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INSECT GALLS
OF
SPRINGFIELD, MASSACHUSETTS,
AND VICINITY.

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WITH 32 PLATES.

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INSECT GALLS OF SPRINGFIELD, MASSACHUSETTS, AND VICINITY.

BY

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A gall has been variously defined by different authors, but apparently all agree in considering it a deformation or malformation of some part of a plant due to injury inflicted. This injury may be chemical or mechanical, and is brought about by the action of fungus, arachnid, insect, character of the soil or fertilizer or cause or causes unknown. The present list includes only those galls caused by insects and the closely allied mites.

Altho this list is the result of several seasons' collecting, there are undoubtedly many galls which should be found here which have escaped observation, and it seems probable that there are many, especially upon herbaceous plants, which have never been collected and described.

No part of the plant is free from the presence of galls, they being found upon stem, branch, bud, leaf, flower, fruit and root. They vary in color, size, shape, surface and especially in structure. The simplest consist of little more than a folding or wrinkling of a leaf with an unusual growth of plant hairs and a slight change of size and shape of the cells. At the other extreme may be found such an elaborate structure as the common "oak apple." But they agree in this, that there is always present a portion from which the maker gets food, known as the nutritive section, and another portion which serves as a protection to the maker, the protective zone.

The effect upon the plant has not been definitely studied in most cases. In many instances no apparent detriment results owing to the comparatively small amount of tissue affected. Some cases are commonly observed in which the persistence upon a plant from year to year of a large number of galls renders it unsightly; an illustration of this is the gall of *Callirhytis punctata* on the black and other oaks. But that the

development of a large number of galls upon a plant is injurious to that plant is evidenced by the effect of the grape phylloxera, *Phylloxera vitifoliae*, generally known as *Phylloxera vastatrix*. In the eastern United States, where it is native, little injury results, but when it was carried to France it multiplied to such extent as to cause very great loss in the vineyards through which it spread. This is an illustration of the the greater damage done by a pest in a new habitat.

Some galls are so noticeable that they have attracted attention from earliest times, but it was not until 1686 that any systematic work was published upon the subject, when Malpighi issued "De gallis," which gave descriptions of those known in Sicily and Italy.

Among modern European writers Adler's name is especially noteworthy because he established the theory, advanced by Bassett, of the alternation of generations among certain of the *Cynipidae*. Bassett was able to verify his thought in one case, while Adler worked out a series of cases, but found that alternation of generations was not universal among *Cynipidae*, as Bassett had thought probable.

Howard, in *Psyche*, 1882, v. 3, p. 329, says:—"America may justly claim the credit for the discovery of this most interesting fact of alternation of generations among cynipids." Continuing, he says of Bassett: "With *Cynips q. operator* he had observed the females of the vernal brood ovipositing in acorn cups and producing the gall *q. operatola* of Riley's MS.; but he failed to rear the flies from these galls and so missed the complete proof. In the case of *C. q. batatus* Bass., he had bred the sexual forms from leaf galls, and the agamic females from twig galls; but had not actually observed the females of the former in the act of ovipositing in the twigs, thus again missing the proof. Riley, however, as he tells us in his published note, succeeded in breeding the agamic females of *q. operator* from the acorn galls, thus, in connection with Bassett's observation of the oviposition, completely establishing the fact of alternation. So the credit should be joint."

Much was contributed to our knowledge of galls by Osten Sacken, Bassett, Fitch, Harris, Shimer, Riley and Walsh among the earlier workers in America.

While several names should be noted among recent workers, Pergande, by patient observation of the gall-makers upon the witch hazel, has disclosed the identity of two sets of insects previously supposed to be four species, and established the fact of their migration from one host-plant to another and back again. And Cook has given us the results of careful study of the abnormal development of the plant tissues and their cell-changes under the stimulus of the gall maker.

Galls have been collected in this section which owe their origin to six orders:

Acarina (Family, *Eriophyidae*).

Hemiptera (Families, *Aphididae*, *Psyllidae*).

Coleoptera (Family, *Cerambycidae*).

Diptera (Families, *Agromyzidae*, *Trypetidae*, *Cecidomyidae*).

Lepidoptera (Families, *Tineidae*, *Elachistidae*, *Gelechiidae*, *Tortricidae*)

Hymenoptera, (Families, *Tenthredinidae*, *Cynipidae*).

(For a more complete list of the species under each family mentioned above see the list serving as index of the gall-insects near the end of this Bulletin.)

In general the more highly organized insect produces the more complex gall. There may be apparent exceptions to this rule, as in the case of the bark louse, *Adelges abietis*, producing a gall at the base of needles of the spruce which is very similar to one produced on the needles of the pitch pine by a two-winged fly, *Diplosis pini-rigidæ*.

Order, *ACARINA*.

Family, *Eriophyidae*, Gall-mites.

These mites are of minute size, and are to be found among the hairs or grains with which the concave surface of the gall is lined. There are several generations during the summer, the newly hatched mites moving out over the plant and producing new galls. The adults hibernate under the scales of buds or in crevices in the bark. A few species are found in such numbers on the leaves of cultivated fruit trees or shrubs as to cause much damage, the aborted leaves not being able to provide sufficient food for the development of the fruit. The galls are usually very simple in structure, and always have an opening by which the maker can pass out or in.

Order, *HEMIPTERA*.

Family, *Aphididae*, Plant-lice.

These insects are soft-bodied, with sucking mouth-parts. There are winged and wingless forms, the latter reproducing parthenogenetically. There are several generations in a season. The galls are usually quite simple in structure and contain many insects. There is an opening for their egress, altho in a few cases this remains closed until the gall matures and dries slightly.

Family, *Psyllidae*.

These are much like the aphids, but have hind legs fitted for jumping. The galls are similar in general structure, altho possibly a little more complex.

Order, *COLEOPTERA*.

Family, *Cerambycidae*, Longicorn beetles.

Most cerambycid larvae are borers in the wood of trees and shrubs, a few in herbaceous plants, but the larvae of a few species produce galls.

Order, *DIPTERA*.

Family, *Agromyzidae*.

The production of galls by the larvae of agromyzids is very exceptional; most of these larvae mine in the leaves or stems of plants.

Family, *Trypetidae*.

These flies are most of them nearly as large as a house-fly. There are few that produce galls. The galls are comparatively complex.

Family, *Cecidomyiidae*, Gall-gnats.

These are small two-winged flies which are seldom noticed. The eggs are laid on a surface of the plant. The larvae either feed from the surface, making an open gall, or gnaw into the tissues of the plant, making a closed gall which opens on maturity at the place where the larva entered, altho during the growth no opening may be evident. The larvae can generally be identified by the color, yellow, orange, or reddish, and by the structure of an organ near the anterior end, which has been designated the "breast-plate" or "breast-bone." These gall-makers are numerous both in species and individuals. Their galls are sometimes quite complex in structure.

Order, *LEPIDOPTERA*.

Families, *Tineidae*, *Elachistidae*, *Gelechiidae*, *Tortricidae*.

The adults are very small moths. There are very few gall makers among them. The eggs are laid on the surface of the plant, the larvae enter the tissues and either leave an opening, as in the gall of *Ecdytolopha insiticiana* on the locust, or just before pupation gnaw almost through the wall, leaving a place for the emergence of the adult, which, of course, having no organs for boring or biting, could not otherwise escape.

Order, *HYMENOPTERA*.

Family, *Tenthredinidae*, Saw-flies.

The members of this and the following family are four-winged insects. The adult tenthredinid is distinguished by the structure of the ovipositor, which consist of several toothed blades, by which the insect cuts or saws into the plant tissue, and there deposits the eggs. Whether a gall-maker deposits also some irritating liquid which causes the gall is a much discussed question. However that may be, it is true that the only cases so far directly observed in which a gall is formed before or without the hatching of the egg have been in this family, among the *Nematinae*. The larvae somewhat resemble caterpillars. Several species make galls on willows.

Family, *Cynipidae*, Gall-wasps.

In the adult the abdomen is usually compressed. The ovipositor is long and slender, and can well bury the egg within the plant-tissue, leaving no mark. The larvae pupate in the closed gall, and the insects when mature cut their way out of it. Alternation of generations is one of the most interesting features in the life of these highest of gall-makers. The galls are, without exception, complex in structure, with several distinct divisions of the walls, and many interesting adaptations for the protection of the inmate.

Within galls may sometimes be found parasites or inquilines. The former, preying directly upon the gall-maker, causes its death, but not until its growth is nearly or quite complete. The inquilines are merely guests within the gall, profiting by the food supply and by the protection.

Aside from the collection of the galls of different localities, and the subsequent summary of their distribution, two very interesting questions suggest themselves for investigation. First, are these malformations the result of chemical or of mechanical action? Second, of which of the American gall-makers is it true that there is alternation of generations? The classification of gall-insects will undoubtedly be somewhat altered when this question is answered. Either line suggests a fascinating series of observations and experiments for the one undertaking it.

