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FLORA OF PERU

J. FRANCIS MACBRIDE
AND COLLABORATORS

CONSPECTUS AND INDEX TO FAMILIES

ALWYN H. GENTRY

FAMILY COMPOSITAE: PART I

INTRODUCTION TO FAMILY

MICHAEL O. DILLON

TRIBE VERNONIEAE

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SAMUEL B. JONES
University of Georgia
Athens, Georgia

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THE FLORA OF PERU: A CONSPECTUS

ALWYN H. GENTRY
Missouri Botanical Garden
2345 Tower Grove Ave.
St. Louis, Mo. 63110

The *Flora of Peru* is the only floristic treatment of Andean or upper Amazonian plants and is one of the most significant of all floristic works. Except for the monumental 19th century *Flora Brasiliensis*, the *Flora of Peru* is today the closest thing to a complete Flora enjoyed by any South American country. The present volume marks the re-inauguration of this project after a hiatus in publication of almost a decade. We anticipate that the *Flora of Peru* will be completed in 1986.

The *Flora of Peru* was begun in 1936 under the direction of J. Francis Macbride who had been hired by Field Museum in 1922 specifically to study Peruvian plants. Macbride and associates made several plant-collecting expeditions to Peru in the 1920's, and other collections of Peruvian plants were also accumulated by Field Museum during this time. By 1936 when the first volume of the *Flora of Peru* was published, Dahlgren (1936) estimated that Field Museum collections included over 33,000 sheets of Peruvian plants which were "undoubtedly the most complete representation of the flora of that country in existence." Although this data base seems quite comparable to that on which initial publications of other Latin American Floras now nearing completion—the largely concurrent Floras of Panama and Guatemala—were undertaken, it was hopelessly inadequate for Amazonian Peru and far from complete for large areas of the Peruvian uplands and many of the coastal lomas as well. As a result the *Flora of Peru* shares with these other attempts to document the incredibly rich neotropical flora many faults attributable to an inadequate collection base (Gentry, 1978).

Another problem with which Macbride was forced to cope, in an era when transoceanic loans of specimens were not so readily available as today, were many species described from Peru but inadequately known

to him. His solution was generally to accept essentially all species which had been proposed: "It soon became evident that an attempt to express an opinion on the merit or lack of merit of every species proposed was impractical if the whole work was to be completed within a reasonable period" (Macbride, 1936). Though perhaps inevitable in the context of 1936, this lack of a thoroughgoing attempt to critically evaluate the species accepted in the Flora poses problems for its users today.

Despite the criticisms to which the perspective of half a century can lead, Macbride's compilation of the *Flora of Peru* is universally recognized as having been a truly herculean task. Macbride's own contributions to the Flora spanned a quarter century from 1936 until 1962, and several subsequent specialists' contributions swelled the number of species published in the Flora to 11,789 (plus an additional 246 varieties) at the cessation of its active publication in 1971.

Although contributing specialists were used when available, the great majority of the compilation of Peruvian plants was by Macbride himself. Paul Standley contributed 10 familial treatments, including the large ones for Gramineae and Rubiaceae. Ellsworth Killip contributed the treatments of Passifloraceae, Caprifoliaceae, Valerianaceae, Urticaceae, and the genus *Bomarea*. Charles Baehni contributed three familial treatments: Lacistemaceae, Violaceae, and Sapotaceae, the latter two co-authored with associates. Lyman Smith contributed treatments of Bromeliaceae and Begoniaceae, the latter jointly authored with B. Schubert, and J. Steyermark treated Fumariaceae and Connaraceae. Fifteen other taxonomists contributed treatments of families or important genera to the Flora, including Schweinfurth's monumental Orchidaceae work and treatments of Piperaceae by Trelease, *Rumex* by Rechinger, Annonaceae by R. Fries, Myristicaceae by A. C. Smith, *Krameria* by Hartmann, *Monnina* by R. Ferreyra, Callitrichaceae by N. Fassett, Myrtaceae by R. McVaugh, Umbelliferae by M. Mathias and L. Constance, Hydrophyllaceae and Polemoniaceae by D. Gibson, *Solanum* by D. Correll, Scrophulariaceae by G. Edwin, Plantaginaceae by R. Pilger, and Campanulaceae by F. Wimmer. Some of these are still considered among the definitive taxonomic works on major plant groups. Altogether 32 families and an additional five genera were treated by specialists and 84 families were treated by Macbride.

In 1975 the *Flora of Peru* was revitalized as a joint project of Field Museum and the Missouri Botanical Garden under this author's direction and supported by the National Science Foundation. An additional 15 spermatophyte families remain to be treated, including the Com-

positae, the largest family of the Peruvian flora, which has been subdivided into tribes to be published individually. Specialists' treatments of all the remaining families and the tribes of Compositae have been arranged, with the last promised by 1986.

Pteridophytes were not included in the original *Flora of Peru* but Rolla Tryon (1964) has separately published an account of an estimated quarter (187 species) of the Peruvian ferns using a somewhat more elaborate format than Macbride's. The remainder of the Peruvian pteridophytes will also be treated under the reactivated *Flora of Peru,* although arrangements for specialist contributions of only part of the pteridophytes have been completed to date.

At this point a preliminary analysis of the Peruvian flora and the completeness of its coverage by the published Flora seems appropriate. To the 11,789 species of spermatophytes treated to date can be added 2,148 additional species, the sum of the estimates of numbers of species in their groups by the various contributors, to give a total number of 13,937 species expected to have been treated in the *Flora of Peru* when it is completed. Similarly 1,654 genera of spermatophytes have already been treated and 298 remain to be covered, for a total of 1,952 genera to be included in the Flora. Table 1 lists the largest families and genera in Peru, as treated in the Flora. It is noteworthy that the number of species included is nearly double that included in the *Flora of Guatemala* and approaching triple the number of species included in the *Flora of Panama* (see Gentry, 1978), a striking indication of the immensity of the task undertaken by Macbride. Only the 19th century *Flora Brasiliensis* covers a larger portion of the neotropical flora.

It is obvious that a neotropical Flora whose publication was begun in 1936 is likely to omit many species which actually occur in the country. For example the *Flora of Panama* will treat only 5,000 of the 8,000-9,000 species estimated to actually occur in that country (Gentry, 1978). In Peru coverage of the floristically rich Amazonian region is especially incomplete, suggesting that many more than the 14,000 species treated in the Flora may actually occur in Peru.

On the other hand, many of the published treatments in the *Flora of Peru* were prone to excessive taxonomic splitting. For example, the genus *Peperomia* was treated as including 342 species and varieties in Peru; the fact that 78% of the accepted taxa were based on single collections and 90% on two or fewer collections is highly suggestive of unwarranted splitting. An average of 1.59 collections per accepted taxon could hardly be adequate for understanding intraspecific varia-

TABLE 1. Largest families in *Flora of Peru*.

Family	No. of species
Compositae	1,432*
Orchidaceae	1,290 (+38 var.)
Leguminosae	751 (+7 var.)
Piperaceae	726 (+64 var.)
Melastomataceae	509
Rubiaceae	480
Gramineae	408
Solanaceae	401 (+29 var.)
Euphorbiaceae	269
Scrophulariaceae	229 (+12 var.)
Malvaceae	218
Campanulaceae	192 (+42 var.)
Myrtaceae	178 (+6 var.)
Bromeliaceae	175
Verbenaceae	174 (+2 var.)
Labiatae	173
Araceae	165
Cyperaceae	156 (+3 var.)
Gesneriaceae	155*
Gentianaceae	150
Guttiferae	150*
Cactaceae	150*

*Estimated.

TABLE 2. Comparison of species numbers in *Flora of Peru* and Peruvian species in *Flora Neotropica* monographs.

Taxon	No. of genera		No. of species (+var.)	
	Fl. of Peru	Fl. Neotr.	Fl. of Peru	Fl. Neotr.
Swartzia	1	1	11	13(+1)
Brunelliaceae	1	1	8	8
Moraceae (Olmedieae and Brosimeae)	9	9	29	30(+2)
Zingiberaceae	4	4	37	29(+3)
Chrysobalanaceae	4	4	29	36(+1)
Dichapetalaceae	4	3	15	14(+1)
Caryocaraceae	2	2	8	6
Manihot	1	1	6	5
Bromeliaceae (Pitcairnioideae and Tillandsioideae)	8	8	148	270(+13)
Memecyleae	1	1	9	11
Trigoniaceae	1	1	7	6
Bignoniaceae	44	41	106	125
Totals	80	76	413	553

tion in *Peperomia*. Uncritical treatments of other groups similarly led to inclusion of some variable species under several different names, inflating the number of Peruvian species.

Is it possible to reconcile these two opposing trends and arrive at a meaningful estimate of the actual number of species in the Peruvian flora without critically reworking the entire Flora? One feasible approach is to compare the number of species "lost" and "gained" from the Flora when compared with that in recent monographs of plant groups occurring in Peru. I have used the *Flora Neotropica* monograph series to arrive at such an estimate. My own specialty group Bignoniaceae is also included, since I have the data readily available, even though only part of the family has been monographed to date for *Flora Neotropica*. Table 2 compares the number of species and genera recorded from Peru in each of the relevant *Flora Neotropica* treatments with the number treated in the Flora. The total of 413 species treated in the *Flora of Peru* for these 12 groups increased to 553 species in the *Flora Neotropica* monographs, a 34% average increase. Although acknowledging that 413 species is a perilously small (3%) sample of the total *Flora of Peru* species, we may tentatively extrapolate from these figures an average increase of 34% in number of species now known from Peru as compared with the number included in the Flora. Applied to the 13,937 treated species, this would project to 18,676 Peruvian plant species.

Actually the Peruvian flora might be expected to be significantly richer than this since very few of the 15,000 collections generated by the current *Flora of Peru* project have been included in the *Flora Neotropica* treatments on which these estimates were based. Many new and new-to-Peru species have already been discovered in some of these groups subsequent to the *Flora Neotropica* monographs. Moreover the rate of discovery of new species in these groups shows no signs of leveling off. Thus it seems likely that a definitive tabulation of Peruvian plants would eventually be expected to include well over 20,000 species, approximately as many plant species as are included in such very much larger areas as North America or tropical continental Africa (cf. Raven, 1976). Thanks to its Flora, Peru is the only tropical South American country (except tiny Surinam) for which such a figure, useful however tentative, can somewhat meaningfully be extrapolated.

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INDEX TO PUBLISHED FAMILIES

Family	**Publication Data**
Acanthaceae (Wasshausen)	———
Actinidiaceae	3A(2): 677-686. 1956.
Aizoaceae	2(2): 558-562. 1937.
Alismataceae	1(1): 91-94. 1936.
Amaranthaceae (Standley)	2(2): 478-518. 1937.
Supplement	2(3): 1134-1136. 1938.
Amaryllidaceae (*Bomarea* by Killip)	1(3): 631-690. 1936.
Anacardiaceae	3A(1): 238-258. 1951.
Annonaceae (Fries)	2(3): 700-766. 1938.
Apocynaceae	5(1): 363-455. 1959.
Aquifoliaceae	3A(1): 270-288. 1951.
Araceae	1(3): 428-486. 1936.
Araliaceae	5(1): 8-44. 1959.
Aristolochiaceae	2(2): 431-443. 1937.
Asclepiadaceae (Spellman & Morillo)	———
Balanophoraceae	2(2): 427-431. 1937.
Balsaminaceae (Gentry)	———
Basellaceae	2(2): 573-578. 1937.
Bataceae	2(2): 546. 1937.
Begoniaceae (L. Smith & B. Schubert)	4(1): 181-202. 1941.
Berberidaceae	2(3): 665-680. 1938.

Family	Publication Data
Betulaceae	2(2): 267-268. 1937.
Bignoniaceae	5C(1): 3-101. 1961.
Bixaceae	(as Flacourtiaceae)
Bombacaceae	3A(2): 593-622. 1956.
Boraginaceae	5(2): 539-609. 1960.
Bromeliaceae (L. Smith)	1(3): 495-592. 1936.
Brunelliaceae	(as Cunoniaceae)
Burmanniaceae	1(3): 767-768. 1936.
Burseraceae	3(2): 703-717. 1949.
Butomaceae	1(1): 94-95. 1936.
Buxaceae	3A(1): 220-221. 1951.
Cactacea (Solomon)	———
Callitrichaceae (Fassett)	3A(1): 235-237. 1951.
Calyceraceae	6(2): 489-491. 1937.
Campanulaceae (Wimmer)	6(2): 383-489. 1937.
Cannaceae	1(3): 738-741. 1936.
Capparaceae	2(3): 984-1006. 1938.
Caprifoliaceae (Killip)	6(2): 281-287. 1937.
Caricaceae	4(1): 132-143. 1941.
Caryocaraceae	3A(2): 697-703. 1956.
Caryophyllaceae	2(2): 578-638. 1937.
Celastraceae	3A(1): 259-270. 1951.
Ceratophyllaceae (Gentry)	———
Chenopodiaceae (Standley)	2(2): 469-478. 1937.
Chloranthaceae	2(2): 257-260. 1937.
Clethraceae	5(1): 45-50, 1959.
Cochlospermaceae	(as Flacourtiaceae)
Columelliaceae	5C(1): 101-103. 1961.
Combretaceae	4(1): 221-229. 1941.
Commelinaceae	1(3): 592-608. 1936.
Compositae (Dillon, Jones, King, Holmes, McDaniel, Turner, Robinson, Sagastegui, Keil, Barkley, Ferreyra)	———
Connaraceae (Steyermark)	2(3): 1119-1125. 1938.
Convolvulaceae	5(1): 455-536. 1959.
Coriariaceae	3A(1): 237-238. 1951.
Cornaceae	5(1): 44-45. 1959.
Crassulaceae	2(3): 1007-1015. 1938.

Family	Publication Data
Cruciferae	2(3): 937-983. 1938.
Cucurbitaceae	6(2): 321-383. 1937.
Cunoniaceae	2(3): 1038-1063. 1938.
Cycadaceae	1(1): 81-82. 1936.
Cyclanthaceae (Standley)	1(3): 421-428. 1936.
Cyperaceae	1(1): 261-320. 1936.
Dichapetalaceae	3(3): 954-964. 1950.
Dilleniaceae	3A(2): 667-677. 1956.
Dioscoreaceae	1(3): 690-707. 1936.
Dipsacaceae	———
Ebenaceae	5(1): 205-214. 1959.
Elaeocarpaceae	(as Tiliaceae)
Elatinaceae	1(1): 84-86. 1936.
Ephedraceae	1(1): 84-86. 1936.
Ericaceae	5(1): 50-149. 1959.
Eriocaulaceae	1(3): 489-494. 1936.
Erythroxylaceae	3(2): 632-647. 1949.
Euphorbiaceae	3A(1): 3-200. 1951.
Flacourtiaceae	4(1): 5-52. 1941.
Frankeniaceae	4(1): 4-5. 1941.
Fumariaceae (Steyermark)	2(3): 936-937. 1938.
Gentianaceae	5(1): 270-363. 1959.
Geraniaceae	3(2): 511-544. 1949.
Gesneriaceae (Skog)	———
Gnetaceae	1(1): 86. 1936.
Gramineae (Standley)	1(1): 96-261. 1936.
Guttiferae (Maguire)	———
Haemodoraceae	1(3): 630-631. 1936.
Haloragaceae	5(1): 3-8. 1959.
Hernandiaceae	2(3): 931-933. 1938.
Hippocrateaceae	3A(1): 200-220. 1951.
Humiriaceae	(as Linaceae)
Hydrocharitaceae	1(1): 95-96. 1936.
Hydrophyllaceae (Gibson)	5A(2): 101-112. 1967.
Hypericaceae (Robson)	———
Icacinaceae	3A(1): 221-233. 1951.
Iridaceae	1(3): 707-717. 1936.
Juglandaceae	2(2): 263-266. 1937.
Julianaceae	2(2): 266-267. 1937.
Juncaceae	1(3): 609-617. 1936.
Labiatae	5(2): 721-829. 1960.

Family	Publication Data
Lacistemataceae (Baehni)	4(1): 52-56. 1941.
Lauraceae	2(3): 819-931. 1938.
Lecythidaceae	4(1): 229-249. 1941.
Leguminosae (*Krameria* by Hartmann)	3(1): 3-507. 1943.
Lemnaceae	1(3): 486-487. 1936.
Lentibulariaceae (Taylor)	———
Liliaceae	1(3): 617-630. 1936.
Linaceae	3(2): 621-632. 1949.
Loasaceae	4(1): 143-181. 1941.
Loganiaceae	5(1): 239-269. 1959.
Loranthaceae	2(2): 375-416. 1937.
Lythraceae	4(1): 206-219. 1941.
Magnoliaceae (Lozano)	———
Malesherbiaceae	4(1): 85-90. 1941.
Malpighiaceae	3(3): 781-871. 1950.
Malvaceae	3A(2): 442-593. 1956.
Addendum	3A(2): 742-744. 1956.
Marantaceae	1(3): 741-767. 1936.
Marcgraviaceae	3A(2): 703-717. 1956.
Martyniaceae (Gentry)	———
Mayacaceae	1(3): 487. 1936.
Melastomataceae	4(1): 249-521. 1941.
Meliaceae	3(2): 717-777. 1949.
Menispermaceae	2(3): 680-699. 1938.
Monimiaceae	2(3): 784-819. 1938.
Moraceae	2(2): 274-331. 1937.
Supplement	2(3): 1126-1127. 1938.
Musaceae	1(3): 717-726. 1936.
Myricaceae	2(2): 261-263. 1937.
Myristicaceae (A. C. Smith)	2(3): 766-784. 1938.
Myrsinaceae	5(1): 163-203. 1959.
Myrtaceae (McVaugh)	4(2): 567-818. 1958.
(Najadaceae)	1(1): 89. 1936.
Nolanaceae	5(2): 829-854. 1960.
Nyctaginaceae (Standley)	2(2): 518-546. 1937.
Nymphaeaceae (Standley)	2(2): 638-639. 1937.
Ochnaceae	3A(2): 686-697. 1956.
Olacaceae (Standley)	2(2): 421-427. 1937.
Supplement	2(3): 1127-1132. 1938.
Oleaceae	5(1): 235-239. 1959.

Family	Publication Data
Onagraceae	4(1): 521-566. 1941.
Opiliaceae (Standley)	2(2): 420-421. 1937.
Orchidaceae (Schweinfurth)	30(1): 1-260. 1958.
	30(2): 261-531. 1959.
	30(3): 533-786. 1960.
	30(4): 787-1005. 1961.
Supplement	33: 1-80. 1970.
Orobanchaceae	5C(1): 103-104. 1961.
Oxalidaceae	3(2): 544-608. 1949.
Palmae	1(2): 321-418. 1960.
Papaveraceae	2(3): 933-936. 1938.
Passifloraceae (Killip)	4(1): 90-132. 1941.
Pedaliaceae (Gentry)	———
Phytolaccaceae	2(2): 546-558. 1937.
Piperaceae (Trelease)	2(1): 3-253. 1936.
Plantaginaceae (Pilger)	6(2): 265-281. 1937.
Plumbaginaceae	5(1): 203-205. 1959.
Podocarpaceae	(as Taxaceae)
Podostemaceae	2(3): 1007. 1938.
Polemoniaceae (Gibson)	5A(2): 112-131. 1967.
Polygalaceae (*Monnina* by Ferreyra)	3(3): 891-950. 1950.
Polygonaceae (Standley) (*Rumex* by Rechinger)	2(2): 444-468. 1937.
Pontederiaceae	1(3): 608-609. 1936.
Portulacaceae	2(2): 562-573. 1937.
Potamogetonaceae	1(1): 87-89. 1936.
Primulaceae	5(1): 149-152. 1959.
Proteaceae	2(2): 367-375. 1937.
Quiinaceae	3A(2): 717-726. 1956.
Rafflesiaceae	2(2): 443-444. 1937.
Ranunculaceae	2(2): 639-661. 1937.
Rapateaceae	1(3): 494-495. 1936.
Rhamnaceae	3A(2): 391-408. 1956.
Rhizophoraceae	4(1): 219-221. 1941.
Rosaceae	2(3): 1063-1119. 1938.
Rubiaceae (Standley)	6(1): 3-261. 1936.
Rutaceae	3(2): 655-689. 1949.
Sabiaceae (Gentry)	———
Salicaceae	2(2): 260-261. 1937.
Santalaceae	2(2): 416-420. 1937.

Family	Publication Data
Sapindaceae	3A(2): 291-391. 1956.
Sapotaceae (Baehni & Bernardi)	5A(3): 135-177. 1970.
Saxifragaceae	2(3): 1015-1038. 1938.
Scheuchzeriaceae	1(1): 90-91. 1936.
Scrophulariaceae (Edwin)	5B(3): 459-717. 1971.
Simaroubaceae	3(2): 689-703. 1949.
Solanaceae (excluding *Solanum*)	5B(1): 3-267. 1962.
Solanum (Correll)	5B(2): 271-458. 1967.
Staphyleaceae	3A(1): 233-235. 1951.
Sterculiaceae	3A(2): 622-667. 1956.
Styracaceae	5(1): 225-235. 1959.
Symplocaceae	5(1): 214-225. 1959.
(Taccaceae)	1(3): 690. 1936.
Taxaceae	1(1): 82-84. 1936.
Theaceae	3A(2): 726-741. 1956.
Theophrastaceae	5(1): 153-163. 1959.
(Thurniaceae)	1(3): 494. 1936.
Thymelaeaceae	4(1): 203-206. 1941.
Tiliaceae	3A(2): 413-442. 1956.
Tovariaceae	2(3): 1006-1007. 1938.
Trigoniaceae	3(3): 950-954. 1950.
Triuridaceae	1(1): 96. 1936.
Tropaeolaceae	3(2): 608-620. 1949.
Turneraceae	4(1): 82-85. 1941.
Typhaceae	1(1): 87. 1936.
Ulmaceae	2(2): 268-274. 1937.
Umbelliferae (Mathias & Constance)	5A(1): 1-97. 1962.
Urticaceae (Killip)	2(2): 331-367. 1937.
Valerianaceae (Killip)	6(2): 287-321. 1937.
Velloziaceae (Gentry)	———
Verbenaceae	5(2): 609-721. 1960.
Violaceae (Baehni & Weibel)	4(1): 56-82. 1941.
Vitaceae	3A(2): 408-413. 1956.
Vochysiaceae	3(3): 872-891. 1950.
Winteraceae	2(3): 699-700. 1938.
Xyridaceae	1(3): 487-489. 1936.
Zingiberaceae	1(3): 726-738. 1936.
Zygophyllaceae	3(2): 647-654. 1949.

