly on the back with barbed hairs, the two inner ones much smaller: sterile filaments as long as the fertile ones.—(*Achyranthes repens* L. *A. achyrantha* R. Br.)—From the banks of the Pecos to Gillespie County.

8. GOSSYPIANTHUS Hook.

Perennial herbs, with procumbent flexuous woolly stems, obovate or elongated-spatulate rigid and subcoriaceous radical leaves, ovate entire sessile more or less silky-woolly stem-leaves, perfect flowers, 2 or 3 deli-

cate keeled deciduous bracts, calyx of 5 subequal very pilose sepals, 5 free stamens, very short roundish style, and an emarginate 2 or 3-lobed stigma.

1. **G. rigidiflorus** Hook. Stems procumbent, diffusely branched: stem leaves secund, 4 to 8 mm. long, acute, tapering to a rather broad base: flowers in axillary clusters, densely covered with jointed cottony hairs: sepals membranaceous: filaments narrow, a little longer than the oblong anthers: stigma 2-lobed: fruit oblong-ovate, 2 mm. long.—Southern Texas, from Bluffton to Laredo.

2. **G. tenuiflorus** Hook. Stems procumbent, diffuse: leaves glabrous on both sides, the radical subspatulate-lanceolate, the cauline lanceolate: flowers densely lanate: sepals narrowly lanceolate-linear: filaments dilated: fruit ovate, 1.5 mm. long, greenish: otherwise like the last.—Texas and Mexico.

9. GOMPHRENA L. (Globe Amaranth.)

Erect or prostrate herbs, hirsute or villous, with usually swollen nodes, sessile or short-petioled entire leaves, usually solitary and sessile heads, perfect flowers, 5-parted or 5-cleft calyx often villous below, concave lanceolate segments (seldom obtuse), and stamen-tube 5-cleft with emarginate or 2-cleft lobes.

** Stigmas short, subsessile: heads subtended by leaves.*

1. **G. Nealleyi** Coult. & Fisher. Ascending, 14 to 20 cm. high, loosely long-villous, from a fusiform root: leaves spatulate, mucronulate, glabrate above, half-clasping, 3 to 3.5 cm. long, the upper ovate and much smaller: peduncle terminal, about 11 cm. long: heads rose-tinted, sessile, dense, oblong or obovate, 2 cm. or more long, subtended by 2 large leaves: flowers 5 mm. long: bracts ovate, acute, half as long as the keeled and slightly crested acute bractlets: sepals linear-lanceolate, slightly cleft, densely woolly below, little shorter than the bractlets: stamen-tube united to the top, with linear-oblong exserted anthers: stigmas 2, minute, spreading.—Corpus Christi. *Nealley* 420, referred to *G. nitida* Roth. in Contr. Nat. Herb. 1, 48.

*** Stigmas filiform on style: heads subtended by leaves.*

2. **G. nitida** Rothrock. Erect, 12 to 28 cm. high, branching, somewhat silky-hairy: leaves oblong-spatulate, 2.5 to 8 cm. long, obtuse, mucronulate, cinereous: heads pearly white, sessile or nearly so, subtended by 2 (or more) large leaves: bracts somewhat lacerate-toothed or crested, very acute: sepals very acute, abundantly hairy below, somewhat shorter than the bracts: stamen-tube united to the top; anthers oblong: style three-fourths as long as the stamen-tube. (*G. globosa*, var. *albiflora* Moq.)—On the Cibola and other tributaries of the Rio Grande.

3. **G. tuberifera** Torr. Scarcely pilose: root fusiform, fleshy and farinaceous, 4 to 6 cm. long: stems erect, 3 to 6 dm. high, sparingly branched: leaves lanceolate-linear, sessile, mucronulate, cinereous: peduncle elongated, simple: head globose or ovate, solitary, subtended mostly by 2 leaves: flowers shining, whitish rose: calyx about equaling the narrowly keeled broadly crested bracts; sepals very acute, 1-nerved, very villous: style (together with stigmas) half as long as the stamen-tube.—On the rocky banks of the San Pedro and other western tributaries of the Rio Grande.

4. **G. decumbens** Jacq. Stems procumbent, 3 to 4 dm. long, lanate, much branched: leaves oblong, obtuse, mucronulate, attenuate below into a half-clasping petiole: peduncle simple: heads erect, subglobose, finally globose-cylindrical, 8 to 18 mm. long: flowers shining, whitish rose: bracts ovate, acuminate, half as long as the keeled crested bractlets: sepals shorter than the bracts, 1-nerved, the exterior obtuse and

glabrous, the interior acute and villous: style (together with stigmas) half as long as the stamen-tube.—On the Lower Rio Grande, October.

* * * *Stigmas filiform on style: heads not subtended by leaves.*

5. **G. cæspitosa** Torr. Very low, cespitose-spreading, white-villous: caudex thick and woody: leaves obovate, obtuse, the radical with an attenuate base, the cauline 2 and subsessile: peduncles short, simple: heads ovate, about 2 cm. long: flowers shining, yellowish white: calyx about as long as the hyaline acute (not keeled) bractlets; sepals obtuse, 1-nerved, very villous.—Above El Paso, near the Organ Mountains.

10. FRŒLICHIA Mœnch.

Hairy or woolly herbs, with spikes of perfect 3 (scarious)-bracted flowers, tubular and densely woolly calyx 5-cleft at summit (2 to 5-crested or tuberculate below) and indurated in fruit inclosing the thin indehiscent utricle, and filaments united into a tube bearing 5 oblong anthers and as many strap-shaped appendages.

1. **F. Floridana** Moq. Root annual: stem leafless above, 3 to 9 dm. high: leaves lanceolate, silky-downy beneath: spikes ovate or oblong, lengthening with age: bractlets thin, little shorter than the calyx, which is 4 mm. long: style short: fruiting calyx round-ovate, somewhat compressed, becoming broadly winged, the wings reddish and irregularly toothed.—Sandy ground, southern and southwestern Texas.

2. **F. gracilis** Moq. Like the last, except more slender, with narrow leaves, smaller spikes, and the crests of the matured calyx of nearly distinct rigid processes.—Near streams, from the Guadalupe to the Rio Grande.

3. **F. Drummondii** Moq. Leaves oblong, 6 to 10 cm. long, 1.5 to 3 cm. wide, attenuate at both ends, white-lanate above, silvery below: spikes ovate-pyramidal, acute, 8 to 16 mm. long, 8 to 12 mm. wide: flowers 5 mm. long, white: style medium length: fruiting calyx round-conical, compressed, twice longer than the bracts, the reddish wings erose-dentate.—Sandy places along the Rio Grande, from El Paso to its mouth.

4. **F. Texana** Coult. & Fisher. Erect, silky-villous, 5 dm. or more high, sparingly branched from a perennial base: leaves usually obtuse, mucronate, farinose, whitish and densely silky below; the radical spatulate, 8 to 9 cm. long, tapering to a slender petiole; the cauline short-petioled or subsessile, oblong or elliptical-ovate, 2.5 to 3.5 cm. long: peduncles terminal and axillary: spikes 3 cm. long, lengthening in age: flowers 5 mm. long, with thin bracts and bractlets, the latter very broad and deeply concave: fruiting calyx fuscous, cordate, flat on one side, the wings pale, broad, crenate.—Pena, western Texas. *Nealley*, 421, referred to *F. Floridana* Moq. in Contr. Nat. Herb. i, 48.

5. **F. interrupta** Moq. Annual, lanately villous: leaves subsessile, lanate beneath, the radical oblong, narrowly spatulate, attenuate below: spikes 3 to 5 cm. long, on a terminal peduncle: flowers 4 to 5 mm. long: bractlets dark, orbicular: style short: fruiting calyx cone-shaped, the narrow wings thin and dentate.—Southwestern Texas.

11. IRESINE Browne.

Herbs, with opposite usually petioled leaves, scarious whitish 3-bracted flowers, which are crowded into clusters or spikes and branching panicles, calyx of 5 sepals often bearing long wool, mostly 5 stamens, the slender filaments united into a short cup at base, ovate anthers, and a globular indehiscent utricle.

* *Flowers diœcious: leaves petioled.*

1. **I. celosioides** Moq. Nearly glabrous annual, erect, slender, 6 to 12 dm. high: leaves ovate-lanceolate: flowers sometimes polygamous, minute: panicles very slender, or often broad and diffuse, naked: bracts and calyx silvery-white, the fertile calyx twice longer than the broad bracts and densely silky-villous at base.—From the Ohio to Kansas and Texas. Var. OBTUSIFOLIA is lower; leaves much smaller, blunt, more scabrous (especially beneath on the prominent white veins), ovate or very broadly spatulate: panicle dense, narrow, leafy: spikes longer; flowers larger.—From western Texas to the State of Chihuahua.

2. **I. diffusa** Humb. & Bonp. Stems erect, 6 to 9 dm. high, smooth, somewhat 5-angled: leaves ovate, 4 to 5 cm. long, acuminate: the upper lanceolate, slightly denticulate-ciliate on the margin, smooth: panicle loose, narrowly pyramidal, much branched: spikes ovate, obtuse, straw-colored: sepals smooth, twice as long as the ovate bracts.—Near the Great Cañon of the Rio Grande.

* * *Flowers perfect: leaves sessile.*

3. **I. vermicularis** Moq. Smooth: stem prostrate or creeping, much branched, 3 to 6 dm. long: leaves club-shaped, fleshy, semiterete, 1.5 to 2.5 cm. long: heads mostly sessile, ovate or globose, at length oblong or cylindrical, obtuse: flowers white: sepals obtuse, longer than the bracts, the two exterior ones woolly at base.—Alluvial soils of the Lower Rio Grande, October.

12. DICRAURUS Hook. f.

Branching whitish-pubescent shrub, with small sparse alternate leaves, small diœcious bracted flowers (immersed in long wool) in terminal branching panicles, oblong or rounded scarious shining bracts, 5-parted calyx with linear-oblong obtuse segments, 5 filaments united at base and but 2 bearing anthers, 2 sessile subulate recurved stigmas, and a broadly ovoid indehiscent utricle.

1. **D. leptocladus** Hook. f. Leaves ovate or ovate-lanceolate, 12 to 25 mm. long, acute, very entire, sericeous beneath, tapering to a short petiole. (*Iresine diffusa* Torr. Bot. Emory Exped., not Humb. & Bonp. *Iresine alternifolia*, var. *Texana* Coulter, Contr. Nat. Herb. i, 48.)—Western Texas (Chenate Mountains) and northern Mexico.

CHENOPODIACEÆ. (GOOSEFOOT FAMILY.)

Chiefly herbs of homely aspect, more or less succulent, with mostly alternate leaves and no stipules or scarious bracts, minute greenish flowers with a free persistent calyx, stamens as many as the calyx-lobes and inserted opposite (or on the base), 2 (rarely 3 to 5) styles or stigmas, and a 1-celled ovary becoming a 1-seeded thin utricle or rarely an achene.

* Saline herbs or shrubs with fleshy linear leaves and stems not jointed: embryo flat-spiral.

1. **Sarcobatus.** Flowers monœcious or diœcious, bractless: fruit transversely winged: seed-coat membranaceous.

2. **Suæda.** Flowers perfect, axillary, with small bractlets: seed-coat crustaceous.

* * Leaves not fleshy (except *Monolepis*), and stems not jointed (except under + + + +).

\+ Flowers usually perfect (polygamous in *Monolepis*), bractless, clustered or paniceled: calyx obvious: seed-coat crustaceous.

\+\+ Seeds horizontal (sometimes vertical in *Chenopodium*).

3. **Cycloloma.** Calyx 5-cleft, in fruit surrounded by a horizontal continuous membranaceous wing: leaves sinuate-toothed.

4. **Chenopodium.** Calyx 5 (or 2 or 3)-cleft or -parted, unchanged or becoming fleshy in fruit.

\+\+ \+\+ Seeds vertical.

5. **Monolepis.** Sepal one, bract-like: stamen one: fruit naked: flowers dense in the axils.

\+ \+ Flowers monœcious or diœcious; staminate with 3 to 5-cleft calyx; pistillate without calyx, inclosed in a pair of more or less united bracts: seed vertical.

\+\+ Bracts compressed: seed-coat mostly coriaceous.

6. **Atriplex.** Fruiting bracts with margins often dilated and sides often muricate.

\+\+ \+\+ Bracts obcompressed, completely united, not muricate: seed-coat membranaceous.

7. **Eurotia.** Fruit conical, densely hairy, turgid, not winged, 2-beaked.

\+ \+ \+ Flowers perfect, naked or with 1 (rarely 2 or 3) sepals, solitary in the axils of the reduced upper leaves.

8. **Corispermum.** Fruit oval, flattened, adherent to the vertical seed: leaves linear.

\+ \+ \+ \+ Flowers perfect, bractless, arranged by threes in close spikes: stamens 1 or 2: fleshy saline plants, with jointed stems and scale-like leaves.

9. **Salicornia.** Flower clusters decussately opposite, sunk in the rachis of the spike: calyx utricle-like: branches opposite.

10. **Allenrolfea.** Flower clusters spirally arranged: calyx 4 or 5-cleft, with keeled sepals: branches alternate.

\+ \+ \+ \+ \+ Flowers perfect, in axillary and terminal spikes, bracted: stems dextrorse-twining.

11. **Anredera.** Floral bracts 2-winged.

1. SARCOBATUS Nees. (Greasewood.)

A rigidly and divaricately branched shrub, with linear leaves, naked staminate flowers in aments, axillary and solitary pistillate ones with saccate calyx which is adherent at the contracted somewhat 2-lipped apex to the base of the stigmas and laterally margined by a narrow erect slightly 2-lobed border which at length becomes a broad circular horizontal membranaceous veined wing, 2 to 5 stamens irregularly arranged under a stipitate peltate scale, and fleshy anthers.

1. **S. vermiculatus** (Hook.) Torr. Erect, subspinescent, scraggy, 6 to 24 dm. high, leafy: branches with smooth white bark: staminate spikes terminal, the persistent scales spirally arranged, rhombic-ovate. (*S. Maximiliani* Nees.)—From the Upper Platte to northwestern Texas, New Mexico, and the Great Basin.

2. SUÆDA Forsk. (Sea blite.)

Herbs or shrubs, with subterete leaves, axillary clustered or solitary sessile flowers, calyx-lobes unappendaged or more or less strongly keeled or crested or at length somewhat winged, 5 stamens, 2 or 3 stigmas, and a black shining seed.

**Calyx-lobes not appendaged: leaves narrow at base.*

+ Herbaceous annuals

1. **S. linearis** Torr., var. **ramosa** Watson. Erect, much branched, 3 to 9 dm. high: branches nearly simple, slender, ascending: floral leaves oblong to linear-lanceolate: calyx-lobes thick and strongly keeled or gibbous in fruit: stigmas 3 (rarely 4): seed horizontal, 1 mm. broad.—From the New England coast to Galveston.

2. **S. diffusa** Watson. Erect, 3 to 4 dm. high, diffusely branching, with usually slender flexuous branches: leaves 1.5 to 2.5 cm. long, acute or acuminate; floral ones similar but shorter, usually rather distant on the branchlets: clusters 2 to 4-flowered: calyx cleft to below the middle, fleshy but not keeled: seed mostly vertical, perfectly smooth, 1 mm. broad.—Common on the alkaline plains from Nevada and the Upper Missouri to northern Mexico and western Texas on the Rio Grande.

+ + Perennials with woody base.

3. **S. Moquini** (Torr.). Erect, 6 to 9 dm. high, with herbaceous leafy branches, smooth or tomentose: leaves 1.5 to 2.5 cm. long, mostly acute, the floral ones similar: clusters several-flowered: calyx rather large, deeply cleft. seed vertical, finely tuberculate, 1.5 mm. broad. (*Chenopodium Moquini* Torr. *S. Torreyana* Watson.)—From the Platte and Nevada to southern California and southern Coahuila. Doubtless to be found in western Texas.

4. **S. suffrutescens** Watson. Shrubby or somewhat so, 6 to 9 dm. high, with slender diffuse or divaricate leafy branches which are more or less tomentose: leaves numerous, mostly small, 1 to 1.5 cm. long, linear to narrowly oblong, obtuse or acute: flowers solitary or clustered, small, with short lobes: seeds less than 1 mm. broad, very obscurely tuberculate.—Saline plains, from the Pecos Flats to the sandhills and ravines of Presidio del Norte.

** * One or more of the calyx-lobes more or less crested or transversely winged: herbaceous annuals, with leaves broadest at base.*

5. **S. depressa** Watson. Low and mostly decumbent, branching from the base, smooth: leaves .5 to 2.5 cm. long; the floral ones oblong- to ovate-lanceolate or ovate, rather crowded upon the branchlets: calyx cleft to the middle, with acute lobes: seed 1 mm. broad, lightly reticulate.—Saline soil of Pecos Flats, and extending far northward. Var. ERECTA Watson is erect, 3 to 6 dm. high, with short and rather strict branches, very narrow leaves, and narrower bracts.—Probably to be found in northwestern Texas.

3. CYCLOLOMA Moq. (Winged pigweed.)

Coarse and much-branched annual herb, with alternate petioled leaves, very small scattered sessile perfect or pistillate flowers in open panicles, concave strongly keeled calyx-lobes inclosing the depressed fruit, 5 stamens, 3 (rarely 2) styles, and flat seeds.

1. **C. atriplicifolia** (Spreng.). Diffuse, 1.5 to 3.5 dm. high, more or less arachnoid-pubescent or glabrate, light green or often purple: leaves lanceolate, 2.5 to 5 cm. long, coarsely sinuate-toothed. (*Salsola atriplicifolia* Spreng. *C. platyphyllum* Moq.)—Northern Texas.

4. CHENOPODIUM L. (Goosefoot. Pigweed.)

Mostly annual weeds which flower through late summer or autumn and are usually mealy or glandular, with perfect (sometimes pistillate) sessile flowers in small clusters collected in spiked panicles, 5 (rarely 4) -parted or -lobed calyx more or less enveloping the depressed fruit, mostly 5 stamens, filiform filaments, 2 (rarely 3) styles, and lenticular seeds.

* *Annual, more or less mealy, not glandular or aromatic: fruiting calyx dry: seeds horizontal.*

\+ *Leaves entire or rarely sinuate-dentate: pericarp very easily separated from the seed.*

1. **C. Boscianum** Moq. Erect, slender, 6 dm. high, loosely branched, often nearly glabrous: leaves oblong- to linear-lanceolate (1.5 to 3 cm. long), attenuate into a slender petiole, acute, the lower sinuate-dentate or often all entire: flowers small, solitary, or in small clusters upon the slender branchlets: calyx not strongly keeled. (*C. album*, var. *Boscianum* Gray.)—Extending into Texas from the Atlantic States.

2. **C. leptophyllum** Nutt. Densely mealy (rarely nearly glabrous), 1.5 to 4.5 dm. high, simple or branched, often strict: leaves linear (1.5 to 2.5 cm. long), entire, rather short-petioled: flowers closely clustered, in dense or interrupted spikes: calyx-lobes strongly keeled.—From Tom Greene County to New Mexico. Var. OBLONGIFOLIUM Watson is rather stout (15 to 25 cm. high), branched and densely mealy, with oblong often slightly hastate leaves (1 to 2 cm. long), and short close spikes.—Near the Mexican border.

\+ \+ *Leaves more or less sinuate-dentate: pericarp persistent upon the smooth seed: mostly introduced species.*

3. **C. Berlandieri** Moq. Somewhat mealy or nearly smooth, 6 to 9 dm. high, the branches slender and loosely spreading: leaves rhombic-oblong or oblong-lanceolate, 2.5 cm. long or less, subhastate, sinuate-dentate (teeth acute), setaceously acuminate: flowers mostly in slender loose interrupted spikes.—Southern and eastern Texas.

4. **C. album** L. (Lamb's quarters.) Erect, 3 to 12 dm. high, more or less mealy: leaves varying from rhombic-ovate to lanceolate, or the uppermost even linear, acute, all or only the lower more or less angulate-toothed: clusters spiked-panicled, mostly dense: calyx (1.5 mm. broad in fruit) with strongly keeled lobes, nearly or quite covering the fruit.—Introduced everywhere. Var. VIRIDE Moq. is less mealy, with less dense inflorescence, and is not so common.

5. **C. hybridum** L. (Maple-leaved goosefoot.) Bright green throughout: stems widely much branched (6 to 12 dm. high): leaves thin (5 to 15 cm. long), somewhat triangular and cordate, taper pointed, sinuate-angled, the angles extending into a few large and pointed teeth: racemes diffusely and loosely panicled, leafless: calyx not fully covering the fruit, its lobes keeled.—From Texas and New Mexico to Kentucky and Oregon.

6. **C. murale** L. Slightly mealy, stout, ascending or decumbent, 3 to 6 dm. high, leaves rhomboid-ovate, acute, coarsely and sharply unequally toothed, thin, bright green: spikes or racemes diverging, somewhat corymbed, axillary (usually shorter than the leaves): calyx-lobes scarcely keeled: seed sharp-edged.—In the streets of Corpus Christi.

* * *Annual, glabrous: fruiting calyx more or less fleshy (dry in all others) and often colored, inclosing the utricle: seed mostly vertical: flowers in crowded clusters, axillary or in spikes.*

7. **C. rubrum** L. (Coast blite.) Stems angled, much branched: leaves thickish, triangular-lanceolate, tapering below into a cuneate base, and above into a slender point, sparingly and coarsely toothed, the upper linear-lanceolate: clusters scattered in axillary leafy spikes: calyx-lobes 2 to 4, rather fleshy: stamens 1 or 2. (*Blitum maritimum* Nutt.) —Saline and alkaline soils, northwestern Texas to Kansas.

8. **C. capitatum** (L.) Watson. (STRAWBERRY BLITE.) Stem ascending, branching: leaves triangular and somewhat halberd-shaped, sinuate-toothed: clusters simple, large, interruptedly spicate, the upper leafless: stamens 1 to 5: calyx berry-like and bright red in fruit. (*Blitum capitatum* L.)—Northern Texas and New Mexico.

* * * *Annual, not mealy, but more or less glandular-pubescent and aromatic: calyx 2 or 3-parted: seed often vertical: embryo not a complete ring (all others complete).*

9. **C. Botrys** L. (JERUSALEM OAK. FEATHER GERANIUM.) Glandular-pubescent and viscid: leaves slender-petioled, oblong, obtuse, sinuate-pinnatifid: racemes cymose-diverging, loose, leafless: fruit not completely inclosed.—Across the continent, but not common in the West.

10. **C. ambrosioides** L. (MEXICAN TEA.) Smoothish: leaves slightly petioled, oblong or lanceolate, repand-toothed or nearly entire, the upper tapering to both ends: spikes densely flowered, leafy or intermixed with leaves: calyx completely inclosing the fruit.—Central Texas (Gillespie County). Var. ANTHELMINTICUM Gray (WORM SEED) has more strongly toothed leaves (the lower sometimes almost laciniate-pinnatifid) and more elongated mostly leafless spikes.—Throughout southern Texas.

5. **MONOLEPIS** Schrad.

Low saline annual, glabrous or somewhat mealy, with small alternate petioled fleshy leaves, polygamous flowers, the single sepal becoming dry in fruit, 2 styles, and the membranaceous pericarp persistent upon the vertical flattened seed.

1. **M. chenopodioides** Moq. Branched from the base: leaves lanceolate-hastate or sometimes narrowly spatulate, entire or sparingly sinuate-dentate, cuneate or attenuate at base: lower petioles elongated: flower-clusters often reddish: pericarp fleshy, becoming dry and minutely pitted.—Northwestern Texas.

6. **ATRIPLEX** L.

Mealy or scurfy herbs or shrubs, with rarely opposite leaves, usually clustered flowers axillary or in simple or panicled spikes (sexes distinct or mingled in the clusters), bractless staminate flowers, erect bracts of pistillate flowers becoming enlarged and inclosing the fruit, two styles, and a thin membranaceous pericarp.

* *Annual, glaucous-mealy, not scurfy: leaves small.*

← *Fruiting-bract broadly cuneate, acutely 5-toothed at summit, united to above the middle, coriaceous or somewhat indurated: leaves entire..*

1. **A. radiata** (Torr.). Slender, erect, 3 dm. high, scarcely branched, leafy below: leaves oblanceolate to linear, 1.5 to 2.5 cm long, acute or the lower obtuse: male flowers in naked terminal spikes, the pistillate leafy: fruiting-bracts axillary, 2 mm. long, on a short pedicel, the sides reticulated, with rarely 1 or 2 straight projections. (*Obione elegans*, var.? *radiata* Torr. Bot. Mex. Bound. 183, in part. *A. Wrightii* Watson.)—Western Texas.

← ← *Fruiting bracts broadly cuneate, somewhat indurated, united at base, herbaceously margined above and coarsely toothed: leaves sparingly dentate or entire.*

2. **A. tuberculata** (Torr). Erect or ascending, 1.5 to 4.5 dm. high, slender, branched, grayish-puberulent: leaves oblanceolate, 1.5 cm. long, attenuate to a slender petiole: male clusters subterminal: calyx 5-cleft: fruiting bracts 3 mm. long, the upper portion margined with several nearly equal triangular somewhat denticulate teeth, the sides reticulated and crested with a double row of acute teeth: style elongated and exserted. (*Obione elegans*, var.? *tuberculata* Torr. Bot. Mex. Bound, 183. *A. Texana* Watson.)—Central, southern, and western Texas.

+++ *Fruiting bracts united, orbicular, compressed, indurated, surrounded by a double herbaceous toothed margin, sides carinate.*

3. **A. elegans** Dietrich. Erect, slender, 1.5 to 3 dm. high, branching, leafy: leaves oblanceolate to linear, 1 to 2 cm. long, obtuse or acute, entire or with few teeth near the apex: male clusters subterminal or in slender naked spikes: fruiting bracts 3 mm. broad, very shortly pedicelled, the margins radiately toothed. (*Obione radiata* Torr. Bot. Mex. Bound. 183. *O. elegans*, var.? *radiata* Torr., in part.)—Western Texas.

++++ *Fruiting bracts rhombic-orbicular, indurated, subcompressed, 4 to 8 mm. long, usually conspicuously appendaged and the foliaceous margin toothed and undulate: leaves triangular and subhastate, the lower opposite.*

4. **A. argentea** Nutt. Usually low (1.5 to 4.5 cm. high), diffusely branched, grayish-scurfy or nearly glabrous: leaves petioled: male flowers in dense and short spikes: bracts short-pedicelled.—Valley of the Pecos.

5. **A. expansa** Watson. Resembling the last, but stouter, erect, with more widely spreading virgate branches: leaves thinner, sessile: staminate spikes elongated, leafless above: fruiting bracts more compressed, and the sides more often unappendaged and strongly reticulated. (*Obione argentea* Torr.)—Common on the alkaline flats of the Pecos and in the valley of the Rio Grande below San Elizario.

** *Perennials, shrubby, densely appressed scurfy.*

+ *Fruiting bracts with a toothed margin, and the sides usually more or less appendaged, somewhat spongy.*

++ *Fruiting bracts rather large, slightly compressed: leaves over 12 mm. long, alternate.*

6. **A. Nuttallii** Watson. Erect, 3 to 9 dm. high, branching from a shrubby base: leaves narrowly oblong-spatulate to oblanceolate, 12 to 50 mm. long, cuneate at base, sessile, entire: fruiting bracts ovate, united to above the middle, the orifice scarcely contracted, becoming suborbicular, 3 to 4 mm. long, the sides more or less crested. (*Obione canescens* Moq.)—Valley of the Rio Grande, from El Paso to Eagle Pass.

7. **A. acanthocarpa** (Torr.) Watson. Erect, 3 to 7 dm. high, branched, leafy: leaves oblong-lanceolate or oblanceolate (often subhastate), 12 to 40 mm. long, acutish, cuneate, short petioled, usually undulate, sinuately toothed or entire: flowers diœcious; the staminate clusters dense in naked terminal spikes; fertile clusters axillary, few-flowered: fruiting bracts lanceolate, the linear apex only free, becoming 8 to 12 mm. long, the sides strongly appendaged with rigid flattened processes. (*Obione acanthocarpa* Torr. Bot. Mex. Bound. 183, mostly.)—From the Guadalupe to the Rio Grande.

+++ *Fruiting bracts more or less compressed, rather small: leaves numerous, about 6 mm. long or less, entire, more or less opposite.*

8. **A. Greggii** Watson. Slender, 1.5 to 3.5 dm. high: leaves alternate or the lower opposite, oblong or spatulate, 6 to 12 mm. long, cuneate at base, mostly sessile: flowers in small axillary clusters or slender interrupted nearly naked spikes: bracts united only at base, cuneate-orbicular, becoming 3 to 6mm. broad, dentate-margined from below the middle, and the convex sides usually tooth crested. (*Obione canescens*, var. and *O. acanthocarpa* Torr. Bot. Mex. Bound. 183, in part.)—On the Rio Grande, below Presidio del Norte, and the Burrow Mountains.

9. **A. oppositifolia** Watson. Woody at base, erect, 3 dm. high, branched: leaves thick, 2 to 4 mm. long, mostly opposite, oblong-lanceolate, sessile and broadest at base: flowers axillary, sessile, diœcious (?): fruiting bracts united, orbicular, 2 mm. broad, short-pedicelled, the margin radiately toothed, sides 3-nerved, not appendaged.—From Corpus Christi to the Rio Grande.

++ *Fruiting bracts indurated, united at apex, with four broad membranaceous veined wings: leaves narrow, entire.*

10. **A. canescens** (Pursh.) James. An erect diffusely branched shrub, 3 to 6 dm. high: leaves narrowly oblong or oblanceolate, 1.5 to 2.5 cm. long, narrowed at base, sessile: flowers axillary or in naked spikes, mostly diœcious: fruiting bracts forming a thick and indurated body, short-pedicelled and with a narrow bifid apex, the broad wings somewhat decurrent upon the pedicel. (*Calligonum canescens* Pursh.)—Throughout western Texas. Often confused with *A. Nuttallii*. Var. ANGUSTIFOLIA Watson has linear often more or less revolute leaves. (*Obione occidentalis*, var. *angustifolia* Torr. Bot. Mex. Bound. 184.)—On the Rio Grande, from El Paso to below San Elizario.

7. EUROTIA Adanson.

Low stellately tomentose undershrubs, with alternate entire leaves, small clustered axillary and subspicate flowers, 4-parted calyx, 4 stamens exserted together with the two somewhat hairy styles.

E. lanata (Pursh.) Moq. White tomentose throughout: leaves linear to narrowly lanceolate, with revolute margins, obtuse: calyx lobes hairy: fruiting bracts lanceolate, nearly covered by 4 dense spreading tufts of long silvery white hairs, and beaked above with two short horns. (*Diotis lanata* Pursh.)—Common in western Texas. A valuable forage plant, known as "white sage" or "winter fat."

8. CORISPERMUM A. Juss. (BUG-SEED.)

Annual herbs, with alternate sessile linear leaves, ebracteate flowers, a suborbicular sepal erose or lacerate at apex, 1 to 5 hypogynous stamens (one longer), 2 styles, and fruit with margin acute or narrowly winged.

1. C. hyssopifolium L. Somewhat floccose or villous pubescent, pale, erect, 1.5 to 4.5 dm. high, diffusely branched: leaves cuspidate; floral leaves or bracts awl-shaped from a dilated base, or the upper ovate and pointed, scarious margined: fruit 6 to 8 mm. long.—Alluvial soils of the Rio Grande. Very variable. Var. MICROCARPUM Watson has elongated spikes and fruit but 2mm. long.—Laredo, along the Rio Grande.

9. SALICORNIA L.

Low plants, with succulent leafless stems and opposite branches, 3 flowers together immersed in each hollow of the thickened upper joints forming the spike, a small bladder-like calyx having a toothed or torn margin, which at length becomes spongy with narrowly winged border and inclosing the flattened thin utricle, two styles, and pericarp adherent to the seed.

1. S. mucronata Bigel. Annual, herbaceous, stout, erect, 5 to 30 cm. high, naked below, turning red in age: spikes thick, closely jointed, obtuse: scales mucronate-pointed and conspicuous, especially when dry: middle flower half higher than the lateral ones or less, occupying nearly the whole length of the joint: fruit pubescent; seed 1 to 1.5 mm. long.—On the beach at Brazos Santiago. Var. SUFFRUTESCENS Watson is stout, woody at base, 3 to 6 dm. high, much branched, with rather acute spikes, and seeds 1.5 to 2mm. long.—At the mouth of the Rio Grande.

2. **S. ambigua** Michx. Numerous tufted stems (.5 to 3 dm. long) decumbent or ascending from a hard and rather woody creeping base or rootstock, greenish, turn-

ing lead color: spikes slender, short-jointed, the scales short, acutish or acute: flowers nearly equal in height and equaling the joint: seed pubescent, 0.7 mm. long.—On the flats of the Pecos and along the seacoast.

10. ALLENROLFEA Kuntze.

Shrubs, with alternate naked branches, densely spiked flowers in threes in the axils of the spirally ranked fleshy sessile bracts, perianth of 4 (rarely 5) concave imbricated and more or less united sepals which become somewhat spongy and cover the fruit, 2 (rarely 3) usually distinct styles, and the pericarp free from the membranaceous seed-coats. (*Spirostachys* S. Watson, not Ung. Sternb.)

1. **A. occidentalis** (Watson) Kuntze. Erect, diffusely branched, 6 to 15 dm. high: scale-like leaves broadly triangular and acute, amplexicaul, often nearly obsolete: spikes numerous, sessile or nearly so, cylindrical, 6 to 20 mm. long, densely flowered: bracts rhomboidal, crowded, persistent: flowers slightly exserted, at length deciduous: seed less than 0.5 mm. long. (*Arthrocnemum macrostachyum* Torr. Bot. Mex. Bound. 184. *Halostachys occidentalis* Watson, Bot. King Exped. *Spirostachys occidentalis* Watson, Rev. Chenop.)—Alkaline soils, throughout western Texas.

11. ANREDERA Juss.

Glabrous climbing or trailing herb, with tuberous roots, alternate fleshy leaves, small white flowers, 5-parted calyx inclosed within 2-winged persistent bracts, 3-parted style, and leathery compressed pericarp semi-adherent to the membranaceous seed-coats.

1. **A. scandens** (L.) Moq. Leaves ovate-oblong, 5 to 7 cm. long, acuminate, petioled: spikes exceeding the leaves: stamens 5, hypogynous; anthers sagittate, included. (*Polygonum scandens* L.)—From the Upper Pecos to the Lower Rio Grande (Ringgold).

PHYTOLACCACEÆ. (Pokeweed Family.)

Plants with alternate entire or subcrenate leaves, perfect flowers, either a simple or several-celled ovary composed of as many carpels united into a ring and forming a berry in fruit.

1. **Rivina.** Fruit simple: leaves subcrenate.
2. **Phytolacca.** Fruit compound: leaves entire.

1. RIVINA L.

Suffruticose (3 to 6 dm. high), with small white or rose-colored flowers in axillary and terminal racemes, 4-parted calyx, 4 to 8 stamens, solitary ovule, and capitate or many-cleft stigma.

1. **R. lævis** L. Suffrutescent, glabrate, with spreading branches: leaves subcordate or ovate, tapering but obtuse at summit: racemes longer than the leaves: calyx obsoletely viened: fruit reddish, shorter than the pedicel. (*R. portulaccoides* Nutt.)—Common in alluvial ground throughout the valley of the Rio Grande and to the center of the State.

2. PHYTOLACCA L. (Pokeweed.)

Tall and stout perennial herbs, with large petioled leaves, terminal racemes which become lateral and opposite the leaves, calyx of 5 rounded and petal-like sepals, 5 to 30 stamens, ovary of 5 to 12 carpels

united into a ring with as many short separate styles and forming in fruit a depressed globose 5 to 12-celled berry with a single vertical seed in each cell.

1. **P. decandra** L. (COMMON POKE OR SCOKE, GARGET, PIGEON BERRY.) Smooth, 6 to 30 dm. high, with a rather unpleasant odor, and a very large poisonous root: calyx white: stamens and styles 10: ovary green: berries purple, with crimson juice, ripe in autumn.—Throughout central Texas.

BATIDEÆ.

A family represented by a single genus and species of wholly doubtful affinity.—A fleshy maritime shrub.

1. BATIS P. Browne.

A low seaside shrub, with opposite entire fleshy leaves without stipules, diœcious bracteate flowers in oblong axillary sessile ament-like spikes, staminate flowers free and with a campanulate 2-lipped calyx, stamens alternate with the 4 petals, the pistillate flowers 8 to 12 united into a fleshy spike without a perianth, 4-celled coherent ovaries with a single ovule in each cell, and a thick capitate sessile stigma.

1. **B. maritima** L. Glabrous: stems branched and straggling, 9 to 12 dm. long: leaves linear to ovate-oblong (2.5 cm. long): spikes solitary in the axils: pistillate spike elongated in fruit: bracts entire, in 4 vertical rows: petals white: stamens exserted: fruit a spongy pericarp.—On the beach at Brazos Santiago.

POLYGONACEÆ. (BUCKWHEAT FAMILY.)

Herbaceous or woody plants, with alternate entire leaves, stipules in the form of sheaths above the swollen joints of the stem (or none), mostly perfect flowers on jointed pedicels, a more or less persistent 3 to 6-cleft calyx, a 1-celled ovary with 2 or 3 styles or stigmas and a single erect seed, 4 to 9 stamens, and fruit a compressed or 3 or 4-angled or winged achene.

* Flowers involucrate: stamens 9: stipules none.

1. Eriogonum. Involucre with several exserted flowers: calyx 6-cleft: styles 3, with capitate stigma.

* * Flowers without involucre: stamens 4 to 8: stipular sheaths present.

+ Sepals 5 (sometimes 4), equal and erect in fruit: achene triangular or lenticular.

2. **Polygonum.** Styles 2 or 3: stigmas capitate.

+ + Sepals 4 to 6, the outer row reflexed, the inner erect and enlarged in fruit.

3. **Oxyria.** Sepals 4: stigmas 2, tufted: achene orbicular-winged: leaves reniform.

4. **Rumex.** Sepals 6: stigmas 3, tufted.

1. ERIOGONUM Michx.

Herbaceous or somewhat woody plants, with radical or alternate or verticillate leaves, involucre (campanulate or turbinate or oblong) 4 to 8-toothed or lobed (lobes pointless), and the colored perianth inclosing the 3-angled (sometimes 3-winged) achene.

* *Involucres more or less broadly turbinate, not nerved or angled, 4 to 8-toothed or lobed: bracts foliaceous, rarely somewhat ternate.*

+ *Achenes membranaceously winged: leaves alternate, long oblanceolate.*

1. **E. alatum** Torr. Loosely silky-villous throughout, or the leaves nearly glabrous except on the margin and midrib: involucres pedunculate, solitary, with 5 erect teeth: flowers 2 mm. long, yellow, nearly glabrous, abrupt at base: achene winged its whole length.—From western Texas to Arizona and Nebraska.

2. **E. hieracifolium** Benth. Hoary-pubescent throughout and leaves usually tomentose beneath: flowers pubescent, yellow or rose-colored, 3 mm. long (or 4 mm. in fruit), abruptly narrowed at base: achenes 5 mm. long, winged above the middle.—Western Texas and the Rio Grande Valley.

+ + *Achenes not winged.*

++ *Flowers glabrous.*

3. **E. umbellatum** Torr. Tomentose: leaves glabrous or glabrate above, oblanceolate or spatulate: involucres deeply lobed, the lobes becoming reflexed: umbel simple, of 2 to 10 naked rays on naked (rarely 1-bracted) peduncles: flowers elongated at base, yellow or yellowish, 4 to 6 mm. long.—Extending into northern Texas from the far north and west.

4. **E. Abertianum** Torr. Stout and leafy often tall annual, silky-villous, di- or trichotomously branched: leaves ovate or subcordate: involucre lobed or parted, long-pedunculate: flowers rose-colored, the outer sepals round-cordate, at length 4 mm. broad, the inner linear-oblong.—In the Chenate, Limpia, and Guadalupe Mountains.

5. **E suffruticosum** Watson. Perennial, very much branched and woody, 10 to 15 mm. high, canescent: leaves finely silky tomentose both sides, fascicled and more or less revolute, oblanceolate, acute, attenuate to a short petiole, 4 to 8 mm. long: peduncles simple or sparingly dichotomous, 2 to 2.5 mm. long, with small linear bracts: involucre solitary, 6-cleft: flowers few, small (2 mm. long), pinkish; the outer segments round-reniform, at length reflexed; the inner oblanceolate, obtuse, erect.—On the foothills of the Bofecillos mountains.

++ ++ *Flowers pubescent.*

6. **E. longifolium** Nutt. Tall perennial, hoary pubescent throughout and the leaves tomentose beneath: involucre and flowers densely white-silky: flowers mostly herbaceous, 3 mm. (becoming 4 to 6 mm.) long: achene 4 mm. long, pubescent above.—From Texas to Indian Territory and Florida. The tapering roots are very astringent and probably contain tannin.

7. **E. Jamesii** Benth. Rather slender, herbaceous, with branching caudex, 3 dm. high or less, white-tomentose: leaves and conspicuous bracts oblong-lanceolate, the latter shortly petiolate: involucres solitary, sessile, with 5 erect teeth on a naked peduncle: flowers whitish silky.—Hillsides and arroyos of the Upper Rio Grande and its tributaries. Var. FLAVESCENS Watson is stouter and has yellow or yellowish flowers (*E. flavum*, var. *vegetius* T. & G.).

* * *Involucres campanulate or short turbinate, not nerved or angled, with 5 rounded erect teeth, pedunculate in diffuse repeatedly di- or trichotomous panicles: bracts not foliaceous, all ternate: flowers not attenuate at base.*

+ *Leaves tomentose.*

++ *Stems simple, leafy, naked above: inflorescence cymose: flowers glabrate.*

8. **E. annuum** Nutt. Stout, 6 dm. high, white floccose-tomentose throughout: leaves oblong-lanceolate, acute at both ends, short-petioled, flat: bracts small, triangular: involucres densely white-tomentose; flowers 3 mm. long: sepals very unequal, the

outer oblong-obovate.—Western Texas, in the mountains and on the tributaries of the Rio Grande.

9. **E. multiflorum** Benth. Tall, stout, white-tomentose: leaves lanceolate, sessile, and somewhat auricled at base, smoother above, with undulate margin: involucres smoother: flowers 3 mm. long: outer sepals round-cordate.—On the Rio Grande, from El Paso to the mouth.

++ ++ *Branching: leaves radical or at least the peduncles leafless: flowers glabrous.*

10. **E. cernuum** Nutt. Glabrous, low, diffuse: leaves broadly ovate, acute: involucres turbinate-campanulate: pedicels deflexed: flowers white or tinged with rose: outer sepals oblong or broader above, retuse.—From western Texas to Arizona.

11. **E. rotundifolium** Benth. Glabrous, low, slender, diffuse: leaves round-ovate, often subcordate at base, on slender petioles: pedicels erect or somewhat spreading: flowers white, becoming 3 mm. long, the outer sepals very broadly dilated above.—Rocky ravines along the Rio Grande and in the Gaudalupe and Chenate mountains. April to June.

12. **E. tenellum** Torr. Tall, densely white-tomentose: branches of the woody caudex short and crowded or elongated: leaves ovate or rounded, tomentose on both sides: inflorescence rather sparingly branched: flowers white or pinkish: outer sepals broadly obovate or orbicular, the inner linear-oblong.—Mountains and cañons of the Rio Grande and along the San Pedro. Var. CAULESCENS T. & G. is leafy from a lignescent root, has ascending branches (10 to 25 cm. long), often larger leaves (with blade 1.5 cm. long), and more ample flowering panicle. (*E. platyphyllum* Torr.)—Central and southwestern Texas.

++ ++ *Leaves not tomentose, radical.*

13. **E. trichopes** Torr. Glabrous, diffusely much-branched and very slender, the stem rarely inflated: leaves pubescent: bracts very small: involucres minute: pedicels 6 to 12 mm. long: flowers yellowish, pubescent, 1 mm. long: sepals ovate-lanceolate, acute.—Dry ravines and rocky banks along the Rio Grande, from El Paso to the Great Cañon, and rocky places at Howards Springs.

14. **E. Nealleyi** Coulter. Perennial, with woody caudex, the loosely branching stems as well as pedicels and flowers glabrous: leaves more or less broadly spatulate, tapering into a long petiole, villous-pubescent on both surfaces, 5 to 7.5 cm. long: involucres few and long-pedunculate: flowers greenish, occasionally with a pinkish tint: sepals lanceolate to ovate, the inner ones usually shorter and broader.—Near Pecos City.

* * * *Involucres cylindric-turbinate, more or less strongly 5 or 6-nerved and often becoming ribbed or angled, with as many short erect teeth, sessile in heads or clusters or scattered in cymes or along virgate panicled branches: bracts ternate, connate at base, more or less rigid: flowers not attenuate at base.*

\+ *Leaves at base.*

15. **E. Havardi** Watson. Perennial, with very short branching caudex: leaves oblong-lanceolate, acute, acuminate, petioled, densely tomentose beneath and silky above, 2.5 to 4 cm. long: peduncle slender, 3 to 6 dm. high, glabrous, sparingly dichotomous above: involucres solitary, long pedicellate, broadly turbinate, glabrate, 2 mm. (or more) long: calyx densely silky, with narrow acute lanceolate segments, 2 mm. long, yellowish.—Western Texas, in the Chenate and Bofecillos mountains, and at Camp Charlotte (Ixion County).

\+ \+ *Stems leafy.*

++ *Flowers glabrous: leaves white-tomentose beneath.*

16. **E. microthecum** Nutt. Low and diffuse perennial, 1 to 3 dm. high, more or less white-tomentose: leaves oblanceolate to linear, 1.5 to 5 cm. long, revolute, becoming glabrate above: involucres mostly solitary in a repeatedly di- or trichoto-

mous corymb-like cyme: flowers 1 to 2 mm. long, from nearly white to deep rose color or rarely yellow.—Mountains and high plains of northwestern Texas. Var. EFFUSUM T. & G. has very diffuse and repeatedly divided inflorescence.—Northwestern Texas, but more comm on eastward.

17. **E. Wrightii** Torr. White-tomentose and leafy perennial, much-branched and slender: leaves oblong to linear-lanceolate, acute, 2.5 cm. (or less) long: bracts small, triangular: involucres solitary and sessile, loosely spicate along the ascending branches, 2 to 3 mm. lo ng, with rigid acute teeth: flowers white or rose color, 2 to 3 mm. long: achene sca brous above, acute at base.—From the mountains and cañons of southwestern Texas to Arizona.

18. **E. polycladon** Benth. Slender annual, 6 to 9 dm. high, white-tomentose throughout, the stem leafy throughout: panicle rather strict and elongated: leaves oblong-lanceolate: bractlets villous, with very long delicate hairs: calyx glabrous, with segments attenua te at base, the outer fan-shaped, the inner obovate-spatulate.—From southwestern Te xas to Arizona and Chihuahua.

++ ++ *Flowers not glabrous.*

19. **E. coriaceum** Coult. & Fisher. Stout subtomentose perennial, about 6 dm. high: stem simple, woody below, naked above: leaves oblong-lanceolate, 7 to 10 cm. long, tapering below to a short clasping petiole, strongly coriaceous, densely tomentose beneath, silky-villous above: inflorescence 2 or 3 times di- or trichotomous, with spreading branches: involucre solitary, sessile, coriaceous, 5 to 7 mm. long, with 5 short and round teeth: flowers yellowish, long-pediceled, densely silky-villous, 7 to 8 mm. long: calyx-segments similar, oblong-lanceolate, thickish, with rugose margins (*E. Texanum* Coult. & Fish., not Scheele.)—Western Texas (*Nealley*). This species seems unlike all others in the very coriaceous texture of the leaves and inflorescence, in the very thick involucre strongly nerved within and the lobes terminated by a short mucro, and the central involucres pedicellate.

2. POLYGONUM L. (KNOTWEED.)

Ours all herbaceous, flowering through the late summer and early autumn, with small and perfect flowers in axillary or spicate or racemose fascicles, mostly 5-parted calyx, with nearly distinct and often petal-like divisions, 5 to 8 stamens, 2 or 3 styles, and lenticular or 3-angled achenes.

* *Flowers in axillary fascicles or spicate with foliaceous bracts: leaves and bracts jointed upon a very short petiole adnate to the short sheath of the 2-lobed or lacerate scarious stipules: stems striate: calyx 5 or 6-parted, more or less herbaceous: stamens 3 to 8, the 3 inner filaments broad at base: styles 3: glabrous annuals.*

+ *Leafy throughout.*

1. **P. aviculare** L. Slender, mostly prostrate or ascending, bluish-green: leaves oblong to lanceolate, 6 to 20 mm. long, usually acute: sepals scarcely 1 mm. long, green with pinkish margins: stamens 8 (rarely 5): achene dull and minutely granular, mostly included.—Throughout Texas.

2. **P. lacerum** HBK. Procumbent and diffuse: sheaths lacerate; leaves linear, somewhat fleshy: axils 2-flowered.—Maronillas Creek, western Texas (*Harvard*). A poorly known species of the Andes found in western Texas (*fide* John K. Small).

3. **P. erectum** L. Stouter, erect or ascending, 3 to 6 dm. high, yellowish: leaves oblong or oval, 1.5 to 6 mm. long, usually obtuse: flowers mostly 3 mm. long, often yellowish, on more or less exserted pedicels: stamens 5 or 6: achene dull, included. (*P. aviculare*, var. *erectum* Roth.)—Extending into northwestern Texas. Usually associated with No. 1.

Leaves much reduced above and bract-like.

4. **P. ramossissimum** Michx. Erect or ascending, 6 to 12 dm. high, yellowish-green: leaves lanceolate to linear, 2.5 to 6 cm. long, acute: flowers and achenes as in the last, but sepals more frequently 6, the stamens 3 to 6, and the achene mostly smooth and shining.—Sandy shores and banks of streams, extending from Texas to the far north and west.

5. **P. tenue** Michx. Stem slender, angled, erect (1.5 to 4.5 dm. high), slightly scabrous at the nodes: leaves narrowly linear to lanceolate (2.5 to 5 cm. long), 3-nerved, acute at each end and often cuspidate, the margins somewhat scabrous and at length revolute: flowers often solitary, nearly sessile: stamens 8: achene ovate, included, black and shining.—From El Paso to central Texas.

6. **P. camporum** Meisn. Stem round, erect or ascending, 6 to 9 dm. high: leaves deciduous, linear to oblong, usually short: pedicels slender, exserted from the scarious sheaths: stamens 8.—From the upper Pecos to the lower Rio Grande.

* * *Flowers in dense spikes, with small scarious bracts: leaves not jointed on the petiole; sheaths cylindrical, truncate, entire, naked or ciliate-fringed or margined: calyx colored, 5-parted, appressed to the fruit: stamens 4 to 8; filaments filiform.*

– *Sheaths and bracts not ciliate or fringed: sepals not punctate: styles 2-cleft (often 3-cleft in No. 11).*

7. **P. lapathifolium** L. Annual, branching, 3 to 12 dm. high, glabrous or the peduncles often minutely glandular: leaves lanceolate, attenuate upward from near the cuneate base and acuminate, somewhat scabrous with short appressed hairs on the midrib and margin, or rarely floccose-tomentose beneath; sheaths and bracts rarely somewhat ciliolate: spikes oblong to linear (1.5 to 5 cm. long), dense, erect or nearly so: flowers white or pale rose-color: stamens 6: achene ovate, rarely 2 mm. broad.—Wet places along the Pecos and the Rio Grande. A very variable species. Var. INCARNATUM Watson has leaves often large (1.5 to 3 dm. long, 2.5 to 8 cm. broad), and nodding spikes more slender and elongated (5 to 10 cm. long).—Central and northern Texas.

8. **P. Pennsylvanicum** L. A similar species, but the branches above and especially the peduncles beset with stipitate glands: flowers larger and often bright rose-color, in short erect spikes, often on exserted pedicels: stamens usually 8: achene nearly orbicular, over 2 mm. broad.—Moist soils, from the upper Pecos and the lower Rio Grande to central Texas.

9. **P. amphibium** L. Perennial, aquatic or rooting in the mud, stout and glabrous or nearly so, not branching above the rooting base: leaves usually floating, thick, smooth and shining above, mostly long-petioled, elliptical to oblong or sometimes lanceolate, acutish, cuneate or cordate at base (5 to 12.5 cm. long): spikes terminal, dense, ovate or oblong (1 to 2.5 cm. long): flowers bright rose color (3 to 6 mm. long): the 5 stamens and style exserted.—From the upper Pecos to the lower Rio Grande.

10. **P. emersum** (Michx.) Britton. Perennial, in muddy or dry places, decumbent or suberect, scabrous with short appressed or glandular hairs: leaves thinner, rather broadly lanceolate, narrowly acuminate (10 to 13 cm. long): spikes more elongated (2.5 to 7.5 cm. long), often in pairs: flowers and fruit nearly as in the last. (*P. amphibium*, var. *emersum* Michx. *P. Muhlenbergii* Watson.)—Western Texas.

11. **P. densiflorum** Meisn. Stem stout, 6 to 12 dm. high, branching above: leaves lanceolate or oblong-lanceolate (15 to 25 cm. long), tapering at the summit, but rather obtuse, rough on the margins and veins: spikes racemed or somewhat panicled, linear (5 to 10 cm. long), erect, densely white-flowered, the peduncles minutely glandular: bracts obliquely truncate: stamens usually 6: achene round-ovate, black and shining, with convex sides. (Incl. most of *P. glabrum* of authors, not Willd.)—Extending from the Gulf States through Texas to tropical America.

+ + Sheaths and bracts bristly ciliate or sheaths foliaceously margined.

++ Sepals not punctate: style 2-cleft, and achene somewhat flattened (except in No. 14).

12. **P. orientale** L. (PRINCE'S FEATHER.) Tall (9 to 15 dm. high) branching soft-hairy annual: leaves ovate or oblong, pointed, distinctly petioled: sheaths ciliate or often with an abrupt spreading border: flowers large, bright rose-purple, in densely cylindrical nodding spikes: stamens 7.—Escaped from gardens.

13. **P. Persicaria** L. (LADY'S THUMB.) Nearly smooth and glabrous, 3 to 5 dm. high: sheaths more or less bristly ciliate; leaves lanceolate, pointed, roughish, often marked with a dark triangular or lunate spot near the middle: spikes ovoid or oblong, dense, erect, on smooth (or at least not glandular) peduncles: stamens mostly 6: styles half 2 or 3-cleft: achene gibbous-flattened or sometimes triangular, smooth and shining.—Wet places, from the Limpia to central Texas.

14. **P. persicarioides** HBK. Stem glabrous: sheaths ciliolate: leaves subsessile, lanceolate, 8 to 11 cm. long, glabrous except margins and veins: spikes racemose-paniculate, densely flowered, linear-oblong, attenuate (2.5 to 3 cm. long) upon glabrous peduncles: bracts subimbricate, the lower short ciliate: pedicels finally exserted: calyx 5-parted, nerveless and glandless: stamens 7 or 8: style 2 or 3-cleft, subincluded: achene small (hardly 2 mm. long), biconvex or 3-angled, very smooth and shining.—Extending from Industry (Austin County) to central Mexico.

++ + Sepals conspicuously dotted and leaves punctate (except No. 16), with acrid juice: style mostly 3-parted and achene 3-angular: sheaths bristly fringed.

15. **P. setaceum** Baldw. Erect perennial (6 to 9 dm. high), sparingly branched, smooth below, the upper portion (as well as the lanceolate leaves) roughened with appressed hairs: leaves 5 to 10 cm. long; stipules appressed-hirsute, copiously fringed with long bristles: spikes filiform (2.5 to 5 cm. long), in pairs, loosely flowered: flowers white, glandless: stamens 8.—Extending from the Gulf States into Texas.

16. **P. hydropiperoides** Michx. (MILD WATER-PEPPER). Perennial, not acrid: stem smooth (3 to 9 dm. high), branching, the narrow sheaths hairy: leaves narrowly lanceolate, sometimes oblong: spikes erect, slender, sometimes filiform, often interrupted at base (2.5 to 6.5 cm. long): flowers small, flesh-colored or nearly white: sepals not dotted: stamens 8: achene sharply 3-angled, smooth and shining.—Wet places and in shallow waters, central and southern Texas.

17. **P. Hydropiper** L. (COMMON SMARTWEED or WATER-PEPPER). Annual, 3 to 6 dm. high, smooth: leaves narrowly to linear-lanceolate: spikes nodding, usually short or interrupted: flowers mostly greenish: stamens 6: styles 2 or 3-parted: achenes dull, minutely striate.—Moist and wet grounds. Apparently introduced in the east, and southwestward as far as northwest Texas and Arizona; but indigenous northward and westward.

18. **P. punctatum** Ell. (WATER SMARTWEED). Perennial, nearly smooth: stems rooting at the decumbent base, 6 to 15 dm. long, leaves 5 to 10 dm. long, longer than the last, taper-pointed: spikes erect: flowers whitish, sometimes flesh-colored: stamens 8: styles mostly 3-parted: achene smooth and shining (*P. acre* HBK., not Lam.).—Wet places from El Paso to central and southern Texas.

+++ Glabrous alpine perennials, with creeping rootstocks and simple stems: flowers in a spike-like raceme: calyx colored, deeply 5-cleft: stamens 8: styles 3, long.

19. **P. bistortoides** Pursh. Stems 3 to 6 dm. high: leaves few, the radical ones on long petioles, oblong-lanceolate to linear, acute at each end; the cauline much reduced, mostly obtuse at base and sessile upon the sheaths, the margin often slightly revolute: flowers rose-colored to white, on slender pedicels, in very dense ovate to oblong spikes, and usually long-pedunculate: stamens and styles exserted: achene smooth and shining. (*P. Bistorta*, var. *oblongifolium* Meisn.)—Meadows and streambanks in the mountains of western Texas.

******** *Twining or climbing: petioled leaves cordate or sagittate: flowers in loose panicles or racemes or in terminal or axillary clusters: calyx green, with colored margins, 5 (rarely 4)-parted: stamens mostly 8: styles or stigmas 3 (2 in No. 20).*

+ Annuals, somewhat climbing by reflexed prickles on the angles of stems and petioles: sepals (pale rose or white) not keeled: bracts chaff-like.

20. **P. arifolium** L. (HALBERD-LEAVED TEAR-THUMB.) Stem grooved-angled: leaves halberd-shaped, taper-pointed, long-petioled: flowers somewhat racemed (few): peduncles glandular-bristly: calyx often 4-parted: stamens 6: styles 2, very short: achene lenticular (large).—Low grounds, sparingly introduced.

21. **P. sagittatum** L. (ARROW-LEAVED TEAR-THUMB.) Stem slender, 4-angled, smooth (except angles): leaves sagittate, short-petioled: flowers capitate: pedunsmooth: stamens mostly 8: styles 3, slender: achene sharply 3-angled.—Wet cles places, more common than the last.

+ + Stems not prickly: calyx with the 3 outer divisions keeled, at least in fruit: flowers in loose corymbose or panicled racemes: bracts short-sheathing.

22. **P. Convolvulus** L. (BLACK BINDWEED.) Annual, twining or procumbent, low, roughish, the joints naked: leaves halberd-heart-shaped, pointed: flowers in small interrupted corymbose racemes: outer calyx-lobes keeled: achenes smoothish.—Cultivated and waste grounds, throughout the United States and Mexico.

23. **P. scandens** L. (CLIMBING FALSE BUCKWHEAT.) Perennial, smooth: sheaths naked: leaves cordate or slightly halberd-shaped, pointed: racemes interrupted, leafy: the outer calyx-lobes strongly keeled and winged in fruit, the wings somewhat crenate, but often one or all three wanting: achene over 3 mm. long, smooth and shining. (*P. dumetorum*, var. *scandens* Gray.)—Moist thickets, extending from the Atlantic States into Texas.

24. **P. cristatum** Engelm. & Gray. Leaves subcordate or truncate at base, triangular, acuminate, with scabrous margin: flowers glomerate in the axils of leaves or loosely disposed in leafy spikes: outer calyx-lobes winged in fruit, the wings crenately incised: achene small (2 mm.) and shining.—Near Industry (*Lindheimer*); also collected in South Carolina by *Ravenel*.

3. OXYRIA Hill. (MOUNTAIN SORREL.)

Low alpine perennial, with round-reniform and long-petioled leaves chiefly from the root, obliquely truncate sheaths, small greenish flowers clustered in panicled racemes on a slender scape, herbaceous calyx of 4 sepals unchanged in fruit, the outer smaller and spreading, but the inner broader and erect, 6 stamens, 2 sessile and tufted stigmas, and the thin lenticular achene (surrounded by a broad veiny wing) flattened contrary to the wing.

1. **O. digyna** Hill. Rather stout and fleshy, 1 to 4.5 dm. high, glabrous: leaves notched at the end: flowers in scarious-bracted fascicles, on short capillary pedicels: sepals often reddish: fruit orbicular.—At high altitudes, in cold and wet places among the rocks.

4. RUMEX L. (DOCK.)

Coarse herbs, with small and homely (mostly green) flowers crowded and commonly whorled in paniculate racemes, somewhat sheathing petioles, 3 outer sepals herbaceous and spreading in fruit, 3 inner ones somewhat colored and becoming reticulated (forming the *valves*) in fruit, 6 stamens, and 3 tufted stigmas.

* *Diœcious: valves without dorsal callosity, not reticulated, not larger than the achene: foliage acid.*

1. **R. Acetosella** L. From low to 5 or 6 dm. high, tufted: leaves rarely 5 cm. long, oblanceolate, acute, the lower mostly hastate with large decurrent rarely 1-toothed auricles, the upper gradually reduced and entire: panicle more or less compound, usually reddish, the filiform ascending branches leafless; pedicels capillary, once or twice as long as the flower, articulated at summit: flower about 1.5 mm. long, the outer sepals granular: achenes four-fifths as broad as long.—Naturalized everywhere. Known as "field-sorrel" or "sheep-sorrel."

* * *Diœcious: valves rather finely reticulated, becoming round-cordate and much larger than the achene: foliage acid: inflorescence with slender leafless branches.*

2. **R. hastatulus** Baldw. Tufted, 3 to 6 dm. high: leaves exceptionally 2.5 by 10 cm., oblong or oblanceolate, obtuse to subacute, some of them hastate with short and often spreading auricles: panicle mostly ample and rather open; pedicels capillary, once or twice as long as the fruit, obscurely articulated below the middle: valves about 4 mm. broad, short-clawed, without callosities, the middle sometimes papillate: achene 1 by 1.5 mm. (*R. Engelmanni* Meisn.)—Sandy bluffs and fields, extending from the Atlantic States into Texas.

* * * *Hermaphrodite or monœcious: valves commonly reticulated, becoming round or elongated and much larger than the achene: leaves only exceptionally acid, never hastate: inflorescence with stouter sometimes leafy branches.*

\+ *Valves at most very minutely erose or low-denticulate.*

\+\+ *Valves large (15 mm. long), mostly rosy, round or broadly ovate, deeply cordate, without callosities: whorls rather remote, but overlapping in fruit: outer sepals at length reflexed: stipular sheaths very large and loose.*

3. **R. hymenosepalus** Torr. (Canaigre). Subsimple, 3 to 9 dm. high, from a cluster of tuberous roots, papillate to glabrous, often red: leaves rather succulent, more or less wavy margined, often 5 by 20 cm or larger, elliptical to oblanceolate, obtuse to very sharply acuminate, the acute base decurrent on the short thick petioles: inflorescence ample, compound, with elongated suberect branches; pedicels slender, about as long as the fruit, somewhat swollen-jointed below the middle: valves flexible, ovate, about 10 by 15 mm., obtuse to subacute, with an open sinus: achene 3 by 5.3 mm.—Dry soil, extending from Texas and Indian Territory westward.

\+ \+ *Valves small or medium sized (not over 10 mm. long), only moderately if at all cordate.*

= *Valves round or very broadly ovate, flexible, low-reticulate: pedicels slender or capillary.*

4. **R. occidentalis** Watson. Mostly 6 to 9 dm. high, erect or abruptly ascending, rather stout, subsimple: leaves somewhat fleshy, glabrous, glossy, bluish green, wavy margined, the lower very large, ovate or mostly oblong-ovate, truncately cordate, the apex rounded to subacute: panicle strict, dense and rosy in fruit, naked or with few small leaves below; whorls somewhat remote but overlapping; pedicels 2 to 3 times as long as the fruit, very obscurely and not swollen-jointed below the middle: valves sometimes rosy, 5 to 6 mm. long (exceptionally 7 by 9 mm.), deltoid-ovate, often only slightly cordate, remotely erose or denticulate, rounded or obtuse at apex without callosities: achene 2 to 2.5 by 4 mm.—Damp or rich soil, in the mountains of Texas (extending from the far north).

5. **R. crispus** L. Erect, rather stout, 6 dm. high, simple, glabrous to slightly papillate: leaves bluish green, the petiole and principal veins papillate, very wavy margined, the lowest ample, elliptical to mostly oblong-lanceolate, rather obtuse, rounded or decurrently acutish at base: flowering branches rather strict, somewhat

leafy; whorls dense and approximated; pedicels about one-half longer than the fruit, swollen-jointed near the base: valves 3 to 5 mm. long, round-ovate, barely cordate, rounded or with a broad blunt acumination, minutely erose or exceptionally broadly dentate below; callosities 3, often rosy, smooth, ovoid, reaching to the middle of the valve: achene 1.5 by 2.5 mm.—Introduced everywhere into cultivated and waste grounds. "Curled dock."

== *Valves triangular-ovate to oblong, sometimes with a contracted apex.*

a. *Pedicels long and slender but rigid, abruptly reflexed near the base then straight: valves rigid, with heavy veins, all of them with elongated wrinkled callosities: glabrous throughout.*

6. **R. verticillatus** L. Erect or quickly ascending (occasionally decumbent), 6 dm. high from a cluster of short conical roots, rather slender, subsimple: leaves not wavy, the lower sometimes 5 by 40 cm., lanceolate or mostly oblong-lanceolate, gradually acute at each end; petioles spongy: inflorescence nearly leafless, with few ascending branches; whorls dense, very remote below; pedicels thrice as long as the fruit, swollen-jointed close to the base, gradually thickened toward the flower: valves 4 by 4 to 5 mm., deltoid to subhastately 3-lobed, more or less cuneate at base; callosities 1 mm. broad and as long as the valve exclusive of its apical lobe: achene 2 by 3.5 mm.—Swamps, extending into Texas from the Atlantic States.

b. *Pedicels shorter, arcuately recurved: valves more flexible and with lighter veins, one or more of them with elongated callosities.*

1. *Stem often glaucous: leaves pale green, lanceolate, minutely crenulate-crisped, not undulate or cordate: inflorescence nearly leafless: glabrous throughout.*

7. **R. altissimus** Wood. Rather slender, 6 to 9 dm. high: leaves as much as 7 by 20 cm., little crenulate, broadly lanceolate to ovate-lanceolate, acute, mostly rounded at base: inflorescence with rather divergent branches, at length congested; whorls dense, approximate; pedicels rather slender, about as long as the fruit, swollen-jointed toward or near the base: valves 4 by 5 mm., deltoid, subacute; callosities 3 (occasionally one or none), white, wrinkled and pitted: achene 1.8 by 3 mm.—Rich soil, especially near brooks, extending from the Northern States into Texas.

8. **R. salicifolius** Weinm. Resembling the last, but more tufted and ascending: leaves rarely over 2.5 by 15 cm., lanceolate, often falcate, acute at both ends: pedicels scarcely equalling the fruit or a few in each cluster longer, jointed near the base: valves 2 to 3 by 4 to 5 mm., triangular-ovate, acute, more delicately veined; callosities variable in number, smooth or mostly pitted, often nearly as long as the valve, 1 mm. or more broad, leaving typically a very narrow margin on each side: achene 1.3 by 1.7 to 2.5 mm.--Extending to the mountains of western Texas from the far north.

2. *Not glaucous: leaves mostly darker green, the lower broadly orate or widest above the middle, undulate, sometimes cordate or abruptly rounded at base: inflorescence lax.*

9. **R. Berlandieri** Meisn. Erect, 6 to 9 dm. high, glabrous to somewhat papillate: stem rather stout and succulent, mostly reddish, subsimple, zigzag above: leaves becoming 4 by 20 cm., spatulate to oblanceolate, obtuse: panicles terminal and axillary, leafless except for the main axis; whorls dense, remote except above; pedicels rather stout, swollen-jointed below the middle: valves 2.5 to 3 by 3 to 4 mm., subtriangular, erose or mostly with 3 or 4 very evident teeth on each side towards the base; callosities mostly 3, oblong, wrinkled on the sides below, unequal, the larger (.7 mm. wide) extending beyond the middle of the valve: achene 1 by 2.3 mm.—From Arizona and New Mexico through Texas to Mexico.

++ *Valves very prominently toothed.*

10. **R. obtusifolius** L. Erect, 6 to 9 dm. high: stem usually and sometimes strongly papillate: leaves somewhat undulate, ample or the lowest very large, broadly ovate, cordate, frequently acute, the often purple veins papillate, especially beneath: flowering branches suberect, sparingly leafy below: lower whorls loose and rather remote; pedicels slender, about twice as long as the fruit, swollen-jointed toward the base: valves flexible, not very heavily veined, 2 to 3 by 4 to 5 mm. ovate-oblong, with 3 to 5 thin triangular teeth on each side; callosities smooth, ovoid, scarcely reaching the middle of the valve, the largest one about 1 mm. broad, the other two usually very small: achene 1.3 by 2.2 mm.—Introduced everywhere in the east, and extending into Texas.

PODOSTEMACEÆ. (River-weed family.)

Aquatics, growing on stones in running water, some with the aspect of sea-weeds, others of mosses or liverworts, with minute naked flowers bursting from a spathe-like involucre and producing a 2 or 3-celled many-seeded ribbed pod.

1. PODOSTEMON Michx.

Submerged plants with 2-ranked leaves, nearly sessile solitary flowers, 2 stamens (with 2-celled anthers) borne on the side of the stalk of the ovary with their long filaments united for more than half their length, 2 short sterile filaments (one on each side), 2 subulate stigmas, 8-ribbed 2-celled 2-valved pedicellate pod, and very many minute seeds on a thick central placenta.

1. **P. ceratophyllus** Michx. A small olive-green plant of firm texture, resembling a seaweed, attached by fleshy disks: leaves rigid or horny, dilated into a sheathing base, mostly forked into filiform linear lobes.—Not rare in shallow waters, extending into eastern Texas from the Atlantic States.

ARISTOLOCHIEÆ. (Birthwort Family.)

Twining shrubs or low herbs, with petiolate mostly cordate entire leaves, perfect flowers, conspicuous lurid calyx valvate in the bud and coherent (at least at base) with the 5 or 6-celled ovary which forms a many-seeded 5 or 6-celled pod or berry in fruit, 5 stamens more or less united with the style, and adnate extrorse anthers.

1. ARISTOLOCHIA L. (Birthwort.)

Perennial herbaceous or frutescent somewhat climbing plants, with alternate leaves, solitary axillary flowers, unilabiate calyx-limb, 5 stamens (the sessile anthers wholly adnate to the short and fleshy 5-lobed or angled style), a 5-celled pod, and very flat seeds.

1. **A. brevipes** Benth. Suffruticose, low, hirsute pubescent: stem branching from the base, with simple slender and diffuse branches: leaves small, reniform-cordate or subhastate-cordate, very obtuse, with rounded divergent auricles and short petioles: flowers small, short-pedunculate; bracts cordate: calyx-tube broadly arcuate, the limb lanceolate and obtuse: seed obcordate, punctate.—Chenate mountains; rare.

2. **A. longifolia** Engelm. & Gray. Stems low, ascending, densely pubescent, with elongated slender spreading branches and short internodes: leaves mostly linear-elongated (few oblong-lanceolate), all with base and apex acute, scarcely pubescent above, glabrate below, short petioled: flowers elongated, short-pedunculate; bracts linear-lanceolate: ovary densely white-villous: calyx-tube more or less arcuate, the limb very long, lanceolate and acute.—In sandy alluvial deposits of the Rio Grande, near and below Eagle Pass.

PIPERACEÆ. (Pepper Family.)

Herbs, with jointed stems, alternate entire leaves and perfect spicate flowers entirely destitute of floral envelopes, with 1 to 5 (ours 1) separate or united ovaries.

1. HOUTTUYNIA Thunb.

Perennial aquatic stoloniferous herb, with thick pungently flavored root, subcoriaceous and pellucid-punctate leaves (radical and petiolate), flowers crowded in a simple conical spadix which is surrounded by a 5 to 8-leaved persistent and colored involucre (each flower subtended by a free colored bract), 6 to 8 free epigynous stamens, 3 or 4 spreading stigmas, and a dehiscent pod.

1. **H. Californica** B. & H. Stem simple, erect, 5 to 15 cm. high, puberulent or somewhat pilose, with a single broad clasping leaf in the middle, and an axillary branchlet reduced to one or more slender-petioled leaves: radical leaves oblong-oval, cordate at base, 2.5 to 15 cm. long (equalling the petiole), glabrous; involucral leaves white, obovate-oblong: pod with about 6 round punctulate seeds. (*Anemopsis Californica* Hook.)—From Texas, along the Rio Grande, to California.

LAURINEÆ. (Laurel Family.)

Aromatic trees or shrubs, with alternate simple leaves mostly marked with pellucid dots, clustered flowers having a regular calyx of 4 to 6 colored sepals which are imbricated in 2 rows in the bud and free from the 1-celled and 1-ovuled ovary, anthers opening by 2 or 4 uplifted valves, a single style, and fruit a 1-seeded berry or drupe.

* Flowers perfect, panicled: stamens 12, three of them sterile and three with extrorse anthers.

1. **Persea.** Calyx persistent: anthers 4-celled: evergreen.

* * Flowers diœcious or nearly so: stamens in the sterile flowers 9: leaves deciduous.

2. **Sassafras.** Flowers in corymb- or umbel-like racemes: anthers 4-celled, 4-valved.
3. **Benzoin.** Flowers in umbel-like clusters: anthers 2-celled, 2-valved.

1. PERSEA Gærtn. (Alligator pear.)

Trees with persistent entire leaves, small panicled flowers, 6-parted calyx which is persistent at the base of the berry-like fruit, 12 stamens in 4 rows, the 3 of the innermost row sterile and gland-like, the rest bearing 4-celled anthers (*i. e.*, with each proper cell divided transversely into two) which open by as many uplifted valves, and anthers of 3 stamens turned outwards (the others introrse).

1. **P. Borbonia** (L.) Spreng. (RED BAY.) A small tree, hoary with fine down (at least when young): leaves oblong, pale, soon smooth above: peduncle bearing few flowers in a close cluster: sepals downy, the outer shorter: berries dark blue, on a red stalk. (*Laurus Barbonia* L. *P. Carolinensis* Nees.)—Swamps, throughout the Gulf States, and extending to Trinity River, Texas.

2. SASSAFRAS Nees.

Trees, with spicy aromatic bark, very mucilaginous twigs and foliage greenish-yellow naked diœcious flowers (appearing with the leaves) which are involucrate with scaly bracts, 6-parted spreading calyx, sterile flowers containing 9 stamens inserted on the base of the calyx in 3 rows (3 inner with a pair of stalked glands at the base of each), fertile flowers containing 6 short rudiments of stamens and an ovoid ovary which ripens into a blue drupe supported on a club-shaped and rather fleshy pedicel.

1. **S. officinale** Nees. Tree 4 to 30 m. high, with yellowish-green twigs: leaves ovate, entire or some of them 3-lobed, soon glabrous.—Extending from the central and southern states to the Valley of the Brazos, Texas.

3. BENZOIN Nees. (WILD ALLSPICE. FEVER BUSH.)

Shrubs, with honey-yellow polygamo-diœcious flowers in almost sessile lateral umbel-like clusters (appearing before the leaves) composed of smaller clusters each of which contains 4 to 6 flowers and is surrounded by an involucre of 4 deciduous scales, 6-parted open calyx, sterile flowers with 9 stamens in 3 rows (inner filaments 1 or 2-lobed and glandular at base) and 2-celled 2-valved anthers, fertile flowers with 15 to 18 rudiments of stamens of two forms, and a red obovoid drupe with stalk not thickened. (*Lindera* Thunb.)

1. **B. æstivale** (L.) Nees. (SPICE BUSH.) Nearly smooth, 18 to 45 dm. high: leaves oblong-obovate, pale underneath. (*Laurus æstivalis* L. *B. odoriferum* Nees. *Lindera Benzoin* Blume.)—Damp woods, central Texas.

THYMELÆACEÆ. (MEZEREUM FAMILY.)

Shrubs, with acrid and very tough (not aromatic) bark, entire leaves, and perfect flowers, with a regular simple colored calyx bearing usually twice as many stamens as its lobes and free from the 1-celled and 1-ovuled ovary.

1. DIRCA L. (LEATHERWOOD. MOOSEWOOD.)

A much-branched bush, with jointed branchlets, oval-obovate alternate leaves on very short petioles (the base of which conceals the bud of the next season), light yellow flowers (preceding the leaves) in clusters of 3 or 4 from a bud of as many scales which form an involucre, petal-like truncate tubular-funnelform calyx with wavy or obscurely 4-toothed border, 8 long stamens inserted on the calyx above the middle (alternate ones longer), filiform style, capitate stigma, and a reddish oval drupe.

1. **D. palustris** L. A shrub 6 to 15 dm. high, with white and soft very brittle wood: fibrous bark remarkably tough (used by the Indians for thongs, whence the popular name).—Damp rich woods, extending from the northeastern states into eastern Texas.

LORANTHACEÆ. (MISTLETOE FAMILY.)

Shrubby plants, with coriaceous greenish foliage, parasitic on trees, represented in the north temperate zone chiefly by the mistletoe and its near allies; distinguished from the next family more by the parasitic habit and more reduced flowers than by essential characters.

1. **Razoumofskya.** Anthers a single orbicular cell: berry compressed, fleshy: leaves scale-like (or none), connate.
2. **Phoradendron.** Anthers 2-celled: berry globose, pulpy: leaves foliaceous.

1. RAZOUMOFSKYA Hoffm.

Glabrous diœcious parasites on conifers, with rectangular branches, flowers solitary or several in axillary or terminal spicate or paniculate clusters, mostly compressed calyx (staminate usually 3-parted and pistillate 2-toothed), obicular anther-cell opening by a circular slit, and fruit on a recurved pedicel. (*Arceuthobium* Bieb.)

1. **R. vaginata** (Eichler.) Kuntze. Leafless: stems quadrangular, but branches round, compressed, the articulations bearing a sheath which is 2-toothed at apex: flowers 2, opposite, sessile in the sinus. (*Arceuthobium vaginatum* Eichler. *A. cryptopodum* Eng.)—From Texas to central Mexico.

2. PHORADENDRON Nutt. (FALSE MISTLETOE.)

Yellowish green diœcious parasites on the branches of trees, with jointed much-branched stems, thick and firm persistent leaves (or only scales in their place), short catkin-like jointed axillary spikes (usually several to each short fleshy bract or scale and sunk in the joint), 3 (rarely 2 or 4)-lobed globular calyx, anthers sessile on the base of the calyx-lobes and opening by a pore (except in No. 3), sessile obtuse stigma, and a semi-transparent berry crowned with the persistent sepals.

* *Leaves foliaceous, mostly dilated upward from a narrow base.*

1. **P. flavescens** Nutt. (AMERICAN MISTLETOE.) Stems round, often 3 dm. long: leaves oblanceolate to ovate or orbicular, obtuse, 1.5 to 5 cm. long, yellowish, 3-nerved, at last glabrous: staminate spikes shorter than the leaves, 3 to 7-jointed, with fragrant flowers: berries white, 4 mm. in diameter.—From Eagle Pass to central Texas. Reported on *Ulmus*, *Quercus*, and *Prosopis*. Var. VILLOSUM Eng. has small or middle-sized orbicular to spatulate leaves which are permanently pubescent or tomentose, and slender rather short spikes.—Extending into Texas from the west and northwest.

2. **P. Bolleanum** Eichler. Puberulent, at length glabrous: leaves spatulate to linear, 12 to 24 mm. long, nerveless, obtuse: staminate spikes of two 6 to 12-flowered joints; the fertile a single 2-flowered joint: fruit white, 3 mm. in diameter.—From the Guadalupe mountains to El Paso, on *Juniperus occidentalis*.

* * *Leaves reduced to short mostly connate scales: spikes opposite, mostly few-flowered.*

3. **P. Californicum** Nutt. Pubescent or at last glabrous: branches round, slender, 3 to 5 dm. long: scales broadly ovate, acute, spreading: staminate spikes of 2 or 3 (rarely 5) flower-bearing joints, each with 2 to 6 ovate-subglobose flowers, anther cells opening by a slit; fertile spikes with nearly as many joints which are elongated

in fruit: berries reddish, 4 mm. in diameter.—Near Eagle Pass, on *Algarobia glandulosa*.

4. **P. juniperinum** Engelm. Glabrous, stout, densely branched, 1.5 to 2.5 dm. high: branches round, the ultimate branchlets quadrangular: scales broadly triangular, obtusish, connate or distinct, ciliate: staminate spikes a single 6 to 8-flowered joint; pistillate spike 2-flowered: berry whitish or light red, 3 mm. wide.—Howard Springs, etc., on different species of *Juniperus*.

SANTALACEÆ. (SANDAL-WOOD FAMILY.)

Herbs or shrubs (usually root-parasitic), with angled or striate branches, entire alternate mostly sessile leaves without stipules, mostly perfect flowers with 3 to 5-cleft perianth adherent to the 1-celled 2 to 4-ovuled ovary, which becomes an indehiscent 1-seeded usually nut-like fruit, 3 to 5 stamens opposite the perianth lobes and at the edge of an epigynous often lobed disk, and a 2 to 5-lobed style.

1. COMANDRA Nutt. (BASTARD TOADFLAX.)

Low herbaceous smooth perennials, with subterranean rootstocks, glaucous leaves (lowest scale-like), greenish-white flowers in small terminal or axillary umbellate clusters, a campanulate or urn-shaped perianth with a 5-lobed persistent limb, included stamens, and anthers attached by tufts of hairs at base of calyx lobes.

1. **C. umbellata** Nutt. Stem 1.5 to 3 dm. high, branched, very leafy: leaves oblong, pale (2.5 cm. long): peduncles several and corymbose-clustered at summit: calyx tube conspicuously continued as a neck to the dry globular urn-shaped fruit, the lobes oblong: style slender.—Dry grounds on the tributaries of the Red River. Var. ANGUSTIFOLIA Torr. has all the middle and upper leaves linear and acute.—From western Texas to Arizona and New Mexico.

2. **C. pallida** A. DC. Leaves narrower, more glaucous and acute, linear to narrowly lanceolate (or those on the main stem oblong), all acute or somewhat cuspidate: fruit ovoid, larger (6 to 8 mm. long), sessile on a short stout pedicel.—Doubtless to be found extending into northwestern Texas from the north and west.

EUPHORBIACEÆ. (SPURGE FAMILY.)

Plants usually with milky acrid juice, monœcious or diœcious mostly apetalous (sometimes achlamydeous or occasionally polypetalous) flowers, free and usually 3-celled ovary with a single ovule (sometimes a pair) hanging from the summit of the cell and maturing into a mostly 3-celled elastically dehiscent pod.

* Flowers all without a calyx, included in a cup-shaped calyx-like involucre.

1. **Euphorbia.** Involucre surrounding many staminate flowers (each of a single naked stamen) and one pistillate flower (a 3-lobed pistil).

* * Flowers with a calyx and no involucre.

+ Seeds and ovules two in each cell: flowers axillary.

2. **Reverchonia.** Monœcious or diœcious: stamens 2: leaves alternate.
3. **Phyllanthus.** Monœcious: stamens 3, united: leaves 2-ranked.
4. **Andrachne.** Monœcious: stamens 5 or 6: leaves alternate.

+ + Seeds and ovules one in each cell.

++ Flowers apetalous, in cymose panicles (di- or trichotomous): stamens 10, erect in bud.

5. **Jatropha.** Calyx corolla-like, the staminate salverform: armed with stinging hairs.

++ ++ Flowers in terminal spikes or spike-like racemes: stamens inflexed in bud.

6. **Croton.** Petals usually present in pistillate flowers.

++ ++ ++ Flowers in loose terminal racemes: stamens 10; anthers with united backs.

7. **Manihot.** Apetalous: calyx petal-like.

++ ++ ++ ++ Flowers in axillary spikes or racemes (except No. 11), apetalous (except No. 8): stamens usually 8 or more: anthers erect in bud.

8. **Argythamnia.** Petals and sepals 5: stamens 10 to 15, united: styles bifid, linear.

9. **Bernardia.** Sepals 3 (or 4): stamens 3 to 20: stigmas sessile, very short, 2-lobed: pistillate flowers terminal, sessile.

10. **Acalypha.** Calyx 3 to 5 (usually 4)-parted: stamens mostly 8: fertile flowers in the axils of leafy bracts: stigmas finely dissected.

11. **Ricinus.** Racemes terminal, subpaniculate: calyx 3 to 5-parted: stamens very numerous; filaments repeatedly branched: styles 2-parted.

++ ++ ++ ++ ++ Flowers fasciculate (the pistillate solitary) in axillary clusters.

12. **Ricinella.** Calyx 5-parted: styles 3-parted: leaves in alternate fascicles.

++ ++ ++ ++ ++ ++ Flowers apetalous, in racemes or spikes: stamens 2 or 3: styles simple.

13. **Tragia.** Flowers in lateral or terminal racemes, pistillate below: hirsute or pubescent.

14. **Stillingia.** Flowers in terminal spikes, pistillate below: glabrous.

1. EUPHORBIA L. (SPURGE.)

Herbs or shrubby, with milky acrid juice, monœcious flowers included in a cup-shaped 4 or 5-lobed terminal involucre resembling a calyx or corolla, numerous sterile flowers lining the base of the involucre, single stamen with separate globular anther-cells, the solitary fertile flower soon protruding on a long pedicel from the middle of the involucre, three 2-cleft styles, and a pod separating into three 1-seeded carpels which split elastically in two valves.

A. *Glands of the involucre with petal-like, usually white or rose-colored, margins or appendages.*

§1. *Leaves opposite (rarely verticillate), more or less oblique at base, subsessile or short-petioled; stipules lanceolate to filiform, persistent (except in No. 3): involucres solitary in the forks or in terminal or pseudo-lateral clusters, small, with 4 glands.*—ANISOPHYLLUM.

* *Rigid hirsute (or strigose) perennials, with subsessile entire leaves attenuate at apex, solitary involucres, and the 4 glands furnished with lobed appendages.*

+ *Seeds smooth.*

1. **E. acuta** Engelm. Stems numerous, 1 to 3 dm. high, leafy: leaves ovate-lanceolate, acute, mucronate, 1 to 2 cm. long; stipules filiform: involucre campanulate, axillary, the triangular lobes ciliate: pod white villous: seed subcubical, 2 mm. long.—Stony prairies of western Texas and along the Pecos.

+ + *Seeds wrinkled or rugose.*

2. **E. lata** Engelm. Canescent with appressed pubescence: stems (10 to 30 cm. high) from a woody rootstock, spreading: lower internodes longer than the leaves, uppermost very short: leaves triangular-ovate and abruptly attenuate or oblong and rather

obtuse, with revolute margins; stipules triangular-lanceolate: involucre axillary or terminal, campanulate, hairy, with elongated lobes: pod hirsute: seed oblong-tetragonal, transversely wrinkled.—From the Upper Rio Grande and the Pecos to Eagle Springs and Runnels.

3. **E. angusta** Engelm. Erect (2 to 4 dm. high), with several stems from a large black root and elongated branches: leaves lanceolate-linear (1 to 1.5 cm. long), acute, the margin subrevolute, at last glabrous; stipules subulate, minute, deciduous: involucres solitary in the upper axils, turbinate, the ovate lobes fimbriate: pod white: seed ovate-tetragonal, irregularly and transversely rugose, 1.6 mm. long.—From Tom Green County to San Diego and the Lower Rio Grande.

* * *Erect annuals, with short petioled leaves, cymose involucres, appendiculate glands, and transversely rugose 4-angled seeds.*

4. **E. pilulifera** L. Pubescent: stems (1 to 1.5 dm. high) forking from the base: leaves oblong-ovate (10 to 16 mm. long), oblique, acute at each end, serrate: involucres minute, in dense terminal short-stalked clusters; glands with narrow or obsolete appendages: pod acute-angled, hairy: seeds rugulose.—Extending from the Gulf States through Texas to New Mexico.

5. **E. hypericifolia** L. Smooth throughout, 2 to 3 dm. high, with alternate 2-ranked branches: leaves (1.5 to 2.5 cm. long) lanceolate-oblong, oblique and obtuse or acute at base, equally serrate on both margins; stipules reflexed: involucres in dense lateral long-pedunculate clusters: pods rather acutely angled, smooth: seeds reddish.—Extending from the Gulf States to southwestern Texas and Mexico.

6. **E. Preslii** Guss. Smooth or with scattered hairs, ascending or erect, 3 to 6 dm. high: leaves oblique at the obtuse or slightly cordate base, ovate-oblong or oblong-linear, sometimes falcate, serrate (1.5 to 3.5 cm. long), often with a red spot or red margins; stipules triangular: peduncles longer than the petioles, collected in a loose leafy terminal cyme: appendages entire, larger and white or smaller and sometimes red: pod glabrous, obtusely angled: seeds ovate, obtusely angled, wrinkled as well as tubercled, 1 mm. long, blackish.—From Tom Green County throughout central and southern Texas.

* * * *Low spreading and mostly procumbent plants, with mostly minute and non-attenuate leaves, mostly solitary involucres and 4 (often appendiculate) glands.*

+ *Seeds smooth: leaves entire.*

++ *Glabrous annuals.*

7. **E. polygonifolia** L. Prostrate spreading: leaves oblong-linear, obtuse, mucronate, slightly cordate or obtuse at base, 8 to 16 mm. long; stipules setaceously divided: peduncles in the forks, as long as the petioles: lobes of the involucre longer than the minute non-appendaged glands: pods obtusely angled: seeds ovate, over 2 mm. long.—Dry sandy and rocky places along the Rio Grande from El Paso to the Gulf and north to Gillespie County.