My thanks are especially due to George Dimmock, Ph. D., for suggestions in preparing this paper, for use of publications not otherwise available and for reading the manuscript. Also assistance has been rendered by Mrs. Anna D. Nash in preparing some of the photographs.

PLANT LIST.

A list of the plants upon which the galls described in this bulletin are found.

The plant names are in accordance with Britton's Manual of the Flora of the Northern States and Canada . . . 1907. See Systematic index for family to which gall-insect belongs.

PINALES.

PINACEAE.

Pinus rigida.

Diplosis rigidae Packard. Pitch-pine needle-gall.

Diplosis pini-rigidae Packard, 10th ann. rept. U. S. geog. and geol. surv. terr. f. 1876, 1878, p. 527, fig.; 5th rept. U. S. ent. comm., 1890, p. 798-800, fig. 271.

Cecidomyia resinicola Aldrich, Cat. N. A. dipt., 1905, p. 160 (following Kertész)

This gall consists of an enlargement at base of cluster of needles. The base of each is widened and curved so as to form one spherical chamber within which are several smaller ones, apparently in pitch. The diameter of the galls is about 5 mm. The needles, stunted in growth, are from 1 to 2 cm. long. On pitch pine, *Pinus rigida*.

*Picea canadensis.**Adelges abietis* Linn. Spruce gall. Fig. 1.*Chermes abietis* Linnaeus, Syst. nat., 1767, v. 1, pt. 2, p. 738.

Cholodkowsky, Zool. anzeiger, 1894, Jahrg. 17, p. 434-437; 1896, band 19, p. 37-40.

Fernald, 9th ann. rept. Hatch exp. sta., 1897, p. 85-86; 34th ann. rept. Mass. agr. coll. f. 1896, [Mass.—Pub. doc., no. 31, 1896], 1897, p. 89-100, pl. 1-2.

Gillette, Bull. 47, Col. agr. exp. sta., 1898, p. 36-37.

Lochhead, 30th ann. rept. Ent. soc. Ontario, 1899, p. 60-61, fig. 8.

Gillette, Bull. 31, Div. ent., U. S. dept. agr., 1902, p. 52-53.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 63.

Adelges abietis, Packard, Bull. 7, U. S. ent. comm., 1881, p. 235; 5th rept. U. S. ent. comm., 1890, p. 853.

Kieffer, Ann. Soc. ent. France, 1902, v. 10, p. 377, 554.

These galls are swellings of the base of the needles. Polythalamous. In July the galls dry, the cavities open and the insects escape. On white and black spruce, *Picea canadensis* and *P. mariana*.

*Picea mariana.**Adelges abietis* Linn. See above.

SALICALES.

SALICACEAE.

Populus.

Pemphigus populicaulis Fitch. Poplar stem-gall.*Pemphigus populicaulis* Fitch, 5th rept. ins. N. Y. for 1858, 1859, p. 845.

Walsh, Proc. Ent. soc. Phil., 1862, v. 1, p. 305.

Walsh and Riley, Amer. ent., 1869, v. 1, p. 57, 245.

LeBaron, 3d rept. ins. Ill., 1873, p. 193.

Thomas, Trans. Dept. agr. Ill. f. 1878, 1879, n. s., v. 8 (Thomas, 3d rept. ins. Ill.), p. 149.

Henry, Amer. ent., 1880, v. 3 (s. 2, v. 1), p. 205-206, fig. 110. (The figure by Riley.)

Oestlund, Bull. 4, Geol. and nat. hist. surv. Minn., 1887, p. 21.

Packard, 5th rept. U. S. ent. comm., 1890, p. 471.

Cook, Ohio nat., 1903, v. 3, p. 425-426, fig. 57-58; 1904, v. 4, p. 118-124; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 849, fig. 41.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 64, pl. C, fig. 3.

An irregularly spherical gall at union of blade and petiole. The opening is closed by a twisting of the leaf. Common on several poplars. The insects emerge when the gall dries somewhat and opens, usually about the middle of the summer.

Pemphigus transversus Riley, Poplar petiole gall.*Pemphigus populi-transversus* Riley, Bull. U. S. geol. and geog. surv. terr., 1879, v. 5, p. 15-16, pl. 2, fig. 5.

Oestlund, Bull. 4, Geol. and nat. hist. surv. Minn., 1887, p. 21.

Packard, 5th rept. U. S. ent. comm., 1890, p. 434.

Cook, Ohio nat., 1903, v. 3, p. 425-426, fig. 55-56; 1904, v. 4, p. 118, 124; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 850, fig. 42.

This oval gall is formed midway of the petiole, on one side, with the opening opposite the petiole and transverse. Not common. On poplar, *Populus*.

Populus deltoides.*Pemphigus vagabundus* Walsh.

Byrsocrypta vagabunda Walsh, Proc. Ent. soc. Phil., 1862, v. 1, p. 306-307; 1864, v. 2, p. 462.

Pemphigus vagabundus Walsh and Riley, Amer. ent., 1868, v. 1, p. 57; 1869, v. 1, p. 107-108. fig. 87-88.

Packard, Guide study ins., 1869, p. 524, fig. 522, 525.

Oestlund, Bull. 4. Geol. and nat. hist. surv. Minn., 1887, p. 22.

Cook, Ohio nat., 1904, v. 4, p. 118, 140, fig. 112; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 850-851, fig. 43.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 63.

A deformation of the terminal bud with the leaves so changed as to lose all appearance of leaves, each becoming bag-like, some like cock's combs. Yellow-green, becoming nearly black in winter. Persistent. Very common. On poplar, *Populus deltoides*.

Populus grandidentata.*Mecas inornata* Say.

Poplar twig gall.

Fig. 2.

Saperda inornata Say, Journ. Acad. nat. sci. Phil., 1823, v. 3, p. 407.

Walsh, Proc. Ent. soc. Phil., 1867, v. 6, p. 264.

Mecas inornata Packard, 5th rept. U. S. ent. comm., 1890, p. 427-428, fig. 156.

. Irregularly spherical swelling of the twig, 1-3 cm. in diameter. At first smooth, pithy, in second season becomes cracked without and hollow within. Beetle bores its way out in May. On *Populus grandidentata* and *P. tremuloides*.

Cecidomyia? irregularis, n. s.

Irregular, monothalamous, blister-galls, between veins. Usually more than one on a leaf. Projecting above mainly, presence indicated below by a light-colored, roughened space. On large-toothed aspen, *Populus grandidentata*. Not rare.

Populus tremuloides.*Pemphigus? rileyi* n. s.

Poplar cluster-gall.

Fig. 3.

A spherical, red and yellow gall occurring in clusters, usually on the under side of the leaf, near the petiole. Above there is a conical projection at the top of which is the opening. Thin-walled. About 5 mm. in diameter. On aspen, *Populus tremuloides*. Rather common.

Mecas inornata Say. See above.

Agromyza simplex Loew.

Agromyza simplex Loew, Dipt. Amer. septentr. indig., centur. viii, p. 84. (Berl. ent. zeitschr., 1869.)

An irregularly oval, rough gall occurring singly or two in line on the twig. Color of the bark. About 8 mm. long, 4 mm. wide. Polythalamous. On American aspen, *Populus tremuloides*.

(This is apparently the same gall as is attributed to *Agromyza aeneiventris* Fallen by Jarvis (38th ann. rept. Ent. soc. Ontario, 1907, p. 85-86, pl. A, fig. 8), but the imago reared from a Springfield gall answering the same description has been pronounced by Mr. C. W. Johnson, of Boston, to be *Agromyza simplex*.)

Ectoedemia populella Busck.*Ectoedemia populella* Busck, Proc. Ent. soc. Washington, 1907, v. 8, p. 97-99.

This subglobular, one-celled gall is found on the petiole at its union with the blade of the leaf. There are distinct longitudinal ridges. Color like that of the petiole. About 5-7 mm. in diameter. The cell-walls are 1-2 mm. thick. Very abundant on American aspen, *Populus tremuloides*. In October the larvae go down to pupate in the ground. The moth emerges in May.

Salix.

Eriophyes aenigma Walsh.

Willow mite gall.

Fig. 8.

Cecidomyia salicis-aenigma Walsh, Proc. Ent. soc. Phil., 1864, v. 3, p. 608-610.*Acarus salicis-aenigma* Walsh, Proc. Ent. soc. Phil., 1866, v. 6, p. 227.

Deformation of leaf or flower bud. Polythalamous, irregular mass both in size and shape. 1-3 cm. long. Like a woolly tangle of aborted flower parts. Silvery to ash gray in color. Appears in early summer (June). On willow, *Salix*.

Eriophyes semen Walsh. Willow seed gall.*Cecidomyia salicis-semen* Walsh, Proc. Ent. soc. Phil., 1864, v. 3, p. 606-608.*Acarus salicis-semen* Walsh, Proc. Ent. soc. Phil., 1866, v. 6, p. 226-227.

Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 858.

