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AUGUST 1, 1917

The University of the State of New York

New York State Museum

JOHN M. CLARKE, DIRECTOR

KEY TO AMERICAN INSECT GALLS

By EPHRAIM PORTER FELT D. Sc.

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1918

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The University of the State of New York
Science Department, May 4, 1917

Dr John H. Finley
President of the University

SIR:

I transmit herewith and recommend for publication as a bulletin of the State Museum, the accompanying manuscript prepared by Dr Ephraim P. Felt, State Entomologist, and entitled: *A Key to American Insect Galls*. The manuscript is accompanied by the necessary illustrative material.

Very respectfully yours

JOHN M. CLARKE
Director

THE UNIVERSITY OF THE STATE OF NEW YORK
OFFICE OF THE PRESIDENT

Approved for publication this 10th day of May 1917

H. S. Finegan

Deputy Commissioner of Education



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KEY TO AMERICAN INSECT GALLS

BY

EPHRAIM PORTER FELT D. SC.

INTRODUCTION

Insect galls are obvious and frequently excite surprise because of the strange form or the wonderful coloring and delicacy of structure. The fresh, well-developed gall of the wool sower is one of the most beautiful of natural objects, while the delicately colored galls of *Itonida anthici* on bald cypress may occasionally be found in such numbers as to suggest a beautiful group of dainty flowers, structures very different from what normally occur on this tree and therefore even more surprising. The great variety of galls found upon the oaks and the interesting alternation of generations characteristic of the gall wasps challenge our admiration and incite to further study. The same is true though possibly to a less marked degree, of the hosts of fragile gall midges, forms which have learned to subsist upon various portions of a very large number of plants and, like the gall wasps, offer many biological puzzles to stimulate the earnest inquirer. Much of this is also true of the gall-making plant lice with their migrations and very dissimilar alternate host plants.

The origin and development of these growths are no less interesting than the deformities themselves. The gall-making habit among insects has undoubtedly developed independently in several widely

separated groups and must have originated in a mutual reaction between the insects and their host plants, which has reached its climax in the many apparently inexplicable deformations of the present day. All stages of the process may be observed among the gall midges, some of which live among succulent fungous growths and either feed a little upon the fungi or obtain nourishment by absorption from the humid surfaces of the host. There are certain predaceous maggots in this group which have the mouth-parts greatly prolonged and apparently specially adapted to withdraw by suction the body fluids of their hosts. It may be one or the other or possibly a combination of the two methods which obtains among the fungivorous species. It is only a step from this to absorption with apparently no mechanical injury as in the leaf spot gall of the soft maple or the pod leaf galls mentioned below. The habit once started, it is possible to understand how the process might continue with infinite variations among a host of species, which is just what has taken place. The adaptations have continued along a number of lines to such an extent that many insect galls give little external evidence of their origin. Gall insects live at the expense of their hosts and in some instances, at least in the case of certain plant lice, the mere satisfying of the primitive instinct of hunger seems to be all that is necessary, not only to preserve life but to compel or cajole, as it were, the host plant, to grow or throw around its enemy a defensive barrier of gall within which the aphid may live in the presence of abundance, be comparatively safe and obtain like conditions for its numerous progeny. This sheltered, luxurious type of existence appears to be essential to many species and the tendencies along these lines have developed to such an extent that twenty-nine species of gall-making aphids, Phylloxera, are known to live at the expense of our hickories and in a similar manner a number of species of jumping plant lice, Pachypsylla, subsist on hackberry.

A very large proportion of insect galls begin growth in the bud and therefore at a time when the plant tissues are plastic and more easily modified. Not a few of the strange forms are to be explained as the arrested development of buds, fruit or leaves as the case may be, frequently accompanied by an excessive development or swelling of parts immediately adjacent to the source of irritation. This latter may be brought about by fluids in the egg or injected with it, as in the case of the galls of certain sawflies which become full size before the larvae hatch. Sometimes it is a reaction between the contents of the egg or larva and adjacent tissues through excretion or osmosis, a condition which must obtain in the familiar pod galls

caused by the deformation of ash and spiraea leaves and showing no trace of mechanical abrasion or injury. Then there are numerous galls which develop as a result of continued stimulation by the gall maker itself, a relation evidenced by the fact that in the case of the beaked willow galls producing parasites, we find mostly partly developed galls which present marked differences from those containing healthy maggots.

This key to American insect galls is an outgrowth of earlier studies of the gall midges and was assembled primarily to facilitate the identification of the numerous galls submitted for name. It gives for the first time, for American forms, a comprehensive survey of the curious plant growths caused by insects and their near allies, the plant mites. With such a guide many amateurs will doubtless be encouraged to enter a charming and delightful field of study, one which may be followed with profit for the child at school as well as by the student of more mature years. The specialist will find herein references to the best accounts of the numerous species listed as well as a summary of American literature, while the many records of host relationships can not be ignored by the biologist and ecologist. The obvious concentration of many forms upon relatively few host plants, especially those with numerous closely allied species, such as the willows, oaks and goldenrods, and the great diversity of both structure and food habits among gall midges, all suggest interesting lines of study. These relationships are brought out more clearly in a tabulation of the hosts and galls (see page 215), where 1441 species are listed, 682 being gall midges and 445 gall wasps. The remainder of the plant deformations discussed in this work are produced by a few of the other two-winged flies or Diptera, four-winged flies or Hymenoptera, beetles or Coleoptera, moths or Lepidoptera, and the true bugs or Hemiptera, especially the plant lice and the plant mites or Eriophyidae, the last being represented by 161 species. The deformations, though numerous, by no means exhaust the possibilities and in the estimation of Mr L. H. Weld, a student of the Cynipidae, nearly one-third, mostly inhabitants of inconspicuous galls, are still unknown. It should also be remembered that extensive regions are comparatively unexplored for insect galls of all kinds.

There are not only a large number of different species of gall insects but occasionally some become exceedingly abundant; for example, there was, a few years ago, near Albany, a large oak with its smaller branches almost covered with the giant, beadlike swellings of the gouty oak gall, *Andricus punctatus* (fig. 57),

and on rearing the gall wasps from a few twigs it was estimated that over 500,000 insects were then living at the expense of the one tree. Last summer the galls of *Andricus gemmarius* were so numerous on a large pin oak near Newton, N. J., that the sweet exudation from the deformations attracted hosts of bees and flies. The unusual noise, humming or "roaring" of these insects resulted in an examination which showed the large tree to be generally infested. The twig illustrated in figure 59 gives an idea of the abundance of the galls. Among gall midges the well-known Hessian fly frequently becomes numerous enough to destroy extensive areas of wheat; the Sorghum midge and the clover midge make it nearly impossible to grow the seed of these plants in certain sections, while the rose midge, the violet midge and the chrysanthemum midge are greenhouse species known only too well to the grower of these highly cherished flowers.

The collection and study of plant galls is a field open to many. The specimens are to be found at all times of the year and those with woody tissues require no special preparation if one desires to make a collection. It is not difficult in numerous instances, especially if collecting is deferred until the gall insects are nearly mature, to rear the producers, though some care is necessary to distinguish between the true gall makers and the very similar inquilines, or particularly in the case of gall midges, between gall makers and other frequently associated enemies. Gall insects are small, fragile, and can not be studied successfully without a good microscope, considerable technical skill and a moderately good collection and library.

Insect galls may be defined as vegetable excrescences resulting from insect activities and usually sheltering the immature stages of the producers, though a wide acquaintance with these growths demonstrates the existence of innumerable gradations between the apparently normal and the decidedly abnormal and, as a consequence, it is difficult to establish a satisfactory distinction between insect galls and deformations not worthy of classification under this term. Some would include the mere curling of leaves and while to a certain extent this is justified, in most cases unless the curling is pronounced the deformation has not been considered as a gall coming within the scope of this work.

The two most important groups of gall insects—the gall midges or the Itonididae, and the gall wasps or the Cynipidae—each contain species living at the expense of plants and producing little or no swelling of the plant tissues. In the former group there

are to be found species, the young or the maggots of which live exposed upon the foliage, some of these evidently absorbing nourishment from the leaf tissues and producing a characteristic modification, such for example as the very common leaf spot caused by *Cecidomyia ocellaris* on soft maple leaves; others subsist upon fungi, some are predaceous, and the young of a number may be found in decaying wood or in subcortical tissues of the host and cause little or no disturbance of the plant functions. Such species are very likely to be reared by the student of insect galls and we have therefore included in the key a number of these forms which have been definitely associated with various food plants.

A comparison of the food habits of the gall midges or Itonididae and the gall wasps or Cynipidae is of more than passing interest. In the first place, the 682 galls produced by the midges occur on plants belonging to 69 botanical families and 202 genera. The larvae of 66 species live at the expense of the willows or Salicaceae (52 of these are found on *Salix*); 29 species occur upon the Juglandaceae, all but one infesting hickory or *Carya*; 43 attack the Fagaceae (36 of these being upon the oaks); 56 species produce galls on the Rosaceae, 24 on the Leguminosae, 22 upon the Vitaceae, and 151 on the Compositae. The most obvious concentration of species, aside from those mentioned above, is the 44 midges reared from *Solidago* and the 22 found upon aster. These figures are approximate, yet taken in connection with the great diversity in the structure of these small insects, indicate that this group has been able to maintain itself upon a great many different plants through a considerable physiological adaptability and that the distinctness of the species has been established by relatively small modifications in structure.

The gall wasps or Cynipidae present an entirely different condition so far as relation to the flora is concerned. They attack plants referable to only 6 botanical families and assignable to but 17 plant genera.¹ There is, however, a most striking concentration in food habits, since a very large proportion of the 445 gall makers subsist at the expense of the Fagaceae which, for this group, means the oaks, the exact number in our list being 359 though this figure, like the above, is an approximation; 38 species have been reared from members of the rose family or Rosaceae, 28 (*Rhodites*) living at the expense of the genus *Rosa*. The other species referable to the Cynipidae are scattered in their food habits, the most evident concentration, and this far from marked, being the 12 species reared

¹ Mr L. H. Weld has called our attention to two undescribed gall wasps which would change the above figures to 7 botanical families and 19 plant genera. There is also a South American species on *Acacia*.

from various Compositae, the genera *Silphium* and *Lactuca* supporting 4 and 3, respectively. This well-defined limitation in food habits is accompanied, as might be expected, by a high degree of specialization in structure.

The plant lice or Aphididae live on a great variety of plants, though the gall-making forms occur upon the members of relatively few plant families and genera, the most evident food preference being in the gall aphids belonging to the genus *Phylloxera*, with its 29 species producing deformations on hickories. The nearly allied jumping plant lice or Psyllidae present a similar condition in the genus *Pachypsylla* and its relation to the numerous galls upon *Celtis*.

It will be seen by referring to the key that the galls are grouped by food plants and that in the case of those infested by numerous gall insects, additional divisions are made according to the location on the plant and the structure of the galls. The difference between the leaf and twig gall is not sharply defined in nature, since the same species may produce a gall diverting only a portion of the nourishment and a part of the leaf is therefore clearly present, while in other cases the deformation may develop to such an extent that there is no hint of a leaf and the gall is apparently, at least, a twig deformation; consequently some galls are entered more than once because of an apparently different origin and the same is true to a certain extent in regard to variations in form.

A few special terms used in the key are explained below:

Blister galls. This is applied primarily to the blisterlike, apparently fungous-filled swellings occurring upon the leaves of *Solidago* and aster and usually inhabited by species of *Asteromyia*.

Bud galls. Deformations which evidently originate from buds. They may vary from a plainly aborted bud to a great enlargement developing from such parts.

Bullet galls. A term which has become somewhat general and refers in particular to the nearly solid, monothalamous bullet galls produced by certain species of *Disholcaspis* upon oak twigs.

Cecidomyia. A term used here in a broad sense and applied to any species referable to the family Itonididae and which can not be readily assigned to more closely defined genera.

Erineum is applied in a general way to the hairy growths upon leaf surfaces inhabited by species of plant mites or Eriophyidae.

Flower galls. Deformed flowers or masses of flowers, frequently more or less variable in shape.

Fruit galls. This term is limited to species inhabiting the seeds or fruits and in some cases producing marked deformities.

Leaf galls. The term is a broad one applying to all deformations definitely associated with leaves.

Leaf spots. A descriptive term which has been adopted for some leaf galls which are more evident because of the marked discoloration than on account of size or elevation.

Monothalamous. Literally, one chamber; a convenient term used to designate galls inhabited by a larva or larvae in one cell or cavity.

Oak apples. A general term applied to the familiar, large galls on oak produced by the genus *Amphibolips* and referring in particular to the large oak apple and the empty oak apple.

Pouch galls are simply pouchlike deformities usually caused by a depression in the leaf surface eventuating in a pouchlike cavity, such, for example, as that inhabited by a number of gall mites.

Root galls is a term applied to any swellings upon roots.

Rosette galls are simply a specialized type of bud gall with the central cell or cells surrounded by a rosette of partly developed leaves.

Stem or twig galls are deformations restricted to that portion of the plant.

Subcortical galls are swellings just under the bark and usually occurring upon one side of a twig or stem.

It is frequently very convenient to be certain of the group to which the gall maker belongs and the following abbreviations are used in the key.

Acarid. An abbreviation for Acarina and in this work refers particularly to the gall mites or Eriophyidae. The galls produced by this group vary from a simple erineum to a more or less modified pouch gall and are most easily recognized in many cases by the abnormally developed plant hairs and the orifice usually guarded by a fuzzy growth. The presence of extremely minute, four-legged mites is characteristic of these deformities.

Aphid. An abbreviation for Aphididae or plant lice and in this work applied to the gall-producing forms. Aphid galls are most easily recognized by the more or less distinct orifice and the characteristic inhabitants.

Coleop. An abbreviation for Coleoptera or beetles, the gall-making larvae of which are legless or nearly so and characterized by the possession of a head and well-developed jaws.

Itonid. An abbreviation for Itonididae or gall midges, a group

which produces an immense number of galls — sometimes closed and sometimes partly open — and most easily recognized by the yellowish or white maggots with a more or less developed Y-shaped "breastbone" and a distinct head.

Cynipid. An abbreviation for Cynipidae or gall wasps and also used as a convenient designation for species not referable to well-defined genera. The group is remarkable because of its producing a large number and variety of closed galls, especially on oaks, the larvae being in individual cells imbedded in the plant tissues, headless and white.

Dipt. An abbreviation for Diptera or the true flies and used in this work where the more restrictive term Itonid can not be employed. The young are headless, legless, usually white maggots. The galls vary greatly in shape and structure.

Hemip. An abbreviation for Hemiptera or true bugs which includes a number of species not referable to the more closely limited term Aphididae or plant lice. The galls are variable in appearance.

Hym. An abbreviation for Hymenoptera or members of the wasp and bee family and in this work applied especially to those not included under the term Cynipidae. The Nematid larvae are false caterpillars with numerous legs and a conspicuous head. The young of the Chalcids are white and without head or legs. The galls are variable in appearance.

Lepid. An abbreviation for Lepidoptera or the butterflies and moths. The young or caterpillars of the latter inhabit a number of galls and may be distinguished from other gall insects by the well-developed head and the presence usually of both true and abdominal legs.

There is no reason why many galls should not have well-recognized common names. The writer has taken pains to use all those worthy of perpetuation and, in addition, following suggestions from various sources, has incorporated in the key a number of vernacular terms, some of which at least, it is hoped, will become current.

The abbreviated references following the description of the gall give, first, the name or an abbreviation of the name of the author, second, the year of publication (in case there is more than one in a year they are distinguished by letters) and, third, the page. These citations are given in full in the bibliography.

The nomenclature used is that current at the time the manuscript was completed, though a recent work: "The Type Species of the Genera of the Cynipoidea or the Gall Wasps and Parasitic Cynipoides" by S. A. Rohwer and Margaret M. Fagan (U. S.

National Museum Proceedings 53:357-80, 1917) indicates that a change must be made in several of the best known Cynipid genera, namely, that *Cynips* of authors not Linnaeus is *Adleria* Rohw. and Fag., *Dryophanta* Forst. is *Cynips* Linnaeus and that *Rhodites* Hartig and *Diplolepis* Goeff. are synonyms. In view of the fact that the above genera are so well known and have been so generally used in literature, it was considered best to continue these names in this key, since it would be decidedly more convenient for those wishing to refer to earlier accounts.

Certain insect galls are commercially valuable and on looking into the matter one may be surprised at the important place they hold in trade. It is well known that some oak galls have long been used in the manufacture of ink, particularly the more permanent writing fluids. The most important gall for this purpose is the Eurasian *Cynips gallae-tinctoriae*, variously known as the Aleppo gall, Turkey gall, Levant gall, gall nut, gall of commerce and ink marble. This gall contains 65 per cent of tannic acid and is mostly used for dyeing wool and skins. The Knoppern or acorn gall, produced by *Cynips quercus-calycis* contains 50 per cent tannic acid and is next in importance to the Aleppo gall. There is a Chinese sumac gall produced by a species of *Pemphigus*, closely allied to the American *P. rhois*, that is imported in considerable quantities because of its high tannin content, a characteristic also of our native gall. The air dried Chinese gall contains over 60 per cent tannic acid and our native sumac gall about 8 per cent less. It is probable that a number of American oak galls in particular could be utilized to advantage. Insect galls are used in medicine on account of their astringent properties and a few have served as articles of food, notably that of a species of *Aylax* on *Salvia pomifera* which forms an article of commerce in the Near East and a somewhat common catmint gall, *Aylax glechomae*. Both are said to have an agreeable taste and the sweet odor of the host plant. The producer of the latter has become well established in this country. Other galls are known to be edible and it is possible that they could be turned to good account when the insects are unusually abundant. There is a record of a black oak gall somewhat resembling wheat and provisionally referred to the genus *Callirhytis* being so abundant in Missouri and Arkansas some years ago that it was fed to various domestic animals with excellent results. One gall, that of *Cynips theophrastea*, was used by Greeks as a fuel in lamps. For an excellent historical account of the use of insect

galls, the reader is referred to a recent article by Miss Fagan cited in the bibliography.

Through the courtesy of the officials of the American Museum of Natural History we have been allowed to use the magnificent series of Beutenmueller illustrations of certain Cynipid galls, and by arrangement with the executor of the will of the late S. Millett Thompson of Providence, R. I., we were at liberty to reproduce figures from the original photographs used in the Illustrated Catalogue of American Insect Galls by the late Dr Millett Taylor Thompson. The late Cora H. Clarke of Boston, Mass., well known as an enthusiastic student of insect galls, kindly placed at our disposal a number of excellent illustrations, and with the consent of Mr L. H. Weld of Evanston, Ill., we have reproduced a number of his admirable photographs. Miss Fannie A. Stebbins, Springfield, Mass., has loaned the use of several illustrations. These and the approximately two hundred original line drawings and a number of illustrations appearing in earlier publications of the office are also incorporated in this work, the whole making an unrivaled series in the literature of American insect galls.

KEY TO AMERICAN INSECT GALLS

Polypodiaceae (ferns)*Cystopteris fragilis* (bladder fern)

Root gall (Cosens, in litt. May 3, '15)

Itonid. *Cecidomyia* sp**Ephedraceae***Ephedra trifurca*

Fusiform twig gall, length 12 mm. Fig. 1. Ckll. '98, p. 327

Itonid. *Lasioptera ephedrae* Ckll.

Irregular, subcortical, resinous gall. Ckll. '02, p. 184

Itonid. *Lasioptera ephedricola* Ckll.

Fig. 1.
Lasioptera ephedrae Ckll., showing two galls, one in section. (Original)



Fig. 2. Gouty pine midge, *Retinodiplosis inopis* O. S. Typical enlargement of twig. (Original)

Pinaceae (pines)*Pinus* (pine)Reared from fungous affected heartwood, *P. rigida*. Felt '13m, p. 191Itonid. *Monardia lignivora* Felt

Reared from Scolytid galleries in pine. Felt '13m, p. 188

Itonid. *Monardia pinicorticis* FeltReared from bark of *P. virginiana*. Felt '07e, p. 23Itonid. *Winnertzia pinicorticis* FeltSubcortical twig swellings with pitch exudations, resinous cocoons on needles of *P. rigida*. Fig. 2. Felt '12h, p. 368Itonid. Gouty pitch pine midge, *Retinodiplosis inopis* O. S.

Spherical or ovoid twig swellings, length 6 to 18 mm, on hard pine.

Coleopt. Pine gall weevil, *Podapion gallicola* Riley

Irregular, subhemispheric or oval, eccentric twig swellings, length 1.5 to 3 cm, diameter 1 to 2 cm, on *P. taeda*. Fig. 4.

Itonid. *Retinodiplosis* sp. a2 12

Rear d from resin masses on *P. strobus*. Felt, '18d, p. 382, 383

Itonid. Banded pitch midge, *Retinodiplosis albitarsi*
Felt

Itonid. *Mycodiplosis packardi* Felt

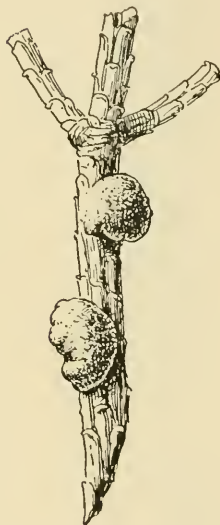


Fig. 3. Pitchmidge, *Retinodiplosis resinicola* O. S. Typical pitch exudations. (Original)



Fig. 4. *Retinodiplosis* sp. Scars on *Pinus taeda*, probably the work of a midge. (Original)

Rear d from extruded resin masses on *P. rigida*. Fig. 3. Felt '06b, p. 410

Itonid. Pitch midge, *Retinodiplosis resinicola* O. S.

Rear d from extruded resin masses on *P. radiata*. Wlms. '09, p. 1

Itonid. Western pitch midge, *Retinodiplosis resinicola* des
Wlms.

Rear d from pitch masses on long leaved pine, *P. palustris*. Felt '15h,
p. 408

Itonid. Southern pitch midge, *Retinodiplosis palustris*
Felt

A subglobose terminal swelling involving the tip of the new growth of *P. edulis*, diameter 5 mm. This kills the apical needles, though the lower ones continue to develop, and in old deformities may produce a ring of short, stout, upstanding needles surrounding a central dead area. Larvae pale orange.

Itonid. *Cecidomyia* sp. a2823

Apical budlike swelling, diameter 1 cm on *P. scopulorum*. Figs. 5, 6.
Felt '12f, p. 240

Itonid. Pine bud gall, *Contarinia coloradensis* Felt

Same gall as above. Felt '11k, p. 549

Itonid. *Dicrodiplosis gillettei* Felt

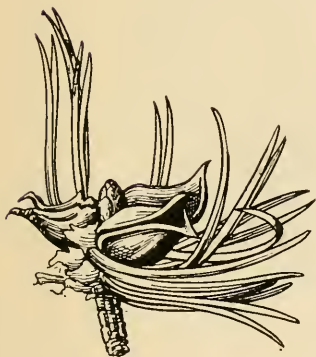


Fig. 5. Pine bud gall, *Contarinia coloradensis* Felt. Three galls. (Original)

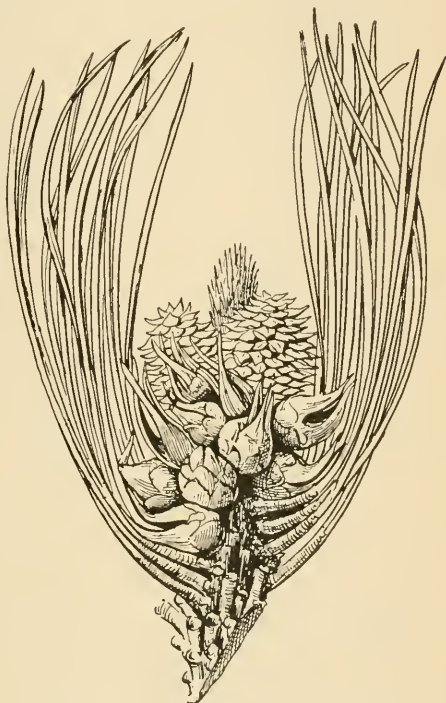


Fig. 6. Pine bud gall, *Contarinia coloradensis* Felt. Cluster of galls on *P. scopulorum*. (Original)

Aborted needle clusters, base subglobose. On *P. rigida*. Fig. 7. Felt '06b, p. 423

Itonid. Pine needle gall, *Cecidomyia pinirigidae* Pack. Globose swellings at base of needles of *P. edulis*, diameter 4 mm, the aborted needles with a length of 1 to 3 cm, the walls thick. Felt, '18d, p. 381

Itonid. ?*Thecodiplosis cockerelli* Felt

Elongate, cylindric or fusiform green or purplish-red swellings at the base of the needles of *P. edulis*, length 1.5 cm, diameter 3 mm, the walls moderately thin and with a large cavity containing several larvae. Occurs also on *P. monophyllus* (a2857)

Itonid. *Cecidomyia* sp. a2821

Kidney shaped enlargements at base of needles of *P. edulis*, length 7 mm, diameter 4 mm, the walls thick and the needles rudimentary. Fig. 8.

Itonid. *Thecodiplosis cockerelli* Felt
Globose swelling at base of needles on *P. virginiana*. Fig. 11. Felt '12e, p. 148

Itonid. *Janetiella coloradensis* Felt
Base of needles of *P. radiata*. Snow and Mills '00, p. 489

Itonid. Western pine needle gall, *Thecodiplosis piniradiatae* Sn. & Mills.

Picea (spruce)

Green or brown, polythalamous, conelike swellings on Norway spruce. Fig. 9.
Felt '06b, p. 189

Aphid. Spruce cone gall, *Chermes abietis* Linn.



Fig. 7. Pine needle gall, *Cecidomyia pinirigidæ* Pack. Typical swelling at base of the leaf. (Original)



B



A

Fig. 8. *Thecodiplosis cockerelli* Felt. Deformed needles of *P. edulis*. (Original)

Green or brown, polythalamous, produced, conelike swelling on Colorado blue spruce, length 5 cm, diameter 2.5 cm. Pl. 14, fig. 1. Felt '11m, p. 37

Aphid. Long spruce cone gall, *Chermes cooleyi* Gill.

Abies (fir)

Reared from seeds. Fig. 10. Felt '15e, p. 162

Itonid. Fir seed midge, *Dasyneura canadensis* Felt

Infertile seed of Douglas fir. Crosby '09, p. 379

Hym. Fir seed wasp, *Megastigmus spermotrophus* Wachtl.

Apical bud gall. Pl. 5, fig. 9. Felt '14j, p. 77

Itonid. Spruce bud midge, *Rhabdophaga swainei* Felt

Bud galls and swellings at base of leaves. Felt '07a, p. 123

Itonid. Spruce gall midge, *Phytophaga tsugae* Felt¹

¹ Probably occurs on hemlock also.

Subglobular basal swellings of leaves, length 3 mm on balsam. Pl. 7, fig. 1.
Lintn, '88, p. 60

Itonid. Balsam gall midge, *Cecidomyia balsamicola* Lintn.

Tsuga (hemlock)

Larvae in *Melanophila* galleries. Felt '13h, p. 214

Itonid. Hemlock bark midge, *Camptomyia tsugae* Felt



Fig. 9. Spruce cone gall, *Chermes abietis* Linn. Normal type of gall. (Author's illustration).



Fig. 10. Firseed midge, *Dasynectura canadensis* Felt. Infested cone. (Original)

Taxodium (bald cypress)

Irregularly globose, thick-walled, somewhat spongy, modified seeds in cones diameter 5 to 7 mm. Fig. 12. Felt '16g, p. 415

Itonid. Cypress seed midge, *Retinodiplosis taxodii* Felt



Fig. 11. *Janetiella coloradensis*. Felt. Deformed needles of *P. virginiana*. (Original)



Fig. 12. Cypress seed midge, *Retinodiplosis taxodii* Felt. Deformed cone and seeds. (Original)

Fusiform twig gall, length 1.25 cm. Felt '12f, p. 242

Itonid. Cypress twig gall, *Thecodiplosis ananassi* Riley

Whitish, flower-shaped, fungoid gall. Fig. 13. Felt '13i, p. 278

Itonid. Cypress flower gall, *Itonida anthici* Felt

A conical, globular or elongate deformation of the leaf. Felt '11k, p. 556

Itonid. Cypress leaf gall, *Itonida taxodii* Felt

Chamaecypris (white cedar, cypress)

Bud gall, quadrangular in section, the size larger than the normal bud, densely imbricate and containing a narrow cell inhabited by a reddish larva. Mex. Trotter '11, p. 122

Itonid. White cedar bud gall, *Cecidomyia* sp.

Reared from seeds of *C. lawsoniana* Felt '17, p. 194

Itonid. *Janetiella siskiyou* Felt



Fig. 13. Cypress flower gall, *Itonida anthici* Felt. Cluster of flower-like galls and one gall enlarged. (Original)



Fig. 14. Juniper rosette gall, *Cynips* sp., a2602, enlarged. (Original)

Thuja (arbor vitae)

Bud gall

Itonid. Arbor vitae bud gall, *Rhopalomyia* sp.

Leaf deformation covered with eggs and cast skins. Parrott '06, p. 288

Acarid. *Eriophyes thujae* Garm.

Juniperus (juniper)

Reared from slightly enlarged fruit of *J. californica*, *J. monospermum* and also from a conical, purplish, apical bud gall, with three or four diverging lobes when mature, length 1 cm, diameter 3 mm

Itonid. Juniper berry midge, *Walshomyia juniperina* Felt



Fig. 15. Juniper berry wasp, *Chalcid* sp., a2603. Deformed berries enlarged. (Original)

Deformed infertile fruit of *J. pachyphlaea*, the interior corky, brown.

Econ. Ent. Jour. 11:149 Acarid. *Eriophyes ramosus* Hodgk. a2858

Apical, reddish, conical gall on *J. utahensis*. Felt '12e, p. 148

Itonid. Juniper cone gall, *Oligotrophus betheli* Felt

Reared from same gall

Itonid. *Arthrocnodax* sp.

Deformed, infertile berries of *J. scopulorum*. Fig. 15.

Hym. Juniper berry wasp, Chalcid sp. a2603

Flowerlike, apical, greenish brown or pinkish deformations composed of four reflexed and slightly thickened leaf scales on *J. scopulorum*. Fig. 14.

Cynipid. Juniper rosette gall, *Cynips* sp. a2602

Thickened, slightly reflexed reddish-brown leaflets of last year's growth on *J. scopulorum*, possibly an older stage of the preceding.

? Itonid. ? *Cecidomyia* sp.¹ a2827

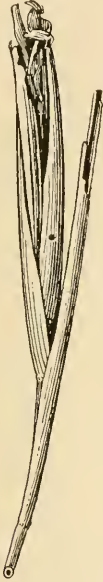


Fig. 16. Wheat joint worm, *Isozona grande* Riley. Infested stem. (Original)

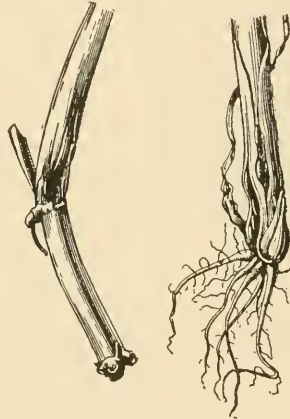


Fig. 17. Hessian fly, *Phytophaga destructor* Say. Infested stems showing pupae. (Author's illustration)

Prickly burrlike bud galls with numerous short, nearly straight leaves, none reflexed, diameter .5 cm. Felt '18d, p. 380

Itonid. *Allomyia juniperi* Felt

Apical rosette gall, diameter 1.5 cm, greenish (brown when old) with a variable whitish pubescence, leaf bracts reflexed

Itonid. *Cecidomyia* sp. a2814

Globose twig enlargement showing a gelatinous growth in June, diameter 3 cm.

Fungus. Cedar apple, *Gymnosporangium globosum*

Sabina sabinoides (wild Texas or mountain cedar)

Reared from bud gall. Felt '16, p. 30

Itonid. Mountain cedar midge, *Walshomyia texana* Felt

¹*Epitetrastichus silvae* Girault was reared in large numbers.

Gramineae (grasses)

Reared from grass. Felt '11j, p. 461

Itonid. *Neolasioptera squamosa* Felt

Triticum (wheat)

Reared from pinkish larvae on roots (C. N. Ainslie)

Itonid. *Lestremia* sp.

Inhabiting stems. Fig. 16. Howard '95, p. 9

Hym. Wheat joint worm, *Isosoma grande* Ril.

Deformed leaf sheathes. Pl. 4, fig. 6. Doane '16, p. 398

Hym. Wheat-sheath joint worm, *Isosoma vaginicum*
Doane

Collected on wheat. Howard '95, p. 15

Hym. Wheat joint worm, *Isosoma websteri* How.

Stems bored and discolored. Comst. '90, p. 127

Hym. Wheat stem sawfly, *Cephus pygmaeus* Linn.

Infesting stems at the uppermost node. Coq. '98, p. 74

Dipt. Wheat stem maggot, *Oscinis carbonaria* Lw.

Boring wheat stems. Webst. & Reeves '10

Hym. Western grass-stem sawfly, *Cephus occidentalis*
Ril & Marl.

Under the leaf sheath. Fig. 17. Felt '02, p. 705

Itonid. Hessian fly, *Phytophaga destructor* Say

Probably the same as the preceding

Itonid. *Cecidomyia culmicola* Morr.

Associated with the above. Fitch '61, p. 831

Itonid. *Cecidomyia inimica* Fitch

Associated with the above. Fitch '46, p. 285

Itonid. *Lestodiplosis graminis* Fitch

Under the leaf sheath. Coq. '98, p. 70.

Dipt. *Chlorops proxima* Say

Reared from wheat heads. Felt '12g, p. 289

Itonid. Wheat midge, *Itonida tritici* Felt

Reared from wheat heads. Felt '12g, p. 287

Itonid. European wheat midge, *Thecodiplosis mosellana*
Gehin

Reared from wheat heads. Felt '12g, p. 288

Itonid. *Prodidiplosis fitchii* Felt

Eriocoma cuspidata

Inhabiting grass stalks. Howard '95, p. 10

Hym. Grass joint worm, *Isosoma californicum* How.

Tripsacum dactyloides (gama or sesame grass)

Larvae between leaf blades. Felt '10a, p. 10

Itonid. *Lasioptera tripsaci* Felt

Sorghum saccharatum (Sorghum)

Reared from seeds. Dean '10, p. 39

Itonid. Sorghum midge, *Contarinia sorghicola* Coq.

Sorghum halpense (Johnson grass)

Reared from seeds. Dean '10, p. 39

Itonid. Sorghum midge, *Contarinia sorghicola* Coq.

? *Digitaria sanguinalis* (crab grass)

Reduced, swollen head, presumably resembling that of *Asteromyia agrostis*, on Muhlenbergia. Coq. '98, p. 71

Dipt. False spike grass fly, *Chlorops graminea* Coq.

Panicum (panic grass)

Ovipositing in stem. Felt '08e, p. 326

Itonid. *Lasioptera panici* Felt



Fig. 18. Black-sheath midge, *Lasioptera inustorum* Felt. Portion of stem showing blackened sheath. (Original)



Fig. 19. *Siteroptes carnea* Bks. Aborted plant of *Aristida purpurea*. (Original)



Fig. 20. *Asteromyia agrostis* O. S. Deformed head of Muhlenbergia. (Author's illustration)

Panicum virgatum

Blackened leaf sheath infested by orange-colored larvae, length of discolored area 3 cm. Fig. 18. Felt '16f, p. 182

Itonid. Black-sheath midge, *Lasioptera inustorum* Felt

Echinochloa crusgalli

Occurring in fibrous, somewhat decayed stems of the crown or in the lower portions of uninjured stems. Felt '16f, p. 181

Itonid. Grass crown midge, *Lasioptera echinochloa* Felt

Setaria glauca (bristly fox-tail grass)

Reared from seeds. Dean '10, p. 39

Itonid. Sorghum midge, *Contarinia sorghicola* Coq

Aristida (triple-awned grass)

Fasciated, reduced leaves, fruit aborted (Bethel in litt.) Banks, '05, p. 140.

Fig. 19.

Acarid. *Siteroptes carnea* Bks.

Muhlenbergia

Fusiform stem enlargement. Fig. 20. Marten '93, p. 155

Itonid. *Asteromyia agrostis* O. S.

Fusiform stem enlargement, apparently an aborted *Asteromyia agrostis* gall.

Dipt. *Chlorops ingrata* Will.

Orange-colored larvae at the base of the leaf sheath and associated with localized, dead areas. Felt '18a, p. 129

Itonid. *Lasioptera colorati* Felt a2716



Fig. 21. False spike midge, *Asteromyia agrostis*? Deformed head of *Distichlis*. (Original)



Fig. 22. Sedge Psyllidiviva maculipennis Fitch. injured head. (Original)

Reared from deformed stems. Howard '95, p. 20

Hym. Joint-worm, *Isosomorpha muhlenbergiae* How.

Phleum pratensis (timothy)

Boring stems. Web. & Reeves '10

Hym. Western grass stem sawfly, *Cephus occidentalis*
Ril. & Marl.

Injuring stem at base of leaf sheath

Itonid. *Cecidomyia* sp.

Alopecurus (fox-tail grass)

Reared from seeds. Felt '07e, p. 303

Itonid. Grass seed midge, *Itonida setariae* Felt

Sporobolus (drop-seed, rush grass)

Deformed heads, Banks, '05, p. 140

Acarid. *Siteroptes carnea* Banks

Agrostis (bent grass)

Elliptical stem swellings, length 7 to 10 mm, diameter 2 to 3 mm. Howard '95, p. 12

Hym. Grass joint-worm, *Isosoma agrostidis* How.

Ovipositing on *A. alba*. Felt '15e, p. 135

Itonid. *Dasyneura graminis* Felt

Avena (oat)

Reared from cage with aphid-infested seedlings, probably zoophagous. Felt '08e, p. 398

Itonid. *Coquillettomyia texana* Felt

Reared from cage sown with oats, probably from decaying vegetable matter. Felt '13m, p. 175

Itonid. *Prionellus monilis* Felt

Reared from oats, possibly fungivorous. Felt '11k, p. 550

Itonid. *Mycodiplosis spinosa* Felt

Danthonia (wild oat grass)

Probably a stem gall. Felt '09e, p. 287

Itonid. Oat grass midge, *Lasioptera danthoniae* Felt

Tridens (tall red top)

Reared from stems. Howard '95, p. 21

Hym. Red top borer, *Eurytomocharis triodiae* How.

Reared from seeds. Dean '10, p. 39

Itonid. Sorghum midge, *Contarinia sorghicola* Coq.

Eragrostis

Reared from apparently normal or small, swollen stems. Howard '95, p. 21

Hym. Red top borer, *Eurytomocharis eragrostidis* How.

Probably a stem gall, on *E. minor*. Felt '11k, p. 483

Itonid. *Neolasioptera agrostis* Felt

Distichlis (spike grass)

Fusiform stem enlargement produced by a massing of the apical or subapical growth (unpublished note). Fig. 21.

Itonid. False spike midge, ? *Asteromyia agrostis* O. S.

Aborted, club-shaped shoots with rudimentary lateral leaves, length 3 to 4 cm, diameter 3 to 4 mm, on *D. spicata* Banks, '05, p. 40

Acarid. *Siteroptes carnea* Bks., a2896

Ovate, bract-covered gall, length 18 mm, diameter 8 mm. Mall. '18, p. 386

Dipt. False spike grass fly, *Anthracophaga distichliae* Mall.

Poa pratensis (Kentucky blue grass)

- Reared from an almost pure blue grass turf (Aldrich in litt.) Felt '15j, p. 149
 Itonid. *Colpodia sanguinia* Felt
 Gall unrecognized. Felt '08c, p. 416
 Itonid. *Colpodia pratensis* Felt
 Probably inhabiting stems. Howard '95, p. 13
 Hym. Grass joint-worm, *Isosoma captivum* How.
 Howard '95, p. 15
 Hym. Grass joint-worm, *Isosoma maculatum* How.

Bromus (brome grass)

- Reared from grass stems. Howard '95, p. 11
 Hym. Grass joint-worm, *Isosoma bromi* How.
 Reared from grass stems, *B. ciliatus*. Howard '95, p. 16
 Hym. Grass joint-worm, *Isosoma bromicola* How.
 Boring stems. Webs. & Reeves '10
 Hym. Western grass-stem sawfly, *Cephus occidentalis*
 Ril. & Marl.

Agropyron (couch or quitch grass)

- Under leaf sheath. Felt '02, p. 705
 Itonid. Hessian fly, *Phytophaga destructor* Say
 Boring stems. Webs. & Reeves '10
 Hym. Western grass-stem sawfly *Cephus occidentalis*
 Ril. & Marl.
 Boring grass stems. Howard '95, p. 12
 Hym. Grass joint-worm, *Isosoma hageni* How.
 Fusiform swellings, length 4 cm, diameter 4 mm, composed of reduced leaves
 and with a central gallery containing a yellowish white larva.
 Hym. Grass joint-worm, ? *Isosoma* sp. a2746

Hordeum (barley)

- Under leaf sheaths. Felt '02, p. 705
 Itonid. Hessian fly, *Phytophaga destructor* Say
 Reared from stems. Howard '95, p. 18
 Hym. Barley joint-worm, *Isosoma hordei* Harr.

Secale (rye)

- Reared presumably from stems. Howard '95, p. 19
 Hym. Rye joint-worm, *Isosoma secale* Fitch
 Howard '95, p. 20
 Hym. Grass joint-worm, *Isosoma fitchii* How.

Elymus (wild rye)

- Under leaf sheath. Felt '02, p. 705
 Itonid. Hessian fly, *Phytophaga destructor* Say
 Probably from stem gall. Felt '15e, p. 90
 Itonid. *Rhabdophaga elymi* Felt

Boring stems. Webs. & Reeves '10

Hym. Western grass-stem sawfly, *Cephus occidentalis*
Ril. & Marl.

Probably inhabiting stems. Howard '95, p. 14

Hym. Rye joint-worm, *Isosoma elymi* French

Reared from grass stems. Howard '95, p. 16

Hym. Wheat joint-worm, *Isosoma tritici* Fitch

Cyperaceae (sedges)

Cyperus (sedge)

Rather cylindrical, bud or shoot galls occurring at the very base of the plant,
length 4 to 5 mm. Felt '16f, p. 176

Itonid. Sedge bud gall, *Hormomyia caudata*¹ Felt

Dulichium

Reared from fruit. Felt '12f, p. 241

Itonid. Sedge fruit midge, *Thecodiplosis dulichii* Felt
Lestodiplosis sp.

Scirpus (bulrush or club rush)

Gall undescribed.

Itonid. *Cecidomyia* sp.

Juncaceae (rushes)

Deformed fruit

Itonid. Rush fruit midge, *Cecidomyia* sp.

Juncus (rush)

Infertile, deformed inflorescence, the floral organs being produced as a moderately
dense cluster of slender, linear bracts having a length of 3 to 4 cm. Fig. 22.
Patch '16, p. 21

Hemip. Sedge Psyllid, *Livia maculipennis* Fitch

Liliaceae (lily family)

Oakesia

Yellowish blister gall.

Itonid. *Cecidomyia* sp.

Yucca

Reared from pods. Felt '15e, p. 140

Itonid. Yucca pod midge, *Dasyneura yuccae* Felt

Reared from stem, probably predaceous. Felt '08e, p. 408

Itonid. *Lestodiplosis yuccae* Felt

Smilacina (false Solomon's seal)

Deformed berries. Felt '16d, p. 131

Itonid. *Asphondylia smilacinae* Felt

Root gall. Bishop '11, p. 346

Itonid. *Dasyneura smilacinae* Bish.

¹ It is probable that a number of *Hormomyias* produce bud or shoot galls on various sedges.

Maianthemum

Leaf blister gall, brown, diameter 6 mm.

Itonid. *Cecidomyia* sp.

Fusiform, monothalamous root gall, length 7 mm, diameter 1.5 mm. Fig. 23.

Felt '15h, p. 495

Itonid. *Dasyneura torontoensis* Felt

Polygonatum (Solomon's seal)

Leaf blister gall, diameter 4 mm.

Itonid. *Cecidomyia* sp.

Smilax (green brier)

Reared from oval blisterlike leaf spots. Pl. 7, fig. 7. Felt '08e, p. 334

Itonid. *Smilax* blister, *Camptoneuromyia rubifolia* Felt

Leaf blister gall, diameter 4 mm, *S. herbacea*

Itonid. *Cecidomyia* sp.



Fig. 23. *Dasyneura torontoensis* Felt. (Original)



Fig. 24. *Cecidomyia* sp. Stem gall, a1436. (Original)



Fig. 25. Orchid *Isosoma*. *Isosoma orchidearum* Westw. Infested pseudobulbs. (After Forbes)

Young leaves rolled longitudinally. Felt '15e, p. 147

Itonid. *Smilax* leaf midge, *Dasyneura smilacifolia* Felt

Irregularly rounded, abrupt, polythalamous, green stem swellings, diameter 16 mm. Fig. 145, 6. Baum. '09, p. 143

Cynipid. *Smilax* stem gall, *Diastrophus smilacis* Ashm.

Dioscoreaceae (yam)*Dioscorea*

Irregular, warty stem gall. Fig. 24.

Itonid. *Cecidomyia* sp.

Iridaceae (Iris family)*Iris* (fleur-de-lis)

Oval, green leaf gall, length 12 to 18 mm, diameter 12 mm. Pl. 4, fig. 2. Claus. '18, p. 9

Dipt. *Iris* leaf gall, *Agromyza laterella* Zett.

Orchidaceae

Cattleya

Irregular root galls. Felt '15i, p. 89

Itonid. Orchid root gall, *Parallelodiplosis cattleyae* Moll.

Subspherical or subconical pseudobulbs. Fig. 25. Felt '15i, p. 89

Hym. Orchid Isosoma, *Isosoma orchidea* um Westw.

Salicaceae (willows and poplars)

Salix (willow)

Key to willow galls

Fruit galls, p. 29

Bud galls, p. 29

Rosette galls, p. 30

Leaf galls, p. 32

Leaf rolls or folds, p. 32

Capsule or pocket galls, p. 32

Turgid leaf galls, p. 33

Twig galls, p. 34

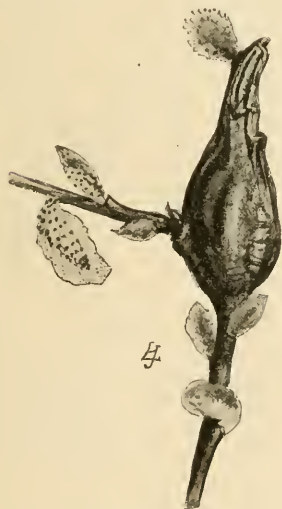


Fig. 26. Beaked willow gall, *Phytophaga rigidae* O. S. Typical gall. (Author's illustration)



Fig. 27. Pine cone gall, *Rhabdophaga strobiloides* Walsh. Typical gall. (Author's illustration)

Fruit galls

Enlarged seeds, reddish brown

Itonid. *Cecidomyia* sp.

Bud galls

Apical willow buds blasted. Pl. 12, fig. 3

Itonid. *Cecidomyia* p.

Apical, fusiform, beaked gall, length 2 cm. Fig. 26, pl. 11, fig. 5. Felt '06a, p. 112

Itonid. Beaked willow gall, *Phytophaga rigidae* O. S.

Reared from similar gall. Felt '15e, p. 88

Itonid. *Rhabdophaga sodalitatis* Felt

Reared from apparently normal bud. Felt '15e, p. 97

Itonid. *Rhabdophaga latebrosa* Felt

Small, conic, apical bud gall. Felt '15e, p. 177

Itonid. *Dasyneura gemmae* Felt

Fusiform apical bud gall, length 1 cm, diameter 7 mm

Itonid. ? *Rhabdophaga* sp., a1828

Small bud gall. Felt '15e, p. 100

Itonid. *Rhabdophaga gemmae* Felt

Ovate, terminal bud gall, diameter 1 cm. Walsh '64, p. 583

Itonid. *Rhabdophaga gnaphalioides* Walsh



Fig. 28. *Phytophaga walshii* Felt. Typical cluster of galls. (Original)



Fig. 29. Clustered willow gall, *Rhabdophaga racemi* Felt. Typical form. (Original)



Fig. 30. Clustered willow gall, *Rhabdophaga racemi* Felt. Provisionally referred to this species. (Original)

Small bud gall. Felt '15e, p. 164

Itonid. *Dasyneura californica* Felt

Deformed leaf and twig, usually clustered near the apex, whitish green, turning black by winter, on *S. fragilis*. Chad. '08, p. 145

Acarid. *Eriophyes* sp.

A mass of small, filamentous structures on leaf or stem, sometimes on distorted buds, on *S. nigra*. Walsh '66, p. 227

Acarid. *Eriophyes aenigma* Walsh

Rosette galls

Pine conelike gall, length 2 to 2.5 cm. Fig. 27. Felt '15e, p. 112

Itonid. Pine cone gall, *Rhabdophaga strobiloides* Walsh

- Reared from above gall, ? inquiline. Walsh '64, p. 629
 Itonid. *Dasyneura annulipes* Walsh
- Reared from above gall, ? inquiline. Walsh '64, p. 628
 Itonid. *Dasyneura atricornis* Walsh
- Reared from above gall, ? inquiline. Walsh '64, p. 626
 Itonid. *Cecidomyia atrocularis* Walsh
- Reared from above gall, ? inquiline. Felt '15e, p. 179
 Itonid. *Dasyneura albovittata* Walsh
- Reared from above gall, predaceous. Walsh '64, p. 631
 Itonid. *Lestodiplosis decemmaculata* Walsh
- Spongy or clustered, rosette gall. Fig. 28. Felt '08e, p. 371
 Itonid. *Phytophaga walshii* Felt
- Large, close, pine, conelike gall resembling a slender *R. strobiloides* gall. Felt '15e, p. 90
 Itonid. *Rhabdophaga persimilis* Felt

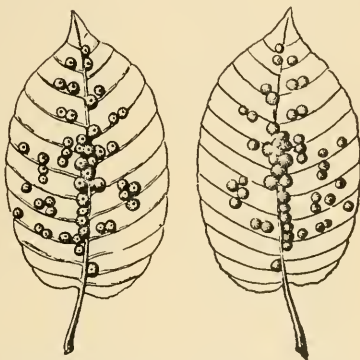


Fig. 31. Willow blister gall, *Oligotrophus salicifolius* Felt, showing upper and lower surface of leaf. (Original)

- Large, open, rosette gall, diameter 1 to 2 cm. Pl. 11, fig. 7. Felt '15e, p. 113
 Itonid. Willow-cabbage gall, *Rhabdophaga brassicoides* Walsh
- Reared from above gall, ? inquiline. Walsh '64, p. 630
 Itonid. *Lestodiplosis septemmaculata* Walsh
- Reared from above gall, ? inquiline. Ckll. '90, p. 280
 Itonid. *Rhopalomyia frater* Ckll.
- Reared from above gall, ? inquiline. Walsh '64, p. 623
 Itonid. *Dasyneura orbitalis* Walsh
- Large, loose, rosette gall, length 1 to 2 cm. Felt '15e, p. 111
 Itonid. *Rhabdophaga rhodoides* Walsh
- Oval, small, rosette gall, resembling a small *R. brassicoides* gall. Felt '15e, p. 103
 Itonid. Small willow-cabbage gall, *Rhabdophaga normaniana* Felt

Small, clustered, rosette gall, length 2 cm. Fig. 29, 30. Felt '15e, p. 94

Itonid. Clustered willow gall, *Rhabdophaga racemi* Felt

Leaf galls

Leaf rolls or folds

Fusiform pod or curled leaves, length 10 mm. Pl. 10, fig. 2. Felt '15e, p. 169

Itonid. Willow-pod midge, *Dasyneura salicifolia* Felt

Closely rolled, terminal leaves. Felt '15e, p. 93

Itonid. *Rhabdophaga plicata* Felt

One or two narrow, longitudinal, yellowish green or brown upward folds opening below, on *S. longifolia*. Chad. '08, p. 145

Acarid. *Eriophyes salicicola* Garm.

Small thickenings or inrollings of the leaf margin, green, scattered or coalescent, on *S. alba*. Chad. '06, p. 144

Acarid. *Eriophyes* sp.

Irregular, more or less crenulate midrib fold, length 7 mm. Utah

Acarid. *Eriophyes* sp. a2759

Capsule or pocket galls

Very small, crimson red, pocket galls or semicapsules, on *S. amygdaloides*. Chad. '08, p. 144

Acarid. *Eriophyes* sp.



Fig. 32. Willow pea gall, *Pontania pisum* Walsh. (Original)



Fig. 33. Willow apple gall, *Pontania pomum* Walsh, side view. (Original)

Small, irregular, serrate, roughened, pocket galls or semicapsules, green or red, usually on upper surface, on *S. alba*, *balsamifera*, *discolor* and *rostrata*. Pl. 16, fig. 8. Chad. '08, p. 144

Acarid. *Eriophyes* sp.

Purple or pale green capsule gall on both surfaces of the leaf, on *S. cordata*. Chad. '08, p. 145

Acarid. *Eriophyes* sp.

Irregularly hemispherical, greenish yellow, pocket gall on either surface, on *S. nigra*. Chad. '08, p. 146

Acarid. *Eriophyes semen* Walsh

Small and very crowded, pocket galls on leaves of *S. nigra*. Chad. '08, p. 146

Acarid. *Eriophyes* sp.

Small, irregular, spherical galls on upper surface of leaves. Chad. '08, p. 146

Acarid. *Eriophyes* sp.

Filamentous structures on leaf. Walsh '66, p. 227

Acarid. *Eriophyes aenigma* Walsh

Turgid leaf galls

Smooth, flattish, fleshy, sessile, yellowish green, on both surfaces of the leaf, length 6 to 12 mm, on *S. humilis*. Pl. 3, fig. 8. Walsh '66, p. 257

Hym. *Pontania desmodioides* Walsh

Yellowish, red-spotted, flattened gall, diameter 2 to 3 mm. Fig. 31. Felt '10d, p. 354

Itonid. Willow blister gall, *Oligotrophus salicifolius* Felt



Fig. 34. *Rhabdophaga caulicola* Felt. Infested stems, two sectioned. (Original)



Fig. 35. *Sackenomyia packardii* Felt. Infested twig and another in section showing characteristic galleries. (Original)



Fig. 36. *Sackenomyia porterae* Ckll. Infested twig. (Original)

Subconical, truncate, greenish yellow, lipped gall, diameter 2 mm. Pl. 10, fig. 6. Walsh '64, p. 606

Itonid. Willow lipped gall, *Hormomyia verruca* Walsh

Apparently reared from the same gall. Felt '07a, p. 108

Itonid. *Clinorhyncha filicis* Felt

Conical, monothalamous, petiole gall, length 6 to 9 mm, diameter 3 to 4 mm.

Rohw. '15, p. 213

Hym. *Euura cosensii* Rohw.

Ovate, fleshy, reddish, willow leaf galls in parallel rows on either side of the midrib, brownish red, beneath white, tinged with purple, length 7 to 10 mm, on *S. fragilis*. Felt '06b, p. 638

Hym. *Pontania hyalina* Nort.

Subspherical, pealike, hollow, pale yellowish green gall on under side of leaf, usually on a side vein, diameter 5 to 7 mm. Fig. 32, pl. 3, fig. 9. Felt '06b, p. 637

Hym. Willow pea gall, *Pontania pisum* Walsh
Rounded or ovate, fleshy, yellowish green, usually rosy-cheeked gall, projecting slightly on the upper surface, diameter 12 mm. Fig. 33. Felt '06b, p. 636

Hym. Willow apple gall, *Pontania pomum* Walsh



Fig. 37.
Rhabdophaga podagrae Felt.
Swollen twig.
(Author's illustration)

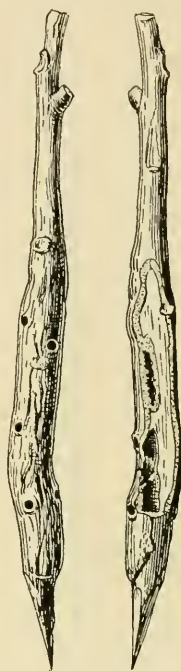


Fig. 38. *Rhabdophaga cornuta* Walsh. Swollen twig and one in section showing galleries. (Original)

Very similar gall, prominent on both surfaces of the leaf, on *S. petiolaris*.
Cosens, '17, p. 18

Hym. *Pontania petiolaris* Rohw.
Fusiform, mid vein swelling, length 3 mm, diameter .75 mm. Cosens in litt.
Hym. ? *Euura* sp.

Twig galls

Reared from twigs, gall unrecognized. Felt '07e, p. 297

Itonid. *Asphondylia salictaria* Felt
Larvae in subcortical cells; no swelling. Felt '15e, p. 168

Itonid. *Dasynura corticis* Felt

Reared from apparently unmodified branches and limbs of *Salix fendleriana*. Felt '16f, p. 191

Itonid. *Phytophaga timberlakei* Felt

Slender twigs slightly enlarged. Felt '08e, p. 370

Itonid. *Phytophaga americana* Felt

Slender twigs slightly enlarged. Fig. 34. Felt '08e, p. 370

Itonid. *Phytophaga caulicola* Felt

Slender twigs slightly enlarged. Felt '15e, p. 103

Itonid. *Rhabdophaga caulicola* Felt

Slender twigs slightly enlarged. Fig. 35. Felt '09e, p. 290

Itonid. *Sackenomyia packardi* Felt

Slender twigs slightly enlarged. Fig. 36. Ckll. '04, p. 155

Itonid. *Sackenomyia porterae* Ckll.

Twigs probably hardly enlarged. Felt '08e, p. 371

Itonid. *Phytophaga peroculta* Ckll.

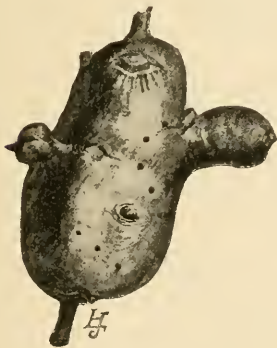


Fig. 39. Willow potato gall, *Rhabdophaga batatus* Walsh. Typical enlargement. (Author's illustration)

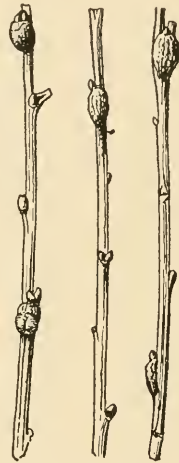


Fig. 40. Scarred willow gall, *Phytophaga tumidosae* Felt. (Original)

Inconspicuous, knot or twig enlargement. Felt '08e, p. 358

Itonid. *Phytophaga latipennis* Felt

Twig uniformly enlarged, gall 5 to 7 cm long. Fig. 37. Felt '15e, p. 109

Itonid. *Rhabdophaga podagrae* Felt

Gall similar to above, cells in wood. Fig. 38. Felt '15e, p. 110

Itonid. *Rhabdophaga cornuta* Walsh

Gradual enlargement of the twig, usually extending partly around it and several near each other, polythalamous, length 1 to 3 cm. Rohw. '09, p. 15

Hym. *Euura nodus* Walsh

Gradual twig enlargement, length 30 mm, diameter 7 to 10 mm, on *S. luteosericea*. Rohw. '09, p. 16

Hym. *Euura macgillivrayi* Rohw.

Twigs enlargement, abrupt basally, resembles that of *E. macgillivrayi* Rohw. '09, p. 24.

Hym. *Euura propinquus* Rohw.

A mass of filamentous structures on the stem. Walsh '66, p. 227

Acarid. *Eriophyes aenigma* Walsh

Apical, fusiform, beaked gall, length 2 cm. Fig. 26, pl. 11, fig. 5. Felt '06a, p. 122

Itonid. Beaked willow gall, *Phytophaga rigidae* O. S. Reared from similar gall. Felt '15e, p. 88

Itonid. *Rhabdophaga sodalitatis* Felt

Twigs irregularly enlarged, galls 1 to 3 cm long. Pl. 12, fig. 2. Felt '15e, p. 96

Itonid. *Rhabdophaga salicis* Schr.

Twig irregularly enlarged, gall 1 to 3 cm long, the stems between the buds dwarfed, giving a "wheat ear" appearance. Pl. 12, fig. 4. Felt '15e, p. 88

Itonid. Wheat ear gall, *Rhabdophaga triticoides* Walsh



Fig. 41. *Cecidomyia* sp., two types of subglobular galls on poplar leaves, the true producers unknown. (Original)

Irregular, ovoid or subglobular galls, diameter 1 to 2 cm. Fig. 39. Felt '15e, p. 105

Itonid. Willow potato gall, *Rhabdophaga batatus* Walsh Reared from same gall. Felt '15e, p. 92

Itonid. *Rhabdophaga ramuscula* Felt

Reared from same gall, dried. Felt '08e, p. 421

Itonid. *Asynapta saliciperda* Felt

Nodular gall at base of twigs, length 8 mm. Pl. 11, fig. 9. Felt '15e, p. 91

Itonid. Nodule willow gall, *Rhabdophaga nodula* Walsh Irregularly elongated, ovate, reddish brown, spongy twig gall, 10 to 20 mm long. Pl. 3, fig. 7. Rohw. '09, p. 12

Hym. Willow egg gall, *Euura ovum* Walsh Subglobose galls, the surface scarred, diameter 4 mm. Fig. 40. Felt '08e, p. 370

Itonid. Scarred willow gall, *Phytophaga tumidosae* Felt

Subglobular lateral gall with dead area on one side, diameter 9 mm. Pl. II, fig. 8. Felt '15e, p. 100

Itonid. *Rhabdophaga globosa* Felt

Abrupt, elongate twig swelling, length 10 to 35 mm, height 8 to 11 mm, width 7 to 12 mm, on *S. rostrata*. Rohw. '09, p. 18

Hym. *Euura bebbianae* Rohw.

Lateral, monothalamous twig enlargements 4 to 9 mm long, 3 to 4 mm wide. Rohw. '09, p. 10

Hym. *Euura orbitalis* Nort.

Aborted, lateral, pale, roughened twig swellings, length 10 mm, width 7 mm. Rohw. '09, p. 11

Hym. *Euura cooperae* Ckll.

Globose, constricted twig swellings, diameter 1.5 cm. Chitt. '00, p. 68

Coleop. *Agrilus politus* Say

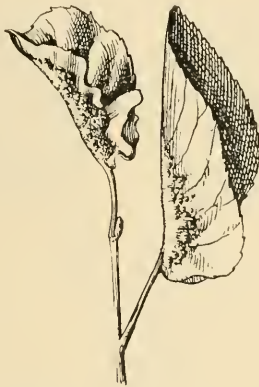


Fig. 42. *Cecidomyia* sp., the larvae producing a midvein fold. (Original)

Irregularly ovate twig swelling, length 4 cm, diameter 3 cm. Felt & Joutel '04, p. 73

Coleop. *Saperda concolor* Lec.

Irregular, branch and trunk swellings, mostly on branches or smaller stems produced by transverse galleries just under the bark. Felt '06b, p. 103

Coleop. Mottled willow borer, *Cryptorhynchus lapathi* Linn.

Populus (poplar)

Irregular, greenish, subtriangular, monothalamous petiole or twig galls, length 1 cm, diameter .7 cm, on cottonwood

Itonid. *Cecidomyia* sp. a1513

Globose, purplish, sometimes adherent masses of deformed flowers, diameter 1.5 cm, from Mojave desert

Acarid. *Eriophyes* sp. a2761

Irregular, monothalamous blister leaf gall. Stebb. '10, p. 9

Itonid. *Cecidomyia* sp. (*irregularis* Stebb.)

Subglobular leaf gall. Felt '15e, p. 206

Itonid. *Rhizomyia absobrina* Felt

Variable, subglobular leaf gall.¹ Fig. 41. Felt '08e, p. 394

Itonid. *Dicrodiplosis populi* Felt

Apparently from the same gall, probably predaceous. Felt '08e, p. 409

Itonid. *Lestodiplosis globosa* Felt

Subglobular leaf gall, diameter 3 to 4 mm. Felt '08e, p. 400

Itonid. *Mycodiplosis populifolia* Felt

Roundly conical leaf gall, diameter 3 mm, on *P. candidans*, balm-of-Gilead.

Pl. 7, fig. 2.

Itonid. *Cecidomyia* sp.



Fig. 43. Vagabond poplar gall, *Pemphigus vagabundus* Walsh. (Original)

Irregular, tumid gall at base of leaf, similar to that of *Lasioptera vitis*

Itonid. *Cecidomyia* sp.

Subglobular galls, diameter 6 to 12 mm, occur in June at the base of cottonwood leaves. Felt '06b, p. 636

Aphid. *Pemphigus populicaulis* Fitch

Marginal leaf roll, length 1 cm, predaceous. Felt '08e, p. 408

Itonid. *Lestodiplosis populifolia* Felt

Brown, marginal leaf roll, length 2.5 cm, several larvae in each

Itonid. *Cecidomyia* sp.

Both edges of the leaf inrolled toward each other, on the upper surface. Chad. '08, p. 138

Acarid. *Eriophyes* sp.

¹ There are a series of these globose or conical galls on poplar leaves which are apparently produced by several species of gall midges.

Longitudinal fold 'galls dwarfing the leaf. Fig. 42.

Itonid. *Cecidomyia* sp.

Light red, cockscomb-like gall developing on the upper surface from the mid-vein. Pack. '90, p. 472

Aphid. *Pemphigus populi-venae* Fitch
A rib gall on the main vein, on *P. heterophylla*. Chad. '08, p. 137

Acarid. ? *Eriophyes* sp.

Irregularly folded, convolute mass of foliage some 2 inches in diameter, frequently apical. Fig. 43. Felt '06b, p. 635

Aphid. Vagabond gall, *Pemphigus vagabundus* Walsh

Irregular, pinkish and light green, pod-shaped shelters formed by apposed leaf edges and containing numerous white plant lice, length 2.5 to 3 cm, diameter 1 cm, on Lombardy poplar.

Aphid. Purse leaf gall, *Pemphigus affinis* Kalt.

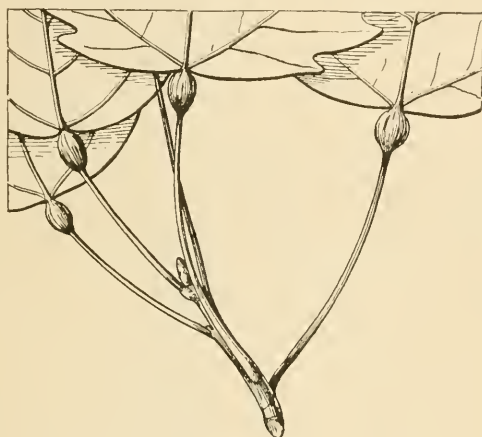


Fig. 44. Ribbed petiole gall, *Ectoedemia populifolia* Busck. (Original)

An olive buff to olive brown erineum or dimple, slightly indented on the under side of the leaf, diameter 6.5 mm or less, one to eight on a leaf. Chad. '08, p. 137

Acarid. *Eriophyes* sp.

Dimples "on the leaves on the upper side, lined with spherical granules, reddish or greenish in color." The galls are green, 3 or 4 on a leaf, diameter 2 to 3 mm, possibly identical with the preceding. Chad. '08, p. 137

Acarid. *Eriophyes* sp.

White to dark brown erineum or dimple gall on the under side of the leaf of *P. grandidentata*. Chad. '08, p. 136

Acarid. *Eriophyes* sp.

A small, green or red, pocket gall on the upper side of the leaf of *P. grandidentata*. Chad. '08, p. 136

Acarid. *Eriophyes* sp.

A large, deep, sharply defined dimple, green, orange yellow within, diameter 4 to 12 mm, convex toward the upper surface of the leaf, on *P. nigra* var. *italica*. Chad. '08, p. 137

Acarid. *Eriophyes* sp.

Oval, somewhat elongate galls with transverse openings occur near the middle of the leaf petioles of cottonwood, the latter part of the summer. Felt '06b, p. 635

Aphid. Poplar leaf stem gall, *Pemphigus populitransversus* Ril.

Globose petiole gall at the base of the leaf and with a transverse mouth. Pack. '90, p. 470

Aphid. Basal leaf gall, *Pemphigus populicaulis* Fitch
Subglobular, distinctly ridged, monothalamous, petiole gall at the base of the leaf, diameter 5 to 7 mm. Fig. 44. Busck '07, p. 98

Lepid. Ribbed petiole gall, *Ectoedemia populella* Busck
An irregular, large stem and petiole deformation. Pl. 16, fig. 3. Chad. '08, p. 138

Acarid. *Eriophyes populi* Nal.

Oval twig gall, length 3 to 4 cm, diameter 3 cm. Felt and Joutel, '04, p. 368

Coleop. *Saperda populnea* Linn.¹

Irregular, branch and trunk swellings, mostly on branches or smaller stems, produced by transverse galleries just under the bark. Felt '06b, p. 103

Coleop. Mottled willow borer, *Cryptorhynchus lapathi* Linn.

Irregularly oval swellings on the smaller twigs, length 3 mm. Pl. 4, fig. 3. Felt '06b, p. 634

Dipt. Poplar twig gall fly, *Agromyza schineri* Giraud
Irregular, subconical twig or petiole gall, length 1 cm

Itonid. *Cecidomyia* sp.

Oval, white cocoons on twigs. Felt '15e, p. 102

Itonid. *Rhabdophaga populi* Felt
In decaying wood. Felt '11k, p. 476

Itonid. *Kronomyia populi* Felt

Myricaceae (sweet gale family)

Myrica cerifer (wax myrtle)

Bud galls. Beutm. '07d, p. 306

Itonid. *Itonida myricae* Beutm.