COMPOSITAE Giseke[1,2]

Annual, biennial or perennial **herbs** or sometimes **shrubs**, **trees**, or **vines**, variously pubescent or glandular, sometimes glabrous, lactiferous or not; stems terete, sometimes winged or flattened into cladodes. **Leaves** alternate, verticillate, or opposite, sometimes basal, rarely reduced to scales, spines, or wanting, simple or 2- to many-foliolate, entire, or variously toothed, lobed or dissected; petioles present or wanting; the leaf bases sometimes decurrent or clasping; exstipulate, but pseudostipules sometimes present. **Inflorescence** cymose, racemose, paniculate, umbellate, or of solitary capitula, sometimes in indefinite aggregates; usually pedunculate, rarely with the capitula in glomerules (pseudocephalium); often bracteate; usually pedicellate, sometimes bracteolate. **Capitula** with 1-many florets inserted on a receptacle; heterogamous, radiate or disciform, or homogamous, discoid or ligulate; basally enclosed in an involucre; phyllaries (involucral bracts) few to many in 1 to several similar, differentiated, or evenly graded series, free or connate, valvate or imbricate; receptacle convex, concave, flat, or conical; paleae flat or keeled and enfolding the florets, or reduced to hairs or short scales, or wanting; florets epigynous, either all hermaphrodite and protandrous, or female, male, or neuter (sterile); corollas gamopetalous, tubular, filiform, ligulate or bilabiate, usually 3- to 5-toothed, rarely absent, the stamens 5, rarely 3 or 4, epipetalous, filaments usually free, the anthers mostly oblong, marginally connate, introrse with sterile appendages, basally truncate to tailed, the style branches 2, pubescent, glabrate or glandular, the ovary terete or compound, often with apical nectary. **Fruit** usually an achene (cypsela), rarely baccate or drupaceous, or a utricle formed by fusion of the achene with paleae, bracts or other parts, the pericarp mostly hard; pappus usually present, of bristles, awns, or scales; sometimes with a distinct carpopodium.

The Compositae is one of the largest flowering plant families in the world, represented by over 1,400 genera and estimates of between 20,000 and 30,000 species. Only the Orchidaceae is comparable in number with about 750 genera and some 18,000 species. The Compositae is cosmopolitan in distribution, occurring on all continents, except Antarctica. The family is well developed in the New World, with Peru being a center of diversity for several tribes. In Peru, there are over 1,400 species of Compositae representing approximately 10% of the total Peruvian flora (see Gentry, A Conspectus).

Presently, 13 tribes are recognized as occurring in Peru. The generic composition of the tribes reflects the results of the Reading Symposium on the Biology and Chemistry of the Compositae (1977).

[1]The treatment for the family Compositae is being coordinated by Michael O. Dillon, Field Museum of Natural History, who wrote introductory material including the family description and key to tribes. Tribes are being published separately as they are completed, with authorship indicated at the beginning of the taxon. Each author is solely responsible for his treatment.

[2]Assisted by National Science Foundation Grant DEB-79-05078 (Alwyn H. Gentry, principal investigator).

TABLE 3. Estimates of the number of genera and species for the tribes represented in the Compositae of Peru.

Tribe	No. of genera	No. of species
VERNONIEAE	7	39
LIABEAE	12	50
EUPATORIEAE	39	290
ASTEREAE	15	200
INULEAE	10	67
HELIANTHEAE	70	289
TAGETEAE	5	23
ANTHEMIDEAE	6	11
SENECIONEAE	9	231
CALENDULEAE	1	1
CARDUEAE	2	2
MUTISIEAE	21	200
LACTUCEAE	6	29
TOTAL	203	1,432

Estimates of the number of genera and species within each tribe are given in Table 3. The tribes Eupatorieae and Heliantheae are the largest, with each containing some 20% of the total, followed by the Senecionieae (ca. 16%), the Astereae (ca. 14%), and the Mutisieae (ca. 14%). The tribe Liabeae is here recognized and considered most closely aligned with the tribe Vernonieae. The polyphyletic tribe Helenieae (sensu Bentham) is not maintained, with constituent genera being realigned with the tribes Heliantheae, Senecioneae, and Tageteae. The tribe Calenduleae is represented by the introduced ornamental *Calendula officinalis* L. Only the African tribe Arctoteae is unrepresented in the flora.

In Peru, the family has radiated into a wide variety of habitats, including the puna, inter-montane valleys, the lomas of the coastal desert, and the ceja de la montaña; however, few are present in the tropical and subtropical rain forests. Nearly every type of habit is to be found, with perennial herbs and shrubs predominating.

Despite their abundance in the flora, few members of the family have any economic importance in Peru. Several introduced ornamentals are cultivated and sold in the markets (e.g., *Calendula, Chrysanthemum*), and some native species are used in folk medicine (e.g., *Spilanthes, Tagetes*). At least some members of the genus *Clibadium* and possibly *Ichthyothere* (Heliantheae) are used as fish poison in the lower Amazon basin.

MORPHOLOGY[3]

Plants of the Compositae display a range of specialized morphology not found in other families, and terminology is often particular to the family. A hand lens or dissecting microscope is useful in examining these plants and some features must be studied with a compound microscope. Literature citations in the following survey of terminology refer mainly to good illustrations of Compositae structures.

Pubescence and glands.—Characteristic hair (trichome) types are found in several groups of Compositae (cf. D'Arcy, 1975; fig. 1). In the Vernonieae hairs are sometimes sturdy, elongate, and single-celled. In the Eupatorieae and Astereae hairs are usually many-celled and uniseriate or moniliform, with the basal or apical cell sometimes slightly differentiated. Arachnoid hairs, too fine to be seen in cellular detail under magnifications less than ×45, occur and may form tomentum in the Inuleae, Liabeae, Senecioneae, and Cardueae. A specialized "verrucose hair" occurs in many genera of the Heliantheae. This hair consists of a multicellular basal rosette, one or two sturdy, distinctly verrucose, erect cells, and an apex of one or two smooth, acicular cells. The basal rosette of cells is sometimes calcified giving the leaf a punctate appearance, and the sometimes calcified rugose and apical cells may result in a scabrous leaf surface. Large multiseriate hairs occurring in *Trixis* (Mutisieae), *Hieracium* (Lactuceae), and *Pectis* (Tageteae), and others may be termed bristles. Branched hairs occur on *Hieracium* and some species of *Senecio*. For a discussion of the double hairs (Zwillingshaare) found on the ovaries of many genera and especially of some primitive elements, see Hess (1938).

Paleae (chaff) and receptacle (torus).—Convention refers to bracts external to the outermost whorl of florets as involucral bracts and those internal to it as paleae. Although artificial, this distinction causes little difficulty. The two structures are homologous with leaves but the paleae are usually considerably more modified. Paleae are best developed in the Heliantheae and Mutisieae but isolated species or genera of the Eupatorieae, Astereae, Liabeae, and Lactuceae and perhaps other tribes also have paleae. In the Heliantheae the paleae frequently enfold the ovary and may be bent over the corolla in bud or occasionally are apically modified into awns or cusps. The paleae of *Eclipta, Cirsium* and some Liabeae are narrowed into bristles or awns. In many genera paleae are reduced to hairs or low scales which may persist on the receptacle. In some genera, low hairs or spicules on the receptacle are referred to as paleae although they may consist of enations of the

[3]Adapted largely from D'Arcy, 1975; pp. 837-843.

receptacle, or remains of carpopodia and are not homologous with the bracts noted above. Aged receptacles may be fimbrillate (fringed), pilose, foveate (pitted), verrucose (warty or knobby), alveolate (honeycombed), spiculiferous, muricate (spiny), or naked (lacking paleae). The receptacle tissue may be completely sclerified or include parenchyma.

Corollas.—Corollas (Hoffman 1894: 99, 101; Solbrig 1963: 451; Bentham 1873: tab. 8; D'Arcy 1975: figs. 34E, 104, 106, 34B, 48B, 81A, 93B, 98B, 57C, 58C) are considered to be either ligulate (rays) or tubular (disc), although the tubular form includes modifications to campanulate, funnelform, etc., and ligulate corollas usually consist of a tube and a straplike ligule. When extremely narrow, corollas are termed filiform or capillary. The outline made by the top of the corollas and paleae is referred to as the disc. In the Lactuceae all corollas have a 5-lobed ligule. In other groups, ligulate corollas are confined to the outer whorls of florets on the head or are lacking. In the Mutisieae, ligulate corollas have a 3- or 4-lobed ligule and short, opposing lobes at the top of the tube (bilabiate). In the Astereae, Inuleae, Heliantheae, Tageteae, Senecioneae, and Anthemideae, ligules are 2- to 3-lobed or entire, and an opposing lobe is seldom present. In *Zinnia* and *Heliopsis* (Heliantheae) the corolla consists of a ligule persistent on the achene and a tube is lacking, and in *Melampodium* also the tube may be obsolete. Ligulate corollas are lacking in all Peruvian taxa of Vernonieae, Eupatorieae, and Cardueae and only tubular corollas are present. Tubular corollas consist of a basal tube, an expanded limb, and 4-5 apical lobes. They are mostly actinomorphic but sometimes one suture of the limb is deeper than the others (e.g., *Elephantopus* and *Pseudelephantopus*), and in other cases two sutures are deeper, producing slightly bilabiate corollas. In *Cotula mexicana* (Anthemideae) the disc corollas are regularly 3-lobed, a rarity in the family.

Sexual condition.—Sexual condition of the florets is of great systematic utility. In the Vernonieae, Eupatorieae, and Cardueae (Peru) and in a few genera in other groups, all florets are alike, perfect, and have tubular corollas. Such heads are termed discoid. All florets of the Lactuceae are also perfect and have only ligulate corollas. These heads are termed ligulate. In the above mentioned groups all florets are fertile, producing mostly viable achenes. In most other groups, the outer florets are pistillate, lack stamens, and only rarely produce staminodes. The outer florets may have tubular or ligulate corollas and the heads are termed radiate or disciform depending on whether the ligules are elongate (exceeding the stigmas and pappus) or short and inconspicu-

ous. The ovaries may be fertile or sterile. Variations in the above conditions occur in a few groups. Some Mutisieae have two peripheral whorls of pistillate florets, the outer with ligulate corollas and the inner with tubular corollas. Whorls internal to these have perfect florets with tubular corollas. In a few cultivated plants (e.g., some strains of *Dendranthema* and *Tagetes*) proliferation of pistillate, often abortive, florets with ligulate corollas may supplant normal florets with tubular corollas.

Conspicuous, often pellucid, oil glands of various shapes are arranged characteristically on leaves and involucres in the Tageteae. In *Siegesbeckia* (Heliantheae), *Hieracium,* and *Sonchus* (both Lactuceae), large globose glands are displayed on bristles. In *Baccharis* (Astereae), and *Flourensia* (Heliantheae), a coating of glandular material may make the leaf shiny. With the aid of a lens, punctate glands in the leaf surface or globose glandular materials on the surface may be observed in many species. In the Lactuceae a network of laticifers invisible without special techniques yields copious milky sap.

Leaf arrangement.—In Peru leaves are opposite or rarely verticillate in most Eupatorieae, Tageteae, many Heliantheae, and Liabeae, but are alternate in all other groups. Plants with leaves in basal rosettes belong to groups with usually alternate leaves, but can occur in opposite leaved members (e.g., *Paranephelius,* Liabeae). In plants with opposite leaves, it is not unusual for some leaves and branches in the region of the inflorescence to be alternate.

Inflorescence (Capitulescence).—Capitula (heads) are often grouped into recognizable general inflorescences (capitulescences), i.e., cymes, corymbs, racemes, panicles. A capitulum occurring singly is described as solitary. When capitula are aggregated into a secondary capitulum, it is termed a glomerule (pseudocephalium) or synflorescence (e.g., *Elephantopus).*

Involucral bracts (phyllaries).—These are mostly numerous and in most groups are overlapping in several graded series. Except in the Eupatorieae this is referred to as imbricate, but in the Eupatorieae the terms eximbricate, subimbricate, and imbricate are used to refer to degrees of overlapping. In some species of Tageteae, Senecioneae, Mutisieae, and Lactuceae, the bracts do not overlap but are valvate, touching only at the margins, or they may sometimes be marginally connate for part of their length. A whorl of short bracts at the base of the involucre may be referred to as either subinvolucral bracts or as calyculate bracts. Commonly one or more subinvolucral bracts may be found on the pedicel, sometimes in a different phyllotaxy from the rest

of the plant. In *Elephantopus* and *Pseudelephantopus* (both Vernonieae), the involucral bracts are decussate, and in these genera with their heads fused into a common receptacle, a series of subinvolucral bracts forms a pseudoreceptacle around the glomerule.

Stamens.—Stamens (Fig. 1, Hoffmann, 1894: 104; Bentham, 1873: tab. 9; Cabrera, 1974: fig. 52, 53; D'Arcy 1975: fig. 1) are usually of the same number as the corolla lobes. Filaments are usually compressed and the anthers are connate or coherent into a narrow tube. The anther apex is usually sterile and differentiated into a distinct, hyaline appendage. In *Ophryosporus* and *Adenostemma* (Eupatorieae) and in *Eclipta* and *Eleutheranthera* (both Heliantheae), the appendage is much reduced or wanting. In the Mutisieae the anther apex is sterile but not demarcated on the dorsal (outer) side, appearing as a homogeneous continuation of the thecae. Anther bases may be blunt, auriculate, sagittate, or with variously elaborated tails. The auricles of adjacent anthers are sometimes united. In some cases short auricles appear to be derived from longer but crumpled tails. Tails are present in most taxa of Inuleae and Mutisieae.

A ring or region of specialized cells near the top to the filaments, the anther collar, acts as a hinge to permit straightening of the filaments at anthesis when the style pushes through the anther tube with much of the pollen. Characteristics of the anther collar have been used systematically in the Eupatorieae and Senecioneae. Endothecial cells of the anthers, visible under a compound microscope after special preparation, have also been of systematic use in the Eupatorieae (King & Robinson, 1970).

Styles.—The style (Hoffmann, 1894: 107, 109; Bentham, 1873: tab. 10; Solbrig, 1963: 443; Cabrera, 1974: 54-56; D'Arcy, 1975: fig. 1) is typically a 2-branched shaft which may have an expansion (node) near the base. The basal expansion sometimes is stipitate above the ovary by a slender pedicel. The base of the shaft is frequently immersed in a cupular nectary on the ovary apex. In some species the branches do not separate and the shaft is entire. In most cases the dorsal (abaxial) surface is pubescent and the ventral (adaxial) surface is more or less flat. The stigmatic region is on the edge or ventral surface in a configuration characteristic of the tribe. Not always correlated with stigmatic position, several shapes of style branch are common:

Lactucoid: Branches slender, longitudinally uniform, and sparingly pubescent. The apex is acute or obtuse. This type occurs in the Lactuceae and in pistillate florets of other tribes.

Vernonioid: Branches elongate, longitudinally uniform, and often copiously pubescent. This type occurs in the Vernonieae and Liabeae.

Eupatorioid: Branches elongate, gradually expanded near the apex, minutely pubescent, papillose, or smooth. It is stigmatic at the margins near the base, and distal portions of the branches may be referred to as appendages. This type occurs in only the Eupatorieae.

Senecioid: Branches often short, truncate, the apex with a fringe of papillae or hairs (penicillate). This type occurs in some species of Senecioneae, Anthemideae, and Inuleae.

Helianthoid: Branches are short, pilose near the apex, and sometimes with a triangular or filiform appendage at the tip. This type occurs in several genera of Astereae, Inuleae, and Heliantheae, and intergrades with the Senecioid type.

Carduoid: Branches short and smooth, the shaft has an annulus of hairs or thickening near the apex. This type occurs in the Cardueae.

Ovaries.—Taxonomic characters of the ovary are usually expressed in terms of the achene, and younger stages may be misleading. Wings in some *Verbesina* (Heliantheae) species do not develop until after anthesis, while in *Wulffia* (Heliantheae) the awn (pappus) is deciduous soon after anthesis. In many groups a copular nectary is present at the apex of the ovary and in some genera, e.g., *Ayapana* (Eupatorieae), it is conspicuous. This is distinct from the expanded style base which resembles a nectary in some groups. The nectary may be stipitate. It may envelop the basal enlargement of the style shaft or end below it, in which case the stylar expansion appears stipitate. The nectary and style shaft are adnate only at the base. In several tribes—Vernonieae, Eupatorieae, Inuleae, Tageteae, Liabeae, and Anthemideae—the ovaries are characteristically terete, often ribbed, while in the Astereae and Heliantheae they are often compressed laterally (radially) or dorsiventrally (tangentially).

Fruits (achenes).—The usual dispersal unit in the Compositae is the achene, which consists of pericarp, endosperm and embryo, and sometimes includes a pappus, persistent nectary, and carpopodium. The pericarp (rind) is usually hard but is soft and fleshy in *Wulffia*. The exocarp is sometimes transparent. The achene may be apically narrowed into a beak which subtends the pappus, and the top of the beak may be expanded in a flange. All structures surmounting the achene except the nectary are referred to as pappus. This may consist of hairs, bristles, scales (squamellae), awns or rarely glands, and sometimes these elements are fused in a corona or annulus. Bristles or hairs are

usually strigulose (barbellate, scabrid) and are especially fine and numerous in the Senecioneae and Lactuceae. Stout bristles are sometimes basally flattened or expanded. Scales may be lacerate. In the Heliantheae awns are common. While the pappus is of great utility in identifying Compositae, it is not unusual to find epappose (calvous) achenes in individuals or species of normally pappose groups (e.g., *Galinsoga*). The carpopodium (hypophysis) is sometimes conspicuous, and the cellular arrangement has been given taxonomic weight in the Eupatorieae. A stipe arising above the carpopodium occurs in some species of *Verbesina*.

Frequently, the achene is united with enveloping bracts or paleae or with adjacent florets, and the compound structure falls together. This compound fruit may be termed a utricle in the same sense as the term is used in the Chenopodiaceae and Urticaceae. It has also been known as an involucral fruit or fruiting involucre. The utricle may be flat and winglike or samaroid as in *Delila,* covered with hooks or spines and burlike as in *Acanthospermum,* or the bract may be tightly fused to and hardly distinguishable from the achene as in *Melampodium* (all Heliantheae). Several achenes (or heads) may be held in glomerules with associated bracts to form a burlike utricle in members of the Vernonieae.

In a number of Peruvian Compositae the fruit is fleshy and bird-dispersed. The inulin-rich pericarp of *Wulffia* is soft and fleshy and this baccate fruit is technically a drupe. In *Clibadium* and *Milleria* (both Heliantheae) parts of the involucre are fleshy or even juicy and form a baccate structure. The baccate condition is best noted in fresh material and may pass unnoticed when dry.

Achene shape is sometimes indicative of tribe; thus, the Heliantheae and Cardueae have generally larger achenes than those of other tribes, and in the Lactuceae, Tageteae, and Mutisieae, fruits are often long and thin. Achenes are often compressed in the Astereae and Heliantheae and sometimes in the Lactuceae, but are mostly oblong and cylindrical in the Vernonieae, Liabeae, Eupatorieae, Inuleae, and Senecioneae. Winged achenes occur in the Heliantheae and Anthemideae.

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Key to Tribes of Peruvian Compositae[4]

1. Heads with staminate or perfect florets towards the middle, the corollas tubular or bilabiate; sometimes with pistillate florets towards the outside; usually sap not milky.
   2. Anther tips with sterile, tonguelike, often hyaline appendages.
      3. Florets all alike, perfect, corollas tubular, not yellow; anthers not tailed; receptacle usually naked.
         4. Leaves alternate; style branches slender, terete, hairy all over, the style shaft apically hairy; anthers auricled (tailed in *Piptocarpha*); hairs often 1-celled .....Tribe VERNONIEAE
         4′. Leaves mostly opposite (except sometimes in the region of inflorescence); style branches gradually expanded near the tips, papillose or short-hairy, the shaft often glabrous; anthers obtuse or rounded; hairs multicellular, often moniliform .....Tribe EUPATORIEAE
      3′. Florets often not all alike, corollas often yellow; anthers sometimes tailed; receptacle naked or with paleae.
         5. Leaves mostly not spiny; involucral bracts not spiny; anthers tailed or not; style shaft without an apical ring.
            6. Leaves alternate; style branches flattened-fusiform, sometimes apically appendaged or rounded; anthers tailed or not; receptacle mostly naked; pappus mostly bristles.
               7. Anthers obtuse; style branches often appendaged; achene often compressed; hairs multicellular .....Tribe ASTEREAE
               7′. Anthers tailed; style branches rounded; achene plump; hairs arachnoid .....Tribe INULEAE
            6′. Leaves alternate or opposite; style branches flattened-fusiform, sometimes apically appendaged; anthers not tailed; receptacle with paleae or naked; pappus of bristles, awns or scales.

[4]Adapted in part from D'Arcy (1975).

8. Pappus of awns, bristles or scales; style branches often appendaged.
   9. Involucre without transparent margins; leaves mostly opposite, often 3-nerved from base or trifoliolate.
      10. Receptacle naked; involucral bracts equal, mostly valvate (biseriate in *Schizothrichia*), with pronounced pellucid glands; leaves glabrous to puberulent, typically bearing conspicuous pellucid secretory cavities or glands filled with strongly scented essential oils ..... Tribe TAGETEAE

      10′. Receptacle with paleae, squamellae, bristles or merely deeply alveolate (rarely truely naked); involucral bracts unequal, overlapping, 2- to many-seriate, lacking pellucid glands; leaves variously pubescent or glabrous, pellucid glands absent.
         11. Receptacle with costate paleae, enfolding the achenes; achenes usually compressed; pappus of scales, awns, or rarely of numerous, strigose bristles; leaves opposite or alternate, mostly eglandular; hairs often verrucose .....Tribe HELIANTHEAE

         11′. Receptacle deeply alveolate, with the margins of the alveolae prolonged into stiff mostly subulate awns, squamellae or bristles, rarely with true paleae (i.e., *Chionopappus*) or naked (i.e., *Cacosmia, Philoglossa*); achenes usually cylindric to turbinate, (2-) 5- to 10-angled; pappus generally biseriate, the inner series of bristles and the outer of bristles or squamellae, rarely absent (i.e., *Cacosmia*); leaves opposite or whorled in a basal rosette, usually tomentose below .....Tribe LIABEAE

   9′. Involucre with hyaline, transparent margins; leaves alternate, with strong midrib.
      12. Leaves usually dissected, often aromatic; style branches in disc and ray florets truncate, penicillate; pappus paleaceous, coroniform, or absent ..... Tribe ANTHEMIDEAE

      12′. Leaves entire, not aromatic; style branches of ray florets filiform, glabrous, and of the disc florets, undivided; pappus lacking .....Tribe CALENDULEAE

8′. Pappus of soft, silky, hairlike bristles; style branches not appendaged .....Tribe SENECIONEAE

5′. Leaves and involucral bracts spiny; anthers tailed; style shaft with an apical ring .....Tribe CARDUEAE

2′. Anther tips sterile, but not differentiated into hyaline, tonguelike appendages; anthers mostly tailed .....Tribe MUTISIEAE

1′. Heads with only perfect florets, the corollas ligulate, 5-denticulate; sap milky ..... Tribe LACTUCEAE

Tribe VERNONIEAE

SAMUEL B. JONES
Professor of Botany
University of Georgia
Athens, Georgia

Vernonieae Cass., J. Phys. Chim. Hist. Nat. Arts 88: 203. 1819. TYPE: *Vernonia* Schreb.

Vernoniaceae Bessey, Ann. Missouri Bot. Gard. 2: 163. 1915. TYPE: *Vernonia* Schreb.