A small, monothalamous, sac-like, rounded gall. About 1 mm. in diameter. Usually on upper side of the leaf with the opening below. Found in large numbers on the leaf affected. Begins in early summer, matures with the leaf. On willow, *Salix*.

Cecidomyia verruca Walsh.*Cecidomyia salicis-verruca* Walsh, Proc. Ent. soc. Phil., 1864, v. 3, p. 606; 1866, v. 6, p. 226.

Monothalamous, subspherical gall on midrib or veins of leaf. Projects very slightly on upper surface, much more on under surface where the insect emerges, apparently, from a neat round hole. (This latter characteristic, so distinct from Walsh's description, has made me mistrust my identification.) On two species of willow, *Salix*. Late summer.

Mayetiola rigidae Osten Sacken.

Willow club-gall.

Fig. 9.

Cecidomyia salicis Fitch, Amer. quart. journ. agr. and sci., 1845, v. 1, p. 263. (Nomen praeoc.)*Cecidomyia rigidae* Osten Sacken, Mon. S. A. dipt., 1862, pt. 1, p. 189.

Walsh, Proc. Ent. soc. Phil., 1864, v. 3, p. 594-597.

Riley, Amer. ent. and bot., 1870, v. 2, p. 214, fig. 133.

Cook, Ohio nat., 1903, v. 3, p. 422, fig. 42.

Jarvis, 37th ann. rept. ent. soc. Ontario, 1906, p. 68.

Mayetiola rigidae Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 357, 371.

Monothalamous, irregularly conical, twig-gall, sometimes terminal, frequently with a twig growing from its side, always with several buds on sides. It is tipped with a hollow bud which looks as if it had died early in the development of the gall. Reddish brown, grooved lengthwise. About 2 cm. long. Larval cell extends the length of the gall. On common willows. Common. Insect remains as larva during winter, pupates in spring, soon emerges through terminal beak.

Rhabdophaga batatas Walsh. Willow potato-gall. Fig. 7.

Cecidomyia salicis-batatas Walsh, Proc. Ent. soc. Phil., 1864, v. 3, p. 606; 1866, v. 6, p. 225-226.
Packard, 5th rept. U. S. ent. comm., 1890, p. 598.

Cecidomyia batatas, Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 268.

Rhabdophaga batatas Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 86, pl. A, fig. 7.
Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 338, 355, pl. 35, fig. 7.

An extremely variable, polythalamous twig-gall. Usually not terminal, surrounding the twig, sometimes with leaves or small twigs growing from sides, sometimes several strung along the twig. Spongy or woody within. On several willows. Common. Insect remains as larva during the winter, pupates in spring and soon emerges.

Rhabdophaga brassicoides Walsh, Willow cabbage-gall. Fig. 6.

Cecidomyia salicis-brassicoides Walsh, Proc. Ent. soc. Phil., 1864, v. 3, p. 575, 577-580.

Walsh and Riley, Amer. Ent., 1869, v. 1, p. 105, fig. 84.

Packard, Guide study ins., 1869, p. 377, fig. 282; 5th rept. U. S. ent. comm., 1890, p. 580.

Townsend, Can. ent., 1895, v. 27, p. 205-207.

Cecidomyia brassicoides, Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 268.

Rhabdophaga brassicoides Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 338, 355.

Gall consisting externally of rather close clusters of leaves, but not so closely overlapping as in *R. strobiloides*, the leaves broader and with full margins, giving ruffled effect. Somewhat conical in outline, about 4 cm. long by 25-30 mm. broad at base. Color like leaves of bush, turning very dark in winter. On willow, *Salix*.

Rhabdophaga gnaphalioides Walsh. Fig. 4.

Cecidomyia salicis-gnaphalioides Walsh, Proc. Ent. soc. Phil., 1864, v. 3, p. 575, 583-585;
1866, v. 6, p. 223-224.

A monothalamous, solitary, oval gall, terminal on twigs. It consists of closely overlapping leaves, much dwarfed, the tips pinched together to form a beak, and spreading. About 1 cm. long. Yellow-brown with the outside of each leaf so covered with appressed, whitish hairs as to look silvery. Gall formed in summer, insects appearing in late April or in May. On willow, *Salix*.

Rhabdophaga strobiloides Osten Sacken. Pine-cone willow-gall. Fig. 5.

Cecidomyia strobiloides Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 203.

Walsh and Riley, Amer. ent., 1869, v. 1, p. 105, fig. 82.

Packard, Guide study ins., 1869, p. 377, fig. 281.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 267-268, pl. 15, fig. 1.

Cook, Ohio nat., 1902, v. 2, p. 272, fig. 32; 1903, v. 3, p. 419; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 840, fig. 33-34.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 66.

Cecidomyia salicis-strobiloides Walsh, Proc. Ent. soc. Phil., 1864, v. 3, p. 580-583.

Rhabdophaga strobiloides Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 338, 355, 356.

Cone-shaped gall consisting of a deformed terminal bud, the leaves closely overlapping. Monothalamous. 2-3 cm. long. Very abundant on willows. Fully grown in July. Insect emerges the following spring. On several species of willows, *Salix*.

Cryptocampus cooperae Cockerell. Fig. 10-11.

Cryptocampus cooperae Cockerell, Ann. and mag. nat. hist., 1901, s. 7, v. 7, p. 335.

Rohwer, Journ. N. Y. ent. soc., 1909, v. 17, p. 11-12.

A roughened, irregular, many-celled gall, rising very abruptly from the side of the twig. Woody, knotty. Two or more crowded together, or occurring singly, 5-15 mm. long, 5-10 mm. wide. On willow, *Salix*. September.

Cryptocampus nodus Walsh.

Euura salicis-nodus Walsh, Proc. Ent. soc. Phil., 1866, v. 6, p. 253-254.

Norton, Trans. Amer. ent. soc., 1867, v. 1, p. 82-83; 1868, v. 2, p. 368.

Cryptocampus salicis-nodus Rohwer, Journ. N. Y. ent. soc., 1909, v. 17, p. 15-16. (Further bibliography.)

A gradual enlargement of the twig, usually around the twig, and several near one another. Polythalamous. From twice to several times the diameter of the twig. 1-3 cm. long. Larvae sometimes remain in gall over winter, sometimes go under ground. Emerge in April or May. On willow, *Salix* sp.

Cryptocampus ovum Walsh. Willow egg-gall. Fig. 12.

Euura salicis-ovum Walsh, Proc. Ent. soc. Phil., 1866, v. 6, p. 251-252.

Norton, Trans. Amer. ent. soc., 1867, v. 1, p. 80-82.

Euura ovum, Beutenmüller, Ins. galls vicin. N. Y., 1904, p. 24, fig. (Not sufficient for identification)

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 69

Cryptocampus salicis-ovum Rohwer, Journ. N. Y. ent. soc., 1909, v. 17, p. 12-14. (Further bibliography.)

This monothalamous gall consists of a deformed bud the tip of which persists. The gall varies considerably in size and shape, sometimes nearly spherical, again elliptical or ovoid, and tapering. When mature the larval cell is surrounded by a red-brown spongy mass, containing fibers transverse to the stem. Rather common on willow, *Salix* sp. Insect remains as larva during winter. Some apparently pupate underground. Imago in April.

Salix cordata.

Nematus pomum Walsh. Willow apple-gall.

Nematus salicis-pomum Walsh, Proc. Ent. soc. Phil., 1866, v. 6, p. 255.

Norton, Trans. Amer. ent. soc., 1867, v. 1, p. 216-218. (Quotes Walsh's description.)

Walsh and Riley, Amer. ent., 1870, v. 2, p. 45, fig. 30.

Cook, Ohio nat., 1904, v. 4, p. 122, 127, 143, fig. 93, 110, 127.

Nematus pomum, Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 263.

Rounded, fleshy leaf-gall, about 1 cm. in diameter. Green with rosy cheek. Appears early in the spring, matures by late July. Insect emerges the following April. Common on heart-leaved willow, *Salix cordata*.

JUGLANDALES.

JUGLANDACEAE.

Hicoria (Carya.)

Phylloxera caryaecaulis Fitch. Hickory louse-gall.

Pemphigus caryaecaulis Fitch, 1st rept. ins. N. Y., 1855, p. 859-860.

Dactylophaera caryae-magnum Shimer, Trans. Amer. ent. soc., 1869, v. 2, p. 391.

Dactylosphaera spinosum Shimer, *op. cit.*, p. 397.

Dactylosphaera subellipticum Shimer, *op. cit.*, p. 389.

Phylloxera caryaecaulis Walsh and Riley, Amer. ent., 1869, v. 1, p. 227.

Riley, 7th rept. ins. Mo., 1875, p. 117.

Cook, Ohio nat., 1903, v. 3, p. 421, 425; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 854, fig. 45.

Pergande, Proc. Davenport acad. sci., 1904, v. 9, p. 244-247, fig. 40-44 106 114, 124-127.