Myrica asplenifolia (sweet fern)

Fleshy vein folds, length 2 to 4 mm. Fig. 45. Felt '07a, p. 159

Itonid. Sweet fern midge, *Janetiella asplenifolia* Felt

¹ Prof. T. D. A. Cockerell has described the gall of *S. lesquereuxi* on *Populus lesquereuxi* from the miocene shales of Florissant, see Proc. U. S. Nat. Mus., no. 2146, p. 105, 1916.

Myrica carolinensis (bayberry)

Bayberry leaves badly dwarfed and deformed. Pl. 15, fig. 6. Thompson '16, p. 80

Acarid. *Eriophyes* sp.

Juglandaceae (walnut family)

Juglans cinerea (butternut)

Folded, appressed, crinkled leaves

Itonid. *Cecidomyia* sp.



Fig. 45. Sweet fern midge, *Janetiella asplenifolia* Felt. Deformed leaves. (Author's illustration)

A brown, velvety erineum surrounding the leaf stalks or on the main veins, causing a swelling and bending of the stalk or vein; also on black walnut. Chad. '08, p. 135

Acarid. *Eriophyes* sp.

A button-shaped, pocket gall usually on the upper side of the leaf, green or lighter colored, beneath widely opened and lined with whitish or brownish hairs. Chad. '08, p. 135

Acarid. *Eriophyes* sp.

Juglans nigra (black walnut)

An erineum and blister on the leaf. Chad. '08, p. 135

Acarid. *Eriophyes tristriatus* Nal.

A green warty, pocket gall on either surface, chiefly the upper, diameter 2 to 5 mm. Chad. '08, p. 136

Acarid. *Eriophyes* sp.

Carya (hickory)

Key to hickory galls

Occurring under the bark, p. 42

Leaves rolled or folded, p. 42

Axillary vein galls, p. 42

Leaf blisters, p. 42

Cylindric leaf galls, p. 42

Conical leaf galls, without a distinct orifice, p. 43

Conical or globose leaf galls with distinct orifice and containing aphids, p. 43

Globose leaf galls (other than those described above), smooth, or nearly so, p. 46

Globose leaf galls — hairy, p. 46

Midrib or vein gall, p. 47

Leaf folds and ridges, p. 47

Petiole or twig galls, p. 47

Occurring on leaf, producing no gall, p. 47

Swellings in husks, p. 49

Occurring under bark

Under dying, sappy bark.

Itonid. *Cecidomyia* sp.

Under decaying bark. Felt '13m, p. 205

Itonid. *Miastor americana* Felt

Leaves rolled or folded

Leaf edges narrowly inrolled, especially toward the base, on *C. pecan* (possibly the same species has been recorded by Thompson from Massachusetts).

Pl. 15, fig. 4. Chad. '08, p. 152

Acarid. *Eriophyes* sp.

"Deformation and folds on the leaf," on *C. alba*. Chad. '08, p. 135

Acarid. *Eriophyes* sp.

Axillary vein galls

Small, axillary galls in the angles of the lateral veins. Wells '15, p. 43

Acarid. *Eriophyes* sp.

Leaf blisters

Irregular, dull greenish or black-margined, slightly nipped, diameter 3 mm.

Pl. 5, fig. 8.

Itonid. *Cecidomyia* sp.

Cylindric leaf galls

Greenish or black, cylindric, length 4 to 5 mm, diameter 1 mm. Fig. 46. Felt '09e, p. 293

Itonid. Hickory tube gall, *Caryomyia tubicola* O.S.

Similar to preceding but longer, curved and tapering, length 5 to 7 mm, diameter 1.4 mm, light green basally, dark brown or black apically. Wells '15, p. 53

Itonid. *Cecidomyia* sp.

Slender, tapering, suberect, light greenish with flaring, dentate base, length 5 to 8 mm, basal diameter 2.5 to 3.5 mm. Wells '15, p. 47

Itonid. *Cecidomyia* sp.

Greenish, hairy, length 5 mm, beaked, on *C. alba*

Caryomyia sp., a2526

Conical leaf galls, without a distinct orifice

Base subglobular, a long, slender apical process, greenish to reddish brown, length 3 to 4 mm, occurs in groups on midrib of bitternut hickory. Pl. 6, fig. 2, 3. Osten Sacken '62, p. 192

Itonid. Hickory seed gall, *Caryomyia caryaecola* O. S.¹ Conical, nearly symmetrical, thin-walled, small, green or red tinted, length 2 mm. Felt '09e, p. 293

Itonid. Conical hickory gall, *Caryomyia sanguinolenta* O. S. Narrowly conical, light green midrib or vein gall, length 5 mm, diameter 1 mm.

Itonid. *Caryomyia* sp.

Conical or globose leaf galls with distinct orifice and containing aphids

Galls more or less conical above and beneath, opening on the upper surface, both nipples surrounded at the apex by a fringe of long filaments, walls thin,



Fig. 46. Hickory tube gall, *Caryomyia tubicola* O. S. Group of galls on under side of leaf and several stages shown below in profile. (Original)

more or less transparent, diameter 5 to 12 mm, height 4 to 6 mm. Perg. '04, p. 190

Aphid. *Phylloxera caryaeseptem* Shim.

Similar to the preceding, with both cones very much elongated, slender and toothlike, length of cones 3 to 8 mm, diameter 2 to 4 mm. Perg. '04, p. 190

Aphid. *Phylloxera caryaeseptem* Shim. var. *perforans* Perg.

Galls conical above, opening on the upper surface, flat beneath, splitting into several bracts when mature, with slender filaments at the center beneath, walls papery, more or less transparent, diameter 5 mm. Perg. '04, p. 194

Aphid. *Phylloxera caryaefoliae* Fitch

Galls similar to *P. caryaeseptem*, opening on upper surface, smaller, more flattened but slightly convex above and beneath, opening round or oval, surrounded by short, recurved, pubescent bracts, a minute, closed nipple beneath, diameter 3 to 6 mm, height 2 to 3 mm. Perg. '04, p. 197

Aphid. *Phylloxera picta* Perg.

¹*Schizomyia caryaecola* Felt was supposed to have been reared from this gall. The one or two specimens obtained were probably accidental.

Galls smaller though similar to *P. picta*, opening on upper surface, more convex and often with a slight depression above, no opening above before maturity, a minute, closed nipple beneath, diameter 3 to 6 mm, height 2 to 3 mm. Perg. '04, p. 189

Aphid. *Phylloxera intermedia* Perg.

Gall convex, opening on the under surface, the walls papery, more elevated above than beneath, with a reddish or crimson fovea or dimple above, varying in depth; the orifice beneath small and surrounded by a fringe of short, flaring bracts, diameter 3 to 5 mm, height 1 to 3 mm. Perg. '04, p. 200

Aphid. Hickory button gall, *Phylloxera foveola* Perg.

Gall concave above, with orifice on under surface, the walls papery, convex beneath, the nipple formed of rather long, slender filaments, the depression above as well as the surface beneath, including the filaments, with long, white hairs, diameter 3 to 6 mm, height 2 to 3 mm. Perg. '04, p. 203

Aphid. *Phylloxera pilosula* Perg.

Gall small, the walls papery, slightly convex above, more prominent beneath, usually with a small, shallow depression toward one side, above, nipple short, without bracts, the orifice beneath, more or less oval and fringed with short pubescence, diameter 1.5 mm. Perg. '04, p. 205

Aphid. *Phylloxera deplanata* Perg.

Gall medium, the walls papery, slightly convex above and beneath with a short nipple, having a rounded orifice surrounded by a burlike fringe of many filaments, diameter 3.8 to 6.2 mm, height 3 mm. Perg. '04, p. 208

Aphid. *Phylloxera depressa* Shim.

Gall medium, opening on the under surface, walls papery, quite flat, above, with a dimpled depression, the opening beneath round and with a downy orifice, diameter 1.5 mm, height 3 to 4 mm. Perg. '04, p. 209

Aphid. *Phylloxera foveata* Shim.

Gall medium, walls papery, convex and considerably elevated above and more prominent than beneath, rather hard, smooth and shining, the orifice beneath round and closed; resembles the gall of *P. caryaesemen*, diameter .6 to 2 mm. Perg. '04, p. 210

Aphid. *Phylloxera minima* Shim.

Gall minute, walls papery, red, more convex and more prominent above than beneath, with a dimpled depression, the nipple short and the orifice beneath surrounded by short, hairy bracts, diameter .3 to 2 mm, height .2 to 5 mm. Pl. 14, fig. 8. Perg. '04, p. 211

Aphid. *Phylloxera caryaesemen* Walsh

Gall medium, walls papery, conical above and much more prominent than the convex under surface, the nipple short with the oval orifice beneath, fringe with short hairs, diameter 1.5 mm. Pl. 14, fig. 5. Perg. '04, p. 214

Aphid. *Phylloxera caryaefallax* Ril.

Gall large, fleshy, convex on both surfaces, more prominent on the lower, the circumference above buttonlike, with a more or less sharply defined edge either above or sunken beneath the surface of the leaf, nipple short, surrounded by short bracts, the orifice beneath round, diameter 3 to 11 mm, height 1.6 to 3.4 mm. Pl. 14, fig. 7. Perg. '04, p. 217

Aphid. *Phylloxera rimosalis* Perg.

Gall subglobose, walls fleshy, about equally prominent above and beneath,

without a nipple, the orifice beneath a transverse slit, diameter 8 to 14 mm, height 2 to 4 mm. Perg. '04, p. 220

Aphid. *Phylloxera caryaescissa* Ril.

Gall subglobose, walls fleshy, somewhat more prominent above than beneath, without a nipple, the orifice beneath an elongate slit, size one-half to one-third the extreme diameter of *P. caryaecaulis*. Fig. 47, pl. 14, fig. 6. Perg. '04, p. 222

Aphid. *Phylloxera caryaeglobuli* Walsh

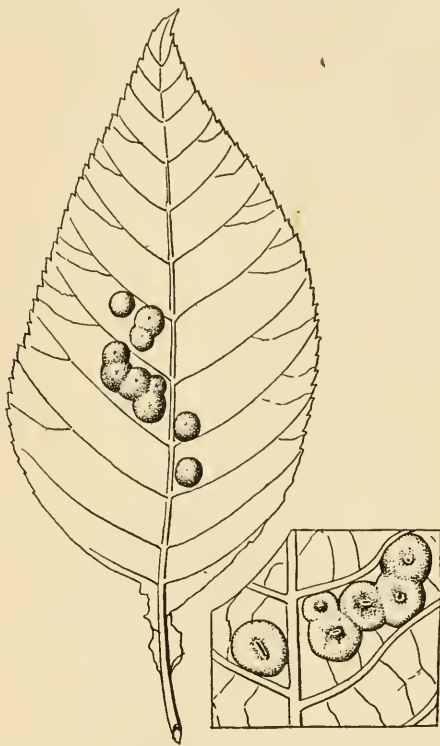


Fig. 47. *Phylloxera caryaeglobuli* Walsh. Group of galls with small group enlarged and showing orifice on under surface. (Original)

Gall subglobose, walls fleshy, about equally prominent on both leaf surfaces, conical beneath, ending in a short nipple and splitting into several stout bracts, diameter 3 to 7 mm, height 2 to 5 mm. Perg. '04, p. 225

Aphid. *Phylloxera conica* Shim.

Gall flat above, walls fleshy, either flush with or sunken below the leaf surface, globular or pyriform beneath and more or less constricted at the base, with or without a distinct nipple which, when present, splits into several bracts, diameter and height 5 to 10 mm. Pl. 14, fig. 4. Perg. '04, p. 228

Aphid. *Phylloxera caryae-avellana* Ril.

Gall medium, walls fleshy, quite flat above, usually with a more or less distinct median depression, prominent and conical beneath, not constricted at the base, the nipple distinct, surrounded by short bracts, diameter 2.5 mm, height 3 to 4 mm. Perg. '04, p. 232

Aphid. *Phylloxera symmetrica* Perg.

Gall large, walls fleshy, more or less irregular, convex above, more prominent and conical beneath, splitting at maturity into several very long bracts, diameter 5 to 10 mm, height 3 to 8 mm. Perg. '04, p. 235

Aphid. *Phylloxera notabilis* Perg.

Gall large, walls fleshy, globular, projecting about equally on both leaf surfaces, nipple short, with four to five short, stout pubescent bracts surrounding the orifice, curving outwards when old, size variable. Perg. '04, p. 236

Aphid. *Phylloxera globosa* Shim.

Gall large, walls fleshy, pedunculate and more or less elongated, suspended from the under surface by a slender petiole, quite sticky when fresh, splitting at the apex into several long filaments. Perg. '04, p. 238

Aphid. *Phylloxera caryaegummosa* Ril.

Globose leaf galls (other than those described above) smooth or nearly so

Nearly smooth, thin-walled, yellowish green or brown, sparsely haired, usually with a slight nipple, diameter 2 mm. Pl. 6, fig. 7. Felt '09e, p. 293

Itonid. Hickory leaf gall, *Caryomyia caryae* O. S.

Reared from the same gall, probably inquiline. Osten Sacken '62, p. 191

Itonid. *Cecidomyia caryae* O. S.

Thin-walled, depressed, yellowish green or brown, diameter 2 to 2.5 mm. Pl. 6, fig. 9. Felt '09e, p. 292

Itonid. *Caryomyia consobrina* Felt

Thin-walled, probably similar to the above. Felt '08e, p. 338

Itonid. *Caryomyia arcuaria* Felt

Thin-walled, without the nipple of *Caryomyia caryae*, with a yellowish pubescence, diameter 2 to 4 mm. Felt '09e, p. 292

Itonid. *Caryomyia similis* Felt

Thin-walled, globose, slightly depressed, with a slight nipple, diameter 3 to 4 mm.

Itonid. *Cecidomyia* sp.

Thick-walled, yellowish green or brown, diameter 4 to 5 mm. Pl. 6, fig. 1. Felt '09e, p. 292

Itonid. *Caryomyia antennata* Felt

Thick-walled, irregularly ovate, granulate, a slight nipple, diameter 2 to 3 mm.

Itonid. *Cecidomyia* sp.

Thin-walled, with a false chamber at the apex, diameter 2 to 3 mm. Felt '09e, p. 292

Itonid. *Caryomyia inanis* Felt¹

Globose leaf galls — hairy

Thick-walled, brownish or reddish brown, hairs rather short, curly, diameter 6 to 7 mm. Beutm. '07, p. 393

Itonid. Hickory peach gall, *Caryomyia persicoides* Beutm.

¹ Wells '15 has characterized several variations in hickory galls having a false apical chamber. They may prove specifically distinct.

Possibly reared from the above gall. Felt '15e, p. 108

Itonid. *Rhabdophaga hirticornis* Felt

Reared from several *Carya* galls, probably inquiline. Felt, '07a, p. 141

Itonid. *Parallelodiplosis caryae* Felt

Thin-walled, rust-red, hairs long, straight, diameter 2 to 4 mm. Pl. 6, fig. 4.
Felt '09e, p. 293

Itonid. Hickory onion gall, *Caryomyia holotricha* O. S.
Gall similar to the above, the midge probably inquiline. Felt '08e, p. 401

Itonid. *Mycodiplosis holotricha* Felt

Thin-walled, long-haired, melon-shaped, diameter 2 to 3 mm. Pl. 6, fig. 8.
Felt '08e, p. 388

Itonid. *Caryomyia thompsoni* Felt

Thin-walled, with long, brown hairs, globose, diameter 3 to 4 mm, nipple distinct,
long on some.

Itonid. *Caryomyia* sp.

Midrib or vein gall

A rounded, irregular, pale yellowish, hard swelling, 12 mm long. Osten Sacken
'62, p. 193

Itonid. *Caryomyia cynipsea* O. S.¹

Leaf folds and ridges

Galls either on the main rib or transverse veins, yellowish green, brownish or
purplish, two or more confluent, length 6 to 14 mm, diameter 2 to 3 mm.
Pergande '04, p. 239

Aphid. *Phylloxera caryae-venae* Fitch

Globular or irregular, terminating in a toothlike nipple and occurring on tender
twigs, petioles or ribs of leaves, often confluent, smooth, diameter 2 to 8 mm.
Pergande '04, p. 251

Aphid. *Phylloxera perniciosa* Perg.

Reniform, petiole or midrib gall, a transverse slit dividing the gall into two
halves, diameter 2 to 15 mm. Pergande '04, p. 257

Aphid. *Phylloxera caryaeren* Ril.

Occurring on leaf, producing no gall

An irregular, yellowish, brown-margined elevation, diameter 3 mm, larva sur-
rounded by a viscid secretion. Osten Sacken '62, p. 193

Itonid. Sticky leaf spot, *Caryomyia glutinosa* O. S.¹

Petiole or twig galls

Globular or oval, often more or less conical, spiny or smooth, according to the
tree on which they grow, and more or less confluent, diameter 5 to 25 mm.
Pergande '04, p. 244

Aphid. Hickory gall aphid, *Phylloxera caryaecaulis* Fitch

Globular, densely covered with long, fleshy filaments, diameter 5 to 15 mm.
Pergande '04, p. 247

Aphid. *Phylloxera spinuloides* Perg.

¹ The reference of this species to *Caryomyia* is provisional.

Medium, growing in larger or smaller clusters and apparently deformations of flower and leaf buds, splitting when mature into four or more broad bracts, surface smooth, diameter 3 to 15 mm. Pergande '04, p. 248

Aphid. *Phylloxera devastatrix* Perg.

Medium, smooth, growing in clusters, usually with a short, stout nipplelike projection on one side, diameter 5 to 10 mm. Pergande '04, p. 249

Aphid. *Phylloxera georgiana* Perg.



Fig. 48. *Cecidomyia* sp. Bud gall on *Corylus*, a1737. (Original)



Fig. 49. Spiny witch-hazel gall aphid, *Hamamelites spinosus* Shim. Pseudo galls on birch leaves. (After Pergande)

Large, oval, smooth, growing on the petioles, a slight, central depression covered with short hairs, length 20 mm, diameter 10 mm. Pergande '04, p. 250

Aphid. *Phylloxera subelliptica* Shim.

Globular or irregular, terminating in a toothlike nipple and occurring on tender twigs, petioles or ribs of leaves, often confluent, smooth, diameter 2 to 8 mm.

Pergande '04, p. 251

Aphid. *Phylloxera perniciosa* Perg.

Reniform, petiole or midrib gall, a transverse slit dividing the gall into two halves, diameter 2 to 15 mm. Pergande '04, p. 257

Aphid. *Phylloxera caryaeren* Ril.

Swellings in husks

Irregular swellings in the husks, produced by pale reddish larvae. Osten Sacken '70, p. 53

Itonid. Hickory husk midge, *Caryomyia nucicola* O. S.¹

Betulaceae (birch family)*Corylus* (hazelnut)

Globose, constricted twig swellings, diameter 1.5 cm.

Coleop. Bronze birch borer, *Agrilus politus* Say

Sterile catkins deformed, swollen basally. Pl. 7, fig. 3. Stebb. '10, p. 16

Itonid. Hazel catkin gall. *Cecidomyia squamulicola* Stebb.

Slightly swollen, aborted buds, length 4 mm, diameter 3mm. Fig. 48

Itonid. Hazel bud gall. *Cecidomyia* sp. a1737

Bud deformation checking further development as soon as it has begun to expand.

Pl. 15, fig. 5. Chad. '08, p. 131

Acarid. *Eriophyes* sp.

Red-haired, leaf fold. Felt '15e, p. 193

Itonid. Red plush gall. *Lasiopteryx coryli* Felt

Reared from same gall. Felt '07a, p. 128

Itonid. *Mycodiplosis corylifolia* Felt

Ostrya (hop hornbeam)

Terminal folded leaves

Itonid. *Cecidomyia* sp.

Globose, red-tinted pocket gall, diameter 1-2 mm. Wells '14, p. 293

Acarid. *Eriophyes* sp.

Carpinus (hornbeam, ironwood)

Reddish leaf fold along lateral veins. Osten Sacken '62, p. 202

Itonid. Hornbeam leaf fold, *Cecidomyia pudibunda* O. S.

Betula (birch)

Under decaying bark. Felt. '13m, p. 205

Itonid. *Miastor americana* Felt

From bark of black birch injured by a Sesian

Itonid. *Mycodiplosis corylifolia* Felt

Under decaying bark. Felt '12f, p. 246

Itonid. *Itonida putrida* Felt

Under decaying bark, presumably predaceous

Itonid. *Lestodiplosis* sp.

Crowded, irregular bud deformation, often in large bunches, on *B. lutea*.

Incipient "witches broom"? Pl. 15, fig. 2. Chad. '08, p. 128

Acarid. *Eriophyes* sp.

Irregular twig and branch annulations. Felt '06, p. 287

Coleop. Bronze birch borer, *Agrilus anxius* Lec.

Reared from seeds. Lintn. '96, p. 162

Itonid. Birch seed midge, *Oligotrophus betulae* Winn.

¹ Generic reference is provisional.

Leaves or parts of leaves thickly corrugated by approximate, lobulate, intervalar swellings. Fig. 49. Felt '06, p. 645

Hemip. Spiny witch hazel gall. *Hamamelistes spinosus* Shim.

Pocket galls, chiefly on the upper side of the leaf, often confluent. Chad. '08, p. 129

Acarid. *Eriophyes* sp.

Nodular pocket gall occurring on both leaf surfaces, yellowish or reddish to purplish, on *B. papyrifera*. Chad. '08, p. 129

Acarid. *Eriophyes* sp.

A crimson red erineum turning to ochreous in straight, beady lines midway between the ribs or closely bordering them, on *B. lenta*. Chad. '08, p. 128

Acarid. *Eriophyes* sp.

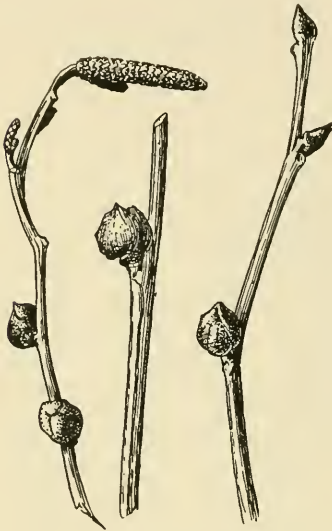


Fig. 50. Alder bud gall, *Dasyneura serrulata* O. S. (Original)

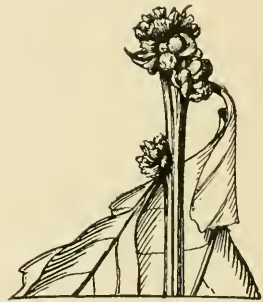


Fig. 51. Chestnut bud gall, *Rhopalomyia castaneae* Felt. (Original)

A rosy pink erineum in large patches on upper leaf surface, on *B. lenta*. Chad. '08, p. 128

Acarid. *Eriophyes* sp.

Small, irregular, mostly elongate, red, crummy leaf patches on *B. alba*, *B. nigra*. Chad. '08, p. 128

Acarid. *Eriophyes* sp.

Yellowish white to brownish erineum, forming large patches on the under surface of the leaf, on *B. papyrifera*. Chad. '08, p. 129

Acarid. *Eriophyes* sp.

A bright rusty erineum lining dimples on the under side of the leaf, dark brown or brick red when dry, on *B. populifolia*. Chad. '08, p. 129

Acarid. *Eriophyes* sp.

A transparently white, granular erineum on the leaf surface of *B. pumila*.
Chad. '08, p. 129

Acarid. *Eriophyes* sp.

An erineum with simple trichomes on leaf of *Betula* sp. Chad. '08, p. 129

Acarid. *Eriophyes* sp.

Alnus (alder)

Irregularly oval stem swelling, length 5 cm, diameter 1 cm. Felt and Joutel '04,
p. 18

Coleop. Alder stem borer, *Saperda obliqua* Say

Subconical bud gall, diameter 6 to 12 mm. Fig. 50. Felt '15e, p. 186

Itonid. Alder bud gall, *Dasyneura serrulatae* O. S.

Small, red, pubescent, pocket gall on leaf of *A. incana*. Pl. 15, fig. 1. Chad.
'08, p. 126

Acarid. *Eriophyes* sp.

Small, remote, pocket gall on upper leaf surface of *A. rugosa*. Chad. '08,
p. 126

Acarid. *Eriophyes* sp.

Erineum with simple trichomes on leaves of *A. alnobetula*. Chad. '08, p. 125

Acarid. *Eriophyes* sp.

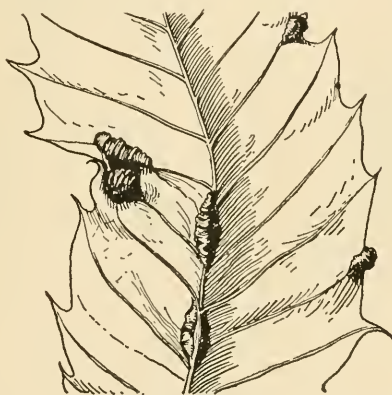


Fig. 52. *Cecidomyia* sp. Vein gall on chestnut. (Original)

An erineum on leaves of *A. ? glutinosa*. Chad. '08, p. 125

Acarid. *Eriophyes* sp.

A white, frostlike erineum on the under side of the leaf in the vein axils, on *A. incana*. Chad. '08, p. 125

Acarid. *Eriophyes* sp.

Small, reddish or whitish, flat, woollen patches on the upper leaf surface of *A. incana*. Chad. '08, p. 126

Acarid. *Eriophyes* sp.

Fagaceae (beech family)

Fagus (beech)

Sparse, somewhat dimpled, rosy or vinose erineum on under leaf surface, on *F. americana*. Chad. '08, p. 152

Acarid. *Eriophyes* sp.



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Fig. 53. *Neuroterus* galls. 1-2. Gall of *N. tectus* Bass. 3-5. Gall of *N. minutus* Bass. 6. Gall of *N. distortus* Bass. 7. Oak flower stem gall, *N. pallidus* Bass. 8, 9. Gall of *N. vernus* Gill. 10. Gall of *N. pallipes* Bass. 11. Gall of *N. longipennis* Bass. 12, 13. Gall of *N. clarkeae* Beutm. (After Beutm., Am. Mus. Nat. Hist.)

- Golden, rusty or dark brown erineum on the under leaf surface of *F. americana*. Chad. '08, p. 132
Acarid. *Eriophyes* sp.
- A whitish or golden yellow to brown erineum on the upper leaf surface between or following the veins. Pl. 15, fig. 7. Chad. '08, p. 133
Acarid. *Eriophyes* sp.
- A frosty white erineum in large patches on the under leaf surface of *F. sylvatica*. Chad. '08, p. 133
Acarid. *Eriophyes* sp.
- Castanea* (chestnut)
Under decaying bark. Felt '13m, p. 205
Itonid. *Miastor americana* Felt
- Under decaying bark. Felt '15i, p. 140
Itonid. *Winnertzia pectinata* Felt
- Under decaying bark. Felt '11k, p. 557
Itonid. *Itonida pugionis* Felt
- Under decaying bark. Felt '15i, p. 220
Itonid. *Janetiella ligni* Felt
- Petiole or terminal bud gall. Fig. 51. Felt '09e, p. 229
Itonid. Chestnut bud gall, *Rhopalomyia castaneae* Felt
- Fusiform, ribbed, greenish or brown mid or lateral vein swelling, length 7 to 15 mm, diameter 3 to 5 mm. Fig. 52.
Itonid. *Cecidomyia* sp.
- Globose or hemispherical capsule leaf gall, diameter 2 to 3 mm. Chadwick, '08, p. 130
Acarid. *Eriophyes* sp.
- Galls encircling young twigs and resembling in size and shape egg masses of the forest tent caterpillar. Braun '17, p. 198
Lepid. *Ectoedemia castaneae* Busck.
- Irregular swelling of the burr of *C. pumila*
Itonid. *Cecidomyia chinquapin* Beutm.
- Irregular swelling of the base of the petiole, dimensions approximately 7 by 10 mm, on *C. pumila*
Itonid. *Cecidomyia* sp.
- Castanopsis* sp. (Western Chinquapin)
- Globular, brown, thin-shelled blossom galls, internally soft, pithy, diameter 12 to 24 mm. Beutm. '17, p. 345
Cynipid. *Andricus castanopsidis* Beutm.

Quercus (oak)

Key to oak galls

- 1 Root galls, p. 54
- 2 Gall insects reared from decaying bark or wood, p. 54
- 3 Galls of branches and twigs, the deformations not separable from the plant (compare with 4, p. 62), p. 54
- 4 Galls attached to branches and twigs but more or less separated from the normal plant tissues [compare with 3, p. 54 and also with oak apples (10), p. 95], p. 62
- 5 Gall consisting of one or more larval cells or capsules in a leaf bud, p. 74
- 6 Galls of the leaves (in some cases a leaf itself is aborted and the gall issues from the twig or bud), p. 78
- 7 Galls of the aments or catkins, p. 116
- 8 Galls of the fruits, p. 117

1 *Root galls*

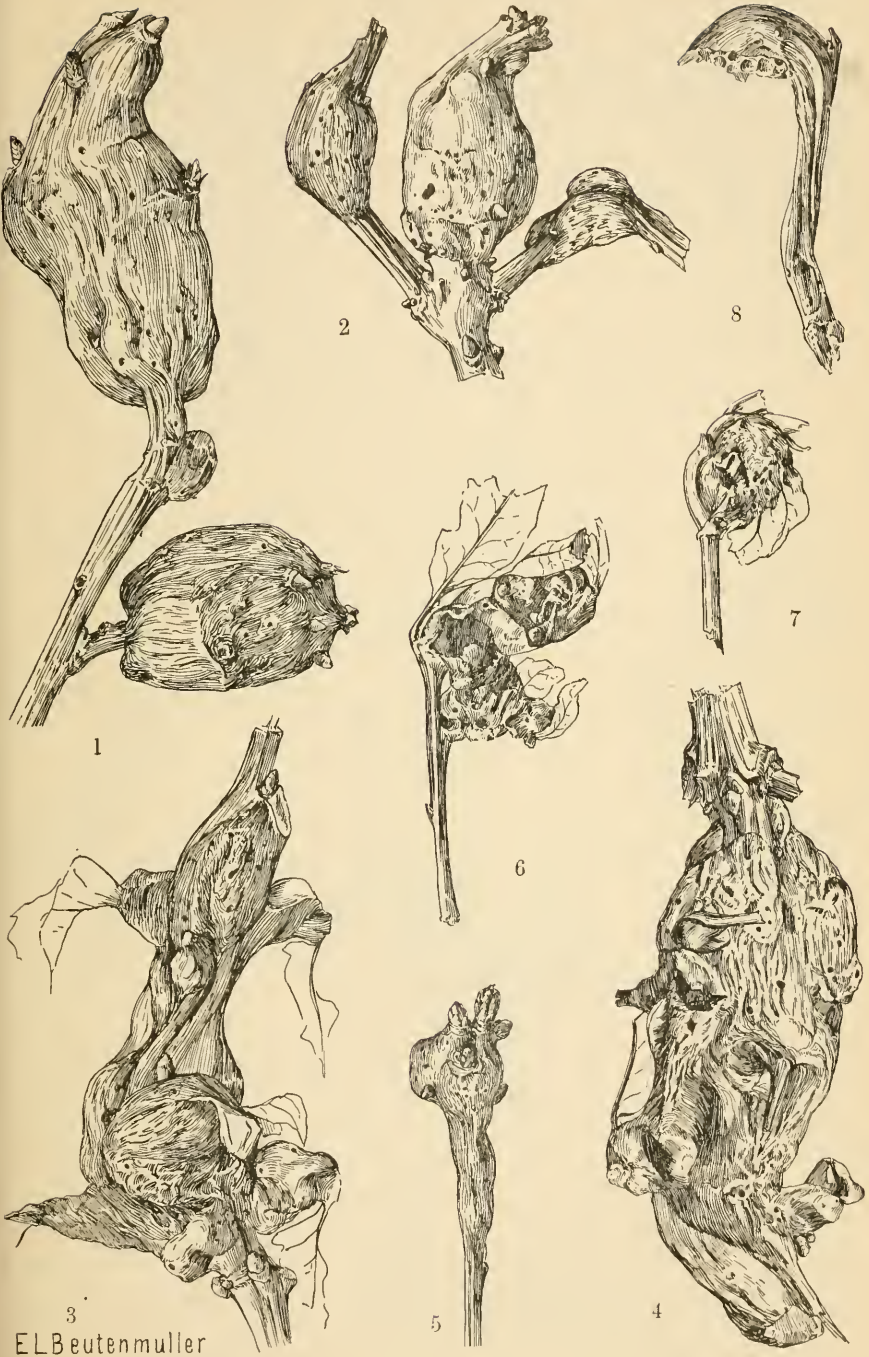
- Globose, polythalamous root galls on *Q. laurifolia*. Beutm. '09, p. 277
Cynipid. *Eumayria floridana* Ashm.
- Irregular, brownish black, globose, dense, pithy root gall, diameter 1.2 cm, on
Q. wislizeni Ashm. '97, p. 120
Cynipid. *Callirhytis apicalis* Ashm.
- Irregular, globose, fleshy, polythalamous root swelling, diameter 4 cm or less,
on live oak. Ashm. '97, p. 132
Cynipid. *Callirhytis rhizoxenus* Ashm.
- Irregular, polythalamous-root gall, diameter 3.5 cm, on *Q. minor*
Cynipid. *Odontocynips nebulosa* Kieff.
- Polythalamous, fig-shaped, yellowish galls just below the surface of the ground,
on *Q. alba* and *Q. minor*. Fig. 87, 9, 10. Beutm. '11, p. 354
Cynipid. Oak fig root gall, *Dryophanta radicola* Ashm.
- Irregular, polythalamous, brown, woody root gall on *Q. virginiana*. Fig.
65, 1. Beutm. '09, p. 278
Cynipid. *Belenocnema treatae* Mayr.
- Irregularly rounded, rugose, fleshy root gall. Ashm. '97, p. 113
Cynipid. *Trigonaspis radialis* Ashm.
- Blisterlike swellings in the smooth bark of the roots, sometimes covering them
for a distance of 2 feet or more from the tree, on *Q. alba*. Bassett '89,
p. 237
Cynipid. *Callirhytis radialis* Bass.
- Globose, polythalamous grayish root gall with dimensions up to 3 x 4½ inches.
Ent. News, 10:193
Cynipid. *Andricus championi* Ashm

2 *Gall insects reared from decaying bark or wood*

- Reared from larvae under decaying bark. Felt '13m, p. 205
Itonid. *Miastor americana* Felt
- Reared from larvae under decaying bark. Felt '13m, p. 215
Itonid. *Leptosyna quercivora* Felt
- Reared from larvae under decaying bark. Felt '11k, p. 558
Itonid. *Itonida cincta* Felt
- Reared from larvae under decaying bark. Felt '15h, p. 407
Itonid. *Parallelodiplosis corticis* Felt

3 *Galls of branches and twigs, the deformations not separable from the plant* (Compare with 4, p. 62)

- a No visible gall or only a slight swelling. See also b-d, e, f, g-h on pages 56, 58, 60 and
61 respectively
- Cocoonlike gall, diameter 2.5 mm, hidden in a branch under the bark and with
no visible external swelling, on *Q. catesbaei*. Ashm. '87, p. 145
Cynipid. *Andricus cryptus* Ashm.
- Slight and very inconspicuous enlargements at the base of new shoots, on *Q.*
velutina. Bassett '00, p. 324
Cynipid. *Callirhytis ceropteroides* Bass.
- Slightly swollen twigs of last summer's growth, on *Quercus* species. Beutm. '10,
p. 126
Cynipid. *Neuroterus virgens* Gill.



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Fig. 54. Oak potato gall, *Neuroterus batatus* Fitch. 1-6 showing various types of galls. (After Beutm., Am. Mus. Nat. Hist.)

Slight, hardly visible, wavy swellings at the base of tender new shoots, on *Q. catesbaei*. Ashm. '81, p. XV

Cynipid. *Neuroterus catesbaei* Ashm.

Elongate twig swelling, length 20 mm, diameter 10 mm, on *Q. douglasi*. Fullaway '11, p. 345

Cynipid. *Cynips kelloggi* Full.

Bud-shaped, elongate, pointed apically, thin-walled and hollow. Length 3 to 4 mm, on trunk of white oak. Beutm. '17, p. 347

Cynipid. *Andricus gemmiformis* Beutm.

Reared from slightly swollen, white oak twigs of *Q. alba*. Fig. 56. Felt '08e, p. 324

Itonid. Oak twig midge, *Lasioptera querciperda* Felt

Elongate twig gall, the walls thin, consisting of thickenings of the woody tissues and not visible externally or forming only slight swellings, on *Q. pedunculata*. Kieff. '10, p. 4

Cynipid. *Loxaulus ashmeadi* Kieff.

b Twig dwarfed but not specially modified

Irregular, polythalamous swellings in the bud or very young leaves, producing rosettelike clusters of small leaves on *Q. platanoides*. Fig. 53, 6. Beutm. '10, p. 127

Cynipid. *Neuroterus distortus* Bass.

Irregular enlargements of the small twigs, on *Q. prinoides*. Fig. 53, 1, 2. Beutm. '10, p. 126

Cynipid. *Neuroterus tectus* Bass.

Inconspicuous enlargements of the upper portion of very young, tender shoots, on *Q. obtusiloba*. Beutm. '11, p. 359

Cynipid. *Dryophanta longicornis* Bass.

c Twig dwarfed, distorted and forms a short, ovoid mass, polythalamous

Woody, apical swellings 18 to 36 mm long, 12 mm in diameter, on *Q. tinctoria* and *Q. rubra*. Pl. 2, fig. 8. Bassett '64, p. 683

Cynipid. *Andricus scitulus* Bass.

Woody, polythalamous twig gall, length 15 mm, diameter 6 mm, resembles the gall of *A. scitulus* Bass. and that of *A. tectus* Bass., on *Q. ilicifolia*, *Q. imbricaria*. Bassett '00, p. 311

Cynipid. *Andricus tuberosus* Bass.

d Twig swollen, dwarfed or distorted into a more or less club-shaped, polythalamous gall

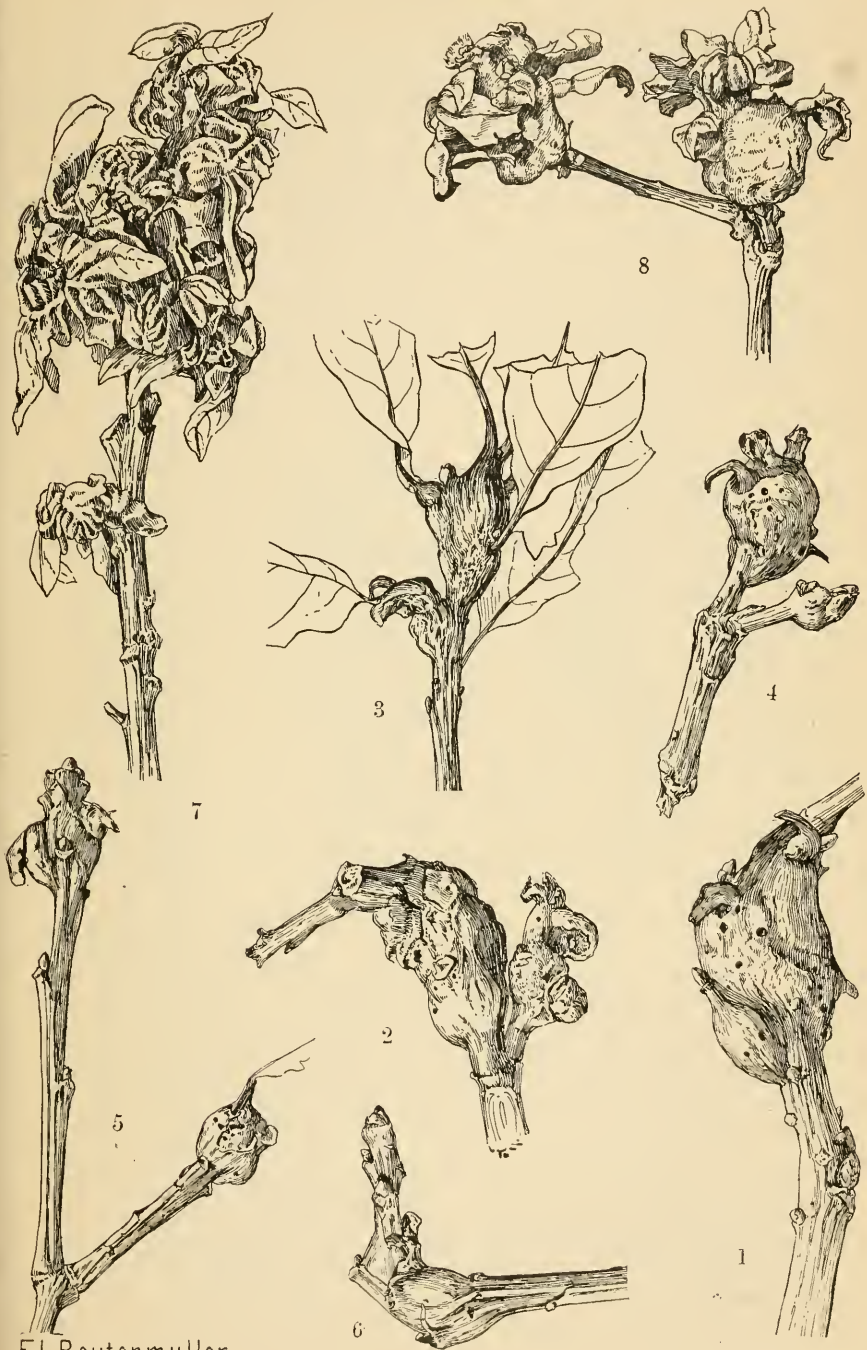
Irregular, potato-shaped, polythalamous, woody leaf or twig gall, green in summer and brown in winter, diameter 1.8 cm, on *Q. alba*. Fig. 54. Beutm. '10, p. 118

Cynipid. Oak potato gall, *Neuroterus batatus* Fitch

Irregularly rounded, woody, aborted leaves and buds on young terminal twigs, diameter 4 to 12 mm, on *Q. alba*. Fig. 81, 3. Beutm. '10, p. 119

Cynipid. *Neuroterus consimilis* Bass.

Irregular, length 5 to 100 mm, diameter 4 to 25 mm, similar to *N. batatus* but on the twigs (winter form) or the midrib and petiole of the leaves (spring



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Fig. 55. Noxious oak gall, *Neuroterus noxiosus* Bass. 1-8 showing various types of galls. (After Beutm., Am. Mus. Nat. Hist.)

form), the blade of the leaf dwarfed, curled and shriveled, on *Q. platanoides*. Fig. 55. Beutm. '10, p. 118

Cynipid. Noxious oak gall, *Neuroterus noxiosus* Bass. Globose, hard, corky twig gall, diameter 18 to 20 mm on *Q. alba*. Osten Sacken '62, p. 255

Cynipid. *Cynips juglans* O. S. Irregular, polythalamous, woody twig gall, length 10 cm, diameter 2.5 cm, twigs not more than 4 to 6 mm in diameter. Cal. Trotter '11, p. 113

Cynipid. *Andricus* sp. Subglobose, lateral, grayish red or fulvous twig gall, the surface smooth, shining and irregularly warty, diameter 8 to 10 mm. Mex. Trotter '11, p. 126

Cynipid. ? *Cynips* sp. Subglobose, polythalamous, solitary or clustered (if the latter more or less fused basally) twig gall, diameter 10 to 15 mm. Mex. Trotter '11, p. 128

Cynipid. ? *Cynips* sp.

e A swelling surrounding the twig, especially at the base of the lateral shoots, often large, abrupt and woody; potato galls

(1) Not woody or a little woody fiber surrounding the larval cells

Hemispherical, woody, polythalamous knots at the base of young shoots, diameter 12 to 18 mm, larval cells thin-walled, on *Q. alba*. Bassett '81, p. 76

Cynipid. *Loxaulus mammula* Bass.

Globose, hard knots, the surface rough, blackened, deeply and irregularly fissured, diameter nearly 2.5 cm, apical on the twig, on *Q. ? virens*. Bassett '90, p. 75

Cynipid. *Callirhytis ruginosus* Bass.

Hard, woody knots sometimes terminal on shoots of oak sprouts, more often enlargements at the base of small, lateral branches; terminal galls, diameter 2.5 cm, strawberry-shaped, on *Q. castanea*. Bass '90, p. 76

Cynipid. *Callirhytis seminosis* Bass.

Subglobose or reniform, irregular, rather thin-walled, monothalamous, smooth, reddish twig gall, length 4 to 7 mm, diameter 3 to 5 mm. Mex. Trotter '11, p. 126

Cynipid. ? *Cynips* sp.

(2) Woody fiber abundant, without hornlike projections

Irregular, potato-shaped, polythalamous woody galls, diameter 1.8 cm, on *Q. alba*. Fig. 54. Beutm. '10, p. 118

Cynipid. Oak potato gall, *Neuroterus batatus* Fitch

Irregular, globose, frequently confluent twig galls, length 10 cm, diameter 3 cm, on *Q. nigra*, *Q. coccinea*, *Q. rubra* and *Q. ilicifolia*. Fig. 57. Bassett '63, p. 323

Cynipid. Gouty oak gall, *Andricus punctatus* Bass.

Abrupt, irregular, potatolike twig or branch swellings, length 10 to 20 mm, diameter 8 mm, on *Q. virginiana*. Ashm. '81, p. XI

Cynipid. Live oak potato gall, *Andricus batatoides* Ashm. Hard, smooth, knotlike twig swellings, diameter 20 mm, on *Quercus* species. Bassett '81, p. 112; '00, p. 320

Cynipid. *Andricus coxii* Bass.

Irregularly rounded or elongate, woody, polythalamous twig swellings much like those of *A. coxii*, on *Q. virginiana*. Beutm. '09, p. 281

Cynipid. *Compsodryoxenus maculipennis* Ashm.

Irregular, dense, corky, polythalamous twig swellings, length 4 cm, diameter 1.6 mm, on *Q. undulata*. Gill. '92, p. 247

Cynipid. *Andricus frequens* Gill.

A gradual twig or branch swelling 3.6 to 8 cm long and 12 to 24 mm in diameter, on *Q. cinerea*. Ashm. '85, p. VIII

Cynipid. *Andricus medullae* Ashm.



Fig. 56. Oak twig midge, *Lasioptera querciperda* Felt. (Original)

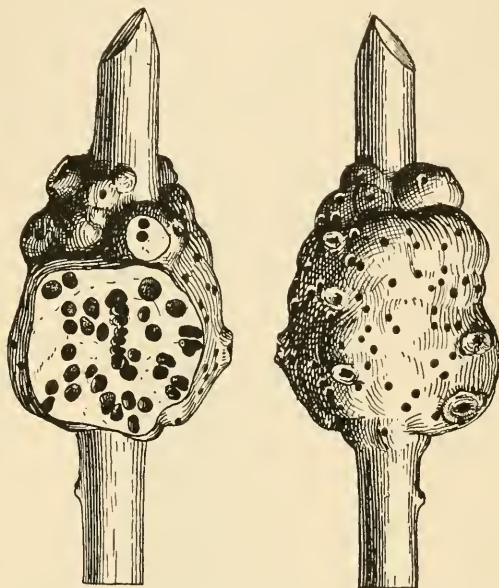


Fig. 57. Gouty oak gall, *Andricus punctatus* Bass. Old gall and one in section. (Original)

Irregular twig enlargement similar to that of *A. medullae*, length 1.2 to 3 cm, on *Q. chrysolepis*. Ashm. '97, p. 124

Cynipid. *Callirhytis chrysolepidicola* Ashm.

Oblong, irregular, woody swellings on leaf petioles or at the base of the new shoots, length 8 to 9 mm, diameter 3.5 to 4 mm, on *Q. laurifolia*. Fig. 53, 11. Beutm. '10, p. 125

Cynipid. *Neuroterus longipennis* Ashm.

Irregularly rounded or elongate, somewhat potato-shaped, polythalamous oak twig gall, length 15 to 30 mm, diameter 14 to 20 mm, on unknown scrub oak. Beutm. '07, p. 464

Cynipid. *Andricus wheeleri* Beutm.

(3) Larval cells each surrounded by a tube of cellular tissue differentiated from the general substance of the galls; tubes may project from the surface in the matured gall

(a) Tubes never project.

Globose or elongate twig and branch gall, length 1.2 to 5 cm, the wood hard, curled, the bark smooth and within concealed, rounded, subcompressed tubes, on *Q. agrifolia*, *Q. chrysolepis*. Bass. '81, p. 54

Cynipid. *Callirhytis suttoni* Bass.

(b) Tubes project like horns or spines

Globose twig gall, irregular, woody, variable in size, with many hornlike projections, occurs on *Q. palustris*, *Q. ilicifolia*, *Q. digitata* and *Q. nigra*. Pl. I, fig. 9. Osten Sacken '62, p. 251

Cynipid. Horned oak gall, *Andricus cornigerus* O. S.

Clustered, fifty to one hundred, quadrate or hexagonal tubes somewhat resembling a honeycomb and arising from trunks of young red and scarlet oak, *Q. rubra* and *Q. coccinea* Beutm. '11c, p. 197

Cynipid. Honey-comb twig gall, *Dryocosmus favus* Beutm.

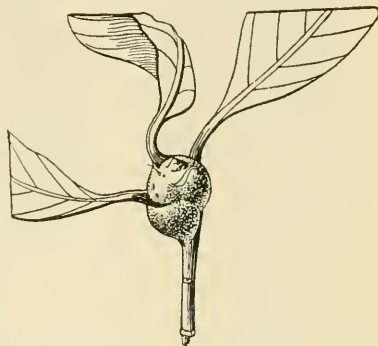


Fig. 58. White oak club gall. *Andricus clavulus* O. S. (Original)

Abrupt, irregular, woody, tuberlike twig gall, at first smooth, later rough, with deep fissures and spiny, succulent tubes, diameter 12 to 30 mm, on *Q. virginiana*. Ashm. '81, p. XXVI

Cynipid. *Andricus clavigerus* Ashm.

f Polythalamous, woody swellings at base of twig, eccentric on twig (grade to last group)

A hard, knotty swelling at the base of small twigs and branches, length 9 to 18 mm, diameter 8 to 10 mm, on *Q. aquatica*. Ashm. '87, p. 144

Cynipid. *Callirhytis aquaticae* Ashm.

Globular, irregular, somewhat elongate, single or clustered, polythalamous oak twig galls; individual galls, diameter 4 to 15 mm, the nutlike masses with a diameter of 40 mm, on *Q. nana*. Beutm. '07, p. 463

Cynipid. *Andricus davisii* Beutm.

Subreniform, irregular, polythalamous, unilateral twig gall, smooth, shining, yellowish or yellowish brown, length 3 cm, diameter 2 cm. Cal. Trotter '11, p. 111

Cynipid. ? *Disholcaspis* sp.

g Pustular elevations of the bark, often enlarging the twig

Abrupt, irregular twig swellings varying from round, pustule-like bodies 4 mm in diameter to confluent, polythalamous masses 25 mm long and 12 mm in diameter, on *Q. prinus*. Fig. 107, 11. Beutm. '10c, p. 120

Cynipid. *Neuroterus rileyi* Bass.

h Monothalamous terminal enlargements or club galls on twigs

Globe-shaped, apical, woody twig galls, length 12 to 25 mm, on *Q. alba*. Fig. 58, pl. 2, fig. 2. Osten Sacken '65, p. 351

Cynipid. White oak club gall, *Andricus clavulus* O. S.

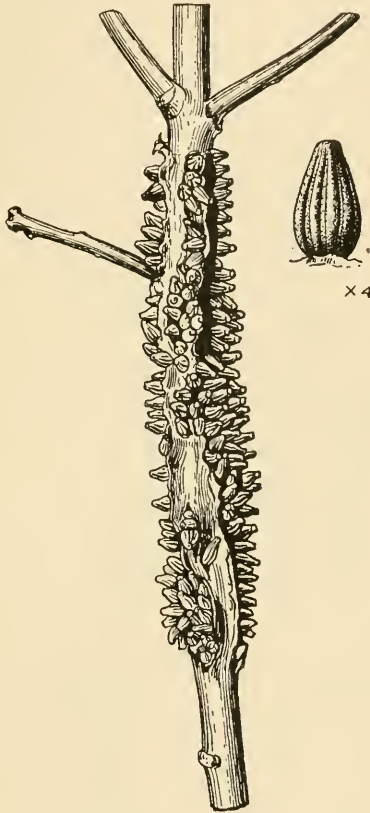


Fig. 59. *Andricus gemmarius* Ashm.
Badly infested twig and one gall enlarged.
(Original)

Ovate or globose apical twig gall, leafy, diameter 7 to 8 mm, on willow oak.
O. S. '61, p. 70

Cynipid. *Andricus*¹ *phellos* O. S.

¹ Generic reference by Beutenmuller.

Irregular, monothalamous, green twig galls, length 18 mm, diameter 12 mm, when green covered with leaves, on *Quercus* species. Bassett '90, p. 82

Cynipid. *Andricus howertoni* Bass.

Club-shaped, woody, apical galls on small limbs, the apex blunt and generally turned to one side. Pl. 2, fig. 9. Bassett '64, p. 685

Cynipid. Scrub oak club gall, *Callirhytis similis* Bass.

4 Galls attached to branches and twigs and more or less separated from the normal plant tissues (Compare with 3, p. 54 and also oak apples (10), p. 95. See also, b and c on p. 71 and d on p. 72.

a Bullet galls, that is woody galls attached to the twigs and in small clusters or solitary
(1) Polythalamous

Subglobular, polythalamous, sessile twig gall, diameter 2 to 6 cm, on *Q. lobata*. Fullaway '11, p. 346

Cynipid. *Andricus californicus* Bass.

Globose, polythalamous, sessile twig galls resembling round apples, surface brown, smooth, 2.5 to 5 cm, on *Q. agrifolia*. Bassett '81, p. 74

Cynipid. *Callirhytis pomiformis* Bass.

Globose, irregular, yellowish brown to dark brown, mostly smooth and shining, probably twig gall, diameter 1 to 1.5 cm, on *Quercus* species. Bassett '90, p. 83

Cynipid. *Andricus maxwelli* Bass.

Globose, irregular, hard, pithy, brown gall, externally finely granulated and with a few short, blunt spines, interior hard, pithy, brown, polythalamous, diameter 8-10 mm. Ashm. '97, p. 117

Cynipid. *Andricus murtfeldtae* Ashm

Irregular, rugose, yellowish brown, woody, polythalamous, apical twig gall, apparently with a long peduncle or this may be the apex of a leaf petiole, length 2 to 4 cm, diameter 1 to 2 cm, on *Q. agrifolia*, *Q. chrysolepis* Ashm. '97, p. 120

Cynipid. *Andricus congregatus* Ashm.

Clustered, variable, presumably green, soft, succulent galls occurring in leaf axils and about as large as a chestnut or hazelnut. Beutm. '11, p. 354

Cynipid. *Dryophanta pumiliventris* Bass.

Globose, clustered, polythalamous, buff-colored twig galls, diameter 3 to 5.5 cm, on *Q. garryana*. Gill. '94, p. 235

Cynipid. *Andricus spongiola* Gill.

Irregularly rounded, polythalamous, as it ages becoming brown, rugose, fissured, length 55 mm, diameter 3.5 mm, on live oak. Beutm. '13, p. 243

Cynipid. *Andricus montezumus* Beutm.

(2) Small, monothalamous, without distinct central cell

(a) Situated in fissures in the twigs

Irregular, brown, somewhat smooth twig gall arising from a slit and with transverse depressions, indicating coalescence, length 25 mm, diameter 12 mm, on *Q. chrysolepis* var. *vaccinifolia*. Fig. 64, 13. Beutm. '09, p. 38

Cynipid. *Disholcaspis truckeensis* Ashm.

Globose, densely rugose, grayish, slightly flattened twig galls, the rugosities in five or six transverse rows, diameter 2 to 2.5 mm, transverse 3 to 4 mm, the galls



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Fig. 60. Oak bullet galls. 1-3. Oak bullet gall, *Disholcaspis globulus* Fitch. 4-7. *D. omnivora* Ashm. 8, 9. *D. rubens* Gill. 10. Mealy oak gall, *D. cinerosa* Bass. 11. *D. succinipes* Ashm. (After Beutm., Am. Mus. Nat. Hist.)

clustered in fissures or slits on the terminal twigs, on *Q. cinerea*. Ashm. '87, p. 143

Cynipid. *Andricus difficilis* Ashm.

Generally oval, sometimes irregularly shaped, usually smooth, cells filling longitudinal slits or fissures in twigs of *Q. rubra*. Ashm. '97, p. 121

Cynipid. *Andricus excavatus* Ashm.

Globose, hard, brown twig galls with a diameter of 7 to 10 mm, occurring several together in fissures in the twigs, on *Q. imbricaria* and *Q. ilicifolia*. Ashm. '97, p. 122

Cynipid. *Andricus imbricariae* Ashm.

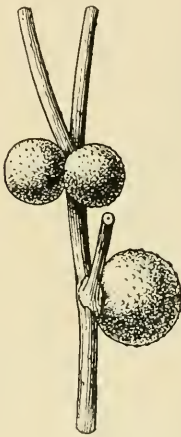


Fig. 61. Oak bullet gall, *Disholcaspis globulus* Fitch. (Original)



Fig. 62. *Disholcaspis omnivora* Ashm. (Original)

(b) Not inserted in fissures on the twigs

Numerous small, oblong, rugose, budlike galls surrounding the twig, sometimes issuing from the sides of the larger branches, length 2.5 to 3 mm, on *Q. cinerea*. Fig. 59. Ashm. '85, p. IX

Cynipid. *Andricus gemmarius* Ashm.

Oblong, oval, longitudinally ribbed, brown galls without a distinct cell, dehiscent, arising in clusters of two to three in bud axils, on *Q. cinerea*. Ashm. '87, p. 142

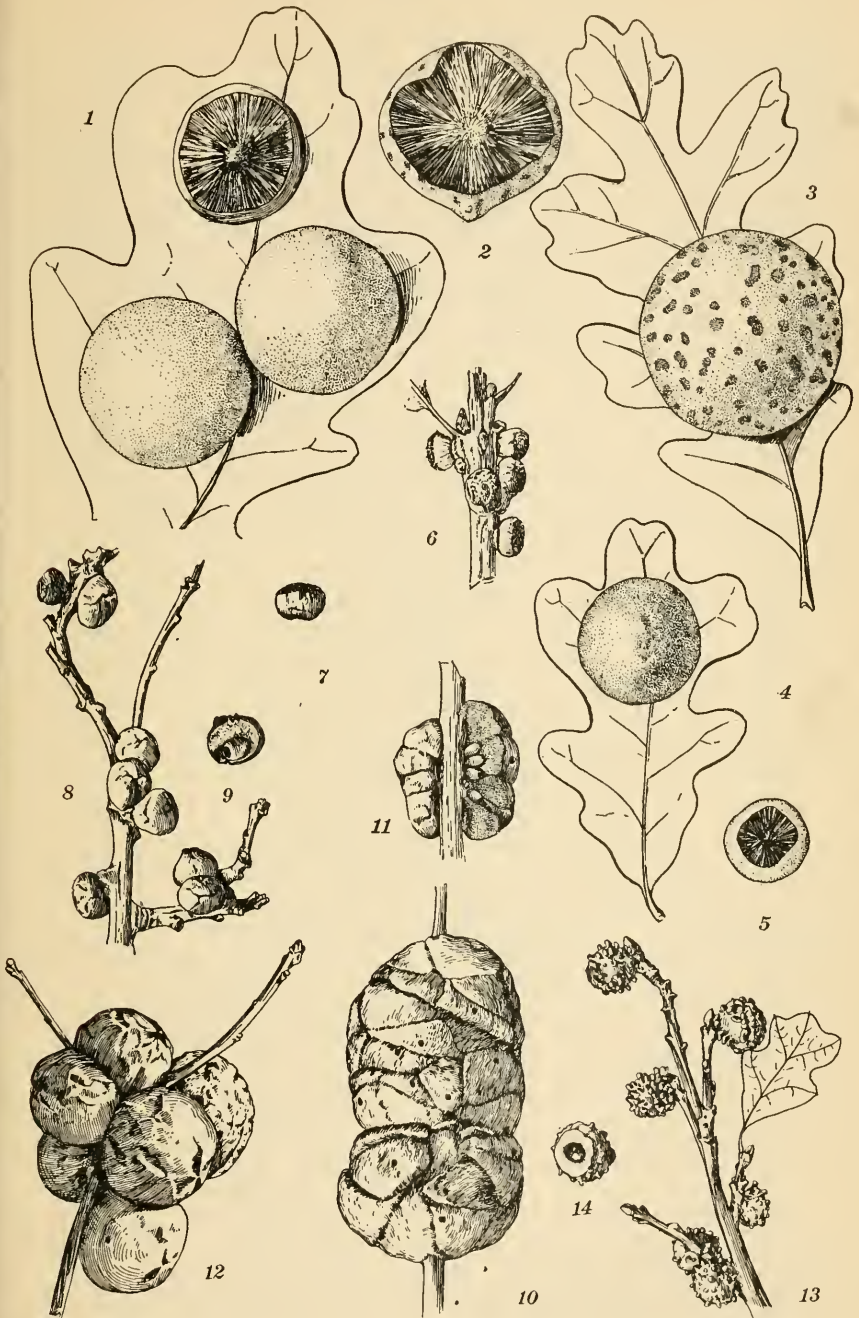
Cynipid. Jumping ribbed gall. *Andricus saltatus* Ashm.

Ellipsoidal, smooth, monothalamous, snuff-colored twig galls, length 5 to 7 mm, on *Q. garryana*. Gill. '94, p. 235

Cynipid. *Callirhytis washingtonensis* Gill.

Small, round, monothalamous twig galls, smooth, when dry wrinkled and resembling pepper corns, diameter 5 mm, on *Q. alba*. Bassett '90, p. 81

Cynipid. *Andricus indistinctus* Bass.



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Fig. 63. Oak bullet galls. 1. *Dryophanta centricola* O. S. 2. 3. *Cynips maculipennis* Gill. 4. 5. *Disholcaspis brevipennata* Gill. 6. 7. *D. eldoradensis* Beutm. 8. 9. *D. pernicioso* Bass. 10. 11. *D. spongiosa* Karsch. 12. Oak bullet gall, *D. globulus* Fitch. 13. 14. Studded oak gall, *Cynips corallina* Bass. (After Beutm., Am. Mus. Nat. Hist.)

Subcylindrical, rounded apically, smooth, shining, translucent twig gall, height 8 mm, diameter 6 mm. Mex. Trotter '11, p. 128

Cynipid. ? *Cynips* sp.

(3) Typical bullet galls of a pithy or woody substance with a central cell in which the larva lives. This may be closely attached to the substance of the gall or fill a larger or smaller cavity within the gall.

(a) Globular or subglobular in shape

Globular, single or clustered, yellow, sometimes tinged with red, twig gall, diameter 8 to 16 mm, on various oaks. Fig. 60, 1-3, 61, 63, 12. Beutm. '09, p. 29

Cynipid. Oak bullet gall, *Disholcaspis globulus* Fitch

Globular, single or clustered, pale brown or yellowish, sometimes tinged with red, twig gall, diameter 8 to 20 mm, on various oaks. Beutm. '09, p. 31.

Fig. 60, 4-7, 62

Cynipid. *Disholcaspis omnivora* Ashm.

Globose, milk-white or pale greenish, white-specked and marbled with green or lilac, oak twig gall, fleshy when fresh, becoming woody, dry and hollow, diameter 3 to 6 mm, on white oak and post oak. Beutm. '11b, p. 70

Cynipid. Marbled oak gall, *Andricus pisiformis* Beutm.

Globose, monothalamous, very hard, corky twig galls, diameter 9 to 15 mm, on *Q. agrifolia*. Bassett '81, p. 53

Cynipid. *Callirhytis agrifoliae* Bass.

Globose, with a pointed apex and the sides longitudinally grooved, a rose colored, monothalamous twig gall. The base imbedded in the twig resembles a very small seed onion, length 5 to 8 mm, diameter 4 to 5 mm, on black oak. Beutm. '11b, p. 69, '17, p. 348

Cynipid. Oak onion gall, *Biorhiza caepulaeformis* Beutm.

Globose, monothalamous, probably twig galls, the surface covered with a mealy, grayish powder, diameter 18 to 24 mm, on *Quercus* species. Bassett '81, p. 110

Cynipid. *Andricus cinerosus* Bass.

Globose, linear, clustered, mottled, light and dark green, monothalamous twig galls, diameter 6 to 12 mm, on *Q. ilicifolia*. Bassett '00, p. 328

Cynipid. *Disholcaspis fasciata* Bass.

Globose, smooth, corky, reddish brown twig or acorn gall, with a large central cell, diameter 8 to 12 mm, on *Q. laurifolia*. Fig. 111, 6, 7. Beutm. '09b, p. 63.

Cynipid. *Amphibolips fuliginosa* Ashm.

Globular, with a blunt point at the apex, hard and resembling small, dark-colored galls of *D. globulus*, the central cell not separating, length 10 mm, diameter 8 mm. Beutm. '09a, p. 35

Cynipid. *Disholcaspis colorado* Gill.

Globose, smooth or rough, light straw, usually red-tinted twig gall, diameter 10 to 14 mm, on *Q. undulata*. Fig. 60, 8, 9. Beutm. '09a, p. 32

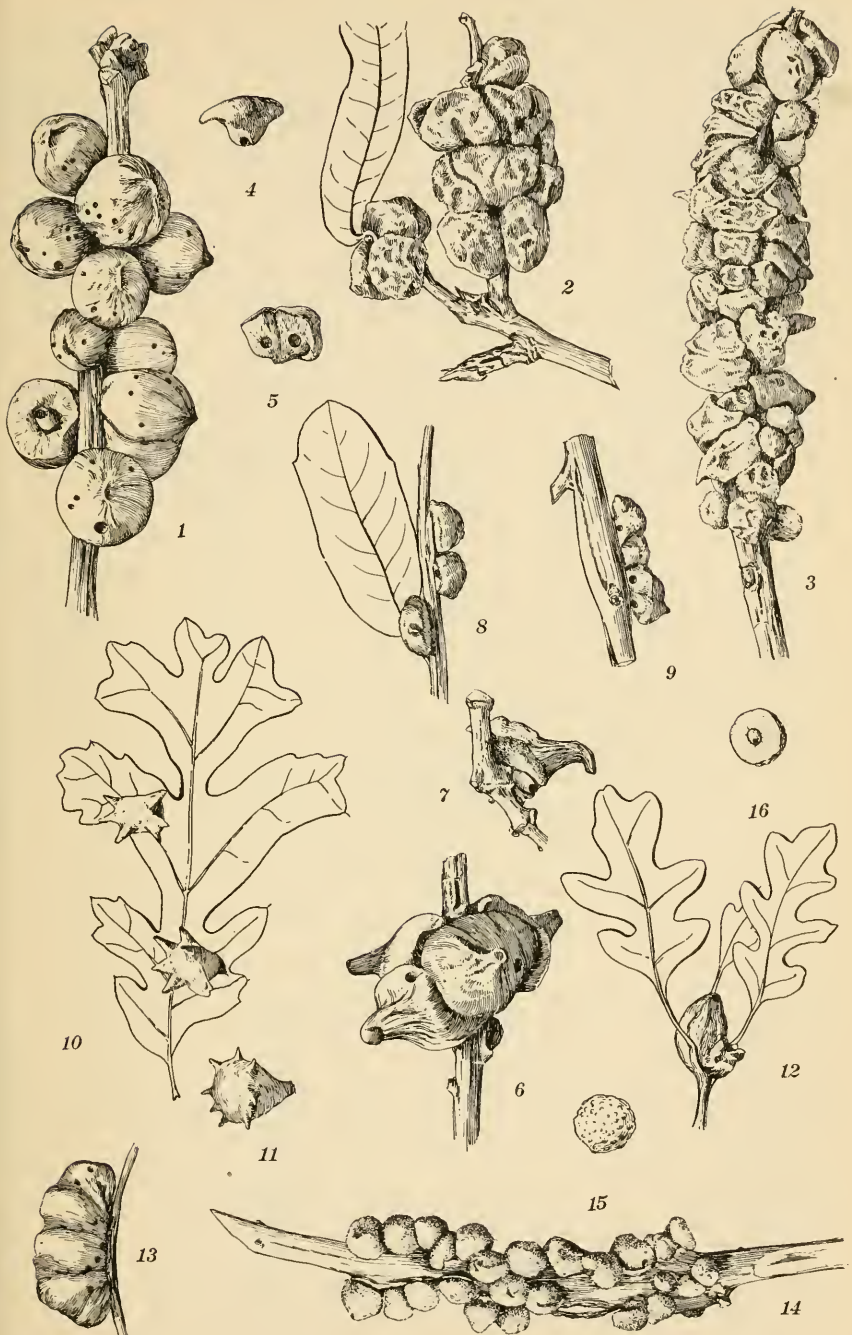
Cynipid. *Disholcaspis rubens* Gill.

Globose, rugose, with raised lines and ridges, diameter 7 mm, on *Q. marilandica*. Fig. 64, 15, 16. Beutm. '09a, p. 33.

Cynipid. *Disholcaspis persimilis* Ashm.

Globose, rugose, monothalamous, dark brown twig galls, diameter 8 mm, of the cell 2 mm, occurring in clusters of 10 to 12, sometimes irregular, on *Q. lobata*. Fullwy. '11, p. 343

Cynipid. *Cynips multipunctata* Fullwy. (not Beutm.)