8. **E. petaloidea** Engelm. Stems procumbent or ascending: leaves attenuate to the scarcely oblique base, oblong-linear or linear, retuse or emarginate: involucre campanulate, lobes hairy beneath the glands within, the broadly campanulate appendages conspicuous: peduncles longer than the petioles: seeds reddish, with rounded angles.—Valley of the Pecos and lower Rio Grande.

9. **E. flagelliformis** Engelm. Resembling *E. petaloidea*, but distinguished by the smaller involucre bearing very small and almost naked glands (often less than 4 in number), more numerous stamens (often 25) with much smaller anthers, and the smaller more angular and more pointed grayish seeds. (*E. petaloidea*, var. *flagelliformis* Eng.)—On the Rio Grande near El Paso and northward to southwestern Colorado.

10. **E. zygophylloides** Boiss. Stems erect-spreading (6 dm. high or more), with slender elongated dichotomous branches: leaves linear (12 to 14 mm. long), truncate

and mucronulate at apex, short-petioled from an attenuate base; stipules subulate: involucres campanulate, on long pedicels, the short lobes ciliate; glands suborbicular-concave, with the ovate entire appendages three times as broad: pod somewhat depressed trisulcate: seed globose, subquadrangular (*E. arenaria* Engelm.)—From Tom Green County through central and southern Texas.

11. **E. polyclada** Boiss. Many-stemmed from the base (10 to 15 cm. high), diffuse or ascending, dichotomously branched, with capillary branchlets: leaves short-petioled, oblong or oblong-elliptical (6 mm. long), obtuse and mucronulate, from a scarcely equal rounded base; stipules 2 or 3-parted into subulate divisions: involucres small and turbinate, on long dichotomous pedicels, with the short triangular lobes strongly barbed; glands transversely ovate, entire or obtusely 2 or 3-lobed: seed obscurely triangular.—Texas.

12. **E. serpens** HBK. Stems filiform, prostrate and often rooting: leaves round-ovate, obtuse or cordate at base (only 1 to 3 mm. long); stipules membranaceous, triangular: peduncles much longer than the petioles, at length in loose foliaceous lateral clusters; glands with minute crenulate appendages: pods acutely angled: seeds obtusely quadrangular, 1 mm. long or less.—Rich soils, along the Pecos and lower Rio Grande. Var. FLEXICAULIS (*E. flexicaulis* Scheele. *E. serpens*, var. *radicans* Eng.) has much smaller leaves broadly ovate or ovate-oblong, and stems rooting from the lower side.—From Corpus Christi to Sutherland Springs.

13. **E. cordifolia** Ell. Prostrate, with stems 1.5 to 2 dm. long: leaves pale green, oval or roundish, obliquely truncate or cordate at base; stipules slender, deeply parted into long capillary segments: gland-appendages conspicuous, oblong or roundish, white: pods acutely angled: seeds quadrangular.—Extending from the Gulf States into Texas.

++ ++ *Glabrous perennial.*

14. **E. albomarginata** T. & G. Slender and much branched: leaves suborbicular, subcordate, distinctly petiolate: involucre shorter than the peduncles; glands transversely oval, with an entire or slightly crenate border which is twice as broad as the gland itself: seeds obovate, somewhat rugose transversely, dull, gelatinous when moistened.—Common throughout southern and western Texas.

+ + *Seeds minutely roughened, transversely wrinkled, or pitted.*

++ *Leaves serrate or serrulate: mostly annuals.*

= *Pubescent: involucres mostly racemose.*

15. **E. Serrula** Engelm. Spreading or decumbent: stems 1 to 1.5 dm. high, clothed with long spreading hairs: leaves coarsely and sharply serrate, oblong (often falcate), 6 to 10 mm. long, obtuse, from an obtuse or subcordate strongly oblique base, pilose beneath; stipules lanceolate, laciniate: involucres axillary, the transversely oblong glands with the appendages somewhat broader, obsoletely lobed: pods large, glabrous: seeds acutely quadrangular, minutely tuberculate.—Western Texas and New Mexico.

16. **E. grisea** Engelm. Erect and appressed-pilose: stems (1 to 1.5 dm. high) filiform, subsimple, from an indurated rootstock, with elongated internodes: leaves subsessile from a strongly cordate base, rhombic-triangular, subfalcate (6 to 8 mm. long), the lower smaller, all acutely calcareo-crenulate; stipules subulate, fimbriate: involucres axillary, 2 to 5-glomerate, narrow turbinate, the glabrous lobes fimbriate; glands transversely oblong, reddish, the appendages repand-lobed, glabrous: pods pubescent, obtuse-angled: seeds ovate, obtusely quadrangular, obscurely rugulose.—From Monterey to Matamoras, Mexico, and doubtless to be found on this side of the Rio Grande.

17. **E. stictospora** Engelm. Pubescent and prostrate: stems 1 to 1.5 dm. long: leaves rounded, subcordate, sharply serrate, 4 to 8 mm. long: racemes crowded with very small and slender long-peduncled involucres; glands narrowly appendaged: pods

pubescent, sharply angled: seeds slender, sharply quadrangular, rugose-dotted.—Common in western Texas.

18. **E. humistrata** Engelm. Procumbent, puberulent or hairy: leaves oblong-linear (4 to 10 mm. long), very oblique at base, serrulate towards the apex, sparsely hairy beneath (sometimes with a brown spot above); stipules lanceolate, fimbriate: peduncles rather shorter than the petioles, in dense scarcely foliaceous lateral clusters: involucre cleft on the back, its (red or white) appendages truncate or crenate: pods sharply angled, puberulent: seeds ovate, obtusely angled, minutely roughened (1 mm. long).—Rich soils, extending from the Mississippi States to eastern Texas.

19. **E. maculata** L. Prostrate: stems puberulent or hairy: leaves oblong-linear, very oblique at base, serrulate upward, more or less pubescent or sometimes smoothish (8 to 12 mm. long), usually with a brown-red spot in the center; stipules lanceolate, fimbriate: peduncles as long as the petioles, in dense foliaceous lateral clusters: glands of the small involucre minute, with narrow slighly crenate (usually red) appendages: pods acutely angled, puberulent: seeds ovate (0.8 mm. long), sharply 4-angled, and with about 4 shallow grooves across the concave side.—From the valleys of the Pecos and Rio Grande to central Texas.

20. **E. prostrata** Ait. Prostrate, very diffuse, woolly and villous puberulent: leaves of two sizes (6 to 10 and 4 to 6 mm. long), roundish oval, very obtuse at both ends, denticulate near the apex, sparsely hairy beneath: peduncles crowded in lateral clusters, longer than the very short petioles: involucral appendages obtuse, entire, the lobes pectinate-ciliate: pod acutely angled, woolly: seeds grayish, deeply 5 to 7-grooved.—From Louisiana through Texas to Mexico.

21. **E. adenoptera** Bertol. Annual or perennial prostrate much branched woolly plants, often from a thick indurated base: leaves oblong (5 to 12 mm. long), denticulate and obtuse or acute, strongly oblique at base, short petioled; stipules linear, ciliate: involucres subsessile, solitary or 2 or 3 in a close axillary fascicle; appendages very unequal, rose-colored, the larger semi-ovate, auricled, repand, the smaller scarcely as broad and often obsolete: pod white-hirsute, acutely angled: seeds acute-quadrangular, pinkish, transversely 5 to 7-grooved.—From the Upper Rio Grande to the plains of Chihuahua.

= = *Glabrous: involucres solitary.*

22. **E. serpyllifolia** Pers. Prostrate, spreading: leaves obovate-oblong, narrowed at the very oblique base, sharply serrulate towards the obtuse apex (6 to 12 mm. long), often with a red spot; stipules lanceolate, fimbriate: peduncles as long as the petioles or longer, at length in loose foliaceous lateral clusters: glands of the small involucre with narrow somewhat toothed appendages: pods sharply angled: seeds acutely quadrangular, slightly cross-wrinkled, often pitted, nearly 1.5 mm. long.—Extending from the northern prairie States through Texas to Mexico. Var. CONSANGUINEA Boiss. is somewhat erect, with obtuse sharply serrate leaves, and ovate depressed-punctate seeds. (*E. consanguinea*, *E. subserrata*, *E. notata*, and *E. inequilatera* Engelm).—From Kansas to Texas.

23. **E. glyptosperma** Engelm. Glabrous (or very rarely puberulent), erect and spreading: leaves linear-oblong, mostly falcate, very unequal at base, slightly serrulate towards the obtuse apex (4 to 10 mm. long); stipules lanceolate, setaceously divided: peduncles as long as the petioles, in dense foliaceous lateral clusters: glands of the very small involucre with narrow crenulate appendages: pods sharply angled: seeds sharply quadrangular and with 5 or 6 sharp transverse wrinkles.—From the Guadalupe to the Lower Rio Grande and the Pecos. Var. TENERRIMA Engelm. has much smaller leaves (2 to 6 mm. long, 1 to 2 mm. broad) scarcely crenulate at apex, and minute involucre with the glands scarcely or not at all appendiculate.—On the Rio Grande and the Arkansas.

++ ++ *Leaves entire: mostly annuals.*

= *Glabrous or glabrate.*

24. **E. polycarpa** Benth. Glabrous or somewhat finely pubescent: stems numerous from a perennial at length woody base, prostrate or ascending, 1 to 3 dm. long: leaves round-ovate to oblong, obtuse or acutish, usually slightly cordate at base, 2 to 6 mm. long; stipules minute, triangular to lanceolate, ciliate: involucres mostly solitary in the axils, turbinate-campanulate; glands dark purple, sometimes yellow, the white or rose-colored crenate margin varying from narrow to broad and conspicuous: pod small, with angled lobes: seeds oblong, 4-angled, about 2 mm. long, obscurely rugose (sometimes almost smooth).—From the Chenate mountains to Ringgold. Var. VESTITA Watson, of the Chenate mountains, is hoary and more or less tomentose throughout with short close pubescence.

25. **E. Fendleri** Torr. & Gray. Glabrous, from a slender rootstock: stems delicately filiform, erect or decumbent, dichotomous, much branched (5 to 10 cm. high): leaves ovate, obtuse, rounded at base; stipules subulate: involucres terminal, solitary, turbinate, slightly bearded in the throat, lobes short and fimbriate; glands transversely oblong, with a very narrow obscure appendage: pod somewhat 6-lobed, with obtuse angles: seeds ovate, 4-angled, irregularly punctuate. (*E. rupicola* Scheele, not Boiss.)—Common in western Texas. Var. CHÆTOCALYX Boiss. is taller and with elongated internodes, with ovate lower leaves, oblong-elliptical acute upper ones, and lateral glands with oblong-triangular appendages.—El Paso.

26. **E. revoluta** Engelm. Glabrous: stems erect, filiform, naked below, much dichotomous above the middle, 10 to 12 cm. high: leaves narrowly linear (15 to 24 mm. long) with revolute margins, attenuate below; stipules subulate, entire: involucres very small, uppermost in the forks of the branches and terminal, short, campanulate; glands purple, with a whitish or reddish oblong appendage: pod glabrous: seeds oblong, sharply 4-angled, sparingly and irregularly rugose.—Along the Rio Grande.

= = *Pubescent or villous.*

27. **E. Laredana** Millsp. Prostrate, densely leafy, white-viscid and villous: stems numerous, branching, 6 to 12 cm. long: leaves lanate, very obliquely cordate at base, obtuse, 2 to 5 mm. long; stipules not distinguishable on account of the densely lanate leaves: involucres solitary in the axils, minute, sessile, a snowy mass of white hairs, lobes triangular; glands transversely ovate, brownish green, without appendages: pod glabrous near the base, sharply-angled: seeds pink, acutely 4-angled, strongly marked by 4 to 6 irregular sharp transverse white farinose ridges.—Laredo.

28. **E. villifera** Scheele. Villous with white spreading hairs: stems erect (1 to 2 dm. high), with several filiform reddish stems from the dark base: leaves short-petioled, ovate or ovate-triangular, from a very unequal subcordate base, obtusish, 5 to 6 mm. long; stipules lanceolate, bifid or trifid: involucres solitary in the axils, and in the forks, turbinate-campanulate, with the ovate lobes white-hairy; glands with white or rose appendages twice as long: pod glabrous, depressed, sharply angled: seeds short ovate, 4-angled, more or less obscurely interrupted rugose.—Limpia Cañon, western Texas.

§ 2. *Leares opposite, on short petioles (except No. 30), not oblique, with stipular glands.*—ZYGOPHYLLIDIUM.

* *Stems erect, dichotomous: cymes terminal: involucres with 1, 4, or 5 glands: seeds tuberculate.*

– *Glands five.*

29. **E. hexagona** Nutt. Somewhat hairy (3 dm. or more high), with striate-angled branches: leaves linear-lanceolate, entire: involucre hairy without and within, the lobes short and multifid; glands 5, with green ovate-triangular appendages twice their length: pod smooth, obtuse-angled: seeds ovate, tuberculate.—Extending from the north into Texas (on the Colorado River).

30. **E. bilobata** Engelm. Slender, erect annuals, 2 to 4 dm. high: leaves linear-lanceolate, acute, entire, glabrate; stipular glands obsolete: involucres campanulate, hairy without and within, denticulate; glands obcordate-bilobed, with the white appendages twice longer and triangular acute: pods smooth: seeds ovate, acute-quadrangular, strongly tuberculate.—Extending from southwestern Texas to New Mexico and northern Mexico.

+ + Glands four or one.

31. **E. bifurcata** Engelm. Glabrous: stem erect, dichotomous, over 3 dm. high: leaves ovate or obovate (2.5 cm. long), on slender petioles, sharply serrate; glandular stipules small: involucres long-pedunculate, hairy in the throat, the lobes ovate, fimbriate, multifid; gland solitary, cymbiform, the broad appendages white and transversely emarginate: pod glabrous: seeds unknown.—Moist places, valley of the Limpia.

32. **E. exstipulata** Engelm. Erect-spreading, branched, minutely appressed pubescent (1.5 dm. high): leaves lanceolate or lanceolate-linear (2.5 cm. long), sharply serrate, narrowed to a short petiole; stipular glands very minute: involucres solitary, with triangular-ovate fimbriate lobes; glands 4, ovate subpeltate, with the white dentate appendages twice broader: pod glabrous, obtusely angled: seeds large (2 mm. long), subcubical, verrucose, and with 2 or 3 transverse furrows.—Western Texas.

** * Stems alternately branched: involucres axillary and terminal, with 4 glands: seed strongly sulcate.*

33. **E. Nealleyi** Coult. & Fisher. Densely puberulent throughout: stems slender, erect or ascending (2 to 3 dm. high), branched or simple at the woody base, with few alternate branches above: leaves opposite, linear-lanceolate (2 to 3 cm. long, 1 to 1.5 mm. wide), entire, short-petioled, thickish, acute and cuspidate; glandular stipules minute: involucres solitary, peduncled, turbinate; glands transversely oblong, with large white irregularly dentate-truncate appendages: pod rather depressed, about 3 mm. broad: seeds ovate-triangular, deeply and irregularly transversely sulcate.—Western Texas (*Nealley*). With the general appearance of *E. biformis*, and apparently intermediate between § ZYGOPHYLLIDIUM and § ALECTOROCTONUM.

§ 3. *Erect annuals: uppermost leaves with conspicuous white margins and whorled or opposite, the others scattered, equal at base, entire, sessile; lanceolate deciduous stipules: the 5-lobed involucres in an umbel-like inflorescence, with 5 peltate glands.*—PETALOMA.

34. **E. marginata** Pursh. Stem stout (6 to 9 dm. high), hairy, densely leafy: leaves ovate or oblong, acute, about 3 to 6 cm. long: involucre hairy without and within; glands transversely ovate, with the broad and white appendages entire and thick-margined: pod hairy: seeds ovate, tuberculate.—Throughout the valleys of the Pecos and Rio Grande.

35. **E. bicolor** Engelm. Stems leafy, hirsute: leaves oblong-lanceolate or linear-oblong (about 3 to 4 cm. long), acute, appressed pubescent on both sides; the floral numerous, very long linear-lingulate, with a reddish-white margin: involucres short-pedicellate; glands with appendages pale-red, large, with repand and thickened margin: pod large and lanate: seeds sparsely tubercled.—Rich plains, from Arkansas to Dallas, Tex.

§ 4. *Only the uppermost leaves whorled or opposite: erect perennials, with entire leaves sessile and equal at base, and no stipules: involucres terminal and in the forks of the branches: inflorescence umbellate.*—TITHYMALOPSIS.

36. **E. corollata** L. Glabrous or sometimes sparingly hairy (6 to 9 dm. high): leaves ovate, lanceolate or linear, obtuse or retuse (5 to 6 cm. long): umbel 5 (3 to 7)

-forked, the forks again 2 to 3 (rarely 5)-forked: involucres long-peduncled, with showy white appendages (petal-like), the lobes minute and incurved: pod slender-pedicelled, smooth: seeds thick (2 mm. long or more), ash-colored, slightly uneven.—Extending into Texas from the Atlantic States.

37. **E. Wrightii** Torr. & Gray. Stems herbaceous from a somewhat ligneous base, much branched (3 dm. or more high): leaves narrowly lanceolate-linear (2.5 to 3 cm. long): involucres solitary, pedunculate, mostly terminal, pubescent; glands transversely oblong, with large petaloid broadly obovate denticulate appendages: pod coriaceous, minutely papillose-pubescent: seeds subglobose, glabrous.—From the headwaters of the Colorado to the San Felipe and San Pedro.

§5. *Shrubby: leaves sparse, entire; stipules none: involucres axillary: glands 5, with entire appendages.*—TRICHEROSTIGMA.

38. **E. antisyphilitica** Zucc. Stems ligneous, procumbent, with the Ephedra-like branches erect, subsimple, soon leafless: leaves linear, 16 mm. long, acute, recurved, rigid; the floral scale-like, leathery, triangular, blackish: involucres solitary in the axils, forming a loose terminal spike; glands transversely oblong, with a broader white cucullate subdentate appendage: pod glabrous, large, obtusely angled: seeds white, 4-angled, irregularly wrinkled.—Gravelly and limestone hills of the Rio Grande.

B. *Glands of the involucre without petaloid appendages.*

§ 6. *Involucres in terminal clusters, 4 or 5-lobed, with few cup-shaped glands: erect annuals, with variable leaves, the lower (sometimes the upper) alternate, and the stipules glandular.*—POINSETTIA.

39. **E. dentata** Michx. Erect or ascending (3 dm. high): leaves ovate, lanceolate, or linear, petioled, coarsely toothed (2.5 to 5 cm. long), only the lowest alternate, the upper often paler at base: involucres almost sessile, with 5 oblong dentate lobes, and one or sometimes more short-stalked glands: seeds ovate, sligtly tuberculate.—Valleys of the Pecos and the Rio Grande. Var. RIGIDA Engelm. is lower (1.5 dm. high), with rigid stems, and smaller coriaceous reticulate leaves with revolute margins.—Headwaters of the San Pedro.

40. **E. heterophylla** L. Erect (3 to 9 dm. high), glabrous: leaves alternate, petioled, ovate, fiddled-shaped and sinuate-toothed, or lanceolate or linear and entire, often only those of the branches linear, the upper usually with a red base: involucres about the length of the peduncle, with 5 ovate incised lobes, and a single or few and almost sessile glands: seeds nearly globular, tubercled.—Along the valleys of the Pecos and lower Rio Grande. Var. GRAMINIFOLIA Engelm. has linear-lanceolate often entire leaves more hairy beneath.—Crevices of rocks and dry beds of rivers, from El Paso to Uvalde and Georgetown.

41. **E. cuphosperma** Boiss. Stems slender, strict, scarcely branched: leaves petioled, narrowly linear-lanceolate, acute, subentire, the lower alternate, the others opposite: involucres 3 to 5, corymbose, subsessile, campanulate, with ovate lobes; glands 4, long-stipitate, tubular: seeds subpyramidal, triangular, with a single sulcus, tuberculate. (*E. dentata,* var. *cuphosperma* Eng.)—Western Texas, near the Rio Grande.

42. **E. barbellata** Engelm. Glabrate: stem slender (3 dm. or more high), subsimple: leaves subsessile (5 to 10 cm. long), linear-lanceolate, remotely and sharply dentate or ovate-3-lobed from a long (pilose-barbed) cuneate base, the middle lobe strongly elongated, acute; the floral ovate or elongated from a dilated rose-colored base: flowers in large glomerules: involucres large, subsessile, glabrous; glands single, sessile on the incised-dentate lobes.—From the Rio Grande, near Eagle Pass, to Uvalde.

43. **E. geniculata** Ort. Stems dichotomously corymbose above: leaves (lower) alternate with acuminate base, petiolate, ovate or oblong, acute, entire or obsoletely

dentate, the uppermost long-attenuate, and often paler at base: cymes densely corymbose: involucres short-pedicelled, cylindrical-turbinate, the glabrous lobes oblong lanceolate, 5 to 7-fimbriate-dentate; glands solitary, fleshy, substipitate: seeds blackish, ovate with truncate base, irregularly tuberculate granular.—Along Texan side of the Rio Grande and in northern Mexico.

§ 7. *Involucres in a terminal dichotomous or commonly umbellate inflorescence, 4 or 5-lobed, with as many flat or convex entire or crescent-shaped glands: seeds carunculate: one species ascending or erect, mostly glabrous, and without stipules: mostly annuals.*—TITHYMALUS.

* *Glabrous annual or biennial, with entire opposite and decussate leaves, an umbelliform inflorescence, and short-horned glands.*

44. **E. Lathyris** L. Stems stout, erect (6 to 9 dm. high): leaves thick, linear to oblong, the floral oblong-ovate and heart-shaped: umbel 4-rayed, then forking: seeds ovate, reticulate-rugose.—Introduced into western Texas and New Mexico.

* * *Involucral glands transversely ovate, margin round, not truncate or 2-horned: stem-leaves scattered: inflorescence umbellate.*

+ *Seeds smooth and even.*

45. **E. obtusata** Pursh. Erect annual (6 to 12 dm. high): leaves oblong-spatulate, minutely serrulate, smooth, all obtuse, upper ones cordate at base, floral ones ovate, dilated, barely mucronate: umbel once or twice divided into 3 rays, then into 2: involucre with naked lobes and small stipitate glands: styles distinct, longer than the ovary, erect, 2-cleft to the middle: pod beset with long warts.—Extending into northwestern Texas from the Atlantic States.

+ + *Seeds rugose or recticulated.*

++ *Pod warty.*

46. **E. dictyosperma** F. & M. Glabrous annual: stem erect (2 to 4 dm. high): leaves membranaceous, oblong or obovate-spatulate, smooth, all obtuse and obtusely serrate, the upper ones cordate at base, the floral roundish ovate or obscurely cordate, slightly mucronate: umbels once or twice 3-forked, then 2-forked: involucre with nearly naked lobes and small sessile glands: styles shorter than the ovary, spreading or recurved: seeds delicately reticulated. (*E. Arkansana* Engelm.)—Western and central Texas. Var. MULTICAULIS is mostly biennial, with many erect or ascending leafy stems (1 to 2.5 dm. high) from a woody base, oblanceolate or oblong-spatulate (not membranaceous) leaves with narrow base and serrate above, obovate-lanceolate acute floral leaves, coriaceous pod warty only on the back of the valves, and smaller less reticulated seeds. (*E. multicaulis* Engelm., excl. var. *Mexicana* Engelm.)—Western Texas. (*Pringle*, in 1883.)

++ ++ *Pod smooth.*

47. **E. Helioscopia** L. Stems ascending (1.5 to 3 dm. high), glabrate: leaves all obovate and very rounded or retuse at apex, finely serrate, smooth or a little hairy, those of the stem cuneate: umbel divided into 5 rays, then into 3, or at length simply forked: glands orbicular, stalked: seeds with honeycomb-like reticulation.—Headwaters of the Trinity.

48. **E. Texana** Boiss. Glabrous: stems numerous from the base, erect (1.5 dm. high), branched above, the branches with 2 or 3 rays, mostly dichotomous: leaves obtuse, crenate, from a long attenuate oblong-cuneate base; the floral oblong-elliptical, acutish, subentire: involucre hemispherical, the lobes ovate, retuse, glabrous: styles long, deeply bifid: pods depressed: seeds blackish, globose, with elevated reticulations. (*E. dictyosperma*, var. *leiococca* Engelm.)—Near the Colorado.

* * * *Involucrat glands with margin truncate or retuse or more or less long 2-horned: stem-leaves scattered: inflorescence umbellate.*

– *Seeds furrowed lengthwise or ornamented with longitudinal series of honeycomb-like reticulations.*

49. **E. Peplus** L. Glabrous annual, erect or ascending (1 to 2.5 dm. high): leaves petioled, thin, round-obovate, obtuse or retuse, entire, the upper floral ones sessile and obovate: umbel 3-rayed, then forking: involucre turbinate, with ovate fimbriate lobes; glands long-horned: lobes of the pod 2-wing-crested on the back: seeds ash-colored, ovate subhexagonal, 2-grooved on the inner face, pitted on the back.—In woods on the Mexican side of the Rio Grande and very likely to be found on the Texan side.

50. **E. Peplidion** Engelm. Erect glabrous annual, much branched from the base (1 dm. high): leaves linear-oblanceolate, obtuse or retuse, from a narrow base, the upper oblong-linear: umbels of 3 dichotomous rays, with lanceolate acute bracts: involucre turbinate, the oblong lobes minutely dentate; glands long-horned: styles shortly bifid: pod depressed, not winged: seeds ovate-truncate, subhexagonal, 2-grooved on the inner face, pitted on the back.—Sandy soils of southwestern Texas.

51. **E. tetrapora** Engelm. Erect, glabrous: leaves cuneate, obtuse and mostly retuse or obcordate: umbel trifid: bracts spatulate: involucre with small ovate lobes; the crescent-shaped glands long-horned: pod glabrous: seeds ovate-truncate, the outer smoothish.—Extending into Texas from the Gulf States. Var. BERLANDIERI Boiss. has smaller leaves and seeds with inner face 4 to 6-punctate and outer somewhat irregularly 15 or 16-punctate.—"Near Bejar."

– – *Seeds irregularly pitted or rugose-reticulate.*

52. **E. longicruris** Scheele. Glabrous: stems simple or many from the base: umbels of 2 or 3 bifid rays, subcorymbose: leaves crowded, minute, cuneate-spatulate, obtuse or retuse, with a long attenuate base; the upper obovate, the floral somewhat densely imbricated, transversely oblong, very obtuse: involucres concealed by the floral leaves, with ovate minutely dentate ciliate lobes and long-horned glands: seeds oblong, whitish, deeply many-punctate. (*E. peploides* Nutt.)—From western Texas to Arkansas.

53. **E. commutata** Engelm. Stems branched from a commonly decumbent base (1 to 3 dm. high): leaves thin, obovate, obtuse; the upper all sessile, the upper floral ones roundish-dilated, broader than long: umbel 3-forked: involucre campanulate, with ciliate dentate lobes and long 2-horned glands: pod obtusely angled: seeds ovate, pitted all over (2 mm. long).—Brazos Santiago.

54. **E. Rœmeriana** Scheele. Glabrous: stem slender, erect (1.5 dm. high): umbel 3-rayed, mostly loosely dichotomous: leaves thin, entire or repand: the lower smaller, ovate-orbicular, retuse, long-petioled; the upper obovate-oblong, the floral broad and connate to the middle: involucre turbinate, with short ovate denticulate lobes and semilunar glands with horns scarcely as long as the broad gland: seeds ovate, deeply sulcate-reticulate.—Recorded only as "Texas."

55. **E. campestris** Cham. & Schl. Glabrous and fruticose: branches slender, virgate, densely leafy (naked when older): umbel rays 3 to 5, mostly dichotomous: leaves firm, entire, subpetioled linear (rarely oblong)-lanceolate, acute and mucronate: upper and floral ones ovate or elliptical and obtuse: involucre campanulate, hairy within, the lobes triangular-oblong; glands semilunar, with horns shorter than the broad gland: pod ovate, depressed: seeds ovate, black-punctate.—Limpia cañon.

56. **E. montana** Engelm. Glabrous and glaucous perennial, with many stems ascending from a cylindrical rootstock, densely leafy: leaves thickish, entire, subsessile, ovate, obtuse, rounded at base; the floral reniform, truncate-cordate at base: umbels repeatedly dichotomous; involucre turbinate, roughish within, with oblong-

linear velvety lobes and truncate very short 2-horned glands: styles very short, bifid: pod ovate, scarcely elevated, punctate: seeds oblong, superficially pitted.—Limpia cañon.

+ + + *Seed smooth, dark: smooth perennials with running rootstocks.*

57. **E. chamæsula** Boiss. Glabrous and glaucous perennial, with erect virgate stems branched from the axils: leaves rigid, entire, rounded at the subsessile base, oblong-lanceolate (12 to 18 mm. long), obtuse; the upper linear, mucronulate, those of the umbel ovate-rhomboid, the floral ones ovate with subcordate base: umbel 5-rayed, mostly bifid: involucre turbinate-campanulate, roughish within, with the triangular lobes acute and the short 2-horned glands denticulate between the horns: styles united at base: pods and seeds ovate.—Chenate mountains, western Texas.

58. **E. Cyparissias** L. Stems densely clustered (1.5 to 2.5 dm. high): stem-leaves linear, crowded; the floral ones cordate: umbel many-rayed: flowers yellowish: involucre short campanulate, with ciliate often retuse lobes, and shortly attenuate 2-horned crescent-shaped glands: styles short: pod granular.—Escaped from gardens.

2. REVERCHONIA Gray.

Annual herb, with monœcious and diœcious flowers, staminate ones with 4-parted calyx of subherbaceous spatulate-oblong segments, short distinct filaments, and introrse anthers dehiscent lengthwise, 6-parted pistillate ones, with 6-crenate disk, short thick emarginate-bilobed stigmas, short separate styles, 3-celled ovary, and the 3-celled globose pod with 2 seeds in each cell.

1. **R. arenaria** Gray. Glabrous with spreading branches (4 to 5 dm. high): leaves alternate, short-petioled, oblong or narrow, entire, 3.5 cm. long; stipules broadly subulate, scarious: pistillate flowers short-pedicelled, either solitary in the axils, or in monœcious plants solitary in a staminate fascicle: perianth greenish, at length purplish.—Near Dallas.

3. PHYLLANTHUS L.

Low plants, with 2-ranked alternate leaves, small stipules, monœcious axillary flowers, usually 5 or 6-parted calyx, no petals, mostly 3 (often united) stamens erect in the bud, and the depressed pod with each carpel 2-valved and 2-seeded (seeds not carunculate).

1. **P. Carolinensis** Walt. Slender and branched, scarcely 3 dm. high: leaves obovate or oval (1.5 to 2.5 cm. long), short-petioled: flowers commonly 2 in each axil, almost sessile, one staminate, the other pistillate: calyx 6-parted: stamens 3: styles 3, each 2-cleft: glands of the disk in the fertile flowers united into a cup: pod globose, smooth: seed striped with 6 lines of minutely raised points.—Common in southwestern Texas.

2. **P. polygonoides** Spreng. Suffrutescent (1.5 dm. high), with subsimple erect scabrous branches: leaves elliptical, smooth, short-petioled, very obtuse, 5 to 8 mm. long, with white subulate stipules; flowers 2 or 3 in the axils: calyx-lobes oblong-obovate, with white margins: glands free, oblong: staminеal column shortly trifid: styles slender, with the lobes spreading and capitate at tip: pod globose: seed irregular, punctate warty.—Dry sandy and rocky places along the Rio Grande from El Paso to the Gulf and the center of the State.

3. **P. abnormis** Baill. Scarcely 1.5 dm. high, with woody base and flexuous stems: branches with 15 to 20 oblong-elliptical leaves rounded at apex (5 to 8 mm. long):

flowers 2 or 3 in the axils: calyx-lobes (pistillate) ciliptical, obtuse, white-margined: glands 3, strap-shaped or 2-parted: styles 2-lobed: pod small: seeds smooth, slightly ribbed lengthwise.—Texas.

4. **P. lathyroides,** var. **commutatus** Muell. Branches round filiform: leaves dense, oblong-ovate, subacuminate, oblique at base, more or less glaucous, 7 to 8 mm. long: filaments united in a slender column, shortly trifid at apex.—Southwestern Texas and Mexico.

4. ANDRACHNE *L.*

Low and shrubby plants, with rather virgate spreading and leafy branches, alternate entire stipulate leaves, monœcious axillary long-pedicelled flowers, 5 or 6-lobed calyx, rather distinct petals, 5 or 6 free stamens with cleft anthers, 3 styles (united below) with capitate stigmas, 3-celled substipitate pod, and rugose ecarunculate seeds.

1. **A. phyllanthoides** (Nutt.) Branches terete, slender and glabrous: leaves 12 to 17 mm. long, 10 to 15 mm. broad, obovate, membranaceous, glabrous, little longer than the internodes; stipules ovate-lanceolate, pilose: flowers on glabrous capillary pedicels (1 cm. long): calyx-lobes oblong-obovate: petals of the staminate flowers narrowly obovate and 3 to 5-toothed, of the pistillate minute and entire. (*Lepidanthus phyllanthoides* Nutt. *A. Ræmeriana* Muell.)—Extending into Texas from Arkansas and Indian Territory.

2. **A. Reverchoni.** More or less hirsute, with 2 or 3 very slender stems (3 to 6 dm. high) from a thick base, densely leafy: leaves thick, pale, orbicular (12 to 16 mm. in diameter), twice the length of the internodes, usually emarginate, subcordate at base, hirsute beneath (and above on midrib); stipules ovate-lanceolate, ciliate: calyx-lobes obovate: petals of the pistillate flowers minute and entire, of the staminate oblong-obvate and slightly dentate.—Rocky prairies, Mustang Creek, Johnson County, *Reverchon,* distributed as *A. Ræmeriana.* May. According to description the resemblance is close to *A. Telephioides,* var. *rotundifolia* Muell, of the eastern Mediterranean region.

5. JATROPHA *L.*

Perennial herbaceous or shrubby plants, with alternate mostly long-petioled palmately veined stipulate leaves, monœcious flowers in terminal open forking cymes, corolla-like calyx (staminate 5-lobed, pistillate 4-lobed), corolla of 5 distinct or apparently united petals or none, glands of the disk opposite the calyx-lobes, 10 to 30 stamens in two or more whorls with filaments monadelphous at base, 3 styles (united below) with summits once or twice forked, and the 3-celled pod (separating into 3 two-valved carpels) with 3 carunculate seeds.

* *Petals present: flowers fasciculate.*

1. **J. spathulata** Muell. Erect and shrubby: leaves subsessile, subfasciculate, narrow: flowers in numerous cushions of many scale-like bracts: staminate calyx with lanceolate-ovate subacute lobes, pistillate with lanceolate acuminate lobes: petals evolute, lanceolate, obtuse, united beyond the middle: ovary acute: styles thick, unequally 2-lobed, united into a column.—San Diego. Var. SESSILIFLORA Muell. has linear to obovate-spatulate obtuse and emarginate to acute leaves (2.5 to 5 cm. long), and white flowers, the staminate being sessile or subsessile.—Common on the gravelly bluffs of the Rio Grande, and the ravines and mountains of western Texas.

2. **J. macrorhiza** Benth. Perennial: stems about 3 dm. high, from a thick fleshy rootstock, subsimple, with the inflorescence and nerves of the leaves pubescent or

puberulent: leaves 12 to 15 cm. broad and long, subcordate at base, with 5 lobes broader than long and 3 longer than broad, the lobes ovate or lanceolate, acute, setaceous; stipules setaceous, 3 to 5-parted: cymes subsessile, few-flowered; bracts lanceolate-subulate, the lower setaceous-laciniate, the others entire: calyx-lobes (1 cm. long) narrowly elongated, laciniate: filaments 8 to 10, with short anthers: fruit pubescent, 12 mm. long: seeds with the elongated caruncle much laciniate.—From southwestern Texas to Central Mexico.

3. **J. multifida** L. Arborescent or shrubby, 3 to 6 m. high, glabrous: branches strong, with leafy ends: leaves long-petioled, palmately many-parted (usually 11), 12 to 15 cm. long, the divisions 1 to 3-lobed; stipules setaceous, many-parted: cymes corymb-like; bracts triangular-ovate, acute, entire: calyx-lobes (4 to 7 mm. long) ovate, obtuse and entire: petals glabrous, indurated at base: filaments almost free, scarcely equaling the anthers: ovary triangular, glabrous.—From southwestern Texas to Central Mexico.

4. **J. Berlandieri** Torr. Glabrous: stems about 3 dm. high, from a large oblong starchy root: leaves long-petioled, palmately 7-parted, the divisions long acuminate and pinnately parted: stipules small, 3-cleft to the middle: cymes corymb-like: calyx-lobes lanceolate, acuminate, entire: petals purple and glabrous: filaments almost free, equaling the long anthers or nearly so: styles short, united below: pod 12 mm. long, triangular, glabrous.—Plains of the lower Rio Grande, near Eagle Pass.

*** Petals none: flowers forking-racemose: plants with stinging bristles.*

5. **J. stimulosa** Michx. (TREAD-SOFTLY. SPURGE NETTLE.) Herbaceous, from a long perennial root, branching, 2 to 6 dm. high: leaves roundish-cordate, 3 to 5-lobed nearly to the base, on long petioles; the divisions entire or acutely toothed, cut or even pinnatifid, often discolored: flowers white, fragrant, 18 mm. long or more: filaments 10, monadelphous only at the woolly base, or the outer set almost distinct. (*J. urens*, var. *stimulosa* Muell.)—Sandy plains along the Rio Grande.

6. CROTON L.

Herbs or shrubs, with stellate pubescence or scales, alternate stipulate leaves, monœcious (rarely diœcious) flowers mostly in terminal spikes or spicate racemes: staminate flowers with a 5 (rarely 4 to 6)-parted calyx, as many (mostly small) hypogynous petals (usually present), as many glands of the disk alternate with the petals, 5 or more stamens with anthers inflexed in the bud: pistillate flowers with a 5 to 10-cleft or parted calyx, petals none or minute rudiments, 3 rarely 2 to 4)-celled ovary separating in fruit into as many 2-valved 1-seeded carpels, and carunculate seeds.

** Petals of staminate flowers evolute, of the pistillate rudimentary or obsolete.*

+ Calyxes equally 5-parted, the staminate pilose: petals (staminate) 5: stamens 6 to 20.

++ More or less scaly.

1. **C. punctatus** Jacq. Herbaceous perennial, covered throughout with stellate silvery scales: stems erect (1.5 to 3 dm. high), umbellately branched: leaves obovate or oblong (2.5 to 3 cm. long), obtuse, entire, silvery beneath, narrowed into a petiole: racemes sessile, oblong, obtuse: fertile flowers numerous and crowded: calyx-lobes acute: stamens 10 to 12, hairy: styles long and slender, 4-cleft: pod much longer than the calyx. (*C. argyranthemum* Michx.)—From the lower Rio Grande to Hockley.

2. **C. corymbulosus** Engelm. Whitish, stellate-scaly, with many erect stems from a woody base (1.5 to 3 dm. high): leaves oval or oblong, acutish, 3 to 4 cm.

long, whitish below, greenish-gray above; stipules subulate, small: inflorescence corymb-like, mostly monœcious; pedicels longer than the flowers: staminate flowers with 5 spatulate or lanceolate bearded petals, pistillate flowers mostly apetalous: stamens 6 to 13, with bearded filaments: style 2-cleft to below the middle, stellate-scaly as well as the ovary and oblong pod: seeds linear-oblong, punctate-reticulate. (*C. Lindheimerianus* Muell.)—A very common weed in the valleys and on the prairies.

3. **C. Torreyanus** Muell. Whitish, with tomentose branches: leaves short-petioled, oblong-ovate or subelliptical, acute at apex and obtuse at base, pilose-stellate above, scaly-stellate and white below (2.5 to 3.5 cm. long, 2 cm. broad); stipules subulate, small: racemes short; bracts ovate, 1 to 3-flowered: pistillate calyx with small ovate subacute lobes: staminate petals obovate, pistillate lanceolate-linear: stamens about 15; filaments glabrous: ovary softly tomentose; styles almost 2-parted: pod subglobose. (*C. suaveolens*, var. *oblongifolius* Torr.)—Rocky ravines, from the Pecos to the Gulf.

4. **C. Sonoræ** Torr. Small and much-branched shrub, with younger branches furfuraceous, the others smooth: leaves ovate (2.5 cm. long), acutish, entire, glabrate above, somewhat stellate-pubescent beneath, green on both sides: flowers monœcious: staminate petals 5 (hairy at base), equaling the calyx; pistillate (1 or 2 flowers) petals narrow, shorter than the calyx: disk 5-lobed: stamens about 13, with 5 spherical orange glands around the receptacle: styles bifid at apex: young fruit globose.—On rocky bluffs of the Upper Llano.

++ ++ *Not scaly.*

5. **C. Cortesianus** HBK. Stellately-pubescent shrub 2 to 3 m. high: leaves petioled, oblong, ovate or lanceolate (3 to 6 cm. long), acuminate, obtuse or subcordate at base, glabrous above, white and densely pilose-stellate beneath: racemes unisexual, the pistillate compact, the staminate rigid: pistillate calyx lobes narrowly triangular-lanceolate, acuminate, or elongated: stamens about 16 to 20, with filaments pilose below: styles 2-parted: ovary hirsute: pod globose: seed smooth. (*C. trichocarpa* Torr.)—Santa Maria, Cameron County.

6. **C. fruticulosus** Torr. From a woody base: leaves ovate or ovate-lanceolate (2.5 to 6 cm. long), acuminate or acute, subcordate, remotely and very minutely denticulate, greenish, puberulent above, densely stellate beneath: flowers monœcious, pedicellate: staminate with 5 oblong petals, pistillate apetalous and sessile: disk 5-lobed, glandular: stamens 5 to 10, exserted, with smooth filaments: pod globose, covered with a short stellate pubescence. (*C. fruticulosus*, var. *pallescens* Muell.)—Mountain sides and rocky ravines, from central Texas to the Rio Grande. Var. FUSCESCENS Muell., of the same range, has long acuminate leaves almost glabrate above and yellowish cinereous-subtomentose beneath.

7. **C. suaveolens** Torr. Whitish shrub, with stout terete stellately-pubescent leafy branches: leaves (4 to 5 cm. long) ovate, obtuse, rounded at base, entire, glandless, densely stellate-tomentose on both sides, petioled; stipules small, palmately 4 or 5-lobed: flowers monœcious; the pistillate solitary or in pairs, subsessile; staminate short-racemose: calyx deeply 5-parted, with lanceolate acute segments: petals oblong: stamens 12 to 14.—Along the Pecos and the Rio Grande to the Gulf.

+ + *Calyxes equally 5-divided: staminate flowers with 5 petals, 25 to 35 stamens, and a glabrous receptacle.*

8. **C. humilis** L. A low stellate-hairy shrub: leaves long-petioled, ovate or ovate-lanceolate, acuminate, slightly cordate at base, membranaceous, minutely crenulate, stipitate-glandular, 1.5 to 3.5 cm. long; stipules minute, deltoid, glandular-lobed: racemes loosely flowered; bracts ovate, glandular-toothed: pistillate flowers with oblong-ovate slightly elongated calyx lobes, and linear petals glandular at apex: staminate flowers with obovate petals: filaments glabrous: styles 4-divided: pod subglobose, scaly: seeds rugose. (*C. Berlandieri* Torr.)—At Matamoras, Mexico, and probably on the Texan side of the Rio Grande.

+ + + *Staminate calyx equally 5 (or 4)-parted, the pistillate unequally 5-parted: receptacle pilose: stamens 8 to 15.*

9. **C. leucophyllus** Muell. Stems 1 to 2 dm. high, glabrate below, densely stellate (white or yellowish white) above, 2 to 4-forked: stipules and bracts setaceous: leaves long-petioled, oblong-ovate (2 to 3.5 cm. long), acute at both ends, entire, soft: racemes short: pistillate flowers with the larger calyx-lobes linear-lanceolate, the smaller triangular and shortly subulate: stamens 11, with pilose filaments: styles bifid: pod subglobose, villous-hirsute.—Texas and New Mexico.

10. **C. glandulosus** L. Annual, rough-hairy and glandular, 3 to 6 dm. high, branched: leaves oblong or linear-oblong (4 to 9 cm. long), obtusely toothed, the base with a saucer-shaped gland on either side: fertile flowers capitate-clustered at the base of the sterile spikes, sessile in the forks and terminal: stamens 8: styles 3, 2-cleft: pod globose-ovoid, pubescent: seed punctate.—From Eagle Pass to Hockley. Var. LINDHEIMERI Muell., credited to Sutherland Springs, has slender stems, branches with spreading hairs near the apex and the rest stellate, and lanceolate-ovate or elliptical scarcely dentate leaves 3 to 5-nerved at base and grayish-green beneath. Var. ANGUSTIFOLIUS Muell., credited simply to Texas, has stems with pale subappressed stellate pubescence, and ovate-lanceolate distantly dentate or sub-entire 5-nerved leaves (or the upper linear-lanceolate or sub-linear). Var. SEPTENTRIONALIS Muell., extending from the Gulf States to Texas and New Mexico, has stems pale hirsute above (the hairs horizontally spreading), oblong-ovate lower leaves 3 to 5-nerved, and lanceolate or linear-elliptical pinnately-nerved upper ones.

11. **C. balsamiferus** Willd. Shrubby (3 to 6 dm. high), with smooth whitish stems and stellate-pubescent roughish branches: leaves (3 to 5 cm. long) slender-petioled, ovate, acute, crenulate, stellate-pubescent: spikes woolly, at length elongated: sterile flowers numerous, the fertile few: sterile calyx 5-parted, longer than the woolly-margined petals: stamens about 15: stigmas 12: pod much longer than the calyx, pubescent: seeds ovoid, smooth.—Brazos Santiago.

+ + + + *Staminate calyx 5-parted, pistillate 6 to 8 (or 12)-parted, lobes all equal: sterile receptacle pilose: stamens 9 to 14: styles 3, twice or thrice 2-parted: flowers capitate.*

12. **C. capitatus** Michx. Annual, densely soft-woolly and somewhat glandular (3 to 6 dm. high), branched: leaves long-petioled, lance-oblong or elongated-oblong (4 to 5 cm. long), rounded at base, entire, obtuse: petals obovate-lanceolate, densely fimbriate: fertile flowers several, capitate crowded at the base of the short terminal sterile spike.—From the Pecos to central and southern Texas. Var. LINDHEIMERI Muell., from near Laredo, has short-petioled leaves narrowed toward the subacuminate apex, and oblong-ovoid or pyramidal fruiting spike.

13. **C. Muelleri**. Perennial, with frutescent base: leaves (5 to 15 mm. long with petiole) ovate or linear-lanceolate, acuminate, obtuse at base, entire: flowers oblong-subcapitate: staminate calyx-lobes ovate, the pistillate obovate-spatulate and elongating: petals obovate-lanceolate, concave, fimbriate: filaments hirsute: pod globose-ovoid, stellate-pubescent: seeds minute, punctate. (*C. Berlandieri* Muell., not Torr.)—From San Fernando to Matamoras, Mexico, and doubtless on the Texan side of the Rio Grande.

+ + + + + *Staminate flowers with unequally 3 to 5-parted calyx, as many petals and scale-like glands, 3 to 11 stamens, and pilose receptacle: pistillate flowers with equally 5-parted calyx, 5 glands, and 2 sessile 2-parted stigmas: annuals.*

14. **C. Lindheimerianus** Scheele. Entire plant whitish and more or less stellate-scaly: leaves long-petioled, ovate, or round and retuse, or oblong-lanceolate and acute, subcrenulate (3 to 5 cm. long): stamens 7 to 11: ovary densely white-tomentose: pod elliptical, both ends equally truncate-obtuse, white-tomentulose, 3-celled: seed oblong-elliptical. (*C. ellipticus* Muell., not Nutt. *C. eutrigynus* Gray.)—From the Chenate mountains to Rio Grande City.

15. **C. monanthogynus** Michx. Whitish stellate-pubescent and rusty glandular: stems (3 to 6 dm. high) slender, erect, below often umbellately 3 or 4-forked, then repeatedly 2 or 3-forked or alternately branched: leaves oblong-ovate or narrowly oblong, entire, obtuse, 1.5 to 2.5 cm. long, twice as long as the petiole: flowers in the forks, the sterile few on the summit of a short erect peduncle, the fertile few and clustered or mostly solitary on short recurved peduncles: ovary 2-celled: pod often 1-celled and 1-seeded by abortion: seeds broadly oval.—From central to southern Texas.

* * *Petals of both sexes rudimentary or none, the calyxes equally 5-parted: sterile receptacle pilose.*

+ *Monœcious.*

16. **C. maritimus** Walt. Herbaceous, the whole plant covered with a rough scurfy stellate somewhat hoary pubescence: stem stout (6 to 9 dm. high), umbellately branched: leaves thick, long-petioled, ovate, obtuse, entire, round or slightly cordate at base, hoary beneath, 5 to 7 cm. long: spikes long-peduncled, capitate, few-flowered: calyx-lobes ovate, obtuse, with pod much longer: stamens mostly 12: stigmas 18 to 20: seeds ovoid, smooth.—Along the Gulf.

+ + *Diœcious.*

++ *Stellate-scaly.*

17. **C. Neo-Mexicanus** Muell. White and stellate-scaly throughout, with suberect stems (2 to 5 dm. high) from a woody base: leaves rather short-petioled, oblong-elliptical or spatulate-lanceolate (3 to 4 cm. long), entire or repand, densely white-scaly beneath; stipules obsolete: staminate raceme short and few-flowered, the pistillate 1 to 3-flowered: bracts and calyx-lobes lanceolate-ovate: staminate flowers with an entire disk, and about 11 stamens with pilose filaments: ovary densely scaly: pod 5 to 6 mm. long (the upper 3-celled): seed smooth.—Western Texas and New Mexico.

18. **C. Californicus** Muell. Perennial, woody at base, with erect or ascending stems (3 dm. high), and heavy throughout with a dense appressed scurf, or the upper leaf surfaces finely stellate-pubescent: leaves oblong or broadly elliptical, obtuse at each end, 3 to 6 cm. long, slender-petioled: staminate flowers in short nearly sessile racemes, with obscurely 5-lobed disk, and hairy filaments; pistillate flowers often solitary on short peduncles: styles twice 2-forked: pod scurfy, 6 mm. in diameter: seed 5 mm. long, with a small appressed caruncle.—Along the Rio Grande below Frontera.

++ ++ *Stellate-pubescent.*

19. **C. Texensis** Muell. Annual, covered with close canescent stellate-pubescence, dichotomously branched or spreading, 3 to 6 dm. high: leaves narrowly oblong-lanceolate to linear, 3.5 to 5.5 cm. long, short petioled: staminate spikes or racemes very short, often sessile: styles twice or thrice dichotomously 2-parted: pod stellate-tomentose and somewhat muricate.—From the Staked Plains to Corpus Christi.

7. MANIHOT Adans.

Suffrutescent plants, with glabrous alternate long-petioled lobed leaves, caducous stipules, monœcious apetalous flowers in loose terminal racemes, 5-lobed (or parted) colored calyx, 10 stamens in 2 series (outer shorter), central disk, many-lobed style, and a 3-celled ovary.

1. **M. Carthagenensis** Muell. Stem slender, glabrous: leaves (8 to 12 cm. long) deeply 3 to 5-lobed, the lowest lobes entire, the others panduriform: staminate flowers 8 to 15, pediceled, with tubular (at length salverform) calyx with linear seg-

ments, and 8 stamens with 5 small glands at base: pistillate flowers on long and reflexed pedicels at the base of the staminate raceme, with calyx 5-parted to the base, globose smooth ovary, 3 short styles, and dilated cristate-lobed stigmas.—Ringgold on the lower Rio Grande.

2. **M. angustiloba** (Torr.) Muell. Smooth, 3 to 9 dm. high, from a somewhat shrubby base, branching above: leaves 5-parted, the lobes narrowly lanceolate-linear, entire or undulate, acute, 5 to 12 cm. long; stipules minute, subulate: racemes 15 to 20-flowered, the 2 lowest flowers fertile: staminate calyx greenish-white, broadly campanulate, 5-lobed about half way down, the lobes oblong: pistillate 5-parted to the base: stamens 10, with 5 glands at base: seeds 9 mm. long, gray mottled with dark purple (*Janipha Manihot*, var. *angustiloba* Torr.)—From Monterey to New Mexico, and probably in southwestern Texas.

8. ARGYTHAMNIA P. Browne.

Erect herbs or undershrubs, with purplish juice, alternate usually stipulate leaves, monœcious (or seldom diœcious) racemose flowers, 5-parted calyx, petals alternate with sepals and the prominent lobes of the disk, 5 to 18 stamens united into a central column in 1 to 3 whorls, 1 to 3-cleft style, 3-lobed depressed pod, and subglobose roughened or reticulated non-carunculate seeds.

** Flowers diœcious: glands short.*

1. **A. aphoroides** Muell. Shrub: leaves subsessile, elliptical, ovate, obovate or lanceolate, entire, 3-nerved: racemes long-peduncled, few-flowered, exceeding the leaves: pistillate flowers with lanceolate acute calyx-lobes and very short petals; the staminate with very acute calyx-lobes, spatulate-obovate obtuse petals, and the broadly ovoid glands almost free above on a hypogynous disk: stamens 8 to 15, in 2 or 3 whorls: ovary and pod villous: styles united below, bifid.—Southern Texas.

** * Flowers monœcious: glands rather long or elongated, narrow.*

+ Petals not rudimentary.

++ Lobes of style not at all dilated.

2. **A. Neo-Mexicana** Muell. Stems scarcely 3 dm. high, appressed-pilose, mostly simple, from many thickened woody roots: leaves lanceolate-ovate or lanceolate or linear-lanceolate (1.5 to 2.5 cm. long), acute, narrow at base, entire, at last purplish: raceme shorter than the leaves: pistillate flowers with calyx-lobes ovate-lanceolate and elongating in fruit, and the lanceolate acute petals (pilose on the back) shorter; staminate with narrow lanceolate calyx-lobes, spatulate petals equaling the calyx, and the glands almost free above: ovary long and densely hispid-pilose: styles deeply bifid, with lobes narrow and smooth: seed globose-conical, truncate at base, acute and tuberculate roughened at apex (*Aphora humilis* Torr.)—Staked Plains, near Odessa Station.

++ ++ Lobes of style dilated above.

3. **A. humilis** (Eng. & Gray) Muell. Stems about 3 cm. high, much branched, silky or strigose-pubescent, with spreading branches: leaves narrow at base, spatulate or obovate-lanceolate, or linear-lanceolate, acute, sparingly pubescent: racemes much shorter than the leaves, on very short peduncles: calyx-lobes narrowly lanceolate: staminate petals lanceolate, about equaling the calyx; pistillate linear-lanceolate, shorter than the filiform glands: ovary and pod rough-pubescent: lobes of the styles reniform-dilated at apex: seeds reticulated, narrow, minutely plicate. (*Aphora humilis* Eng. & Gray.)—From the Chenate mountains to southern Texas. Much resembles the last, but differs in form of petals and styles.

4. **A. lævis** (Torr.) Muell. Stems, etc., as in the last: leaves obovate- or lanceolate-spatulate, acute, narrowed at base to a short petiole, entire: racemes twice shorter than the leaves: staminate flowers with linear-lanceolate calyx-lobes, and lanceolate petals equaling the calyx; pistillate with lanceolate calyx-lobes and much shorter petals: glands hypogynous, compressed-filiform, often lobed: ovary glabrous: styles glabrous, with lobes dilated at apex: seed globose, minutely apiculate, more or less undulate rugulose (*Aphora lævis* Torr.)—Near Pecos City.

\+ + *Fertile flowers with rudimentary petals.*

5. **A. pilosissima** (Benth.)Muell. Similar to the next, but the pubescence longer and more yellow: leaves subsessile, obovate, or the upper lanceolate-elliptical or oblong-ovate, acute, obtuse at base: racemes longer than the leaves: calyx-lobes narrowly lanceolate, long acuminate: staminate petals spatulate-ovate, equaling the calyx: glands of both kinds of flowers long and hirsute-villous: seeds reticulated, plicate-roughened (*Scrophyton pilosissimum* Benth. *Aphora pilosissima* Torr.)—Southern Texas.

6. **A. mercurialina** Muell. Stem erect, nearly simple (3 to 6 dm. high), sericeous: leaves sessile, oblong-ovate to lanceolate, entire, pubescent with appressed hairs or glabrate, somewhat rigid: racemes many-flowered, exceeding the leaves: staminate flowers with linear-lanceolate membranaceous calyx-lobes, and spatulate petals equaling the calyx; pistillate with lanceolate calyx-lobes: glands of both kinds of flowers long and glabrous: ovary sericeous: pod appressed-pubescent: seeds smooth. —Throughout central and southern Texas.

9. BERNARDIA P. Browne.

Shrubs or undershrubs, with simple or stellate pubescence, alternate 2-stipulate leaves, diœcious flowers in small spicate or racemose clusters (mostly axillary, apetalous, and without involucre), staminate calyx 3 to 5-parted, pistillate usually 5 to 6 (sometimes 3 or 9)-parted, 3 to 20 distinct stamens with cruciate globose anthers, 3-celled and 3-ovuled ovary, nearly sessile stout 2-lobed or parted (lacerate or papillose) stigmas, and non-carunculate seeds.

1. **B. myricæfolia** (Scheele.) Watson. Irregularly branched shrub (9 to 30 dm. high), grayish-green throughout, with a dense fine stellate-pubescence: leaves thick and reticulate-veined, oblong to ovate-oblong, obtuse, cuneate to cordate at base (1 to 5 cm. long), repand-dentate, very short-petioled: staminate flowers small and axillary, pistillate terminal and sessile: calyx 3 (rarely 4)-parted: stamens 3 to 20: seeds 5 mm. long nearly smooth, dull, slightly carinate (*Tyria myricæfolia* Scheele.)—Western Texas.

10. ACALYPHA L. (Three-seeded mercury.)

Herbs, with alternate petioled stipulate leaves, monœcious or diœcious apetalous flowers, sterile ones very small and clustered in spikes with few or solitary fertile ones at base or in separate spikes, sterile calyx 4-parted, fertile 3 to 5-parted, 8 to 16 short stamens monadelphous at base and with long anther-cells, 3 styles with upper face or stigma cut-fringed, and pod separating into 3 globular 2-valved carpels (rarely 1).

* *Both kinds of flowers in the same spike.*

1. **A. Virginica L.** Smoothish or hairy (3 to 6 dm. high), often turning purple: leaves ovate or oblong-ovate, obtusely and sparsely serrate, long-petioled: sterile spike rather few-flowered, mostly shorter than the large leaf-like palmately 5 to 9-cleft fruiting bracts: fertile flowers 1 to 3 in each axil: pod smooth or merely pubes-

cent: seed nearly smooth.—Eastern Texas. Var. GRACILENS Muell. is common throughout central and southern and western Texas, and has lanceolate or linear less-toothed and shorter-petioled leaves, and the slender sterile spikes (often 2.5 cm. long) much surpassing the less cleft or few-toothed fruiting bracts.

2. **A. Lindheimeri** Muell. Stems apparently procumbent, with erect hairy branches about 3 dm. high: leaves rhombic-ovate (2.5 to 3 cm. long), rather acuminate, serrate, acute at base: spikes slender (2.5 to 5 cm. long); pistillate bracts 1 to 3-flowered, ovate, acuminate, deeply 5 to 7-toothed with lanceolate lobes: ovary hirsute: styles laciniate above into filiform divisions: seeds minutely punctate (*A. pheloides* Torr.)—Hillsides and cañons of central and western Texas.

* * *The two kinds of flowers in separate spikes.*

\+ *Flowers monœcious.*

3. **A. ostryæfolia** Riddell. Stems erect, much branched (3 to 6 dm. high), pubescent: leaves thin, ovate-cordate, sharply and closely serrate, abruptly acuminate, long-petioled: sterile spikes short, axillary; fertile ones mostly terminal and elongated, their bracts deeply cut into many linear lobes: fruit echinate, with soft bristly green projections: seed rough-wrinkled (*A. Caroliniana* Ell., not Walter.)—Ravines toward the mouth of the Presidio del Norte.

\+ \+ *Flowers mostly diœcious.*

4. **A. hederacea** Torr. Slender, prostrate, much branched, cinereous-pubescent, 2 to 4 dm. high, from a woody base: leaves orbicular-reniform, small, long-petioled, crenate-dentate: spikes (very rarely monœcious) terminal, pedunculate; the staminate long; the pistillate short: bracts cucullate, obtusely 9 or 10-dentate: styles elongated, laciniate.—Damp places, from the Pecos to Rio Grande City.

5. **A. radians** Torr. Much branched, from a suffruticose base, villous with long spreading hairs: leaves long-petioled, orbicular-reniform, cut into 7 to 15 sub-linear lobes: spikes terminal, pedunculate, wholly diœcious; the staminate oblong-linear; the pistillate thickened: bracts obtuse, 9 or 10-toothed: styles long, laciniate: ovary pubescent.—Southern and western Texas.

11. RICINUS L. (CASTOR-OIL PLANT.)

A tall stately annual, with very large alternate peltate and palmately 7 to 11-cleft leaves (often 3 to 6 dm. broad), flowers in racemose or paniced clusters (fertile above, staminate below), 5-parted calyx, very numerous stamens with repeatedly branching filaments, 3 red bifid styles (united at base), and a large 3-lobed spiny pod with 3 large seeds.

1. **R. communis** L.—Cultivated extensively for ornament, and sparingly escaped in Missouri and southwestward to Central Mexico.

12. RICINELLA Muell.

Diœcious shrub, with the axils of the alternate short-petioled fascicled entire leaves producing fascicled clusters of apetalous flowers, 5-parted calyx, 12 to 15 distinct stamens united in the center of the perigynous disk, ovoid-oblong extrorse anthers, 3-lobed (laciniate) styles, and a 3-celled much depressed coriaceous pod containing 3 smooth globose scarcely carunculate seeds.

1. **R. Vaseyi** Coulter & Fisher. Shrub with several straight branches (15 to 18 dm. high) from the base, glabrous or the young branches puberulent: leaves minutely puberulent or glabrate, subsessile, fascicled upon much reduced wart-like villous

branchlets (from which arises a solitary long-pedicelled pistillate flower), narrowly obovate, with a 3-nerved cuneate base, 15 to 30 mm. long and 4 to 9 mm. wide, equalling the hairy pedicels: sepals 5, hairy, lanceolate: stamens 10: pod 6 mm. long, 9 to 10 mm. broad, with rounded lobes, smooth or somewhat granulate: seeds round ovate, slightly angular (4 mm. long), with a distinct hilum. (*Euphorbia Vaseyi* Coulter, Contr. Nat. Herb. I, 48.)—Brazos Santiago and Boonville. The species falls into the old genus *Adelia* and follows the merging of that genus into *Ricinella*.

13. TRAGIA L.

Erect or climbing perennial pubescent or hispid herbs (sometimes stinging), with mostly alternate stipulate leaves, monœcious apetalous small flowers in terminal or lateral racemes (fertile at base of sterile), sterile calyx 3 to 5-parted, fertile 3 to 8-parted and persistent, 2 or 3 stamens with short filaments and united anther-cells, 3-cleft (or parted) style, and 3-celled 3-lobed bristly pod separating into three 2-valved 1-seeded carpels.

1. **T. urens** L. Erect, paniculately branched, softly hairy-pubescent (1.5 to 3 dm. high), not stinging: leaves varying from obovate-oblong to narrow linear, acute at base, obtusely or sinuately few-toothed or lobed, sometimes entire, short-petioled or sessile, paler beneath: sterile calyx usually 4-parted: stamens 2. (*T. innocua* Walt.)—Hills of the lower Rio Grande.

2. **T. nepetæfolia** Cav. Erect or reclining or slightly twining, hirsute with stinging hairs: leaves ovate-lanceolate or triangular-lanceolate, or the lower ovate, all somewhat cordate or truncate at base, coarsely cut-toothed, short-petioled: sterile calyx usually 3-parted: stamens 3. (*T. urticæfolia* Michx.)—Valley bottoms of the Pecos and the lower Rio Grande. Var. ANGUSTIFOLIA Muell. has erect stems, triangular-lanceolate leaves obtuse at base, and the upper linear-lanceolate or sublinear.—From the Limpia to San Diego.

3. **T. macrocarpa** Willd. Twining, somewhat hirsute: leaves deeply cordate ovate, mostly narrowly acuminate, sharply serrate (7 to 12 cm. long), all but the uppermost long-petioled: pod 12 mm. broad. (*T. cordifolia* Michx.)—Along the Gulf from Florida to Mexico.

4. **T. stylaris** Muell. Similar to *T. nepetæfolia*, but easily distinguished by its 4 or 5-parted sterile calyx, 4 or 5 stamens, and elongated styles.—From Kansas to western Texas.

14. STILLINGIA Garden.

Smooth upright plants, with alternate leaves (mostly 2-glandular at base), monœcious flowers aggregated in a dense terminal spike (fertile at base), bracts with a gland on each side, no petals or glands of the disk, 2 or 3-cleft (or parted) calyx, 2 or 3 stamens (the adnate anthers turned outward), thick style, 3 diverging or simple stigmas, 3-celled 3-lobed 3-seeded pod, and carunculate seed.

* *Perennials: spikes terminal.*

1. **S. sylvatica** L. Herbaceous: stems clustered, erect or ascending (3 to 9 dm. high), from a woody root, umbellately branched: leaves nearly sessile, oblong-lanceolate, serrulate (2.5 to 5 cm. long): glands of the spike saucer-shaped: stamens 2: pod roughish.—Sandy and dry soils, extending from the Southern States to western Kansas and Texas.

2. **S. angustifolia** Engelm. Similar, but distinguished by its narrowly linear very acute leaves, somewhat smaller pod, and the quite smooth seed. (*S. sylvatica*, vars. *angustifolia* and *lincarifolia* Muell.)--Ravines of the San Pedro and Rio Grande.

* * *Annuals: spikes axillary: leaves 3-nerved.*

3. **S. spinulosa** Torr. Low (5 to 15 cm. high), somewhat viscid, dichotomously branched, the stems angled and leafy: leaves ovate to lanceolate, acuminate, narrowed to a broad-winged petiole, ciliate or spinulose-dentate, 2.5 cm. long: spikes shorter than the leaves, with 1 to 3 pistillate flowers at base: staminate bracts minute, 1 flowered; the pistillate with small glands on long stout pedicels: pod 4 mm. broad, with a gynophore: seeds oblong-ovate (3 mm. long), smooth, with no caruncle or a small one. (*Sapium* (?) *annuum* Torr. *S. annua* Muell.)—Wet ravines near Eagle Pass.

4. **S. dentata** (Torr). Sessile leaves sharply and sometimes doubly toothed, rounded above, cuneate at base, faintly nerved; stipules short, fimbriate: spikes terminal, short and slender; bracts very small, ovate, acute, 1-flowered, with short stipitate convex glands: pistillate calyx of 3 triangular sepals: pod 4 mm. broad, with stout gynophore: seeds 3 mm. long, with conspicuous caruncle. (*Sapium annum*, var. *dentatum* Torr. *Sebastiana Treculiana* Muell.? *Stillingia Torreyana* Watson.)—Eagle Pass.

URTICACEÆ. (NETTLE FAMILY.)

Herbs, shrubs, and trees, with stipules (often diœcious), monœcious or diœcious or rarely (in the Elm family) perfect flowers furnished with a regular calyx and free from the 1 (rarely 2)-celled ovary which forms a 1-seeded fruit, and stamens as many as the calyx-lobes (or fewer) and opposite them.

I. Trees, with alternate serrate pinnately-veined leaves and fugacious stipules: flowers mostly polygamous, upon the last year's branches: anthers erect in bud, extrorse: styles or stigmas 2: fruit a winged samara or nut-like.—ULMEÆ.

1. **Ulmus.** Flowers preceding the leaves: ovary 1 or 2-ovuled: fruit winged all around.

2. **Planera.** Flowers appearing with the leaves: ovule 1: fruit wingless, nut-like.

II. As in I, but the diœcious-polygamous flowers upon branches of the same year: fruit a drupe.—CELTIDEÆ.

3. **Celtis.** Ovary 1-ovuled: flowers appearing with the leaves, which are 3-nerved at base.

III. Climbing herbs, with watery juice, mostly opposite 3 to 5-lobed leaves, persistent stipules, and a fibrous inner bark: flowers diœcious, axillary; the sterile panicled; the fertile spicate: calyx of one sepal embracing the ovary: filaments short, erect in bud: stigmas 2, elongated.—CANNABINEÆ.

4. **Humulus.** Fertile flowers in a solitary short spike forming a membranaceous catkin in fruit: ovary 1-celled, forming a small glandular achene in fruit.

IV. Trees or shrubs, with milky juice, alternate leaves, and fugacious stipules: flowers unisexual, racemose, spicate, or capitate: calyx becoming fleshy or juicy in fruit: anthers inflexed in bud: styles undivided or 2-parted, filiform, fruit an achene.—MOREÆ.

5. **Ioxylon.** Sterile flowers in loose racemes; fertile in globose heads: leaves entire.

6. **Morus.** Fertile and sterile flowers in separate spikes: leaves dentate, 3-nerved:

V. Herbs, with watery juice, tough fibrous bark, often armed with stinging hairs: flowers unisexual: filaments inflexed in bud: style or stigma simple: ovary 1-celled, with an erect ovule, in fruit forming an achene.—URTICEÆ.

*Calyx in the fertile flowers of 2 to 5 separate or nearly separate sepals: beset with stinging bristles.

7. **Urtica.** Sepals 4 in both kinds of flowers: achene straight and erect, inclosed by the 2 inner and larger sepals: stigma capitate-tufted: leaves opposite.

** Fertile calyx tubular or cup-shaped, inclosing the achene: unarmed.

8. **Bœhmeria.** Flower clusters spiked, not involucrate: styles long and filiform, stigmatic down one side: leaves opposite, serrate.

9. **Parietaria.** Flowers in involucrate-bracted clusters: stigma tufted: leaves alternate, entire.

1. ULMUS L. (ELM.)

Trees, with polygamous purplish or yellowish flowers in lateral clusters appearing before the short-petioled oblique or unequally somewhat heart-shaped (at base) leaves, bell-shaped 4 to 9-cleft calyx, 4 to 9 slender stamens, the short diverging styles stigmatic along the inner margin, and the 1-seeded fruit winged all around.

** Flowers nearly sessile: fruit orbicular, not ciliate: leaves very rough above.*

1. **U. pubescens** Walt. (SLIPPERY or RED ELM.) Small or middle-sized tree (13.6 to 18 m. high), with tough reddish wood and very mucilaginous inner bark: buds large, before expansion soft-downy with rusty hairs: leaves ovate-oblong taper-pointed, doubly serrate (10 to 20 cm. long), soft downy beneath or slightly rough downward: branchlets downy: calyx-lobes and stamens 5 to 9: fruit 16 to 18 mm. long, with the cell pubescent. (*U. fulva* Michx.)—Extending from the Atlantic States to the valley of the San Antonio.

*** Flowers on slender drooping pedicels, which are jointed above the middle: fruit ovate or oval, fringed-ciliate: leaves smooth above or nearly so.*

2. **U. Americana** L. (AMERICAN or WHITE ELM.) Large and well known ornamental tree, usually with spreading branches and drooping branchlets: buds and branchlets glabrous: branches not corky: leaves obovate-oblong or oval, abruptly pointed, sharply and often doubly serrate (5 to 10 cm. long), soft pubescent beneath, or soon glabrous: flowers in close fascicles: calyx with 7 to 9 roundish lobes: fruit glabrous except the margins (12 mm. long), its sharp points incurved and closing the notch.—Extending westward to the streams of southern and central Texas.

3. **U. alata** Michx. (WAHOO OR WINGED ELM). Small tree, with bud scales and branchlets nearly glabrous: branches corky-winged, at least some of them: leaves downy beneath, ovate-oblong and oblong-lanceolate, acute, thickish, small (2.5 to 6.5 cm. long): calyx-lobes obovate: fruit downy on the face, at least when young.—On streams, extending to the valley of the Trinity.

**** Flowers axillary, fasciculate on short pedicels: samara ciliate-fringed.*

4. **U. crassifolia** Nutt. Leaves persistent or semi-deciduous, oblique, oblong or ovate-elliptical, obtuse (rarely acute), doubly serrate, sub-coriaceous, shining above, rough below on the nerves: flowers serotinous: calyx 5 or 6 or 8-parted, ciliate: fruit oblique, ovate-elliptical, puberulent, lanate-ciliate on margin.—Extending to the valley of the Rio Grande and west to the Pecos.

2. **PLANERA** Gmelin. (PLANER-TREE.)

Trees, with small leaves (like those of elms), monœciously-polygamous flowers in axillary clusters, 4 or 5-cleft calyx, 4 or 5 stamens, and ovoid 1-celled ovary crowned with 2 spreading styles which are stigmatic down the inner side.

1. **P. aquatica** Gmelin. Nearly glabrous: leaves ovate-oblong: fruit stalked in the calyx, beset with irregular rough projections.—Wet banks, extending from the Gulf States to Kansas and the valley of the Trinity.

3. **CELTIS** L. (NETTLE-TREE. HACKBERRY.)

Trees or shrubs, with inequilateral pointed short-petioled leaves, greenish axillary flowers, the fertile peduncled and solitary or in pairs, the lower usually staminate (only) and fascicled or racemed, 5 or 6-parted persistent calyx, 5 or 6 stamens, 1-celled ovary, 2 long-pointed recurved stigmas, and a globular drupe.

1. **C. pallida** Torr. Shrub 18 to 30 dm. high, with numerous flexuous spreading white-puberulent branches: spines in pairs, 4 to 25 mm. long: leaves ovate or ovate-oblong, 16 to 28 mm. long, mostly acute, scabrous on both sides, thickish: flowers small, white, in polygamous cymes of 3 to 5 flowers longer than the petiole; the lower mostly staminate with rudimentary pistils, the terminal one perfect: styles thick, cleft nearly half their length: fruit ovate, glabrous, 6 mm. long, orange, yellow, and red, with an acid pulp.—Very common on all mesas and foothills of western and southern Texas. Known as "granjeño."

2. **C. reticulata** Torr. Somewhat pubescent with short spreading hairs: leaves thick, very rough and strongly reticulated, 5 to 10 cm. long, obliquely ovate, cordate at base, shortly acuminate, sharply serrate or sometimes partially entire: fruit 6 mm. or more broad, on slender pedicels 10 to 14 mm. long.—From New Mexico to Uvalde, Texas.

3. **C. occidentalis** L. (SUGARBERRY. HACKBERRY.) Small or sometimes large tree: leaves reticulated, ovate, cordate-ovate, and ovate-lanceolate, taper-pointed, sharply serrate, sometimes sparingly so or only towards the apex, scabrous but mostly glabrous above, usually soft pubescent beneath (at least when young): fruit reddish or yellowish, turning dark purple at maturity, its peduncle once or twice the length of the petiole.—Very common in the valleys of western and southwestern Texas. "Palo blanco."

4. **C. Mississippiensis** Bosc. Small tree, with warty bark: leaves entire (rarely few toothed), very long taper-pointed, rounded at base, mostly oblique, thin, smooth: fruit small.—Extending to central Texas.

4. **HUMULUS** L. (HOP.)

Twining rough perennials, with stems almost prickly downward, heart-shaped leaves, ovate stipules between the petioles, sterile flowers of five sepals and five erect stamens in loose axillary panicles, foliaceous imbricated bracts two-flowered and forming a sort of membranaceous cone in fruit, and achenes invested with the enlarged scale-like calyx.

1. **H. Lupulus** L. (COMMON HOP). Leaves mostly 3 to 5-lobed, commonly longer than the petioles: bracts, etc., smoothish: the fruiting calyx, achene, etc., sprinkled with yellow resinous grains which give the bitterness and aroma to the hop.—Alluvial banks of northern Texas.

5. IOXYLON Raf. (Osage orange.)

Trees, with entire pinnately veined leaves, axillary peduncles, stout axillary spines, diœcious flowers, the staminate with 4-parted calyx and 4 stamens, the pistillate in a dense globose head with the 4-cleft calyx inclosing the ovary, long-exserted filiform styles, and the achene buried in the greatly enlarged fleshy calyx. (*Maclura* Nutt).

1. **I. pomiferum** Raf. Tree 9 to 15 m. high, with bright orange wood: leaves ovate to oblong-lanceolate, pointed, mostly rounded at base, green and shining: the aggregated mass of fruit globose, yellowish green, 5 to 12.5 cm. in diameter. (*Maclura aurantiaca* Nutt.).—Near waters, from eastern to central and southern Texas. Extensively used for hedges.

6. MORUS L. (Mulberry.)

Trees, with broad leaves, monœcious or diœcious axillary flowers, 4-parted calyx with ovate lobes, 4 stamens, elastically expanding filaments, 2-celled ovary (one of the cells smaller and disappearing), and 2 filiform styles stigmatic down the inside.

1. **M. rubra** L. (Red mulberry.) Large tree, ripening its blackberry-like fruit in July: leaves cordate-ovate, serrate, rough above, downy beneath, pointed (on young shoots often lobed): flowers frequently diœcious: fruit dark purple, oblong.—Extending to the valley of the Colorado in Texas.

2. **M. microphylla** Buckley. (Wild mulberry.) A tree 4.5 to 6 m. high, with smooth light gray bark, ripening its fruit the last of May: leaves cordate-ovate or -lobed, serrate with mucronate teeth, smoothish on both sides (veins and margins sparingly and minutely ciliate): styles divaricate and obtuse: fruit black and sour, with little juice and deep sinuses between the achenes, which are little compressed.—A common Texan mulberry, from the valley of the Colorado, through western Texas to New Mexico.

7. URTICA L. (Nettle.)

Herbs armed with stinging hairs, with distinct stipules, monœcious (rarely diœcious) greenish clustered flowers mostly in racemes or spikes or loose heads, sterile flowers with four stamens inserted around the cup-shaped rudiment of a pistil, fertile flowers with the 2 outer sepals smaller, sessile stigmas, and an ovate flattened achene.—In summer.

* *Perennials: flower clusters in branching panicled spikes, often diœcious.*

1. **U. gracilis** Ait. Sparingly bristly, slender, 6 to 18 dm. high: leaves ovate-lanceolate, pointed, serrate, 3 to 5-nerved from the rounded scarcely heart-shaped base, almost glabrous, the elongated petioles sparingly bristly: spike slender and loosely panicled.—Extending from the Atlantic States to the banks of the Limpia.

2. **U. dioica** L. Very bristly and stinging, 6 to 9 dm. high: leaves ovate, cordate, pointed, very deeply serrate, downy beneath as well as the upper part of the stem: spikes much branched.—From the Atlantic to Central Mexico.

3. **U. Breweri** Watson. Tall and stout, grayish with a short somewhat hispid pubescence, or nearly glabrous with scattered bristles: leaves thin, finely pubescent, soon glabrate or roughish above, ovate to oblong-lanceolate, rounded or slightly cordate at base, coarsely serrate, on slender petioles: flowers in short open panicles, scarcely exceeding the petioles.—From southern California to southern Colorado and Texas.

* * *Annuals: flower-clusters chiefly axillary and shorter than the petioles, androgynous.*

4. **U. urens** L. With sparse stings, 2 to 3 dm. high: leaves elliptical-ovate, very

coarsely and deeply serrate with long spreading teeth, the terminal teeth not longer than the lateral: flower clusters 2 in each axil, small and loose.—Corpus Christi, and wet ravines above El Paso.

5. **U. chamædryoides** Pursh. Slender, 1.5 to 7 dm. high, with sparse stings: leaves ovate and mostly cordate, the upper ovate-lanceolate, coarsely serrate-toothed: flower-clusters globular, 1 or 2 in each axil and spiked at summit. (*U. purpurascens* Nutt.)—Alluvial shaded soils, central, southern and western Texas.

8. BŒHMERIA Jacq. (False nettle.)

Stingless herbs, with monœcious or dioecious clustered flowers, the sterile much as in *Urtica*, the fertile with a tubular or urn-shaped entire or 2 to 4-toothed calyx, elongated and awl-shaped style stigmatic and papillose down one side, and the elliptical achene invested by the dry and persistent compressed calyx.

1. **B. cylindrica** Willd. Perennial, smoothish or pubescent and more or less scabrous, with simple stem 3 to 9 dm. high: leaves rarely alternate, ovate to ovate-oblong or oblong-lanceolate, pointed, serrate, 3-nerved; stipules distinct; petioles short or elongated: flowers dioecious, or the two kinds intermixed, the small clusters densely aggregated in simple and elongated axillary spikes; the sterile interrupted; the fertile continuous, frequently leaf-bearing at apex.—Moist, shady grounds, western Texas.

9. PARIETARIA L. (Pellitory.)

Homely diffuse or tufted herbs (not stinging), with 3-ribbed leaves, no stipules, monœciously-polygamous flowers in the same involucrate-bracted cymose axillary clusters, the sterile much as in the last, the fertile having a 4-parted and nerved calyx, a slender style (or none), a pencil-tufted stigma, and an ovoid ovary.

1. **P. Pennsylvanica** Muhl Low annual, simple or sparingly branched, minutely downy: leaves oblong-lanceolate, thin, veiny, roughish with opaque dots: flowers shorter than the involucre: stigma sessile.—Extending from New England to central Mexico.

2. **P. debilis** Forst. Taller, pubescent with straight and hooked hairs intermixed: stems much branched, pellucid: leaves ovate, mostly acuminate, roughened with elevated dots: clusters loose, spreading: flowers as long as the involucre. (*P. Floridana* Nutt.)—Rocky places, from the upper Rio Grande to central Texas.

PLATANACEÆ. (Plane-tree Family.)

Trees, with watery juice, alternate palmately-lobed leaves, sheathing stipules, monœcious flowers destitute of calyx and corolla and in separate and naked spherical heads, the fruit merely clavate 1-seeded nutlets furnished with a ring of bristly hairs about the base.

1. PLATANUS L. (Sycamore. Buttonwood.)

Large trees, with the bark deciduous in broad thin brittle plates, the dilated base of the petioles inclosing the bud of the next season, sterile flowers of numerous stamens with clavate little scales intermixed and very short filaments, fertile consisting of inversely pyramidal ovaries mixed with little scales, the simple rather lateral style awl-shaped or filiform, and coriaceous nutlets.

1. **P. occidentalis** L. Very large tree, 18 to 54 m. high: leaves mostly truncate at base, angularly sinuate-lobed or toothed, the short lobes sharp pointed: fertile heads solitary, hanging on long peduncles.—Alluvial banks, extending to the Nueces and the Pecos.

2. **P. Wrightii** Watson. Leaves subtomentose beneath, very acutely and deeply 5 to 7-lobed, the lower lobes projecting backwards and forming a deep sinus: racemes not exceeding the leaves: fertile heads 3, 16 to 20 mm. in diameter: nutlets truncate above and tubercled with the short base of the style: receptacle densely hairy and fruit-bearing over nearly the entire surface.—Valleys from the San Pedro (Arizona) to southwestern New Mexico and extending into Mexico; probably in southwestern Texas.

JUGLANDEÆ. (Walnut Family.)

Small family of important trees, with alternate pinnate leaves, no stipules, monœcious flowers, the sterile in catkins and with an irregular calyx adnate to the bract; the fertile solitary or in a small cluster or spike and with a regular 3 to 5-lobed calyx adherent to the incompletely 2 to 4-celled but only 1-ovuled ovary, and the dry crustaceous or bony-shelled drupaceous fruit containing a large 4-lobed orthotropous seed.

1. HICORIA Raf. (Hickory.)

Fine timber trees, with very hard and tough wood, the scaly buds (in spring) usually putting forth both kinds of flowers, the sterile flowers below in slender lateral catkins (with the naked calyx adherent to the bract and unequally 2 or 3-parted, 3 to 10 stamens, and the free filaments short or none), the fertile 2 to 5 in a short cluster or spike on a peduncle terminating the shoot of the season (with 4-toothed calyx, 2 to 4 large papillose sessile stigmas, and fruit with a 4-valved firm and at length dry exocarp [involucre] falling away from the smooth endocarp).

* *Sterile catkins fascicled (no common peduncle or somelimes a very short one) from separate lateral scaly buds near the summit of the shoots of the preceding year: bud-scales few: fruit elongated-oblong: the thin-shelled nut 2-celled below: seed sweet: leaflets short-stalked, numerous.*

1. **H. Pecan** (Marsh.) Britton. (Pecan-nut.) A large tree (18 to 48 m. high), with delicious nuts, minutely downy, becoming nearly smooth: leaflets 13 to 15, oblong-lanceolate, tapering gradually to a slender point, falcate, serrate: nut olive-shaped. (*Juglans Pecan* Marsh. *Carya oliræformis* Nutt.)—Extending from the Mississippi States to the streams of central and southwestern Texas, as far west as Fort Concho. *H. Texana* Le Conte is referred here, but Dr. Britton thinks it may prove distinct.

* * *Sterile catkins in threes (rarely more) on a common peduncle from the axil of the inner scales of the common bud, therefore at the base of the shoot of the season, which, then bearing 3 or 4 leaves, is terminated by the fertile flowers: fruit globular or oval: nut 4-celled at base: leaflets sessile or nearly so.*

† *Hull splitting promptly into 4 more or less thick and when dry hard woody valves: seed sweet and delicious.* (The "hickory-nuts" of the market.)

2. **H. ovata** (Mill.) Britton. (Shell-bark or Shag-bark hickory.) Large tree, with bark of trunk exfoliating in rough strips: inner bud-scales becoming large and conspicuous, persistent till the flowers are fully developed: leaflets 5 or 7, minutely

downy beneath when young, finely serrate, the three upper obovate-lanceolate, the lower pair much smaller and oblong-lanceolate, all taper-pointed: fruit globular or depressed: nut white, flattish-globular, barely mucronate, thin-shelled. (*Juglans ovata* Mill. *Carya alba* Nutt.)—Extending into eastern Texas.

3. **H. sulcata** (Willd.) Britton. (BIG SHELL-BARK. KING-NUT.) Large tree, with bark as in the last: leaflets 7 or 9, more downy beneath: fruit oval or ovate, 4-ribbed above the middle, the hull very thick: nut large (3 to 5 cm. long) and usually angular, dull white or yellowish, thick-shelled, usually strongly pointed at both ends. (*Juglans sulcata* Willd. *Carya sulcata* Nutt.)—Rich soils, extending into eastern Texas from the North Atlantic States.

4. **H. alba** (L.) Britton. (MOCKER-NUT. WHITE-HEART HICKORY.) Large tree, with bark close and rough, but not shaggy and exfoliating on old trunks: catkin-shoots and lower leaf-surfaces tomentose when young, resinous-scented: leaflets 7 or 9, lance-obovate, or the lower oblong-lanceolate, pointed: fruit globular or ovoid, with very thick and hard hull: nut globular, not compressed, 2 to 2.5 cm. in diameter. (*Juglans alba* L. *Carya tomentosa* Nutt.)—Extending to the valley of the Brazos.

5. **H. myristicæformis** (Michx. f.) Britton. Bark not exfoliating: leaflets 5, ovate-lanceolate, smooth, the terminal one sessile: fruit oval, rugose, rough: nut oval, slightly acuminate, furrowed, very hard. (*Juglans myristicæfolia* Michx. f. *Carya myristicæformis* Nutt.)—From the Gulf States to central Mexico. Fruit resembles nutmegs.

+ + Hull thin and rather friable at maturity, 4-valved only to the middle (except C. aquatica): seed more or less bitter: bark not exfoliating.

6. **H. glabra** (Mill.) Britton. (PIG-NUT or BROOM HICKORY.) Rather large tree, with bud scales nearly as in *C. tomentosa*, but smaller, caducous: shoots, catkins and leaves glabrous or nearly so: leaflets 5 or 7, oblong- or obovate-lanceolate, taper-pointed, serrate: fruit pear-shaped, oblong or oval (3.5 to 5 cm. long), with thick bony shell: the oily seed at first sweet, then bitterish. (*Juglans glabra* Mill. *Carya glabra* Torr. *C. porcina* Nutt.)—Extending to the valley of the Nueces.

7. **H. minima** (Marsh.) Britton. Tree 15 to 25 m. high: scales of the small yellowish buds about 6, valvate in pairs, caducous in leafing: catkins and young herbage more or less pubescent, soon becoming glabrous: leaflets 7 to 11, lanceolate or oblong-lanceolate: fruit globular, narrowly 6-ridged: nut globular, short-pointed, white, barely 2.5 cm. long, thin-shelled: seed at first sweet, soon extremely bitter. (*Juglans alba*, var. *minima* Marsh. *Carya amara* Nutt.)—Moist soils, extending to the valley of the Trinity.

8. **H. aquatica** (Michx. f.) Britton. Small tree, with roughish bark: leaflets 9 to 13, lanceolate, acuminate, slightly serrate, smooth: fruit roundish, 4-ribbed: hull 4-parted to the base: nut compressed, 4-angled: seed much wrinkled. (*Juglans aquatica* Michx. f. *Carya aquatica* Nutt.)—River swamps, extending from the Gulf States to the valley of the Brazos.

2. JUGLANS L. (WALNUT.)

Trees, with strong-scented or resinous-aromatic bark, few-scaled or almost naked buds, odd-pinnate leaves of many leaflets, sterile flowers in long and simple lateral catkins from the wood of the preceding year with the 3 to 6-cleft calyx adherent to the entire bracts or scales and 12 to 40 stamens with free and very short filaments, fertile flowers solitary or several together on a peduncle at the end of the branches bearing a 4-toothed calyx and 4 small petals at the sinuses, 2 very short styles, 2 subclavate and fringed stigmas, and fruit with a fibrous-fleshy indehiscent exocarp and an irregularly rough endocarp and a sweet edible embryo.

1. **J. Californica** Watson. Large tree (12 to 18 m. high), more or less pubescent: leaflets 5 to 8 pairs, oblong-lanceolate, acute, narrowed upward from near the base, 5 to 7 cm. long: aments often in pairs, 10 to 15 cm. long, loose: staminate calyx-lobes acute or obtuse, veined: stamens 30 to 40; anthers 2 mm. long, the apex of the connective very short and bifid: fruit globose, slightly compressed, 2 to 2.5 cm. in diameter: nut shallow sulcate, the walls rather thin, with two broad cavities on each side. (*J. rupestris*, var. *major* Torr.)—From the valley of the Colorado, through western Texas to California and Sonora.