Hemispherical gall of varying size on stem, petiole or ribs of leaves. Hollow, filled with lice. Bursts open becoming cup-shaped. Tough. May and June. Common on hickories, *Hicoria*.

Phylloxera globuli Walsh.

Phylloxera caryae-globuli Walsh, Proc. Ent. soc. Phil., 1862, v. 1, p. 309; 1867, v. 6, p. 275.

Riley, 7th rept. Ins. Mo., 1875, p. 117.

Packard, 5th rept. U. S. ent. comm., 1890, p. 322.

Cook, Ohio nat., 1902, v. 2, p. 266, fig. 18; 1903, v. 3, p. 425, fig. 53; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 852.

Pergande, Proc. Davenport acad. sci., 1904, v. 9, p. 222-225.

Dactylosphaera hemisphericum Shimer, Trans. Amer. ent. soc., 1869, v. 2, p. 387-388.

A hemispherical gall on upper side of leaf, opening by a slit on the under side. 5-7 mm. in diameter. Green becoming black. On hickories, *Hicoria*.

Cecidomyia caryaecola Osten Sacken. Hickory seed-gall. Fig. 13.

Cecidomyia caryaecola Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 192.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 266, pl. 14, fig. 2.

Smooth, elongated gall, somewhat conical, apex prolonged into a point, which is frequently curved. Monothalamous, 7-9 mm. long, 3-4 mm. wide. Green becoming brown in fall. Common separately, or mixed with other galls, in large numbers on under side of leaves of hickories, *Hicoria*.

Cecidomyia persicoides Osten Sacken. Hickory peach-gall.

Cecidomyia persicoides Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 193.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 267, pl. 14, fig. 3; 1907, v. 23, p. 393, pl. 17, fig. 10.

Rounded, irregular galls on under side of leaf. Variable both in shape and size. Covered with a very fine down. One medium sized one about 5 mm. in diameter. Monothalamous. Light brown when mature. Not as abundant as other species of cecidomyid galls on hickories. On hickories, *Hicoria*. August.

Cecidomyia sanguinolenta Osten Sacken. Hickory cone-gall.

Cecidomyia sanguinolenta Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 192.

Beutenmüller, Ins. galls vicin. N. Y., 1904, p. 28, fig.

Conical gall, narrowed at the base. About 4 mm. high, 3 mm. wide. Red or violet. Monothalamous. Found in July. Common on under side of leaves of hickories, *Hicoria*.

Hormomyia holotricha Osten Sacken. Hickory onion-gall.

Cecidomyia holotricha Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 193.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 266, pl. 14, fig. 1; Ins. galls vicin. N. Y., 1904, Separate, p. 26-27, fig.

Cook, Ohio nat., 1904, v. 4, p. 140-141, fig. 116; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 840.

Hormomyia holotricha Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 382, 389.

Subglobular, monothalamous galls, 3-5 mm. in diameter, covered with pale hairs when young which become rusty brown when the gall is mature. Very abundant on under side of leaves of different hickories, *Hicoria*. Sometimes so massed as entirely to cover the leaf. Sometimes with other galls. Larvae fully grown in October.

Hormomyia tubicola Osten Sacken. Hickory tube-gall.

Cecidomyia tubicola Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 192.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 267, pl. 14, fig. 4;
Ins. galls vicin. N. Y., 1904, p. 27, fig.

Cook, Ohio nat., 1904, v. 4, p. 141, fig. 117; 29th ann. rept. Dept. geol. and
nat. res. Indiana f. 1904, 1905, p. 840.

Hormomyia tubicola Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 382, 388, pl. 37, fig. 5.

Slender, cylindrical galls inserted in a saucer-like base from which they fall very easily. About 5 mm. long, 1 mm. wide. Green when young, becoming brown or almost black at the tip when mature. In October each contains one very light, full-grown larva. Usually in clusters on leaves of different hickories, *Hicoria*. Common. Galls fall to the ground where the insects mature.

Hicoria ovata.

Hormomyia caryae Osten Sacken.

Diplosis caryae Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 191.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 67.

Hormomyia caryae Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 382, 388.

Smooth, globular, monothalamous, seed-like gall, with a small point at apex. 2-4 mm. in diameter. In summer green and soft, in winter brown and woody. Those collected in October contained full-grown larvae. Fly emerges in April. Common on leaves of shell-bark hickory, *Hicoria ovata*.

Hicoria alba.

Phylloxera fallax Riley.

Phylloxera caryae-fallax Riley, 7th rept. ins. Mo., 1875, p. 118.

Packard, 5th rept. U. S. ent. comm., 1890, p. 323.

Cook, Ohio nat., 1902, v. 2, p. 266, fig. 17; 1903, v. 3, p. 425, fig. 51-52; 29th
ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p.
852-853, fig. 44.

Pergande, Proc. Davenport acad. sci., 1904, v. 9, p. 214-216, fig. 52-53,
71-74.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 64, pl. C, fig. 4.

Conical gall on upper side of leaf, opening on under side of leaf by a much shorter cone. About 5 mm. above. Very abundant on white-heart hickory, *Hicoria alba*.

Phylloxera caryaevanae Fitch.

Pemphigus? caryaevanae Fitch, 3d rept. ins. N. Y., 1856, p. 126.

Phylloxera caryaevanae Riley, 7th rept. ins. Mo., 1875, p. 117.

Packard, 5th rept. U. S. ent. comm., 1890, p. 322.

Pergande, Proc. Davenport acad. sci., 1904, v. 9, p. 239-243, fig. 38-39,
98-105.

Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905,
p. 852.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 64.

This gall is a folding of the leaf along the midrib with the opening below, guarded by a hair-like growth. On white-heart hickory, *Hicoria alba*. Not common.

Phylloxera pilosula Pergande.

Phylloxera pilosula Pergande, Proc. Davenport acad. sci., 1904, v. 9, p. 203-205, fig. 17, 49.

Convex on upper side of the leaf, prolonged below into a long and slender point, which splits into five or six parts. Covered above and below with yellowish shiny hairs. 3-6 mm. in diameter, 2-3 mm. thick. Not rare on white-heart hickory, *Hicoria alba*.

Hicoria glabra.

Phylloxera semen Walsh.

Xerophylla caryae-semen Walsh, Proc. Ent. soc. Phil., 1867, v. 6, p. 283.

Dactylosphaera caryae-semen Walsh, 1st rept. ins. Ill., 1868, p. 23.

Shimer, Trans. Amer. ent. soc., 1869, v. 2, p. 392-393.

Phylloxera caryae-semen Riley, 7th rept. ins. Mo., 1875, p. 117.

Packard, 5th rept. U. S. ent. comm., 1890, p. 322.

Pergande, Proc. Davenport acad. sci., 1904, v. 9, p. 211-213, fig. 50-51.

A small seed-like gall found by hundreds on upper side of leaf of pig-nut, *Hicoria glabra*, July.

FAGALES.

BETULACEAE.

Carpinus caroliniana.

Cecidomyia pudibunda Osten Sacken.

Cecidomyia pudibunda Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 202.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 66, pl. D, fig. 6.

Bentenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 389, pl. 13, fig. 8.

This gall consists of a fold between the larger veins of the leaf, projecting above, open beneath. Green becoming brown or red, 7-11 mm. long, 1-3 mm. high, tapering to the surface of the leaf. On American hornbeam, *Carpinus caroliniana*. Collected by Dr. Geo. Dimmock, Aug. and Sept. 1908.

This gall seems to be the same as *Cecid. pudibunda*. It is called *Contarinia carpini* and is found on *Carpinus betulus* of Europe. See C. Houard, Les zoocécidies des Plants d'Europe, 1908, p. 187.

Corylus americana.

Eriophyes avellanae Jarvis. Hazelnut bud-gall.

Eriophyes avellanae, Jarvis, 39th ann. rept. Ent. soc. Ontario, 1908, p. 83.

This gall is an abortion of the terminal bud and sometimes the lateral bud or buds. The stem does not develop, and the leaves become scarcely more than scales. Subspherical, about 1 cm. in diameter. On hazelnut, *Corylus americana*. Rather common. Similar to *Phytoptus coryligallarum* Targ. of Europe.

Eriophyes coryli n. s. Mite gall of hazelnut.

A deformity of the leaf brought about by the excessive shortening and thickening of midrib and some of the main veins, producing puckering of

the blade tissues. The thickened sac-like veins are really the galls, opening by slits above. Pubescent. On leaves of hazelnut, *Corylus americana*. One specimen. September.

Cecidomyia? squamulicola, n. s. Hazel catkin gall. Fig. 14.

A gall which deforms the base of the sterile catkins, increasing the size of the scale, so the diameter of the catkin is twice or thrice the normal. Not uncommon on hazelnut, *Corylus americana*. September.

Betula lenta.

Hamamelistes spinosus Shimer.

See account of this species under *Hamamelis virginiana*, further on.

Betula lutea.

Eriophyes betulae n. s. Bud gall of birch. Fig. 15.