Perennial or rarely annual **herbs**, **shrubs**, **trees**, or scandent **vines**. **Leaves** alternate, rarely opposite or whorled, sometimes in a basal rosette, sessile or petiolate, entire or remotely toothed, rarely lobed, usually revolute. **Inflorescences** various, heads separate or united in glomerules. **Heads** discoid, homogamous, 1-many flowered, sometimes reduced and syncephalous, florets normally bisexual and fertile; involucre usually campanulate, ovoid, or globular; phyllaries many, closely or loosely imbricated in several series, or rarely few in one series; receptacle flat or subconvex, either smooth or pitted, rarely alveolate, sometimes with palea-like bracts. **Corollas** tubular, usually regular (subligulate in *Stokesia*), tube elongate, with five narrow lobes to the limb, rarely 3-4 lobed, or somewhat bilabiate (e.g., *Elephantopus*), deep purplish-red to white or blue (rarely yellow-orange in a few Old World species), often glandular; anthers with terminal appendages, basally sagittate, the auricles obtuse, acute or rarely tailed, pollen grains echinate to echinolophate, filaments inserted high above the base; style branches semicylindrical, long and slender, narrowed to the acute tips, usually short-hirsute outside, rarely glabrate, stigmatic papillae on the inner surface. **Pappus** usually elongate and setose, sometimes of scales or coroniform, often in two series, the outer reduced or rarely absent. **Achenes** variable, terete to slightly flattened, often 10-ribbed or 4- or 5-angled, occasionally smooth, rarely dimorphic.

Vernonieae may be recognized by their usually alternate leaves, their slender, pubescent style branches tapering to slender tips, their involucre of similar imbricate phyllaries in graded series, and (in Peru) by their reddish-purple, or pink to whitish corollas. Vernonieae are most likely to be confused with Eupatorieae since the heads of both are homogamous and their corollas are similarly colored. The leaves of most Vernonieae, however, are alternate as opposed to those of Eupatorieae, which are mostly opposite. In Vernonieae, the stigmatic papillae of the style branches are on the inner surface, but in Eupatorieae, they are restricted to the lower half of the lateral margins.

The tribe (worldwide) has ca. 1,456 species and over 70 genera. There is little doubt that this tribe originated in the tropics, since that is its center of diversity, the area where its primitive species occur, and the region where the majority of its genera are located. The tribe Vernonieae seemingly has two centers of distribution, one in southern Brazil and the second in tropical Africa. Vernonieae are also commonly found in Southeast Asia and associated archipelagos and in the

West Indies, Central America, and North America. Carlquist (1976) argues that the tribe originated in the New World.

Chromosome numbers are known from 16 of the 70 genera of Vernonieae. On a worldwide basis, genera with $x = 10$ predominate, with the second greatest number having $x = 9$. The Old World Vernonias are dibasic with $x = 9$, or 10, and have polyploids derived from either base number. *Vernonia* in the New World has a base number of $x = 17$ which is assumed to represent ancient polyploids derived by aneuploidy from a base of $x = 9$. Cytologically, this tribe has less known about it than any of the other Compositae tribes.

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KEY TO GENERA OF VERNONIEAE

a. Heads united in glomerules, syncephalous.

b. Pappus of straight bristles which are all alike .....VI. *Elephantopus*.

bb. Pappus of bristles, at least two of which are spirally twisted or doubly bent ... VII. *Pseudelephantopus*.

aa. Heads separate from each other, not syncephalous.

c. Pappus a ring or corona shorter than the achene .....V. *Struchium*.

cc. Pappus of strigose bristles or of scales longer than achene, often biseriate, the outer shorter.

d. Outer phyllaries leaflike, wide-spreading; pappus easily deciduous; inner phyllaries usually distinctly awn-tipped .....IV. *Centratherum*.

dd. Outer phyllaries scalelike, mostly appressed; pappus persistent; inner phyllaries acute to acuminate or mucronate.

e. Heads with 2 (rarely 1 or 3) florets .....III. *Pollalesta*.

ee. Heads with more than 3 florets.

f. Inflorescences terminal, composed of scorpioid cymes or becoming paniculate or corymbiform; anthers saggitate at base; pubescence not stellate-tomentose .....I. *Vernonia*.

ff. Inflorescences aggregated in rounded axillary corymbs or sessile in rounded axillary clusters. Anthers caudate at base; pubescence often stellate-tomentose .....II. *Piptocarpha*.

I. VERNONIA

Vernonia Schreb., Gen. Pl. 2: 541. 1791. *nom. cons.* TYPE: *V. noveboracensis* (L.) Willd.

Serratula noveboracensis L., Sp. Pl. 818. 1753. TYPE: *S. noveboracensis* L. *typ. cons.*

Behen Hill, Veg. Syst. 4: 41. 1762. TYPE: *B. noveboracensis* (L.) Hill.

Suprago Gaertn., Fruct. 2: 402. 1791. TYPE: *S. glauca* Gaertn.

Baccaroides Moench, Meth. 578. 1794. TYPE: *B. anthelmintica* (L.) Moench.

Hololepis DC., Ann. Mus. Natl. Hist. Nat. 16: 190. 1810. TYPE: *H. pedunculata* DC.

Teichostemma R. Br. ex Salt, Abyss. App. 65. 1814. TYPE: *T. fruticosum* R. Br.

Bracheilema R. Br. ex Salt, Abyss. App. 65. 1814. TYPE: *B. paniculatum* R. Br.

Ascaricida Cass., Dict. Sc. Nat. 3: Suppl. 38. 1816. TYPE: *A. indica* Cass.

Centrapalus Cass., Dict. Sc. Nat. 7: 382. 1817. TYPE: *C. galamensis* Cass.

Isonema Cass., Bull. Soc. Philom. Paris 1817: 152. 1817. TYPE: *I. ovata* Cass.

Distephanus Cass., Bull. Soc. Philom. Paris 1817: 151. 1817. TYPE: *Conyza populifolia* Lam.

Lepidaploa Cass., Bull. Soc. Philom. Paris. 1817: 66. 1817. TYPE: *V. glauca* (L.) Willd.

Gymnanthemum Cass., Bull. Soc. Philom. Paris 1817: 10. 1817. TYPE: *G. congestum* Cass.

Turpinia Lex. ex LaLlave & Lex., Nov. Veg. Desc. fasc. 1: 22. 1824. TYPE: *T. tomentosa* Lex. ex LaLlave & Lex.

Acilepsis D. Don, Prod. Fl. Nep. 169. 1825. TYPE: *A. squarrosa* D. Don.

Cyanthillium Bl., Bijdr. 889. 1826. TYPE: *C. moluccense* Bl.

Achyrocoma Cass., Dict. Sc. Nat. 5: 57. 1828. TYPE: *A. tomentosa* Cass.

Cyanopis Bl. ex DC., Prodr. 5: 69. 1836. TYPE: *C. villosa* (Bl.) DC.

Plectreca Raf., Fl. Tellur. 4: 119. 1836. TYPE: *P. corymbosa* (Schwein.) Raf.

Webbia DC., Prodr. 5: 72. 1836. TYPE: *W. pinifolia* (Less.) DC.

Monosis DC., Prodr. 5: 77. 1836. TYPE: *M. wightiana* DC. ex Wight.

Keringa Raf., Sylva Tellur. 144. 1838. TYPE: *K. amygdalina* (Delile) Raf.

Flustula Raf., Sylva Tellur. 116. 1838. TYPE: *F. tomentosa* Raf.

Candidea Ten., Atti Accad. Sci. Fis. 4: 104. 1839. TYPE: *C. senegalensis* Ten.

Cyanopsis Endl., Ench. 232. 1841.

Trianthaea Spach, Hist. Vég. Phan. 10: 39. 1841.

Linzia Sch. Bip., Flora 24. I. Intell. 26. 1841. TYPE: *L. glabra* (Steetz) Sch. Bip.

Cheliusia Sch. Bip., Flora 24. I. Intell. 26. 1841. TYPE: *C. abyssinica* Sch. Bip.

Stengelia Sch. Bip., Flora 24. I. Intell. 26. 1841. TYPE: *S. adoensis* Sch. Bip.

Polydora Fenzl, Flora 27: 312. 1844. TYPE: *P. stoechadifolia* Fenzl.

Claotrachelus Zoll., Natuur- Geneesk. Arch. Ned.-Indië. 2: 565. 1845. TYPE: *C. rupestris* Zoll. & Mor.

Leiboldia Schlecht., Linnaea 19: 742. 1847. TYPE: *L. leiboldiana* Schlecht.

Vernonella Sond., Linnaea 23: 62. 1850. TYPE: *V. africana* Sond.

Llerasia Triana., Ann. Sci. Nat. Ser. 4: 10. 1858. TYPE: *L. lindeni* Triana.

Strobocalyx Sch. Bip., Pollichia 28/29: 170. 1861. TYPE: *S. arborea* (Buch.-Ham.) Sch. Bip.

Crystallopollen Steetz ex Peters., Reise Mossamb. Bot. part 6: 363. 1862-1864. TYPE: *C. angustifolium* Steetz.

Ambassa Steetz ex Peters., Reise Mossamb. Bot. part 6: 346. 1862-1864. TYPE: *A. hochstetteri* (Sch. Bip. ex Hochst.) Steetz ex Peters.

Xipholepis Steetz ex Peters., Reise Mossamb. Bot. part 6: 344. 1862-1864. TYPE: *X. silhetensis* (DC.) Steetz.

Punduana Steetz ex Peters., Reise Mossamb. Bot. part 6: 345. 1862-1864. TYPE: *P. volkameriaefolia* (DC.) Steetz ex Peters.

Lysistemma Steetz ex Peters., Reise Mossamb. Bot. part 6: 340. 1862-1864. TYPE: *L. indica* (Wall. ex Clarke) Steetz ex Peters.

Stenocephalum Sch. Bip., Pollichia 20/21: 385. 1863. TYPE: *S. monticolum* (DC.) Sch. Bip.

Tephrothamnus Sch. Bip., Pollichia 20/21: 431. 1863. TYPE: *T. pycnanthus* (Benth.) Sch. Bip.

Critoniopsis Sch. Bip., Pollichia 20/21: 430. 1863. TYPE: *C. lindenii* Sch. Bip.

Senecioides Post & O. Ktze., Lex. Gen. Phan. 2: 515. 1903. TYPE: *S. cinereum* (L.) Post & O. Ktze.

Eremosis (DC.) Gleason, Bull. New York Bot. Gard. 4: 227. 1906. TYPE: *E. salicifolia* (DC.) Gleason.

Perennial **herbs**, **shrubs**, or small **trees**, scandent **lianas**, or rarely annuals. **Leaves** alternate, simple, pinnately veined, usually cauline, or sometimes basal in herbaceous perennials; blades various, lanceolate to ovate or elliptic. **Inflorescences** terminal or upper axillary or scorpioid cymes, panicles, corymbs, of combinations thereof, or reduced to solitary terminal or axillary heads. **Heads** discoid, homogamous, with 1-many florets; involucre cylindric to broadly hemispheric or campanulate; phyllaries loosely or closely imbricate in several series, the inner phyllaries progressively longer; receptacle flat to subconvex. **Corollas** tubular, regular, 5-lobed, deep reddish purple to whitish or pinkish (blue and yellow in the Old World); often slightly glandular; anthers sagittate at the base; style branches elongate, filiform-subulate, outer surface hispid throughout, with stigmatic pappillae on inner surfaces. **Pappus** usually in 2 series, the inner pappus of capillary, terete, or slightly flattened, purple to white bristles; the outer series short, of bristles or scales, or pappus bristles subequal and not in distinct series. **Achenes** ribbed or sometimes ribless, commonly resinous-dotted between the ribs. Chromosome number: $x = 17$ in New World.

Key to Species of *Vernonia*[5]

a. Heads with 7 or fewer florets.

b. Inner pappus bristles ca. 3.5 mm long; corollas ca. 3 mm long..... 1. *V. pycnantha*.

[5]As the present manuscript went to press, two additional *Vernonia* species were described from Peru; see Robinson, H., 1980. Phytologia 45(2): 158-165.—M.O.D.

bb. Inner pappus bristles 4 mm or more long; corollas 5 mm or more long.

c. Leaves glabrate or with scattered small trichomes beneath; inflorescences large (2-3 dm broad and tall) with scorpioid-cymose branches ..... 21. *V. cainarachiensis*.

cc. Leaves tomentose, softly pubescent, or with tomentum beneath; inflorescences smaller (less than 2 dm broad), branches not scorpioid.

d. Inner pappus bristles ca. 9 mm long; corollas ca. 8 mm long; achenes strigose .....2. *V. lambayequensis*.

dd. Inner pappus bristles ca. 6.5 mm or less long; corollas 7 mm or less long; achenes glandular to sparsely pilose.

e. Leaf blades 3.5-6 cm long, 1.5-2.4 cm wide, coriaceous ..... 3. *V. jalcana*.

ee. Leaf blades 7-20 cm long, 2.5-5.5 cm wide, not coriaceous.

f. Achenes sparsely pilose; inner phyllary tips obtuse; leaf blades elliptic to ovate .....4. *V. woytkowskii*.

ff. Achenes glabrous to glandular; inner phyllary tips acute; leaf blades lanceolate to long-elliptic.

g. Inner pappus bristles 6.5 mm long; heads with 4-5 florets; pappus white; leaf blades tomentose beneath, with scattered longer dark-brown villous trichomes arising above the tomentum .....5. *V. peruviana*.

gg. Inner pappus bristles 5 mm long; heads with 5-7 florets; pappus straw-colored; leaf blades tomentose beneath with no long villous trichomes.....6. *V. jelskii*.

aa. Heads with 8 or more florets.

h. Heads with more than 50 florets.

i. Heads with 80-90 florets; corollas ca. 5.5 mm long; leaf blades rigid or coriaceous .....7. *V. libertadensis*.

ii. Heads with ca. 50 florets; corollas ca. 2.5 mm long; leaf blades thin ..... 8. *V. gracilis*.

hh. Heads with 36 or less florets.

j. Pappus straw-colored, brown or pinkish.

k. Inner pappus bristles ca. 10-11 mm long, corollas 12-13 mm long.

l. Heads with ca. 20 florets; corolla throats glandular; phyllary tips acute; inflorescences of axillary, leafy cymes .....9. *V. laurifolia*.

ll. Heads with ca. 12 florets; corolla throats glandular; phyllary tips acuminate; inflorescences paniculate-corymbose ..... 10. *V. sordidopapposa*.

kk. Inner pappus bristles ca. 7 mm or less long; corollas 10 mm or less long.

m. Corollas ca. 10 mm long; heads with 7-13 florets; inner phyllary tips obtuse; pappus pinkish .....21. *V. cainarachiensis*.

mm. Corollas ca. 8 mm long; heads with 14-26 florets; inner phyllary tips acute to long-acuminate; pappus straw-colored to brown.

n. Outer pappus of fimbriate scales ca. 1.2 mm long; pappus light brown; corollas ca. 8 mm long; inner phyllary tips long-acuminate .....11. *V. mapirensis*.

nn. Outer pappus of bristles 0.8 mm or less long; pappus straw-colored; corollas ca. 6.5 mm or less long; inner phyllary tips acute to slightly acuminate.

o. Leaf blades densely tomentose beneath, oblong-elliptic; achenes faintly strigose .....12. *V. ferruginea.*

oo. Leaf blades glabrate to hispid or downy beneath, elliptic to broadly elliptic or ovate-lanceolate; achenes glandular-hispid .....16. *V. patens.*

jj. Pappus white.

p. Inflorescences paniculate-corymbose or cymose.

q. Inner bristles of pappus ca. 6-7 mm long .....17. *V. fulta.*

qq. Inner bristles of pappus ca. 4.5 mm or less long.

r. Leaf blades 2-6 cm long, 1-2.7 cm wide.

s. Corollas ca. 9 mm long; leaf blades cordate to ovate or ovate-elliptic, densely white tomentose beneath; inner phyllary tips long-acuminate. .....18. *V. apurimacensis.*

ss. Corollas ca. 4.5-5 mm long; leaf blades lanceolate, glabrate beneath; inner phyllary tips acute to obtuse or mucronate . 14. *V. stuebellii.*

rr. Leaf blades ca. 12-26 cm long, ca. 5-15 cm wide.

t. Heads with ca. 36 florets; leaf blades elliptic to elliptic-oblong, villous beneath .....13. *V. costata.*

tt. Heads with ca. 20 florets; leaf blades ovate to ovate-lanceolate, tomentose beneath .....15. *V. sambrayana.*

pp. Inflorescences scorpioid-cymose or somewhat scorpioid-paniculate.

u. Leaf blades 3.5 cm or less long.

v. Inner phyllary tips slightly recurved; heads with 14-24 florets . 19. *V. scorpioides.*

vv. Inner phyllary tips flat or straight; heads with 11-13 florets.

w. Corollas ca. 5 mm long; leaf blades ca. 1.9 cm wide, closely pubescent with minute slender hairs, ovate-oblong to elliptic-ovate ..... 25. *V. fieldiana.*

ww. Corollas ca. 8 mm long; leaf blades ca. 2.5 cm wide, villous to hirsute with straw-colored trichomes; obovate to obovate-lanceolate ..... 27. *V. herbacea.*

uu. Leaf blades (4)6-70 cm long.

x. Inner phyllary tips slightly recurved .....19. *V. scorpioides.*

xx. Inner phyllary tips flat or straight.

y. Achenes brownish, with round glandular trichomes ..... 22. *V. yurimaguasensis.*

yy. Achenes not brownish, with hairlike trichomes.

z. Leaf blades minutely or sparsely pubescent beneath; inner phyllary tips acute to acuminate or fimbriate.

a′ Achenes strigose; leaf blades 10-17 cm long, 3.5-7 cm wide .....23. *V. myriocephala.*

aa′ Achenes sparsely pubescent; leaf blades 20-70 cm long, 8-19 cm wide .....20. *V. brachiata.*

zz. Leaf blades densely or sparsely strigose or strigose-hirsute beneath; inner phyllary tips acute, subulate or spinose.

b′ Inner pappus bristles 4 mm long; corollas pinkish to whitish; leaf blades 4-7 cm wide; inflorescences of scorpioid cymes arranged in spreading panicles or corymbs .....24. *V. canescens.*

bb′ Inner pappus 6-8 mm long; corollas reddish-purple; leaf blades 1.5-3 cm wide; inflorescences divaricately spreading scorpioid cymes ..... 26. *V. salzmannii.*

1. **Vernonia pycnantha** Benth., Pl. Hartw. 134. 1844. TYPE: in montibus Paccha (K, not seen).

Critoniopsis lindenii Sch. Bip., Pollichia 20/21: 431. 1863. TYPE: Colombia: Quindiu, Los Volcancitos, *Linden 1054* (Holotype P, as photo F!).

Vernonia lindenii (Sch. Bip.) Cuatr., Bot. Jahrb. Syst. 77: 72. 1956.

Shrub with long scandent branches, sometimes forming a **tree**, young stems brownish-tomentose to almost glabrate. **Leaves** cauline, petiolate; petiole ca. 0.8-1.5 cm long; blades ovate-elliptic, elliptic, or elliptic-lanceolate, acuminate to acute at the apex, cuneate to cuneate-rounded at the base, ca. 8-15 cm long, ca. 3.5-7 cm wide, margins revolute, and sometimes remotely toothed, largely glabrous but remotely glandular above, glabrate and glandular to tomentose beneath. **Inflorescence** of terminal, corymbose cymes with reduced bracteal leaves along main axis. **Heads** with ca. 6 florets, sessile in dense pedunculate clusters; involucres campanulate, ca. 4 mm long, loosely imbricated; phyllaries soon deciduous, glabrous to slightly pubescent, green, tipped with purple; inner phyllaries oblong, tips rounded; outer phyllaries ovate. **Corollas** ca. 3 mm long. **Pappus** white; inner bristles 3.5 mm long, outer bristles ca. 1 mm long. **Achenes** ca. 2.2 mm long, ribbed, lightly strigose.

This species is distributed from Ecuador south to Peru. In Peru, it has been collected at 1,750 m elevation within a forest border. Flowering and fruiting occur from July to September.

HUANUCO: Churubamba, *Mexia 8229* (F, MO, NY, UC).

2. **Vernonia lambayequensis** S. B. Jones, *sp. nov.* TYPE: Peru: Lambayeque: km 28 E of Olmos, *Hutchison and Wright 3473* (Holotype UC! Isotypes F! MO! USM!).

Frutex 2.5 m altus. Foliorum laminae ellipticae ad elliptico-obovatae, ca. 8-12 cm longae, ca. 4-5 cm latae. Inflorescentia terminalis, paniculato-corymbiformis, capitulis in fasciculos compactos, rotundatos, conspicue aggregatis. Capitula 5 flosculos habentia. Achenia strigosa.

Erect **shrub**, up to 2.5 m tall, young stems canescent. **Leaves** cauline; petioles ca. 0.7-1 cm long; blades elliptic to elliptic-obovate, acute to rounded or mucronate at the apex, cuneate at the base, ca. 8-12 cm long, 4-5 cm wide, margins revolute, very faintly

toothed, glabrate to slightly canescent above, veins canescent above, softly pubescent beneath. **Inflorescences** terminal, paniculate-corymbiform, heads grouped in compact, rounded clusters within the inflorescence, branches canescent. **Heads** with 5 florets, sessile; involucres cylindric, ca. 6 mm long, 4- to 5-seriate; phyllaries canescent and dark at tips, yellowish; inner phyllaries oblong-lanceolate, tips obtuse to acute; outer phyllaries ovate, arachnoid. **Corollas** ca. 8 mm long, pale purple to almost white, glandular on tube. **Pappus** white; inner bristles ca. 9 mm long, outer bristles ca. 1 mm long. **Achenes** ca. 3.5 mm long, strigose, ribbed.

This species is known only from the type location in Depto. Lambayeque, where it was collected at 1,150 to 1,200 m elevation. Habitat information was not available on the label; however, it was described as being rare.

3. **Vernonia jalcana** Cuatrec., Ann. Missouri Bot. Gard. 52: 312. 1965. TYPE: Peru: Amazonas: Prov. Chachapoyas, Molinopampa. *Wurdack 1359* (Holotype US, Isotype UC!).

Shrub, 1.5-2 m tall; stems grayish to brownish-tomentose to almost black, with scattered long purple trichomes. **Leaves** crowded, coriaceous; petiolate, petioles ca. 7 mm long; blades ovate-elliptic, acute at the apex, cuneate to slightly rounded at the base, 1.5-2.4 cm long, 3.5-6 cm wide, margins entire, upper surface reticulate and tomentose on lower part of midvein, gray tomentose, with scattered long purple trichomes beneath. **Inflorescences** densely corymbose-paniculate. **Heads** with 3 florets, compact and almost sessile; involucres campanulate-cylindric, 7-8.5 mm long, 5- to 6-seriate; phyllaries arachnoid, glandular near tips, tightly appressed, purplish; inner phyllaries oblong, tips acute; outer phyllaries lanceolate. **Corollas** ca. 6-7 mm long, reddish-purple, with scattered glands. **Pappus** white; inner bristles ca. 6.5 mm long, outer bristles ca. 1-1.5 mm long. **Achenes** 3 mm long, glandular, very faintly ribbed.

This species occurs in Depto. Amazonas in the jalca zone (north Peruvian paramo) at 2,000-3,000 m elevation. Flowering and fruiting occur in June.

AMAZONAS: Chachapoyas, Cerros Calla Calla, 19 km above Leimebama on road to Balsas, *Hutchison and Wright 5515* (F, MO, NY, USM); Bongará, 3 km S of Pomacocha, *Wurdack 971* (F, USM). CAJAMARCA: Cutervo: Cerros de Cutervo, 2,500-2,600 m, *Ferreyra 0810* (USM).

4. **Vernonia woytkowskii** S. B. Jones, *sp. nov.* TYPE: Peru: Lambayeque: Porculla ad Olmos, *Woytkowski 6770* (Holotype MO! Isotype GA!).