2. **J. rupestris** Engelm. Smaller (18 to 60 dm. high), with more numerous (6 to 12 pairs) and usually more acuminate leaflets: aments only 5 cm. long, with smaller calyx, 20 to 30 stamens, shorter anthers and more prominent connective: nut globose, 12 to 14 mm. in diameter, with very thick nearly solid walls.—Frequent in Texas and New Mexico.

3. **J. nigra** L. (Black walnut). A large and handsome tree (often 27 to 45 m. high), with rough brown bark and valuable purplish-brown wood, turning blackish with age: leaflets 7 to 11 pairs, ovate-lanceolate, taper-pointed, somewhat cordate or unequal at base, smooth above, minutely downy beneath (as well as the petioles): fruit globular, roughly dotted: nut corrugated, 4-celled at top and bottom.—Extending from the east to the valley of the Colorado and San Antonio. Principally used in the manufacture of furniture.

CUPULIFERÆ. (Oak Family.)

Monœcious trees or shrubs, with alternate simple straight-veined leaves, deciduous stipules, sterile flowers in catkins (or capitate-clustered in the beech), the fertile solitary or clustered or spiked, or in scaly catkins, and the 1-celled 1-seeded nut with or without an involucre.

* Flowers in scaly catkins, 2 or 3 to each bract: stamens 2 or 4, and calyx usually 2 to 4-parted: fertile flowers with no calyx and no involucre to the often winged small nut: ovary 2-celled, 2-ovuled.

1. **Betula**. Stamens 2, bifid: fertile scales thin, 3-lobed, deciduous with the broadly-winged nuts.

2. **Alnus**. Stamens 4: fertile scales thick, entire, persistent after the wingless nuts have fallen.

* * Sterile catkins with no calyx: stamens 3 or more to each simple bract and more or less adnate to it, the filaments often forked (anthers 1-celled): fertile flowers in short aments or heads, 2 to each bract, each with a foliaceous involucre to the small achene-like nut: ovary 2-celled 2-ovuled.

3. **Ostrya**. Each ovary and nut included in a bladdery and closed bag.

4. **Carpinus**. Each nut subtended by an enlarged leafy bractlet.

* * * Sterile flowers with 4 to 7-lobed calyx, and indefinite (3 to 20) stamens: fertile 1 or few, enclosed in a cupule consisting of consolidated bracts, which becomes indurated (scaly or prickly) and surrounds or incloses the nut.

← Sterile flowers in slender catkins.

5. **Quercus**. Cupule 1-flowered, scaly and entire: nut hard and terete.

6. **Castanea**. Cupule 2 to 4-flowered, forming a prickly hard bur, which is 2 to 4-valved when ripe.

← ← Sterile flowers in a small head.

7. **Fagus**. Cupule 2-flowered, 4-valved, containing 2 sharply triangular nuts.

1. BETULA L. (Birch.)

Trees, with dotted branchlets, mostly thin and light foliage, sessile scaly buds, the long sessile staminate catkins formed in summer and expanding their golden flowers in the following spring, the oblong or

cylindrical fertile ones peduncled and usually terminating very short 2-leaved lateral branches of the season, 3 sterile flowers (consisting each of a calyx of one scale bearing 4 short filaments with 1-celled anthers) and 2 bractlets to each shield-shaped scale or bract, fertile flowers 2 or 3 to each 3-lobed bract, the naked ovary becoming broadly winged, and the scale-like nutlet crowned with the 2 spreading stigmas.

1. **B. nigra** L. (RIVER OR RED BIRCH.) Tree with greenish-brown bark (somewhat laminate), and reddish twigs: leaves rhombic-ovate, whitish and (until old) downy beneath; petioles and peduncle about the same length (6 to 14 mm.) and with the oblong catkin tomentose: bracts with oblong-linear nearly equal lobes: fruit broadly winged.—Banks of streams, extending from the Atlantic States to the valley of the Trinity.

2. ALNUS Gaertn. (ALDER.)

Ours a small shrub, with few-scaled leaf buds, solitary or often racemose-clustered catkins terminating leafless branches or peduncles, the elongated sterile catkins with 4 or 5 bractlets and 3 (rarely 6) flowers upon each short-stalked peltate scale, 3 to 5-parted calyx and as many stamens, short simple filaments, 2-celled anthers, the fertile catkins ovoid-oblong, the fleshy scales each 2 or 3-flowered, with calyx of 4 little scales adherent to the scales or bracts of the catkin.

1. **A. serrulata** Willd. Forming dense thickets (seldom a small tree): leaves obovate, acute at base, sharply serrate with minute teeth, thickish, green on both sides, smooth or often downy beneath; stipules oval: flowers developed before the leaves from mostly clustered catkins which (of both sorts) were formed the foregoing summer and have remained naked through the winter: fruit ovate.—Extending westward to the valley of the Trinity.

3. CARPINUS L. (HORNBEAM. IRONWOOD.)

Trees or tall shrubs, with smooth close gray bark (together with buds and leaves resembling the beech), sterile flowers in cylindrical catkins consisting of several stamens in the axils of the entire scale-like bract, very short filaments (mostly 2-forked), 1-celled hairy-tipped anthers, the fertile flowers several in terminal spikes, the single involucre-like bractlet becoming foliaceous in fruit and merely subtending the small ovate several-nerved nut.

1. **C. Caroliniana** Walt. (AMERICAN HORNBEAM. BLUE OR WATER BEECH.) Small tree (3 to 12 m. high), with rigid trunk and very hard wood: leaves ovate-oblong, pointed, sharply doubly serrate, soon nearly smooth: bracts 3-lobed, halberd-shaped, sparingly cut-toothed on one side, acute. (*C. Americana* Michx.)—Along streams, extending into Texas (valley of the Trinity) from the Atlantic States.

4. OSTRYA Scop. (HOP HORNBEAM. IRONWOOD.)

Slender trees, with very hard wood, brownish furrowed bark, leaves open and concave in bud, flowers appearing with the leaves, the cylindrical sterile catkins 1 to 3 together at the tip of the branches of the preceding year, the short fertile ones single and terminating the shoots of the season, sterile flowers consisting of several stamens in the axil

of each bract, fertile two to each bract, ovary (with two long linear stigmas) bearded at apex and enclosed in a bladdery bag.

1. **O. Virginica** Willd. (AMERICAN HOP HORNBEAM. LEVER WOOD.) Tree 7 to 12 m. high, with hop-like strobiles ripe in summer: leaves oblong-ovate, taper-pointed, very sharply doubly serrate, downy beneath, with 11 to 15 principal veins; buds acute: involucral sacs bristly hairy at base.—Extending from the east into eastern Texas.

5. QUERCUS L. (OAK).

Trees or shrubs, flowering in spring and shedding their nuts the autumn of the same or next year, with greenish or yellowish flowers, the sterile catkin single or several from the same lateral bud, 3 to 12 stamens (with 2-celled anthers) to each flower, fertile flowers scattered or somewhat clustered and consisting of a nearly 3-celled and 6-ovuled ovary (with a 3-lobed stigma) inclosed by a scaly bud-like involucre which becomes an indurated cup (cupule) around the base of the rounded nut or acorn.

I. *Bark pale, often scaly: leaves and their lobes or teeth obtuse: stamens 6 to 8: scales of the cup more or less knobby at base: stigmas sessile, or nearly so: abortive ovules at base of perfect seed: inner surface of nut glabrous: fruit maturing the first year: kernel commonly sweetish: wood, tough and dense.*

* *Leaves deciduous, lyrate or sinuate-pinnatifid, pale beneath.*—WHITE OAKS.

1. **Q. alba** L. (WHITE OAK.) Large and valuable tree: mature leaves smooth, pale or glaucous beneath, bright green above, obliquely cut into 3 to 9 oblong or linear and obtuse mostly entire lobes: cup crateriform, rough or tubercled at maturity, naked, much shorter than the ovoid or oblong acorn (2.5 cm. long).—In all soils, extending westward to the valley of the Brazos.

2. **Q. minor** (Marsh.) Sargent. (POST OAK. IRON OAK.) A small tree with very durable wood: leaves grayish or yellowish-downy beneath, pale and rough above, thickish, sinuately cut into 5 or 7 rounded divergent lobes, the upper ones much larger and often 1 to 3-notched: cup deep saucer-shaped, naked, $\frac{1}{3}$ or $\frac{1}{2}$ the length of the ovoid acorn (12 to 18 mm. long). (*A. alba*, var. *minor* Marsh. *Q. stellata* Wang. *Q. obtusiloba* Michx.)—Sandy or sterile soils, extending from the Atlantic States to central Texas.

3. **Q. macrocarpa** Michx. (BUR OAK. OVER-CUP or MOSSY-CUP OAK.) Large and valuable tree: leaves obovate or oblong, lyrately pinnatifid or deeply sinuate-lobed, or nearly parted (sometimes nearly entire), irregular, downy or pale beneath; lobes sparingly and obtusely toothed, or the smaller ones entire: cup deep, thick, and woody (2 to 5 cm. across), conspicuously imbricated with hard and thick-pointed scales, the upper ones awned, so as to make a mossy-fringed border: acorn broadly ovoid (2.5 to 3 cm. long), $\frac{1}{2}$ immersed in or entirely enclosed by the cup.—Rich soils, extending from the Atlantic States to the valleys of the Colorado and Nueces.

4. **Q. lyrata** Walt. (OVER-CUP OAK. SWAMP POST OAK.) A large tree with flaky bark: leaves crowded at the ends of the branchlets, obovate-oblong, acute at base, more or less deeply 7 or 9-lobed, white tomentose beneath (or at length smoothish), the lobes triangular to oblong, acute or obtuse, entire or sparingly toothed: fruit short-peduncled: cup round-ovate, thin, with rugged scales, almost covering the depressed-globose acorn (16 to 20 mm. long).—River swamps, extending from the Southern States to the valley of the Trinity.

* * *Leaves coarsely sinuate-toothed but not lobed, whitish and more or less downy beneath: cup hoary, hemispherical or a little depressed, about one-half as long as the oblong-ovoid edible acorn.*—CHESTNUT OAKS.

5. **Q. Michauxii** Nutt. (BASKET OAK. COW OAK.) Large and valuable tree, with gray flaky bark and large sweet acorns (3.5 cm. long): leaves (12 to 15 cm.

long) oval or obovate, acute, obtuse or even cordate at base, regularly dentate, rather rigid, usually very tomentose beneath: stamens usually 10: fruit short-peduncled: cup shallow, tuberculate with hard and stout acute scales, without fringe. (*Q. Prinus*, var. *Michauxii* Chap.)—Along streams and swamps, extending from the Atlantic States to the valley of the Trinity.

6. **Q. Prinus** L. (CHESTNUT OAK.) A large tree, with thick and deeply furrowed bark (rich in tannin): leaves thick, obovate or oblong to lanceolate, sometimes acuminate, with obtuse or acute base, undulately crenate-toothed, pale and minutely downy beneath, the primary ribs straight, 10 to 16 pairs, prominent beneath: fruiting peduncle shorter than petiole: cup thick (12 to 24 mm. across), mostly tubercled with hard stout scales: acorn large (sometimes 2.5 to 3 cm. long). (Incl. var. *monticola* Michx.)—Rocky banks and hillsides of the Atlantic States, and reported from Gillespie County (*Jermy*).

7. **Q. Muhlenbergii** Engelm. (YELLOW CHESTNUT OAK.) Tall tree, with thin flaky bark: chestnut-like leaves (12 to 17 cm. long) slender-petioled, oblong or lanceolate, usually pointed, obtuse or roundish at base, almost equally and rather sharply toothed, the primary veins straight and prominent beneath: acorn globose or obovate (14 to 18 mm. long). (*Q. Prinus*, var. *acuminata* Michx.)—Extending from the east to the valley of the Nueces and the Guadalupe mountains.

8. **Q. prinoides** Willd. Like the last, but of low stature (6 to 12 dm. high), with smaller more undulate leaves on shorter petioles (6 to 12 mm. long), and deeper cups with more swollen scales. (*Q. Prinus*, var. *humilis* Marsh.)—Extending into Texas from the Atlantic States.

* * * *Leaves coriaceous, entire, lobed, or rarely spiny-toothed.*—LIVE OAKS.

+ *Shrubs: leaves deciduous.*

9. **Q. undulata** Torr. Very variable in foliage and to some extent in stature: leaves oblong, 5 cm. long or more (sometimes less), undulate or lobed, with 1 to 3 rather obtuse scarcely mucronate teeth on each side, densely and softly pubescent beneath, nearly smooth above: acorns edible, oval, oblong, sometimes elongated.—Common west of the Devils River and east to the Colorado. Var. GUNNISONI Engelm., extending into western Texas from the west, has large (10 to 15 cm. long) strongly-lobed (divisions narrow and entire) darker green decidedly deciduous leaves, narrower calyx-lobes, and ciliate often thicker and shorter acorns. (*Q. alba*, var. *Gunnisoni* Torr.). Var. JAMESII Engelm., of the same range, is similar, but with smaller and more rigid leaves with acute lobes.

10. **Q. Gambelii** Engelm. Resembling *Q. undulata*, but a bush or small-sized tree, with larger bluntly lobed (lobes often retuse or notched) dark green leaves, and commonly larger elliptical edible nuts in deep strongly tubercled cups. (*Q. undulata*, var. *Gambelii* Engelm.)—Extending into western Texas from the west.

++ *Trees: leaves persistent (except No. 11).*

11. **Q. Durandii** Buckley. Tree 21 to 24 m. high: leaves subcoriaceous, strongly reticulated, obovate-oblong, with cuneate base and short obtuse lobes, smooth above, pale and pubescent beneath: fruit sessile, solitary or in pairs, the cup depressed-hemispherical (12 mm. across): edible acorns shining, ovate, about 9 mm. long. (*Q. obtusifolia*, var.? *breviloba* Torr.)—Extending from the Gulf States into western Texas where it is common, and the most valuable white oak.

12. **Q. grisea** Lieb. Tree 15 to 24 m. high, with yellow tomentose branches: leaves elliptical or oblong (5 to 7 cm. long), often cordate at base, rarely obtuse, entire or scarcely mucronate-dentate, glabrate above, thickly stellate-pubescent beneath on very short petioles: cup hemispherical, 16 mm. broad, cinereous-tomentose: acorn slender (12 to 20 mm. long).—In the mountains of western Texas, where it is the most abundant oak. "This species and *Q. undulata* deserve notice as producers of tannin" (Havard).

13. **Q. oblongifolia** Torr. Tree 6 to 9 m. high, with pale smoothish bark: leaves oblong, 2.5 to 5 cm. long and half as wide, on very short petioles, entire (or with few blunt teeth), obtuse at each end or subcordate at base, entirely glabrous (at first soft-downy), almost without reticulation: cups sessile, hemispherical, tubercled: acorns oblong (1.5 to 2.5 cm. long).—Mountains of the Limpia, and westward.

14. **Q. Virginiana** Mill. (LIVE OAK.) Rather large tree: leaves small, oblong-elliptical (6 to 7 cm. long), entire (or rarely spiny toothed), hoary beneath as well as the branchlets: peduncle conspicuous, 1 to 3-fruited: cup top-shaped: acorn oblong. *Q. virens* Ait.—Common along water courses extending from the Gulf States through southern and western Texas to the mountains of New Mexico. Used principally in shipbuilding.

15. **Q. hypoleuca** Engelm. An evergreen black oak, becoming 9 m. high, with dark rough bark: leaves lanceolate or oblong-lanceolate, tapering into a short petiole, 5 to 8 cm. long, revolute on the margin, entire (or with few broad teeth toward the apex), glabrous and shining above, white-tomentose beneath: cup hemispherical, with triangular obtuse scales: acorns ovate. (*Q. confertifolia* in Torr. Mex. Bound.)—In the Limpia mountains and westward. This species and the following are intermediate between the white and black oaks.

16. **Q. Emoryi** Torr. A shrubby or arborescent black oak (12 to 15 m. high), with black bark and downy branchlets: leaves coriaceous, 3 to 4.5 cm. long, on very short downy petioles, lanceolate with cordate or hastate base, tapering to a sharp point, spinose-dentate, rarely entire: cup hemispherical, with triangular obtuse almost flat scales covering about one-third of the oblong long-pointed acorn (17 mm. long).—Throughout the mountain ranges of western Texas, and extending into New Mexico. Wood very heavy.

II. *Bark dark and furrowed: leaves deciduous, the lobes and teeth acute and bristle-pointed: stamens mostly 4 to 6: cup-scales membranaceous: styles long and spreading: abortive ovules near the top of the perfect seed: inner surface of the nut tomentose: fruit maturing the second year, sessile or on short thick peduncles: wood porous and brittle.*—BLACK OAKS.

* *Leaves pinnatifid or lobed, slender petioled, not coriaceous, the lobes or teeth conspicuously bristle-pointed.*

+ *Mature leaves glabrous (or nearly so) on both sides, oval, oblong or obovate, sinuately pinnatifid, turning various shades of red and crimson in autumn: large trees, with reddish coarse-grained wood.*

17. **Q. rubra** L. (RED OAK.) Bark of trunk gray and smoothish: leaves rather thin, turning dark red after frost, moderately pinnatifid, the lobes acuminate from a broad base, with few coarse teeth: cup saucer-shaped or flat, with a narrow raised border (18 to 24 mm. across), of rather fine close appressed scales, sessile or on a very short abrupt narrow stock or neck, very much shorter than the oblong-ovoid or ellipsoidal acorn, which is 2.5 cm. or less long.—Extending to the valleys of the Colorado and San Antonio. Not abundant, and timber poor. Var. TEXANA Buckley, extending from the Colorado to the Nueces and the Limpia mountains, is a tree 20 to 24 m. high, with heavier and harder wood, much smaller oblong deeply sinuate-pinnatifid leaves glabrous or shining on both sides and with 2 or 3 scarcely dentate lobes, and acorns scarcely $\frac{1}{3}$ as large.

18. **Q. coccinea** Wang. (SCARLET OAK.) Bark gray, with reddish interior: leaves bright green, shining above, turning red in autumn, deeply pinnatifid, the slender lobes divergent and sparingly cut-toothed: cup top-shaped or hemispherical with conical base (14 to 18 mm. broad), coarsely scaly, covering $\frac{1}{2}$ or more of the broadly or globular-ovoid acorn (12 to 18 mm. long), the scales somewhat appressed and glabrate (sometimes as in the var.)—An Eastern species, reported from Sutherland Springs. Var. TINCTORIA Gray (QUERCITRON. YELLOW-BARKED or BLACK OAK) occurs in east Texas and in rocky ravines and mountains near the mouth of the Pecos. It has leaves

with broader undivided lobes, paler and somewhat pubescent beneath, turning brownish, orange or dull red in autumn; large yellowish-gray pubescent and loosely imbricated cup-scales (or squarrose when dry); and darker rougher thicker bark orange within. (*Q. tinctoria* Bart.)

19. **Q. palustris** Du Roi. (SWAMP SPANISH or PIN OAK.) Leaves deeply pinnatifid, with divergent lobes and broad rounded sinuses: cup flat-saucer-shaped, sometimes contracted into a short scaly base or stalk, fine-scaled (10 to 14 mm. broad), very much shorter than the usually globose or depressed acorn (10 to 14 mm. long).—Low grounds, extending to the valley of the Colorado.

+ + Mature leaves soft-downy beneath: cup saucer-shaped, with a somewhat top-shaped base, about ½ the length of the fully developed acorn.

20. **Q. digitata** (Marsh.) Sudworth. (SPANISH OAK.) A large or small tree, extremely variable in foliage: leaves grayish-downy or fulvous beneath, obtuse or rounded at base, 3 to 5-lobed above (sometimes entire); the lobes prolonged, mostly narrow and more or less scythe-shaped, especially the terminal one, entire or sparingly cut-toothed: acorn globose, 8 to 10 mm. long.—*Q. nigra digitata* Marsh. *Q. falcata* Michx.) Dry or sandy soils, extending from the Atlantic States to the valley of the Brazos.

** * Leaves entire or with a few teeth (sometimes 3 or 5-lobed at summit), coriaceous, commonly bristle-pointed: acorns globular, small (not over 12 mm. long).*

+ Leaves widening or often much dilated above and more or less sinuate or somewhat 3 or 5-lobed: acorns globular-ovoid.

21. **Q. aquatica** Walt. (WATER OAK.) Small tree (9 to 12 m. high), with smooth bark: leaves glabrous and shining, obovate-spatulate or narrowly cuneate, with a long tapering base and an often obscurely 3-lobed summit, varying to oblanceolate: cup saucer-shaped or hemispherical. —Wet grounds, extending from the South Atlantic States to the valley of the Colorado.

22. **Q. nigra** L. (BLACK-JACK or BARREN OAK.) Small tree (6 to 12 m. high): leaves broadly cuneate, but sometimes rounded or obscurely cordate at base, widely dilated and somewhat 3-lobed (rarely 5) at summit, occasionally with 1 or 2 lateral conspicuously bristle-tipped lobes or teeth, rusty pubescent beneath, shining above, large (1 to 2 dm. long): cup top-shaped, coarse scaly: acorn short-ovoid.—Extending to the valleys of the Colorado and Nueces. Timber of little value.

+ + Leaves not dilated upward, generally entire: acorn globose.

23. **Q. cinerea** Michx. (HIGH-GROUND WILLOW-OAK.) Small tree fruiting abundantly: leaves perennial, oblong-lanceolate (5 to 7 cm. long), white-tomentose beneath (scurfy like the branchlets when young): cup shallow, narrowed at base, pale, enclosing one-third of the acorn.—Sandy barrens, extending from the Gulf States to the valley of the Brazos.

24. **Q. Phellos** L. (WILLOW-OAK.) Slender tree (12 to 15 m. high): leaves linear-lanceolate, narrowed to both ends, soon glabrous, light green (scurfy like the branchlets when young), 5 to 7 cm. long: cup flat saucer-shaped, inclosing the base of the acorn.—Rich soils, extending from the North Atlantic States to the valley of the Sabine.

25. **Q. heterophylla** Michx. (BARTRAM'S OAK.) Small tree (12 to 15 m. high), with hard and very strong wood: leaves smooth and shining above, tomentose on veins beneath, on long petioles, oblong or oblong-ovate (10 to 15 cm. long), round or subcordate at base, the margin with a few shallow tooth-like (setaceous-acuminate) lobes or only wavy: acorn subglobose, in a hemispherical cup with oblong-ovate obtuse scales.—Reported from eastern Texas (*Hall*). A very confused species and possibly a hybrid.

6. CASTANEA L. (CHESTNUT.)

Trees or shrubs, with oblong petioled sharply serrate straight-veined leaves, flowers appearing later than the leaves and axillary near the ends of the branches, the fertile at the base of the naked cream-colored catkins which have mostly a 6-parted calyx, 8 to 20 stamens with slender filaments and 2-celled anthers, fertile flowers in an ovoid prickly involucre, with calyx with a 6-lobed border, 5 to 12 abortive stamens, linear exserted styles, and ovoid coriaceous nuts (1 to 3) in the hard and very prickly involucre.

1. **C. pumila** Mill. (CHINQUAPIN.) A spreading shrub or small tree: leaves oblong-lanceolate, acute, white downy beneath: involucres small, often spiked: the ovoid pointed nut scarcely half as large as the common chestnut, very sweet, solitary, not flattened.—Rich hillsides and borders of swamps, extending from the Atlantic States to the valley of the Nueces.

7. FAGUS L. (BEECH.)

Trees, with a close and smooth grayish bark, straight-veined leaves appearing with the flowers, the sterile in small heads on drooping peduncles with deciduous scale-like bracts, bell-shaped 5 to 7-cleft calyx, 8 to 16 stamens with slender filaments and 2-celled anthers, the fertile solitary or in pairs at the apex of short peduncles, surrounded by linear bractlets and a 4-lobed involucre, 6 subulate calyx-lobes, 3-celled ovary with 2 ovules in each cell, filiform styles, and 2 acutely triangular nuts inclosed in the soft spiny 4-valved involucre.

1. **F. atropunicea** (Marsh.) Sudworth. (AMERICAN BEECH.) Tree 20 to 30 m. high: leaves oblong-ovate, taper-pointed, distinctly and often coarsely toothed; petioles and midrib soon nearly naked: prickles of the fruit mostly recurved or spreading: nuts edible. (*F. sylvatica*, var. *atropunicea* Marsh. *F. ferruginea* Ait.)—Clay soils, extending from the Atlantic States to the valley of the Trinity.

SALICINEÆ. (WILLOW FAMILY.)

Diœcious trees or shrubs, with both kinds of flowers naked (one to each bract) in catkins, the fruit a 1-celled and 2 to 4-valved pod bearing numerous seeds furnished with long silky down, style short or none, 2 stigmas (often 2-lobed), and alternate undivided leaves with scale-like (deciduous) or leaf-like (persistent) stipules. Wood soft and light, with bitter bark.

1. **Salix**. Bracts entire: flowers with small glands; disks none: stamens few: stigmas short: buds with a single scale.

2. **Populus**. Bracts lacerate: flowers with a broad or cup-shaped disk: stamens numerous: stigmas elongated: buds scaly.

1. SALIX L. (WILLOW. OSIER.)

Small trees or shrubs, with round and lithe branches, entire or glandular-toothed taper-pointed leaves, bud scales with an inner adherent membrane, aments on short leafy branchlets (the yellowish scales deciduous), sterile flowers of 2 to 10 distinct stamens accompanied by 1 or 2 small glands, and the fertile with a small flat gland at base of ovary.

* *Leaves closely serrate with inflexed teeth: scales entire: pods glabrous: sterile catkins elongated: rough trees.*

1. S. nigra Marsh. (BLACK WILLOW.) Leaves narrowly lanceolate, very long attenuate from near the roundish or acute base to the usually curved tip, becoming green and glabrous (except the petiole and midrib); stipules large, semicordate, pointed and persistent: fruiting aments (3 to 7.5 cm. long) more or less dense: pods ovate-conical, short-pediceled.—On banks, bending over the water of most streams of western Texas. Var. WRIGHTII Anders., of the upper Rio Grande and westward, has shorter more densely flowered thicker aments, long-pediceled pods, and lanceolate-linear leaves.

2. **S. amygdaloides** Anders. Leaves lanceolate or ovate-lanceolate (5 to 10 cm. long), attenuate-cuspidate, pale or glaucous beneath, on long slender petioles; stipules minute, early deciduous: fertile aments becoming very loose in fruit from the lengthening of the slender pedicels.—Common on the Rio Grande, from El Paso to old Fort Quitman.

* * *Leaves remotely denticulate with projecting teeth: stamens 2: pod glabrous or silky: shrubs.*

3. **S. longifolia** Muhl. Clumpy shrubs, rooting in alluvial deposits: leaves linear-lanceolate (7 to 10 cm. long, 2 to 10 mm. broad), tapering at each end, nearly sessile, more or less silky when young, at length smooth and green on both sides: stipules small, lanceolate, deciduous: aments linear-cylindric, often clustered at the ends of the branchlets: pod short-pedicelled: stigma large, sessile.—Common along the water courses, from the Pecos to the lower Rio Grande and northward. Var. ARGYROPHYLLA Anders., of western Texas and northwestward, has leaves and pods clothed with a lustrous silky tomentum (*S. argyrophylla* Nutt.) Var. EXIGUA Bebb, of western Texas and westward, has narrowly linear leaves 5 to 7.5 cm. long and less than 2 mm. wide. (*S. exigua* Nutt.)

4. **S. taxifolia** HBK. Shrub 15 to 18 dm. high, with short divaricate branches thickly set with numerous distichous yew-like leaves, which are 6 to 12 mm. long and 2 mm. wide, acute, obsoletely denticulate and silky-pubescent: aments oblong, densely flowered, terminating the branchlets, usually clustered; scales obovate, ciliate on the margins: pod sessile, ovate-conical: stigma bifid.— Extending from the west into western Texas.

2. POPULUS L. (POPLAR. ASPEN.)

Trees, with broad and more or less cordate or ovate-toothed leaves, scaly buds covered with resinous varnish, long drooping catkins appearing before the leaves, flowering disk obliquely lengthened in front, 8 to 60 stamens with distinct filaments, 2 to 4 elongated stigmas, and a 2 to 4-valved pod.

* *Styles 2, with 2 or 3 narrow or filiform lobes: pod small, thin, oblong-conical, 2-valved: seeds very small: leaves ovate.*

1. **P. tremuloides** Michx. (AMERICAN ASPEN.) Small tree 6 to 15 m. high, with smooth greenish-white bark: leaves roundish-cordate, with a sharp point and small somewhat regular teeth, smooth on both sides, with downy margins, on slender petioles (flattened laterally): scales cut into 3 or 4 deep linear divisions, fringed with long hairs: bracts silky: stamens 7 to 10.— Along water courses, throughout the State.

* * *Styles 2 to 4, with dilated lobes: pod large, often thick, subglobose to ovate-oblong, 2 to 4-valved: bracts mostly glabrous: stamens 60 or more: seeds 2 to 4 mm. long.*

2. **P. monilifera** Ait. (COTTONWOOD. NECKLACE POPLAR.) Tree 20 to 40 m. high: leaves broadly deltoid, with numerous crenate serratures and narrow very acute acumination, sometimes ovate, rarely cordate, on elongated flattened petioles: scales lacerate-fringed, not hairy: pods on slender pedicels, in long catkins, oblong-ovate, 3 to 4-valved (Incl. *P. angulata* Ait.)—Extending into the mountains of western Texas.

3. **P. Fremonti** Watson. A large tree, with gray cracked bark: leaves broadly deltoid (or somewhat reniform), with a broad acute apex and more or less of a sinus at base, few serratures (4 to 12 on each side), on petioles 2.5 to 7 cm. long: aments with glabrous rhachis and bracts; the staminate loose, with pedicels 16 to 20 mm. long and the conspicuous disk 6 to 8 mm. broad; the fruiting 7 to 10 cm. long: pod 6 to 8 mm. long, on short stout pedicels, the disk 6 mm. broad; valves 3, thick coriaceous: seeds white.—Along water courses throughout the State. Var. (?) WISLIZENI Watson, of the Rio Grande valley from El Paso to the Gulf, has sharply acuminate leaves truncate or slightly cuneate at base, staminate aments with shorter pedicels and less dilated thin disks, pistillate very slender (5 to 15 cm. long), disk 4 to 6 mm. broad, and ovate to ovate-oblong somewhat angled 3 (usually 4)-valved pods (8 to 10 mm.) long on slender pedicels.

CERATOPHYLLEÆ. (HORNWORT FAMILY.)

Aquatic herbs, with whorled finely dissected leaves, minute axillary sessile monœcious naked flowers, but with an 8 to 12-cleft involucre in the place of calyx, the fertile a simple 1-celled ovary with a suspended ovule, and the seed filled by a highly developed embryo.

1. CERATOPHYLLUM L. (HORNWORT.)

Herbs growing under water, with the sessile leaves cut into thrice-forked filiform rigid divisions, sterile flowers of 10 to 20 stamens of sessile anthers, and the achene beaked with the slender persistent style.

1. **C. demersum** L. Fruit smooth, marginless, the long style with a short spine or tubercle at the base on each side.—Var. ECHINATUM Gray, found in slow streams and ponds across the continent, has the fruit mostly larger (6 mm. long), rough-pimpled on the sides, the narrowly winged margin spiny-toothed.

Subclass II. MONOCOTYLEDONS: those whose embryos have a single cotyledon; the stems with more or less scattered fibro-vascular-bundles; the leaves usually parallel-veined; and the flower usually 3-merous.

HYDROCHARIDEÆ. (Frog's-bit Family.)

Aquatic herbs, with diœcious or polygamous regular flowers (sessile or on scape-like peduncles from a spathe), single or double floral envelopes united into a tube (in the fertile flowers) and coherent with the 1 to 3-celled ovary, 3 to 12 distinct or monadelphous stamens with 2-celled anthers, 3 to 6 stigmas, and the many-seeded indehiscent fruit ripening under water.

* Ovary 1-celled: stigmas 3.

1. Elodea. Stems elongated, submerged: leaves verticillate (rarely opposite): perianth-tube long filiform.

2. **Vallisneria.** Stemless, grass-like, submerged: leaves elongated: fertile flowers solitary on a very long scape.

* * Cells of the ovary and stigmas 6 to 9.

3. **Limnobium.** Stemless, floating: leaves broad, long-petioled.

1. ELODEA Michx. (Water-weed.)

Perennial herbs, with elongated branching stems, numerous whorled or opposite sessile leaves, polygamo-diœcious sessile solitary flowers from a sessile tubular 2-cleft axillary spathe, the minute sterile flowers with 3 sepals and petals and 9 stamens, fertile flowers pistillate or perfect with perianth extended into an extremely long tube with 6-parted limb, 3 to 9 stamens, capillary style adnate to the tube, 2-lobed or notched exserted stigmas, and an oblong coriaceous few-seeded fruit.

1. **E. Canadensis** Michx. Leaves in 3s or 4s, or the lower opposite, varying from linear to oval-oblong, minutely serrulate: stamens 9 in the sterile flowers, 3 or 6 almost sessile anthers in the fertile. (*Anacharis Canadensis* Planchon.)—Slow streams and ponds.

2. VALLISNERIA L. (Tape-grass. Eel-grass.)

Submerged stemless plants, with grass-like leaves, monœcious flowers, the sterile numerous and crowded in a head on a conical receptacle enclosed in an ovate at length 3-valved spathe which is borne on a very short scape and with mostly 3 stamens, the fertile solitary and sessile in a tubular spathe upon an elongated scape, the linear perianth-tube coherent with the 1-celled ovary, 3 large nearly sessile 2-lobed stigmas, and elongated cylindrical berry-like fruit.

1. **V. spiralis** L. Leaves linear, thin, long and ribbon-like (3 to 18 dm. long), obscurely serrulate, obtuse, somewhat nerved and net-veined.—Common in slow waters, extending from New England to Texas.

3. LIMNOBIUM Richard. (American frog's-bit.)

Stemless perennial herb floating in stagnant waters, with slender hairy rootlets, round cordate leaves which are spongy-reticulated and purplish beneath, diœcious flowers from sessile or somewhat peduncled spathes, sterile spathe 1-leaved, producing about 3 long-pedicelled flowers, fertile 2-leaved with a single short-pedicelled flower, 3-parted or cleft calyx with oblong-oval sepals, 3 oblong-linear petals, filaments united into a column bearing 6 to 12 linear anthers, 6 to 9-celled ovary forming an ovoid many-seeded berry in fruit, and the subulate 2-parted stigmas as many as the cells.

1. **L. Spongia** Richard. Leaves 2.5 to 5 cm. long, faintly 5-nerved: peduncle of sterile flower 7.5 cm. long and filiform, of the fertile only 2.5 long and stout.—Stagnant waters near San Antonio.

BURMANNIACEÆ. (Burmannia Family.)

Small annual herbs, with minute and scale-like leaves or those at the root grass-like, perfect flowers with a 6-cleft corolla-like perianth whose tube adheres to the 1 or 3-celled ovary, 3 distinct stamens opposite the inner perianth-divisions, and pod with many very minute seeds.

1. BURMANNIA L.

Herbs, with 3 very short filaments, 3-celled ovary with thick axillary placentæ, slender style, capitate 3-lobed stigma, and pod often 3-winged.

1. **B. biflora** L. Stems low and slender (5 to 10 cm. high), 2-flowered at summit or soon several-flowered: perianth (5 to 7 cm. long) bright blue, 3-winged.—Peaty bogs, extending from the Gulf States into eastern Texas.

ORCHIDEÆ. (Orchis family.)

Perennial herbs, with simple stems from fibrous or tuberous roots, mostly alternate leaves, perfect irregular flowers, 6-parted perianth united below with the 1-celled ovary, the 3 outer divisions (sepals) and 2 of the inner ones (petals) similar but the third (labellum or lip) differing from the others, 1 or 2 gynandrous stamens with pollen-grains cohering in one or more waxy masses (pollinia), 3-valved pod with 3 parietal placentæ, and numerous minute seeds.

*Anthers terminal, operculate; pollinia smooth and waxy, 2 or 4 in each cell and distinct: flowers racemose.

+ Green-foliaged plants from solid bulbs, with solitary leaf.

1. **Achroanthes.** Flowers minute, greenish: petals filiform.

+ + Leafless, with coralloid roots: whole plant brownish or yellowish.

2. **Corallorhiza.** Flower gibbous or somewhat spurred, and lip with 1 to 3 ridges: sepals and petals 1 to 3-nerved.

3. **Hexalectris.** Flower not gibbous, and lip with 5 or 6 ridges: sepals and petals several-nerved.

* * Anthers erect upon the back of the column at summit, or terminal and opercular; pollinia granular or powdery, more or less cohering in 2 to 4 delicate masses and attached at apex to the beak of the stigma.

\+ Anthers without operculum: flowers small, in spikes: pollinia 2.

4. **Gyrostachys.** Stem leafy below from tuberous-fascicled roots: flowers 1 to 3-ranked in a twisted spike.

\+ \+ Anthers operculate.

5. **Peramium.** Stem stout, very leafy: flowers racemose.

6. **Cathea.** Stem scapose: leaf solitary, grass-like: flowers large: pollinia 4.

* * * Anthers without operculum, the cells adnate to the top of the column; pollinia 2, of coarse grains united by an elastic web, each attached at base by a stalk to a viscid gland.

7. **Habenaria.** Glands naked, either approximate or widely separate: flowers ringent and spurred, spicate upon a leafy stem.

1. ACHROANTHES Raf. (Adder's-mouth.)

Low bulbous simple-stemmed herbs, with solitary leaf, raceme of minute greenish flowers, spreading oblong sepals, spreading linear or filiform petals, the subentire non-tuberculate lip auricled or ovate at base, the very small round column with 2 teeth or auricles at summit and the erect anthers between them, and 4 waxy pollen-masses (2 to each cell in one row) cohering (without stalks, threads, or gland) by pairs at the apex. (*Microstylis* Nutt.)

1 **A. monophylla** (Lindl.) Greene. Slender (1 to 1.5 dm. high): leaf sheathing the base of the stem, ovate-elliptical: racemes spiked, long and slender; pedicels not longer than the flowers: lip truncate-3-lobed at summit, the middle lobe very small: pollinia sometimes only one in each cell. (*Microstylis monophyllos* Lindl.)—Eastern Texas, near Hockley, and Trinity River.

2. CORALLORHIZA R. Br. (Coral-root.)

Brownish or yellowish herbs destitute of green foliage, with much-branched and coral-like rootstocks, solitary scape with membranaceous sheaths, simple raceme of small dull-colored flowers, the ascending 3-nerved sepals and petals similar and nearly equal, but the lateral sepals oblique at base and either decurrent in a short spur adnate to the side of the ovary or gibbous above it, lip slightly adherent to the base of the 2-edged straightish column, and 4 pollinia obliquely incumbent.

1. **C. odontorhiza** Nutt. Light brown or purplish: stems rather slender, bulbous-thickened at base (1.5 to 3 dm. high), 6 to 20-flowered: pedicels rather slender: perianth about 6 mm. long; lip entire or merely denticulate, thin, broadly ovate or obovate, abruptly contracted into a claw-like base, the lamellæ a pair of short projections; spur wholly adnate to summit of ovary: pod short oval (at first acute at base), 8 mm. long.—Eastern Texas, from Hockley to the Trinity.

3. HEXALECTRIS Raf.

Leafless plants, with the several-nerved nearly equal somewhat spreading sepals and petals free and neither gibbous nor spurred at base, the obovate lip with 5 or 6 prominent ridges down the middle

(3-lobed above, middle lobe somewhat concave), 8 pollen-masses, and otherwise as in *Corallorhiza*.

1. **H. aphyllus** Raf. Stem 3 to 6 dm. high, beset with purplish scales, the lower sheathing: flowers racemed, bracteate, brownish-purple, 12 to 16 mm. long. (*Bletia aphylla* Nutt.)—Rich woods, extending from the Gulf States through Texas into Mexico.

4. GYROSTACHYS Pers. (Ladies' tresses.)

Leafy plants, with clustered-tuberous roots, stems leafy at base, small white flowers in a regular or one-sided or spirally twisted spike, nearly equal sepals and petals (lateral sepals diverging and dilated at base, upper connivent with the petals), the clawed concave lip furnished with 2 callosities near the base and involute around the lower part of the column, ovate beaked stigmas, anthers attached to back of column, and 2 obovate 2-cleft powdery pollen-masses fixed to a common gland of the stigma. (*Spiranthes* Richard.)

1. **G. cernua** (L.) Kuntze. Stem leafy below and leafy-bracted above (1.5 to 4 dm. high): leaves linear-lanceolate, the lowest elongated (1 to 3 dm. long): spike cylindrical, rather dense (5 to 12 cm. long) and with white fragrant flowers, pubescent or nearly smooth: perianth horizontal or recurving (8 to 10 mm. long); the lower sepals not upturned or connivent with the upper; lip oblong, longer than the sepals, contracted above the middle, wavy at the recurved obtuse apex, the callosities at the base prominent, nipple-shaped, somewhat hairy: glands of the stigma linear, in a long and very slender beak. (*Ophrys cernua* L. *Spiranthes cernua* Richard.)—From Hockley to the Trinity.

2. **G. gracilis** (Bigelow) Kuntze. Stem very slender (1.5 to 3 dm. high), smooth throughout, scape-like: lowest leaves lanceolate or elliptical (2.5 to 5 cm. long), spreading: spike very slender, with the minute flowers (2 to 4 mm. long) on one side of the rhachis or sparingly spiral, smooth: lip finely crenulate on the margins. recurved and acute at apex, with 2 nipple-shaped callosities at base: anthers 4-cleft. (*Spiranthes gracilis* Bigelow.)—From Hockley to the Trinity.

3. **G. cinnabarina**. (Llave) Kuntze. Stem scape-like, pilose: radical leaves oblong-lanceolate, acute: spike large, conical-thyrsoid and compact, with lanceolate dull olive-green bracts shorter than the pilose flowers, which are vermillion red externally and bright yellow within: sepals and petals linear-lanceolate, acuminate, spreading at apex: lip glabrous, narrowed and channeled at base. (*Neottia cinnabarina* Llave. *Stenorrhynchus cinnabarinus* Lindl. *Spiranthes cinnabarina* Watson.)—A very showy Mexican species, found in one locality in the Chisos mountains. (*Havard*).

5. PERAMIUM Salisb.

Stems leafy, from creeping rootstocks, with racemed flowers, conspicuous bracts, nearly equal sepals and petals, the free lip narrowly constricted at the middle, short and erect column, sessile anthers behind the broad truncate stigma, the coarsely granular pollen-masses becoming attached to the gland capping the small rounded beak of the stigma, and ovaries at right angles to the stem. (*Epipactis* Haller.)

1. **P. giganteum** (Dougl.) Stem 3 to 12 dm. high, nearly smooth: leaves from ovate (below) to narrowly lanceolate (above), somewhat scabrous on the veins beneath: racemes pubescent: flowers greenish, strongly veined with purple: saccate base of lip with erect wing-like margins, strongly nerved and the nerves callous-tuberculate near the base. (*Epipactis gigantea* Dougl.)—Extending into western Texas from the west.

6. **CATHEA** Salisb.

Scape erect from a solid tuber, sheathed below by the base of the grass-like leaf, naked above, bearing several large flowers, with lanceolate-ovate spreading sepals and petals nearly alike, lip (the ovary or stock not twisting) brought to the upper or inner side of the flowers (dilated at apex, bearded on face, narrowed to a hinge-like claw), the free slender column winged at apex, terminal lid-like sessile anthers, and the 4 pollen-masses (of soft powdery grains) lightly connected by delicate threads.

1. **C. tuberosa** (L.) Salisb. Leaf linear: scape (3 dm. high) 2 to 6-flowered: flowers 2.5 cm. broad, pink-purple: lip as if hinged at the insertion, beautifully bearded toward the dilated summit with white, yellow and purple clavate hairs. (*Limodorum tuberosum* L. *Calopogon pulchellus* R.Br.)—Moist ravines, near the Pecos.

7. **HABENARIA** Willd. (Rein-orchis.)

Herbs, with fleshy fibrous roots, leafy stems, spiked flowers, nearly equal sepals (the lateral reflexed) and petals, pendent lip spurred below, contiguous and nearly parallel anther-cells, 2 pollinia of coarse waxy grains, and 2 naked glands.

1. **H. flava** (L.) Gray. Stems 15 to 30 cm. high: leaves ovate-oblong or oblong-lanceolate, the upper linear-lanceolate and pointed, passing into the bracts of the elongated (at first dense) raceme: lip furnished with a tooth on each side and a strong nasal protuberance in the middle of the base, oblong, truncate-obtuse, about the length of the sepals, half the length of the slender clavate spur: glands dilated orbicular and incurved. (*Orchis flava* L. *H. virescens* Spreng.)—From Hockley to the Trinity.

BROMELIACEÆ. (Pine-apple Family.)

Herbs (or scarcely woody plants), the greater part epiphytes, with long rigid persistent scurfy leaves, 6-cleft perianth free from the ovary, 6 stamens, introrse 2-celled anthers, and a 3-celled 3-valved berry-like fruit with stalked seed.

1. **Hechtia.** Tall diœcious plants: not epiphytes.
2. **Tillandsia.** Flowers perfect: epiphytes.

1. **HECHTIA** Klotsch.

Terrestrial herbs, with densely rosulate long rigid strongly spinose-dentate leaves, a long terminal peduncle bearing a large panicle (or raceme), free ovate imbricate sepals, the slightly connate petals a little longer, stamens in the staminate flowers (staminodia in the pistillate) adnate to the base of the corolla, and a 3-sulcate pod with short-appendiculate seeds.

1. **H. Texensis** Watson. Leaves 3.5 to 4.5 dm. long, 3 to 5 cm. broad at base, white scurfy beneath, glabrous above, with 10 to 12 large curved teeth: fertile flower-stems 6 to 12 dm. high, bearing a simple pubescent panicle (6 dm. long) with ascending branches: flowers solitary and sessile along the branches, subtended by a broadly deltoid-ovate scarious brownish bract: sepals broadly ovate, acute, 4 mm.

long, brownish and nerved: petals white, 8 mm. long, oblong-ovate, nerved: stamens none: ovary and stigmas pubescent: pod glabrate, 10 mm. long: staminate inflorescence unknown.—On limestone bluffs of the Great Bend of the Rio Grande.

2. TILLANDSIA L. (Long moss.)

Epiphytes, with scurfy channeled crowded leaves, the 3 membranaceous sepals and 3 colored petals connivent below into a tube with lanceolate spreading lobes, hypogynous stamens, filiform style, 3 stigmas, cartilaginous pod (valves splitting into two layers), and several or many clavate pointed seeds raised on a long hairy-tufted stalk.

1. **T. usneoides** L. (Common long-moss. Black-moss.) Stems filiform, branching, pendulous: leaves thread-shaped: peduncle short, one-flowered: flower yellow.—Hanging on trees, forming long tufts, southern Texas, but not north of the mouth of the Pecos.

2. **T. recurvata** L. Cespitose (1.5 dm. high): leaves 2-ranked, ash-colored, bristle-subulate, narrowly channeled, recurved, subterete, shorter than the stem, which is naked above and 1 or 2-flowered: bracts 2 or 3, acuminate, longer than the calyx.—On trees in southern Texas and along the lower Rio Grande.

HÆMODORACEÆ. (Bloodwort Family.)

Herbs, with fibrous roots, usually equitant leaves, perfect 3 to 6-androus regular flowers which are woolly or scurfy outside, tube of the 6-lobed perianth coherent with the whole surface (or with merely the lower part) of the 3-celled ovary, introrse anthers, 3-parted (or single) style, 3 stigmas alternate with the ovary cells, and a many-seeded pod crowned or inclosed by the persistent perianth.

1. ALETRIS L. (Colic-root. Star-grass.)

Smooth stemless bitter perennial herbs, with a spreading cluster of thin flat lanceolate leaves, small flowers in a spiked raceme terminating a naked slender scape (6 to 9 dm. high), minute subulate bracts, scurfy and viscid (smooth within) 6-cleft perianth adherent to the base of the ovary, 6 short included stamens, subulate style 3-cleft at apex, minutely 2-lobed stigmas, ovate coriaceous pod, and the ovate ribbed seeds fixed at the base.

1. **A. aurea** Walt. Leaves ovate-lanceolate, narrowed at base: raceme elongated (3 to 6 dm. long), slender: flowers scattered, bell-shaped, yellow (or white), with short ovate lobes: style short, sub-conical, obscurely 3-cleft: pod as long as the perianth.—From Hockley to the Trinity.

IRIDEÆ. (Iris Family.)

Perennial herbs, with equitant 2-ranked sheathing leaves, perfect flowers, divisions of the 6-cleft petal-like perianth in two sets, the tube adherent to the 3-celled ovary, 3 distinct or monadelphous stamens alternate with the inner divisions of the perianth, extrorse anthers, 3 stigmas opposite the ovary-cells, and a many-seeded 3-lobed loculicidal pod.

* Branches of the style opposite the anthers.

1. **Herbertia.** Perianth with no tube and more or less spreading lobes: filaments united: style-branches bifid, with linear lobes.

* * Branches of the style alternate with the anthers: perianth regular.

2. **Calydorea.** Bulbous: filaments free: style elongated, its branches undivided.

3. **Nemastylis.** Stem from coated bulb: filaments united: style-branches filiform, 2-parted.

4. **Sisyrinchium.** Root fibrous: filaments united: style-branches filiform, undivided.

1. **HERBERTIA** Sweet.

From a tunicated bulb, with narrowly linear leaves, narrow herbaceous solitary terminal spathe containing many long-pediceled flowers, perianth with no tube and more or less spreading lobes (the 3 inner much smaller), stamens adnate to the perianth with filaments connate in a cylindrical tube which bears the sessile anthers, filiform style with 3 divergent 2-lobed branches opposite the anthers, oblong exserted loculicidally 3-valved pod truncate or convex at apex, and numerous angular seeds.

1. **H. Drummondiana** Herb. From a small ovoid brown-coated bulb: produced leaves about 4, narrowly linear, erect, as long as the slender simple or forked stem (1.5 to 3 dm.): spathe cylindrical, 3 to 5 cm. long: perianth fugacious, blue, 5 cm. across; outer segments obovate, with a white claw spotted with violet; inner oblanceolate, acute, shorter than the stamens: stamen-tube blue, 4 mm. long; anthers 6 mm. long, curling up after flowering: style-branches shorter than the anthers, bifid at tip: pod clavate-oblong, 2.5 cm. long. (*Trifurcia cærulea* Herb. *H. cærulea* Herb. *Alophia Drummondiana* Herb.)—"Prairies of the Colorado" (Mex. Bound. Surv.).

2. **H. Watsoni** Baker. Stem 15 to 20 cm. high, with 1 or 2 very narrow sheathing leaves: spathe about 3 cm. long: perianth purple; outer segments oblanceolate, 2.5 cm. long; inner obovate, 6 mm. long: filaments, 6 mm. long, united nearly to the top: style 6 mm. long, with linear branches as long as the entire part. (*Gelasine Texana* Wats. Proc. Am. Acad. 20, 375, not Herb.)—"Damp prairies near San Antonio" (*Havard*).

2. **CALYDOREA** Herb.

Stem simple, from a coated bulb, with a few narrow radical leaves and sometimes a few reduced ones on the stem, few pediceled flowers in the solitary terminal spathe, perianth with very short tube or none, and equal erect-spreading lobes, free filaments bearing linear anthers, filiform style with subulate divaricate branches, an obovoid exserted loculicidally 3-valved pod truncate at apex, and globose or angular seeds.

1. **C. Texana** (Herb.) Baker. Root-leaves 3 or 4, narrowly linear, grass-like, 4.5 dm. long: stem 1 to 4-headed, 1.5 to 3 dm. long, bearing reduced leaves from the forks, and sometimes one also from the middle: spathe cylindrical, 3 to 5 cm. long, outer valve shorter: perianth-segments bright blue, obovate-cuneate, subequal, 2.5 cm. long: anther 6 mm. long, much exceeding the free filaments: style-branches subulate, shorter than the anthers. (*Gelasine? Texana* Herb.)—Galveston Bay (*Drummond*).

3. NEMASTYLIS Nutt.

Stems round, from coated bulbs, with few plicate leaves, few fugacious flowers from 2-bracted spathes, spreading perianth with similar segments, filaments more or less united into a tube, the slender 2-parted style-branches of the short style exserted between the anthers, minute terminal stigmas, oblong or ovate truncate pod (dehiscent at summit), and globose or angled seeds.

1. **N. cœlestina** (Bart.) Nutt. Stems 4 to 6 dm. high, from a small roundish bulb: radical leaves elongated, few, the upper stem-leaves bract-like: perianth bright blue, terminal, mostly solitary; segments oblong-obovate: pod obtusely 3-angled: seeds angular, brown. (*Ixia cœlestina* Bart.)—Extending into eastern Texas from the Gulf States.

2. **N. acuta** (Bart.) Herb. Stems 1.5 to 3 dm. long, bearing 2 or 3 long-peduncled clusters, bracteate at the fork by a large linear leaf, and sometimes with one below it: radical leaves 2 or 3, linear, plicate, 1.5 to 3 dm. long: spathe 2 or 3-flowered, 2.5 to 3 cm. long, outer valve shorter: perianth bright blue; segments ovate-cuneate, subequal, 2.5 cm. long: filaments very short; anthers 6 to 8 mm. long, curling up: style-branches half as long as the anthers: pod turbinate. (*Ixia acuta* Bart. *N. geminiflora* Nutt.)—From Arkansas through eastern and southern Texas.

4. SISYRINCHIUM L. (Blue-eyed grass.)

Low slender perennials, with fibrous roots, mostly branching 2-edged or winged stems, grassy or lanceolate leaves, fugacious flowers (on slender pedicels) clustered within 2 sheathing herbaceous bracts, a bractlet subtending each pedicel, 6-parted perianth with spreading divisions nearly alike, stamens monadelphous to the top, and a membranaceous subglobose pod.

1. **S. angustifolium** Mill. Scape (1 to 3 dm. high) winged or wingless, simple: spathe solitary and terminal, its outer bract more or less elongated: flowers delicate blue, changing to purplish (rarely white): divisions of the perianth more or less notched, bristle-pointed and ciliate: mature seed globose, large (1 mm. broad), faintly pitted or nearly smooth. (*S. mucronatum* Michx. *S. Bermudiana*, var. *mucronatum* Gray.)—Western Texas, common along the Rio Grande. Var. GENICULATUM Herb. (*S. geniculatum* Herb.), from the San Antonio through central Texas, has slender stems narrowly winged low down and often bearing 1 or 2 leaves below the fork, and smaller flowers, pods, and seeds.

2. **S. anceps** Cav. Scape (1.5 to 4.5 cm. high) usually branching and bearing 2 or more peduncled spathes: seeds more ovate, much smaller, deeply pitted. (*S. Bermudiana*, var. *anceps* Gray.)—From San Antonio to central and eastern Texas.

3. **S. bellum** Watson. Stem (1.5 to 6 dm. high) with 1 to 3 nodes: leaves 2 to 4 mm. wide, shorter than the stem: peduncles 1 to 4 (usually 2) at each node, 5 to 10 cm. long, equaling the bract: spathes of 2 nearly equal bracts (1.5 to 2.5 cm. long), scabrous on the keel, 4 to 7-flowered: flowers somewhat pubescent (as also the ovary), light purple, the segments 3-toothed or mucronate, shortly ciliate: anthers very small: stigmas scarcely exserted: pod depressed-globose or obovoid (4 to 6 mm. broad): seeds obscurely pitted.—Reported from Gillespie County.

4. **S. Thurowi** Coult. & Fisher. Low (4 to 7 cm. high), cespitose, procumbent: stems rather broadly winged, with a solitary peduncle at each node: leaves short, scarcely 2 mm. broad: perianth 4 or 5 mm. long, yellow: outer bract of the 2 to 4-flowered spathes a little longer than the very slender pedicels: pod oblong or pear-shaped (4 to 5 mm. long), prominently transversely wrinkled between the seeds: seeds 10 to 14 in each cell, depressed-globose, very small (scarcely 0.5 mm. broad), black, deeply punctate.—Near Hockley (*Thurow*).

AMARYLLIDEÆ. (AMARYLLIS FAMILY.)

Chiefly bulbous and scape-bearing smooth herbs, with flat linear root leaves, regular perfect 6-androus flowers, tube of the corolla-like 6-parted perianth coherent with the 3-celled ovary (lobes imbricate in bud), introrse anthers, single style, and a several to many-seeded pod.

* Root tuberous.

1. **Hypoxis.** Flowers umbellate: pod circumscissile: leaves grass-like.
2. **Agave.** Flowers spiked: leaves thick and fleshy.

* * Root bulbous.

3. **Cooperia.** Scape one-flowered: perianth-tube very long.
4. **Crinus.** Scape 2 to 4-flowered: perianth-tube elongated.
5. **Zephyranthes.** Scape one-flowered: perianth-tube short or none.

1. HYPOXIS L. (STAR-GRASS.)

Small stemless herbs, with grass-like hairy linear leaves, slender few-flowered scape, spreading persistent perianth (3 outer divisions a little herbaceous), sagittate erect anthers, indehiscent pod crowned with the withered or closed perianth, and globular seeds.

1. **H. erecta** L. Leaves longer than the umbellately 1 to 4-flowered scape: perianth-divisions hairy, greenish without, yellow within.—From the headwaters of the Trinity to Hockley.

2. AGAVE L. (AMERICAN ALOE.)

Conspicuous plants, with thick fleshy leaves (often toothed) clustered at base of a many-flowered scape from a thick fibrous-rooted crown, the persistent tubular-funnelform perianth parted into narrow subequal divisions, versatile linear anthers, coriaceous many-seeded pod, and flattened seeds.

* *Flowers solitary from the axils of the bracts, loosely spicate.*

1. **A. Virginica** L. Herbaceous: leaves entire or denticulate, broad or oblong-lanceolate, concave, deep green: scape simple, smooth, 9 to 18 dm. high: flowers scattered in a loose wand-like spike, greenish-yellow, fragrant: perianth 2 to 2.5 cm. long, its narrow tube twice longer than the erect lobes.—Hills of the Rio Grande, from El Paso to Laredo. Extending from the South Atlantic States.

2. **A. maculosa** Hook. Leaves linear (1.5 to 3 dm. long), from a thick cylindrical subterranean caudex, concave, dark spotted, cartilaginous-dentate: spikes with lanceolate-subulate bracts: perianth-lobes whitish, linear-oblong, rotate-spreading, much shorter than the slender subcylindrical tube (2.5 cm. long): stamens inserted in the throat, hardly equaling the lobes and mostly exceeding the style: stigmas spreading, obcordate: ovary ovate-lanceolate, short: pod oblong, long-cuspidate, contracted at base into a stipe. (*E. maculata* Engelm., not Regel.)—Throughout southern Texas.

3. **A. variegata** Jacobi. Stemless: scape 9 to 15 dm. high: leaves broadly lanceolate (2 to 2.5 dm. long), undulate and sharply denticulate on the margin: perianth broadly funnelform; the lobes ovate-oblong, spreading (finally reflexed), equaling the ovary and tube, 12 mm. long: filaments adnate to the upper part of the tube, long-exserted (5 cm. long); anthers 12 mm. long: style slender, exceeding the stamens: pod oblong, cuspidate: seeds oblique, 5 mm. in the longest diameter.—Near Hidalgo and Ringgold.

* * *Flowers in pairs from the axils of the bracts, densely spicate.*

4. A. heteracantha Zucc. Subcaulescent (1 to 1.5 cm. high): scape 18 to 30 dm. high: leaves thick, rigid, linear-lanceolate (3 to 5 dm. long), with hooked spreading teeth, the terminal spine subterete, unarmed below: bracts lanceolate, from a clasping base; flowers subsessile: perianth longer than the oblong ovary; lobes linear-oblong, erect, much longer than the very short campanulate tube: pod ovate or oblong, more or less cuspidate.—Very common on most of the limestone highlands of southwestern Texas.

* * * *Flowers paniculate toward the apex of the branches.*

5. A. Parryi Engelm. Acaulescent: leaves ascending, scarcely narrowed above the dilated base, ovate-lanceolate (25 to 30 cm. long), strongly attenuate at apex and terminating in a robust flattened spine (2.5 cm. long), with small marginal teeth: scape (24 to 36 dm. high) strongly imbricated with large foliaceous triangular bracts, bearing a large panicle (6 to 9 dm. long) with spreading branches: flowers very numerous, over 5 cm. long, yellowish-white, the tube funnelform and twice shorter than the oblong-linear lobes: stamens adnate to the top of the tube, long-exserted, equaling the style: pod ovate, very short cuspidate, with flat punctate large seeds.—From the mountains below El Paso to western New Mexico.

6. A. rigida Mill. Caulescent, 3 to 6 dm. high: leaves lanceolate-linear (4 to 6 dm. long), contracted above the broader base, glaucescent, toothed, the terminal spine thick (2.5 cm. long), the marginal scattered and mostly straight: scape (36 to 45 dm. high) with broad foliaceous bracts, and horizontally branched panicle with pale yellowish-green paniculate flowers, the tube shorter than the lobes: stamens inserted about the middle of the tube, blood-red above, long-exserted, equaling the style.—Woods below Ringgold.

7. **A. Wislizeni** Engelm. Acaulescent: leaves ovate (3 dm. long), narrowed above the base, broader above the middle, acute, the spines subflexuous, blackish, decurrent, the terminal 20 to 22 mm. long, stout, the marginal rigid, the upper larger and straight, the lower smaller and subdeflexed: scape 36 dm. high, with a loosely-flowered panicle: ovary equaling the lobes and tube of the perianth: stamens long-exserted, adnate to the middle of the tube: pod slender, prismatic, acute.—Gaudalupe and Chisos mountains.

DIOSCOREACEÆ. (Yam Family.)

Plants with twining stems from a large tuberous or knotted rootstock, ribbed net-veined petioled leaves, small diœcious 6-androus regular flowers, the 6-cleft calyx-like perianth adherent in the fertile plant to the 3-celled ovary, and 3 distinct styles.

1. DIOSCOREA L. (Yam.)

Herbaceous plant, with very small flowers in axillary panicles or racemes, stamens at the base of the parted perianth, the 3-winged 3-celled pod loculicidally 3-valved by splitting through the winged angles, and 1 or 2 flat seeds (with a membranaceous wing) in each cell.

1. **D. villosa** L. (Wild yam.) Stems slender, from a matted rootstock, climbing over bushes: leaves mostly alternate, sometimes nearly opposite or in 4s, more or less downy beneath, cordate, conspicuously pointed, 9 or 11-ribbed: flowers pale greenish yellow, the sterile in drooping panicles, the fertile in drooping racemes: pod 16 to 20 mm. long.—Extending into Texas from the Atlantic States.

LILIACEÆ. (Lily Family.)

Herbs or rarely woody plants, with regular symmetrical flowers, perianth not glumaceous and free from the chiefly 3-celled ovary, 6 stamens (one before each of the divisions or lobes of the perianth) with 2-celled anthers, and fruit a few to many-seeded pod or berry.

I. Shrubby or rarely herbaceous, climbing or supported by a pair of tendrils of the ribbed and net-veined leaves: small diœcious flowers in axillary umbels, with a deciduous perianth and apparently 1-celled anthers.—Smilaceæ.

1. **Smilax.** Stigmas 3, sessile: fruit a berry, with 1 or 2 pendulous seeds in each cell.

II. Never climbing by tendrils: very rarely diœcious.

A. Floral bracts scarious: stamens perigynous on the withering-persistent nerved perianth; anthers introrse: style undivided: fruit a loculicidal pod or berry: leaves transversely veined.

* Flowers umbellate, with a scape from a coated corm or bulb; segments 1-nerved (except No. 5): pedicels not jointed.

2. **Allium.** Perianth parted: pod deeply lobed (often crested); cells 1 or 2 seeded: alliaceous.

3. **Nothoscordum.** Perianth parted: cells of pod several-seeded: not alliaceous.

4. **Androstephium.** Perianth tubular funnelform, pale lilac: filaments united into a crown.

5. **Milla.** Perianth salverform, greenish-white: stamens subsessile.

* Flowers racemose or paniculate, on jointed pedicels: stems not from a bulb (except No. 6).

+ Perianth-segments many-nerved: fruit a pod (except part of No. 10).

++ Leaves not thick: anthers not sagittate.

6. **Camassia.** Flowers on pedicels jointed near the summit, bluish, slightly gibbous, rather large: from a bulb.

7. **Anthericum.** Pedicels (usually fascicled) jointed near the middle: from a fleshy fibrous root.

8. **Schœnolirion.** Pedicels (mostly solitary) jointed near the summit: from a thick rootstock.

++ ++ Leaves thick: anthers sagittate.

9. **Hesperaloe.** Flowers narrow-cylindric, reddish: style filiform, deciduous.

10. **Yucca.** Flowers campanulate, white or whitish: style stout and persistent (or none).

+ + Perianth-segments one-nerved.

++ Fruit a dry indehiscent pod: leaves linear.

11. **Nolina.** Flowers polygamo-diœcious, in loose racemes: stamens included: fruit thin, 1 to 3-seeded.

12. **Dasylirion.** Flowers diœcious, in dense racemes: stamens exserted: fruit coriaceous, 1-celled, 1-seeded.

++ ++ Fruit a berry: leaves cordate to lanceolate.

13. **Polygonatum.** Flowers axillary, gamophyllous.

14. **Unifolium.** Flowers in a terminal raceme, parted.

B. Floral bracts none or foliaceous: stamens hypogynous or at the base of the distinct segments of the deciduous perianth (except No 18); anthers more or less extrorse: style undivided, deciduous (stigma sessile and persistent in Nos. 17 and 18): fruit a loculicidal pod or berry: veinlets anastomosing (except Nos. 17 and 18).

* Fruit a pod.

+ Stem leafy, from a rootstock: pod few-seeded.

15. **Uvularia.** Leaves perfoliate: flowers terminal: pod truncate, 3-lobed.

+ + Stem or scape from a coated corm: pod many-seeded.

16. **Calochortus.** Outer perianth-segments smaller: flowers few: anthers basifixed.

17. **Erythronium.** Scape with 2 leaves: flower solitary: anthers erect.

* * Fruit a berry: stem from a tuber-like rootstock, bearing a whorl of 3 leaves.

18. **Trillium.** Flower solitary, terminal: outer perianth-segments leaf-like: stigmas sessile: leaves net-veined.

C. Floral bracts green or greenish or none: stamens at the base of the distinct several-nerved persistent perianth-segments; anthers small, extrorse, 1-celled, cordate or reniform: styles or sessile stigmas distinct: pod septicidal: leaves with transverse veinlets.

* Inflorescence pubescent.

19. **Melanthium.** Claws of the perianth-segments bearing the filaments.

* * Inflorescence glabrous.

20. **Zygadenus.** Perianth-segments oblong-lanceolate to ovate, glandular toward the base.

21. **Schœnocaulon.** Perianth-segments linear or linear-oblong, without glands and nearly nerveless.

1. SMILAX L. (GREENBRIER. CAT-BRIER).

Shrubby (rarely herbaceous) plants climbing or supported by tendrils on the petioles of the net-veined simple leaves, with green or yellowish diœcious flowers in umbels or on axillary peduncles, distinct and deciduous perianth-segments, linear filaments inserted at the base, introrse apparently 1-celled anthers, mostly 3-celled ovary, thick spreading subsessile stigmas, and the fruit a small berry.

** Herbaceous, not prickly: flowers carrion-scented; ovules 2 in each cell.*

1. **S. herbacea** L. (CARRION FLOWER). Stems climbing 9 to 45 dm. high: leaves ovate or rounded, mostly cordate or truncate at base, abruptly acute to short-acuminate, 7 or 9-nerved, smooth; petioles 1.5 to 2.5 cm. long: peduncles elongated (7 to 24 cm. long), 20 to 40-flowered.—Common in the Atlantic States and extending into Texas. Var. PULVERULENTA Gray has leaves more or less soft downy beneath.

** * Stems woody and prickly: ovules solitary: glabrous throughout.*

+ Leaves ovate or roundish, mostly rounded or cordate at base, 5 to 9-nerved.

++ Peduncles shorter than the petioles.

2. **S. rotundifolia** L. (COMMON GREENBRIER. HORSE-BRIER). Stems tall, armed with scattered prickles as well as the round branches, more or less 4-angular: leaves ovate or round-ovate, often broader than long, slightly cordate, abruptly short-pointed (5 to 7 cm. long): berries blue-black, with a bloom.—Moist thickets, extending into Texas from the east. Var. QUADRANGULARIS Gray has branches and especially branchlets 4-angular.

++ ++ Peduncles longer than the petioles.

3. **S. glauca** Walt. Round branches and somewhat 4-angular branchlets armed with scattered stout prickles, or naked: leaves subpersistent, ovate, rarely subcordate, glaucous beneath (and sometimes above), as well as the branchlets when young, 5 cm. long, abruptly mucronate, the edges smooth and naked: berries black, with a bloom.—Dry thickets, extending into Texas from the east.

4. **S. bona-nox** L. Branches and angular (often square) branchlets sparsely armed with short rigid prickles: leaves subpersistent, varying from round cordate and slightly contracted above the dilated base to fiddle-shaped and halberd-shaped or three-lobed, green and shining on both sides, cuspidate-pointed, often somewhat bristly ciliate or spinulose on the margins. (*S. tamnoides* of Gray's Man., probably not L.)—Abundant along the Rio Grande and Pecos.

5. **S. hispida** Muhl. Rootstock cylindrical, elongated: stem (climbing high) densely beset with long and weak blackish bristly prickles below, the flowering branchlets mostly naked: leaves ovate (the larger cordate), pointed, slightly rough-margined, membranaceous and deciduous: peduncles 3 to 5 cm. long: sepals lanceolate (5 mm. long).—Moist thickets, extending into Texas from the east.

++ Leaves oblong-lanceolate to linear, 3 or 5-nerved, shining above: branches round, unarmed.

6. **S. lanceolata** L. Leaves thinnish, rather deciduous, ovate-lanceolate or lanceolate-oblong: stigmas 3: berries dull red.—Rich woods, extending into Texas from the Southern States.

2. ALLIUM L. (Onion. Garlic.)

Strong-scented pungent stemless herbs, with leaves and scape from a coated bulb, umbellate flowers (frequently changing to bulbs), scarious 1 to 3-valved spathe, colored perianth with one-nerved distinct (or united at base) segments, persistent but jointed filiform style, simple stigma, and lobed pod with 1 or 2 ovoid-reniform black seeds in each cell.

** Bulbs cespitose, narrowly oblong, crowning a rhizome: coats membranaceous.*

1. **A. cernuum** Roth. (Wild onion.) Scape naked, angular (1.5 to 6 dm. high), nodding at apex, bearing a loose or drooping few to many-flowered umbel: leaves linear, flat, sharply keeled, 3 dm. long: perianth-segments oblong-ovate, rose-color: stamens and style exserted: pod 6-crested.—Moist places, throughout the State.

*** Bulbs mostly solitary, not rhizomatous: leaves narrowly linear, flat, or channeled.*

+ Bulb-coats more or less fibrous: leaves several.

++ Pod not crested: spathes usually 3-valved.

2. **A. Canadense** Kalm. (Wild garlic.) Scape 3 dm. or more high: bulb-coats somewhat fibrous: umbels densely bulbiferous or few-flowered: flowers on slender pedicels, white or pinkish; segments narrowly lanceolate, obtusish, equaling or exceeding the stamens.—Extending westward to central Texas.

3. **A. mutabile** Michx. Scape 3 to 5 dm. high: bulbs densely and coarsely fibrous-coated: umbel rarely bulbiferous: flowers white to rose-color: segments thin and lax in fruit, ovate to narrowly lanceolate, obtusish or acute, ⅓ longer than the stamens. (*A. reticulatum*, var. γ Watson.)—Gravelly hills, from central to western Texas, along the Rio Grande.

4. **A. Nuttallii** Watson. Scape low (1 to 1.5 dm. high): bulb usually smaller, very fibrous: pedicels shorter: perianth-segments usually broader, rather rigid in fruit, acute or acuminate, rose-color or white (*A. mutabile*, var. β Watson.)—Throughout the State.

+++ Pod crested: spathe usually 2-valved.

5. **A. reticulatum** Fraser. Scape 1 to 2 dm. high: bulbs densely and coarsely fibrous-coated: umbels rarely bulbiferous: pedicels short: perianth-segments ovate to narrowly lanceolate, thin and lax in fruit, ⅓ longer than the stamens.—Along streams throughout the State.

+ + Bulb-coats not fibrous, the outer more or less reticulated.

++ Leaves 2 to 4: spathes 2-valved.

= Scapes tall.

6. **A. scaposum** Benth. Scape 3 dm. or more high: outer bulb-scales dark, with coarse rectilinear reticulations: umbels loose, rather few-flowered: perianth-seg-

ments white, with red mid-vein, lanceolate, acuminate, 6 to 8 mm. long: ovary not crested.—Western and southern Texas.

7. **A. stellatum** Fraser. Scape 1.5 to 2.5 dm. high, slender, bearing an erect umbel: outer bulb-coats reddish, with very close linear reticulations: perianth-segments broad, acute, mostly rose-color: stamens and style exserted: ovary conspicuously 6-crested.—Northwestern Texas and northward.

= = *Scapes low.*

8. **A. bisceptrum** Watson. Scapes frequently in pairs: bulbs light-colored, with indistinct reticulations: perianth-segments (mostly rose-color), oblong-lanceolate, acuminate, slightly exceeding the stamens: alternate filaments with a broad deltoid adnate base: crests of ovary narrow, central.—On mountain streams, from the Trinity to East Humboldt mountains.

9. **A. Palmeri** Watson. Habit of the last: bulb coats with a distinct somewhat quadrilateral reticulation: scape always solitary: perianth-segments (rose-color) 6 to 10 mm. long, ovate-lanceolate, acuminate: filaments and crests nearly as in the last.—In the Chisos mountains.

++ ++ *Leaf solitary.*

10. **A. Nevadense** Watson. Scape 2.5 to 7 cm. high, almost equaling the narrowly linear or filiform flat leaf: bulb coats light-colored, with close much distorted reticulation: spathe-valves acuminate; pedicels 12 mm. long; perianth white or pinkish, with lanceolate segments little exceeding the stamens and style.—Dry ridges and foothills, from the Trinity to East Humboldt mountains.

3. NOTHOSCORDUM Kunth.

Bulb tunicated, not alliaceous, the ovary-cells several-seeded; otherwise like *Allium*.

1. **N. striatum** (Jacq.) Kunth. Scape 3 dm. high or less: bulb small, often bulbiferous at base: leaves narrowly linear: flowers few, on slender pedicels: the segments narrowly oblong (8 to 12 mm. long): ovules 4 to 7 in each cell. (*Allium striatum* Jacq.)—Moist places, throughout the State.

4. ANDROSTEPHIUM Torr.

Scape and linear leaves from a membranaceous or fibrous-coated corm, with pale-lilac umbellate flowers, unjointed pedicels, funnelform perianth (the tube equaling the spreading limb or shorter), united bifid filaments upon its throat, sessile beaked subglobose pod, and few to several large seeds in each cell.

1. **A. violaceum** Torr. Scape 5 to 15 cm. high: flowers 16 to 24 mm. long or more, usually exceeding the stout pedicels, the tube nearly as long as the limb; crown scarcely shorter than the limb, the lobes exceeding the anthers.—From the Colorado, through central Texas to the Trinity.

5. MILLA Cav.

Scape from a small membranaceous-coated corm, with the white salverform perianth greenish outside and with stout green mid-veins and narrowly turbinate tube, nearly sessile naked stamens with basifixed anthers, and an oblong ovate sessile pod.

1. **M. biflora** Cav. Leaves subterete, very rough: scape (5 to 30 cm. high), smooth, bearing 1 to 5 nearly equal elongated pedicels (7 to 15 cm. long): perianth (3 to 5 cm. long) with the broadly oblong-lanceolate segments (inner narrower) about twice longer than the tube.—El Paso County.

6. CAMASSIA Lindl.

Scape and linear leaves from a coated bulb, with a simple raceme of small-bracted bluish slightly gibbous flowers on pedicels jointed near summit, the 3 to 7-nerved segments spreading, filiform style with persistent base, oblong or obovate 3-angled loculicidal 3-valved pod, and several black roundish seeds in each cell.

1. **C. Fraseri** Torr. (EASTERN CAMASS. WILD HYACINTH.) Scape 3 dm. or more high: leaves 8 to 14 mm. broad, keeled: raceme elongated; bracts longer than the pedicels: perianth-segments pale blue, 3-nerved, 8 to 14 mm. long: pod acutely triangular-globose. (*Scilla Fraseri* Gray.)—Prairies of north and west Texas. Var. ANGUSTATA Torr. (*Scilla angustata* Eng. & Gray), extending to central Texas from Arkansas and Louisiana, is very slender, with narrow leaves (6 to 8 mm. broad) and smaller flowers.

7. ANTHERICUM L.

Plants with naked stems (or with 1 or 2 setaceous leaves) from a thick cylindrical fleshy-fibrous root, narrowly linear grass-like leaves, surrounded at base by the fibrous remnants of older ones, yellow flowers on pedicels jointed near the middle, 3 to 5-nerved segments spreading from the base and twice longer than the anthers, slender elongated style and oblong pod with several flattened angular seeds in each cell.

1. **A. Torreyi** Baker. Stem slender, 3 to 9 dm. high: radical leaves several, elongated, smooth: raceme simple or branched, loosely flowered; pedicels 10 to 12 mm. long; flowers (10 to 12 mm. long) with brownish nerves: pod 12 mm. long, 12 to 16-seeded. (*Hesperanthes Torreyi* Watson.)—Rocky limestone hills near the mouth of the Pecos, and west to Arizona.

8. SCHŒNOLIRION TORR.

Plants with naked stems (scaly and thickened at base) from a thick rootstock, with radical few-nerved very narrow flat leaves, yellow or whitish flowers in loose or sparingly panicled racemes, the 3 to 5-nerved segments exceeding the stamens, short style, and the deeply-lobed depressed globose pod with 1 or 2 subglobose shining seeds in each cell.

1. **S. Texana** (Scheele) Gray. Stem slender, 3 dm. high: raceme short (2.5 to 10 cm.); bracts narrow, acutish: flowers greenish-white, with narrow segments: seeds 2 mm. long. (*Ornithogalum Texanum* Scheele. *S. Michauxii* Torr. Mex. Bound. excl. syn. and descr.)—Moist places, from the Colorado to the Red River.

9. HESPERALOE Engelm.

Plants with short stout caudex sending up a slender sparingly bracteate flowering stem, crowded thick linear deeply-channelled leaves with filiferous margins, erect fascicled flowers in a paniculate raceme, narrowly cylindric reddish perianth with linear 7-nerved segments, smooth filiform filaments with linear-oblong anthers, filiform deciduous style, small capitate stigma, and a loculicidal 3-celled pod.

1. **H. parviflora** (Torr.) Stem 6 to 12 dm. high, sparingly branched: leaves crowded, 3 to 6 dm. long, 6 to 8 mm. broad, recurved, long-attenuate: bracts broad and acuminate, rather large: pedicels cymose-fascicled (1 to 3.5 cm. long): flowers (12 mm. long) with erect segments: stamens shorter, with small anthers (2 mm. ing): style exserted, two or more times longer than the ovary: pod ovate, acute, 2.5 cm. long. (*Yucca* (?) *parviflora* Torr. *Aloe yuccafolia* Gray. *H. yuccafolia* Engelm.)—Western Texas, from Frio County to the Pecos.

2. **H. Engelmanni** Krauskopf, of the same region, is not so well known, but may be distinguished by its more slender and flexuous branches, smaller bracts, twice longer anthers, and the stouter included style scarcely longer than the ovary.

10. YUCCA L. (Bear-grass. Spanish Bayonet.)

Stems woody, either very short or rising into a thick and columnar palm-like trunk bearing crowded linear-lanceolate spinescent (at apex) thick leaves and a racemose panicle of flowers with white or whitish campanulate perianth with ovate-lanceolate many-nerved segments, clavate papillose filaments with small anthers, stout persistent style (or none), emarginate stigmas more or less connate into a stigmatic tube, and the narrowly oblong fruit berry-like or a septicidal or loculicidal incompletely 6-celled pod.—The pollination of the species of Yucca by moths of the genus *Pronuba* is one of the most wonderful chapters in the history of pollination.

**Fruit berry-like, pendulous: seed thick, rugose, not margined: mostly arborescent, with sessile panicle.*

1. **Y. Treculeana** Carr. Caudex 18 to 75 dm. high, branching at top: leaves very long (7 to 13 dm.), straight, very rigid, deeply channelled, rough on back, with entire margins: panicle subsessile, ovate, 6 to 12 dm. long, densely flowered, nearly glabrous; bracts large, ovate or broadly lanceolate: flowers cream-white; segments ovate or ovate-lanceolate, acute or acuminate (3 to 5 cm. long): filaments scarcely papillose, equaling the pistil: style slender: stigmas narrow, deeply 2-lobed: fruit sub-cylindric, strongly beaked, 7 to 10 cm. long: seeds 6 to 7 mm. broad. (*Y. canaliculata* Hook.)—Southern and southwestern Texas to northern Mexico.

2. **Y. baccata** Torr. Caudex short or none: leaves coarsely filamentous on margin, very thick and rigid (4 to 12 dm. long by 2.5 to 5 cm. broad), channeled or concave, rough, especially on the back, tipped by a very stout brown spine: panicle pedunculate, usually glabrous, with ovate-lanceolate or ovate bracts: perianth-segments narrow, 6 to 7.5 cm. long: stamens equaling the ovary: style slender: fruit oval or cylindric (7 to 12 cm. long), dark purple, often long-beaked: seeds 8 to 16 mm. broad.—From western Texas to southern Colorado. The roots of this as well as of the three following species are used for "amole" by the Indians and Mexicans.

3. **Y. australis** (Engelm.) Trelease. Resembling the last, but with a taller branching caudex (generally 3 to 4.5 m. high), thinner very concave leaves entirely smooth (or only slightly scabrous on the back) and with finer fibers, smaller flowers (3 cm. long) with ovate segments, and short style. (Y. *baccata*, var. *australis* Engelm.)—A species of the nothern highlands of Mexico and extending into the elevated Sierra Blanca region of southwestern Texas.

** * Fruit capsular, erect: seed thin, smooth, broadly margined: caudex none or short, the panicle upon a tall scape.*

+ Leaves serrulate.

4. **Y. rupicola** Scheele. Acaulescent: leaves 3 to 6 dm. long, 2.5 to 5 cm. wide, rigid, erect, pungent, smooth, deep green, mostly oblique and undulate or twisted with coarse reddish serratures: scape 12 to 21 dm. high, with long and narrow,

bract-like leaves, and a pyramidal few-flowered panicle with small bracts: flowers greenish-white, the ovate sharply acuminate segments 3 to 7 cm. long: stamens straight, equaling the ovary: style slender: pod 6-sided, acute or beaked, 5 to 7 cm. long: seeds 7 to 8 mm. broad. (*Y. luctesens* Carr.)—Sandy hills and plains, from San Saba and San Antonio to the Pecos and Rio Grande. Var. RIGIDA Engelm., of extreme western Texas, has pale and glaucous not twisted leaves keeled and often rough on the back (2 to 3 dm. long, 6 to 12 mm. wide), and smaller pods and seeds.

+ + *Leaf margins filamentose.*

5. **Y. glauca** Fraser. Leaves straight, very stiff, pointed, usually 3 to 9 dm. long and 6 to 12 mm. wide, smooth: raceme usually simple, nearly sessile, 3 to 12 dm. long: flowers greenish-white or tinged with brown; segments broadly ovate, 2.5 to 5 cm. long: stigmas green, shorter than the ovary: pod 6-sided, 7 cm. long: seeds 10 to 12 mm. broad. (*Y. angustifolia* Pursh.)—Sandy hills and plains of western Texas; common west of the Pecos. Var. STRICTA Trelease (*Y. angustifolia*, var. *mollis* Engelm.), extending from Arkansas and Louisiana to the Rio Grande, is acaulescent, with the softer and less pungent leaves broadest (10 to 16 mm.) in the middle, raceme or panicle (1.5 to 3 dm. long) on a peduncle 6 to 9 dm. high, greenish flowers, shorter pod (5 cm. long), and more narrowly winged seed.

6. **Y. elata** Engelm. Caudex 9 to 15 dm. high: leaves linear, rigid, sharp pointed, white-margined: bracts white, oval, acute or acuminate, as long as the pedicels: flowers white, with ovate acute segments: ovary attenuate into a whitish style: pod cylindrical-ovate, obtuse, short-cuspidate: seeds large (12 mm. wide), narrowly wing-margined. (*Y. angustifolia*, var. *elata* Engelm. *Y. constricta* Baker.) —Dry gravelly mesas of western Texas.

11. NOLINA Michx.

Perennials, with a thick caudex or trunk, numerous narrowly linear serrulate leaves, stout nearly naked flowering stem bearing a compound racemose many-flowered panicle (the main branches subtended by foliaceous long-attenuate bracts), solitary pedicels, small polygamo-diœcious flowers with persistent whitish oblong-lanceolate segments, included stamens, introrse cordate-ovate anthers, very short distinct styles, dry and thin indehiscent fruit, and subglobose light-colored seeds.

1. **N. Lindheimeriana** (Scheele) Watson. Stem stout, 16 to 18 dm. high, from a very short caudex: leaves (3 to 9 dm. long) flat, thin, strongly serrulate, the cauline 15 dm. long: panicle simple or compound; bracts not conspicuous: fruit very thin, emarginate at both ends, broader than long (10 mm. broad), on pedicels about 8 mm. long. (*Dasylirion Lindheimerianum* Scheele, *D. tenuifolium* Torr.)—Stony places, along the Guadalupe, and through central and western Texas to New Mexico.

2. **N. Texana** Watson. Stems several, very short (3 to 6 dm. high, including the panicle), from a very short caudex: leaves (6 to 12 dm. long, 2 to 4 mm. wide) concavo-convex below, triangular toward the apex, roughish on margins, covering the ground: panicle compound, the main bracts foliaceous and with dilated bases: pod (4 to 6 mm. broad) on pedicels 4 to 6 mm. long: seed globose, nearly smooth, 4 mm. in diameter, bursting the cell.—Abundant on all foothills of western Texas.

3. **N. erumpens** (Torr.) Watson. Stem 6 to 15 dm. high, rough-scabrous: leaves thick, subcarinate, 6 to 9 dm. long (12 mm. wide above base), very strongly serrulate: panicle compound, with large dilated bracts; the partial panicles pyramidal (15 dm. long); pedicels 4 mm. long or less: stigmas linear, distinct, sessile: the ripening seed bursting the cell. (*Dasylirion erumpens* Torr.)—Between the Pecos and the Rio Grande.

12. DASYLIRION Zucc.

Plants with a stout naked cylindrical caudex, terminated by a tall leafy flowering stem with crowded linear hooked-spiny leaves, diœcious flowers in dense racemes forming a narrow compound panicle, oblong-obovate obtuse perianth-segments, exserted stamens, short style, and triangular 3-winged 1-celled 1-seeded coriaceous indehiscent fruit with obtusely triangular seed.

1. **D. Texanum** Scheele. Caudex 6 to 15 dm. high, bearing a dense rosette of leaves and a flowering stem 24 to 30 dm. high: leaves light green, 6 to 12 dm. long and 8 to 10 mm. wide below, attenuate upwards, splitting into coarse fibers at the apex, serrulate and toothed, the dilated base gradually narrowed and entire: panicle (6 to 9 dm. long) very narrow; partial panicles erect or suberect (7cm. long), equaling the broad subtending bracts; floral bracts broadly ovate, acute, lacerately toothed: perianth 2 mm. long: fruit broadly elliptical (6 to 7 mm. long), short pedicellate, with the narrow wings continued above and adnate to the style.—Arid and stony slopes throughout western Texas.

2. **D. graminifolium** Zucc. Like the last, but with base of the shorter glaucous leaves abruptly contracted and spiny-toothed above, thicker staminate spikes, body of fruit less attenuate above and wings free from the style.—Hills and table-lands of western Texas and adjoining Mexico.

13. POLYGONATUM L. (Solomon's seal.)

Perennial herbs, with simple erect or curving stems from creeping thick knotted rootstocks, nearly sessile half-clasping nerved leaves, axillary nodding greenish flowers, oblong-cylindrical perianth lobed at summit, included stamens, slender deciduous style, obtuse stigma, and a globular black or blue 1 or 2-seeded berry.

1. **P. biflorum** (Walt.) Ell. (Smaller Solomon's seal.) Glabrous, except the ovate-oblong or lanceolate-oblong nearly sessile leaves, which are commonly minutely pubescent, pale or glaucous beneath: stem slender, 3 to 9 dm. high: peduncles 1 to 3 (mostly 2)-flowered: perianth 8 to 12 mm. long: filaments papillose-roughened, inserted toward the summit of the perianth. (*Convallaria biflora* Walt.)—Wooded hillsides of northern Texas.

2. **P. giganteum** Diet. (Great Solomon's seal.) Glabrous throughout: stem stout, 6 to 21 dm. high: leaves ovate, partly clasping (7 to 20 cm. long), or the upper oblong and nearly sessile: peduncles several (2 to 8)-flowered: flowers 10 to 18 mm. long: filaments smooth and naked, inserted on the middle of the tube.—River banks of northern Texas.

14. UNIFOLIUM Adans. (False Solomon's seal.)

Perennial herbs, with simple stems from a creeping rootstock, alternate nerved sessile leaves, white flowers in a terminal simple or compound raceme, parted and spreading perianth, slender filaments, short anthers, short and thick style, obscurely 3-lobed stigma, and a 1 or 2-seeded globular berry. (*Smilacina* Desf.)

1. **U. racemosum** (L.) Britton. Minutely pubescent, 3 to 9 dm. high; leaves numerous, oblong or ovate-lanceolate, taper-pointed, ciliate, abruptly short-petioled: flowers on very short pedicels, in a terminal racemose panicle: stamens exceeding the small segments: berries pale red, speckled with purple, aromatic. (*Conrallaria racemosa* L. *Smilacina racemosa* Desf.)—Northern Texas "False spikenard."

2. **U. stellatum** (L.) Greene. Glabrous or pubescent, 3 dm. or less high: leaves 7 to 12, oblong-lanceolate, slightly clasping: raceme simple, sessile or nearly so: flowers few, larger, on solitary pedicels: stamens included: berries blackish. (*Convallaria stellata* L. *Smilacina stellata* Desf.)—Northwestern Texas.