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Fig. 64. Oak bullet galls. 1. Rough bullet gall, *Disholcaspis mamma* Walsh. 2-5. Woolly fig gall, *D. ficigera* Ashm. 6, 7. *D. basseti* Gill. 8, 9. *D. chrysolepidis* Beutm. 10, 11. Spined turban gall, *D. douglasii* Ashm. 12. *D. sileri* Bass. 13. *D. truckeensis* Ashm. 14. *D. succinipes* Ashm. 15, 16. *D. persimilis* Ashm. (After Beutm., Am. Mus. Nat. Hist.)

Globular, thick-shelled, slightly nipped twig gall, green, becoming brown, diameter 14 to 17 mm, on *Q. marilandica*. Fig. 88, 3-5. Beutm. '09b, p. 60

Cynipid. *Amphibolips globulus* Beutm. Globose, clustered, bluntly spurred twig gall resembling small specimens of *D. m a m m a* though the surface is more hoary, internally a larval cell attached but readily separated from the gall, diameter 10 mm, on dwarf oak, *Q. douglasi*. Fullaway '11, p. 342

Cynipid. *Cynips canescens* Bass. Globose, reddish, buff-colored twig gall, irregularly and thickly studded with short, stout spurs, monothalamous, diameter 7 to 12 mm, on dwarf oak, *Q. douglasi*. Fig. 63, 13, 14. Beutm. '09a, p. 37

Cynipid. Studded oak gall, *Cynips corallina* Bass. Globular, thin-shelled, yellowish, pink or red-tinged, clustered twig gall, within a larval cell supported by radiating fibers, diameter 20 to 40 mm, on *Q. reticulata*. Beutm. '11a, p. 86

Cynipid. *Disholcaspis weldi* Beutm. Clustered, globose or bud-shaped, yellowish brown, later turning black, diameter 3 to 6 mm, on *Q. virginiana*. Fig. 60, 11, 64, 14. Beutm. '09a, p. 40

Cynipid. *Disholcaspis succinipes* Ashm. Single or clustered, globose, nipped twig gall covered with a dense, mealy powder, within a partly free larval cell, diameter 12 to 22 mm, on *Q. virginiana*. Fig. 60, 10. Beutm. '09a, p. 36.

Cynipid. Mealy oak gall, *Disholcaspis cinerosa* Bass. Globose, brownish yellow twig gall, the apex sometimes acuminate, diameter 6 to 16 mm, on *Q. chrysolepis*. Ashm. '97, p. 118

Cynipid. *Andricus pacificus* Ashm. Irregular, somewhat rounded twig gall, the sides flattened, slightly oblique, ridged around the upper part of the sides, the apex rounded, occurs singly or in rows, usually closely pressed together, diameter 5 to 10 mm, height 4 to 7 mm, on *Q. chrysolepis*. Fig. 64, 8, 9. Beutm. '11b, p. 68

Cynipid. *Disholcaspis chrysolepidis* Beutm. Globose, yellowish brown or dark brown, sometimes mottled with purple and brown, the interior hard and containing a small larval cell, diameter 3 to 4 mm, on *Q. wislizeni*. Ashm. '97, p. 119

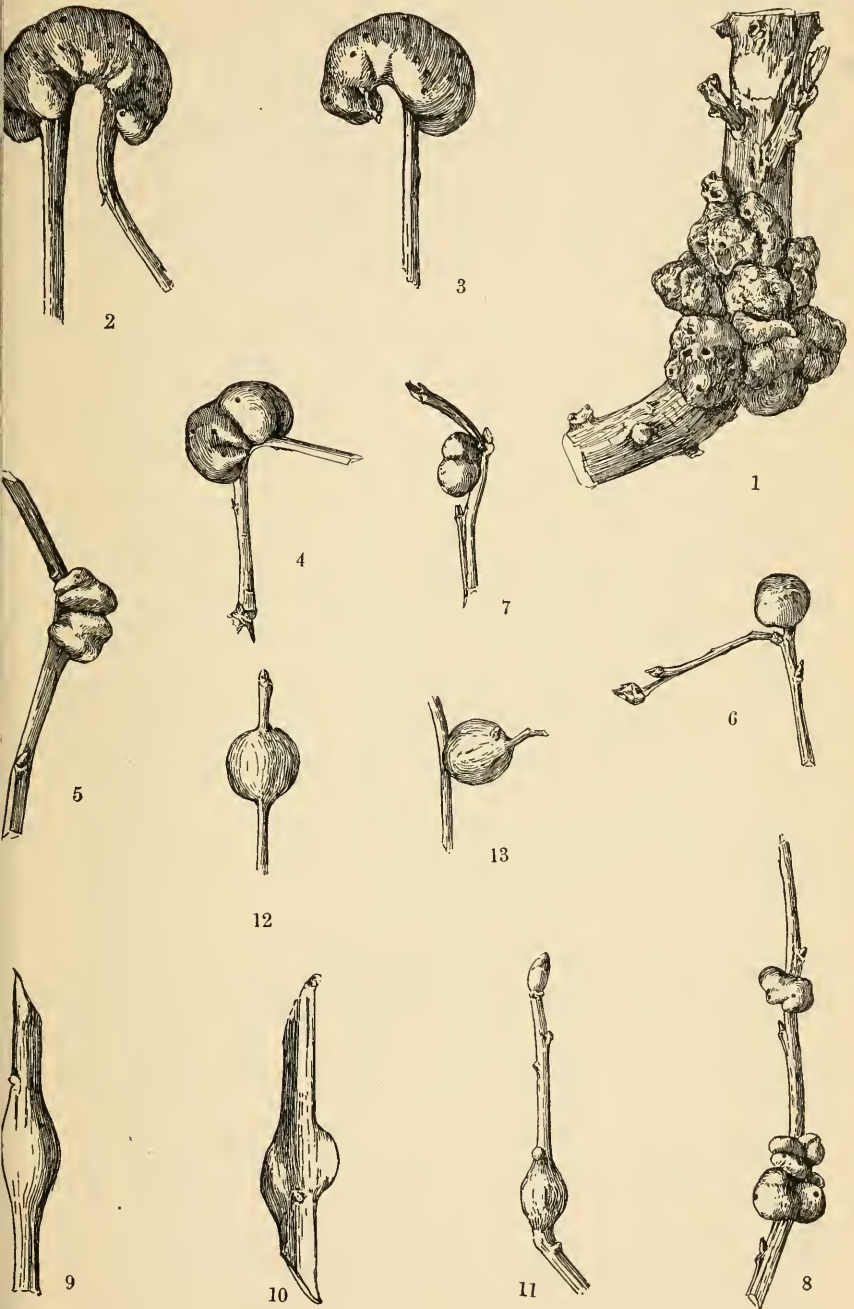
Cynipid. *Andricus wislizeni* Ashm. Ovate or globular, nipped, presumably twig gall containing a central larval cell and covered with a dense, fine, short pubescence, diameter 5 to 8 mm, on *Q. chrysolepis*. Ashm. '97, p. 119

Cynipid. *Andricus chrysolepidis* Ashm. Globose, slightly nipped, wrinkled, with many short, spinelike projections, light yellowish brown, some of the spines tipped with pink, diameter 20 mm, on *Q. chrysolepis*. Beutm. '11c, p. 211

Cynipid. *Andricus yosemite* Beutm. Globose, densely woolly, peach-like twig gall. Diameter 22 to 50 mm. Beutm. '17, p. 348

Cynipid. *Amphibolips nigra* Beutm. Oblate, pale brown, broadly attached twig gall, diameter 4 to 7 mm, height 4 mm, on *Q. kelloggii*. Fig. 63, 6, 7. Beutm. '09a, p. 38

Cynipid. *Disholcaspis eldoradensis* Beutm.



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Fig. 65. 1. Oak fig root gall, *Belenocnema treatae* Mayr. 2-8. Blueberry stem gall, *Solenozophera vaccinii* Ashm. 9-13. *Compsodryoxenus brunneus* Ashm. (After Beutm., Am. Mus. Nat. Hist.)

Globose, apical, somewhat pointed, crimson or scarlet, turning a dark brown, monothalamous, diameter 5 to 8 mm, on *Q. undulata* and *Q. gambellii*. Fig. 63, 8, 9. Beutm. '09a, p. 39

Cynipid. *Disholcaspis perniciosa* Bass.

Globose or irregular, clustered, woody, clay-brown or reddish tinged, twig galls, diameter of mass 30 mm, of individual galls 8 to 18 mm. Beutm. '11a, p. 87

Cynipid. *Disholcaspis mexicana* Beutm.

Globose, solitary, woody, thin-shelled twig gall, the tip frequently slightly pointed, the base somewhat excavated and partly surrounding the twig, pale orange, with short, gray hairs, internally a small basal cell, diameter of gall 12 to 15 mm. Ore. Trotter '11, p. 102

Cynipid. *Andricus* sp.

Globose, woody, solitary or clustered twig gall with a short stem, the dry galls of the same color as the twig, diameter 7.9 mm, of the cell 4 mm. Ore. Trotter '11, p. 102

Cynipid. *Callirhytis* sp.

(b) Form more ovoid, with a point at the apex

Globose, obscurely pointed, green, bright red, turning to brown or dark red, diameter 6 to 18 mm, on *Q. platanoides*, *Q. macrocarpa*. Fig. 64, 1. Beutm. '09a, p. 31

Cynipid. Rough bullet gall, *Disholcaspis mamma* Walsh

Ovate, green, becoming brown, bud gall usually with leaves growing from the sides and internally a closely imbedded though separate larval cell, length 9 mm, diameter 5 to 6 mm, on *Q. undulata*. Fig. 64, 12. Beutm. '09a, p. 34

Cynipid. *Disholcaspis sileri* Bass.

Globose gall covered with very fine, short, grayish pubescence and somewhat pointed at the apex; the larval cell occupies most of the gall, diameter 5 mm. Ashm. '97, p. 122

Cynipid. *Andricus perplexus* Ashm.

Irregularly pyriform twig gall with a bent point apically, diameter 1 cm, on *Q. macrocarpa*. Karsch '80, p. 291

Cynipid. *Andricus macrocarpae* Karsch

(c) Form more or less conical

Hard, conical, black or brownish black galls issuing from the bud axils on the larger branches, the apex sometimes curved, dimensions 12 by 6 mm, on *Q. laurifolia*, *Q. phellos*. Ashm. '81, p. XXVI

Cynipid. *Andricus coniferus* Ashm.

Irregular, somewhat triangular, hard, finely rugose, blackish, seedlike twig gall, mostly covered with a whitish bloom. Ashm. '97, p. 130

Cynipid. *Callirhytis crassicornis* Ashm.

Conical, clustered twig or branch gall, often deep red, becoming when dry, brown or black, length 12 to 18 mm, on *Q. ilicifolia*. Pl. 1, fig. 8. Bassett '64, p. 68

Cynipid. *Andricus ventricosus* Bass.

Globose, usually with a produced, curved apex, single or clustered twig gall, green turning to brown, on *Q. platanoides*, *Q. imbricaria*. Fig. 64, 6, 7. Beutm. '09, p. 33

Cynipid. *Disholcaspis bassetti* Gil.

(d) Not globular or conical

Very hard, ovate or elongate, woody, polythalamous twig swelling on *Q. chrysolepis*. Fig. 65, 9-13. Beutm. '09e, p. 281

Cynipid. *Compsodryoxenus brunneus* Ashm.

Globo-cylindrical, cellular twig galls attached by a broad base and with cuplike expansions, yellowish or greenish brown, frequently black and dirty, diameter 6 mm, on scrub oak. Gillette '93, p. 30, Beutm. '09a, p. 39

Cynipid. *Disholcaspis perniciosa* Bass.

Ovate or budlike, monothalamous, green or red, fleshy gall on trunks of young trees or stems of very young shoots, length 5 to 6 mm, diameter 3 to 3.25 mm, on *Q. rubra*, *Q. velutina*. Beutm. '11e, p. 211

Cynipid. *Andricus rugulosus* Beutm.

(4) Woody, a central kernel and the outer substance of the gall chambered, clustered

Clustered, elongate, fusiform, monothalamous twig galls, the interior corky, filamentaceous, length 1.5 to 2 cm, diameter 1 cm, on *Q. rubra*, *Q. cinerea*, *Q. coccinea*. Pl. 3, fig. 2. Bassett '64, p. 679

Cynipid. *Andricus formosus* Bass.

b Galls distinctly woody, with the structure of typical bullet galls and clustered in compact and characteristic masses about the supporting twig

Clustered, compressed, somewhat fig-shaped, yellowish brown twig galls covered with a feltlike substance, on *Q. virginiana*. Fig. 64, 2-5. Beutm. '09a, p. 40

Cynipid. Woolly fig gall, *Disholcaspis ficigera* Ashm.

Closely compressed clusters of twig galls covered with a rust-colored, velvety substance, spongy internally, reddish brown, length of masses 25 to 50 mm, diameter 16 to 38 mm, on *Q. macrocarpa*, *Q. minor* and *Q. chapmani*. Fig. 63, 10, 11. Beutm. '09a, p. 41.

Cynipid. *Disholcaspis spongiosa* Karsch

Clustered, dark reddish brown twig gall, the mass resembling an irregular nubbin of red dent corn, on *Q. virginiana*. Bassett '00, p. 329

Cynipid. *Loxaulus spicatus* Bass.

Globose twig enlargement, diameter 12 mm, composed of a series of monothalamous, brown, wedge-shaped, closely fitted cells, on *Q. bicolor*, *Q. macrocarpa*. Pl. 3, fig. 5. Osten Sacken '62, p. 254

Cynipid. Lobed oak gall, *Cynips strobilana* O. S.

Rounded or crown-shaped, monothalamous, pale green twig gall, soft when fresh, becoming hard after drying, thick-walled, diameter 6 to 12 mm, length 8 to 12 mm, on *Q. palustris*, *Q. aquatica*. Beutm. '07, p. 464

Cynipid. *Andricus coronus* Beutm.

c Galls in compact cluster around the twig but bladderlike and not woody as in the last group

Numerous soft, thin-shelled, yellow, red or brown twig galls frequently closely pressed together and somewhat resembling figs, on *Q. alba*, *Q. prinoides* and *Q. prinus*. Fig. 66, 84, 1, 2. Beutm. '09d, p. 244

Cynipid. Oak fig gall, *Biorhiza forticornis* Walsh

d Galls on twigs, consisting of fibrous material which conceals one or more cells containing larvae

(1) Cells large, solitary or clustered

Elongate or oblong, woody, tubelike twig gall resembling a date seed, sessile on the branch and covered with long, brownish yellow wool, length 2 cm, diameter 5 to 7 mm, on *Q. chrysolepis*. Ashm. '97, p. 117

Cynipid. Woolly tube gall, *Andricus dasydactyli* Ashm.

Elongate, irregular, hard, woody cell, broadly attached to the twig and covered with a compact mass of white, woolly substance sometimes tinged with red or brown, length 15 to 20 mm, diameter 12 to 20 mm, on *Q. minor*. Beutm. '09f, p. 248

Cynipid. *Andricus aciculatus* Beutm.



Fig. 66. Oak fig gall. *Biorhiza forticornis* Walsh. (Original)

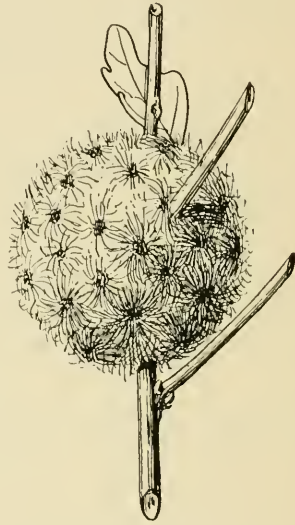


Fig. 67. Wool sower, *Andricus seminator* Harr. (Original)

(2) Cells small, numerous, massed in a cluster beneath the fibers

Globular white, pinkish marked, woolly growth containing seedlike grains and occurring on twigs in June, diameter 2.5 to 4 cm, on *Q. alba*. Fig. 67. Walsh '70, p. 71

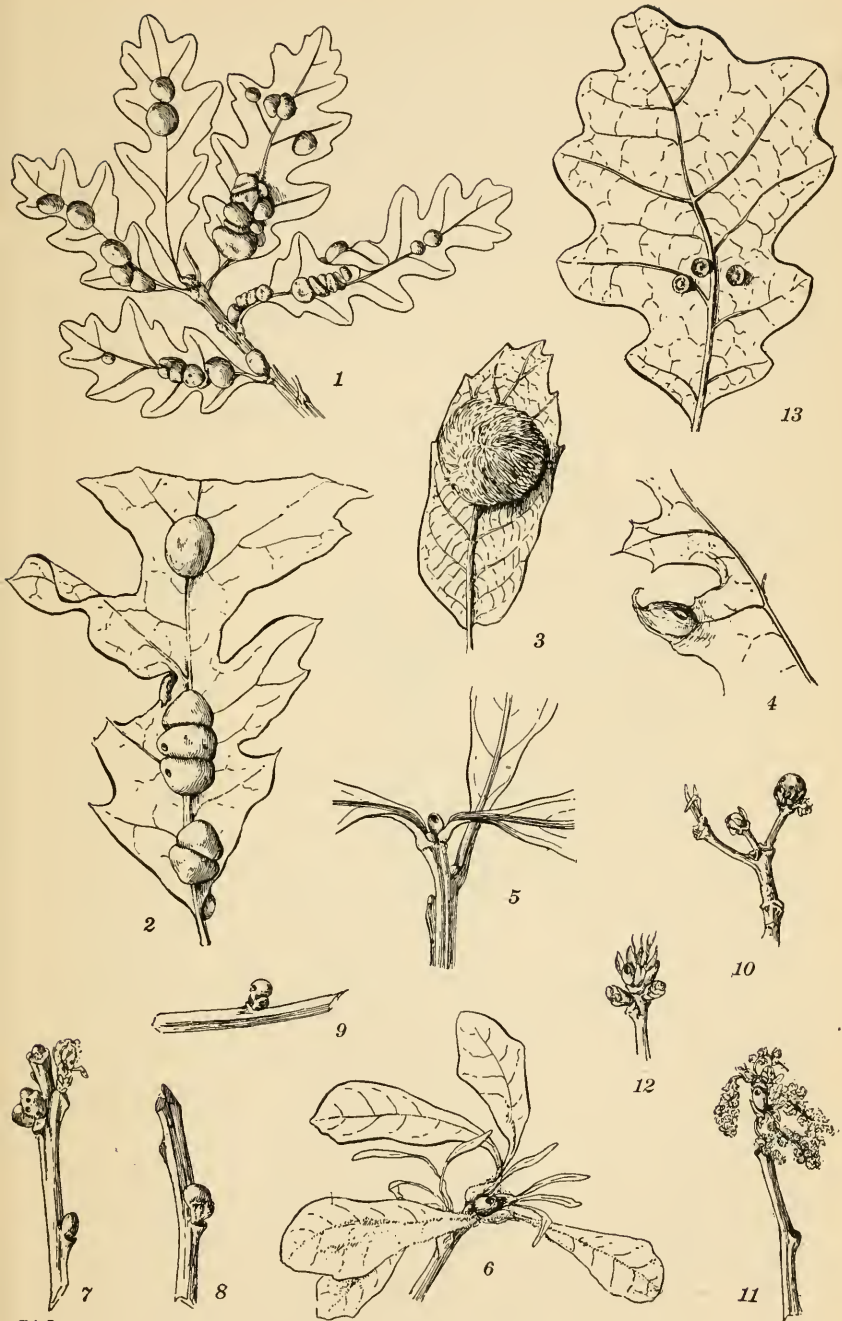
Cynipid. Wool sower, *Andricus seminator* Harr.

Among the fibers of fresh *Andricus seminator* galls

Itonid. *Cecidomyia* sp.

Round, woolly twig gall containing seedlike grains and closely resembling that of *C. seminator* Harr., on *Q. nigra*. Osten Sacken '62, p. 256

Cynipid. *Callirhytis operator* O. S.



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Fig. 68. *Dryophanta* galls. 1, 2. *D. eburnea* Bass. 3. *D. nubila* Bass. 4. *D. notha* O. S. 5, 6. Threaded oak gall, *D. pallipes* Bass. 7-10. *D. clarkei* Bass. 11, 12. Hard oak bud gall, *D. gemula* Bass. 13. *D. discus* Bass. (After Beutm., Am. Mus. Nat. Hist.)

Ovate, haired twig gall consisting of 20 to many irregularly fusiform cells, apically haired, forming gray, brown masses, on *Q. macrocarpa*. Karsch '80, p. 291

Cynipid. *Andricus setifer* Karsch

Large twig gall composed of a woolly mass having a diameter of 85 to 60 mm and encircling twigs 5 mm in diameter, each mass composed of from few to many cells and covered with long, white wool. Beutm. '13, p. 132

Cynipid. *Callirhytis furnessae* Weld.

Irregular, globose, brownish yellow twig gall, smooth above, tomentose below, length 2.5 cm, diameter 12 mm. Mayr. '05, p. 571

Cynipid. *Andricus bonansea* Mayr.

Woolly twig gall composed of numerous haired cells, white, blended with rose and later rusty red, diameter 1 to 3 cm. Mex. Trotter '11, p. 127

Cynipid. ? *Callirhytis* sp.

5 Gall consisting of one or more larval cells or capsules in a leaf bud

a Hard cell or cells surrounded by a number of modified leaves. See also b, c, d on pages 75 and 76.

(1) Cells surrounded by a few threadlike bodies

Oblong, oval, thin-shelled, blackish brown galls among the thrifty young buds and surrounded by six or more long, brown, threadlike bodies, length 2.5 mm, diameter 1.5 mm, on *Q. alba*. Fig. 68, 5, 6. Bassett '00, p. 327

Cynipid. Threaded oak gall, *Dryophanta pallipes* Bass.

(2) Cells surrounded by a rosette of linear leaves

Conical, axillary leaf bud gall covered with a dense, rosettelike cluster of aborted leaves, cell oval, length 3 mm, on *Q. prinoides*. Fig. 69, pl. 3, fig. 3. Bassett '64, p. 688

Cynipid. Oak rosette gall, *Cynips frondosa* Bass.

Dormant bud galls covered with short fuzzy abortive leaflets and occurring in clumps on trunks of Spanish oak (*Q. digitata*) and blue jack oak (*Q. brevifolia*). Beutm. '17, p. 349

Cynipid. *Dryophanta floridensis* Beutm.

Urn-shaped bud gall with numerous lanceolate, leaflike spines, diameter 12 to 18 mm, middle cell brownish, length 3.5 to 4 mm, diameter 2 to 2.5 mm, on *Q. prinoides*, *Q. alba* and *Q. macrocarpa*. Pl. 1, fig. 3. Ashm. '81, p. XII

Cynipid. Leafy oak gall, *Andricus foliatus* Ashm.

Small, brown, acorn-shaped gall issuing from a bud axil and surrounded basally by small, narrow, dense leaflets, the cell ovate, diameter 3.75 by 2.5 mm, on *Q. obtusiloba*. Ashm. '87, p. 136

Cynipid. *Andricus stropus* Ashm.

(3) Several cells surrounded by a rosette of aborted leaves

A rosette cluster of dense, narrow leaflets springing from a bud, cells, length 3 mm, diameter 2 mm, on *Q. macrocarpa* Ashm. '87, p. 136

Cynipid. *Andricus topiarius* Ashm.

Conical, axillary leaf bud gall covered with a dense, rosettelike cluster of aborted leaves, cell oval, length 3 mm, on *Q. prinoides*. Fig. 68, pl. 3, fig. 3. Bassett '64, p. 688

Cynipid. Oak rosette gall, *Cynips frondosa* Bass

Polythalamous bud galls surrounded by a thick, compact leaf cluster, on *Q. lobata*. Fullaway '11, p. 353

Cynipid. *Andricus wiltzae* Fullw.

Irregularly rounded or ovate, woody, polythalamous swellings with aborted leaves, on *Q. minor*. Fig. 85, 8. Beutm. '10c, p. 120

Cynipid. *Neuroterus obtusilobae* Karsch

b A hard cell in the bud and no circle of modified leaves

Rounded or oval, monothalamous, blackish, flower or leaf bud gall, length 2.5 mm, diameter 1.25 mm, on *Q. prinoides*. Fig. 68, 11, 12. Beutm. '11d, p. 358

Cynipid. Hard oak bud gall, *Dryophanta gemula* Bass. Smooth, thin-shelled, globular gall, diameter 2 to 3 mm, arising from a bud and occasionally inclosed by bud scales, on *Q. laurifolia*. Ashm. '87, p. 141

Cynipid. *Andricus calycicola* Ashm.



Fig. 69. Oak rosette gall, *Cynips frondosa* Bass. (Original)



Fig. 70. *Neuroterus minutus* Bass., showing aborted leaves. (Original)



Fig. 71. *Neuroterus minutus* Bass., showing several galls on a slightly deformed leaf. (Original)

c A soft capsule in the bud and no modified leaves

A smooth, reddish brown vesicle in the center of the bud of *Q. alba* and surrounded at the base by bud scales, color pale greenish brown, on *Q. alba*, *Q. bicolor*, *Q. prinoides*, *Q. platanoides* and *Q. macrocarpa*. Fig. 81, 4-9. Beutm. '10e, p. 131

Cynipid. Soft oak bud gall, *Neuroterus vesiculus* Bass. Reddish vesicles on the terminal growing point of buds and bud scales. Trigger-son '14, p. 4

Cynipid. *Cynips erinacei* Mayr.¹

¹ The better known agamic form is *Philonix erinacei* Mayr., see p. 94

Polythalamous, small, round, brown, thin-walled bud gall, diameter 3 mm, on *Q. alba*, *Q. minor*, resembles gall of *D. vesiculus*. Fig. 68, 7-10. Beutm. '11d, p. 368

Cynipid. *Dryophanta clarkei* Bass

Conical bud gall, length 8 to 12 mm, diameter 4 to 5 mm, on *Q. parvifolia*. Ashm. '87, p. 137

Cynipid. *Andricus cinnamomeus* Ashm.

Small, thin, completely concealed capsules occurring singly in buds of *Q. undulata*. Gill. '92, p. 247

Cynipid. *Andricus cellularius* Gill.

d Capsules in the bud, blasting it completely or so that only a few deformed and imperfect leaves appear

Polythalamous, small, round, brown, thin-walled bud gall, diameter 3 mm, on *Q. alba*, *Q. minor*, resembles gall of *D. vesiculus*. Fig. 69, 7-10. Beutm. '11d, p. 368

Cynipid. *Dryophanta clarkei* Bass.

A minute, round, thin-shelled gall in apparently normal, young buds of post oak, diameter 1 mm. Beutm. '13, p. 247

Cynipid. *Dryophanta cressoni* Beutm.

Globose, whitish, smooth and glabrous apically, polythalamous bud gall, within whitish, spongy, diameter 22 mm, on *Q. agrifolia*. Fullaway '11, p. 358

Cynipid. *Callirhytis maculipennis* Kieff.

Oblong, oval, longitudinally ribbed, brown galls without a distinct cell, occurring in groups of two or three and issuing from bud axils, on *Q. cinerea*. Ashm. '87, p. 142

Cynipid. Jumping ribbed gall, *Andricus saltatus* Ashm.

Clustered, globular, woolly bud capsules, apical or axillary, the clusters with a diameter of 6 to 8 mm. Beutm. '10c, p. 132

Cynipid. *Neuroterus congregatus* Gill.

Rounded, monothalamous bud gall, diameter 10 mm, yellowish, woolly, within a thin-shelled cell with a diameter of 4 mm, on *Q. wislizeni*. Fullaway '11, p. 359

Cynipid. *Callirhytis eriophora* Kieff.

Globose, opaque, yellowish, sparsely brown-spotted, glabrous apically, monothalamous bud gall, diameter 8 mm, within spongy and a thick-shelled cell, the latter with a diameter of 5 mm, on *Q. agrifolia*. Fullaway '11, p. 359

Cynipid. *Callirhytis clarimontis* Kieff.

Oval bud gall, smooth, glabrous, ligneous, length 13 mm, diameter 11 mm, apically with a thin, longitudinally striated, thick and more or less bent point about 8 mm long and 1.5 mm thick, on *Q. chrysolepis*. Fullaway '11, p. 360

Cynipid. *Callirhytis bakeri* Kieff.

Irregular, oval bud gall, the leaflets hardly extending from the buds. Pl. 16, fig. 5. Thompson '15, p. 98

Acarid. *Eriophyes* sp.

Globose, yellowish brown, polythalamous bud gall with numerous irregular, longitudinal and transverse ridges or tuberosities, diameter 40 mm, apically with a conical spur and having a length of 5 mm, internally numerous oval cells, on *Q. chrysolepis*. Fullaway '11, p. 361

Cynipid. *Callirhytis rossi* Kieff.

Globose, monothalamous, thin-shelled bud gall, green, turning brown or gray, imbedded in short, lanceolate, aborted leaves more or less concealing the gall, diameter 3 mm, on *Q. platanoides*. Beutm. '13f, p. 124

Cynipid. *Andricus flavohirtus* Beutm.

Globular or elliptical, grayish red, woody bud gall, the apex slightly pointed, length 10 to 14 mm, diameter 6 to 9 mm. Cal. Trotter '11, p. 113

Cynipid. ? *Cynips* sp.

Subglobose, monothalamous, yellowish bud gall, diameter 2 to 3 cm, diameter of cell 6 mm. Mex. Trotter '11, p. 127

Cynipid. ? *Cynips* sp.



Fig. 72. Oak leaf stalk gall, *Andricus petiolicola* Bass. (Original)

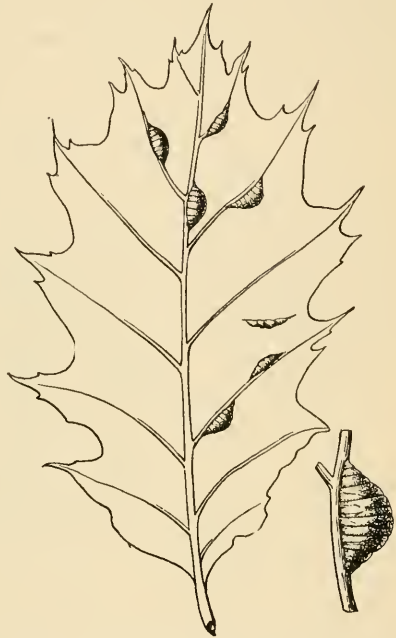


Fig. 73. *Cecidomyia* sp. Vein gall on oak. (Original)

Ovate bud gall, the surface with numerous reddish scales, length 10 to 12 mm, diameter 7 to 8 mm. Wash. Trotter '11, p. 113

Cynipid. *Andricus* sp.

Subglobose lateral bud gall, diameter 8 to 15 mm. Cal. Trotter '11, p. 111

Itonid. *Cecidomyia* sp.

Bud gall composed of a basal, oblate part with a height of 3 to 4 mm and a conico-pyramidal portion with a height of 10 to 12 mm and a diameter of 8 to 12 mm, the larval cell in the basal portion, resembles *D. bassetti*. Cal. Trotter '11, p. 109

Cynipid. ? *Disholcaspis* sp.

6 Galls of the leaves (in some cases the leaf itself is aborted and the gall issues from the twig or bud)

a Galls on the petiole of the leaf

Irregularly globose petiole gall about the size and color of a large, dry pea, on live oak. Ashm. '97, p. 123

Cynipid. *Cynips sulcatus* Ashm.

Globose, somewhat pubescent, monothalamous, brownish gall with a hard outer shell and a spongy interior, diameter 5 to 6 mm, on under surface of leaf on *Q. alba*. Fig. 97, 4. Beutm. '11d, p. 346

Cynipid. *Dryophanta carolina* Ashm.

Globular, below ochreous, not shining petiole leaf gall, internally brown, fibrous, with at least two cells, diameter 9 mm, on *Q. arizonica*. Beutm. '09a, p. 35

Cynipid. *Disholcaspis arizonica* Ckll.



Fig. 74. *Cecidomyia* sp. on black oak, a2296. An older gall, possibly different from the preceding. (Original)

Polythalamous, irregular, clustered swellings of the petiole and midrib covered with pinkish pubescence, on *Q. alba*. Fig. 53, 3-5, 70, 71. Beutm. '10c, p. 127

Cynipid. *Neuroterus minutus* Bass.

Irregular swellings of the petiole, midrib or portions of the catkins dwarfing the growth, on *Q. macrocarpa*. Fig. 53, 8, 9. Beutm. '10c, p. 128

Cynipid. *Neuroterus vernus* Gill.

b Gall a swelling of the midvein or sometimes of the petiole (See also (13) p. 106, and (15) a, b, p. 110)

(1) Swellings abrupt

Globose or spindle-shaped, woody, green petiole or midrib gall on *Q. alba*, *Q. prinus*, *Q. macrocarpa*, *Q. bicolor*, *Q. prinoides*, *Q. obtusiloba*. Fig. 72. Bass. '63, p. 324

Cynipid. Oak leaf stalk gall, *Andricus petiolicola* Bass. Polythalamous, midvein gall projecting on both surfaces, rounded beneath, conical above, length 19 to 22 mm, diameter 12 mm, on *Q. alba*. Pl. 1, fig. 1. Bass. '90, p. 80

Cynipid. *Andricus cicatriculus* Bass. Irregular, polythalamous, reddish brown, woody thickening of the midvein or leaf and containing radiating larval cells, length 8 to 15 mm, diameter 5 to 6 mm, differs from both *Andricus petiolicola* and *Callirhytis tumifica*. Mex. Trotter '11, p. 131

Cynipid. ? *Cynips* sp.

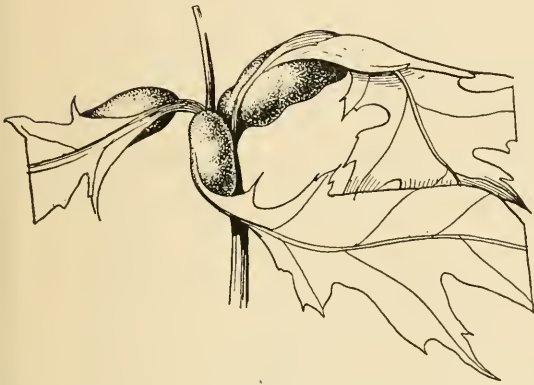


Fig. 75. Midrib tumor gall, *Callirhytis tumifica* O. S. (Original)

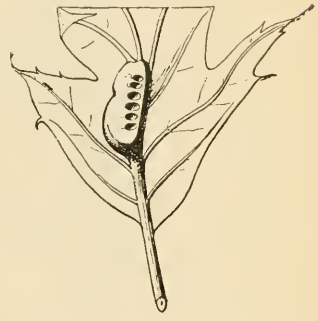


Fig. 76. Midrib tumor gall, *Callirhytis tumifica* O. S. Section showing arrangement of larval cells. (Original)

Soft, thin-shelled, red or brown vein galls frequently closely pressed together and somewhat resembling figs, on *Q. alba*, *Q. prinoides* and *Q. prinus*. Fig. 66, 84, 1, 2. Beutm. '09d, p. 244

Cynipid. Oak fig gall, *Biorhiza forticornis* Walsh Small, rounded, polythalamous, midvein gall projecting equally on both surfaces, diameter 2 to 3 mm, on *Q. parvifolia*. Ashm. '87, p. 138

Cynipid. *Callirhytis parvifoliae* Ashm. Globose, polythalamous, midvein gall near the base of the leaf, prominent on both surfaces, diameter 6 mm, cells radiating from a common center and not separable from woody fiber about them, on *Quercus* species. Bassett '90, p. 74

Cynipid. *Callirhytis reticulata* Bass. Irregular, polythalamous, globose, fleshy gall occurring near the base of the leaf and projecting about equally above and below, diameter 4 to 7 mm. Ashm. '97, p. 116

Cynipid. *Andricus morrisoni* Ashm.

Globose, hard petiole gall projecting equally above and beneath, at first smooth, reddish brown, minutely pubescent, later turning black, within five longitudinal partitions, diameter 6 mm, on *Q. obtusiloba*. Ashm. '85, p. 299
Cynipid. Five-chambered oak gall, *Andricus quinqueseptum* Ashm.

Globose, clustered, monothalamous, midrib gall with a more or less distinct nipple apically and a long stem basally, brown when old, probably green when fresh, diameter 4 to 7 mm, stem 1 to 2.5 mm, resembles a huckleberry, on post oak. Beutm. '13, p. 247

Cynipid. Huckleberry oak gall, *Cynips vacciniiformis* Beutm.

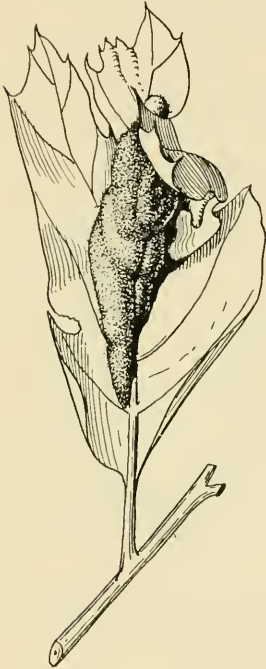


Fig. 77. Woolly fold gall. *Cecidomyia niveipila* O. S., leaf badly deformed. (Original)



Fig. 78. Woolly fold gall, *Cecidomyia niveipila* O. S., leaf slightly deformed. (Original)

Globular, clustered, monothalamous, midrib gall, the diameter of individual galls 2 to 5 mm, on *Q. undulata*, *Q. muhlenbergii*, *Q. prinoides*. Stebb. '10, p. 31

Cynipid. *Cynips caducus* Walsh

Subglobular, straw-colored or brown, midrib galls, flattened next the leaf, within a larval cell with radiating fibers, diameter 4 to 6 mm, on *Q. undulata*. Fig. 68, 1, 2. Beutm. '11d, p. 348

Cynipid. *Dryophanta eburnea* Bass.

Rounded or elongate midrib swellings filled with oblong or elongate kernels, a few to 40; when young concealed in the tissues and bursting open in October, on *Q. rubra*, *Q. velutina*. Beutm. '13g, p. 131

Cynipid. Deciduous oak gall, *Andricus decidua* Beutm.

Irregularly rounded, oval or elongate, midrib or vein gall, sometimes deforming the entire leaf, green, turning brown and becoming woody when old, length 10 to 35 mm, diameter 10 to 15 mm, on *Q. garryana*. Beutm. '13d, p. 280

Cynipid. *Neuroterus washingtonensis* Beutm.

Fusiform ribbed or carinate mid or lateral vein folds on the under surface, length 6 to 8 mm, diameter 3 to 4 mm. Fig. 73, 74.

Itonid. *Cecidomyia* sp. a2296

Elongate, polythalamous, midrib swellings with the larval cells perpendicular to the surface of the leaf, length 18 mm, diameter 9 mm, on *Q. ? undulata*. Beutm. '10, p. 134

Cynipid. *Neuroterus quercicola* Dalla Torre

(2) Less abrupt and localized enlargements of midveins (more rarely of lateral veins and the petiole)

Midrib, polythalamous swellings mostly near the base of the leaf, some on the petiole, on *Q. tinctoria*. Fig. 75, 76. Osten Sacken '65, p. 356

Cynipid. Midrib tumor gall, *Callirhytis tumifica* O. S.

Irregular, elongate or globose enlargements of the midrib or terminal twigs, length 1.5 to 2.5 mm, diameter 4 to 12 mm, on *Q. nigra*, *Q. rubra*, *Q. lobata*. Fullaway '11, p. 362

Cynipid. *Callirhytis nigrae* O. S.

Irregular, polythalamous, midrib swellings often 2.5 cm long, 1.2 cm in diameter, on *Q. tinctoria*. Bassett '81, p. 105

Cynipid. Oak midrib gall, *Andricus piger* Bass.

Slight, fleshy swelling along the midrib, containing two or more small cells, diameter of latter 1.8 to 2 mm, on *Q. laurifolia*. Ashm. '87, p. 141

Cynipid. *Callirhytis cellae* Ashm.

Hard, woody, midvein or lateral vein galls, the leaf much wrinkled and deformed, length 18 mm, diameter 6 mm, on *Q. macrocarpa*. Beutm. '10c, p. 135

Cynipid. *Neuroterus flavipes* Gill.

Irregular, pustulelike, polythalamous petiole and midrib gall on *Q. minor*. Beutm. '10c, p. 133

Cynipid. *Neuroterus gillettei* Bass.

Subglobose, slightly depressed, monothalamous, smooth and, under the lens, squamose, grayish red vein gall, diameter 5 to 6 mm, height 3 to 3.5 mm. Mex. Trotter '11, p. 126

Cynipid. ? *Cynips* sp.

Spherical, monothalamous, smooth, with a slight, superficial roughness, reddish vein gall, occurs singly or in clusters and when in the latter, somewhat compressed, diameter 5 to 6 mm. Mex. Trotter '11, p. 123

Cynipid. *Cynips* sp.

Spherical, monothalamous, woody vein gall, the surface smooth, grayish, with minute, grayish warts, diameter 8 mm. Cal. Trotter '11, p. 118

Cynipid. ? *Cynips* sp.

Irregular, monothalamous or polythalamous thickenings of the mid or lateral veins occurring on both surfaces, diameter 3 to 4 mm. Mex. Trotter '11, p. 128
Cynipid. ? *Cynips* sp.

Pyriform or clavate, reddish vein galls, the expanded portion with a lateral ridge and longitudinal striations; within a larval cell, height 6 mm, diameter 4.5 mm. Cal. Trotter '11, p. 117

Cynipid. *Andricus pistillarum* Trott.

Nar ow, dark pu plish, fusiform, thin-walled swelling on the under side of the mid or lateral veins may contain two or more larvae, length 8 mm. Pl. 8, fig. 9. Felt '16d, p. 159

Itonid. Purple oak vein gall, *Cincticornia podagrae* Felt Large, midrib fold with a conspicuous, white pubescence, the leaf frequently deformed. Fig. 77, 78, 79. Stebb. '10, p. 17

Itonid. Woolly fold gall. *Cecidomyia niveipila* O. S. Elongate, pocketlike swellings along the midrib of round-leaved scrub oak, length 5 mm. Pl. 8, fig. 3. Felt '08e, p. 411

Itonid. Vein-pocket gall, *Parallelodiplosis florida* Felt



Fig. 79. Woolly fold gall, *Cecidomyia niveipila* O. S., early stages of two galls. (Original)

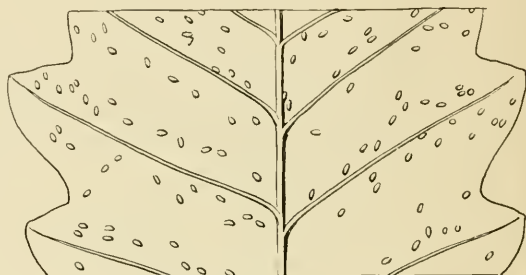


Fig. 80. Oak blister gall, *Neuroterus papillosus* Beutm. (Original)

Elongate fold gall close to the midrib on the under surface, length 12 mm, diameter 1 mm, on *Quercus*, possibly identical with the preceding.

Itonid. *Cecidomyia oruca* Walsh

Fusiform, thin-walled, striate, pale green vein swelling, length 5 mm, diameter 3 mm, on red oak. Pl. 8, fig. 4.

Itonid. *Cecidomyia* sp. a2728

Globose or blisterlike, monothalamous leaf vein swellings more distinct on the upper side and with a minute nipple on the lower surface, diameter 1 to 1.75 mm, on *Q. alba* and *Q. macrocarpa*. Fig. 81, 1. Beutm. '10c, p. 121

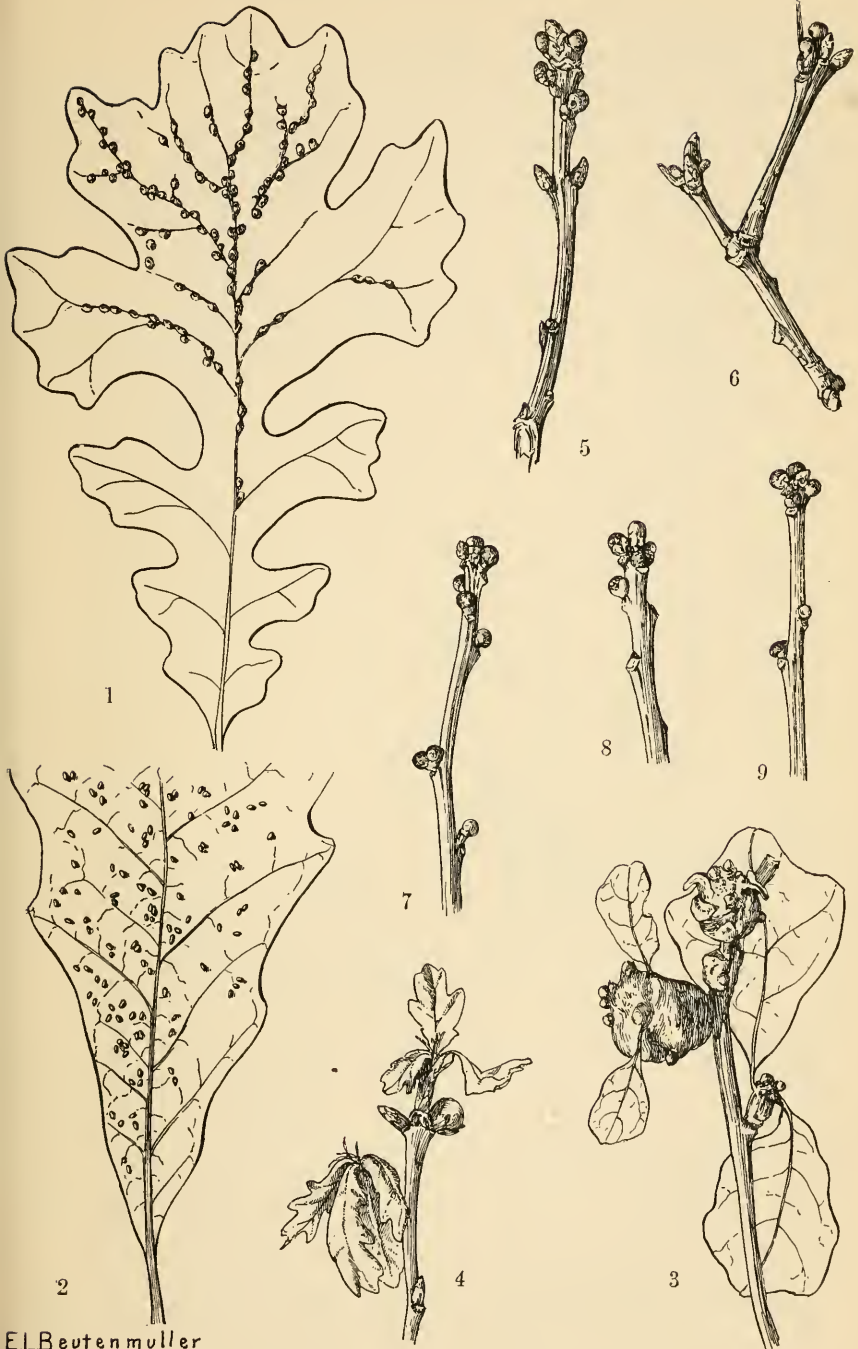
Cynipid. *Neuroterus niger* Gill.

Hemispherical or subhemispherical, pale brown, minutely cracked vein gall, diameter 4 mm, height 2.5 mm, on *Quercus* sp. Fig. 107, 10. Beutm. '10c, p. 125

Cynipid. *Neuroterus cockerelli* Beutm.

Oval, thin-walled, monothalamous vein swellings covered with a dense, brown pubescence, on *Q. alba*. Fig. 53, 10. Beutm. '10c, p. 128

Cynipid. *Neuroterus pallipes* Bass.



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Fig. 81. *Neuroterus* galls. 1. *N. niger* Gill. 2. Gall of oak blister wasp, *N. papillosus* Beutm. 3. Gall of *N. consimilis* Bass. 4-9. Soft oak bud gall, *N. vesiculus* Bass. (After Beutm., Am. Mus. Nat. Hist.)

A slight circular, blisterlike swelling on the lateral veins, length 3 mm, diameter 1 mm, on *Q. rubra*. Felt '16d, p. 161

Itonid. Oak vein blister, *Cincticornia americana* Felt
Subglobose or fusiform, pale green, yellow margined leaf fold, mostly on under surface, length 3 to 7 mm, diameter 3 mm. Pl. 9, fig. 1.

Itonid. *Cecidomyia* sp. a1979

Gall, similar to, if not identical with the above. Pl. 9, fig. 2. Stebb. '10, p. 17

Itonid. *Cincticornia majalis* O. S.

(3) A whole leaf is swollen to form a fleshy, elongated gall

Very irregular, swollen mass originating from the midvein or the petiole of the leaf and involving the whole structure, green and succulent, later shriveling and drying, size variable, on *Q. platanoides*. Fig. 55. Beutm. '10c, p. 119

Cynipid. Noxious oak gall, *Neuroterus noxiosus* Bass.



Fig. 82. *Eriophyes* sp., showing upper and lower surface of leaf. (Original)



Fig. 83. Oak wart gall, *Andricus futilis* Bass. in profile and sectioned. (Original)

Subglobose, polythalamous, reddish brown leaf gall, entirely deforming small leaves, diameter 4 to 5 mm. Cal. Trotter '11, p. 114

Cynipid. ? *Cynips* sp.

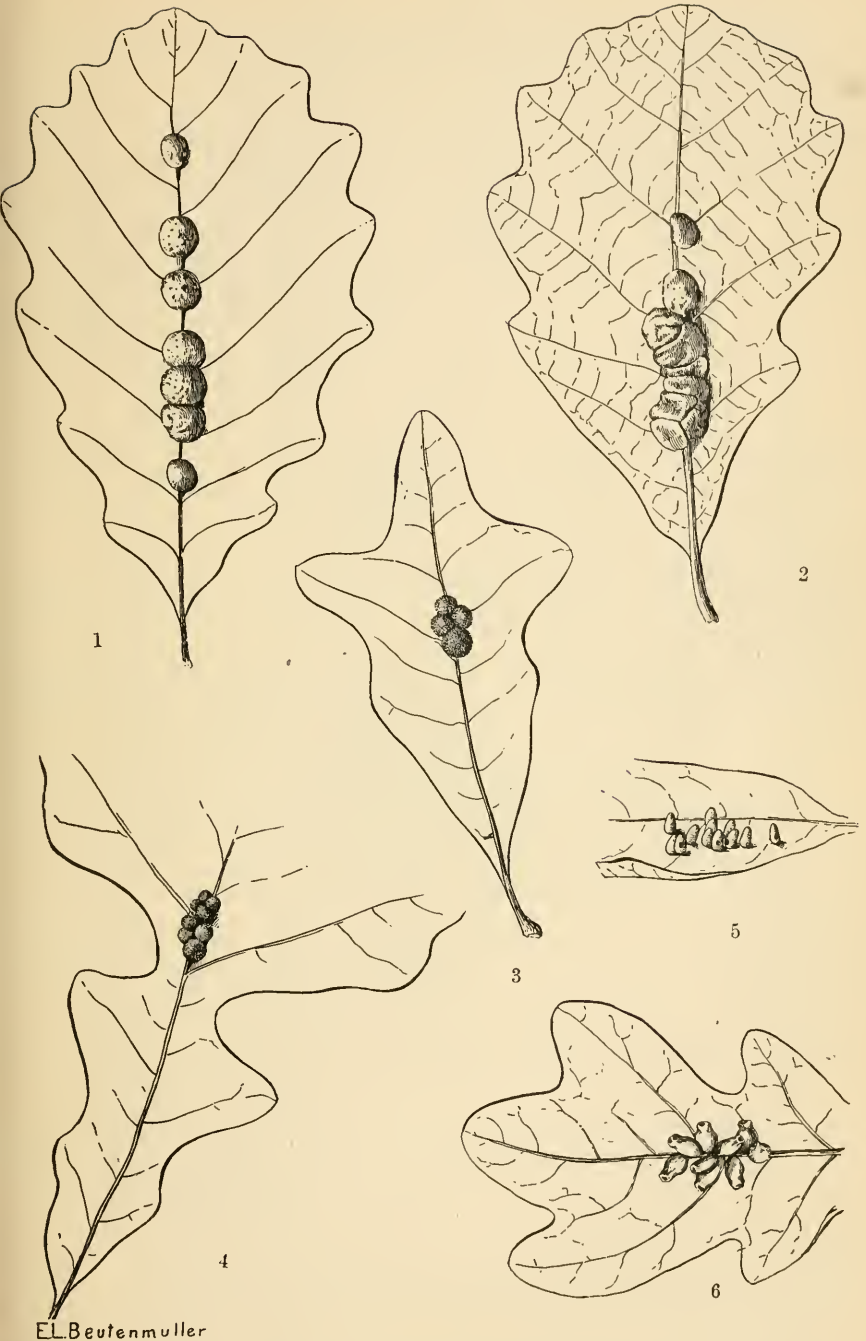
c Galls involving or attached to the lamina of the leaves

(1) Little or no thickening of the leaf tissues. See also (2-3), (4-5), (6), (7-8), (9-10), (11), (12), (13), (14), (15-16), (17), (18), on pages 88, 90, 92, 94, 95, 102, 104, 106, 109, 110, 115 116 respectively.

(a) Small, blisterlike or pustular swellings of the leaf blade

Globose, thin-walled, monothalamous leaf galls, single or clustered, showing on both surfaces, diameter 5 mm, on live oak. Fig. 107, 6. Beutm. '10c, p. 122

Cynipid. *Neuroterus howertoni* Bass



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Fig. 84. 1, 2. Oak fig gall, *Biorhiza forticornis* Walsh on dwarf chestnut oak. 3, 4. *B. mellea* Ashm. 5. *Xystoteras volutellae* Ashm. 6. Bell-shaped oak gall, *Zophero-
 eras vacciniæ* Ashm. (After Beutm., Am. Mus. Nat. Hist.)

Elongate, oval, blisterlike leaf swelling without a nipple, on the under side, length 1 mm, diameter .75 mm, on *Q. platanoides*. Fig. 80, 81, 2.
Beutm. '10c, p. 121

Cynipid. Oak blister wasp, *Neuroterus papillosus* Beutm.
Subelliptical, blister leaf gall, length 2 to 2.5 mm. Cal. Trotter '11, p. 108

Cynipid. *Neuroterus* sp.

A broadly yellow-margined, circular, blister leaf gall, diameter 3 mm, on *Q. coccinea*. Felt '16d, p. 154

Itonid. Oak yellow-spot, *Cincticornia serrata* Felt
A variable brown, irregularly oval, pustulate leaf swelling, diameter 5 to 6 mm, on *Q. velutina*, *Q. rubra*. Pl. 8, fig. 7. Felt '16d, p. 156

Itonid. Oak blister midge, *Cincticornia pustulata* Felt
An irregularly oval, pustulate swelling showing equally on both leaf surfaces but with no nipple, diameter 5 to 6 mm, on *Q. rubra*, *Q. velutina*.
See plate 8, figure 8 for similar galls. Felt '16d, p. 157

Itonid. *Cincticornia simpla* Felt
Irregularly oval, pustulate leaf swelling showing equally on both surfaces but with no nipple, diameter 5 to 6 mm, on *Q. velutina*. Felt '16d, p. 168

Itonid. *Cincticornia sobrina* Felt
A slight, circular, blisterlike swelling of the lateral veins, length 3 mm, diameter 1 mm. Felt '08e, p. 380, 381

Itonid. Oak vein blister, *Cincticornia americana* Felt
A flat, relatively inconspicuous, presumably blister gall on *Q. rubra*. Felt '16d, p. 155

Itonid. *Cincticornia quercifolia* Felt
Blister leaf gall, inconspicuous, greenish, diameter 4 to 5 mm, on *Q. agrifolia*

Itonid. *Cecidomyia* sp. a2905

(b) Superabundant leaf hairs (erineum) or more or less distinct dimples

A yellowish green dimple, convex on the upper surface of the leaf, lined within with whitish or brownish hairs, on *Q. alba*. Chad, '08, p. 142

Acarid. *Eriophyes* sp.

Very small, pocket galls, crowded on the upper surface of the leaf, on *Q. platanoides*. Chad, '08, p. 143

Acarid. *Eriophyes* sp.

Galls on the leaves of burr oak, *Q. macrocarpa*. Parrott et al. '06, p. 289

Acarid. *Eriophyes querci* Garm.

Deformation of leaves on the margin, on *Q. minor*. Chad, '08, p. 142

Acarid. *Eriophyes* sp.

A large, greenish yellow dimple, slightly convex above, beneath filled with a dense, brown pubescence, on *Q. macrocarpa*. Chad, '08, p. 142

Acarid. *Eriophyes* sp.

Greenish or reddish elevations on the upper surface, the concavity below nearly filled with yellowish brown hairs, on *Q. marilandica*. Fig. 82.

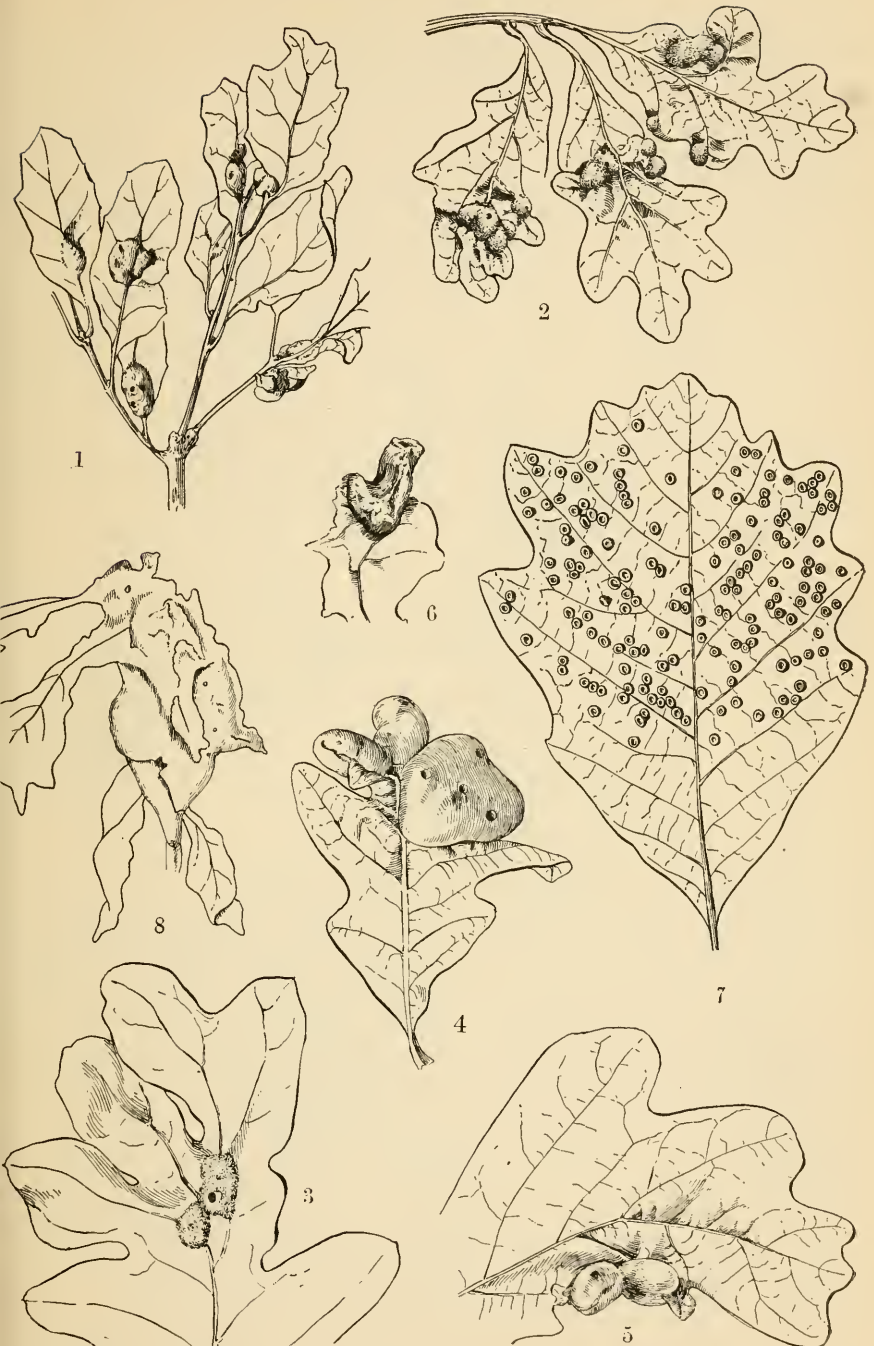
Acarid. *Eriophyes* sp.

Brown erineum on the under side of the leaves, on *Q. rubra*. Chad, '08, p. 143

Acarid. *Eriophyes* sp.

Large patches of dense, brown hairs on the under side of the leaf, on *Q. coccinea*. Chad, '08, p. 142

Acarid. *Eriophyes* sp.



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Fig. 85. *Neuroterus* galls. 1. Gall of *N. fragilis* Bass. 2, 3. Gall *N. irregularis* O. S. 4-6. Gall of *N. majalis* Bass. 7. Oak button gall, *N. umbilicatus* Bass. 8. Gall of *N. obtusilobae* Karsch. (After Beutm., Am. Mus. Nat. Hist.)

Velvety red erineum on the under side of the leaf, the younger portions greenish, on *Q. velutina*. Chad. '08, p. 143

Acarid. *Eriophyes* sp.

A snuff-brown erineum in large patches on the under side of the leaf of *Q. nana*. Chad. '08, p. 142

Acarid. *Eriophyes* sp.

An ashen erineum in the angles of the veins and spreading along them, mostly on the under side of the leaves, on *Q. palustris*, *Q. texana*, *Q. velutina*. Chad. '08, p. 152

Acarid. *Eriophyes* sp.

Larvae on a grayish green erineum, on *Q. utahensis*

Itonid. *Cecidomyia* sp.



Fig. 86. Succulent oak gall, *Dryophanta palustris* O. S. One gall in section showing loose cell. (Original)

(2) Blister above lamina, woolly gall beneath

Globose leaf gall, smooth above, thickly covered with white wool below, single or confluent, diameter 1.5 to 3.5 mm, on *Q. alba* and *Q. platanoides*. Beutm. '10c, p. 123

Cynipid. Oak flake gall, *Neuroterus floccosus* Bass.

(3) Rounded gall with several cells imbedded in the lamina of the leaf

Small, slightly flattened, green leaf gall projecting from both surfaces, hollow, containing two or three oblong, filament-suspended cells, diameter about 3 mm, on *Q. alba*. Fig. 83, pl. 2, fig. 3. Osten Sacken '61, p. 63

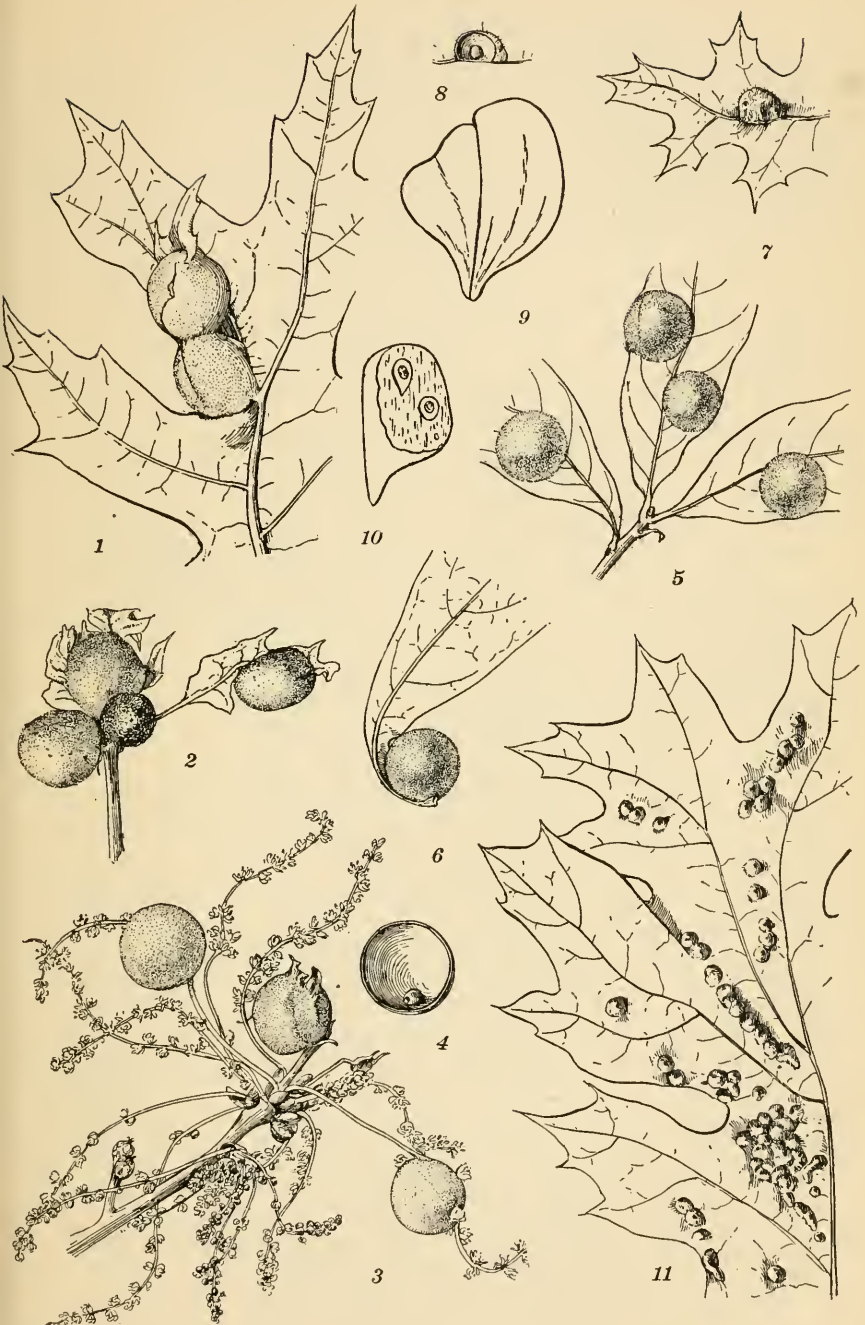
Cynipid. Oak wart gall, *Andricus futilis* Bass.

Round, flattened leaf gall projecting on both surfaces, red above, yellowish below, diameter about 3 mm, on *Q. coccinea*, *Q. prinus*. Pl. 2, fig. 6. Osten Sacken '61, p. 64

Cynipid. Oak nipple gall, *Andricus papillatus* O. S.

Small, irregular, hard swellings on both sides of the leaf and concolorous, diameter 4 mm, on *Q. rubra*. Osten Sacken '61, p. 66

Cynipid. *Callirhytis modestus* O. S.



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Fig. 87. *Dryophanta* galls. 1-4. Succulent oak gall, *D. palustris* O. S. 5. *D. laurifoliae* Ashm. 6. *D. aquatica*e Ashm. 7, 8. *Callirhytis saccularius* Bass. 9, 10. *Dryophanta radicola* Ashm. 11. *D. papula* Bass. (After Beutm., Am. Mus. Nat. Hist.)

(4) Galls making a sort of thickened and elevated area in the lamina

(a) The platform is formed of crowded, monothalamous galls

Papillose or conelike, clustered, small leaf galls projecting unequally and usually crowded, on *Q. rubra*, *Q. tinctoria* and *Q. coccinea*. Fig. 87, 11. Beutm. '11d, p. 360

Cynipid. *Dryophanta papula* Bass.

Globular, single or clustered leaf gall covered with minute, warty pubescent dots, monothalamous, fleshy, on the upper surface, diameter 2.5 to 3.75 mm, on *Q. minor*. Fig. 84, 3, 4. Beutm. '09d, p. 245

Cynipid. *Biorhiza mellea* Ashm.

(b) The platform is made by a single polythalamous gall

Flattened, polythalamous leaf galls projecting from both surfaces of the leaf diameter 6 to 24 mm, the upper and lower surfaces resembling a honey comb, on *Q. tinctoria*. Bassett '90, p. 87

Cynipid. Honeycomb leaf gall, *Neuroterus favosus* Bass.

Irregular, somewhat flattened, polythalamous, yellowish, pithy leaf galls, on *Q. minor* and *Q. alba*. Fig. 85, 2, 3. Beutm. '10c, p. 134

Cynipid. *Neuroterus irregularis* O. S.

Flattened, often very irregular, green, succulent leaf galls, horizontal diameter 6 to 25 mm, vertical diameter 6 to 9 mm, on *Q. alba*. Bassett '64, p. 682

Cynipid. *Dolichostrophus majalis* Bass.

Pale yellowish green, irregular, polythalamous leaf galls, usually in the midrib, on *Quercus* species. Fig. 85, 1. Beutm. '10c, p. 133

Cynipid. *Neuroterus fragilis* Bass.

Globose or subglobose, irregular, reddish, wrinkled leaf gall, diameter 3 to 4 mm, on red oak. Pl. 9, fig. 3. Felt '16d, p. 164

Itonid. Oak pill gall, *Cincticornia pilulae* Walsh

Gall similar to that of *Cincticornia pilulae* and possibly identical, apparently southern. Osten Sacken '62, p. 200. Felt '16d, p. 167

Itonid. *Cincticornia symmetrica* O. S.

Gall similar to, though much smaller than that of *Cincticornia pilulae*. Felt '15e, p. 157

Itonid. *Dasyneura florida* Felt

(5) Gall spherical, semispherical or conical; usually succulent and consisting of a wall inclosing a chamber in which the larval cell lies free. Some of these galls are loosely attached to the leaf, though more often they are imbedded in the blade.