Frutex scandens, ca. 7 m altus, caulibus dense canescentibus. Foliorum laminae ellipticae vel oblongo-ellipticae vel ovatae, ca. 7-12 cm longae, ca. 4-5 cm latae. Inflorescentia terminalis, compacta, capitulis dense conglomeratis. Capitula 5-6 flosculos habentia. Achenia sparsim pilosa.

Liana, ca. 7 m tall, young stems densely canescent. **Leaves** cauline; petioles canescent, ca. 1 cm long; blades elliptic, oblong-elliptic, or ovate, acute to obtuse at the apex,

cuneate at the base, 7-12 cm long, 4-5 cm wide, margins mostly entire, slightly revolute, very remotely fine-toothed, finely and remotely canescent above, softly tomentose and with raised veins beneath. **Inflorescences** terminal, very compact (actually forming a dense mass of heads) corymbose-paniculate, bracts only at very base of inflorescence. **Heads** with 5-6 florets, sessile; involucres cylindric-campanulate, 5.5 mm long, 4- to 5-seriate; phyllaries pubescent at tips, wide spreading when mature and deciduous along with achenes; inner phyllaries oblong, tips obtuse, dark brown; outer phyllaries obtuse. **Corollas** ca. 5.5. mm long, white (from label), sparsely glandular. **Pappus** whitish; inner bristles ca. 4.5 mm long, outer bristles ca. 0.5 mm long. **Achenes** ca. 2.4 mm long, very sparsely pilose, faintly ribbed.

This species is known only from the type location in Depto. Lambayeque. It was collected on the barren slope of a hill, sprawling upon *Cereus* at an elevation of 2,100 m. It apparently flowers and fruits in August and September.

5. **Vernonia peruviana** Cuatrec., Bot. Jahrb. Syst. 77: 75. 1956. TYPE: Peru: Villcabamba, Hacienda on Rio Chinchao, *Macbride 5150* (Holotype F! as photo F! Isotype NY).

Shrub 3-4 m tall, with spreading branches, younger stems pubescent. **Leaves** cauline, coriaceous; petioles pubescent, 1-2.5 cm long; blades oblong-lanceolate to oblong-elliptic, acute to slightly acuminate at the apex, rounded or obtuse at the base, 10-20 cm long, 3-5.5 cm wide, margins mostly entire, but sometimes remotely toothed, slightly revolute, mostly glabrate except pubescent along midvein above, densely tomentose beneath, also having scattered dark brown, villous trichomes beneath. **Inflorescences** terminal, paniculate-corymbose. **Heads** with (4)5 florets, mostly sessile or subsessile; involucre broadly campanulate, ca. 6 mm long, 5- to 6-seriate; phyllaries arachnoid to ciliate, mostly deciduous when achenes mature; inner phyllaries oblong, tips acute; outer phyllaries ovate. **Corollas** ca. 7 mm long. **Pappus** white; inner bristles ca. 6.5 mm long, outer bristles ca. 2-4 mm long. **Achenes** ca. 3 mm long, glabrous or sparsely glandular, ribbed.

This species is known only from the type location where it was collected on a mountain slope at 2,000 m elevation. Flowering and fruiting occur in July and August.

6. **Vernonia jelskii** Hieron., Bot. Jahrb. Syst. 36: 459. 1905. TYPE: Tambillo, *Jelski 602* (Holotype B, as photo F! Isotype MO!).

V. jelskii Hieron. var. *virescens* Hieron., Bot. Jahrb. Syst. 36: 459. 1905. TYPE: Peru: Tambillo, *Jelski 623* (Holotype B, not seen).

Shrub, stems slightly brownish-tomentose. **Leaves** cauline, prominately pinnately nerved; petiolate, petioles ca. 1 cm long with brownish tomentum; blades narrowly, long-elliptic, acuminate at the apex, cuneate at the base, 12-18 cm long, 2.5-4 cm wide, margins revolute, glabrous above, reticulate veined, finely glandular, and with tomentum beneath. **Inflorescences** paniculate-corymbose, leafy. **Heads** with 5-7 florets, sessile; involucres campanulate, ca. 6 mm long, loosely imbricate, 6- to 9-seriate; phyllaries arachnoid with tomentum at base, loosely appressed, brownish-straw colored; inner

phyllaries oblong, deciduous, tips acute to slightly fimbriate; outer phyllaries lanceolate, tips acute. **Corollas** ca. 5 mm long, light reddish-purple, glandular. **Pappus** straw-colored; inner bristles 5 mm long, outer bristles 0.5-0.7 mm long. **Achenes** ca. 2.5 mm long, glandular, slightly ribbed.

This species is known only from the type location of Tambillo. Flowering and fruiting occur in August.

7. **Vernonia libertadensis** S. B. Jones, *sp. nov.* TYPE: Peru: La Libertad: Otuzco: Cerro Sango (Motil-Shorey), *Lopez 1947* (Holotype GA!).

Frutex caule glanduloso. Folia rigida, laminis ca. 2.5 cm longis, ca. 0.8-1 cm latis, resinoso-glandulo-punctatis. Inflorescentia parva, terminalis, corymbosa. Capitula 80-90 flosculos habentia. Involucrum 10-11 mm longum. Setae pappi subaequales, ca. 7 mm longae.

Shrub, stems glandular. **Leaves** rigid, cauline, crowded, sessile; blades oblong-lanceolate, obtuse to acute at the apex, cuneate at the base, ca. 2.5 cm long, ca. 0.8-1 cm wide, margins entire, resinous, glandular-punctate both above and beneath. **Inflorescences** relatively small, terminal, corymbose-cymose, the few heads terminal on short branches, the heads subtended by bracteal leaves which are only slightly reduced from the cauline leaves. **Heads** with 80-90 florets; involucres campanulate, 10-11 mm long, ca. 6-seriate; phyllaries slightly fimbriate, resinous, tightly appressed; inner phyllaries oblong, tips obtuse to rounded or cuspidate; outer phyllaries oblong-lanceolate to ovate-lanceolate. **Corollas** ca. 5.5 mm long, reddish-purple, tube slender. **Pappus** straw-colored; bristles in one series ca. 7.5 mm long. **Achenes** ca. 2.4 mm long, ribbed, remotely strigose.

This species is known only from the type location where it was collected at the border of a field at an elevation of 3,300 to 3,400 m. Flowering and fruiting occur in June and July.

8. **Vernonia gracilis** H.B.K., Nov. Gen. & Sp. 4: 34. 1820. TYPE: Colombia: Turbaco, *Humboldt and Bonpland 1439* (Holotype P, as IDC microfiche!).

V. moritziana Sch. Bip., Linnaea 20: 511. 1847. TYPE: Venezuela (not seen).
Cacalia gracilis (H.B.K.) O. Ktze., Rev. Gen. Pl. 970. 1891.
C. moritziana (Sch. Bip.) O. Ktze., Rev. Gen. Pl. 970. 1891.

Annual **herbs**, 2-3 dm tall, stems reddish-purple, sparsely strigose. **Leaves** cauline, thin; petioles 0-5 mm long; blades lanceolate, elliptic to elliptic-lanceolate, rounded to acute at the apex, cuneate at the base, 4-5 cm long, 1-1.6 cm wide, margins remotely toothed, minutely scabrous above, glandular punctate and remotely pubescent beneath. **Inflorescences** cymose, weakly branching, bracteal leaves present and similar to the stem leaves. **Heads** with ca. 50 florets, sessile; involucres broadly campanulate, ca. 5 mm long, 3- to 4-seriate; phyllaries minutely glandular, ciliate, arachnoid, greenish; inner phyllaries oblong-lanceolate, tips acuminate; outer phyllaries ovate-lanceolate. **Corollas** pinkish, ca. 2.5 mm long. **Pappus** straw-colored, of indurate, thick bristles; inner 2.5 mm long, outer 0.3 mm long. **Achenes** ca. 2 mm long, slightly pubescent, ribbed.

This species is distributed from northern South America south into Peru. Only one collection has been seen. It was flowering in September.

LORETO: Rio Mamón near Rio Nanay, *Croat 19916* (MO, NY).

9. **Vernonia laurifolia** DC., Prodr. 5: 30. 1836. TYPE: (G-DC, as IDC microfiche!).

Cacalia laurifolia (DC.) O. Ktze., Rev. Gen. Pl. 2: 970. 1891.

Herb 1 m tall, stems brownish-tomentose. **Leaves** coriaceous, cauline; petiolate, petiole 0.3-0.8 cm long; blades elliptic to lanceolate, acute at the apex, cuneate to rounded at the base, ca. 5-7.5 cm long, 2-3.5 cm wide, margins revolute, glabrous except along midvein above, glandular and prominently veined beneath. **Inflorescences** of axillary leafy cymes, heads usually arising in the internodes of the bracteal leaves. **Heads** with ca. 20 florets, long peduncled; involucres narrowly campanulate, ca. 14 mm long, tightly imbricate, 7-seriate; phyllaries slightly arachnoid at base, reddish-purple; inner series of phyllaries linear-lanceolate and much longer than the other series, tips acute; outer phyllaries lanceolate. **Corollas** ca. 13 mm long, reddish-purple, glandular on outer throat. **Pappus** light brown; inner bristles ca. 10 mm long, outer bristles ca. 2 mm long. **Achenes** (immature) brownish-pubescent.

This species has been collected in Depto. Puno at elevations of 1,900 m, growing in a moist, shady place in rocky soil. Flowering and fruiting occur from May to June.

PUNO: Carabaya: trail Santo Domingo to Chabucamine, *Metcalf 30660* (MO, UC, US).

10. **Vernonia sordidopapposa** Hieron., Bot. Jahrb. Syst. 22: 697. 1897. TYPE: Peru: Sandia, *Weberbauer 759* (Holotype B, as photo F! NY!).

Cacalia sordidopapposa (Hieron.) O. Ktze., Rev. Gen. Pl. 2: 971. 1891.

Shrub 1-2 m tall, stems strigose to long strigose-pilose. **Leaves** cauline; petioles 3-4 mm long; blades elliptic-lanceolate, acuminate at the apex, broadly cuneate at the base, 3-8 cm long, 1.5-2.5 cm wide, margins distinctly revolute, pilose-hispid and reticulate veined above, glandular and pilose-hispid to pilose beneath. **Inflorescences** paniculate-corymbose, with bracteal leaves. **Heads** with ca. 12 florets, subsessile; involucres narrowly campanulate, ca. 7 mm long, imbricate, 3- to 4-seriate; phyllaries ciliate, arachnoid to pilose-hispid, appressed, greenish-purple; inner phyllaries oblong-lanceolate, tips acuminate; outer phyllaries lanceolate. **Corollas** ca. 12 mm long, reddish-purple, glabrous. **Pappus** brown; inner bristles ca. 11 mm long, outer scales fimbriate ca. 1.5 mm long. **Achenes** ca. 2 mm long, pilose, faintly ribbed.

This species is distributed from Depto. Amazonas south to Depto. Puno at elevations of 2,400 to 3,400 m. It grows in the jalca zone and puna in moist soil. Flowering and fruiting occur from May to June.

AMAZONAS: Chachapoyas, west of Molinopampa, *Wurdack 1371* (NY, US). PUNO: Sandia, near Limbani, *Metcalf 30513* (MO).

11. **Vernonia mapirensis** Gleason, Amer. J. Bot. 10: 307. 1923. TYPE: Bolivia: Mapiri, *Buchtien 1533* (Holotype NY!).

V. trichoclada Gleason, Bull. Torrey Bot. Club 52: 184. 1925. TYPE: Peru: La Merced, Hacienda Schunke, *Macbride 5775* (Holotype F! as photo F! Isotype NY).

Perennial **herb**, erect, ca. 3.5 m tall, stems long hirsute-villous. **Leaves** cauline; petioles ca. 1 cm long; blades elliptic-ovate, acuminate at the apex, rounded at the base, 10-14 cm long, 5-6 cm wide, margins revolute, slightly crenate and remotely callus toothed, rugose, slightly pubescent above, hirsute-villous on midvein above, rugose and hirsute-villous beneath. **Inflorescences** paniculate to cymose. **Heads** with (10)14-20(23) florets, sessile; involucres campanulate, 8-9 mm long, imbricate, ca. 4-seriate; phyllaries ciliate, loosely appressed, greenish to reddish-purple; phyllaries long-lanceolate, tips long-acuminate. **Corollas** ca. 8 mm long, reddish-purple, glabrous. **Pappus** light brown; inner bristles ca. 7 mm long, outer scales fimbriate, ca. 1.2 mm long. **Achenes** 3 mm long, densely pilose.

This species occurs in Peru from Depto. Junin south to Depto. Puno at elevations of 1,300 to 2,600 m in open areas in the mountains. Flowering and fruiting occur from June to September.

JUNIN: La Merced, *Macbride 5775* (F). CUZCO: Tambopata, Machupijcho, *Vargas 13539* (US). PUNO: Sandia, 2-6 km Oconeque, *Metcalf 30603* (UC).

12. **Vernonia ferruginea** Less., Linnaea 4: 271. 1829. TYPE: Brasil: *Sellow s.n.* (not seen).

Cacalia ferruginea (Less.) O. Ktze., Rev. Gen. Pl. 2: 970. 1891.

A small **tree** or **shrub**, 2-4 m tall, crown bushy, stems tomentose. **Leaves** cauline; petiolate, petioles 0.5-1 cm long; blades oblong-elliptic, obtuse at the apex, truncate to slightly rounded at the base, 8-16 cm long, 3-5 cm wide, margins remotely callus toothed, revolute, undulate to crenate, arachnoid to glabrate, tomentose on large veins above, tomentose beneath. **Inflorescences** paniculate-cymose with slightly scorpioid branches. **Heads** with 20 to 26 florets, sessile; involucres campanulate, 5-6.5 mm long, ca. 5-seriate; phyllaries arachnoid-tomentose, appressed, greenish with lighter green margins; inner phyllaries ovate-lanceolate, tips acute to slightly acuminate; outer phyllaries oblong-lanceolate. **Corollas** 4.5-5 mm long, reddish-purple, sometimes slightly glandular. **Pappus** straw-colored; inner bristles 3.5-4 mm long, outer bristles ca. 0.7 mm long. **Achenes** ca. 1.8 mm long, faintly strigose, weakly ribbed.

This species is distributed from Depto. Junin south to Depto. Cuzco into Brazil at elevations of 800 to 1,000 m on open hillsides and grassy slopes. Flowering and fruiting occur from June to August.

JUNIN: San Ramón, *Killip and Smith 24780* (F, NY, US). CUZCO: Convencion, Chahuares, *Vargas 21674* (US).

13. **Vernonia costata** Rusby, Mem. Torrey Bot. Club 6: 53. 1896. TYPE; Bolivia: Mapiri, *Rusby 1472* (not seen).

Slender, erect **shrub**, 1-2 m tall, stems brownish-tomentose to villous. **Leaves** cauline; petioles brownish-villous, 1-1.5 cm long; blades elliptic to elliptic-oblong, acute to acuminate at the apex, cuneate to slightly rounded at the base, 12-26 cm long, 5-15 cm broad, margins revolute, sometimes with callous teeth, villous wide, densely brownish-villous and prominently veined beneath. **Inflorescences** cymose-paniculate. **Heads** with ca. 36 florets, sessile; involucres campanulate, 7-8 mm long, 6- to 7-seriate; phyllaries slightly arachnoid, tightly appressed, greenish to reddish-purple; inner phyllaries long-lanceolate, tips subacute; outer phyllaries lanceolate. **Corollas** ca. 5 mm long; reddish-purple, glandular and hairy on outside of lobes. **Pappus** white; inner bristles ca. 4.5 mm long, outer bristles ca. 0.8 mm long. **Achenes** 2-3 mm long, strigose.

This species is distributed from Depto. Junin to Depto. Cuzco south into Bolivia at elevations of 600 to 1,300 m, growing in thickets and thin woods. Flowering and fruiting occur from June to August.

JUNIN: Colonia Perene, *Killip and Smith 25012* (F, NY, US). CUZCO: Convencion, Cuesta de Ichiquiato, *Vargas 14495* (US).

14. **Vernonia stuebelii** Hieron., Bot. Jahrb. Syst. 21: 327. 1895. TYPE: Peru: San Martín: Cerro de la Campana between Moyobamba and Rio Huallaga, *Stübel 58b* (Holotype B, as photo F! USM).

Perennial **herb** or suffrutescent, stems striate, puberulent to glabrate. **Leaves** cauline; petioles short to indistinct; blades lanceolate, acute or short acuminate at the apex, cuneate at the base, ca. 5-6 cm long, ca. 1.4-1.6 cm wide, margins remotely toothed, slightly scabrous and subrugose above, glabrate beneath. **Inflorescences** corymbose-paniculate, heads numerous. **Heads** with 11-16 florets; involucres campanulate, 5- to 6-seriate; phyllaries slightly pubescent to glabrate, minutely ciliate at tips, purplish; inner phyllaries lanceolate, tips acute to obtuse or mucronate; outer phyllaries ovate. **Corollas** 4.5-5 mm long. **Pappus** white; inner bristles ca. 4 mm long, outer pappus almost scalelike, ca. 0.3 mm long. **Achenes** (immature) pubescent, turbinate.

Vernonia stuebelii is known only from the type collection from Cerro de la Campana, a remote area of Peru. Its habitat is not known. Flowering and fruiting occur in July and August.

15. **Vernonia sambrayana** S. B. Jones, *sp. nov.* TYPE: Peru: Cuzco: La Convencion: upper valley of Rio Sambray; western affluent of Vilcanota, open woods along trail, 1,600 m elevation, *Mexia 8055a* (Holotype UC!).

Arbor ca. 7 m alta. Foliorum laminae ovatae vel ovato-lanceolatae, longo-acuminatae, rotundatae vel rotundato-cuneatae versus basim, 12-15 cm longae, 5-6 cm latae. Inflorescentia terminalis, obovata. Capitula ca. 20 flosculos habentia. Achenia remote strigosa.

Small **tree** ca. 7 m tall, young stems brownish-tomentose, older stems becoming glabrate. **Leaves** cauline; petioles canescent, ca. 1.5 cm long; blades ovate to ovate-

lanceolate, long acuminate at the apex, rounded to rounded-cuneate at the base, 12-15 cm long, 5-6 cm wide, margins entire, revolute, faintly glandular-punctate and lightly pubescent above, softly tomentose and with brownish, elevated veins beneath. **Inflorescences** terminal, obovate, paniculate-corymbiform with branching of a scorpioid-cymose nature, a few foliaceous bracts are present in the inflorescence. **Heads** with ca. 20 florets, sessile to nearly sessile; involucres broadly campanulate, ca. 3.2 mm long, 4-seriate; phyllaries slightly arachnoid; inner phyllaries ovate to ovate-oblong, tips obtuse to acute; outer phyllaries ovate. **Corollas** ca. 3 mm long, reddish-purple, faintly glandular. **Pappus** whitish; inner bristles ca. 2.2 mm long, outer bristles ca. 0.1 mm long. **Achenes** ca. 1.7 mm long, faintly glandular, especially at base, very remotely strigose.

This species is known only from the type location in Depto. Cuzco. It apparently flowers and fruits in May and June.

16. **Vernonia patens** H.B.K., Nov. Gen. & Sp. 4: 41. 1820. TYPE: *Humboldt and Bonpland s.n.* (Holotype P, as IDC microfiche!).

V. baccharoides H.B.K., Nov. Gen. & Sp. 4: 40. 1820. TYPE: Colombia: Andium Novo-Granatensium juxta Gonzanama et Salto del Fraile, *Humboldt and Bonpland 3438* (Holotype P, as IDC microfiche!).

V. suaveolens H.B.K., Nov. Gen. & Sp. 4: 38. 1820. TYPE: Novo-Granatensi, *Humboldt s.n.* (Holotype P, as photo F! Isotype B, as photo F!).

V. floribunda H.B.K., Nov. Gen & Sp. 4: 38. 1820. TYPE: Peru: *Humboldt and Bonpland s.n.* (Holotype P, as photo F! as IDC microfiche!).

V. micradenia DC., Prodr. 5: 38. 1836. TYPE: *Poeppig 1215* (Holotype G-DC, as photo NY!).

V. lanceolaris DC., Prodr. 5: 37. 1836. TYPE: México: *Haenke s.n.* (Holotype G-DC, as microfiche!).

V. haenkeana DC., Prodr. 5: 37. 1836. TYPE: Peru: *Haenke 8122.* (Holotype G-DC, as microfiche! as photo F! NY!).

V. pacchensis Benth., Pl. Hartw. 134. 1844. TYPE: montibus Paccha, *Hartweg s.n.* (Holotype K).

V. aschenborniana Schauer, Linnaea 19: 714. 1847.

Cacalia lanceolaris (DC.) O. Ktze., Rev. Gen. Pl. 2: 970. 1891.

C. patens (H.B.K.) O. Ktze., Rev. Gen. Pl. 2: 970. 1891.

C. baccharoides (H.B.K.) O. Ktze., Rev. Gen. Pl. 2: 969. 1891.

C. suaveolens (H.B.K.) O. Ktze., Rev. Gen. Pl. 2: 970. 1891.

C. aschenborniana (Schauer) O. Ktze., Rev. Gen. Pl. 2: 969. 1891.

C. haenkeana (DC.) O. Ktze., Rev. Gen. Pl. 2: 970. 1891.

Vernonia bangii Rusby, Mem. Torrey Bot. Club 6: 52. 1896. TYPE: Bolivia: between Mapiri and Tipuani, *Bang 1483* (Holotype NY).

V. pacchensis Benth. var. *tambillensis* Hieron., Bot. Jahrb. Syst. 36: 460. 1905. TYPE: Peru: Tambillo, *Jelski 699* (Holotype B, as photo F! NY!).

V. monsonensis Hieron., Bot. Jahrb. Syst. 40: 335. 1908. TYPE: Peru: *Weberbauer 3489* (Holotype B, as photo F!).

V. weberbaueri Hieron., Bot Jahrb. Syst. 40: 354. 1908. TYPE: Peru: *Weberbauer 5023* (Holotype B, as photo F!).

V. salamana Gleason, Bull. Torrey Bot. Club 46: 242. 1919. TYPE: Guatemala: Salamá, *Maxon and Hay 3385* (Holotype NY).

Large **shrubs** or small branched **trees**, 1.5-7 m tall, stems glabrate to lanate or tomentose, younger stems sometimes brownish-lanate. **Leaves** cauline, slightly coriaceous; petiole 0.7-3 cm long; blades elliptic to broadly elliptic or ovate-lanceolate, acuminate to acute at the apex, attentuate or rounded or truncate at the base, 12-22 cm long (2)3-6(10) cm wide, margins revolute, remotely callus-toothed to serrate, shiny when fresh, surface variable, glabrate to glandular-scabrous above, almost glabrate to hispid or downy, rarely brownish-tomentose beneath. **Inflorescences** in terminal, much branched panicles or corymbs, the branches sometimes slightly scorpioid. **Heads** with 14-24 florets, sessile; involucres campanulate, 3.5-5.5 mm long, loosely imbricate, 3- to 6-seriate; phyllaries arachnoid to ciliate, glandular, greenish to reddish-purple; inner phyllaries oblong-ovate to ovate-lanceolate, tips acute; outer phyllaries ovate, tips acute to apiculate. **Corollas** ca. 5-6.5 mm long, whitish to pinkish, glabrous, sweet-scented. **Pappus** straw-colored; inner bristles 4-4.8(6) mm long, outer bristles 0.3-0.8 mm long. **Achenes** 1.5-2 mm long, glandular, hispid, ribbed. Chromosome number: $n = 17$.