15. UVULARIA L. (Bellwort.)

Stems rather low and forking above, from a short rootstock with fleshy roots, with oblong perfoliate membranaceous leaves, yellowish drooping flowers solitary on terminal peduncles, narrowly bell-shaped deciduous perianth (the acuminate spatulate-lanceolate distinct segments obtusely gibbous at base and with a honey-bearing groove within), much shorter stamens with linear anthers, deeply 3-cleft style, coriaceous truncate 3-lobed pod, and a few seeds (within a white aril) in each cell.

1. **U. perfoliata** L. Glaucous throughout, 2 to 4 dm. high, with 1 to 3 leaves below the fork: leaves glabrous, oblong to ovate-lanceolate, acute: perianth-segments glandular-pubescent within: stamens shorter than the styles: tip of connective acuminate: cells of pod with 2 dorsal ridges and 2-beaked at apex.—Northern Texas.

16. CALOCHORTUS Pursh.

Stems usually flexuous and branching, with few linear-lanceolate radical and cauline leaves (the latter alternate and clasping) with many nerves and transverse veinlets, open campanulate flowers with densely hairy glands, and the narrowly oblong pod with thick obtusely angled lobes.

1. **C. Gunnisoni** Watson. Stem slender, bulbiferous at base, with 1 to 3 narrow cauline leaves, and umbellately 1 to 5-flowered: petals 3 to 3.5 cm. long, light lilac, yellowish green below the middle, banded and lined with purple, the transverse gland nearly as broad as the petal: anthers acuminate.—Northwest Texas and northward.

17. ERYTHRONIUM L. (Dog's-tooth violet.)

Nearly stemless herbs, with two smooth shining flat net-veined leaves tapering into a long petiole and sheathing the base of the one-flowered scape which arises from a deep solid-scaly bulb, rather large nodding lily-like flowers with distinct lanceolate recurved segments, subulate filaments, erect oblong-linear anthers, elongated style, oblong-obovate pod, and numerous ovoid membranaceous-tipped seeds.

1. **E. albidum** Nutt. (White Dog's-tooth violet.) Leaves elliptical-lanceolate, scarcely or not at all spotted: perianth pinkish white; inner divisions toothless: styles rather slender except at apex, bearing 3 short spreading stigmas.—From central to northern and western Texas. Common in McLennan County is the var. COLORATUM Sterns, with white perianth more or less suffused with rose-purple varying to bright red, and the leaves more strongly green and brown mottled.—Mr. Sterns notes that the suffusion of red extends to the ripening pod, and that the plant exhales a delicate fragrance.

18. TRILLIUM L. (Wake robin. Birth-root.)

Low perennial herbs, with a stout naked simple stem rising from a short tuber-like rootstock and bearing at summit a whorl of 3 ample net-veined leaves and a terminal large flower, 3 lanceolate herbaceous sepals, 3 larger petals, adnate anthers on short filaments, persistent sessile stigmas, and an ovate berry with several ovate seeds in each cell.

1. **T. pusillum** Michx. Stem 1.5 to 2 dm. high: leaves sessile, lanceolate or oblong, obtuse, 3 to 5 cm. long: sepals obtuse: petals lanceolate, acutish, pale flesh-color, 16 to 20 mm. long: stigmas slender, united below. (*T. Texanum* Buckley.)—Northeastern Texas.

19. MELANTHIUM L.

Tall leafy roughish-downy plants from a thick rootstock, with linear or oblanceolate or oval leaves, monœciously polygamous cream-colored or greenish flowers in a pyramidal panicle, orbicular to oblanceolate persistent perianth-segments, cordate or reniform confluently one-celled anthers, 3 subulate diverging styles, 3-lobed ovoid-conical pod of 3 inflated carpels united in the axis, and several flat broadly winged seeds.

1. **M. Virginicum** L. (Bunch flower.) Stems 9 to 15 dm. high, rather slender: leaves linear (8 to 20 mm. broad): perianth-segments flat, ovate to oblong or slightly hastate (5 to 8 mm. long), with conspicuous double gland at summit of claw: pod 12 mm. long: seeds 10 in each cell, 4 to 6 mm. long.—Extending from the Atlantic States into Texas.

20. ZYGADENUS Michx.

Very smooth perennials, with simple stems from a coated bulb (in ours), linear leaves, large panicled greenish-white perfect or polygamous flowers, spreading withering persistent perianth, the oblong or obovate petal-like sepals with 1 or 2 glands near the base, stamens free from the sepals and about their length, cordate anthers, 3 styles, ovoid-conical pod, and angled seeds.

1. **Z. Nuttallii** Gray. Stems 3 to 9 dm. high: leaves flat, carinate: racemes rather densely flowered, with narrow bracts: perianth free: sepals with an ill-defined gland at base, not at all clawed: seeds 6 mm. broad.—Throughout northern Texas.

21. SCHŒNOCAULON Gray.

Scape very slender, from a black and fibrous bulb, with narrow long dry channelled radical leaves, many small pale-green nearly sessile perfect flowers in a spike-like raceme, linear or linear-oblong obtuse perianth-segments, long-exserted stamens with reniform anthers, very short style with minute stigmas, and brown angled seeds.

1. **S. Drummondii** Gray. Stout, 3 to 9 dm. high: leaves 2 to 6 mm. broad: raceme 1 to 6 dm. long, with green flowers whose segments are oblong-lanceolate and 3 mm. long: filaments stout, subclavate-filiform: fruiting pedicel 2 mm. long: pod erect, narrow, 12 mm. long, the cells 4 to 6-seeded. (S. *Texanum* Scheele.)—Southern Texas (Yorktown and Sutherland Springs).

PONTEDERIACEÆ. (Pickerel-weed Family.)

Aquatic herbs, with perfect more or less irregular flowers from a spathe, the petal-like 6-merous imbricated perianth free from the 3-celled ovary, introrse anthers, single style with 3-lobed or 6-toothed stigma, and a 3-celled many-seeded pod, or a 1-celled 1-seeded utricle.

1. **Pontederia**. Spike many-flowered: stamens 6: fruit a 1-seeded utricle.
2. **Heteranthera**. Spathe one to few-flowered: stamens 3: pod many-seeded.

1. PONTEDERIA L. (Pickerel-weed.)

Stout herbs growing in shallow water, with creeping rootstock producing erect long-petioled mostly cordate leaves, 1-leaved stem bearing a spike of violet-blue ephemeral flowers, a funnelform 2-lipped perianth (3 upper divisions united to form the 3-lobed upper lip, the 3 lower spreading), the 3 anterior stamens exserted (posterior short), blue oval anthers, and a 1-celled 1-seeded utricle.

1. **P. cordata** L. Leaves arrow-shaped, blunt: spikes dense, from a spathe-like bract: upper perianth-lobe with a pair of yellow spots: fruiting calyx-tube crested with 6-toothed ridges.—From the Trinity to Hockley. Var. ANGUSTIFOLIA Torr. has triangular-elongated and tapering scarcely cordate leaves.

2. HETERANTHERA Ruiz and Pavon. (Mud plantain.)

Creeping, floating or submerged low herbs in mud or shallow water, with a one to few-flowered spathe bursting from the sheathing side or base of a petiole, slender-tubed salverform 6-parted ephermal perianth with 3 stamens in the throat, erect anthers, and a 1 (or incompletely 3)-celled many-seeded pod.

* *Stamens unequal.*

1. **H. limosa** Vahl. Creeping or floating plants: leaves rounded, oblong or lance-oblong, obtuse at both ends, long-petioled: spathe with one large blue flower: the two posterior filaments with ovate yellow anthers, the other longer and with oblong or sagittate greenish anther: pod incompletely 3-celled.—Wet places, along the Limpia and to the Guadalupe.

2. **H. Mexicana** Watson. Stems short, ascending from a short rooting base, glandular pubescent above the inflorescence: leaves linear, with dilated sheathing base 7 to 10 dm. long: spathe ovate-lanceolate, acuminate, 18 mm. long: spike pedunculate above spathe, 12 to 15-flowered, naked, the flowers scattered and ascending: limb of perianth blue, with a white center: one stamen nearly twice as long as the others and equalling the style: pod oblong ovate: seed globose, 12-striate.—Devil's River.

* * *Stamens alike.*

3. **H. graminea** Vahl. Submerged grass-like herbs, with only the flowers reaching the surface: stems slender, branching, leafy, bearing a terminal 1-flowered spathe (becoming lateral): leaves linear, translucent, sessile: flowers small, pale yellow, with very long filiform tube: anthers sagittate: pod 1-celled.—Santa Maria, Cameron County.

XYRIDACEÆ. (Yellow-eyed-grass Family.)

Rush-like herbs, with equitant leaves sheathing the base of a naked scape which is terminated by a head of perfect flowers, glumaceous calyx, regular colored corolla, 3 stamens with extrorse anthers, and the 3-valved mostly 1-celled pod containing several or many seeds.

1. XYRIS Gronov. (Yellow-eyed-grass.)

Perennials, with yellow flowers solitary in the axils of coriaceous scale-like bracts which are densely imbricated in a head, the two lateral sepals glumaceous and keeled and enclosing the third membranaceous one, 3-clawed petals, 3 fertile stamens (with linear anthers) inserted on the claw (the 3 alternate ones sterile), 3-cleft style, and oblong pod with 3 parietal placentæ.

* *Keel of lateral sepals fringed with hairs.*

1. **X. ambigua** Beyr. Scape 6 to 9 dm. high, slightly twisted, furrowed, 2-edged above: leaves linear-lanceolate (1.5 to 3 dm. long), smooth and shining: spikes ovate-lanceolate, oblong or cylindric, many-flowered: bracts convex, light brown: lateral sepals lanceolate, shining, the upper two-thirds of the narrowly winged keel fringed and tapering at both ends. (*X. stricta* Chapm.)—Hardin and Austin Counties.

2. **X. flexuosa** Muhl. Scape 3 to 4 dm. high, twisted or spiral, 2-edged above from somewhat bulbous root: leaves linear, twisted: spike globose, few-flowered: lateral sepals linear, curved, fringed the whole length of the wingless keel. (*X. scabra* Engelm.)—Eastern Texas.

* * *The winged keel of the lateral sepals toothed or fimbriate.*

3. **X. iridifolia** Chapm. Scape 5 to 6 dm. high, stout, 2-edged and flattened above: leaves broadly linear, acuminate, 3 to 6 dm. long: spikes oval or oblong, many-flowered: scales dark, thick, convex, with entire margin: lateral sepals rather stout, linear, thin, the winged keel irregularly incised-fimbriate throughout its length.—From Houston to the mouth of the Brazos.

4. **X. fimbriata** Ell. Scape 6 to 12 dm. high, straight, twisted, 2-edged above: leaves long, broadly linear (3 to 6 dm. long), acuminate: spike cylindric or globose, many-flowered: scales broader above the middle, with entire margin: lateral sepals long-linear, long-fimbriate above the middle.—Hockley.

5. **X. torta** Smith. Scape 3 to 6 dm. high, spirally twisted, 1-edged, from bulbous shining roots: leaves linear (2 to 4 dm. long), twisted: spikes cylindric, pointed: scales light brown, twice as long as wide, serrulate at apex: lateral sepals linear, exserted, the upper portion of the keel-wing short-fimbriate.—Hempstead.

6. **X. Baldwiniana** R. & S. Scape slender, 2 to 4 dm. high: leaves filiform (1 to 2 dm. long), hollow, twisted, acute: spikes globose or oval: scales round, the outer margin usually lacerate: lateral sepals linear, the upper half of the keel-wing serrate. (*X. tenuifolia* and *X. setacea* Chapm.)—From Hempstead to Hardin County.

MAYACEÆ. (Mayaca Family.)

Moss-like densely leafy aquatic plants, with narrowly linear sessile pellucid leaves, axillary naked peduncles terminated by a solitary perfect 3-androus flower, herbaceous calyx, white corolla, and a 3-valved 1-celled several-seeded pod.

1. MAYACA Aublet.

Creeping or floating in shallow water, with 1-nerved entire (notched at apex) leaves, solitary peduncles sheathed at base, persistent perianth of 3 herbaceous lanceolate sepals and 3 obovate petals, alternate stamens, ovary with 3 parietal few-ovuled placentæ, filifom style, and simple stigma.

1. **M. Michauxii** Schott & Endl. Peduncles not much exceeding the leaves, nodding in fruit.—Extending into Texas from the South Atlantic and Gulf States.

COMMELINACEÆ. (SPIDERWORT FAMILY.)

Herbs, with fibrous or sometimes thickened roots, jointed and often branching leafy stems, flat (ovate, lanceolate or linear) parallel-veined leaves sheathing at base, chiefly perfect and 6-androus (often irregular) flowers, perianth free from the 2 or 3-celled ovary, distinct persistent calyx, and corolla of ephemeral or deciduous petals, one style, undivided stigma, and a 3 to several-seeded pod.

* Perfect stamens 3.

1. **Commelina.** Cymes sessile within a cordate or connate bract: petals unequal: filaments naked.

* * Perfect stamens 6, usually with bearded filaments: petals equal.

2. **Tradescantia.** Cymes not prolonged or scorpioid.
3. **Tinantia.** Cymes prolonged and scorpioid.

1. COMMELINA Dill. (DAY-FLOWER.)

Stems branching, with leaves contracted at base into sheathing petioles, the floral one cordate-clasping and folded together or hooded and enclosing the ephemeral irregular blue flowers, somewhat colored unequal sepals (the two lateral partly united), the two lateral petals rounded or reniform on long claws (the other smaller), unequal stamens (the sterile with cross-shaped anthers), and a 3-celled pod (2 of the cells 2-seeded, the other 1-seeded or abortive).

* *Ventral cell 2-ovuled (usually 2-seeded), the dorsal 1-ovuled.*

\+ *Margins of the spathe not united.*

1. **C. nudiflora** L. Slender and creeping, glabrous: leaves lanceolate, small (2.5 to 5 cm. long): spathe cordate, acute: seeds reticulated. (*C. communis* Chapm.)—Extending from the Atlantic States into Texas.

2. **C. dianthifolia** DC. Slender, erect, from a tuberous root: leaves linear: spathe cordate and long-attenuate: seeds wrinkled or pitted. (*C. linearis* Benth. *C. leiandra* Clark.)—From the Pecos to the copper mines of New Mexico.

\+ \+ *Margins of the spathe united.*

3. **C. hirtella** Vahl. Stems erect, 6 to 12 dm. high: leaves large, lanceolate, the sheaths brown-bearded: spathes crowded: seeds smooth. (*C. erecta* of Gray and Chapman.)—Extending from the Atlantic States to Texas.

* * *Cells 1-ovuled, with 1 smooth seed: spathe cucullate.*

4. **C. Virginica** L. Slender, usually tall, from a fleshy subtuberous root: leaves lanceolate to linear: dorsal cell indehiscent, scabrous.—Moist thickets and borders of rivers, southern and southwestern Texas.

5. **C. erecta** L. Slender, often low, from a subtuberous root: leaves linear: cells all dehiscent.—Extending from the Gulf States into Texas.

2. TRADESCANTIA L. (SPIDERWORT.)

Perennials, with leafy subsimple mucilaginous stems, keeled leaves (the floral almost as in *Commelina*), ephemeral umbellate-clustered axillary and terminal regular flowers, herbaceous sepals, similar ovate sessile petals, stamens all fertile, and the 2 or 3-celled pod 2-seeded.

* *Umbel terminal, sessile, subtended by two leaf-like bracts: leaves lanceolate.*

1. **T. micrantha** Torr. Low and rooting, slender, subpubescent: leaves 2.5 mm. long or less: flowers small (4 mm. long): filaments all hairy.—Southwestern Texas.

2. **T. leiandra** Torr. Stout, 3 dm. high, rooting at base: leaves 5 to 7 cm. long, somewhat villous or nearly glabrous: sepals more or less villous, 6 to 8 mm. long: filaments all naked.—Western Texas and New Mexico. A form from the Chenate mountains (*Nealley*), with insufficient flowering material, with short and rather broadly ovate leaves (4 to 5 cm. long, 2.7 cm. broad), has been referred to this species as var (?) OVATA Coulter.

* * *Umbels terminal (seldom lateral), sessile, subtended by 1 or 2 leaf-like bracts: leaves linear to narrowly lanceolate.*

3. **T. Virginica** L. (COMMON SPIDERWORT.) Roots fleshy-fibrous: smooth or only slightly villous, more or less glaucous, often tall and slender: leaves linear: rarely 1 or 2 long lateral peduncles.—Throughout central and southern Texas. Var. VILLOSA Watson, from Gillespie County to the Gulf, is often dwarf, and more or less villous throughout as well as pubescent.

3. TINANTIA Scheidw.

Cyme prolonged and scorpioid: otherwise as *Tradescantia.*

1. **T. anomala** (Torr.) Clarke. Tall, glabrous: leaves cordate-lanceolate: inflorescence shorter than the upper leaf: flowers few: sepals 12 mm. long. (*Tradescantia anomala* Torr.)—Shaded woods, eastern, central, and southern Texas.

JUNCACEAE.

By FREDERICK V. COVILLE.

Herbaceous, grass-like plants (in the United States) of varied habit, principally perennials, with branching rootstocks and loosely or closely tufted stems; leaves, principally radical, with sheathing base, the blade flat and grass-like, or terete, or vertically compressed, or sometimes obsolete; flowers inconspicuous, single or in heads, upon the branches of an inflorescence having the form of a panicle with the lower arms successively longer and often unilaterally developed, passing therefore into a wide variety of forms, and sometimes reduced to a single cluster or a single flower; perianth consisting of 6 chartaceous divisions.

1. **Juncus.** Capsule many-seeded, 3-celled with axial placentæ, or 1-celled with parietal intruded placentæ.

2. **Juncoides.** Capsule 1-celled, with 3 seeds borne upon a basal placenta.

JUNCUS L.

Perennial or annual plants devoid of hairs, with terete or subcompressed leafless or few-leaved stems, principally radical leaves, their blades either transversely flattened, subterete, or compressed, inconspicuous green to brown-purple flowers, and minute delicately ribbed or reticulated seeds.

ANALYTICAL KEY TO THE SPECIES.

Lowest leaf of the inflorescence terete, not channeled, erect, appearing like a continuation of the stem.

Flowers sessile in heads on the ultimate branches of the inflorescence.

J. ROEMERIANUS.

Flowers inserted singly on the branches of the inflorescence.....J. EFFUSUS.

Lowest leaf of the inflorescence not appearing like a continuation of the stem, or if so, channeled along the inner side.

Leaf-blade transversely flattened (*i. e.*, inserted with its flat surface facing the stem), or terete and channeled, not provided with node-like septa.

Flowers inserted singly on the branches of the inflorescence, each with two opposite scarious bractlets at the apex of the pedicel.

Annual..... J. BUFONIUS.

Perennials.

Leaf-blade flat but sometimes involute in drying so as to appear terete.

J. TENUIS.

Leaf-blade terete, channeled along the upper side.

Lowest involucral leaf less than three times as long as the inflorescence.

J. DICHOTOMUS.

Lowest involucral leaf more than three times as long as the inflorescence .....J. SETACEUS.

Flowers in heads on the branches of the inflorescence, without bractlets on their pedicels.

Stem erect; capsule obovate.

Perianth at least one-half longer than the capsule; anthers yellow, about 0.5 mm. long.....J. FILIPENDULUS.

Perianth equaling or barely exceeding the capsule; anthers reddish brown, about 1 mm. long.

Inner perianth parts acute, often setigerous.....J. MARGINATUS SETOSUS.

Inner perianth parts obtuse .....J. MARGINATUS ARISTULATUS.

Stem usually creeping, and rooting at the nodes; capsule narrowly linear-lanceolate.....J. REPENS.

Leaf-blade vertically flattened (*i. e.*, inserted with one margin toward the stem), or terete and not channeled, provided with node-like septa.

Leaf-blade vertically flattened, with thin margins, the septa incomplete and situated at irregular intervals.

Heads (in the Texan plant) less than 10-flowered; stamens 6; capsule oblong, obtuse, mucronate.....J. XIPHIOIDES MONTANUS

Heads more than 10-flowered; stamens 3; capsule linear-subulate.

J. ENGELMANNI.

Leaf-blade terete, or if somewhat compressed having obtuse margins, the septa passing entirely across the blade and situated at regular intervals.

Stamens 6, *i. e.*, one opposite each perianth part.

Outer perianth parts longer than the inner ....J. NODOSUS MEGACEPHALUS.

Inner perianth parts longer than the outer .....J. NODOSUS TEXANUS.

Stamens 3, *i. e.*, none opposite the inner perianth parts.

Capsule less than three-fourths as long as the perianth ..J. BRACHYCARPUS.

Capsule more than three-fourths as long as the perianth.

Capsule lanceolate-subulate, the body tapering gradually into a long subulate beak.

Stamens as long as the perianth, the anthers visible at its mouth.

J. SCIRPOIDES.

Stamens about one-half as long as the perianth, the anthers concealed within it.....J. CRASSIFOLIUS.

Capsule oblong to linear-lanceolate, obtuse or acute, abruptly mucronate or apiculate.

Capsule linear-lanceolate, twice as long as the perianth.

J. DIFFUSISSIMUS.

Capsule oblong or ovate, equaling or barely exceeding the perianth.

Capsule narrowly acute ..... J. ACUMINATUS.

Capsule obtuse or broadly acute.

Capsule light brown to stramineous at maturity, obtuse ..... J. ACUMINATUS ROBUSTUS.

Capsule chestnut brown, broadly acute ..... J. ELLIOTTII.

Group I. POIOPHYLLI Buch.

Flowers prophyllate, inserted singly on the branches of the inflorescence; leaf-blades gramineous, or terete and channeled along the upper side, not septate.

* *Leaves flat.*

1. **J. bufonius** L. Sp. Pl. i, 328 (1753). Plant *annual*, branching from the base, erect, seldom exceeding 20 cm. in height, the stems in larger plants *with one or two leaves below the inflorescence:* leaf-blade 0.2 to 1 mm. wide, in the larger plants flat, in depauperate ones filiform-involute: inflorescence about one-half as high as the plant; flowers inserted singly on its branches, in one abnormal form fasciculate: perianth parts 4 to 7 mm. long, lanceolate, acuminate: stamens usually 6, sometimes 3, seldom half as long as the perianth; the anther shorter than the filament: capsule about two-thirds as long as the perianth, narrowly oblong, obtuse, mucronate, 3-celled: *seed broadly oblong, with straight apiculations*, 0.35 to 0.5 mm. long, *finely reticulated in 30 to 40 longitudinal rows*, the areolæ broader than long.—Occasional throughout the State, the only annual Juncus of Texas.

2. **J. tenuis** Willd. Sp. Pl. ii, 214 (1799). Plant *perennial*, closely tufted, 20 to 70 cm. high: *leaves all basal*, except those of the inflorescence; *blades flat*, 0.5 to 1.5 mm. wide, sometimes involute in drying: inflorescence exceeding or exceeded by its lowest leaf, rarely reaching one-fourth the height of the plant: perianth 3.5 to 5 mm. long, its parts lanceolate, acuminate: stamens 6, about one-half as long as the perianth; the anthers shorter than the filaments: capsules usually about one-fifth shorter than the perianth, ovate to obovate, obtuse, mucronate, 3-celled: *seeds* 0.4 to 0.55 mm. in length, *narrowly oblong, with oblique apiculations, reticulated in about 16 longitudinal rows, the areolæ two or three times broader than long.*—Common in the humid regions of Texas, rarer westward.

* *Leaves terete, channeled.*

3. **J. dichotomus** Ell. Bot. S. C. i, 406 (1817). Plant perennial, closely tufted, 30 to 90 cm. high: leaves all basal except those of the inflorescence; *blades terete, channeled along the upper side:* inflorescence and flowers as characterized in the last species: *seed oblong*, obliquely apiculate, *0.35 to 0.45 mm. long, reticulated in about 13 longitudinial rows, the smooth areolæ about as long as broad.*—Closely related to the last. Eastern Texas.

4. **J. setaceus** Rostk. Monog. Junc. 13 (1801). Plant perennial, in large dense tufts, erect at the base, spreading and at length recurved above, 40 to 100 cm. long: *uppermost sheath* usually *bearing a long, slender, terete blade similar in appearance to the stem* but channeled; other sheaths with minute filiform blades less than 1 cm. in length; involucral leaf appearing like a continuation of the stem, 10 to 30 cm. long: inflorescence appearing lateral, 5 cm. or less in length: *perianth 3 to 5 mm. long*, its parts lanceolate, acuminate, rigid, widely divergent in fruit: stamens 6; the anthers usually longer than the filaments, and commonly deciduous after flowering: *capsule globose*, shining, mucronate, 1-celled, with intruded placentæ, *barely dehiscent: seed subglobose, 0.5 to 0.7 mm. long, reticulated in about 11 longitudinial rows, the areolæ* large, smooth, usually a little broader than long.—Resembling the following but more nearly related to the preceding. Confined to the coast region.

Group II. GENUINI Buch.

Flowers prophyllate, inserted singly on the branches of the inflorescence; leaf-blades, when present, and lowest involucral bract terete or slightly compressed, not channeled, not septate.

5. **J. effusus** L. Sp. Pl. i, 326 (1753). Plant 50 to 120 cm. high, densely tufted, erect: basal *leaf-blades all reduced to filiform rudiments* a few millimeters long: inflorescence 2 to 10 cm. high, occasionally congested to a smaller size; its leaf erect, appearing like a continuation of the stem, 5 to 25 cm. long: *perianth 2 to 3 mm. long*, its parts lanceolate, acuminate: *stamens 3*, persisting in the fruiting perianth; the anthers shorter than the filaments: *capsule obovate, 3-celled, regularly dehiscent:* seed as described under *J. tenuis*.—Confined principally to the humid region of eastern Texas.

Group III. THALLASSICI Buch.

Flowers aprophyllate, inserted in heads on the brauches of the inflorescence; leaf-blades as in group II.

6. **J. Rœmerianus** Scheele, Linnæa, xxii, 348 (1849). Plant 50 to 120 cm. high: *stems* erect, *arising singly from a* tough, scaly, *horizontal rootstock* 5 to 10 mm. thick: *sheaths all* basal and *bearing erect blades exactly resembling the stem* and of about the same length: inflorescence appearing lateral, 6 to 15 cm. high, diffuse, its leaf 10 to 25 cm. long: heads 2 to 6-flowered: perianth 2 to 3.5 mm. long, the parts linear-oblong, outer acuminate, inner shorter and bluntly acute: flowers usually diœcious: stamens 6, on fertile plants reduced to sterile staminodia: capsule brown, about as long as the perianth, narrowly obovate, obtuse or truncate, mucronate, 3-celled; *placenta very thick and spongy*, about one-third as broad as the valve.—The only species with diœcious flowers. Along the Gulf coast, within the influence of salt water.

Group IV. SEPTATI Buch.

Flowers aprophyllate, inserted in heads on the branches of the inflorescence; leaf-blades terete, laterally compressed, or iridaceous, septate.

* *Leaves vertically flattened, imperfectly septate.*

7. **J. xiphioides montanus** Engelm. Trans. St. Louis Acad. ii, 482 (1868). *Plant erect, 20 to 50 cm. high:* stems compressed, arising at intervals of one or a few centimeters from a scaly rootstock: leaf-sheaths compressed, with conspicuous membranaceous margins; blades vertically flattened, 1.5 to 3 mm. broad, seldom exceeding 10 cm. in length, the septa incomplete; cauline leaves 2 to 4, similar to the others: inflorescence rarely 10 cm. long: *heads 3 to 10-flowered:* perianth brown 2.5 to 3 mm. long, the parts lanceolate, acute, with green midrib: *stamens 6;* the anthers usually exceeding the filaments: capsule equaling the perianth, oblong to narrowly oblong, or broadly acute, mucronate, 1-celled, the placentæ strictly parietal: seed 0.4 to 0.5 mm. in length, narrowly oblong, obliquely apiculate, conspicuously reticulated in about 16 longitudinal rows, the *areolæ* nearly isodiametrical, and *transversely lineolate*.—Mountains of western Texas.

8. **J. Engelmanni** Buch. Krit. Verz. Junc. 67 (1880). *Plant about 1 meter high:* stem stout, compressed, 2 to 4-leaved: leaves 50 cm. or less in length, the upper shorter; blades vertically flattened, 3 to 8 mm. broad, the septa incomplete: inflorescence 8 to 30 cm. high, its leaves with nearly obsolete blades: *heads* globose, 7 to 10 mm. in diameter, *20 to 100-flowered;* perianth 3 to 4 mm. long, its parts subulate: *stamens 3*, one-half to three-fourths as long as the perianth; the anthers shorter than

the filaments: capsule subulate, 1-celled, slightly exceeding the perianth, the *valves in dehiscence remaining united by the slender beak, abruptly divergent below, the margins finally involute: seed narrowly oblong,* acute at either end, with nearly straight apiculations, 0.45 to 0.6 mm. long, *reticulated in about 13 longitudinal rows, the areolæ smooth.*—Confined to the coast region.

** * Leaves terete or compressed, perfectly septate.*

+ Heads many-flowered, spherical.

++ Stamens 3; rootstock short, thickened throughout.

9. **J. crassifolius** (Mx.) Buch. Mon. Junc. 326 (1890). *J. polycephalus crassifolius* Mx. Fl. Bor. Amer. i, 193 (1803). Plant 40 to 100 cm. high: stem stout, compressed, 1 to 3-leaved: *leaf blades* commonly 10 to 20 cm. long, *compressed,* 2 to 4 mm. wide, gradually acuminate above, *the septa complete:* inflorescence 8 to 35 cm. high, its branches stiff and spreading, its leaves with nearly obsolete blades: heads globose, 8 to 12 mm. in diameter in flower, 12 to 15 in fruit: *perianth 4 to 5 mm. long,* its parts subulate: stamens about one-half as long as the perianth; anthers not exceeding the filaments: capsule subulate, often falcate, exceeding the perianth, 1-celled; *valves separating throughout in dehiscence, flat, their apices spreading: seed broadly oval,* broadly acute at both ends, 0.4 to 0.55 mm. in length, *not more than twice as long as broad, reticulated in about 20 longitudinal rows,* the areolæ smooth.—Closely related to the last. Eastern Texas.

10. **J. scirpoides** Lam. Enc. Meth. Bot. iii, 267 (1789). Plant 20 to 70 cm. high: stems erect, terete, in clusters from short, horizontal rootstocks, these 2 to 3 mm. thick, and with a yearly growth of 1 to 2 cm.: cauline leaves 1 to 3; *blades terete, 2 mm. or less thick,* usually less than 10 cm. long, the septa perfect; basal leaves similar, but with longer blades: inflorescence strict or slightly spreading, reaching 15 cm. in length, sometimes reduced to only 1 or 2 cm.: heads 2 to 30, either simple, globose, 6 to 8 mm. in diameter in flower, and 8 to 11 mm. in fruit, or compound, lobed, and of slightly greater diameter: *perianth 2.5 to 3.5 mm. long,* its parts subulate, the inner somewhat shorter: *stamens equaling* at least *the inner perianth parts; anthers exserted at the mouth of the perianth: capsule* subulate, 1-celled, its long beak *exceeding the perianth* and holding the valves united above in dehiscence: seed oblong, acute at both ends, 0.4 to 0.5 mm. in length, reticulated in about 20 longitudinal rows, the areolæ smooth and nearly isodiametrical.—The exserted anthers of this species are very characteristic. Eastern Texas.

11. **J. brachycarpus** Engelm. Trans. St. Louis Acad. ii, 467 (1868). Plant 20 to 90 cm. high, loosely cespitose from horizontal rootstocks, these having a yearly growth of 1 to 5 cm., a thickness of about 2.5 mm., and bearing 1 to 6 stems: stems erect, terete: cauline leaves 1 to 4; blades terete, 2 mm. or less thick, seldom exceeding 15 cm. in length, the upper much shorter: inflorescence 10 cm. high and with 20 heads, or reduced to a single one: perianth 3 to 3.5 mm. long, its parts subulate, the *inner about three-fourths as long as the outer: stamens about half as long as the perianth: capsule one-half to two-thirds as long as the perianth,* oblong, acute, mucronate, 1-celled, dehiscent through the mucro: seed oblong, acute at both ends, 0.35 to 0.4 mm. long, reticulate in about 18 longitudinal rows, the areolæ smooth, nearly isodiametrical.—Readily distinguishable from all the allied species by its very short capsules, which are entirely concealed within the perianth parts. Eastern Texas.

++ ++ Stamens 6; rootstock slender, tuberiferous.

12. **J. nodosus megacephalus** Torr. Fl. N. Y. ii, 326 (1843). Plant 20 to 100 cm. high, not cespitose: rootstock slender, about 2 mm. thick, tuberiform-thickened at intervals of a few centimeters, each tuber supporting a single stem: *stem* terete or slightly compressed, *stout* 1 to 4-leaved: *blades stout,* terete, 1 to 2.5 mm. in thickness, in most cases abruptly divergent from the stem: inflorescence usually con-

gested, only a few centimeters in length and consisting of from 1 to 6 heads, occasionally 10 cm. long and bearing 15 or 20 heads, exceeded by the involucral leaf: heads 10 to 15 mm. in diameter: perianth 4 to 5 mm. long, its parts subulate, the *outer longer than the inner:* stamens about one-half as long as the perianth: capsule subulate, 1-celled, its beak 1 to 1.5 mm. long, *barely exceeding the perianth* and holding the valves together throughout dehiscence: seed 0.4 to 0.5 mm. in length, oblong, acute at both ends, reticulated in about 20 longitudinal rows, the areolæ transversely plurilineolate.—Throughout the State. This plant and the next differ from all the others in their slender tuberiferous rootstocks.

13. **J. nodosus Texanus** Engelm. Trans. St. Louis Acad. ii, 471 (1868). Plant 20 to 60 cm. high: rootstock slender, about 1 mm. thick, tuberiform-thickened at intervals of a few centimeters: *stems* single, one for each tuber, erect, terete, *slender*, 3 to 5-leaved: *blades slender*, divergent, not exceeding 1.5 mm. in thickness, seldom more than 1 mm.: inflorescence 10 cm. or less high, consisting of 2 to 15 heads, about equaled by its lowest leaf: heads 10 to 40-flowered: 8 to 10 mm. in diameter in flower, 12 to 15 mm. in fruit: perianth 3.5 to 4.5 mm. long, its parts subulate, the *outer shorter than the inner:* stamens one-half to two-thirds as long as the perianth: capsule subulate, 1-celled, valves united above in dehiscence; *beak* 1.5 to 2 mm. long, *almost wholly exserted from the perianth:* seed 0.4 to 0.5 mm. in length, broadly oblong or obovate, acute at both ends, reticulated in about 20 longitudinal rows, the areolæ transversely plurilineolate.—Southern and eastern Texas.

+ + *Heads few to many-flowered, turbinate or hemispherical.*

14. **J. diffusissimus** Buckley, Proc. Acad. Phila. 1862, 9 (1862.) Plant 30 to 60 cm. high: rootstock very short and inconspicuous: stems usually few in a tuft, erect, slender, terete or slightly compressed, 2 to 4-leaved: blades 10 to 20 cm. long, 1 to 1.5 mm. thick: *inflorescence diffusely branched*, 10 to 20 cm. high, much exceeding its lowest leaf, the branches slender and widely spreading: heads 3 to 12-flowered: perianth 2.5 to 3.5 mm. long, its parts subulate, equal: stamens one-half to two-thirds as long as the perianth: *capsule linear-lanceolate, 4 to 5.5 mm. in length, almost twice as long as the perianth*, obtuse or broadly acute, short-mucronate, 1-celled, the valves separating through the apex in dehiscence: seed oblong to obovate, 0.4 to 0.5 mm. long, acute at the base, abruptly apiculate at the apex, reticulated in about 16 rows, the areolæ transversely plurilineolate.—Eastern Texas.

15. **J. acuminatus** Mx. Fl. Bor. Amer. i, 192 (1803). Plant 25 to 80 cm. high: rootstock very short and inconspicuous: stems few or several in a tuft, erect, terete or slightly compressed, 1 to 3-leaved: blades of the lower leaves 10 to 18 cm. long, 1 to 2 mm. thick, the upper shorter: *inflorescence commonly* 5 to 15 cm. high, and *with 5 to 50 heads*, rarely larger, or reduced to even a single head, its branches usually spreading or sometimes strict; heads 3 to 20-flowered, commonly 5 to 12-flowered: perianth 2.5 to 3.5 mm. long, its parts lanceolate-subulate, nearly equal: stamens about one-half as long as the perianth; *capsule ovate-lanceolate*, broadly acute, mucronate, 1-celled, *equaling the perianth*, light brown at maturity, the valves separating through the apex in dehiscence: *seed* narrowly to broadly oblong, 0.4 to 0.55 mm. in length, acute at both ends, *reticulated in about 16 to 20 longitudinal rows, the areolæ transversely plurilineolate.*—Eastern and southern Texas.

16. **J. acuminatus robustus** Engelm. Trans. St. Louis Acad. ii, 463 (1868). Plant 60 to 100 cm. high: rootstock short, inconspicuous: stems few in a tuft, stout, nearly terete, 2 to 3 mm. thick below, 1 to 2-leaved: blades erect, terete, conspicuously septate, 20 to 60 cm. long, 2 to 3.5 mm. thick, usually reaching the inflorescence: *inflorescence* 10 to 25 cm. high, *with* moderately spreading branches and *innumerable heads*, its largest leaf with a blade obsolete or sometimes one-half as long as the inflorescence: heads 2 to 10-flowered: perianth 2 to 3 cm. long, its parts nearly equal, lanceolate-subulate: stamens one-half to two-thirds as long as the perianth: *capsule* one to one and one-third times as long as the perianth, *light brown or almost stramin-*

cous at maturity, narrowly to broadly oblong, *obtuse* with a short apiculation, triquetrous when dry, 1-celled, the valves separate and involute after dehiscence: seed as in *J. acuminatus*.—Eastern Texas. A larger, stouter plant than the type form with more numerous, fewer-flowered heads, and smaller flowers and capsules.

17. **Juncus Elliottii** Chapm. Fl. South U. S. 494 (1860). Plant 20 to 75 cm. high: stems erect, tufted, from branched congested rootstocks, 3-leaved, nearly terete: lower leaf-blades commonly 8 to 15 cm. long, rarely reaching 25 cm., the upper often much shorter, 1 to 2 mm. in diameter: inflorescence 3 to 20 cm. high, occasionally somewhat larger, with moderately spreading branches, and 5 to sometimes 150 heads, the blades of the lowest involucral leaf usually obsolescent, rarely 4 cm. long: *heads 2 to 5-flowered:* perianth 2 to 2.5 mm. long, the parts equal, lanceolate, and acute: stamens one-half to three-fourths as long as the perianth; the anthers shorter than the filaments: *capsule* oblong to narrowly oblong, *at maturity chestnut-brown above and shining*, broadly acute, equalling the perianth, 1-celled, the valves spreading and often involute when mature: *seed* lanceolate-oblong, 0.35 to 0.45 mm. in length, reticulated *in about 12 to 14 rows, the areolæ* linear-oblong, and *smooth*, or marked with a single longitudinal line.—Eastern Texas. Distinguishable from all forms of *J. acuminatus* by its chestnut-brown capsules, and its darker-colored seeds with fewer rows of reticulations and smooth areolæ; and from the type form of *J. acuminatus* also in its heads with fewer and smaller flowers.

Group V. GRAMINIFOLII Buch.

Flowers aprophyllate; leaves gramineous, not septate.

* *Capsule subulate.*

18. **J. repens** Mx. Fl. Bor. Amer. i, 191 (1803). Plant apparently perennial by stolons; *stems* tufted, compressed, commonly 1 to 2 mm. in width, *ascending to a height of 5 to 20 cm., or prostrate, often rooting at the nodes*, and sometimes attaining a length of more than 50 cm.: leaves with compressed sheaths 2 cm. or less in length, auriculate, the blades commonly 3 to 8 cm. long and 1 to 2 mm. broad, filiform-acuminate at the apex: inflorescence paniculate, the heads 1 to 8, one or more often occurring also at the lower nodes: heads 5 to 10-flowered: flowers 6 to 10 mm. long, those outermost in the head slightly recurved: *perianth parts subulate-lanceolate, green to stramineous at maturity*, the outer keeled and about one-third shorter than the inner: stamens 3, one-half to one-third the length of the perianth, the filaments several times longer than the yellow anthers: *capsule subulate*, but beakless, about as long as the outer perianth parts, 3-celled, the valves membranaceous and breaking away from the placental axis in dehiscence: *seeds* oblong, acute at both ends, 0.3 to 0.4 mm. long, finely *reticulated in 25 to 40 longitudinal rows*, the areolæ much broader than long.—Eastern Texas, near the coast.

* * *Capsule obovate.*

19. **J. marginatus aristulatus** (Mx.) Coville, Proc. Biol. Soc. Wash. viii, 123 (1893). *J. aristulatus* Mx. Fl. Bor. Amer. i, 192 (1803) *J. marginatus biflorus* (Ell.) Engelm. Perennial, commonly 30 to 60 cm. high, sometimes reaching 100 cm.: rootstock horizontal, 1 to 2.5 mm. in diameter, its annual growth about 1 to 2 cm.: *stem erect*, compressed, 2 to 4-leaved, tuberiform-thickened at base to a diameter of 3 to 10 mm.: leaves of the stem with auriculate sheaths 2 to 8 cm. long, and flat, striate blades 1 to 5 mm. broad and 5 to 20 cm. in length: *inflorescence* paniculate, commonly 5 to 12 cm. high and *with innumerable branches and heads*, sometimes much reduced: heads usually 2 to 5-flowered: flowers 2.5 to 3.5 mm. long: *perianth parts with green midrib, rather poorly defined brown lateral stripes, and hyaline margins*, the outer 3 shorter, *ovate*, acute to acuminate at apex, the inner 3 longer, *oblong to obovate*, usually mucronate, but broadly obtuse at the apex by reason of the broad, hyaline margins: stamens 3, as

long as the perianth; the *anthers reddish brown*, about 1 mm. long, exserted between the perianth parts: *capsule* broadly obovate, muticous, 1-celled, but apparently 3-celled from the deeply intruded placentæ, *about as long as the perianth: seeds linear-oblong, 0.5 to 0.6 mm. in length*, attenuate-apiculate, *conspicuously 12 to 16-costate*, finely translineolate.—Eastern Texas. This plant and the next, together with *J. marginatus* proper, are the only American Junci with anthers of a reddish color, those of all the other species being yellow.

20. **J. marginatus setosus** Coville, Proc. Biol. Soc. Wash. viii, 124 (1893). Plant closely resembling *J. marginatus aristulatus*, but often closely tufted, 30 to 75 cm. high: leaf-blade and inflorescence as described in that plant: *inner perianth parts narrowly* ovate to lanceolate, *setiform-acuminate* at apex: seed oblong, *0.3 to 0.4 mm. in length*, reticulated in 12 to 16 longitudinal rows, the areolæ nearly isodiametrical, transversely plurilineolate.—Throughout all except the coastal region of Texas.

21. **J. filipendulus** Buckley, Proc. Acad. Phila. 1862, 8 (1862); *J. leptocaulis* Torr. & Gr. in Engelm. Trans. St. Louis Acad. ii, 454 (1866). Perennial, erect, 12 to 30 cm. high: rootstock branching, the branches hardly longer than broad, closely congested: stems closely tufted, flattened, at least when dry, 1 mm. or less in breadth, 1 to 3-leaved: radical leaves about one-half the length of the stems, their blades 1 to 2.5 mm. broad: *inflorescence consisting of 1 to 5, commonly 2 or 3, heads*, each 4 to 7-flowered: flower 4 to 6 mm. long: *perianth parts* lanceolate, *with hyaline margins and green midrib*, acuminate into an aristate apex, the outer slightly the shorter: stamens 3, about one-half as long as the perianth; the *yellow anthers* much shorter than the filaments: *capsule one-half to two-thirds as long as the perianth*, obovate, retuse, mucronate by the persistent base of the style, almost 3-celled, the septa not quite uniting at its center: seed 0.45 to 0.55 mm. in length, oblong, acute at both ends, with 14 to 18 prominent longitudinal costæ (and often as many intermediate, much less conspicuous ones) the intermediate areas smooth, with an occasional transverse line.—Apparently confined in Texas to the northern portion of the State. The leaf-blades of this species are conspicuously constricted and slightly bent at a point not more than 1 or 2 cm. from the apex, a character common to all the *Graminifolii*, but more pronounced in this than in any other species.

2. JUNCOIDES Adans.

Perennial plants, tufted, grass-like in appearance, in most cases sparsely pilose, with flat leaves, inflorescence varying as in Juncus, 6 stamens (in the North American species), and 1-celled, 3-seeded capsules.—A genus principally of boreal, circumpolar distribution (*Luzula* D. C.).

1. **Juncoides campestre** (L.) Kuntze, Rev. Gen. Pl. 722 (1891); *Juncus campestris* L. Sp. Pl. i, 329 (1753). Perennial, densely tufted, erect, 10 to 30 cm. high: stem 1 to 2 mm. in diameter, terete or nearly so, 2 to 4-leaved: leaf-blades flat, grass-like, 2 to 7 mm. broad, acuminate at the apex to a blunt almost gland-like point, sparingly provided with cobwebby hairs when young, glabrate with age, inflorescence umbelloid, its lower leaves with green blades, the lowest often exceeding the inflorescence, its branches of very unequal length, each bearing at its apex an oblong to short-cylindrical dense spike 5 to 7 mm. in diameter: flowers inserted each in the axil of a scarious, ovate, acuminate bract, and bearing at base a pair of similar but smaller bractlets fimbriate at the apex: perianth 2 to 3 mm. long, from light to dark brown in color, its divisions lanceolate-ovate, acuminate: stamens 6, about one-half as long as the perianth: capsules obovate or broadly oblong: seed dark brown with an oblong body, about 1 mm. long, reticulated in about 50 to 100 longitudinal rows, with smooth areolæ, obtuse at the apex, bearing at the base a white, loosely cellular caruncle about one-half as long as the body.—Eastern Texas.

PALMÆ. (Palm Family.)

Chiefly trees with thick woody stem (caudex), long-petioled pinnate or fan-shaped leaves, an axillary spadix of small perfect or polygamous flowers, 3 persistent sepals and petals, mostly 6 hypogynous or perigynous stamens, 2-celled introrse anthers, 3-celled ovary with a single erect ovule in each cell, 3 mostly united styles, and fruit a drupe or berry.

1. SABAL Adans. (Palmetto.)

Plants with simple erect stems, palmate leaves (segments 2-cleft at apex), long branching spadix with sheathing spathe at the joints, small white perfect flowers, 3-cleft cup-shaped calyx, 3-petalled corolla, hypogynous stamens, subulate distinct filaments, cordate-ovate horizontal anthers, united 3-angled styles, capitate or obtuse stigmas, and a 1-seeded drupe.

1. **S. Palmetto** R. & S. (Cabbage palmetto.) Stem 6 to 12 m. high: leaves 15 to 25 dm. long, cordate in outline, pinnatifid fan-shaped, recurved at summit, the numerous divisions deeply cleft, and with thread-like filaments at the sinuses: spadix smooth, spreading, usually shorter than the leaves: petals slightly united: style thick: drupe black, globose.—In sparse clumps, from the mouth of the Rio Grande to Edinburg.

TYPHACEÆ. (Cat-tail Family.)

Marsh or aquatic herbs, with nerved linear sessile leaves, monœcious flowers (destitute of proper floral envelopes) on a spadix or in heads, 1 or 2-celled ovary and as many persistent styles, one-sided stigmas, and nut-like 1 (rarely 2)-seeded fruit.

1. TYPHA L. (Cat-tail flag.)

Plants with simple and jointless stem, long thickish leaves sheathing at base, flowers in a long very dense cylindrical spike terminating the stem, the upper part consisting of stamens intermixed with long hairs, the lower of ovaries surrounded by clavate bristles which form the copious down in fruit, and minute very long-stalked nutlets.

1. **T. latifolia** L. (Common cat-tail.) Stout, 12 to 18 dm. high, the flat sheathing leaves 6 to 20 mm. broad, exceeding the stem: the staminate and dark brown pistillate parts of the spike (each 7 to 15 cm. long) usually contiguous, the latter 2.5 cm. in diameter: pistillate flowers without bractlets.—Marshes of central and west Texas.

2. **T. Domingensis** Pers. Stem very tall (36 to 54 dm. high): leaves 10 to 14 mm. broad, flat or slightly convex: inflorescence sometimes 9 dm. long; staminate and pistillate spikes distant, both cylindrical: male bractlets often as long as the anthers, thick cuneate or broad spatulate at summit; female bractlets delicate, with a small rounded or spatulate head as long as the stigmas. (*T. bracteata* Greene.)—Southwestern Texas and adjoining Mexico.

ARACEÆ. (Arum Family.)

Plants with acrid or pungent juice, simple or compound often veiny leaves, flowers crowded on a spadix which is usually surrounded by a spathe, and fruit usually a berry.

1. ARISÆMA Martius. (INDIAN TURNIP.)

Low perennial herbs, with a tuberous rootstock or corm sending up a simple scape sheathed with the petioles of the veiny leaves, spathe convolute below and mostly arched above, monœcious flowers covering only the base of the spadix which is elongated and naked above, no floral envelopes, sterile flowers above the fertile with subsessile 2 to 4-celled anthers opening by pores or chinks at apex, fertile flowers each a one-celled ovary with depressed stigma, fruit a 1 to few-seeded scarlet berry.

1. **A. Dracontium** Schott. (DRAGON ROOT.) Corms clustered: petiole 3 to 6 dm. long (much longer than the peduncle); leaf solitary, pedately divided into 7 to 11 oblong-lanceolate pointed leaflets: spadix often androgynous, tapering to a long slender point beyond the oblong and convolute pointed greenish spathe.—Extending into Texas from the east.

LEMNACEÆ. (DUCKWEED FAMILY.)

Minute stemless plants, floating free on the water, destitute of distinct foliage, being merely a frond producing one or few monœcious flowers from the edge or upper surface, with commonly hanging roots underneath, ovules rising from the base of the cell, fruit a 1 to 7-celled utricle, and the large seed with apex (radicle end) of seed-coat separable as a lid.

1. **Spirodela.** Frond 7 to 11-nerved, with several rootlets.
2. **Lemna.** Frond 1 to 5-nerved, with a single rootlet.
3. **Wolffia.** Frond thick, very minute, without rootlets.

1. SPIRODELA Schleiden.

Frond 7 to 11-nerved or more, with several rootlets having axial vascular tissue, anthers 2-celled by vertical partition and longitudinally dehiscent, and two ovules; otherwise as *Lemna*.

1. **S. polyrrhiza** (L.) Schleid. Frond round-obovate (4 to 8 mm. long), thick, purple and rather convex beneath, dark green above, palmately (mostly 7)-nerved. (*Lemna polyrrhiza* L.)—Very common in ponds and slow streams of central and west Texas.

2. LEMNA L. (DUCKWEED.)

Fronds 1 to 5-nerved, with single rootlet (destitute of vascular tissue), flowers (usually 3 together surrounded by a spathe, 2 consisting of a stamen and 1 of a pistil) produced from a cleft in the margin of the frond, slender filaments, 2-celled didynamous anthers, 1-celled ovary with 1 to 7 seeds, and the style and truncate stigma simple.

* *Ovule solitary: frond 1 to 3-nerved.*

\+ *Fronds oblong, stalked at base, remaining connected.*

1. **L. trisulca** L. Fronds thin, oblong to oblong-lanceolate (12 to 18 mm. long), attenuate at base into a slender stalk, denticulate at tip, obscurely 3-nerved, often without rootlet, usually several series of offshoots remaining connected: spathe saclike: seed ovate, with small round operculum.—Ponds and slow waters about the Pecos and San Felipe creek.

+ + *Fronds oblong to elliptical, sessile, soon separating.*

2. **L. Valdiviana** Philippi. Fronds elliptic-oblong, small (2 mm. long), rather thick, obscurely one-nerved: spathe broad-reniform: utricle long-ovate, pointed by the long style: seed oblong, with prominent acute operculum. (*L. Torreyi* Austin).—Pools and slow-running waters.

3. **L. minor** L. Fronds round- to elliptical-obovate (2 to 3 mm. in diameter), rather thick, obscurely 3-nerved: spathe sac-like: utricle short-urn-shaped, tipped with a short style: seed oblong-obovate, with prominent rounded operculum.—Everywhere in stagnant waters.

* * *Ovules 2 to 7: fronds obscurely 5-nerved.*

4. **L. gibba** L. Fronds obovate-elliptic to nearly orbicular (3 to 6 mm. long), very thick and spongy, flat above, almost hemispherical, soon separating: bract sac-like.—Extending from Missouri through Texas to Arizona and California.

3. WOLFFIA Horkel.

Simplest and smallest of flowering plants, with rootless fronds proliferous from a cleft or funnel-shaped opening at base, 2 flowers (one a single stamen, the other a globular ovary) bursting through the upper surface of the globular and loosely cellular frond, 1-celled 2-valved anther, short style, depressed stigma, and a spherical utricle.

1. **W. Columbiana** Karsten. Globose or globular, 0.6 to 1.3 mm. in diameter, light green all over, not dotted: stomata 1 to 6: opening at base circular and with a thin border.—Floating rather beneath the surface of stagnant waters, extending from the north Atlantic States to Louisiana and through Texas to Central Mexico.

ALISMACEÆ. (Water-plantain Family.)

Marsh herbs, with fibrous roots, scape-like stems, transversely-veined sheathing petioled radical leaves, perfect or monœcious or diœcious flowers, perianth of 3 herbaceous persistent sepals and as many white deciduous petals, 6 or more included stamens, and numerous 1-celled ovaries becoming 1-seeded achenes in fruit.

1. **Alisma.** Flowers perfect: carpels flattened, in one whorl.
2. **Sagittaria.** Flowers mostly unisexual: carpels flattened, in dense heads winged.
3. **Echinodorus.** Flowers perfect: carpels capitate, turgid and ribbed.

1. ALISMA L. (Water-plantain.)

Herbs in shallow water or mud, with several-ribbed leaves, small white perfect flowers in a verticillately branched panicle, mostly 6 stamens, somewhat channeled (on back) obtuse achenes in a crowded whorl.

1. **A. Plantago** L. Perennial by a stout proliferous corm: leaves long-petioled, ovate, oblong, lanceolate, or even linear, acute, mostly rounded or cordate at base, 3 to 9-nerved: panicle (3 to 6 dm. long) loose, compound, many-flowered: carpels obliquely obovate, forming an obtusely-triangular whorl in fruit.—Shallow water and ditches, everywhere.

2. SAGITTARIA L. (Arrow-head.)

Stoloniferous herbs, with milky juice, long-petioled sheathing leaves (often without blade), mostly simple stems bearing one to few whorls of membranaceous-bracted flowers usually in threes, staminate flowers above, indefinite (rarely few) stamens, many ovaries crowded in a spherical or sub-triangular depressed head on a globular receptacle, and forming in fruit flat membranaceous-winged achenes.

**Flowers monœcious or diœcious, with the lower whorls pistillate: stamens covering the receptacle: sepals spreading or reflexed in fruit.*

+ Filaments numerous, as long as the linear-oblong anthers or longer: bracts distinct: fruiting heads larger than in the next.

1. **S. variabilis** Engelm. Scape (1 to 12 dm. high) angled, with one or more of the lower whorls fertile: leaves very variable, almost always sagittate: pedicels of fertile flowers at least half the length of the sterile ones: petals white: filaments glabrous, nearly twice the length of the anthers: achenes obovate, winged on both margins, with a long curved or usually horizontal beak ¼ or ⅓ its length. (*S. sagittæfolia* L., var. *variabilis* Micheli.)—Throughout Texas. Var. ANGUSTIFOLIA Engelm., near Brazos Santiago, has narrow leaves with long and linear diverging lobes.

2. **S. lancifolia** L. Scape 6 to 15 dm. high, with several of the lower whorls fertile: leaves lanceolate or lance-oblong (rarely linear), with tapering base (15 to 45 cm. long), on a stout petiole, the nerves arising from the very thick midrib: bracts ovate, acute, or acuminate: pedicels slender, the fertile scarcely shorter than the sterile ones: filaments pubescent: achenes falcate, winged on the back, pointed with an incurved beak.—Extending from the east through Texas to southern Mexico.

+ + Filaments very short: fruiting head small: bracts connate.

3. **S. graminea** Michx. Scape 1 to 6 dm. high: phyllodia flat, mostly broadly linear, acuminate: leaves ovate-lanceolate to linear, on long slender petioles: bracts obtuse: whorls of flowers few, all staminate or the lower fertile; pedicels slender, spreading, nearly equal: filaments 15 to 20, glandular pubescent: achene small, narrowly obovate, almost beakless, winged on the back, flat and scarcely costate on the sides.—Extending from the Atlantic States into Texas.

***Fertile flowers perfect: stamens 9 to 15 at the base of the receptacle: sepals erect and embracing the fruit.*

4. **S. calycina** Engelm. Scape weak, 1 to 2 dm. high: leaves broadly halberd-shaped, with spreading lobes: pedicels about equal, recurved in fruit: bracts orbicular; filaments slightly rough, as long as the anthers: achenes obovate, with a short horizontal style.—Extending from the North Atlantic States to Texas. Var. FLUITANS Gray, found in ponds and slow-running waters of western Texas, has lance-linear floating leaves.

3. ECHINODORUS Richard.

Mostly annuals, with the habit of *Sagittaria*, naked sparingly branched or simple stems, short pediceled perfect flowers in 3 to 8 whorls, 6 to 21 stamens, and the several or many ovaries imbricated in a head and forming thick and ribbed achenes in fruit.

1. **E. parvulus** Engelm. Scapes 2.5 to 7 cm. high: leaves lanceolate or spatulate, acute, 1 to 3 cm. long: umbel single, 2 to 8-flowered; pedicels reflexed in fruit:

flowers 6 mm. broad: stamens 9: style much shorter than the ovary: achenes beakless, obtusely few-ribbed.—In mud, extending from the Atlantic States to Texas.

2. **E. rostratus** Engelm. Scape erect (1 to 6 dm. high), longer than the leaves: leaves broadly ovate, cordate or truncate at base, obtuse, 6 to 12 cm. long: umbels proliferous, in a branched panicle: flowers 10 mm. broad: stamens 12: styles longer than the ovary: achenes beaked, acutely many-ribbed.—Western Texas.

3. **E. radicans** Engelm. Stems or scapes prostrate, creeping (6 to 12 dm. long), proliferous, bearing many whorls of flowers: leaves truncately broadly cordate, obtuse (5 to 20 cm. broad), long-petioled: flowers 12 to 18 mm. broad: stamens about 21: styles shorter than the ovary: achenes short-beaked, the keeled back denticulate.—Central and western Texas.

NAIADACEÆ. (Pond-weed Family.)

Immersed aquatic herbs, with leafy-jointed stems, flat leaves stipular or sheathing at base, perfect or unisexual (often spathaceous) flowers, with or without a perianth, 1 to 4 stamens with extrorse anthers, and solitary or distinct one-ovuled ovaries.

* Flowers perfect: leaves alternate.

1. **Potamogeton.** Spike peduncled: sepals 4: stamens 4.
2. **Ruppia.** Flowers on a spadix, without a perianth: stamens 2, with 2 distinct cells.

* * Flowers monœcious or diœcious, monandrous: leaves opposite.

3. **Zannichellia.** Monœcious: pistils 2 to 5, from a cup-shaped involucre.
4. **Naias.** Diœcious: pistil solitary, naked.

1. POTAMOGETON L. (Pond-weed.)

Brackish or fresh-water herbs, with slender branching stems, 2-ranked alternate (or imperfectly opposite) leaves, membranaceous sheathing stipules, spike of perfect flowers sheathed by stipules in the bud, 4 rounded sepals with as many opposite stamens (anthers nearly sessile), 4 ovaries, subsessile stigmas, and the ovate compressed drupe-like fruit with a crustaceous nutlet within.

* *Leaves of two sorts: floating ones more or less coriaceous, with a dilated petioled blade, different in form from the thinner submersed ones.*

– *Submersed leaves reduced to narrowly grass-like or filiform sessile phyllodia.*

1. **P. natans** L. Stem rather stout, simple or sparingly branched: floating leaves long-petioled, elliptical or ovate, somewhat cordate at base, obtuse, 21 to 29-nerved; upper submersed leaves lanceolate, the lower (later in the season) very slender; stipules free, the upper very long and acute: peduncle about the thickness of the stem: spike 2.5 to 5 cm. long, emersed: fruit obliquely obovate, acute, fleshy turgid: nutlet with a small deep impression in the middle.—Waters of the Limpia.

2. **P. hybridus** Michx. Stems slender, much branched: floating leaves oval to lance-oblong, large, longer than the filiform petioles, with 5 to 7 deeply impressed nerves; submersed leaves very numerous, almost setaceous, 2.5 to 7 cm. long; stipules obtuse, adnate to the base of the leaf: emersed spikes 10 to 18 cm. long; the submersed ones 1 to 4-flowered, their peduncles frequently recurved: fruit minute, about 8-toothed on the margin.—Shallow stagnant waters on the prairies of the Guadalupe River.

+ + *Submersed leaves lanceolate, rarely oval or linear: spikes dense, many-flowered, on stout peduncles.*

3. **P. rufescens** Schrad. Stem simple: floating leaves (often wanting) 5 to 12 cm. long, rather thin, wedge-oblanceolate, narrowed into a short petiole, 11 to 17-nerved; submersed leaves almost sessile, lanceolate and lance-oblong, fewer-nerved; stipules broad, hyaline, obtuse, the upper acuminate: fruit obovate, lenticular, pitted when immature, acutely margined, beaked with rather long style.—In streams and ponds, extending from the Atlantic States to Texas.

4. **P. fluitans** Roth. Stems branching: floating leaves thinnish, lance-oblong or long-elliptical, long-petioled, 17 to 23-nerved; submersed leaves very long (1 to 3 dm.), lanceolate and lance-linear, 7 to 15-nerved, coarsely reticulated: peduncles thickened above: fruit obliquely obovate, 3-keeled (the middle keel winged above): style short: nutlets with the sides scarcely impressed. (*P. lonchites* Tuckerm.)—In streams, extending from the Atlantic States to Central Mexico.

* * *Leaves all submersed, uniform, mostly sessile, membranaceous and dilated, lanceolate to oval, numerous; stipules obtuse, becoming loose.*

5. **P. lucens** L. Stem thick and branching: leaves more or less petioled, oval or lanceolate, mucronate, often rough-serrulate, frequently shining; stipules large: peduncle often elongated: fruit roundish, compressed, with obtuse margins, slightly keeled.—From San Antonio to the Rio Grande.

6. **P. perfoliatus** L., var. **lanceolatus** Robbins. Larger: leaves long-lanceolate, from a cordate-clasping base, acuminate, wavy, 7 to 11 cm. long: peduncles thickened upward.—Apparently across the continent.

* * * *Leaves all submersed and similar, thin, sessile, linear or setaceous.*

7. **P. foliosus** Raf. Stem filiform, flattish, and much branching: leaves narrowly linear (2.5 to 5 cm. long), acute, obscurely 3-nerved; stipules obtuse, free from the sheathing base of the leaf: spikes capitate, 1 to 4 (usually 2)-flowered, on short clavate peduncles: fruit roundish lenticular, the back more or less crested. (*P. pauciflorus* Pursh, not Lam.)—Stagnant waters of the Limpia.

8. **P. pectinatus** L. Stem filiform, repeatedly dichotomous: leaves very narrowly linear, attenuated at apex, 1-nerved with a few transverse veins; stipules united with the sheathing base of the leaf: spikes interrupted, on long filiform peduncles: fruit obliquely broad-obovate, compressed, bluntly keeled: shell of nutlet very thick.—Throughout northern and central Texas.

2. RUPPIA L. (Ditch-grass.)

Marine herbs, with long filiform forking stems, slender almost capillary leaves (sheathing at base), two or more perfect flowers on a slender spadix which is at first inclosed in the sheathing spathe-like base of a leaf, no perianth, two sessile stamens each with two large separate anther-cells, 4 small sessile ovaries, sessile depressed stigma, small obliquely ovate pointed drupe on slender stalk, and the spadix also raised on an elongated filiform peduncle.

1. **R. maritima** L. Leaves linear-capillary: nut ovate, obliquely erect, 3 mm. long: fruiting pedicel capillary, 7 to 15 cm. long: stipes 2 to 24 mm. long.—Shallow saline waters, near Brazos Santiago.

3. ZANNICHELLIA Micheli. (Horned pond-weed.)

Slender branching herbs, with mostly opposite long-filiform leaves, sheathing membranaceous stipules, naked sessile monœcious axillary flowers; the sterile consisting of a single stamen with a slender fila-

ment bearing a 2 to 4-celled anther; the fertile of 2 to 5 sessile pistils (in a cup-shaped involucre) forming obliquely oblong nutlets which are beaked with the short style, and a disk-like or 2-lobed stigma.

1. **Z. palustris** L. Stems leafy: leaves 2 to 7 cm. long: style at least half as long as fruit: fruit flattish, somewhat incurved, even or occasionally more or less toothed on the back, nearly sessile.—Slow-running streams and stagnant waters of western Texas.

4. NAIAS L. (Naiad.)

Slender branching herbs, with opposite linear spinulose-toothed sessile leaves (dilated at base), very small solitary diœcious or monœcious flowers sessile in the axils; the sterile consisting of a single stamen inclosed in a little membranaceous spathe (filament at first short); the fertile consisting of a single ovary tapering into a short style, 2 to 4 subulate stigmas, and the fruit a little seed-like nutlet inclosed in a loose separable membranaceous epicarp.

1. **N. flexilis** Rostk. & Schmidt. Stems usually very slender: leaves very narrowly linear (1.5 to 2.5 cm. long), very minutely serrulate: fruit 3 mm. long, narrowly oblong: seeds lance-oval, smooth and shining.—Ponds and slow waters, western Texas. Var. ROBUSTA Morong has a stout few-leaved sparsely branching elongated stem and flat abruptly acute leaves.

ERIOCAULEÆ. (Pipe-wort Family.)

Aquatic or marsh herbs (stemless or short-stemmed), with a tuft of fibrous roots, a cluster of linear loosely cellular grass-like leaves, naked (sheathed at base) scapes bearing dense heads of monœcious (rarely diœcious) small 2 or 3-merous flowers each in the axil of a scarious bract, chaffy double perianth (in ours), introrse anthers, and a 2 or 3-celled 2 or 3-seeded pod.

1. ERIOCAULON L. (Pipe-wort.)

Acaulescent, with mostly smooth pellucid flat or concave (above) leaves, scapes or peduncles terminated by an involucrate single head of monœcious and androgynous white-bearded or woolly flowers; the sterile with a calyx of 2 or 3-keeled or boat-shaped sepals, tubular 2 or 3-lobed corolla (each lobe with a black gland or spot), twice as many stamens; the fertile with often remote calyx, 2 or 3 separate narrow petals, 2 or 3-lobed ovary, 1 style, 2 or 3 slender stigmas, and a membranaceous loculicidal pod.

* *Receptacle smooth.*

1. **E. articulatum** Morong. Leaves short (2 to 7 cm. long), acuminate, fenestrate, usually equaling the sheath: scapes weak, 4 to 7-striate, smooth, 5 to 15 cm. high (or when submersed becoming 3 to 20 dm. high): heads 4 to 6 mm. broad: involucral scales obtuse: bracts cuneate or obovate, abruptly pointed, white-bearded: flowers densely bearded, the fertile about half as large as the sterile. (*E. septangulare* With.)—Still waters and ponds throughout Texas.

2. **E. compressum** Lam. Leaves spreading (5 to 12 cm. long), usually shorter than the sheath, grassy, awl-shaped, rigid (thin when submersed), tapering gradually to a sharp point: scape (2 to 9 dm. high) 10-ribbed: scales of the involucre very obtuse, turning lead-color: bracts obtuse. (*E. gnaphalodes* Michx.)—Ponds and streams.

3. **E. Körnickianum** Van Heurck & Müll. Leaves smooth, short, linear (16 to 22 mm. long, 2 mm. wide at base): scapes numerous, 10 to 12 cm. high, setaceous, compressed, 2 or 3-angled, with loose sheaths as long as the leaves: heads ovoid-globose, 3 cm. long: involucral scales dusky, broadly obovate, denticulate.—Eastern Texas.

* * *Receptacle hairy.*

4. **E. decangulare** L. Caudex short and thick (2.5 to 5 cm. long): leaves obtuse, varying from linear-lanceolate to linear-subulate, usually much longer than the sheaths, 1.5 to 5 dm. high, rather rigid: scapes 10 to 12-ribbed, 3 to 9 dm. high, stout: head hemispherical, becoming globular (4 to 14 mm. broad): scales of the involucre acutish, straw-colored or light brown: bracts pointed, dentate at apex.—Swamps, extending from the Atlantic and Gulf States to Texas.

5. **E. Texense** Körn. Leaves acuminate, a little shorter than the sheaths, 2.5 to 5 cm. long: scapes 20 to 25 cm. high, 6 or 7-ribbed, slender: heads hemispherical, 2 to 4 mm. broad: involucral scales obovate or nearly orbicular, entire, straw-colored: bracts cuneate or obovate, fimbriate.—Texas.

CYPERACEÆ. (Sedge Family.)

Grass-like or rush-like herbs, with fibrous roots, mostly solid stems, closed sheaths (stem-leaves when present 3-ranked), and spiked chiefly 3-androus flowers which occur one in the axil of each of the glume-like imbricated bracts and destitute of any perianth or with hypogynous bristles or scales in its place, one-celled ovary with a single ovule and becoming an achene, 2-cleft style with fruit flattened or lenticular, or 3-cleft style and fruit 3-angular.

I. Flowers all perfect (abortive stamens or pistil rare): spikes all of one sort.

Tribe I. Spikelets mostly many-flowered, with only 1 (rarely 2) of the lower scales empty.—Scirpeæ.

* Spikelet scales strictly 2-ranked, conduplicate and keeled.

+ Flowers destitute of bristles and of beak to achene: inflorescence terminal.

1. **Cyperus**. Spikelets few to many-flowered, usually elongated or slender.

2. **Kyllinga**. Spikelets one-flowered (but of 3 or 4 scales), glomerate in a sessile head.

+ + Flowers with bristles: achene beaked: inflorescence axillary.

3. **Dulichium**. Spikelets 6 to 10-flowered, slender, clustered on an axillary peduncle.

* * Scales of the several to many-flowered spikelet imbricated all round.

+ Achene crowned with the bulbous persistent base of the style (usually deciduous in Fimbristylis): flowers without inner scales.

++ Hypogynous bristles (representing perianth) generally present: stem naked.

4. **Eleocharis**. Spikelet solitary, terminating the stem: stamens 3.

++ ++ Bristles always none: stem leafy.

5. **Dichromena**. Spikelets crowded into a leafy-involucrate head, laterally flattened: many of the flowers imperfect or abortive.

6. **Fimbristylis**. Spikelets in an involucrate umbel: stem leafy at base: style usually wholly deciduous.

+ + Style not bulbous at base.

++ Flowers without inner scales, but bristles generally present.

7. **Scirpus**. Spikelets solitary or clustered, or in a compound umbel, the stem often leafy at base and inflorescence involucrate: barbed bristles 3 to 8 or none: stamens mostly 3.

++ ++ Flower with one or more inner scales.

8. **Fuirena**. Scales of spikelet awned below apex: flower surrounded by 3 stalked petal-like scales alternating with 3 bristles.

9. **Hemicarpha**. Flower with a single very minute hyaline scale next the axis of the spikelet: bristles none.

Tribe II. Spikelets mostly 1 or 2-flowered (sometimes more in No. 10), generally with 2 to many of the lower scales empty.—RHYNCHOSPOREÆ.

10. **Rhynchospora**. Spikelets terete or flattish; scales convex, either loosely enwrapping or regularly imbricated: achene crowned with a persistent tubercle or beak, and commonly surrounded by bristles.

11. **Cladium**. Spikelets terete, few-flowered, the scales, etc., as in the preceding: achene destitute of tubercle: no bristles.

II. Flowers Unisexual.

Tribe III. Flowers monœcious, the two kinds in the same or in different spikes: achene naked, bony or crustaceous, supported on a hardened disk.—SCLERIEÆ.

Scleria. Spikes few-flowered; lower scales empty: no bristles or inner scales.

Tribe IV. Flowers monœcious in the same (androgynous) or in separate spikes, or sometimes diœcious: achene inclosed in a sac (*perigynium*).—CARICEÆ.

Carex. Hypogynous bristle short and enclosed in the perigynium or none.

1. CYPERUS L.

Stems mostly triangular and simple, leafy at base and with one or more leaves at summit forming an involucre to the umbel or head, with few to many-flowered mostly flat spikelets, unequal peduncles or rays sheathed at base, 2-ranked conduplicate and keeled scales, 1 to 3 stamens, no bristles or inner scales, 2 or 3-cleft deciduous style, and a lenticular or triangular achene naked at apex.

§ 1. Achene lenticular, the edge turned to the rhachis, which is narrow and not winged: spikelet flattened, many-flowered: annuals.—PYCREUS.

* *Umbel simple or capitate, rarely slightly compound.*

+ *Superficial cells of achenium oblong.*

1. **C. flavescens** L. Stems 10 to 25 cm. high: involucre 3-leaved, very unequal: spikelets 10 to 16 mm. long, becoming linear, obtuse, clustered on the 2 to 4 very short rays: scales obtuse, straw-yellow: stamens 3: achene shining, orbicular.—In low ground, extending from Canada to Texas and northern Mexico.

+ + *Superficial cells of achenium quadrate.*

2. **C. diandrus** Torr. Spikelets 6 to 18 mm. long, lance-oblong, scattered or clustered on the 2 to 5 very short or unequal rays: scales rather obtuse, purple-brown on the margins or nearly all over: stamens 2 or sometimes 3: achene dull, oblong-obovate.—Extending throughout eastern North America and as far west as New Mexico. Var. CAPITATUS Britton, extending from Texas (Sabine Pass and

Chenate mountains) and northern Mexico to California, has a single capitate cluster appearing somewhat lateral, an involucre of 1 or 2 elongated leaves with 1 or 2 bracts, and scales generally brown-margined.

3. **C. polystachys** Rottb., var. **leptostachys** Boeckl. Stems very slender, 15 to 35 cm. high: leaves and elongated involucre very narrow: spikelets few to many on the 4 to 8 rays, linear, acute 4 to 18 mm. long: scales thin, ovate, acute, closely imbricated, pale brown: stamens 2: achene linear-oblong or clavate, short-pointed, grayish and minutely pitted. (*C. microdontus* Torr. *C. Texensis* Steud.)—Extending from the Gulf States into Texas (Sabine Pass).

* * *Umbel compound.*

4. **C. Hochstetteri** Nees. Stem stout, 3 dm. or more high: involucral leaves 3 to 5, very long: spikelets linear, spiked and crowded along the branchlets of the several-rayed umbel: scales oval, very obtuse, dark reddish brown, broadly white-scarious-margined: stamens 3: achenes broadly ellipsoidal, blackish. (*C. flavicomus* Torr. in Mex. Bound.)—From Louisiana through Texas to New Mexico.

§2. Achene triangular: spikelets usually many-flowered, more or less flattened, with keeled scales which are sometimes decurrent upon the rhachis as scarious wings.—EUCYPERUS.

1 Spikelets oblong to linear, in dense terminal sessile or short-rayed clusters; scales with long recurred point, nerved: stamen solitary: achene oblong-obovate, obtuse.*

5. **C. aristatus** Rottb. Low annual, 2.5 to 12.5 cm. high: involucre 2 or 3-leaved: spikelets chestnut-brown, oblong becoming linear, 7 to 13-flowered, in 1 to 5 ovate heads: scales tapering to a long recurved point. (*C. inflexus* Muhl.)—In the Chenate mountains. Distributed throughout North America.

2 Spikelets oblong to linear, in simple sessile or unequally-rayed umbellate clusters; scales many-nerved (recurved tips in No. 10): stamens 3: achene obovate, sharply triangular.*

6. **C. compressus** L. Low annual, 7 to 20 cm. high, with a simple sessile or a few umbellate clusters of oblong to linear spikelets (15 to 30-flowered and 6 to 16 mm. long) with crowded, strongly keeled, many-nerved, and very acute pale scales.—Along the Atlantic and Gulf coasts to Texas (Sabine Pass).

7. **C. Rusbyi** Britton. Stem slender, about 3 dm. high, from fibrous roots bearing short scaly rhizomes: involucre about 5-leaved, equalling the 3 to 5 rays, 1 or 2 of which become about 7.5 cm. long: heads of 4 to 7 lanceolate acute 13 to 20-flowered spikelets with rachises not winged: scales broadly ovate and obtuse, keeled, with slightly darker midnerve, about 11-nerved: achene black.—In the Chenate mountains (*Nealley*) and extending to Silver City, New Mexico (*Rusby*).

8. **C. Buckleyi** Britton. Stem quite stout, 3 to 6 dm. high: involucre about 4-leaved, mostly elongated: umbel rays 5 to 7, the longest about 10 cm. long: spikelets broadly linear, 12 to 20 mm. long, 12 to 20-flowered, clustered in loose heads of 12 to 30 at the ends of the rays, the rachis not winged: scales oblong or oblong-ovate, obtusish or truncate, with a dark keel and lighter brown somewhat scarious margins, 9 to 11-nerved: achene obtuse, with short point.—Valley of the lower Rio Grande; also in Chihuahua and Indian Territory.

9. **C. Schweinitzii** Torr. Perennial, propagating from hard clustered corms or bulb-like tubers: stems rough on the angles, 3 to 6 dm. high: umbel 4 to 8-rayed, with very unequal erect rays: spikelets loosely or somewhat remotely 6 to 12-flowered, with convex many-nerved scales and narrowly winged joints.—From Canada to southwest Texas and westward.

10. **C. Fendlerianus** Boeckl. Resembling the last species, but distinguished by the very short-rayed umbels forming a dense compact cluster, and the strongly mucronate scales with horizontal or recurved tips.—On the Rio Grande and westward to Arizona.

3* *Spikelets lanceolate and flat, in rather lax subglobose clusters in single umbels: scal acuminate: stamens 3: achene attenuate at base.*

11. **C. viscosus** Ait. Stem stout: involucre 3 or 4-leaved, very long: umbe simple, with 3 to 6 very uneqal rays: spikelets 10 to 14-flowered: scales somewh remote, ovate, subrecurved mucronate at apex, the keel denticulate-spinulose abov achene black. (*C. trachynotus* Torr.)—Extending from the Gulf States into Tex (ravines near the mouth of the Pecos, etc.) and southward.

4* *Spikelets in dense globose heads in mostly compound umbels: scales acute, 3-nerv (sometimes nerveless): stamen mostly solitary: achene linear to oblong, mostly acu or acuminate at each end.*

12. **C. pseudovegetus** Steud. Tall perennial, 3 to 12 dm. high: leaves and invo ucre very long and keeled: umbel compound, many-rayed: spikelets ovate, 3 m long, in numerous small greenish heads: scales narrow, pointless (acutish), obscurel 3-nerved: achene pale, linear, on a slender stipe. (*C. virens* Gray, in part, n Michx. *C. Luzulæ*, var. *umbellatus* Britton. *C. calcaratus* Wats. & Coult.)—Exten ing from the Atlantic and Gulf States to Indian Territory and Texas (Sabine Pass

13. **C. virens** Michx. Tall stout perennial, 3 to 12 dm. high: leaves and inv lucre very long, broad and strongly keeled: umbels compound, often muc reduced: spikelets ovate-oblong, acute, 4 to 8 mm. long: scales green, acutis obscurely 3-nerved: achene oblong, acute at each end, brown, 1 mm. long.—Fro the South Atlantic and Gulf States to Texas, Mexico, and California.

14. **C. Surinamensis** Rottb. An annual, with stems 15 to 40 cm. high, ver rough, and longer than the narrow leaves: umbels compound, of 4 to 6 prima rays, and as many smaller ones, shorter than the 4-leaved involucre: spikelets oblo or oblong-linear, 40 to 50-flowered, 10 to 20 in a head: scales yellowish, ovat acute, 3-nerved: achene oblong, pointed, abruptly contracted at base, minute wrinkled. (*C. Drummondii* Torr.)—From the Gulf States through eastern Texas Mexico.

15. **C. ochraceus** Vahl. Stems 2 to 6 dm. high, smooth, about as long as th leaves: involucre of about six very long leaves and several short ones: umbel mo or less compound, with many unequal rays from almost sessile to 5 to 10 cm. long spikelets linear, obtuse: scale ovate, mucronate, loosely spreading, yellowish-brow stamens 3: achene oblong, acute, sharply triangular.—From western Louisia through eastern Texas to Mexico.

16. **C. reflexus** Vahl. Stem (4.5 dm. high) smooth, longer than the rather rig very narrow flat leaves: involucre of about three elongated leaves: spikelets ovat oblong or linear-oblong, 11 to 30-flowered, crowded in subglobose heads in simp or somewhat compound 4 to 5-rayed umbels: scales ovate, carinate, acute, nerved (keel green, sides reddish-brown), closely imbricated and straight: stame 1 to 3: achene elliptical, acuminate at each end. (*C. rufescens* Torr. & Hook.)- Eastern Texas.

17. **C. cyrtolepis** Torr. & Hook. Stems cespitose, slender and wiry, 3 dm. more high: leaves very slender, nearly as long as the stem: involucre of 3 or 4 set ceous leaves: heads in a 3 to 5-rayed umbel (rays very unequal and erect): spikele broadly ovate, 9 to 12-flowered, the florets distant: scales lanceolate, acute, recurve and spreading, nerveless, dull greenish-white (or yellowish): achene oblong, acut at each end, smooth and dull.—From Sabine Pass to Arizona. Var. DENTICARINATU Britton (*C. rufescens*, var. *denticarinatus* Britton), from the valley of the lower R Grande, has scales with a prominent keel which is armed with small hyaline teet near its apex, and umbel appearing somewhat lateral.

18. **C. acuminatus** Torr. & Hook. Slender, 7.5 to 30 cm. high: involucre 2 3-leaved: spikelets short, ovate, becoming oblong, 16 to 30-flowered, pale: scal obscurely 3-nerved, short-tipped: achene oblong, pointed at both ends.—A Missi sippi Valley species, extending to Louisiana, Texas, and Arizona.

5* *Spikelets narrowly linear, in a spreading umbel: scales 3-nerved, decurrent in a persistent wing: stamens 3: achene round obovate.*

19. **C. Haspan** L. Perennial by slender running rootstocks: stems 3 to 5 dm. high: leaves linear, often reduced to membranous sheaths: umbel spreading, the filiform rays mostly longer than the 2-leaved involucre: scales light reddish-brown, oblong, mucronate, keeled, decurrent upon the rachis as persistent scarious wings. —Throughout the Gulf States and extending throughout Texas to Mexico and southward.

6* *Spikelets linear or lanceolate, in large ovate spike-like heads in simple 3 to 5-rayed umbels: scales reddish: stamens 3: achene obovate-oblong, pointed.*

20. **C. cephalanthus** Torr. & Hook. Stem tall (12 dm.), sharply 3-angled, angles scabrous: leaves flat (4 mm. wide): involucre of 2 or 3 leaves (one very long, the other about as long as the umbel): umbel somewhat simple, 3 or 4-rayed, the large ovate spike-like heads with short setaceous involucels: spikelets 50 to 80 in each head, linear, about 10-flowered (lowest fasciculate): scales lanceolate, reddish, with pale-green keel, remote, pointless, 7-nerved: achene with a short abrupt point.—Louisiana and Texas.

21. **C. spectabilis** Schreb. Stem 3 to 4 dm. high or more, 3-angled, smooth, from a tuberous root: leaves much longer than the stem, acuminate, keeled, with scabrous margin: involucre of 3 leaves, one much elongated: umbel of 4 or 5 unequal rays: spikelets linear-lanceolate, loosely imbricated, smooth and shining: scales oblong-ovate, obtuse, reddish-purple.—Texas (*Drummond*) and Arizona (*Rothrock*).

7* *Spikelets slender, in loose or sometimes compact heads in simple or compound umbels: scales decurrent in usually persistent scarious wings: stamens 3: achene linear to oblong.*

\+ *Stem jointed, leafless.*

22. **C. articulatus** L. Stems stout, 9 to 15 dm. high, from a creeping rootstock bearing tuber-like buds: involucre very short, of 3 bract-like pungent leaves: umbel compound, many-rayed, spreading or recurved: spikelets long (1 to 3.5 cm.), linear, spreading, 30 to 40-flowered, 3 to 10 in a cluster: scales whitish, oblong, obtuse, 7-nerved.—Extending from the Gulf States along the coast of Texas. Var. CONGLOMERATUS Britton, of the valley of the lower Rio Grande, has spikelets 2.5 to 37.5 cm. long, in dense clusters on the ends of short rays, producing a compact glomerate cluster 5 to 7.5 cm. in diameter. Dr. Britton also says that "a form of this species with the spikelets greatly elongated has been collected by Mr. Nealley in Texas."

\+ \+ *Stems leafy.*

++ *Perennial by tuberiferous stolons.*

23. **C. rotundus** L. Stem slender, 1.5 to 4.5 dm. high, equalling the leaves: umbel simple or slightly compound, about equalling the involucre; the few rays each bearing 4 to 9 dark chestnut-purple 12 to 40-flowered acute spikelets 8 to 18 mm. long: scales ovate, closely appressed, pointless or nearly so, nerveless except on the keel.—From the South Atlantic and Gulf States to the Texan coast (Sabine Pass and Brazos Santiago). Often called "nut grass."

24. **C. esculentus** L. Stem 3 to 7.5 dm. high, equaling the leaves: umbel often compound, 4 to 7-rayed, much shorter than the long involucre: spikelets numerous, light chestnut or straw-color, acutish, 12 to 30-flowered, 8 to 14 mm. long: scales ovate or ovate-oblong, narrowly scarious-margined, nerved, the acutish tips rather loose: achene oblong-obovate. (*C. phymatodes* Muhl. *C. repens* Ell.)—Throughout eastern North America and extending through Texas to Mexico and California.

Spreads extensively by means of its small nut-like tubers, and often becomes a pes in cultivated grounds. Var. MACROSTACHYS Boeckl. (*C. lutescens* Torr. & Hook Ann. Lyc.), of Florida and Texas (on the Rio Grande), is a stouter taller form (6 to dm. high), with larger 30 to 40-flowered spikelets (25 mm. long and 3 mm. wide) Var. ANGUSTISPICATUS Britton, reported from near Sabine Pass, has narrowly linea spikelets (about 18 mm. long and 2 mm. wide).

25 **C. Hallii** Britton. Stem 6 to 9 dm. high: rootstalks scaly: leaves elongated involucre of several leaves, one of them elongated far beyond the others and becom ing 3 dm. long or more: umbel more or less compound, with 5 or 6 elongated rays an several shorter ones: spikelets linear, 9 to 15-flowered, arranged in loose heads: scale ovate, acute, strongly 7 to 9-nerved, dark reddish-brown, with lighter colored mar gins and tips: achene linear.—Eastern Texas and valley of the lower Rio Grande

++ ++ *Annual or perennial: roots fibrous, but stems often hard and corm-like at base.*

26. **C. strigosus** L. Perennial, propagating by corm-like tubers from the base stem mostly stout, 3 to 9 dm. high: most of the rays elongated (2.5 to 12.5 cm.), thei sheaths 2-bristled: spikelets 5 to 25-flowered, narrow, acuminate, spreading: scale oblong-lanceolate, several-nerved: achene linear-oblong.—Throughout eastern North America and extending through Texas to California. An exceedingly variable species. Dr. Britton distinguishes the following varieties: Var. ROBUSTIOR Kunth, occurring with the type, has large elongated 10 to 25-flowered spikelets; var. CAPITATUS Boeckl., reported from Texas by Bigelow, has an inflorescence of several capitate clusters on short rays; var. COMPOSITUS Britton, reported from near Sabine Pass, has a compound umbel, with 4 or 5-flowered spikelets 8 to 12 mm. long; var. GRACILIS Britton, of the lower Rio Grande, is a slender form, with leaves shorter than the stem, and an umbel of 1 to 3 short rays bearing few linear spreading spikelets; var. ELONGATUS Britton (*B. Michauxianus*, var. (?) *elongatus* Torr.), collected in Texas by Drummond, has much elongated rays bearing single capitate clusters.

27. **C. stenolepis** Torr. Stem rather slender, 6 to 9 dm. high, longer than the leaves, which are very rough on the margins and whitish beneath: umbel of 6 to 9 rays shorter than the 3 to 6-leaved involucre and their sheaths truncate: spikes ovate and compact: spikelets yellowish, linear, acute, compressed, 5 to 8-flowered, 12 to 16 mm. long: scales linear-lanceolate, acute, spreading, 7 to 11-nerved: achenes oblong-linear, acute, dull.—Extending from the Gulf States into Texas.

28. **C. setigerus** Torr. & Hook. Stem 12 dm. high, acutely triangular, smooth: leaves nearly as long, flat, about 6 mm. wide: involucre of 3 much elongated leaves: umbel compound, 7 to 9-rayed; primary rays elongated and erect, secondary widely spreading: spike-like heads of 12 to 16 spikelets which are lanceolate and about 10-flowered: scales lanceolate, mucronulate, appressed, 3-nerved, tinged with brownish-red. (Incl. *C. lutescens* Torr. Mex. Bound. Survey.)—Valley of the Rio Grande, from Eagle Pass to New Mexico.

29. **C. refractus** Englem. Perennial: stem 3 to 6 dm. high: rays more or less elongated: spikelets very slender, in rather loose heads, divaricate or more or less reflexed, 2 to 4-flowered: joints of the rachis winged, enclosing the linear triangular achene.—Near Sabine Pass and Brazos Santiago.

30. **C. tetragonus** Ell. Stems mostly slender, 3 to 6 dm. high, as long as the green rough-edged leaves: involucre many-leaved: umbel of 6 to 12 slender rays (7.5 to 12.5 cm. long): spikes cylindrical, loose, those on the longer rays commonly compound: spikelets short (4 to 6 mm.), oblong, 4-angled, 4 to 6-flowered, the joints of the rachis broadly winged: scales ovate, mucronate, appressed, 9 to 11-nerved.—Extending from the Gulf States through Texas into Mexico.