(a) Gall globular

Globose, succulent, hollow leaf, bud and catkin gall containing a white, free, globular kernel, green, sometimes red-tinged, diameter 5 to 12 mm, on various oaks. Fig. 86, 87, 1-4. Beutm. '11d, p. 361

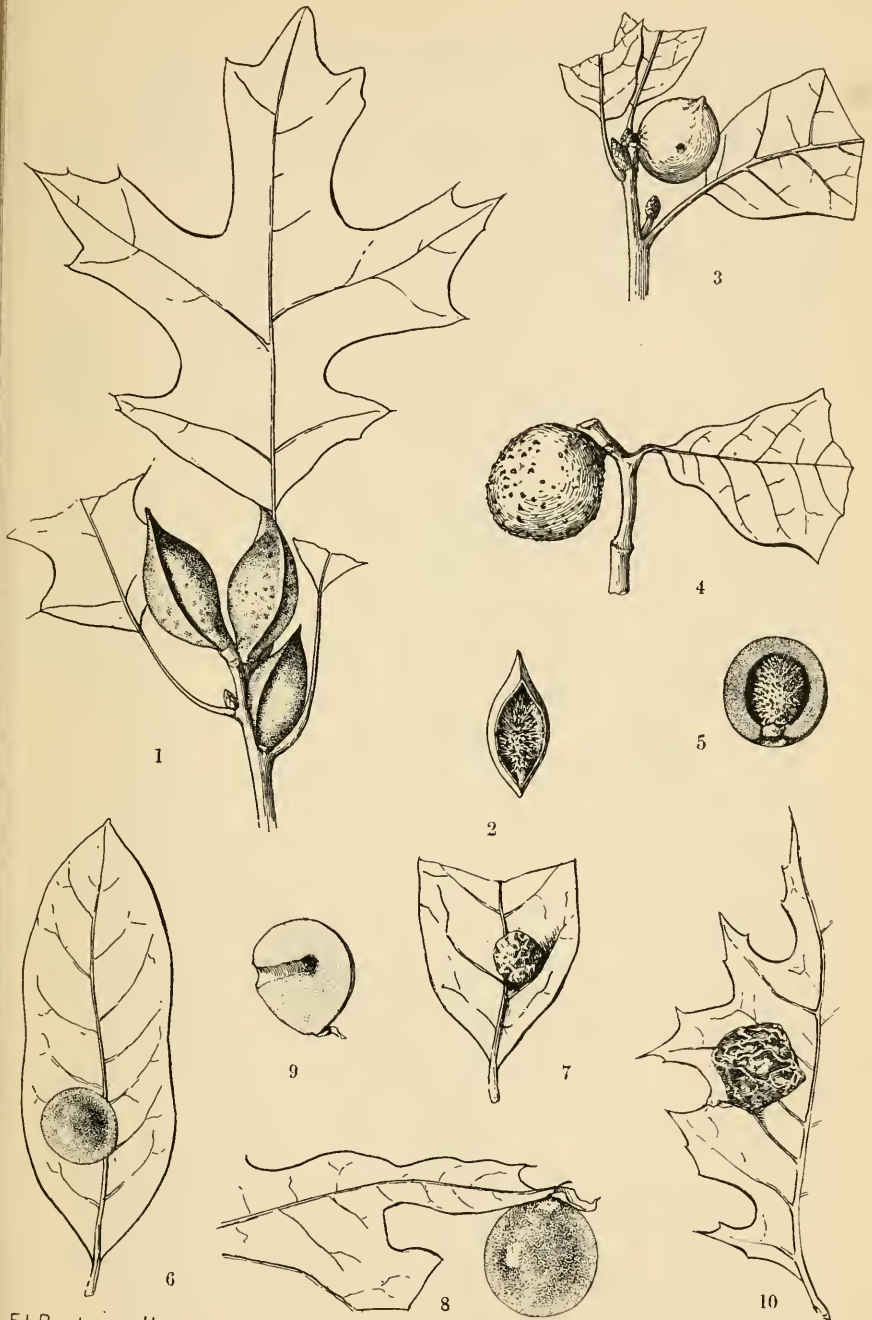
Cynipid. Succulent oak gall, *Dryophanta palustris* O. S.

Globose, hollow, plum-colored leaf gall, similar to that of *D. palustris* and developing equally upon both leaf surfaces; within a small, free cell, on *Q. aquatica*. Fig. 87, 6. Beutm. '11d, p. 363

Cynipid. *Dryophanta aquaticae* Ashm.

Gall similar to that of *D. palustris*, except that it projects about equally on both surfaces of the leaf, length 5 to 6.25 mm, diameter 3 to .75 mm, on *Q. laurifolia*. Fig. 87, 5. Beutm. '11d, p. 362

Cynipid. *Dryophanta laurifoliae* Ashm.



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Fig. 88. Oak apples. 1, 2. Keeled oak apple, *Amphibolips tinctoriae* Ashm. 3-5. *A. globulus* Beutm. 6, 7. *A. racemaria* Ashm. 8-10. Translucent oak gall, *A. nubilipennis* Harr. (After Beutm., Am. Mus. Nat. Hist.)

Globose, succulent leaf gall with a loose, whitish kernel similar to that of *Dryophanta aquatica* but much smaller, on *Q. catesbaei*. Beutm. '11d, p. 365

Cynipid. *Dryophanta quercifoliae* Ashm.

Globose, somewhat roughened, fuzzy, thick-celled leaf galls closely resembling those of *D. palustris*, diameter 6.5 mm to 9.5 mm, on red oak and scarlet oak. Beutm. '11d, p. 364

Cynipid. *Dryophanta liberaecellulae* Gill.

Globose, succulent, yellowish green, hollow galls containing a free cell and attached to the vein on the under side of the leaf of *Q. laurifolia*, diameter 1.5 mm, height 2.5 mm. Beutm. '11d, p. 365

Cynipid. *Dryophanta confusa* Ashm.

(b) Hemispherical or conical, attached to the under surface of the leaf

Subglobose, greenish gray, somewhat longitudinally ribbed, rugose, sessile galls; internally, with a loose kernel, diameter 4 mm, height 3.25 mm, on *Q. cinerea*. Fig. 99, 11, 12. Beutm. '11d, p. 367

Cynipid. *Dryophanta cinereae* Ashm.

Hemispherical, pouchlike, green leaf galls on the under surface, diameter 5 mm, walls thin, within a free, oval larval cell, on *Q. coccinea*. Fig. 87, 7, 8. Bassett '90, p. 76

Cynipid. *Callirhytis saccularius* Bass.

Single or clustered, conical, bluish gray, monothalamous leaf galls, height 3 to 3.5 mm, diameter 2.5 mm, on *Q. macrocarpa*. Fig. 84, 5. Beutm. '09d, p. 256

Cynipid. *Xystoteras volutellae* Ashm.

(6) Succulent, solid, spherical galls, usually firmly attached to the leaf blade

Globular or ovate, green, sometimes tinged with pink, succulent, translucent leaf gall, diameter 6 to 18 mm, on *Q. rubra* and *Q. coccinea*. Fig. 88, 8-10. Beutm. '09b, p. 60

Cynipid. Translucent oak gall, *Amphibolips nubilipennis* Harr.

Globose, rosy, juicy leaf galls on the upper surface, diameter 2 to 3 mm, on *Q. alba*. Beutm. '09d, p. 245

Cynipid. *Biorhiza rubina* Gill.

Globose, crisp, sour and succulent, green, becoming brown, leaf gall, internally with a reddish larval cell, diameter 8 to 10 mm, on *Q. laurifolia* in April and May. Fig. 88, 6, 7. Beutm. '09b, p. 61

Cynipid. *Amphibolips racemaria* Ashm.

Subglobular, thin-shelled leaf gall about the size of a pea, pointed at opposite poles, on *Q. douglasii*. Fullaway '11, p. 353

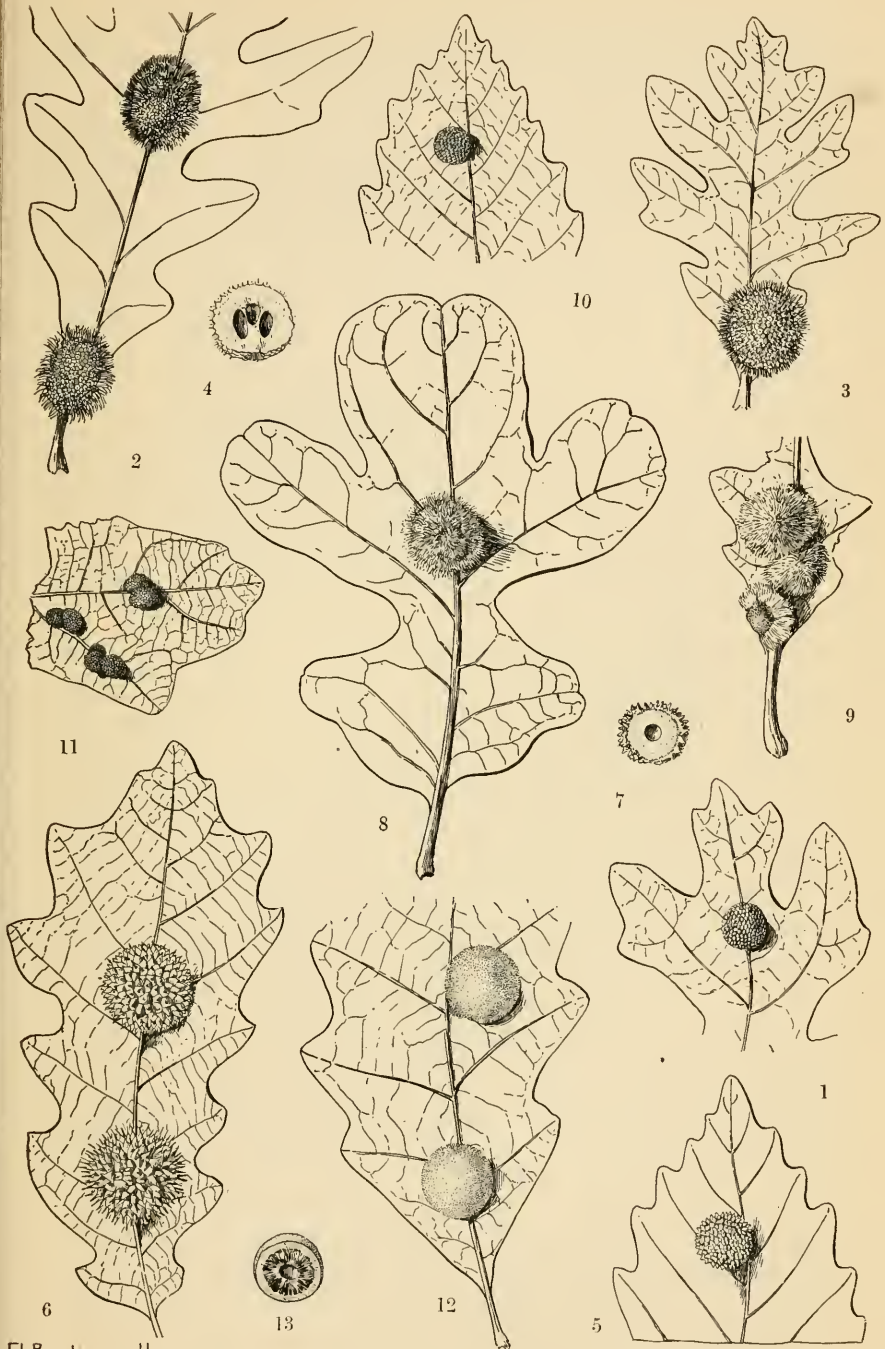
Cynipid. *Andricus brunneus* Fullw.

Subhemispherical, brown, slightly nipped, monothalamous gall on the under side of the leaf, diameter 1.75 mm, on black oak, probably *Q. velutina*. Pl. 13, fig. 8. Felt '16d, p. 160

Itonid. *Cincticornia globosa* Felt

Globose gall, diameter 4 mm, on under side of running oak leaf. Felt '11k, p. 551

Itonid. *Youngomyia quercina* Felt



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Fig. 80. Philonix galls. 1. Oak pea gall, *P. pezomachoides* O. S. 2-4. Oak hedgehog gall, *P. erinacei* Beutm. 5. Yellow sea urchin, *P. echini* Ashm. 6. 7. Spiny oak gall, *P. prinoides* Beutm. 8, 9. Hairy oak gall, *P. villosa* Gill. 10. *P. hirta* Bass. 11. Jewel oak gall, *P. macrocarpae* Bass. 12, 13. *P. niger* Gill. (After Beutm., Am. Mus. Nat. Hist.)

(7) Small, solid, fleshy galls loosely attached to the leaf

Subglobular, greenish yellow, smooth, hard leaf galls attached to the under surface, internally hard, fibrous, diameter 5 mm, vertical diameter 2 to 2.5 mm, on *Q. laurifolia*. Ashm. '81, p. XVIII

Cynipid. *Andricus rugosus* Ashm.

Globular, single or clustered leaf galls covered with minute, warty, pubescent dots, monothalamous, fleshy, on the upper surface, diameter 2.5 to 3.75 mm, on *Q. minor*. Fig. 84, 3, 4. Beutm. '09d, p. 245

Cynipid. *Biorhiza mellea* Ashm.

Globose, white or red tinged, waxlike, juicy, monothalamous gall on the under surface of leaves of *Q. rubra* and *Q. coccinea*. Beutm. '09d, p. 253

Cynipid. *Philonix compressa* Gill

(8) Moderate sized, hard galls loosely attached to the vein below and with a faceted or spiny surface

(a) Surface faceted

Globular, pale yellowish leaf galls finely netted with fissures or cracks and intervening elevated points; occurs on both surfaces and contains two larval cells, diameter 5 to 7 mm. Fig. 89, 1. Beutm. '09d, p. 247

Cynipid. Oak pea gall, *Philonix pezomachoides* O. S.

Oval or rounded, monothalamous, pale green or yellow leaf vein gall, the surface fissured, each facet with a short, hard point, diameter 2 to 4 mm, on *Q. macrocarpa* and *Q. undulata*. Fig. 89, 11. Beutm. '09d, p. 251

Cynipid. Jewel oak gall, *Philonix macrocarpae* Bass.

Globular, monothalamous, fissured, green gall, each facet with a short point, diameter 4 to 6 mm, on *Q. prinus*. Fig. 89, 10. Beutm. '09d, p. 350

Cynipid. *Philonix hirta* Bass.

(b) Facets on the surface pointed or spine-tipped

Globose leaf gall with the surface finely netted or fissured like a strawberry and covered with short, spiny prickles, yellowish, and containing one to four cells, diameter 5 to 7 mm, on *Q. platanooides*. Fig. 89, 5. Beutm. '09d, p. 248

Cynipid. Yellow sea urchin, *Philonix echini* Ashm.

Globular, woody, monothalamous midrib leaf gall with numerous conelike projections, green or yellowish, usually red tinged, diameter 6 to 12 mm, on *Q. prinoides*. Fig. 89, 6, 7. Beutm. '09d, p. 249

Cynipid. Spiny oak gall, *Philonix prinoides* Beutm.

(c) Spines of the facets long

Globose or elongate, polythalamous leaf gall netted with fissures or cracks, more or less densely covered with spines and yellow, sometimes shaded with red, length 10 to 20 mm, diameter 6 to 12 mm, on *Q. alba*. Fig. 89, 2-4. Beutm. '09d, p. 247.

Cynipid. Oak hedgehog gall, *Philonix erinacei* Walsh¹

(d) Spines long, hairlike

Globular, fissured midrib leaf gall somewhat like that of *P. erinacei* but densely covered with long, bristlelike hairs, pale yellow, monothalamous, bristlelike hairs 3 mm long, diameter 9 to 11 mm, on *Q. macrocarpa*. Fig. 89, 8, 9. Beutm. '09d, p. 249

Cynipid. Hairy oak gall, *Philonix villosa* Gill

¹Agamic form of *Cynips erinacei*, see Triggerson, Ent. Soc. Am. Ann. 7:26, 1914.

Subglobose, monothalamous, yellowish white, hairy vein gall, diameter 4 to 10 mm. Wash. Trotter '11, p. 106

Cynipid. *Philonix* sp.

(9) Solid galls attached to the leaf and with a central, harder kernel or larval cell. These approach the oak apple gall in structure

Globular, grayish, pubescent, monothalamous, thin-shelled leaf gall, pithy internally, diameter 7.5 to 8 mm, on the under surface, on *Q. platanoidea*. Beutm. '09d, p. 252

Cynipid. *Philonix lanaeglobuli* Ashm.

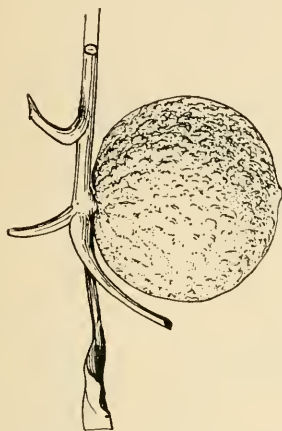


Fig. 90. Large oak apple, *Amphibolips confluens* Harr. (Original)



Fig. 91. Larger empty oak apple, *Amphibolips inanis* O. S. (Original)

Globular, below brownish, the size of a pea or slightly larger, two to ten on the under side of the leaf, within a dense, yellowish brown, spongy mass; diameter 3.75 to 6 mm, on *Q. virens*. Ashm. '81, p. X

Cynipid. *Andricus virens* Ashm.

(10) Oak apples, i. e. galls with a central, hard kernel or larval cell, a firm (often hard) outer shell and a spongy or fibrous intervening substance

(a) Intervening substance is spongy

[1] Size large

Globular, smooth, shining or opaque leaf gall, internally a juicy, white, spongy substance and a large central larval cell, green, turning with age to light brown, diameter 2.5 to 5 cm, usually on a vein or petiole, on *Q. rubra*, *Q. coccinea* and *Q. velutina* in May and June. Fig. 90, 92, 1-2. Beutm. '09b, p. 50

Cynipid. Large oak apple, *Amphibolips confluens* Harr.

Spherical oak apple, dirty yellow, with wine-red stripes, diameter 1 to 2 cm, resembles *A. confluens*. Mex. Trotter '11, p. 129

Cynipid. ? *Amphibolips* sp.

Globose, yellowish brown twig gall with an uneven, wrinkled surface, internally spongy, the larval cell rounded, diameter 3.5 to 7 cm, on *Quercus* sp. Fig. 111, 10, 11. Beutm. '09b, p. 64

Cynipid. Palmer's oak apple, *Amphibolips palmeri* Bass. Fusiform, tapering, the apex usually somewhat curved, yellowish brown twig gall, internally spongy, with a hard larval cell, length 3 to 5.5 cm, diameter 1.5 to 3 cm, on *Q. marilandica* in May and June. Fig. 92, 4, 5. Beutm. '09b, p. 53

Cynipid. Fusiform oak apple, *Amphibolips acuminata* Ashm.

Globose, monothalamous, very thin-shelled leaf and twig gall, internally soft, light, spongy, not unlike *A. confluens*, form *spongifica*, diameters 3.5 and 3 cm. Beutm. '09b, p. 53

Cynipid. *Amphibolips longicornis* Bass. Globular leaf gall resembling that of *A. confluens*, form *spongifica*, and *A. cinerea*, but the surface is more coarsely reticulated and less glossy and the larval cell much darker in color, diameter 2.5 cm, on midrib near base of leaf, on *Q. ? minor*. Fig. 92, 3. Beutm. '09b, p. 52

Cynipid. *Amphibolips carolinensis* Bass. Lemon-shaped, monothalamous, green, yellowish and finally brown oak apple, length 10 to 15 mm, diameter 7 to 10 mm, the central cell with a length 4 to 4.5 mm, diameter 1.5 to 2 mm. Cal. Trotter '11, p. 114

Cynipid. *Cynips* sp. Ellipsoidal, woody, greenish oak apple, the base rounded, apically a short, obtuse point, length 17 mm, diameter 10 mm. Cal. Trotter '11, p. 110

Cynipid. *Amphibolips* sp. Globular, grayish brown or black, pubescent, monothalamous, thin-shelled leaf gall, the larval cell supported by a loosely fibrous mass, diameter 6 to 11 mm, on under surface of leaf of *Q. alba*, *Q. macrocarpa* and *Q. prinoides*. Fig. 89, 12, 13. Beutm. '09d, p. 251

Cynipid. *Philonix niger* Gill.

[2] Size small

Globose, monothalamous, light reddish leaf gall filled with spongy tissue, except for the large cell, diameter 6 mm, on *Q. rydbergiana*. Beutm. '11d, p. 355

Cynipid. *Dryophanta rydbergiana* Ckll. Globose, spined, brown, thick-shelled leaf gall, internally slightly spongy, diameter 7.5 mm, on *Q. laurifolia*. Beutm. '09b, p. 59

Cynipid. Spiny oak apple, *Amphibolips spinosa* Ashm. Subspherical or subpyriform, monothalamous oak apple, diameter 4 to 5 cm. Mex. Trotter '11, p. 131

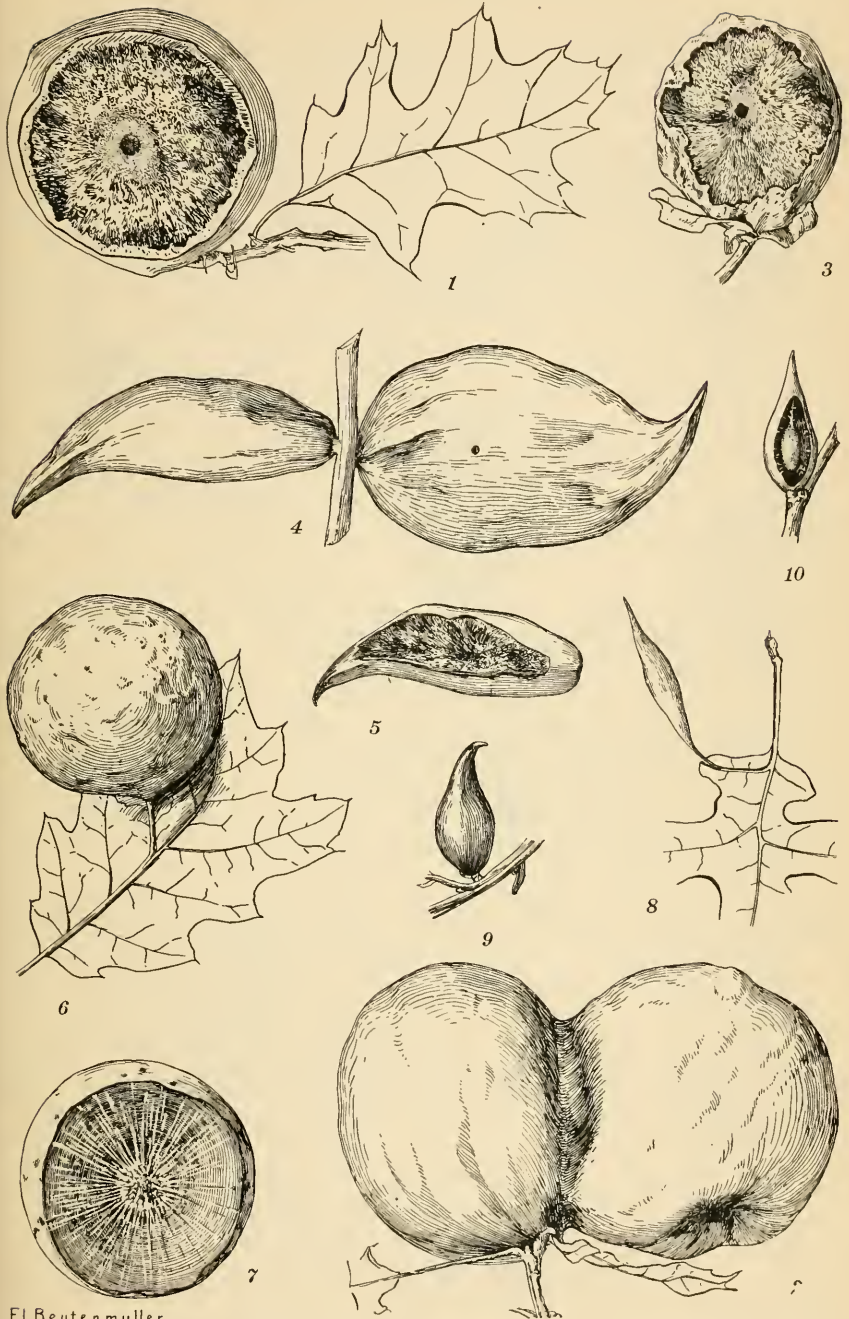
Cynipid. ?*Cynips* sp.

* (b) The substance lying between the rind and the kernel is fibrous and often very scanty

[1] Size large, kernel central, leaf usually aborted

Globose, bright green, becoming yellowish brown, slightly nipped, thin-shelled, glossy leaf gall, the central larval cell supported by radiating fibers, diameter 25 to 35 mm, on *Q. coccinea*, *Q. rubra* in May and June. Fig. 91, 92, 6, 7. Beutm. '09b, p. 54

Cynipid. Larger empty oak apple, *Amphibolips inanis* O. S.



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Fig. 92. Oak apples. 1, 2. Large oak apple, *A. amphibolips confluens* Harr. 3. *A. carolinensis* Bass. 4, 5. Fusiform oak apple, *A. acuminata* Ashm. 6, 7. Larger empty oak apple, *A. inanis* O. S. 8-10. Oak spindle gall, *A. coelebs* O. S. (After Beutm., Am. Mus. Nat. Hist)

Globose, white, yellowish or brownish, velvety, thin-walled leaf gall, diameter 30 to 40 mm, within a thick-walled, fiber-supported cell with a diameter of 10 mm. Galls usually in groups of two or three, on the under side and near the base of the leaf. Kieff. '11, p. 346

Cynipid. *Disholcaspis lapiei* Kieff.

Globose, thin-shelled leaf gall with a central, filament-supported kernel, diameter 1.2 to 2.5 cm, resembles gall of *A. inanis* but averages smaller and the color is darker, on *Q. vaccinifolia*. Ashm. '97, p. 130

Cynipid. *Callirhytis vaccinifoliae* Ashm.

Globular, thin-shelled leaf gall, sometimes tinged with pink and covered with a white bloom; internally a central, filament-supported cell, diameter 15 to 20 mm, on under side of leaf of *Q. minor*. Fig. 63, 1. Beutm. '09a, p. 42

Cynipid. *Dryophanta centricola* O. S.

Globose or ovate, slightly nipped, dark crimson with lighter mottlings and becoming brown, thick-shelled twig gall with filament-supported larval cell, length 2.5 to 3.5 cm, diameter 2 to 3 cm, on *Q. brevifolia*. Fig. 93, 7-10. Beutm. '09b, p. 57

Cynipid. *Amphibolips cinerea* Ashm.

Subspherical, green, later yellowish, finally brown oak apple with numerous small points and a fiber-supported larval cell, diameter 3 cm. Cal. Trotter '11, p. 112

Cynipid. ?*Callirhytis* sp.

Globose, very thin-shelled, yellowish, irregularly reddish brown marked leaf gall containing a fiber-supported larval cell, diameter 2 cm, on *Q. rubra*. Fig. 99, 4, 5. Beutm. '11d, p. 351

Cynipid. *Dryophanta rubrae* Karsch

Globose or ovate, yellowish green or brown, glossy when dry, thin-shelled, slightly nipped, axillary bud gall, diameter 7 to 15 mm, on *Q. nigra*. Fig. 93, 1-4. Beutm. '09b, p. 57

Cynipid. *Amphibolips melanocera* Ashm.

Globose, thin-shelled, pubescent, yellowish, pink or red-shaded leaf gall, within a fiber-supported larval cell, diameter 6 to 18 mm, on *Q. hypoleuca*. Fig. 97, 6, 7. Beutm. '11d, p. 345

Cynipid. *Dryophanta dugesi* Mayr.

Irregular, subglobose, usually clustered, monothalamous, straw-colored or brown leaf gall containing a fiber-supported cell, occurs on both surfaces of the leaf, on *Q. undulata* and *Q. gambelii*. Fig. 68, 1, 2. Beutm. '11d, p. 348

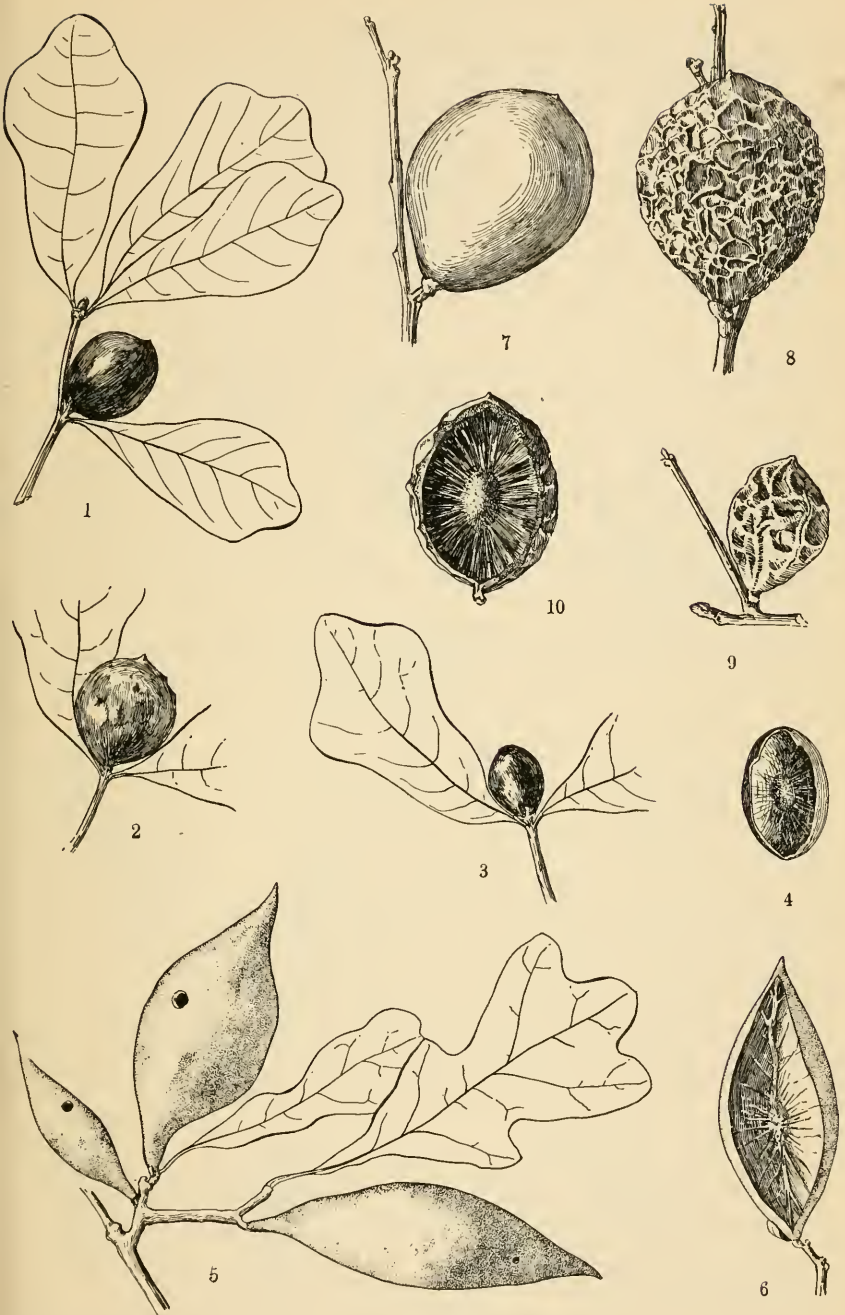
Cynipid. *Dryophanta eburnea* Bass.

Fusiform to subglobular, pointed, yellowish, thin-shelled twig gall with a fiber-supported cell, length 12 to 24 mm, diameter 6 to 12 mm, on *Q. phellos*. Fig. 94, 6-10. Beutm. '09b, p. 56

Cynipid. Small pointed oak apple, *Amphibolips citriformis* Ashm.

Elongate, fusiform, dark green leaf gall, usually arising from the petiole, internally an ovate, fiber-supported cell, length 25 to 55 mm, diameter 7 to 20 mm, on the upper leaf surface of *Q. nana*. Fig. 93, 5, 6. Beutm. '09b, p. 55

Cynipid. Scrub oak gall, *Amphibolips ilicifoliae* Bass.



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Fig. 93. Oak apples. 1-4. *Amphibolips melanocera* Ashm. 5, 6. Scrub oak gall, *A. ilicifoliae* Bass. 7-10. *A. cinerea* Ashm. (After Beutm., Am. Mus. Nat. Hist.)

Globose, single or clustered, yellowish, brown-spotted leaf galls occurring on both surfaces, a fiber-supported larval-cell, diameter 15 to 35 mm, on *Q. wrightii*, *Q. undulata* and *Q. garryana*. Fig. 63, 2, 3. Beutm. '09a, p. 43

Cynipid. *Cynips maculipennis* Gill.

Spherical oak apple, smooth, reddish, with fiber-supported larval cell, diameter 15 to 20 mm. Cal. Trotter '11, p. 105

Cynipid. ? *Cynips* sp.

Globose, reddish brown oak apple containing a fiber-supported cell, maximum diameter 5 cm. Mex. Trotter '11, p. 128

Cynipid. ? *Amphibolips* sp.

[2] Size small, leaf aborted

Almond-shaped, pointed, keeled bud or twig gall, green or reddish, becoming brown, smooth, rather thick-shelled with a central, fiber-supported cell, length 12 to 20 mm, on *Q. velutina* and *Q. rubra* in autumn. Fig. 88, 1, 2. Beutm. '09b, p. 59

Cynipid. Keeled oak apple, *Amphibolips tinctoriae* Ashm.

Globose, slightly nipped, green, spotted with red, becoming brown, moderately thick-shelled twig or bud gall, with a fiber-supported, central cell, diameter 16 to 18 mm, on *Q. rubra* in September and October. Fig. 94, 1-5. Beutm. '09b, p. 58

Cynipid. *Amphibolips cookii* Gill

Globular, very thin-shelled leaf gall containing a fiber-supported cell, diameter 8 mm, on *Q. laurifolia*. Ashm. '87, p. 141

Cynipid. *Andricus femoratus* Ashm.

[3] Gall small, leaf present and gall usually on the under side and solitary

Globose, yellowish, yellowish brown and brown spotted when dry, leaf gall, single or clustered, with fiber-supported cell, diameter 15 to 35 mm, on under surface of leaf of *Q. wrightii*, *Q. undulata* and *Q. garryana*. Beutm. '09a, p. 43

Cynipid. *Cynips maculipennis* Gill.

Globular, thin-shelled, straw colored, stained with rusty brown and a fiber-supported central cell, diameter 11 to 18 mm, on *Q. undulata*. Fig. 63, 4, 5. Beutm. '09a, p. 42

Cynipid. *Disholcaspis brevipennata* Gill.

Globose, monothalamous, thin-shelled leaf gall, often near the margin and mostly on the midrib, with a fiber-supported cell, brown or pinkish brown when dry, with a fine pubescence and nearly smooth though not polished, diameter 12 to 22 mm, on *Q. ?arizonica*. Fig. 97, 1-3. Beutm. '11d, p. 343

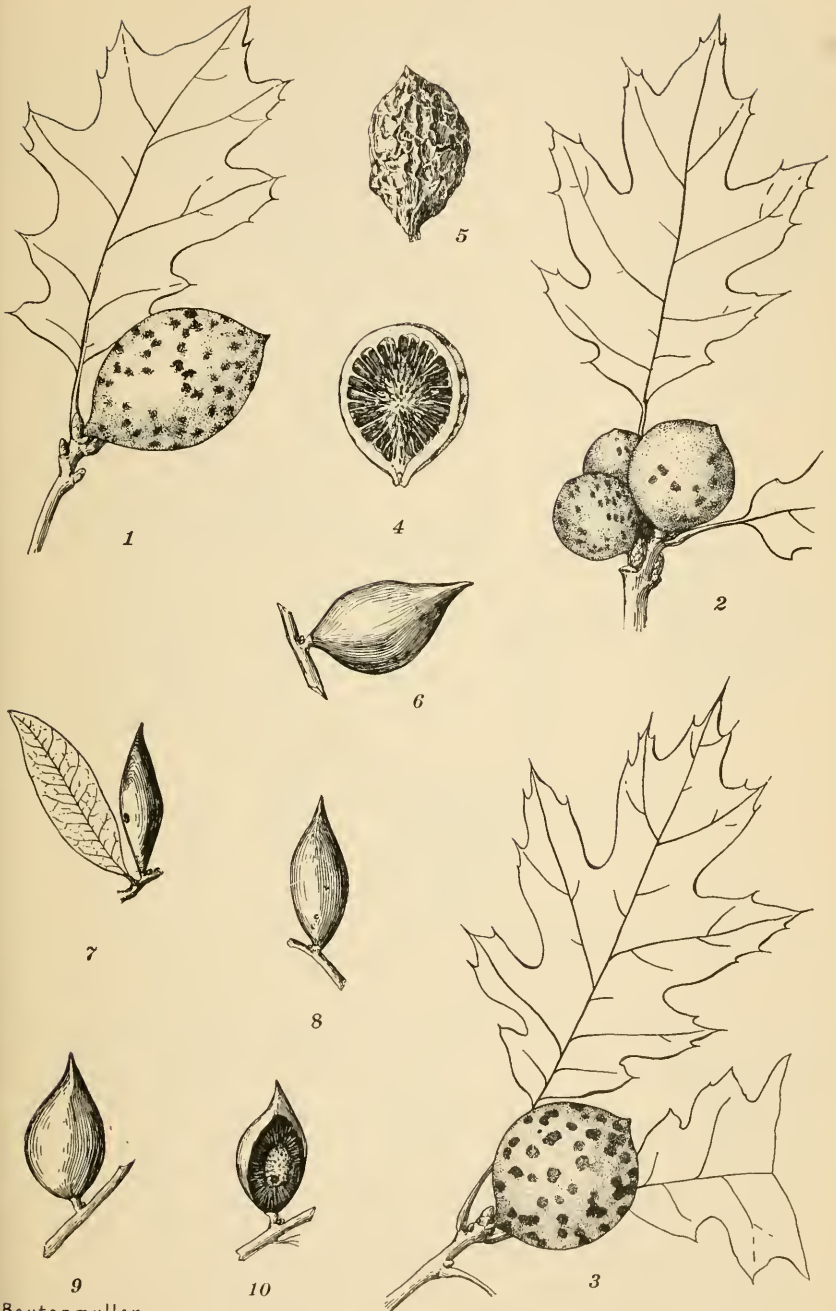
Cynipid. *Dryophanta bella* Bass.

Subglobose, monothalamous, brown, thin-shelled, solitary or clustered leaf gall, diameter 2 to 3.5 mm, on under surface of leaf of *Q. emoryi*. Fig. 108, 4-7. Beutm. '11d, p. 356

Cynipid. *Dryophanta emoryi* Ashm.

Globular, smooth, green leaf gall, diameter 6 to 12 mm, on red oak. Fig. 95, 96. Bassett '63, p. 326

Cynipid. Small oak apple, *Andricus singularis* Bas



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Fig. 94. Oak apples. 1-5. *Amphibolips cookii* Gill. 6-10. Small pointed oak apple, *A. citrifomis* Ashm. (After Beutm., Am. Mus. Nat. Hist.)

Globular, minutely pubescent, reddish, greenish or brownish leaf gall, diameter 4-7 mm, on *Q. grisea*. Fig. 98.

Cynipid. *Cynips* sp. a2062

Globose, somewhat oblong, hollow, pale greenish yellow leaf gall with a fiber-supported cell, on *Q. ilicifolia* and *Q. coccinea*. Pl. 1, fig. 5. Bassett '63, p. 327

Cynipid. *Andricus ostensackenii* Bass.

(11) Galls small, the leaf present and the galls tend to cluster

(a) Cells central in the gall

Globose, monothalamous, yellow, thin-shelled leaf gall, tinged with red or brown, diameter 10 to 15 mm, the central cell fiber-supported on both surfaces of leaf of *Q. minor*. Fig. 99, 1-3. Beutm. '11d, p. 349

Cynipid. Polished oak gall, *Dryophanta polita* Bass.



Fig. 95. Small oak apple, *Andricus singularis* Bass. Gall on leaf and one in section. (Original)



Fig. 96. Small oak apple, *Andricus singularis* Bass. A small gall provisionally referred to this species. (Original)

Globose, brown, subopaque leaf galls with a central, fiber-supported cell, diameter 6 to 8 mm, on *Quercus* sp. Ashm. '97b, p. 68

Cynipid. *Trichoteras coquilletti* Ashm.

(b) Cell basal, against the leaf

Subglobose, flattened basally, leaf galls usually on the midrib, the shell thick, the interior filled with silvery-white hairs supporting a larval cell attached to the base of the gall, on both surfaces of leaf of *Q. undulata*, *Q. gambellii*. Fig. 68, 1, 2. Beutm. '11d, p. 348

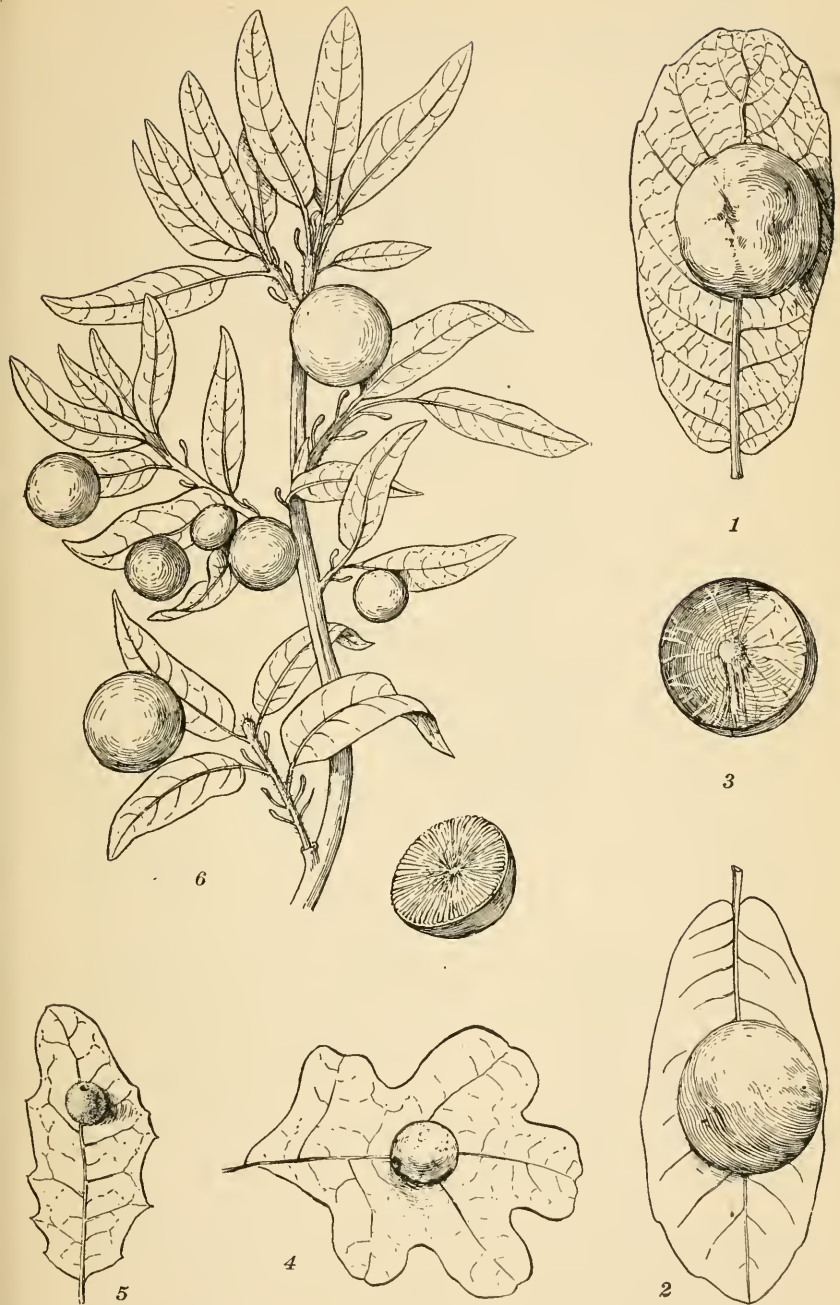
Cynipid. *Dryophanta eburnea* Bass.

Gall similar to that of *D. eburnea* but shining, brownish above and probably on a different species of oak. Beutm. '11d, p. 348

Cynipid. *Dryophanta simillima* D. T.

Spherical, subcoriaceous, reddish, monothalamous vein gall, developing in fissures of crossveins. Wash. Trotter '11, p. 108

Cynipid. *Dryophanta* sp.



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Fig. 97. *Dryophanta* galls. 1-3. *D. bella* Bass. 4. *D. carolina* Ashm. 5. *D. multipunctata* Beutm. 6, 7. *D. dugesi* Mayr. (After Beutm., Am. Mus. Nat. Hist.)

Ovate, small, monothalamous apical vein gall developing in a slit, woody, the walls thin, smooth, shining and reddish. Cal. Trotter '11, p. 113

Cynipid. *Cynips* sp.

(12) Small, thin-walled, globose or fusiform galls, usually marginal, on the leaf and piercing the lamina

Globose, densely pruinose, thin-walled leaf or ament gall, diameter 3 to 3.75 mm, sometimes banded by a minute ridge, on *Q. obtusiloba*. Bassett '00, p. 311

Cynipid. *Andricus pruinosis* Bass.

Oval, thin-walled, monothalamous vein swelling covered with a dense, brown pubescence, on *Q. alba*. Fig. 53, 10. Beutm. '10c, p. 128

Cynipid. *Neuroterus pallipes* Bass.

Hemispherical or subhemispherical, pale brown, minutely crackled vein gall, diameter 4 mm, height 2.5 mm, on *Quercus* sp. Fig. 107, 10. Beutm. '10c, p. 125

Cynipid. *Neuroterus cockerelli* Beutm.



Fig. 98. *Cynips* sp. on *Q. grisea*.
One shown in section. (Original)

Small, round, thin-shelled galls on leaf blades, usually near the margin and always on the upper leaf veins, projecting on both surfaces, diameter 3.7 mm, on *Q. undulata*. Bassett '90, p. 77

Cynipid. *Andricus pilula* Bass.

Hemispherical, pale brown, reticulate leaf gall with minute, reddish tubercles, diameter 3 mm, on *Q. undulata*. Fig. 108, 8. Beutm. '11d, p. 357

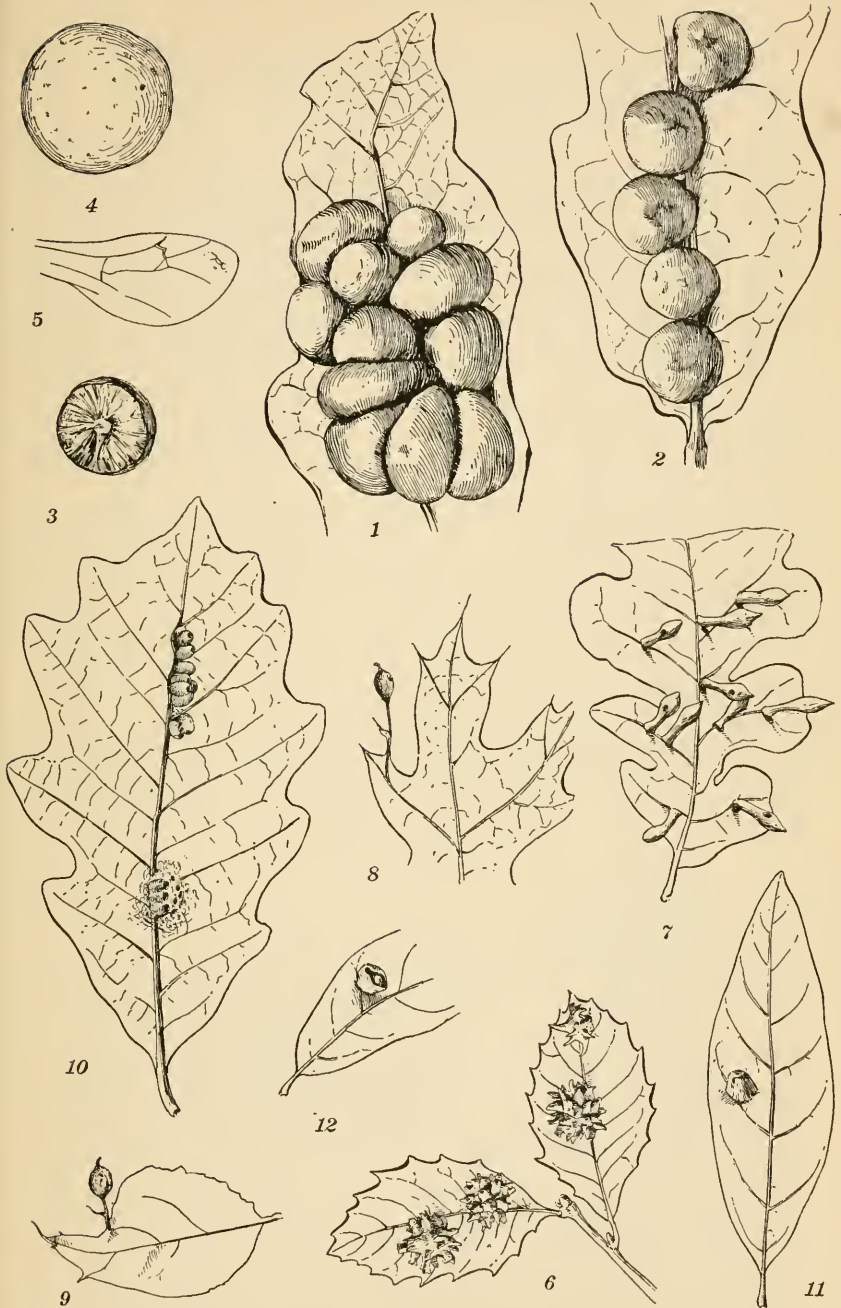
Cynipid. *Dryophanta pulchripennis* Ashm.

Brown, globose, pedunculate, midrib leaf gall, diameter 3 mm, on *Q. rubra*. Pl. 2, fig. 1. Ashm. '97, p. 121

Cynipid. *Andricus rileyi* Ashm.

Ovate, monothalamous, grayish, pubescent vein gall with a very thin wall and joined by a short stem to the side of the vein, length 2.5 mm, diameter 2 mm. Mex. Trotter '11, p. 130

Cynipid. ? *Neuroterus ostreatus* Trott.



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Fig. 99. Dryophanta galls. 1-3. Polished oak gall, *D. polita* Bass. 4, 5. *D. rubrae* Karsch. 6. Red sea urchin, *D. echina* O. S. 7. Clubbed oak leaf gall, *D. clavula* Beutm. 8, 9. *D. pedunculata* Bass. 10. *D. ignota* Bass. 11-12. *D. cinereae* Ashm. (After Beutm., Am. Mus. Nat. Hist.)

Globose, thin-shelled leaf gall with a slight point apically, diameter .75 mm to 1 mm, on *Q. undulata*, *Q. alba*, *Q. minor* and *Q. macrocarpa*. Fig. 107, 9, 12. Beutm. '10c, p. 125

Cynipid. Jumping bullet gall, *Neuroterus saltatorius*
Hy. Edw.

Globular, green or purplish, pubescent, monothalamous leaf and petiole gall, diameter 3.75 mm, on *Q. alba*. Bassett '81, p. 78

Cynipid. *Andricus utriculus* Bass.

(13) Small galls attached to the leaf blades, of various structure and peculiar form

Globose, monothalamous leaf galls with many pointed processes not much shorter than the diameter of the gall, color red or pinkish, covered with a crystalline substance, diameter 5 to 8 mm, on both surfaces of leaf of *Q. agrifolia*. Fig. 99, 6. Beutm. '11d, p. 351

Cynipid. Red sea urchin gall, *Dryophanta echina* O. S.

Subconical or convex, the apex subtruncate or almost umbilicate, smooth, brown, reddish, minutely pubescent leaf gall, diameter 4 to 5 mm, height 2.5 to 3.5 mm. Mex. Trotter '11, p. 125

Cynipid. ? *Neuroterus sublenticularis* Trott.

Cylindrical, fimbriate, bright red and yellow banded leaf gall on live oak, height 4 to 6 mm, diameter 2 to 3 mm, the distal portion hollow, the outer surface with numerous long, yellowish or reddish processes, solitary, Arizona (See *A. tubicola*, p. 109)

Cynipid. *Andricus splendens* Weld,¹ MS.

Stellate, reddish brown midvein gall with four subconical, radiating arms, the extreme diameter 5 mm. Mex. Trotter '11, p. 123

Cynipid. ? *Cynips* sp.

Squash-shaped or top-shaped leaf gall, the marginal ridge produced in 7 to 10 irregular tubercles, brown, with a lilac gray bloom, diameter 6 to 10 mm, height 7 to 10 mm, on *Q. douglasii*. Fig. 64, 10, 11. Beutm. '09a, p. 37

Cynipid. Spined turban gall, *Disholcaspis douglasii*
Ashm.

Small, wartlike midrib galls on the under surface of the leaves and with corollalike processes apically, on *Q. alba*. Gill. '89, p. 214

Cynipid. Flowery oak gall, *Andricus foliaformis* Gill.

Small, irregularly cubical leaf gall with many ridges and pointed projections, length 8 mm, diameter 5 mm, on *Q. lobata*. Fullaway '11, p. 345

Cynipid. *Cynips heldae* Fullw.

Hemispherical leaf gall covered with a white, crystallike pubescence, diameter 1.5 to 2.25 mm, on *Q. minor*. Fig. 107, 5. Beutm. '10c, p. 122

Cynipid. *Neuroterus verrucarum* O. S.

Spindle-shaped or clavate leaf galls on under surface, length 5 to 7 mm, diameter of narrow part 1 mm, of inflated portion 1.75 mm, on *Q. lobata*. Fig. 99, 7. Beutm. '11b, p. 67

Cynipid. Clubbed oak leaf gall, *Dryophanta clavula*
Beutm.

Fusiform, green, succulent, thin-shelled leaf gall with a free cell within, occurs singly on the acute lobes of several oaks. Fig. 68, 4. Beutm. '11d, p. 366

Cynipid. *Dryophanta notha* O. S.

¹ See also, (14) (b) on p. 109.

Ovate-acuminate, blisterlike galls on the points of the acute lobes of the leaf, each with a long, hairlike point, on *Q. coccinea*. Bassett '90, p. 74

Cynipid. Leaf-lobe blister gall, *Callirhytis pusulatoides* Bass.



Fig. 100. Oak button gall, *Neuroterus umbilicatus* Bass. One gall shown in section. (Original)

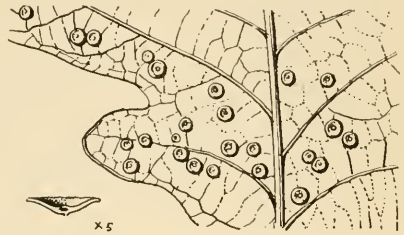


Fig. 101. Oak spangles, *Cecidomyia poculum* O. S., on *Q. alba*. One gall shown in section. (Original)

Ellipsoidal, very small, monothalamous, yellowish, minutely pubescent leaf gall occurring on either surface, diameter 1 mm, on opposite side of leaf a yellowish spot with a diameter of 1 to 2 mm. Cal. Trotter '11, p. 119

Cynipid. ?*Neuroterus perpusillus* Trott.

Rounded, flattened, disklike, monothalamous leaf galls, pinkish or purplish apically, sometimes yellowish, diameter 3 to 4 mm, height 1 mm, on white oak. Fullaway '11, p. 334

Cynipid. *Biorhiza californica* Beutn.

Small, circular, flattened, brown, monothalamous leaf galls, concave and with a minute, conical elevation centrally, diameter 1 to 1.5 mm, in greatest numbers on the under surface of the leaf, on *Q. platanoides*. Fig. 85, 7, 100. Beutn. '10c, p. 124

Cynipid. Oak button gall, *Neuroterus umbilicatus* Bass.

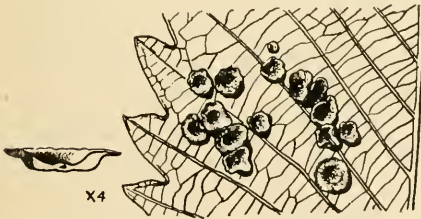


Fig. 102. Oak spangles, *Cecidomyia poculum* O. S., on *Q. muhlenbergiae*. One gall shown in section. (Original)

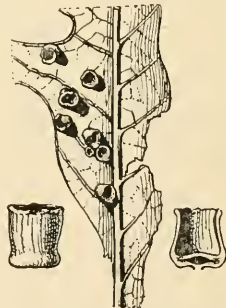


Fig. 103. Oak spangles, *Cecidomyia poculum* O. S., on *Q. macrocarpa*. Side view and section of gall. (Original)

Disk-shaped, often flat, greenish leaf galls with a lilac center, the margin irregular, diameter 6 mm, on *Q. douglasii*. Fullaway '11, p. 352

Cynipid. *Andricus pattersonae* Fullw

Disk-shaped, flat, hard, smooth, monothalamous galls on the under side of the leaves, diameter 5 to 6 mm, on *Q. chrysolepis*. Fullaway '11, p. 363

Cynipid. *Callirhytis guadaloupensis* Fullw.
 Button-shaped vein gall with a depressed center and median larval cell having the smoothness and polish of bone, the diameter 10 to 13 mm, height 6.7 mm.
 Cal. Trotter '11, p. 106

Cynipid. *Andricus patelloides* Trott.
 Saucerlike, small galls frequently on the under side of the leaves, usually clustered and varicolored, diameter 3-5 mm, on *Q. alba*, *Q. macrocarpa*, *Q. obtusiloba*. Pl. 8, fig. 1, 2, fig. 101, 102, 103. Stebb. '10, p. 27
 Itonid. Oak spangles, *Cecidomyia poculum* O. S.

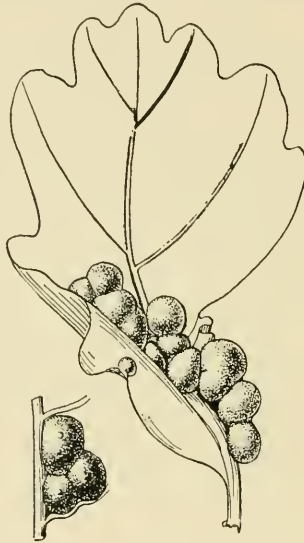


Fig. 104. Gall of *Neuroterus majalis* Bass. (Original)

Saucer-shaped, sessile, minute, flat, red leaf galls on the under surface, diameter 3 mm, on *Q. lobata*. Bassett '00, p. 312

Cynipid. *Andricus parmula* Bass.
 Very irregular, flat, green, succulent leaf galls, brown when dry, diameter 6 to 25 mm, height 6 to 9 mm, on *Q. alba* and *Q. prinus*. Fig. 85, 4-6, 104. Beutm. '10c, p. 134

Cynipid. *Neuroterus majalis* Bass.
 Flattened, rounded, disklike, monothalamous oak leaf galls, pinkish or purplish, sometimes with a yellowish apex, the sides flat and very thin, diameter 3 to 4 mm, on white oak. Beutm. '11b, p. 69

Cynipid. *Philonix californica* Beutm.
 Broad, ovate, saucer-shaped leaf gall terminating in a slender cone with incurved sides, pubescent, smoky gray, length 6 mm, diameter 5 mm, on *Q. douglasii*. Bassett '00, p. 316

Cynipid. *Andricus kingi* Bass.

Saucerlike, flattened, clustered, monothalamous galls with a minute central point, the edge slightly raised, closely resembles gall of *Cecidomyia poculum*, diameter 1.5 to 2 mm, height .75 mm, on *Q. undulata*. Fig. 68, 13. Beutm. '11d, p. 368

Cynipid. *Dryophanta discus* Bass. Fusiform, marginal, smooth, solitary fold, length 6 mm, diameter 2 mm, the walls somewhat thickened, on live oak. Fig. 105

Cal. Cynipid. *Dryophanta* sp. a2570 Ovate, pocket-shaped, marginal, pilose leaf fold, usually clustered, sometimes single, length 4 mm, diameter 3 mm, on live oak. Fig. 106

Cal. Cynipid. *Dryophanta* sp. Ovate, pocket-shaped, marginal leaf fold with greatly thickened walls, solitary, sometimes in pairs, length 5 to 8 mm. Cal. Trotter '11, p. 108

Itonid. ? *Diplosis silvestrii* Trott.



Fig. 105. *Dryophanta* sp., a2570, enlarged. (Original)



Fig. 106. *Dryophanta* sp. on live oak. Cal. (Original)

Gall a folded leaf edge between serrations. Pl. 8, fig. 5. Ent. News 19:349

Itonid. Marginal fold gall, *Itonida foliora* Rssl. & Hkr. Galls similar, possibly identical. Felt. '06b, p. 672

Itonid. *Cecidomyia erubescens* O. S.

(14) Galls composed apparently of crystalline matter; attached to the leaves

(a) Solitary, globular

Globose, pink, thick-walled leaf galls on the under surface, with 50 or 60 short, blunt horns, diameter 9 to 18 mm, on *Quercus* sp. Bassett '90, p. 81

Cynipid. Handsome oak gall, *Andricus speciosus* Bass. Clustered, woolly, bright pinkish leaf galls, the wool crystalline, semitransparent, diameter 3 to 8 mm, on *Q. ? agrifolia*, *Q. dumosa*, *Q. douglasii*. Bassett '00, p. 319

Cynipid. *Andricus crystallinus* Bass.

(b) Clustered, tubular

Tubular leaf gall, length 7 to 10 mm, narrow basally, open apically, yellowish, the surface with numerous red spines, the interior divided by two horizontal partitions, the basal and distal cavities empty, the latter open, on *Q. obtusiloba*. Osten Sacken '61, p. 60

Cynipid. Spined oak tube gall, *Andricus tubicola* O. S.¹

¹ See also, *A. splendens* on p. 106

Tubular, monothalamous, yellowish red vein gall, truncate and deeply excavated apically, the walls of the cavity contracted near the top, larval cell just beneath and an empty cavity below, height 7 mm, diameter 5 mm. Wash. Trotter '11, p. 107

Cynipid. ? *Trigonaspis vaccinioides* Trott

(15) Small, fleshy galls, clustered on leaves

(a) Split midvein in their growth

Clusters of seedlike bodies, often 30 to 40 together, occur on the under side of the midvein of red oak leaves, the larger cells smooth, greenish white with an enlarged apex and about the size of grains of wheat, on *Q. bicolor*, *Q. ilicifolia*, *Q. rubra* and *Q. coccinea*. Pl. 3, fig. 1. Bassett '64, p. 689

Cynipid. Oak leaf seed gall, *Cynips decidua* Bass.

Clustered, pubescent, globular, drab or brownish red midvein galls, frequently splitting and extending along the vein 4 to 8 cm, diameter 3 to 9 mm, occur in clusters of 10 to 100 or more on a leaf, on *Q. rubra*. Pl. 1, fig. 6. Bassett '00, p. 314

Cynipid. *Andricus piperoides* Bass.

Pyriform, usually clustered, reddish brown leaf gall with a minute, whitish pubescence and arising from a slit in the basal two-thirds of the midvein, height 5 to 8 mm. Cal. Trotter '11, p. 117

Cynipid. ? *Andricus* sp.

(b) Do not split midvein in growing

Galls in rounded masses, a few to 30 in each, closely packed, clustered on the under side of the midrib or petiole, monothalamous, globose, pointed basally, greenish, tinged with pink when fresh, grayish when old, individual galls, diameter 2.5 mm to 3 mm, diameter of masses from 6 to 15 mm, on burr oak, dwarf chestnut oak and white oak. Beutm. '13e, p. 245

Cynipid. *Cynips dimorphus* Gill.

Clustered, bell-shaped, monothalamous, greenish or reddish leaf vein gall, shaped somewhat like a huckleberry blossom, length 3 to 4 mm, on *Q. minor*. Fig. 84, 6. Beutm. '09, p. 255

Cynipid. Bell-shaped oak gall, *Zopheroteras vaccinii* Ashm.

Conical, clustered leaf gall attached to the under surface of the midrib, on *Q. bicolor*. Gill. '89, p. 217

Cynipid. *Cynips nigricens* Gill.

(16) Galls attached to leaves and covered with woolly fibers

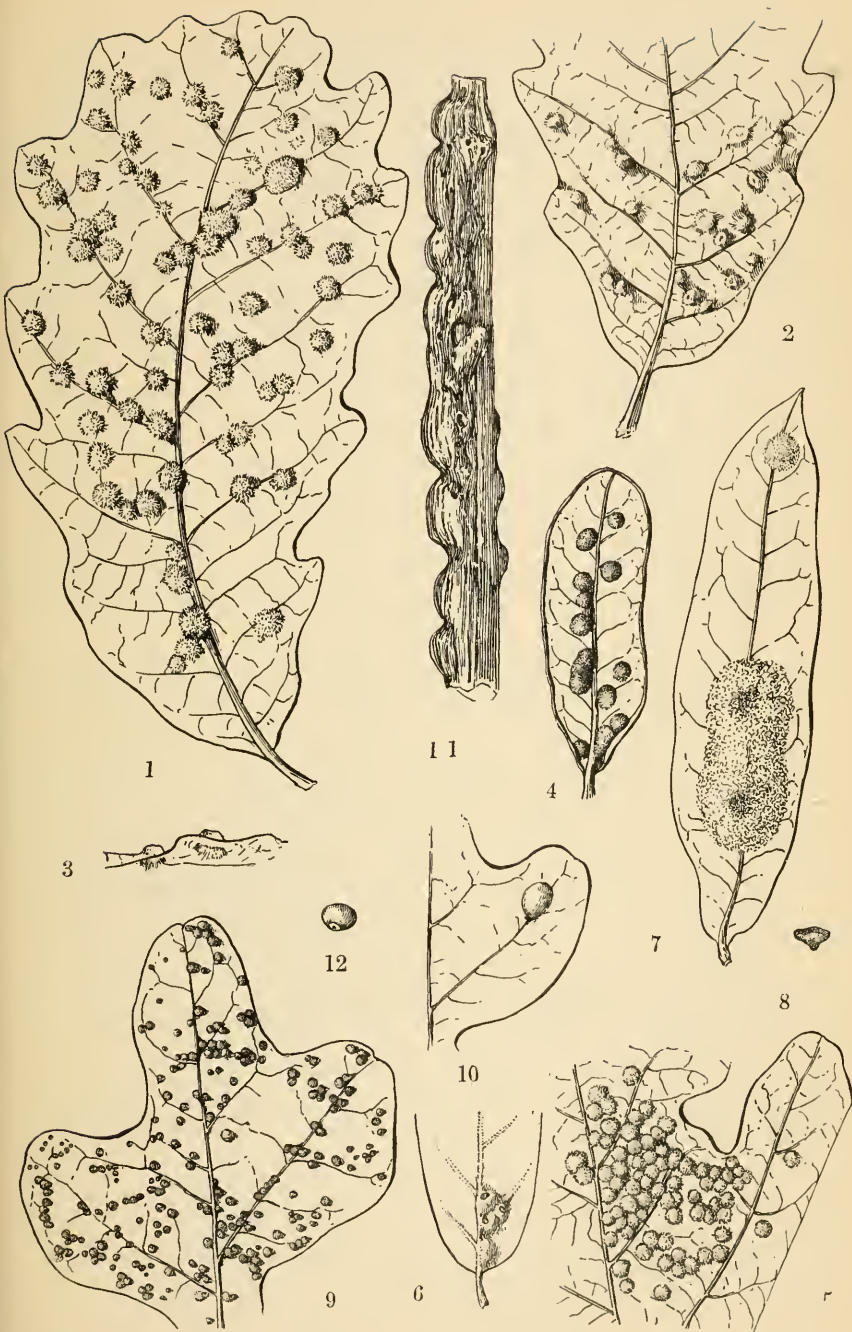
(a) Small cells, each with a separate crown of wool

Globose leaf gall, densely covered with coarse, brown, mosslike wool, diameter 1.25 to 2.50 mm, on under side of leaf, on *Q. virginiana*. Fig. 107, 4. Beutm. '10c, p. 123

Cynipid. *Neuroterus minutissimus* Ashm.

Globose leaf gall, smooth above, thickly covered with white wool below, single or confluent, diameter 1.5 to 3.5 mm, on *Q. alba*, *Q. platanoides*. Fig. 107, 1-3. Beutm. '10c, p. 123

Cynipid. Oak flake gall, *Neuroterus floccosus* Bass.



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Fig. 107. *Neuroterus* galls. 1-3. Oak flake gall, *N. floccosus* Bass., upper, lower and side view. 4. Gall of *N. minutissimus* Ashm. 5. Gall of *N. verrucarum* O.S. 6. Gall of *N. howertoni* Bass. 7. 8. Gall of *N. laurifoliae* Ashm. 9, 12. Jumping bullet gall, *N. saltatorius* Hy. Edw. 10. Gall of *N. cockerelli* Beutm. 11. Gall of *N. rileyi* Bass. (After Beutm., Am. Mus. Nat. Hist.)

Light brown, budlike, thin-shelled, marginal leaf gall covered with short wool, length 2 to 3 mm, on *Q. alba*. Fig. 53, 12, 13. Beutm. '10c, p. 132

Cynipid. *Neuroterus clarkeae* Beutm.