This species is distributed from Mexico into South America at altitudes of 100 to 2,300 m. In Peru it occurs from Deptos. Amazonas and Loreto south to Cuzco. It is very common in old clearings, along roadsides, and various open places in forests where it is an important part of secondary tropical communities. Flowering and fruiting occur from May to October. Minor variations are common within this wide ranging species; however, it is not possible to separate morphologically the Central and South American material into *V. patens* and *V. baccharoides*.

LORETO: Boqueron Padre Abad, *Woytkowski 34350* (F, MO, UC). AMAZONAS: Chachapoyas: Rio Utcubamba, *Hutchison and Wright 5854* (F, MO, UC, US, USM). CAJAMARCA: Celendin: Canyon of Rio Marañon above Balsas, *Hutchison and Wright 5399* (F, MO, UC, USM). PIURA: Ayabaca: road to Ayabaca, 18 km above Puente Tandopa, *Hutchison and Wright 6690* (F, UC, US, USM). SAN MARTÍN: San Martín: 1-4 km NE Tarapoto, *Belshaw 3252* (F, UC, US). HUANUCO: Tingo Maria, *Ferreyra 879* (F, UC, US). PASCO: between Oxapampa and LaMerced, *R.P.s.n.* (USM). JUNIN: Chanchamayo Valley, *Schunke 1586* (F). AYACUCHO: LaMar: between Ayna and Hacienda Luisiana, *Dudley 11764* (USM). CUZCO: Machupicchu, *Vargas 4557* (F). MADRE DE DIOS: Iberia, *Seibert 2126* (F).

17. **Vernonia fulta** Griseb., Goett. Abh. 24: 164. 1879. TYPE: not seen.

V. trixioides Rusby, Mem. Torrey Bot. Club 6: 54. 1896. TYPE: Bolivia: Mapiri, *Rusby 1484* (Holotype NY, Isotype MO!).

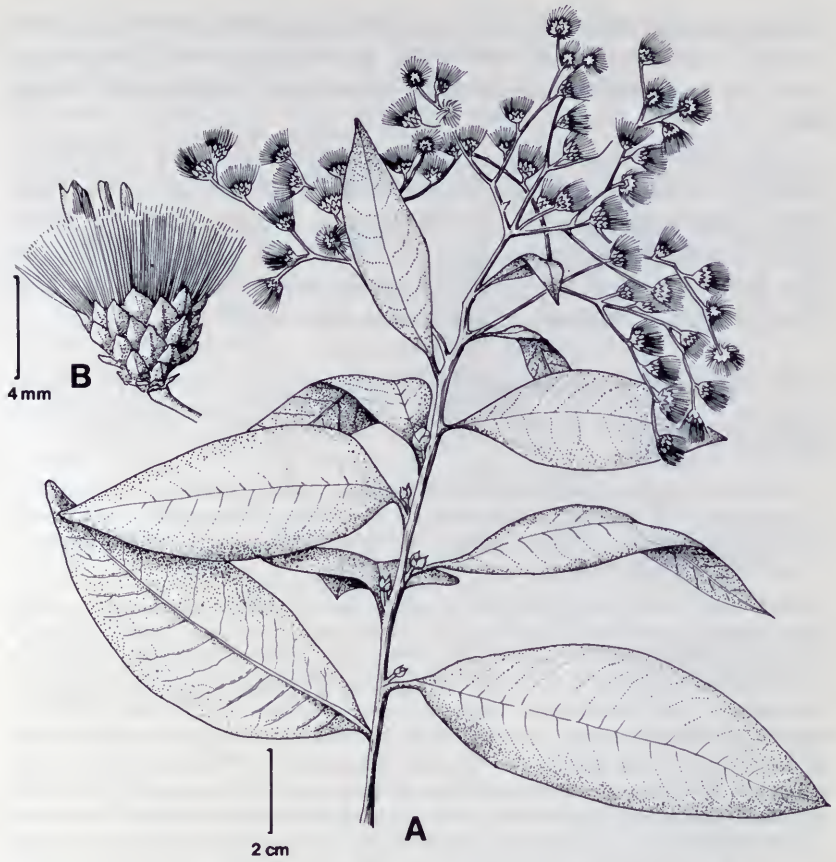

FIG. 1. *Vernonia patens*. A, habit; B, head. (From *Belshaw 3284*, F.)

V. cotaniensis Hieron., Bot. Jahrb. Syst. 40: 352. 1908. TYPE: Peru: PUNO: Cotani, *Weberbauer 1290* (Holotype B, as photo F! NY! USM!).

Liana 2-4 m, sprawling over other vegetation, stems tomentose to glabrate. **Leaves** cauline; petioles glabrate to tomentose, 1-2 cm long; blades elliptic, acute to acuminate at the apex, cuneate at the base, 7-18 cm long, 3.5-7 cm wide, margins very remotely callus toothed and slightly revolute, glabrous to glabrate or scabrous above, punctate, and sometimes pilose-hispid beneath. **Inflorescences** paniculate-cymose. **Heads** with 22-36 florets, stalked; involucres campanulate, 8-11 mm long, 5-seriate; phyllaries arachnoid, loosely appressed, brownish-green with a lighter margin; inner phyllaries oblong-lanceolate, tips acute to slightly apiculate; outer phyllaries lanceolate. **Corollas** 10 mm long, light reddish-purple, glandular on the lobes. **Pappus** whitish; inner bristles 7 mm long, outer bristles 0.8 mm long. **Achenes** 1.8 mm long, strigose, faintly ribbed. Chromosome number: $n = 17$.

This species is distributed from Depto. Amazonas in Peru south to Bolivia at elevations of 1,450 to 1,800 m. Flowering and fruiting occur from July to September. In the field, it is a very attractive and striking plant.

AMAZONAS: Cascadas de Mayasi, Bagua, *Wurdack 1830* (US). LORETO: Coronel Portillo: Boquerón del Padre Abad, entre Tingo Maria y Pucallpa, 400-500 m, *Ridoutt s.n.* (USM). SAN MARTÍN: Jepelacio near Moyobamba, *Klug 3734* (MO, NY, US). PASCO: Villa Rica, *Soukup 4378* (US). JUNIN: Chanchamayo Valley, *Schunke 1786* (F). CUZCO: Amaytamta, Convencion, *Marin 1602* (F).

18. **Vernonia apurimacensis** S. B. Jones, *sp. nov.* TYPE: Peru: Apurimac: 84 miles E of Abancay, *Hutchison 1748* (Holotype UC! Isotypes F! NY!).

Frutex 1 m altus, caulibus albido-canescentibus. Foliorum laminae ca. 2-3.5 cm longae, ca. 1-2.7 cm latae, subtus dense albotomentosae. Inflorescentia composita ex cymis compactis, reductis. Capitula 18 flosculos habentia. Phyllariorum interiorum apices longoacuminati. Achenia pubescentia.

Shrub up to 1 m tall, stems whitish, canescent. **Leaves** relatively small, cauline, sometimes crowded; petiolate to almost sessile, petioles to 0.5 cm long; blades cordate to ovate or ovate-elliptic, acute to mucronate at the apex, cordate to rounded or cuneate at the base, 2-3.5 cm long, 1-2.7 cm wide, margins revolute, remotely toothed, rugose and scabrous above and pubescent on large veins above, densely white tomentose beneath. **Inflorescences** usually of compact reduced cymes, but sometimes with elongated cymes, small bracteal leaves present at base of cymes. **Heads** with ca. 18 florets, sessile or short peduncled; involucres campanulate, 8-9 mm long, imbricated, 5-seriate; phyllaries widespreading when achenes are mature, arachnoid; inner phyllaries oblong-lanceolate, tips long-acuminate; outer phyllaries ovate-lanceolate. **Corollas** ca. 9 mm long, reddish-purple. **Pappus** whitish; inner bristles ca. 4.5 mm long, outer bristles ca. 1 mm long. **Achenes** ca. 1.5 mm long, pubescent.

This species occurs in Depto. Apurimac and Depto. Cuzco at elevations of 2,200 to 2,700 m in open shrubland. Flowering and fruiting occur from November to February.

APURIMAC: Andahuaylas: Pincos, *Stork and Horton 10668* (F, UC); Rio Pinkos, *Weberbauer 5859* (F). CUZCO: Anta: quebrada de Sisal, hasta el puente de Cunyac, hoya del Apurimac, hacia Cuzco, *Vargas 412* (F). Puente Cunyac, *Ferreyra 2744* (USM).

19. **Vernonia scorpioides** (Lam.) Pers., Syn. Pl. 2: 404. 1807.

Conyza scorpioides Lam., Encycl. Méth. 2: 88. 1783-1817. TYPE: Brasil: *Commerson s.n.* (Holotype: P-JU, as IDC microfiche P-JU!).

Vernonia subrepanda Pers., Syn. Pl. 2: 404. 1807. TYPE: based upon *C. scorpioides* Lam.

V. tournefortioides H.B.K., Nov. Gen. & Sp. 4: 34-35. 1818. TYPE: Venezuela: Caracas, *Humboldt s.n.* (Holotype: B, as photo B!).

Lepidaploa scorpioides (Lam.) Cass., Dict. Sc. Nat. 2: 16. 1823.

Staehelina solidaginoides Willd. ex Less., Linnaea 4: 281-282. 1829. TYPE: based upon *V. tournefortioides* H.B.K.

Vernonia flavescens Less., Linnaea 6: 657. 1831. TYPE: based upon *C. scorpioides* Lam.

V. scorpioides (Lam.) Pers. α *centriflora* DC., Prodr. 5: 42. 1836. TYPE: Brasil: Bahia, April 1831, *d'Hostky s.n.* (Holotype: G-DC, as IDC microfiche G-DC!).

V. scorpioides (Lam.) Pers. β *subrepanda* DC., Prodr. 5: 42. 1836. TYPE: P, not seen.

V. scorpioides (Lam.) Pers. γ *subtomentosa* DC., Prodr. 5: 42. 1836. TYPE: Brasil: 1834, *Lund 479* (Holotype: G-DC, as IDC microfiche, G-DC!).

V. scorpioides (Lam.) Pers. δ *longifolia* DC., Prodr. 5: 42. 1836. TYPE: Brasil: Bahia 1830, *Salzmann s.n.* (Holotype: G-DC, as IDC microfiche G-DC!).

V. scorpioides (Lam.) Pers. ε *longeracemosa* DC., Prodr. 5: 42. 1836. TYPE: Brasil: 1832, *Poeppig 33 (1203)* (Holotype: G-DC, as IDC microfiche G-DC!).

V. longeracemosa Mart. ex DC., Prodr. 5: 42. 1836. TYPE: not seen.

V. languinosa Gardn., J. Bot. 5: 219. 1846. TYPE: Brasil: Minas Geras Prov.: In fruticetis propre Formigas in Sertao, *Gardner 4764* (Holotype: BM! Isotype: NY!).

Cacalia tournefortioides (H.B.K.) O. Ktze., Rev. Gen. Pl. 2: 971. 1891.

C. scorpioides (Lam.) O. Ktze., Rev. Gen. Pl. 2: 971. 1891.

V. saepium Ekman., Ark. Bot. 17: 63. 1929. TYPE: Haiti: Depart du Sud: Morne de la Hotte ad Ma Blanche, prope Dayette, 7 Aug. 1917, *Ekman 463* (Holotype: S! Isotypes: F! GH! NY! S! US!).

Perennial **herb** to almost shrublike, upright or often scandent and sprawling over other vegetation, stems densely pubescent, strigose to villous, ribbed when dry. **Leaves** numerous, but not crowded along stem; petioles densely pubescent, 4-7(10) mm long; blades ovate to elliptic, obtuse to acute or acuminate at the apex, cuneate and tapering at the base, (1.8)3.3-15 cm long, (1.2)2.2-8 cm wide, margins entire to rarely denticulate, strigose to pilose-hispid above, hispid to hirsute below. **Inflorescences** of scorpioid cymes, heads very close together. **Heads** with 14 to 22 florets, sessile to 1 mm peduncles; involucres campanulate, 3.5-4.5(6) mm long; phyllaries ciliate, pubescent, firmly appressed, often purple tinged; inner phyllaries linear-lanceolate with curled tips, 3.8-4.5 mm long; outer phyllaries lanceolate, 2 mm long. **Corollas** 6-7(8) mm long, reddish-purple, lobes ciliate. **Pappus** white; inner bristles 4.5-6 mm long, outer scales fimbriate, (0.8)1-1.6 mm long. **Achenes** 1.5 mm long, with sparse, stiff hairs between ribs. Chromosome number: $n = 17$.

This species is distributed from Central America and the West Indies southward into Argentina. In Peru it occurs in the selva east of the Andes. *Vernonia scorpioides* is a widely distributed species, rather weedy, and commonly occurs on disturbed sites. Flowering and fruiting occur throughout the year.

LORETO: Prov. Coronel Portillo, *Ferreyra 18029* (MO). LA LIBERTAD: Otuzco: Huaranchal, Otuzco, *Miranda 1334* (USM). AMAZONAS: Prov. Bongara, *Hutchison and Wright 6829* (F, MO,

FIG. 2. *Vernonia scorpioides*. **A**, habit; **B**, head. (From *Hutchison & Wright 3848*, F.)

UC, US). CAJAMARCA: Prov. Hualgayoc, Monte Seco, *Soukup 3821* (US). SAN MARTÍN: Jepelacio, near Moyobamba, *Klug 3297* (F, MO, NY, US). HUANUCO: Prov. Huanuco, Tingo Maria, *Asplund 12962* (US). PASCO: Tarma: San Luis de Shuaro, *Ferreyra 18608* (USM). AYACUCHO: La Mar: between Ayna and Hacienda Luisiana, *Dudley 11661* (USM). JUNIN: Pichis Trail, Eneñas, *Killip and Smith 25782* (F, US). CUZCO: Macchu-Picchu, *Ferreyra 2700* (MO, US).

20. **Vernonia brachiata** Benth. ex Oerst., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1852: 67. 1852. TYPE: *Oersted s.n.* (K).

Cacalia brachiata (Benth.) O. Ktze., Rev. Gen. Pl. 2: 969. 1891.

Vernonia megaphylla Hieron., Verh. Bot. Vereins Prov. Brandenburg 48: 195. 1906. TYPE: Peru: Loreto: Pongo de Cainarachi, *Ule 6386* (B, as photo F! NY!).

V. digitata Rusby, Bull. New York Bot. Gard. 8: 125. 1912. TYPE: Bolivia: Mapiri, *Williams 713* (NY, not seen).

Coarse suffrutescent, perennial **herb**, 1.5-6 m tall, stems glabrate to lanate. **Leaves** cauline on current season's growth; petiole ca. 1 cm long; blades elliptic, coriaceous, acuminate at the apex, cuneate to auriculate at the base, 20-70 cm long, 8-19 cm wide, margins entire to remotely toothed, glabrous above, remotely glandular to sparsely pubescent beneath. **Inflorescences** terminal, large, branches of scorpioid cymes with numerous, relatively small heads. **Heads** with 24-34 florets, sessile in 1 or 2 rows along branches of inflorescence; involucres campanulate, 3-6 mm long, loosely imbricate, 4- to 5-seriate; phyllaries lanate-glandular, loosely appressed, reddish-purple; inner phyllaries long-lanceolate, tips acuminate; outer phyllaries ovate-lanceolate. **Corollas** ca. 6.5 mm long, reddish-purple, lobes glandular. **Pappus** white; inner bristles ca. 5 mm long, outer bristles ca. 0.7 mm long. **Achenes** ca. 2.8 mm long, sparsely pubescent, ribbed. Chromosome number: n = ca. 17.

It is found from Costa Rica and Panama southward into Peru. This species is distributed in Peru from Depto. Amazonas south to Depto. Cuzco in the selva. It occurs at the edge of woods, along streams, and in tropical woodlands at elevations of 135 to 1,000 m. Flowering and fruiting occur from June to November.

AMAZONAS: Bagua, Aramango, *Sagástegui s.n.* (GA). SAN MARTÍN: Lamas, *Belshaw 3423* (F, MO). HUANUCO: Tingo Maria, *Ferreyra 10293* (MO). LORETO: Previsto, *Woytkowski 7585* (US). JUNIN: Tarma: Puente Perené, *Ferreyra 11349* (USM). CUZCO: Inambari, *Vargas 16514* (US).

21. **Vernonia cainarachiensis** Hieron., Verh. Bot. Vereins Prov. Brandenburg 48: 196. 1906. TYPE: Peru: Loreto: Pongo de Cainarachi, *Ule 6387* (Holotype B, as photo F! Isotype F!).

Herbaceous to suffrutescent **shrub**, 2.5-5 m tall, often sprawling over other vegetation, stems brownish, pilose-hispid to glabrate. **Leaves** cauline; petioles (0)1.5-3.5(4) cm long; blades elliptic-obovate, long-acuminate at the apex, cuneate at the base, 14-40 cm long,

FIG. 3. *Vernonia brachiata*. A, habit; B, head; C, achene. (From *Liesner 221*, MO.)

5-14 cm wide, margins slightly revolute, very remotely callus toothed, glabrous above, almost glabrate or with small closely appressed hairs and strigose on veins beneath. **Inflorescences** terminal, paniculate-scorpioid-cymose. **Heads** with 7-13 florets, sessile; involucres campanulate, 5.5-6.9 mm long, ca. 4-seriate; phyllaries ciliate to arachnoid, and sometimes finely strigose, appressed, reddish-purple; inner phyllaries oblong, tips obtuse; outer phyllaries oblong and obtuse. **Corollas** 10 mm long, reddish-purple, glandular. **Pappus** whitish to pinkish; inner bristles ca. 6 mm long, outer bristles ca. 1 mm long. **Achenes** ca. 3 mm long, short pilose, ribbed. Chromosome number: $n = 17$.

This species is distributed in Peru from Depto. Loreto south to Depto. Cuzco at 400 to 1,600 m elevation in open forest or brushland. Flowering and fruiting occur from July to October.

AMAZONAS: Huampami, *Kayap 1413* (MO). LORETO: Coronel Portillo, *Ferreyra 18048* (MO). SAN MARTÍN: Puerto Pizana, Rio Huallaga, *Schunke 6453* (MO). HUANUCO: Tingo Maria, *Ferreyra 2281* (US). JUNIN: San Ramón, *Schunke A-1* (F, NY, US). CUZCO: Paucartambo, *Marin 1716* (F).

22. **Vernonia yurimaguasensis** Hieron., Verh. Bot. Vereins Prov. Brandenburg 48: 195. 1907. TYPE: Peru: Loreto: Yurimaguas, *Ule 6270* (Holotype B, as photo F! Isotype F!).

V. vargasii Cuatrec., Bot. Jahrb. Syst. 77: 83. 1956. TYPE: Peru: Cuzco: Urubamba, Machupicchu, *Vargas 6236* (Holotype F!).

Scandent **shrub**, stems grayish-brown, velutinous. **Leaves** cauline; petiole up to 1 cm long; blades broadly elliptic, acute to acuminate at the apex, cuneate at the base, 11-16 cm long, 4-8 cm wide, margins slightly revolute, sparsely pubescent to glabrate above, sparsely pubescent and glandular-punctate beneath. **Inflorescences** terminal, scorpioid cymes, branches divaricate. **Heads** with ca. 20 florets; involucres campanulate, ca. 5 mm long; phyllaries pubescent, loosely imbricated, grayish; inner phyllaries oblong, tips acute; outer phyllaries ovate. **Corollas** ca. 4 mm long, violet. **Pappus** whitish; inner bristles ca. 4 mm long, outer bristles ca. 0.6 mm long. **Achenes** ca. 2.2 mm long, glandular, brownish.

This species occurs in Deptos. Loreto, Amazonas and Cuzco in the tropical selva. Flowering and fruiting occur from May to August.

AMAZONAS: Bagua, *Sagastegui, Lopez and Collantes 4248* (GA). LORETO: as type. CUZCO: Urubamba: Machupicchu, *Vargas 6236* (F).

23. **Vernonia myriocephala** DC., Prodr. 5: 40. 1836. TYPE: Peru: *Haenke s.n.* (Holotype G-DC, as IDC microfiche! Isotype F! NY!).

Cacalia myriocephala (DC.) O. Ktze, Rev. Gen. Pl. 2: 970. 1891.

Shrub, 1.5-6 m tall, branches erect, stems strigose to glabrate. **Leaves** cauline, firm; petioles 0.2-1.3 cm long; blades elliptic to ovate or lanceolate, acuminate at the apex, cuneate and slightly decurrent at the base, 10-17 cm long, 3.5-7 cm wide, margins revolute (sometimes only slightly so) and remotely toothed, sometimes sparsely glandular or

faintly scabrous, glabrate, pubescent on large veins above, glandular and minutely pubescent (best viewed by turning leaf at oblique angle) beneath. **Inflorescences** scorpioid with a few very small bracteal leaves scattered in the inflorescence. **Heads** with 17-22 florets, sessile to short-stalked; involucres campanulate, (6)6.5-6.8(8) mm long, imbricate, ca. 5-seriate; phyllaries arachnoid, and sometimes minutely strigose, somewhat loosely arranged, reddish-purple to greenish; inner phyllaries oblong-lanceolate, tips acute rarely acute-acuminate or fimbriate; outer phyllaries tips acuminate to long-acuminate. **Corollas** ca. 7 mm long, reddish-purple fading to whitish, glabrous. **Pappus** white; inner bristles ca. 6 mm long, outer scales ca 1.1 mm long. **Achenes** ca. 2.5 mm long, strigose, ribbed.

This species is distributed from Depto. San Martín south to Depto. Cuzco at an elevation of 200 to 1,000 m. It occurs in tropical forests, sunny clearings, and brushlands. *Vernonia myriocephala* appears closely related to *V. canescens,* differing in amount of pubescence on the lower surfaces of the leaves. The former has leaf blades minutely or sparsely pubescent beneath, whereas *V. canescens* is densely to sparsely strigose to strigose hirsute beneath. Flowering and fruiting occur from June to August.

LORETO: Alto Amazonas: Yurimaguas, *Ferreyra 4979* (USM). SAN MARTÍN: Mishquiyacu, *Ferreyra 4622* (MO, USM). HUANUCO: Tulumayo near Tingo Maria, *Ferreyra 2168* (US, USM). JUNIN: Satipo, *Ridoutt 11718* (MO, USM). CUZCO: Quispicanchis, *Vargas 16495* (F).

24. **Vernonia canescens** H.B.K., Nov. Gen. & Sp. 4: 35, tab. 317. 1820. TYPE: Peru: Guancabamba, *Bonpland 3529* (Holotype P, as IDC microfiche! as photo F!).

V. mollis H.B.K., Nov. Gen. & Sp. 4: 36. 1820. TYPE: (Holotype P, as IDC microfiche!).

Lepidaploa canescens (H.B.K.) Cass., Dict. Sc. Nat. 26: 18. 1823.

Vernonia bullata Benth. ex. Oerst., Vidensk. Meddel. Dansk Naturhist. Foren. Kjobenhavn 1852: 67. 1852. TYPE: Costa Rica: Cartago, *Bjergene s.n.* (K).

V. arborescens Sw. var. *cuneifolia* Britt., Bull. Torrey Bot. Club 18: 311. 1891. TYPE: Bolivia: Reis, *Rusby 2148* (Holotype NY!).

Cacalia canescens (H.B.K.) O. Ktze., Rev. Gen. Pl. 2: 969. 1891.