31. **C. dissitiflorus** Torr. Stems filiform, 3 to 6 dm. high: leaves narrow-linear umbel simple, 3 or 4-rayed: spikelets scattered along the upper portion of the slender rays, lanceolate, compressed, acute, 5 to 7-flowered: scales oblong-lanceolate, acute: achene oblong-obovate, compressed triangular.—Extending from the Gulf States to the valley of the lower Rio Grande and Mexico.

3*. *Spikelets linear and flat, in spicate heads in a compound many-rayed umbel: scales reddish or brown, decurrent: stamens* 3.

32. **C. giganteus** Vahl. Stem triangular, smooth, leafy at base with rigid flat leaves: involucre of 8 to 10 leaves equaling the compound many-rayed umbel: primary rays elongated, the secondary ones about 9: spikelets about 12-flowered: scales ovate, mucronate, carinate, with reddish back, green keel and whitish hyaline margins: achene oblong, concavo-convex, yellowish white. (*C. erythrorhizos*, var. *erectus* Britton.)—On the lower Rio Grande.

33. **C. erythrorhizos** Muhl. Annual: stem 7.5 to 90 cm. high: umbel many-rayed, with 4 or 5 very long involucral leaves: spikelets very numerous, crowded in oblong or cylindrical nearly sessile heads or spikes, bright chestnut-colored: scales lanceolate, mucronulate, decurrent upon the rachis as scarious wings which soon separate to the base as a pair of free scales: achene triangular.—Apparently throughout the State.

§ 3. *Spikelets narrow, terete or nearly so, few to many-flowered, the scales closely appressed, and the broad wings of the jointed rachis inclosing the triangular achene.*—DICLIDIUM.

34. **C. speciosus** Vahl. Stem stout, mostly low (12.5 to 50 cm. high): rays of the simple or compound umbel mostly all short and crowded: spikelets 10 to 20-flowered, yellowish brown at maturity, the short joints of its axis winged with very broad scaly margins which embrace the ovate achene: scales ovate, obtusish, imbricately overlapping. (*C. Michauxianus* Torr., not of Schultes.)—Throughout eastern North America; reported in Texas as far south and west as Duval County, and probably further west. Var. SQUARROSUS Britton (*C. ferruginescens* Bœckl.), found in Missouri, Texas, and New Mexico, has spreading or recurved reddish scales. Var. PARVUS Britton (*C. parvus* Bœckl.), reported by Bœckeler from the Drummond collection, is low (2.5 to 7.5 cm.), with a very simple umbel, generally consisting of a single cluster of short terete spikelets.

35. **C. ferox** Richard. Stem stout and tall, with broad much elongated involucral leaves and an open spreading compound umbel: spikelets pale (darker brown in Buckley's specimens), scattered in loose spikes, terete, usually 8 to 10-flowered: scales oblong-ovate, obtuse, obscurely 7 to 9-nerved, at length spreading, longer than the thick broadly winged joints: achene obovoid-oblong, closely embraced by the wings.—From Missouri and Texas (*Bigelow* and *Buckley*) to Arizona and California.

36. **C. oxycarioides** Britton. Stem about 6 dm. high, with about six narrow elongated involucral leaves: inflorescence a single terminal dense globular head (about 2.5 cm. in diameter) composed of a very great number of sharply acute teretish about 5-flowered spikelets: scales oblong-ovate, acutish: achene oblong, acute.—Valley of the lower Rio Grande.

§ 4. *Spikelets 1 to 4-flowered, subterete, usually in dense heads: scales appressed, several-nerved, the lower empty and often persistent after the fall of the rest of the spikelet: joints of rachis winged, inclosing the triangular achene.*—MARISCUS.

* *Spikelets 2 to 6-flowered.*

37. **C. ovularis** Torr. Stem 1.5 to 6 dm. high: umbel 1 to 6-rayed: spikelets (50 to 100) very short, blunt, in a globular head, 3-flowered, oblong: scales ovate, obtuse, a little longer than the ovate-oblong achene.—In the northern Atlantic States, southward to Arkansas and the Rio Grande. Var. SPHÆRICUS Bœckl., from Indian Territory to southwestern Texas, has smaller very dense heads and more subulate reddish brown spikelets.

38. **C. cylindricus** Britton. Like the last, but heads cylindrical or oblong, spikelets usually 2-flowered, and achene linear-oblong. (*C. Torreyi* Britt., not *C. cylindricus* Chapman.)—From the north Atlantic and Gulf States to southwestern Texas.

39. **C. retrofractus Gray**. Stem and leaves usually minutely downy, 3 to 9 dm. high: spikelets slender, awl-shaped, very numerous in obovate or oblong heads terminating the elongated rays, soon strongly reflexed, 1 or 2-flowered in the middle: the empty scales ovate, the fertile lanceolate and pointed, the uppermost involute-awl-shaped: achene linear.—From the south Atlantic and Gulf States to Texas.

40. **C. flavomariscus** Griseb. Stems usually slender, from creeping-rootstocks, 3 to 6 dm. high, exceeding the leaves: spikes about 5 (4 to 6), very dense: spikelets spreading, oblong-lanceolate, acute, 2-flowered, 1-fruited: scales yellowish or brownish, ovate, about 11-nerved: achene triangular-obovate.—Valley of the lower Rio Grande and southward.

41. **C. uniflorus** Torr. & Hook. Stem filiform, triangular, smooth (3 dm. or more high), longer than the very narrow leaves: involucre of 3 leaves much longer than the simple 4 or 5-rayed umbel: spikes of about 25 spikelets irregularly spreading in all directions: spikelets approximated, subulate, 2 or 3-flowered (only the lower floret fertile): scales linear-lanceolate, slightly mucronate: stamens 4: achene oblong-linear, partly embedded in the broad rachis and covered with the inflexed margin.—Texas (*Drummond*). Var. PUMILUS Britton, of the lower Rio Grande, is about 7.5 cm. high, with a single (occasionally slightly compound) head of 8 to 20 spikelets mostly composed of 3 glumes (lowest persistent and empty, middle one fertile, uppermost sterile and subulate).

* * *Spikelets 4 to 12-flowered.*

42. **C. filiculmis** Vahl. Perennial, propagating from hard clustered corms or bulb-like tubers: stem slender, wiry, often reclined, 2 to 4 dm. high: leaves linear or filiform: spikelets numerous and clustered in one sessile dense head, or in 1 to 7 additional looser heads on spreading rays of an irregular umbel: scales many-nerved, blunt, greenish: stamens 3: achene obovate, sharply triangular.—Extending from the northern States into Texas.

43. **C. echinatus** Britton. Annual, with fibrous roots: stem 3 to 6 dm. high, longer than the linear leaves: umbel 6 to 12-rayed: heads globose or oblong: spikelets linear, acute: scales greenish or yellowish, oblong, obtuse, mucronate: achene oblong. (*C. Baldwinii* Torr.)—From North Carolina and Florida to the lower Rio Grande.

2. KYLLINGA Rottboell.

Stems leafy at base, with 3-leaved involucre, spikes densely aggregated in solitary or triple sessile heads, one-flowered spikelets of 3 or 4 two-ranked scales (the 2 lower scales minute and empty), and lenticular achene.

1. **K. pumila** Michx. Annual: stems 5 to 25 cm. high: leaves linear: head globular or 3-lobed, whitish-green: spikelets strictly 1-flowered: upper scales ovate, pointed, rough on the keel: stamens and styles 2.—Extending from the Mississippi Valley States into Texas.

3. DULICHIUM Pers.

A perennial herb, with terete simple hollow stem jointed and leafy to the summit, 6 to 10-flowered linear flattened spikelets sessile in 2 ranks on axillary solitary peduncles emerging from the leaf-sheaths, 2-ranked lanceolate scales which are decurrent and form flat wing-like

argins on the joint below, perianth of 6 to 9 downwardly barbed istles, 3 stamens, 2-cleft style, and flattened linear-oblong achene aked with the long persistent style.

. **D. arundinaceum** (L.) Britton. Stem 3 to 6 dm. high: leaves short and flat, ear, 3-ranked. (*Cyprus arundinacea L. D. spathaceum* Pers.)—Borders of ponds, roughout eastern North America and extending into Texas.

4. ELEOCHARIS R. Br. (SPIKE-RUSH.)

Leafless, with tufted stems sheathed at base and from matted or eeping rootstocks, a single several to many-flowered spike terminating e naked stem, scales imbricated all round in many (rarely in 2 or 3) nks, perianth of 3 to 12 (commonly 6) bristles which are usually ugh or barbed downward and rarely obsolete, 2 or 3 stamens, 2 or cleft style, its bulbous base persistent as a tubercle jointed upon the ex of the lenticular or triangular achene.

pike terete, scarcely thicker than the soft cellular stem: style 3-cleft: achene lenticular, pitted or wrinkled in longitudinal lines.

. **E. interstincta** R. & S. Stem terete, knotted as if jointed by many cross-rtitions, 6 to 12 dm. high: spike cylindrical, 2.5 to 5 cm. long: scales round-ovate: istles 6 (rarely 7), firm or rigid, hisped: achene smooth, obscurely wrinkled, shin-g, with a sessile conical-beaked tubercle. (*E. equisetoides* Torr.)—In shallow ter, throughout eastern United States and extending to the lower Rio Grande d western Texas.

2. **E. mutata** R. & S. Like the last, but stem continuous and sharply 4-angled, d achene finely reticulated and with a conical flattened distinct tubercle. (*E. adrangulata* R. & S.)—Eastern United States, and extending through Texas to exico.

3. **E. cellulosa** Torr. Stem obscurely 3-angled below, terete above, 3 to 6 dm. gh: spike cylindrical, spirally twisted, 1.5 to 2.5 cm. long: scales round-obovate: istles rather rigid, nearly or quite smooth: achene conspicuously pitted, narrowed to the conical (at length flattened) tubercle.—A marsh plant of the Gulf States, d extending through eastern Texas into Mexico.

4. **E. elongata** Chapm. Stems floating (6 to 9 dm. long, all but the summit mersed), slender, terete: spike 12 to 20-flowered, acute, 12 to 18 mm. long: scales ther distant on the compressed rachis, oblong-ovate, green on the back, dark own on the sides: bristles 7, strongly bearded, rather longer than the obovate nticular or somewhat triangular faintly pitted achene; tubercle minute.—A Florida ecies, collected in Texas by *Nealley*.

* * *Spike thicker than the stem: style usually 2-cleft: achene lenticular.*

5. **E. atropurpurea** Kunth. Stems tufted, erect (1.5 to 12.5 cm. high), 4-angled: ikes ovate or oblong, obtuse, at length very many (70 to 100)-flowered: scales oval, ry obtuse, thin, with brown sides and white margins: stamens 2: bristles none: hene very minute, pear-shaped, almost truncate, tipped with the somewhat peltate bercle. (*E. multiflora* Chapm.)—A tropical species, extending into Florida, Texas, d New Mexico.

6. **E. capitata** R. Br. Stem terete, 0.5 to 20 cm. high or more: spike ovate to long, 2 to 6 mm. long, obtuse, 15 to 40-flowered: scales round-ovate, obtuse, brown or ownish with green keel and paler margins: stamens 2: achene obovate, black, out equaling the 6 to 8 bristles, tipped with a flattened or saucer-shaped tubercle.— sand or gravel near sloughs, from the Gulf States through Texas to New Mexico d Mexico.

7. **E. ovata** R. & S. Stems nearly terete, 20 to 35 cm. high: spike globose-ovoid to ovate-oblong, obtuse, 2 to 12 mm. long, dull brown: scales very obtuse, densely crowded in many ranks: style sometimes 3-cleft: achene obovate with narrow base, pale brownish, shining, shorter than the 6 to 8 bristles, broader than the short-deltoid acute flattened tubercle. (*E. obtusa* Schult.)—Valley of the lower Rio Grande; a species occurring on both sides of the continent. Var. ENGELMANNI Britton (*E. Engelmanni* Steud.), of almost equally extensive range, has an elongated spike tapering to a blunt point.

8. **E. palustris** R. & S. Perennials, with running rootstocks and nearly terete striate stems (3 to 15 dm. high): spike oblong-lanceolate, pointed, many-flowered: scales ovate-oblong, loosely imbricated, reddish-brown with a broad and translucent whitish margin and a greenish keel, the upper acutish, the lowest rounded and often enlarged: stamens 2 or 3: style sometimes 3-cleft: achene narrowly obovate, somewhat shining, crowned with a short ovate or ovate-triangular flattened tubercle, shorter than the usually 4 bristles.—In the valley of the lower Rio Grande, and probably common throughout eastern and southern Texas, as it is one of the commonest of species. When in water it is rather stout and tall; in wet grassy grounds it is slender and lower. Var. GLAUCESCENS Gray, which occurs with the type, has slender or filiform stems, and narrower acute beak-like tubercle sometimes half as long as the achene. From the lower Rio Grande is also reported a form (*E. calva* Torr.) of this variety with no bristles.

* * * *Style 3-cleft: achene triangular.*

9. **E. acicularis** R. & S. Stems finely capillary (5 to 20 cm. long), more or less 4-angular: spike 3 to 9-flowered: scales thin, ovate-oblong, rather obtuse, greenish with purple sides: achene obovate-oblong, with 3-ribbed angles and 2 or 3 times as many smaller intermediate ribs, longer than the 3 or 4 very fugacious bristles; tubercle conical-triangular, contracted at its junction with the achene.—Throughout North America, and extending into Mexico.

10. **E. tortilis** Schultes. Stems sharply triangular, filiform, twisting when dry, 3 to 4.5 dm. high: spike ovate, 4 to 6 mm. long, somewhat acute, few-flowered: scales somewhat coriaceous, ovate, obtuse, whitish (with light chestnut sides): bristles 6, very rigid, a little overtopping the achene, which is longitudinally furrowed (the furrows strongly pitted); tubercle conical, compressed, produced into a beak nearly one-third as long as the achene. (*E. simplex* Torr.)—From the south Atlantic and Gulf States to Texas.

11. **E. tuberculosa** R. & S. Like the last, but stems flattish, spike 6 to 12 mm. long and many-flowered, and tubercle flattish-cap-shaped and as large as the body of the achene.—Extending from the north Atlantic States to the Gulf States and westward to Texas.

12. **E. microcarpa** Torr. Stems capillary, quadrangular, 15 to 20 cm. high: spikes oblong, compressed (often proliferous), 10 to 20-flowered: scales broadly ovate, somewhat acuminate, somewhat keeled, with whitish margins and brownish-red sides, the lowest one much the largest: bristles 3 to 5, very slender and fragile, shorter than the achene, which is minute, obovate, obtusely triangular, and smooth: tubercle triangular, very minute, closely sessile.—Extending through the south Atlantic and Gulf States into Texas.

13. **E. albida** Torr. Stems capillary, terete: spike dense, ellipsoidal or oblong, 2 to 8 mm. long, acutish, 20 to 30-flowered, with pale ovate mostly obtuse coriaceous scales: achene very small, obovate, very smooth, with a broadly triangular tubercle upon a narrow base, shorter than or exceeding the reddish bristles.—Salt marshes, from the south Atlantic and Gulf States to the valley of the lower Rio Grande. Var. BERLANDIERI Clarke, of southeastern Texas, is stouter, with longer heads, and the tubercle slightly more beaked.

14. **E. tenuis** Schultes. Stems almost capillary, erect from running rootstocks, 4-angular and flattish (3 dm. high), the sides concave: spike elliptical, acutish, 20

to 30-flowered (6 mm. long): scales ovate, obtuse, chestnut-purple with a broad scarious margin and green keel: bristles (2 to 4 or none) half as long as the achene which is obovate, roughish wrinkled, and crowned with a small depressed tubercle.—Throughout the eastern United States and extending into eastern Texas.

15. **E. montana** R. & S. Stems very slender, sulcate, 15 to 45 cm. high, from rather slender running rootstocks: spikes ovate or usually oblong, 4 to 10 mm. long; the numerous closely imbricated scales ovate and very obtuse, brown with greenish midvein and pale border: bristles 4 or 6, about equaling the very obtusely triangular oblong-obovate achene (nearly 1 mm. long): tubercle much broader than the apex of the achene, thick, deltoid, acute. (*E. Dombeyana* Kunth. *E. arenicola* Torr. *E. truncata* Schl.)—Throughout the southern United States, from South Carolina and Florida to southern California, and southward into Mexico.

16. **E. cylindrica** Buckley. Stems very slender, spikes linear, terete or slightly compressed, acutish, 12 to 18 mm. long: scales very numerous, the lowest ovate and obtusish, the others ovate-lanceolate and acute, all with broad hyaline margins: bristles none: stamens 3: achene obovoid, contracted at the neck, tipped with a conical acute tubercle. (*E. Texana* Britton.)—Valley of the lower Rio Grande.

17. **E. rostellata** Torr. Stem compressed, filiform, sulcate, 3 to 4 dm. high: spike ovate-lanceolate, acute, 12 to 20-flowered, 6 to 8 mm. long: scales ovate, obtuse, loose, somewhat cartilaginous, light-brown with scarious margin: bristles 4 to 6, strong, conspicuously scabrous, longer than the minutely roughened achene; tubercle conical-beaked, rather obtuse.—Throughout the United States and southward through Texas into Mexico.

5. DICHROMENA Richard.

Stems leafy, from creeping perennial rootstocks, with involucral leaves mostly white at base, more or less compressed few-flowered (all but 3 or 4 of the flowers usually imperfect or abortive) spikelets aggregated in a terminal leafy-involucrate head, imbricate more or less keeled white or whitish scales, no bristles, 3 stamens, 2-cleft style and a lenticular transversely wrinkled achene crowned with the persistent and broad tubercled base of the style.

1. **D. cephalotes** Britton. Stem triangular, 3 to 6 dm. high: leaves narrow, those of the involucre 4 to 7: achene truncate, not margined. (*D. leucocephala* Michx.)—Pine barrens of the Atlantic coast, and extending through eastern Texas to the valley of the lower Rio Grande.

2. **D. latifolia** Baldwin. Stem stouter, nearly terete: leaves broadly linear, those of the involucre 8 or 9, tapering from base to apex: achene round-obovate, faintly wrinkled, the tubercle decurrent on its edges.—A south Atlantic species, collected in the vicinity of Sabine Pass.

3. **D. nivea** Bœckl. Stem nearly terete, 10 to 25 cm. high: leaves very narrow, almost capillary, those of the involucre 2, slender and unequal, dilated and whitened at base: scales keeled and white: achene strongly wrinkled, round-obovate, very convex, the tubercle decurrent on both edges to and around the base of the nut (giving it an annulated appearance at base). (*D. Reverchoni* S. H. Wright.)—Texas and Arkansas.

6. FIMBRISTYLIS Vahl.

Stems leafy at base, with several to many-flowered terete spikelets in umbels or heads, a 2 or 3-leaved involucre, scales (all floriferous) regularly imbricated in several ranks, no bristles, 1 to 3 stamens, and a 2 or 3-cleft style often with a dilated or tumid base which is deciduous (except in *F. capillaris*) from the apex of the naked lenticular or triangular achene.

** Spikelets in umbels.*

+ Style 2-cleft, flattened and ciliate: achene lenticular: tubercle soon deciduous: spikelets many-flowered.

1. **F. spadicea** Vahl. Stems cespitose, rigid, terete, compressed and rather scabrous above: leaves rigid and terete, convolute-channeled, with scabrous margin: spikelets cylindraceous-oblong, acute, dark brown: stamens 3: achene scarcely beaked, minutely impressed-punctate in lines, delicately cancellate.—A tropical species, extending northward to western Texas and eastward to Georgia.

2. **F. castanea** Vahl. Stems (3 to 7.5 dm. high) tufted from a perennial root, rigid, as are the filiform convolute-channeled leaves, smooth: spikelets ovate-oblong becoming cylindrical, dark chestnut-color, 4 mm. thick: stamens 2 or 3: achene very minutely striate and reticulated. (*F. spadicea*, var. *castanea* Gray.)—Salt marshes, extending from the north Atlantic coast to the valley of the lower Rio Grande.

3. **F. laxa** Vahl. Stems slender (5 to 30 cm. high), from an annual root, weak, grooved and flattish: leaves linear, flat, ciliate-denticulate, glaucous, sometimes hairy: spikelets ovate, acute, 6 mm. long: stamen 1: achene conspicuously 6 to 8-ribbed on each side, and with firm cross-lines.—Eastern United States, and extending to the valley of the lower Rio Grande.

+ + Style 3-cleft and achene triangular: tubercle soon deciduous: spikelets smaller and fewer-flowered.

4. **F. autumnalis** R. & S. Annual, in tufts, 7.5 to 40 cm. high: stems flat, slender, diffuse or erect: leaves flat, acute: umbel compound: spikelets oblong, acute (2 to 4 mm. long), single or 2 or 3 in a cluster: scales ovate-lanceolate, mucronate: stamens 1 to 3.—Eastern United States, and extending to the valley of the lower Rio Grande.

+ + + Style 3-cleft, filiform and not ciliate: achene acutely triangular: tubercle more or less persistent.

5. **F. capillaris** Gray. Low annual, densely tufted, 7.5 to 22.5 cm. high: stems and leaves nearly capillary, the latter short: umbel compound or panicled: spikelets ovoid-oblong, 4 mm. long: stamens 2: achene minutely wrinkled, very obtuse.—Sandy fields across the continent, and reported throughout Texas.

** * Spikelets in a capitate cluster.*

6. **F. Vahlii** Link. A diminutive species, with long filiform leaves, sessile capitate spikelets, and 4 very long involucral leaves, narrow ovate-lanceolate acuminate scales, 2-cleft style (not ciliate), and a lenticular obtuse achene. (*F. congesta* Torr.)—A tropical species, extending to the valley of the lower Rio Grande and eastward through the Gulf States.

7. SCIRPUS L. (Bulrush. Club-rush.)

Mostly perennials, with stems sheathed at base and the sheaths usually leaf-bearing, several to many-flowered terete spikelets solitary or in a terminal cluster which is subtended by a one to several-leaved involucre (this when simple often appearing like a continuation of the stem), all the scales with perfect flowers (or all but one or two of the lowest), 3 to 6 mostly retrorsely barbed or ciliate bristles (sometimes wanting), mostly 3 stamens, and a 2 or 3-cleft simple style not bulbous at base and wholly deciduous, or sometimes leaving a tip or point to the lenticular or triangular achene.

* *Spikelet solitary (sometimes 2), sessile, terminal or lateral.*

1. **S. nanus** Spreng. Stems very slender, bristle-like, flattened and grooved, 2.5 to 5 cm. high: spikelet solitary and terminal, ovate, 3 to 8-flowered: scales ovate and greenish, the upper rather acute: bristles mostly longer than the fruit: achene ovoid, acutely triangular, smooth and shining, minutely tipped. (*Eleocharis pygmæa* Torr.)—Salt-marshes, from the north Atlantic coast to Texas. Var. ANACHÆTUS Britton, extending from Louisiana to New Mexico and Mexico, is a form without bristles.

2. **S. carinatus** Gray. Stems slender, triangular and channelled, 2.5 to 10 cm. high, with a short leaf at base: spikelets 1 or 2, subtended by a single erect involucral leaf, 5 to 10-flowered: scales very broadly ovate, greenish or tinged with brown, strongly keeled and boat-shaped, acute, gibbous in fruit and retaining the brown achene, which is very broad, acutely triangular, smooth, with a broad scar at summit: bristles none.—In low ground, extending from the Gulf States into Texas.

* * *Spikelets several or numerous, capitate or umbelled, subtended by one or several involucral leaves.*

– *Spikelets appearing lateral, the 1-leaved involucre appearing to be a continuation of the naked stem.*

3. **S. Hallii** Gray. Stems filiform, 12.5 to 30 cm. high, upper sheath rarely distinctly leaf-bearing: spikelets 1 to 7 in a sessile or sometimes proliferous cluster, ovate-oblong becoming cylindrical: scales ovate, greenish, strongly keeled, mucronate-pointed: bristles none: achene obovate-orbicular, mucronate, plano-convex, strongly wrinkled transversely. (*S. supinus*, var. *Hallii* Gray.)—Throughout east United States, and extending through Texas into Mexico.

4. **S. Americanus** Pers. Stems stout, sharply triangular throughout with concave sides, 3 to 12 dm. high, from long and stout running rootstocks: leaves 1 to 3, elongated (10 to 25 cm.), keeled and channeled: spikelets 1 to 6, capitate, ovoid, much overtopped by the pointed involucral leaf: scales ovate, rusty-brown, sparingly ciliate, 2-cleft at apex and awn-pointed from between the acute lobes: anthers tipped with an awl-shaped minutely fringed appendage: bristles 2 to 6, shorter than the obovate mucronate smooth achene. (*S. pungens* Vahl.)—In salt or fresh marshes and low grounds throughout North America.

5. **S. Olneyi** Gray. Stem stout (6 to 20 dm. high), 3-wing-angled, with deeply concave sides, the upper sheath bearing a short triangular leaf or none: spikelets 6 to 13, closely capitate, ovoid, obtuse, overtopped by the short involucral leaf: scales orbicular, rusty-brown, smooth, the inconspicuous mucronate point shorter than the scarious apex: anthers with a very short and blunt minutely bearded tip: bristles 6, scarcely equaling the narrowly obovate mucronate achene.—In salt marshes, from the north Atlantic States to the gulf and extending westward through Texas to Mexico and the Pacific coast.

6. **S. lacustris** L. Stem terete, very tall (9 to 36 dm.) and stout, from a deep running rootstock, leafless or nearly so: spikelets numerous, ovate-oblong, clustered in a one-sided compound umbel-like panicle longer than the involucral leaf: scales rusty or chestnut-brown, scarious, mostly a little downy on the back and ciliate, the midrib extended into a mucronate point: achene pale and dull, obovate with a narrowed base, mucronate-pointed, usually overtopped by the 4 to 6 slender downwardly barbed bristles. (*S. validus* Vahl.)—In ponds and streams throughout North America. Known as the "great bulrush" or "tule" and sometimes occupying large areas in marshy ground.

7. **S. Californicus** Britton. Very near the last, but distinguished by the 2 to 4 very dark-brown bristles which are somewhat flattened and retrorsely plumose with short curved hairs and shorter than the achene, which is narrowly obovate and

shortly attenuate into the stout beak; scales brown, not pubescent. (*S. Tatora* Kunth.)—In swamps, extending from the Gulf States through Texas to Mexico and the Pacific coast.

+ + Spikelets in simple or compound umbellate clusters, subtended by 1 to 4 flat involucral leaves: stems tall, triangular, leafy, sedge-like.

8. **S. maritimus** L. Leaves flat and linear, as long as the stout stem (3 to 6 dm. high), those of the involucre very unequal (one much the longest and more erect): spikelets few to several in a sessile cluster, and often also with 1 to 4 unequal rays bearing 1 to 7 ovate or oblong-cylindrical (rusty-brown) spikelets (1 to 2 cm. long): midrib of scale extended beyond the mostly lacerate or 2-cleft apex into a distinct awn which soon becomes recurved: achene obovate-orbicular, triangular or somewhat compressed, shorter than the 1 to 6 unequal and deciduous (sometimes obsolete) bristles.—In swamps, apparently only west of the Mississippi, and extending from Manitoba through Texas to Mexico and west to the Pacific coast.

9. **S. robustus** Pursh. Like the last, but larger, with very thick oblong-cylindrical heads (2.5 to 4 cm. long), longer involucral leaf (often 3 dm. long), and a compressed achene, which is plano-convex or obtuse-angled on one side. (*S. maritimus*, var. *macrostachyus* Michx.)—In salt marshes, from New England to the Gulf States and west into Texas. Apparently the Atlantic representative of *S. maritimus*, to which it has been constantly referred by American authors, and to which the above description of that species may partly apply.

** * * Spikelets very numerous in terminal large compound umbels: stems leafy throughout.*

10. **S. lineatus** Michx. Stem 3-angled, 6 to 9 dm. high, very leafy: leaves flat, linear-lanceolate: umbels axillary and terminal, loose, the slender rays longer than the 1 to 3-leaved involucre: spikelets oblong becoming cylindrical, 6 to 8 mm. long: scales rigid, green-keeled, mucronate: bristles 6, capillary, rust-colored, smooth, crisped and entangled, barely exserted: achene compressed 3-angled, pointed. (*Eriophorum lineatum* Benth. & Hook.)—In swamps throughout eastern United States and extending to the valley of the lower Rio Grande.

8. FUIRENA Rottboell. (Umbrella-grass.)

Stems obtusely triangular, from a perennial root, with many-flowered terete clustered or solitary (axillary and terminal) spikelets, scales awned below the apex and all floriferous, perianth of 3 oblong or ovate petaloid scales mostly on claws and usually with as many alternating small bristles, 3-stamens, 3-cleft style, and a triangular achene pointed with the persistent base of the style.—In ours the leaves have well-developed blades.

1. **F. simplex** Vahl. Mostly smooth, 8 to 50 cm. high: leaves with flat grass-like blades: scales of the spikelet with a long squarrose or recurved awn: perianth-scales ovate-oblong, obtuse at both ends, the slender mostly smooth awn rising abruptly from the back just below the apex (sometimes as long as the body of the scale, sometimes minute), and the stalk reaching to the middle or base of the nearly sessile achene: bristles retrorsely barbed, as long as the achene.—From Arkansas and Indian Territory, through Texas and New Mexico to Mexico. A form larger throughout and with long spikelets has been collected in the valley of the lower Rio Grande.

2. **F. squarrosa** Michx. Usually small (5 to 15 cm. high), but sometimes reaching 60 cm., mostly smooth except the lower sheaths: leaves and spikelet-scales as in the last: perianth-scales narrowly to broadly oblong, acuminate at both ends (sometimes abrupt at base), tapering into a slender tapering smooth or downwardly

barbed awn which usually exceeds the scale, the stalk half as long as the nearly sessile achene: bristles slender, tapering to the apex, retrorsely barbed, usually longer than the achene. (*F. squarrosa*, var. *pumila* Torr.)—A species of the eastern United States and extending to Louisiana, but represented within our range by the two following varieties: var. BREVISETA Coville, of the Gulf States and eastern Texas, has smooth bristles not exceeding the stipe of the achene, and broader perianth-scales rounded at apex and awnless or with a mere apiculation; var. HISPIDA Chapman, of the north Atlantic and Gulf States and extending into Texas, is 4 to 9 dm. high, with sheaths and frequently the stems and leaves densely hirsute retrorsely barbed bristles reaching the middle or apex of the achenium, and rhomboidal or deltoid-ovate perianth-scales with a thick short awn or point.

9. HEMICARPHA Nees.

Spikelet, flowers, etc., as in *Scirpus*, except that there is a minute translucent scale between the flower and the axis of the spikelet; also with only one stamen, 2-cleft style, and no bristles or other perianth.

1. **H. micrantha** Britton. Dwarf annual, 2.5 to 12.5 cm. high: involucre 1-leaved, as if a continuation of the bristle-like stem, and usually with another minute leaf: spikelets 2 or 3, barely 4 mm. long: scales brown, tipped with a short squarrose point. (*H. subsquarrosa* Nees.)—Sandy borders of ponds and rivers, from the Atlantic States through Texas to Mexico and the Pacific coast. Var. ARISTULATA Coville, from the interior of the State, bears sporading awns nearly as long as the scales themselves.

10. RHYNCHOSPORA Vahl. (BEAK-RUSH).

Chiefly perennials, with more or less triangular and leafy stems, terete or sometimes flattish spikelets (ovate, globular, or spindle-shaped) panicled or variously clustered, open or barely concave scales (lower commonly loosely imbricated and empty, the uppermost often subtending imperfect flowers), mostly 6 perianth-bristles (sometimes wanting), generally 2 stamens, and a lenticular globular or flat achene crowned with a conspicuous tubercle or beak consisting of the persistent indurated base or even of the greater part of the style.

* *Style entire or only shortly bifid, never cleft to the middle: inflorescence paniculate.*

1. **R. corniculata** Gray. Stem 9 to 18 dm. high: leaves about 12 mm. wide: cymes decompound, diffuse: spikelets lanceolate, acuminate, with 1 perfect and 1 to 4 staminate flowers: scales few: bristles rigid, stout, awl-shaped, minutely scabrous upward, unequal, shorter than the achene: style filiform and gradually thickened downward, in fruit persistent as an exserted slender-awl-shaped upwardly roughened beak several times longer than the smooth flat obovate achene.—Extending into Texas from the Mississippi Valley and Gulf States. Var. MACROSTACHYA Britton (*R. macrostachya* Torr.), of similar but more northeastern range, has often somewhat simple and smaller cymes, usually more clustered spikelets, and capillary bristles twice the length of the achene.

2. **R. scutellata** Griseb. Stem rather stout, 3 to 9 dm. high, glabrous: leaves linear, flat: spikelets lanceolate (6 to 10 mm. long), 3 to 5-flowered, in corymbose clusters of 3 to 5 spikelets: scales brown, ovate, acute, fertile ones larger than the sterile: bristles slender, unequal, finely barbed upward, equaling or slightly exceeding the achene, which is brown, ovate or obovate, compressed, slightly concave on each face, finely puncticulate, with a rather prominent keel on both edges; beak black, compressed, conic, about as long as the achene.—A West Indian species found near Indianola. (*Ravenel*)

* * *Style deeply bifid.*

\+ *Bristles none or rudimentary.*

3. **R. nitens** Gray. Stems nearly terete, 1.5 to 6 dm. high: leaves narrowly linear, longer than the stem: corymbs 2 or 3, widely spreading, the terminal one mostly compound: spikelets ovate, many-flowered, all the scales (ovate, acute) with perfect flowers: achene lenticular, orbicular, strongly transversely wrinkled; tubercle compressed, very short. (*Scirpus nitens* Vahl. *Psilocarpa rhynchosporoides* Torr. *P. Texensis* Torr. & Hook.)—Extending into Texas from the south Atlantic and Gulf States.

4. **R. pusilla** Curtis. Stems (15 to 30 cm. high) and leaves bristle-form: corymbs 2 or 3, distant, spreading, the upper one compound: spikelets minute, ovate, mostly scattered on the branches, 1 to 3-flowered: scales ovate, brown: achene white, oblong-obovate, compressed-lenticular, contracted at base, transversely wrinkled; tubercle depressed-conical.—A West Indian species, extending through the Gulf States to Texas.

\+ \+ *Bristles 6, plumose.*

5. **R. oligantha** Gray. Stems (15 to 30 cm. high) and smooth leaves bristle-like, reclining: corymb terminal, of 3 to 6 large ovate-lanceolate whitish stalked spikelets: bristles plumose below the middle, longer or shorter than the oval lenticular faintly wrinkled achene: tubercle dilated at base, conical, flat.—From the south Atlantic and Gulf States to Texas.

6. **R. plumosa** Ell. Stems (15 to 30 cm. high) and leaves filiform: spikelets few, in about 3 small clusters at the summit of the stem: bristles plumose throughout or nearly to the summit, rather longer than the nearly globular strongly wrinkled achene which is pointed with the short ovate smooth tubercle.—Extending into eastern Texas from the south Atlantic and Gulf States.

7. **R. intermedia** Britton. Stems taller (3 to 6 dm.) and leaves narrowly linear: spikelets in clusters of 4 to 6, forming an interrupted spike at the summit of the stem: bristles plumose only at base or below the middle: achene obovate, lenticular, pointed with the conical-beaked pubescent tubercle. (*R. plumosa* var. *intermedia* Chapm.)—A Florida species, but reported from near Sabine Pass.

8. **R. semiplumosa** Gray. Stems erect, rigid, 3 to 6 dm. high: leaves narrowly linear: spikelets oblong-ovate, dark brown, crowded in a terminal head, or rarely in a remote axillary one: bristles exceeding the tubercle, plumose below the middle: achene globose-obovate, faintly wrinkled, pointed with the short broadly conical smooth tubercle.—From Florida to Texas.

\+ \+ \+ *Bristles retrorsely barbed.*

9. **R. alba** Vahl. Stems slender, 3 to 6 dm. high, triangular above: leaves narrowly linear or almost bristle-form: spikelets lanceolate, white or whitish (tawny with age), perfecting only a single flower, densely crowded in a head-like terminal corymb and usually 1 or 2 lateral ones: achene oblong-obovate with narrowed base, scarcely longer than the flattened awl-shaped tubercle, shorter than the 9 to 12 bristles.—Across the continent north of our range, but represented in Texas (*Drummond*) by the var. MACRA Clarke, in which the clusters are larger (sometimes 3 cm. broad), and the bristles more numerous (15 to 20).

10. **R. glomerata** Vahl. Stem 3 to 9 dm. high: leaves linear, flat: spikelets numerous in distant clusters or heads (often in pairs from the same sheath), ovoid-oblong, dark chestnut-brown, few to several-flowered: achene obovate, margined, narrowed at base, as long as the lance-awl-shaped flattened tubercle, which equals the usually 6 bristles.—Throughout eastern United States and extending into Texas. Var. PANICULATA Chapm. (*R. paniculata* Gray), of the south Atlantic and Gulf States, has stouter taller stems, and compound paniculate corymbs with the very numerous spikelets clustered at the summit of the branches.

+ + + + *Bristles 6, scabrous upwards: achene smooth.*

11. **R. filifolia** Torr. Stems 3 to 6 dm. high, filiform, erect: leaves setaceous: corymbs 2 to 4, distant, capitate: spikelets lanceolate, brown, densely clustered: bristles rigid, nearly as long as the achene and tubercle: achene minute, obovate, lenticular, smooth and shining, twice as long as the compressed triangular-ovate ciliate tubercle.—South Atlantic and Gulf States to Texas.

12. **R. fuscoides** Clarke. Stems 1.5 to 4.5 dm. high, erect: leaves linear: corymbs capitate, in pairs at the summit of the stem, and often with a third rather distant lateral one: spikelets ovate, brown: bristles as long as the oval or orbicular, lenticular, dark brown achene (rarely twice as long): tubercle white, conical, obtuse. (*R. fascicularis* var. *distans* Chapm.)—Florida and Texas (*Hall*).

13. **R. gracilenta** Gray. Stems (3 to 6 dm. high) and leaves filiform or setaceous: corymbs 2 or 3, distant, capitate, brown: spikelets densely clustered, ovate-lanceolate: bristles twice as long as the oval dull achene, which is as long as the slender subulate tubercle.—From the south Atlantic and Gulf States to Texas.

14. **R. Grayii** Kunth. Stem solitary, 6 to 9 dm. high, 3-angled: leaves linear, rigid, shining: corymbs 3 or 4, distant, capitate: spikelets few, large, ovate: bristles as long as the achene and tubercle: achene round-obovate, tumid, slightly pitted, dull; tubercle short-conical, dilated at base.—From the south Atlantic States to Texas.

+ + + + + *Bristles scabrous upwards: achene transversely rugose.*

15. **R. cymosa** Nutt. Stems 6 to 9 dm. high, 3-angled: leaves narrowly linear: corymbs mostly 3, distant, open or contracted: spikelets ovate, clustered, light brown: scales mucronate: achene broadly obovate, lenticular, faintly rugose, twice as long as the 3 to 6 bristles; tubercle broadly conical, compressed, a fourth as long as the achene.—From the Atlantic and Mississippi Valley States to Texas.

16. **R. rariflora** Ell. Stems (3 to 4.5 dm. high) and leaves bristle form, the former commonly reclining: corymbs 2 or 3, remote, spreading: spikelets few and scattered, ovate, pedicelled: achene broadly obovate, lenticular, strongly rugose, twice as long as the 6 fragile bristles; tubercle flat, broadly conical, a third as long as the achene.—From the south Atlantic States to Texas.

17. **R. microcarpa** Baldwin. Stems 6 dm. high, erect, slender, nearly terete: leaves narrowly linear: corymbs 4 to 6, slender, spreading, compound: spikelets small, round-ovate, scattered: bristles 5 or 6, as long as the round-obovate lenticular strongly rugose achene, which is tipped with a very short and broad tubercle.—From the south Atlantic States to Texas.

18. **R. caduca** Ell. Stems stout, 9 to 12 dm. high, 3-angled: leaves broadly linear: corymbs 4 to 6, compound, remote, the branches and short pedicels erect: spikelets very numerous, approximate, ovate: scales caducous: bristles 6, slender, twice as long as the obovate lenticular faintly rugose achene (4 to 8 on the spikelet): tubercle flat, conical, ciliate, half as long as the achene.—From the south Atlantic States to Texas.

19. **R. schœnoides** Britton. Stems 6 to 9 dm. high, 3-angled: leaves linear: corymbs 3 to 5, compound, the lower ones remote: spikelets small, ovate, crowded: bristles 6, strongly hispid, as long as the achene and tubercle: achene obovate, flattened, strongly rugose; tubercle broadly conical, flat, a fourth as long as the achene. (*R. Elliottii* Dietr. *R. multiflora* Gray.)—South Atlantic States to Texas (near Sabine Pass).

20. **R. patula** Gray. Stems 6 to 9 dm. high, 3-angled, slender above: leaves linear: corymbs 3 to 5, remote, compound, widely spreading: spikelets scattered, ovate, on slender stalks: bristles 6, rather longer than the round-obovate lenticular achene: tubercle flat, conical, ciliate on the edges, half as long as the achene.—South Atlantic States to Texas.

21. **R. inexpansa** Vahl. Stems nearly terete, slender, 3 to 9 dm. high: leaves narrowly linear: corymbs 4 or 5, narrow, remote, compound, drooping: spikelets scattered, lanceolate: bristles 6, very slender, twice as long as the lanceolate-oblong compressed achene, which is twice as long as the conical-beaked tubercle.—South Atlantic States to Texas (near Sabine Pass).

11. CLADIUM P. Browne. (TWIG-RUSH.)

Stems tall, with ovoid or oblong spikelets of several loosely imbricated scales (the lower empty, 1 or 2 above bearing a staminate or imperfect flower, the terminal flower perfect and fertile), no perianth, 2 stamens, 2 or 3-cleft deciduous style, and an ovoid or globular achene somewhat corky at summit, or pointed, but without any tubercle.

1. **C. effusum** Torr. Stems 12 to 24 dm. high, nearly terete: leaves linear, elongated, saw-edged: panicles numerous, diffuse: spikelets small, 3 or 4 in a cluster, deep brown: scales about 6: achene ovate, pointed, wrinkled.—Fresh or brackish marshes, along the whole Gulf coast, and extending to the southwestern borders of Texas. Known as "saw-grass."

12. SCLERIA Berg. (NUT-RUSH.)

Perennials, with triangular leafy stems mostly from creeping rootstocks, inflorescence of terminal and axillary clusters (the lower clusters usually peduncled), monœcious flowers (fertile spikelets 1-flowered, usually intermixed with clusters of few-flowered staminate spikelets), oosely imbricated scales (lower empty), 1 to 3 stamens, 3-cleft style, no bristles, and a globular achene, stony, bony, or enamel-like in texture. All in low ground or swamps.

* *Achene smooth.*

1. **S. triglomerata** Michx. Stems (4.5 to 9dm. high) and broadly linear leaves roughish: fascicles of spikelets few, the lowest peduncled, the upper somewhat in threes: achene ovate-globose or depressed, on an obscure crustaceous disk.—Eastern United States, and extending into Texas.

2. **S. oligantha** Ell. Stems slender, 6 dm. high, the angles somewhat winged: leaves linear (4 mm. wide), smooth except the scabrous apex: lateral fascicles 1 or 2, usually on long exserted peduncles: achene ovate, on a tuberculate disk.—South Atlantic States to Texas.

** *Achene papillose or reticulated and wrinkled.*

3. **S. pauciflora** Muhl. Smoothish or hairy: stems slender, 20 to 60 cm. high: leaves narrowly linear: fascicles few-flowered, the lateral pedunculate, sessile, or wanting: bracts ciliate: achene globose-ovate, papillose or warty: the disk a narrow ring bearing 3 pairs of minute tubercles.—Eastern United States and extending into Texas.

4. **S. Torreyana** Walpers. Stems weak, diffuse, slightly scabrous or smooth: leaves linear (4 to 8 mm. wide), smooth: lateral fascicles loose, on more or less elongated and drooping filiform peduncles: achene irregularly pitted-reticulated or pitted-rugose with the ridges somewhat spirally arranged and more or less hairy (sometimes smooth). (*S. laxa* Torr.)—Pine-barrens from the south Atlantic States to Texas.

13. CAREX Ruppius. (SEDGE)

By L. H. BAILEY.

Perennial grass-like herbs, with 3-ranked leaves and mostly triangular stems, unisexual flowers borne in spikes and destitute of floral envelopes, the staminate consisting of three stamens borne in the axil of a bract or

scale and usually disposed in the terminal portion of the inflorescence or spike, the pistillate flowers composed of a single 2-styled or 3-styled pistil which forms in fruit a lenticular or triangular hard achene, and which is contained in a close sac or *perigynium* which, in turn, stands in the axil of a bract or scale.

§ 1. CAREX proper. *Staminate flowers aggregated in one or more terminal cylindrical or club-shaped spikes (sometimes pistillate at base or apex): pistillate flowers usually in distinct and simple mostly peduncled spikes: cross-section of perigynium usually prominently triangular in outline or at least never lenticular: styles mostly 3-parted and achene triangular or triquetrous.*

1 * *Perigynium mostly straw-colored at full maturity, papery in texture, usually more or less inflated, smooth (in our species), nerved, tapering as long as or longer than the body: spikes few to many, distinct, compactly flowered, erect or drooping: stigmas 3.*—PHYSOCARPÆ.

\+ *Mature perigynium greenish-tawny (very rarely clear yellow), very long and taper-pointed and prominently inflated below: spikes 3 or more: the staminate mostly one and stalked, the pistillate mostly rather short and thick (except in No. 2), and usually becoming dark colored in drying: scales much shorter than the perigynium.*

++ *Perigynia prominently ascending at maturity.*

1. **C. lupulina** Muhl. Very stout and leafy, often 1 m. high: spikes 2 to 6, erect, approximate at the top of the culm, all closely sessile or the lower sometimes short peduncled, oblong or short-cylindrical, very heavy and densely flowered and hop-like (whence the name): staminate spike small and mostly sessile: perigynium very large and rather soft.—Bogs and wet places throughout the eastern states. In Texas perhaps represented only by var. PEDUNCULATA Dewey, in which the spikes are more or less scattered and some or all prominently peduncled, and the staminate spike usually long peduncled. (*C. gigantea* Rudge. *C. lupulina* Olney, Hall's Pl. Tex., No. 756.)—Houston (*Hall*) and probably westward.

++ ++ *Perigynia divaricate at maturity.*

2. **C. grandis** Bailey. Tall and rather slender: spikes erect, much scattered and all (or all but the upper one) peduncled, 5 to 8 cm. long, evenly and comparatively cylindrical and more loosely flowered than in the last species: perigynium smaller below, but very abruptly contracted into a slender and spreading beak 3 to 4 times as long as the body and 2 to 3 times longer than the narrow thin scale.—Swamps and ponds, Kentucky and Delaware southward to our eastern limits.

3. **C. Louisianica** Bailey. Slender, usually low (30 to 50 cm.), the leaves flat and narrow: staminate spike usually one, carried on a long and very thin stalk: pistillate spikes one to three, somewhat scattered, only the lowest one or two peduncled, short (usually about globular, never over twice longer than broad), subtended by leafy bracts, becoming almost yellow at maturity: perigynium very turgid and long-conical, shining, three or four times the length of the very small scale. (*C. Halei* Carey, not Dewey. *C. intumescens* Olney, Hall's Pl. Tex., No. 755).—In ponds and bogs, Florida to our eastern limits. The southern representative of *C. intumescens* Rudge.

\+ + *Mature perigynium yellowish-tawny, mostly abruptly contracted into a very slender straight beak, smaller and much less inflated than in + : spikes mostly regularly cylindrical and usually stalked, not discoloring in drying if mature: scale (in ours) awl-like and nearly as long as the perigynium.*

4. **C. lurida** Wahl. Tall and spreading (5 to 10 dm. high), very leafy: spikes aggregated at the top of the culm, the pistillate 2 to 4 and short-stalked, 2 to 5 cm.

long, spreading or drooping: perigynium thin and mostly shining, rather lightly about 10-nerved, ascending. (*C. tentaculata* Muhl.)—Swales, east of the Mississippi and to central Texas. **Variable.**

+ + + *Perigynium less inflated than in* + +, *more conspicuously nerved, and the teeth of the beak more or less setaceous: spikes nodding, comose or bristly in appearance.*

5. **C. hystricina** Muhl. Slender but erect (3 to 7 dm.), with a sharp and rough culm and narrow leaves: pistillate spikes 1 to 3, approximate near the top of the culm, 2 to 5 cm. long, the lower one or two on filiform stalks, whitish or greenish-white in appearance, especially before pressed: perigynium very strongly 15 to 20-nerved, the very slender beak strongly toothed, smaller than in No. 4: scale linear and rough, nearly or quite as long as the perigynium.—Swales, probably throughout western Texas.

+ + + + *Mature perigynium tawny-yellow, obconic or obovoid, densely packed in short spikes.*

++ *Terminal spike normally staminate.*

6. **C. Frankii** Kunth. Stiff and very leafy but low (3 to 6 dm.), with an obtusely angled and smooth culm: pistillate spikes 3 to 5, the lower one or two short-stalked but erect, the remainder sessile on the zigzag top of the culm, all short (2.5 to 3 cm.) and evenly cylindrical and sometimes staminate at the top: perigynium very abruptly contracted into a short but slender beak which is usually shorter than the bristly scale. (*C. stenolepsis* Torr., not Less.)—Meadows and low places, Pennsylvania to Texas. The terminal spike is occasionally androgynous.

++ ++ *Terminal spike densely pistillate above.*

7. **C. squarrosa** L. Somewhat slender (5 to 10 dm. high), in clumps, with flat and weak leaves and sharp culm: spike sometimes single, but usually there are two or three, the lower ones being near the terminal one and short-peduncled, sometimes even nodding, all oblong, conical-oblong, or oblong-cylindric and exceedingly densely packed with pergynia, nut-brown: perigynium larger than in the last, the beak rough: scale short and usually entirely hidden.—Grassy places and copses, New England to Arkansas and evidently reaching our limits.

2 * *Perigynium dull, mostly large, thick and hard in texture, straight-beaked, not inflated: pistillate spikes mostly large and compactly flowered, erect or nearly so: stigmas 3.*—TRACHYCHLÆNÆ.

8. **C. riparia** W. Curtis. Very stout and large (6 to 15 dm. high), from creeping roots, with broad, thick and glaucous leaves: staminate spikes usually 2 or 3, aggregated on a common stalk: pistillate spikes 2 to 4, scattered and more or less peduncled, the lowest often very long-stalked, ordinarily 5 to 10 cm. long, mostly loosely flowered below: perigynium ovate-lanceolate, rather lightly many-nerved and becoming shining, the beak short and thick: scale various, mostly shorter than the perigynium.—Swales, throughout most of the United States, reaching part way across Texas.

3 * *Distinguished from* 2 * *by the much smaller and short perigynium, which is only slightly or not at all beaked and which is much thinner in texture, by very narrow slender spikes, and stigmas 2* (3 in No. 11).—MICRORHYNCHÆ.

+ *Pistillate scales not awned, mostly not exceeding the perigynium.*

9. **C. stricta** Lam. Tall and slender, but erect (5 to 15 dm. high), forming dense tussocks when growing in boggy places, the culm sharp and leaves long and narrow: pistillate spikes 3 to 5, variable in size, 2.5 to 7 cm. long and narrowly cylindrical, compactly flowered above but often alternate at the base, scattered, the

lowest one or two usually more or less peduncled and somewhat clavate and subtended by leafy bracts equaling or surpassing the culm and spreading or nodding, the remainder sessile and often staminate at the top, all greenish-purple or pallid: perigynium small and ovate, tawny, mostly very lightly few-nerved and somewhat granular, the beak very short and commonly entire,—Swales, throughout the eastern states to Texas. Var. EMORYI Bailey, (*C. Emoryi* Dewey) with spikes usually heavier and more densely flowered and often more numerous, the pistillate ones obtuse if not staminate at the apex, the lower bracts usually very long and leaf-like, is a stiffer plant than the species and evidently much commoner in Texas.

++ *Pistillate scales awned, mostly exceeding the perigynium.*

10. **C. crinita** Lam. Robust and usually stout (6 to 10 dm. high), growing in clumps, with sharp culm and flat rather broad striate leaves: spikes 3 to 6, somewhat scattered and variously peduncled, mostly secund, curved and drooping (or in very small forms almost erect), 5 to 10 cm. long, narrowly and evenly cylindrical, compactly flowered but often alternate below and usually staminate at the top: perigynium ovate, thin, and puncticulate, obscurely nerved, the minute point entire, falling easily when mature: scale rough-awned, 2 or 3 times longer than the perigynium.—Swales, Canada to Florida and Texas.

11. **C. verrucosa** Muhl. Stout and stiff (6 to 10 dm. high), rather pale throughout, culm sharp, leaves very rough and long-pointed and rolling when dry: staminate spikes one or two, comparatively short (terminal one 2.5 to 4 cm.), and elevated on a short stalk: pistillate spikes 3 to 7, approximate or the lowest one remote, variously peduncled or the uppermost oftenest sessile, the lowermost nodding, all rather thick and evenly cylindrical (2.5 to 7 cm. long), glaucescent, frequently staminate at the top: perigynium slightly obovoid, or buckwheat-shaped, lightly veined, the minute point entire, a half or third as long as the laciniate awn of the thin wide-bottomed scale: stigmas 3, and achene trigonous. (*C. scaberrima* Scheele, probably.)—Margins of ponds and low pine woods, Virginia to Florida and Texas. Terminal spike sometimes androgynous.

4* *Perigynium mostly light-green or whitish when fresh, thin and membranaceous (thickish in No. 12), often somewhat inflated or loosely investing the achene, smooth and mostly shining (in ours) at full maturity, usually oblong or slender (short in No. 12): pistillate spikes several or many, and in most of the species on spreading or nodding stalks: bracts leaf-like: stigmas 3.*—HYMENOCHLÆNÆ.

\+ *Terminal spike normally pistillate at the top.*

++ *Pistillate spikes oblong or short-cylindric, dense, and erect*

12. **C. triceps** Michx. Small and slender (15 to 40 cm. high): leaves smooth, or rarely sparsely hairy below: sheaths hairy or puberulent: spikes small, 15 mm. or less long, contiguous, and sessile: perigynium narrowly ovate or cylindrical-ovate, ascending: pistillate scale white-hyaline, the mid-nerve extended into a short and often hispid awn.—Woods and glades, Carolina to central Texas. Var. SMITHII Porter is usually more slender, olive-green, smooth throughout or lower sheaths puberulent: spikes evenly cylindrical and more scattered, the lower one or two usually short-peduncled: perigynium nearly globular or globular-ovate, somewhat turgid, standing at right angles to the rhachis when mature: scales normally more obtuse. (*C. Smithii* Porter.)—New Jersey and Pennsylvania to our eastern limits.

++ ++ *Pistillate spikes long-cylindric or linear, loose and spreading.*

13. **C. oxylepis** Torr. & Hook. Very slender but erect, 3 to 7 dm. high, with short and soft flat leaves, which are slightly hairy below: pistillate spikes 3 or 4, approximate near the top of the culm or the lowest one remote, about 2.5 cm. long, variously peduncled and spreading or the lowest nodding: perigynium angular and

scarcely inflated, ovate-oblong, pointed but not toothed, prominently few-nerved, rarely slightly pubescent, equalling or more commonly surpassing the thin sharp scale.—Wet woods and grassy places, from our eastern region to Florida and South Carolina.

14. **C. Davisii** Schw. & Torr. Taller than the last, with broader leaves and a laxer habit, smooth throughout: perigynium conspicuously inflated and toothed.—Rich woods and meadows, Massachusetts and Minnesota, southward to Georgia and Texas.

+ + *Terminal spike normally entirely staminate.*

++ ***Perigynium** not beaked, finely striate, more or less inflated: **spikes erect.***

= *Terminal (staminate) spike sessile or very nearly so, and oblique.*

15. **C. flaccosperma** Dewey. Low (3 to 5 dm.) glaucous, the culm slender, leaves often very broad (4 to 6 mm.) and flat and comparatively short: staminate spike springing from the base of the upper pistillate spike, short (often less than the pistillate-spike) and oblique: pistillate-spikes 3 to 5, the two uppermost usually together at the top of the culm and sessile and the others more or less remote and slenderly peduncled, rather densely flowered, about 2 to 2.5 cm. long, rust-colored: perigynium oblong cylindric soft, narrowed to a point, twice or thrice longer than the sharp very small scale. (*C. microsperma* Steud.)—Wet grassy places, Florida to central Texas.

16. **C. grisea** Wahl. Habitually somewhat taller than the last, green, leaves flat and rather broad (3 to 5 cm.), lax and usually overtopping the culm: staminate spikes borne as in No. 15: pistillate disposed as in No. 15, also green, some of them occasionally reduced to two or three perigynia: perigynium oblong, pointless, prominently turgid, all but the lowest longer than the narrow-nerved scale.—Moist grounds, Canada to Texas and New Mexico (*Wright*).

= = *Terminal spike more or less stalked and erect.*

17. **C. amphibola** Steud. Slender and erect (25 to 50 cm.), often stiff, green, the leaves scarcely half so wide as in Nos. 15 and 16: spikes slender and loosely flowered: perigynium scarcely inflated, triangular, oblong, narrowed into a sharp beak-like point, 2-ranked on the spike: scales nerveless and long-awned, spreading. (*C. grisea*, var. *angustifolia* Boott, and var.? *rigida* Bailey. *C. grisea* Olney Hall's Pl. Tex., No. 741, and var. *minor*, No. 743. *C. cryptandra* Olney, Hall's Pl. Tex., No. 742.)—Grassy places, New Jersey to Florida and Texas. Lower forms with shorter perigynia are var. GLOBOSA. (*C. grisea*, var. *globosa* Bailey.)

++ ++ *Perigynium prominently beaked, prominently few-nerved, not inflated: spikes (in ours) flexuose or nodding, linear.*

18. **C. debilis** Michx. Very slender and diffuse (4 to 6 dm. high), with narrow soft leaves: pistillate spikes 3 or 4, scattered or the two uppermost contiguous, all on filiform stalks of varying lengths, linear (2 to 4 cm. long), loosely flowered: perigynium linear-ovate and very long, twice or more longer than the bluntish very thin scale.—South Carolina to central Texas.

++ ++ ++ *Perigynium (in ours) very short-beaked and few-nerved, not inflated and firm in texture: spikes spreading or erect, heavy.*

19. **C. Cherokeensis** Schw. Tall (5 to 7 dm.) and rather stiff, pale throughout, the very long pointed leaves rough: pistillate spikes 3 to 12, often 2 or 3 from a sheath, scattered along the upper part of the culm, the very uppermost sessile, or nearly so; the others variously rather short-peduncled, 2 to 5 cm. long and densely flowered, pale, often staminate at the apex: perigynium ovate, very few-nerved, the short cylindrical beak entire: scale acute and about the length of the perigynium.—Banks and woods, Georgia to central Texas.

5 * *Perigynium firm and rusty, smooth or minutely granular, nerved, not inflated, mostly short-beaked with an entire orifice: pistillate spikes compactly flowered and mostly short and erect, fuscous: stigmas 3.*—SPIROSTACHYÆ.

20. **C. microdonta** Torr. & Hook. Erect and rather strict 25 to 50 cm. high, the leaves short and flat (often becoming involute when dry), 3 to 4 mm. wide: pistillate spikes (2 or 3) all scattered, the lowest one usually radical or nearly so, and long peduncled, erect, 2 to 3 cm. long: bracts sheathing: perigynium ovate, prominently pointed, finely nerved, about equaling the sharp hyaline scale. (*C. alveata* Boott. *C. Rœmeriana* Scheele. *C. Wrightii* Dewey.)—Wet prairies and woods, Mississippi to central Texas. Var. LATIFOLIA Bailey, of wet prairies, has leaves very short (7 to 12 cm.) and very broad (6 cm.), many-nerved, long-acuminate, and the sheaths loose and conspicuous.

6 * *Perigynium firm, greenish or green-tawny, mostly short and triangular and bearing a short straight or curved beak, scarcely inflated: pistillate spikes short (seldom exceeding 2.5 cm.) and except in No. 24 very loosely flowered, the scales whitish or purple margined: bracts sheathing.*—DACTYLOSTACHYÆ.

+ Spikes loosely or even alternately flowered.

21. **C. laxiflora** Lam. Slender but usually erect, 3 to 5 dm. high, the leaves soft and nearly flat and rarely over 3 to 4 cm. wide: staminate spike peduncled or at least conspicuous: pistillate spikes 2 to 4, scattered, peduncled or the top one sessile, cylindric or sometimes short-oblong, erect or the lowest one or two spreading: perigynium obovate, conspicuously nerved, the short entire beak much bent or even recurved: scale thin and whitish, blunt or cuspidate, mostly shorter than the perigynium. (*C. truncata* Bœckl. *C. laxiflora*, var. *intermedia* Boott. *C. laxiflora*, var. *styloflexa* Olney, Hall's Pl. Tex., No. 750, at least in part.)—Grassy places, Canada to the Gulf and central Texas. Var. BLANDA Boott is diffuse, with broader leaves, staminate spike mostly sessile and inconspicuous, pistillate spikes seldom over 15 mm. long, the upper ones sessile and more or less aggregated, the lowest one or two usually long-exserted. (*C. blanda* Dewey *C. laxiflora*, var. *striatula* Carey.)

22. **C. Styloflexa** Buckley. Very slender, the culms long (3 to 5 dm.) and weak, the leaves 2 to 3 mm. wide: staminate spike commonly peduncled: pistillate spikes 2 or 3, scattered in the typical forms but sometimes aggregated and sessile near the top of the culm, few-flowered, the lowest ones normally drooping: perigynium prominently triangular with a long and nearly straight point. (*C. acuminata* Schw. *C. protracta* and *C. Chapmanni* Steud. *C. fusiformis* Chapm. *C. styloflexa* Buckl. *C. laxiflora*, var. *styloflexa* Boott.)—Pennsylvania to Florida and Texas.

23. **C. striatula** Michx. Usually tall and very slender but mostly strict, with very narrow leaves: staminate spike long-peduncled: pistillate spikes scattered, the lowest slenderly peduncled, all loosely or alternately flowered, not over 2 to 3 cm. long: perigynium long-pointed and but little curved, triquetrous, finely many-nerved, much longer than the very thin scale. (*C. ignota* Dewey *C. laxiflora*, var. *Michauxii* Bailey.)—Carolina to Florida and Texas.

++ Spikes compactly flowered, especially above the base.

24. **C. tetanica** Schk., var. **Meadii** Bailey. Strict, 25 to 50 cm. high: staminate spike single, clavate, and stalked: pistillate spikes 1 to 3, the upper one sessile or nearly so and the others more or less peduncled and sometimes loosely flowered at the base, all erect, 2.5 cm. or less long, rather thick above the base: perigynium somewhat turgid or at least plump, greenish when fresh, and prominently many nerved, the short beak strongly bent: scale bluntish or at most short-acute, rarely exceeding but mostly not equalling the perigynium. (*C. Meadii* Dewey. *C. panicea*, var. *Meadii* Olney, Hall's Pl. Tex., No. 739.)—Meadows and moist woods, Rhode Island to Nebraska and southward to central Texas.

7 Perigynium mostly short and rounded, triquetrous in No. 27, firm or even hard in texture, not inflated, sometimes hairy, the beak straight and usually bifid or erose: pistillate spikes few-flowered, usually globular or very short-oblong, more or less sessile and approximate at the top of the culm or some of them radical: bracts sheathless: stigmas 3, or rarely 2.*—SPHÆRIDIOPHORÆ.

← Perigynium globular with a flattened beak.

25. **C. varia** Muhl., var. **australis** Bailey. Strongly stoloniferous, the wiry culms rising from the mass of narrow leaves to a height of 3 to 5 dm.: terminal spike straight and prominent, sessile, 1 to 1.5 cm. long: pistillate spikes 2 to 4, all small and sessile, contiguous on the top of the culm but distinct from each other, greenish: perigynium small, hairy, the body hard and globular, contracted into a flat beak which about equals the greenish or brown-margined scale. (*C. Emmonsii* Olney, Hall's Pl. Tex., No. 752.)—Dryish woods and copses, Mississippi to Texas.

26. **C. Floridana** Schw. Culms very low and slender, from 2.5 to 12 cm. high, very much overtopped by the long thick persistent leaves: staminate spike single and partially hidden in the terminal cluster of pistillate spikes: some of the pistillate spikes radical, others clustered at the top of the culm and closely sessile, all greenish or whitish, or occasionally slightly variegated by lightly purple-margined scales: perigynium much as in the last, almost smooth.—South Carolina to Florida and Texas (*Reverchon. Thurow.*) Little known.

← ← Perigynium triquetrous.

27. **C. planostachys** Kunze. Low, the culms from 2.5 to 12 cm. high, overtopped by the narrow and rather stiff leaves: staminate spike single and small, sessile or very nearly so at the base of the uppermost pistillate spike: pistillate spikes partly radical and partly approximate and short-stalked near the top of the culm, loosely few-flowered on a zigzag rachis: perigynium either minutely tomentose or smooth, strongly many nerved, the beak terete and entire or very nearly so. (*C. Halleriana* American authors, not Asso.)—Dry uplands throughout Texas and in Mexico. This species differs from its European and African representative, *C. Halleriana*, to which it has been referred, by its habitually lower stature, culms much shorter than the leaves, more uniformly stalked spikes, the filiform bracts, zigzag rachis of the spikes, more pronounced beak of the perigynium, and sharper scales.

8 Perigynium hard with a globular body and long flattened beak: spike single, staminate above and pistillate below, the pistillate flowers few: scales prolonged and bract-like: stigmas 3.*—PHYLLOSTACHYÆ.

28. **C. Willdenovii** Schk. Low, culms 7 to 15 cm. high and shorter than the rather stiff leaves, pale: pistillate flowers 3 to 9: perigynium prolonged into a prominent 2-edged very rough beak: scales chaffy, nerved, as broad as the perigynium and somewhat longer or the lowest sometimes overtopping the spike. Var. PAUCIFLORA Olney is a form with fewer pistillate flowers.—Copses, New England to North Carolina and central Texas.

9 Perigynium thin in texture, green, oblong to linear and beakless: spike one, staminate above, thin and slender: stigmas 3.*—LEPTOCEPHALÆ.

29. **C. leptalea** Wahl. Culms and leaves capillary, 15 to 40 cm. high, in tufts, leaves mostly not exceeding the culm: spike 4 to 10 mm. long, linear, the staminate portion very small: perigynium nerved, about twice longer than the obtuse caducous scale. (*C. polytrichoides* Muhl.)—Bogs, throughout most of the United States.

§ 2. VIGNEA. *Staminate flowers few and inconspicuous and borne at the base or apex of the pistillate spikes: pistillate flowers in short sessile spikes which are commonly more or less aggregated into heads or even panicled: perigynium plano-convex: styles 2, and achene lenticular.*

** Staminate flowers borne at the apex of the spikes.*—ACROARRHENÆ.

+ Perigynium thick in texture and spongy at the base, mostly stipitate, conspicuously nerved: inflorescense in No. 30 nearly a panicle.

30. **C. crus-corvi** Shuttlw. Very stout, 7.5 to 10 dm. high, glaucous, leaves flat and very wide: head much bracted and compound, 6 to 15 cm. long: perigynium long-lanceolate, the short cushion-like base very thick, the roughish and very slender beak thrice the length of the body, and three to four times the length of the inconspicuous scale. (*C. Nuttallii* Olney, Hall's Pl. Tex., No. 833.)—Bogs, Minnesota to Florida and Texas.

31. **C. stipata** Muhl. Stout, 3 to 8 dm. high, green, in clumps, the culm rather soft and very sharply angled: head 2 to 6 cm. long, rarely somewhat compound at base, interrupted, the lowest spikes of 1.5 cm. long: perigynium lanceolate, brown-nerved, the beak toothed and slightly rough, about twice the length of the body and much longer than the scale.—Swales, Canada to our eastern limits.

+ + Perigynium mostly very small and short and nearly nerveless (in ours), not spongy at the base: head yellow or tawny, mostly long.

32. **C. triangularis** Bœckl. Stiff and erect, 3 to 7.5 dm. high, the narrow leaves mostly shorter than the culm: head 2 to 5 cm. long and usually interrupted below, simple, dull tawny-brown at maturity: spikes short-oblong and truncate at the apex, the perigynia conspicuously spreading: bracts few and inconspicuous, or absent above the base of the head: perigynium broadly ovate or round-ovate, minutely nerved and often slightly dotted. (*C. vulpinoidea*, var. *platycarpa* Olney, Hall's Pl. Tex., No. 729. Var. *Drummondiana* Bœckl.)—Wet places and prairies, Mississippi to Indian Territory and central Texas.

+ + + Perigynium mostly short-ovate, mostly glossy at maturity, often nerved, not spongy at the base (except in Nos. 33 and 34): head green or nearly so when mature (light tawny in Nos. 34 and 35), mostly short.

++ Head loose and very slender: perigynium spongy at base.

33. **C. Texensis**. Very slender, 2 to 4 dm. high, the leaves loose and mostly very narrow: head 1.5 to 3 cm. long, open below, green: perigynium lanceolate, smooth or nearly so, spreading at right angles to the rachis. (*C. rosea*, var. *Texensis* Torr.)—Dry places, southern Illinois to Alabama and Texas. A delicate and pretty species.

34. **C. retroflexa** Muhl. Slender but rather stiff, 3 to 5 cm. high: head much as in the last but tawny: perigynium ovate, smooth, very corky at the base, which is contracted until almost stipitate, at full maturity widely spreading or even reflexed: scale brownish and sharp, at length deciduous. (*C. rosea*, var. *retroflexa* Torr.)—Throughout the States east of the Mississippi and in Indian Territory and central Texas.

++ ++ Head dense and stout: perigynium not spongy at base.

35. **C. Leavenworthii** Dewey. Low (15 to 25 cm. high) but erect, the culms mostly overtopping the very narrow long-pointed leaves: head globular or globular-oblong and very small, tawny: perigynium very small, ovate and beaked, entire, rather thin, the edges rounded, about the length of or a little shorter than the thin acute scale. (*C. cephalophora*, var. *angustifolia* Boott. *C. cephalophora* Olney, Hall's Pl. Tex., No. 732.)—Grassy places, Ontario to Texas. Nearer the *C. rosea* group than to *C. cephalophora*.

36. **C. cephalophora** Muhl. Slender but mostly strict, 3 to 5 cm. high, pale: head small (rarely exceeding 1.5 cm.) but rather broad, especially at the base, and very dense, never interrupted, green, the lower one or two spikes of the head bearing a very setaceous short bract: perigynium twice larger than in the last, green and

often glossy, sharp-edged, scarcely longer than the rough-cuspidate scale.—Throughout the eastern United States on dry knolls and banks.

37. **C. Muhlenbergii** Schk. Very stiff, the culm 3 to 7.5 cm. tall and much prolonged beyond the few narrow and at length involute long-pointed leaves, pale throughout: head 2 cm. or less long, usually heavy, but the individual spikes clearly defined: spikes 4 to 8, globular: perigynium nearly circular, glossy, very strongly nerved on both faces, spreading, falling easily at maturity: scale rough-cuspidate, about as long as the perigynium but narrower.—Dry and poor soil, throughout the eastern States and in Texas. Variable in the nerving of the perigynium. When nerveless it becomes var. ENERVIS Boott. A common Texan form is var. AUSTRALIS Olney, distinguished by perigynium nerveless or nearly so, scales very sharp and prominently nerved, and especially by the bracts being dilated at the base and prolonged.

* * *Staminate flowers borne at the base of the spikes.*—HYPARRHENÆ.

38. **C. straminea** Willd. Slender and erect, or the top of the culm often flexuose, 3 to 9 dm. high, the culm mostly longer than the narrow and long-pointed stiff leaves: spikes 3 to 8, tawny or straw-colored, small (3 to 6 mm. broad), globular or occasionally somewhat tapering below from the presence of many staminate flowers, commonly all entirely distinct on the very slender often zigzag or flexuose rachis: bracts none, or at least only the very lowest ones conspicuous: perigynium small and ovate, nearly flat, lightly nerved on both faces, the points spreading and rather conspicuous: scale acute, about the length of the perigynium.—Dry banks and fields throughout the eastern United States and in Texas. Var. BREVIOR Dewey, with stiffer culm, larger and more aggregated spikes in a short erect head, and broader perigynium, occurs within our territory. Var. HYALINA Boott is tall and slender: spikes much contracted below, medium in size: perigynium very thin, flat, and scale-like, the wide-nerved margin wrinkled above, produced into a very long and slender beak which give the spikes a comose appearance: scale small and inconspicuous.—Florida to central Texas.

39. **C. albolutescens** Schw. Culm very stiff, longer than the long-pointed leaves: spikes 4 to 8, contiguous or the lower ones separated, erect or ascending, prominently contracted both above and below, very densely flowered, green or silvery-green. (*C. straminea*, var. *fœnea* Torr.)—Near the seacoast from New Brunswick to Mexico, in Texas reaching as far inland as Houston, and probably farther.

40. **C. Brittoniana.** Rather stiff, 4 to 6 dm. high, the culm overtopping the leaves: spikes 3 to 5, usually contiguous at the top of the culm, globular and very large (often 2 cm. broad), rusty or whitish-rusty: perigynium very large, the body broader than long (5 to 6 mm. across), broadly winged, and very abruptly contracted into a long, well-defined beak, which is conspicuously spreading and prominently toothed. (*C. Wrightii* Olney, not Dewey. *C. straminea*, var. *maxima* Bailey.)—Damp fields, confined to Texas. Named for Dr. N. L. Britton, who has long insisted that it deserves specific rank.

GRAMINEÆ. (GRASS FAMILY.)

By L. H. DEWEY.

Inflorescence paniculate, racemose, spicate or capitate, bearing the florets in 1 to many-flowered scaly (glumiferous) spikelets: glumes distichous; the lower two empty (rarely 3 or 4 or sometimes reduced to 1 or wanting); the other glumes (*floral glumes*) often similar to the empty ones, bearing in each axil a sessile flower composed of a palet, 2 or 3 minute scales (*lodicules*), 3 stamens, and a simple pistil; these

with the subtending glume forming the floret, (some of the parts frequently wanting and the number of stamens sometimes increased to 6): floral glume herbaceous, membranaceous or coriaceous, convex or carinate, with an odd number of nerves, one of them being the mid-nerve, and one or more often excurrent in awns; palet facing the floral glume, usually thinner and smaller, 2-nerved or 2-keeled; lodicules 2 or 3 or wanting, generally microscopic, scale-like; stamens hypogynous, one opposite the floral glume and two opposite the palet when of the usual number; filaments threadlike; anthers 2-celled, versatile or sometimes basifixed; styles 1 or 2 or more, stigmas 2, linear, plumose, ovary 1-celled, 1-ovuled, becoming a seed-like grain free or adnate to the palet; embryo small, lateral at the base of the starchy albumen.—Herbs, annual or perennial: roots fibrous: stems (*culms*) terete or compressed, usually hollow between the closed nodes: leaves alternately 2-ranked; sheaths convolute about the culm, usually split opposite the blade, projecting more or less above the base of the blade in a scarious appendage (*ligule*); blade linear or lanceolate, parallel-veined.—A large family second only to Compositæ in the number of species in Texas. The most important order of plants in the vegetable kingdom in the number and value of food-producing species.

Series I. PANICACEÆ. Spikelets with one perfect terminal floret and with or without a staminate or rudimentary lateral floret; sometimes all the spikelets unisexual, with no appreciable internode between the florets; articulated below the lower glume, the spikelet falling entire.

A. Spikelets dorsally compressed or terete.

a. Floral glumes and palets hyaline; empty glumes thicker, the lower one largest, embracing the second glume and floret with its edges: spikelets generally in racemes or spikes with articulate axes.

Tribe I. Spikelets unisexual in separate inflorescences or on different parts of the same inflorescence, awnless.—MAYADEÆ.

1. **Tripsacum**. Pistillate and staminate spikelets in the same inflorescence, the axis of the former articulated between each spikelet.

Tribe II. Spikelets all perfect or staminate and perfect, and then so arranged in twos or threes that a perfect floret stands with one or two staminate or imperfect florets.—ANDROPOGONEÆ.

* Spikelets awnless in spike-like racemes in alternate notches in the thickened rachis, one sessile and perfect, the other pedicelled and staminate or neutral.

\+ Rachis hairy: spikelets not deeply embedded.

2. **Elionurus**. Spikelets flat on the back.

\+ \+ Rachis glabrous: spikelets deeply embedded.

3. **Rottbœllia**. Sessile spikelets flat or convex.
4. **Manisurus**. Sessile spikelets small and globular, pitted.

* * Spikelets in spikes or loose racemes on the slender axis, the perfect ones awned, the others awnless.

5. **Trachypogon.** Sessile spikelets staminate; pedicellate ones perfect.
6. **Heteropogon.** Sessile spikelets perfect; pedicellate ones staminate or neutral.

* * * Inflorescence paniculate, of many spikelike racemes: axis of the racemes articulate, usually bearded: sessile spikelets perfect, usually awned; pedicellate spikelets neutral, staminate or perfect, often awned.

+ Panicle compound.

++ Spikelets alike, all perfect; branches of the panicle spikelet-bearing to the base.

7. **Imperata.** Spikelets awnless.
8. **Erianthus.** Spikelets awned.

++ ++ Pedicellate spikelets staminate or neutral; branches of the panicle naked at the base.

9. **Chrysopogon.** Outer glumes lance-ovate, coriaceous, lanceolate, 2-nerved.
10. **Sorghum.** Outer glume broad, indurate and shining at maturity.

+ + Panicle simple or reduced to single secund spikes.

11. **Andropogon.** Sessile spikelet perfect, awned; pedicellate one staminate or neutral, awnless.

a a Floral glumes and palets membranaceous; empty glumes herbaceous or chartaceous, the lower one usually larger, not embracing the second glume and floret: spikelets falling singly or in groups from the continuous rachis.

Tribe III. Spikelets in groups of 2 to 5, nearly sessile in solitary terminal spikes: floral glumes awnless.—ZOYSIEÆ.

12. **Hilaria.** Empty glumes strongly nerved, awned.
13. **Nazia.** Second empty glume coriaceous, beset with hooked spines.

a a a Floral glumes and palets cartilaginous, coriaceous or chartaceous; empty glumes thinner, the first usually smaller: spikelets falling singly from the ultimate branches of the panicle or continuous rachis of a spike.

Tribe IV. Spikelets all alike, with one perfect floret and sometimes a second staminate or neutral in panicles or unilateral spikes: floral glumes awnless.—PANICEÆ.

* Spikelets not involucrate.

+ Spikelets plano-convex in unilateral spikes: empty glumes 2 (rarely 3), awnless.

14. **Paspalum.** Spikelets sessile or nearly sessile, smooth or slightly pubescent. (See Panicum §§ 1 and 2.)
15. **Eriochloa.** Spikelets with a ring-like callus at the base, silky pubescent.

+ + Spikelets usually terete, spicate or paniculate: empty glumes 3, the first usually small (rarely wanting), or a staminate floret in place of the third glume, awnless or awned.

16. **Panicum.** Spikelets sessile or pediceled, glabrous, hispid or pubescent, awnless except in *P. Crus-galli.*
17. **Oplismenus.** Empty glumes awned.

* * Spikelets subtended by an involucre consisting of one to many bristles, sometimes grown together and bur-like.

18. **Setaria.** Bristles separate, persistent.
19. **Cenchrus.** Bristles grown together, falling with the inclosed spikelets.

* * * Spikelets in short few-flowered spikes, in alternate notches in a thickened axis, awnless and not involucrate.

20. **Stenotaphrum.** Spikelets with one perfect and one staminate floret.

B. Spikelets laterally compressed.

Tribe V. Spikelets unisexual and monoecious or perfect, in loose panicles: empty glumes wanting or rudimentary: palet often 1-nerved: stamens often 6.—ORYZEÆ.

* Spikelets unisexual, linear; pistillate spikelets awned.

21. **Zizania.** Upper branches bearing pistillate spikelets; lower ones staminate.
22. **Zizaniopsis.** All the branches bearing pistillate spikelets near the extremities and staminate ones near the bases.

* * Spikelets perfect, oblong, much compressed.

23. **Homalocenchrus.** Spikelets awnless.

Tribe VI. Spikelets with one perfect terminal floret and two lateral rudimentary florets, in contracted or spike-like panicles: empty glumes present: palet 1-nerved or wanting.—PHALARIDEÆ.

24. **Phalaris.** Empty glumes equal: neutral florets reduced to small scales.
25. **Anthoxanthum.** Empty glumes unequal: neutral florets awned.

Series II. POACEÆ. Spikelets 1 to many-flowered, imperfect floret uppermost, if present; if unsexual, more than 3-flowered: internode of rachilla somewhat elongated, articulated usually above the empty glumes, sometimes at the base of each floret.

A. Culm herbaceous: leaf-blade not narrowed to a petiole.

a. Spikelets upon distinct (sometimes very short) pedicels, cuneate-clustered in racemes, or often solitary in panicles, these sometimes contracted and spike-like, but never in unilateral spikes.

Tribe VII. Empty glumes 2: perfect floret solitary or with an obscure rudiment: palet 2-nerved or absent (1-nerved in No. 29.)—AGROSTIDEÆ.

Subtribe 1. Floral glume coriaceous or chartaceous, much firmer in texture than the empty glumes, closely convolute about the palet and grain, awned: florets borne on stipes.—*Stipeæ.*

26. **Aristida.** Awn trifid (lateral divisions often short).
27. **Stipa.** Awn simple, twisted, rather stout, stipe, hairy; sharp and prominent.
28. **Oryzopsis.** Awn simple, slender, often caducous; stipe obtuse.
33. **Muhlenbergia.** Awn simple, slender; stipe very small.

Subtribe 2. Floral glume very thin, herbaceous or membranaceous, loosely or not at all convolute about the grain, short-awned or awnless.—*Euagrosteæ.*

* Floral glume 3 to 5-nerved, 2-toothed, short awned from the sinus.

+ Stamen 1.

29. **Cinna.** Floral glume raised on a distinct naked internode of the rachilla: palet 1-nerved.

+ + Stamens 3.

30. **Polypogon.** Empty glumes awned: panicle contracted.
31. **Limnodea.** Empty glumes awnless: panicle open.

* * Floral glumes 1 or indistinctly 3-nerved, short awned from the apex or between the two minute teeth or awnless: florets equaling or usually exceeding the empty glumes.

32. **Sporobolus.** Floral glume awnless, loosely enveloping the oblong or spherical grain.

33. **Muhlenbergia.** Floral glume awned or at least mucronate, closely enveloping the narrow grain.

34. **Epicampes.** Like the preceding: panicle dense, long and narrow.

* * * **Floral glume obtuse, denticulate, with a very short dorsal awn or awnless; empty glumes exceeding the small floret.**

35. **Agrostis.** Floral glume obtuse, 5-nerved: awn very short or wanting.

36. **Gastridium.** Floral glume with a slender dorsal awn, exserted beyond the long empty glumes.

Subtribe 3. Panicles contracted to narrow cylindrical spikes: floral glume dorsally awned or awnless, not enveloping the grain.—*Phleoideæ.*

37. **Lycurus.** Empty glumes shorter than the floret, awned.

38. **Alopecurus.** Empty glumes exceeding the floret, awnless.

Tribe VIII. Spikelets 2 to many-flowered, paniculate: upper floret imperfect: floral glume 2-toothed, with a bent awn in the sinus.—AVENEÆ.

39. **Trisetum.** Floral glume prominently 2-toothed: panicles open, usually narrow.

Tribe X. Spikes 2 to many-flowered, the upper floret usually imperfect: empty glumes always present awnless; floral glume with a straight awn or awnless: palet 2-keeled.—FESTUCEÆ.

* **Floral glume cleft into 3 or more awned lobes at the apex or awned between the numerous lobes.**

\+ **Awns 7 or more.**

50. **Pappophorum.** Spikelets urn-shaped: panicles narrow.

51. **Cottea.** Spikelets compressed, cuneate: panicles spreading.

\+ \+ **Awns 3.**

52. **Cathesticum.** Spikelets small in cuneate clusters: perfect florets 2 or 3.

46. **Bouteloua.** Spikelets in cuneate clusters in racemes: perfect floret only 1.

53. **Scleropogon.** Spikelets rather large, dioecious; staminate form awnless.

* * **Floral glume entire, dentate or 3-cleft, awnless or 1-awned in Festuca.**

\+ **Rachilla or floral glume bearing long hairs enveloping the florets.**

56. **Arundo.** Hairs on the glumes only.

57. **Phragmites.** Hairs on the rachilla only.

\+ \+ **Rachilla and glume naked or with hairs much shorter than the florets (except the narrow web at the base of the floret in Poa).**

\+\+ **Spikelets in sessile clusters, half concealed among the floral leaves.**

= **Spikelets unisexual, usually dioecious.**

49. **Bulbilis.** Spikelets 2 or 3 together in short spikes: empty glumes thin.

54. **Monanthochlœ.** Spikelets solitary: empty glumes coriaceous and rigid like the upper leaves.

= = **Spikelets perfect.**

55. **Munroa.** Floral glume mucronate, slightly pubescent.

58. **Sieglingia.** Floral glume cleft to the middle, densely pubescent.

++ ++ Panicle exserted.

= Floral glumes 3-nerved, often obscurely so.

a. Empty glumes ovate, acute, or subacute.

1. Floral glumes obtuse, often toothed or mucronate (except *Sieglingia Wrightii.*)

58. **Sieglingia.** Floral glumes convex, at least below, usually toothed or mucronate.

59. **Diplachne.** Floral glumes usually keeled and mucronate or toothed at the apex: spikelets sessile on the under sides of the branches.

2. Floral glume ovate, entire, acute or subacute: spikelets compressed, linear.

60. **Eragrostis.** Glumes membranaceous: florets less than 3 mm. long.

53. **Scleropogon.** Glumes rather thick: florets 5 mm. long or more.

b. Empty glumes thin, obovate or oblanceolate.

61. **Eatonia.** Empty glumes very dissimilar; the upper one broadly obovate.

62. **Kœleria.** Empty glumes similar, oblanceolate.

= = Floral glumes 5 to many-nerved.

a. Grain free.

1. Floral glumes thin or membranaceous at the obtuse or subacute apex.

63. **Melica.** Upper florets imperfect, unlike the others, convolute about each other.

67. **Poa.** Imperfect floret only one: floral glumes 5-nerved, webbed at the base.

68 **Panicularia.** Imperfect floret only one: floral glumes 7 to 9-nerved, glabrous.

2. Floral glumes firm or coriaceous, acute, or very narrow at the apex and denticulate.

64. **Uniola.** Three to six lower glumes empty: spikelets broad, compressed.

65. **Distichlis.** Dioecious: empty glumes only 2: spikelets compressed, in small narrow panicles.

66. **Dactylis.** Spikelets narrow, densely clustered, in branching panicles.

b. Grain adnate to the palet.

69. **Festuca.** Spikelets less than 1 cm. long: floral glumes convex.

70. **Bromus.** Spikelets more than 1 cm. long: floral glumes often carinate.

aa. Spikelets nearly or quite sessile in unilateral racemes, these usually digitate or racemose.

Tribe IX. Spikelets 1 to 4-flowered, with a rudiment (except in *Spartina*), nearly or quite sessile in two rows on one side of the continuous axis, forming unilateral racemes or spikes, these digitate or racemose.—CHLORIDEÆ.

* Spikes digitate or whorled.

+ Spikes slender.

40. **Capriola.** Spikelets awnless: floral glume deeply carinate.

+ + Spikes thick: florets closely imbricated.

++ One perfect floret in each spikelet.

42. **Chloris.** Floral glume with a short dorsal awn or awnless.

43. **Trichloris.** Floral glume with 3 terminal awns.

++ ++ 2 to 5 perfect florets in each spikelet.

47. **Eleusine.** Floral glumes ovate, awnless.

* * Spikes racemose.

\+ Spikelets remotely alternate in the slender spikes.

44. **Gymnopogon.** Spikelets awned.

45. **Schedonnardus.** Spikelets awnless, appressed in notches in the continuous rachis.

48. **Leptochloa.** Floral glume short-awned or awnless: spikelets not appressed in notches.

\+ \+ Spikelets closely imbricated in rather thick spikes.

41. **Spartina.** Spikelets strictly 1-flowered: floral glume acute, awnless.

46. **Bouteloua.** Spikelets with an awned rudiment: floral glume 3-toothed or 3-awned.

49. **Bulbilis.** Diœcious: the staminate spikelets in pectinate spikes on an elongated peduncle; the pistillate ones in sessile clusters.

a a a. Spikelets sessile on opposite sides of a channeled rachis forming solitary terminal spikes.

Tribe XI. Spikelets 1 to 10-flowered: empty glumes usually awned or aristiform; floral glume awned (sometimes awnless in *Lolium*).—HORDEÆ.

* Spikelets solitary.

71. **Lolium.** Spikelets with the edge to the rachis: lower inner empty glume wanting.

72. **Agropyron.** Spikelets with the side to the rachis: both empty glumes present.

* * Spikelets 2 to 5 at each node of the rachis: empty glumes all present, nearly side by side in front of the spikelets.

73. **Hordeum.** Spikelets 1-flowered, in clusters of 3 each; the lateral spikelets slightly stalked, staminate or neutral.

74 **Elymus.** Spikelets 2 to 6-flowered in clusters of 2 to 4, all perfect and alike.

75. **Hystrix.** Spikelets in very short-pedicelled clusters: empty glumes small and deciduous.

B. Culms woody: leaf blade with a short petiole articulated with the sheath.

76. **Arundinaria.** Spikelets many-flowered, compressed.

1. TRIPSACUM L.

Spikes single or digitate, staminate above, pistillate below: staminate spikelets sessile, in pairs, usually secund on the triangular jointed rachis; each with one neutral and one staminate floret; the first outer glume 2-keeled near the margins, coriaceous or rigid; inner glumes membranaceous; pistillate spikelets solitary, imbedded in cavities on alternate sides of the thick cylindrical polished rachis; each with one neutral and one pistillate floret; the first empty glume thick and polished, closing the mouth of the cavity; inner glume thinner; floral glumes and palets thin and scarious; styles united, bearing two brown

or purple stigmas, an inch long, exserted: at maturity the rachis disarticulating readily at the oblique joints between the pistillate spikelets.