Globose, brown-haired, clustered vein galls, each monothalamous, diameter 2.5 mm on upper surface, usually two or three in a cluster and not showing on the lower surface.

Cynipid. *Neuroterus* sp. a2762

(b) Small, seedlike cells in groups and covered by wool

Woolly, whitish, mass on the under side of the leaves, usually along the midrib, diameter 9 mm, containing a mass of small, monothalamous cells, on *Q. alba*, *Q. macrocarpa*, *Q. lobata*. Pl. 1, fig. 2. Walsh '64, p. 482

Cynipid. *Andricus flocci* Walsh

Globose leaf gall, smooth above, thickly covered with white wool beneath, singly or confluent, diameter 1.5 to 3.5 mm, on *Q. alba*, *Q. platanoides*. Fig. 107, 1-3. Beutm. '10c, p. 123

Cynipid. Oak flake gall, *Neuroterus floccosus* Bass.

Small, flattened, circular or irregular tufts of rather long, whitish or reddish wool covering two to six irregular, brown, seedlike kernels, usually on the under surface, diameter 1.8 to 2 mm. Ashm. '81, p. XIII

Cynipid. *Andricus lanigera* Ashm.

Clustered, larval cells along the midvein, the cells hidden in short, dense, brownish wool, the largest clusters often more than half the length of the leaf, on *Q. obtusiloba*. Bassett '81, p. 98

Cynipid. *Andricus pattoni* Bass.

Oval, rather thick-shelled, brown leaf vein gall, at first woolly, later naked, length 3 mm, diameter 1.5 mm, on *Q. platanoides*. Fig. 99, 10. Beutm. '11d, p. 359

Cynipid. *Dryophanta ignota* Bass.

White or buff-colored, woolly masses attached to the principal veins on the under side of the leaves, on *Q. alba*. Pl. 1, fig. 4. Felt '06b, p. 625

Cynipid. Oak wool gall, *Andricus lana* Fitch

Monothalamous, clustered, hard, woody, subcylindrical, wedge-shaped or subtriangular leaf galls, each densely covered with short, coarse, whitish woolly fibers, the cluster appearing as one large gall, on *Q. minor*. Beutm. '09f, p. 248

Cynipid. *Andricus texanus* Beutm.

Subdiscoidal leaf gall, diameter 3.5 to 5 mm and with whitish gray, transparent, radiating hairs; on the opposite surface a discolored depression with a diameter of 1 mm. Mex. Trotter '11, p. 130

Cynipid. *Neuroterus bonanseae* Trott.

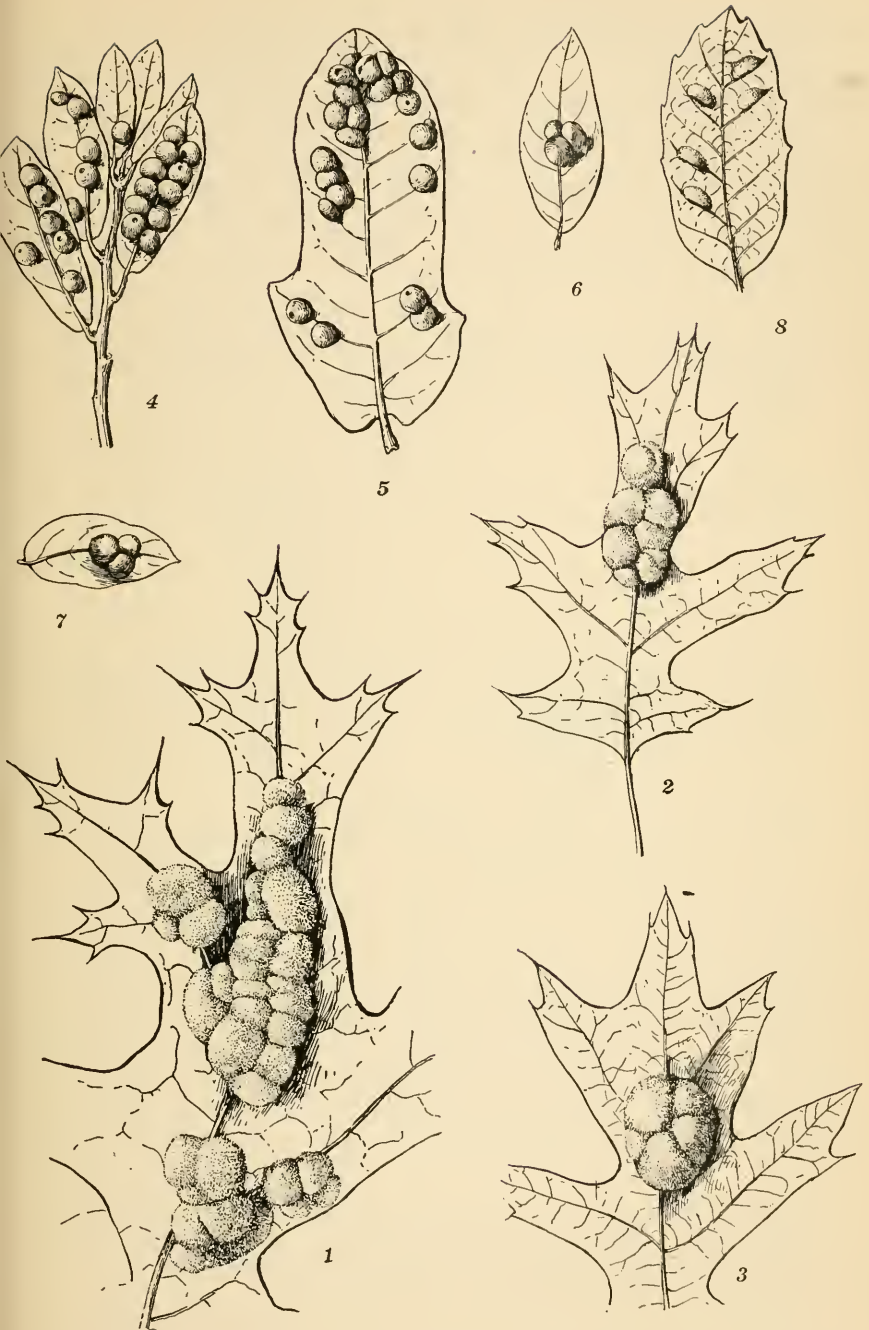
Button-shaped, golden-yellow haired, vein gall, diameter 10 to 20 mm and consisting of a number of cells, each with a diameter of 3.5 mm and sometimes of 10 mm. Mex. Trotter '11, p. 124

Cynipid. *Philonix comata* Trott.

(c) Cells large, not seedlike but clustered under wool as before

Globose, kernel-like leaf galls occurring singly or in clusters and covered with long, loose, fawn-colored wool, diameter of kernel 2 to 2.5 mm, on *Q. laurifolia*, *Q. imbricaria*. Fig. 107, 7, 8. Beutm. '10c, p. 130

Cynipid. *Neuroterus laurifoliae* Ashm



E.L.Beurenmüller

Fig. 108. *Dryophanta* galls. 1-3. *D. lanata* Gill. 4-7. *D. emoryi* Ashm. 8. *D. pulchripennis* Ashm. (After Beutm., *Am. Mus. Nat. Hist.*)

Globular, fleshy, monothalamous leaf gall with dense, yellow wool, diameter 5 to 6 mm, on upper surface, on *Q. catesbaei* Ashm. '87, p. 144

Cynipid. *Andricus infuscatus* Ashm.

Bunches of pale brown wool on under surface of leaf, each with 2 to 8 triangular or irregularly conical cells, diameter 5 to 15 mm, on *Q. rubra*, *Q. coccinea*, *Q. velutina*, *Q. marylandica*, *Q. phellos*, *Q. nana*. Fig. 108, 1-3. Beutm. '11d, p. 350

Cynipid. *Dryophanta lanata* Gill.

Globular or hemispherical, densely haired, pinkish red clusters of leaf galls, each with 1 to 5 larval cells, diameter 5 to 12 mm, on *Q. ?arizonica*. Fig. 68, 3. Beutm. '11d, p. 344

Cynipid. *Dryophanta nubila* Bass.

Monothalamous, clustered, thin-shelled, reddish, woolly oak leaf gall, individual galls, diameter 1 to 1.5 mm, height 2 mm, on *Q. lobata*. Beutm. '13c, p. 244

Cynipid. *Andricus fullawayi* Beutm.



Fig. 109. ?*Callirhytis flocculenta* Trott. on live oak. (Original)



Fig. 110. Oak capsule gall, *Andricus capsulus* Bass. (Original)

Globose, grayish brown, clustered leaf gall, sometimes slightly flattened basally, irregularly wrinkled and covered with dense, short, woolly hairs, diameter 8 mm, on *Q. lobata*. Fig. 97, 5. Beutm. '11b, p. 67

Cynipid. *Dryophanta multipunctata* Beutm.

Subelliptical or subcylindrical, yellowish vein gall with long, yellowish hairs and ordinarily in clusters of two to three, length about 3 mm, differs from *A. infuscatus* by the greater thickness of the walls. Cal. Trotter '11, p. 116

Cynipid. *Andricus* sp.

Depressed, hemispherical, grayish red vein gall, the mass with a diameter of 5 to 15 mm, individual galls, subpyramidal, the surface rough and with clusters of minute, whitish hairs, major diameter 5 to 6 mm, diameter of base 4 to 5 mm. Cal. Trotter '11, p. 119

Cynipid. ? *Cynips* sp.

(d) Cells small and bonded together by a hard substance

Hemispherical, hard, polythalamous leaf gall covered with pale yellowish wool more or less ringed with ferruginous, stem entirely rust-red, resembles *Afloccus*, diameter 5 to 9 mm, occurs on both surfaces of *Q. chrysolepis*. Ashm. '97, p. 132

Cynipid. *Callirhytis lasius* Ashm.

Densely haired, russet-colored, hemispherical masses attached by a small point to the upper surface of the leaf, diameter 12 to 18 mm, on *Quercus* sp. Bassett '81, p. 92

Cynipid. *Bassettia tenuicornis* Bass.

(e) Polythalamous, under wool

Woolly, rusty, yellowish brown, polythalamous midvein gall, dimensions 2 by 3 cm on *Q. crassifolia*. Bassett '90, p. 78

Cynipid. *Andricus mexicanus* Bass.

(f) Monothalamous, large

Irregular, lemon-shaped, monothalamous oak apple, length 8 to 10 mm, diameter 5 to 7 mm, thickly covered with whitish, fulvous hairs. Fig. 109. Cal. Trotter '11, p. 115

Cynipid. ? *Callirhytis flocculenta* Trott.

(17) Galls on pedicels attached to the leaves

Elongate or fusiform, pointed leaf or twig gall, usually with a long pedicel, the prolongation of a leaf vein, pale green, thin-shelled and with an oblong, thin larval cell supported by radiating fibers, length 20 to 25 mm, diameter 4 to 8 mm, on *Q. coccinea* and *Q. rubra*. Fig. 92, 8-10. Beutm. '09b, p. 56

Cynipid. Oak spindle gall, *Amphibolips coelebs* O.S.

Elongate, fusiform, stemmed leaf gall mostly on the margin, sometimes on the surface, length of stems 5 mm, of the fusiform gall 3 to 4 mm, on *Q. alba*. Osten Sacken '61, p. 61

Cynipid. Small oak spindle gall, *Andricus fusiformis* O.S. Slender, globe-shaped, leaf galls nearly 12 mm long, the stalk twice as long as the swelling, the surface pubescent, on *Q. prinoides* Fitch '51, p. 820

Cynipid. *Andricus chinquapin* Fitch

Monothalamous, marginal, stemmed leaf gall, length of stem 12 to 18 mm, length of gall 10 mm, diameter of gall 3 mm, on *Q. bicolor*. Fig. 110, Bassett '81, p. 101

Cynipid. Oak capsule gall, *Andricus capsulus* Bass.

Fusiform, stemmed, green or dark olive-brown leaf gall with a free cell within, length 4 to 5 mm, diameter 2.5 to 3 mm, on *Q. rubra* and *Q. coccinea*. Fig. 99, 8, 9. Beutm. '11d, p. 366

Cynipid. *Dryophanta pedunculata* Bass.

Fusiform, pedunculate, smooth, reddish brown vein gall, length 8 to 10 mm, the stem slender, smooth, length mm. Cal. Trotter '11, p. 105

Cynipid. *Andricus pseudo-callidoma* Trott.

Globose or fusiform, stemmed, smooth, shining, dark-brown leaf gall, length 4 cm, greatest diameter 3.5 to 4.5 mm, length of stem 4 to 6 or 8 mm. Mex. Trotter '11, p. 123

Cynipid. ? *Andricus longepedunculatus* Trott.

(18) Presumably leaf galls, the gall unknown

Reared from oak, presumably from a gall resembling that made by Cynips. Felt '08e, p. 391

Itonid. *Thecodiplosis quercifolia* Felt

Probably reared from oak leaves. Felt '07a, p. 137

Itonid. *Dicrodiplosis quercina* Felt

7 Galls of the aments or catkins

Clavate, irregular, rather angulate, thin-shelled, polythalamous, clustered, staminate, brown, ament gall, diameter 3 or 4 mm, on *Q. agrifolia*. Fullaway '11, p. 339

Cynipid. *Dryophanta dubiosa* Fullw.

Globular, woolly gall, diameter 12 mm, on *Q. aquatica*. Ashm. '81, p. XVI

Cynipid. *Andricus turneri* Ashm.

Rounded, shotlike, greenish white, soft, spongy, polythalamous gall on red oak catkins. Pl. 2, fig. 7. Bassett '90, p. 73

Cynipid. Oak flower gall, *Callirhytis pulchra* Bass.

Conical, monothalamous blossom galls, dark brown or black when dry, length 2.5-3 mm, on *Q. myrtifolia*. Beutm. '17, p. 346

Cynipid. *Andricus myrtifoliae* Beutm.

Ovate, smooth, blossom galls, diameter 1 mm, on *Q. cinerea*. Ashm. '87, p. 143

Cynipid. *Andricus blastophagus* Ashm.

Nodular enlargements of the flower cluster, more or less concealed by the floret.

They are small, succulent and shrivel soon after the flies emerge, on *Q. minor*.

See also, fig. 107, 1-3. Beutm. 10c, p. 123

Cynipid. Oak flake gall, *Neuroterus floccosus* Bass.

Oval, small, short, dark slate colored, ament galls, length 1.25 mm, diameter 1 mm, on *Q. obtusiloba*. Bassett '00, p. 318

Cynipid. *Andricus exiguus* Bass.

Small, black, polythalamous galls in sterile florets of *Q. ilicifolia*, occasionally very abundant, diameter 2.5 mm. Bassett '90, p. 79

Cynipid. *Callirhytis clarkei* Bass.

Globose, monothalamous, pale wood colored galls in dense clusters near the ends of the aments, on *Q. platanoides*. Fig. 53, 7. Beutm. '10c p. 129

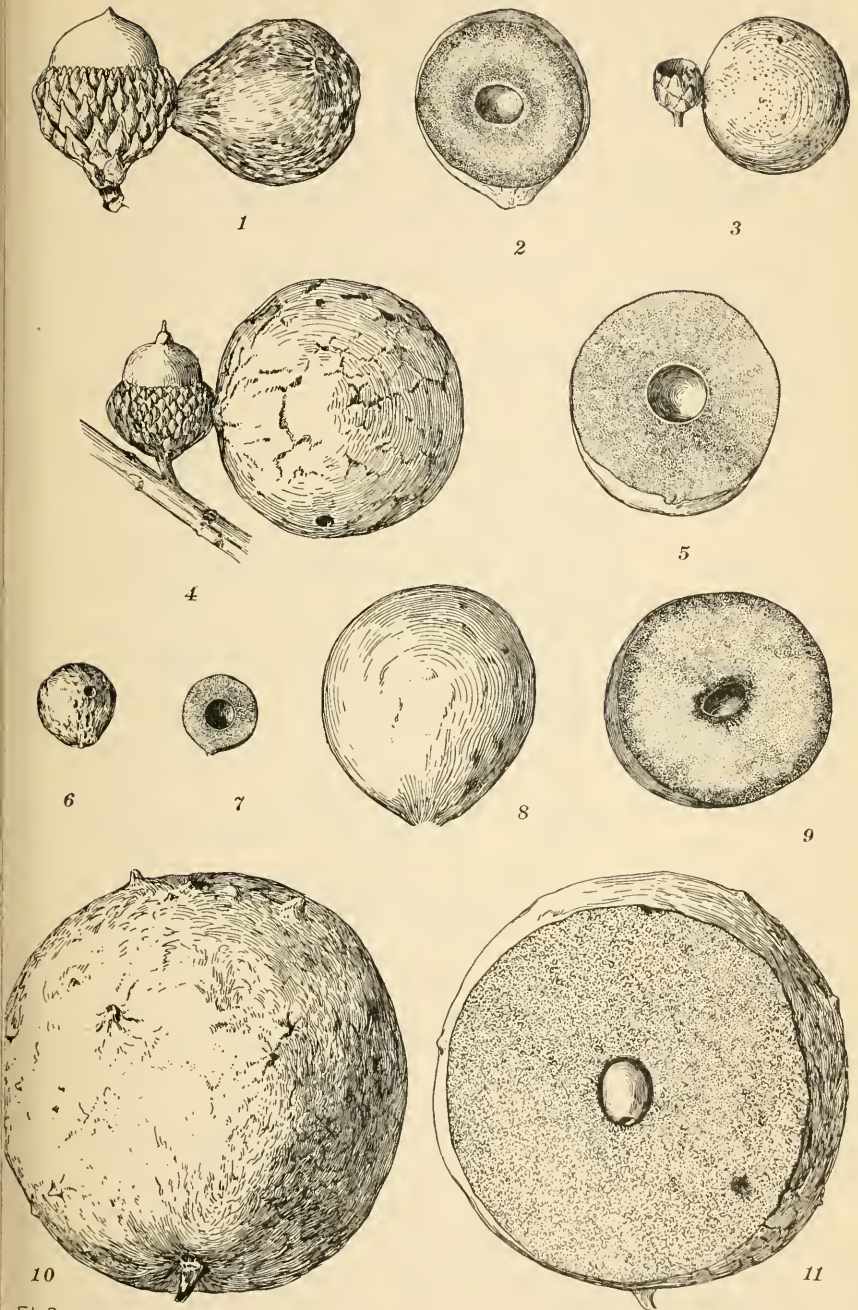
Cynipid. Oak flower stem gall, *Neuroterus pallidus* Bass

Globose, moderately thick-shelled, yellowish, almost smooth, pithy gall, diameter 20 to 35 mm, possibly on oak blossoms. Fig. 111, 8, 9. Beutm. '09b, p. 65.

Cynipid. *Amphibolips trizonata* Ashm.

Reared from undescribed oak blossom galls. Felt '08e, p. 325

Itonid. *Lasioptera querciflorae* Felt



EL. Beutenmüller

Fig. 111. Oak apples. 1-3. Acorn plum gall, *Amphibolips prunus* Walsh. 4, 5. *A. ainesi* Bass. 6, 7. *A. fuliginosa* Ashm. 8, 9. *A. trizonata* Ashm. 10, 11. Palmer's oak apple, *A. palmeri* Bass. (After Beutm., *Am. Mus. Nat. Hist.*)

8 Galls of the fruits

a Galls of the acorn

Inhabiting apparently normal, small acorns or those slightly deformed, on *Q. ilicifolia*. Pl. 1, fig. 7. Beutm. '13e, p. 105

Cynipid. *Andricus perditor* Bass.

White kernel or larval cell in the meaty portion of acorns, though sometimes outside near its base and hidden by the cup, on scarlet, red and black oak and probably in others of the red oak group. Beutm. '13e, p. 102

Cynipid. *Callirhytis fruticola* Ashm.

Gall similar to that of *C. fruticola* probably new, and occurring in the acorns of swamp oak, *Q. platanoides*, found by L. H. Weld. Beutm. '13e, p. 102

Cynipid. ? *Callirhytis* sp.

Acorns containing rounded bodies or larval cells, sometimes filling the whole interior and resembling those of *C. fruticola*, on *Q. agrifolia*.

Beutm. '13e, p. 105

Cynipid. *Andricus eldoradensis* Beutm.

Acorns containing 1 to 5 or 6 pseudochestnut-shaped galls, the latter varying in size from that of a flax seed to a length of 8 mm (spring form, *C. operatola* Ril. & Bass.) Bassett '00, p. 315

Cynipid. *Andricus operator* O. S.

Monothalamous acorn galls at the tip of leaf twigs, double, the basal portion smaller and telescoped in the upper part, rugose, with a whitish bloom, length 15 mm, on *Q. chrysolepis*. Fullaway '11, p. 363

Cynipid. *Callirhytis sanctae-clarae* Fullw.

Bud gall, possibly acorn gall composed of a basal, oblate part with a height of 3 to 4 mm and a distal conico-pyramidal portion with a height of 10 to 12 mm and a diameter of 8 to 12 mm, the larval cell in the basal portion. Trotter '11, p. 109

Cynipid. *Disholcaspis* sp.

Reared from larvae found between the seed coats of an acorn. Felt '15e, p. 137

Itonid. *Dasyneura glandis* Felt

b Galls of the acorn cup (cupule)

Globose, bright red acorn-cup gall, the fresh flesh pink, shading to yellow toward the middle, at maturity blood-red, diameter 15 to 25 mm, on *Q. rubra*, *Q. nana*, *Q. velutina* and *Q. coccinea* in August and September. Fig. 111, 1-3. Beutm. '09b, p. 62

Cynipid. Acorn plum gall, *Amphibolips prunus* Walsh

Globular, smooth, densely corky, acorn-cup gall, internally rusty brown, with a large larval cell, diameter 24 to 42 mm, on *Q. marilandica*. Fig. 111, 4, 5. Beutm. '09b, p. 63

Cynipid. *Amphibolips gainesi* Bass.

Irregular, monothalamous, conical swellings of the cupule, length 5 mm, diameter 2 mm, on *Q. platanoides*, *Q. macrocarpa*, *Q. prinoides* and *Q. prinus*. Beutm. '13e, p. 103

Cynipid. *Andricus glandulus* Beutm.

Flattened, toothlike or wedge-shaped galls on the outside of the acorn and between the cup and the acorn, the ends usually protruding more or less on red, scarlet, black and scrub oak (fall form). Pl. 2, fig. 5. Beutm. '13e, p. 103

Cynipid. *Andricus operator* O. S.

Seedlike capsule in acorn cup, on *Q. alba*, *Q. prinus* and allied oaks.
Pl. 3, fig. 4. Riley '75, p. 577

Cynipid. *Cynips glandulosus* Riley
Globose, small, red, smooth, corky, probably acorn galls, diameter 8 to 12 mm,
on *Q. laurifolia*. Fig. 111, 6, 7. Beutm. '13e, p. 102

Cynipid. *Amphibolips fuliginosa* Ashm.

9 *Supplementary list of gall-making Cynipids, the galls being unknown*

Amphibolips montana Beutm. '13 Insec. Inscit. Menst., 1:122

A. nigra Beutm. '11 Ent. News, 22:198

A. verna Bass. '00 Am. Ent. Soc. Trans., 26:321



Fig. 112. Woolly elm louse, *Schizoneura rileyi* Thos. Twig enlargement. (Original)



Fig. 113. Aborted buds on slippery elm, possibly the work of *Dasynura ulmea* Felt. (Original)

Andricus ashmeadi Bass. '00 Am. Ent. Soc. Trans., 26:320

A. aztectus Cam. '97 Ann. Nat. Hist., 19:261

A. brevicornis Beutm. '13 Am. Ent. Soc. Trans., 39:245

A. ignotus Bass. '00 Am. Ent. Soc. Trans., 26:317

A. incertus Bass. '00 Am. Ent. Soc. Trans., 26:317

A. durangensis Beutm. '11 Ent. News, 22:198

A. lustrans Beutm. '13 Am. Ent. Soc. Trans., 39:244

A. obtusilobae Bass. '00 Am. Ent. Soc. Trans., 26:316

A. patiens Bass. '00 Am. Ent. Soc. Trans., 26:312

A. pulchellus Bass. '00 Am. Ent. Soc. Trans., 26:314

Aylax quinquecostata Prov. '80 Nat. Canad., 14:20

A. rufipes Cam. '84 Ent. Soc. Lond. Trans., p. 485

Aulacidea harringtoni Ashm. '87 Am. Ent. Soc. Trans., 14:146

Callirhytis arcuata Kieff. '09 Lab. Zool. Portici Bul., 4:341

- C. defecta* Kieff. '09 Lab. Zool. Portici Bul., 4:116
Chilaspis ferrugineus Gill. '90 Ill. State Lab. of Nat. Hist. Bul.,
 3:200
Cynips flavicollis Ashm. '96 U. S. Nat. Mus. Proc., 19:123
C. gibbosa Prov., '81 Nat. Canad., 12:232
Diastrophus piceus Prov. '86 Add. Faune Canad., Hym., p. 161
Disholcaspis heynei Kieff. '09 Lab. Zool. Portici Bul., 4:113
Dryophanta corrugis Bass. Beutm. '11 Amer. Mus. of Nat. Hist.
 Bul., 30:353
D. parvula Bass. '00 Am. Ent. Soc. Trans., 26:326
D. pulchella Beutm. '14 Ent. News, 22:357
Holocynips emarginata Kieff. '09 Lab. Zool. Portici Bul., 4:114
Neuroterus dubius Bass. '00 Am. Ent. Soc. Trans., 26:335
N. crassitelus Prov. Nat. Can., 12:233

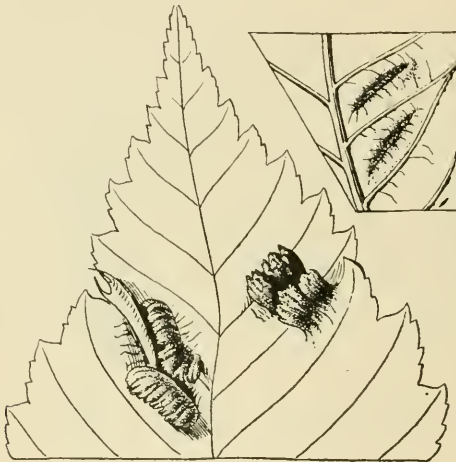


Fig. 114. Cockscomb elm gall, *Colopha ulmicola* Fitch, showing upper and lower surface of leaf. (Original)

- Phamacis americana* Baker. '96 Can. Ent., 28:131
Trissandricus maculipennis Kieff. '09 Lab. Zool. Portici Bul.,
 4:115

Urticaceae (nettle family)

Ulmus (elm)

- Reared from larvae under decaying bark. Felt '13m, p. 224
 Itonid. *Oligarces ulmi* Felt
 Knotty growths on the trunk and branches, usually covered with woolly plant-
 lice, on *U. americana*. Fig. 112. Felt '06b, p. 192
 Aphid. Woolly elm louse, *Schizoneura rileyi* Thos.
 Aborted or blasted buds. Fig. 113, pl. 10, fig. 3. Felt '15e, p. 171
 Itonid. *Dasyneura ulmea* Felt
 Blasted leaf buds or adherent, immature leaf clusters. Pl. 11, fig. 6. Felt
 '12f, p. 240
 Itonid. *Phytophaga ulmi* Beutm.

Thickened, green or reddish, crested, cockscomb-shaped ridges arising from lateral veins, length 10 to 15 mm, height 8 mm. Fig. 114. Felt '06b, p. 186

Aphid. Cockscomb elm gall, *Colopha ulmicola* Fitch

Spindle-shaped, hollow gall on the upper surface of the leaf, variable in size, length about 15 mm, on slippery elm. Fig. 115. Felt '15e, p. 58

Aphid. Slippery elm pouch gall, *Pemphigus ulmifusus* Walsh



Fig. 115. Slippery elm pouch gall, *Pemphigus ulmifusus* Walsh. (Author's illustration)



Fig. 116. Elm sack gall, *Tetraneura ulmisacculi* Patch. (Author's illustration)

Globose, sessile, yellowish green, sometimes pink-tinted leaf gall, diameter 5 to 12 mm, on *U. montana*. Fig. 116. Felt '15e, p. 57

Aphid. Elm sac gall, *Tetraneura ulmisacculi* Patch

Curled and twisted leaves containing numerous mealy-covered Aphids, on *U. americana*. Felt '06b, p. 177

Aphid. Elm leaf aphid, *Schizoneura americana* Ril.

Globose, green or yellowish green, pocket galls, on *U. americana*, *U. racemosa*, *U. fulva*. Chadwick '08, p. 149

Acarid. *Eriophyes* sp.

Large, pouch gall, diameter 1 to 2 cm, on *U. fulva*. Chadwick '08, p. 149
Acarid. *Eriophyes* sp.
Pubescent, pouch gall, diameter 3 to 6 mm, on *U. fulva*. Chadwick '08,
p. 149

Acarid. *Eriophyes* sp.
Whitish erineum on the under side of the leaf of *U. racemosa*. Chadwick
'08, p. 150

Acarid. *Eriophyes* sp.

Celtis (hackberry)

"Witch-broom" on branches and twigs. Chadwick '08, p. 130

Acarid. *Eriophyes* sp.



Fig. 117. Hackberry bud gall, *Pachy-psylla gemma* Riley. Infested twig and one gall in section, the latter enlarged. (Original)

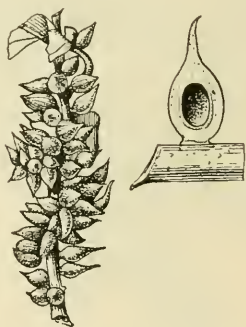


Fig. 118. Hackberry flask gall, *Phytophaga celtiphyllia* Felt. Cluster of galls and one in section, the latter enlarged. (Original)

Hollow, elongate twig swellings, length 1.25 to 2.5 cm. Patton '97, p. 247

Itonid. *Cecidomyia deserta* Patt.

Fusiform bud gall, length 1.5-3 cm, diameter 4-6 mm. Wells '16, p. 258

Lepidopt. ? *Proteoteras aesculana* Ril.

Twig galls resembling seed capsules of *Rumex*, apically with a spine about one-half the length of the gall, the height, excluding the spine, 4.5 mm, the diameter approximately the same. Pack. '90, p. 613

Itonid. *Cecidomyia semenrumicis* Patt.

Bud-shaped, polythalamous twig gall without an opening. Fig. 117. Pack.
'90, p. 615

Hemip. Hackberry bud gall, *Pachypsylla gemma* Ril.

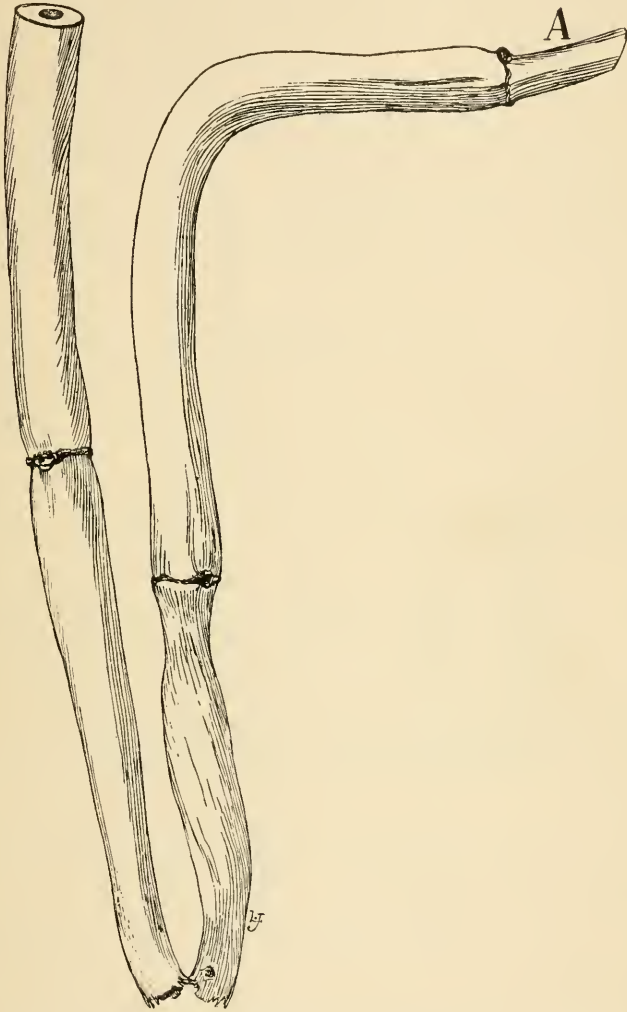


Fig. 119. Hop stem gall, *Lasioptera humulicaulis* Felt.
(Author's illustration)

Conical, spine-shaped leaf gall on the under surface and arising from a circular,
yellowish base, height 4 mm, diameter 2.8 mm. Pack. '90, p. 614

Itonid. Spiny hackberry gall, *Cecidomyia spiniformis*
Patt.

Globular, sessile, small leaf gall with a small impression at the top, not pubescent. Pack. '90, p. 621

Hemip. *Pachypsylla globulus* Ril.

Top-shaped, monothalamous, moderately thick leaf gall, the surface sparsely clothed with whitish, appressed pubescence, the greatest diameter 3 to 4 mm. Felt '16f, p. 190

Itonid. *Phytophaga wellsi* Felt

Rosette-shaped, ribbed leaf gall resembling the seed capsule of *Hibiscus*, on under surface of leaf, diameter 2 to 3 mm. Pack. '90, p. 614

Itonid. *Cecidomyia capsularis* Patt.

Reniform, large, petiole gall involving the base of the leaf and with an opening, polythalamous. Pack. '90, p. 617

Hemip. Hackberry petiole gall, *Pachypsylla venusta* O. S. Mammiform, very large leaf gall without a depression or rim on the top, usually not pubescent, sometimes with a slight down at the base, diameter 4.5 mm. Pl. 14, fig. 2. Pack. '90, p. 619

Hemip. Hackberry nipple gall, *Pachypsylla mamma* Ril. Elevated, mammiform, with a long nipple-like protuberance, diameter 6 mm, on under surface of leaf of *C. reticulata*. Cockerell, '10, p. 180

Hemip. *Pachypsylla rohweri* Ckll.

Subglobular, sessile, smaller leaf gall with long hairs and with a smooth, shining impression on the upper surface, diameter 3 mm. Pack. '90, p. 620

Hemip. *Pachypsylla pubescens* Ril.

Leaf gall resembling that of *Pachypsylla pubescens* but with no cup-shaped depression on the upper surface of the leaf, diameter 3.5 to 4 mm. Pack. '90, p. 613

Itonid. *Cecidomyia pubescens* Patt.

Circular, depressed leaf gall on the upper surface, the outer rim depressed, the central part slightly raised and with a median spine; wartlike on the under surface, much flattened and with a depression in the middle; height 2 mm, diameter 5 mm. Pack. '90, p. 619

Hemip. Hackberry button gall, *Pachypsylla umbilicus* Ril. Star-shaped or flower-shaped leaf gall and not forming a depression on the under side, on the upper surface blisterlike, height 1.25 mm, diameter 5 mm. Pack. '90, p. 618

Hemip. Hackberry star gall, *Pachypsylla asteriscus* Ril. Blisterlike, yellowish, monothalamous gall occurring on both sides of the leaf and hardly raised above the surface. Pack. '90, p. 618

Hemip. Hackberry blister gall, *Pachypsylla vesiculum* Ril. Globose, not pubescent, sessile leaf gall, wider than high, much flattened on the top and usually with two concentric, elevated rims and a central nipple. Pack. '90, p. 621

Hemip. Hackberry melon gall, *Pachypsylla cucurbita* Ril. Conical, flask-shaped or subglobular, slightly ribbed, greenish leaf or tender twig gall arising from a circular, truncate base, diameter 3.4 mm. Fig. 118. Felt '08e, p. 371

Itonid. Hackberry flask gall, *Phytophaga celtiphyllia* Felt
(*oviformis* Patt.)

Subconical leaf gall, clustered on the under surface, length 3 to 5 mm. Beutm. '07c, p. 388

Itonid. *Cecidomyia unguicula* Beutm.

Subconical, solitary or compound leaf, stem, petiole or fruit gall with a bluntly truncate, dehiscent larval cell, diameter about 4 mm. Wells '16, p. 277
Itonid. *Cecidomyia* sp.

Humulus (hop)

Swollen stems, diameter 1 cm, length 4 to 50 cm. Fig. 119. Felt. '07a, p. 151
Itonid. Hop stem gall, *Lasioptera humulicaulis* Felt

Urtica (nettle)

Globose, hoary, pubescent, yellowish white gall on the under surface of the leaf, diameter 4 mm. Pl. 7, fig. 8. Felt '11j, p. 474

Itonid. Nettle bullet gall, *Cecidomyia* sp.

Urn-shaped, sessile, pale green midrib or vein gall, diameter 3 mm. Osten Sacken '75, p. 202

Itonid. Nettle urn gall, *Cecidomyia urnicola* O.S.

Laportea (wood nettle)

Irregular, oval, stem gall. Felt '11j, p. 463

Itonid. *Cecidomyia* sp.



Fig. 120. *Cecidomyia* sp.
Bud gall on *Laportea*. (Original)



Fig. 121. *Cecidomyia boehmeriae* Beutm.
Stem gall. (Original)

Irregular, probably bud gall, length 1.2 cm. Fig. 120. Felt '11j, p. 463

Itonid. *Cecidomyia* sp.

Boehmeria (false nettle)

Fusiform stem gall, length 12 mm, diameter 6 mm. Fig. 121. Beutm. '08, p. 74

Itonid. *Cecidomyia boehmeriae* Beutm.

Aristolochiaceae (birthwort family)

Aristolochia (birthwort)

Ovate leaf gall, diameter 4 mm. Hagen '81, p. 37

Itonid. *Cecidomyia hageni* Aldr.

Small, woolly capsule on under surface of the leaf, on *A. macrophylla*.
Chadwick '08, p. 127

? Acarid. *Eriophyes* sp.

Polygonaceae

Eriogonum

Elongate, bud swelling. Felt, '11j, p. 460

Itonid. *Cecidomyia* sp.

Rumex (dock)

Reared from deformed, reddish seeds. Felt, '08e, p. 392

Itonid. Dock seed midge, *Contarinia rumicis* Loew

Reared from same gall. Felt, '08e, p. 410

Itonid. *Lestodiplosis rumicis* Felt

Coccolobis revifera (sea grape)

Blister leaf gall, dark green, with a darker median nipple showing equally on both surfaces, diameter 5 mm. Fig. 122, Felt, '15a, p. 199

Itonid. Sea grape blister, *Ctenodactylomyia watsoni* Felt

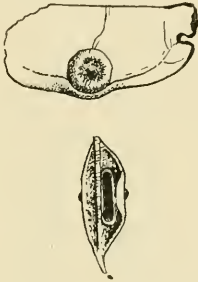


Fig. 122. Sea grape blister gall, *Ctenodactylomyia watsoni* Felt. Gall and one in section, the latter enlarged. (Original)



Fig. 123. Greasewood bud gall, *Onodiplosis sarcobati* Felt. (Original)

Chenopodiaceae (goosefoot family)

Eurotia

Irregular bud galls. Felt, '11j, p. 460

Itonid. *Cecidomyia* sp.

Sarcobatus vermiculatus (greasewood)

Irregularly oval bud galls, fleshy, becoming hard and apparently composed of closely appressed, thickened bud scales, length 10 mm, diameter 6 mm.

Fig. 123. Felt, '16f, p. 176

Itonid. Greasewood bud gall, *Onodiplosis sarcobati* Felt

Somewhat produced, axillary, rosette bud galls, length 1.5 cm, diameter .5 cm.

Collected by L. H. Weld.

Dipt. Trypetid a2772

Swollen, folded leaflets, length 12 mm, diameter 1.5 mm. Felt, '16c, p. 202

Itonid. Greasewood leaf gall, *Protaplonyx hagani* Felt

Oval leaf swellings. Felt '14i, p. 93

Itonid. *Aplonyx sarcobati* Felt

Atriplex

Irregular, subglobular bud galls with sparse, long hairs, diameter 8 to 9 mm.

Fig. 124. Cockerell '96, p. 402. Felt '16d, p. 139

Itonid. *Atriplex* bud midge, *Asphondylia neomexicana* Ckll.

Fleshy, polythalamous, tumorlike twig gall, length 12 mm, diameter 4.5 to 6 mm. Fig. 125. Amer. Nat. 29:766. Felt '16d, p. 138

Itonid. *Atriplex* tumor gall, *Asphondylia atriplicis* Ckll.

Irregular twig gall, length 1.5 mm, diameter 5 mm. Fig. 126. Cockerell '98, p. 327

Itonid. *Lasioptera willistoni* Ckll.



Fig. 124. *Atriplex* bud midge, *Asphondylia neomexicana* Ckll. (Author's illustration)

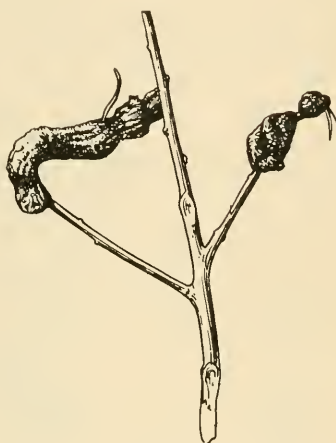


Fig. 125. *Atriplex* tumor gall, *Asphondylia atriplicis* Ckll. (Original)

Circular, pustulate leaf gall, diameter 2.5 mm. Cockerell '98, p. 326

Itonid. *Atriplex* leaf blister, *Cecidomyia atriplicicola* Ckll.

Woolly masses 1 to 2 cm long on the stems, evidently appressed, aborted leaves, on *A. ? polycarpa*

Itonid. *Asphondylia ? atriplicis* Ckll. a2893

Globose, sessile, whitish, short-haired galls, diameter 4 mm, on *A. confertifolia*

Itonid. *Asphondylia atriplicis* Ckll.

Subglobose or lenticular, apposed leaf galls, diameter 3 to 4 mm, length 6 or 7 mm. Cockerell and Rohwer, '08, p. 169. Fig. 127

Hemip. *Atriplicia ? gallicola* Ckll. a2478

Longitudinally curled, apposed leaves, length 5 to 6 mm, diameter 1 to 1.5 mm.

Fig. 128

Hemip. Coccid sp. a2479

Suaeda or *Dondia* (Sea blite)

Blackish, globose, sessile, leafy deformations, diameter 3 mm. Felt '18d, p. 381

Itonid. *Asphondylia dondiae* Felt, MS.

Phytolaccaceae (poke weed family)

Rivina (rouge-plant)

Reared from bud gall. Felt '16d, p. 112

Itonid. *Schizomyia rivinae* Felt

Nyctaginaceae (four-o'clock family)

Oxybaphus

Stem gall, length 1.5 to 2 cm. Felt '11k, p. 482

Itonid. *Lasioptera allioniae* Felt



Fig. 126.
Lasioptera
willistoni
Ckll. (Original)



Fig. 127. Coccid
gall on *Atriplex*, a2478
(Original)



Fig. 128. Coccid
gall on *Atriplex*
canescens, a2479.
(Original)

Pisonia

Subconic, stem gall on *P. aculeata*. Felt '11k, p. 547

Itonid. *Feltomyia mexicana* Felt

Oval leaf gall on *P. nigricans*. Felt '12b, p. 353

Itonid. *Feltomyia pisonifolia* Felt

Irregular stem swellings on *P. nigricans*. Felt '12a, p. 174

Itonid. *Feltomyia pisoniae* Felt

Ranunculaceae (crowfoot family)

Thalictrum (meadow rue)

Enlarged seed pods, length 8 mm. Felt '11k, p. 547

Itonid. Meadow rue seed midge, *Asphondylia thalictri*
Felt

Reared from same gall and probably zoophagous. Felt '11j, p. 473

Itonid. *Trotteria* sp.

Anemone (Anemone)

Slightly enlarged, loose bud gall on *A. canadensis*. Felt '15e, p. 139

Itonid. Anemone bud gall, *Dasyneura anemone* Felt

Golden brown erineum on the under side of the leaf of *A. virginiana*.

Chadwick '08, p. 127

Acarid. *Eriophyes* sp.

Clematis (Virgins bower)

Oval stem gall, length 2 cm, diameter 1 cm. Pl. 4, fig. 1. Thompson '15, p. 82

Dipt. *Agromyza* sp.

Irregular, subglobular bud gall, diameter 1 cm. Pl. 9, fig. 4. Felt '08e, p. 393

Itonid. Clematis bud gall, *Contarinia clematidis* Felt

Irregular, subglobular bud gall, diameter 1 cm. Felt '15e, p. 147

Itonid. *Dasyneura clematidis* Felt

Ovate, reddish brown, axillary bud gall, diameter 4 mm. Felt '07e, p. 287

Itonid. *Neolasioptera clematidis* Felt

Enlarged, reddened, flower buds. Felt '07e, p. 302

Itonid. Clematis flower midge, *Prodiplosis floricola* Felt

Unopened, apparently normal flowers, probably predaceous. Felt '08e, p. 409

Itonid. *Lestodiplosis clematiflorae*

Felt

Small, short, whitish tubes, open at the end, in crowded patches on leaves, bud stalks and buds. Chadwick '08, p. 131

Acarid. Clematis mite gall, *Eriophyes* sp.

Paeonia (peony)

Reared from decaying roots. Felt '11k, p. 476

Itonid. *Joannisia pennsylvanica* Felt

Magnoliaceae (magnolia family)

Liriodendron (tulip tree)

Globular, midrib or vein gall, monothalamous, length 5 mm.

Itonid. Tulip vein gall, *Cecidomyia* sp.

Midrib, irregular, polythalamous leaf gall, length 1.5 cm. Osten Sacken '62, p. 202

Itonid. Tulip midrib gall, *Cecidomyia tulipiferae* O.S.

Purplish blister gall on the leaf, diameter about 3 mm. Pl. 10, fig. 7. Osten Sacken '62, p. 202

Itonid. Tulip spot gall, *Thecodiplosis liriodendri* O.S.

Lauraceae (laurel family)

Sassafras

Reared from curling leaves of *S. variifolium*. Felt '06a, p. 29

Itonid. Sassafras leaf midge, *Dasyneura sassafras* Felt

Benzoin (spicebush)

Leaves with margins rolled.

Itonid. *Cecidomyia* sp.

Irregular, subcortical gall, length .5 to 2 cm. Fig. 129. Beutm. '07, p. 398

Itonid. Spicebush stem gall, *Lasioptera linderæ* Beutm.

Papaveraceae (poppy family)*Papaver* (poppy)

Reared from undescribed stem gall. Insect Life, 7:401

Itonid. *Clinodiplosis caulicola* Coq.

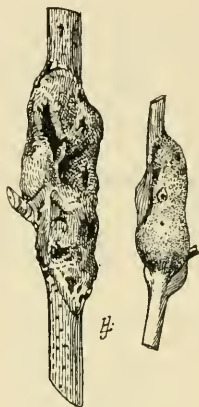


Fig. 129. Spicebush stem gall, *Lasioptera linderæ* Beutm. (Author's illustration)

Cruciferae (mustard family)*Lepidium* (peppergrass)

Swollen, discolored seed capsules. Felt '15e, p. 154

Itonid. Peppergrass seed midge, *Dasyneura lepidii* Felt

Sisymbrium (hedge mustard)

Irregular bud gall, diameter 8 mm.

Itonid. *Dasyneura ? sisymbrii* Schr.

Stanleya glauca

Swollen flower with thickened, enlarged sepals and containing many pale larvae.

Cockerell '14, p. 240

Itonid. *Dasyneura stanleyae* Ckll.

Capparidaceae (Caper family)*Cleome serrulata* (Stinking clover)

Claviform or variously enlarged seed pods. Ckll. '13, p. 279

Itonid. *Cecidomyia peritomatis* Ckll.**Crassulaceae***Clementsia* (red orpine)

Globose, crimson-lake deformations of flower heads. Ckll., Ent. News, 25:466

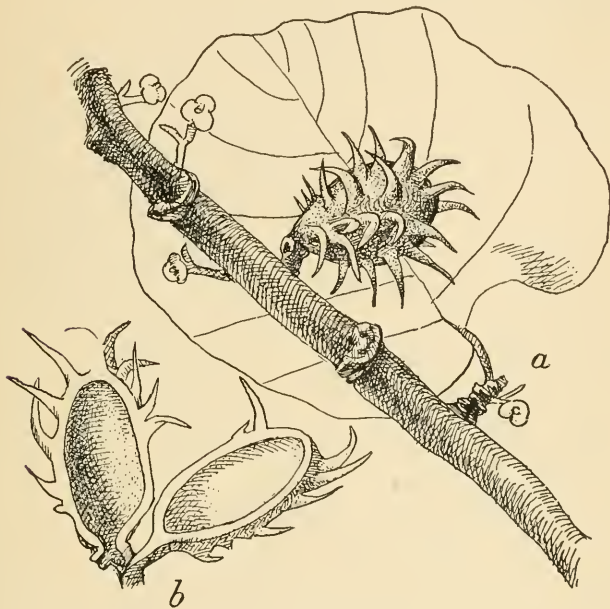
Acarid. *Eriophyes* sp.

Fig. 130. Spiny witch-hazel gall, *Hamamelistes spinosus* Shim. (After Pergande)

Saxifragaceae (saxifrage family)*Hydrangea arborescens* (wild Hydrangea)

Bud gall, length 1 cm. Felt '16d, p. 136

Itonid. Hydrangea bud gall, *Asphondylia hydrangeae* Felt*Ribes* (currant, gooseberry)

Arrested gooseberry bud. Pl. 12, fig. 8. Felt '11j, p. 347

Itonid. Gooseberry bud midge, *Rhopalomyia grossulariae* Felt

Red, prematurely ripe currants. Fitch '55, p. 880

Itonid. Currant midge, *Dasyneura grossulariae* Fitch

Irregular, greenish or dark brown blister leaf gall, diameter 3 mm, on *R. longiflorum*, also on *Grossularia inermis*. Felt '11j, p. 468

Itonid. Currant leaf blister, *Cecidomyia* sp.

Gall undescribed, on *R. menziesii*. Felt '08c, p. 370

Itonid. *Phytophaga californica* Felt

Hamamelidaceae (witch-hazel family)

Hamamelis (witch-hazel)

Many-spined, green or reddish, oval bud gall, length 2 cm, diameter 1 cm. Fig. 130, Felt '06b, p. 246

Aphid. Spiny witch-hazel gall, *Hamamelistes spinosus* Shim.

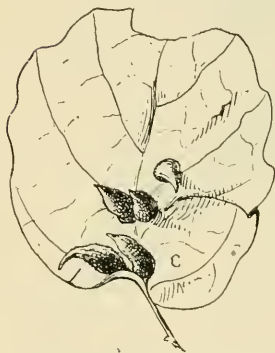


Fig. 131. Witch-hazel cone gall, *Hormaphis hamamelidis* Fitch. (Original)



Fig. 132. *Eriophyes* galls on *Exochorda*. (Original)

Fleshy vein folds, length 2 cm. Felt '11j, p. 461

Itonid. *Cecidomyia* sp.

Purplish, corrugated folds between veins. Felt '11j, p. 461

Itonid. *Cecidomyia* sp.

Greenish blister leaf gall, diameter 3 to 4 mm. Felt '11k, p. 481

Itonid. *Asteromyia nigrina* Felt

Purplish blister leaf gall, diameter 5 mm. Felt '11j, p. 461

Itonid. *Cecidomyia* sp.

Conical, greenish or reddish gall on the upper surface of the leaf, diameter 5 mm, length 12 mm. Fig. 131. Felt '06b, p. 246

Aphid. Witch-hazel cone gall, *Hormaphis hamamelidis* Fitch

Liquidambar (sweet gum)

A tawny or brown erineum on the under surface of the leaf, in the angles of the veins and close to the petiole. Chadwick '08, p. 152

Acarid. *Eriophyes* sp.

Platanaceae (plane tree family)*Platanus* (buttonwood)

Reared from rolled leaves, probably predaceous on plant lice. Felt '08e, p. 410

Itonid. *Lestodiplosis platanifolia* Felt

Exochorda

Small, confluent, lobulate leaf vein swelling, diameter 1 mm, length 4 to 6 mm.
Fig. 132

Acarid. *Eriophyes* sp.

Rosaceae (rose family)*Spiraea latifolia* (meadow sweet)

Slightly enlarged, reddened flowers. Felt '07e, p. 304

Itonid. *Spiraea* flower midge, *Itonida spiraeae florae* Felt

Reared from unopened flowers. Felt '07e, p. 302

Itonid. *Prodidiplosis floricola* Felt

Globose axillary bud galls. Pl. 14, fig. 9

Cecid. *Cecidomyia* sp.

Deformed, deep-red or purplish and greenish leaf buds, length 1 cm, diameter 4 mm. Felt '11j, p. 472

Itonid. ? *Asphondylia* sp.

Terminal, globular, usually green bud gall, diameter 4 mm. Felt '08a, p. 388

Itonid. Lobular bud gall, *Hormomyia clarkeae* Felt

Terminal, oval, brown bud gall, diameter 3 mm. Felt '11k, p. 555

Itonid. *Itonida spiraeina* Felt

Terminal, clustered bud gall, diameter 3 mm, length 7 mm. Felt '11k, p. 553

Itonid. Clustered bud gall, *Parallelodiplosis clarkei*

Felt

Terminal "cabbage" or "lettuce" bud gall. Felt '11k, p. 547

Itonid. *Spiraea* cabbage gall, *Contarinia spiraeina* Felt

Terminal bud gall, the leaflets fringed, diameter 3 to 4 mm. Felt '11j, p. 473

Itonid. Fringed bud gall, *Cecidomyia* sp.

Arrested development of flower buds. Chadwick '08, p. 148

Acarid. *Eriophyes* sp.

Conic leaf gall forming a pustule on the under side, diameter 4 mm, height 2 mm.
Fig. 133

Itonid. *Cecidomyia* sp.

Yellowish brown, spotted, blister leaf gall, diameter 3 mm. Felt '09e, p. 287

Itonid. *Lasioptera spiraeae folia* Felt

Thickened, greenish, midrib fold, length 1 to 1.5 cm, diameter .5 cm. Pl. 12, fig. 1. Felt '15e, p. 106

Itonid. *Spiraea* pod gall, *Rhabdophaga salicifolia* Felt

Apparently reared from the same gall, probably predaceous. Felt '08e, p. 410

Itonid. *Lestodiplosis spiraeae folia* Felt

Marginal leaf rolls, length 3 mm. Fig. 134. Felt '09e, p. 293

Itonid. *Spiraea* leaf roll, *Parallelodiplosis spirae* Felt

Pyrus (apple, pear)

Deformed, especially globose, young pears. Felt '13m, p. 97

Itonid. Pear midge, *Contarinia pyrivora* Riley

Deformed young apples and rudimentary or infertile seeds. Crosby '09, p. 369

Hym. Pear seed wasp, *Syntomaspis druparum* Boh.

Irregular, sinuous bark elevations on the trunks and branches of pear trees

Coleop. Sinuate pear borer, *Agilus sinuatus* Oliv.

Greenish or brown, blister leaf galls on both pear and apple. Parrott et al. '06, p. 291

Acarid. Pear blister mite, *Eriophyes pyri* Pgst.



Fig. 133. *Cecidomyia* sp.
Gall on *Spiraea*.
(Original)



Fig. 134.
Spiraea leaf
roll, *Parallelodiplosis*
spirae Felt.
(Original)

An erineum on the under side of the leaves of American crab apple. Chadwick '08, p. 141

Acarid. *Eriophyes* sp.

Cercocarpus parvifolius

Bud gall. Felt '13h, p. 215

Itonid. *Dasyneura cercocarpifolia* Felt

Aronia nigra (black chokeberry)

Tiny, specklike capsule leaf galls, brown when matured. Chadwick '08, p. 127

Acarid. *Eriophyes* sp.

Small pouch gall on under side of leaf of *A. arbutifolia*. Pl. 16, fig. 4. Thompson '15, p. 82

Acarid. *Eriophyes* sp.

Amelanchier (June berry)

Truncate leaf gall, greenish, tapering, red-lipped, length 5 mm. Fig. 135. Felt '08e, p. 388

Itonid. June berry lipped gall, *Hormomyia canadensis* Felt

Flattened, white, pouch gall on leaf, the margin denticulate, length 3 to 4 mm.

Felt '11j, p. 453

Itonid. Toothed purse gall, *Cecidomyia* sp.

Oval, yellowish vein gall, length 1 to 1.5 cm. Fig. 136. Felt '11k, p. 558

Itonid. *Itonida canadensis* Felt

Leaf fold containing white larvae. Felt '11j, p. 453

Itonid. *Cecidomyia* sp.

A dimple similar to a phrygian cap with the tip rolled down on the upper side of the leaf, rarely below. Chadwick '08, p. 126

Acarid. *Eriophyes* sp.

Small, globose, dark brown, pocket leaf galls, singly or in clusters, on the upper surface; beneath pubescent and protuberant, diameter 2 mm, on *A. rotundifolia*. Chadwick '08, p. 126

Acarid. *Eriophyes* sp.



Fig. 135.
June berry
lipped gall,
Hormomyia
canadensis
Felt. Badly
infested leaf.
(Original)

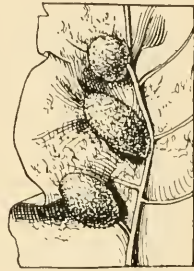
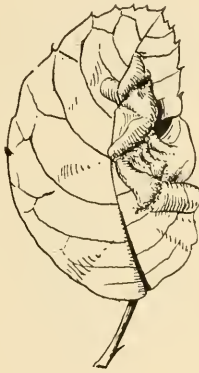


Fig. 136. *Itonida canadensis* Felt.
Upper and lower surface, the latter enlarged.
(Original)

Sorbus (mountain ash)

Rudimentary or infertile seeds. Crosby '09, p. 369

Hym. *Syntomaspis druparum* Boh.

Rudimentary or infertile seeds. Crosby '09, p. 375

Hym. *Megastigmus brevicaudis* Ratz.

Blister leaf gall. Parrott et al. '06, p. 298

Acarid. Pear blister mite, *Eriophyes pyri* Pgst.

Light brown or whitish erineum on the under surface of the leaf. Chadwick '08, p. 147

Acarid. *Eriophyes* sp.

Crataegus (White thorn)

Globose, constricted twig swellings, diameter 1.5 cm.

Coleop. Thorn limb borer, *Agilus politus* Say

Irregularly oval, frequently fissured twig gall, length 3 to 4 cm, diameter 2.5 cm.

Felt and Joutel '04, p. 62

Coleop. Thorn limb borer, *Saperda fayi* Bland.



Fig. 137. *Cecidomyia* sp. on *Crataegus*, a2727.
(Original)

Irregular twig swelling, resembling black knot of plum but with bright red spores, length 1-2 cm, on *C. oxycantha*.

Fungus. Cedar rust, *Gymnosporangium globosum*



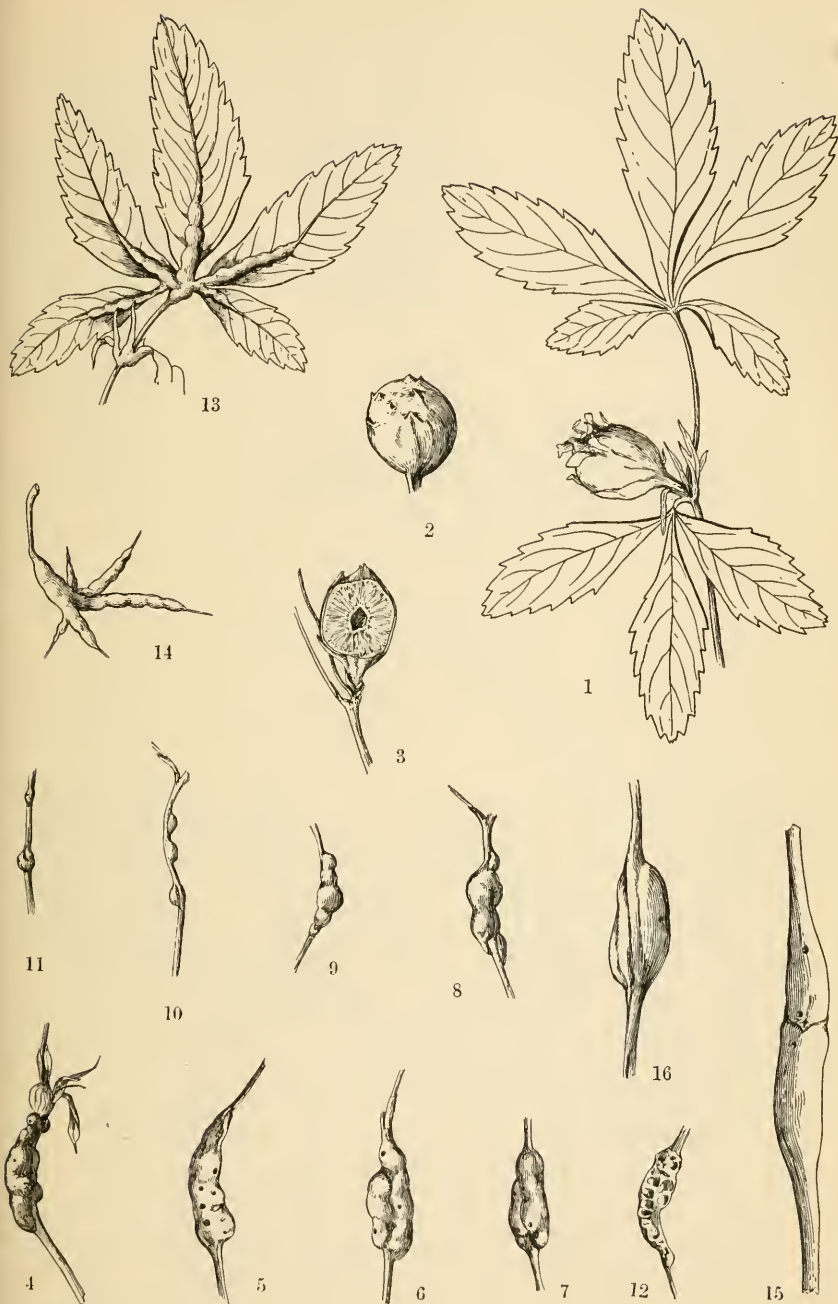
Fig. 138. *Cecidomyia* sp. on *Crataegus*, a1840. (Original)



Fig. 139. Thorn vein gall, *Lobopteromyia venae* Felt, typical and confluent forms. (Original)

Cockscomb leaf gall, green and red, length 1 cm. Felt '07a, p. 160

Itonid. Thorn cockscomb gall, *Hormomyia crataegifolia*
Felt



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Fig. 140. 1-3. Cinquefoil axil gall, *Gonaspis potentillae* Bass. 4-14. *Diastrophus niger* Bass. 15, 16. Fusiform stem gall, *D. fusiformans* Ashm. (After Beutm., Am. Mus., Nat. Hist.)

- Filamentous, subglobular vein gall, length 1 cm. Walsh '67, p. 266
 Itonid. Tufted thorn gall, *Cecidomyia bedeguar* Walsh
 Subglobose, greenish, sometimes confluent, frequently pointed, polythalamous
 vein gall, the under surface a variable brown or reddish, diameter about 3 mm.
 Fig. 137
 Itonid. *Cecidomyia* sp. a2727
 Fusiform, thickened vein fold gall, greenish or reddish, length 1 cm, diameter
 2 mm. Fig. 138
 Itonid. *Cecidomyia* sp. a1840
 Stout, cup-shaped, fimbriate, unicellular leaf gall. Felt '08e, p. 422
 Itonid. Fringed cup gall, *Winnertzia hudsonici* Felt
 Cylindric, green, fimbriate, unicellular leaf gall, length 4 to 5 mm, height 1.5
 mm. Felt '15e, p. 206
 Itonid. *Rhizomyia absobrina* Felt
 Reared from the same gall. Pl. 11, fig. 2, 3. Felt '08e, p. 408
 Itonid. *Lestodiplosis crataegifolia* Felt
 Marginal leaf roll, probably predaceous. Felt '08e, p. 409
 Itonid. *Lestodiplosis florida* Felt
 Oval, smooth, fleshy vein gall, length 5 to 8 mm. Fig. 139, pl. 10, fig. 9. Felt
 '14d, p. 120
 Itonid. Thorn vein gall, *Lobopteromyia venae* Felt
 Reared from the same gall. Felt '14d, p. 121
 Itonid. *Dicrodiplosis venitalis* Felt
 Purplish brown or green, blister leaf mine, diameter 8 mm. Felt '07e, p. 6
 Itonid. Purple leaf blotch, *Lasioptera excavata* Felt
 Reared from the same gall. Felt '15e, p. 208
 Itonid. *Rhizomyia hirta* Felt
 Spinulose, blackish gall on the upper surface of the leaf, on *C. coccinea*.
 Chadwick '08, p. 131
 Acarid. *Eriophyes* sp.
 Leaf curls, on *C. crus-galli*, *C. tomentosa*. Chadwick '08, p. 131
 Acarid. *Eriophyes* sp.
 Capsule gall, very small, green to brown and abundant on the leaves of *C.*
punctata. Chadwick '08, p. 131
 Acarid. *Eriophyes* sp.
 Long, serpentine leaf folds, disposed radially, convex on the upper surface,
 green and red. Chadwick '08, p. 132
 Acarid. *Eriophyes* sp.
- Coloneaster*
- Blister leaf galls. Parrott et al. '06, p. 298
 Acarid. Pear blister mite, *Eriophyes pyri* Pgst.
- Fragaria* (strawberry)
- Elongate, cylindrical, polythalamous petiole swelling, length 10 to 15 mm,
 diameter 3 mm. Cosens '15, p. 354
 Cynipid. Cylindrical strawberry gall, *Diastrophus fragariae*
 Beutm.
 Reniform petiole gall, length 8 to 21 mm. Felt '11j, p. 460
 Itonid. Reniform strawberry gall, *Cecidomyia reniformis*
 Stebb.



E.L. Beutenmüller

Fig. 141. *Diastrophus* galls. 1, *D. turgidus* Bass. 2, 3, *D. kincaidi* Gill. 4, 5, Black berry root gall, *D. radicum* Bass. (After Beutm., *Am. Mus. Nat. Hist.*)

Potentilla (cinquefoil)

Globose bud enlargement containing an oval larval cell, green turning brown, diameter 8 to 12 mm. Fig. 140, 1-3. Beutm. '09, p. 144

Cynipid. Cinquefoil axil gall, *Gonaspis potentillae* Bass. Much enlarged, internodal part of stem, apparently monothalamous. Stebb. '10, p. 37

Itonid. Internodal stem gall, *Cecidomyia potentillae-caulis* Stebb.



Fig. 142. Raspberry cane girdler, *Oberia bimaculata* O. S. (Original)



Fig. 143. Nodular stem gall, *Lasioptera nodulosa* Beutm. (Author's illustration)

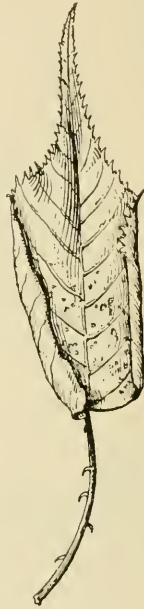


Fig. 144. Leaf roll of *Camponeuromyia rubifolia* Felt. (Original)

Elongate, fusiform, polythalamous, stalk swelling, length 15 to 45 mm, diameter 5 to 8 mm. Fig. 140, 15, 16. Beutm. '09c, p. 141

Cynipid. Fusiform stem gall, *Diastrophus fusiformans* Ashm.

Elongate, oval, abrupt or blisterlike swellings on the stalk and midribs, monothalamous when single, polythalamous when coalescent, green turning brown, size variable, on *P. canadensis*. Fig. 140, 4-14. Beutm. '09c, p. 142

Cynipid. *Diastrophus niger* Bass.

A whitish erineum resembling minute tufts of grass, on both surfaces of the leaf. Chadwick '08, p. 138

Acarid. *Eriophyes* sp.



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Fig. 145. *Diastrophus* galls. 1-5. Basset's blackberry gall, *D. bassetti* Beutm. 6. Smilax stem gall, *D. smilacis* Ashm. 7-10. Blackberry seed gall, *D. cuscutaeformis* O. S. (After Beut m., Am. Mus. Nat. Hist.)

Rubus (bramble)

Irregular, rounded, brown, usually clustered galls on the root stalk, diameter 5 to 25 mm, on *R. canadensis*. Fig. 141, 4, 5. Beutm. '09c, p. 139

Cynipid. Blackberry root gall, *Diastrophus radicum* Bass.

Irregular, globose, greenish or yellowish green, tinged with red or sometimes entirely red swellings of the root or the stalk close to the ground, diameter 12 to 25 mm, on *R. canadensis*. Fig. 145, 1-5. Beutm. '09c, p. 139

Cynipid. Bassett's blackberry gall, *Diastrophus bassetti*
Beutm.

Variable stem swelling with a characteristic girdling a little above and below, length 2 to 3 cm, on raspberry. Fig. 142. Sling. & Crosby '14, p. 326

Coleop. Raspberry cane girdler, *Oberia bimaculata* Oliv.

Irregular, ridged, cane gall, length 6 mm, diameter 2 cm, on blackberry

Coleop. Gouty gall beetle, *Agrius ruficollis* Fabr.

Small, clustered, ovate, spined, seedlike, green or reddish, monothalamous, cane galls, on *R. villosus*, *R. canadensis* and *R. cuneifolius*. Fig. 145, 7-10. Beutm. '09c, p. 140

Cynipid. Blackberry seed gall, *Diastrophus cuscutae-*
formis O. S.