Without scientific name, Hagen, Can. ent., 1885, v. 17, p. 25.

Eriophyes, sp., Jarvis, 37th ann. rept. Ent. soc. Ontario 1906, p. 59, pl. A, fig. 6.

An abnormal growth of the buds, the terminal growth being checked, forming considerable masses of undeveloped buds. On yellow birch, *Betula lutea*. Common.

Alnus rugosa.

Dasyneura serrulatae Osten Sacken. Alder bud-gall. Fig. 16.

Cecidomyia serrulatae Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 198.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 264, pl. 13, fig. 4;

Ins. galls vicin. N. Y., 1904, p. 24, fig.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 68.

Dasyneura serrulatae Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 336, 351.

A deformation of the terminal bud. Rounded, very pubescent, brown, 10-15 mm. in diameter. Not common. On *Alnus rugosa*. Galls collected in October, kept on moist earth, gave a fly the following April.

FAGACEAE.

Fagus americana.

Eriophyes? ferruginea Farlow. Beech mite-gall.

Erineum ferrugineum Farlow, Hagen, Can. ent., 1885, v. 17, p. 26.

Without scientific name, Garman, Psyche, 1892, v. 6, p. 246.

Eriophyes, sp., Jarvis, 37th ann. rept. Ent. soc. Ontario 1906, p. 62.

The upper side of the leaf is discolored and somewhat depressed above the clusters of granules which on the under side are very numerous. The mites feed among these granules. At first white, "frosty," later brown. On beech, *Fagus americana*.

Castanea dentata.

Eriophyes dentatae n. s. Chestnut leaf gall. Fig. 17.

Eriophyes, sp., Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 93.

A small, rough, monothalamous gall on the leaf. Woody, circular, projecting more above, 2-3 mm. in diameter, usually surrounded by a light ring. Larval cell held in place by radiating fibers. Usually several on a leaf of chestnut, *Castanea dentata*.

Cecidomyia? castaneae, n. s.

Fig. 18.

An ellipsoidal, monothalamous gall found singly or in small groups near the base of leaves of chestnut, *Castanea dentata*, projecting from under side of the principal veins, occasionally from the midrib, seeming to be an enlargement of the vein. It opens by a slit above, extending the length of the gall, the lips tightly closed. The surface is smooth like the surface of the leaf. The walls are succulent, from 0.6 to 1.5 mm. thick at back. Galls 6-12 mm. long, 3-6 mm. wide, 4-8 mm. deep, tapering to union with the leaf at the ends. Light yellow-green, a few tinged with red. Collected from very young trees, on short sprout from base of tree, in June, when the galls seemed well grown.

A gall which seems to be identical is described by C. Houard, in *Les Zoocécidies des Plantes d'Europe*. p. 210. This occurs on *Castanea vulgaris*.

Quercus.

Cecidomyia niveipila Osten Sacken. Oak fold-gall.

Cecidomyia niveipila Osten Sacken, in Loew's Mon. dipt. X. A., 1862, pt. 1, p. 199-200.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 271; Ins. galls vicin. N. Y., 1904, p. 31, fig.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 66.

Irregular in size and shape, consists of a fold or cavity from the upper side of the leaf. The fold is lined with white pubescence which is also conspicuous on the under side. Sometimes the whole leaf is deformed, sometimes only the midrib. In a large gall several larvae are found; these go into the ground to pupate. Common early on leaves of several kinds of oaks, *Quercus*.

Quercus, black oak group.

Andricus excavatus Ashmead. Excavated gall.

Andricus excavatus Ashmead, Proc. U. S. nat. mus., 1896, v. 19, p. 121.

Rounded, woody galls, looking as if they had been forced out of slits in the twigs. Varying much in shape and size, from 3-6 mm. in diameter. Brown, monothalamous. Collected in fall, insects emerge in following spring. On black oak group, *Quercus*.

Quercus rubra.

Cecidomyia majalis Bassett. Vein gall of oak. Fig. 32.

Cecidomyia quercus-majalis Bassett, Proc. Ent. soc. Phil., 1864, v. 3, p. 682-683.

Cecidomyia majalis Osten Sacken, Proc. Ent. soc., Phil., 1865, v. 4, p. 340, 353; Trans. Amer. ent. soc., 1870, v. 3, p. 53.

Packard, 5th rept. U. S. ent. comm., 1890, p. 207.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 68, pl. D, fig. 5.

An oblong blister-like gall along the principal veins, usually on the under side of the leaf. It opens by a slit on the opposite side which may be opened by pulling the leaf. Green becoming brown. Sometimes veins show on the gall. Thin-walled. The larva drops to the ground to trans-

form. Common on scarlet oak, black oak, red oak and pin oak, *Quercus coccinea*, *Q. velutina*, *Q. rubra* and *Q. palustris*.

Cincticornia pilulae Walsh. Oak pill-gall.

Cynips quercus-pilulae Walsh, Proc. Ent. soc. Phil., 1864, v. 2, p. 481-482.

Cecidomyia quercus-pilulae Walsh and Riley³, Amer. ent., 1869, v. 2, p. 29.

Packard, 5th rept. U. S. ent. comm., 1890, p. 206-207.

Cecidomyia pilulae, Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 269, pl. 15, fig. 3; Ins. galls vicin. N. Y., 1901, p. 30, fig.

Cook, Ohio nat., 1902, v. 2, p. 267, fig. 23; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 841.

Cincticornia pilulae Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 374, 381.

A solid, rounded, irregular polythalamous gall on upper side of leaf. Differs from *C. symmetrica* Osten Sacken in having a small green projection on under side of leaf instead of being same above and below. Frequently several coalesce. Brown becoming reddish. Surface much cracked, later the covering bursting and standing up ragged and irregular. Common on several species of red oak group. Matures in September.

Amphibolips coelebs Osten Sacken. Oak spindle-gall. Fig. 26-29.

Cynips quercus-coelebs Osten Sacken, Proc. Ent. soc. Phil., 1861, v. 1, p. 60-61; 1865, v. 4, p. 340.

Amphibolips coelebs Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

Beutenmüller, Ins. galls vicin. N. Y., 1904, p. 12, fig.

A smooth, spindle-shaped gall, attached to the midrib or to a large vein, sometimes very little of the leaf developed. Stem long, the gall tapering very gradually, especially at the base, tip pointed. Light brown. 3-4 cm. long, 4-15 mm. wide. Monothalamous, thin-walled, the larval cell supported mainly by longitudinal fibers, a few radiating transverse fibers. On red oak, *Quercus rubra*, and on scarlet oak, *Q. coccinea*. Not rare.

Amphibolips confluentus Harris. Oak apple.

Cynips confluentus Harris, Rept. ins. Mass. inj. veg., 1841, p. 397; Treat. ins. N. E. inj. veg., 1842, p. 397.

Cynips confluentus Harris, Treat. ins. N. E. inj. veg., 1852, p. 433; Treat. ins. inj. veg. (Flint ed.), 1862, p. 516.

Cynips quercus-spongifica Osten Sacken, Proc. Ent. soc. Phil., 1862, v. 1, p. 244-249; 1865, v. 4, p. 340-341, 354.

Walsh, Proc. Ent. soc. Phil., 1864, v. 2, p. 443-500, fig.

Walsh and Riley, Amer. ent., 1869, v. 1, p. 103, fig. 78.

Walsh, Amer. ent. and botan., 1870, v. 2, p. 330-335, fig. 5.

Cynips quercus-aciculata Osten Sacken, Proc. Ent. soc. Phil., 1862, v. 1, p. 56-57 note, 245; 1865, v. 4, p. 345.

Cynips quercus-coccineae Osten Sacken, Proc. Ent. soc. Phil., 1862, v. 1, p. 243, 248.

Amphibolips coccineae Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.

Packard, 5th rept. U. S. ent. comm., 1890, p. 104.

Amphibolips spongifica Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294; Psyche, 1903, v. 10, p. 154.

Gillette, Psyche, 1889, v. 5, p. 184.

Amphibolips confluentus Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 250, pl. 10, fig. 4.

Cook, Ohio nat., 1904, v. 4, p. 119, 126, 131, 141, fig. 105, 121.

A globular gall found attached to leaf by small portion. Monothalamous; larval cell surrounded by brown spongy mass, and that by a rather smooth thickened wall. Pale green and soft while fresh, turning brown and brittle. 2-4 cm. in diameter. Common on black, red and scarlet oaks, *Quercus velutina*, *Q. rubra* and *Q. coccinea*. Begins growth about

May. Males and females emerge in June. Some females remain until October (*C. aciculata* Osten Sacken.) A good example of dimorphism.

Amphibolips inanis Osten Sacken. Empty oak-apple.

- Callaspidia confluenta* Fitch (non Harris), 5th rept. ins. N. Y. f. 1858, 1859, p. 817.
Cynips quercus-inanis Osten Sacken, Proc. Ent. soc. Phil., 1861, v. 1, p. 58, 242; 1865, v. 4, p. 354.
 Walsh, Proc. Ent. soc. Phil., 1864, v. 2, p. 457-460; 1864, v. 3, p. 408-430.
 Walsh and Riley, Amer. ent., 1869, v. 1, p. 104, fig. 79.
 Walsh, Amer. ent., 1870, v. 2, p. 330-335, fig. 6.