1. **T. dactyloides** L. (GAMA GRASS.) Culms tufted, 1 to 2 m. high, stout: leaves coarse, 3 to 6 cm. long, 2 to 3 dm. wide, flat, attenuate, usually somewhat hispid: spikes 2 to 4 together at the apex and sometimes 1 or 2 lateral ones, 1 to 2 dm. long, rigid, the lower one-fourth pistillate: staminate spikelets 6 to 9 mm. long, exceeding the internodes, often purple; pistillate spikelets 6 to 8 mm. long, about equaling the cylindrical joints in which they are embedded.—Low land, eastern Texas and eastward. Var. MONOSTACHYA Vasey, of the same range, is smaller, 3 to 8 dm. high: cauline leaves 1 to 2 dm. long and 1 to 2 cm. wide, often glaucous: spike single and terminal: spikelets like those of the species.

2. **T. Floridanum** Porter. Culms slender, 8 to 10 dm. high, from strong horizontal rootstocks: leaves narrow, 1 cm. wide or less, rigid, conduplicate or involute, usually smooth, 6 dm. long: spike single, terminal, erect, rather slender, 1.5 to 2.5 dm. long: staminate spikelets 2-ranked, secund, much exceeding the short internodes of the flat-backed rachis; pistillate portion usually less than one-fourth the length of the spike.—Near the mouth of the Rio Grande.

2. ELIONURUS HBK.

Spike cylindrical, single and terminal, or lateral: spikelets two at each node, exceeding the shallow cavities in the white hairy rachis, one sessile and perfect, the other pedicelled and staminate: glumes 4; the lower one usually largest and thickest, keeled near the margins; the second smaller and thinner; third and fourth hyaline: stamens 3: styles distinct; stigmas plumose, slightly exserted.

1. **E. tripsacoides** HBK. Culms 1 to 1.5 m. high, stout, erect, smooth or slightly pubescent near the nodes: leaves slender, involute, smooth, 2 to 3 dm. long: spikes terminal and lateral, 1 to 1.5 dm. long, on long peduncles: rachis and pedicels of staminate florets white ciliate: outer glumes hispid-ciliate near the margins, otherwise smooth.—Throughout Texas and eastward to Florida.

2. **E. barbiculmis** Hack. Culms 6 to 9 dm. high, densely pubescent at the nodes and somewhat velvety below: radical leaves numerous, almost capillary, involute, curved, thinly pubescent with long white hairs near the base: spikes mostly terminal, about 1 dm. long; rachis, pedicels, and first and second glumes white villous.—Table-lands, western Texas.

3. ROTTBŒLLIA L. f.

Spikes single, terminal or terminal and lateral, cylindrical or slightly compressed: spikelets in pairs on alternate sides at each node of the thickened rachis; one perfect, sessile, imbedded in a cavity; the other neutral, staminate or sometimes perfect on a thickened pedicel the length of the cavity: outer empty glumes coriaceous or thickened: inflorescence usually glabrous throughout.

** Joints of rachis readily disarticulating.*

1. **R. cylindrica** Chapm. Culms slender, erect, usually simple, terete, 3 to 6 dm. high: leaves mostly flat, thin, 2 mm. wide, 2 to 3 dm. long: spikes mostly terminal, 1 to 2 dm. long, 2 to 3 mm. thick; rachis smooth: perfect spikelets 5 to 6 mm. long, equaling the nearly straight internode; outer glume obtuse, thickened, obscurely pitted: pedicellate spikelets rudimentary, small.—Throughout Texas.

2. **R. rugosa** Nutt. Culms rather robust, erect, usually much branched above, 6 to 12 dm. high: leaves mostly conduplicate, rather thick, 3 to 5 mm. wide, 2 to 4 dm. long: spikes numerous, erect, 5 to 10 cm. long, 3 to 5 mm. thick; rachis striate: perfect spikelets 4 to 5 mm. long, exceeding the short curved internode; outer glume acute or subacute, thickened, transversely rugose or sometimes reticulated: pedicellate spikelet 3 mm. long, neutral.—Near the coast.

3. **R. corrugata** Baldw. Culms rather robust, compressed, much branched above, 10 to 15 dm. high: leaves flat or involute toward the points, 4 to 7 mm. wide, 3 to 6 dm. long, with rather broad, open, carinate sheaths: spikes numerous, erect or curved, 5 to 15 cm. long, 3 mm. thick; rachis nearly smooth: perfect spikelet 5 mm. long, about equaling the nearly straight internode; outer glume thickened, pitted or corrugated: pedicellate spikelet about 2 mm. long, neutral.

* * *Joints of rachis persistent or tardily disarticulating.*

4. **R. fasciculata** Lam. Culms rather robust, ascending, geniculate at the nodes, branched, angular or compressed, 6 to 12 dm. high: leaves numerous, fascicled, 4 to 8 cm. long: spikes numerous, somewhat fascicled, spreading, compressed, not rigid, 5 to 10 cm. long; rachis striate: sessile spikelet narrow, 5 to 6 mm. long, slightly exceeding the straight internode; outer glume coriaceous, nervose: pedicellate spikelet perfect, about like the sessile one; pedicel adnate to the rachis. (*Hemarthria fasciculata* Kth.)—Along the lower Rio Grande.

4. MANISURUS Swartz.

Spikes single or fascicled, unilateral, somewhat compressed: spikelets 1-flowered, small, in pairs; the sessile ones perfect, globose, pitted externally; pedicellate spikelets staminate or neutral; pedicels adnate to the rachis.

1. **M. granularis** Swartz. Culms 4 to 8 dm. high, much branched: leaves 3 to 12 cm. long, 5 to 10 mm. wide, hirsute pubescent like the short sheaths: spikes 1 to 2 cm. long, numerous, closely flowered: sessile spikelets 1.5 mm. long; outer glume indurated, rather thin, pitted: pedicellate spikelet 2 mm. long; outer glumes nervose.—Near the coast or in wet places up the Rio Grande Valley.

5. TRACHYPOGON Nees.

Spike or spikelike raceme solitary and terminal; axis indistinctly articulate, not brittle: spikelets 1-flowered, in pairs; one short-pedicelled, staminate, awnless; the other longer pedicelled, perfect, long-awned; outer glumes coriaceous, nervose; inner ones thin: stamens 3: styles distinct; stigmas plumose.

1. **T. polymorphus** Hack. Perennial: culms 6 to 12 dm. high, simple, rather slender, terete, smooth: leaves flat or involute toward the points, scabrid or pubescent, 1 to 2 dm. long: spike 1 to 2 dm. long, slightly nodding, somewhat unilateral, rather loosely flowered: spikelets 6 to 8 mm. long, pubescent; outer glume lance-oblong, obtuse, 9 to 13-nerved; awn pubescent, twisted and bent, 4 to 6 cm. long.—Table-lands of western Texas.

6. HETEROPOGON Pers.

Spikes terminal or often lateral and fascicled, densely flowered, appearing one-sided; axis rather brittle; spikelets 1-flowered, in pairs; one sessile and perfect, cylindrical, awned; the other pedicellate, staminate or neutral, flat, imbricated, bent to one side, awnless; outer glume

of perfect spikelet hard, convolute, brown, pubescent; second glume softer, the third hyaline, fourth hyaline at base, terminating above in a hard twisted and bent awn: first outer glume of pedicellate spikelet lanceolate, green, coriaceous, scarious-margined, many-nerved; second glume 3 or 5-nerved, scarious; floral glume and palet hyaline.

1. **H. contortus** (L.) R. & S. Perennial, strongly rooted, often glaucous: culms tufted, smooth, rather slender, branching above, erect, 6 to 9 dm. high: leaves flat or conduplicate, usually abruptly acute, 3 to 6 mm. wide, 1 to 3 dm. long; sheaths carinate: spikes few, mostly long pedicelled, cylindrical, 6 cm. long excluding the awns; rachis with a tuft of brown hairs at each node: sessile spikelet dark brown, 7 mm. long; awn dark brown below, 6 to 10 cm. long: pedicellate spikelet 9 to 11 mm. long; first glume subacute, oblique and twisted. (*Andropogon contortus* L.)—West of the Pecos River.

2. **H. melanocarpus** (Muhl.) Perennial: culms rather stout, smooth, bushy-branched above, erect, 1 to 2 m. high: leaves flat, attenuate at each end, 1 cm. wide, 3 to 6 dm. long: spikes numerous, approximate, one-sided, 3 to 5 cm. long, shorter than the sheathing bract; tufts of hairs on the rachis light brown or white: sessile spikelet rusty or dark brown, 8 to 10 mm. long; awn rusty or light brown, 8 to 10 cm. long: pedicellate spikelets about 2 cm. long; first glume flat, attenuate, wrinkled on the back. (*Stipa melanocarpa* Muhl. *Heteropogon acuminatus* Trin.)—Eastern Texas to Florida.

7. IMPERATA Cyrill.

Panicle spikelike; spikelets in pairs on unequal short clavate articulate pedicels, or one sessile, both perfect, awnless; outer empty glumes clothed with long white silky hairs; third and fourth glumes and palet hyaline: stamens 1 or 2: stigmas 2, exserted.

1. **I. Hookeri** Rupr. Culms 8 to 12 dm. high from creeping rootstocks, simple, smooth: radical leaves 1 to 3 dm. long; cauline shorter, decreasing upwards; ligule short ciliate: panicle nearly cylindrical, erect, 1.5 to 3 dm. long, sometimes interrupted below, lower branches 3 to 6 dm. long, appressed or slightly spreading: spikelets about 3 mm. long; hairs dense, straight, about 1 cm. long, giving the panicle a feathery appearance flecked with the yellow or brown anthers and stigmas.—Along watercourses, western Texas.

8. ERIANTHUS Michx.

Panicle broad and ample or rarely narrow: spikelets in pairs, one sessile and one pedicelled, both alike, 1-flowered, perfect and awned; outer empty glumes nearly equal, coriaceous, 5 to 7-nerved; 3d and 4th glumes and palet membranaceous, often bright red or purple, the 4th awned: stamens 2: styles distinct; stigmas 2, slightly exserted: tall reed-like perennials with large coarse leaves more or less pubescent.

* *Tuft of silky hairs at the base of each spikelet.*

1. **E. alopecuroides** (L.) Ell. Culms 1 to 2 m. high, hairy at the nodes: panicle densely flowered, 1.5 to 3 dm. long and half as wide; axis silky villous: spikelets 5 mm. long, shorter than the hairs; outer glumes and pedicels sparsely hairy; awn nearly straight, 1 to 2 cm. long. (*E. saccharoides* Michx.)—New Jersey to Texas, Mexico, and South America.

2. **E. brevibarbis** Michx. Culms 1 to 1.5 m. high, rather stiffly bearded at the upper nodes: panicle 1.5 to 3 dm. long, less dense than the preceding; axis pubescent or smooth: spikelets 6 to 7 mm. long, equaling or exceeding the hairs at the base;

empty glumes and pedicel thinly bearded; awn nearly straight, 1 to 2 cm. long.—Near the coast.

3. **E. contortus** Ell. Culms naked at the nodes: panicle rather narrow: awns spirally twisted: otherwise like the preceding.—Central Texas to Virginia.

*** No silky hairs in the panicle.*

4. **E. strictus** Baldw. Culms rather slender, smooth throughout: panicle narrow and strict, 1.5 to 2.5 dm. long: spikelets 7 to 8 mm. long; outer glumes scabrous; awns straight, 1.5 cm. long.—Eastern Texas to Alabama and Tennessee.

9. CHRYSOPOGON Trin.

Panicle terminal, open: spikelets in twos or more, often threes, on the flexuous, articulate branches; the lateral ones pedicellate, sterile, and often reduced to mere hairy pedicels; the middle or terminal one sessile and perfect, spindle-shaped: glumes of perfect spikelet 4; the first and second nearly equal, coriaceous, 5 to 9-nerved, obtuse, convex, or the second somewhat carinate toward the involute apex; the third hyaline, 2-nerved; the fourth (floral glume) smaller, hyaline, 2-lobed, with a brown or golden awn from the sinus, rarely awnless; palet small or wanting: stamens 3: styles distinct, with short, plumose stigmas.

1. **C. nutans** (L.) Benth. (INDIAN GRASS.) Roots perennial: culms simple, 1 to 2 m. high, smooth except the pubescent nodes: leaves narrowly lanceolate hispid; sheaths smooth: panicle narrowly oblong, erect or nodding, rather loose, 1.5 to 3 dm. long: fertile spikelet 6 to 7 mm. long, yellow or brown, shining above, pubescent, especially near the base; awn twisted and bent, 1 to 2 cm. long: sterile pedicels plumose, slightly shorter than the perfect spikelet. (*Andropogon nutans* L.)—Common in rather dry soil throughout the United States, but more abundant in the South.

10. SORGHUM Pers.

Panicle terminal, ample, dense or effuse: spikelets arranged like those of the preceding genus, but more persistent; sessile spikelet broadly lanceolate or nearly spherical; outer glume hardened at maturity, very obscurely nerved and nearly glabrous.

1. **S. Halepense** (L.) Pers. (JOHNSON GRASS.) Perennial from strong running rootstocks: culms erect, branching, 1 to 1.5 m. high: leaves flat, smooth, except the hispid margins, 2 to 4 dm. long: panicle pyramidal, rather open, 2 to 3 dm. long; rays mostly in threes or fours, naked at the base: spikelets about 5 mm. long, slightly pubescent or glabrate, short-awned or awnless. (*Holcus halepensis* L.)—Introduced originally from north Africa. Valuable for pasture or hay but very troublesome in cultivated lands.

NOTE.—*S. vulgare* is widely introduced in cultivation. This species includes the many varieties cultivated as sugar sorghum, Kaffir corn, Jerusalem corn, and broom corn.

11. ANDROPOGON L.

Inflorescence in simple or paniculate spikes or spike-like racemes, either solitary, in pairs, digitate, or panicled: spikelets in pairs at each node of the slender articulate rachis; one sessile, perfect, 1-flowered, awned; the other pediceled, staminate, neutral or rudimentary, awnless: glumes of the perfect spikelet 4; the first bifid or subobtuse, coriaceous or rigid, with two thickened keels; the second glume carin-

ate, acute, usually broader than the first and nearly equaling it in length, 3-nerved, membranaceous or coriaceous, except the slender green keel; the third glume empty, hyaline; the fourth (floral glume) hyaline below, entire or bifid, awned; palet small or wanting.—A large genus comprising many subgenera or sections, three of which are represented in Texas.

§ 1. *Racemes slender, solitary, terminal on long peduncles; the thickened clavate pedicels and joints of the rachis with a cup or a tooth-like appendage at the apex: floral glume cleft to the middle or below, awned from the sinus.*—SCHIZACHYRIUM.

* *Racemes close flowered with appressed spikelets.*

1. **A. hirtiflorus** Kth., var. FEENSIS (Fourn.) Hack. Culms 5 to 10 dm. high, slender, smooth, branched above: racemes 3 to 5, 5 to 8 cm. long, of 8 to 12 joints; rachis villous with hairs about 2 mm. long; margin of cup toothed and ciliate: sessile spikelet 8 to 10 mm. long; first glume lance-linear, 2-toothed, scabrid, sparsely hairy, 5 to 7-nerved; awn 1 to 1.5 cm. long.—Western Texas to Arizona and Mexico.

2. **A. cirratus** Hack. Culms 4 to 8 dm. high, erect, slender, smooth, branched above: racemes 3 to 5, 5 to 7 cm. long, of 8 to 12 joints; rachis smooth except the ciliate margin of the cup, and sometimes a slight tuft of hairs at the base of the joint; pedicel of neutral flower bearded near the apex: sessile spikelet 7 mm. long; first glume 2-toothed, chartaceous below the middle, 9-nerved, nearly smooth; awn 1 cm. long.—Western Texas to Arizona and Mexico.

3. **A. tener** Kth. Culms 4 to 8 dm. high, very slender, with long filiform branches from near the base: leaves soon involute filiform, smooth: racemes 3 to 8, slender, 4 to 8 cm. long, of 10 to 15 joints, often nodding on the long peduncles; joints of the rachis bearded at the base and on the rim of the cup, otherwise smooth; pedicels bearded near the apex: sessile spikelet 5 mm. long; first glume subacute, 5-nerved, smooth; awn bent, 1.5 cm. long.—Near the mouth of the Rio Grande.

* * *Racemes very hairy, loosely flowered with divergent spikelets.*

4. **A. scoparius** Michx. Culms 5 to 10 dm. high, smooth and wiry, loosely branching above; branches single or in fascicles, sometimes subdivided: racemes usually numerous, 3 to 4 cm. long, of 4 to 6 joints slender below, curved or zigzag at maturity, loosely bearded above; pedicels slender, bearded above, bearing a rudimentary spikelet: sessile spikelet about 7 mm. long; first glume slightly bifid, nearly smooth, 5 to 7-nerved; awn 1 cm. long.—Common in the river valleys throughout the United States east of the Rocky Mountains. Var. MARITIMUS Hack. is like the species, but more robust and often pubescent throughout; differing especially in the larger spikelets (9 to 10 mm. long) and the more abundant silky hairs on the rachis and pedicels.—Eastern Texas to Florida.

§ 2. *Racemes in pairs, rarely digitate or panicled, the lateral ones sessile: rachis joints and pedicels not translucent, a leaf-like bract below the first joint: floral glume bifid or 2-toothed.*—ARTHROLOPHIS.

* *Racemes very hairy, loosely flowered, with divergent spikelets; rachis joints and pedicels not clavate: floral glume slightly bidentate.*

– *Sheathing bract at the base of the racemes equaling or longer than the racemes.*

5. **A. glomeratus** (Walt.) B. S. P. Culms 5 to 15 dm. high, somewhat compressed below, smooth, much branched, especially near the summit; branches usually fasciculate; panicle dense, silky, 1 to 5 dm. long, of somewhat interrupted cymose clusters; racemes in pairs, 2 to 3 cm. long, of 5 to 8 joints, usually exceeded by the lanceolate

bract; rachis joints and sterile pedicel clothed with long white hairs: sessile spikelet 4 mm. long; first glume bidentate, nerveless and smooth except the two hispid keels; awn yellow, very slender, 1 to 3 cm. long. (*Cinna glomerata* Walt. *A. macrourus* Michx.)—Common in rich bottom lands, Eastern Texas to New Jersey. Var. PUMILUS Vasey is a remarkable dwarf form about 2 dm. high, tufted and branching from the base.—Seminole Cave, Val Verde County.

6. **A. Virginicus** L. Culms 5 to 10 dm. high, compressed below, branched above; branches short, twice or thrice subdivided: panicle erect, rather slender and open, 2 to 4 dm. long, of interrupted, loose cymose clusters; racemes in pairs, 2 to 3 cm. long, of 8 to 10 joints, exceeded by the lanceolate bract; rachis joints and pedicels with long silky hairs, especially above: sessile spikelet 3 mm. long; first glume slightly bidentate, scarious, smooth and nerveless except the 2 hispid keels; awn 1.5 to 2 cm. long.—Common in rather poor dry soil, Eastern Texas to Illinois and New York.

\+ + *Sheathing bracts at some distance below the racemes and exceeded by them.*

7. **A. Elliottii** Chapm. Culms 5 to 10 dm. high, bearded at the upper nodes, loosely branched above: leaves and sheaths usually pubescent: racemes in pairs (rarely threes or fours), becoming long exserted, 2.5 to 3 cm. long, of 6 to 8 joints; rachis joints and pedicels long hairy: sessile spikelet 4 mm. long; first glume slightly bifid at the apex, smooth, and nerveless except the two hispid keels or with few hairs near the apex; awn 1 to 2 cm. long.—Eastern Texas to Florida and Maryland.

* * *Racemes not hairy except in No. 8, rather closely flowered with appressed spikelets; rachis joints and pedicels clavate thickened: floral glume cleft ¼ from the apex.*

8. **A. argyræus** Schultes. Culms 5 to 10 dm. high, slender, smooth, or rarely bearded at the upper nodes, loosely branched, the branches single or in pairs at the upper nodes, 1 to 2 dm. long: leaves smooth throughout: racemes in pairs (rarely threes), not fasciculate, 3 to 4 cm. long, of 6 to 9 joints; rachis joints and pedicels densely long villous: sessile spikelet 5 to 6 mm. long; first glume bidentate, slightly sulcate, rather rigid, nerveless except the two hispid or bearded keels; awn about 2 cm. long.—Common in sandy soil, Central Texas to Delaware. Var. TENUIS Vasey is much more slender, with narrowly linear leaves and fewer branches.—Eastern Texas.

9. **A. provincialis** Lam. Culms 1 to 2 m. high, smooth, terete, branching above: racemes in pairs or often two or three pairs approximate and appearing digitate at the summits of the culm and few stout lateral branches, 6 to 8 cm. long, of 18 to 25 joints; pedicels and rachis joints sparingly ciliate on the margins: sessile spikelet 7 mm. long; first glume rigid, coriaceous, indistinctly 4 or 5-nerved, scabrous; awn about 1 cm. long; palet 2 mm. long, fimbriate at the apex: pedicellate spikelet as long as the sessile one, staminate or perfect.—Texas to Montana and eastward to the Atlantic Ocean.

10. **A. Hallii** Hack. Culms 1 to 2 m. high, glaucous, terete, branching above: racemes usually in twos or threes or sometimes two or three pairs approximate at the summits of the culms and long lateral branches, 6 to 9 cm. long, of 10 to 15 joints; pedicels and rachis joints villose: sessile spikelet 8 to 10 mm. long; first glume prominently sulcate, rigid; awn 3 to 10 mm. long; palet 4 mm. long, fimbriate at the apex: pedicellate spikelet longer than the sessile one, staminate.—On sandy hillsides and borders of the mesas, Texas to Montana. Var. FLAVEOLUS Hack. has hairs of the rachis and pedicels straw color, denser and longer than in the species, and the first and second glumes of both spikelets often hairy near the apex. Var. MUTICUS Hack., of the high plains, has rachis canescent with white hairs, spikelets 11 to 12 mm. long, short-awned or awnless.

§ 3. *Racemes panicled at the summit of the usually simple culm; rachis joints and pedicels with a median longitudinal translucent line: floral glume pedicel-like, tapering into the awn.*—AMPHILOPHIS.

11. **A. Wrightii** Hack. Culms 5 to 10 dm. high, simple, slender: racemes 3 to 7, subfastigiate or apparently digitate, 5 to 8 cm. long, of 10 to 15 joints; peduncles glabrous, 5 to 15 mm. long; rachis joints and pedicels ciliate: sessile spikelets about 5 mm. long; first glume 7-nerved, ciliate on the margins and often hairy near the base, usually with a punctate depression in the median line; awn 1.5 cm. long: pedicellate spikelet staminate or neutral, with 3 or 4 glumes as long as the sessile one.—Rare, western Texas.

12. **A. saccharoides** Sw. Culms 5 to 10 dm. high, erect or ascending, often branching below, usually barbellate at the nodes: racemes 15 to 30 in erect close panicles about 1 dm. long, the upper racemes usually single and sessile, the lower ones in twos or threes, on short, branching, glabrous peduncles; rachis joints and pedicels densely villous, with white hairs longer than the spikelets: sessile spikelet 5 to 6 mm. long; first empty glume 7 to 9-nerved, hispid-ciliate on the keels and slightly pubescent on the flat back; awn usually golden, 2 cm. long.—Along water courses, Mississippi to Southern California. Var. GLAUCUS (Torr.) Scribn. has leaves and sheaths generally smooth and glaucous, nodes barbellate, and spikelets 4 to 5 mm. long. (*A. saccharoides var. Torreyamis* Hack.)—On hillsides in drier localities than the species. Var. SUBMUTICUS Vasey has a narrow and rather dense panicle, and small spikelets 3 to 4 mm. long, short-awned or awnless. Var. PERFORATUS Hack. has a corymbose panicle, 2 to 7 racemes, and first glume with a punctate depression on the back.—Central Texas to Northern Mexico.

12. HILARIA HBK.

Inflorescence in solitary terminal spikes: spikelets in clusters of 3, closely sessile at the nodes of the rachis; the central spikelet containing a single pistillate or perfect floret; the lateral spikelets each with two or three staminate florets; outer glumes of the spikelets unlike, mostly thin with strong, rigid nerves, usually obliquely lobed, and awned on the side or back or between the lobes; outer glumes of the lateral spikelets standing in front of the cluster like an involucre; those of the central spikelet more slender, standing between the cluster and the rachis; floral glume mucronate or with a very short awn just below the apex: the cluster of spikelets falling entire at maturity: hardy perennials.—Said to be very nutritious and valuable for grazing, on the high plains.

1. **H. cenchroides** HBK., var. TEXANA Vasey. Multiplying by suckers at intervals of 1 to 2 dm.: culms slender, 2 to 3 dm. high, barbellate at the nodes: leaves narrow, rigid, 5 to 10 cm. long, thinly pubescent: spikes 3 to 4 cm. long, rather loosely flowered with 5 to 10 clusters of spikelets, often purple; hairs at the base about 1 mm. long: spikelets 4 to 6 mm. long; empty glumes scabrid, cleft into 2 linear unequal lobes, entire or merely erose with awns about equaling the spikelets.—Dry hills and high prairies, Central Texas to Arizona and Mexico.

2. **H. mutica** (Buckl.) Benth. Rootstocks creeping, strongly rooted: culms 3 to 5 dm. high, in small tufts or sometimes bunched: leaves usually hispid, flat or involute toward the sharp points: spikes 6 to 8 cm. long, densely flowered, usually white: spikelets 6 to 7 mm. long; hairs at the base about 2 mm. long; glumes all thin at the apex, ciliate or fimbriate; outer ones of the central spikelet with 5 or 6 awns shorter than the floret; outer ones of the lateral spikelets narrowly cuneate, equaling the

florets, the anterior with a short usually divergent awn on one side, below the middle. (*Pleuraphis mutica* Buckl.)—High plains and mesas, western Texas to Arizona.

3. **H. Jamesii** (Torr.) Benth. Rootstock creeping, strongly rooted: culms 2 to 5 dm. high in small tufts, rarely bunched: leaves mostly involute rigid, pungent-pointed, hispid: spikes 4 to 6 cm. long, rather densely flowered, often purple: spikelets 7 to 9 mm. long; hairs at the base about 3 mm. long; empty glumes all ciliate on the margins; those of the central spikelet 4 or 5-awned on the back; the anterior ones of the lateral spikelets awned at one side above the middle, the awns exceeding the cluster. (*Pleuraphis Jamesii* Torr.)—High plains west of the Pecos and northwestward to Colorado and Nevada.

NAZIA Adans.

Inflorescence in solitary terminal spikes: spikelets in short pedunculate or almost sessile clusters of 2 to 5; the clusters single on all sides of the terete axis: second empty glumes turned to the outside surrounding the cluster like an involucre, coriaceous and beset with hooked spines; the first glume small and inconspicuous; floral glume membranaceous acute; palet present in the perfect florets: some of the florets in each cluster imperfect. (*Tragus* Hall.)

1. **N. racemosa** (Hall) Kuntze. Annual: culms 2 to 3 dm. high, branching: leaves bristly ciliate on the margins; spikes 4 to 8 cm. long, often included at base in the vaginate upper sheaths: spikelets 3 to 4 mm. long. (*Tragus racemosus* Hall.)—Introduced and abundantly naturalized near the coast and in the Rio Grande Valley.

14. **PASPALUM** L.

Spikes unilateral, single and terminal, subdigitate or paniculate: spikelets in one, two or three rows, plano-convex, obtuse or subacute, awnless, each with one perfect floret: glumes 3, the outer ones membranaceous, equal or in a few species the outer one smaller; the floral glume more or less convex, becoming indurated, embracing the shorter flat palet of the same texture.

§ 1. *Spikelets more or less secund along the rachis, with the backs of the floral glumes turned inward or toward the rachis.*—EUPASPALUM.

* *Rachis of the spikes membranaceous, dilated, somewhat conduplicate, nearly inclosing the small spikelets at maturity.*

1. **P. fluitans** (Ell.) Kth. Culms decumbent, often rooting at the nodes: leaves broadly lanceolate, 5 to 10 mm. broad: spikes numerous (15 to 40) in panicles 1 to 2 dm. long; the rachis extending beyond the spikelets, taper-pointed: spikelets thinly pubescent, about 1 mm. long. (*P. Ceresia fluitans* Ell.)—Muddy banks, near or in water, eastern Texas to Florida.

2. **P. Walterianum** Schultes. Culms decumbent and rooting at the nodes, branching: leaves narrowly lanceolate, 3 to 5 mm. broad: spikes few (3 to 7) in panicles less than 1 dm. long; rachis blunt pointed, not extending beyond the spikelets: spikelets smooth, nearly 2 mm. long.—Low, wet ground, eastern Texas to New Jersey.

** *Rachis flat or subterete, not inclosing the spikelets.*

+ *Spikes single and terminal, or a terminal pair, or 1 terminal with 1 (rarely 2) approximate.*

3. **P. monostachya** Vasey. Culms tufted, erect, rigid, 5 to 10 dm. high, simple: leaves narrow, convolute, 2 to 3 dm. long: spike erect, 1.5 to 2 dm. long: spikelets closely imbricated on the narrow rigid rachis subacute, 3 mm. long; the

first empty glume one-third shorter than the floret.—Low land, southern Texas to Florida.

4. **P. vaginatum** Sw. Culms ascending from a long creeping base, 1 to 4. dm. high: leaves distichous, divergent, usually involute, almost subulate pointed; sheaths equaling or exceeding the internodes: spikes a pair (rarely 3), 3 to 5 cm. long on clavate peduncles: spikelets acute, smooth, about 4 mm. long.—Swamps and wet places near the coast, eastern Texas to Florida.

5. **P. distichum** L. (JOINT GRASS.) Culms ascending, 3 to 6 dm. high, from a creeping base: leaves linear-lanceolate, 1 to 1.5 dm. long: spikes 1 terminal and 1 (rarely 2) about 1 cm. below, 2 to 6 cm. long: spikelets crowded, subacute, pubescent or nearly smooth, nearly 3 mm. long.—Moist places throughout Texas and across the continent.

6. **P. setaceum** Michx. Culms decumbent or erect, 5 to 7 dm. high: leaves lanceolate, mostly flat, 1 to 2 dm. long: spikes 5 to 10 cm. long, one terminal and usually one or more sessile 2 to 3 cm. below; rachis narrow: spikelets rotund, 1 to 2 mm. in diameter.—Hillsides. Var. CILIATIFOLIUM Vasey has stouter and taller culms, and leaves 6 to 10 mm. wide and hairy on the margins or all over.—With the type, in open woods throughout eastern and northern Texas.

+ + Spikes 3 to 10, or sometimes reduced to 2 in No. 7.

++ Spikelets rotund, less than 3 mm. long.

7. **P. Drummondi** Vasey. Culms 5 to 10 dm. high, often branching below: leaves lanceolate, about 1 dm. long and 1 cm. wide: spikes 2 to 4, arcuate, spreading, 5 to 10 cm. long; rachis narrow: spikelets in 2 or 3 indistinct rows, 2 mm. in diameter, pubescent, brownish dotted, generally with a small extra outer glume.—Woods and shady ravines, eastern Texas to Florida.

8. **P. læve** Michx. Culms usually erect, 5 to 15 dm. high, rarely branching: spikes 3 to 6, somewhat spreading, 5 to 10 cm. long, 3 cm. or more apart, hairy in the axils; rachis about 1 mm. wide: spikelets in two rows, smooth, nearly 3 mm. long.—Moist soil, central Texas to the Atlantic States. Var. BREVIFOLIUM Vasey has rather slender culms 4 to 8 dm. high, leaves 1 to 1.5 dm. long and 1 cm. wide, and spikelets slightly smaller than in the species. Var. ANGUSTIFOLIUM Vasey has culms usually 1 m. high or more, long and narrow leaves, and spikelets slightly larger than the species.

9. **P. præcox** Walt. Culms about 1 m. high, simple: leaves 2 to 4 dm. long, less than 1 cm. wide: spikes 3 to 6, somewhat spreading, 3 to 5 cm. long; rachis 1 mm. wide: spikelets mostly in 3 rows, smooth, 2 mm. in diameter.—In moist soil, extending from the south Atlantic States to Texas.

++ ++ Spikelets lanceolate or oblong, less than 3 mm. long.

10. **P. lividum** Trin. Culms 5 to 8 dm. high, compressed below, sometimes branching near the base: leaves narrowly lanceolate, slender-pointed, about 2 dm. long: spikes 4 to 6, arcuate, nearly erect, 3 to 4 cm. long in a rather close terminal panicle; rachis 2 mm. broad: spikelets oval or broadly oblanceolate, 2 mm. long, smooth.—Near the coast or in wet places in the river valleys.

11. **P. Buckleyanum** Vasey. Culms ascending, 5 to 10 dm. high, often branching below: leaves narrow, flat or conduplicate: spikes 2 to 6, nearly straight, spreading, 4 to 8 cm. long, in a loose panicle; rachis 2 mm. wide: spikelets broadly lanceolate, subacute, nearly 3 mm. long; pubescent empty glumes longer than the obtuse floret.—Moist places, southern Texas.

12. **P. pubiflorum** Rupr. Culms 5 to 10 dm. high, erect or ascending from a creeping base, pubescent at the nodes: leaves flat, lanceolate, 1 to 2 dm. long, about 1 cm. wide: spikes 3 to 6, spreading, 4 to 8 cm. long; rachis 2 mm. wide: spikelets in 2 to 4 rows, oblong, obtuse, nearly 3 mm. long, pubescent.—In moist soil, eastern Texas. Var. GLAUCUM Scribn. has rigid culm and leaves and is glaucous throughout.—Southwestern Texas and northern Mexico.

13. **P. plicatulum** Michx. Culms slender, usually simple, 5 to 10 dm. high: leaves slender (3 mm. wide or less), involute at the attenuate points: spikes 3 to 5, arcuate or rather rigid, 4 to 5 cm. long; rachis narrow, flexuous: spikelets oblong, obtuse, nearly 3 mm. long, nearly smooth; second empty glume transversely plicate near the margins; floral glume and palet dark brown at maturity.—Extending from the gulf States into eastern Texas.

++ ++ ++ *Spikelets more than 3 mm. long.*

14. **P. racemulosum** Nutt. Culms nearly 1 m. high, slender, simple, from scaly rootstocks: leaves lanceolate, flat; blades and sheaths usually pubescent: spikes 3 to 5, nearly erect, 5 to 10 cm. long; rachis very slender, flexuous, loosely flowered with distinctly pedicellate spikelets: spikelets oblong or obovate, 3 to 4 mm. long, nearly smooth.—In moist soil, eastern Texas, not common.

15. **P. dilatatum** Poir. Culms 8 to 12 dm. high, simple erect: leaves 2 to 3 dm. long, less than 1 cm. wide: spikes 4 to 7, somewhat spreading, 7 to 10 cm. long, hairy at the axils; rachis 1 to 2 mm. wide: spikelets in 4 rows, ovate, acuminate, 3 mm. long, pubescent, villous on the margins.—Extending from the Atlantic States to central Texas, in moist soil.

16. **P. difforme** Le Conte. Culms nearly 1 m. high, from strong, scaly rootstocks: leaves rather rigid, 1 to 1.5 dm. long: spikes 2 to 4 (usually 2), 4 to 7 cm. long; rachis flexuous, about 1 mm. wide: spikelets broadly oblong, nearly 4 mm. long, smooth.—Moist soil, eastern Texas.

17. **P. Floridanum** Michx. (LARGE-FLOWERED PASPALUM.) Culms 1 to 1.5 m. high, robust: leaves 3 to 6 dm. long, 1 cm. wide, usually pubescent throughout: spikes 3 to 7, nearly erect, 8 to 12 cm. long, hairy at the axils; rachis nearly 2 mm. wide: spikelets oval, nearly 4 mm. long, smooth and often glaucous.—River bottom lands, central Texas to Florida and Dalaware. Var. GLABRATUM Engelm. has smooth leaves and sheaths.

\+ + + Spikes numerous, 20 or more.

18. **P. virgatum** L. var. PUBIFLORUM Vasey. Culms 1 to 1.5 m. high, robust: leaves 2 to 8 dm. long, 8 to 11 mm. wide: spikes 20 to 30, 8 cm. long or less, mostly alternate in a slightly spreading panicle about 2 dm. long, rather crowded above: spikelets ovate, acute, hairy on the margins, about 2 mm. long.—Moist uplands, eastern Texas to Louisiana.

§ 2. *Spikelets distichous rather than secund, with the back of the floral glume turned outwards or away from the rachis.*—ANASTROPHUS.

19. **P. compressum** (Swartz) Nees. (CARPET GRASS.) Culms slender, compressed below, 3 to 6 dm. high from a creeping base: leaves linear, obtuse, smooth: spikes very slender, 5 to 8 cm. long, a pair at the apex of the culm with often 1 to 3 approximate and sometimes others on long lateral peduncles: spikelets single, linear, subacute, 2 mm. long, the empty glumes slightly longer than the floret. (*Milium compressum* Swartz, *P. platycaule* Poir.)—Moist meadow land, forming more nearly a continuous sod than any other species of the genus, eastern Texas to Virginia.

20. **P. furcatum** Fliigge. Culms 4 to 8 dm. high from a creeping base: leaves lanceolate, rather blunt-pointed, usually smooth: spikes slender, 1 to 1.5 dm. long in pairs, usually some on lateral axillary peduncles: spikelets lanceolate, 5 to 6 mm. long, the attenuate empty glumes one-third longer than the obtuse floret.—Moist soil, eastern Texas to Virginia.

15. ERIOCHLOA HBK.

Spikes paniculate, unilateral, with a rather slender rachis: spikelets with a cup or annular swelling at the base, 1-flowered or with 1 perfect and 1 staminate or neutral floret: outer glumes nearly equal,

thin herbaceous, silky-pubescent, acute or acuminate; floral glumes of perfect floret shorter, coriaceous or chartaceous, obtuse or mucronate; palet like the glume in texture; imperfect floret, when present, consisting of a thin glume, staminate or neutral.

1. **E. sericea** Munro. Perennial: culms simple, erect 6 to 10 dm. high: leaves narrow, 2 to 3 dm. long, softly pubescent: panicle slender, 1 to 2 dm. long, of 6 to 10 appressed, close-flowered branches, about equaling the intervals, with a tuft of persistent hairs at the base of each spikelet: spikelets 3 to 4 mm. long, 1-flowered; floral glume mucronate.—Dry prairies, central Texas.

2. **E. punctata** (L.) Hamil. Culms ascending or erect, branched below, 6 to 10 dm. high: leaves 5 to 10 mm. wide: panicle about 1 dm. long, of 8 to 10 spikes generally exceeding the internodes; rachis glabrous: spikelets short-pedicelled, 4 to 5 mm. long; floral glumes one-third shorter than the empty glumes, all awn-pointed.—Dry prairies throughout the State and westward to California. Var. MINOR Vasey is smaller than the species, with short branches in the panicle and smaller spikelets (2 to 3 mm. long), the floral glume nearly equaling the empty ones, all merely mucronate.—Western Texas to New Mexico.

16. PANICUM L. (PANIC-GRASS.)

Inflorescence spicate or paniculate: spikelets with one terminal perfect floret and a second one staminate or rudimentary, awnless except in § 3: empty glumes 3 (rarely 2), thin, membranaceous or herbaceous; the outer one small, often minute, rarely wanting; the second and third alike in size, texture and apparent position, equaling or exceeding the floret (the third glume really the floral glume of the imperfect floret, but for convenience commonly mentioned in connection with the second empty glume); glume and palet of perfect floret usually coriaceous, obtuse or subacute; second or lower floret represented by the third glume either empty or with palet and stamens.—The largest genus of grasses in Texas and having a larger number of species there than in all North America beside.

§ 1. *Panicle of several unilateral spikelike branches, digitate or approximate at the summit of the culm: spikelets usually small, in pairs, one sessile, the other short pedicelled outer empty glume minute or wanting.*—DIGITARIA.

* *Rachis flat or winged: leaves lanceolate.*

1. **P. sanguinale** L. (CRAB-GRASS.) Culms 3 to 8 dm. high, erect or decumbent: spikes 3 to 10, spreading, about 1 dm. long; rachis flat: spikelets lance-oblong, acute, about 3 mm. long; first glume minute; second pubescent, about two-thirds as long as the floret; third equaling the acute floret.—Naturalized everywhere.

2. **P. serotinum** Trin. (CREEPING CRAB-GRASS.) Culms 1 to 3 dm. high from a decumbent or extensively creeping base: leaves short (1 to 3 cm. long): spikes 3 to 6, approximate, spreading, 3 to 8 cm. long; rachis wing-margined: spikelets acute at base and apex; outer glumes 2; the lower one less than one-half as long as the floret; the second nearly equaling it.—In moist soil, almost forming a sod.

* * *Rachis nearly filiform: leaves narrow.*

3. **P. filiforme** L. (SLENDER CRAB-GRASS.) Culms 4 to 8 dm. high, very slender but rather rigid, simple or sparingly branched: spikes 2 to 8, approximate, rarely digitate, 1 to 2 dm. long: spikelets about 2 mm. long; outer glumes 2, ciliate margined, nearly equaling the dark brown acute floret.—Sandy or gravelly soil.

§ 2. *Panicle of nearly sessile alternate spreading branches: spikelets sessile in two rows on one side of a flattened rachis as in Paspalum, but with a small outer glume; perfect floret rugose.*—BRACHIARIA.

* *Culms rather robust, though often weak and decumbent.*

4. **P. paspaloides** Pers. Culms 5 to 10 dm. high, decumbent and rooting below, leafy: panicle 1 to 2 dm. long, strict, with 10 to 20 branches 4 cm. long or less: spikelets about 2 mm. long, smooth, subacute, plano-convex, in two regular rows with the backs of the floral glumes toward the rachis; first glume broad, truncate, one-third as long as the floret; second and third glumes equaling the floret.—In moist land, eastern Texas, Mexico, and southern Florida.

5. **P. platyphyllum** Munro. Culms 5 to 8 dm. high, usually decumbent, rooting and branching below: leaves smooth, lanceolate, subcordate at base: panicle of 3 to 6 spreading, distant branches, 6 to 10 cm. long, usually included at base: spikelets ovate, acute, smooth, 3 to 4 mm. long; first glume obtuse, one-third as long as the second and third; these acute, exceeding the floret.—Wet soil, eastern Texas.

NOTE.—*P. cæspitosum* Swartz is found in Chihuahua and may be expected in the bluffs and ravines between Del Rio and El Paso. It differs from the preceding in the shorter more numerous branches and shorter spikelets (barely 3 mm. long).

** *Culms very slender, creeping.*

6. **P. prostratum** Lam. Culms ascending, 3 to 5 dm. high, from a long creeping base: leaves short, lance-ovate, subcordate and clasping: panicle 3 to 8 cm. long; branches alternate, about 2 cm. long: spikelets ovate, acute, smooth, nearly 2 mm. long; first glume one-fourth as long as the second and third; these acute, slightly exceeding the mucronulate floret.—Along streams and in wet soil, eastern Texas.

§ 3. *Spikelets densely crowded in 3 or 4 rows on one side of the rather slender flattened rachis of the alternate spikes: empty glumes scabrous or hirsute, acute or long-awned.*—ECHINOCHLOA.

7. **P. colonum** L. Culms 3 to 6 dm. high, usually decumbent at the base: leaves flat, glabrous: panicle 1 to 2 dm. long; branches erect or ascending, 2 to 3 cm. long: spikelets 2 to 3 mm. long, acute; first outer glume nearly one-half as long as the second and third; these acute or acuminate and slightly exceeding the acute smooth floret.—Moist soil throughout the State. Var. ZONALE (*P. zonale* Guss), of southern Texas, is generally smaller and more spreading than the species, the leaves with transverse purple stripes.

8. **P. crus-galli** L. (BARN GRASS. COCK'S FOOT.) Culms 5 to 15 dm. high, usually robust: leaves flat: panicle pyramidal, 1 to 3 dm. long, rather dense; branches ascending, 3 to 5 cm. long below, shorter toward the apex: spikelets 4 to 5 mm. long, often purple or nearly black; first glume broad, mucronate, one-third as long as the spikelet; second glume acuminate or awn-pointed, exceeding the acuminate floret; third glume equaling the second, terminating in an awn 5 to 20 mm. long.—Apparently native in the Southern States. Var. HISPIDUM Torr. is large and coarse, with hispid sheaths and usually long awned spikes.—Moist rich land. Var. MUTICUM Vasey is generally smaller and with awnless spikelets.—Rather dry soil.

§ 4. *Spikelets white, silky hairy, sessile or short pediceled, in pairs on the simple erect branches of the panicle.*—TRICHACHNE.

* *Lower glume very minute.*

9. **P. lachnanthum** Torr. (SILKY PANIC-GRASS.) Culms erect, slender, 5 to 10 dm. high: panicle narrow, 1 to 1.5 dm. long, with short, erect branches: spikelets acuminate, 3 to 4 mm. long; first empty glume smooth; second and third equaling or slightly exceeding the mucronate brown floret.—Dry plains, western Texas.

NOTE.—*P. leucophæum* HBK., although not reported from Texas, may be expected along the coast. It differs from the preceding in being more robust and having a larger, looser panicle.

** Lower glume more than one-half as long as the spikelet.*

10. **P. tenerrimum** Kth. Culms erect, very slender, 2 to 5 dm. high, branching and leafy at the base: leaves flat, 5 cm. long or less, rather rigid; lower sheaths often pubescent: panicle about 1 dm. long; branches single, 1 to 3 cm. long: spikelets 2 mm. long; first glume glabrous, about one-half as long as the spikelet; perfect floret smooth; lower floret neutral and without a palet.—Low land, Pecos County, Texas, rare.

11. **P. ciliatissimum** Buckley. Culms decumbent, much branched, 2 to 4 dm. high, leafy, pilose at the nodes: leaves flat, 5 cm. long; sheaths pubescent: panicle 4 to 8 cm. long: spikelets 3 to 4 mm. long; first glume two-thirds as long as the spikelet; perfect floret rugose; lower floret staminate and with a palet.—Low land, southern Texas to Florida.

§ 5. *Panicle linear or narrow; branches sessile, erect or appressed, or the apex spicate; spikelets nearly glabrous, short-pediceled.*—SUBSPICATA.

** Spikelets small (2 mm. long), not turgid; perfect floret smooth.*

12. **P. stenodes** Griseb. Culms 6 to 10 dm. high, wiry, often branching above: leaves narrow, mostly involute, rigid and erect: panicle 6 to 9 cm. long; branches alternate or in twos, unequal, the longer exceeding the intervals: spikelets lanceolate, slightly more than 2 mm. long; outer glumes all acute, the first one-half as long as the second and third; these exceeding the floret.—In shallow water near the coast and extending along the Gulf to Florida.

13. **P. digitarioides** Carpenter. Culms about 1 m. high, rooting at the lower nodes: panicle 1 to 2 dm. long, of 8 to 15 branches, single or rarely fascicled, the lower ones remote, 5 cm. long or less: spikelets ovate, 2 to 3 mm. long; glumes all acute, subcarinate; the first one-half as long as the floret; the second and third equaling it. (*P. Curtisii* Chapm., not Steud.)—Ponds and swamps, eastern Texas and eastward.

** * Spikelets larger (2.5 to 5 mm. long), turgid.*

+ Perfect floret smooth.

14. **P. obtusum** HBK. Culms 5 to 8 dm. high, branching, sending off long (sometimes 2 to 3 m.) runners; stem and leaves rather rigid: panicle about 1 dm. long with 3 to 6 branches 5 cm. long or less: spikelets oblong or obovate, smooth, about 3 mm. long; 3 outer glumes subequal and nearly equaling the floret.—High plains of western and northern Texas.

+ + Perfect floret transversely rugose.

++ Spikelets subtended by a bristle.

15. **P. subspicatum** Vasey. Culms 3 to 5 dm. high from a strong rootstock, branching, leafy: leaves mostly flat: panicle 8 to 15 cm. long, interrupted; branches short, appressed: spikelets little more than 2 mm. long, ovate, curved, subacute, smooth; lower glume one-half as long as the spikelet; second and third glumes equaling the floret.—Southern and western Texas.

16. **P. Reverchoni** Vasey. Culms 4 to 6 dm. high, erect, slender, from a thickened base: leaves mostly radical, narrow, involute: panicle 1 to 2 dm. long, interrupted; branches few and short: spikelets ovate, 3 to 4 mm. long, smooth; first glume deltoid, one-half as long as the spikelet; second and third glumes equaling the acute floret.—Plains of central and northern Texas.

++ ++ No bristles in the panicle: empty glumes reticulately veined.

17. **P. Texanum** Buckley. (TEXAS MILLET.) Culms about 1 m. high, often decumbent, branching and rooting below: leaves pubescent, 1 to 2 cm. wide: panicle 1 to 2 dm. long, usually included at the base in the upper sheath; branches 8 cm. long or less: spikelets broadly lanceolate, acute; glumes all acute; first one-half as long

as the spikelet; second and third equaling the floret.—Throughout Texas. Often cultivated.

18. **P. reticulatum** Torr. Culms 3 to 6 dm. high, slender, weak, branching: leaves lanceolate, subcordate at base: panicle 5 to 10 cm. long, rather dense; branches often subfasciculate, with some short appressed subdivisions: spikelets obovate, nearly 3 mm. long; first glume broad, one-fourth as long as the spikelet; second and third glumes conspicuously reticulate-veined, equaling the floret.—Along streams, western Texas and westward.

NOTE.—Some forms of *P. fuscum* Swartz come here, but the generally spreading panicle places this species in the next section.

§ 6. *Branches of the panicle numerous, rather closely flowered, spreading, mostly single, simple or with few short almost appressed subdivisions: spikelets sessile or short-pedicelled.*—POLYSTACHYÆ.

* *Branches of the panicle wing-margined or flattened: perfect florets transversely rugose.*

19. **P. fuscum** Swartz. Culms 3 to 8 dm. high, branching, leafy: panicle 1 to 1.5 dm. long; branches narrowly wing-margined, sparsely hairy, and with a tuft of fuscous pubescence in the axils: spikelets nearly 3 mm. long turgid; first glume deltoid, one-third as long as the second and third; these reticulate-veined, slightly exceeding the floret.—Open woods, central and western Texas.

20. **P. barbinode** Trin. (PARA GRASS.) Culms 1 to 2 m. high, robust, villous at the nodes: leaves lanceolate, smooth; sheaths pubescent, especially at the base and throat: panicle 1.5 to 3 dm. long; axis angular; branches flexuous, somewhat villous at the nodes: spikelets ovate, acute, 3 mm. long; first glume deltoid, one-fourth as long as the second and third; these slightly exceeding the floret.—Introduced and cultivated throughout the State in moist soil.

* * *Branches of the panicle terete or angular: perfect florets smooth.*

– *Spikelets crowded in continuous or interrupted clusters along the branches.*

21. **P. hians** Ell. Culms 2 to 6 dm. high, slender: leaves narrow: panicle about 1 dm. long, rather loose; branches slender, naked below, densely flowered near the ends: spikelets 2 mm. long, obovate; the empty glumes spreading, shorter than the prominent curved, clavate, imperfect floret; this exceeding the acute, perfect floret.—Low prairies throughout Texas.

22. **P. agrostoides** Muhl. (MUNRO-GRASS.) Culms 6 to 15 dm. high, somewhat compressed below, in tufts or bunches: leaves lance-linear, 3 to 6 dm. long, smooth throughout: panicle 1.5 to 3 dm. long, usually with small lateral panicles in the upper sheaths; branches ascending: spikelets less than 2 mm. long, slightly or not at all curved at the acute apex; first empty glume about one-half as long as the second and third; these exceeding the floret.—Wet land, eastern Texas and eastward. The small spikelets and form of the panicle give it very much the appearance of red-top (*Agrostis vulgaris*).

23. **P. anceps** Michx. Culms 8 to 12 dm. high, compressed below, from scaly rootstocks: leaves lance-linear, 2 to 6 dm. long, usually smooth: panicle 1 to 3 dm. long usually with smaller lateral panicles subvaginate in the upper sheaths; branches ascending: spikelets 3 mm. long, curved at the acute apex.—Woods and moist places throughout Texas, and eastward. Var. PUBESCENS Vasey has pubescent leaves and sheaths, slender panicle, and branches and spikelets smaller than in the species.

– – *Spikelets scattered or solitary: panicle almost diffuse except in some forms of No. 24.*

24. **P. diffusum** Swartz. Culms 2 to 4 dm. high, slender, erect, simple or branching below: leaves narrowly linear, subinvolute and rather rigid, 1 to 3 dm. long, often pubescent: panicle 5 to 15 cm. long, loose; branches 2 to 4 cm. long, capillary, spreading, bearing few short-pedicelled spikelets near the extremities and on the

divergent subdivisions: spikelets 2 to 3 mm. long, acute; outer glume acute, one-half as long as the second and third; these acuminate, slightly exceeding the obtuse floret.—Southern Texas.

25. **P. repens** L. Culms 4 to 6 dm. high, rigid, terete, erect or ascending from a strong creeping base: leaves narrow, involute, divaricate: panicle rather cymose spreading, 1 dm. long or less; branches ascending, rather sparsely flowered, the lower ones nearly as long as the panicle and usually subdivided: spikelets turgid, 2 to 3 mm. long; first glume rounded, one-fourth as long as the second and third; these acuminate, slightly exceeding the obtuse or subacute floret.—Moist soil, eastern Texas and along the Gulf coast to Florida. Var. CONFERTUM Vasey has short culms, panicle condensed with short branches and crowded spikelets, and lower glume longer and more acute.

§ 7. *Branches of the panicle subdivided, spreading, naked below; spikelets solitary, pedicelled.*—EUPANICUM.

* *Spikelets turgid, obtuse or subacute: usually with a rosette of broad short leaves at the base of the culm.*[1]

\- *Upper leaves narrowly lanceolate or linear: panicle less than 1 dm. long, except in some forms of No. 27.*

\+ *Spikelets more than 2 mm. long: rosette of broader basal leaves inconspicuous.*

= *Leaves linear, subinvolute, rather rigid and erect.*

26. **P. depauperatum** Muhl. Culms 2 to 3 dm. high, slender, in small tufts from perennial rootstocks: leaves mostly from near the base, slender, often pubescent on the sheaths or throughout: panicle oblong, rather loosely few-flowered, usually with some small panicles half concealed among the leaves: spikelets 3 mm. long; first glume less than one-fourth as long as the prominently nerved second and third.—Prairies throughout Texas and northward.

27. **P. neuranthum** Griseb. Culms 3 to 5 dm. high, slender, branching, leafy to the middle or above: leaves flat or subinvolute 4 to 8 cm. long: terminal panicle usually long exserted, 4 to 8 cm. long, with divergent, few-flowered branches; lateral panicles numerous among the leaves: spikelets 2 to 3 mm. long, oval or obovate, finely pubescent; first glume deltoid, acute, one-fourth as long as the second and third; these nearly equal, prominently 7 to 9-nerved, slightly exceeding the smooth oval floret.—Ravines and river banks, eastern Texas to Florida. Var. RAMOSUM Griseb. is much branched, with numerous very slender involute leaves and generally smaller spikelets.—Possibly only an autumnal form of the species.

28. **P. sparsiflorum** Vasey. Culms 3 to 6 dm. high, slender, branching below: leaves slender often filiform-involute, 5 to 15 cm. long: terminal panicle 5 to 10 cm. long, very open; branches 3 to 5, slender, ascending or horizontal, bearing few short-pedicelled spikelets often in pairs near the extremities: spikelets 3 to 4 mm. long, elliptical, hispid-pubescent, bluish-green; first glume acute, deciduous, one-half as long as the acute second and third.—Low land, near the coast.

= = *Leaves flat, narrowly lanceolate, spreading or divaricate.*

29. **P. pedicellatum** Vasey. Culms 3 to 5 dm. high, branching below, leafy to the middle or above: leaves thin, often ciliate at the base, 4 to 8 cm. long: panicle 3 to 6 cm. long; branches 3 to 5, spreading, bearing few scattered spikelets mostly on long pedicels: spikelets 3 mm. long, nearly smooth, narrowly obovate; first empty glume narrow, one-half as long as the spikelet; second glume slightly shorter than the third, both obtuse, 7-nerved, barely equaling the smooth floret.—Rocky woods and ravines, east of the Pecos River.

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[1] Nearly all the species of this group have a peculiar autumnal habit, sending out from the base or lower nodes low much-branched culms with numerous narrow leaves and small subvaginate panicles, a character that causes much confusion, but seems to be of very little value in determining species.

30. **P. cc··· ·nguineum** Kth. Culms 4 to 8 dm. high, branching, usually pubescent: leaves 1 to 2 dm. long, 1 cm. wide or less, rather rigid, tapering toward the involute points, often pubescent especially on the sheaths: panicle 5 to 10 cm. long; branches spreading, subdivided, and spikelet-bearing to the base: spikelets 2 to 3 mm. long, obovate, finely pubescent; first glume acute, one-third as long as the second and third; these equal, 9-nerved, barely equaling the smooth floret.—Eastern Texas and eastward to Georgia.

NOTE.—Some narrow-leaved forms of *P. scoparium* may be looked for here.

++ ++ *Spikelets less than 2 mm. long: leaves usually lanceolate and divaricate.*

31. **P. laxiflorum** Lam. Culms 2 to 5 dm. high, branching below: leaves numerous, flat, 1 to 2 dm. long, villous pubescent on the sheaths and sometimes throughout: panicle 5 to 10 cm. long; branches spreading, subdivided to the base, sparingly hairy: spikelets nearly 2 mm. long, oval, finely pubescent; first glume deltoid, one-fourth as long as the second and third; these obtuse, equal, about equaling the smooth floret.—Woods, eastern Texas and eastward. Variable and difficult to distinguish from some forms of *P. dichotomum*.

32. **P. nitidum** Lam. Culms 3 to 6 dm. high, simple or with few inconspicuous branches: leaves 4 to 8 cm. long, rather thick, usually smooth: panicle pyramidal or broadly oval, 3 to 6 cm. long; branches spreading, capillary, subdivided to the base, bearing numerous spikelets: spikelets about 1.5 mm. long, oval; first glume a minute scale; second and third minutely pubescent, usually purple, equaling but often open and disclosing the smooth white floret.—Eastern Texas and eastward to the Atlantic.

33. **P. dichotomum** L. Culms 2 to 8 dm. high, at first mostly simple, with flat narrowly lanceolate leaves 5 to 10 cm. long, smooth or pubescent: panicle broadly ovate, spreading, 4 to 8 cm. long; branches capillary, mostly single but diffusely subdivided to the base, bearing numerous rather long-pedicelled spikelets: spikelets about 1.5 mm. long, oblong or obovate; first glume obtuse, less than one-fourth as long as the spikelet, often minute; second and third pubescent or nearly smooth, about 7-nerved, barely equaling or slightly shorter than the smooth, subacute floret.—Common everywhere except in arid regions. Very varible, extending in some forms to nearly every other species of this group. Sometimes producing only the branching autumnal form, the spikelets of which are often slightly larger than those of the exserted panicle, but never 2 mm. long.

+ + *Upper leaves broadly lanceolate with cordate clasping base, somewhat nervose: panicle often more than 1 dm. long.*

++ *Spikelets small, less than 2 mm. long.*

34. **P. sphærocarpon** Ell. Culms 3 to 6 dm. high, erect, simple: leaves 5 to 10 cm. long, obscurely nerved, usually ciliate at the cordate base, otherwise smooth, or scabrid above: panicle broadly ovate, about 1 dm. long; branches capillary, usually single, but diffusely subdivided to the base and appearing fasciculate, bearing numerous rather long-pedicelled spikelets: spikelets 1.5 mm. long, spherical; first glume one-fourth as long as the second and third; these nearly equal, rather rough and nervose, usually purple, equaling but at maturity open and disclosing the smooth white floret.—Open woods, eastern Texas and eastward to the Atlantic States.

35. **P. microcarpon** Muhl. Culms 4 to 8 dm. high, simple, leafy: leaves divergent, 1 to 2 dm. long, prominently nerved, smooth or minutely scabrid above, sometimes ciliate at the base: panicle 6 to 12 cm. long, oval or oblong; branches capillary, diffusely subdivided to the base, bearing numerous spikelets: spikelets 1.5 mm. long, oval; first glume one-fifth as long as the second and third; these minutely pubescent, equaling the floret.—Low ground, eastern Texas and thoughout the eastern United States.

++ ++ *Spikelets larger, more than 2 mm. long.*

36. **P. commutatum** Schultes. Culms 5 to 10 dm. high, erect or somewhat geniculate, sometimes branching below: leaves 5 to 10 cm. long, divergent, smooth: panicle 6 to 12 cm. long, broadly ovate or oblong, loose; branches spreading, capillary, diffusely subdivided to the base: spikelets slightly more than 2 mm. long, oblong, early deciduous; first glume deltoid, one-third as long as the second and third; these finely pubescent, subacute, equaling or barely exceeding the smooth floret.—Open woods, eastern Texas and eastward.

37. **P. scoparium** Lam. Culms 3 to 6 dm. high, erect or decumbent, rather weak, rough, often pubescent: leaves 5 to 10 cm. long, ciliate on the margins, often pubescent throughout; sheaths papillose pubescent: panicle oblong, open, 4 to 8 cm. long; branches ascending, hispid or pubescent, with few subdivisions: spikelets about 3 mm. long, pubescent or nearly smooth; first glume about one-fourth as long as the second and third; these 7 to 9-nerved, equaling the floret.—Thickets and moist land.

38. **P. latifolium** L. Culms 3 to 6 dm. high, leafy, mostly simple, often pubescent or barbulate at the nodes: leaves about 1 dm. long, 2 to 3 cm. broad, smooth or thinly pubescent, woolly at the throat: panicle 5 to 10 cm. long, broad and open; branches mostly single with few subdivisions: spikelets mostly short-pedicelled, 3 to 4 mm. long, obovate; first glume acute, one-third as long as the second and third; these pubescent, 11-nerved, equaling the smooth subacute floret.—Moist thickets, eastern Texas and eastward.

39. **P. clandestinum** L. Culms 6 to 12 dm. high, rather robust, leafy to the top: leaves 1 to 2 dm. long, smooth except the hispid margins; lower sheaths papillose pubescent: panicle usually included in the upper sheath until after flowering, exserted at maturity, 1 to 1.5 dm. long; branches subverticillate, ascending: spikelets 3 mm. long; first glume ovate, about one-half as long as the second and third; these 9-nerved, slightly pubescent.—Open woods, eastern Texas and northeastward.

+ + *Leaves lanceolate, very slightly or not at all cordate-clasping: panicle 1 to 2 dm. long.*

40. **P. viscidum** Ell. Culms 5 to 10 dm. high, rather stout, leafy to the top, velvety pubescent throughout, except a narrow ring below each node: leaves 1 to 3 dm. long; sheaths and usually the blades velvety: panicle 1 to 2 dm. long; branches ascending or spreading, diffusely subdivided to the base: spikelets 2 mm. long; first glume one-fourth as long as the second and third; these pubescent, 7 to 9-nerved, barely equaling the smooth obtuse floret.—Moist land, eastern Texas and eastward.

41. **P. scabriusculum** Chapm. Culms 8 to 12 dm. high, smooth, usually with short branches at the middle nodes, rigid, leafy: leaves rather thick and firm, smooth, 1.5 to 3 dm. long, slender pointed: panicle broadly oval, 1 to 2 dm. long; branches ascending, diffusely subdivided, bearing numerous spikelets: spikelets 2 mm. long, subacute; first glume less than one-fourth as long as the second and third; these 9-nerved, nearly smooth.—Low land, southern and eastern Texas and eastward to Florida.

* * *Spikelets acute or acuminate.*

\+ *Culms low, less than 1 m. high, except in some forms of No. 46: panicle diffuse.*

++ *Spikelets long (5 mm. long).*

42. **P. capillarioides** Vasey. Perennial: culms 3 to 5 mm. high, tufted, branching below: leaves narrowly lanceolate, 1 to 3 dm. long, pubescent on the sheaths and often on the blades: panicle 1 to 2 dm. long, loose; branches capillary, spreading, 1 dm. long or less, bearing rather short-pedicelled spikelets, clustered at the ends of the branches and divergent subdivisions: spikelets narrowly conical, 4 to 5 mm. long; first glume 5-nerved, equaling the floret and one-third as long as the many-nerved second and third.—Duval County, southern Texas.

++ ++ *Spikelets small (about 2 mm. long).*

== *Spikelets all long-pedicelled and solitary.*

43. **P. capillare** L. (OLD WITCH GRASS.) Annual: culms 3 to 8 dm. high, usually weak and decumbent: sheaths and often the blades villose or hirsute: panicle 1 to 3 dm. long; branches spreading and diffusely subdivided, hispid, bearing scattered long-pedicelled spikelets: spikelets 2 mm. long; the first glume one-third as long as the second and third.—In cultivated land everywhere.

42. **P. autumnale** Bosc. Culms 3 to 5 dm. high, erect or decumbent and branching near the base: leaves 1 dm. long or less, narrowly lanceolate: panicle 1 to 3 dm. long, broad and open, the long capillary branches and divergent branchlets bearing single spikelets at the extremities: spikelets 2 to 3 mm. long, spindle shaped; first glume minute; second and third ciliate near the apex.—Sandy plains throughout Texas. Var. PUBIFLORUM Vasey, of southwest Texas, has the empty glumes densely pubescent all over, and culm and leaves more rigid.

== *Spikelets short-pedicelled, appressed in rather close clusters along the branches.*

45. **P. Hallii** Vasey. Culms tufted, 3 to 5 dm. high, slender, branching near the base: leaves lance-linear, 1 to 1.5 dm. long; sheaths usually papillose: panicle 1.5 to 2 dm. long, open; branches ascending or divergent, bearing few, short-pedicelled spikelets at the ends and on the divergent subdivisions: spikelets 2 to 3 dm. long, spindle-shaped, acute; first glume one-half as long as the spikelet.—Prairies, central Texas and westward to Arizona and Mexico.

46. **P. proliferum** Lam. (SPROUTING CRAB-GRASS.) Culms rather robust, 5 to 10 dm. high: leaves 1 to 4 dm. long, smooth or hispidulous toward the apex: panicle 1 to 3 dm. long, often with small lateral panicles; primary branches spreading, bearing appressed spikelets near the ends and on the subdivisions: spikelets 2 to 3 mm. long, spindle-shaped; first glume one-fourth as long as the spikelet.—Moist soil, central Texas and eastward. Var. GENICULATUM Vasey has coarse and succulent culms 1 to 2 m. high and geniculate, large leaves with inflated often hairy sheaths, and a diffusely spreading panicle 3 to 6 dm. long.—Cultivated.

+ + *Tall grasses, 1 m. high or more: panicle large, of virgate or spreading branches: spikelets large, 3 mm. long or more.*

++ *Spikelets turgid.*

= *Perfect floret nearly equaling the acute empty glumes.*

47. **P. bulbosum** HBK. (BULBOUS PANIC-GRASS.) Culms 1 to 1.5 m. high from a strong bulbiferous rootstock, erect, smooth: leaves narrow, 2 to 4 dm. long: panicle oblong, 2 to 4 dm. long; branches mostly alternate, subdivided to the base, 1 to 2 dm. long: spikelets mostly short-pedicelled on the subdivisions, 3 to 4 mm. long, smooth, oblong or spindle-shaped; first glume one-half as long as the spikelet; both florets often sterile.—Moist land, central Texas and westward to Arizona. Var. MINOR Vasey, of the same region, is smaller throughout except the spikelet.

== *Perfect floret shorter than the acuminate empty glumes.*

48. **P. virgatum** L. (SWITCH-GRASS.) Culms 1 to 1.5 dm. high, erect, simple, from strong, creeping rootstocks: leaves flat, 3 to 6 dm. long, smooth except the hispid margins: panicle 3 to 5 dm. long; branches numerous, alternate or subverticillate, diffusely spreading at maturity, rather rigid, bearing numerous spikelets on the subdivisions: spikelets ovate, acuminate, 4 to 5 mm. long; first glume two-thirds as long as the third; this somewhat exceeded by the second.—Variable, often with small or undeveloped spikelets, sometimes cultivated. Var. ELONGATUM Vasey has a large panicle like the species, but the spikelets empty and narrowly linear.—Texas and eastward.

49. **P. Havardii** Vasey. Culms 1 to 2 m. high, erect, from strong rootstocks: leaves involute, rigid, long-pointed: panicle 3 to 5 dm. long, loose; branches rather rigid, bearing few spikelets on the divergent subdivisions: spikelets 6 mm. long, ovate, acute; first glume one-half as long as the second and third; these equal.—Mountains and rocky ravines, western Texas.

50. **P. miliaceum** L. (MILLET.) Culms 1 to 1.5 m. high, often branching, weak and decumbent, hispid pubescent as are also the sheaths and often the flat blades: panicle 1 to 3 dm. long, rather dense; branches numerous, slightly spreading, much subdivided: spikelets 4 to 5 mm. long, ovate, acuminate; first glume one-half as long as the spikelet; second and third nearly equal, exceeding the shining, subacute floret.—Introduced and cultivated.

++ ++ *Spikelets not turgid.*

51. **P. jumentorum** Pers. (GUINEA GRASS.) Culms in "bunches," robust, 1 to 2 m. high, pubescent at the nodes: leaves 3 to 6 dm. long; sheaths and often the blades thinly pubescent: panicle 3 to 6 dm. long, of numerous, virgate branches: spikelets oblong, subacute, 3 mm. long; first glume one-third as long as the spikelet; perfect floret transversely rugose. (*P. maximum* Jacq.)—Introduced and cultivated near the coast.

52. **P. gymnocarpon** Ell. Culms erect, about 1 m. high: leaves lanceolate, cordate-clasping, smooth throughout: panicle 2 to 4 dm. long, axis and branches angular: spikelets in rather close clusters of 2 to 4, narrowly lanceolate, 4 to 6 mm. long; the three outer glumes awn-pointed, much longer than the floret.—Eastern Texas and eastward in low land, near the coast. An anomalous species, appearing more like *Ichnanthus*.

17. OPLISMENUS Beauv.

Spikelets in small sessile distant one-sided clusters in a simple panicle; the first and second empty glumes and frequently the third awned, the awn of the lower one longest; 2-flowered, the lower flower staminate or neutral.

1. **O. setarius** (Lam.) R. & S. Culms weak, ascending from a decumbent or creeping base, 3 to 6 dm. long: leaves ovate, lanceolate, 3 to 5 cm. long, thin, smooth: panicle racemose, about 1 dm. long: spikelets in clusters of 4 to 10, lanceolate, nearly 3 mm. long; the first and second glumes one-half as long as the spikelet; the third exceeding the perfect floret; the three awns respectively about 6 mm., 2 mm. and 1 mm. long. (*Panicum setarium* Lam.)—Woods and wet land near the coast.

18. SETARIA[1] Beauv. (BRISTLY FOXTAIL.)

Inflorescence a cylindrical spike-like or sometimes interrupted panicle, with several persistent bristles below the articulation of each spikelet: spikelets as in *Panicum;* the first glume small, the second and third alike, the third being the floral glume of a neutral or staminate floret; terminal floret perfect, with hardened glume and palet, usually rugose.

* *Bristles barbed upward.*

\+ *Spikes simple: perfect florets plainly rugose.*

1. **S. glauca** (L.) Beauv. (PIGEON-GRASS. YELLOW FOX-TAIL.) Culms 3 to 6 dm. high: leaves hispid: spike 3 to 8 cm. long; bristles 6 to 12 in a cluster, tawny or rarely purple: spikelets nearly 3 mm. long; perfect floret subacute at each end.—Introduced in cultivated fields. Var. LÆVIGATA (Muhl.) Chapm. has smooth leaves and culm. (*Panicum lævigatum* Muhl.)—Damp soil near the coast.

[1] *Setaria* although a homonym is retained here provisionally, as the combination of this genus with *Chamæraphis* R. Br. does not appear to be satisfactory.

2. **S. imberbis** (Poir.) R. & S. Culms 3 to 6 dm. high: leaves narrow: spike very slender, 3 to 6 cm. long; bristles 4 to 8, less than twice as long as the spikelets: spikelets about 2 mm. long; perfect floret usually purple at the acute apex.—Throughout Texas except on the dry mesas.

+ + *Spikes compound or nearly simple in No. 7.*

+ *Branches short, crowded, densely flowered: perfect floret obscurely rugose or nearly smooth.*

3. **S. viridis** (L.) Beauv. (PIGEON-GRASS. GREEN FOXTAIL.) Culms 3 to 6 dm. high: leaves hispid: panicle 4 to 10 cm. long; bristles 2 to 5, mostly light green: spikelets 2 to 3 mm. long; perfect floret oval or obovate.—Introduced in cultivated land.

4. **S. Italica** (L.) Kth. (ITALIAN MILLET.) Culms 1 to 1.5 m. high: panicle 1 cm. thick or more, 6 to 20 cm. long, sometimes interrupted below, often nodding; bristles 2 to 5 in a cluster, light green or purple: spikelets nearly 3 mm. long; perfect floret obovate, oval or spheroidal.—Introduced from Europe and cultivated in all parts of the United States; often escaped from cultivation.

+ + *Branches more loosely flowered: panicle interrupted: perfect florets rugose.*

5. **S. setosa** (Swartz.) Beauv. Culms about 1 m. high, usually branching: panicle 1.5 to 3 dm. long, very narrowly conical, often nodding; lower branches 2 to 4 cm. long: bristles 1 to 3 in each cluster: spikelets 2 mm. long.—From the Pecos river westward.

6. **S. caudata** (Lam.) R. & S. Culms 6 to 10 dm. high, usually branching, often pubescent at the nodes: leaves narrow: panicle 8 to 12 cm. long nearly cylindrical; lower branches about 1 cm. long: bristles 1 or 2; spikes 2 mm. long, broadly obovate.—Throughout Texas and extending to Florida and Arizona.

7. **S. pauciseta** Vasey. Culms slender, 2 to 4 dm. high: leaves flat, lanceolate: panicle cylindrical, narrow, loosely flowered, 3 to 8cm. long: bristles 1 to 3: spikelets nearly 2 mm. long, oblong, in small clusters, on very short branches. (Perhaps only a variety of *S. caudata.*)—Texas to Arizona.

** *Bristles barbed downward.*

8. **S. verticillata** (L.) Beauv. (BRISTLY FOXTAIL.) Culms weak, 5 to 10 dm. high: panicle nearly cylindrical, dense, compound with short branches: bristles 1 or 2, adhesive: spikelets 2 mm. long; perfect floret finely rugose.—Introduced in cultivated lands.

19. CENCHRUS L. (BUR-GRASS.)

Spikelets as in Panicum, awnless, but inclosed, 1 to 5 together, in a globular bristly or spiny involucre, which becomes coriaceous and forms a deciduous hard and rigid bur; the involucres sessile in a terminal spike: spines minutely barbed backward, causing the burs to stick to anything with which they come in contact.

* *Burs hard and spiny, but with few or no bristles except at the base.*

1. **C. tribuloides** L. (SAND-BUR.) Culms branched, ascending, 2 to 5 dm. high: spike oblong, often interrupted, of 8 to 20 heads, about 5 mm. in diameter, more or less downy: spines spreading, rigid, broad at the base.—Sandy soil, waste land, throughout the United States. A bad weed.

2. **C. echinatus** L. (HEDGE-HOG GRASS). Culms 3 to 6 dm. high, branched, ascending: spike 8 to 20 cm. long, rather closely crowded with 20 to 40 burs 5 to 7 mm. in diameter, downy: spines mostly erect: bristles usually purple, mostly from near the base, erect like the spines.—Waste land.

* * *Burs softer, bristles numerous.*

3. **C. mysuroides** HBK. Culms erect or ascending, 6 to 10 dm. high, often glaucous: leaves convolute toward the points or throughout: spike 1 to 2 dm. long of many closely imbricated oblong heads about 4 mm. long; bristles numerous, erect; no rigid spines.—Sandy land, near the coast.

20. STENOTAPHRUM Trin.

Spikelets 2-flowered, the terminal floret perfect, the lower one staminate or neutral: the first glume short and obtuse, the second coriaceous, slightly exceeding the two nearly equal florets, the glumes of which are coriaceous and the palets membranaceous: spikelets more or less imbedded, 2 to 3 together in the broad or thickened rachis which is sometimes indistinctly articulated near the top.

1. **S. secundum** (Walt.) Kuntze. (ST. AUGUSTINE GRASS.) Culms 2 to 3 dm. high, erect or ascending from creeping stems, compressed, smooth throughout: sheaths compressed; leaves flat or with involute margins, obtuse: spikes 6 to 12 cm. long, lateral and terminal: spikelets about 5 mm. long. (*Ischæinum secundum* Walt. *Stenotaphrum Americanum* Schrank.)—Near the coast. Cultivated in Florida.

21. ZIZANIA L. (WILD RICE.)

Spikelets 1-flowered, monœcious in the same panicle; those on the upper branches pistillate, awned; those on the lower branches staminate, awnless; both kinds caducous, the pistillate ones especially so.—Tall reed-like grasses.

1. **Z. aquatica** L. Culms erect, simple, 1 to 3 m. high: panicle 3 to 6 dm. long, pyramidal; the staminate portion spreading below the erect plume-like pistillate portion: pistillate spikelets 1 to 2 cm. long exclusive of the persistent awn.—Along the edges of streams, or in water 3 to 10 dm. deep.

22. ZIZANIOPSIS Doell & Aschs.

Spikelets 1-flowered, monœcious, the staminate spikelets near the bases and the pistillate spikelets near the extremities of the branches throughout the panicle, caducous.

1. **Z. miliacea** (Michx) Doell & Asch. Culms 1 to 3 m. high, simple: panicle 4 to 8 dm. long; branches all spreading: spikelets 5 to 7 mm. long; pistillate spikelet turgid, short-awned. (*Zizania miliacea* Michx.)—Margins of streams and ponds in shallow water.

23. HOMALOCENCHRUS Mieg. (CUT GRASS.)

Spikelets flat, more or less imbricated, in clusters on short articulate pedicels near the ends of the branches, 1-flowered, perfect but often failing to mature seed: glumes 2, hispid on the margins and nerves (except in No. 4); no palet: leaves roughened with very short stiff hairs often hooked at least on the margins and usually subappressed in opposite directions from the middle. (*Leersia* Swartz.)

* *Spikelets narrowly oblong or lanceolate.*

1. **H. oryzoides** Mieg. (RICE CUT-GRASS.) Culms 6 to 10 dm. high: sheaths hispid; blades rather thick and rough: panicle 2 to 3 dm. long; branches rather weak and

flexuous, subdivided: spikelets 4 to 5 mm. long, one-third as broad; glumes carinate, hispid throughout. (*Leersia oryzoides* Swartz.)—Margins of streams, often in shallow water, Texas to Minnesota and eastward.

2. **H. Virginica** (Willd.) Britton. (VIRGINIA CUT-GRASS.) Culms slender and weak, 4 to 8 dm. high: sheaths nearly smooth; blades thin: panicle 2 to 3 dm. long, open; branches slender, rather rigid, with few, mostly appressed subdivisions: spikelets appressed, 3 to 4 mm. long, nearly one-third as broad; glumes carinate, hispidulous throughout, or nearly smooth. (*Leersia Virginica* Willd.)—Wet land, Texas to Minnesota and eastward.

3. **H. hexandra** (Swartz) Kuntze. Culms rather rigid, often branched below, 5 to 10 dm. high: sheaths hispid; blades rather rigid: panicle narrowly oblong, about 1 dm. long; branches ascending, spikelet-bearing nearly to the base: spikelets 4 to 5 mm. long; glumes smooth, except the hispid margins and keel. (*Leersia hexandra* Swartz.)—Low land, near the coast, eastern Texas to North Carolina.

** *Spikelets orbicular or broadly ovate.*

4. **H. monandra** (Swartz) Kuntze. Culms slender, but rather rigid and wiry, 4 to 8 dm. high: sheaths nearly smooth: panicle open; branches distant, spikelet-bearing near the extremities: spikelets broadly ovate, nearly 2 mm. long, smooth throughout. (*Leersia monandra* Swartz.)—Low grounds, near the Gulf coast.

5. **H. lenticularis** (Michx.) Kuntze. (CATCHFLY GRASS.) Culms rather robust, 5 to 10 dm. high: sheaths hispid; blades 4 to 8 mm. wide: panicle 1 to 2 dm. long; branches somewhat flexuous, subdivided: spikelets 4 to 5 mm. long, hispid on the nerves and margins. (*Leersia lenticularis* Michx.)—Not yet reported from Texas, but it may be expected in the eastern half of the State.

24. **PHALARIS** L. (CANARY GRASS.)

Panicle dense, spike-like, cylindrical, or ovate: spikelets 1-flowered, flattened laterally: glumes 5; the outer empty glumes subequal, carinate, and winged on the keel, exceeding the floret; inner empty glumes usually small and inconspicuous, appressed to the lower margins of the floret; the fifth or floral glume acute, coriaceous, and shining at maturity; palet 1-nerved, coriaceous, but thinner than the glume: grain smooth and shining.

* *Spikelets narrow, acute; inner empty glumes narrow and small, hairy.*

1. **P. angusta** Nees. Culms rather robust, 6 to 12 dm. high: panicle cylindrical, 6 to 12 cm. long, about 1 cm. in diameter: spikelets 3 to 4 mm. long; floret three-fourths as long as the outer glumes.—Texas to California, in low ground.

2. **P. intermedia** Bosc. (SOUTHERN CANARY GRASS.) Culms 5 to 10 dm. high, simple: upper sheaths somewhat inflated: panicle 4 to 10 cm. long, about 1.5 cm. in diameter: spikelets 4 to 6 mm. long; floret little more than half as long; inner empty glumes about one-half as long as the floret.—Low land, Texas to California and Virginia. Cultivated as a winter forage plant. Var. MICROSTACHYS (DC.) Vasey has slender low culms, and small panicle (2 to 4 cm. long).—Florida to California.

** *Spikelets broadly obovate, obtuse or acuminate; inner empty glumes broad and prominent, not hairy.*

3. **P. Canariensis** L. (CANARY GRASS.) Culms 4 to 8 dm. high, sometimes branching: sheaths inflated: panicle ovate or oblong, 2 to 4 cm. long and nearly one-half as thick: spikelets 5 to 7 dm. long; the wings broad and white with a distinct green line at the keel.—Introduced. Cultivated for bird-seed.

25. ANTHOXANTHUM L.

Panicle spikelike: spikelets narrow, long-pointed, 3-flowered, the two lower florets neutral; outer glumes unequal, herbaceous; glumes of neutral florets awned, 2-lobed at the apexes, hairy; floral glume and palet of perfect floret short, membranaceous: stamens 2: stigmas 2, long exserted.

1. **A. odoratum** L. (SWEET VERNAL GRASS.) Culms slender, 3 to 6 dm. high: leaves flat, hairy: panicle 4 to 8 cm. long: spikelets 8 to 10 mm. long, the acute second glume about twice as long as the first; the sterile florets somewhat exceeding the perfect floret.—Introduced from Europe. Very fragrant.

26. ARISTIDA L. (TRIPLE-AWNED GRASS.)

Spikelets 1-flowered, spicate or paniculate, pedicellate: empty glumes persistent, thin or chartaceous, acute or bristle-pointed, generally unequal; floral glume coriaceous or indurate, closely folded about the small thin palet and stamens and the narrowly terete grain, awned: awn trifid except in Nos. 17 and 18, the divisions divergent: culms slender and wiry: leaves narrow, often involute.

§ 1. *Awns deciduous (tardily deciduous), articulated with the glume: spikelets clustered near the ends of the branches.*—ARTHRATHERUM.

1. **A. tuberculosa** Nutt. Culms 3 to 5 dm. high, branched: panicle rigid, somewhat spreading, 1 to 2 dm. long; branches mostly in twos, unequal, 6 cm. long, or less: spikelets about 2 mm. long; empty glumes nearly equal, bristle pointed; floral glume, including the slender hairy stipe, about 1 cm. long: common stock of the awn twisted, 8 to 10 mm. long; branches nearly equal, 3 to 4 cm. long, often reflexed.—Prairies, northern Texas and northward.

2. **A. desmantha** Trin. & Rupt. Culms 4 to 8 dm. high, much branched: panicle 1 to 2 dm. long, slightly nodding; branches mostly in twos, unequal, 1 dm. long, or less: spikelets about 1.5 cm. long; empty glumes bristle-pointed; floral glume about 1 cm. long, including the stipe: awns divided nearly or quite to the base; the branches curved and reflexed, 2 to 3 cm. long, equal.—Sandy plains, Texas and Indian Territory.

§ 2. *Awns persistent, not articulated with the glume.*—CHÆTARIA.

* *Panicle narrow and spikelike.*

– *Spikelets less than 1 cm. long: awns but little longer.*

†† *Awns unequal, the lateral ones very short, erect, the middle one horizontal or turned back, divided to the base.*

3. **A. dichotoma** Michx. (POVERTY GRASS.) Culms slender, branched, 3 to 5 dm. high: panicle 5 to 15 cm. long, thin and slender: spikelets about 6 mm. long; empty glumes nearly equal; middle awn about 1 cm. long; lateral ones 1 to 2 mm. long.—Light sandy land, northern Texas and eastward.

4. **A. simplicifolia** Chapm., var. TEXANA Vasey. Differs from the preceding in the smaller spikelet, about 4 mm. long and the longer lateral awns 2 to 3 mm. long.—Low, sandy land, eastern Texas.

†† †† *Awns nearly equal.*

= *Panicle thin and slender: spikelets 2 to 4 on the short appressed branches.*

5. **A. gracilis** Ell. Culms branched near the base, 3 to 5 dm. high: panicles 1 to 2 dm. long: spikelets 5 to 6 mm. long; empty glumes nearly equal, equaling or slightly shorter than the floret; middle awn about 1 cm. long; lateral awns usually shorter.—Light soil, eastern Texas and eastward.

6. **A. Nealleyi** Vasey. Culms slender, mostly simple, 4 to 6 dm. high: panicle 1 to 1.5 dm. long: spikelets about 8 mm. long; the floret nearly equalled by the second empty glume; the first one-half to three fourths as long; lateral branches slightly shorter, united in the tapering apex of the floral glume and twisted.—Among rocks, southwestern Texas.

= = *Panicle rather dense, spikelets 4 or more on each branch.*

7. **A. bromoides** HBK. Culms in small tufts, branching below, 1 to 3 dm. high: leaves few and short: panicle 6 to 12 cm. long: spikelets 7 to 9 mm. long; floral glume spotted, slightly exceeding the second empty glume, nearly twice as long as the first; awns nearly equal, about 1 cm. long, divided to the base.—High plains, western Texas and westward to California.

8. **A. dispersa** Trin. & Rupt. Culms branching, 3 to 6 dm. high: leaves flat or involute, 1 to 3 dm. long: panicle somewhat loose or interrupted, 1 to 2 dm. long: spikelets 7 to 9 mm. long; first empty glume two-thirds as long as the floret; second empty glume about equaling the floret; awns 9 to 15 mm. long.—Mountains, western Texas and westward.

+ + *Spikelets larger, 1 to 2 cm. long; awns 2 to 3 cm. long.*

++ *Branches erect, making the spikelike panicle nearly continuous.*

9. **A. Reverchoni** Vasey. Culms 3 to 4 dm. high, simple: radical leaves numerous, 1 to 2 dm. long, setaceously pointed, curved: panicle 1 to 2 dm. long, slender and strict but closely flowered: spikelets 11 to 14 mm. long; floral glume narrow and slightly twisted above, slightly exceeding the unequal, mucronate or toothed, empty glumes; awns 2 to 3 cm. long.—Rocky ravines and hills, western Texas.

10. **A. Arizonica** Vasey. Culms rigid, 4 to 7 dm. high: leaves flat or involute, nearly straight: panicle strict, 2 to 3 dm. long: spikelets about 11 mm. long; first empty glume 3-nerved; second empty glume 1-nerved, longer, about equaling the floret; floral glume narrow and twisted above; awns 2 to 3 cm. long.—Sandy plains, Texas to Arizona.

++ ++ *Branches often slightly spreading: panicle somewhat interrupted.*

11. **A. purpurascens** Poir. Culms 4 to 6 dm. high, rarely branching: radical leaves mostly flat, 2 to 3 dm. long: panicle slender, usually somewhat interrupted, 1 to 1.5 dm. long: spikelets 8 to 10 mm. long; empty glumes 1-nerved; the first longer than the second, both exceeding the spotted floret; awns 2 to 3 cm. long, divided to the base.—Sandy land, Texas and eastward. Var. MINOR Vasey has more branched culms, and shorter spikelets and awns.—Low sandy land.

12. **A. lanata** Poir. Culms rather stout, simple, 5 to 10 dm. high: leaves mostly flat, 3 to 6 dm. long; sheaths lanate: panicle rather loose, erect or nodding and secund; branches mostly in twos, one long and naked below, the other short: spikelets about 12 mm. long; first empty glume exceeding the floret; second empty glume about equaling the floret; middle awn curved backwards, 2 cm. long; lateral awns usually one-third shorter.—Central Texas to Florida and along the coast region to New Jersey.

++ ++ ++ *Panicle loose and interrupted: awns 3 to 8 cm. long.*

13. **A. fasciculata** Torr. Culms 2 to 5 dm. high, rarely branched: leaves short, involute, scabrid: panicle 1 to 2 dm. long, slender and flexuous; branches erect or slightly spreading, 1 to 3 cm. long: spikelets 12 to 15 mm. long; empty glumes 1-nerved, somewhat bifid and mucronate or irregularly toothed at the apex; the first

one-half to two-thirds as long as the second; the second nearly equaling or often slightly exceeding the attenuate floret; awns equal, capillary, 3 to 4 cm. long (*A. purpurea* Nutt.)—Dry land, throughout Texas and westward. Var. FENDLERIANA (Steud.) Vasey has culms tufted and mostly simple (2 to 4 dm. high), numerous involute-filiform radical leaves, and erect panicle about 1 dm. long.—High plains, Texas and westward. Var. MICRANTHA Vasey has tufted branching very slender culms 3 to 5 dm. high, involute curved leaves, a loose flexuous panicle, short capillary branches bearing few spikelets on curved capillary pedicels, and spikelets 10 to 12 mm. long.—Western Texas. Var. CALIFORNICA Vasey is like the preceding, but larger, with the flat or involute leaves usually straight, panicle 1 to 2 dm. long, branches fasciculate (the longer 3 to 5 cm. long) and naked below, and spikelets and awns generally longer than in the species.—Texas to California. Var. HOOKERI Trin. has mostly simple culms, with involute leaves, loose panicle, spikelets nearly 2 cm. long, and awns 3 to 8 cm. long.—Western Texas and northward.