Stem gall similar to that of *D. turgidus*, irregular and completely filled with oval, hard larval chambers, length 25 to 60 mm, diameter 12 to 25 mm, on *R. nutkanus*. Fig. 141, 2, 3. Beutm. '09c, p. 138

Cynipid. *Diastrophus kincaidi* Gill.

Abrupt, irregularly rounded or elongate stem swellings, sometimes with four or five deep, longitudinal furrows, variable in shape, dark green, turning reddish, length 25 to 75 mm, diameter 25 to 40 mm, on *R. villosus*. Fig. 146, 1, 2. Beutm. '09c, p. 136

Cynipid. Blackberry knot gall, *Diastrophus nebulosus*
O. S.

Abrupt, elongate, soft, pithy, sometimes spined, irregular, stemmed swellings, length 25 to 75 mm, diameter 15 to 30 mm, on *R. strigosus*. Fig. 141, 1, 146, 3-9. Beutm. '09c, p. 137

Cynipid. *Diastrophus turgidus* Bass.

Irregular, subcortical stem gall, length 2 cm. Fig. 143. Beutm. '07c, p. 397

Itonid. Nodular stem gall, *Lasioptera nodulosa* Beutm.

A subglobular, unilateral branch enlargement, diameter 5 mm, the walls thin and the cavity large, possibly North American. Marcellia 5:101

Cynipid. *Rhodites rubicola* Kieff.

Reared from blossoms of *R. ? villosus*. Felt '15e, p. 138

Itonid. Blackberry blossom midge, *Dasyneura rubiflorae*
Felt

Warty, pruinose leaf vein gall, length 1 to 3 cm. Osten Sacken '62, p. 204

Itonid. Mealy leaf gall, *Lasioptera farinosa* Beutm.

Subglobular, filamentous vein gall on *R. nigrobaccus*. Stebb. '10, p. 35

Itonid. Mossy vein gall, *Cecidomyia muscosa* Stebb.

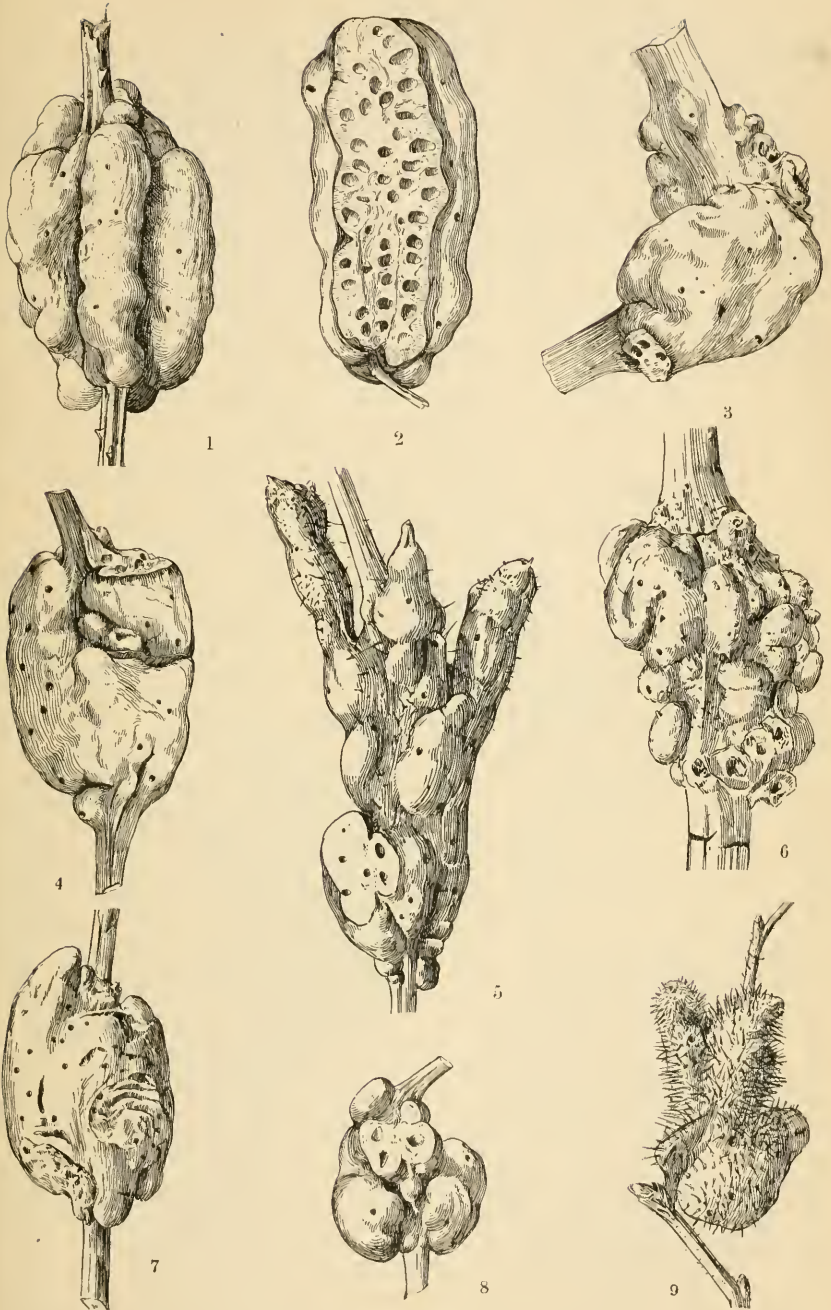
Marginal leaf roll, length 4 to 6 cm. Fig. 144. Felt '08e, p. 34

Itonid. *Camptoneuromyia rubifolia* Felt

Agrimonia (agrimony)

Reared from florets. Felt '07e, p. 21

Itonid. *Contarina agrimoniae* Felt



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Fig. 146. *Diastrophus* galls. 1, 2. Blackberry knot gall, *D. nebulosus* O. S. 3-9. *D. turgidus* Bass. (After Beutm., Am. Mus. Nat. Hist.)

Rosa (rose)

Root galls

Roundish, reddish brown, variable or frequently tomato-shaped root gall, diameter 35 to 60 mm. Fig. 148, 7-8. Beutm. '07a, p. 648

Cynipid. Rose root gall, *Rhodites radicum* O. S. Similar to *R. radicum* but with the top and sides deeply incised, giving a rosette effect. Fig. 148, 6. Beutm. '07a, p. 649

Cynipid. *Rhodites utahensis* Bass. Globose, woody, root nodules, single, clustered or coalescent; diameter of nodules 4 to 6 mm, of clusters 10 to 39 mm, on sweetbrier. Fig. 150, 2-4. Beutm. '07a, p. 647

Cynipid. *Rhodites fulgens* Gill



Fig. 147. Spiny rose gall, *Rhodites bicolor* Harr. (Original)

Twig galls

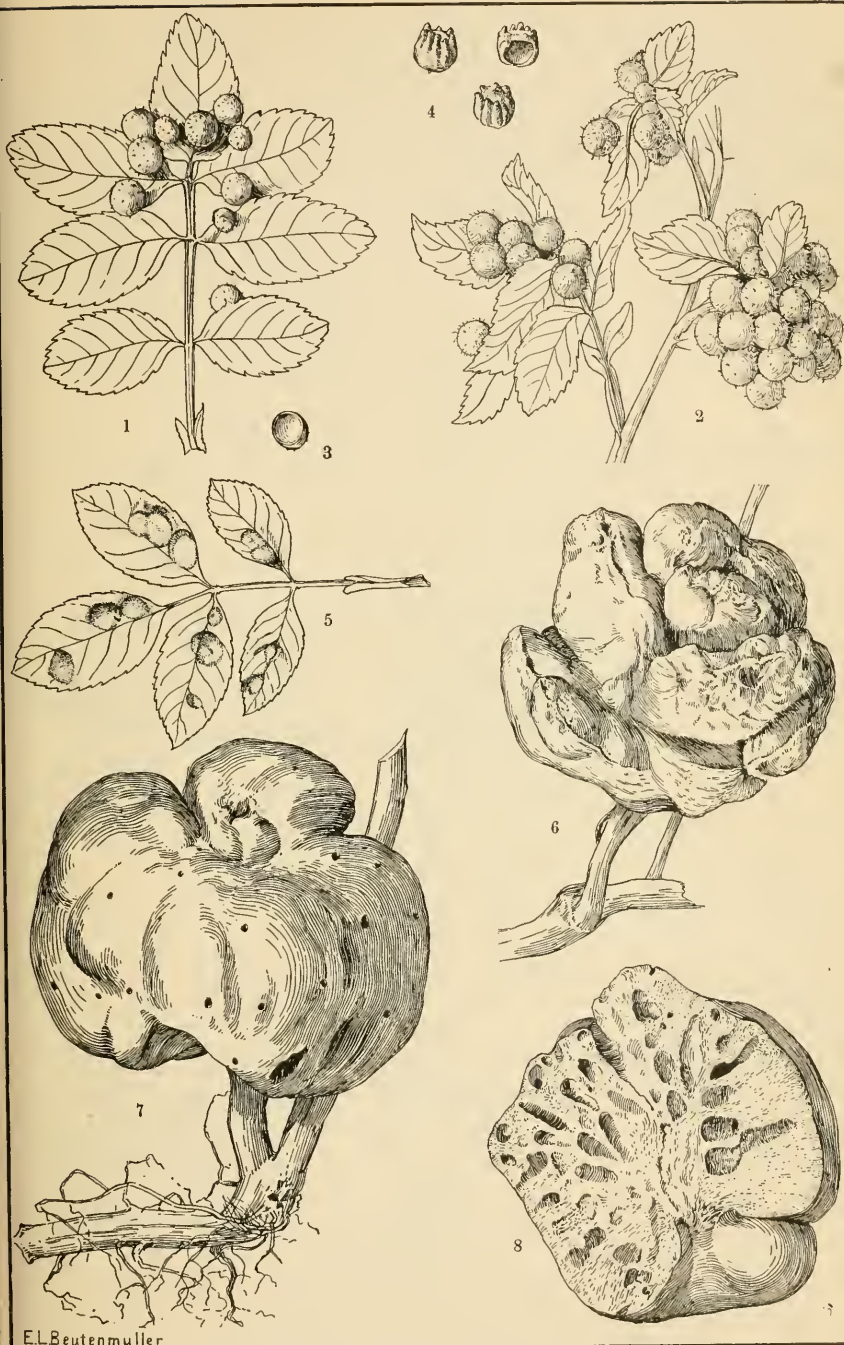
Irregularly oval, filamentaceous, polythalamous twig galls composed of numerous hard cells, diameter 25 to 50 mm. Fig. 149, 5, 6. Beutm. '07a, p. 633

Cynipid. Mossy rose gall or rose bedeguar, *Rhodites rosae* Linn.

Masses of confluent, spherical, unilocular, spined cells or an irregular twig gall ranging in size from a walnut to an apple, differing from the preceding by the absence of mossy filaments; young galls clothed with short, erect, fine spines, later becoming smooth. Beutm. '14, p. 87

Cynipid. *Rhodites mayri* Schl. Globose, irregularly rounded, polythalamous, somewhat elongated, green twig swelling covered with numerous aborted leaflets and filaments, giving it a mossy appearance; diameter 20 to 35 mm. Beutm. '14, p. 88

Cynipid. *Rhodites californicus* Beutm.



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Fig. 148. Rose or Rhodites galls. 1-3. *R. nebulosus* Bass. 4. Regal rose gall, *R. gracilis* Ashm. 5. Rose blister gall, *R. rosaefolii* Ckll. 6. *R. utahensis* Bass. 7-8. Rose root gall, *R. radicum* O. S. (After Beutm., Am. Mus. Nat. Hist.)

Globular, yellowish green or reddish, prickly twig galls, diameter 5 to 15 mm, usually in clusters of 2 to 10. Fig. 147, 149, 1-4. Beutm. '07a, p. 633

Cynipid. Spiny rose gall, *Rhodites bicolor* Harr.

Spherical, smooth, reddish yellow, varying to pink and dull purplish twig galls, diameter 25 to 38 mm, on wild rose. Fig. 151, 8-10. Cockerell '88, p. 60

Cynipid. *Rhodites tuberculator* Ckll.

Globose, densely spined, reddish brown twig gall, diameter 20 to 32 mm. Fig. 150, 1, 151, 11-12. Beutm. '07a, p. 642

Cynipid. Many spined twig gall, *Rhodites multispinosus* Gill.

Globose, reddish, stem swellings, frequently in series, length 12 mm. Fig. 152, 1. Beutm. '07a, p. 635

Cynipid. Knotty rose gall, *Rhodites vernus* O. S.

Globose, elongate, soft, polythalamous enlargements, length 4 to 12 mm, diameter 4 to 9 mm. Fig. 150, 10-12. Beutm. '07a, p. 643

Cynipid. *Rhodites fusiformans* Ashm.

Subglobose, irregular, dense, corky twig enlargements, usually close to the stem from which the shoot arises, the surface rusty and finely wrinkled; diameter 12 to 21 mm. Fig. 151, 1-4, 13. Beutm. '07a, p. 640

Cynipid. *Rhodites arefactus* Gill.

Subglobose, budlike, hard, polythalamous enlargements on a short stem; diameter 15 to 25 mm. Fig. 151, 5-7. Beutm. '07a, p. 640

Cynipid. *Rhodites tumidus* Bass.

Rounded or reniform, smooth, green or brown, polythalamous enlargements arising abruptly from the branch; length 35 mm, diameter 10 to 22 mm. Fig. 152, 2-6. Beutm. '07a, p. 638

Cynipid. Globular rose gall, *Rhodites globuloides* Beutm.

Rounded or elongate, smooth, with two or more transverse ridges, polythalamous, abrupt twig swellings, length 14 to 18 mm, diameter 11 to 15 mm. Fig. 152, 7, 8. Beutm. '07a, p. 638

Cynipid. *Rhodites neglectus* Gill.

Subfusiform, elongate, smooth or prickly twig swellings, length 14 to 54 mm, diameter 7 to 18 mm. Fig. 152, 9-14. Beutm. '07a, p. 637

Cynipid. Long rose gall, *Rhodites dichlocerus* Harr.

Elongate, slight, monothalamous twig swelling, length 8 to 12 mm, diameter 2 to 4 mm. Beutm. '09f, p. 247

Cynipid. Nodular twig gall, *Rhodites nodulosus* Beutm.

Globose, elongate or reniform, woody twig or leaf galls covered with a white powder, diameter 4 to 15 mm. Fig. 149, 7-10. Beutm. '07a, p. 634

Cynipid. Mealy rose gall, *Rhodites ignotus* O. S.

Similar to the preceding, brown or reddish but without the white powder, diameter 5 to 15 mm. Fig. 150, 5-9. Beutm. '07a, p. 635

Cynipid. *Rhodites variabilis* Bass.

Leaf galls

Lentil-shaped, monothalamous swellings showing on both leaf surfaces, transverse diameter 2.5 to 3 mm, vertical diameter 1 to 2 mm. Fig. 148, 5, 150, 13. Beutm. '07a, p. 646

Cynipid. Rose blister gall, *Rhodites rosaefolii* Ckll.

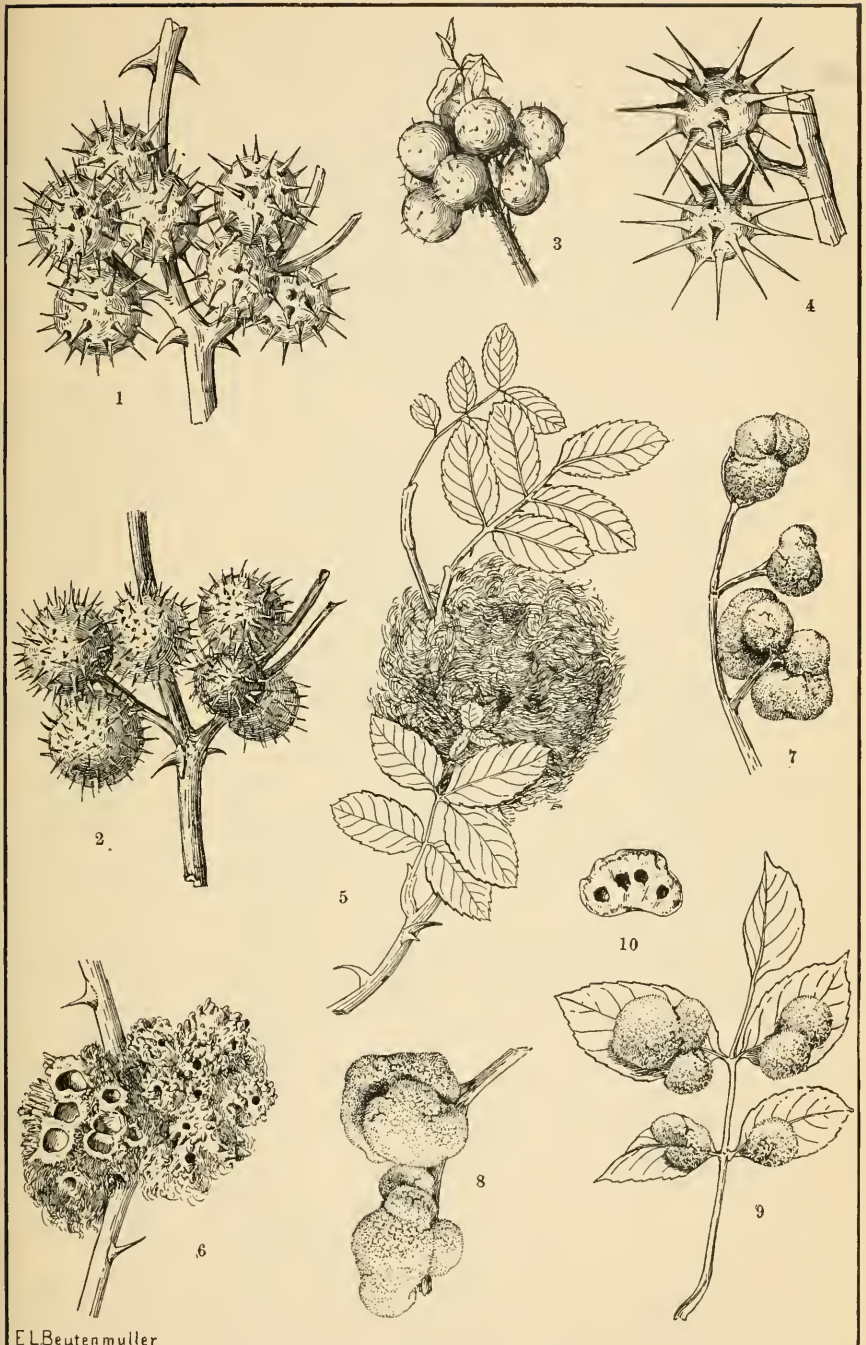


Fig. 149. Rose or Rhodites galls. 1-4. Spiny rose gall, *R. bicolor* Harr. 5, 6. Mossy rose gall or rose bedeguar, *R. rosae* Linn. 7-10. Mealy rose gall, *R. ignotus* O. S. (After Beutm., Am. Mus. Nat. Hist.)

Globular, hollow, weakly-spinose, small, green leaf galls, diameter 5 to 6 mm; occur singly or in clusters. Fig. 148, 1-3. Beutm. '07a, p. 644

Cynipid. *Rhodites nebulosus* Bass.

Gall resembling the preceding, on wild rose. Beutm. '14, p. 89

Cynipid. *Rhodites pustulatooides* Beutm.

Small gall, possibly identical with *R. nebulosus*. Beutm. '07a, p. 644

Cynipid. *Rhodites politus* Ashm.

Irregularly obconical leaf gall with short, obtuse processes around the edges, diameter 3 to 4 mm, on *Rosa blanda*. Fig. 148, 4, 153. Felt '15e, p. 48

Cynipid. Regal rose gall, *Rhodites gracilis* Ashm.

Leaf gall resembling a miniature simlin squash with numerous long, slender, bractlike processes, length 4 to 5 mm, diameter of top 4 mm, on wild rose. Beutm. '13a, p. 93

Cynipid. Tufted rose gall, *Rhodites weldi* Beutm.

Globose, monothalamous leaf galls with a subapical circle of slender, fleshy appendages 2 to 3 mm long, diameter of gall 5 mm, near *R. politus*. Wash. Trotter '11, p. 104

Cynipid. *Rhodites* sp.

Subglobose, longitudinally ribbed leaf gall, the poles broadly truncate, green or reddish, diameter 3.5 mm, near *R. gracilis*. Wash. Trotter '11, p. 103

Cynipid. *Rhodites silvestrii* Trott.

Bud galls

Rose buds and developing leaves inhabited and sometimes blasted by yellowish larvae. Felt '15e, p. 130

Itonid. Rose bud midge, *Dasyneura rhodophaga* Coq.

Reared from similar rose buds and undoubtedly preying on aphids. Coq. '00, p. 46

Itonid. Rose aphid midge, *Aphidoletes rosivora* Coq.

Curled or folded terminal leaves. Pl. 10, fig. 1. Felt '15e, p. 166

Itonid. Rose leaf midge, *Dasyneura? rosarum* Hardy

Apical, loose bud or rosette gall, length 2 to 2.5 cm. Fig. 154. Felt '15e, p. 97

Itonid. Rosette midge, *Rhabdophaga rosacea* Felt

Globose or fusiform, irregularly enlarged terminal or lateral buds with a leafy crest around and more or less concealing the acuminate apex; internally a large, irregular cavity, length 5 to 15 mm, diameter 4 to 7 mm. Wash. Trotter '11, p. 104

Cynipid. Rose bud wasp, *Rhodites* sp.

Reared from infertile seeds. Crosby '09, p. 377

Hym. Rose seed wasp, *Megastigmus aculeatus* Swed.

Amygdalus (peach)

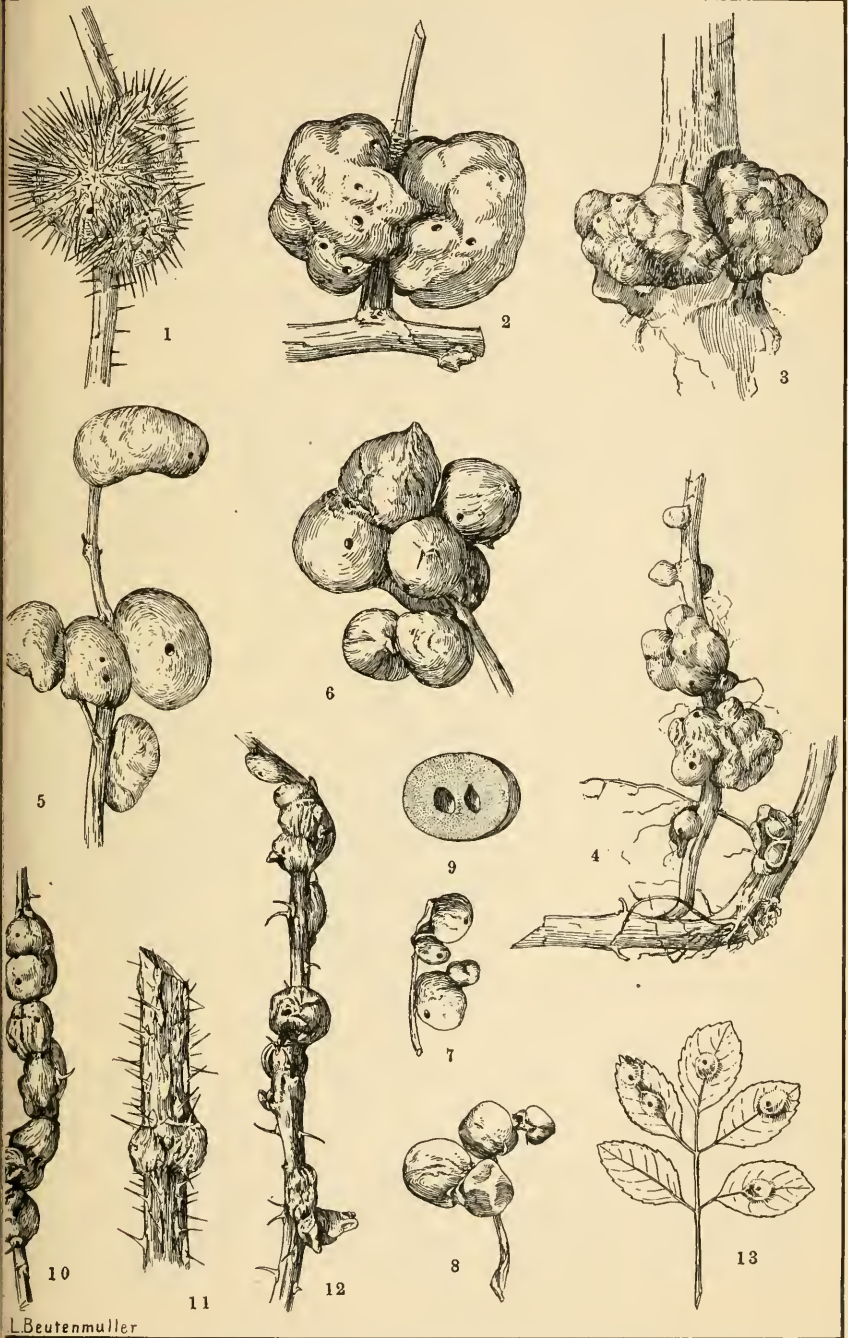
A silver sheen on the leaf of peach. Chadwick '08, p. 127

Acarid. *Phyllocoptes cornutus* Bnks.

Prunus (plum, cherry)

Irregular, subcortical, black twig swelling, length 1-3 cm, on plum

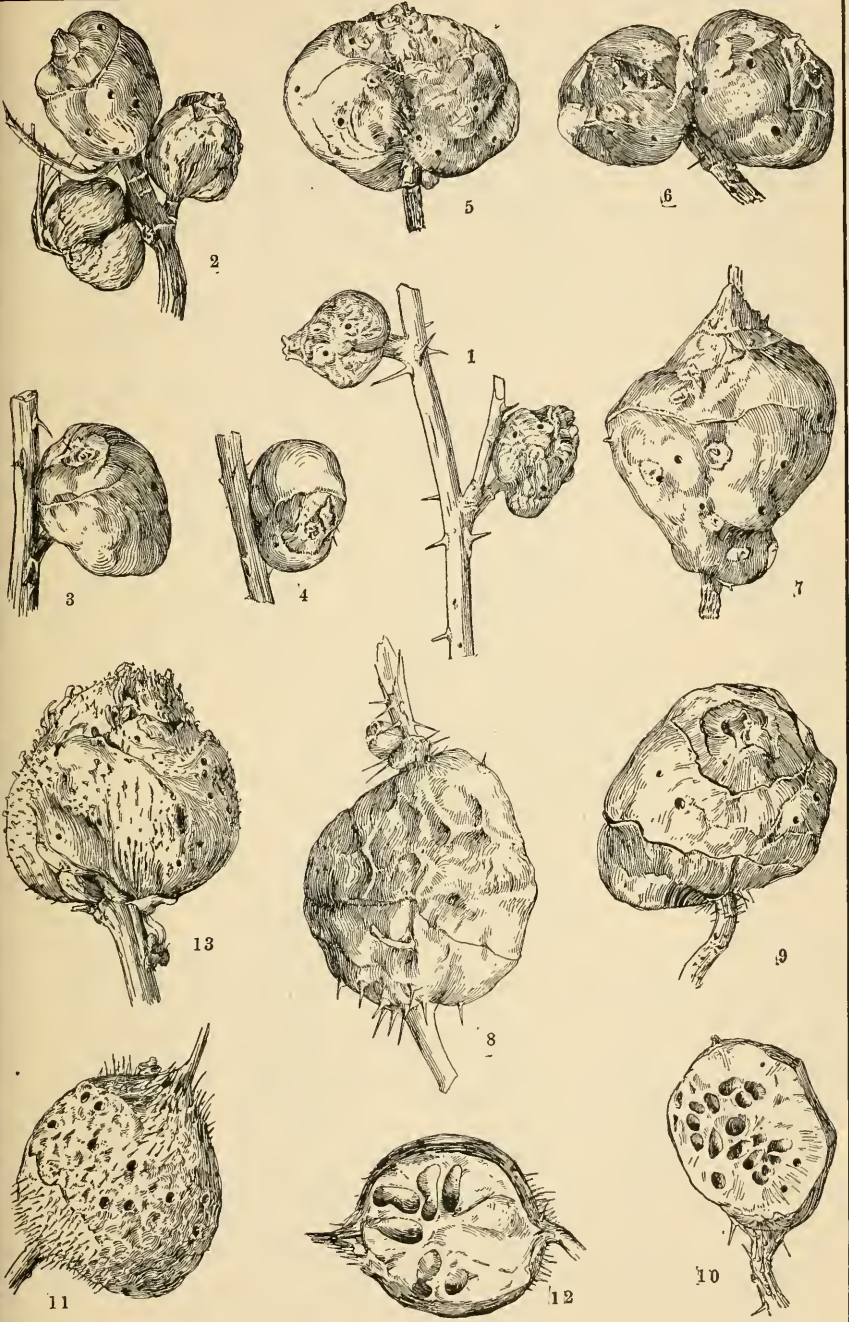
Fungus. Black knot, *Plowrightia morbosa*



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Fig. 150. Rose or Rhodites galls. 1. Many spined twig gall, *R. multispinosus* Gill. 2-4. *R. ligens* Gill. 5-9. *R. variabilis* Bass. 10-12. *R. fusiformans* Ashm. 13. Rose stem gall, *R. rosaefolii* Ckll. (After Beutm., Am. Mus. Nat. Hist.)

- Greenish, curled, irregularly swollen pouch gall, length 5 mm, diameter 2 to 3 mm, on wild plum, *P. americana* Fig. 155
Acarid. *Eriophyes* sp. a2535
- A very long, slender, green or whitish pouch gall on the under side of the leaf, on wild plum, *P. americana*. Chadwick '08, p. 138
Acarid. *Eriophyes* sp.
- Pocket leaf galls, elongate and purselike, tomentose below, rounded and hairy above, on Chickasaw plum, *P. angustifolia*. Chadwick '08, p. 139
Acarid. *Eriophyes* sp.
- Tubular growth encircling the base of buds and shoots of plum, *P. domestica*. Chadwick '08, p. 139
Acarid. *Eriophyes phloeocoptes* Nal.
- Long, pedunculated, black, pouch galls on the upper side of the leaf, on beach plum, *P. maritima*. Chadwick '08, p. 139
Acarid. *Eriophyes* sp.
- Smaller and shorter-stalked, green, pouch gall on the upper side of the leaves of beach plum, *P. maritima*. Chadwick '08, p. 139
Acarid. *Eriophyes* sp.
- Small, yellow, pocket galls crowded on the upper side of the leaf and around some leaf stalks of plum. Chadwick '08, p. 141
Acarid. *Eriophyes* sp.
- Swollen, deformed fruit of chokecherry, *P. virginiana*. Pl. 9, fig. 6. Felt '06a, p. 130
Itonid. Chokecherry midge, *Contarinia virginianiae* Felt
- Reared from the same fruit, probably inquiline. Felt '07a, p. 143
Itonid. *Paralldiplosis acernea* Felt
- Reared from the same fruit, probably inquiline. Felt '11k, p. 558
Itonid. *Itonida canadensis* Felt
- Reared from the same fruit, probably predaceous. Felt '11j, p. 466
Itonid. *Lestodiplosis* sp.
- Reared from the same fruit, probably inquiline. Felt '15e, p. 206
Itonid. *Rhizomyia absobrina* Felt
- Probably reared from the same fruit, presumably inquiline. Felt '11k, p. 554
Itonid. *Cecidomyia cerasiphila* Felt
- Reared from the same fruit, probably predaceous. Felt '07e, p. 20
Itonid. *Arthrocnodax apiphila* Felt
- Swollen, deformed fruit, on wild cherry, *P. ? melanocarpa*. Felt '11k, p. 480
Itonid. *Dasyneura pergandei* Felt
- Elliptical, polythalamous gall on the raceme axis, length 27 mm, on choke cherry, *P. virginiana*. Pl. 7, fig. 5. Felt '11j, p. 466
Itonid. *Cecidomyia racemi* Stebb.
- Irregular, terminal shoot and bud gall, diameter 1.5 cm, on wild black cherry, *P. serotina*. Pl. 7, fig. 6. Osten Sacken '71, p. 346
Itonid. Wild cherry bud gall, *Cecidomyia serotinae* O.S.
- Variable, oval or fusiform twig galls on wild black cherry, *P. serotina*. Felt '08e, p. 407
Itonid. *Cecidomyia* sp.



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Fig. 151. Rose or Rhodites galls. 1-4, 13. *R. arefactus* Gill. 5-7. *R. tumidus* Bass. 8-10. *R. tuberculator* Ckll. 11-12. Many spined twig gall, *R. multispinosus* Gill (After Beutm., Am. Mus. Nat. Hist.)

Conical swelling at base of leaf stalk, length 1.5 cm, diameter 8 mm. Felt '15e, p. 219

Itonid. *Cecidomyia* sp.

Reared from same gall, probably predaceous. Felt '11j, p. 466

Itonid. *Lestodiplosis cerasi* Felt

Irregular, thickened, folded, nearly full-sized choke cherry leaf, *P. virginiana*. Pl. II, fig. 4. Felt '07e, p. 21

Itonid. *Mycodiplosis cerasifolia* Felt

Stemmed, fusiform, green or red leaf galls on upper surface, length 1 cm, diameter 4 to 5 mm, on wild black cherry, *P. serotina*. Fig. 156, 157, pl. 16, fig. 2. Beutm. '04, p. 38

Acarid. Wild cherry pouch gall, *Eriophyes padi* Nal. Pocket gall, shorter and more densely crowded than the preceding, on wild black cherry, *P. serotina*. Chadwick '08, p. 140

Acarid. *Eriophyes* sp.

Greenish or reddish pouch gall on the upper surface of the leaf of choke cherry *P. virginiana*. Chadwick '08, p. 140

Acarid. *Eriophyes* sp.

Reddish, slender, pouch galls, somewhat irregular and pubescent, on pin cherry leaves, *P. pennsylvanica*. Chadwick '08, p. 139

Acarid. *Eriophyes* sp.

Adenostoma

Reared from apparently unmodified seeds. Felt '16f, p. 177

Itonid. *Asphondylia adenostoma* Felt

Leguminosae (pulse family)

Prosopis (mesquite)

Aborted fruit. Ckll. '98, p. 329. Felt '16d, p. 149

Itonid. *Asphondylia prosopidis* Ckll.

Fusiform bud gall. Felt '11j, p. 466

Itonid. *Cecidomyia* sp.

Gleditsia (honey locust)

Twig gall undescribed. Felt '11j, p. 461

Itonid. *Neolasioptera* sp.

Orange larvae in folded leaflets. Pl. 9, fig. 8. Felt '15e, p. 163

Itonid. Honey locust pod gall, *Dasyneura gleditschiae* O. S.

Cassia (wild sensitive plant)

Irregular stem gall, length 3 cm, diameter 5 or 6 mm. Felt '09e, p. 287

Itonid. *Lasioptera cassiae* Felt

Thermopsis montana

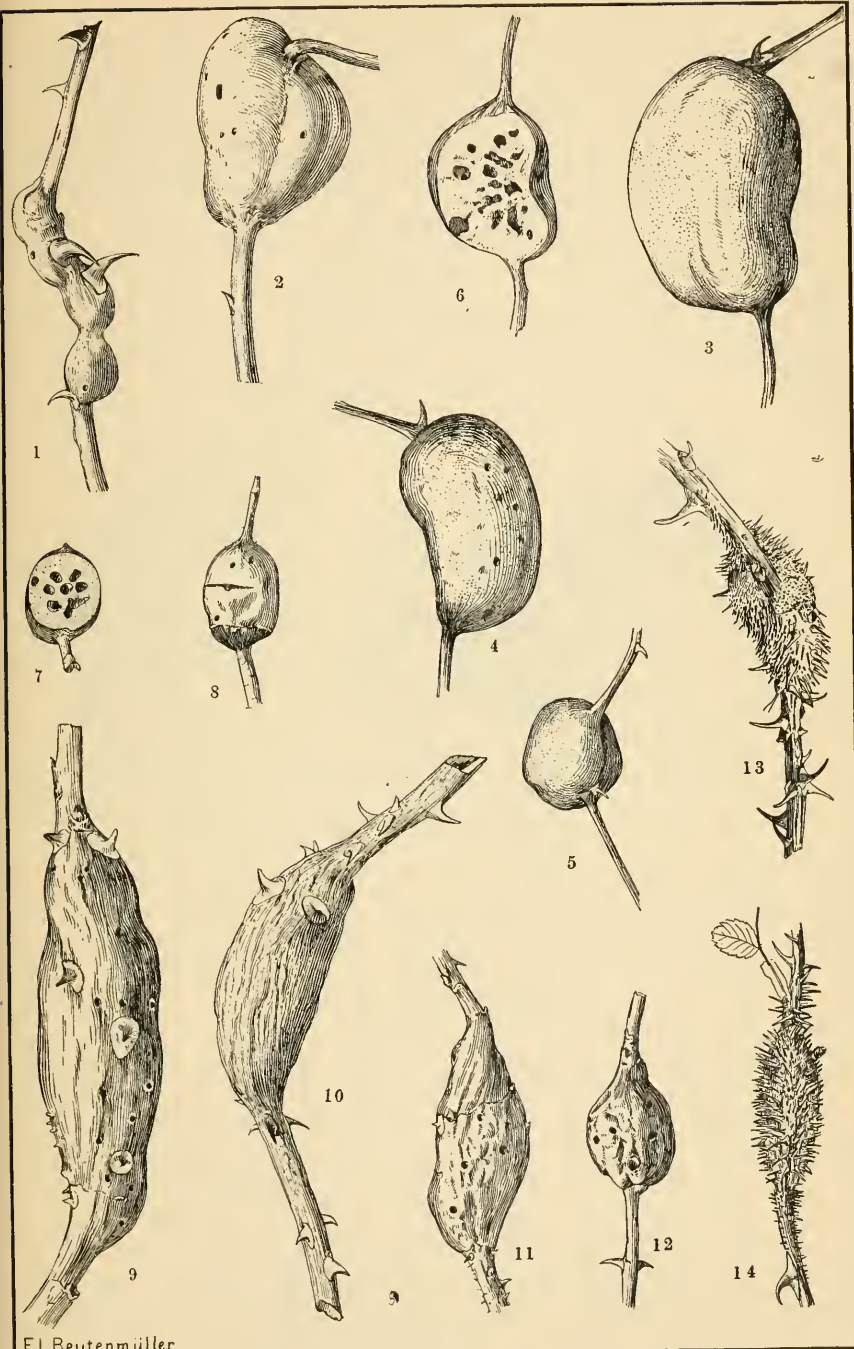
Folded, thickened, terminal leaf pods

Itonid. *Cecidomyia* sp.

Crotalaria (rattle box)

Fusiform stem swelling. Felt '11j, p. 459

Itonid. *Cecidomyia crotalariae* Stebb.



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Fig. 152. Rose or Rhodites galls. 1. Knotty rose gall, *R. vernus* O. S. 2-6. Globular rose gall, *R. globuloides* Beutm. 7, 8. *R. neglectus* Gill. 9-14. Long rose gall, *R. dichlocerus* Harr.; 9-12. smooth; 13, 14. spiny types. (After Beutm., Am. Mus. Nat. Hist.)

Genista (woad-waxen)

Folded apical leaflets. Felt '11j, p. 461

Itonid. ? *Dasyneura genistamtorquens* Kieff.

Lupinus (lupine)

Irregularly fusiform stem galls, light green when fresh, fleshy, firm, polythalamous, the interior fibrous; length 1.5 to 2.5 cm, diameter 1 to 1.5 cm, on *L. propinquus*. Fig. 158. Felt '16g, p. 413

Itonid. *Dasyneura lupini* Felt

Elongate stem swelling

Itonid. *Cecidomyia* sp.

Reared from undescribed gall. Felt '08e, p. 326

Itonid. *Lasioptera lupini* Felt

Folded leaflets. Felt '15e, p. 143

Itonid. Clover leaf midge, *Dasyneura trifolii* Loew



Fig. 153. Regal rose gall, *Rhodites gracilis* Ashm. (Author's illustration)



Fig. 154. Rosette midge, *Rhabdophaga rosacea* Felt. (Original)

Trifolium (clover)

Yellowish larvae in the flower heads of red clover, *P. pratense*. Felt '15e, p. 172

Itonid. Clover seed midge, *Dasyneura leguminicola* Lint. Folded, variably discolored with reddish and yellowish, white clover leaves, *T. repens*. Felt '15e, p. 143

Itonid. Clover leaf midge, *Dasyneura trifolii* Loew

Medicago (alfalfa)

Aborted seed pods. Felt '11j, p. 463

Itonid. *Asphondylia websteri* Felt

Reared from seeds, probably predaceous upon *Asphondylia*

Itonid. *Lestodiplosis* sp. a2705

Robinia (locust)

Irregular, fusiform twig swellings, diameter 7 to 8 mm, length 2 mm. Pl. 4, fig. 7. Felt '06b, p. 478

Lepid. Locust twig gall, *Ecdytolopha insiticihana* Zell.
Folded, young leaflets. Felt '15e, p. 163

Itonid. Locust midge, *Dasyneura pseudacaciae* Fitch
Rolled leaf margins. Felt '08e, p. 410

Itonid. *Obolodiplosis robiniae* Hald.

Desmodium (tick trefoil)

Bud gall, probably loose. Beutm. '07d, p. 306

Itonid. *Hyperdiplosis meibomiifoliae* Beutm.
Elongate, fusiform, clustered bud gall, length 8 to 22 mm. Beutm. '07c, p. 390

Itonid. *Dasyneura meibomia* Beutm.
Irregular stem gall, length 1.8 cm. Fig. 159. Felt '07a, p. 106

Itonid. *Lasioptera desmodii* Felt

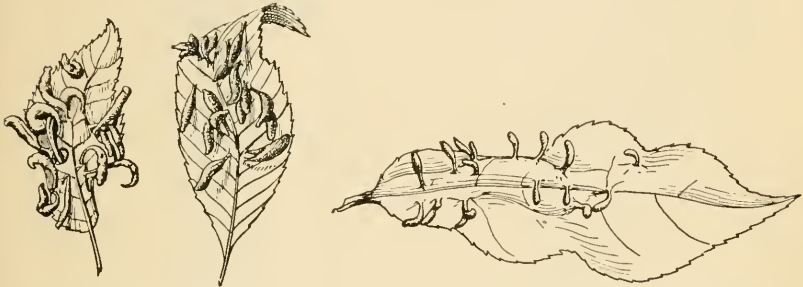


Fig. 155. *Eriophyes* gall on wild plum, a2535. (Original)

Fig. 156. Wild cherry pouch gall, *Eriophyes padi* Nal. A rather thick infestation. (Original)

Fig. 157. Wild cherry pouch gall, *Eriophyes padi* Nal. A scattering infestation. (Original)

Polythalamous stem gall, length 2 cm. Fig. 160. Felt '07a, p. 155

Itonid. *Neolasioptera hamata* Felt

Lespedeza (bush clover)

Stem gall, length 5 mm, diameter 3 mm. Felt '11j, p. 463

Itonid. *Cecidomyia* sp.

Lathyrus maritimus (beach pea)

Rolled leaflets, length 1 to 2 cm. Felt '15e, p. 149

Itonid. *Dasyneura maritima* Felt

Amphicarpa (hog peanut)

Oval stem gall, length 1.5 cm, diameter 1 cm. Felt '11j, p. 453

Itonid. *Lasioptera* sp.

Geraniaceae (geranium family)*Geranium* (Crane's-bill)

Colorless larvae on a blister enlargement, apparently fungivorous. Felt '11j, p. 461

Itonid. *Cecidomyia* sp.

Irregular, hairy, pinkish, pouch leaf gall, diameter 3 to 4 mm, on *G. richardsonii*. Fig. 161

Acarid. *Eriophyes* sp. a2529



Fig. 158. *Dasyneura lupini*
Felt. (Original)

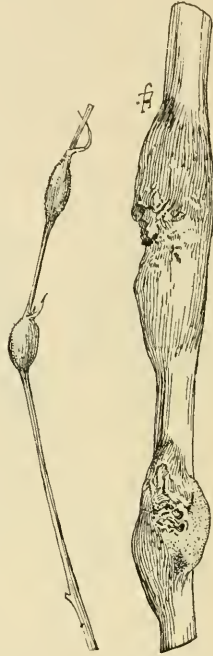


Fig. 159. *Lasioptera desmodii* Felt,
two types of gall. (Author's illustration)

Zygophyllaceae (Caltrop family)*Covillea tridentata* (creosote bush)

Gall undescribed. Felt '16d, p. 118

Itonid. *Asphondylia auripila* Felt
Globose, polythalamous, woody gall bearing a dense cluster of thin, linear filaments, diameter of gall 1 to 2 cm. Ariz. Fig. 162. Trotter '11, p. 132

Itonid. *Asphondylia ?auripila* Felt

Rutaceae (Rue family)*Citrus* (orange, lemon)

Irregularly lobulate, woody bud galls on navel orange, length 1.5 cm, diameter 1 cm

Acarid. *Eriophyes* sp. a2856

Brownish, rust spots on the orange and curled leaves, lacking gloss, *C. aurantium*. Chadwick '08, p. 130

Acarid. *Phyllocoptes oleivorus* Ashm.

Whitened or silvery spots on the lemon rind and curled lemon leaf. Chadwick '08, p. 131

Acarid. *Phyllocoptes oleivorus* Ashm.



Fig. 160. *Neolasioptera hamata* Felt. (Original)



Fig. 161. *Eriophyes* on *Geranium richardsonii*. (Original)

Euphorbiaceae (spurge family)*Manihot* (cassava)

Leaf galls. Felt '10c, p. 268

Itonid. *Itonida manihot* Felt

Leaf galls. Felt '12c, p. 144

Itonid. *Lasiopteryx manihot* Felt

Acalypha (three-seeded mercury)

Subglobular, reddish brown bud gall, diameter 4 mm. Felt '11j, p. 452

Itonid. *Cecidomyia* sp.

Phyllanthus distichus (Otaheite gooseberry)

Reared from fruit. Felt '16d, p. 123

Itonid. *Asphondylia siccae* Felt

Euphorbia (spurge)

Cylindrical fruit gall, length 5 mm, diameter 1 mm. Felt '11j, p. 460

Itonid. Spurge fruit gall, *Cecidomyia* sp.

A deformation of the leaves and flower buds of *E. corollata*. Chadwick '08, p. 132

Acarid. *Eriophyes* sp



Fig. 162. *Asphondylia ?auripila*. Gall on creosote bush. (Original)



Fig. 163. Box leaf midge, *Monarthropalpus buxi* Lab. (Author's illustration)

Buxaceae (box family)*Buxus* (box)

Oval, yellowish or brownish blister leaf galls, diameter 2 to 4 mm. Fig. 163. Felt '11j, p. 455

Itonid. Box leaf midge, *Monarthropalpus buxi* Lab.

Anacardiaceae (cashew family)*Mangifera* (mango)

Reared from subcortical gall. Felt '09n, p. 299

Itonid. Mango bark midge, *Asynapta mangiferae* Felt

Reared from blister leaf gall. Felt '11g, p. 49

Itonid. Mango blister midge, *Erosomyia mangiferae* Felt

Rhus (sumac)

Subcortical stem gall. Felt '11j, p. 468

Itonid. *Cecidomyia* sp.

Reared from dead twigs. Felt '14b, p. 113

Itonid. *Parallelodiplosis cinctipes* Felt

Globose root galls on poison dogwood. Felt '15e, p. 146

Itonid. Sumac root gall, *Dasyneura rhois* Coq.

Infertile seeds. Crosby '09, p. 385

Hym. *Eurytoma rhois* Crosby

Stunted heads or curled leaves. Fig. 164, pl. 16, fig. 7. Felt '08e, p. 404

Acarid. *Eriophyes* sp.

Fig. 164. Sumac leaves deformed by *Eriophyes* from which *Arthrocnodax rhoina* Felt was reared. (Original)



Fig. 165. Sumac bud gall, *Asphondylia integrifoliae* Felt. (Original)

Probably preying on a plant mite.

Itonid. *Arthrocnodax rhoina* Felt
Subglobular flower bud gall, diameter 3 mm. Fig. 165. Felt '16d, p. 126Itonid. Sumac bud gall, *Asphondylia integrifoliae* Felt
An erineum on the leaves of *R. radicans*. Chadwick '08, p. 144Acarid. *Eriophyes* sp.Irregular, rounded, green to red or purple dimple galls, usually in granular heaps, on *R. radicans*. Pl. 16, fig. 6. Chadwick '08, p. 144Acarid. *Eriophyes* sp.

Irregular, purplish, pouch or cylindric leaf galls with a diameter of 1 mm, the orifice with a white pubescence, on *R. trilobata*, Utah

Acarid. *Eriophyes* sp. a2760

Somewhat pear-shaped or round, reddish leaf galls occur in September, length 18 to 36 mm. Felt '06b, p. 647

Aphid. Red pouch gall, *Pemphigus rhois* Fitch

Aquifoliaceae (holly family)

Nemopanthus (mountain holly)

Oval bud gall, length 5 mm. Felt '16d, p. 142

Itonid. *Asphondylia ilicoides* Felt

Celastraceae (staff tree family)

Pachistima myrsinitis

Terminal leaves, folded, dark red. Felt '11j, p. 464

Itonid. *Cecidomyia* sp.



Fig. 166. Gouty vein midge, *Dasyneura communis* Felt. Gall on red maple. (Original)



Fig. 167. Bladder maple gall, ? *Phyllocoptes quadrupes* Shim., on red maple, showing lower and upper surface and one gall enlarged. (Original)

Celastrus (climbing bitterweet)

Irregular, subcortical gall on the root, length 2.5 cm, diameter 1 cm. Stebb. '10, p. 41

Itonid. *Cecidomyia celastris* Stebb.

Irregular, subcortical stem gall, probably identical with the preceding. Felt '11j, p. 457

Itonid. *Cecidomyia* sp.

Aceraceae (maple family)

Acer rubrum (red maple)

Whitish larvae under decaying bark. Felt '13h, p. 213

Itonid. *Winnertzia aceris* Felt

Same as above. Felt '13m, p. 205

Itonid. *Miastor americana* Felt

Same as above, predaceous. Felt '13h, p. 213

Itonid. *Lestodiplosis* sp.

Irregular twig swellings resembling those on willow and poplar made by
Saperda concolor

Coleopt. Maple twig gall, *Xylotrechus aceris* Fisher

Irregular, oval, roughened branch swellings, length 10 to 15 cm, diameter 6 to 10 cm. Felt '06b, p. 56

Lepid. Maple sesian, *Sesia acerni* Clem.

Pustular areas in the smooth bark of red maple. Hodgk. '13, p. 420

Acarid. *Anthocoptes transitionalis* Hodgk.

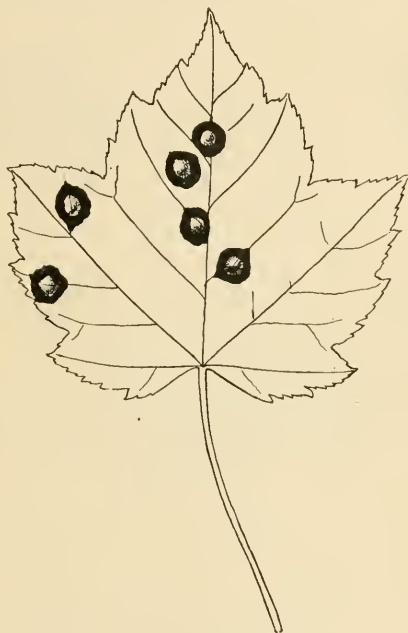


Fig. 168. Maple leaf spot, *Cecidomyia ocellaris* O. S. (Original)

Pouch vein galls, greenish or reddish, length 6 mm. Fig. 166. Felt '11, p. 478

Itonid. Gouty vein gall, *Dasyneura communis* Felt

Small bladder like leaf galls, diameter 2.5 mm. Fig. 167, Chadwick '08, p. 120

Acarid. Maple bladder gall, ? *Phyllocoptes quadripes* Shim.

Ocellate, yellow, red-margined blister leaf gall, diameter 3 to 4 mm. Fig. 168.

Osten Sacken '62, p. 199

Itonid. Maple leaf spot, *Cecidomyia ocellaris* O. S.

Irregular leaf folds. Felt '15e, p. 94

Itonid. *Rhabdophaga rileyana* Felt

Distorted, rolled leaves bearing cocoons, possibly identical with the preceding.

Felt '11j, p. 452

Itonid. *Dasyneura* sp

Reared from similar leaves, predaceous. Felt '11j, p. 452

Itonid. *Lestodiplosis* sp.

Slender, fusiform leaf galls, length 5 mm. Felt '06b, p. 650

Acarid. Maple spindle gall, *Phyllocoptes aceris-crumena*
Riley

Red erineum on the upper leaf surface. Hodgk. '13, p. 423

Acarid. *Phyllocoptes minutissimus* Hodgk.

Pinkish erineum on the under leaf surface. Hodgk. '13, p. 421, 422, 424

Acarid. *Eriophyes major* Hodgk.

Eriophyes ornatus Hodgk.

Phyllocoptes quinquilobus Hodgk.



Fig. 169. Maple bladder gall, *Phyllocoptes quadripes* Shim., on soft maple. Several galls greatly enlarged. (Original)

Yellowish to deep brown erineum in large patches on under side of leaf. Chadwick '08, p. 120

Acarid. *Eriophyes* sp.

A whitish or brown erineum in elongated patches on the veins, on the upper side of the leaf. Chadwick '08, p. 120

Acarid. *Eriophyes* sp.

A whitish, frostlike erineum with small spots of rosy pink spreading broadly along the main veins, on the upper surface. Chadwick '08, p. 120

Acarid. *Eriophyes* sp.

Acer saccharinum (white or silver maple)

Free larvae on irregularly curved leaves. Felt '15e, p. 93

Itonid. Maple leaf midge, *Rhabdophaga aceris* Shim.

Slender, fusiform leaf galls, length 5 mm, sometimes very abundant, on the upper surface, also on sugar maple and white-barked maple. Felt '06b, p. 630

Acarid. Maple spindle gall, *Phyllocoptes aceris-crumena* Riley

Small, bladderlike greenish or reddish leaf galls, diameter 2.5 mm, very abundant, on the upper surface. Fig. 169, pl. 16, fig. 9. Felt '06b, p. 630

Acarid. Maple bladder gall, *Phyllocoptes quadripes* Shim.

Associated with the preceding. Hodgk. '13, p. 421

Acarid. *Eriophyes confusus* Hodgk.

A pale yellow to deep brown erineum on the under side of the leaf. Chadwick '08, p. 121

Acarid. *Eriophyes* sp.

Acer saccharum (sugar or rock maple)

Thickened vein galls, green to brownish, length 3 to 5 mm. Fig. 170. Felt '15e, p. 181

Itonid. ? *Dasyneura communis* Felt

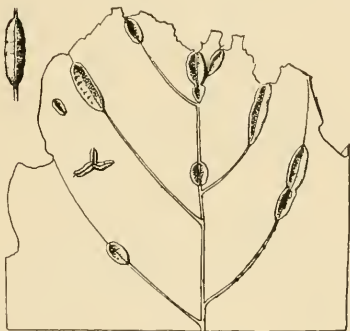


Fig. 170. Gouty vein midge, *Dasyneura communis* Felt. Gall presumably of this species on sugar maple, one gall closed, the others open. (Origina.)

Slender, fusiform leaf galls, length 5 mm, sometimes very abundant, on the upper surface, also on soft maple and white-barked maple. Felt '06b, p. 630

Acarid. Maple spindle gall, *Phyllocoptes aceris-crumena* Riley

Red erineum on the upper leaf surface. Hodgk. '13, p. 421, 422, 423 and 424

Acarid. *Eriophyes elongatus* Hodgk.

Eriophyes maculatus Hodgk.

Eriophyes regulus Hodgk.

Phyllocoptes constrictus Hodgk.

Phyllocoptes variabilis Hodgk.

Greenish erineum on the under leaf surface. Hodgk. '13, p. 421

Acarid. *Eriophyes modestus* Hodgk.

A white or whitish erineum in patches on the under side of the leaf. Chadwick '08, p. 121

Acarid. *Eriophyes* sp.

A rusty or brown erineum on the under leaf surface, forming patches along the veins. Chadwick '08, p. 122

Acarid. *Eriophyes* sp.

Acer platanoides (Norway maple)

Epidermal, hairy growths in vein axils, on the under leaf surface. Hodgk. '13, p. 423

Acarid. *Phyllocoptes magnificus* Hodgk.

Acer leucoderme (white-barked maple)

Slender, fusiform leaf galls, length 5 mm, sometimes very abundant on the upper surface, also on sugar maple and soft maple. Felt '06b, p. 630

Acarid. Maple spindle gall, *Phyllocoptes aceris-crumena* Riley

An erineum in scattered patches, mostly on the under surface of the leaf and slightly dimpled. Chadwick '08, p. 152

Acarid. *Eriophyes* sp.

Acer spicatum (mountain maple)

Whitish erineum on the upper leaf surface. Hodgk. '13, p. 422

Acarid. *Eriophyes parallelus* Hodgk.

Acer glabrum (dwarf maple)

A purple erineum in large patches at the tips of the lobes and on the upper side of the leaf, sometimes sprinkled over the under side. Chadwick '08, p. 119

Acarid. *Eriophyes* sp.

Acer species (maple)

Rolled leaf margin, the edges yellow, the center crimson. Felt '11j, p. 452

Itonid. *Cecidomyia* sp.

A black, velvety erineum in large, irregular patches on the leaf. Chadwick '08, p. 123

Acarid. *Eriophyes* sp.

Acer negundo (box elder)

Terminal bud galls with a diameter of 1 to 2 cm or greatly swollen, deformed leaflets, the thickened midrib forming a mass 3 cm long and 7 mm in diameter, the blade being almost aborted. Gill. '90a, p. 392

Acarid. Box elder bud gall, *Cecidomyia negundinis* Gill.

Variable, subglobose leaf gall, diameter about 2 mm. Felt '08e, p. 394

Itonid. Box elder leaf gall, *Contarinia negundifolia* Felt

A white erineum or shallow dimple on the under side of the leaf, sometimes involving entire leaves of young or basal shoots. Chadwick '08, p. 119

Acarid. *Eriophyes* sp.

Warty swellings on the leaves. Hodgk. '13, p. 422, 424

Acarid. *Eriophyes negundi* Hodgk.

Phyllocoptes splendidus Hodgk.

Balsaminaceae (touch-me-not family)

Impatiens (balsam, jewel weed)

Globose, flower bud gall, length 1 cm. Pl. 7, fig. 4. Osten Sacken '62, p. 204

Itonid. Touch-me-not gall, *Cecidomyia impatientis* O. S.

Tumid, midrib fold, length 5 mm. Pl. 10, fig. 8. Felt '07a, p. 105

Itonid. *Lasioptera impatientifolia* Felt

Subglobular stem gall. Beutm. '08, p. 75

Itonid. *Lasioptera fulva* Beutm.

Enlarged stem infested with *Æcidium impatientis*. Felt '08e, p. 401

Itonid. *Mycodiplosis impatientis* Felt

Rhamnaceae (buckthorn family)

Ceanothus (red root)

Loose, terminal bud gall, length 2 cm, diameter 1.5 cm. Felt '16d, p. 135

Itonid. Redroot bud gall, *Asphondylia ceanothi* Felt

Thickened vein fold, sometimes confluent, light green, 5x3 mm

Itonid. *Cecidomyia* sp. a2818

Spindle-shaped stem enlargements, 10 to 15 mm long, 5 to 8 mm in diameter, sometimes on branches, occasionally aborting flower clusters.

Lepid. Red root stem gall, *Stagmatophora ceanothiella*

Cosens

Vitaceae (vine family)

Psedera (Virginia creeper, woodbine)

Infertile seeds. Crosby '09, p. 382

Hym. Woodbine seed wasp, *Prodecatoma phytophaga*

Crosby

Tumid, more or less irregular, sometimes winged midrib leaf gall, length 1 cm.

Fig. 171. Felt '13h, p. 216

Itonid. Woodbine vein gall, *Dasyneura parthenocissi*

Stebb.

A "nail gall" or pouch leaf gall tapering at both extremities. Chadwick '08, p. 127

Acarid. *Eriophyes* sp.

Irregular root gall, diameter 2 to 3 mm. Felt '11j, p. 466

Itonid. Woodbine root gall, *Cecidomyia* sp.

Vitis (grape)

Fruit and bud galls

Shriveled berries and enlarged seeds. Crosby '09, p. 380

Hym. Grape seed wasp, *Evoxysoma vitis* Saund.

Reared from grape seeds. Howard '95, p. 23

Hym. *Decatomidea cooki* How.

Reared from enlarged, sometimes reddish, striped blossom buds, diameter 2 to 3 mm. Felt '09f, p. 15

Itonid. Grape blossom midge, *Contarinia johnsoni* Sling.

Hard, nut-like, polythalamous bud gall, diameter 1.5 cm. Felt '16d, p. 109

Itonid. Grape apple gall, *Schizomyia pomum* Walsh & Riley
Possibly reared from the same gall. Felt '15c, p. 108

Itonid. *Rhabdophaga hirticornis* Felt

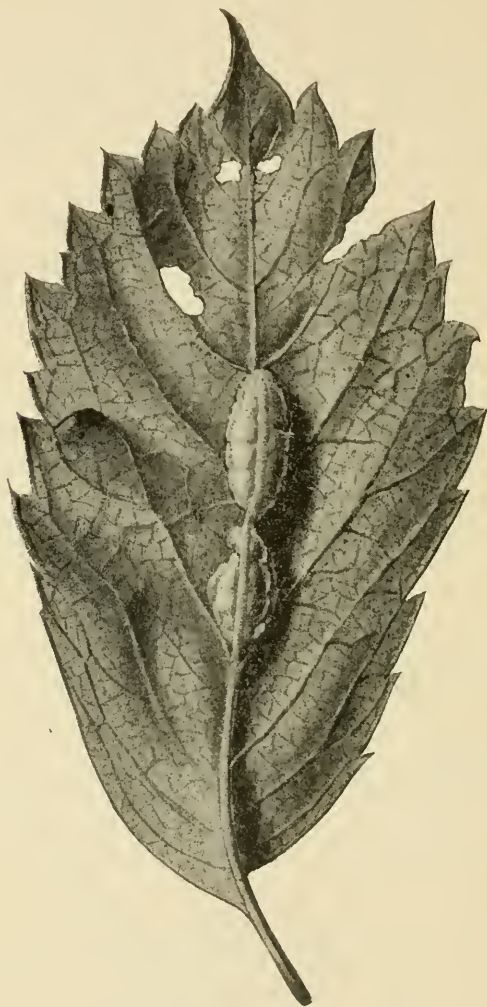


Fig. 171. Woodbine vein gall, *Dasyneura parthenocissi* Stebb. (Author's illustration)

Clustered, fusiform, woolly, pubescent bud galls, each 1 to 1.5 cm long. Pl. 13, fig. 6. Felt '16d, p. 107

Itonid. Grape filbert gall, *Schizomyia coryloides* Walsh & Riley

Leaf or tendril galls

Oval, petiole or tendril gall, length 2.5 cm, swelling mostly distant from the base. Felt, '16d, p. 113

Itonid. *Schizomyia petiolicola* Felt
Reared from similar gall. Fig. 172. Felt '08e, p. 328

Itonid. *Asteromyia petiolicola* Felt
Reared from similar gall. Felt '09e, p. 287

Itonid. *Lasioptera riparia* Felt
Reared from similar gall, swellings mostly basal. Felt '07a, p. 153

Itonid. *Neolasioptera vitinea* Felt



Fig. 172. Grape tendril gall, *Asteromyia petiolicola* Felt. (Original)

Fig. 173. Grape tomato gall, *Lasioptera vitis* O. S. (Original)

Somewhat cylindrical, reddish petiole galls, length 1.5 to 2.25 cm, diameter 5 to 6 mm, two or three larvae huddled together in cells in the pith

Itonid. *Cecidomyia* sp. a2684

Irregular, tumid, lobulate, greenish or reddish leaf or tendril gall, diameter .5 to 1.5 cm. Fig. 173. Osten Sacken '62, p. 201

Itonid. Grape tomato gall, *Lasioptera vitis* O. S.
Reared from similar gall. Felt '15e, p. 134

Itonid. *Dasyneura vitis* Felt
Reared from similar gall. Felt '15e, p. 206

Itonid. *Rhizomyia vitis* Felt
Reared from similar gall. Felt '13m, p. 220

Itonid. *Brachyneura vitis* Felt
Reared from similar gall. Felt '08e, p. 392

Itonid. *Janetiella brevicauda* Felt

Vein galls, solitary or confluent, frequently distorting the leaf and showing on both surfaces, color yellowish red, more obscure on the upper surface, diameter 10 to 12 mm. Mex. Trotter '11, p. 131

Itonid. *Cecidomyia* sp.

Circular, pinkish or greenish, pustulate leaf galls, the middle depressed on the upper surface and protuberant on the lower, diameter 2 to 3 mm. Pl. 9, fig. 5

Itonid. Grape blister gall, *Cecidomyia* sp. a2749

Elongate, conical, reddish or greenish leaf gall, length 6 to 9 mm. Fig. 174. Osten Sacken '62, p. 202

Itonid. Grape tube gall, *Cecidomyia viticola* O. S.



Fig. 174. Grape tube gall, *Cecidomyia viticola* O. S. (Original)

Irregular, subglobose leaf gall showing a swelling on the upper surface and a globose enlargement on the lower. Pl. 4, fig. 9.

Lepid. ?*Coleophora* sp.

Small, wartlike leaf galls on either the upper or the lower surface, diameter 2 to 3 mm.

Aphid. Grape phylloxera, *Phylloxera vitifoliae* Fitch
Reared from Phylloxera gall. Felt '15e, p. 195

Itonid. *Lasiopteryx arizonensis* Felt
Reared from similar gall, predaceous. Felt '08e, p. 408

Itonid. *Lestodiplosis grassator* Fyles

An orange brown to light chocolate colored erineum on the lower surface of the leaf, on *V. bicolor*. Chadwick '08, p. 150

Acarid. *Eriophyes* sp.

Small, semicircular or nearly circular, wart galls along the veins and but slightly elevated, on either surface, diameter 2 mm, on *V. cordifolia*. Chadwick '08, p. 151

Acarid. *Eriophyes* sp.

Quite distinct from the above, with a long, white pubescence, on the under surface, diameter 5 to 10 mm, on *V. cordifolia*. Chadwick '08, p. 151

Acarid. *Eriophyes* sp.



Fig. 175. *Astrodiplosis speciosa* Felt.
Shrunken gall. (Original)



Fig. 176. Linden bark gall, *Agromyza tiliae* Coud. (Original)

Green, pouch gall with irregularly-lobed top and mostly on the under surface of the leaf, on *V. cordifolia*. Chadwick '08, p. 151

Acarid. *Eriophyes* sp.

An erineum on the under side of the leaf, causing a swelling above, on *V. vinifera*. Chadwick '08, p. 151

Acarid. *Eriophyes vitis* Land.

A leaf curl or warty, greenish elevation on the upper surface of the leaf, entirely smooth on the underside, becoming brown or reddish when old, on *V. vinifera*. Chadwick '08, p. 151

Acarid. *Eriophyes* sp.

Irregular, oval cane galls, length 2 cm, diameter 1.5 mm.

Coleop. Grape cane weevil, *Ampelogyptersesostris* Lec.

Cissus

Irregular, tumid, stem gall, length 2-9 cm. Fig. 175. Felt '13h, p. 218

Itonid. *Astrodiplosis speciosa* Felt

Tiliaceae (linden family)

Tilia (linden, basswood)

Irregular, oval, subcortical twig swellings, length 1 cm. Fig. 176. Couden '08, p. 35

Dipt. Linden bark gall, *Agromyza tiliae* Coud.



Fig. 177. Linden twig gall, *Cecidomyia citrina* O. S. Various types. (Original)

Irregular swellings on twigs and petioles, diameter 4 to 8 mm. Fig. 177. Osten Sacken '71, p. 53

Itonid. Linden twig gall, *Cecidomyia citrina* O. S.¹

Irregular, subglobular, distorted galls at the base of the leaf or along the mid vein. Felt '15j, p. 156

Itonid. *Colpodia pectinata* Felt

Subglobular, brownish leaf galls, diameter 3 mm. Pl. 7, fig. 9. Osten Sacken '75, p. 201

Itonid. Linden wart gall, *Cecidomyia verrucicola* O. S. Apparently reared from the same gall. Felt '08e, p. 418

Itonid. *Porricondyla dilatata* Felt

¹ Rearing may prove this insect to be identical with *Contarinia tiliarum* Kieff.

Top-shaped, greenish leaf galls sometimes very abundant on the upper leaf surface, diameter 2.5 mm. Fig. 178, 179. Felt '06b, p. 631

Acarid. Linden mite gall, *Eriophyes abnormis* Garm.

Malvaceae (mallow family)

Gossypium (cotton)

Reared from flower buds. Felt '08b, p. 210

Itonid. Cotton bud midge, *Contarinia gossypii* Felt

Reared from red spider, on cotton. Felt '13n, p. 488

Itonid. *Arthrocnodax carolinæ* Felt

Leaf galls sometimes deforming foliage. Parrott et al. '06, p. 290

Acarid. *Eriophyes gossypii* Bnks.