- Amphibolips inanis* Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.
 Gillette, Psyche, 1889, v. 5, p. 184.
 Packard, 5th rept. U. S. ent. comm., 1890, p. 105.
 Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 251, pl. 10, fig. 5.
 Cook, Ohio nat., 1902, v. 2, p. 268, fig. 28; 1904, v. 4, p. 119, 126, 131, fig. 79, 104.

This is a spherical gall with thin walls from which many fibers extend towards the center, these holding in place the cell in which the larva develops. The gall is between 15 and 30 mm. in diameter, light yellow-green changing to light brown. Common on leaves of scarlet and red oak, *Quercus coccinea* and *Q. rubra*. Matures in June.

Amphibolips nubilipennis Harris. Transparent oak-gall. Fig. 23.

- Cynips nubilipennis* Harris, Rept. ins. Mass. inj. veg., 1841, p. 398; Treat. ins. N. E. inj. veg., 1842, p. 398; same, 1852, p. 434; Treat. ins. inj. veg. (Flint ed), 1862, p. 548.

- Cynips quercus-sculptus* Bassett, Proc. Ent. soc. Phil., 1863, v. 2, p. 324.
Cynips sculpta Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 356.
Cynips quercus-sculpta Packard, 5th rept. U. S. ent. comm., 1890, p. 114.
Amphibolips sculpta Gillette, Psyche, 1889, v. 5, p. 184.

- Packard, 5th rept. U. S. ent. comm., 1890, p. 105.
 Cook, Ohio nat., 1904, v. 4, p. 142, fig. 123.

- Amphibolips nubilipennis* Beutenmüller, Psyche, 1908, v. 15, p. 10.

A smooth, globular, fleshy, monothealous gall, looking like a green grape, translucent. 8-15 mm. in diameter. Difficult to preserve. Found on red oak, *Quercus rubra*, scarlet oak, *Q. coccinea* and black oak, *Q. velutina*. Insects appear in June.

Amphibolips prunus Walsh. Acorn plum-gall. Fig. 38-40

- Cynips quercus-prunus* Walsh, Proc. Ent. soc. Phil., 1864, v. 3, p. 639.
 Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 360.
 Walsh and Riley, Amer. ent., 1869, v. 1, p. 104, fig. 80-81.
Amphibolips prunus Gillette, Psyche, 1889, v. 5, p. 184.

- Packard, 5th rept. U. S. ent. comm., 1890, p. 105, 115.
 Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 252.
 Cook, Ohio nat., 1904, v. 4, p. 142, fig. 122.

A subspherical, fleshy, solid, monothealous gall. Smooth. Bright red shading to yellow within. About 15-30 mm. in diameter. On the cup of acorn of red oak, *Quercus rubra*, and scrub oak, *Q. nana*. Fairly common. Falls readily from the acorn, so it may be frequently found on the ground. The insect remains two years in the gall; emerges in the spring. When the gall grows to large size the acorn remains small.

Andricus piperoides Bassett.

- Andricus piperoides* Bassett, Trans. Amer. ent. soc., 1900, v. 26, p. 314-315.

These galls are found in clusters of one to five dozen along the midrib, looking as if they had burst out from the inside of the leaf or vein. Each

is smooth, spherical, attached by a small stem, 3-8 mm. in diameter, monothalamous, grayish or tinged with red. They fall to the ground, where the larva completes its metamorphosis, which sometimes requires two years. Insects in second summer. Leaves of red oak, *Quercus rubra*. Not rare.

Andricus singularis Bassett. Small oak apple.

Cynips quercus-singularis Bassett, Proc. Ent. soc. Phil., 1863, v. 2, p. 326.

Cynips singularis Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 355.

Cynips nubilipennis Fitch (non Harris). Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 340, 348.

Andricus singularis Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 295.

Gillette, Psyche, 1889, v. 5, p. 186.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

Bentzenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 256; pl. 11, fig. 4.

Spherical, smooth, thin-walled gall, projecting on both sides of the leaf. About 1 cm. in diameter. The larval cell held in place by radiating fibers. Green becoming brown and brittle. Common on red oak, *Quercus rubra*. Insects in July.

Callirhytis punctata Bassett. Knot oak-gall.

Cynips quercus-punctata Bassett, Proc. Ent. soc. Phil., 1863, v. 2, p. 324.

Cynips quercus-podagrarum Walsh, Proc. Ent. soc. Phil., 1864, v. 2, p. 492.

Cynips punctata, Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 341, 358.

Andricus (Callirhytis) punctata Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

Bentzenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 253-254.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 91, fig.

Andricus punctatus Gillette, Psyche, 1889, v. 5, p. 185.

An irregularly spherical, rough, woody gall, constricted at its union with the branch which it usually surrounds. Polythalamous. Color of the branch, but turning almost black with age. Varying greatly in size; sometimes several are united and masses the size of the fist are formed which impair the appearance of the tree. On black oak, *Quercus velutina*, and red oak, *Q. rubra*. Common. Reported on scarlet oak, *Q. coccinea*.

Cynips? constricta, n. s.

Fig. 24.

A smooth, fleshy, one-celled gall occurring scattered on the under side of the leaf, along midrib or larger veins. Urn-shaped. Green with red tips, shiny. 4-6 mm. tall, 3-4 mm. wide. On red oak, *Quercus rubra*. September.

Cynips decidua Bassett.

Fig. 54.

Cynips quercus-decidua Bassett, Proc. Ent. soc. Phil., 1864, v. 3, p. 689.

Riley, Amer. ent., 1880, v. 3, p. 278.

Packard, 5th rept. U. S. ent. comm., 1890, p. 115.

Clusters of seed-like galls, often thirty or more, growing on the midrib of leaves. Smooth, monothalamous, larger at tip where there is a slight ring. About 6 mm. long. Greenish-white, looking as if they had burst the covering. Full grown in October, but apparently the larvae grow after the galls have fallen to the ground. On red oak, *Quercus rubra*.

Dryophanta lanata Gillette.

Fig. 25.

Dryophanta lanata Gillette, Bull. Ill. state lab. nat. hist., 1891, v. 3, p. 198, pl. 9, fig. 5.

A cluster of several light brown, wooly galls, sometimes pink-tinted, found on the under side of the leaf. Individual galls cone-shaped, monothalamous, attached by tip of cone to common center. About 5 mm. wide, 5-7 mm. high. The galls fall from the leaf in early autumn. The flies emerge the following spring. Common on scarlet oak, *Quercus coccinea*. Figured on red oak, *Q. rubra*.

Holcaspis fasciata Bassett.

Fig. 43.

Holcaspis fasciata Bassett, Trans. Amer. ent. soc., 1900, v. 26, p. 328-329.

Spherical, smooth galls arranged in lines near the tips of the year's growth. In the fall full of a fleshy mass with no distinct organism. 5-15 mm. in diameter. Banded with irregular red and green spots. Turning dark and falling to the ground, where, during the next summer, the larva develops and emerges the succeeding fall. Common on scrub oak, *Quercus nana*; also found on *Q. coccinea*, *Q. velutina* and *Q. rubra*.

Quercus palustris.*Cecidomyia foliora* Russell and Hooker.

Fig. 30.

Cecidomyia foliora Russell and Hooker, Ent. news, 1908, v. 19, p. 349-352, pl. 14.

Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 384, 415.

Cecidomyia erubescens Osten Sacken, who described the gall only, in Loew's Mon. dipt. X. A., 1862, pt. 1, p. 200.

This gall consists of a rolling of the edge of the leaf over to the upper surface. Occasionally the larva begins eating at a hole in the leaf, causing the roll at that place. Color more or less red. One or more larvae. May. Common on scarlet oak, *Quercus coccinea*. Sometimes on black oak, *Q. velutina*, and pin oak, *Q. palustris*.

Cecidomyia majalis Bassett. See. p. 17.*Callirhytis cornigera* Osten Sacken. Horned-knot oak-gall.*Cynips quercus-cornigera* Osten Sacken, Proc. Ent. soc. Phil., 1862, v. 1, p. 251.*Cynips cornigera* Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 3, p. 358.*Andricus (Callirhytis) cornigera* Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.

Gillette, Psyche, 1889, v. 5, p. 185, 221.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

Beutenmüller, Bull. Amer. mns. nat. hist., 1892, v. 4, p. 253, pl. 10, fig. 3.

Cook, Ohio nat., 1904, v. 4, p. 122-123, 143-144, fig. 130.

Irregularly spherical, indented at union with stem, rough with protuberances from which the insect emerges. Polythalamous. Hard, woody, 2-5 cm. in diameter. Color of the branch of pin oak, *Quercus palustris*, on which it is found. Not common. Insects emerge in September; two sexes.