14. **A. oligantha** Michx. Culms much branched throughout, 3 to 5 dm. high: panicles lateral and terminal, 1 to 1.5 dm. long, nearly simple, loose; the few short branches or single spikelets rather divergent: spikelets nearly 2 cm. long; first empty glume 5-nerved; both awn pointed, nearly equal, about as long as the attenuate floret; awns capillary, 3 to 5 cm. long.—Texas and eastward.

* * *Panicle broad and spreading, with divergent branches, naked below.*

\+ *Awns nearly equal, 1 to 2 cm. long.*

15. **A. Havardii** Vasey. Culms 1.5 to 3 dm. high, slender, simple, tufted: leaves involute: panicle loose, flexuous, 1 to 1.5 dm. long: spikelets about 1 cm. long, on slender capillary pedicels; empty glumes 1-nerved, awn-pointed, equaling or slightly exceeding the floret; floral glume slender and twisted above; awns 1.5 to 2 cm. long.—Western Texas and New Mexico.

16. **A. Humboldtiana** Trin. & Rupt. Culms rigid, simple, 3 to 6 dm. long: leaves narrow, flat or convolute, straight and rigid: panicle open, erect, 2 to 4 dm. long; branches alternate or in twos, divergent or horizontal, straight and rigid, 5 to 10 cm. long: spikelets about 1 cm. long; empty glumes usually nearly equal and about equaling the hispid floret; awns nearly 2 cm. long, lateral ones slightly shorter.—Western Texas to California. Var. MINOR Vasey, of the same range, is smaller, with leaves nearly equaling the culm, and smaller spikelets with shorter nearly equal glumes.

\+ \+ *Lateral awns minute or wanting.*

17. **A. Scheidiana** Trin. & Rupt. Culms erect, 4 to 6 dm. high, mostly simple: leaves convolute-filiform: panicle 2 to 4 dm. long, open, pyramidal; branches rigid, spreading or horizontal, naked below the outer third: spikelets 10 to 15 mm. long; empty glumes nearly equal, bristle-pointed, shorter than the attenuate twisted floral glume; lateral awns 2 mm. long or less; middle awn about 1 cm. long, turned backward.—Texas to Arizona.

18. **A. divergens** Vasey. Culms slender, simple, about 3 dm. high: panicle 1 to 2 dm. long, pyramidal, usually included below in the upper sheath; branches single or in twos, often divided nearly to the base and appearing verticillate, again subdivided and spikelet-bearing beyond the middle: spikelets 10 to 12 mm. long; empty glumes subequal, the lower one usually slightly longer, equaling the attenuate twisted floret; lateral awns minute or wanting; middle awn about 1 cm. long, nearly straight.—Texas to Arizona.

27. STIPA L. (FEATHER-GRASS.)

Spikelets 1-flowered, paniculate or subspicate, pedicellate: empty glumes persistent, thin or chartaceous, acute or bristle-pointed, nearly

equal, exceeding the floret; floral glume coriaceous or indurate, closely folded about the smaller palet and terete or fusiform grain, with a simple twisted and bent awn articulated with its apex; hairy stipe sharp and prominent: Perennials, growing in bunches: leaves narrow, usually involute or convolute.

* *Awns 6 to 20 times as long as the florets.*

\+ *Awns plumose.*

1. **S. pennata** L., var. NEO-MEXICANA Thurb. Culms 4 to 8 dm. high, simple: radical leaves almost equaling the culm, convolute, rather rigid: panicle somewhat secund, narrow, 1 to 2 dm. long: spikelets erect; empty glumes 3 to 4 cm. long, nervose below, with long attenuate points, twice as long as the brown hairy stipe and shining floret; awn 1 to 2 dm. long.—Mountains, western Texas to Arizona.

\+ \+ *Awns naked.*

++ *Florets small, 7 mm. long or less.*

2. **S. tennuissima** Trin. Culms very slender, 4 to 6 dm. high: leaves convolute-filiform, nearly equaling the culm: panicle 2 to 4 dm. long, usually included below: empty glumes about 7 mm. long, with long attenuate membranaceous points 3 to 5 times as long as the oblong floret; awn capillary, 6 to 10 cm. long.—Mountains, western Texas.

3. **S. flexuosa** Vasey. Culms 6 to 10 dm. high: leaves flat or involute: panicle rather flexuous and somewhat spreading, 2 to 3 dm. long: empty glumes 6 to 10 mm. long, acute or acuminate, with membranaceous margins, about one-third longer than the terete floret; awn slender, 6 to 8 cm. long.—Mountains and high plains, central Texas to Arizona and Mexico.

++ ++ *Florets larger, 10 mm. long or more.*

4. **S. leucotricha** Trin. Culms 3 to 6 dm. high: leaves flat or involute; sheaths somewhat inflated: panicle erect, or secund and slightly nodding: spikelets about 15 mm. long; empty glumes membranaceous-margined; floret 1 cm. long, white silky, or glabrate and brown at maturity, with a pit in the constricted neck below the apex; awn pubescent below, 6 to 8 cm. long.—Central Texas and westward to Arizona.

5. **S. avenacea** L. (BLACK OAT-GRASS.) Culms 6 to 10 dm. high: leaves flat or involute; upper one with a long inflated sheath and short blade: panicle rather loose, 1 to 2 dm. long, included below: spikelets about 15 mm. long; empty glumes green with membranaceous margins; floret 10 to 12 mm. long, brown or nearly black, with a prominent brown hairy stipe, hispidulous above, constricted to a very short neck; awn nearly smooth, 6 to 9 cm. long.—Dry land, Texas and eastward.

* * *Awns 2 to 4 times as long as the florets.*

6. **S. viridula** Trin., var. ROBUSTA Vasey. (SLEEPY GRASS.) Culms rather robust, 1 to 2 m. high: leaves involute, 3 to 6 dm. long: panicle erect, dense, 3 to 5 dm. long: spikelets about 1 cm. long; empty glumes acute, one-fourth longer than the floret; floral glume hairy with a short stipe and a thin tuft of white hairs at the apex; awn 2 cm. long.—Mountain valleys, western Texas and northward to Colorado. This grass is said to have a narcotic effect on horses and cattle.

7. **S. Pringlei** Scribn. Culms 6 to 10 dm. high: leaves mostly flat, rather rigid: panicle loose or contracted, 1 to 2 dm. long; branches few-flowered, usually naked below: spikelets about 1 cm. long, rather thick for the genus; empty glumes but little longer than the brown pubescent floret; awn hispidulous, 2 to 3 cm. long.—Mountains, western Texas to southern California.

28. ORYZOPSIS Michx.

Spikelets 1-flowered, rather short oblong: empty glumes persistent, membranaceous, acuminate, slightly longer than the floret; floral glume pubescent, broad, indurate at maturity; awn somewhat excentric, 2 cm. long or less: perennials, growing in small tufts, with numerous involute radical leaves.

** Empty glumes pubescent.*

1. O. membranacea (Pursh) Vasey. (MOUNTAIN RICE.) Culms erect, 3 to 5 dm. high: lower leaves nearly reaching the panicle; upper leaf with a broad inflated sheath and narrow blade usually overtopping the panicle: panicle open and diffusely spreading at maturity; branches dichotomously subdivided, bearing solitary spikelets on long pedicels: empty glumes ventricose below, attenuate above; floret prominently white-bearded, becoming glabrate, dark and shining at maturity. (*Stipa membranacea* Pursh.)—Mountain regions of western Texas and northward.

** * Empty glumes smooth.*

2. O. fimbriata (HBK.) Hemsl. Culms slender, 3 to 5 dm. high: radical leaves involute-filiform, one-half as long as the culm or more; culm leaves shorter: panicle usually exserted, 1 to 2 dm. long, with few spreading branches, bearing few scattered spikelets near the extremities: spikelets about 5 mm. long, obovate; empty glumes slightly exceeding the pubescent floret. (*Stipa fimbriata* HBK.)—Mountains, western Texas and westward to California.

3. **O. micrantha** (Trin. & Rupt.) Thurb. Culms slender, 5 to 8 dm. high: leaves narrow, flat or involute: panicle 1 to 2 dm. long; branches spreading, with short appressed subdivisions bearing the spikelets somewhat clustered near the extremities: spikelets about 4 mm. long; empty glumes thin, nearly twice as long as the brown finely pubescent floret; awn 5 to 10 mm. long, tardily deciduous. (*Urachne micrantha* Trin. & Rupt.)—Mountains and high plains, western Texas to Colorado.

29. CINNA L.

Spikelets 1-flowered, rarely with a rudiment of a second, narrow, flattened laterally, pedicellate in rather close or spreading panicles: empty glumes acute, carinate, hispid on the keel, the second longer, about equaling the floret; floret raised on a distinct stipe; floral glume 3-nerved, herbaceous, emarginate with a short awn in the sinus; palet nearly as long as the floral glume, 1-nerved.

1. **C. arundinacea** L. (SWEET REED-GRASS.) Culms 1 to 2 m. high, rather robust, leafy to the top: panicle 2 to 3 dm. long, rather dense: spikelets 4 to 6 mm. long; empty glumes scabrous throughout; floret about equaling the second glume; awn seldom exceeding the lobes of the emarginate floral glume.—Northern Texas to Maine and Minnesota.

2. **C. latifolia** (Trev.) Griseb. (SLENDER REED GRASS.) Culms slender, about 1 m. high, leafy throughout: panicle usually flexuous, loose and spreading: spikelets 3 to 4 mm. long; empty glumes smooth except the hispid keel; awn of the floral glume often 1 to 2 mm. long. (*Agrostis latifolia* Trev. *C. pendula* Trin.)—Cold bogs, northern Texas and northward.

30. POLYPOGON Desf.

Spiklets 1-flowered, compressed laterally, nearly sessile on the short branches of a dense oblong spikelike panicle: empty glumes equal,

longer than the floret, hispid, long awned; floral glume sessile, smooth at the base, toothed and bearing a short deciduous awn; palet wanting; lodicules two, nearly as long as the floral glume.

1. **P. paniceum** (L.) Lag. (ANNUAL BEARD-GRASS.) Culms 2 to 4 dm. high, decumbent and geniculate below: panicle 3 to 10 cm. long, sometimes interrupted below, soft and yellow: spikelets about 2 mm. long; awns of empty glumes 3 to 4 times as long. (*Cynosurus paniceus* L. *Polypogon monspeliensis* Desf.)—Edges of ponds and streams, Texas to California.

31. LIMNODEA nom. nov.

Spikelets 1-flowered with a very small awn-like pedicel or rudiment of a second, terete, short-pedicelled, in a loose narrow panicle: empty glumes equal, coriaceous, subinvolute; floral glume nearly as long as the empty glumes, chartaceous, oblique at the 2-toothed apex, awned from the sinus; palet shorter than the glume, membranaceous. (*Thurberia* Benth. Jour. Linn. Soc. xix 58, 1882, non Gray 1854.)

1. **L. Arkansana** (Nutt.) Culms slender, 3 to 6 dm. high: leaves flat, lance-linear: panicle somewhat flexuous, 1 to 2 dm. long: spikelets nearly 4 mm. long; empty glumes finely pubescent; awn twisted, about 1 cm. long. (*Greenia Arkansana* Nutt. *Thurberia Arkansana* Benth.)—Dry land throughout Texas.

32. SPOROBOLUS R. Br. (DROPSEED GRASS.)

Spikelets 1 (rarely 2)-flowered, in a narrow subspicate or open spreading panicle, awnless: empty glumes usually persistent, shorter than the floret, more or less unequal, 1 to 3-nerved, thin, herbaceous or membranaceous; floral glume of the same texture, 1 (or obscurely 3)-nerved; palet similar in texture or thinner, 2-nerved: seed often in a loose hyaline pericarp: mostly perennials with wiry or reed-like stems and more or less involute leaves.

**Panicle contracted, narrow and spikelike.*

+ Culms erect or ascending.

++ Panicle single and terminal, exserted.

1. **S. Indicus** (L.) R. Br. (SMUT-GRASS.) Culms 4 to 8 dm. high simple: leaves narrow, involute, nearly smooth, 3 to 6 dm. long: panicle very narrow, dense or somewhat interrupted below, 2 to 3 dm. long; branches erect, densely flowered to the base, 3 cm. long or less: spikelets about 1.5 mm. long; empty glumes obtuse; the second nearly twice as long as the first and two-thirds as long as the floret; floral glume acute, 1-nerved: grain readily separating from its loose coat, 1 mm. long, nearly equaling the spreading glume and palet. (*Agrostis Indica* L.)—Introduced in rather moist land throughout the southern United States. Often attacked by a fungus, hence the common name.

2. **S. Virginicus** (L.) Kth. Culms 3 to 6 dm. high, ascending or decumbent and much branched below, from a running rootstock: leaves distichous, short, convolute: panicle 3 to 6 cm. long, dense: spikelets 2 to 3 mm. long; empty glumes acute, 1-nerved, subequal and nearly as long as the floret; floral glume acute, 1-nerved: grain 1 mm. long, shorter than the floret. (*Agostis Virginica* L.)—Salt marshes, Texas and eastward.

3. **S. ligulatus** Vasey & Dewey. Culms 3 to 5 dm. high, slender, simple, from knotted rootstocks: leaves narrow, flat or convolute, 1 to 3 dm. long; ligule 4 to 6 dm.

long, lacerate: panicle loosely subspicate or interrupted, 1 to 1.5 dm. long: spikelets 3 to 3.5 mm. long; empty glumes obtuse, nerveless, subequal, one-half as long as the floret; floral glume obscurely 3 to 5-nerved, subobtuse.—Limpia cañon, Presidio County, Texas.

++ ++ *Panicles terminal and lateral, mostly inclosed in the sheaths.*

= *Culms rather robust: panicles 1 dm. long or more.*

4. **S. asper** (Michx.) Kth. (PRAIRIE GRASS.) Culms erect, mostly simple, 5 to 10 dm. high: lower leaves 2 to 4 dm. long, tapering to an involute point; culm leaves shorter, the upper ones with a broadly inflated sheath partly or wholly inclosing the panicle: terminal panicle 1 to 2 dm. long, slender: spikelets 4 to 6 mm. long; empty glumes acute, unequal, one-half to three-fourths as long as the one-nerved acute floral glume and broad palet: grain nearly 2 mm. long. (*Agrostis asper* Michx.)—Dry land, Texas, and northward. Var. DRUMMONDII Vasey has the terminal panicle usually exserted, empty glumes nearly equal and little more than one-half as long as the floret, and palet nearly one-fourth shorter than the glume.—Rich low land, Texas, and northward.

NOTE.—Two varieties of *S. cryptandrus* may be looked for here.

= = *Culms slender: panicles 5 cm. long or less.*

5. **S. vaginæflorus** (Torr.) Vasey. (SOUTHERN POVERTY GRASS.) Culms tufted, usually geniculate, 2 to 5 dm. high: leaves closely involute, mostly less than 1 dm. long: panicles 2 to 4 cm. long, usually one for each internode, inclosed in the inflated sheaths: spikelets 2 to 3 mm. long; empty glumes acute, subequal, nearly as long as the floret: grain more than one half as long as the equal glume and palet. (*Vilfa vaginæflorus* Torr.)—Dry sterile soil, northern Texas and eastward.

6. **S. filiculmis** nom. nov. Culms 3 to 6 dm. high, very slender, weak, tufted, usually geniculate, branching: leaves short, closely involute: panicles mostly terminal, and at length exserted, 2 to 4 cm. long, slender: spikelets about 4 mm. long; empty glumes, floral glume and palet all nearly equal, narrow and acute. (*Sporobolus minor* Vasey in Gray Man. 646, 1891, non Kunth 1833.)—Dry, sterile soil, northern Texas and eastward.

+ + *Culms low and decumbent, from creeping rootstocks.*

7. **S. depauperatus** (Torr.) Vasey. (APAREJOS GRASS.) Culms decumbent and much branched in a tangled prostrate mat, with ascending branches 1 to 3 dm. high: leaves 1 to 3 dm. long, mostly involute and curved; sheaths exceeding the internodes: panicle 2 to 5 cm. long, somewhat interrupted: spikelets about 2.5 mm. long; empty glumes broad, abruptly acute, about one-half as long as the 3-nerved acute or submucronate floral glume; palet nearly as long as the glume. (*Vilfa depauperata* Torr.)—Dry gravelly soil, western Texas to California.

8. **S. Sacatilla** Griseb. (SACATILLA.) Culms much branched, 1 to 2 dm. high, very slender, ascending from a strong rootstock: leaves numerous, almost filiform-involute, divergent or recurved; sheaths exceeding the short internodes: terminal panicles about 2 cm. long, lateral ones shorter, interrupted: spikelets 2 to 3 mm. long; empty glumes obtuse, one-half as long as the equal acute floral glume and palet.—Dry mountain sides, western Texas.

* * *Panicle spreading except in two varieties of No. 13.*

\- *Spikelets somewhat crowded, short pedicelled and loosely appressed along the branches or short subdivisions except in S. cryptandrus var. flexuosus; first empty glume not more than one-half as long as the second.*

+ + *Culms short: panicle less than 5 cm. long.*

9. **S. Nealleyi** Vasey. Culms 1 to 2 dm. high, from strong perennial rootstocks, slender, simple, rigid below: leaves rigid, involute, divaricate, 1 to 3 cm. long, pilose at the throat: panicle 2 to 4 cm. long; branches few, ascending, about 1 cm. long, capillary like the main axis: spikelets about 1.5 mm. long, purple; first empty glume very narrow, small; second empty glume about equaling the floral glume and palet.—Rare, Brazos Santiago, southern Texas.

++ ++ *Culms 2 to 8 dm. high: panicle narrowly pyramidal; branches verticillate, 5 cm. long or less.*

10. **S. argutus** (Nees.) Kth. Culms tufted, 2 to 5 dm. high: leaves numerous near the base, mostly flat, 3 to 6 cm. long; the upper one with long sheath and short blade, ciliate at the throat: panicle about 1 dm. long; branches spreading, the lower ones 4 cm. long or less, naked near the base: spikelets about 1.5 mm. long; first empty glume one-third as long; second empty glume equaling the floral glume and slightly exceeding the palet. (*Vilfa arguta* Nees.)—Dry sandy soil, central Texas to Arkansas and Colorado.

11. **S. junceus** (Michx.) Kth. Culms slender, 5 to 8 dm. high, simple: leaves mostly from the base, involute, 1 to 3 dm. long: panicle 1 to 2 dm. long; branches 3 cm. long or less, spreading or horizontal: spikelets nearly sessile, 3 mm. long, purple or brown; second empty glume twice as long as the first and about equaling the smooth floral glume and palet: grain oblong, in a thin pericarp, 2 mm. long. (*Agrostis juncea* Michx.)—Low sandy land, Texas to Florida.

++ ++ ++ *Panicle generally large; branches alternate, often 1 dm. long: tall coarse grasses.*

= *Branches closely flowered nearly to the base, except in S. cryptandrus var. flexuosus.*

12. **S. Wrightii** Munro. (BUNCH GRASS. ZACATON.) Culms stout, 1 to 3 m. high, in large bunches with numerous coarse roots: leaves involute, long pointed, 3 to 6 dm. long, ciliate at the throat; panicle 3 to 6 dm. long erect; branches spreading, 1 to 2 dm. long: spikelets 2 to 2.5 mm. long; first empty glume about one-half as long as the second and nearly equaling the floret; palet nearly as long as the floral glume; empty glumes usually deciduous.—In adobe soil, along streams, western Texas to southern California.

13. **S. cryptandrus** (Torr.) Gray. Culms tufted or in bunches, 5 to 10 dm. high: leaves 1 to 3 dm. long, mostly flat; sheaths usually longer than the internodes, very pilose at the throat: panicle oblong or pyramidal, 1 to 3 dm. long, bursting from the upper sheath or often vaginate until maturity; branches 8 cm. long or less: spikelets 1.5 to 2 mm. long; second empty glume twice as long as the first and about as long as the nearly equal floral glume and palet: grain about 1 mm. long. (*Agrostis cryptandra* Torr.)—Low sandy land, central Texas and northward. Var. STRICTUS Scribn. has narrow dense and spike-like panicles, the branches remaining strict.—River valleys, western Texas to Colorado and Utah. Var. ROBUSTUS Vasey has robust often branching culms, numerous flat leaves (5 to 8 mm. wide, 3 to 6 dm. long), narrow panicle (3 to 6 dm. long), densely flowered slightly spreading branches, and somewhat scabrous spikelets.—Western Texas. Var. FLEXUOSUS Thurb. has rather slender culms, leaves about 1 dm. long, very loose and open panicle mostly exserted (3 to 5 dm. long), and branches spreading, subdivided, bearing pedicellate scattered spikelets. (Apparently distinct enough to be a good species).—Sand hills, western Texas to New Mexico.

= = *Panicle more open; branches naked below.*

14. **S. airoides** Torr. (BUNCH GRASS.) Culms 1 to 2 m. high, in dense "bunches," stout and erect, from strong rootstocks: leaves involute, slender, pointed, ciliate at the throat: panicle 2 to 4 dm. long, pyramidal; branches 1 dm. long or less, spreading, with divergent subdivisions: spikelets about 2 mm. long; empty glumes thin,

deciduous; the second about equaling the glume and palet.—Low land near water, western Texas to California and Idaho.

15. **S. Buckleyi** Vasey. Culms 6 to 10 dm. high: leaves flat, attenuate pointed: panicle one-third as long as the culm, loose; branches alternate or subverticillate, bearing numerous short-pedicelled spikelets on the short curved subdivisions: spikelets about 1.5 mm. long; second glume slightly shorter than the floral glume: grain nearly as long as the palet.—Southwestern Texas to Mexico.

16. **S. heterolepis** Gray. Culms slender, 3 to 5 dm. high: leaves mostly from the base, involute-filiform, nearly equaling the culm: panicle 1 to 3 dm. long, narrowly pyramidal; branches spreading, bearing the large dark-colored spikelets more or less crowded near the extremities: spikelets 3 to 4 mm. long; second empty glume acuminate, at least twice as long as the narrow first glume, and slightly exceeding the subequal floral glume and palet: utricle subglobose, coriaceous, 2 mm. in diameter.—Rare in central and northern Texas, more common northward.

+ + Pedicels longer than the scattered spikelets: empty glumes subequal, except in S. Texana.

++ Empty glumes broad, thin, dark-colored, nearly equaling the floret: panicle rather close.

17. **S. tricholepis** Torr. Culms 3 to 6 dm. high, simple: leaves mostly radical, involute, 1 to 2 dm. long: panicle oblong, 1 to 2 dm. long; branches subverticillate, spreading: spikelets 3 mm. long; empty glumes subequal, nearly as long as the equal pubescent floral glume and palet.—Mountain valleys, western Texas to Colorado and Utah.

++ ++ Empty glumes membranaceous, much shorter than the floret: panicle diffuse with long capillary branches and long pedicels.

18. **S. auriculatus** Vasey. Culms 2 to 3 dm. high, branching below, from perennial, running rootstocks: leaves crowded, narrow, 2 to 4 cm. long; ligule somewhat lacerate with two prominent acute lateral lobes: panicle about 1 dm. long, broadly spreading, open: spikelets 2 mm. long; empty glumes obtuse, about one-half as long as the truncate toothed floral glume and palet.—Sandy plains, western Texas.

19. **S. asperifolius** (Nees. et Mey.) Thurb. Culms ascending from a decumbent branching base, 1 to 3 dm. high, leafy to the panicle: leaves mostly flat, not rigid: panicle 1 to 2 dm. long, inclosed below in the upper sheath; branches spreading: spikelets 1 mm. long; empty glumes two-thirds as long as the obtuse mucronate floral glume. (*Vilfa asperifolia* Nees. et Mey.)—Banks of streams, western Texas to California and northward to Montana. Spikelets attacked by a fungus (*Ustilago*) are 2 to 3-flowered. Var. MAJOR Vasey is larger than the species, with long running rootstocks, spikelets nearly 2 mm. long, and empty glumes little more than one-half as long as the floret.—Western Texas.

20. **S. confusus** Vasey. Culms 1 to 4 dm. high: leaves few and short: panicle oblong, more than one-half as long as the culm, diffusely spreading; branches spreading, 2 to 5 cm. long: spikelets 1 mm. long; empty glumes usually minutely ciliate fringed.—Western Texas to southern California and north to Colorado.

21. **S. Texanus** Vasey. Culms 3 to 5 dm. high, branching, leafy: leaves mostly flat; sheaths thinly pubescent: panicle one-half as long as the culm, inclosed at base in the upper sheath, open, diffusely spreading: spikelets 2.5 mm. long; second empty glume acute, more than twice as long as the first, and slightly exceeding the floret.—Western Texas to Oklahoma.

33. MUHLENBERGIA Schreb. (DROP-SEED GRASS.)

Spikelets 1-flowered in an open spreading or narrow contracted panicle: empty glumes usually persistent, shorter than the narrowly

conical floret, nearly equal, 1-nerved, membranaceous, often purple, acute, bristle-pointed or obtuse and denticulate; floral glume slightly thicker, rolled about the palet and grain, 3-nerved, lateral nerves often obscure, more or less pubescent near the base, mucronate or awned from between the two inconspicuous teeth at the apex; palet thin, equaling the glume, pubescent on the two nerves near the base: callus at the base of the floret inconspicuous, shortly pubescent or obsolete: grain terete or oblong, transluscent, amber-colored.—Mostly perennial, various in habit.

§ 1. *Panicle very open, diffusely spreading; branches and pedicels capillary.*—TRICHOCHLOA.

* *Culms erect, simple above the strongly rooted base, or branching matted rootstocks.*

+ *Culms 5 to 10 dm. high: leaves 1 to 3 dm. long; ligules prominent, nearly 1 cm. long.*

1. **M. capillaris** (Lam.) Trin. (MUHLENBERG'S HAIR-GRASS.) Culms 6 to 10 dm. high, smooth: leaves 2 to 4 dm. long, narrow becoming involute, scabrous or nearly smooth: panicle 2 to 5 dm. long: spikelets 4 to 5 mm. long, minutely scabrous; empty glumes subequal, bristle-pointed, one half as long as the floret; callus small, with short hairs; awn about 1 cm. long (*Stipa capillaris* Lam.)—Dry sandy land, central Texas to Florida and Virginia. Var. TRICHOPODES (Ell.) Vasey, of the same range, has empty glumes generally smaller and not awn-pointed, and awn of floral glume about as long as the floret. (*Agrostis trichopodes* Ell.)

2. **M. affinis** Trin. Culms 4 to 8 dm. high, smooth: leaves mostly involute, 2 to 4 dm. long; sheaths retrorsely roughened, exceeding the internodes: panicle 1 to 3 dm. long, purple; branches and long pedicels finely capillary, erect spreading: spikelets 4 mm. long, minutely scabrous; empty glumes obtuse, erose or denticulate, subequal, one-fourth as long as the floret; awn nearly 2 cm. long; hairy callus small.—Low land, western Texas to Arizona.

3. **M. Reverchoni** Vasey. Culms 3 to 6 dm. high, slender, smooth: leaves mostly flat except the involute points, smooth except the slightly hispid upper surface, 8 to 12 cm. long: panicle pyramidal, 1 to 2 dm. long: spikelets 4 to 5 mm. long; empty glumes nearly equal, acute or the second acuminate and bristle-pointed, about one-third as long as the floret; awn slightly shorter than the floret.—Hillsides, western Texas.

+ + *Culms 3 to 5 dm. high: leaves 1 dm. long or less.*

++ *Ligule fimbriate, less than 1 mm. long.*

4. **M. pungens** Thurb. Culms 3 to 5 dm. high, hoary or puberulent: leaves rigidly divergent, involute, pungently pointed, 5 cm. long: panicle 1 to 2 dm. long, pyramidal: branches 4 to 6, single, bearing long branching subdivisions from near the base: spikelets 3 to 4 mm. long; empty glumes subequal, acute, usually with two lateral teeth, one-half as long as the floret; floral glume acute or merely bristle-pointed; palet with two bristle points; the small callus almost glabrous.—Sand hills, western Texas to Nebraska and Arizona.

++ ++ *Ligule 3 to 5 mm. long.*

5. **M. arenicola** Buckl. Culms 3 to 6 dm. high, slender, inclosed to the panicle in the long sheaths: leaves erect, narrow, mostly involute: panicle one-half as long as the culm, pyramidal; branches alternate or subverticillate, naked near the base: spikelets 3 mm. long, somewhat appressed on rather short pedicels; empty glumes acute, one-half to two-thirds as long as the short-awned floret; floral glume minutely pubescent near the base.—Mesas and foothills, western Texas to Arizona.

6. **M. gracillima** Torr. Culms 1 to 3 dm. high, slender, usually naked and smooth below the panicle: leaves crowded at the base, 2 to 3 cm. long, filiform-involute, curved; culm leaves one or two: panicles about 1 dm. long, usually purple; branches mostly single, naked below and with few subdivisions: spikelets about 3 mm. long; empty glumes acute, the second one slightly larger, two-thirds as long as the floret; awn about equaling the floret.—Rocky cañons, western Texas to Colorado and Arizona.

* * *Culms branched and somewhat spreading.*

+ *Annual.*

7. **M. Buckleyana** Scribn. Culms 2 to 3 dm. high, spreading from the tufted base: leaves few near the base, mostly flat: panicle oblong, one-half to two-thirds as long as the culm, usually purple; branches subverticillate or single, sparsely subdivided toward the extremities: spikelets 2 mm. long, on pedicels scarcely equaling themselves; empty glumes subequal, acute, ciliate, one-half as long as the slightly pubescent floret; floral glume rather broadly toothed at the apex; awn little shorter than the glume.—Gravelly bars and river banks, western Texas to Mexico.

+ + *Perennial.*

8. **M. Texana** Thurb. Culms 3 to 5 dm. high, spreading, much branched throughout, somewhat hoary; leaves flat, not rigid, narrow, 3 to 8 cm. long: panicles about 1 dm. long, terminating the numerous branches, usually vaginate at the base; branches mostly single, sparsely subdivided: spikelets 3 to 4 mm. long, purple; empty glumes narrow, acute, three-fourths as long as the floret; glume and palet pubescent on the nerves; awn 4 to 6 mm. long.—High mesas, western Texas to Arizona.

§ 2. *Panicles narrow, contracted; pedicels short.*—MUHLENBERGIA proper.

* *Culms branching.*

+ *Leaves flat, 3 mm. wide: awn not more than twice as long as the spikelet: from scaly perennial rootstocks.*

9. **M. diffusa** Schreb. (NIMBLE WILL.) Culms 4 to 8 dm. high, diffusely branching throughout: leaves thin, about 5 cm. long: panicles numerous, 5 to 20 cm. long, slender, interrupted; branches single: spikelets 2 to 2.5 mm. long; first empty glume obsolete; second minute, obtuse; floral glume scabrid; awn equaling or twice as long as the floret.—Dry hills and woods, northern Texas and northward.

10. **M. tenuiflora** (Willd.) B. S. P. Culms 5 to 10 dm. high, much branched above, leafy throughout: leaves thin, about 1 dm. long: panicles 6 to 20 cm. long, slender; branches single, erect: spikelets subappressed, 3 to 4 mm. long; empty glumes subequal, acute, slightly scabrid on the prominent green keels, one-half to two-thirds as long as the floret; floral glume and palet somewhat pubescent near the base; awn 3 to 6 mm. long. (*Agrostis tenuiflora* Willd., *Muhlenbergia Willdenovii* Trin.)—Low, swampy land, northern Texas to Massachusetts and Minnesota.

11. **M. sobolifera** (Muhl.) Trin. Culms 6 to 10 dm. high, branching above: leaves firm, erect or spreading, 1 dm. long or less: panicle 6 to 15 cm. long, slender; branches single, erect: spikelets about 2 mm. long; empty glumes equal, two-thirds as long as the floret; floral glume pubescent near the base, mucronate or with an awn as long as itself. (*Agrostis sobolifera* Muhl.)—Sandy woodland, northern Texas and northward.

+ + *Leaves very narrow, flat or involute; ligule short: in strongly rooted tufts or from scaly rootstocks.*

++ *Awns not longer than the glomerate spikelets.*

12. **M. Lemmoni** Scribn. Culms 3 to 5 dm. high, with few erect branches above the base, leafy throughout: leaves 1 dm. long or less: panicle 1 to 1.5 dm. long, narrow, interrupted; branches single or in twos or threes and unequal, 3 cm. long or less, closely flowered to the base except the longer ones: spikelets 3 to 3.5 mm. long, scabrid; empty glumes acute, prominently keeled, nearly as long as the floret; floral glume and palet pubescent below the middle; awn 2 to 3 mm. long.—Mountains, western Texas to Arizona.

+ + Awns at least twice as long as the spikelets.

13. **M. pauciflora** Buckl. Culms 3 to 5 dm. high, spreading or erect: leaves involute, rather rigid, about 5 cm. long: panicle 5 to 10 cm. long, narrow, flexuous, interrupted; branches single, closely flowered: spikelets 3 to 4 mm. long, nearly sessile; empty glumes acute, bristle-pointed, scabrid on the keels, about one-half as long as the scabrid or smooth floral glume; awn 6 to 8 mm. long; callus rather prominent.—Mountains, western Texas to Arizona.

14. **M. monticola** Buckl. Culms 3 to 6 dm. high, erect, rarely simple, leafy: leaves flat or involute, erect: panicle 5 to 10 cm. long, erect or slightly flexuous; branches single or in twos and threes and unequal, 2 cm. long or less, erect, closely flowered: spikelets 2.5 to 3 mm. long; empty glumes obtuse or minutely toothed, one-half to two-thirds as long as the floret; floral glume and palet finely pubescent below the middle; awn about 1.5 cm. long.—Mesas and foothills, western Texas to Arizona.

15. **M. parviglumis** Vasey. Culms 3 to 6 dm. high, sparingly branched throughout: leaves 1 dm. long or less: panicle 1 to 2 dm. long, erect, narrow not dense; branches subverticillate, subdivided to the base, 3 cm. long or less: spikelets 3 mm. long; empty glumes obtuse, often denticulate, one-fourth as long as the scabrid floret; floral glume and palet minutely pubescent near the base; awn about 2 cm. long.—Western Texas. Difficult to distinguish from young and unexpanded forms of *M. affinis*.

** * Culms simple in strongly-rooted tufts: ligule about 1 cm. long.*

+ Leaves closely involute: panicle rather loose or interrupted.

16. **M. setifolia** Vasey. Culms 3 to 6 dm. high, simple, tufted: leaves from the base 1 to 3 dm. long, filiform involute, setaceously pointed, scabrid, often curved; culm leaves 2 or 3, shorter; sheaths long: panicle 1 to 2 dm. long, erect, often vaginate below; branches single or subverticillate, 4 cm. long or less: spikelets 3.5 to 4 mm. long; empty glumes obtuse, denticulate, one-third as long as the smooth floret; awn about 2 cm. long.—Mountains, western Texas.

17. **M. gracilis** (HBK.) Trin. Culms 3 to 5 dm. high: leaves mostly from the base, with open scarious sheaths and scabrous involute blades 1 to 3 dm. long; leaves of the culm 1 or 2; sheaths long, scabrous: panicle 1 to 1.5 dm. long, erect; branches mostly single, 4 cm. long or less: spikelets 3 to 4 mm. long; first empty glume acute, somewhat erose; second empty glume distinctly 3-awned, one-third larger than the first and about one-half as long as the floret; floral glume scabrid, pubescent on the nerves; awn 1 to 1.5 cm. long. (*Podosæmum gracilis* HBK.)—Mountains, western Texas to California and Montana.

+ + Leaves coriaceous, flat or conduplicate: panicle usually dense, plumelike.

18. **M. Berlandieri** Trin. Culms nearly 1 m. high: leaves 1 to 3 dm. long, flat or conduplicate, mostly from the base, nearly smooth: panicle 1.5 to 2.5 dm. long, erect; branches 5 cm. long or less, subdivided nearly to the base: spikelets 4 mm. long; empty glumes equal, obtuse, denticulate, one-third as long as the prominently 3-nerved floral glume; awn nearly 1 cm. long; hairs of the callus few and short.—Foot hills, western Texas and New Mexico.

19. **M. distichophylla** (Presl.) Kth. Culms about 1 m. high, robust, leafy: leaves 3 to 6 dm. long, flat or conduplicate, hispid on the margins: panicle 2 to 3 dm. long,

erect; branches mostly single, erect, naked at the base, 1 dm. long or less: spikelets 2.5 to 3 mm. long; empty glumes thin, obtuse, subequal, nearly as long as the floret; floral glume and palet slightly pubescent near the base or nearly smooth; awn 5 to 10 mm. long or absent, often varying much in the same panicle. (*Podosæmum distichophyllum* Presl. Awnless form is *Epicampes ligulata* Scribn.)—Rocky ridges, western Texas to Arizona.

34. **EPICAMPES** Presl.

Spikelets 1-flowered, terete or turgid, in a dense long narrow panicle: outer glumes subequal, acute, equaling or shorter than the floret; floral glume and palet nearly equal, similar in texture, raised on a very short stipe.—Tall reed-like perennials.

1. **E. rigens** Benth. Culms erect, about 1 m. high: leaves narrow, convolute, rigid, rough; ligule 3 to 6 mm. long: panicle very narrow, 3 to 6 dm. long; rays verticillate, appressed, unequal, the longer 3 to 8 cm. long, naked near the base: spikelets 3 to 4 mm. long; empty glumes thin; floral glume pubescent near the base.—High plains, western Texas to California.

35. **AGROSTIS** L. (Bent grass.)

Spikelets 1-flowered, small, in a spreading or contracted verticillately-branched panicle: empty glumes persistent, subequal, acute, longer than the smooth oblong floret; floral glume thin, hyaline, obtuse, 5-nerved, smooth, awnless or with a short dorsal awn; palet often wanting; hairy callus small, obscure.—Culms tufted, slender.

* *Panicle loose, with spreading capillary branches: palet wanting.*

1. **A. Elliottiana** Schultes. (Spider bent grass.) Culms 2 to 5 dm. high, weak: leaves 1 to 2 mm. wide, 3 to 5 cm. long: panicle one-half as long as the culm; branches naked below the middle: spikelets 1.5 to 2 mm. long; empty glumes equal, one-fourth longer than the floret; floral glume 2-toothed, with a very fine awn 2 to 4 mm. long from near the apex or awnless. (*Agrostis arachnoides* Ell. non Poir.)—Low wet land, central Texas to Tennessee.

2. **A. perennans** (Walt.) Tuck. (Thin grass.) Culms 3 to 6 dm. high, erect or decumbent below: leaves about 3 mm. wide, 1 to 2 dm. long, scabrid: panicle oblong, 1 to 3 dm. long; branches divided to the middle or below: spikelets 2 to 2.5 mm. long; empty glumes subequal, one-fourth longer than the floret; floral glume awnless. (*Cornucopiæ perennans* Walt.)—Rare in northern Texas, common northward.

3. **A. scabra** Willd. (Hair grass.) Culms 3 to 6 dm. high, erect: leaves about 2 mm. wide, 1 dm. long or less, scabrid, often involute: panicle 2 to 3 dm. long, broadly spreading; branches subdivided near the extremities, very scabrid: spikelets about 2 mm. long; empty glumes narrowly acute, slightly unequal, one-third longer than the floret; floral glume awnless or rarely with a short, dorsal awn.—Rare in northern Texas, common northward.

* * *Panicle contracted, dense: palet equaling the floral glume.*

4. **A. verticillata** Vill. Culms 2 to 5 dm. high from a decumbent base: leaves 4 to 8 mm. wide, 5 to 15 cm. long: panicle 5 to 10 cm. long, interrupted below; branches densely flowered to the base: spikelets about 2 mm. long; empty glumes equal, minutely pubescent throughout.—Common, western Texas to Colorado and California.

36. GASTRIDIUM Beauv. (Nit-grass.)

Spikelets 1-flowered, with a minute pedicel of a second, long and narrow, in a rather dense tapering panicle: empty glumes unequal, attenuate-pointed, ventricose near the base, much longer than the floret; floral glume thin, 4-toothed, thinly pubescent, bearing a slender dorsal awn; palet equaling the floral glume.—Culms low and branching.

1. **G. australe** Beauv. Culms 2 to 5 dm. high: leaves narrow, mostly flat: panicle about 1 dm. long: spikelets 4 to 6 mm. long; empty glumes scabrid on the back, about four times as long as the floret.—Low land, rare. Introduced from Australia.

37. LYCURUS HBK.

Spikelets 1-flowered, subterete, in a narrow cylindrical spikelike panicle: outer glumes membranaceous, subequal, much shorter than the floret; the first 2 to 3-awned; the second 1-awned; floral glume narrow, awn-pointed; palet slightly shorter than the glume.

1. **L. phleoides** HBK. Culms 2 to 4 dm. high, erect or geniculate at the nodes: leaves flat or conduplicate, rather rigid, recurved, short, narrow: panicle 4 to 8 cm. long, 5 mm. in diameter: spikelets 4 to 6 mm. long; empty glumes about one-half as long as the purple-spotted floral glume and palet; awns of empty glumes shorter than that of the floral glume.—Mesas, western Texas to Arizona.

38. ALOPECURUS L. (Meadow foxtail.)

Spikelets 1-flowered, compressed, in a dense cylindrical spikelike panicle: empty glumes equal, carinate, somewhat connate near the base, slightly exceeding the floret; floral glume thin, obtuse, smooth, margins connate near the base, dorsally awned; palet wanting.

1. **A. geniculatus** L. (Water foxtail.) Culms weak, usually geniculate below, 2 to 5 dm. high: leaves narrow, 1 dm. long or less, with somewhat inflated sheaths: panicles about 5 cm. long, 4 mm. in diameter: spikelets 2 mm. long; empty glumes very slightly united, obtuse, pubescent, ciliate on the keels; awns arising near the base of the floret, about 5 mm. long.—Wet land, northern Texas and northward.

39. TRISETUM Pers.

Spikelets 2 to 4-flowered, in a contracted panicle; naked rachilla extending slightly beyond the base of the upper floret: empty glumes subequal, slightly shorter than the contiguous floret, 3 to 7-nerved, with rather broad membranaceous apexes; the second broader; floral glume thin herbaceous, or membranaceous, with a slender awn arising between the two prominent slender teeth at the apex; palet hyaline, about two-thirds as long as the glume.—Low weak annuals.

* *Awn of lower floret short and straight.*

1. **T. Hallii** Scribn. Culms 3 to 5 dm. high, simple: leaves flat, scabrous: panicle 1 to 1.5 dm. long, somewhat interrupted: spikelets obovate, 4 to 5 mm. long; empty glumes obovate, subobtuse, scabrous on the backs.—Moist prairie land, central Texas.

* * *Awn of lower floret long and bent like the others.*

2. **T. interruptum** Buckl. Culms 3 to 5 dm. high, often branching below: leaves narrow, mostly flat, 5 to 15 cm. long, usually interrupted: spikelets 2 to 4-flowered, 4 to 5 mm. long; empty glumes equal, broadly oblanceolate, acute.—Prairies, central and northern Texas.

40. CAPRIOLA Adans.

Spikelets 1-flowered, with a naked rudiment of a second, sessile, imbricate-spiked on one side of a flat rachis: spikes digitate at the apex of the culm: empty glumes subequal, carinate, shorter than the floret; floral glume deeply carinate, awnless, slightly longer than the palet.—Low branching extensively creeping perennials. (*Cynodon* Pers.)

1. **C. Dactylon** (L.) Kuntze. (BERMUDA GRASS.) Culms 2 to 6 dm. high: leaves narrow, short and flat: spikes 2 to 5, 3 to 8 cm. long: spikelets 2 mm. long; floral glume nearly smooth, longer than the rudiment. (*Panicum Dactylon* L., *Cynodon Dactylon* Pers.)—Introduced and extensively naturalized. A valuable grass in lawns and permanent pastures.

41. SPARTINA Schreber. (CORD-GRASS.)

Spikelets 1-flowered, narrowly linear, closely imbricate-spiked in 2 ranks on one side of a flattened or triangular rachis: spikes racemose on an elongated axis: outer glumes coriaceous, carinate; the first shorter than the floret; the second equaling or exceeding the floret; floral glume subcoriaceous, carinate, awnless, exceeded by the broad hyaline palet.—Rush-like marsh grasses, with terete rigid culms and involute leaves, from perennial scaly rootstocks.

* *Glumes hispid on the keels.*

\+ *Spikes appressed in a spike-like panicle.*

1. **S. gracilis** Trin. Culms about 1 m. high, leafy: leaves closely involute, 2 to 5 dm. long: panicle 1 to 3 dm. long: spikes 15 to 40, sessile, about 2 cm. long: spikelets 5 to 7 mm. long; glumes subobtuse; the first three-fourths as long as the second, slightly shorter than the floret. (*Spartina junciformis* Engelm. & Gray.)—Low land and salt marshes, southern Texas to Florida.

\+ \+ *Spikes divergent.*

2. **S. patens** (Ait.) Muhl. (RUSH SALT-GRASS.) Culms 6 to 10 dm. high, smooth and shining: leaves narrow, closely involute, 1 to 3 dm. long: spikes 5 to 8, short-peduncled or nearly sessile, 4 to 8 cm. long, slightly exceeding the intervals: spikelets 8 to 10 mm. long; glumes acute; the first one-third as long as the second and about one-half as long as the floret. (*Dactylis patens* Ait., *Spartina juncea* Willd.)—Salt marshes, eastern Texas to Florida.

* * *Glumes smooth.*

3. **S. stricta** (Ait.) Roth. (SALT MARSH-GRASS.) Culms robust, about 1 m. high, leafy: leaves closely involute toward the points: spikes 6 to 10, exceeding the intervals, 5 to 10 cm. long, erect or somewhat spreading; smooth rachis extending beyond the spikelets: spikelets about 1 cm. long; first glume about one-half as long as the second. (*Dactylis stricta* Ait.)—Salt marshes, mostly near the coast.

42. CHLORIS Swartz.

Spikelets with one perfect floret and one or more rudimentary florets, imbricate-spiked in two rows on one side of a slender rachis: spikes digitate at the apex of the culm, erect or stellate spreading: empty glumes persistent, acute or mucronate, the second longer than the first, nearly equaling the floret; floral glume broad, deeply carinate, ciliate on the margin or intra-marginal nerves and usually on the keel, with a short dorsal awn near the apex or awnless; glumes of imperfect florets rolled in a broadly obovate or clavate cluster, the lowest glume in the cluster awned or awnless like the perfect floret.—Smooth flat-leaved annuals in low sandy land.

* *Awns longer than the spikelets.*

\+ *Floral glumes prominently pilose-ciliate.*

1. **C. alba** Presl. Culms 4 to 8 dm. high, often branching, usually compressed: leaves acute, nearly smooth or thinly pubescent: spikes 6 to 15, ascending, 5 to 8 cm. long: spikelets about 3 mm. long; awns of floral glume and rudiment 4 to 8 mm. long.—Wet land, western Texas to Arizona.

\+ \+ *Floral glumes not conspicuously ciliate.*

2. **C. verticillata** Nutt. Culms 2 to 5 dm. high, sometimes branching: leaves narrow, abruptly acute: spikes 5 to 20 cm. long, clustered at the apex of the culm or sometimes 2 or 3 verticillate clusters raised on a prolongation of the axis, usually pilose in the axils: spikelets 2 to 2.5 mm. long, rather loosely arranged along the rachis; awns 5 to 8 mm. long.—Sandy land, central Texas to Oklahoma. Var. INTERMEDIA Vasey, of the same range, has spikelets close and awns shorter, the imperfect floret protruding. Intermediate between *C. verticillata* and *C. cucullata*.

* * *Awns shorter than the spikelets.*

\+ *Floral glumes nearly glabrous.*

3. **C. cucullata** Bisch. Culms 3 to 5 dm. high, slender, rarely branched: spikes 8 to 18, spreading, 3 to 5 cm. long: spikelets triangular, 2 mm. long; hispid awns about one-half as long as the florets; imperfect floret very broadly obovate and protruding at the side of the spikelet.—Sandy land, central and southern Texas.

\+ \+ *Floral glumes conspicuously ciliate.*

4. **C. ciliata** Swartz, var TEXANA Vasey. Culms slender, 3 to 6 dm. high, rarely branching: leaves subinvolute, attenuate pointed: spikes 3 to 6, usually arcuate, 5 to 8 cm. long: spikelets about 2 mm. long; awns slightly shorter than the florets.—Low land, southern Texas.

* * * *Awnless.*

5. **C. Swartziana** Doell. Culms compressed, often branching, 4 to 8 dm. high: leaves obtuse: spikes 2 to 5, nearly erect, 4 to 8 cm. long: spikelets about 2 mm. long; floral glume usually brown, mucronulate.—Low sandy land, southern Texas and Florida.

43. TRICHLORIS Fourn.

Spikelets with one perfect and one or more imperfect florets, sessile, spicate on one side of a narrow rachis: spikes digitate or subdigitate

at the apex of the culm: empty glumes membranaceous, lance-ovate, 1-nerved, awn-pointed, the second longer than the first but shorter than the spikelet; floral glume involute, thicker than the outer ones, tipped with three awns, the middle one much longer than the glume; palet equaling the glume; upper florets separated on elongated smooth internodes of the rachilla, each awned like the lower floret.—Perennial grasses with flat attenuate leaves.

* *Spikelets with one sterile floret.*

1. **T. fasciculata** Fourn. Culms 5 to 10 dm. high, often branching below: leaves narrow, thinly papillose pubescent near the base; sheaths compressed, carinate: spikes 8 to 15, digitate, plumose, erect, 8 to 12 cm. long: spikelets 3 mm. long; second empty glume 3 to 5 times as long as the first; middle awn of perfect floret about 1 cm. long; lateral ones one-third shorter.—Mountains, western Texas to Arizona.

* * *Spikelets with 2 or 3 sterile florets.*

2. **T. pluriflora** Fourn. Culms 6 to 10 dm. high, rarely branching: leaves about 1 cm. wide, hispidulous or smooth; sheaths cylindrical: spikes 10 to 20, 8 to 20 cm. long, racemose or subdigitate, somewhat spreading: spikelets 4 to 5 mm. long; first empty glume one-half to two-thirds as long as the second; middle awn 6 to 8 mm. long; lateral ones less than one-third as long.—Low sandy plains, western Texas to New Mexico.

44. **GYMNOPOGON** Beauv.

Spikelets with one or two perfect florets and an awned rudiment, subsessile, remotely alternate on a slender triangular rachis: spikes racemose crowded, on an elongated axis: empty glumes lance-awl-shaped, hispid on the keel, rigid, longer than the floret; floral glume involute, membranaceous, obtuse, the midnerve terminating in a single awn longer than the glume; palet equaling the glume: leaves flat and rather thick: root perennial.

1. **G. ambiguus** (Michx.) Beauv. (NAKED BEARD GRASS.) Culms 3 to 6 dm. high: leaves numerous, flat, divaricate, 1 to 2 cm. wide, 4 to 8 cm. long: spikes 15 to 40, spreading, 1 to 2 dm. long; rachis hispid: spikelets 5 to 6 mm. long, with one or two perfect florets and a rudiment; awn of lower floret 6 to 12 mm. long; awns of upper florets shorter. (*Andropogon ambiguus* Michx. *Gymnopogon racemosus* Authors.)—Woods and high lands, central Texas to Arkansas.

45. **SCHEDONNARDUS** Steud.

Spikelets 1-flowered, closely sessile in shallow excavations on alternate sides of the slender rachis: spikes remotely alternate, spreading or horizontal: empty glumes narrow with rigid keels; the second longer than the first but shorter than the rather rigid, acuminate, awnless, floral glume; palet slightly shorter than the glume.—Low annuals, branching near the base, with narrow leaves flat or twisted.

1. **S. paniculatus** (Nutt.) Scribn. Culms 2 to 5 dm. high, leafy at the base: panicle naked, long and loose: spikes 5 to 15 cm. long: spikelets 3 mm. long, closely appressed in the excavations until maturity. (*Lepturus paniculatus* Nutt., *Schedonnardus Texanus* Steud.)—Sandy plains, central Texas to Montana.

46. BOUTELOUA Lag.

Spikelets with one perfect floret and one or two rudimentary florets, sessile, crowded on the narrow flattened rachis: spikes various, mostly pectinate, sometimes 1-flowered, but then distinguished by the prolongation of the rachis, distinctly alternate and usually secund on the common axis: empty glumes carinate or convex, the lower one shorter; floral glume of perfect floret 3-nerved, the nerves terminating in awns or awn-like teeth, usually with 2 or 4 teeth beside the awns; palet bidentate, or 2-awned and 4-toothed, nearly equaling the glume; rudimentary florets usually 3-awned, often with small glumes, staminate in one species.—Rather low annuals or perennials with slender culms and narrow leaves. This genus contains some of the most important forage grasses on the ranges of the southwest.

§ 1 *Spikelets pectinate, numerous (more than 20) in each of the more or less falcate spikes; sterile floret with 3 awns and usually with small rudimentary glumes.*—CHONDROSIUM.

* *Spikes always single.*

1. **B. prostrata** Lag. (GRAMA.) Culms in small tufts, prostrate or ascending, 1 to 3 dm. high: leaves smooth, 2 to 5 cm. long: spikes 1 to 3 cm. long: spikelets 4 to 5 mm. long; second empty glumes twice as long as the first and slightly exceeding the floret; floral glume pubescent on the nerves, 3-lobed, the middle lobe 2-toothed; the middle awn about as long as the glume, longer than the lateral awns; palet obtuse or bidentate, awnless; awns of the rudiment slightly longer than those of the floral glume; pedicel narrowly villous tufted at the apex.—Sandy plains, from the Pecos valley westward to Arizona.

* * *Spikes two or more (sometimes single in No. 2).*

\+ *Sterile floret with small but distinct glumes at the bases of the awns.*

\+\+ *Teeth at the base of the middle awn minute; lateral awns winged below or reduced to awl-pointed teeth; no teeth outside the lateral awns: palet bidentate, awnless.*

= *Empty glumes glabrous.*

2. **B. breviseta** Vasey. (GRAMA.) Culms 1 to 3 dm, high, rigid from an almost woody perennial base: leaves distichous, involute, rigid, 2 to 4 cm. long; sheaths exceeding the internodes: spikes 1 to 3, 2 to 3 cm. long: spikelets 3 to 4 mm. long; second empty glume very acute, slightly shorter than the floret; floral glume pubescent; awns about 1 mm. long; awns of rudiment 2 mm. long; pedicel hairy at the apex.—Rare, Presidio County, Texas.

3. **B. ramosa** Scribn. (GRAMA.) Culms about 3 dm. high, sparingly branched, wiry, from a perennial knotted rootstock: leaves mostly involute, 3 to 6 cm. long: spikes mostly in twos, 2 to 3 cm. long, recurved: spikelets about 4 mm. long; second empty glume very acute, about one-fourth shorter than the floret; floral glume pubescent, narrow at the apex; awns less than one-half as long as the glume; pedicel of rudiment hairy at the apex; awns exceeding those of the floral glume.—Mountains, western Texas to northern Mexico.

= = *Empty glumes pubescent.*

4. **B. oligostachys** (Nutt.) Gray. (GRAMA.) Culms from 2 to 8 dm. high from a perennial rootstock, often branching: leaves flat except near the attenuate points: spikes 2 to 4, 2 to 3 cm. long: spikelets 5 to 6 mm. long; second empty glume 3 times as long as the first and slightly exceeding the floret, papillose pubescent on the midnerve; floral glume deeply 2-cleft with a short slender tooth each side of the middle awn; awns 1 to 2 mm. long; awns of rudiment about twice as long; pedicel villous

tufted. (*Atheropogon oligostachyus* Nutt.)—Dry hillsides, Texas to Wisconsin and westward to Montana and Arizona. Var. MAJOR Vasey has spikes 4 to 6 cm. long and spikelets 6 to 7 mm. long.—Texas to Arizona.

5. **B. hirta** (HBK.) Scribn. (HAIRY GRAMA.) Culms 3 to 5 dm. high, usually simple above the base, in perennial tufts; leaves flat, slender-pointed, thinly papillose pubescent near the base, 1 to 2 dm. long: spikes 2 to 6, 2 to 4 cm. long; rachis prominently prolonged beyond the upper spikelet: spikelets 3.5 to 4.5 mm. long; second outer glume papillose pubescent, twice as long as the first, nearly as long as the floret; floral glume pubescent, deeply 2-cleft, the lateral lobes merely awn-pointed, the middle lobe 2-toothed at the base of the short awn; pedicel of rudiment naked; awns 3 to 5 mm. long. (*Chondrosium hirtum* HBK. *Bouteloua hirsuta* Lag.)—Prairies, Texas to Wisconsin and westward to California. Var. MAJOR Vasey is larger (5 to 8 dm. high), with spikelets nearly 6 mm. long, longer awned than in the species, and sterile pedicel sometimes slightly hairy.—Prairies, western Texas to Mexico. Var. MINOR Vasey is slender (1 to 3 dm. high), with 1 to 3 spikes 1 to 2 cm. long, and spikelets 3 to 4 mm. long.—Central Texas.

++ ++ *Teeth at the base of the middle awn nearly one-half as long as the awn, or equaling it; lateral awns naked to the base; lateral teeth outside the lateral awns more or less distinct: palet 4-toothed, short awned from the lateral sinuses.*

= *Empty glumes glandular pubescent.*

6. **B. vestita** (Watson.) Scribn. in Herb. (GRAMA.) Culms 3 to 6 dm. high: leaves mostly flat, thinly pubescent: spikes 4 to 6, about 2 cm. long, at intervals longer than themselves; rachis pubescent: spikelets 3.5 to 4.5 mm. long; second empty glume awn-pointed between the small unequal lobes, twice as long as the first glume and slightly exceeding the floret; floral glume thinly pubescent at the base and on the nerves; inner lobes larger, minutely ciliate; awns from the sinuses equaling or slightly longer than the glume; palet minutely ciliate on the four equal lobes, short awned; sterile pedicel pilose tufted, bearing three awns equaling those of the perfect floret.—Ravines and mountains, western Texas.

= = *Empty glumes glabrous.*

a. *Upright, perennial.*

7. **B. Rothrockii** Vasey. (GRAMA.) Culms 3 to 6 dm. high, sometimes branching near the base: leaves mostly flat, 5 to 10 cm. long, thinly pubescent near the base: spikes 4 to 10, 2 to 3 cm. long: spikelets 3 to 4 mm. long; second outer glume prominently mucronate between the two unequal lobes, much larger than the first but shorter than the floret; floral glume deeply 4-lobed; the lobes subacute, nearly equal, minutely ciliate; awns equaling or longer than the glume; teeth of the palet ciliate; awns slightly shorter than those of the glume; awns of the rudiment usually longer; pedicel villous tufted.—Dry mesas, Arizona and Mexico and doubtless extending into western Texas.

b. *Spreading or prostrate, annual.*

8. **B. microstachys** (Fourn.) (GRAMA.) Culms 1 to 2 dm. high usually branching: leaves flat, narrowly lance-linear, 2 to 5 cm. long: spikes 3 to 6, about 2 cm. long, slightly exceeding the intervals: spikelets 2.5 to 3.5 mm. long; second outer glume much longer than the first, about equaling the floret, mucronate; floral glume deeply 4-lobed, the outer lobes smaller, often inconspicuous, inner ones subacute; awns equaling or longer than the glume; awns of the acutely 4-toothed palet and the pilose pedicelled rudiment nearly as long as those of the glumes. (*Chondrosium microstachyum* Fourn. *B. arenosa* Vasey, in "Grasses of the Southwest." *B. polystachys* Benth. in part.)—Sandy river banks, western Texas to southern California.

9. **B. polystachys** (Benth.) Torr. (SIX-WEEKS GRAMA.) Culms 1 to 3 dm. high, weak, usually branching at the geniculate lower nodes: leaves flat, 2 to 5 cm. long: spikes 4 to 8, about 2 cm. long, slightly exceeding the intervals: spikelets 1.5 to 2.5 mm. long; second empty glume obtuse or subacute, usually mucronate, shorter than the floret; floral glume with four short obtuse lobes, the outer lobes narrow, awns nearly equal, not more than one-half as long as the glume; palet obtusely 4-toothed, awns little longer than the teeth; awns of rudiment slightly longer than the others; pedicel of rudiment bearing a pilose tuft. (*Chondrosium polystachyum* Benth.)—River valleys, western Texas to southern California.

+ + Sterile floret reduced to three naked or slightly winged awns.

++ Floral glume 3-toothed or short awned.

10. **B. eriopoda** Torr. (WOOLLY-STEMMED GRAMA.) Perennial culms 3 to 6 dm. high, rigid, often decumbent and rooting at the nodes, lanate especially below: leaves flat or involute, attenuate: spikes 3 to 6, 2 to 5 cm. long, rather loosely flowered: spikelets 6 to 7 mm. long; second empty glume acute, twice as long as the first, about equaling the floret; floral glume slightly pubescent or nearly smooth, middle awn nearly 3 mm. long, twice as long as the lateral ones; rudiment with few short hairs and three equal awns about 6 mm. long.—Dry gravelly plains, western Texas to Arizona.

++ ++ Floral glume distinctly 3-awned.

11. **B. trifida** Thurb. (GRAMA.) Culms 1 to 3 dm. high, mostly simple, from a perennial cespitose base: leaves narrow, hispidulous, mostly at the base: spikes 3 to 6, rather loosely flowered, about 2 cm. long, exceeding the intervals: spikelets 2.5 to 3 mm. long; second empty glume subobtuse, one-third longer than the first, and about equaling the floret; floral glume slightly ciliate on the nerves or nearly smooth; awns 2 to 3 times as long as the glume; palet awnless; sterile pedicel naked, the awns equaling those of the perfect floret.—High mesas, western Texas to Arizona. Var. BURKEI (Scribn.) Vasey is generally leafy throughout, with spikelets 3 to 3.5 mm. long, and floral glume more pubescent than in the type. (*B. Burkei* Scribn.)—Sandy plains, central and southern Texas to New Mexico.

§ 2. Spikelets not distinctly pectinate, few (5 to 12) in the short thick straight spikes; sterile floret sometimes staminate, sometimes reduced to 1 to 3 awns.—ATHEROPOGON.

** Empty glumes woolly pubescent.*

12. **B. Havardii** Vasey. (WOOLLY-SPIKED GRAMA.) Culms 2 to 6 dm. high, simple from a tufted perennial base: leaves mostly from the base, flat, rather thick, 1 to 2 dm. long; spikes 4 to 8, 1 to 2 cm. long at intervals of about their own length on the flat axis: spikelets 6 mm. long, pubescent throughout; second empty glume three times as long as the first, nearly equaling the floret; floral glume 3-toothed, awnless; awns of rudiment nearly equal, 5 to 10 mm. long, the middle one wing-margined; pedicel naked.—High gravelly plains, western Texas to Arizona.

** * Empty glumes glabrous except the hispidulous keel.*

+ Sterile floret staminate, with an obscure pedicel-like rudiment of a third flore

13. **B. bromoides** (HBK.) Lag. (?) (LARGE MESQUIT.) Culms 2 to 6 dm. high, often branching: leaves flat, narrow, smooth or ciliate margined: spikes 5 to 10, subsecund, 1 to 2 cm. long, exceeding the intervals: spikelets 6 to 8 mm. long; second empty glume boat-shaped, nearly equaling the floret; floral glume smooth except on the three short awl-pointed teeth, the middle one longer than the lateral ones; glume of staminate floret awned midway on the margins and with a membranaceous tooth each side of the base of the middle awn; palet equaling the glume; pedicel naked or slightly bearded. (*Dinebra bromoides* HBK.)—Western

Texas to southern California. Var. RADICOSA (Fourn.) Vasey has culms generally taller and from a strong rootstock, with leaves 3 to 4 mm. wide with slender attenuate points, spikes usually larger (often 3 cm. long), and spikelets exactly like those of the species. (*Atheropogon radicosus* Fourn.)—Same range as the species.

\+ + *Sterile floret very small, 1 to 3-awned, always neutral.*

14. **B. curtipendula** (Michx.) Torr. (TALL MESQUIT.) Culms 4 to 8 dm. high, simple or sparingly branched: leaves slender, 1 to 3 dm. long: spikes 15 to 40, about 1 cm. long, nearly sessile, spreading or pendulous, at intervals less than their own length, 4 to 8-flowered: spikelets 4 to 6 mm. long; second empty glume slightly exceeding the floret; floral glume smooth, terminating in three short, awl-pointed teeth; awns of rudiment usually shorter than the perfect floret. (*Chloris curtipendula* Michx. *Bouteloua racemosa* Lag.)—Dry hills and plains, Texas to New York and westward to Arizona.

§ 3. *Spikelets 1 to 3 in the slender numerous spikes; sterile floret reduced to 1 to 3 awns, with no glumes.*—TRIATHERA.

15. **B. uniflora** Vasey. (MESQUIT.) Culms 3 to 5 dm. high, simple, rigidly erect: leaves narrow, subinvolute, one-half as long as the culm: spikes 25 to 75, spreading or pendant, secund at intervals less than one-half their length, bearing one spikelet subtended by a glume-like prolongation of the rachis: spikelets 6 to 8 mm. long; second empty glume twice as long as the first and slightly exceeding the floret; floral glume minutely 3-toothed; rudiment reduced to a single slender awn shorter than the floret.—Western Texas.

16. **B. aristidoides** (HBK.) Thurb. (SIX-WEEKS MESQUIT.) Culms 1 to 3 dm. high, spreading, branching below: leaves usually sparsely pilose near the base: spikes 5 to 10, about 1 cm. long, at intervals less than their length, bearing 2 to 5 appressed spikelets; rachis pubescent: spikelets 5 to 7 mm. long; second empty glume twice as long as the first, equaling or slightly exceeding the floret; floral glume narrow, pubescent, terminating in three short awn-like teeth; pedicel of rudiment slightly bearded; awns 3 to 5 mm. long. (*Dinebra aristidoides* HBK.)—Western Texas to California.

§ 4. *Spikelets 3 to 6 in the cuneate spikes; second empty glume 2-cleft: rudimentary florets 2, each 3 to 5-awned and with more or less developed glumes.*—POLYODON.

17. **B. Texana** Watson. (MESQUIT.) Culms 1 to 3 dm. high, tufted, simple: leaves narrow, usually involute near the points: spikes 5 to 10, about 1 cm. long, secund, horizontal, at intervals of about one-half their length: spikelets about 6 mm. long; second empty glume slightly longer than the perfect floret, pubescent near the base; floral glume with two slender lobes and three divergent awns shorter than the body; palet obtuse; awns of rudiments 4 to 6 mm. long.—Dry hills throughout Texas and northward to Arkansas.

47. ELEUSINE Gaertn.

Spikelets 2 to 6-flowered, the upper floret imperfect or rudimentary, sessile, crowded pectinately on one side of the narrow angular or flattened rachis: spikes digitate at the summit of the culm: empty glumes carinate, the second slightly larger than the first, but shorter than the awnless florets; floral glume ovate, prominently keeled, longer than the palet: grain rough or wrinkled, contained in a loose pericarp.—Low annuals with flat leaves.

1. **E. Indica** (L.) Gaertn. (YARD-GRASS.) Culms erect, 5 to 10 dm. high: leaves mostly smooth: spikes 2 to 8 (rarely single), frequently one or two below the digitate

cluster, 5 to 10 cm. long: spikelets 4 to 6 mm. long, 3 to 6-flowered; glumes convex, sub-acute, hispidulous on the back. (*Cynosurus Indicus* L.)—Yards and cultivated land. (Introduced from India?)

2. **E. Ægyptiaca** (L.) Pers. (GOOSE-GRASS.) Culms 1 to 4 dm. high, usually from decumbent running stems: leaves ciliate near the base: spikes 3 to 6, 2 to 5 cm. long; spikelets 3 mm. long, 2 to 3-flowered, smooth; first empty glume short awned; second glume and floral glumes broadly carinate, acuminate. (*Cynosurus Ægyptius* L.)—Yards and cultivated land. (Introduced from Africa?)

48. LEPTOCHLOA Beauv.

Spikelets 3 to 6-flowered, the upper floret imperfect, loosely spicate on one side of a slender rachis: spikes racemose, erect or slightly spreading in a plume-like panicle: empty glumes carinate membranaceous, equal or the second slightly larger, rarely exceeding the florets, awnless; floral glume 3-nerved, oval, sometimes 1-awned, larger than the palet: seeds oblong, slightly roughened, closely inclosed.—Annuals.

** Empty glumes narrowly ovate or awl-shaped, about equaling the florets.*

1. **L. mucronata** (Michx.) Kth. (FEATHER GRASS.) Culms 2 to 6 dm. high, usually branching near the base, rather weak: leaves flat; sheaths usually pilose: spikes 3 to 8 cm. long, mostly alternate, spreading in slender racemes one-half as long as the culm: spikelets about 2 mm. long, 2 to 4-flowered; empty glumes very acute, but not "mucronate;" floral glume obtuse or slightly emarginate, pubescent on the back. (*Eleusine mucronata* Michx.)—Fields and sandy river banks, Texas to Illinois and Virginia.

** * Empty glumes broadly oval, shorter than the florets.*

+ Raceme dense, 25 to 75 spikes.

2. **L. Nealleyi** Vasey. Culms rather robust, about 1 m. high: leaves smooth throughout: spikes 2 to 5 cm. long, decreasing upwards, subverticillate in a raceme 2 to 3 dm. long, usually included at the base: spikelets 2 to 3 mm. long, 3 to 5-flowered; floral glume subobtuse or emarginate and mucronulate, pubescent on the margins and keel.—Low land, central Texas.

+ + Raceme rather loose, 6 to 15 spikes.

3. **L. virgata** (L.) Beauv. Culms slender, 4 to 8 dm. high: leaves often involute; sheaths usually smooth: spikes 5 to 10 cm. long, nearly erect in a plumose raceme 1 to 2 dm. long: spikelets 3 to 4 mm. long, 3 to 6-flowered; floral glume ciliate, emarginate, more or less distinctly awned. (*Cynosurus virgatus* L. *L. Domingensis* in part.)—Southern Texas to Florida, near the coast.

49. BULBILIS Raf.

Spikelets diœcious (rarely monœcious), very unlike; staminate spikelet 2 to 3-flowered, sessile in two rows in short one-sided spikes; empty glumes 1-nerved, subacute, the second larger but shorter than the florets; floral glume 3-nerved, slightly exceeding the palet: pistillate spikelets 1-flowered in short spikes; empty glumes nearly equal, united at the base, 3-toothed, indurated, larger than the floret; floral glume narrow, membranaceous, 2-cleft or nearly entire, inclosing the palet and large grain.—Perennial, creeping or stoloniferous. (*Buchloë* Engelm.)

1. **B. dactyloides** (Nutt.) Raf. (BUFFALO GRASS.) Culms 1 to 2 dm. high from a tufted leafy base, propagating chiefly by runners: leaves flat, 1 to 2 mm. wide, attenuate: staminate spikelets in pectinate spikes 1 cm. long or less; pistillate spikelets (rare) in terminal or axillary clusters, subtended by inflated involucral sheaths (*Sesleria dactyloides* Nutt. *Buchloe dactyloides* Engelm.)—Formerly one of the most important grasses of the plains from Texas to Minnesota, but now rapidly disappearing.

50. PAPPOPHORUM Schreb.

Spikelets awn-shaped, 2 to 6-flowered, the upper floret imperfect, often staminate, sessile and rather loosely arranged along the short branches of a narrowly pyramidal or spike-like panicle: empty glumes thin, persistent, the second slightly larger; floral glume broad, convex, enveloping the palet and broadly fusiform grain, 7 to 9-nerved; the nerves terminating in awns as long as the body and often with smaller intermediate aristiform lobes.—Annuals or perennials with rather rigid leaves.

* *Empty glumes 1-nerved, equaling the florets, or shorter.*

1. **P. apertum** Munro. Culms erect, simple or sparingly branched below, 4 to 8 dm. high, from a strongly rooted perennial base: leaves flat or involute, 1 to 3 dm. long, smooth except the pilose ligule: panicle narrowly pyramidal, 1 to 2 dm. long; branches 4 to 8 cm. long, decreasing upward, slightly spreading: spikelets 4 to 6-flowered, 6 to 8 mm. long, including the densely clustered awns; floral glume 7-nerved, the nerves terminating in awns about as long as the body and with nearly as many aristiform lobes in the intervals.—Dry hills, western Texas. Var. VAGINATUM (Buckl.) Scribn. has culms more robust, panicle spike-like (usually vaginate at the base), branches shorter and closely appressed, and spikelets slightly larger, but otherwise like those of the species (*P. vaginatum* Buckley. *P. apertum* in "Grasses of the Southwest.")—Western Texas to Arizona.

* * *Empty glumes 3 to 5-nerved, twice as long as the body of the florets.*

2. **P. Wrightii** Watson. Culms 2 to 4 dm. high, slender, branching, slightly barbellate at the nodes: leaves slender, 1 dm. long or less: panicle oblong, spike-like, often interrupted below, 5 to 10 cm. long: spikelets 4 to 6 mm. long, including the awns, 2 to 3-flowered; floral glume with 9 nerves terminating in ciliate awns nearly twice as long as the glume.—Foothills and mesas, western Texas to Arizona.

51. COTTEA Kth.

Spikelets compressed, cuneate, 3 to 6-flowered, short-pedicelled in rather loose panicles: empty glumes subacute or 2 to 3-toothed, nearly equal, slightly shorter than the adjacent florets, 7 to 13-nerved; floral glume broad, convex, pubescent at the base, 9 to 11-nerved, terminating in as many unequal alternately mucronate and aristiform lobes; palet as long as the body of the glume: grain smooth, oblong.—Erect perennials, with narrow attenuate flat leaves.

1. **C. pappophoroides** Kth. Culms 3 to 6 dm. high, sparingly branched, from bulbiferous rootstocks: panicle oblong or pyramidal, hoary pubescent throughout; branches alternate, 3 to 5 cm. long, spreading, rather sparingly subdivided: spikelets 6 to 8 mm. long.—Mountains and rocky cañons, western Texas to Arizona and southward.

52. CATHESTECUM Presl.

Spikelets 2 to 4-flowered, in sessile cuneate clusters, racemose on the slender axis, each cluster bearing 3 spikelets, the lateral ones 2-flowered, the terminal one 2 to 4-flowered: glumes all membranaceous; first empty glume short, erosely truncate, or often mucronate; second empty glume lanceolate, nearly equaling the lower floret; floral glume 2 or 4-lobed at the apex with the 3 nerves produced in short awns at the sinuses; palet equaling the glume, the two nerves slightly excurrent.—Low creeping grasses with narrow flat leaves.

1. **C. erectum** Vasey & Hackel. Culms erect, 1 to 2 dm. high, slender, from a leafy tufted base, propagating by stoloniferous runners: spikelets in 5 to 10 clusters about 5 mm. long; awns 1 to 4 mm. long.—Mesas, western Texas to central Mexico.

53. SCLEROPOGON Phillippi.

Spikelets diœcious (rarely monœcious), very unlike, narrowly paniculate: staminate spikelets compressed, linear, many (10 to 14)-flowered; empty glumes lanceolate, acute, subequal, nearly equaling the contiguous florets; floral glume 3-toothed or subentire, equaled by the palet: pistillate spikelets narrowly cylindrical, 3 to 5-flowered; empty glumes lanceolate, the upper larger; floral glume rigid, cylindrical, enveloping the palet, linear grain and long internode of the rachilla, 5-nerved, the three prominent nerves terminating in 3 long straight twisted awns.—Slender-stemmed grasses with short flat leaves, from matted rootstocks.

1. **S. Karwinskianus** (Fourn.) Benth. Culms 1 to 3 dm. high, generally simple above the cespitose leafy base: staminate spikelets 5 to 8, 1 to 3 dm. long; pistillate spikelets 1 to 2 cm. long; awns rigid, several times longer than the florets. (*Lesourdia Karwinskyana* Fourn.)—High rocky ridges, western Texas to Arizona.

54. MONANTHOCHLOE Engelm.

Spikelets diœcious, slightly dissimilar, 2 rarely 3-flowered, sessile, usually in pairs, hidden in fascicles of leaves; rachilla slightly continued beyond the base of the staminate florets: empty glumes similar to the leaves; floral glumes membranaceous, obtuse or denticulate, enveloping the palet and stamens or long-styled pistil: grain narrowly oblong.—Creeping or stoloniferous grasses, with short rigid distichous leaves.

1. **M. littoralis** Engelm. Culms rigid, ascending, 1 to 2 dm. high, bearing numerous crowded leaves about 1 cm. long.—Salt marshes, mostly near the coast, Texas to Florida and in southern California. In appearance very much like a creeping juniper.

55. MUNROA Torr.

Spikelets 3 to 5-flowered, perfect or the upper florets sterile, sessile in leafy clusters at the nodes and ends of branches: empty glumes thin, lanceolate, subequal, slightly shorter than the contiguous florets;

floral glumes herbaceous or coriaceous, obtuse or dentate, mucronate, convex, enveloping the palet and stamens: grain translucent, broadly spindle-shaped.—A low tufted grass, with flat rather thick leaves fasciculately crowded at the nodes.

1. **M. squarrosa** (Nutt.) Torr. Culms 1 to 2 dm. high, spreading, fasciculately branched: leaves 2 to 3 cm. long, rigid and pungent (*Crypsis squarrosa* Nutt.)—Dry plains, Texas to Montana.

56. ARUNDO L.

Spikelets 3 to 4-flowered, cuneate, in a large dense plume-like panicle: empty glumes lanceolate, attenuate, subequal, smooth, about equaling the florets; floral glumes convex, cleft at the attenuate apex and short-awned from the sinus, bearing near the base abundant silky hairs nearly as long as the glume; palet ciliate on the keels, nearly one-half as long as its glume; internode of rachilla glabrous.—Tall broad-leaved grasses from perennial rootstocks.

1. **A. Donax** L. Culms 2 to 5 m. tall: leaves clasping at the broad base: spikelets about 1 cm. long.—Cultivated for ornament and sparingly naturalized in lowland.

57. PHRAGMITES Trin.

Spikelets 3 to 7-flowered, cuneate, in large plume-like panicles; empty glumes lanceolate, the second one-third longer than the first and about equaling the florets; floral glumes lanceolate, attenuate, entire, glabrous, much longer than the palets; internode of rachilla pilose with silky hairs as long as the florets.—Tall stout broad-leaved grasses from long perennial rootstocks.

1. **P. Phragmites** (L.) Karst. (Reed grass.) Culms 2 to 3 dm. high: leaves narrowed at the base: spikelets nearly 1 cm. long (*Arundo Phragmites* L. *Phragmites communis* Trin.)—Wet land throughout the United States. (Often improperly called Pampas grass.)

58. SIEGLINGIA Bernh.

Spikelets 2 to 10-flowered, compressed or subterete, perfect except the upper florets or rarely diœcious: panicle capitate, spike-like, open and spreading or linear and slender: empty glumes membranaceous, subequal, broadly ovate, usually nearly equaling the lower florets, 1 (rarely 3)-nerved; floral glume oblong or nearly rotund, entire, emarginate or cleft at the apex, membranaceous (rarely coriaceous in the middle), 3-nerved, the lateral nerves nearly marginal, all usually pubescent near the base, the middle one and sometimes the lateral ones slightly excurrent; palet broad, prominently keeled.—Perennial grasses of variable habit. (*Triodia* R. Br.)

* *Spikelets compressed, in short verticillate leafy panicles.*

1. **S. pulchella** (Kth.) Kuntze. Culms 1 dm. high, fasciculately branched from a stoloniferous base: leaves fasciculate, involute, setaceous, 1 to 3 cm. long: spikelets white, 5 to 8 mm. long, 5 to 10-flowered; floral glumes 4 to 6 mm. long, prominently

pubescent, oblong, cleft to the middle. (*Uralepis pulchella* Kth.)—Dry sandy mesas, western Texas to southern California. Var. PARVIFLORA Vasey is slender, with florets 2 to 3 mm. long.—Western Texas.

* *Spikelets compressed, crowded in short subcapitate panicles on the simple nearly naked culms, bleaching white at maturity: leaves short, blunt-pointed, strongly keeled.*

\+ *Floral glume entire or merely mucronate.*

2. **S. acuminata** (Munro) Kuntze. Culms 1 to 3 dm. high, erect, tufted from a perennial rootstock: spikelets 4 to 8, about 1 cm. long; empty glumes smooth, acute, shorter than the contiguous florets; floral glumes broadly lance-ovate, subacute, or somewhat acuminate, mucronulate, pubescent, twice as long as the broad palet (*Tricuspis acuminata* Munro.)—Dry gravelly soil, Texas to Arizona.

\+ \+ *Floral glume deeply cleft at the apex; awn from the sinus exceeding the lobes.*

++ *Floral glume lance-ovate; lobes subacute.*

3 **S. avenacea** (HBK.) Kuntze. Culms 2 to 3 dm. high from a stoloniferous base: panicle 3 to 5 cm. long: spikelets 6 to 8 mm. long, 5 to 8-flowered; empty glumes nearly equaling the lower florets; floral glume oblong, prominently ciliate near the base on the nerves; palet about one-half as long as the glume. (*Triodia avenacea* HBK.)—Western Texas to central Mexico. Var. GRANDIFLORA (Vasey), of the same range, is slightly larger throughout, with spikelets 8 to 12 mm. long, and 6 to 8-flowered. (*Triodia grandiflora* Vasey.)

++ ++ *Floral glumes linear-oblong, lobes obtuse.*

4. **S. Nealleyi** (Vasey). Culms slender, 3 to 5 dm. high: panicle lance-oblong, 3 to 6 cm. long: spikelets 6 to 8 mm. long, 5 to 8-flowered; first empty glume nearly equaling and second slightly exceeding the lower florets; floral glume prominently pubescent; palet about one-half as long as the glume. (*Triodia Nealleyi* Vasey.)—Cañons, Presidio County, Texas.

* * * *Spikelets oblong, subcompressed, in a rather dense spikelike panicle: culms leafy: leaves attenuate pointed, nervose.*

\+ *Panicle elongated: spikelets about 5 mm. long.*

= *Empty glumes much longer than the lower florets.*

5. **S. stricta** (Nutt.) Kuntze. Culms erect, 5 to 10 dm. high: leaves numerous 2 to 5 dm. long: panicle rigid, 1 to 3 dm. long: spikelets 4 to 6 mm. long, 2 to 10-flowered; floral glume obtuse or slightly emarginate, often mucronate, pubescent on the nerves below the middle, equaled by the palet. (*Tricuspis stricta* Nutt.)—Lowland, central Texas to Louisiana.

= = *Empty glumes about as long as the lower florets.*

6. **S. albescens** (Munro) Kuntze. Culms 4 to 8 dm. high, usually simple: leaves mostly flat, 1 to 3 dm. long: panicle 1 to 2 dm. long: spikelets short oblong, 4 to 6 mm. long, 8 to 10-flowered; floral glumes rotund, somewhat emarginate or erose, mucronate, slightly pubescent at the base; palet broadly ovate, equaling the glume. (*Tricuspis albescens* Munro.)—Prairies, southern Texas to New Mexico.

\+ \+ *Panicle short, oblong: spikelets about 10 mm. long.*

7. **S. congesta** sp. nov. Culms 4 to 8 dm. high, from a perennial rootstock: nodes and throats of striate sheaths usually purple: leaves 5 to 15 cm. long: panicle 5 to 8 cm. long; rays single, 1 to 3 cm. long, crowded with sessile spikelets: spikelets 8 to 12 mm. long, 10 to 15-flowered, turgid; empty glumes slightly shorter than the adjacent florets, 1-nerved; floral glume 4 to 5 mm. long, ovate-oblong, obtuse, mucronate, the lateral nerves slightly or not at all excurrent, pubescent on the

nerves near the base; palet one-fourth shorter than the glume, the keels prominently arcuate near the base.—Type specimen in Nat. Herb. No. 24, collected by G. C. Nealley near Corpus Christi, Texas, May, 1891. It is the same as No. 121, J. Reverchon, Texas, 1879, which was distributed as *Tricuspis albescens* Munro.

* * * * *Panicle open, branches spreading.*

\+ *Panicle ample (1 to 3 dm. long): spikelets compressed.*

\+\+ *Floral glume entire or emarginate, sometimes mucronate.*

8. **S. Texana** (Thurb.) Kuntze. Culms slender, leafy, 3 to 5 dm. high: leaves 2 to 3 dm. long, often exceeding the panicle: spikelets 6 to 12 mm. long, 6 to 10-flowered; empty glumes unequal, about one-half as long as the adjacent florets; floral glume broadly ovate or rotund; palet broadly ovate or almost hastate lobed at the base, one-third shorter than the glume. (*Tricuspis Texana* Thurb. Mss.)—Hills, southwestern Texas.

9. **S. eragrostoides** (Vasey.) Culms nearly 1 m. high, leafy: leaves hispidulous, flat, 2 to 3 dm. long: panicle pyramidal, 2 to 3 dm. long: spikelets 5 to 7 mm. long, 8 to 10-flowered; empty glumes nearly equaling or slightly exceeding the lower florets; floral glume broadly oblong, slightly pubescent below the middle, one-third longer than the palet. (*Triodia eragrostoides* Vasey & Scribn.)—Hillsides, southern Texas and Florida.

\+\+\+ *Floral glumes somewhat 3-toothed, the nerves all slightly excurrent.*

10. **S. ambigua** (Ell.) Kuntze. Culms 4 to 8 dm. high, simple: leaves attenuate, 1 to 3 dm. long: panicle 1 to 2 dm. long: spikelets short oblong, 4 to 6 mm. long, 5 to 8-flowered, usually purple; empty glumes slightly shorter than the lower florets; floral glume broadly oblong, pubescent below the middle; palet equaling the glume. (*Poa ambigua* Ell. *Tricuspis ambigua* Chapm. *Triodia ambigua* Vasey.)—Rare, Point Isabel, Texas, and northwestern Florida.

11. **S. seslerioides** (Michx.) Scribn. (TALL RED TOP.) Culms about 1 m. high, simple, leafy: panicle 2 to 3 dm. long: spikelets linear, 6 to 8 mm. long, 5 to 8-flowered, usually purple; empty glumes shorter than the lower florets; floral glumes oblong, pubescent below the middle on the nerves; palet one-fourth shorter than the glume. (*Poa seslerioides* Michx. *Tricuspis seslerioides* Torr. *Triodia cuprea* Jacq.)—Low rich land, Texas to Minnesota and eastward to Maine and Florida. Var. INTERMEDIA Vasey has culms slender and generally shorter than the species, with panicles very open and usually hairy in the axils, and pedicels longer than the spikelets.—Texas to Oklahoma.

\+ \+ *Panicle small (3 to 5 cm. long): spikelets subcylindrical.*

12. **S. purpurea** (Walt.) Kuntze. (SAND GRASS.) Culms rather robust, slightly barbellate at the numerous geniculate nodes: leaves short, flat or involute, acute: panicle 3 to 5 cm. long; branches few, short and spreading: spikelets purple, 4 to 7 mm. long, 2 to 5-flowered; empty glumes shorter than the lower florets; floral glume oblong, cleft one-third way from the apex, with a ciliate awn exceeding the lobes, ciliate on the nerves; palet prominently ciliate, one-third shorter than the glume. (*Aira purpurea* Walt. *Triodia purpurea* Hack.)—Sandy shores, eastern Texas to Michigan and along the Gulf and Atlantic coasts.

* * * * * *Panicle narrowly linear: spikelets terete.*

\+ *Empty glumes both 1-nerved.*

13. **S. mutica** (Torr.) Kuntze. Culms slender, wiry, 3 to 5 dm. high: leaves mostly involute, rather rigid: panicle 1 to 2 dm. long; branches appressed: spikelets 8 to 10 mm. long, 5 to 8-flowered; empty glumes nearly equal, shorter than the lower florets; floral glume oblong, entire or emarginate, prominently pubescent near the base,

nearly twice as long as the palet. (*Tricuspis mutica* Torr.)—Dry hills, western Texas to Arizona and northern Mexico.

+ + *Second empty glume 3 to 5-nerved.*

14. **S. trinerviglumis** (Munro) Kuntze. Culms 4 to 8 dm. high, tufted, leafy: leaves 2 to 3 dm. long: panicle 1 to 2 dm. long; branches appressed, about equaling the intervals: spikelets 7 to 10 mm. long, 6 to 8-flowered; empty glumes about equaling the lower florets; floral glume subentire or emarginate, often mucronate, pubescent below the middle, one-third longer than the ciliate palet. (*Tricuspis trinerviglumis* Munro.)—Western Texas to Colorado and Arizona.

15. **S. Buckleyana** (Vasey.) Culms slender, about 5 dm. high: leaves narrow, subinvolute, pungent-pointed: panicle 1.5 to 2.5 dm. long; branches erect, 2 to 4 cm. long, slightly exceeding the intervals: spikelets 4 to 6 mm. long, 3 to 5-flowered; second empty glume larger than the first and about equaling the florets; floral glume ovate-oblong, slightly 2-lobed at the obtuse apex, pubescent on the nerves below the middle; palet one-fourth shorter than the glume. (*Triodia Buckleyana* Vasey.)—Rare, southern Texas.

* * * * * * *Diœcious: panicles linear: staminate spikelets compressed; pistillate spikelets fusiform.*

16. **S. Wrightii** Vasey. Both sexes stoloniferous and very leafy: *staminate plant,* culms 1 to 3 dm. high; spikelets nearly 1 cm. long, in short, few-flowered panicles (*Poa Texana* Vasey): *pistillate,* culms 3 to 6 dm. high; panicle 1 to 2 dm. long; spikelets 8 to 14 mm. long, 4 to 8-flowered; empty glumes slightly shorter than the lower florets, 3 (or indistinctly 5)-nerved; floral glume ovate, entire or slightly mucronate, smooth, prominently 3 to 5-nerved, subcoriaceous with broad membranaceous margins; palet rigid, slightly ciliate, one-third shorter than the glume.—Presidio County, Texas. An anomalous species, very unlike the other species of the genus, but fitting here better than in any other established genus.

59. DIPLACHNE Beauv.

Spikelets 2 to 12-flowered, linear, compressed or subterete, sessile or short pedicelled on the lower sides of the rays of the racemose panicle (rarely in a simple spicate panicle), rays horizontal to nearly erect, spikelet-bearing to the base: empty glumes 1-nerved, acute or somewhat tridentate, the second larger but not exceeding the adjacent floret; floral glumes membranaceous, rarely rigid, obtuse, truncate or acute, sometimes short-awned or 3-toothed, often pubescent on the 3 nerves near the base, slightly exceeding the palet: grain translucent amber colored, oblong or subterete: internode of rachilla glabrous. —Perennial grasses with abundant narrow leaves; some of the species widely diffused but none of them common.