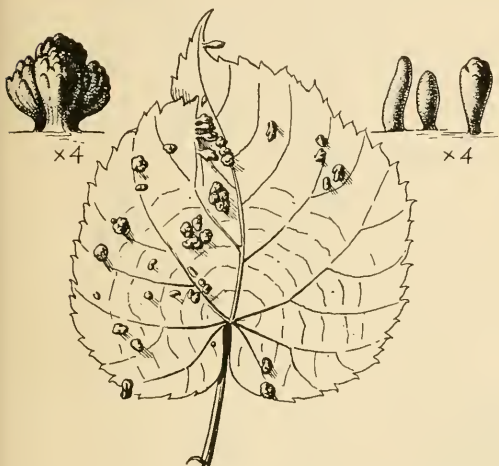


Fig. 178. Linden mite gall, *Eriophyes abnormis* Garm. Several types of gall in profile and enlarged. (Original)

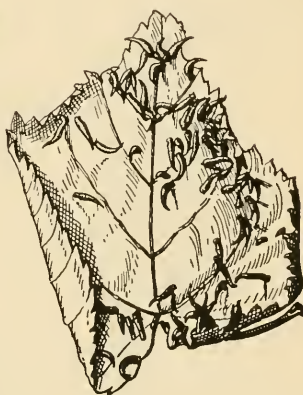


Fig. 179. Linden mite gall, *Eriophyes abnormis* Garm. Leaf with numerous galls, presumably this species. (Original)

Pocket-like galls on the mid rib, deforming but not preventing leaf development.

Pierce and Morrill, '14, p. 20

Itonid. *Cecidomyia* sp.

Reared from cambium layer. Coq. '05, p. 200

Itonid. *Porricondyla gossypii* Coq.

Hibiscus moscheutos (swamp rose mallow)

Variably swollen stems. Fig. 180. Felt '07a, p. 155

Itonid. Mallow stem midge, *Neolasioptera hibisci* Felt

Hypericaceae (St John's-wort family)

Hypericum (St John's-wort)

Axillary bud galls, length 5 mm, on *H. mutilum*. Felt '15e, p. 187

Itonid. *Dasyneura toweri* Felt

Globular stalk swellings, length 6 to 10 mm. Beutm. '08, p. 74

Itonid. *Cecidomyia triadenii* Beutm.

Subglobose stem gall, length 1 cm. Felt '09e, p. 287

Itonid. *Lasioptera virginica* Felt

An erineum of very fine and numerous black spots on the upper leaf surface of *H. virginicum*. Chadwick '08, p. 149

Acarid. *Eriophyes* sp.

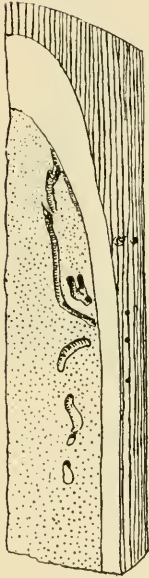


Fig. 180. Mal-low stem midge, *Neolasioptera hibisci* Felt (Author's illustration)



Fig. 181. *Asphondylia betheli* Ckll. Infested fruit. (Original)

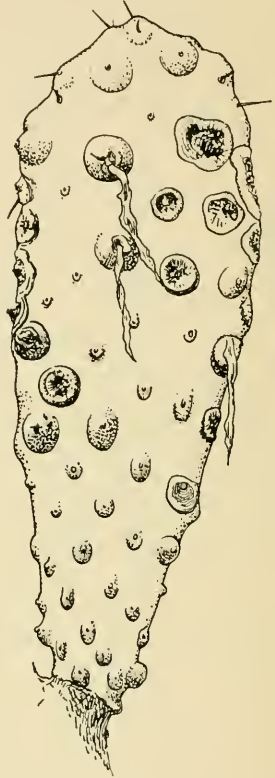


Fig. 182. Cactus midge, *Itonida opuntiae* Felt, showing characteristic appearance of infested lobe. (Original)

Violaceae (violet family)

Viola (violet)

Deformed fruit, irregular "plumlike," length 1 cm. Felt '15e, p. 166

Itonid. Violet fruit midge, *Dasyneura semenivora* Beutm.

Rolled, discolored leaves of *V. odorata*. Felt '07a, p. 59

Itonid. Violet leaf midge, *Phytophaga violicola* Coq.

Reared from red spider on violet leaves

Itonid. *Arthrocnodax* sp. a2346

Loasaceae (loasa family)*Mentzelia*

Reared from flower buds. Ent., 33:302; Felt '16d, p. 149
Itonid. *Asphondylia mentzeliae* Ckll.

Cactaceae (cactus family)*Opuntia* (prickly pear)

Very large, swollen fruit. Felt '16d, p. 148
Itonid. *Asphondylia arizonensis* Felt
Swollen fruit. Fig. 181. Cockerell '07, p. 324; Felt '16d, p. 122
Itonid. *Asphondylia betheli* Ckll.
Swollen leaves. Pl. 5, fig. 6. Felt '08e, p. 124, '16d, p. 144
Itonid. *Asphondylia opuntiae* Felt
Decayed, frequently yellowish spots at the base of spines. Fig. 182. Felt '10a, p. 10
Itonid. Cactus midge, *Itonida opuntiae* Felt

Elaeagnaceae (oleaster family)*Shepherdia canadensis*

Oval bud gall. Felt '16g, p. 414
Itonid. *Asphondylia shepherdiae* Felt

Myrtaceae (myrtle family)*Eugenia*

Deformed fruit. Felt '12d, p. 106
Itonid. *Dasyneura eugeniae* Felt
Hairy, globose leaf gall, diameter 1.5 mm. Felt '13a, p. 175
Itonid. *Cystodiplosis eugeniae* Felt

Lythraceae (loosestrife family)*Decodon* (swamp loosestrife)

Globose bud gall, length 3-5 mm. Wells, '14, p. 291
Itonid. ? *Dasyneura* sp.

Onagraceae (including primrose family)*Zauschneria*

Rosette gall. Fig. 183. Felt '12, p. 152
Itonid. *Thecodiplosis zauschneriae* Felt

Umbelliferae (parsley family)*Cicuta* (water hemlock)

White larvae, probably on leaves. Felt, '11j, p. 458
Itonid. *Cecidomyia* sp.

Zizia (golden Alexanders)

Fusiform stem gall, length 3 cm. Fig. 184. Felt '08e, p. 327

Itonid. *Lasioptera ziziae* Felt**Cornaceae** (dogwood family)*Garrya fremontii*

Suboval, black, irregular bud gall. Felt '11j, p. 461

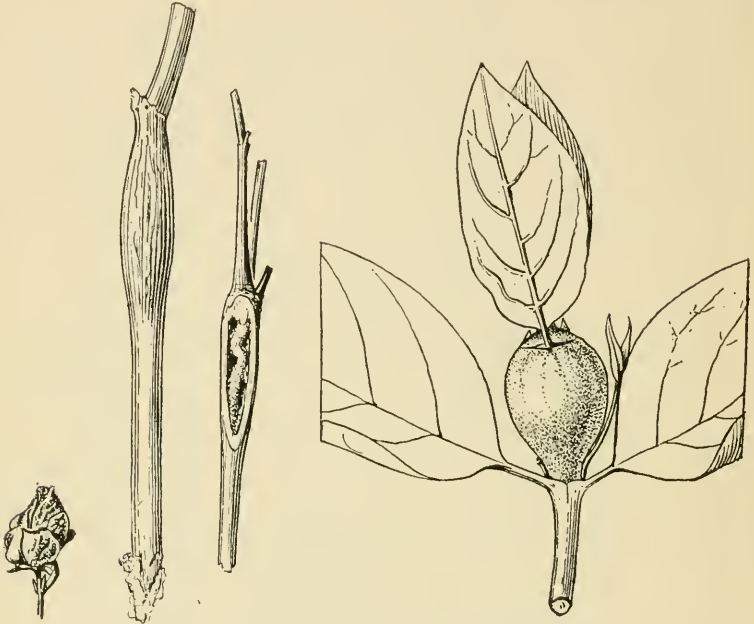
Itonid. *Asphondylia* sp.

Fig. 183. *Thecodiplosis zauschneriae* Felt. A somewhat shriveled gall. (Original)

Fig. 184. *Lasioptera ziziae* Felt. Stem gall, one sectioned. (Original)

Fig. 185. Dogwood bud gall, *Cecidomyia* sp. (Original)

Cornus (dogwood)

Ovate, green, red-tinted, succulent, apical, shoot gall, length 1.5 cm, diameter 1 cm, on *C. alternifolia*. Fig. 185

Itonid. Dogwood bud gall, *Cecidomyia* sp. a2655

Clavate twig gall, length 1 to 2 cm, on *C. florida*. Fig. 186. Beutm. '92, p. 269

Itonid. Dogwood club gall, *Lasioptera clavula* Beutm.

Tubular, curved, green leaf gall, length 8 mm, on *C. amomum*. Stebb. '10, p. 46

Itonid. Dogwood tube gall, *Cecidomyia tuba* Stebb.

Yellowish, purple-margined blister leaf gall, diameter 2 to 3 mm, on *C. stolonifera*. Pl. 13, fig. 9. Felt '07a, p. 107

Itonid. Dogwood spot gall, *Lasioptera corni* Felt
Irregular, subcortical, stem gall, length 1 to 2 cm, on *C. stolonifera*. Fig. 187, 188. Beutm. '07, p. 394

Itonid. Dogwood ~~twigs~~ gall, *Neolasioptera cornicola*
Beutm.

An erineum in small, blackish spots, on the upper side of the leaf. Chadwick '08, p. 131

Acarid. *Eriophyes* sp.



Fig. 186. Dogwood club gall, *Lasioptera clavula* Beutm., several types. (Original)

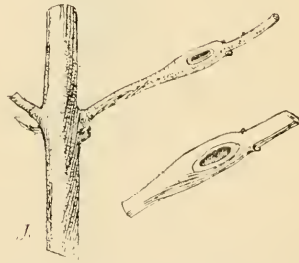


Fig. 187. Dogwood stem gall, *Neolasioptera cornicola* Beutm. (Original)

Nyssa (black or sour gum)

Twig gall, length 4 to 5 cm, diameter 8 mm. Felt '11j, p. 464

Itonid. *Cecidomyia* sp.

Marginal leaf fold, length 2.5 to 3.5 mm. Beutm. '07, p. 387

Itonid. *Cecidomyia nyssaecola* Beutm.

Small, round capsule gall on the leaf, often lobed above, conical below, with an opening at the apex. Chadwick '08, p. 136

Acarid. *Eriophyes nyssae* Trott.

A narrow infolding of the leaf margin upon the upper surface, dark brown when dry, elegantly scalloped. Chadwick '08, p. 136

Acarid. *Eriophyes* sp.

Ericaceae (heath family)

Rhododendron nudiflorum (pinxter)

Fusiform, brownish bud gall, length 7 mm. Fig. 189. Felt '16d, p. 119

Itonid. Pinxter bud gall, *Asphondylia azaleae* Felt



Fig. 188. Cornus twig gall, possibly the work of *Neolasioptera cornicola* Beutm. (Original)



Fig. 189. Pinkster bud gall, *Asphondylia azaleae* Felt. (Original)

Gaylussacia frondosa (dangleberry)

Irregular globose monothalamous or lobulate polythalamous leaf gall, diameter 5-10 mm. Beutm. '07c, p. 392

Itonid. *Cecidomyia (vaccinii)* O. S.

Vaccinium (blueberry, cranberry)

Reared from blueberries (fruit). Woods '16, p. 266

Itonid. Blueberry midge, *Lasioptera fructuaria* Felt

Apical bud gall on blueberry. Felt '15e, p. 145

Itonid. Blueberry bud gall, *Dasyneura cyanococci* Felt

Oval, valved midrib leaf gall, length 3 mm, on blueberry. Osten Sacken, '62, p. 196

Itonid. Blueberry leaf gall, *Dasyneura gaylussacii* Felt (*vaccinii* O. S., not Smith)

Small, round galls (capsules?) on blueberry leaves. Chadwick '08, p. 150

Acarid. *Eriophyes* sp.

Irregularly rounded, frequently kidney-shaped, polythalamous, stem gall, green or brown, diameter 12 to 25 mm, on blueberry. Fig. 65, 2-8. Beutm. '09, p. 280

Cynipid. Blueberry stem gall, *Solenozopheria vaccinii* Ashm.

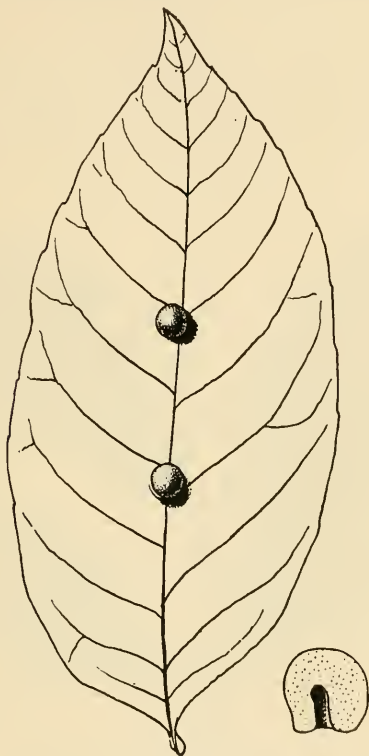


Fig. 190. Ash bullet gall, *Cecidomyia pellex* O.S. One gall in section and enlarged. (Original)

Leaf fold or bud gall on cranberry. Felt '15e, p. 150

Itonid. Cranberry midge, *Dasyneura vaccinii* Smith

Plumbaginaceae (leadwort family)

Limonium (sea lavender)

An erineum of very small, black spots on the upper side of the leaves. Chadwick '08, p. 148

Acarid. *Eriophyes* sp.

Primulaceae (primrose family)*Lysimachia* (loosestrife)

Loose, apical bud gall. Pl. 9, fig. 9. Felt '15e, p. 182

Itonid. Loosestrife bud gall, *Dasyneura lysimachiae*
Beutm.

Gall undetected, probably from vegetable matter. Felt '13m, p. 139

Itonid. *Lestremia solidaginis* Felt

Sapotaceae (sapodilla family)*Bumelia*

Probably bud galls, on *B. lanuginosa*. Felt '16d, p. 124

Itonid. *Asphondylia bumeliae* Felt



Fig. 191. Ash midrib gall, *Contarinia canadensis*
Felt. (Author's illustration)

Ebenaceae (ebony family)*Diospyros* (persimmon)

An erineum in numerous small patches on the upper side of the leaf. Chadwick '08, p. 132

Acarid. *Eriophyes* sp.

Oleaceae (olive family)*Fraxinus* (ash)

Deformed, terminal, leafy buds on white ash. Felt '15e, p. 152

Itonid. Ash bud gall, *Dasyneura apicata* Felt

Subglobular, white ash leaf galls, diameter 5 mm. Felt '08e, p. 327

Itonid. *Lasioptera fraxinifolia* Felt

Apparently from the same gall. Felt '08e, p. 416

Itonid. *Colpodia temeritatis* Felt

Inhabiting a similar gall. Fig. 190. Osten Sacken '62, p. 199

Itonid. Ash bullet gall, *Cecidomyia pellex* O.S.

Large, tumid midrib gall on white ash, length 5 to 15 mm. Fig. 191. Felt '08e, p. 394

Itonid. Ash midrib gall, *Contarinia canadensis* Felt

Probably reared from the same gall. Felt '15e, p. 155

Itonid. *Dasyneura tumidosae* Felt

Reared from tightly-rolled leaves of white ash. Felt '15e, p. 133

Itonid. *Dasyneura fraxinifolia* Felt

Reared from badly rolled leaves. Fig. 192. Felt '15e, p. 203

Itonid. *Rhizomyia fraxinifolia* Felt



Fig. 192. *Rhizomyia fraxinifolia* Felt. Deformed head. (Original)



Fig. 193. Ash petiole midge, *Phytophaga fraxini* Felt. (Original)

Reared from badly rolled leaves of white ash, probably predaceous. Felt '08e, p. 408

Itonid. *Lestodiplosis fraxinifolia* Felt

Badly curled, purple-streaked terminal leaves. Pl. 15, fig. 3. Felt '11m, p. 39

Hemip. Ash psyllid, *Psyllopsis fraxinicola* Forst.

Reared from base of leaf petioles of white ash. Fig. 193. Felt '15i, p. 206

Itonid. Ash petiole midge, *Phytophaga fraxini* Felt

Lobulate deformations of the staminate flowers of white ash, diameter 6 to 12 mm.

Pl. 15, fig. 9. Felt '06b, p. 633

Acarid. Ash flower gall, *Eriophyes fraxiniflora* Felt

Elongate capsule or vein galls on the leaves, pinkish above, whitish beneath, on one side of the vein, on white ash. Chadwick '08, p. 134

Acarid. *Eriophyes* sp.

Typical capsule leaf galls, small, irregular, circular and light green in color, opening below. Chadwick '08, p. 134

Acarid. *Eriophyes* sp.

Depressed, wartlike leaf galls on green ash. Parrott et al. '06, p. 290

Acarid. *Eriophyes* sp.

Hairy, capsule galls on red ash leaves. Pl. 15, fig. 8. Chadwick '08, p. 134

Acarid. *Eriophyes fraxini* Garm.

Apocynaceae (dogbane family)

Apocynum (dogbane)

Reared from slightly enlarged flower buds. Felt '08e, p. 414

Itonid. Dogbane flower midge, *Itonida apocyni* Felt

Reared from unopened flower buds, probably predaceous. Felt '08e, p. 409

Itonid. *Lestodiplosis apocyniflorae* Felt



Fig. 194. Milkweed stem midge, *Neolasioptera asclepieae* Felt. (Author's illustration)

Fig. 195. Bindweed stem gall, *Lasioptera convolvuli* Felt. (Author's illustration)

Asclepiadaceae (milkweed family)

Asclepias (milkweed)

Oval, tumid midrib fold, length 7 mm, diameter 4 mm, on *A. incarnata*
Felt '11j, p. 454

Itonid. *Ceeidomyia* sp.

Rusty brown, irregularly swollen leaves, on *A. incarnata*. Felt '11j, p. 451

Itonid. *Ceeidomyia* sp.

Reared from rolled leaves of *A. syriaca*, probably predaceous. Felt '08e, p. 409

Itonid. *Lestodiplosis asclepieae* Felt

Elongate, fusiform stem gall, on *A. incarnata*. Fig. 194. Felt '08e, p. 332

Itonid. Milkweed stem midge, *Neolasioptera asclepieae* Felt

Felt

Convolvulaceae (convolvulus family)*Ipomoea* (morning-glory)

Reared from flower buds. Felt '10b, p. 160

Itonid. *Schizomyia ipomoeae* Felt

Flower buds. Felt '10c, p. 269

Itonid. *Camptoneuromyia meridionalis* Felt*Convolvulus sepium* (hedge bindweed)

Fusiform stem gall, monothalamous, length 1.5 cm. Fig. 195. Felt '07a, p. 149

Itonid. Bindweed stem gall, *Lasioptera convolvuli* Felt

Fig. 196. *Rhopalomyia audibertiae* Felt. Galls on leaf and flower stem. (Original)

Fig. 197. Blue curls stem gall, *Stagmatophora sexnotella* Chamb. (Original)

Boraginaceae (borage family)*Amsinckia lycopsoides*

Reared from an undescribed, presumably bud gall. Felt '16d, p. 106

Itonid. *Schizomyia macrofila* Felt**Verbenaceae** (vervain family)*Verbena* (vervain)Cylindric swelling of the flower stalk of *V. rostrata*. Felt '12e, p. 150Itonid. *Lasioptera verbeniae* Felt

Irregular, oval, stem gall, length 3 to 5 mm. Felt '11j, p. 474

Itonid. *Cecidomyia* sp.

Reared from marginal leaf rolls. Beutm. '07d, p. 306

Itonid. Vervain leaf midge, *Itonida verbenae* Beutm.

Reared from rolled leaves, probably predaceous. Felt '08e, p. 408

Itonid. *Lestodiplosis verbenifolia* Felt

A white and pinkish, frostlike erineum and leaf curl involving the whole plant and apparently very destructive, on *V. hastata*. Chadwick '08, p. 150

Acarid. *Eriophyes* sp.

Stachytarpha jamaicensis

Reared from a flower gall, probably produced by mites. Felt '12a, p. 177

Itonid. *Hyperdiplosis producta* Felt

Clerodendron aculeatum

Reared from a flower bud gall. Felt '09c, p. 300

Itonid. *Asphondylia attenuatata* Felt



Fig. 198. Cat mint gall, *Aylax glechomae* Linn. Several types of gall. (Original)

Labiatae (mint family)

Audibertia stachyoides

Subcylindrical, somewhat irregular, the base swollen, grayish or light brown leaf petiole or flower stem galls, length 5 mm, diameter 3 mm. Fig. 196. Felt '07e, p. 18

Itonid. *Rhopalomyia audibertiae* Felt

Trichostema (blue curls)

Irregular, reniform stem gall, tapering somewhat above, obtuse below, length 18 mm, diameter 6 mm. Fig. 197. Stebb. '10, p. 47

Lepid. Blue curls stem gall, *Stagmatophora sexnotella* Chamb.

Scutellaria (skullcap)

Oval, greenish, stem gall, length 8 mm. Felt '11j, p. 470

Itonid. *Cecidomyia* sp.

Nepeta (cat mint)

Globular or irregular, monothalamous or polythalamous leaf petiole or stem gall, the simple galls with a diameter of 6 mm. Fig. 198. 235, 1-3. Beutm. '10a, p. 138

Cynipid. Cat mint gall, *Aylax glechomae* Linn.

Galeopsis (hemp nettle)

Irregular, stem gall, length .5 to 2 cm. Felt '09e, p. 287

Itonid. Hemp nettle gall, *Lasioptera galeopsidis* Felt

Salvia (sage)

A conical, thick-walled, grayish brown leaf gall with a length 1 cm and a diameter 6 mm or a tubular, thin-walled leaf gall, with a length of 6 mm, on *S. californica* and *S. nivea*. Fig. 199. Felt '16f, p. 184

Itonid. *Salvia* leaf gall, *Rhopalomyia salviae* Felt

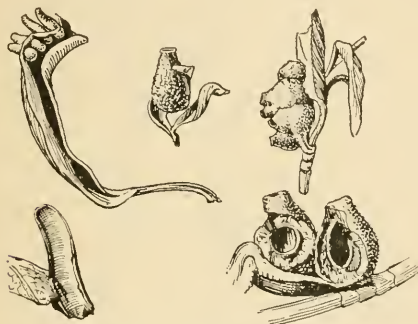


Fig. 199. *Salvia* leaf gall, *Rhopalomyia salviae* Felt. Several types of gall, two in section. (Original)



Fig. 200. *Cecidomyia* sp. on *Monarda*, a2704, enlarged. (Original)

Monarda fistulosa (wild bergamot)

Variable, stem gall, length 10 to 22 mm. Brodie '94, p. 109

Itonid. *Cecidomyia monardi* Brodie

Ovate root stalk bud gall, length 2.5 mm, diameter 2 mm. Fig. 200.

Itonid. *Cecidomyia* sp. a2704

Lycopus (water horehound)

Subglobular, stem gall, length 8 to 10 mm. Fig. 201. Felt '07a, p. 152

Itonid. *Lasioptera lycopi* Felt

Fusiform stem gall, length 1.5 to 2 cm. Fig. 202. Felt '08e, p. 325

Itonid. *Lasioptera mitchellae* Felt

Mentha (mint)

Terminal bud gall, length 3 mm, on *M. gentilis*. Felt '11j, p. 464

Itonid. *Cecidomyia* sp.

Axillary or terminal bud gall, length 4 mm, on *M. ?spicata*. Felt '15e, p. 183

Itonid. Spearmint bud gall, *Dasyncura aromatica* Felt
Loose bud gall, length 3 mm, on *M. piperita*. Felt '15e, p. 136

Itonid. Peppermint bud gall, *Dasyncura piperitae* Felt
Pustule gall in the axil of the leaf, diameter 3.5 mm, on *M. canadensis*.
Felt '08e, p. 405

Itonid. *Giardomyia menthae* Felt
Polythalamous, stem gall, length 6 to 12 mm. Fig. 203. Felt '09e, p. 288

Itonid. *Neolasioptera menthae* Felt



Fig. 201. *Lasioptera lycopi*
Felt. (Original)



Fig. 202. *Lasioptera mitchellae* Felt. Two types
of gall. (Original)

Collinsonia (horse balm)

Subglobular, pubescent leaf gall, length 4 to 7 mm. Beutm. '08b, p. 703

Itonid. *Cecidomyia collinsoniae* Beutm.

Narrow, midrib or vein swelling. Beutm. '08b, p. 74

Itonid. *Cecidomyia collinsonifolia* Beutm.

Solanaceae (nightshade family)

Lycopersicum esculentum (tomato)

Reared from flowers. Felt '11c, p. 303

Itonid. Tomato flower gall, *Contarinia lycopersici* Felt

Solanum carolinense (horse nettle)

Irregular, spiny, stem gall, length 3.75 to 5 cm. Fig. 204. Felt '07a, p. 164

Itonid. Horse nettle gall, *Neolasioptera solani* Felt

Scrophulariaceae (figwort family)*Scrophularia* (figwort)

Reared from distorted flower buds, probably predaceous. Felt '08e, p. 409
Itonid. *Lestodiplosis scrophulariae* Felt

Pentstemon (bearded tongue)

Fasiform stem or branch gall, monothalamous, length 15 mm, diameter 3 mm.
Fig. 205

Itonid. *Lasioptera tibialis* Felt

Mimulus (monkey flower)

Stem gall, undescribed. Felt '08e, p. 332

Itonid. *Neolasioptera mimuli* Felt



Fig. 203. *Neolasioptera menthae* Felt. One gall in section. (Original)



Fig. 204. Horse nettle gall, *Neolasioptera solani* Felt. (Author's illustration)

Diplacus

Ovoid, stem gall. Felt '12e, p. 151

Itonid. *Lasioptera diplaci* Felt

Cabbage bud gall. Fig. 206. Felt '12e, p. 151

Itonid. *Asphondylia diplaci* Felt

Gerardia flava (downy false foxglove)

Larvae in seed pods. Fig. 207. Felt '11j, p. 461

Itonid. *Cecidomyia* sp.

"Deformation of the leaf." Chadwick '08, p. 132

Acarid. *Eriophyes* sp.

Bignoniaceae (bignonia family)*Tecoma* (trumpet flower)

Reared from irregularly curled and wrinkled leaves. Felt '06a, p. 127

Itonid. *Itonida tecomiae* Felt

Catalpa (catalpa)

Reared from dwarfed shoots and pods. Comst. '81, p. 266

Itonid. *Catalpa* midge, *Itonida catalpae* Comst.

Plantaginaceae (plantain family)*Plantago* (plantain)

Reared from apparently normal plants, probably predaceous. Felt '11j, p. 465

Itonid. ? *Lestodiplosis* sp.

Rubiaceae (madder family)*Galium* (bedstraw)

Aborted flower buds, diameter 3 mm. Felt '15e, p. 168

Itonid. Bedstraw midge, *Dasyneura americana* Felt



Fig. 205.
Lasioptera
tibialis Felt.
(Original)



Fig. 206. *Asphondylia diplaci* Felt.
Two types of gall. (Original)



Fig. 207. *Cecidomyia* sp. Infested seed pods of *Gerardia*. (Original)

Upper whorls of leaves with the margins longitudinally inrolled, on *Galium triflorum*

Acarid. *Eriophyes galii* Karp.

Cephalanthus (buttonbush)

Twig gall, undescribed. Felt '15e, p. 104

Itonid. Buttonbush twig gall, *Rhabdophaga cephalanthi* Felt

Clusters of small, paler or reddish protuberances (dimples?) on the upper side of the leaf, beneath with a white pubescence, height 1 to 3 mm. Chadwick '08, p. 130

Acarid. *Eriophyes cephalanthi* Cook

A pocket gall, like that on *Salix nigra*. Chadwick '08, p. 130

Acarid. *Eriophyes* sp.

Caprifoliaceae (honeysuckle family)*Diervilla* (bush honeysuckle)

Green bud gall or enlarged fruit, length 4 to 5 mm. Felt '16d, p. 140

Itonid. Bush honeysuckle bud midge, *A sphondylia diervillae* Felt

Reared from apparently normal stems having a diameter of 3 to 4 mm. Felt '07a, p. 162

Itonid. Bush honeysuckle stem midge, *Lasioptera caulicola* Felt

Lonicera (honeysuckle)

Irregular, lobulate bud gall with a short, rusty brown pubescence, diameter 7 to 10 mm.

Itonid. *Cecidomyia* sp. a2657

Symphoricarpos (snowberry)

Irregularly thickened, distorted leaflets. Felt '14c, p. 132

Itonid. *Thomasia californica* Felt

Fusiform twig gall.

Itonid. *Cecidomyia* sp.

Viburnum (arrowwood)

Globose bud gall, length 4 mm. Felt '16d, p. 104

Itonid. Arrowwood bud midge, *Schizomyia viburni* Felt

Purplish swellings on the lateral veins, length 5 mm. Pl. 13, fig. 5. Felt '15i, p. 280

Itonid. Purple vein midge, *Sackenomyia viburnifolia* Felt

Purplish discolorations along the veins, showing on both sides of the leaf and making a striking pattern, on *V. pubescens*. Fig. 208. Chadwick '08, p. 150

Acarid. *Eriophyes* sp.

Minute, blister gall on the under side of the leaf, diameter 2 mm. Pl. 9, fig. 7. Felt '11k, p. 480

Itonid. Arrowwood blister midge, *Cystiphora viburnifolia* Felt

Circular, blister gall, diameter 1.5 to 2 mm, on *V. cassinoides*. Felt '11j, p. 474

Itonid. *Cecidomyia* sp.

Pustule, blisterlike gall with pinkish aureola, diameter 3 mm, on *V. acerifolium*. Felt '11j, p. 474

Itonid. Arrowwood spot gall, *Cecidomyia* sp.

Inconspicuous, pale green, circular leaf mines, diameter 5 to 6 mm, on *V. opulus*

Itonid. *Cecidomyia* sp. a2764

Oval, greenish, blister gall, showing on both surfaces, diameter 2 mm, larvae deep red, escape through a central hole in the upper surface, on *V. dentatum*. Felt '11j, p. 474

Itonid. *Cecidomyia* sp.

Large, irregular, lobed dimples, convex above, rarely reversed, pubescent without, long, slender hairs within, on *V. dentatum*. Chadwick '08, p. 150

Acarid. *Eriophyes* sp.

Marginal leaf roll, length 10 mm, on *V. cassinoides*. Felt '11j, p. 474

Itonid. *Cecidomyia* sp.

Irregular, subcortical gall, length 2 to 6 cm, on *V. dentatum*. Fig. 209
Beutm. '07c, p. 398

Itonid. Arrowwood stem midge, *Neolasioptera viburnicola*
Beutm.

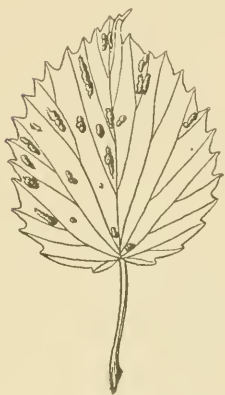


Fig. 208. *Eriophyes*
sp. on *Viburnum*. (Original)



Fig. 209. Arrow-
wood stem midge,
Neolasioptera
viburnicola
Beutm. (Original)

Sambucus (elder)

Swollen, unopened florets. Pl. 13, fig. 7. Beutm. '07c, p. 393

Itonid. Elder flower midge, *Youngomyia umbellicola*
O. S.

Bud gall, diameter 1.5 cm. Fig. 210. Felt '16d, p. 139

Itonid. Elder bud midge, *Asphondylia sambuci* Felt

Leaf margin rolled tightly upward and inward on both sides and bearing stout, whitish or brownish trichomes within. Chadwick '08, p. 147

Acarid. *Eriophyes* sp.

Rolled leaves, probably predaceous. Pl. 5, fig. 1. Felt '08c, p. 404

Itonid. *Arthrocnodax sambucifolia* Felt

Irregular, subcortical gall, length 2 to 4 cm. Fig. 211. Felt '06a, p. 132

Itonid. Elder stem midge, *Neolasioptera sambuci* Felt

Cucurbitaceae (gourd family)

Cucumeris (melon)

Reared from curled, slightly enlarged tips. Lintn. '96, p. 168

Itonid. Melon tip midge, *Contarinia setigera* Lintn.

Reared from aphids infesting melon tips. Felt '08e, p. 397

Itonid. Melon aphid midge, *Aphidoletes cucumeris* Lintn.



Fig. 210.
Elder bud midge,
Asphondylia sambuci Felt.
(Author's illustration)

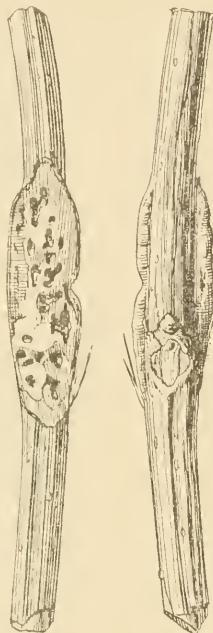


Fig. 211. Elder stem
midge, *Neolasioptera sambuci* Felt. One gall
in section and another
shown behind the normal
stem. (Original)

Compositae (composite family)

Vernonia (ironweed)

Probably from a bud gall. Felt '16d, p. 135

Itonid. Ironweed bud midge, *Asphondylia vernoniae* Felt

Reared from blossoms. Felt '11k, p. 552

Itonid. Ironweed blossom midge, *Youngomyia vernoniae*

Felt

Reared from deformed florets or an oval petiole or midrib gall, with a length
of 6 mm. Beutm. '07c, p. 389

Itonid. *Lasioptera vernoniae* Beutm.

Eupatorium purpureum (Joe-pyeweed)

Oval, blossom bud gall, length 1 cm. Felt '15e, p. 181

Itonid. Joe-pyeweed blossom midge, *Dasyneura purpurea*
Felt

Eupatorium perfoliatum (thoroughwort, boneset)

Reared from florets. Felt '08e, p. 391

Itonid. Boneset blossom midge, *Contarinia perfoliata*
Felt

Reared from apparently normal florets. Felt '07e, p. 6

Itonid. *Clinorhyncha eupatoriflorae* Felt

Oval, stem gall, length 1 to 1.5 cm. Felt '07a, p. 156

Itonid. Boneset stem midge, *Neolasioptera perfoliata*
Felt

Reared from apparently the same gall. Felt '13m, p. 221

Itonid. *Brachyneura eupatorii* Felt



Fig. 212. Tar weed blister midge, *Asteromyia grindeliae* Felt. (Original)



Fig. 213. Tar weed blossom midge, *Rhopalomyia grindeliae* Felt. Infested head. (Original)



Fig. 214. Black gouty gall, *Asteromyia gutierreziae* Felt. (Original)

Eupatorium urticaefolium (white snakeroot)

Globose, flower bud galls, length 6 mm, probably predaceous. Pl. 11, fig. 1.
Felt '11k, p. 121

Itonid. *Lestodiplosis eupatorii* Felt
Subglobular stem gall, length 1.5 cm. Felt '07a, p. 154

Itonid. *Neolasioptera eupatorii* Felt
Green, fleshy, stem gall similar to the preceding. Felt '11k, p. 546

Itonid. *Asphondylia eupatorii* Felt
Oval, yellowish leaf mine, diameter 5 to 7 mm.

Itonid. *Cecidomyia* sp.

Mikania (climbing hempweed)

Fusiform, internodal stem gall, length 1 to 2.5 cm, diameter .5 to 1.25 cm.
Wells '14, p. 292

Dipt. ? Trypetid

Grindelia (gum-plant, tar-weed)

Oval, blister leaf gall, greenish or blackish, diameter 3 to 4 mm, on *G. robusta*, *G. cuneifolia*. Fig. 212. Felt '12e, p. 149; '16f, p. 180

Itonid. Tar-weed blister midge, *Asteromyia grindeliae* Felt

Reared from apparently unmodified flower heads. Fig. 213. Felt '16f, p. 186

Itonid. Tar-weed blossom midge, *Rhopalomyia grindeliae* Felt

Gutierrezia sarothrae

Oval, flower bud gall, length 7 mm. Felt '15i, p. 274

Itonid. Gutierrezia bud midge, *Rhopalomyia gutierreziae* Kkl.

Slight enlargement of the slender stems, composed of blackened tissue, length 6 to 8 mm, diameter 1 mm. Fig. 214. Felt '16f, p. 179

Itonid. Black gouty gall, *Asteromyia gutierreziae* Felt



Fig. 215. Downy flower gall, *Rhopalomyia anthophila* O. S. Cluster of galls. (Original)



Fig. 216. Nun midge, *Asphondylia monacha* O. S. Apical bud gall. (Original)



Fig. 217. Clarke's goldenrod gall, *Rhopalomyia clarkei* Felt. (Original)

Chrysopsis (golden aster)

Woolly, polythalamous bud gall, diameter 1.5 cm. Felt '15i, p. 278

Itonid. Golden aster bud midge, *Rhopalomyia chrysopsidis* Lw.

Solidago (goldenrod)

Flower galls

Greenish or reddish, subglobular, budlike galls, diameter 2 mm, on *S. canadensis*. Pl. 12, fig. 6. Felt '15i, p. 249

Itonid. Beaked flower gall, *Rhopalomyia racemicola* O. S.

Green, densely pubescent, cylindrical gall, length 6 mm, on *S. canadensis*. Fig. 215, pl. 12, fig. 5. Felt '15i, p. 251

Itonid. Downy flower gall, *Rhopalomyia anthophila* O. S.

Reared from undescribed flower gall. Felt '15i, p. 268

Itonid. *Rhopalomyia cruziana* Felt

- Florets apparently unaffected. Osten Sacken '69, p. 299; Felt, '16d, p. 127
 Itonid. Nun midge, *Asphondylia monacha* O. S.
 Florets apparently unaffected, gall undescribed. Felt '16d, p. 143
 Itonid. *Asphondylia johnsoni* Felt

Bud galls

Apical bud galls

Loose, convolute mass of developing leaves, diameter 6.5 mm. Felt '07a,
 p. 110

Itonid. *Asteromyia convoluta* Felt
 Loose, apical pod of narrow, adherent leaves, on *S. canadensis*. Felt
 '15e, p. 199

Itonid. *Dryomyia folliculi* Felt
 Two or more leaves with the edges adherent, length 2.5 to 5 cm, on *S.*
graminifolia. Felt '15e, p. 148

Itonid. *Dasyneura flavicornis* Felt
 Galls pyriform, composed of closely adherent leaves, length 1 mm, on *S.*
graminifolia and *S. canadensis*. Felt '08e, p. 327

Itonid. *Camptoneuromyia flavescens* Felt
 Probably a loose apical bud gall, on *S. graminifolia*. Felt '15e,
 p. 132

Itonid. *Dasyneura carbonaria* Felt
 Subglobose, white or brownish, apical galls on stems or subterranean root
 stalks, diameter 2.5 cm, on *S. juncea*. Pl. 12, fig. 9. Felt '15i, p. 242

Itonid. Rootstalk bud midge, *Rhopalomyia hirtipes* O. S.
 Apical, cylindric bud gall on subterranean root stalk, length 6 mm, diameter
 2.5 mm. Pl. 12, fig. 7. Felt '15i, p. 260

Itonid. *Rhopalomyia bulbula* Felt

Apical rosette galls

On *Solidago canadensis*

Deformed head, diameter about 11 cm, height 3 cm, and composed of
 numerous smaller heads. Felt '15i, p. 255

Itonid. *Rhopalomyia carolina* Felt
 Gall pyriform, composed of closely adherent leaves, length 1 mm. Felt
 '08e, p. 327

Itonid. ? *Camptoneuromyia flavescens* Felt
 Globular, the head with a diameter of 4 to 5 cm. Pl. 13, fig. 2. Felt
 '15i p. 246

Itonid. Goldenrod bunch gall, *Rhopalomyia solidaginis*
 Lw.

Large, rosette gall similar to the above. Felt '15j, p. 253

Itonid. *Rhopalomyia albipennis* Felt
 Reared from similar gall. Felt '08e, p. 409

Itonid. *Lestodiplosis carolinae* Felt
 Large, rosette gall, predaceous. Felt '08e, p. 409

Itonid. *Lestodiplosis solidaginis* Felt
 Large, terminal, rosette gall, probably inquiline. Felt '15i, p. 230

Itonid. *Oligotrophus inquilinus* Fel

On *Solidago canadensis* and *S. serotina*

Gall composed of numerous small cells and with a diameter of 2.5 cm.
Felt '15i, p. 245

Itonid. Goldenrod rosette midge, *Rhopalomyia capitata*
Felt

Reared from the same gall. Felt '15j, p. 248

Itonid. *Rhopalomyia inquisitor* Felt

On *Solidago graminifolia*

Moderately loose apical bud gall, diameter 1 to 1.5 cm, resembles that of *Oedaspis polita*. Fig. 216, pl. 5, fig. 5. Osten Sacken '69, p. 299; Felt '16d, p. 127

Itonid. Nun midge, *Asphondylia monacha* O. S.
Presumably reared from the same gall. Felt '08e, p. 327

Itonid. *Camptoneuromyia flavescens* Felt
Gall similar to the above, possibly inquiline. Felt '15j, p. 269

Itonid. *Rhopalomyia lanceolata* Felt

On *Solidago sempervirens*

Small, loose apical bud gall as described above. Osten Sacken '69, p. 299.
Felt '16d, p. 127

Itonid. Nun midge, *Asphondylia monacha* O. S.

On *Solidago altissima*

Small, rosette gall, length 12 to 18 mm, and containing a small larval cell.
Stebb. '10, p. 52

Dipt. Small rosette gall, *Oedaspis polita* Lw.
Oedaspis atra Lw.

Leaf galls

Galls attached to one or at most two leaves and producing a marked deformity

On *Solidago graminifolia*

Gall fusiform, sessile, ribbed, greenish, with red markings, length 6 mm.
Felt '15i, p. 254

Itonid. Goldenrod ribbed gall, *Rhopalomyia fusiformis*
Felt

Gall fusiform, stemmed, green, red-marked, length 13 to 14 mm. Felt
'15i, p. 262

Itonid. Goldenrod stemmed gall, *Rhopalomyia pedicellata*
Felt

On *Solidago puberula* or *S. juncea*

Gall oval, irregular, greenish, composed of clusters of root leaves, length 1
cm. Felt '15c, p. 178

Itonid. *Dasyneura radifolii* Felt

On *Solidago rugosa*

Gall fusiform, sessile, green, red-marked, length 1.6 mm. Fig. 217. Felt
'15i, p. 239

Itonid. Clarke's goldenrod gall, *Rhopalomyia clarkei*
Felt

On *Solidago canadensis* and *S. serotina*

Oval gall (Adherent capsule gall) between adherent leaves, diameter 2 mm.

Pl. 5, fig. 4. Osten Sacken '69, p. 299. Felt '16d, p. 127

Itonid. Nun midge, *Asphondylia monacha* O. S.

Reared from similar gall. Pl. 5, fig. 4. Felt '08e, p. 291

Itonid. *Camptoneuromyia adhesa* Felt

Possibly reared from the same gall. Felt '08e, p. 324

Itonid. *Lasioptera argentisquamae* Felt

Possibly reared from the same gall, probably predaceous. Felt '08e, p. 335

Itonid. *Trotteria solidaginis* Felt

Blisterlike galls occurring in the leaf tissues and producing at most a slight thickening and discoloration

Gall oval, black, length 4 to 5 mm, on *S. graminifolia*. Osten Sacken '62, p. 195

Itonid. Black blister gall, *Asteromyia carbonifera* Felt
Irregular, grayish brown, black-margined, diameter 3 mm, on *S. squarrosa*. Felt '08e, p. 329

Itonid. *Asteromyia squarrosae* Felt

Circular, marginal, golden-gray gall, diameter 3.5 mm, on *S. canadensis*. Felt '08e, p. 329

Itonid. *Asteromyia flavoanulata* Felt
Circular, variable pink or rosy gall, diameter 1 cm, on *S. rugosa*. Felt '07a, p. 152

Itonid. Rosy blister gall, *Asteromyia rosea* Felt
Oval blister gall, on *S. canadensis*, presumably reared from. Felt '08e, p. 328

Itonid. *Asteromyia socialis* Felt

Reared from blister gall on *Solidago* and also from *Aster*, the gall on the latter with a diameter of 3 to 4 mm. Felt '07a, p. 111

Itonid. *Asteromyia albomaculata* Felt
Oval, variegated gall, the older ones mostly black, the younger yellowish olive with a darker central nipple, diameter 3 to 6 mm, on *S. rugosa*. Felt '07a, p. 103

Itonid. *Asteromyia rubra* Felt
Apparently reared from a similar gall, probably predaceous. Felt '08e, p. 409

Itonid. *Lestodiplosis rugosa* Felt
Semioval, marginal, yellowish gall, length 1 cm, on *S. canadensis*. Felt '07a, p. 154

Itonid. Yellow blister gall, *Asteromyia flavolunata* Felt

Elongate, yellowish brown, blistered area, length 3 cm, on *S. canadensis*, probably predaceous. Felt '08e, p. 410

Itonid. *Lestodiplosis triangularis* Felt

Stem and root galls

On *Solidago graminifolia*

Fusiform, sessile, ribbed, greenish, red-marked gall, length 6 mm. Felt '15i, p. 254

Itonid. Goldenrod ribbed gall, *Rhopalomyia fusiformis* Felt

Fusiform, stemmed, red-marked, green gall, length 13 to 14 mm. Felt '15i, p. 262

Itonid. Goldenrod stemmed gall, *Rhopalomyia pedicellata* Felt

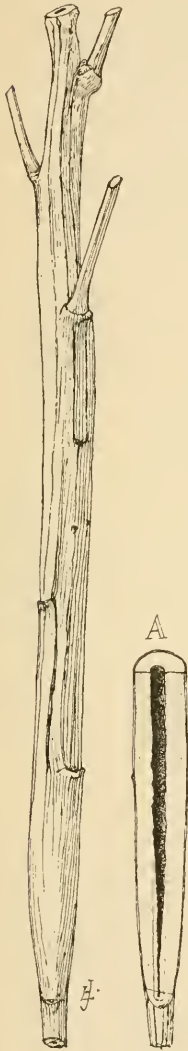


Fig. 218. Goldenrod stem midge, *Lasioptera cylindrigallae* Felt. (Author's illustration)

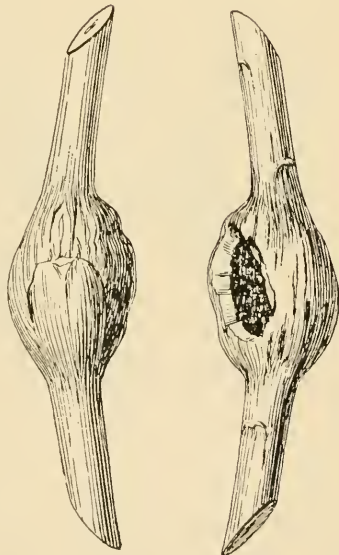


Fig. 219. Knotty goldenrod gall, *Lasioptera solidaginis* O. S. One gall broken open to show interior. (Original)

Subglobular, green gall near the tip, diameter 1.5 cm. Felt '15i, p. 264

Itonid. *Rhopalomyia lobata* Felt

A uniform enlargement of the stem, length 10 cm, diameter 7 mm.
Fig. 218. Felt '07a, p. 150

Itonid. Goldenrod stem midge, *Lasioptera cylindri-*
gallae Felt

On *Solidago*, various species

Irregular, globo-conical lateral stem gall, greenish, diameter 3 mm, on
Solidago occidentalis

Itonid. *Cecidomyia* sp. a2702

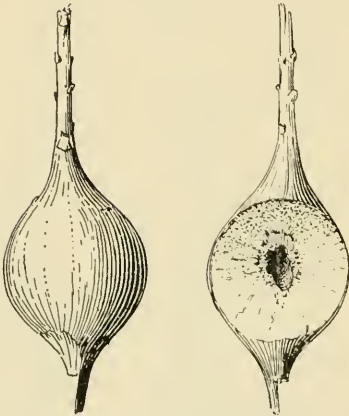


Fig. 220. Goldenrod ball gall, *Eurosta solidaginis* Fitch. One partly in section. (Original)



Fig. 221. Elliptical goldenrod gall, *Gnorimoschema gallaesolidaginis* Riley. One gall in section. (Original)

Irregular, subglobose or fusiform, eccentric enlargement, length 2.5 cm, on *S. rugosa*. Fig. 219. Osten Sacken '62, p. 368

Itonid. Knotty goldenrod gall, *Lasioptera solidaginis* O.S (*L. tumifica* Beutm.)

Globose or subglobose, smooth, brownish and apical on either aerial or subterranean stems, diameter 2.5 cm, on *S. juncea*. Pl. 12, fig. 9. Felt '15i, p. 242

Itonid. Root stalk bud midge, *Rhopalomyia hirtipes* O.S.

Cylindric, apical bud gall on subterranean root stalk, length 6 mm, diameter 2.5 mm. Pl. 12, fig. 7. Felt '15i, p. 260

Itonid. *Rhopalomyia bulbula* Felt

Globular stem gall, diameter 2.5 cm, the interior pithy, with an oval cell in the center. Fig. 220. Stebb. '10, p. 51

Dipt. Goldenrod ball gall, *Eurosta solidaginis* Fitch

Oval, stem gall, length 1 cm, diameter 4 to 5 mm. Pl. 4, fig. 8. Stebb. '10, p. 51

Lepid. Scarred goldenrod gall, *Eucosma scudderiana* Clem.

Oval, stem gall on *S. sempervirens*. Busck '11, p. 4

Lepid. *Gnorimoschema salinaris* Busck

Gall just above or close to the ground, on *S. rigida*. Busck '15, p. 82

Lepid. *Gnorimoschema gibsoniella* Busck

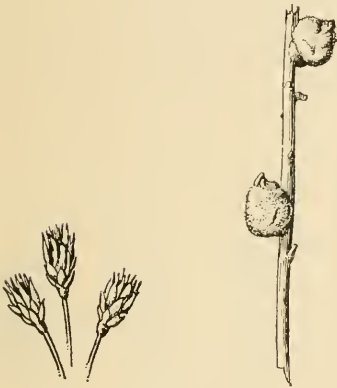


Fig. 222. *A. chrysothamni* Felt. Infested heads. (Original)

Fig. 223. *Eurosta bigeloviae* Ckll. (Original)

Fig. 224. *Rhopalomyia utahensis* Felt. Bud galls, one in section. (Original)

Fusiform, stem gall, length 3 mm, diameter 1.5 cm, usually near the ground, on *Solidago latifolia*, *S. caesia* and *Aster divaricatus*. Busck '11, p. 6

Lepid. *Gnorimoschema gallaeasteriella* Kellicott

Elongate, spindle-shaped, stem enlargement of *S. canadensis*. Fig. 221. Stebb. '10, p. 51

Lepid. Elliptical goldenrod gall, *Gnorimoschema gallae solidaginis* Riley

Ovoid, solitary or clustered, fleshy, bud galls on the root stalk, length 5 mm, diameter 3 mm. Pl. 13, fig. 4. Felt '15i, p. 257.

Itonid. *Rhopalomyia thompsoni* Felt¹

Cylindrical, hollow, budlike gall near the surface, length 2 cm, diameter .5 cm. Pl. 4, fig. 4. Stebb. '10, p. 52

Dipt. *Eurosta reticulata* Snow

¹ Possibly a synonym of *R. hirtipes*.

Fusiform, subterranean, bud gall, length 2 to 3 cm. Pl. 4, fig. 5.
Thomp. '15, p. 55

Dipt. *Eutreta sparsa* Wied.

Ovate potato-like root gall, monothalamous, length 20 to 25 mm, diameter 10 to 12 mm. Daecke '10, p. 341

On *S. rugosa* Dipt. *Eurosta comma* Wied.

On *S. juncea* Dipt. *Eurosta elsa* Daecke.

Bigelovia graveolens (rayless goldenrod)

Swollen or enlarged leaf buds composed of short, ovate, aborted, glumelike leaflets without a distinct central cell, length 5 to 6 mm, diameter 3 mm Fig. 222. Felt '16f, p. 178

Itonid. *Asphondylia chrysothamni* Felt
void, hypertrophied, monothalamous leaf buds, green or somewhat purplish externally with short, recurved, aborted leaflets covered with a thick, gray pubescence, length 10 to 11 mm, diameter 7 to 8 mm, two or three frequently confluent. Fig. 224. Felt '16f, p. 186

Itonid. *Rhopalomyia utahensis* Felt



Fig. 225. *Rhopalomyia bigelovioides* Felt. Infested stem. (Original)



Fig. 226. *Rhopalomyia glutinosa* Felt. Two infested twigs. (Original)

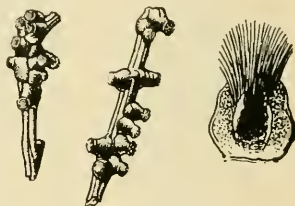


Fig. 227. *Rhopalomyia chrysothamni* Felt. Two infested twigs and one gall in section, enlarged. (Original)

Ovate, woolly, lateral bud gall, length 1 cm, diameter 7 mm. Fig. 223. Town. '93, p. 48

Dipt. *Eurosta bigeloviae* Ckll.

Dipt. *Oedaspis atra* Lw.

Oval, seed gall or an irregular, globose lateral bud swelling. Fig. 225. Felt '15i, p. 265

Itonid. *Rhopalomyia bigelovioides* Felt
A small, budlike gall. Felt '11j, p. 455

Itonid. *Cecidomyia brassicoides* Town.

Conelike, probably bud gall. Felt '11j, p. 455

Itonid. *Dasyneura strobiloides* Town.

Slightly swollen leaflet. Felt '16

Itonid. *Asteromyia chrysothamni* Felt
Globose or globe-shaped, polythalamous terminal twig enlargement, length 15 to 30 mm, diameter 12 to 20 mm. Fig. 235, 9. Beutm. '10a, p. 143

Cynipid. *Aylax chrysothamni* Beutm.

Hemispherical or subglobose, green, glabrous, cortical, stem swellings, becoming brown and resembling Lecaniums, diameter 3.5 mm, height 2 mm. Fig. 226.
Felt '16f, p. 188

Itonid. Lecanoid gall, *Rhopalomyia glutinosa* Felt
Conical stem gall, length 4 mm, diameter 3 mm. Fig. 227. Felt '16f, p. 187

Itonid. *Rhopalomyia chrysothamni* Felt
Hollow, stem gall. Felt '15i, p. 276

Itonid. *Rhopalomyia bigeloviae* Ckll.
Cylindrical, brown, indistinctly ridged stem gall. Height 2 mm. Diameter.
1.25 mm. Stands at right angles to stem.

Itonid. *Cecidomyia* sp.
Reared from an oval, subcortical cell, length 2.5 mm, diameter 1 mm, showing
practically no enlargement. Felt '16

Itonid. *Asteromyia* sp

Bigelovia plattensis (rayless goldenrod)

Globose, probably bud gall, diameter 5 to 6 mm.

Itonid. *Cecidomyia* sp.

Aster

Flower or bud galls

Aborted flower head of *Aster patens*. Osten Sacken '69, p. 299. Felt
'16d, p. 127

Itonid. Nun midge, *Asphondylia monacha* O. S.
Dwarfed or stunted flower heads of *Aster paniculatus*. Felt '15i,
p. 265

Itonid. *Rhopalomyia asteriflorae* Felt
Axillary bud gall, diameter 3-10 mm, on *Aster lateriflorus*. Pl. 13,
fig. 1. Felt 15i, p. 247

Itonid. *Rhopalomyia lateriflori* Felt
Ovate, axillary bud gall, length 2 to 4 mm, diameter 2 mm, on *A. undulatus*.
Pl. 13, fig. 3

Cecid. *Rhopalomyia* sp.

Blister leaf galls

Circular, yellowish white gall, diameter 2 to 3 mm, on *Aster macro-*
phyllus. Felt '09e, p. 287

Itonid. *Lasioptera clarkei* Felt
Narrowly oval, yellowish brown gall, length 4 mm, diameter 2 mm. Felt '09e,
p. 286

Itonid. *Asteromyia dumosae* Felt
Circular, brownish, yellow-ringed gall, diameter 3 mm. Felt '09e, p. 286

Itonid. *Asteromyia waldorfi* Felt
Oval, yellowish, shining gall, diameter 6 to 7 mm. Felt '09e, p. 286

Itonid. *Asteromyia nitida* Felt
Large, oval, pinkish blotches, diameter 10 to 12 mm, on *Aster divari-*
catus. Felt '08e, p. 330

Itonid. *Asteromyia divaricata* Felt
Irregularly oval, yellowish or brownish gall, diameter 6 mm, on *Aster*
paniculatus. Felt '07a, p. 109

Itonid. *Asteromyia paniculata* Felt

Oval, blackish gall, diameter 4 mm, on *A. undulata*. Felt '11k, p. 481
 A similar, possibly the same gall, occurs on *Ionactis linearifolius*.
 Pl. 5, fig. 7. Felt, '11j, p. 481

Itonid. *Asteromyia reducta* Felt

Oval, greenish yellow or papery white gall, diameter 1.75 cm, on *Aster laevis*.
 Felt '07a, p. 108

Itonid. Papery blister gall, *Asteromyia laeviana* Felt

Oval leaf gall, sooty yellow beneath, dirty white above, length 2 cm, diameter
 1.2 cm. Felt '08e, p. 329

Itonid. *Asteromyia flavomaculata* Felt

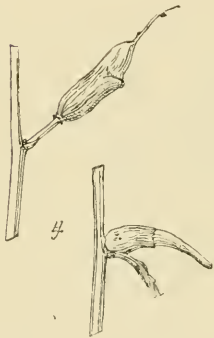


Fig. 228. Aster stem
 gall, *Neolasioptera*
ramuscula Beutm.
 (Author's illustration)



Fig. 229.
Neolasioptera
albitalarsis Felt.
 A series of galls.
 (Original)

Circular, yellowish white, dark margined gall, diameter 3 mm, on *Aster*
lateriflorus. Beutm. '07c, p. 395

Itonid. *Asteromyia asterifoliae* Beutm.

Oval, green swellings, length 2 mm, diameter 1.5 mm. Felt '09e, p. 286

Itonid. *Asteromyia vesiculosa* Felt

Circular, yellowish or brownish gall, diameter 3 to 4 mm, on *Aster cordi-*
folius. Can. Ent. 47:228

Itonid. *Asteromyia sylvestris* Felt

Stem or branch galls

Small, pustulate swellings on the stems, diameter 3 mm. Felt '08e, p. 328

Itonid. *Asteromyia pustulata* Felt

Oval twig gall, length 1.5 cm, on *Aster novae-angliae*. Felt '15i, p. 259

Itonid. *Rhopalomyia astericaulis* Felt
Fusiform stem or branch gall, length 1 cm, diameter .4 cm. Fig. 228. Beutm. '07c, p. 392

Itonid. Aster stem gall, *Neolasioptera ramuscula* Beutm.
Fusiform, greenish brown, irregular stem swelling at or near the base of the leaf, length 1 cm, diameter .6 cm, on *Aster infirmus*. Fig. 229. Felt '07a, p. 153

Itonid. *Neolasioptera albitarsis* Felt



Fig. 230.
Horseweed blister midge, *Asteromyia modesta* Felt. (Author's illustration)



Fig. 231.
Horseweed stem midge, *Neolasioptera erigerontis* Felt. (Original)



Fig. 232.
Rhopalomyia erigerontis Felt.
Typical gall. (Original)

Fusiform stem gall, length 2 cm, diameter 1 cm, on *Aster umbellatus*. Fyles '11, p. 135

Lepid. *Gnorimoschema gallaediplopappi* Fyles
Fusiform stem gall, length 3 cm, diameter 1.5 cm, usually near the ground, on *Aster divaricatus*, *Solidago latifolia* and *S. caesia*. Busck '11, p. 6

Lepid. *Gnorimoschema gallaeasteriella* Kell.
Spindle-shaped, stem or root galls, length 15 mm, diameter 6 to 8 mm, near or beneath the surface of the ground, on *Aster multiflorus*. Busck '11, p. 5

Lepid. *Gnorimoschema subterranea* Busck

Ovate, sessile, brownish, densely white-haired galls, length 7 mm, on *Aster crassulus*. Felt '15i, p. 237

Itonid. *Rhopalomyia crassulina* Ckll.

Acamptopappus sphaerocephalus

Gall-like swellings on tips of branches. Busck '03, p. 830

Lepid. *Gnorimoschema octomaculella* Chamb.

Erigeron canadensis (horseweed, butterweed)

Reared from a scarcely discolored, inconspicuous blister mine. Fig. 230. Felt '07a, p. 163

Itonid. Horseweed blister midge, *Asteromyia modesta* Felt

Fusiform stem gall, length 2 cm. Fig. 231. Felt '07a, p. 163

Itonid. Horseweed stem midge, *Neolasioptera erigerontis* Felt



Fig. 233. *Rhopalomyia ericameriae* Felt. Typical rosette galls. (Original)



Fig. 234. *Paradiplosis parthenicola* Ckll. (Original)

Erigeron fragilis

Oval apical bud gall, length 10 mm, diameter 7 mm. Fig. 232. Felt '16f, p. 189

Itonid. *Rhopalomyia erigerontis* Felt

Sericocarpus asteroides (white-topped aster)

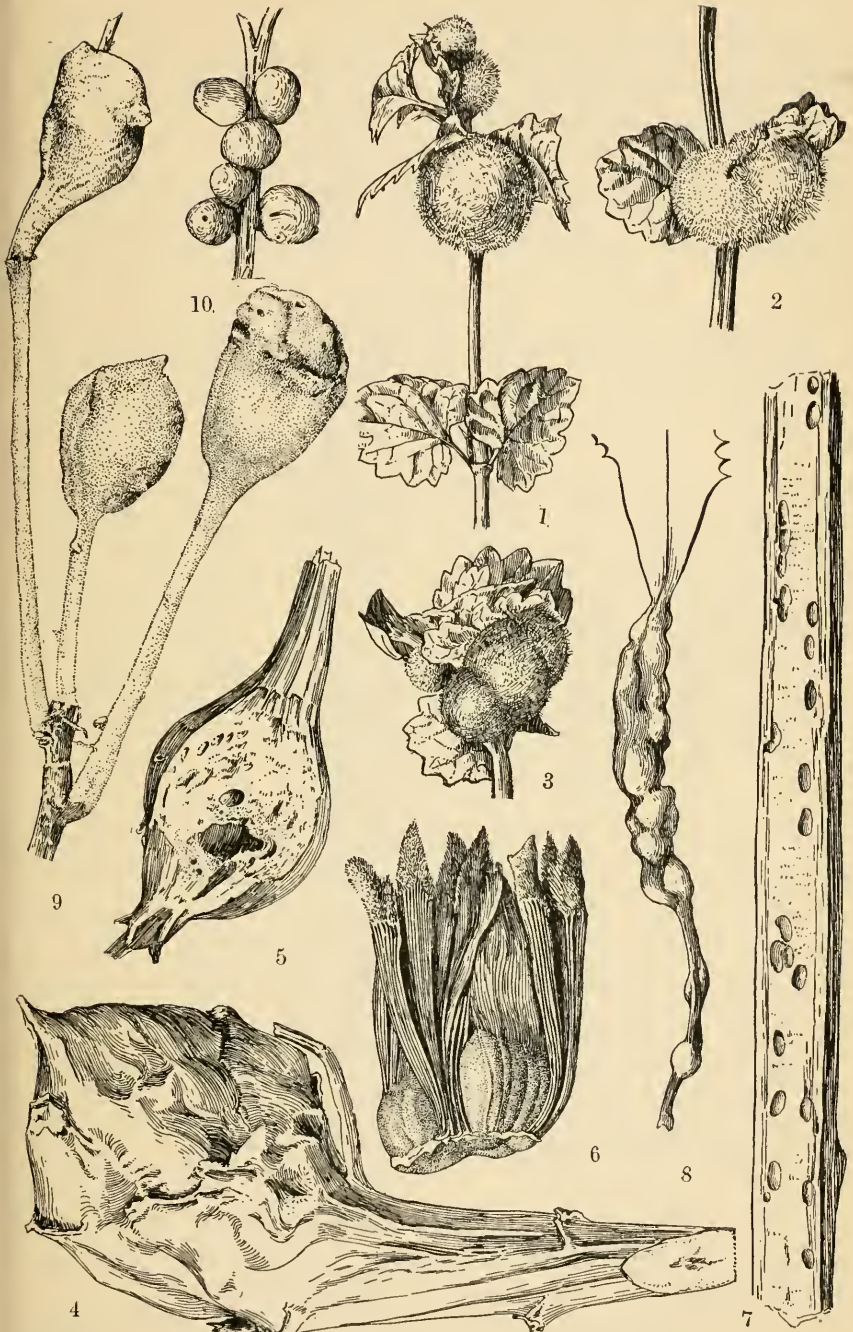
Apical, greenish bud gall. Felt '16d, p. 127

Itonid. ? Nun midge, *Asphondylia monacha* O. S. a2347

Baccharis pilularis (groundsel tree)

Flower bud or leaf gall, single or clustered, lobulate, greenish or reddish brown, diameter 5 mm to 1.5 cm. Felt '15i, p. 255

Itonid. *Rhopalomyia californica* Felt



E.L. Beutenmuller

Fig. 235. Aylax galls. 1-3. Cat mint gall, *A. glechomae* Linn. 4, 5. Gall of rosin weevil stem wasp, *A. leavenworthi* Bass. 6. Gall of rosin weevil flower wasp, *A. laciniatus* Gill. 7. Gall of *A. rufus* Gill. 8. Gall of dandelion gall wasp, *A. taraxaci* Ashm. 9. Gall of *A. chrysothamni* Beutm. 10. Gall of *A. pisum* Walsh. (After Beutm., *Am. Mus. Nat. Hist.*)

Lobulate bud gall. Felt '11j, p. 455

Itonid. *Rhopalomyia* sp.

Globose, fleshy, terminal, polythalamous twig gall, diameter 7 to 12 mm.

Felt '16

Itonid. *Cecidomyia* sp.

Stem gall. Felt '15i, p. 256

Itonid. *Rhopalomyia baccharis* Felt

Stem gall. Busck '03, p. 827

Lepid. *Gnorimoschema baccharisella* Busck

Ericameria

Small, rosette galls, the leaflets more or less recurved, really aborted branchlets and usually on the main stalk near the ground, length 12 mm, diameter 8 mm.

Fig. 233. Felt '16f, p. 190

Itonid. *Rhopalomyia ericameriae* Felt

Antennaria (everlasting, ladies' tobacco)

Corn-shaped bud gall, the leaflets recurved, length 8 to 12 mm. Felt '16d, p. 133

Itonid. Everlasting bud midge, *Asphondylia antennariae*

Whlr.

Elongate, oval bud galls, the leaflets scarcely recurved, length 3 to 5 mm. Felt '15i, p. 270

Itonid. *Rhopalomyia antennariae* Whlr.

Globose, white, woolly masses with white fibers 5 mm long radiating from hard, thin-shelled cells. Felt '15i, p. 266

Itonid. Woolly bud midge, *Rhopalomyia pilosa* Felt

Gnaphalium (cudweed)

Narrowly ovate, white, woolly bud gall

Itonid. Cudweed bud gall, *Asphondylia* sp. a2697

Silphium (rosinweed)

Ovate, frequently clustered, flower galls, length 4 to 5 mm. Fig. 235, 6. Beutm. '10a, p. 140

Cynipid. Rosinweed flower wasp, *Aylax laciniatus* Gill.

Irregular, apical, polythalamous, green, stem swellings, length 30 to 75 mm. Fig. 235, 4, 5. Beutm. '10a, p. 139

Cynipid. Rosinweed stem wasp, *Aylax leavenworthi* Bass.

Inhabiting oval cells in apparently normal stems. Fig. 235, 7. Beutm. '10a, p. 141

Cynipid. *Aylax rufus* Gill.

Aylax gillettei Kieff.

Parthenium

Woolly gall, diameter 5 mm. Fig. 234. Ckll. '00, p. 201

Itonid. *Paradiplosis parthenicola* Ckll.

Iva (related to *I. axillaris*)

Globular, pubescent, yellowish or greenish, pouch gall on the upper leaf surface, length 1.5 mm.

Acarid. *Eriophyes* sp. a2717

Ambrosia (ragweed)

Presumably from a stem gall, the latter possibly identical in appearance with that of a Lepidopteron. Beutm. '10b, p. 256

Cynipid. Ragweed stem wasp, *Aulacidea ambrosiae* Ashm.

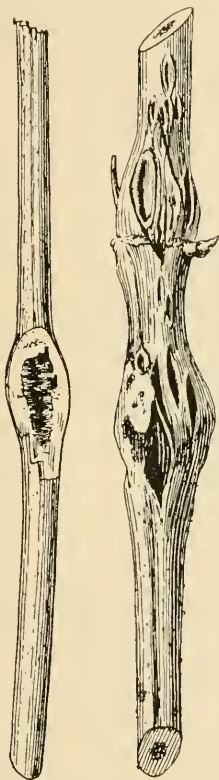


Fig. 236. Ragweed stem gall, *Neolasioptera ambrosiae* Felt. One gall in section. (Original)



Fig. 237. Sunflower stem midge, *Lasioptera weldi* Felt. One gall partly in section. (Original)

Reared from stems of giant ragweed. Fig. 236. Felt '09e, p. 288

Itonid. Ragweed stem midge, *Neolasioptera ambrosiae* Felt

Rudbeckia (cone-flower)

Deformed, enlarged florets, the affected ones leafy. Beutm. '07c, p. 388

Itonid. *Cecidomyia rudbeckiae* Beutm.