C. mollis (H.B.K.) O. Ktze., Rev. Gen. Pl. 2: 970. 1891.

C. bullata (Benth. ex Oerst) O. Ktze., Rev. Gen. Pl. 2: 969. 1891.

Vernonia volubilis Hieron., Bot. Jahrb. Syst. 36: 460. 1905. TYPE: Peru, Tambillo, *Jelskii 775* (Holotype B, as photo NY!).

V. patuliflora Rusby, Bull. New York Bot. Gard. 4: 376. 1907. TYPE: Bolivia: Coroico, Yungas, *Bang 2396* (Holotype NY! Isotype NY!).

V. cuneifolia (Britt.) Gleason, Amer. J. Bot. 10: 301. 1923. (non *V. cuneifolia* Gardn., Hooker's J. Bot. Kew Gard. Misc. 5: 215. 1846).

V. rusbyi Gleason, Amer. J. Bot. 2: 753. 1932. (based upon *V. arborescens* Sw. var. *cuneifolia* Britt.).

V. pseudomollis Gleason, Amer. J. Bot. 10: 307. 1932. TYPE: Bolivia: Yungas, *Rusby 1658* (Holotype NY! Isotype NY!).

Semi-woody perennial **herbs**, to sprawling **shrubs**, to 3 m tall, often much branched, stems densely pubescent above especially near the inflorescence. **Leaves** cauline, usually not crowded; petioles 4-14 mm long; blades broadly lanceolate to ovate-elliptic, acuminate to acute at the apex, rounded to cuneate at the base, 9-20 cm long, 4-7 cm wide, margins almost entire to remotely toothed, sometimes revolute, scabrous to sparsely strigillose above, densely to sparsely strigillose, and sometimes glandular beneath. **Inflorescences** of terminal, scorpioid-cymes arranged into spreading panicles or corymbs. **Heads** with 18-24 florets, sessile; involucres campanulate, 5-6 mm long, loosely imbricated; phyllaries tomentose; inner phyllaries linear-lanceolate, tips acute to slightly spinulose tipped; middle phyllaries spinulose tipped, outer phyllaries lanceolate spinulose tipped. **Corollas** ca. 5 mm long, pinkish fading to white. **Pappus** white; inner bristles ca. 4 mm long, outer bristles ca. 0.8 mm long, sometimes slightly flattened. **Achenes** ca. 2.5 mm long, densely strigillose, faintly ribbed. Chromosome number: $n = 17$.

This species is distributed from Mexico and Central America southward into Bolivia. It occurs in tropical vegetation often in secondary scrub. Flowering and fruiting occur from July to December.

LORETO: Ucayali, Contamana, *McDaniel 14091* (F, MO, MISSA). PIURA: Huancabamba, Palambla, *Sagástegui, Cabanillas, Dios 8139* (MO) AMAZONAS: Bongara, Rio Utcubamba, *Hutchison and Wright 5865* (MO, UC, US). SAN MARTIN: Lamas, *Ferreyra 17285* (MO). HUANUCO: Cayumba entre Huánuco y Tingo Maria, *Ferreyra 4196* (MO). JUNIN: Colonia Perene, *Killip and Smith 24974* (F, NY). CUZCO: Machupicchu, *Vargas 19902* (US).

25. **Vernonia fieldiana** Gleason, Bull. Torrey Bot. Club 59: 374. 1932. TYPE: Peru: San Martín: San Roque, *Williams 7663* (Holotype US, Isotype F!).

Shrub, ca. 1 m tall, upper stems slender, densely and closely cinereous-tomentose. **Leaves** firm, dull green; petioles stout, ca. 1 mm long; blades ovate-oblong to elliptic-ovate, sharply acute or subacuminate at the apex, rounded-cuneate at the base, ca. 3.5 cm long, ca. 1.9 cm wide, margins mostly entire, but slightly revolute and very remotely toothed, both sides inconspicuously pubescent with minute slender hairs; lateral veins curved, ascending, and parallel, strongly elevated beneath. **Inflorescences** somewhat crowded, many-flowered, compound scorpioid cymose-paniculate, its branches densely and softly cinereous-tomentose. **Heads** with ca. 11 florets, sessile; involucres broadly campanulate, 4-5 mm long, ca. 4-seriate; phyllaries densely subtomentose, loosely imbricate; inner phyllaries oblong-lanceolate, tips sharply acute; outer phyllaries triangular-lanceolate. **Corollas** ca. 5 mm long, reddish-purple. **Pappus** whitish; inner bristles ca. 4.5 mm long, outer scales ca. 1 mm long. **Achenes** ca. 1 mm long, densely sericeous.

This species is known only from Depto. San Martín in Peru. It has been collected in mountain forests at elevations of 1,200 to 1,600 m. Flowering and fruiting occur from December to February.

SAN MARTÍN: Jepelacio near Moyobamba, *Klug 3423* (F, MO, NY, US).

26. **Vernonia salzmannii** DC., Prodr. 5: 55. 1836. TYPE: Brasil: *Salzmann 1830* (Holotype G-DC, as IDC microfiche!).

V. poeppigiana DC., Prodr. 5: 55. 1836. TYPE: Peru: *Poeppig 1204* (Holotype G-DC, as IDC microfiche!) *non. V. poeppigiana* DC., Prodr. 5: 20. 1836.

V. argyropappa Buek, Index Prodr. I:IX Tom. V. (based upon *V. poeppigiana* DC., Prodr. 5: 55. 1836).

V. geminiflora Poepp., Poepp. & Endl. Nov. Gen. & Sp. 3: 42. 1845. (based upon *V. poeppigiana* DC., Prodr. 5: 55. 1836).

Cacalia argyropappa (Buek) O. Ktze., Rev. Gen. Pl. 2: 969. 1891.

C. salzmannii (DC.) O. Ktze., Rev. Gen. Pl. 2: 971. 1891.

Herb 1-2 m tall, branched, stems sparsely hirsute-pubescent with brownish hairs. **Leaves** thin but firm; almost sessile; blades ovate-lanceolate to oblong-lanceolate, acute or acuminate at the apex, gradually narrowed or obtuse at the base, 6-12 cm long, 1.5-3 cm wide, margins entire or minutely serrulate, rugose and papillate-pilose above, softly strigose-hirsute and resinous beneath. **Inflorescences** sparingly branched, of several divaricately spreading scorpioid cymes each bearing 4-10 heads, bracteal leaves oblong to oblong-lanceolate. **Heads** with 21-34 florets, 1-3 cm apart; involucres campanulate or nearly hemispheric, 8-10 mm long; phyllaries sparsely pilose, erect, linear, tips narrowed to a subulate, spinose tip. **Corollas** 5-6 mm long, reddish-purple. **Pappus** white; inner bristles 6-8 mm long, outer scales ca. 1 mm long. **Achenes** ca. 3 mm long, hirsute.

This species is distributed from southern México south through Central America and northern South America into Brazil. In Peru, it occurs in the tropical selva in old clearings or secondary growth from Depto. San Martín to Depto. Madre de Dios. Flowering and fruiting occur from May to August.

SAN MARTIN: San Martín, *Ferreyra 17401* (MO, USM). HUANUCO: Huánuco: Concordia, cerca a Puente Durand, *Ferreyra 9327* (USM). JUNIN: Tarma: arriba de San Ramón, *Ferreyra 16321* (USM). CUZCO: Convencion: *Vargas 13170* (US). MADRE DE DIOS: Iberia, vic. Rio Thuamanu, *Seibert 2125* (MO, F, US).

27. **Vernonia herbacea** (Vell.) Rusby, Mem. Torrey Bot. Club 4: 209. 1895.

Chrysocoma herbacea Vell., Fl. Flum. 330. 1825. TYPE: as illustration, Atlas Tab. 29. T 8. 1835.

Vernonia obovata Less., Linnaea 4: 279. 1829. TYPE: Brasil: *Sellow s.n.* (not seen).

V. paucifolia Rusby, Mem. Torrey Bot. Club 3: 50. 1893. TYPE: Bolivia: Yungas, *Bang 247* (NY).

Perennial **herb**, stems villous to hirsute, pubescence straw-colored. **Leaves** cauline; sessile; blades obovate to obovate-lanceolate, obtuse at the apex, cuneate at the base, 6-7 cm long, 2.5-3.5 cm wide, margins slightly revolute, pubescent, remotely hirsute above, upper surface of leaf dark brown when dry, villous to hirsute with straw-colored pubescence beneath. **Inflorescences** terminal, condensed scorpioid-cymose to corymbose. **Heads** with 12-13 florets, short pedunculate; involucres broadly campanulate, ca. 7 mm long, 3- to 4-seriate; phyllaries strigose, loosely appressed; inner phyllaries lanceolate-oblong, tips acute to acuminate or slightly aristate; outer phyllaries tips lanceolate. **Corollas** ca. 8 mm long, dark reddish-purple, sparsely glandular. **Pappus** white; inner bristles ca. 7 mm long, outer bristles ca. 1 mm long. **Achenes** ca. 2 mm long, strigose.

This species is distributed from southern Brazil northward into Peru. It is apparently uncommon in Peru since only one collection has been seen. Flowering and fruiting occur from May to June.

JUNIN: Chanchamayo Valley, *Schunke 1527* (F).

II. PIPTOCARPHA[6]

Piptocarpha R. Br., Trans. Linn. Soc. London 12: 121. 1817. (1818). TYPE: *P. brasiliana* Cass., Dict. Sc. Nat. 41: 109. 1826.

Carphobolus Schott, Spreng. Syst. iv. Cur. Post. 409. 1827. TYPE: *C. sessiliflorus* Schott.

Monanthemum Griseb., Fl. Brit. W. Ind. 354. 1861. TYPE: *M. cruegerii* Griseb.

Shrubs, usually scandent or infrequently trees, especially in some Brazilian species; branches pubescent, stellate-tomentulose or lepidote. **Leaves** alternate, petiolate, blades large, ovate to lanceolate, entire to subentire, pinnately veined with prominent ascending lateral veins, arching and anastomosing near the margins, glabrous above, often tomentose with stellate trichomes or lepidote beneath, bases usually oblique. **Inflorescences** aggregated at base of leaves (often reduced toward apex of stem and on secondary branches) in axillary corymbs, umbels or sessile to subsessile in axillary clusters or in axillary and terminal panicles. **Heads** with 1-35 florets; involucre campanulate, cylindrical-campanulate to turbinate; phyllaries imbricated in several series, the outer bracts persistent, small, triangular-ovate, apex obtuse, tomentulose, upper margin ciliate to fimbriate; inner bracts narrowly ovate to oblong to lanceolate, apex tomentulose to glabrous, acute, often with a dark tip, curling and usually deciduous with achenes; receptacle convex, flowers in species with turbinate or broadly campanulate involucres subtended by distinct, linear-lanceolate, scarious paleas with acuminate tips, deciduous with achenes; in species with cylindrical to narrowly campanulate involucres (usually with 6 or less florets), paleas absent. **Corollas** regular, narrowly tubular, 5-lobed; stamens 5, anthers apically acute, bases sagittate with auricles acute to caudate; style branches slender, acute, stigma bifid, the stigmatic surface hispid. **Pappus** biseriate, the inner series of long, filiform, equal bristles, the outer series of shorter, filiform, unequal bristles or paleaceous scales, often inconspicuous or absent in some species. **Achenes** glabrous or infrequently pilose, cylindrical or angled, often 10-costate, apex truncate.

[6]Mr. Gerald L. Smith, a pre-doctoral student, is presently revising *Piptocarpha* and generously contributed to this treatment. His assistance is gratefully acknowledged.

Piptocarpha is a small neotropical genus of ca. 40 species, extending southward from the West Indies and Central America into northern and central South America.

REFERENCE

ELIAS, THOMAS S. 1975. Fl. of Panama. Part IX. Compositae. Ann. Missouri Bot. Gard. 62(4):860.

KEY TO SPECIES OF *Piptocarpha*

a. Inflorescences of 20-60 heads.
  b. Inflorescences of terminal and axillary panicles of heads clustered at the ends of branchlets ..... 7. *P. gutierrezii.*
  bb. Inflorescences of axillary, branching corymbose clusters of heads.
    c. Heads with 3 florets; involucre campanulate; leaves basally cuneate ..... 5. *P. sprucei.*
    cc. Heads with 6 florets; involucre ovoid-campanulate; leaves basally oblique.
      d. Lower leaf surface densely appressed, cinereous-tomentose with stellate trichomes; phyllaries sparsely tomentose at apex .... 1. *P. poeppigiana.*
      dd. Lower leaf surface thinly gray-pubescent with stellate trichomes; phyllaries densely tomentose at apex ..... 4. *P. canescens.*
aa. Inflorescences of 4-16 heads.
  e. Inflorescences of axillary, stoutly pedunculate clusters of heads; involucre campanulate ..... 6. *P. lechleri.*
  ee. Inflorescences of axillary clusters of subsessile heads; involucre turbinate.
    f. Lower leaf surface yellow-gray tomentose with stellate trichomes; branches cinnamon-tomentose with stellate trichomes ..... 2. *P. asterotrichia.*
    ff. Lower leaf surface cinereous to yellow-brown tomentose with stellate trichomes; branches cinereous-tomentulose or lepidote ..... 3. *P. opaca.*

1. **Piptocarpha poeppigiana** (DC.) Baker in Mart., Fl. Bras. 6(2): 131. 1873.

Vernonia poeppigiana DC., Prodr. 5:20. 1836. TYPE: Peru; *Poeppig 1425* (Holotype: G-DC, as microfiche G-DC!, photo NY! Isotypes: G! P! BM! B as photos GH! NY!).

Vernonia tereticaulis DC., Prodr. 5:20. 1836. TYPE: Peru: *Haenke s.n.* (Holotype: PR! Isotypes: G-DC, as microfiche G-DC! P! F!).

Carphobolus poeppigiana (DC.) Sch. Bip., Pollichia 20/21:422. 1863.

Carphobolus tereticaulis (DC.) Sch. Bip., Pollichia 20/21: 422. 1863.

Piptocarpha tereticaulis (DC.) Baker in Mart., Fl. Bras 6(2): 131. 1873.

Piptocarpha chontalensis Baker in Mart., Fl. Bras. 6(2): 132. 1873. TYPE: Nicaragua: *Tate 163* (Lectotype: K! [selected from among syntypes] Isolectotype: BM! Syntypes: BM!).

Piptocarpha costaricensis Klatt, Bull. Soc. Bot. Belg. 31(1): 184. 1892. TYPE: Costa Rica: *Pittier 4927* (Lectotype: GH! [selected from among syntypes] Isolectotypes: GH! M! BR!).

Piptocarpha laxa Rusby, Bull. New York Bot. Gard. 8(28): 123. 1912. TYPE: Bolivia: Charopampa, *Williams 703* (Holotype: NY! Isotypes: K! BM! US!).

Piptocarpha foliosa Cuatrec., Brittonia 8: 161. 1955. TYPE: Colombia: Amazonas, Tacana, Castanal igapó, *Schultes & Black 46-82* (Holotype: US!).

Piptocarpha paraensis Cabrera, Arquiv. Jard. Bot. Rio de Janeiro 15: 73. 1957. TYPE: Brazil: Para: Rio Tapajoz, Pimentel, *Ducke 21-VIII-1923* (Holotype: LP! Isotypes: RB!).

Subscandent **shrub** to drooping **liana** with branches 3-30 m long; stems cinereous to yellow-brown tomentulose-lepidote. **Leaves** cauline, not crowded; petioles sulcate, 1-2.5 cm long; blades coriaceous, elliptic to oblong-ovate to broadly ovate, acute to acuminate at the apex, oblique at the base, 7-20 cm long, 4-10 cm broad, margin revolute, sometimes faintly toothed; glabrous above except tomentulose on midvein, densely cinereous to yellow-brown stellate-tomentose, occasionally glandular beneath, lateral veins 6-8 pairs. **Inflorescences** in dense axillary corymbose clusters of 20-60 heads. **Heads** usually with 6 florets, sessile or shortly pedicellate in groups of 2 or 3 at the ends of tomentose peduncles; involucre ovoid to narrowly campanulate, 5-7 mm long, 3-4 mm broad, 4-seriate; phyllaries tomentulose at tips, margins ciliate to fimbriate; outer phyllaries triangular-ovate, acute, persistent; inner phyllaries oblong to lanceolate, acute, deciduous. **Corollas** 4-5 mm long, glabrous, the lobes 1.5-3 mm long, revolute, white, fragrant; anthers 3 mm long, basal auricles caudate, 0.4 mm long. **Pappus** white, biseriate, the inner series of equal, filiform bristles 5-6.5 mm long, the outer series of short, inconspicuous bristles 0.5-1 mm long. **Achenes** 2.5-3 mm long, 10-costate, glabrous or sparsely pilose.

This species is distributed throughout tropical regions from southern Mexico to central Bolivia. It is most frequently found along rivers in tropical forests at elevations of 250-1,000 m. Flowering and fruiting occur mainly from July to November but occasionally the year round.

LORETO: Previsto, *Woytkowski 7566* (MO, UC, US). AMAZONAS: Bagua, Rio Santiago, *Wurdack 2501* (F, UC, USM). SAN MARTIN: Lamas, *Belshaw 3445* (F, MO, UC). HUANUCO: Tingo Maria, *Ferreyra 891* (US, USM). JUNIN: Mazamar., *Woytkowski 5966* (MO, US). CUZCO; Paucartambo, *Marin 1697* (F).

2. **Piptocarpha asterotrichia** (Poepp. & Endl.) Baker in Mart., Fl. Bras. 6(2): 127. 1873.

Vernonia asterotrichia Poepp. & Endl., Nov. Gen. & Sp. 3:41-42 t. 247. 1843. TYPE: Peru: *Poeppig 1887* (Holotype: W! Isotypes: P! NY! GH!).

Carphobolus asterotrichus (Poepp. & Endl.) Sch. Bip., Pollichia 20/21: 426. 1863.

Piptocarpha insignis Gleason, Bull. Torrey Bot. Club 59: 371-372. 1932. TYPE: Peru: Junin, San Nicolas, Pichis Trail, *Killip & Smith 26083* (Holotype: NY! Isotype: US!).

A high-climbing, wide-spreading, much-branched **liana** with branches reaching 3-15 m, often in trees, showy; stems densely cinnamon-stellate tomentose. **Leaves** cauline, not crowded; petioles sulcate, densely yellow-gray stellate-tomentose, 0.8-1.7(2.5) cm long; blades ovate-oblong to lanceolate, acuminate at the apex, oblique or rounded to subcordate at the base, 6-19 cm long, 3-9 cm wide, margins slightly revolute and very faintly remotely toothed, glabrous, opaque, glandular above except yellow-gray stellate-tomentose on major veins, prominently reticulately veined when dry, 5-8 pairs of lateral

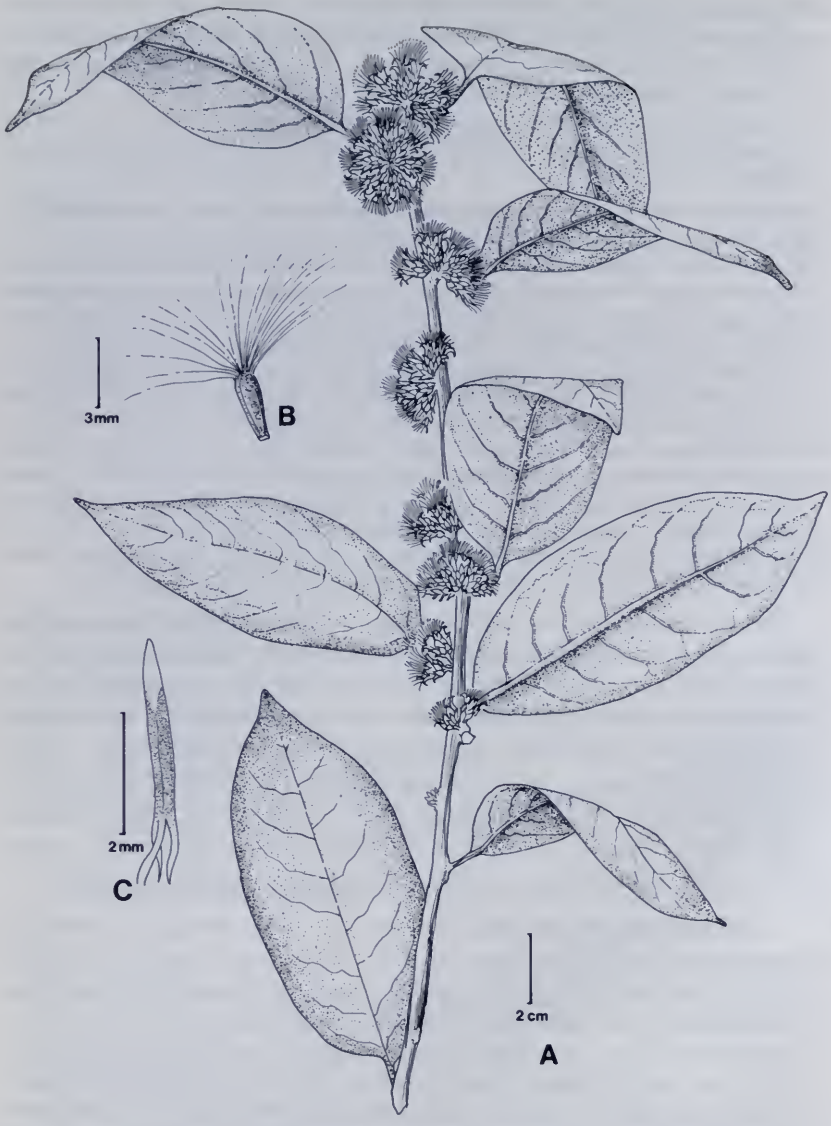

FIG. 4. *Piptocarpha asterotrichia*. **A**, habit; **B**, achene; **C**, anther. (From *Schunke 263*, F.)

veins, densely yellow-gray stellate-tomentose beneath. **Inflorescences** in dense, rounded, axillary, clusters of 4-10 subsessile heads, number of heads in glomerules reduced toward apex of stem (seemingly forming flat "sprays" in the fresh condition). **Heads** with 11-35 florets, subsessile; involucre broadly turbinate, 10-17 mm long, 4-10 mm wide, closely imbricate in 5-6 series, when fresh the involucre is brilliant yellow-green; phyllaries ciliate on the margins, rarely pubescent; outer phyllaries persistent, ovate, apex acute with a dark tip; inner phyllaries deciduous, lanceolate, apex acute; flowers subtended by linear-lanceolate paleas, tips acuminate, deciduous with achenes. **Corollas** 6-7.5 mm long, creamy white, fragrant, sometimes glandular, lobes revolute, 2-3 mm long; anthers ca. 4 mm long, basal auricles sharply acute, 0.2 mm long. **Pappus** white, predominately uniseriate, inner bristles equal, 6-8 mm long, outer bristles less than 1 mm long, totally absent in some specimens. **Achenes** 3.5-4.5 mm long, angled, indistinctly costate, glabrous.

This species is distributed from Colombia south to the Cordillera Real in eastern Bolivia. It occurs at elevations of 425-1,500 m in tropical forests, montane rain forests, at lower edges of cloud forests, and in secondary growth. Flowering and fruiting occur mainly from June to December but occasionally throughout the year.

Piptocarpha insignis Gleason is considered to be a very robust form of *P. asterotrichia*. It is known only from the type collection and differs only from typical *P. asterotrichia* specimens by its larger heads.