* *Panicle simple, linear.*

1. **D. spicata** Doell. Culms slender, 1 to 2 dm. high, nearly naked above the base: leaves at the base numerous, narrow, involute, 3 to 5 cm. long: panicle 5 to 10 cm. long: spikelets about 6 mm long, 8 to 10-flowered; second empty glume obtuse or somewhat toothed, one-third longer than the acute first glume; floral glume ovate, short-awned between the obtuse lobes, pubescent at the base rachilla pubescent at the nodes. (*D. Reverchoni* Vasey.)—Among rocks, Llano County, central Texas.

* * *Panicle racemose, more or less spreading.*

\+ *Floral glume truncate or obtusely lobed.*

2. **D. imbricata** (Thurb.) Scribn. Culms 4 to 8 dm. high, erect or decumbent at the base, usually simple: leaves often involute: panicle rather dense; branches numerous, 3 to 5 cm. long: spikelets 6 to 8 mm. long, 6 to 10-flowered; florets closely imbricated; empty glumes subacute, the second twice as large as the first; floral glume truncately obtuse, or somewhat 3-toothed, the 3 nerves all slightly excurrent, the lateral ones pubescent below the middle. (*Leptochloa imbricata* Thurb.)—River banks, western Texas to the Gulf of California.

3. **D. dubia** (HBK.) Benth. Culms erect, 4 to 8 dm. high, usually simple: leaves 2 to 4 dm. long: panicle open, 1 to 2 dm. long; branches alternate, 1 dm. long or less: spikelets 5 to 7 mm. long, 2 to 5-flowered; empty glumes acute, slightly unequal; floral glume emarginate, mucronate between the broad obtuse lobes, smooth except the slightly ciliate margins. (*Chloris dubia* HBK. *Leptochloa dubia* Nees.)—Western Texas to northwestern Mexico and in southern Florida.

+ + Floral glume subacute and denticulate or acute and entire.

4. **D. fascicularis** (Lam.) Beauv. Culms 3 to 6 dm. high, erect or decumbent at the base, often branching: sheaths loose: panicle usually included below; branches alternate or subverticillate, spreading or nearly erect: spikelets 6 to 9 mm. long, 6 to 10-flowered; empty glumes somewhat 3-toothed, the second twice as large as the first; floral glume mucronate or awned, 2-toothed, or somewhat 4-toothed by the excurrent lateral nerves, pubescent near the base. (*Festuca fascicularis* Lam. *Leptochloa fascicularis* Gray.)—Brackish meadows, Texas to California, northward in the Mississippi Valley, and along the Atlantic coast to New England.

60. ERAGROSTIS Beauv.

Spikelets 3 to 30-flowered, compressed, awnless, perfect except the upper floret: panicle usually large and spreading, rarely contracted or subcapitate; rachilla usually persistent with the palets: empty glumes ovate, acute, or subobtuse, membranaceous, 1-nerved, the second rarely 3-nerved; floral glumes membranaceous, ovate, acute, or subobtuse, smooth or slightly hispid on the keel; palets arched, 2-keeled, slightly shorter than the glumes: grain oblong or globose, semi-translucent, amber colored, terete or with a shallow channel.—Perennials or annuals, usually with numerous leaves somewhat pilose at the ligule.

** Panicle large, occupying one-half of the culm or more, loose and spreading: mostly erect perennials: culms simple or branching only at the base.*

+ Panicle virgately elongated: empty glumes narrow, very acute, about equaling the lower florets.

1. **E. tenuis** (Ell.) Gray. Culms nearly 1 m. high: branches and remote subdivisions in the panicle capillary, slightly hispid, usually pilose in the lower axils: spikelets 4 to 8-flowered, 5 to 8 mm. long, on pedicels usually twice as long; florets rather loose on the elongated rachilla: grain slightly grooved, about 1 mm. long. (*Poa tenuis* Ell.)—Sandy land, Texas to Kansas and Ohio. Var. TEXENSIS Vasey has spikelets 1 to 4-flowered, and lower glumes usually exceeding the lowest floret. —Texas to Louisiana.

+ + Panicle broadly spreading: empty glumes broadly ovate except in Nos. 3 and 4, shorter than the adjacent florets.

++ Spikelets very short-pedicelled or sessile on the divergent subdivisions of the panicles.

2. **E. curtipedicellata** Buckley. Culms 5 to 10 dm. high, tufted, from perennial rootstocks: spikelets numerous, subappressed on the rather rigid branches and subdivisions, 7 to 10-flowered, 4 to 7 mm. long; floral glume acute, slightly exceeding the hispid ciliate palet: grain oblong, nearly smooth, about 0.7 mm. long.—Low sandy land, central and western Texas.

3. **E. refracta** (Muhl.) Scribn. Culms 3 to 6 dm. high, erect: leaves narrow, often involute: panicle very open: spikelets scattered along the subdivisions, flatly compressed, 8 to 20-flowered, 5 to 10 mm. long; floral glume one-fourth longer than the palet: grain oblong, slightly recticulate or nearly smooth. (*Poa refracta* Muhl. *Eragrostis campestris* Trin.)—Low sandy land, central Texas to Florida and South Carolina.

4. **E. sessilispica** Buckl. Culms erect or ascending, rather rigid, simple, 3 to 9 dm. high: leaves mostly from the base, 1 to 3 dm. long: panicle loose, rigid, more than one-half as long as the culm; branches alternate, horizontal, 1 to 2 dm. long, pubescent in the axils: spikelets 6 to 10 mm. long, 6 to 12-flowered; empty glumes acute, nearly equaling the lower florets; floral glume rigid, ovate, acute, glabrous. (*Leptochloa rigida* Munro Mss. *Diplachne rigida* Vasey.)—Dry prairies and river valleys, central Texas to New Mexico and northward to Kansas.

++ ++ *Spikelets small, 3 to 9-flowered, on divergent pedicels many times their own length.*

5. **E. capillaris** (L.) Nees. Culms 3 to 6 dm. high, erect or spreading: leaves narrow, often pilose: panicle loose, capillary; branches scabrous: spikelets 2 to 4 mm. long, 2 to 4-flowered; floral glume broadly lance-ovate, smooth, nearly equaled by the palet: grain subglobose, 0.7 mm. long, finely rugose under a glass. (*Poa capillaris* L.)—Low prairies, Texas to Iowa and eastward.

6. **E. pectinacea** (Michx.) Steud. (MEADOW COMB GRASS.) Culms 4 to 8 dm. high: sheaths somewhat pubescent: panicle very open; branches 2 dm. long or less, horizontal, hispidulous, pilose at the axils: spikelets 4 to 8-flowered, 3 to 6 mm. long; floral glume subacute, slightly exceeding the ciliate palet: grain oblong, smooth, 0.8 mm. long. (*Poa pectinacea* Michx.)—Central Texas to Florida and northward.

7. **E. lugens** Nees. Culms 3 to 6 dm. high: leaves attenuate, prominently pubescent at the ligule: panicle diffuse; branches smooth, subverticillate at the base, in twos, or single above: spikelets 3 to 6 mm. long, 5 to 9-flowered, rather turgid; floral glume broadly ovate, acute, slightly exceeding the smooth palet: grain oblong, about 1 mm. long.—Low prairies, Texas to Arizona and eastward to Florida. Var. MAJOR Vasey, of the same range, is larger (6 to 8 dm. high), with a large open spreading panicle.

++ ++ ++ *Spikelets large, 8 to 15-flowered, on pedicels nearly their own length.*

8. **E. Neo-Mexicana** Vasey. Culms 4 to 8 dm. high, usually branching near the base: leaves flat, 4 to 10 mm. wide: panicle oblong, 2 to 4 dm. long, diffuse; branches 1 dm. long or less, hispid, ascending: spikelets 5 to 8 mm. long, 8 to 15-flowered; floral glume hispidulous on the keel near the acute apex, one-fourth longer than the ciliate palet: grain oblong, truncate at each end, slightly grooved.—Mountain sides, western Texas to southern California.

* * *Panicle comparatively small, somewhat contracted: annuals, branching and usually spreading or decumbent.*

\+ *Spikelets rather turgid on pedicels of various lengths.*

9. **E. Mexicana** Link. Culms 3 to 6 dm. high: panicle oblong; branches smooth, single or somewhat verticillate, ascending, 1 dm. long or less: spikelets 4 to 10-flowered, 3 to 6 mm. long; empty glumes one-half as long as the contiguous florets; floral glume subacute, hispidulous on the keel, one-fourth longer than the hispidulous palet: grain oblong, oblique, nearly smooth under a glass, about 0.8 mm. long.—Lowland, western Texas to southern California.

10. **E. pilosa** (L.) Beauv. Culms 2 to 5 dm. high, rather weak: leaves usually pilose at the ligule: panicle 1 to 2 dm. long, diffuse; branches 5 cm. long or less: spikelets 3 to 6 mm. long, 4 to 8-flowered; florets rather loose on the elongated rachilla; empty glumes unequal, about one-half as long as the contiguous florets; floral glume nearly smooth, subacute, slightly exceeding the smooth palet: grain oblong, smooth, nearly 1 mm. long.—Texas to Minnesota and eastward to Maine and Florida. (The introduced form, common along the eastern coast, can not be distinguished from the native form which has been called *E. Purshii* Schrad.)

11. **E. major** Host. (PUNGENT MEADOW GRASS.) Culms 2 to 5 dm. high, leafy: leaves flat, 4 to 8 mm. wide: panicle rather densely flowered, oblong, 1 to 2 dm. long: spikelets sessile or short-pedicelled, 6 to 15 mm. long, 6 to 20-flowered; upper empty glume somewhat 3-nerved; floral glumes obtuse, prominently nerved, one-fourth longer than the ciliate palet: grain subglobose, 0.8 mm. in diameter.—Introduced everywhere in the United States and northern Mexico.

+ + Spikelets flatly compressed, sessile.

12. **E. glomerata** (Walt.) Culms 4 to 8 dm. high, erect or ascending: panicle narrow, rather dense, 1 to 3 dm. long; branches numerous, subverticillate: spikelets 6 to 10-flowered, about 3 mm. long; florets about 1 mm. long; glumes all acute; floral glume one-fourth longer than the palet; grain broadly spindle-shaped, nearly 0.5 mm. long. (*Poa glomerata* Walt. *Poa conferta* Ell. *Eragrostis conferta* Trin.)—Sandy river banks, central Texas to Florida.

** * * Panicle composed of more or less crowded clusters of sessile flatly compressed spikelets.*

+ Culms upright.

13. **E. interrupta** (Nutt.) Trelease. Culms 3 to 6 dm. high, usually simple: panicle subspicate, interrupted: spikelets pale green, usually variegated with red and purple, 5 to 20 mm. long, 5 to 30-flowered; glumes all very acute; upper empty glume more or less distinctly 3-nerved: grain terete, smooth, nearly 1 mm. long. (*Poa interrupta* Nutt. *Eragrostis oxylepis* Torr.)—Dry sandy hills, especially near the nests of the red ants, Texas to Arizona and eastward along the Gulf coast to Florida.

+ + Culms creeping.

14. **E. hypnoides** (Lam.) B. S. P. (CREEPING MEADOW GRASS.) Culms more or less fasciculately branched, 5 to 15 cm. high: leaves short, usually divaricate: spikelets crowded in subcapitate clusters, 10 to 20-flowered, 1 cm. long or less: grain globose, 0.5 mm. in diameter. (*Poa hypnoides* Lam. *Poa reptans* Michx. *Eragostis reptans* Nees.)—Low wet land, throughout the United States and Mexico.

61. EATONIA Raf.

Spikelets usually 2-flowered, with a naked pedicel-like rudiment, compressed, cuneate, awnless, perfect, numerous, short-pedicelled or nearly sessile on the verticillate branches of the rather slender panicles; rachilla smooth, articulate above the thin herbaceous empty glumes, first empty glume narrowly lanceolate, 1-nerved; second empty glume broad, obovate, 3-nerved; floral glume lance-oblong, herbaceous with membranaceous margins, nearly smooth, indistinctly 3-nerved, slightly exceeding the very thin palet: grain lance-oblong, yellow, nearly opaque. Erect grasses with slender simple culms and usually flat puberulent leaves.

* *Panicle dense.*

1. **E. obtusata** (Michx.) Gray. (EARLY BUNCH-GRASS.) Culms 4 to 8 dm. high: panicle 1 to 2 dm. long; branches short, erect: spikelets short-pedicelled, about 2.5 mm. long; upper empty glume broadly obovate, obtuse, exceeding the lower, nearly one-third shorter than the lower floret; floral glume slightly exceeding the palet. (*Aira obtusata* Michx.)—Moist land, central Texas to Minnesota and eastward. Var. ROBUSTA Vasey is robust and scabrous throughout (5 to 10 dm. high), with panicle dense interrupted spikelike, and spikelets about 3 mm. long.—Western Texas to Arizona.

* * *Panicle rather loosely flowered.*

2. **E. Pennsylvanica** (DC.) Gray. Culms 5 to 10 dm. high: panicle 1 to 2 dm. long, often slightly nodding; branches ascending: spikelets 3 mm. long; upper empty glume oblong-obovate, often subacute, about equaling the lower in length, one-third shorter than the lower floret; floral glume slightly exceeding the palet. (*Kœleria* (*?*) *Pennsylvanica* DC.)—Moist woods and meadows, northern Texas and more common northward. Var. LONGIFLORA Vasey has leaves 5 to 8 mm. wide, spikelets about 4 mm. long (nearly equaled by the pedicels), and floral glume one-fourth longer than the palet.—Lowland, central Texas.

3. **E. Dudleyi** Vasey. Culms slender, 6 to 10 dm. high: panicle slender, 1 to 2 dm. long; branches mostly erect, the longer ones naked near the base: spikelets about 3 mm. long; empty glumes equal, nearly equaling the lower floret; floral glume subacute, scabrid, slightly exceeding the palet.—Hillsides, eastern Texas to New England, mostly along the coast region.

62. KŒLERIA Pers.

Spikelets 2 to 4-flowered, with an obscure naked pedicel-like rudiment, compressed, awnless, short pedicelled in narrow subspicate panicles; rachilla hispidulous, articulating above the empty glume: empty glumes lanceolate, acute, carinate, herbaceous with membranaceous margins, subequal, the first 1-nerved, the second 3-nerved; floral glume thin, herbaceous, lanceolate, obscurely 3-nerved, nearly smooth, equaling or slightly exceeding the thin, hyaline palet.—Erect perennial grasses with simple culms, and numerous usually flat leaves at the base.

1. **K. cristata** (L.) Pers. Culms 3 to 6 dm. high: panicle subspicate, sometimes interrupted near the base and usually tapering near the apex: spikelets mostly 2-flowered, 4 to 6 mm. long; empty glumes about equaling the lower floret; floral glume acute or mucronulate. (*Aira cristata* L.)—Hills and high mesas, northern Texas to New York and westward.

63. MELICA L.

Spikelets 3 to 12-flowered, oblong or conical, awnless; the upper 1 to 3 florets imperfect, unlike the lower perfect ones and convolute around each other forming a clavate or oblong rudiment: panicle open: spikelets short-pedicelled and somewhat racemose along the few branches: empty glumes thin, broad, the upper usually larger, 7 to 9-nerved; floral glume ovate, scarious at the obtuse or subacute apex, 5 to 15-nerved, one-third longer than the palet: grain oblong or broadly spindle-shaped, channelled, opaque.—Slender leafy perennial grasses with large spikelets.

* *Spikelets broadly oblong: rudiment prominent, clavate, on the elongated rachilla: floral glume 11 to 15-nerved.*

1. **M. diffusa** Pursh. Culms about 1 m. high, simple: leaves nearly 1 cm. broad: panicle 1 to 2 dm. long; branches mostly in twos with the spikelets racemose and pendant: spikelets 10 to 12 mm. long, usually 2-flowered; first empty glume very broad, membranaceous, shorter than the obovate second; floral glume lance-oblong, membranaceous at the obtuse apex: grain spindle-shaped, about 2.5 mm. long.—Rocky ravines, central Texas to Arkansas and westward to New Mexico.

2. **M. mutica** Walt. Culms 4 to 8 dm. high: leaves 3 to 7 mm. wide: panicle 1 to 1.5 dm. long, with few spreading branches or sometimes reduced to a simple raceme: spikelets pendant, 8 to 10 mm. long, 2-flowered; empty glumes subequal, subacute, the lower broader, nearly equaling the florets.—Moist land, central Texas to Georgia and Maryland.

*** Spikelets conical or narrowly linear: rudiment narrowly conical or linear: rachilla not prominently elongated: floral glume 5 to 7-nerved.*

3. **M. Porteri** Scribn. Culms 5 to 8 dm. high: leaves narrow, 2 to 4 dm. long: panicle narrow, 2 to 3 dm. long: spikelets racemose, pendant on the few slender branches, 8 to 12 mm. long, 2 to 4-flowered; empty glumes equal, about one-third shorter than the lower floret: grain oblong, subacute, 2.5 mm. long.—Mountains, Texas to Arizona and adjacent Mexico.

4. **M. multinervosa** Vasey. Culms slender, 5 to 10 dm. high: leaves slender, often involute; lower sheaths pubescent at the base: panicles 1 to 1.5 dm. long; branches few, nearly erect or the lower ones spreading: spikelets rigid, 8 to 12-flowered, 1 to 2 cm. long; empty glumes ovate, acute, coriaceous; floral glume, coriaceous, pubescent at the base: grain 2.5 mm. long, obovate with a broad, deep channel.—Rare, southern Texas. Apparently diœcious but the staminate form not seen. In many respects this species appears to be more closely related to *Sieglingia Wrightii* than to any of the Melicas.

64. UNIOLA L.

Spikelets with 3 to 15 perfect florets and 3 to 9 empty glumes at the base and usually one or two imperfect florets at the apex, compressed, awnless: panicle narrow or somewhat spreading: floral glumes rather rigid, acute or denticulate, 7 to 15-nerved, one-half to one-third longer than the palet: grain flattened, obtuse, smooth.—Mostly tall grasses with simple leafy culms, tufted from perennial rootstocks.

** Spikelets large, in ample panicles: floral glumes prominently keeled.*

1. **U. paniculata** L. (Sea oats.) Culm 1 to 3 dm. high, coarse: leaves involute, long attenuate: panicle rather dense, 3 to 5 dm. long: spikelets short pedicelled, 1 to 3 dm. long, flatly compressed, with 5 to 15 perfect florets and two or three pairs of empty glumes nearly as long as the mucronate or denticulate floral glumes.—Drifting sand along the coast, southern Texas to New Jersey.

2. **U. latifolia** Michx. (Broad-leaved spike-grass.) Culms nearly 1 m. high: leaves numerous, nearly 2 cm. wide: panicle spreading, rather loose: spikelets 2 to 4 cm. long and more or less drooping on the long pedicels, flatly compressed; usually 4 empty glumes, the upper pair slightly shorter than the prominently carinate acute floral glume.—Sandy river banks, central Texas to Illinois and eastward.

** * Spikelets small, in narrow panicles: floral glumes convex, acuminate.*

3. **U. gracilis** Michx. (Slender spike-grass.) Culms slender, 6 to 10 dm. high: leaves narrow: panicle very slender, sometimes simple, 2 to 5 dm. long: spikelets 5 to 8 mm. long, with 3 to 5 perfect florets, the three lower glumes empty and short; florets turgid, the glumes involute acuminate at the beak-like points.—Wet woodland, central Texas to Florida and Pennsylvania.

65. DISTICHLIS Raf.

Spikelets 6 to 15-flowered, compressed, linear or narrowly ovate, smooth, awnless, in small subspicate panicles: second empty glume slightly larger, but shorter than the lower floret; floral glume rather rigid, ovate, acute, indistinctly 7 to 11-nerved, slightly larger than the thin palet: grain oblong, oblique, subacute, opaque: dicecious, the pistillate spikelets more turgid, otherwise alike.—Rather low rigid leafy grasses from perennial running rootstocks.

1. **D. spicata** (L.) Kuntze. (SALT GRASS). Culms erect, 2 to 4d m. high: leaves usually crowded, distichous and rigid: panicle 4 to 8 cm. long: spikelets about 1 cm. long. (*Uniola spicata* L.)—Common in saline soil, throughout Texas and northward.

66. DACTYLIS L.

Spikelets 2 to 4-flowered with a glumiferous rudiment, perfect, compressed, sessile or very short-pedicelled in glomerate clusters in a rather dense branching panicle: glumes all herbaceous, or the lower ones submembranaceous, carinate and hispid-ciliate on the keel: empty glumes lanceolate, acute, subequal, shorter than the lower florets; floral glume mucronate, 5-nerved, slightly exceeding the hyaline palet: grain linear, yellow, opaque, channelled or triquetrous.—Rather stout tufted perennial grasses with numerous rough leaves.

1. **D. glomerata** L. (ORCHARD GRASS.) Culms 6 to 10 dm. high, simple: leaves flat, hispid, 2 to 4 dm. long: panicle 1 to 2 dm. long, irregularly pyramidal: spikelets 5 to 8 mm. long.—Introduced. A valuable grass in cultivation.

67. POA L. (SPEAR-GRASS.)

Spikelets 2 to 10-flowered with a glumaceous rudiment, perfect, compressed, ovate, awnless, in a contracted or open panicle: empty glumes membranaceo-herbaceous, lance-ovate, subacute, the first 1-nerved, the second 3-nerved; floral glume thin, herbaceous, subacute or obtuse, 5-nerved, usually pubescent on the keel and with cobwebby hairs at the base, longer than the hyaline palet: grain oblong, linear, much shorter than the floret.—Slender tufted perennial grasses with smooth flat leaves.

* *Panicle dense or narrow.*

1. **P. arachnifera** Torr. (TEXAS BLUE GRASS.) Culms 4 to 8 dm. high from strong rootstocks: leaves linear, flat: panicle oblong or pyramidal, 1 to 2 dm. long: spikelets 4 to 10-flowered, 6 to 10 mm. long; floral glume ciliate on the keel and prominently webbed from the base.—Rich prairies, central Texas to Oklahoma. Sometimes cultivated. Var. GLABRATA Vasey, of the same range, has the floral glume smooth except the web at the base.

2. **P. Bigelovii** Vasey & Scribn. Culms slender, erect, 2 to 4 dm. high: leaves 1 dm. long or less: panicle linear, about 1 dm. long: spikelets 3 to 5-flowered, 3 to 4 mm. long; floral glumes, somewhat ciliate on the keel and marginal nerves, and webbed at the base.—Dry hills, western Texas to southern California.

* * *Panicle very loose and open.*

3. **P. campyle** R. & S. Culms slender, weak 3 to 5 dm. high: leaves narrowly linear, 1 to 2 dm. long: panicle 1 to 2 dm. long with slender distant few-flowered

branches: spikelets 2 to 4-flowered, 5 to 8 mm. long, the florets rather loose on the elongated rachilla; floral glume obtuse, pubescent below the middle. (*Poa flexuosa* Muhl. non L.)—Dry woods, central Texas to Pennsylvania.

68. PANICULARIA Fabr.

Spikelets 4 to 15-flowered, slightly compressed, linear or oblong, smooth or slightly hispid, awnless, in narrow or open spreading panicles: empty glumes unequal, persistent, thin, one-half as long as the adjacent florets; floral glumes herbaceous, membranaceous at the obtuse apex, 7 to 9-nerved, nearly equaled or slightly exceeded by the bidentate palet: grain linear or fusiform, narrowly channeled. —Rather coarse broad-leaved grasses, the florets early deciduous. (*Glyceria* R. Br.)

1. **P. fluitans** (L.) Kuntze. (MANNA GRASS.) Culms about 1 m. high: panicle, slender, erect or somewhat speading: spikelets 7 to 13-flowered, linear, 1 to 2 cm. long; floral glume shorter than the bidentate palet. (*Festuca fluitans* L. *Glyceria fluitans* R. Br.)—Shallow water, rare in Texas, more common northward.

2. **P. nervata** (Willd.) Kuntze. (NERVED MANNA GRASS.) Culms 5 to 10 dm. high, leafy: panicle open and spreading or the slender branches often drooping: spikelets 4 to 7-flowered, 3 to 5 mm. long; floral glume prominently nerved, slightly exceeding the palet. (*Poa nervata* Willd. *Glyceria nervata* Trin.)—Wet land, rare in Texas.

69. FESTUCA L.

Spikelets 4 to 15-flowered, perfect except the glumiferous rudiment, compressed, short-pedicelled or nearly sessile in narrow or open spreading panicles: empty glumes, acute, narrow, unequal, about one-third shorter than the adjacent florets; floral glumes herbaceous or coriaceous, obscurely 5-nerved, hispidulous, slightly pubescent or smooth, acute or awned, convex, often involute; palet bidentate, nearly equaling the glume: grain narrowly linear or fusiform, channelled, usually adhering to the enveloping glume and palet.—Erect simple-stemmed grasses.

* *Panicle narrow: spikelets short-pedicelled or sessile; floral glumes narrow, involute, bristle-pointed or awned: leaves short, involute.*

1. **F. octiflora** Walt. (SLENDER FESCUE.) Culms 2 to 4 dm. high: panicle narrow, subspicate or rarely with the lower branches spreading: spikelets 8 to 12-flowered, 6 to 8 mm. long; floral glumes hispidulous, tapering into a short awn or awnless. (*F. tenella* Willd.)—Dry hills throughout Texas and common throughout the southern United States. Var. ARISTULATA Torr., of the same range, has awns equaling or somewhat exceeding the florets.

2. **F. sciurea** Nutt. Culms slender, weak, 1 to 3 dm. high: panicle 1 to 2 dm. long, with erect or slightly spreading, closely flowered branches: spikelets 4 to 5 mm. long, 4 to 6-flowered; floral glumes pubescent, tapering into an awn two or three times as long as the glume.—Central Texas to Mississippi.

* * *Panicle open: spikelets distinctly pedicelled: floral glume broad, not involute, awnless: leaves broadly linear.*

+ *Florets rather narrow, bristle-pointed.*

3. **F. Texana** Vasey. Culms 4 to 8 dm. high: branches of panicle mostly in twos, rather rigid or slightly flexuous, few-flowered toward the extremities: spikelets 4 to

6-flowered, 8 to 11 mm. long; floral glume acute, smooth, nearly equaled by the palet.—River banks and ravines, central and western Texas.

+ + Florets oblong or obovate, subacute or obtuse.

4. **F. nutans** Willd. (NODDING FESCUE.) Culms 5 to 8 dm. high: branches of the panicle few-flowered near the extremities: spikelets 6 to 8 mm. long, 3 to 5-flowered; second empty glume broader above with membranaceous margins; floral glumes subacute, slightly exceeding the palet.—Rocky woods and hills, central Texas to Illinois and Pennsylvania. Var. JOHNSONI Vasey, of northern Texas, is tall (about 1 m. high), with leaves nearly 1 cm. wide and 2 to 4 dm. long, and florets and empty glumes long and narrow, the second empty glume with no membranaceous margin.

5. **F. Shortii** Vasey. Culms 5 to 10 dm. high, leafy: leaves 3 to 6 mm. broad: panicle somewhat contracted; branches ascending, subdivided and rather densely flowered beyond the middle: spikelets 3 to 6-flowered, 4 to 8 mm. long; empty glumes narrow, scabrous; floral glumes smooth, broadly oblong, obtuse, slightly exceeded by the palets.—Central Texas to Illinois.

70. BROMUS L.

Spikelets 5 to 15-flowered, large, perfect except the upper florets, in open panicles, the triquetrous pedicels thickened upward, at length drooping: empty glumes subequal, two-thirds as long as the adjacent florets, acute or subacute, the first 1 to 3-nerved, the second 3 to 9-nerved; floral glumes herbaceous, rather rigid, convex or carinate, acute, denticulate or obtuse, short-awned or awnless; palets ciliate on the two keels, at length adhering to the prominent groove in the linear smooth amber-colored grain.—Rather coarse grasses with flat leaves.

** Floral glumes smooth; first empty glume 3-nerved; second empty glume 5 to 9-nerved.*

+ Glumes all convex, obtuse.

1. **B. secalinus** L. (CHESS. CHEAT.) Culms 4 to 8 dm. high: panicle 1 to 2 dm. long, pyramidal; branches mostly in fours or fives, verticillate, nearly smooth: spikelets 1 to 2 cm. long, 5 to 10-flowered; florets turgid; empty glumes obtuse or subacute; floral glume obtuse, denticulate, mucronate or short-awned, smooth, 7-nerved; grain concavo-convex.—Introduced, too common in grain fields.

+ + Glumes carinate, acute.

2. **B. unioloides** Willd. (RESCUE-GRASS. AUSTRALIAN BROME GRASS.) Culms 6 to 12 dm. high with numerous rather broad flat leaves from the base: panicle 2 to 4 dm. long; branches finally drooping: spikelets compressed, 2 to 4 cm. long; glume acute or bristle-pointed, 9-nerved, one-third longer than the narrowly lanceolate palet: grain flattened laterally with a narrow deep channel.—Introduced, a valuable grass in cultivation.

** * Floral glume pubescent; first empty glume 1-nerved; second empty glume 3-nerved.*

3. **B. ciliatus** L. (SWAMP CHESS.) Culms 6 to 10 dm. high, leafy: leaves and sheaths pubescent or smooth: panicle open, erect or flexuous, 2 to 3 dm. long; branches hispid, at length drooping: spikelets 2 to 4 cm. long, 6 to 15-flowered; empty glumes unequal, about two-thirds as long as the adjacent florets; floral glumes 5 to 7-nerved, pubescent with appressed silky hairs, obtuse, mucronate or short-awned, equaled by the hispid ciliate palet.—Moist land, Texas and northward. Var. MINOR Munro, of northern Texas, is smaller throughout, with floral glumes nearly acute, 3-nerved, and very short-awned.

71. LOLIUM L.

Spikelets 5 to 10-flowered, perfect, compressed with the edge to the axis, sessile, and alternately 2-ranked in long rigid terminal spikes: upper empty glume external, rigid, 5 to 7-nerved; lower empty glume wanting except in the terminal spikelet; floral glume coriaceous, 3 to 5-nerved, obtuse or subacute, short-awned or awnless, convex, smooth, nearly equaled by the palet and large adherent grain.—Coarse erect grasses with numerous flat leaves.

1. **L. perenne** L. (PERENNIAL RYE GRASS.) Culms 4 to 8 dm. high: root perennial: spikelets 1 to 2 cm. long, exceeding the intervals; empty glume about equaling the adjacent floret.—Introduced, sometimes cultivated.

2. **L. temulentum** L. (DARNEL.) Culms rather stout, 5 to 10 dm. high: spikelets 1 to 2 cm. long, often shorter than the intervals; empty glumes usually exceeding the spikelet; florets short, obtuse.—Introduced.

72. AGROPYRON Gaertn.

Spikelets 4 to 15-flowered, perfect, compressed, sessile, with the side against the axis, usually solitary, alternately 2-ranked in the terminal spike: empty glumes subequal, herbaceous, acute, 5 to 7-nerved; floral glume rather rigid, herbaceous, acute or bristle-pointed, 5 to 7-nerved, exceeding the prominently keeled palet: grain linear with a broad channel.—Rather coarse erect grasses.

1. **A. repens**, var. GLAUCUM (Desf.) Scribn. (COLORADO BLUE-STEM.) Culms 4 to 10 dm. high, from running rootstocks, usually glaucous throughout: leaves narrow, rather rigid, sometimes involute: spike 1 to 2 dm. long, with one or sometimes two or three spikelets at the nodes: spikelets 1 to 2 cm. long, 5 to 15-flowered, awnless. (*Triticum glaucum* Desf. *Agropyrum glaucum* R. & S.)—High plains, western Texas and northward.

73. HORDEUM Fourn. (BARLEY.)

Spikelets 1-flowered with an awl-shaped rudiment next to the palet, nearly sessile, 3 at each node of the axis, forming dense spikes: empty glumes somewhat stalked, in pairs in front of each spikelet, 6 in number, forming a kind of involucre, slender, awn pointed or aristiform: lateral florets staminate or neutral, or reduced to bristles; middle floret perfect; floral glume convex, rigid, herbaceous, tapering into an awn, hispid or smooth; palet equaling the glume: grain oblong, usually adherent.—Rather low annual or biennial grasses with numerous rather short flat leaves; the close bristly spikes disarticulating at maturity.

* *Spikes bushy, with spreading awns 3 to 8 cm. long.*

1. **H. jubatum** L. (SQUIRREL TAIL.) Culms 2 to 5 dm. high: spike 1 dm. long or less, light green or yellow, very fragile; lateral florets reduced to awns slightly exceeding the perfect floret; empty glumes aristiform, slightly exceeded by the awn of the perfect floret.—Prairies, Texas to Minnesota and westward. A very troublesome weed.

* * *Spikes narrow, with rigid nearly erect awns 2 cm. long or less.*

2. **H. nodosum** L. (WILD BARLEY.) Perennial (?), culms 4 to 8 dm. high: spike narrow, 4 to 8 dm. long, usually dark green or purple; lateral spikelets staminate or

neutral, awnless; empty glumes aristiform about 1 cm. long, equaling the awn of the perfect floret. (*H. pratense* Huds.)—Rather low lands, mostly in alkaline soil, throughout the southern United States.

3. **H. pusillum** Nutt. Annual: culms 3 to 5 dm. high, slender, weak: spikes 3 to 6 cm. long; lateral spikelets staminate or neutral, awnless; four anterior empty glumes broadened above the narrow stalk-like base, tapering above into a rigid awn about 1 cm. long, equaling the awn of the perfect floret.—Central Texas to California.

74. ELYMUS L. (LYME-GRASS.)

Spikelets 2 to 7-flowered, all perfect except the upper florets, compressed, sessile in clusters of 2 to 4 at each node in the spike: empty glumes nearly side by side in front of the spikelets 2 for each, thickened and nervose or aristiform; floral glume coriaceous or rigid, convex, very acute or awned, nearly equaled by the palet: grain linear, channelled, adhering to the palet and enveloping glume.—Rather coarse grasses with flat rough leaves.

* *Empty glumes thickened and nervose: spikes tardily disarticulating.*

1. **E. Virginicus** L. (VIRGINIA LYME-GRASS.) Culms stout, about 1 dm. high: spikes rigidly erect, 1 to 1.5 dm. long: spikelets 2 to 4 at each node, rather closely appressed, nearly smooth throughout or hispidulous; empty glumes thickened, prominently 5 to 7-nerved, lanceolate, longer than the florets, bristle-pointed or short-awned; awn of floral glume usually straight and rigid, 2 cm. long or less.—River banks, central Texas and northward. Var. MINOR Vasey, of northern Texas, is smaller and slender (4 to 8 dm. high), with spikes loose, and the spikelets rather divergent.

2. **E. Canadensis** L. (CANADA LYME-GRASS.) Culms stout, 5 to 10 dm. high: spike usually nodding, 1 to 2 dm. long: spikelets mostly in pairs, 3 to 5-flowered, hispid or pubescent throughout; empty glumes narrowly lanceolate, indistinctly 3-nerved, tapering into a rather rigid awn 1 to 2 cm. long and about one-half as long as the divergent awns of the 5-nerved floral glumes.—River banks, Texas and northward. Var. GLABRIFLORUS Vasey, of central Texas to Georgia, has smooth floral glumes and strongly 3-nerved empty glumes.

* * *Empty glumes aristiform.*

– *Rachis persistent with the empty glumes.*

3. **E. striatus** Willd. (DENNET-GRASS.) Culms slender, about 1 m. high: spikes usually nodding, 1 to 1.5 dm. long: spikelets 2 to 3 at each node; empty glumes about 2 cm. long; floral glume sparsely hispid pubescent, terminating in an awn slightly exceeding the empty glumes.—Hillsides and open woods, central Texas and northward. Var. VILLOSUS Gray, of the same range, has sheaths and spikelets villous.

– – *Spikes very readily disarticulating.*

4. **E. elymoides** (Raf.) Swezey. Culms 2 to 5 dm. high: leaves numerous, often involute: spikes 1 to 2 dm. long; empty glumes scabrous, spreading, 5 to 10 cm. long, equaled by the awns of the floral glumes. (*Sitanion elymoides* Raf. *Elymus Sitanion* Schultes.)—Hills and dry mesas, central Texas to Minnesota and westward.

75. HYSTRIX Mœnch.

Spikelets 2 to 4-flowered, sessile, 2 or 3 together or solitary at the nodes of the flattened axis in a loose spike: empty glumes aristiform,

about equaling the lower florets, caducous; floral glumes coriaceous, 5-nerved near the apex, terminating in stout hispid awns; palet equaling the glumes: grain linear-oblong flat.—Rather coarse grass, with a dark bottle-green color, rough or hispid throughout. (*Asprella* Willd.)

1. **H. hystrix** (L.) MacMillan. (BOTTLE BRUSH.) Culms about 1 m. high: leaves 2 to 5 dm. long, lanceolate: spike loose, 1 to 2 dm. long: spikelets divergent; floral glumes tipped with awns two or three times their own length. (*Elymus hystrix* L. *Asprella hystrix* Willd.)—Moist woods, central Texas and northward.

76. ARUNDINARIA Michx.

Spikelets 5 to 15-flowered, compressed, awnless, usually solitary at the nodes of the elongated cylindrical jointed rachis, the loose few-flowered spikes thus formed fasciculate in irregular panicles: empty glumes small acute; floral glume herbaceous, about 9-nerved, acute or bristle pointed, equaled by the palet: grain spindle-shaped, with a shallow channel, opaque, free: blade of leaf narrowed to a short petiole-like base, articulate with the sheath.

1. **A. macrosperma** Michx. (CANE.) Culms arborescent, 3 to 10 m. high, simple or branching: panicles lateral: spikelets 3 to 5 cm. long.—River banks, forming cane-brakes, central Texas to Virginia.

2. **A. tecta** (Walt.) Muhl. (SWITCH CANE.) Culms slender, 1 to 3 dm. high: spikelets solitary or in simple terminal racemes, long peduncled. (*Arundo tecta* Walt. *A. macrosperma*, var. *fruticosa* Munro.)—Swamps or wet land, often in water, central Texas to Illinois and Florida.

Class II. **GYMNOSPERMS.**

Those in which the ovules are naked upon the surface of a scale or bract, or within a more or less open perianth: flowers monœcious or diœcious.

GNETACEÆ.

Shrubs or small trees, mostly with jointed opposite or fascicled branches and foliaceous or scale-like opposite (or ternate) exstipulate leaves, mostly diœcious flowers with decussate persistent bracts; staminate in aments, with solitary or monadelphous stamens within a membranous bifid calyx-like perianth, the anther-cells dehiscent by a pore or chink at apex; fertile consisting of an erect sessile ovule terminated by an exserted style-like process, included within a perianth which becomes hardened and often thickened in fruit.

1. **EPHEDRA** L.

Shrubs, with numerous Equisetum-like branches, persistent or deciduous leaves reduced to scales connate into sheaths, axillary inflorescence, 3 to 8 filaments united into a clavate stamineal column, 2-celled anthers, and the fertile perianth hardening and 3 or 4-angled in fruit.

* *Scales binate: branches (not spinose) opposite: bracts opposite, connate, scarious only on margin: fruit smooth, solitary or in pairs.*

1. E. Nevadensis Watson. Erect, 6 dm. or more high, with erect or spreading branches: scales sheathing, with short blunt lobes or more or less elongated tips: staminate aments sessile or short-pedunculate, ovate, of 4 to 6 pairs of bracts: fertile aments pedunculate, with 4 or 5 pairs of round ovate bracts: fruit exserted acute. (*E. antisyphilitica* Watson, not Meyer.)—From the Rio Grande to central Texas.

2. **E. antisyphilitica** Meyer. Stems very weak (24 to 30 dm. long), nearly prostrate or supported by other shrubs, with very short or setaceously tipped distinct subpersistent scales: peduncles very short: staminate bracts 4 to 6 pairs: filaments distinct above.—Along the upper Rio Grande, from the Great Bend to El Paso.

3. **E. pedunculata** Engelm. Stems slender and elongated (18 to 30 dm. long), climbing over surrounding bushes: leaves and fruit-scales in pairs, the latter more or less connate and becoming at length fleshy and forming a red edible pedunculate fruit.—Uvalde.

* * *Scales ternate: branches ternate: bracts in threes and scarcely connate, the pistillate mostly scarious and more or less clawed: fruit solitary, rarely in threes.*

4. **E. trifurca** Torr. Erect, with spinosely tipped branches and conspicuous persistent sheathing acuminate scales (6 to 12 mm. long) becoming white and shreddy

staminate perianth cuneate-oblong, included: fertile aments of numerous whorls of entire bracts (10 to 12 mm. long): fruit smooth, 12 mm. long.—In the mountains and along the Rio Grande, from El Paso to Frontera.

5. **E. Torreyana** Watson. Like the last, but the branches not spinose, and the short acutish scales less persistent and not becoming shreddy: staminate perianth round-ovate: fertile aments with fewer (6 or 7 whorls) often crenulate bracts (6 to 10 mm. long): fruit scabrous, about 8 mm. long.—Extending from the Rio Grande northwestward.

CONIFERÆ. (Pine Family.)

Mostly evergreen trees or shrubs, with resinous juice, mostly awl-shaped or needle-shaped entire leaves, monœcious (rarely diœcious) flowers in catkins and destitute of calyx or corolla, fertile flowers in scaly aments becoming cones or berry-like, and two or more ovules at the base of each scale.

* Fertile scales numerous, spirally imbricated, forming in fruit a dry coriaceous cone: staminate flowers also spirally arranged: leaves scattered or fascicled, from linear to needle-shaped: flowers monœcious: leaf buds scaly: evergreens.

1. **Pinus.** Cones maturing the second year, the scales becoming thickened and corky: leaves 2 to 5 in a cluster, surrounded at base by a sheath of scarious bud-scales.

2. **Pseudotsuga.** Cones maturing the first year, the scales remaining thin: leaves solitary, petioled.

* * Fertile aments of several spirally arranged imbricated scales, without bracts, becoming a globular woody cone: leaves linear, alternate: leaf buds not scaly.

3. **Taxodium.** Seeds two to each scale: leaves 2-ranked, deciduous.

* * * Fertile scales few, decussately opposite, becoming in fruit drupe-like with bony seeds: leaves opposite or ternate: flowers diœcious: leaf-buds not scaly.

4. **Juniperus.** Berry globose, reddish, blue, or blackish, ripening the second year: evergreens.

1. PINUS L. (Pine.)

Trees, with the primary leaves (only on seedlings and young shoots) flat and subulate and serrulate, the secondary in bundles and needle-shaped (terete, semiterete or triangular, depending on the number in a bundle), the sterile cluster at the base of the shoot of the same spring, the fertile immediately below the terminal bud, and the cone-fruit formed of imbricated woody carpellary scales.—Valuable timber trees.

* *Leaves 5, each with a single fibro-vascular bundle: sheaths loose and deciduous: cones subterminal, with scales but slightly thickened at apex and without prickle or point.*

1. **P. flexilis** James. About 15 to 18 m. high and 9 to 15 dm. in diameter, with furrowed gray bark: leaves 3 to 5 cm. long: cones oval to subcylindric, 7 to 12 cm. long, light brown, with somewhat squarrose scales.—In the Guadalupe and Limpia mountains and westward. "White pine."

* * *Leaves 2 or 3, each with two fibro-vascular bundles: sheath close: woody scales of the cones thickened at apex and usually spiny-tipped.*

\+ *Cones lateral; scales much thickened at apex, mostly spiny.*

++ *Leaves in threes.*

2. **P. Tæda** L. A tree 15 to 45 m. high: leaves long (15 to 25 cm.), with elongated sheaths: cones elongated-oblong (7 to 12 cm. long) and tapering; scales tipped with very stout incurved spines: seed with 3 strong rough ridges on the under side.—Extending from the Gulf States to the valley of the Colorado. "Loblolly pine." "Old-field pine."

++ ++ *Leaves in twos.*

3. **P. mitis** Michx. A straight tree 15 to 30 m. high: leaves sometimes in threes, from long sheaths, slender (7 to 12 cm. long): cones ovate or oblong-conical (barely 5 cm. long), the scales with a minute weak prickle.—Extending into eastern Texas from the Atlantic and Gulf States. "Yellow pine." "Short-leaved pine." "Spruce pine." "Bull pine."

4. **P. glabra** Walt. A tree 24 to 30 m. high, with smoothish bark and soft white wood, branching near the ground: branches and branchlets smooth, whitish: leaves slender (7 to 10 cm. long), scattered: cones generally solitary, somewhat cylindrical (5 cm. long), spines nearly obsolete.—Extending into eastern Texas from the Gulf States. "Cedar pine." "Spruce pine." "White pine."

\+ \+ *Cones terminal or subterminal.*

++ *Leaves in twos (rarely threes).*

5. **P. edulis** Engelm. A low round-topped tree, 6 to 9 m. high, branched below: leaves 2.5 to 3 cm. long, rigid, curved or straightish, spreading: cones sessile, subglobose, 5 cm. long; tips of the scales thick, truncate, raised pyramidal, but without awns or prickles: seeds brown, wingless, edible.—In the mountains of western Texas and westward. One of the trees known as "piñon" or "nut-pine."

++ ++ *Leaves in threes.*

= *Scales spiny.*

6. **P. ponderosa** Dougl. A very large tree (60 to 90 m. high, and 35 to 45 dm. in diameter), with very thick reddish-brown bark, deeply furrowed and split into large plates: leaves 12 to 17 cm. long: cones oval, 7 to 12 cm. long and 4 cm. thick, rich brown, sessile (or nearly so), often 3 to 5 together; scale-tips with a stout recurved prickle: seeds dark brown, 8 mm. long, with wings 20 to 25 mm. long, and widest above the middle.—Guadalupe and Limpia mountains and northward. "Yellow pine." "Bull pine."

7. **P. palustris** Mill. A large tree, with thin-scaled bark and very hard resinous wood: leaves from long sheaths, very long (15 to 37 cm.), crowded at the summit of very scaly branches: cones large, cylindrical or conical-oblong (15 to 25 cm. long), the thick scales armed with a short recurved spine. (*P. australis* Michx.)—Sandy soils, extending from the Gulf States as far as Trinity River. "Long-leaved pine." "Georgia pine." "Southern pine." "Yellow pine." "Hard pine."

8. **P. Chihuahuana** Engelm. A middle-sized tree: leaves closely serrulate, 6 to 10 cm. long; sheaths loose, glistening (12 mm. long), deciduous after the first season: cones oval, small, 3 cm. long; scale-tips bearing recurved deciduous prickles.—Extending from the mountains of northern Mexico to those of western Texas and Arizona.

= = *Scales not spiny.*

6. **P. cembroides** Zucc. A small tortuous tree (9 m. high), with spreading or subdeflexed branches ascending at apex: leaves sometimes in pairs, short (3 to 4 cm. long), rigid, with smooth margin, deep green; sheaths very short, finally lacerate: cones small, ovate-globose or globose (6 to 12 cm. long); the scales thick and unarmed: seeds large, with minute wing.—On the summits of the Presidio Mountains. "Nut pine."

2. PSEUDOTSUGA Carr. (Douglas spruce.)

A very large tree, at first pyramidal and spruce-like and often at last more spreading, with leaves 2-ranked by a twist at the base, the stomata only on the lower surface, close to the epidermis of which are the two lateral resin-ducts.

1. **P. Douglasii** Carr. About 45 to 90 m. high and 18 to 45 dm. in diameter, with very thick brown deeply fissured bark: leaves flat, linear, 1.5 to 2.5 cm. or more long: cones 5 to 10 cm. long, subcylindrical; bracts more or less exserted and spreading or reflexed, giving a fringed appearance to the cones: seeds triangular, on the upper side convex and reddish brown, on the lower flat and white, 6 mm. long. (*Abies Douglasii* Lindl.)—In the Guadalupe Mountains and northwestward. "Red fir." "Yellow fir." "Oregon pine."

3. TAXODIUM Richard. (Bald cypress.)

Large and valuable trees, with narrow linear 2-ranked deciduous leaves (part of the leafy branchlet also deciduous), monœcious flowers with both kinds on the same branch; the sterile short-panicled, of few stamens (scale-like shield-shaped filaments bearing 2 to 5 anther-cells); the fertile catkins ovoid, in small scaly clusters, with a pair of ovules at the base of each scale, and a closed globular cone composed of very thick and angular somewhat shield-shaped scales bearing 2-angular seeds at base.

1. **T. distichum** Richard. Leaves linear and spreading; also some awl-shaped and imbricated ones on flowering branchlets.—Extending from the Gulf States to the valley of the Nueces; also a few trees between that and the Devils River.

4. JUNIPERUS L. (Juniper.)

Evergreen trees or shrubs, with subulate or scale-like rigid leaves (often of two shapes), diœcious (occasionally monœcious) flowers in very short lateral catkins, 3 to 6 anther-cells attached to the lower edge of the peltate-scale, the ovoid fertile catkins of 3 to 6 fleshy coalescent one-ovuled scales forming a sort of berry in fruit (which is scaly-bracted underneath and bluish-black with white bloom) with 1 to 3 ovate wing-less bony seeds.

* *Aments axillary: leaves in whorls of three, free and jointed at base, linear-subulate, prickly-pointed, channelled and white glaucous above.*

1. **J. communis** L. (Common juniper.) Shrub or small tree, with spreading or pendulous branches: leaves rigid, more or less spreading (10 to 18 mm. long): berry dark blue, 6 mm. or more in diameter.—Dry sterile hills of northwestern Texas and New Mexico; its southern limit.

* * *Aments terminal: leaves mostly opposite, of two forms, i. e., subulate and loose, and scale-shaped and appressed-imbricated and crowded, the latter with a resiniferous gland on the back.*

← *With smaller bluish-black pulpy resinous berries.*

2. J. Virginiana L. (RED CEDAR or SAVIN.) Varying from a shrub to a tree 18 to 27 m. high, pyramidal, with shreddy bark and red aromatic heart and wood: leaves opposite, mostly acutish, with entire margins: berries on straight peduncles, 1 or 2-seeded: seeds angled, mostly grooved, and often rough toward the upper end.—Throughout northern, central, and western Texas.

3. **J. occidentalis** Hook. A shrub or small tree, with shreddy bark and pale reddish-yellow wood: leaves closely appressed, in threes (or pairs), delicately fringed on the edges: berries 8 to 10 mm. in diameter, with one or more seeds.—Mountains, foothills, and bluffs of southwestern Texas. Var. CONJUGENS Engelm. is a bush or tree 6 to 12 m. high (often with eccentric layers of wood), with 4-ranked obtuse closely appressed slightly denticulate leaves on slender branches, and globose berries 6 to 8 mm. in diameter containing one or two smooth or more or less tuberculate seeds.—Common on the Nueces and San Antonio, but quite rare west of the Pecos. Var. MONOSPERMA Engelm. is a shrub or small tree of scraggy growth, with short branches at right angles, leaves as often in twos as threes, and smaller berries with a single (or two or more) less grooved seed.—Mountains of western Texas and westward.

← ← *With larger reddish-glaucous fibrous dry sweetish berries.*

4. **J. pachyphlœa** Torr. A middle-sized tree, with spreading rounded top, thick much-cracked bark, and pale reddish wood: leaves squarrose, acute, denticulate or ciliate, usually in pairs: berries globose or irregularly tubercled, 10 to 12 mm. in diameter: seeds mostly 4-angled.—Mountains and hillsides of western Texas.

5. **J. flaccida** Schlecht. A bush or small or middle-sized tree, with shreddy bark, spreading branches, and slender nodding branchlets: leaves always in pairs, acute, with spreading tips and slightly denticulate margins: berry large (12 to 14 mm. in diameter), globose or often irregularly tubercled, with 8 to 12 small much distorted seeds in several tiers.—Chisos Mountains.

Series II. **PTERIDOPHYTA.**

By Lucien M. Underwood.

Vascular, mostly herbaceous plants. Reproductive bodies consisting of spores variously borne on the leaves, or in special receptacles, separate or clustered on the stems. Spores on germinating producing a liverwort-like prothallus on which the sexual organs, consisting of archegones and antherids, are borne. From the fertilized archegone arises the asexual or mature plant. Contains (in our limits) seven orders, distinguished as follows:

ARTIFICIAL KEY TO THE ORDERS.

* *Heterosporous, i. e., spores of two kinds.*

\+ *Terrestrial moss-like plants.*

Selaginellaceæ. Leaves 4-ranked or many-ranked; spores borne in the axils of leaves which form more or less distinct terminal spikes ..... p. 557

\+ \+ *Aquatics, rooting in mud.*

Isoetaceæ. Leaves awl-shaped, arising from short bilobed trunks; spores borne in oval sporangia which are inclosed in the base of the leaves ..... p. 558

Marsileaceæ. Leaves filiform or quadrifoliate, rising from more or less creeping rootstocks; spores borne in oval sporocarps ..... p. 560

\+ \+ \+ *Aquatics, floating.*

Salviniaceæ. Leaves distichous on a more or less branching stem; sporocarps ovoid or globose, borne in the axils of the leaves ..... p. 559

* * *Isosporous, i. e., spores of one kind.*

Equisetaceæ. Rush-like plants, with spores borne in sporangia under shield-shaped scales which are crowded in terminal spikes ..... p. 559

Filices. Fern-like plants, with circinate vernation; spores collected in reticulate sporangia, borne in clusters on the back or margin of the leaf or in spikes or panicles ..... p. 560

Ophioglossaceæ. Small somewhat fleshy plants with erect or merely inclined vernation and with spiked or panicled sporangia which open by a transverse slit.. p. 568

SELAGINELLACEÆ.

Plant body leafy, terrestrial, moss-like, with more or less branching stems and scale-like leaves: sporangia one-celled, solitary, borne in the axils of the leaves, some containing macrospores and others microspores.

1. SELAGINELLA Beauv.

The only genus, with the characters of the order.

§ 1. *Stem leaves of one kind, many-ranked: scales of the spikes uniform.*—EUSELAGINELLA.

1. **S. rupestris** (L.) Spring. Stems densely cespitose, prostrate, ascending or trailing, much branched, 5 to 30 cm. long: leaves appressed-imbricate, linear or linear-lanceolate, convex and sulcate dorsally: spikes strongly quadrangular, 12 to 25 mm. long: macrospores abundant.—Granitic rocks, Burnet County (*Reverchon*); Chenate Mountains, Presidio County (*Nealley*). A very variable species.

§ 2. *Stem leaves of two kinds, 4-ranked, spreading in two planes; those of the upper plane smaller and more ascending: scales of the spikes uniform.*—STACHYGYNANDRUM Baker.

* *Main stems decumbent, mostly annual: leaves flaccid.*

2. **S. apus** (L.) Spring. Stems 2.5 to 10 cm. long, slender, angled on the face: leaves of the lower plane spreading above, the lower reflexed, ovate, acute, serrulate, not distinctly ciliate; leaves of the upper plane ovate, short cuspidate: spikes 6 to 12 mm. long, with the scales ovate, acute, membranous, strongly serrulate, acutely keeled in the upper half.—Springy places, head of the Seco (*Reverchon*).

The larger *S. Ludoriciana* should be looked for in the lowlands of the Gulf border.

* * *Stems densely cespitose, rolling into a nest-like ball when dry.*

+ *Light green above, straw colored at base below: leaves ending in a long white awn.*

3. **S. Pringlei** Baker. Stems densely rosulate, the outer 5 to 10 cm. long, the inner gradually shorter; branchlets crowded, ascending, 2 to 3 mm. wide: leaves crowded, those of the lower plane but little larger: spikes short.—Chenate Mountains, Presidio County. This species was erroneously referred to *S. cuspidata* in Contr. U. S. Nat. Herb. I, 60.

+ + *Dark green above, reddish brown below: leaves moderately cuspidate or barely pointed.*

4. **S. lepidophylla** (Hook. & Grev.) Spring. Stems 5 to 10 cm. long, pinnately branched to the base, the pinnæ ascending, subflabellately compound: leaves of the lower plane ascending, closely imbricate, obliquely ovate, obtuse, thick, rigid minutely ciliate; leaves of the upper plane nearly as long, obtuse: spikes 6 to 12 mm. long, with deltoid acutely-keeled bracts.—Western Texas (*Wright*), Chenate Mountains, Presidio County (*Nealley*).

5. **S. pilifera** A. Braun. Differs from the last mainly in having the primary branching varying from flabellate to pinnate, and with leaves cuspidate and serrulate.—Reported from Texas by Baker, who attributes its collection to Wright, but we have failed to find this species among any of Wright's collections accessible. As it is found on the high plateaus of Mexico, its appearance in our flora is to be expected.

Various species of Lycopodium (*L. alopecurioides, L. inundatum*, etc.) should be looked for in the lowlands of the Gulf borders, as they are found in the remaining Gulf States as far as Louisiana.

ISOETACEÆ.

Plant body consisting of a short bilobed or trilobed trunk which emits dense tufts of roots and sends up a compact rosette of rush-like leaves: sporangia sessile in the axils of the leaves, some containing macrospores and others microspores.—Plants submerged or growing in very wet places.

1. ISOETES L. (QUILLWORTS.)

The only genus, possessing the characters of the order.

1. **I. melanopoda** J. Gay. Polygamous: trunk subglobose, deeply bilobed: leaves 15 to 60, slender, erect, bright green, 1 to 2.5 dm. long, usually black at base: sporangia mostly oblong, 4 to 10 mm. long, spotted with a narrow velum: macrospores 0.25 to 0.4 mm. thick, with depressed tubercles often confluent into worm-like wrinkles or almost smooth: microspores spinulose, 0.023 to 0.028 mm. thick.—Houston (*Hall*). The Texan specimens are of the var. PALLIDA Engelm., with paler bases to the leaves of the taller more robust plants.

EQUISETACEÆ. (HORSE-TAILS.)

Plant body rush-like, with jointed and usually hollow stems, the sterile leaves reduced to sheaths at the joints, the fertile forming a short spike terminating the stem.—Plants of sandy banks and wet places.

1. EQUISETUM L.

Perennial plants with wide creeping rootstocks: stems simple or branched, furrowed lengthwise, hollow: sporangia adhering to the under side of shield-shaped scales of the spike, one-celled, opening down the inner side: spores furnished with two slender filaments (*elaters*), which are attached by the middle and uncoil when dry.

1. **E. hiemale** L. Stems 3 to 12 dm. high, rough, 8 to 34-furrowed; ridges with two indistinct lines of tubercles: sheaths rather long, cylindric, marked with one or two black girdles; ridges of the sheaths quadricarinate; teeth membranous, soon deciduous.—Houston (*Ravenel*).

It is not unlikely that the closely allied species *E. robustum* will also be found within our limits.

2. **E. lævigatum** A. Braun. Stems 3 to 12 dm. high, rather slender, 14 to 30-grooved, nearly smooth: sheaths somewhat enlarged upward, marked with a black ring at the base of teeth, which are white-margined and usually deciduous; ridges of the sheath unicarinate or obscurely tricarinate.—Banks, Hempstead, Waller County (*Hall*).

SALVINIACEÆ.

Small floating plants, with a more or less elongate and branching axis bearing apparently distichous leaves: sporocarps thin-walled, two or more on a common stalk, one-celled, with a central receptacle bearing macrosporangia containing a single macrospore, or microsporangia containing numerous microspores.

1. AZOLLA Lam.

Small moss-like plants with pinnately branching stems covered with minute imbricate bilobed leaves, and emitting copious rootlets beneath.

1. **A. Caroliniana** Willd. Floating usually in matted tufts, greenish in shade, reddish in the sunshine: plants 8 to 25 mm. broad: leaves with ovate lobes: macrospores minutely granular: masses of microspores barbed at the tips, the stems of the barbs septate.—Cypress swamps near Victoria (*Lindheimer*).

MARSILEACEÆ. (WATER FERNS.)

Perennial plants rooting in mud or wet sand, with slender creeping rootstocks and (in our species) quadrifoliate long-petioled leaves; fructification consisting of sporocarps borne on peduncles which rise from the rootstock near the base of the leaf or consolidated with it, and containing macrospores and microspores.

1. MARSILEA L.

Sporocarps ovoid or bean-shaped, composed of two vertical valves having several transverse compartments or sori in each valve, the sori composed of both macrosporangia and microsporangia, also provided with a ring which, at the opening of the valves, swells and tears the sori from their position.

* *Sporocarps 2 to 6 on each peduncle.*

1. **M. macropoda** Engelm. Plant robust: petioles 6 to 25 cm. long, with large usually undulate leaflets which are clothed with white hairs on both sides when young, smoother in age: sporocarps 2 to 6 on branching peduncles, densely villose, 6 to 8 mm. long, 5 to 6 mm. wide: sori 10 to each valve.—Rio Grande (*Wright*), Guadalupe County (*Lincecum*), ponds on the Seco (*Reverchon*), Austin (*Buckley*), San Diego (*Croft*).

* * *Sporocarps solitary (rarely 2) on each peduncle.*

2. **M. uncinata** A. Braun. Petioles 6 cm. to 2 dm. long, with nearly smooth entire leaflets which are 10 to 16 mm. long: sporocarps 8 mm. long, 6 mm. wide, borne on peduncles 1.5 to 3 cm. long, with long raphe which terminates in 2 approximate teeth, the upper longer and mostly uncinately curved: sori 13 to 14 in each valve.—In swamps, Dallas (*Reverchon.*)

3. **M. vestita** Hook. & Grev. Petioles 3 to 6 cm. long, with entire or slightly toothed leaflets: sporocarps 4 to 7 mm. long, 3 to 5 mm. wide, with a short raphe and short usually blunt teeth, covered with palæ which vary from a copious soft covering to short appressed beard, or rarely wanting: sori 6 to 11 to each valve. (Includes *M. mucronata* A. Braun, which insensibly graduates into typical forms).—Austin (*Hall, Letterman*), Dallas (*Hall, Reverchon*), between Cibolo and the upper Guadalupe (*Lindheimer*), western Texas (*Wright*), probably widely distributed through the State. Var. TENUIFOLIA (Engelm.) Underw. & Cook has petioles somewhat slender, 5 to 15 cm. long, with narrow villose more or less falcate leaflets with truncate and somewhat toothed apex, sporocarps 5 to 8 mm. long and 4 to 5 mm. wide with divergent subequal teeth, sori 9 to 11 in each valve. (*M. tenuifolia* Engelm.)—"Ponds in the sandy post-oak woods on the Pierdenales" (*Lindheimer*). This interesting form has been only once collected and more information is needed to determine its true relations.

FILICES. (FERNS.)

Plant body consisting of prostrate, ascending, or erect root-stocks, bearing leaves (*fronds*) mostly provided with petioles (*stipes*) and circinate in vernation; spores borne in sporangia which are reticulate, one-celled, and encircled by a more or less complete jointed elastic ring, and are collected in clusters (*sori*) of various forms on the under surface of the leaf with or without a membranous covering (*indusium*);

in a few cases the sporangia are in spikes or panicles: prothallium above ground, green, monoecious or dioecious.—The following is an artificial key to the genera.

* Sporangia surrounded by a vertical ring, bursting transversely, and collected in sori on the back or margin of a leafy frond.

\+ Sori naked.

1. **Polypodium**. Sori round, dorsal: fronds pinnatifid.
2. **Gymnogramme**. Sori dorsal, following the veins: fronds pentagonal (hispid in our species).
3. **Notholæna**. Sori marginal: fronds variously divided, tomentose or covered with a waxy powder.

\+ \+ Sori covered with an indusium.

\+\+ Sori marginal, covered with a reflexed portion of the frond which is more or less altered and membranous.

= Sporangia borne on the reflexed portion.

4. **Adiantum**. Fronds mostly smooth, with polished black stipes.

== Sporangia borne on a continuous vein-like receptacle which connects the apices of the veins.

5. **Pteris**. Fronds large, coarse (in our species ternate and triangular).

=== Sporangia at or near the ends of unconnected veins borne on the under surface of the frond.

6. **Pellæa**. Sori on the upper part of the veins, forming a continuous marginal band: fronds mostly smooth.
7. **Cheilanthes**. Sori minute at the ends of the veins: indusium interrupted or, if continuous, the ultimate segments bead-like: fronds mostly chaffy or woolly.

\+\+ \+\+ Sori dorsal, provided with special indusia.

= Indusia linear or oblong, attached along a vein.

8. **Asplenium**. Sori oblique to the midribs of the pinnæ.
9. **Woodwardia**. Sori parallel to the midribs of the pinnæ.

== Indusia round-reniform or stellate.

10. **Dryopteris**. Indusia superior, orbicular and fixed by the center, or round-reniform and attached by the sinus.
11. **Woodsia**. Indusia inferior, bursting above the sorus into stellate lobes which are more or less concealed by the ripened sporangia.

* * Sporangia pear-shaped, surrounded by an apical ring, bursting longitudinally, and borne in panicles.

12. **Anemia**. Lower pair of pinnæ elongated and fertile.

* * * Sporangia large, globose, with merely the rudiments of a ring; panicled.

13. **Osmunda**. Fertile portions of fronds contracted into panicles.

1. POLYPODIUM L.

Sori round, naked, in one or more rows either side of the midrib; stipe articulated to the rootstock.—Our single species is epiphytic, growing on tree trunks.

1. **P. incanum** Swz. Rootstock woody, wide creeping, scaly: stipes 3 to 9 cm. long, densely scaly: fronds 3 to 15 cm. long, about 3 cm. wide, cut to the rachis into entire pinnæ which are densely squamous beneath; texture coriaceous with the veinlets indistinct.—On trees, Houston (*Hall, Ravenel*), and probably throughout the State. (*P. vulgare* L. should be looked for in the northern part of the State, and *P. thysanolepis* A. Br. in the southwestern).

2. GYMNOGRAMME Desv.

Sori naked, mostly linear, following the course of the veins, and like them simple, forked, or variously branching.—Our single species is a small plant growing in rocky places.

1. **G. Ehrenbergiana** Klotzsch. Rootstock slender, creeping: stipes 7 to 18 cm. long, grayish-brown, slightly scaly and puberulent: fronds 2 to 7 cm. each way, pentagonal, pinnate with the lower pinnæ much the largest, hispid above, tomentose beneath. (*G. hispida* Mett.)—Chenate mountains, Presidio County (*Nealley*). (*G. triangularis*, reported from west Texas in Contr. U. S. Nat. Herb. i, 60, was based on *Notholæna Hookeri*).

3. NOTHOLÆNA R. Br.

Sori naked, at first roundish or oblong, soon confluent into a narrow marginal band; margin of the segments often inflexed so as to form a covering for the sori when young.—Ferns of small or medium size mostly growing on rocks.

§ 1. *Fronds scaly, hairy, or tomentose beneath.*—EUNOTHOLÆNA.

* *Fronds once pinnate.*

1. **N. ferruginea** (Humb.) Hook. Rootstocks short, ascending, with dense rigid scales: stipes 3 to 10 cm long, cespitose, silky-woolly at first: fronds 1.5 to 3 dm. long, 2 to 3 cm. wide, narrowly lanceolate; the pinnae numerous, pinnatifid, densely tomentose beneath, with whitish and afterward rusty wool.—Limpia Cañon, Presidio County (*Nealley*), and probably throughout southwestern Texas.

2. **N. sinuata** (Swz.) Kaulf. Rootstock short, thick, with dense slender chaffy scales: stipes 3 to 10 cm. long, scaly: fronds 1.5 to 6 dm. long, 1 to 3 cm. wide; the pinnæ varying from entire to sinuate, densely scaly beneath. –Chenate mountains, Presidio County (*Nealley*), San Geronimo Creek (*Reverchon*), Crab Apple, Uvalde Cañon (*Mrs. Young*), Gillespie County (*Jermy*), and probably widely distributed in southwest Texas.

* * *Fronds bipinnate to tripinnatifid.*

3. **N. Aschenborniana** Klotzsch. Rootstock short, creeping, clothed with rigid black scales: stipes 7 to 10 cm. long, densely scaly, the scales ciliate: fronds 2 to 4 dm. long, 3 to 7 cm. wide, mostly tripinnatifid, green above, covered below with rusty ciliate scales.—Texas (*Trecul, Drummond*), but not collected recently; to be sought in the southwest.

§ 2. *Fronds farinose beneath, with white or yellow powder.*—CINCINALIS Desv.

* *Fronds pentagonal, bipinnatifid.*

4. **N. Hookeri** D. C. Eaton. Rootstock short, densely covered with rigid dark-brown scales: stipes 1 to 2 dm. long, reddish-brown, smooth, shining: fronds 3 to 9

cm. each way, pentagonal; lower pinnæ much the largest, with their basal segments on the lower side enlarged and again pinnatifid.—On rocks, House Mountain, Llano County (*Reverchon*), Limpia Cañon, Presidio County (*Nealley*).

* * *Fronds deltoid-ovate, nearly bipinnate, the lower segments of the first pair of pinnæ enlarged.*

5. **N. candida** (Mart. & Gale.) Hook. Rootstock slender, scaly: stipes 5 to 20 cm. long, with a few large scarious-margined brown scales which are soon deciduous, black, wiry: fronds 8 to 20 cm. long, 5 to 8 cm. wide, bright green above, chalky-white beneath, nearly bipinnate with narrow linear-oblong segments, margins slightly revolute.—Cañon of the Sabinal, Uvalde County (*Reverchon*), Cedar Mountain, Gillespie County (*Jermy*), Uvalde Cañon (*Mrs. Young*).

* * * *Fronds lanceolate or linear-oblong, bipinnate or tripinnatifid.*

6. **N. Grayi** Dav. Rootstock short: stipes cespitose, 3 to 10 cm. long, light brown, clothed with slender somewhat deciduous scales: fronds 6 to 18 cm. long, 2 to 4 cm. wide, with broadly triangular pinnæ; under surface with copious waxy powder with scattered pale-brown scales: sori brown.—Limpia Cañon, Presidio County (*Nealley*).

7. **N. Schaffneri** (Fourn.) Underw. Rootstock short, clothed with black slightly pectinate scales: stipes 3 to 5 cm. long, dark brown or black, clothed with dark reddish-brown bristly scales and hairs: fronds 10 to 15 cm. long, 2 to 3 cm. wide, with lanceolate-ovate pinnæ; under surface with copious waxy powder with scattered red-brown scales: sori dark brown to black. (*N. Nealleyi* Seaton, Contr. U. S. Nat. Herb. i, 61. *Aleuritopteris Schaffneri* Fourn.)—Chenate Mountains, Presidio County (*Nealley*).

* * * * *Fronds deltoid-ovate, tri-quadripinnate at base.*

8. **N. nivea** Desv., var. DEALBATA (Pursh) Dav. Rootstock short, with copious rusty, lanceolate scales: stipes 2 to 12 cm. long, wiry, dark reddish-brown, smooth: fronds 5 to 12 cm. long, 3 to 8 cm. wide, gradually less pinnate above; ultimate segments numerous, oval or oblong, the terminal ones larger. (*N. dealbata* (Pursh) Kunze.)—On rocks, Meridian, Bosque County (*Hasbrouck*), San Saba (*Reverchon*), and doubtless distributed throughout the western portion of the State.

4. ADIANTUM L. (MAIDENHAIR.)

Sori marginal, attached to the under side of a reflexed portion of the frond which is more or less altered in texture.—Smooth ferns of medium size with polished black stipes and rachises.

1. **A. Capillus-veneris** L. Rootstock creeping: stipes 6 to 25 cm. long: fronds ovate-lanceolate in outline, bipinnate or the upper third simply pinnate, with smooth pinnules which are rhomboid or wedge-obovate, 8 to 15 mm. each way, margins incised except when recurved to form the lunulate indusia.—Along streams, Austin (*Hall*), San Antonio (*Mrs. Young*), Crab Apple, Gillespie County (*Jermy*), and probably more or less frequent in moist places throughout.

2. **A. tricholepis** Fee. Rootstock short, stout, scaly: stipes 7 to 15 cm. long, black: fronds tripinnate, oval in outline, with numerous small pinnules which are roundish-rhombic, barely crenate, and pubescent on both sides: indusia 2 to 4 on each pinnule, velvety.—Pecos River (*Bigelow*), but not collected recently.

5. PTERIS L. (BRAKE.)

Sori marginal, continuous, attached to a slender filiform receptacle which connects the apices of free veins: indusium membranous formed of the reflexed margin of the frond.—Coarse ferns of woods and thickets.

1. **P. aquilina** L. Rootstock wide-creeping: stipes scattered, 3 to 7 dm. high, stramineous: fronds ternate, triangular-ovate, 3 to 6 dm. each way, smoothish or in one form woolly pubescent beneath; lower pinnules pinnatifid.—Var. CAUDATA Hook. Pinnules often linear and entire or with the segments less crowded.—In woods, Houston (*Hall*).

6. PELLÆA Link.

Sori intramarginal, terminal on the veins, at first dot-like, at length confluent forming a marginal line: indusium membranous, formed of the altered and reflexed margin of the segment.—Rock ferns of small or medium size.

§ 1. *Texture coriaceous: indusium broad, conspicuous.*—ALLOSORUS Baker.

* *Pinnules or segments obtuse or acute.*

+ *Fronds pinnate or bipinnate.*

1. **P. atropurpurea** (L.) Link. Rootstock short, with narrow ferruginous scales: stipes 6 to 10 cm. long, dark purplish brown, smooth: fronds 5 to 20 cm. long, 2 to 9 cm. wide, simply pinnate or bipinnate below; pinnules and upper pinnæ 1.5 to 4 cm. long, 2 to 4 mm. wide, nearly sessile, smooth.—Crab apple, Gillespie County (*Jermy*).

2. **P. aspera** (Hook.) Baker. Rootstock short, with ferruginous scales: stipes densely cespitose, 2 to 5 cm. long, brown or black with narrow whitish scales and bristly hairs: fronds 6 to 15 cm. long, 2 to 3 cm. wide, bipinnate, covered on both sides with whitish hairs; segments short, 2 to 4 mm. long, the upper portions of the pinnæ merely pinnatifid.—San Antonio (*Palmer*), Chenate Mountains, Presidio County (*Nealley*), Uvalde Cañon (*Mrs. Young*).

+ + *Fronds tri-quadripinnate at base.*

3. **P. pulchella** (Mart. & Gale.) Fee. Stipes densely tufted, with ferruginous scales at base, 7 to 18 cm. long, brown: fronds 8 to 16 cm. long, 3 to 10 cm. wide, gradually simpler above; segments 2 to 6 mm. long, oval or cordate-ovate, smooth.—Uvalde Cañon (*Mrs. Young*), Mountains near El Paso (*G. R. Vasey*).

* * *Pinnules mucronulate or decidedly acute.*

4. **P. ternifolia** (Cav.) Link. Rootstock short: stipes 5 to 15 cm. long, dark brown or black: pinnæ usually 9 to 15 pairs, all but the uppermost trifoliate; segments mostly linear, sessile or the middle one slightly stalked; margins much inflexed.—Limpia Cañon, Presidio County (*Nealley*).

5. **P. Wrightiana** Hook. Rootstock short, thick, densely chaffy: stipes crowded purplish-brown, 1 to 1.5 dm. long: fronds 8 to 25 cm. long, 5 to 10 cm. wide, pinnate; pinnæ mostly lanceolate, with several pairs of pinnules, occasionally reduced to only three when it approaches the preceding; pinnules elliptical, short, mucronulate, the middle one short-stalked.—Granitic rocks, Llano County (*Reverchon*), Gillespie County (*Jermy*), both resembling *P. ternifolia* in the trifoliate pinnæ.

§ 2. *Texture coriaceous: the ultimate segments broad and flat with very narrow indusia.*—PLATYLOMA J. Sm.

6. **P. flexuosa** (Kaulf.) Link. Rootstock rather slender, creeping: stipes 1.2 to 3.5 dm. long, grayish-red, passing into a flexuose rachis: fronds 1.5 to 7 dm. long, bi-tripinnate with the secondary rachises also zigzag and flexuous; pinnæ mostly alternate; pinnules 1 to 1.5 cm. long, roundish-ovate, smooth, soon becoming flat.—Southwestern Texas (*Wright, Palmer*), Llano County (*Reverchon*), Youngblood County (*Jermy*), Limpia Cañon, Presidio County (*Nealley*). The second form mentioned in Contr. U. S. Nat. Herb. i, 61, belongs to the next species.

7. **P. intermedia** Mett. Rootstock long, slender, widely creeping: stipes scattered, 1 to 1.5 dm. long, pinkish-stramineous, continued into nearly straight rachises: fronds 8 to 25 cm. long, 3 to 10 cm. wide, simply pinnate to bipinnate; pinnæ commonly opposite, remote, the secondary rachises straight, often pubescent; pinnules oval or cordate-ovate.—Limpia Cañon, Presidio County (*Nealley*).

7. **CHEILANTHES** Swz.

Sori nearly terminal on the veins, at first small and roundish, at length confluent.—Mostly hairy or woolly rock-ferns of medium or small size.

§ 1. *Segments mostly flat, the indusia more or less confluent, usually extending over the apices of several veinlets, but not continuous around the segment.*—EUCHEILANTHES.

* *Fronds lanceolate, with brown or black stipes.*

← *Pinnæ usually 5 or 6 pairs; segments and rachises smooth.*

1. **C. Wrightii** Hook. Rootstocks rather slender, creeping: stipes 3 to 8 cm. long, chestnut brown, slightly scaly at base: fronds 5 to 12 cm. long, 2 to 4 cm. wide, mostly tripinnatifid: indusium similar to the frond in texture.—Limpia Cañon, Presidio County (*Nealley*), western Texas (*Wright*).

← ← *Pinnæ more numerous; segments and rachises more or less pubescent.*

2. **C. Alabamensis** (Buckley) Kunze. Rootstock creeping, clothed with slender brown scales: stipes 5 to 18 cm. long, black, with scanty, rusty wool: fronds 8 to 25 cm. long, 3 to 6 cm. wide, narrowly lanceolate, and tapering to an acuminate apex, bipinnate; pinnæ close, ovate-lanceolate, the lower usually slightly smaller than those above; pinnules mostly acute, often auriculate on the upper side at base: indusia pale, interrupted only by the incising of the pinnules.—Lower Rio Grande (*Schott*), mouth of the Pecos (*Bigelow*), Austin (*Hall, Underwood*), Squaw Creek and Enchanted Rock, Gillespie County (*Jermy*), and probably widely distributed. This species closely resembles the next with which it has often been confounded in collections.

3. **C. microphylla** Swz. Rootstock short, creeping: stipes dark brown, 5 to 25 cm. long, rusty pubescent on the upper side: fronds 1 to 2.5 dm. long, 5 to 15 cm. wide, ovate-lanceolate, bi-quadripinnate; pinnæ more distant, deltoid-ovate to ovate-lanceolate, the lower often much larger than those above; pinnules rather blunt, incised on both sides or again pinnate: indusium similar to frond in texture, sub-continuous.—Uvalde Cañon (*Mrs. Young*), Limpia Cañon, Presidio County (*Nealley*).

* * *Fronds triangular-pentagonal, with stout straw-colored stipes.*

4. **C. leucopoda** Link. Rootstock very stout, chaffy: stipes 1 to 2.5 cm. long, densely pubescent: fronds 5 to 16 cm. each way, quadripinnatifid at base, gradually simpler above; lower pinnæ much larger, with the pinnules on the lower side elongate, the segments and rachises everywhere glandular-pubescent.—Uvalde Cañon (*Mrs. Young*).

§ 2. *Ultimate segments minute, bead-like, with the indusium continuous all around the margin: fronds scaly or tomentose or both.*—PHYSAPTERIS Presl.

* *Fronds hairy or tomentose (not scaly) beneath.*

5. **C. gracilis** (Fee) Mett. Stipes densely cespitose, clothed at first with woolly hairs, at length almost smooth: fronds 5 to 10 cm. long, ovate-lanceolate, tripinnatifid or tripinnate, upper surface barely tomentose, the lower densely matted with whitish-brown woolly hairs: indusium narrow. (*C. lanuginosa* Nutt.)—Upper Hondo (*Reverchon*); reported also from the upper Rio Grande (New Mexico?).

6. **C. tomentosa** Link. Rootstock stout, scaly: stipes 5 to 18 cm. long, covered with pale brown tomentum: fronds 2 to 4 dm. long, 3 to 8 cm. wide, everywhere, but especially beneath, tomentose with slender obscurely articulated hairs, tripinnate; ultimate pinnules 1 to 1.5 mm. long, the terminal ones twice as large.—Texas (*Lindheimer*), Chenate Mountains, Presidio County (*Nealley*), Llano County (*Reverchon*). Var. EATONI (Baker) Dav. differs from the type mainly in having the rachises scaly. (*C. Eatoni* Baker.)—Chenate Mountains, Presidio County (*Nealley*).

** *Fronds covered beneath with imbricated scales, not tomentose.*

7. **C. Fendleri** Hook. Stipes 5 to 12 cm. long, chaffy with minute slender scales: fronds 6 to 10 cm. long, ovate-lanceolate, tripinnate; scales of primary rachis like those of the stipe, those of the secondary and ultimate rachises larger, broadly ovate, entire or nearly so, usually edged with white, imbricated and overlapping the subglobose ultimate segments, which are only 0.5 to 0.8 mm. each way, and usually bear a single broad scale at their center.—Texas (*Fendler*), but not recently collected; it should be found in the mountainous portions of western Texas.

*** *Under surface both tomentose and scaly.*

8. **C. Lindheimeri** Hook. Rootstock long, slender, chaffy: stipes scattered, 1 to 2 dm. long, dark brown: fronds 8 to 20 cm. long, 3 to 5 cm. wide, triquadripinnate; ultimate segments 0.5 mm. long, crowded; the upper surface white tomentose, the lower chaffy, passing into a tangled tomentum.—Texas (*Lindheimer*), but not recently collected.

C. lanosa should be looked for in the northern and western portions.

8. ASPLENIUM L.

Sori oblong or linear, oblique, separate; indusium straight or rarely curved, opening toward the midrib.—Confined in this flora to small or medium sized rock ferns; elsewhere larger and coarser plants.

§ 1. *Veins free, simple or branched: indusia straight or slightly curved, attached to the upper side of the veins.*—EUASPLENIUM. (Our species are simply pinnate.)

* *Fronds simply pinnate; pinnæ narrowed on both sides at base.*

1. **A. trichomanes** L. Stipes densely cespitose, short, polished: fronds 8 to 20 cm. long, 1 to 2 cm. wide; the pinnæ 15 to 30 pairs, nearly opposite, roundish-oblong or oval: sori 3 to 6 to each pinna.—Reported from Texas in Mr. Davenport's list.

** *Fronds simply pinnate; pinnæ truncate or auricled on the upper side at base.*

2. **A. parvulum** Mart. & Gale. Stipes cespitose, 1 to 3 cm. long, black: fronds 1 to 2.5 dm. long, narrowed both ways from a little above the middle; pinnæ more commonly opposite, oblong, obtuse, entire or crenulate, the lower gradually reduced and somewhat triangular. (*A. ebeneum* Ait., var. *minus*.)—In woods, Houston (*Hall*), Gillespie County (*Jermy*), Chenate Mountains, Presidio County (*Nealley*).

3. **A. platyneuron** (L.) Oakes. Stipes cespitose, chestnut-brown: fronds 1.5 to 3.5 dm. long, 2 to 3 cm. wide; the pinnæ usually alternate, subfalcate, often auriculate on lower as well as the upper side, the lower ones gradually reduced: sori often 10 or 12 on each side the costa. (*A. ebeneum* Ait.)—On the Rio Grande (*Bigelow*), Houston (*Hall*), Harrisburgh, Harris County (*Joor*), San Antonio (*Mrs. Young*).

§ 2. *Veins free: sori more or less curved, sometimes horseshoe-shaped, often crossing to the outer or lower side of a fruiting vein; fronds large bi-tripinnate.* ATHYRIUM Roth.

4. **A. filix-fœmina** (Swz.) Bernh. Stipes usually clustered, 2 to 4 dm. long, straw-colored or brownish: fronds 4 to 8 dm. long, broadly lanceolate to oblong-ovate, mostly bipinnate; pinnules oblong-lanceolate, pointed, more or less pinnately incised or serrate; very variable.—Texas (*Wright*).

9. **WOODWARDIA** Smith.

Sori oblong or linear, sunk in cavities in the frond and arranged in chain-like rows parallel to the midribs of the pinnæ and segments and near them: indusia somewhat firm, fixed by the outer margin to the veinlets and covering the sori like lids: veins more or less uniting.

1. **W. Virginica** (L.) Smith. Stipes stout, rising from a thickish rootstock, 3 to 5 dm. long: sterile and fertile fronds uniform, oblong-lanceolate, 3 to 5 dm. long, 1.5 to 2 dm. wide, bipinnatifid with linear-oblong lobes; veins free between the sori and the margins.—Texas (*Wright*).

W. areolata (L.) Moore (*W. angustifolia* Sm.), with dimorphous fronds, is to be looked for in the state.

10. **DRYOPTERIS** Adans. (Shield-fern.)

Sori round, borne on the back or rarely at the apex of the veins: indusium flat or flattish, orbicular and peltate at the center or cordate-reniform and fixed either centrally or at the sinus. (*Aspidium* Swz.) —Large ferns of rich woods and swamps.

§ 1. *Veins anastomosing copiously: fronds large, trifoliate in our species.*—Aspidium.

1. **D. trifoliata** (L.) Kuntze. Stipes cespitose, 3 to 5 dm. long, brownish, scaly at base: fronds 3 to 4.5 dm. long, 1.5 to 3 dm. wide, with a large ovate acuminate central pinna, and one or two lateral ones on each side; primary veins distinct to the margin, with fine copious areolae: sori in rows near the main veins; indusia orbicular, peltate.—Entrance to a limestone cave near New Braunfels (*Lindheimer*, 1878).

§ 2. *Veinlets uniting slightly near the margin: indusium peltate: fronds simply pinnate with broad pinnæ.*—Cyrtomium Presl.

2. **D. juglandifolia** (H B K.) Kuntze. Stipes cespitose, clothed below with large scales: fronds 1.5 to 6 dm. long, of leathery texture; pinnæ 2 to 12 pairs, short-stalked, ovate-oblong to broadly lanceolate, the terminal one distinct, and in small fronds the largest: sori scattered in several irregular rows.—"Hueco tanks and Van Horn's well," El Paso County? (*Mex. Boundary Survey*), but not since collected in the State.

§ 3. *Veins free: indusium cordate-reniform with narrow sinus.*—Nephrodium Rich.

3. **D. patens** (Swz.) Kuntze. Rootstock rather stout, bearing several fronds at its growing end: fronds 6 to 9 dm. long, 1 to 2.5 dm. wide, ovate-oblong, pubescent beneath; pinnæ close, linear-acuminate, the lowest pair somewhat deflexed, all cut three-fourths the way to the middle; segments numerous, the basal ones longer; lowest veinlets of adjacent segments often uniting: indusia very pubescent.—Western Texas (*Wright, Lindheimer*), Hockley, Harris County (*Thurow*).

4. **D. Thelypteris** (L.) Gray. Rootstocks slender: fronds 3 to 6dm. long, 5 to 8 cm. wide, lanceolate with horizontal linear-lanceolate pinnæ; segments oblong, entire, obtuse or appearing acute in fertile fronds from the revolute margins; veins mostly forked, bearing the sori near the middle: indusia minute, smooth and naked.—In bogs, Hempstead, Waller County (*Hall*, erroneously distributed as *A. Noveboracensis*).

11. WOODSIA R. Br.

Sori round, borne on the back of simply forked free veins: indusium inferior, thin and often evanescent, small and open or early bursting at the top into irregular lobes.—Medium-sized ferns of rocky places.

1. **W. obtusa** (Spreng.) Torrey. Stipes 8 to 15 cm. long: fronds 1.5 to 4 dm. long, broadly lanceolate, nearly bipinnate; pinnæ rather remote, triangular-ovate or oblong, pinnately parted; segments obtuse, crenately toothed, the lower ones pinnatifid.—**On banks,** Hempstead, Waller County (*Hall*).

12. ANEMIA Swz.

Sporangia ovate, sessile, placed in two rows on the back of very narrow branchlets of the two long-stalked panicled lower branches of a pinnately divided frond.—Medium-sized ferns of rocky banks.

1. **A. Mexicana** Klotzsch. Rootstalks creeping, covered with fine scales: stipes scattered, 1.5 to 3 dm. long: fronds simply pinnate, the lowest pair of pinnæ elongated and fertile, the others 4 to 8 cm. long, 1 to 1.5 m. wide, the lower in sterile fronds often lobed or auriculate on both sides at base.—"Texas" (*Lindheimer*), Upper Hondo (*Reverchon*), Uvalde Cañon (*Mrs. Young*).

13. OSMUNDA L.

Fertile portions of the frond very much contracted, bearing short pedicelled naked sporangia on the margins of the rachis-like divisions: sporangia large, globular, opening by a longitudinal cleft into two halves with the merest rudiments of a transverse ring: spores green.

1. **O. regalis** L. Stipes clustered, 4 to 6 dm. long, erect, naked: fronds 6 to 15 dm. long, bipinnate, fertile at the apex; sterile pinnæ 1.5 to 3 dm. long, 5 to 10 cm. wide, with oblong, obtuse divisions.—Texas (*Wright*).

O. cinnamomea L. is to be looked for in swampy portions eastward.

OPHIOGLOSSACEÆ.

Plant body consisting of stem and leaf rising from a fleshy sometimes bulbous root, straight or inclined in vernation: sporangia formed from the interior tissue of the frond, spiked or panicled, not reticulated, opening by a transverse slit into two valves: spores copious, sulphur yellow.

1. OPHIOGLOSSUM L. (Adder-tongue.)

Sporangia large, coriaceous, connate coherent in two ranks on the margins of a simple spike: veins forming copious areolæ.—Small plants of low grassy lands. Inconspicuous and therefore not often collected.

1. **O. vulgatum** L. Rootstock short, oblique: stalk 8 to 20 cm. long, bearing an ovate or elliptic-oblong sterile segment near its middle: spike 2 to 3 cm. long. (*O. Englemanni* Prantl.)—Houston (*Hall*).

2. **O. crotalophoroides** Walt. Rootstock bulbous, 6 to 10 mm. thick: stalk 8 to 15 cm. long, bearing the ovate sterile segment considerably below the middle: spike 6 to 10 mm. long, thick. (*O. bulbosum* Michx.)—Houston (*Hall*).

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