Callirhytis palustris Osten Sacken.

Succulent oak gall.

Fig. 37.

Cynips quercus palustris Osten Sacken, Proc. Ent. soc. Phil., 1861, v. 1, p. 51, 62-63; 1865, v. 4, p. 359; Trans. Amer. ent. soc., 1870, v. 3, p. 54-55.

Bassett, Proc. Ent. soc. Phil., 1863, v. 2, p. 329.

Walsh, Proc. Ent. soc. Phil., 1864, v. 2, p. 488.

- Andricus (Callirhytis) palustris* Bassett, Amer. nat., 1882, v. 16, p. 246.
 Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.
 Packard, 5th rept. U. S. ent. comm., 1890, p. 105, 113.
 Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 256.
Dryophanta palustris Cresson, Trans. Amer. ent. soc., 1887, v. 14, suppl., p. 179.
 Bassett, Trans. Amer. ent. soc., 1890, v. 17, p. 74.
Andricus palustris Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 71.
 Westwood (quoting Bose), Intr. mod. classif. ins., 1840, v. 2, p. 131, probably refers to this species.

Spherical, fleshy, smooth, hollow gall on young leaves. Monothalamous. The larval cell spherical, rolling about, unattached. Green, becoming brown. About 1 cm. in diameter. Rather common on pin oak, *Quercus palustris*. Abundant on aments and leaves of scarlet oak, *Q. coccinea*, and scrub oak, *Quercus nana*. Insects in May.

Quercus coccinea.

Cecidomyia foliora Russell and Hooker. See p. 21.

Cecidomyia majalis Osten Sacken. See p. 17.

Cecidomyia pustuloïdes Beutenmüller. Fig. 36.

Cecidomyia pustuloïdes Beutenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 390.

Irregular, blister-like, hard galls projecting from either or both sides of the leaf. Many on the edge, others scattered within the blade. One-celled to several-celled (!). Opening above or below. Leaf somewhat puckered. Galls 1.5-4 mm. in diameter, about 1 mm. thick. Walls rather thick, woody. Red, of color of surrounding parts of leaf when found, Oct. 11. On scarlet oak, *Quercus coccinea*, and black oak, *Q. velutina*.

Amphibolips coelebs Osten Sacken. See p. 18.

Amphibolips confluentus Harris. See p. 18.

Amphibolips inanis Osten Sacken. See p. 19.

Amphibolips nubilipennis Harris. See p. 19.

Amphibolips tinctoriae Ashmead. Fig. 19-20, 31.

Amphibolips tinctoriae Ashmead, Proc. U. S. nat. mus., 1896, v. 19, p. 125.

Thin-walled, smooth, monothalamous galls, sometimes several together, on tip of young twigs. Irregularly triangular in outline, much inflated on one side, with a distinctly sharp edge. The brown larval cell held in place by radiating fibers. Has a thin but hard wall; 6-20 mm. long, 4-11 mm. wide. Green with dark spots when young, brown when mature. Very abundant on one tree, from which many had fallen. Scarlet oak, *Quercus coccinea*, and black oak, *Q. velutina*.

Near Port Jefferson, Long Island, N. Y., in October, 1908, the ground under several oaks examined was literally strewn with these galls, which there averaged considerably larger. Many had their larval chambers emptied, apparently by birds.

Andricus? gallaestriatae, n. s. Striate oak-gall. Fig. 34.

A spindle-shaped gall developed from a very small bud near the base of last season's twig, projecting from the tip of the bud. Top blunt with inserted tip. Comparatively thick-walled, the one larval cell filling the space, with a mere suggestion of supporting fibers at either end. Stem longer than remainder of the gall. Gall about 2 cm. long, 2 mm. wide. Green yellow with each of the 7-10 longitudinal ridges tinged with red, more strongly on one side of the gall than on the other. On scarlet oak, *Quercus coccinea*. September.

This gall resembles *Andricus callidoma* Girard and *A. giraudi* Wachtl of Europe in situation and general shape, but is smooth instead of hairy. See C. Houard's *Les zoocécidies des plantes d'Europe*, 1908, p. 236 and 243.

Callirhytis fruticola Ashmead. Fig. 33.

Callirhytis fruticola Riley MS., *Ins. life*, 1893, v. 5, p. 196; Murtfeldt, *Ins. life* 1894, v. 6, p. 322. Ashmead, *Proc. U. S. nat. mus.*, 1896, v. 19, p. 131.

Small galls, several (7 or more) completely filling the shell of acorns. So massed as to give irregular shapes. Walls pithy, inner wall firm, rather thick, filled by white larva. Size varying with size of acorn. Brown without, white within. On scarlet oak, *Quercus coccinea*. May be quite common, but the acorns give no external indication of their presence, so it is seldom noticed.

Callirhytis palustris Osten Sacken. See p. 21-22.

Callirhytis punctata Bassett. See p. 20.

Callirhytis pusulatoides Bassett.

Andricus (Callirhytis) pusulatoides Bassett, *Trans. Amer. ent. soc.*, 1890, v. 17, p. 74.

"Blister-like galls on the points of the acute lobes of the leaves of *Quercus coccinea*, each tipped with the long hair-like point that terminates each lobe. They are ovate-acuminate, and look as if a bubble of air had separated the upper and under lamina of the leaf. They are about one-third by one-fifth of an inch in diameter, sometime a little depressed vertically. The walls are very thin, the color the same as the leaf. Each contains a free, oblong-oval, thin-walled larval cell, whose length is fully twice its diameter."

Callirhytis saccularius Bassett.

Callirhytis saccularius Bassett, *Trans. Amer. ent. soc.*, 1890, v. 17, p. 76.

An irregularly hemispherical gall projecting from the under side of the leaf, showing above a brown circle in which is usually the opening through which the adult emerges. Green becoming brown, surface with rather long, scattered hairs. Monothalamous with thin walls, 3-4 mm. in diameter, 2-3 mm. deep. On scarlet oak, *Quercus coccinea*, usually, sometimes on black oak, *Q. velutina*.

Cynips? cristata, n. s. Oak tufted gall. Fig. 41.

A polythalamous gall on the upper side of the leaf, usually on a vein. About 1 mm. in diameter. Covered with a dense mass of silky hairs about 0.5 mm. long. Red when young, soon becoming brown. On scarlet oak, *Quercus coccinea*, and scrub oak, *Q. nana*.

Cynips? obovata, n. s. Obovate oak-gall. Fig. 21, 35.

A deformation of the bud, terminal or near the tip. Obovate, slightly pointed, smooth, with thin shell to which the single larval chamber is attached by radiating fibers. About 12 mm. long, 8 mm. wide. Dull yellow-green becoming light brown, thickly sprinkled with dots of violet-red, these sometimes so running together as to make one side nearly all red. Fairly common on scarlet oak, *Quercus coccinea*. September.

Cynips? sera, n. s.

A smooth, fleshy, subglobular gall, on the under side of the leaf, slightly attached to the blade or very small vein. A slight depression at the top. White, with tinge of pink, to deep red of autumn color of the leaf. 2-4 mm. in diameter. Monothalamous. Quite abundant on scarlet oak, *Quercus coccinea*, in September and October.

Quercus velutina.

Cecidomyia foliora Russell and Hooker. See p. 21.

Cecidomyia majalis Osten Sacken. See p. 17.

Cecidomyia pustuloides Beutenmüller. See. p. 22.

Amphibolips confluentus Harris. See p. 18.

Amphibolips nubilipennis Harris. See p. 19.

Amphibolips tinctoriae Ashmead. See p. 22.

Callirhytis punctata Bassett. See p. 20.

Callirhytis saccularius Bassett. See p. 23.

Holcaspis fasciata Bassett. See p. 21.

Quercus nana.

Eriophyes querci Garman. Oak mite gall. Fig. 52.

Phytoptus querci Garman, 12th rept. state ent. Ill., 1883, p. 138.

Packard, 5th rept. U. S. ent. comm., 1890, p. 213-214.

Eriophyes querci Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 61.

This gall appears on the upper surface of the leaf as a circular convex swelling, below it is concave, filled with pink or brown pubescence: rarely occurs with the upper surface concave, but the pubescence below as in the common form. Of variable size. Described from specimens from *Quercus macrocarpa*. Found here on white oak, *Quercus alba*. Chestnut oak, *Q. prinus*, dwarf chestnut oak, *Q. prinoides* and scrub oak, *Q. nana*. Rather common.

Amphibolips ilicifoliae Bassett. Scrub-oak gall. Fig. 44.*Cynips quercus-ilicifoliae* Bassett, Proc. Ent. soc. Phil., 1864, v. 3, p. 681-682.*Cynips ilicifoliae* Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 340, 355.*Amphibolips ilicifoliae* Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 252, pl. 10, fig. 6.

Cook, Ohio nat., 1904, v. 4, p. 142.