Irregular, subglobular, apical, bud gall, diameter 4 cm. Pl. 5, fig. 2. Osten Sacken '71, p. 51. Felt '16d, p. 146

Itonid. Cone-flower gall, *Asphondylia conspicua* O. S.

Nodular, stem gall. Felt '11j, p. 468

Itonid. *Cecidomyia* sp.

Undetected gall, possibly from an apparently unmodified stem. Felt '08e, p. 324

Itonid. Cone-flower stem midge, *Lasioptera rudbeckiae* Felt

Lepachys

Deformed flower bud. Cook '04a, p. 116

Itonid. *Cecidomyia* sp.

Helianthus (sunflower)

Sunflower seeds apparently normal. Felt '09e, p. 288

Itonid. Sunflower seed midge, *Lasioptera murtfeldtiana* Felt

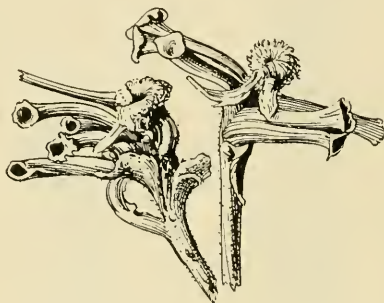


Fig. 238. Tubular bud gall, *Hormomyia helianthi* Brodie. (Original)

Subglobular leaf gall, diameter 6 to 7 mm. Pl. 10, fig. 5. Felt '14e, p. 286

Itonid. Sunflower bullet gall, *Hormomyia bulla* Felt

Globular or spherical, stem galls, diameter 1 to 4 cm. Pl. 5, fig. 3. Osten Sacken '69, p. 301. Felt '16d, p. 131

Itonid. Sunflower purse gall, *Asphondylia globulus* O. S.

Stem gall undescribed. Osten Sacken '71, p. 51. Felt '16d, p. 146

Itonid. *Asphondylia conspicua* O. S.

Stem gall, on *H. divaricatus*. Brodie '94, p. 73

Itonid. *Cecidomyia thurstoni* Brodie

Fusiform stem gall, length 3 cm, diameter .7 mm. Fig. 237. Felt '08e, p. 326

Itonid. Sunflower stem midge, *Lasioptera weldi* Felt

Stem gall undescribed. Felt '11k, p. 484

Itonid. *Neolasioptera trimera* Felt

Helianthus strumosus

Flower heads apparently unmodified. Felt '16, p. 120

Itonid. *Asphondylia helianthiflorae* Felt

Tubular, axillary bud gall, length 10 to 25 mm. Fig. 238. Felt '13d, p. 418

Itonid. Tubular bud gall, *Hormomyia helianthi* Brodie
Rearred from undetected gall. Felt '07e, p. 7

Itonid. *Neolasioptera helianthi* Felt

Actinomeris alternifolia

Globose bud gall. Beutm. '07c, p. 391

Itonid. *Cecidomyia ? verbesinae* Beutm.

Helenium (sneezeweed)

Apical rosette gall, length 2 to 3 cm. Beutm. '07c, p. 383. Felt '16d, p. 137

Itonid. *Asphondylia autumnalis* Beutm.

Small stems with the pith tunneled by orange-colored larvae

Itonid. *Cecidomyia* sp. a274



Fig. 239. *Rhopalomyia alticola* Ckll. (Author's illustration)



Fig. 240. *Diarthronomyia floccosa* Felt. (Original)



Fig. 241. *Diarthronomyia californica* Felt. Three galls. (Original)



Fig. 242. *Rhopalomyia betheliana* Ckll. Cluster of galls. (Original)

Achillea (yarrow)

Florets apparently normal. Felt '08e, p. 333

Itonid. Yarrow flower midge, *Clinorhyncha millefolii* Wachtl.

Irregularly oval, flower bud gall with a whitish pubescence, length 7 mm.

Itonid. ? *Rhopalomyia millefolii* H. Lw.

Anthemis (chamomile)

Larvae in flower heads. Felt '11j, p. 453

Itonid. *Cecidomyia* sp.

Chrysanthemum

Swollen stems, leaf stalks or deformed buds containing oval, frequently coalescent cells with a length about 2 mm. Pl. 10, fig. 4. Felt '16d, p. 51

Itonid. *Chrysanthemum* midge, *Diarthronomyia hypogaea*
H. Lw.

Artemisia californica

Irregular, lobulate, woolly masses apparently arising from lateral buds and frequently confluent; individual galls with a diameter of about 4 mm. Fig. 240. Felt '16f, p. 195

Itonid. *Diarthronomyia floccosa* Felt
Subconical, thin-walled, obliquely set, brownish or reddish leaf gall, length 1.5 mm, diameter .5 mm. Fig. 241. Felt '12j, p. 193

Itonid. *Diarthronomyia californica* Felt

Artemisia caudata

Oval, woolly, apical or lateral bud galls, diameter 1 to 1.5 cm, consisting of a series of oval cells with a length of about 2 mm and with numerous long fibers. Felt '15i, p. 272

Itonid. Woolly wormwood gall, *Rhopalomyia ?alticola*
Ckll.

Artemisia forwoodii (?*canadensis*)

Globular, woolly galls, diameter about 1 cm. Fig. 239. Felt '15i, p. 272

Itonid. Woolly wormwood gall, *Rhopalomyia alticola* Ckll.

Artemisia frigida

Fusiform, flower or leaf bud galls, length 4 mm, also on *A. filifera*. Fig. 242. Felt '15i, p. 238

Itonid. *Rhopalomyia betheliana* Ckll.

Artemisia gnaphalodes

Irregular, lobulate, polythalamous, white, pubescent gall, diameter 1 cm. Felt '11k, p. 484

Itonid. *Rhopalomyia gnaphalodis* Felt

Artemisia heterophylla

Ovate, thin-walled, oblique leaf galls, length 1 mm, also breeds in apparently normal flower buds. Fig. 244. Felt '16f, p. 194

Itonid. *Diarthronomyia occidentalis* Felt

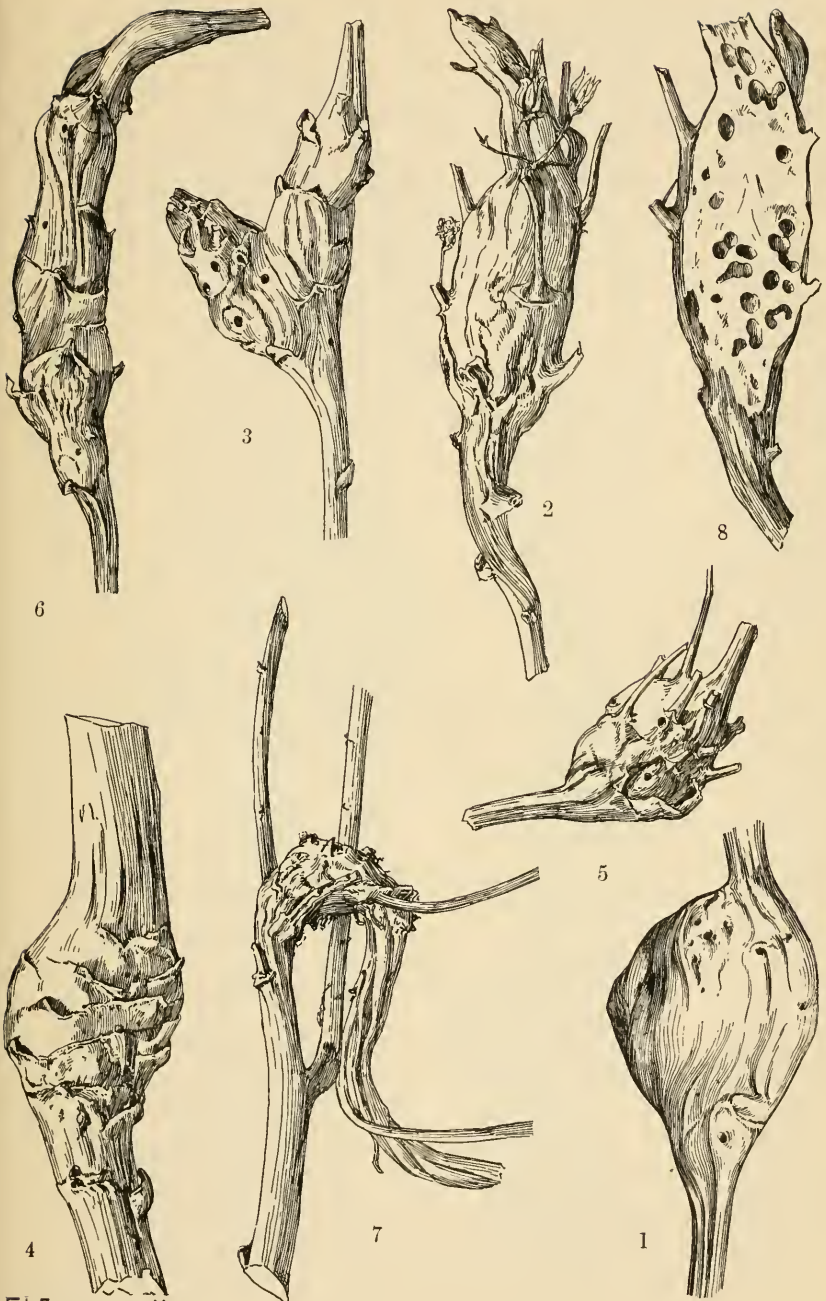
Artemisia species (wormwood)

Deformed flower heads, length 10 mm, diameter 5 to 6 mm. Felt '11j, p. 453

Itonid. Wormwood flower midge, *Rhopalomyia coloradella* Ckll.

Bud galls, presumably. Felt '16d, p. 133

Itonid. *Asphondylia artemisiae* Felt



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Fig. 243. Lettuce tumor gall, *Aulacidea tumida* Bass. 1-8 showing various types. (After Beutm., Am. Mus. Nat. Hist.)

A bud deformation of black, globose or densely-crowded filaments. Chadwick '08, p. 127

Acarid. *Eriophyes* sp.

Ovate masses of linear, modified leaves occurring on the branchlets of a species of *Artemisia*, length of mass 1.5 cm, diameter 5 to 7 cm.

Acarid. *Eriophyes* sp., a2733

Subconical, short-wooled, yellowish gray, axillary bud gall, length 2 cm, diameter 1 cm. (Collected by L. H. Weld)

Dipt. Trypetid a2774

Globose, axillary, woolly bud gall, diameter 7 to 10 mm, the hairs grayish white, short and thick. (Collected by L. H. Weld)

Dipt. Trypetid a2773

Artemisia tridentata (sage bush)

Oval, budlike, flower gall the size of a pea. Felt '15i, p. 271

Itonid. *Rhopalomyia tridentatae* Rubs.



Fig. 244. *Diarthronomyia occidentalis* Felt. Galls on *A. heterophylla*. (Original)



Fig. 245. *Diarthronomyia artemisiae* Felt. Several types of spongy gall, one in section. (Original)

Ovate, hard, thick-walled, yellowish brown bud gall, length 1.5 cm, diameter .8 cm. (Collected by L. H. Weld)

Dipt. Trypetid a2775

Flask-shaped leaf gall, length 4 mm, diameter 2 mm. Fig. 247. Felt '16f, p. 185

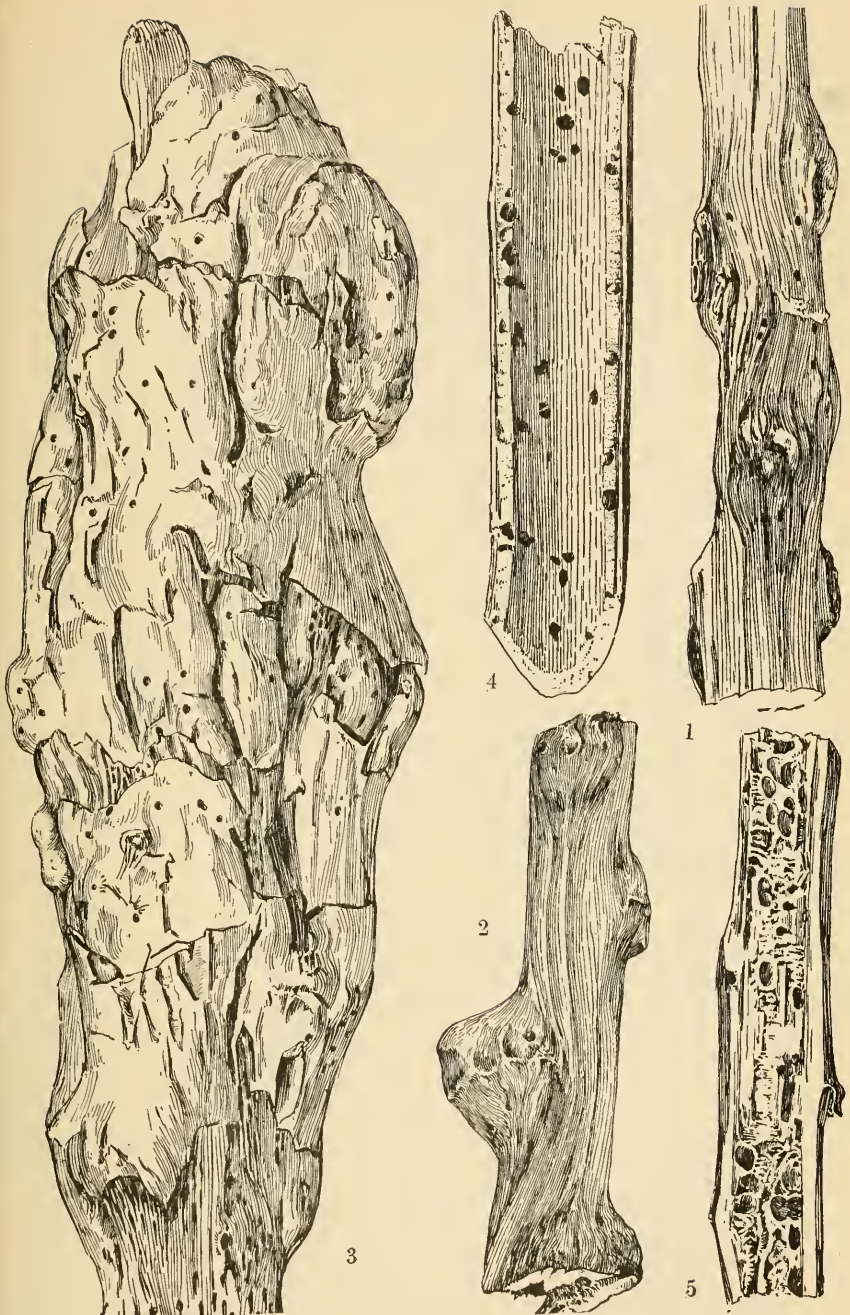
Itonid. Wormwood flask gall, *Rhopalomyia ampullaria* Felt

Oval, grayish or almost black, solitary or clustered gall on the under side of the leaves, length 1.5 cm. Fig. 248. Felt '16f, p. 194

Itonid. *Diarthronomyia occidentalis* Felt

Globose, variable, monothalamous or polythalamous leaf bud or rosette galls, or a bladdery gall arising from the leaf, pubescence variable, dimensions 3 to 15 mm. Fig. 245. Felt '16f, p. 193

Itonid. *Diarthronomyia artemisiae* Felt



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Fig. 246. Wild lettuce galls. 1-4. *Aulacidea podagrae* Bass. 5. *A. bicolor* Bass.
(After Beutm., Am. Mus. Nat. Hist.)

Subglobular, brown, spongy, apical gall, diameter 1.8 cm, possibly identical with the preceding. Felt '11j, p. 453

Itonid. *Cecidomyia* sp.

Senecio (groundsel, ragwort, squaw-weed)

Flower heads, presumably unmodified. Felt '15i, p. 237

Itonid. *Rhopalomyia cockerelli* Felt

Stem gall undescribed. Felt '11k, p. 482

Itonid. *Lasioptera arizonensis* Felt

Tetradymia spinosa (salt bush)

Fusiform, woolly, hollow stem enlargement, length 3 cm. diameter 1 cm.

Busck '03, p. 834

Lepid. *Gnorimoschema ? tetradymiella* Busck

Arctium (burdock)

Yellowish larvae in burs. Felt '11j, p. 453

Itonid. *Cecidomyia* sp.

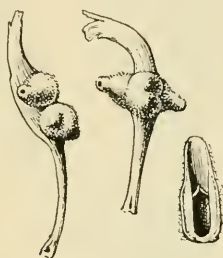


Fig. 247. Wormwood flask gall, *Rhopalomyia ampullaria* Felt. Two clusters of gall, one in section, the last enlarged. (Original)

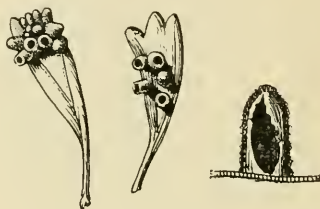


Fig. 248. *Diarthronomyia occidentalis* Felt. Gall on *A. tridentata*, one in section, much enlarged. (Original)

Taraxacum (dandelion)

Oblong, irregular, polythalamous, petiole or midrib swellings, length 25 to 50 mm. Fig. 235, 8. Beutm. '10a, p. 142

Cynipid. Dandelion gall wasp, *Aylax taraxaci* Ashm.

Lactuca (lettuce)

Irregular stem gall, diameter 1.75 cm. Felt '07a, p. 151

Itonid. Lettuce stem midge, *Lasioptera lactucae* Felt

Rounded, elongate, irregular, polythalamous, stem swelling, length 25 to 75 mm.

Fig. 243. Beutm. '10b, p. 253

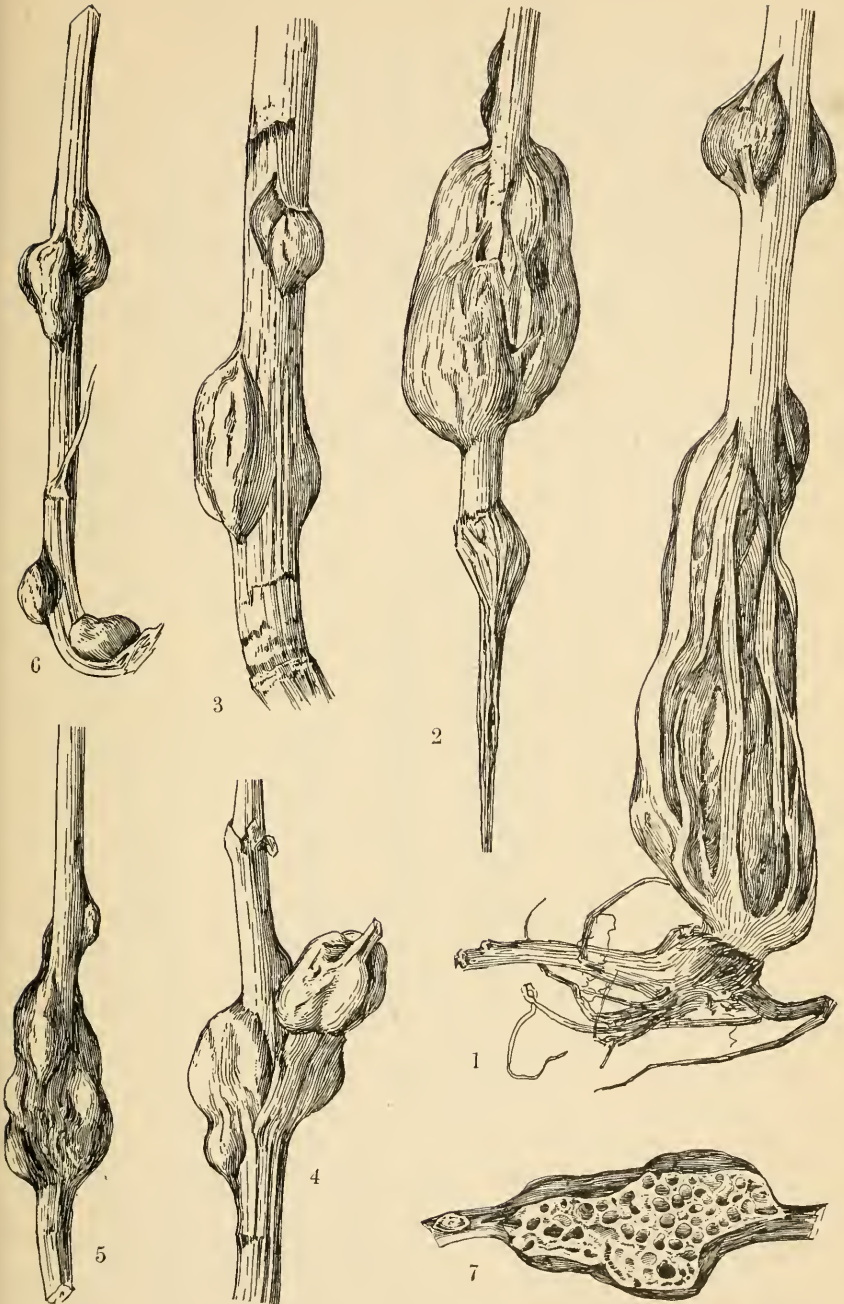
Cynipid. Lettuce tumor gall, *Aulacidea tumida* Bass.

Occurring in the pith, sometimes causing a stem swelling. Fig. 246, 1-4, pl. 3, fig. 6. Beutm. '10b, p. 254

Cynipid. *Aulacidea podagrae* Bass.

Occurring in thin-walled cells in the pith of the stem. Fig. 246, 5. Beutm. '10b, p. 255

Cynipid. *Aulacidea bicolor* Bass.



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Fig. 249. Rattlesnake root gall, *Aulacidea nabali* Brodie. 1-7 showing various types of the gall. (After Beutm., Am. Mus. Nat. Hist.)

Sonchus (sow thistle)

Reared from stems. Ashm. '97e, p. 134

Cynipid. *Lettuce tumor gall, Aulacidea tumida* Bass.

Encelia

Leaf bud gall, length 10 mm, diameter 4 mm. Felt '12e, p. 152

Itonid. *Asphondylia enceliae* Felt

Conical, thick-walled, lateral bud gall, length 6 mm, diameter 3 mm, frequently confluent basally, sometimes twisting the stem and producing a marked deformation. Felt '16f, p. 183

Itonid. *Rhopalomyia enceliae* Felt

Lygodesmia

Oval or pea-like, monothalamous stem galls, diameter 5 to 12 mm. Fig. 235, 10.

Beutm. '10a, p. 142

Cynipid. *Aylax pisum* Walsh

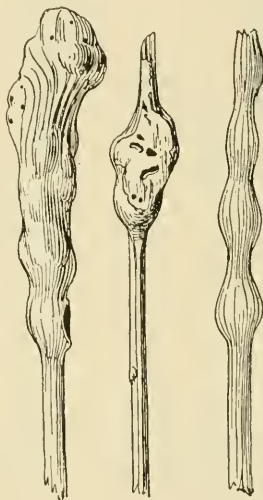


Fig. 250. *Lasioptera palustris* Felt. A group of galls, one sectioned. (Original)

Prenanthes (rattlesnake-root)

Flat, purplish leaf gall, length 2 to 3 mm. Felt '13d, p. 417

Itonid. *Cystiphora canadensis* Felt

Irregular, polythalamous, basal, stem swelling somewhat resembling small, knotty artichokes, diameter 5 to 10 mm. Fig. 249. Beutm. '10b, p. 256

Cynipid. *Aulacidea nabali* Brodie

American Insect Galls

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didae	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
<i>Polypodiaceae</i>								
<i>Cystopteris</i>								
<i>Cecidomyia</i>	I							
<i>Ephedraceae</i>								
<i>Ephedra</i>								
<i>Lasioptera</i>	2							
<i>Pinaceae</i>	38	2	I		3	I		2
<i>Pinus</i>								
<i>Cecidomyia</i>	5							
<i>Chermes</i>					I			
<i>Contarinia</i>	I							
<i>Dicrodiplosis</i>	I							
<i>Janetiella</i>	I							
<i>Monardia</i>	2							
<i>Mycodiplosis</i>	I							
<i>Podapion</i>			I					
<i>Retinodiplosis</i>	6							
<i>Thecodiplosis</i>	I							
<i>Winnertzia</i>	I							
<i>Picea</i>								
<i>Chermes</i>					3			
<i>Abies</i>								
<i>Cecidomyia</i>	I							
<i>Dasyneura</i>	I							
<i>Phytophaga</i>	I							
<i>Rhabdophaga</i>	I							
<i>Taxodium</i>								
<i>Itonida</i>	2							
<i>Thecodiplosis</i>	I							
<i>Retinodiplosis</i>	I							
<i>Chamaecyparis</i>								
<i>Cecidomyia</i>	I							
<i>Janetiella</i>	I							
<i>Thuja</i>								
<i>Eriophyes</i>								I
<i>Rhopalomyia</i>	I							
<i>Tsuga</i>								
<i>Camptomyia</i>	I							
<i>Juniperus</i>								
<i>Allomyia</i>	I							
<i>Arthrocnodax</i>	I							
<i>Cecidomyia</i>	2							
<i>Chalcid</i>						I		
<i>Cynipid</i>		2						
<i>Eriophyes</i>								I
<i>Oligotrophus</i>	I							
<i>Walshomyia</i>	I							
<i>Sabina</i>								
<i>Walshomyia</i>	I							
<i>Gramineae</i>	33				4	2I		2
<i>Triticum</i>								
<i>Cecidomyia</i>	2							
<i>Cephus</i>						2		
<i>Chlorops</i>				1				
<i>Isosoma</i>						3		
<i>Itonida</i>	I							
<i>Lestodiplosis</i>	I							
<i>Lestremia</i>	I							
<i>Oscinis</i>				1				
<i>Phytophaga</i>	I							
<i>Prodiplosis</i>	I							
<i>Thecodiplosis</i>	I							
<i>Eriocoma</i>								
<i>Isosoma</i>						I		
<i>Tripsacum</i>								
<i>Lasioptera</i>	I							
<i>Sorghum</i>								
<i>Contarinia</i>	I							

American Insect Galls — (continued)

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didae	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
Sorghastrum								
Contarinia.....	I							
Digitaria								
Chlorops.....				I				
Panicum								
Lasioptera.....	2							
Echinochloa								
Lasioptera.....	I							
Setaria								
Contarinia.....	I							
Aristida								
Siteroptes.....								I
Muhlenbergia								
Asteromyia.....	I							
Cecidomyia.....	I							
Chlorops.....				I				
Isosomorpha.....						I		
Lasioptera.....	I							
Phleum								
Cephus.....						I		
Alopecurus								
Itonida.....	I							
Sporobolus								
Siteroptes.....								I
Agrostis								
Dasyneura.....	I							
Isosoma.....						I		
Avena								
Coquillettomyia.....	I							
Mycodiplosis.....	I							
Prionellus.....	I							
Danthonia								
Lasioptera.....	I							
Tridens								
Contarinia.....	I							
Eurytomocharis.....						I		
Eragrostis								
Eurytomocharis.....						I		
Neolasioptera.....	I							
Distichlis								
Anthracophaga.....				I				
Asteromyia.....	I							
Siteroptes.....								I
Poa								
Colpodia.....	2							
Isosoma.....						2		
Bromus								
Cephus.....						I		
Isosoma.....						2		
Agropyron								
Cephus.....						I		
Isosoma.....						2		
Phytophaga.....	I							
Hordeum								
Isosoma.....						I		
Phytophaga.....	I							
Secale								
Isosoma.....						2		
Elymus								
Cephus.....						I		
Isosoma.....						2		
Phytophaga.....	I							
Rhabdophaga.....	I							
Cyperaceae.....	4							
Cyperus								
Hormomyia.....	I							
Dulichium.....								
Lestodiplosis.....	I							
Thecodiplosis.....	I							

American Insect Galls — (continued)

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didae	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
Scirpus								
Cecidomyia	I							
<i>Juncaceae</i>								
Juncus								
Cecidomyia	I							
Livia					I			
<i>Liliaceae</i>	II	I						
Oakesia								
Cecidomyia	I							
Yucca								
Dasyneura	I							
Lestodiplosis	I							
Smilacina								
Asphondylia	I							
Dasyneura	I							
Maianthemum								
Cecidomyia	I							
Dasyneura	I							
Polygonatum								
Cecidomyia	I							
Smilax								
Camptoneuromyia	I							
Cecidomyia	I							
Dasyneura	I							
Diastrophus		I						
<i>Dioscoreaceae</i>								
Dioscorea								
Cecidomyia	I							
<i>Iridaceae</i>								
Iris								
Agromyza					I			
<i>Orchidaceae</i>								
Cattleya								
Isosoma						I		
Parallelodiplosis	I							
<i>Salicaceae</i>	66		5	6		14	I	23
Salix								
Acarus								I
Agrilus			I					
Asphondylia	I							
Asynapta	I							
Cecidomyia	2							
Clinorhyncha	I							
Cryptorhynchus			I					
Dasyneura	8							
Eriophyes								13
Euura						9		
Hormomyia	I							
Lestodiplosis	2							
Oligotrophus	I							
Pontania						5		
Phytophaga	9							
Rhabdophaga	23							
Rhopalomyia	I							
Sackenomyia	2							
Saperda			I					
Populus								
Agromyza					I			
Cecidomyia	7							
Cryptorhynchus			I					
Dicrodiplosis	I							
Ectoedemia								I
Eriophyes	I							9
Kronomyia	I							
Lestodiplosis	2							
Pemphigus						6		
Mycodiplosis	I							
Rhabdophaga	I							
Rhizomyia	I							
Saperda			I					

American Insect Galls — (continued)

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didae	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
<i>Myricaceae</i>								
Myrica								
Cecidomyia	I							
Eriophyes								I
Janetiella	I							
<i>Juglandaceae</i>	29				29			7
Juglans								
Cecidomyia	I							
Eriophyes								4
Carya								
Caryomyia	20							
Cecidomyia	4							
Eriophyes								3
Miastor	I							
Mycodiplosis	I							
Parallelodiplosis	I							
Phylloxera					29			
Rhabdophaga	I							
<i>Betulaceae</i>	11		3		2			18
Corylus								
Agrilus			I					
Cecidomyia	I							
Eriophyes								I
Lasipteryx	I							
Mycodiplosis	I							
Ostrya								
Cecidomyia	I							
Eriophyes								I
Carpinus								
Cecidomyia	I							
Betula								
Agrilus			I					
Eriophyes								10
Hamamelistes					I			
Hormaphis					I			
Itonida	I							
Lestodiplosis	I							
Miastor	I							
Mycodiplosis	I							
Oligotrophus	I							
Alnus								
Eriophyes								6
Dasyneura	I							
Saperda			I					
<i>Fagaceae</i>	43	359						17
Fagus								
Eriophyes								4
Castanea								
Cecidomyia	2							
Ectoedemia								I
Eriophyes								I
Itonida	I							
Janetiella	I							
Miastor	I							
Rhopalomyia	I							
Winnertzia	I							
Castanopsis								
Andricus		I						
Quercus								
Amphibolips		26						
Andricus		114						
Bassetia		I						
Biorhiza		5						
Blenocnema		I						
Callirhytis		41						
Cecidomyia	11							
Cincticornia	12							
Compsodryoxenus		2						
Cynips		36						
Dasyneura	2							

American Insect Galls — (continued)

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didae	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
Dicrodiplosis	I							
Disholcaspis		27						
Dolichostrophus		I						
Dryocosmus		I						
Dryophanta		4I						
Eriophyes								12
Eumayria		I						
Itonida	2							
Lasioptera	2							
Loxaulus		3						
Leptosyna	I							
Miastor	I							
Neuroterus		47						
Odontocynipis		I						
Parallelodiplosis	2							
Philonix		13						
Thecodiplosis	I							
Trichoterus		I						
Trigonaspis		2						
Xystoterus	I	I						
Youngomyia	I							
Zopheroterus		I						
<i>Urticaceae</i>	18				14			5
Ulmus								
Colopha					I			
Dasyneura	I							
Eriophyes								4
Oligarces	I							
Pemphigus					I			
Phytophaga	2							
Tetraneura					I			
Schizoneura					2			
Celtis								
Cecidomyia	7							
Eriophyes								I
Pachyphylla					9			
Phytophaga	2							
Humulus								
Lasioptera	I							
Urtica								
Cecidomyia	2							
Laportea								
Cecidomyia	2							
Boehmeria								
Cecidomyia	I							
<i>Aristolochiaceae</i>								
Aristolochia								
Cecidomyia	I							
Eriophyes								I
<i>Polygonaceae</i>	5							
Eriogonum								
Cecidomyia	I							
Rumex								
Contarinia	I							
Lestodiplosis	I							
Coccolobis								
Ctenodactylomyia	I							
<i>Chenopodiaceae</i>	7				2			
Eurotia								
Cecidomyia	I							
Atriplex								
Asphondylia	2							
Cecidomyia	I							
Coccid					2			
Lasioptera	I							
Sarcobatus								
Aplonyx	I							
Onodiplosis	I							
Protaplonyx	I							
Trypetid					I			
Suaeda								
Asphondylia	I							

American Insect Galls — (continued)

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didae	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
<i>Phytolaccaceae</i>								
Rivina								
Schizomyia.....	I							
<i>Nyctaginaceae</i>								
Oxybaphus								
Lasioptera.....	I							
<i>Pisonia</i>								
Feltomyia.....	3							
<i>Ranunculaceae</i>								
Thalictrum				I				2
Asphondylia.....	I							
Trotteria.....	I							
<i>Anemone</i>								
Dasyneura.....	I							
Eriophyes.....								I
<i>Clematis</i>								
Agromyza.....				I				
Contarinia.....	I							
Dasyneura.....	I							
Eriophyes.....								I
Lestodiplosis.....	I							
Neolasioptera.....	I							
Prodiplosis.....	I							
<i>Paeonia</i>								
Joannisia.....	I							
<i>Magnoliaceae</i>								
Liriodendron								
Cecidomyia.....	2							
Thecodiplosis.....	I							
<i>Lauraceae</i>								
Sassafras								
Dasyneura.....	I							
Benzoin								
Cecidomyia.....	I							
Lasioptera.....	I							
<i>Papaveraceae</i>								
Papaver								
Clinodiplosis.....	I							
<i>Cruciferae</i>								
Lepidium								
Dasyneura.....	I							
Sisymbrium								
Dasyneura.....	I							
Stanleya								
Dasyneura.....	I							
<i>Capparidaceae</i>								
Cleome								
Cecidomyia.....	I							
<i>Crassulaceae</i>								
Clementsia.....								I
<i>Saxifragaceae</i>								
Hydrangea								
Asphondylia.....	I							
Ribes								
Cecidomyia.....	I							
Dasyneura.....	I							
Eriophyes.....								I
Phytophaga.....	I							
Rhopalomyia.....	I							
<i>Hamamelidaceae</i>								
Hamamelis.....								
Asteromyia.....	I							
Cecidomyia.....	3							
Hormaphis.....					I			
Liquidambar								
Eriophyes.....								I
<i>Platanaceae</i>								
Platanus								
Lestodiplosis.....	I							

American Insect Galls — (continued)

PLANT FAMILIES AND GENERA, INSECT GENERA	Itonididae	Cynipidae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
<i>Rosaceae</i>	56	38	5			4		27
<i>Exochorda</i>								
<i>Eriophyes</i>								1
<i>Spiraea</i>								
<i>Asphondylia</i>	1							
<i>Cecidomyia</i>	3							
<i>Contarinia</i>	1							
<i>Eriophyes</i>								1
<i>Hormomyia</i>	1							
<i>Itonida</i>	2							
<i>Lasioptera</i>	1							
<i>Lestodiplosis</i>	1							
<i>Paralodiplosis</i>	2							
<i>Prodiplosis</i>	1							
<i>Rhabdophaga</i>	1							
<i>Pyrus</i>								
<i>Agrilus</i>			1					
<i>Contarinia</i>	1							
<i>Eriophyes</i>								3
<i>Syntomaspis</i>						1		
<i>Cercocarpus</i>								
<i>Dasyneura</i>	1							
<i>Aronia</i>								
<i>Eriophyes</i>								1
<i>Amelanchier</i>								
<i>Cecidomyia</i>	2							
<i>Eriophyes</i>								2
<i>Hormomyia</i>	1							
<i>Itonida</i>	1							
<i>Sorbus</i>								
<i>Eriophyes</i>						1		2
<i>Megastigmus</i>						1		
<i>Syntomaspis</i>								
<i>Crataegus</i>								
<i>Agrilus</i>			1					
<i>Cecidomyia</i>	3							
<i>Eriophyes</i>								4
<i>Hormomyia</i>	1							
<i>Dicrodiplosis</i>	1							
<i>Lasioptera</i>	1							
<i>Lestodiplosis</i>	2							
<i>Lobopteromyia</i>	1							
<i>Rhizomyia</i>	2							
<i>Saperda</i>			1					
<i>Winnertzia</i>	1							
<i>Cotoneaster</i>								
<i>Eriophyes</i>								1
<i>Fragaria</i>								
<i>Cecidomyia</i>	1							
<i>Diastrophus</i>		1						
<i>Potentilla</i>								
<i>Cecidomyia</i>	1							
<i>Diastrophus</i>		2						
<i>Eriophyes</i>								1
<i>Gonaspis</i>		1						
<i>Rubus</i>								
<i>Agrilus</i>			1					
<i>Camptoneuromyia</i>	1							
<i>Cecidomyia</i>	1							
<i>Dasyneura</i>	1							
<i>Diastrophus</i>		6						
<i>Lasioptera</i>	2							
<i>Oberea</i>			1					
<i>Rhodites</i>		2						
<i>Agrimonia</i>								
<i>Contarinia</i>	1							
<i>Rosa</i>								
<i>Aphidoletes</i>	1							
<i>Dasyneura</i>	2							
<i>Rhabdophaga</i>	1							

American Insect Galls — (continued)

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didae	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
Rhodites.....		28						
Megastigmus.....						I		
Amygdalus								
Phyllocoptes.....								I
Prunus								
Arthrocnodax.....	I							
Cecidomyia.....	5							
Contarinia.....	1							
Dasyneura.....	1							
Eriophyes.....								10
Itonida.....	I							
Lestodiplosis.....	2							
Mycodiplosis.....	I							
Paralldiplosis.....	I							
Rhizomyia.....	I							
Adenostoma								
Asphondylia.....	I							
Leguminosae.....	24						I	
Prosopis								
Asphondylia.....	I							
Cecidomyia.....	1							
Gleditsia								
Dasyneura.....	I							
Neolasioptera.....	I							
Cassia								
Lasioptera.....	I							
Thermopsis								
Cecidomyia.....	I							
Crotalaria								
Cecidomyia.....	1							
Genista								
Dasyneura.....	I							
Lupinus								
Cecidomyia.....	1							
Dasyneura.....	2							
Lasioptera.....	I							
Trifolium								
Dasyneura.....	2							
Medicago								
Asphondylia.....	I							
Robinia								
Ecdytolopha.....								I
Dasyneura.....	I							
Obolodiplosis.....	I							
Desmodium								
Cecidomyia.....	2							
Lasioptera.....	1							
Neolasioptera.....	1							
Lespedeza								
Cecidomyia.....	I							
Lathyrus								
Dasyneura.....	1							
Amphicarpa								
Lasioptera.....	I							
Geraniaceae								
Geranium								
Cecidomyia.....	1							
Eriophyes.....								I
Zygophyllaceae								
Covillea								
Asphondylia.....	2							
Rutaceae								
Citrus								
Eriophyes.....								I
Phyllocoptes.....								2
Euphorbiaceae.....	5							I
Manihot								
Itonida.....	I							
Lasiopteryx.....	I							

American Insect Galls — (continued)

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didae	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
Nyssa								
Cecidomyia	2							
Eriophyes								
<i>Ericaceae</i>								
Rhododendron								
Asphondylia	1							
Gaylussacia								
Cecidomyia	1							
Vaccinium								
Dasyneura	3							
Eriophyes								1
Lasioptera	1							
Solenzopheria		1						
<i>Primulaceae</i>								
Lysimachia								
Dasyneura	1							
Lestremia	1							
<i>Sapotaceae</i>								
Bumelia								
Asphondylia	1							
<i>Ebenaceae</i>								
Diospyros								
Eriophyes								1
<i>Oleaceae</i>	10				1			5
Fraxinus								
Cecidomyia	1							
Contarinia	1							
Colpodia	1							
Dasyneura	3							
Eriophyes								5
Lasioptera	1							
Lestodiplosis	1							
Phytophaga	1							
Psyllopsis					1			
Rhizomyia	1							
<i>Apocynaceae</i>								
Apocynum								
Itonida	1							
Lestodiplosis	1							
<i>Asclepiadaceae</i>								
Asclepias								
Cecidomyia	2							
Lestodiplosis	1							
Neolasioptera	1							
<i>Convolvulaceae</i>								
Ipomoea								
Camptoneuromyia	1							
Schizomyia	1							
Convolvulus								
Lasioptera	1							
<i>Boraginaceae</i>								
Amsinckia								
Schizomyia	1							
<i>Verbenaceae</i>	7							1
Verbena								
Cecidomyia	2							
Lasioptera	1							
Lestodiplosis	1							
Eriophyes								1
Clerodendron								
Asphondylia	1							
Stachytarpha								
Hyperdiplosis	1							
<i>Labiatae</i>	14	1						1
Audibertia								
Rhopalomyia	1							
Trichostema								
Stagmatophora								1
Scutellaria								
Cecidomyia	1							

American Insect Galls — (continued)

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didae	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
<i>Cucurbitaceae</i>								
<i>Cucumeris</i>								
Aphidoletes.....	I							
Contarinia.....	I							
<i>Compositae</i>	151	12		8			8	3
<i>Vernonia</i>								
Asphondylia.....	I							
Lasioptera.....	I							
Youngomyia.....	I							
<i>Eupatorium</i>								
Asphondylia.....	I							
Cecidomyia.....	I							
Brachyneura.....	I							
Clinorhyncha.....	I							
Contarinia.....	I							
Dasyneura.....	I							
Lestodiplosis.....	I							
Neolasioptera.....	2							
<i>Mikania</i>								
Trypetid.....				I				
<i>Grindelia</i>								
Asteromyia.....	I							
Rhopalomyia.....	I							
<i>Gutierrezia</i>								
Asteromyia.....	I							
Rhopalomyia.....	I							
<i>Chrysopsis</i>								
Rhopalomyia.....	I							
<i>Solidago</i>								
Asphondylia.....	2							
Asteromyia.....	9							
Camptoneuromyia.....	3							
Cecidomyia.....	I							
Dasyneura.....	3							
Dryomyia.....	I							
Eucosma.....								I
Eurosta.....				2				
Eutreta.....				I				
Gnorimoschema.....								4
Lasioptera.....	3							
Lestodiplosis.....	4							
Oedaspis.....				I				
Oligotrophus.....	I							
Rhopalomyia.....	16							
Trotteria.....	I							
<i>Bigelovia</i>								
Asphondylia.....	I							
Asteromyia.....	2							
Aylax.....		I						
Cecidomyia.....	3							
Dasyneura.....	I							
Eurosta.....				I				
Rhopalomyia.....	5							
<i>Aster</i>								
Asphondylia.....	I							
Asteromyia.....	13							
Gnorimoschema.....								3
Lasioptera.....	2							
Neolasioptera.....	I							
Rhopalomyia.....	5							
<i>Acamptopappus</i>								
Gnorimoschema.....								I
<i>Erigeron</i>								
Asteromyia.....	I							
Neolasioptera.....	I							
Rhopalomyia.....	I							
<i>Sericocarpus</i>								
Asphondylia.....	I							
<i>Baccharis</i>								
Cecidomyia.....	I							

American Insect Galls — (concluded)

PLANT FAMILIES AND GEN- ERA, INSECT GENERA	Itoni- didac	Cynip- idae	OTHER GALL INSECTS					
			Col.	Dipt.	Hem.	Hym.	Lep.	Acarid
Groenlandia							1	
Rhopalomyia	3							
Ericameria								
Rhopalomyia	1							
Antennaria								
Asphondylia	1							
Rhopalomyia	2							
Gnaphalium								
Asphondylia	1							
Silphium								
Aylax		4						
Parthenium								
Paradiplosis	1							
Iva								1
Eriophyes								
Ambrosia								
Aulacidea		1						
Neolasioptera	1							
Rudbeckia								
Asphondylia	1							
Cecidomyia	2							
Lasioptera	1							
Lepachys								
Cecidomyia	1							
Helianthus								
Asphondylia	3							
Cecidomyia	1							
Hormomyia	2							
Lasioptera	2							
Neolasioptera	2							
Actinomeris								
Cecidomyia	1							
Helenium								
Asphondylia	1							
Cecidomyia	1							
Achillea								
Clinorhyncha	1							
Rhopalomyia	1							
Anthemis								
Cecidomyia	1							
Chrysanthemum								
Diarthronomyia	1							
Artemisia								
Asphondylia	1							
Cecidomyia	1							
Diarthronomyia	4							
Eriophyes								2
Rhopalomyia	7							
Trypetid				3				
Senecio								
Lasioptera	1							
Rhopalomyia	1							
Arctium								
Cecidomyia	1							
Taraxacum								
Aylax		1						
Lactuca								
Aulacidea		3						
Lasioptera	1							
Sonchus								
Aulacidea		1						
Encelia								
Asphondylia	1							
Rhopalomyia	1							
Lygodesmia								
Aylax		1						
Prenanthes								
Aulacidea		1						
Cystiphora	1							
Total species	682	445	12	18	61	44	17	162

Synopsis of American Gall Makers — (continued)

DIPTERA	HYMENOPTERA	COLEOPTERA	LEPIDOPTERA	HEMIPTERA	ERIOPHYIDAE
Lestodiplosis.....	31				
Lestremia.....	1				
Lobopteromyia.....	1				
Miastor.....	1				
Monardia.....	2				
Monarthropalpus.....	1				
Mycodiplosis.....	7				
Neolasioptera.....	21				
Obolodiplosis.....	1				
Oligarces.....	1				
Oligotrophus.....	4				
Onodiplosis.....	1				
Paradiplosis.....	1				
Paralloeodiplosis.....	8				
Phytophaga.....	16				
Porricondyla.....	2				
Prionellus.....	1				
Prodiplosis.....	2				
Protaplonyx.....	1				
Retinodiplosis.....	7				
Rhabdophaga.....	30				
Rhizomyia.....	4				
Rhopalomyia.....	50				
Sackenomyia.....	3				
Schizomyia.....	7				
Thecodiplosis.....	7				
Thomasia.....	1				
Trotteria.....	2				
Walshomyia.....	2				
Winnertzia.....	4				
Youngomyia.....	3				
	682				
<i>Trypetidae</i>					
Eurosta.....	3				
Eutreta.....	1				
Oedaspis.....	1				
Trypetid.....	5				
	10				

<i>Oscinidae</i>					
Anthracophaga	1				
Chlorops	3				
Oscinis	1				
	<hr/>				
	5				
<i>Agromyzidae</i>					
Agromyza	4				

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- 1918b ——— Notes and descriptions of Itonididae in the collections of the American Museum of Natural History. Amer. Mus. Nat. Hist. V. 38, Art. 6, p. 179-82
- 1918c ——— Gall insects and their relation to plants. Sci. Mon. 6:509-525
- 1918d ——— New Gall Midges. Econ. Ent. Jour. 11:380-84
- 1918 **Malloch, J. R.** *Anthracophaga distichliae* sp. n. Econ. Ent. Jour. 11:361-62

Explanation of Plates

Plate 1

Cynipid Galls

- 1 Gall on oak, of *Andricus cicatriculus* Bass. (After Thompson)
- 2 Gall on oak, of *Andricus flocci* Walsh. (After Thompson)
- 3 Leafy oak gall, *Andricus foliatus* Ashm. (After Weld)
- 4 Oak wool gall, *Andricus lana* Fitch. (After Thompson)
- 5 Gall on oak, of *Andricus ostensackeni* Bass. (After Thompson)
- 6 Gall on oak, of *Andricus piperoides* Bass. (After Thompson)
- 7 Gall on oak, of *Andricus perditor* Bass. (After Thompson)
- 8 Galls on oak, of *Andricus ventricosus* Bass. Single gall and a typical cluster. (After Stebbins)
- 9 Horned oak gall, *Andricus cornigerus* O. S. on pin oak, *Q. palustris*

Plate I

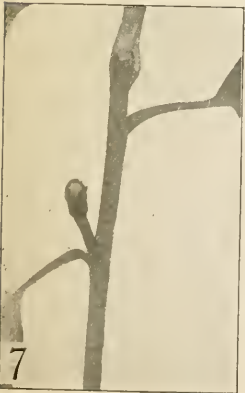
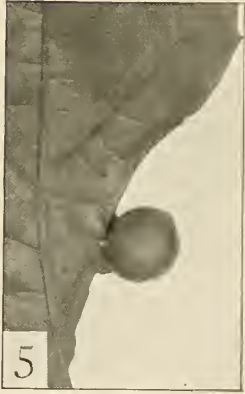
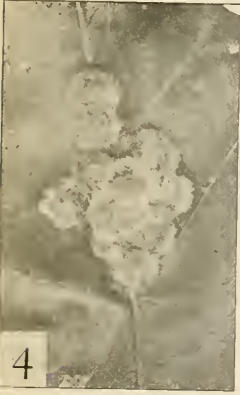


Plate 2

245

Cynipid Galls

- 1 Gall on oak, of *Andricus rileyi* Ashm. (After Thompson)
- 2 White oak club gall, *Andricus clavula* O. S. (After Thompson)
- 3 Oak wart gall, *Andricus futilis* Bass. (After Thompson)
- 4 Gall on oak, of *Andricus operator* O. S. Spring form. (After Thompson)
- 5 Gall on oak, of *Andricus operator* O. S. Fall form. (After Thompson)
- 6 Oak nipple gall, *Andricus papillatus* O. S. (After Thompson)
- 7 Oak flower gall, *Callirhytis pulchra* Bass. (After Thompson)
- 8 Gall on oak, of *Andricus scitula* Bass. (After Thompson)
- 9 Scrub oak club gall, *Callirhytis similis* Bass. (After Thompson)

Plate 2

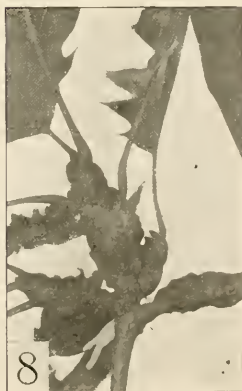
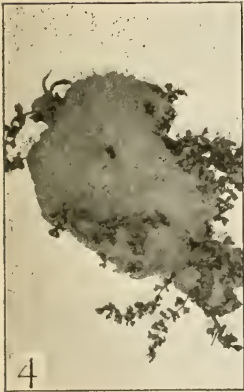


Plate 3

247

Insect Galls

- 1 Oak leaf seed gall, *Cynips decidua* Bass. (After Thompson)
- 2 Gall on oak, *Andricus formosa* Bass. (After Weld)
- 3 Oak rosette gall, *Cynips frondosa* Bass. (After Thompson)
- 4 Gall on oak, of *Cynips glandulosus* Riley. (After Thompson)
- 5 Lobed oak gall, *Cynips strobilana* O. S.
- 6 Gall on oak, of *Aulacidea podagrae* Bass. (After Thompson)
- 7 Willow egg gall, *Euura ovum* Walsh. (After Thompson)
- 8 Gall on oak, of *Pontania desmodioides* Walsh. (After Thompson)
- 9 Willow apple gall, *Pontania pomum* Walsh. (After Thompson)

Plate 3

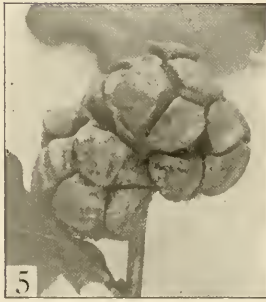


Plate 4

249

Insect Galls

- 1 Dipterous gall, probably *Agromyza* on *Clematis*. (After Thompson)
- 2 Iris leaf gall, *Agromyza laterella* Zett. (After Thompson)
- 3 Poplar twig gall, *Agromyza schineri* Giraud
- 4 Gall on *Solidago*, of *Eurosta reticulata* Snow. (After Thompson)
- 5 Gall of *Eutreta sparsa* Wied. (After Thompson)
- 6 Wheat sheath joint worm, *Isosoma vaginicum* Doane. (After Doane)
- 7 Locust twig gall, *Ecdytolopha inscitiana* Zell. (After Thompson)
- 8 Scarred goldenrod gall, *Eucosma scudderiana* Clem. (After Thompson)
- 9 Irregular, subglobose grape leaf gall, showing a slight swelling on the upper surface and a globose enlargement beneath. ?*Coleophora* sp. (After Clarke)

Plate 4

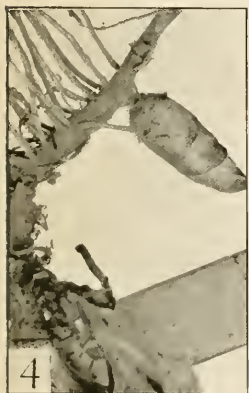


Plate 5

251

Midge Galls

- 1 Ash leaves inhabited by *Arthrocnodax sambucifolia* Felt, the deformation probably produced by a mite, *Eriophyes* sp. (After Thompson)
- 2 Cone-flower gall, *Asphondylia conspicua* O. S.
- 3 Sunflower purse gall, *Asphondylia globulus* O. S. (After Weld)
- 4 Adherent capsule gall on *Solidago*, inhabited by the nun midge, *Asphondylia monacha* O. S. and *Camptoneuromyia adhesa* Felt
- 5 Gall of nun midge, *Asphondylia monacha* O. S., on narrow-leaved goldenrod
- 6 Cactus infested by *Asphondylia opuntiae* Felt. (After Essig)
- 7 Gall of *Asteromyia* sp. on *Ionactis linearifolius*. (After Clarke)
- 8 Blister gall of ? *Caryomyia* species on hickory
- 9 Gall of spruce bud midge, *Rhabdophaga swainei* Felt. (After Swaine)

Plate 5

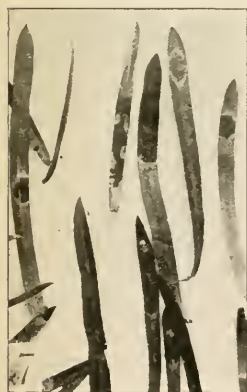
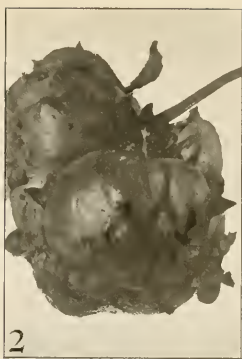


Plate 6

53

Midge Galls

- 1 Gall on hickory, of *Caryomyia antennata* Felt. (After Thompson)
- 2 Hickory seed gall, *Caryomyia caryaecola* O. S.
- 3 Hickory seed gall, *Caryomyia* "caryaecola O. S." Another type. (After Stebbins)
- 4 Hickory onion gall, *Caryomyia holotricha* O. S. (After Thompson)
- 5 Gall on hickory, of *Caryomyia* sp.
- 6 Gall on hickory, of *Caryomyia* sp. (After Thompson)
- 7 Hickory leaf gall, *Caryomyia caryae* O. S.
- 8 Gall on hickory, of *Caryomyia thompsoni* Felt. (After Thompson)
- 9 Gall on hickory, of *Caryomyia consobrina* Felt. (After Clarke)

Plate 6

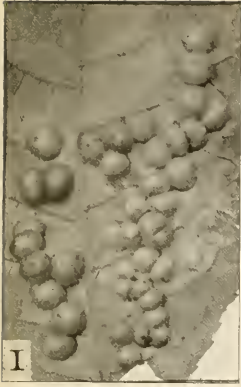


Plate 7

255

Midge Galls

- 1 Balsam gall midge, *Cecidomyia balsamicola* Lintn. (After Thompson)
- 2 Gall of *Cecidomyia* sp., on balm of Gilead
- 3 Hazel catkin gall, *Cecidomyia squamulicola* Stebb.
- 4 Touch-me-not gall, *Cecidomyia impatientis* O. S. (After Thompson)
- 5 Gall on cherry racemes produced by *Cecidomyia racemi* Stebb. (After Stebbins)
- 6 Wild cherry bud gall, *Cecidomyia serotinae* O. S. (After Clarke)
- 7 Smilax blister, *Camptoneuromyia rubifolia* Felt.
- 8 Nettle bullet gall, *Cecidomyia* sp. on *Urtica*. (After Weld)
- 9 Linden wart gall, *Cecidomyia verrucicola* O. S., young galls. (After Thompson)

Plate 7

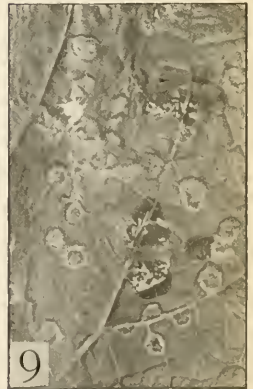
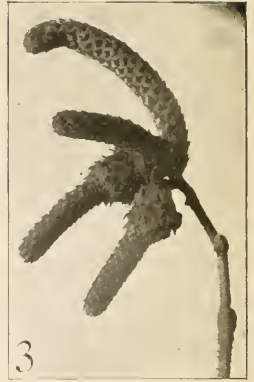
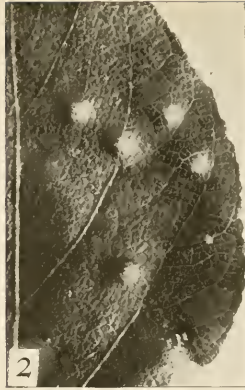


Plate 8

257

Midge Galls

- 1 Oak spangles, *Cecidomyia poculum* O. S. (After Thompson)
- 2 Probably the same as figure 1. (After Weld)
- 3 Vein pocket gall, *Parallelodiplosis florida* Felt, on oak. (After Clarke)
- 4 Oak gall of *Cecidomyia*, adult unknown. Resembling much that of *Neuroterus niger* Gill. (After Clarke)
- 5 Marginal fold gall of *Itonida foliora* Rssl. & Hkr., on oak. (After Clarke)
- 6 Oak leaves with lobes folded by *Cecidomyia* sp., adult unknown. (After Clarke)
- 7 Oak blister midge, *Cincticornia pustulata* Felt. (After Clarke)
- 8 Oak leaf showing galls of *Cincticornia* sp., possibly *C. simpla* Felt.
- 9 Purple oak vein gall, *Cincticornia podagrae* Felt.

Plate 8

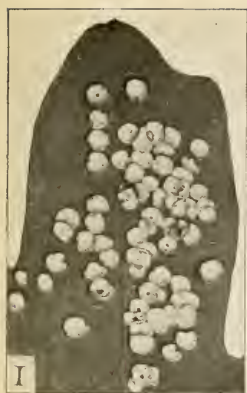


Plate 9

259

Midge Galls

- 1 Subglobose vein gall on oak, produced by *Cecidomyia* sp., adult unknown
- 2 Gall on oak, of *Cincticornia majalis* O. S. (After Thompson)
- 3 Oak pill gall, *Cincticornia pilula*? Walsh. (After Thompson)
- 4 Clematis bud gall, *Contarinia clematidis* Felt. (After Thompson)
- 5 Grape blister gall, *Cecidomyia* species. (After Weld)
- 6 Chokecherry midge, *Contarinia virginianiae* Felt. (After Thompson)
- 7 Arrow-wood blister midge, *Cystiphora viburnifolia* Felt. (After Clarke)
- 8 Honey locust pod gall, *Dasyneura gleditschiae* O. S. (After Clarke)
- 9 Loosestrife bud gall, *Dasyneura lysimachiae* Beutm. (After Clarke)

Plate 10

261

Midge Galls

- 1 Rose leaf midge, *Dasyneura rosarum* Hardy. (After Thompson)
- 2 Willow pod midge, *Dasyneura salicifolia* Felt. (After Clarke)
- 3 Elm buds blasted by *Dasyneura ulmea* Felt. (After Houser)
- 4 Galls of Chrysanthemum midge, *Diarthronomyia hypogaea*
H. Lw.
- 5 Sunflower bullet gall, *Hormomyia bulla* Felt. (After Weld)
- 6 Willow lipped gall, *Hormomyia verruca* Walsh. (After Clarke)
- 7 Tulip spot gall, *Thecodiplosis liriiodendri* O. S. (After
Thompson)
- 8 Gall on Impatiens, of *Lasioptera impatientifolia* Felt. (After
Thompson)
- 9 Thorn vein gall, *Lobopteromyia venae* Felt. (After Thompson)

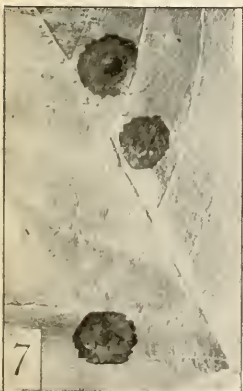
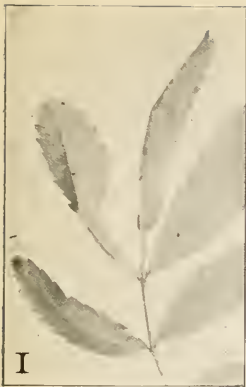


Plate 11

263

Midge Galls

- 1 White snake root flower buds from which was reared *Lestodiplosis eupatorii* Felt.
- 2 Gall of *Crataegus* leaf from which was reared *Lestodiplosis crataegifolia* Felt. This midge is probably predaceous. (After Thompson)
- 3 Gall on *Crataegus* leaf from which was reared *Lestodiplosis crataegifolia* Felt. (After Thompson)
- 4 Cherry leaf from which was reared *Mycodiplosis cerasifolia* Felt. (After Thompson)
- 5 Beaked willow gall, *Phytophaga rigidae* O. S.
- 6 Elm leaves deformed by *Phytophaga ulmi* Beutm. (After Thompson)
- 7 Willow cabbage gall, *Rhabdophaga brassicoides* Walsh.
- 8 Willow twig showing deformation, provisionally referred to *Rhabdophaga globosa* Felt.
- 9 Nodule willow gall, *Rhabdophaga nodula* Walsh.

Plate 11

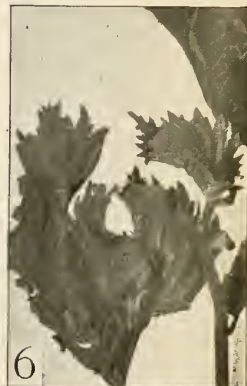


Plate 12

265

Midge Galls

- 2 Spiraea pod gall, *Rhabdophaga salicifolia* Felt. (After Thompson)
- 1 Willow twig deformed by *Rhabdophaga salicis* Schr.
- 3 Willow tips showing blasted apical buds, the work of *Cecidomyia* sp., adult unknown.
- 4 Wheat ear gall, *Rhabdophaga triticoides* Walsh, on willow.
- 5 Downy flower gall, *Rhopalomyia anthophila* O. S. (After Weld)
- 6 Beaked flower gall, *Rhopalomyia racemicola* O. S. (After Weld)
- 7 Solidago showing subterranean bud galls of *Rhopalomyia bulbula* Felt. (After Thompson)
- 8 Galls of gooseberry bud midge, *Rhopalomyia grossulariae* Felt. (After Houser)
- 9 Root stalk bud midge, *Rhopalomyia hirtipes* O. S. (After Stebbins)

Plate 12



Plate 13

267

Midge Galls

- 1 White flowered aster buds deformed by *Rhopalomyia lateriflora* Felt. (After Clarke)
 - 2 Goldenrod bunch gall, *Rhopalomyia solidaginis* Lw.
 - 3 Flower bud galls of *Aster undulatus*, deformed by *Rhopalomyia* sp. (After Clarke)
 - 4 Subterranean galls on *Solidago* inhabited by *Rhopalomyia thompsoni* Felt. (After Thompson)
 - 5 Gall on arrow-wood leaves produced by the purple vein midge, *Sackenomyia viburnifolia* Felt.
 - 6 Grape filbert gall, *Schizomyia coryloides* Walsh & Riley. (After Weld)
 - 7 Gall of elder flower midge, *Youngomyia umbellicola* O. S. (After Weld)
 - 8 Gall on oak leaves produced by *Cincticornia globosa* Felt. (After Clarke)
- Dogwood spot gall, *Lasioptera corni* Felt. (After Clarke)



Plate 14

269

Plant Galls

- 1 Long spruce cone gall, *Chermes cooleyi* Gill.
- 2 Hackberry nipple gall, *Pachypsylla mamma* Riley. (After Thompson)
- 3 Red pouch gall, *Pemphigus rhois* Fitch. (Author's illustration)
- 4 Hickory leaf gall produced by *Phylloxera caryae-avellana* Riley. (After Thompson)
- 5 Hickory leaf gall produced by *Phylloxera caryaefallax* Riley. (After Thompson)
- 6 Hickory leaf gall produced by *Phylloxera caryaeglobuli* Walsh. (After Thompson)
- 7 Hickory leaf gall produced by *Phylloxera rimosalis* Perg. (After Thompson)
- 8 Hickory leaf gall produced by *Phylloxera caryaesemen* Walsh. (After Thompson)
- 9 Axillary Spiraea bud galls infested by *Cecidomyia* sp. (After Clarke)

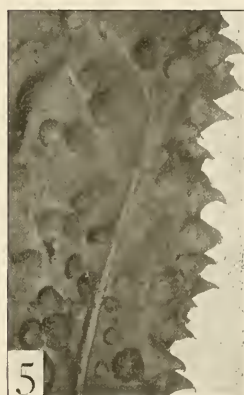
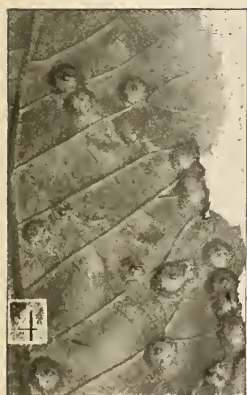


Plate 15

271

Plant Mite Galls

- 1 Alder leaf galls produced by a plant mite, *Eriophyes* sp. (After Thompson)
- 2 Bud galls on yellow birch produced by a plant mite, *Eriophyes* sp.
- 3 Foliage deformed by ash Psyllid, *Psyllopsis fraxinicola* Forst. (Author's illustration)
- 4 Hickory leaves with margins inrolled by *Eriophyes* sp. (After Thompson)
- 5 Hazel or *Corylus* buds deformed by *Eriophyes* sp. (After Thompson)
- 6 Bayberry leaves badly deformed by *Eriophyes* sp. (After Thompson)
- 7 Beech leaves affected by *Eriophyes* sp. (After Thompson)
- 8 Ash leaves showing numerous galls of *Eriophyes fraxini* Garm. (After Thompson)
- 9 Ash flower gall, *Eriophyes fraxiniflorae* Felt. (After Thompson)

Plate 15

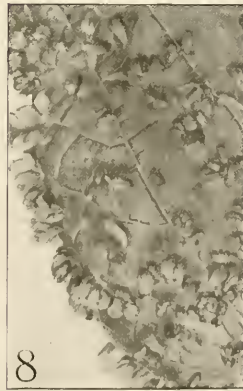
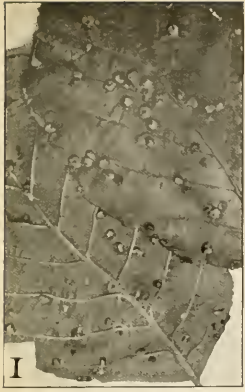


Plate 9

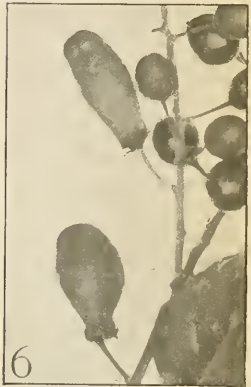
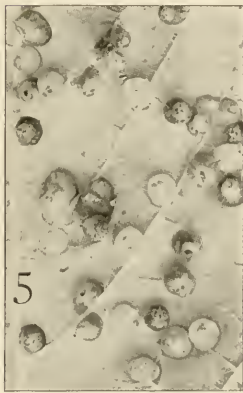


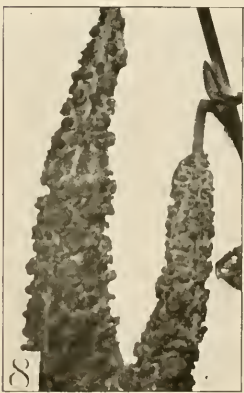
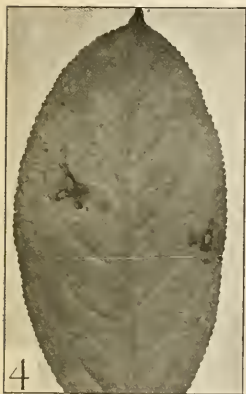
Plate 16

273

Plant Mite Galls

- 1 *Eriophyes* sp. on red maple, *Acer rubrum*. (After Thompson)
- 2 Wild cherry pouch gall, *Eriophyes ?padi* Nal. (After Thompson)
- 3 Poplar leaves deformed possibly by *Eriophyes populi* Nal. (After Thompson)
- 4 Leaf gall on *Pyrus arbutifolia*, produced by *Eriophyes* sp. (After Thompson)
- 5 Oak buds blasted by *Eriophyes* sp. (After Thompson)
- 6 Galls on poison ivy produced by *Eriophyes* sp. (After Thompson)
- 7 Terminal leaves of *Rhus copallina* deformed by *Eriophyes* sp. (After Thompson)
- 8 Willow leaf gall produced by *Eriophyes* sp. (After Thompson)
- 9 Maple bladder gall, *Phyllocoptes quadripes* Shim.

Plate 16



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