AMAZONAS: Quebrada Aintami, *Kayap 690* (GA, MO). SAN MARTIN: Lamas, *Belshaw 3434* (F, MO, UC). JUNIN: San Ramon, *Killip & Smith 24747* (F, US). CUZCO: Convencion, *Dudley 10282* (MO). LORETO: Maynas, Tocache, *Poeppig 1887* (W, P, NY, GH).

3. **Piptocarpha opaca** (Benth.) Baker in Mart., Fl. Bras. 6(2): 124. 1873.

Vernonia opaca Benth., in Hooker Lond. J. Bot. 2: 39. 1840. TYPE: Guyana: Serra Mey, *Schomburgk 1016* (Holotype: K! Isotypes: K! BM!).

Carphobolus latifolius Sch. Bip., Pollichia 20/21: 426. 1863. TYPE: Brasil: Para: in vicinity of Obidos, *Spruce Dec. 1849* (Holotype: K! Isotypes: BM! M! NY! GH!).

Piptocarpha opaca (Benth.) Baker var. *latifolia* (Sch. Bip.) Baker in Mart., Fl. Bras. 6(2):124. 1873.

A highly scandent, much-branched **liana** with branches 3-12 m long, often in trees, stems cinereous, appressed tomentulose-lepidote. **Leaves** cauline, not crowded; petioles sulcate, cinereous tomentose-lepidote, 1-2 cm long; blades coriaceous, elliptic to ovate-oblong to broadly ovate, acuminate at the apex, oblique at the base, 7-13 cm long, 3-5 cm wide, margins slightly revolute and remotely toothed, glabrous and somewhat lustrous above, 6-8 pairs of lateral veins, densely stellate-tomentose and yellow-brown lepidote beneath. **Inflorescences** in dense axillary, hemispheric to rounded clusters of 6-15 heads. **Heads** with 9-12 florets, subsessile; involucre turbinate, 7.5-11 mm long, 3.5-5 mm wide, imbricate in 5-6 series; phyllaries darkened and tomentulose at tips, especially in outer phyllaries, margins ciliate to fimbriate; outer phyllaries persistent, ovate, apex

acute to obtuse; inner phyllaries deciduous, narrowly ovate to oblong, apex acute; flowers subtended by linear-lanceolate paleas, tips acuminate, deciduous with achenes. **Corollas** 4-5 mm long, purple-white, very fragrant, glabrate, lobes revolute, 1.5-2.5 mm long; anthers 3-4 mm long, basal auricles caudate, 0.4 mm long. **Pappus** white, biseriate, the inner series of bristles equal, filiform, 5-6 mm long, the outer series poorly developed, bristles short, unequal, 0.5-1 mm long. **Achenes** 2.5-3 mm long, cylindrical to 3-angled, 10-costate, glabrous or sparsely pilose.

This species is distributed throughout the range of the Amazon River. It occurs most frequently in secondary woods with sandy soil along the margins and upland regions of the Amazon River at elevations of 25-700 m.

LORETO: tributary of Rio Nanay near Iquitos, *McDaniel 10749* (GA). LORETO: Iquitos, *Vandemann 2260* (K). AMAZONAS: Rio Santiago-Rio Pongo de Manseriche, *Tessmann 3694* (NY, G, S).

4. **Piptocarpha canescens** Gleason, Bull. Torrey Bot. Club 59: 373. 1932. TYPE: Peru: Junin: San Nicholas, *Killip & Smith 26084* (Holotype: NY! Isotype: US!).

Subscandent **shrub**, ca. 3-4 m tall, stems densely cinereous-pubescent. **Leaves** cauline, petioles stout, densely tomentose, 1-2 cm long; blades thin, elliptic-oblong to elliptic-ovate, acute to acuminate at apex, oblique at base, ca. 15-21 cm long, 6-10 cm wide, margins revolute, primary and secondary veins elevated beneath, glabrous, opaque above except densely stellate-tomentose on the midvein, 8-10 pairs of lateral veins, stellate-pubescent beneath. **Inflorescences** in axillary, branching, corymbose clusters, ca. 2.5 cm in diameter (when pressed) with ca. 40 heads. **Heads** with 6 florets, shortly pedicellate terminating peduncles, pedicels and peduncles densely stellate-tomentose, heads immature on the specimen examined; phyllaries (when dry) brown with dense grayish brown pubescence at the tips; inner phyllaries ovate, tips acute; outer phyllaries ovate.

According to Gleason, this species is distributed in Depto. Junin. It occurs in dense forest at ca. 1,100 m. It either is not abundant or has been poorly collected. Flowering and fruiting occur from July to September. The only collection examined is the type.

5. **Piptocarpha sprucei** Baker in Mart., Fl. Bras 6(2): 129. 1873. TYPE: Peru: Tarapoto, *Spruce 4362* (Holotype: K! Isotypes: BR! P! F! NY! BM! G! W! GH! E!).

Liana, stems densely and finely canescent, strongly 4-angled. **Leaves** cauline; petioles slender, ca. 0.5 cm long; blades elliptic, somewhat rigid and coriaceous when dry, acuminate at the apex, cuneate at the base, 8-13 cm long, 2.5-6 cm wide, margins slightly revolute, remotely toothed, glabrous above but canescent along midvein, veins elevated (in dry specimens), glabrate to cinereous lepidote-black glandular beneath. **Inflorescences** in dense axillary corymbose clusters of ca. 35 heads, ca. 1.2 cm wide. **Heads** with 3 florets, sessile in groups of 2 at the ends of stout, tomentose peduncles; involucre campanulate, 4-5 mm long; phyllaries yellow-brown with a dark tip when dry, tomentulose at

apex, upper margin finely ciliate; outer phyllaries persistent, ovate, apex obtuse; inner phyllaries deciduous with achenes, ovate-oblong, apex acute to obtuse. **Corollas** ca. 3 mm long, white, glabrate but with occasional glands, lobes revolute 1.5-3 mm long; anthers ca. 3 mm long, basal auricles acute, less than 0.1 mm. **Pappus** white biseriate, inner bristles equal, filiform, ca. 6 mm long, outer bristles inconspicuous, short, unequal, 0.5-1 mm long. **Achenes** ca. 3 mm long, 10-costate, glabrous or sparsely pilose.

This species is found in forests in Loreto where it is rare or poorly collected. Flowering and fruiting occur from August to September. It appears to be closely allied with the Brazilian species *Piptocarpha leprosa* (Less.) Baker, and further study may show *P. sprucei* to be the northern range of *P. leprosa*.

LORETO: Pumayacu, *King 3167* (F, MO). LORETO: Tarapoto, *Spruce 4362* (K, BR, P, F, NY).

6. **Piptocarpha lechleri** (Sch. Bip.) Baker in Mart., Fl. Bras. 6(2): 127. 1873.

Carphobolus lechleri Sch. Bip., Pollichia 20/21: 428. 1863. TYPE: Peru: prope St. Gavan, *Lechler 2479* (Holotype: B as photos F! NY! GH! Isotypes: K! G!).

Piptocarpha vismiaefolia Gleason, Bull. Torrey Bot. Club 59: 372. 1932. TYPE: Peru: Junin: La Merced, *Killip & Smith 23848* (Holotype: NY! Isotypes: K! F! US!).

Piptocarpha longifolia Gleason, Bull. Torrey Bot. Club 59: 372-373. 1932. TYPE: Peru: Junin, Pichis Trail, Yapas, *Killip & Smith 25459* (Holotype: NY! Isotype: US!).

Shrubs to **slender trees**, 3-6 m high, branches slender, long, widely spreading, stems cinereous, appressed tomentulose-lepidote. **Leaves** cauline, not crowded; petioles stout, sulcate, densely tomentose, 1-2 cm long; blades large, coriaceous, oblong to lanceolate, acuminate at the apex, oblique at the base, 10-22 cm long, 3-10 cm wide, margins slightly revolute and remotely toothed, glabrous and lustrous above, 6-10 pairs of prominent lateral veins, densely cinereous stellate-tomentose and yellow-brown lepidote beneath. **Inflorescences** in dense, axillary, rounded, umbellate clusters of 9-16 heads. **Heads** with 10-20 florets, stoutly pedicellate, singly or in groups of 2 or 3, at the ends of stout peduncles of a uniform length giving an umbellate appearance to inflorescences; involucres broadly campanulate at maturity, 8-10 mm long, 4.5-5.5 mm wide, imbricate in 5-6 series; phyllaries uniformly brown when dried, nearly glabrous; outer phyllaries persistent, ovate, margin minutely ciliate, apex obtuse; inner phyllaries deciduous with achenes, oblong-lanceolate, apex acute; flowers subtended by linear, acuminate paleas, deciduous with inner involucral phyllaries. **Corollas** 4-5 mm long, white, glabrate, lobes revolute, 1.5-2.5 mm long; anthers 3.5-4 mm long, basal auricles caudate, 0.3 mm long. **Pappus** white, predominately uniseriate, inner bristles equal, 5-6 mm long, outer bristles inconspicuous, less than 1 mm long, totally absent in some specimens. **Achenes** 3-3.5 mm long, 10-costate, glabrous or sparsely pilose.

This species is distributed in the Peruvian Andes to eastern Bolivia. It occurs at elevations of 360-1,600 m in dense montane rain forests. Flowering and fruiting occur from June to November.

PERU: near St. Gavan, *Lechler 2479* (B, K, G). JUNIN: La Merced, *Killip & Smith 23848* (NY, K, F, US). JUNIN: Pichis Trail, Yapas, *Killip & Smith 25459* (NY, US). SAN MARTIN: Alto Rio Huallaga, *Williams 6675* (US). CUZCO: San Lorenzo, *C. Vargas C. 11749* (US).

7. **Piptocarpha gutierrezii** Cuatrec., Brittonia 8(2): 161-162. 1955. TYPE: Colombia: Antioquia, Municipio Sonsón: region de Rioverde, Orilla de Rio Verde de los montes, *Gutierrez 35633* (Holotype: F! Isotype: MO!).

Piptocarpha umbricola Cuatrec., Brittonia 8(2): 163. 1955. Type: Colombia: Comisaria de Putumayo: Umbria, *Klug 1863* (Holotype: F! Isotypes: GH! NY! S! US!).

Scandent **shrubs**, 3-6 m high, branches slender, spreading, stems glabrate to minutely silvery lepidote. **Leaves** cauline, not crowded; petioles slender, sulcate, appressed yellow-brown tomentulose-lepidote, 0.5-2 cm long; blades large, papery, elliptic to obovate to ovate-lanceolate, acute to abruptly acuminate at apex, oblique or cuneate to slightly rounded at the base, 9-16 cm long, 4-8 cm wide, margins slightly revolute, entire to very faintly and remotely toothed, glabrous, opaque above, 6-8 pairs of prominent lateral veins, densely and closely silvery cinereous lepidote-tomentose beneath. **Inflorescences** in axillary and terminal panicles. **Heads** with 6 florets, clustered in groups of 6-12 on stout peduncles at the ends of lateral branchlets; involucres cylindrical-campanulate, 6-7 mm long, ca. 3 mm wide, closely imbricate in 3-4 series; phyllaries straw-colored with brown-purple tips, nearly glabrous; outer phyllaries persistent, ovate, margins ciliate, apex obtuse, inner phyllaries deciduous with achenes, ovate-oblong, apex obtuse to acute. **Corollas** 3.5-4 mm long, white, glabrate, lobes revolute 1.5-2 mm long; anthers ca. 3 mm long, basal auricles caudate, 0.3 mm long. **Pappus** biseriate, the inner bristles equal, filiform, 5-5.5 mm long, the outer bristles irregular, short, unequal, 0.5-1 mm long. **Achenes** immature, ca. 2.5 mm long, costate, sparsely pilose.

This species is distributed in the northern Andes ranging from NW Venezuela to N Peru. It occurs in dense montane rain forest and along rivers at elevations of 300-700 m. Flowering and fruiting occur mainly from July to November but occasionally the year round.

AMAZONAS: Lugar Aintami, *Kayap 356* (NY).

III. POLLALESTA

Pollalesta H.B.K., Nov. Gen. & Sp. 4: 46. 1820. TYPE: *P. vernonioides* H.B.K.

Oliganthes Cass., Bull. Soc. Philom. Paris 10. 1817. TYPE: *O. triflora* Cass.

Odontoloma H.B.K., Nov. Gen. & Sp. 4: 43. 1820. TYPE: *O. acuminata* H.B.K.

Dialesta H.B.K., Nov. Gen. & Sp. 4: 45. 1820. TYPE: *D. discolor* H.B.K.

Adenocyclus Less., Linnaea 4: 337. 1829. TYPE: *A. condensatus* Less.

Shrubs to **trees**, usually diffusely branched, branches often tomentose. **Leaves** alternate, petiolate; blades lanceolate to ovate, usually elliptic, cuneate at the base, occasionally oblique, apex acute to long acuminate, margins entire to subserrate, be-

coming glabrate above, densely stellate below, punctate-glandular both above and below. **Inflorescences** terminal, corymbose-paniculate. **Heads** with 1-5 florets; involucre cylindric to narrowly campanulate to strongly compressed; phyllaries 5-18, imbricate, membranous to scarious, receptacle subconvex to flat, naked. **Corolla** tubular, 5-lobed; stamens 5, anthers basally sagittate; style branches slender. **Pappus** variable, usually of 2 series, outer series of short scales, usually separate but occasionally coroniform, sometimes absent; inner pappus of 0-15 aristate bristles. **Achenes** obconic to slightly truncate, 8-10 ribbed.

Pollalesta is a small neotropical genus ranging from Central America south into Peru and northern Brasil. One species occurs in Peru.

REFERENCE

ARISTEGUIETA, L. 1963. El genero *Oliganthes* de Madagascar y su equivalente Americano *Pollalesta*. Bol. Soc. Venez. Ci. Nat. **23**(103): 255-288.

1. **Pollalesta discolor** (H.B.K.) Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 275. 1963.

Dialesta discolor H.B.K., Nov. Gen. & Sp. 4: 45. 1820. TYPE: Colombia: Honda, *Bonpland s.n.* (Holotype P, as photo GH! Isotype B, as photo GH!).

Eupatorium cuspidatum Willd. ex Less., Linnaea 4: 315. 1829. TYPE: *15156* (Holotype B, as microfiche Willd. Herb.!).

Oliganthes discolor (H.B.K.) Sch. Bip., Linnaea 20: 502. 1847.

O. karstenii Sch. Bip., Linnaea 30: 116. 1859-1860. TYPE: Colombia: Guaduas, *Karsten s.n.* (Isotype F!).

O. ferruginea Gleason, N. Amer. Fl. 33: 102. 1922. TYPE: Costa Rica: Forests of Alto de Mano Tigre, Diquis Valley, *Pittier 12138* (Holotype US!).

O. corei Cuatrec., Brittonia 8: 185. 1956. TYPE: Colombia: Dept. Antioquia, El Radio, *Core 720* (Holotype WVA! as photo GH! NY! Isotype US!).

Pollalesta argentea Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 275. 1963. TYPE: Peru: Dept. Cajamarca: Valle del Rio Tabaconas, *Weberbauer 6162* (Holotype F!).

P. brasiliana Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 280. 1963. TYPE: Brasil: Amazonas: São Paulo de Olivenca, *Ducke 298* (Holotype NY! Isotype MO!).

P. colombiana Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 274. 1963. TYPE: Colombia: Villavincencio, *Pennell 1406* (Holotype NY! Isotypes GH! US!).

P. corei (Cuatrec.) Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 276. 1963.

P. ecuatoriana Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 277. 1963. TYPE: Ecuador: Prov. Napo-Pastaza: cerca de Puyo, *Skutch 4428* (Holotype NY, Isotype MO!).

P. ferruginea (Gleason) Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 273. 1963.

P. karstenii (Sch. Bip.) Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 273. 1963.

P. klugii Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 278. 1963. TYPE: Peru: Dept. Loreto: Fortaleza, cerca de Yurimaguas, *Klug 2819* (Holotype GH! Isotype MO!).

P. peruviana Aristeg., Bol. Soc. Venez. Ci. Nat. 23(103): 277. 1963. TYPE: Peru: Dept. Loreto: Mishuyaca, cerca de Iquitos, *Klug 1242* (Holotype F!).

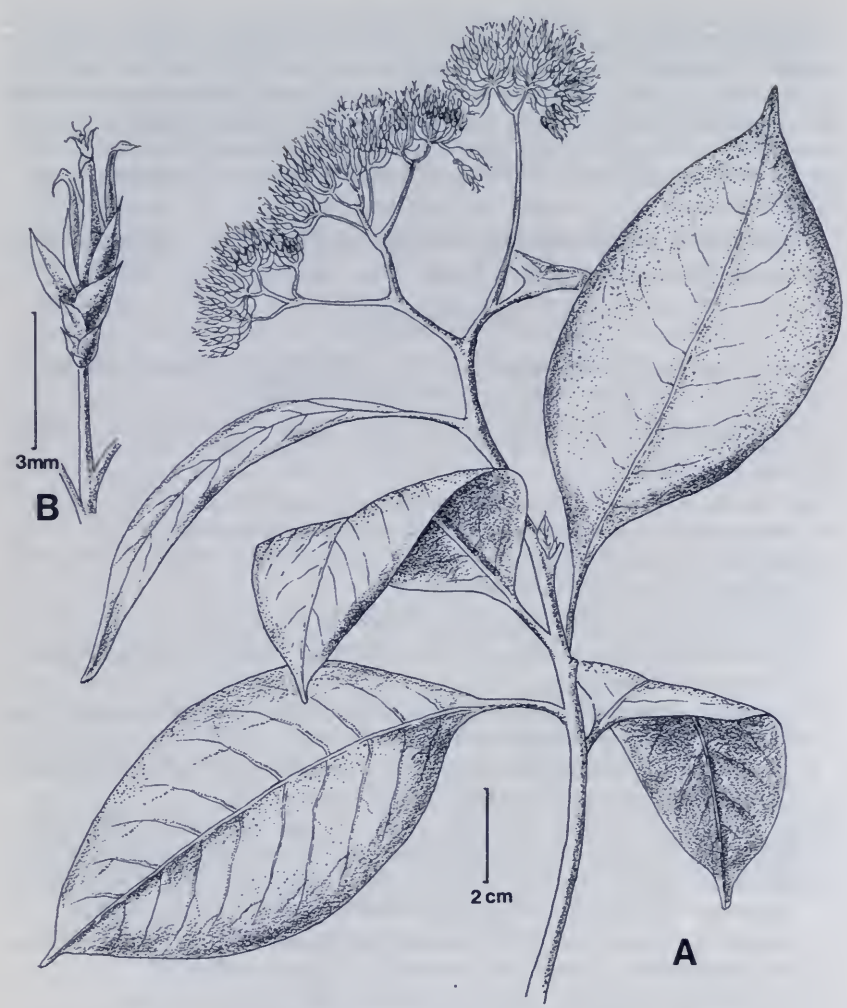

FIG. 5. *Pollalesta discolor*. **A**, habit; **B**, head. (From *Klug 2220*, F.)

Tree, 10 to 30 m tall, of a single trunk branched in the crown, young stems stellate pubescent, brown to grayish. **Leaves** somewhat crowded at tips of stems; petiole 1-3.5 cm long; blades elliptic to lanceolate or ovate, acute to long acuminate at the apex, cuneate to oblique at the base, 5-20 cm long, 1.5-9 cm wide, margins mostly entire, sometimes remotely serrate, becoming glandular punctate and glabrate except pubescent on midvein and at base above, densely stellate-pubescent beneath. **Inflorescences** terminal corymbose-paniculate. **Heads** with (1)2(3) florets, pedunculate; involucre narrowly cam-

panulate, 4.5-9 mm long; phyllaries often ciliate, glabrous to slightly pubescent, glandular punctuate near the tips, yellowish-brown, sometimes with dark tips; inner phyllaries oblanceolate; tips acute; outer phyllaries elliptic-ovate. **Corollas** 5.5-7.5 mm long, whitish to light purple with glandular dots, fragrant. **Pappus** straw-colored; inner bristles ca. 3-4 mm long, outer scales minute to 1.2 mm long. **Achenes** 1.8-2.4 mm long, obconic, gland-dotted, sometimes thinly pubescent, 8-10 ribbed.

This species is distributed from Costa Rica into Peru in tropical forest or secondary vegetation from 100-1,600 m elevation. Flowering and fruiting throughout the year.

LORETO: Florida, Rio Putumayo at mouth of Rio Zubineta, *Klug 2220* (BM, F, GH, MO, NY, S, US). AMAZONAS: Rio Cenepa, *Ancuash 302* (MO). CAJAMARCA: Valle del Rio Tabaconas, *Weberbauer 6162* (F, GH, US). SAN MARTIN: Moyobamba, *Klug 3578* (F, GH, K, MO, NY, S).

IV. CENTRATHERUM

Centratherum Cass., Dict. Sci. Nat. 7: 384. 1817. TYPE: *C. punctatum* Cass.

Spixia Schrank, Pl. Rar. Hort. Monac. tab. 80. 1819. TYPE: *S. violacea* Schrank.

Ampherephis H.B.K., Nov. Gen. & Sp. 4: 31. 1820. TYPE: *A. mutica* H.B.K.

Amphibecis Shrank, Syll. Pl. Nov. 1: 86. 1824. TYPE: *A. violacea* Schrank.

Crantzia Vell., Fl. Flum. viii. tab. 153. 1835. TYPE: *C. ovata* Vell.

Herbs to **subshrubs**, often branched, stems glabrescent to villous. **Leaves** alternate, petiolate to sessile; petioles often indistinct, blades ovate, linear, or oblanceolate, obtuse, or subacute to blunt at the apex, cuneate to attenuate at the base, margins serrate, lobed, glabrous, punctate, or pubescent above and beneath. **Inflorescences** with heads terminal on axillary branches, occasionally 2 or 3 heads clustered together. Heads with numerous florets, sessile; involucre cylindric-campanulate, 8-25 mm wide; phyllaries in several series, outer series foliaceous, intergrading to firm scales, tips variable, rounded to long awned. **Corollas** tubular, 5-lobed, reddish-purple, glandular, tube sometimes pubescent. **Pappus** straw-colored, deciduous, of bristles, infrequently absent. **Achenes** 8-10 ribbed, obconic. Chromosome number: $n = 16, 32$.

Centratherum is a small tropical genus of two species found in the New World, in Australia, and the Philippines. Formerly, the genus *Centratherum* included species from India and Java. Based on chromosome numbers, pollen morphology, and trichome morphology correlated with geographical distribution, these Old World species are presently recognized as the genus *Phyllocephalum*.

REFERENCE

KIRKMAN, L. K. Revision of *Centratherum* and *Phyllocephalum* (Compositae: Vernonieae), Rhodora (in press).

FIG. 6. *Centratherum punctatum*. A, habit; B, head. (From *Woytkowski 7643*, F.)

1. **Centratherum punctatum** Cass. Dict. Sc. Nat. 7: 384. 1817. TYPE: Panama: *Jussieu s.n.* (Holotype: P-JU, as IDC microfiche cat. number 8420-JU!).

Spixia violacea Schrank, Pl. Rar. Hort. Monac. Tab. 80. 1819. TYPE: as illustration GH!.

Ampherephis aristata H.B.K., Nov. Gen. & Sp. 4: 31. 1820. TYPE: *Bonpland s.n.* (Holotype: P, as photo TEX!; Isotype P!).

A. mutica H.B.K., Nov. Gen. & Sp. 4: 31. 1820. TYPE: *Humboldt & Bonpland* (Holotype: P, as photo GH!).

Amphibecis violacea (Schrank) Schrank, Syll. Pl. Nov. 1: 86. 1824.

Ampherephis pulchella Cass., Dict. Sc. Nat. 57: 346. 1828. TYPE: *d'Urville and Lesson s.n.* not seen.

A. pilosa Cass., Dict. Sc. Nat. 57: 346. 1828. TYPE: based upon *A. mutica* Kunth.

Centratherum brevispinum Cass., Dict. Sc. Nat. 57: 346. 1828. TYPE: same as *A. aristata* H.B.K.

C. longispinum Cass., Dict. Sc. Nat. 57: 346. 1828. TYPE: based upon *C. punctatum* Cass.

Ampherephis intermedia Link, Abbild. 5 tab. 29. 1828. TYPE: not seen.

Centratherum muticum (H.B.K.) Less., Linnaea 4: 320. 1829.

C. intermedium (Link) Less., Linnaea 4: 320. 1829.

Crantzia ovata Vell., Fl. Flum. viii. tab. 153. 1835. TYPE: as illustration!.

Centratherum pulchellum (Cass.) Steud., Nom. ed. II. 324. 1840.

C. punctatum Cass. var. *parviflorum* Baker in Mart., Fl. Bras. 6(2): 12. 1873. TYPE: *Blanchet 3689* (BRAZIL: Bahia: Holotype: K! Isotypes: BR! F! G! LE! MO! P!).

C. holotoni Baker in Mart., Fl. Bras 6(2): 12. 1873. TYPE: BRAZIL: Ibague, *Holton 301* (Holotype: K!).

C. brachylepis Sch. Bip. ex Baker in Mart., Fl. Bras. 6(2): 12. 1973. TYPE: BRAZIL: *Martius 461* (Holotype: M! as photo GH! NY! TEX!).

Baccarodes holtonii (Baker) O. Ktze., Rev. Gen. Pl. 1: 320. 1891.

B. brachylepis (Sch. Bip. ex Baker) O. Ktze., Rev. Gen. Pl. 1: 320. 1891.

B. violaceum (Schrank) O. Ktze., Rev. Gen. Pl. 1: 320. 1891.

B. punctatum (Cass.) O. Ktze., Rev. Gen. Pl. 1: 320. 1891.

B. muticum (H.B.K.) O. Ktze., Rev. Gen. Pl. 1: 320. 1891.

Centratherum aristatum non Cass. Index Kew. 1: 478. 1895.

C. punctatum Cass. var. *foliosa* Chod., Bull. Herb. Boissier 2(2): 298. 1902. TYPE: PARAGUAY: Capibuy, *Hassler 4378.* (Holotype: G! Isotype: BM! K! NY! P!).

C. punctatum Cass. ssp. *camporum* Hassl. var. *viscosissimum* Hassl. *f. foliosum* (Chod.) Hassl., Feddes Repert. Spec. Nov. Regni Veg. 12: 369. 1913.

C. punctatum Cass. ssp. *camporum* Hassl. var. *viscosissimum* Hassl. f. *brachyphyllum* Hassl. Feddes Repert. Spec. Nov. Regni Veg. 12: 369. 1913. TYPE: PARAGUAY: In regione vicine Igatimi, *Hassler 4768* (Holotype: G! Isotypes: GH! MO! MPU! NY! P! S!).

C. punctatum Cass. ssp. *camporum* Hassl. var. *longipes* Hassl., Feddes Repert. Spec.

Nov. Regni Veg. 12: 369. 1913. TYPE: PARAGUAY, *Fiebrig 4532* (Holotype: B, as photo GH! TEX!).

C. violaceum (Schrank) Gleason, N. Amer. Fl. 33: 49. 1922.

C. camporum (Hassl.) Malme var. *longipes* (Hassl.) Malme, Ark. Bot. 24A 6: 15. 1931.

Sprawling to erect **herb** becoming suffrutescent with age, stems strigose, often ridged. **Leaves** cauline, often crowded; short petiolate to sessile; blades ovate to elliptic to spatulate, obtuse at the apex, cuneate to attenuate at the base, (1)2-7 cm long, (0.5)0.8-3 cm wide, margins serrate, often ciliate, glandular-punctate, often pubescent (especially on veins) above and beneath. **Inflorescences** of terminal heads, or occasionally 2-3 headed clusters, peduncles 2-7 cm long. **Heads** with numerous florets; involucre cylindric-campanulate, imbricate in several series; phyllaries glandular, membranaceous, outer foliaceous, greenish; inner phyllaries purplish, rounded to aristate (when awned, awns to 3 mm). **Corollas** 5-8(10) mm long, glandular. **Pappus** straw-colored; bristles numerous, deciduous 1.5-2.8(3.5) mm long, rarely absent. **Achenes** (1.2)1.6-2.6 mm long, 8-10 ribbed. Chromosome number: $n = 16, 32$.

This subspecies occurs in South and Central America and the West Indies. It grows in pastures and waste places, flowering the year around. It is sometimes cultivated as an ornamental.

The one specimen seen was: PERU: no locality cited, *Woytkowski 7643* (MO). The material from Peru represents *C. punctatum* Cass. ssp. *punctatum*.

V. STRUCHIUM

Struchium P. Br., Civ. Nat. Hist. Jam. 312, tab. 34, fig. 2. 1756. TYPE: *S. herbaceum* St.-Hil.

Athenaea Adans. Fam. 2: 121. 1763, non Sendtn. (Solanaceae), *nom. cons.*

Sparganophorus Vaill. ex Crantz, Inst. 1: 261. 1766.

Erect, weedy, annual **herbs**, stems simple or branched, somewhat succulent. **Leaves** alternate, simple, petiolate, blades subentire to serrate, pinnately veined. **Inflorescences** axillary, of single or glomerate heads. **Heads** discoid; involucre hemispheric; phyllaries numerous, imbricated in several series. **Corollas** tubular, 3-lobed, white; style branches reddish-purple. **Pappus** a cartilaginous, whitish corona, ca. one-half the length of the achene. **Achenes** 3-4 angled.

A monotypic genus of the New World tropics that is reportedly weedy in Africa.

1. **Struchium sparganophorum** (L.) O. Ktze., Rev. Gen. Pl. 366. 1891.

Ethulia sparganophora L., Sp. Pl., ed. 2. 1171. 1763. TYPE: not seen.

Struchium herbaceum P. Br. ex St.-Hil., Expos. Fam. 1: 406. 1805.

Sparganophorus struchium Poir. in Lam., Encycl. Méth. 7: 302. 1806. (July). TYPE: P. Br., Civ. Nat. Hist. Jam. 312, tab. 34, fig. 2. 1756.

FIG. 7. *Struchium sparganophorum*. **A**, habit, × ½; **B**, detail showing axillary inflorescences, natural size; **C**, mature head showing achenes and receptacle, × 5; **D**, mature head with fallen corollas showing top achenes, × 3½; **E**, flower at anthesis, × 16; **F**, corolla showing position of lobes and stamens, × 18, stigma, × 25. (From *Steyermark 46308*, F.)

S. fasciatus Poir. in Lam., Encycl. Méth. 7: 302. 1806. TYPE: Lam. Ill. Genres. tab. 670. 1823.

Struchium americanum Poir. in Lam., Encycl. Méth. 7: 475. 1806. TYPE: P. Br., Civ. Nat. Hist. Jam. 312, tab. 34, fig. 2. 1756.

Ethulia struchium Sw., Prod. Veg. Ind. Occ. 3: 1297. 1806. TYPE: P. Br., Civ. Nat. Hist. Jam. 312, tab. 34, fig. 2. 1756.

Annual **herbs**, 0.4-1 m tall, stems simple or branched, somewhat succulent, stout, sparsely short-strigose. **Leaves** cauline; petioles ca. 1 cm long; blades elliptic, acuminate at the apex, cuneate at the base, 9-12 cm long, 3-7 cm wide, margins subentire to serrate, inconspicuously strigose to glabrate on both surfaces. **Inflorescences** of solitary or glomerate heads in the leaf axils. **Heads** with 60-70 florets, sessile or on short branches; involucre hemispheric, 3-5 mm long; phyllaries arachnoid, appressed, greenish with white margins, tips acuminate. **Corollas** 2 mm long, white, 3-lobed, glabrous; style branches reddish purple. **Pappus** a cartilaginous corona. **Achenes** 2 mm long, 3- to 4-angled, glandular.

This species is distributed throughout tropical America and is reportedly adventive in Africa. It grows in moist alluvial or sandy soil along streams or in flood plains. Flowering and fruiting occur throughout the year.

LORETO: Pongo de Manseriche, *Mexia 6350* (MO, UC, US). SAN MARTIN: Tocache Nuevo, *Vigo 7144* (MO).

VI. ELEPHANTOPUS

Elephantopus L., Sp. Pl. 814. 1753. TYPE: *Elephantopus scaber* L.

Orthopappus Gleason, Bull. New York Bot. Gard. 4: 237. 1906. TYPE: *Elephantopus angustifolius* Sw.

Erect perennial **herbs**, simple or sparsely branched; stems usually solitary and pubescent. **Leaves** cauline or chiefly basal; petioles usually indistinct; blades elliptic to lanceolate or ovate, acute at the apex, attenuate at the base, margins entire to crenate or dentate. **Inflorescences** spicate, corymbose, or slightly paniculate; bracteate; the heads in ovoid or globose glomerules, the glomerules dense with many heads. **Heads** with (1)2-4(5) florets; involucre of 8 phyllaries, in 4 decussate pairs. **Corollas** blue to white, tubes slender, the limb unequally 5-cleft with a deeper fissure on the inner side. Chromosome number: $n = 11, 22$.

Elephantopus is a largely tropical genus of ca. 30 species centered in the New World but also occurring in the Old World tropics.

REFERENCES

Baker, C.F. 1902. A revision of the Elephantopeae. Trans. Acad. Sci. St. Louis. **12**, pp. 43-56.

Clonts, J. A. 1972. A revision of the genus *Elephantopus*, including *Orthopappus* and *Pseudelephantopus* (Compositae). Unpublished Ph.D. dissertation, Miss. State Univ.

Clonts, J. A. and S. McDaniel. 1978. Elephantopus. N. Amer. Fl. Ser. II, pt. 10, pp. 196-202.

KEY TO SPECIES OF *Elephantopus*

a. Inflorescence paniculate, glomerules pedunculate; pappus bristles 5-8 ..... 1. *E. mollis*.

aa. Inflorescence appearing spicate, glomerules sessile, pappus bristles numerous (ca. 20-30) ..... 2. *E. angustifolius*.

1. **Elephantopus mollis** H.B.K., Nov. Gen. & Sp. 4: 26. 1820. TYPE: Caracas, Caracas, *Humboldt and Bonpland 627* (Holotype P, as IDC microfiche!).

E. martii Grah., Edinburgh New Philos. J. Jan.-Mar. 378. 1830. TYPE: Brazil: Rio Janeiro, *Harris s.n.* (not seen).

E. sericeus Grah., Edinburgh New Philos. J. Jan.-Mar. 373. 1831. TYPE: Dominica: *Krous s.n.* (not seen).

E. serratus Blanco, Fl. Filip. ed 1. 635. 1837.

E. carolinanus var. *mollis* (H.B.K.) Beurl., Bidr. Portobellensis F. 134. 1854.

E. hypomalacus Blake, Contr. Gray Herb. 52: 20. 1917. TYPE: Costa Rica, *Holway 314* (Holotype GH).

E. pilosus Philipson, J. Bot. 77: 314. 1939. TYPE: Dutch Guiana: *Hostmann 875* (Holotype BM, Isotype K).

Erect perennial **herbs**, 3-10(20) cm tall, from a creeping rootstock, stems pilose or hirsute. **Leaves** cauline or basal, greatly reduced upward; petioles short and clasping the stem; blades ovate, obovate, or oblanceolate, acute to short acuminate at the apex, attenuate to the base, 8-20 cm long, 5-10 cm wide, margins crenate, serrate to subentire, thinly pilose to slightly scabrous above, softly pilose beneath. **Inflorescences** corymbose-paniculate, glomerules terminal, to 2.3 cm wide; bracts 3, cordate to deltoid, 0.7-1 cm wide, 0.7-1.3 cm long, occasionally longer or shorter than the glomerules, acute to short acuminate, pilose. **Heads** with 4 florets; phyllaries lanceolate, 1.5-2 mm wide, 6-8 mm long, sharply acuminate, membranous along the margin, at least below, sparsely pubescent, at least above the middle. **Corollas** 5-6 mm long, white to bluish pink, deeply divided on the adaxial side. **Pappus** of 5(8) bristles unseriate, ca. 4 mm long dilated into a narrow to broad triangular base. **Achenes** 2.5-3.5 mm long, ribbed minutely pubescent. Chromosome number: $n = 11$.

This species is widely distributed in the American tropics and has been introduced into tropical Africa and southeast Asia. Flowering and fruiting occur throughout the year.

AMAZONAS: Mendoza, *Woytkowski 8111* (MO). LORETO: Lago Llanchama near Rio Nanay, *Croat 18756* (MISSA, MO). SAN MARTIN: Jepelacio near Moyobamba, *Klug 3464* (F, MO, US). HUANUCO: Tingo María, *Asplund 12155* (US). JUNIN: near La Merced, *Killip and Smith 23972* (US). AYACUCHO: La Mar: Between Ayna and Hacienda Luisiana, *Dudley 11686* (USM). CUZCO: Machupicchu, *Vargas 806* (F, USM). MADRE DE DIOS: ca. 20 km W of Puerto Maldonado, *Gentry, Revilla, Alfaro, Daly 19677* (MO).

FIG. 8. *Elephantopus mollis*. **A**, habit, × ½; **B**, inflorescence, × 2; **C**, flowering head with detail, × 3; **D**, corollas, one dissected to show detail, × 13; **E**, anther, × 25. (From *Standley 76193*, F.)

2. **Elephantopus angustifolius** Sw., Prod. Veg. Ind. Occ. Prodr. 115. 1788. Based on Sloane, Voy. Isl. Madera. 1: 256, pl. 148, fig. 4. 1707.

E. nudiflorus Willd. Sp. Pl. 3: 2390. 1804. TYPE: St. Domingo, *Poiteau* (not seen).

Elephantosis quadriflora Less., Linnaea 4: 323. 1829. TYPE: Brazil, *Beyrich s.n.* (not seen).

Elephantopus quadriflorus (Less.) D. Dietr., Syn. Pl. 4: 1372. 1847.

Orthopappus angustifolius (Sw.) Gleason, Bull. New York Bot. Gard. 4:237. 1906.

Perennial erect **herbs** arising from a short caudex, usually 3-12(15) dm tall, stems pilose. **Leaves** cauline and basal, crowded near the base; petioles short and broad; blades narrowly oblanceolate to oblong-lanceolate or linear to oblong, acute to obtuse at the apex, long attenuate at the base, (5)10-35(50) cm long, 1.3-4(5.5) cm wide, margins shallowly and irregularly crenate, thinly and softly strigose on both surfaces, the trichomes somewhat silvery beneath. **Inflorescences** spicate or racemose-spicate below, glomerules lateral and terminal, to 2 cm wide, bracts 1 or 2, lanceolate, to 1 cm long. **Heads** with 4 florets; phyllaries 8, in 2 descussate series, acute to acuminate, membranous along the margin, sparsely strigose at least above the middle. **Corolla** tubes to 6 mm long, the limb 2 mm long, white to lavender, 5 parted, deeply divided on the adaxial side. **Pappus** of 20-40 bristles, uniseriate, 6-7 mm long, gradually dilated near the base. **Achenes** 1.5-2.5 mm long, ribbed, pubescent. Chromosome number: $n = 11$.

This species is distributed from southern Mexico south to northern Argentina and Chile and into the West Indies. Flowering and fruiting occur throughout the year.

AMAZONAS: 4 km from Campamento Ingenio, *Hutchison and Wright 3980* (F, MO, US). LORETO: Yurimaguas, *McDaniel and Rimachi Y 16554* (MISSA, F, MO). SAN MARTIN: Tarapoto, *McDaniel 13724* (F, MO, MISSA). HUANUCO: Pachitea, Camino a Shahuinto a 5 km del campamento de Iparia, *Schunke 1667* (F). JUNIN: San Ramon, *Woytkowski 7487* (MO, US). CUZCO: *Herrera 3232* (F).

VII. PSEUDELEPHANTOPUS

Pseudelephantopus Rohr, Skr. Naturhist.-Selsk. 2: 213. 1792. "PseudoElephantopus," TYPE: *Elephantopus spicatus* Juss. ex Aubl.

Distreptus Cass., Bull. Soc. Philom. Paris 1817: 66. 1817. TYPE: *Elephantopus spicatus* Juss.

Matamoria La Llave & Lex., Nov. Veg. Desc. fasc. 1: 8. 1824. TYPE: *Elephantopus spicata* Juss. ex Aubl.

Spirochaeta Turcz., Bull. Soc. Imp. Naturalistes Moscou 24: 166. 1851. TYPE: *S. funckii* Turcz.

Chaetospira Blake, J. Wash. Acad. Sci. 25: 311. 1935. TYPE: *Spirochaeta funckii* Turcz.

Erect **herbs**, stems solitary, branched. **Leaves** cauline, clasping, alternate, pinnately veined; petioles indistinct. **Inflorescences** terminal, slender, racemose-spicate, in glomerules of 1-5 heads usually subtended by 2 foliaceous bracts. **Heads** with 4 florets; involucre of 8 phyllaries. **Corollas** tubular-funnelform, the tube slender, the limb 5-cleft, deeply divided on one side; anthers sagittate at the base; style slender. **Pappus** of 5-15 unequal or subequal bristles, uniseriate, plicate or spiraled at the tip, some straight bristles in 1 species. **Achenes** 10-ribbed.

A neotropical genus of two species, both known from Peru; introduced pantropically.

Cronquist (1971) discusses the spelling of *Pseudelephantopus* and maintains it as a genus. It was recognized as a genus by Busey (1975); however, Clonts (1972) submerged it in *Elephantopus*. The two genera *Pseudelephantopus* and *Elephantopus* differ in gross morphology of the inflorescence and in other features. *Pseudelephantopus* differs cytologically having a chromosome number of $n = 13$; *Elephantopus* has $n = 11, 22$. Because of the cytological differences and its specialized morphology, it clearly merits generic status.

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Cronquist, A. 1971. Composite. *In* I. L. Wiggins and D. M. Porter, Flora of the Galapagos. pp. 350-353. Stanford Univ. Press, Stanford.

Gleason, H. A. 1922. *Pseudelephantopus*, N. Amer. Fl. **33**, p. 109.

Key to Species of *Pseudelephantopus*

a. Pappus consisting of 2 bristles bent and curled and several short straight bristles.. 1. *P. spicatus*.

aa. Pappus bristles curled or twisted .....2. *P. spiralis*.

1. **Pseudelephantopus spicatus** (Juss. ex Aubl.) C. F. Baker, Trans. Acad. Sci. St. Louis 12: 55. 1902. Based on Sloane, Voy. Isl. Madera 1: 256, pl. 150, fig. 3-4. 1707.

Elephantopus spicatus Juss. ex Aubl. Pl. Gui. 2: 808. 1775.

Distreptus spicatus (Juss. ex Aubl.) Cass., Dict. Sc. Nat. 13: 667. 1819.

Matamoria spicata (Juss. ex Aubl.) La Llave & Lex., Nov. Veg. Desc. fasc. 1: 8. 1824.

Erect perennial **herb** up to 1 m tall, stems pilose or hirsute, striate. **Leaves** cauline; petioles indistinct; blades lanceolate, oblanceolate, obovate, reduced above, acute at the apex, attenuate, clasping at the base, (3)4-10(17) cm long, 1-5 cm wide, margins remotely serrate to sinuate, hispid above, pilose to hirsute and punctate beneath. **Inflorescences** racemose-spicate; clusters of heads subsessile, lateral and terminal, 3-5 headed. **Heads** with 4 florets; phyllaries 8, similar, in 4 pairs, lanceolate, keeled, 9-12 mm long, 1.5-2(3)

FIG. 9. *Pseudelephantopus spiralis*. **A**, habit; **B**, head; **C**, achene. (From *Dillon & Turner 1421*, F.)

mm wide, sparsely pubescent at apex, tips sharply acuminate. **Corollas** 6-10 mm long, white to blue-purple. **Pappus** of 4-10 bristles, 2-seriate, 2-plicate, 5-7 mm long, the remainder straight and shorter, gradually dilated at the base. **Achenes** 5-7 mm long, ribbed, pubescent. Chromosome number: $n = 13$.

This species is distributed from Central Mexico and the West Indies south to Chile, and has become a pantropical weed. Flowering and fruiting occur throughout the year.

SAN MARTIN: San Martín: Tarapoto Hills, *Plowman 6026* (USM). LORETO: Coronel Portillo: cerca a Neshuya, *Ferreyra 17193* (USM). JUNIN: Tarma: La Merced, Chanchamayo, *Ferreyra 0490* (USM).

2. **Pseudelephantopus spiralis** (Less.) Cronq., Madroño 20: 255. 1970.

Distreptus spiralis Less. Linnaea 6: 690. 1831. TYPE: Jamaica, *Herb. Thunberg 20920* (UPS).

Spirochaeta funckii Turcz., Bull. Soc. Imp. Naturalistes Moscou 24: 167. 1851. TYPE: Venezuela, LaGuayra, *Funck 358*, Galeotii Herb. 380 (G-Delessert Herb. 28530).

Chaetospira funckii (Turcz.) Balke, J. Wash. Acad. Sci. 25: 311. 1935.

Pseudelephantopus funckii (Turcz.) Philipson, J. Bot. 76: 301. 1938.

Chaetospira spiralis (Less.) Aspl. & Blake, Svensk Bot. Tidskr., 52: 50. 1958.

Erect, perennial, stoloniferous **herb**, stems pilose to hirsute. **Leaves** cauline; petioles indistinct; blades oblanceolate to obovate, acute to obtuse at the apex, attenuate at the base, 3-7(15) cm long, 1.2-3(5) cm wide, margins crenate, hispid above, punctate and hispid beneath. **Inflorescences** racemose-spicate, bracteate, clusters of heads subsessile, 5-10 headed. **Heads** with 4 florets; phyllaries 8, similar, in 4 pairs, oblong-lanceolate, keeled, 7-8 mm long, 1-2 mm wide, pubescent above middle, tips acuminate. **Corollas** 6-7 mm long, whitish to blue-purple. **Pappus** of 4-6 bristles, uniseriate, 4-6 mm long, strongly twisted above the middle, dilated at the base. **Achenes** 2.5-3 mm long, ribbed, pubescent.

This species is distributed from Costa Rica and the Lesser Antilles throughout northern South America south to northern Argentina and occurs as a weed in pastures and waste places. Flowering and fruiting occur throughout the year.

SAN MARTIN: San Martín: cerca a Tarapoto, *Ferreyra 17863* (USM). LORETO: Mishuyacu, *Klug 1331* (F). MADRE DE DIOS: Iberia, *Seibert 1928* (US, USM). MAYNAS: Bellavista, *McDaniel 16052* (MISSA, MO). JUNIN: Rio Pinedo, N of La Merced, *Killip and Smith 23596* (F).

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Figures 7 and 8 were drawn by Marion Pahl and are used with the permission of the Editor of *Fieldiana*. The remaining figures were drawn by Marlene Werner, Department of Exhibition, Field Museum of Natural History.

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Names in **boldface** refer to new species; names in Roman type refer to valid species; names in *italics* refer to synonyms. Numbers in **boldface** refer to descriptions; numbers in *italics* refer to illustrations.


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