A rather rough fusiform gall, tapering at either end, especially at tip. Thin-walled, the larval chamber in the center, held in place by radiating fibers. About 40 mm. long, half as broad in broadest part. Light green changing to light brown in autumn. Very common on leaves of scrub oak, *Quercus nana*.

Amphibolips prunus Walsh. See p. 19.*Andricus flocci* Walsh. Oak wool-gall. Fig. 46.*Cynips quercus-flocci* Walsh, Proc. Ent. soc. Phil., 1864, v. 2, p. 482-483.*Andricus flocci* Gillette, Psyche, 1889, v. 5, p. 185-186, 221.

The following references are to *Synergus lana* Fitch, an inquiline in the gall made by *Andricus flocci*, but the gall should be designated by the name of its maker.

Cynips quercus-lana Fitch, 5th rept. ins. N. Y. for 1858, 1859, p. 814.

Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 350.

Andricus lana Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 295.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 257, pl. 11, fig. 5.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 71, pl. D, fig. 1.

Synergus lana Cresson, Trans. Amer. ent. soc., 1887, v. 14, suppl., p. 180.

Numerous small seed-like galls grouped on a large vein of the leaf, covered with a woolly white or a light brown mass. About 15 mm. long. On the under side of leaves of white oak, *Quercus alba*, and scrub oak, *Q. nana*. Common.

Andricus imbricariae Ashmead.*Andricus imbricariae* Ashmead, Proc. U. S. nat. mus., 1896, v. 19, p. 122.

"A brownish, hard, globular gall, from 7 to 10 mm. in diameter, issuing, usually several together, from a fissure in a twig of *Quercus imbricaria* and *Q. nana*. The larval cell is nearly always closely cemented to the thick, hard, outer rind, but in a single instance there are a few fibers separating it." "Reared Sept. and Oct." Found here on scrub oak, *Q. nana*.

Andricus ventricosus Bassett. Fig. 49-50.*Cynips quercus-ventricosa* Bassett, Proc. Ent. soc. Phil., 1864, v. 3, p. 681.Packard, 5th rept. U. S. ent. comm., 1890, p. 114. (*Op. cit.*, p. 105, as *Andricus ventricosus*.)

Conical, rough, woody galls, the point sometimes prolonged into a recurved tip. In clusters, sometimes a dozen about the twig. When closely pressed together the shape is somewhat changed. 7-12 mm. long, 3-7 mm. wide. Slightly pubescent. Deep red, becoming nearly black. One free larval cell at the base. Galls collected in June, insect developed in October but does not emerge until spring. On scrub oak, *Quercus nana*.

Callirhytis operator Osten Sacken. Fig. 47-48.*Cynips quercus-operator* Osten Sacken, Proc. Ent. soc. Phil., 1862, v. 1, p. 256-257; 1865, v. 4, p. 341, 357.

Bassett, Proc. Ent. soc. Phil., 1863, v. 2, p. 332-333; Can. ent., 1873, v. 5, p. 91-94; 1877, v. 9, p. 121.

Riley, Amer. nat., 1873, v. 7, p. 519, note.

Howard, Psyche, 1882, v. 3, p. 328-329.

Packard, 5th rept. U. S. ent. comm., 1890, p. 11.

Andricus (Callirhytis) operator Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

This species was the one from which the combined observations of Bassett and Riley proved the interesting fact of alternating generations in *Cynipidae*.

The spring form consists of a woolly mass on the staminate aments, 2-4 cm. in diameter, dull yellow in color, from which emerge numerous insects of both sexes. The second form, producing an agamic female, consists of a monothalamous, irregular gall growing out from the cup and pressed close to the side of the acorn. Smooth, light brown, the larval cell nearly filling the gall. About 8 mm. long, 5 mm. wide. On scrub oak, *Quercus nana*. Spring form abundant and noticeable.

Callirhytis palustris Osten Sacken. See p. 21-22.

Callirhytis similis Bassett. Scrub-oak club-gall. Fig. 45.

Cynips quercus-similis Bassett, Proc. Ent. soc. Phil., 1864, v. 3, p. 685.

Cynips similis Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 341.

Andricus (Callirhytis) similis Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 255, pl. 11, fig. 2.

Club-shaped, woody gall at end of twig. Rather blunter than gall of *Callirhytis clavula*. Polythalamous. A few leaves grow from it. Green, turning brown; surface looks as if covered with dust. 2-4 cm. long. Rather common on scrub oak, *Quercus nana*.

Callirhytis tuberosa Bassett.

Andricus (Callirhytis) tuberosa Bassett, Trans. Amer. ent. soc., 1900, v. 26, p. 311.

A tuberosus gall on one side or surrounding a young shoot near the tip. Smooth at first, but wrinkling and roughening later. The same color as the twig, quite green early in the season. 8-15 mm. long, 7-12 mm. wide; rising abruptly from the twig. Monothalamous, the cell-walls 2-3 mm. thick; corky, the bark showing distinctly. The white larvae have partially buried themselves in the wall in places. September. On scrub oak, *Quercus nana*.

Cynips? aspera, n. s.

Fig. 22, 42.

An ovate, roughened, one-celled bud-gall, usually terminal and solitary, occasionally lateral, or in pairs. From the slightly prolonged tip run down two ridges nearly to the base of the slightly flattened, asymmetrical gall. About 12 mm. long, 7 mm. wide. Green, sometimes dotted with red. The larval cell is held in place by radiating fibers. On scrub oak, *Quercus nana*. September.

Cynips? cristata, n. s. See p. 24.

Holcaspis fasciata Bassett. See p. 21.

Quercus alba.

Eriophyes querci Garman. See p. 24.

Cecidomyia? poculum Osten Sacken. Oak spangles.

Cecidomyia poculum Osten Sacken, in Loew's Mon. dipt., N. A., 1862, pt. 1, p. 201.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 271, pl. 15, fig. 4;

Ins. galls vicin. N. Y., 1904, p. 30, fig.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 69.

Small, saucer-shaped galls on under side of leaf. 2-3 mm. in diameter. Red or violet with white bloom. On white oak, *Quercus alba*. Common. August and September.

Andricus flocci Walsh. See p. 25.

Andricus petiolicola Bassett. Oak petiole-gall. Fig. 55.

Cynips quercus-petiolicola Bassett, Proc. Ent. soc. Phil., 1863, v. 2, p. 325.

Walsh, Proc. Ent. soc. Phil., 1864, v. 2, p. 487.

Cynips petiolicola Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 339, 351, 379.

Andricus petiolicola Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 295.

Gillette, Psyche, 1889, v. 5, p. 186.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 257, pl. 13, fig. 2.

Cook, Ohio nat., 1904, v. 4, p. 120, 126, 142, fig. 83, 103, 124.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 70.

A woody, club-shaped gall on petiole or midrib of leaf. Polythalamous. About 15 mm. in diameter. Green becoming brown. Common on white oak, *Quercus alba*, chestnut oak, *Q. prinus* and dwarf chestnut oak, *Q. prinoides*.

Callirhytis clavula Osten Sacken. White-oak club-gall.

Cynips quercus-tuber Bassett, Proc. Ent. soc. Phil., 1864, v. 3, p. 685-687; 1885, v. 4, p. 351.

Cynips clavula Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 351, 379.

Andricus (Callirhytis) clavula Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105, 113.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 255-256, pl. 11, fig. 3.

Cook, Ohio nat., 1902, v. 2, p. 272, fig. 33; 1903, v. 3, p. 419.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 91, pl. C., fig. 3.

Club-shaped woody gall at end of twigs. Sometimes leaves develop from the bud of which this gall is a malformation. Polythalamous, 2-4 cm. long. Green occasionally faintly marked with red, turning brown. Common on white oak, *Quercus alba*. Insects from April to July.

Callirhytis futilis Osten Sacken. Oak wart-gall.

Cynips quercus-futilis Osten Sacken, Proc. Ent. soc. Phil., 1861, v. 1, p. 63-64.

Cynips futilis Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 339, 352.

Andricus futilis Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 379.

Andricus (Callirhytis) futilis Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.

Gillette, Psyche, 1889, v. 5, p. 185.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 254; pl. 11, fig. 1.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 89-90, pl. B, fig. 4.

Callirhytis futilis Bassett, Psyche, 1889, v. 5, p. 235-238.

Rounded, projecting on both sides of the leaf. Thin-walled. Two or more larval cells held in center by radiating fibers. Light green. About 7 mm. in diameter. Very common on white oak, *Quercus alba*. Insects emerge in June.

Callirhytis seminator Harris. Oak seed-gall.

Cynips seminator Harris, Rept. ins. Mass. inj. veg., 1841, p. 399; Treat. ins. N. E. inj. veg., 1842, p. 399; same, 1852, p. 434; Treat. ins. inj. veg. (Flint ed.), 1862, p. 548.

Fitch, 5th rept. ins. N. Y. for 1858, 1859, p. 813.

Osten Sacken, Proc. Ent. soc. Phil., 1861, v. 1, p. 69; 1865, v. 4, p. 339, 351.

Walsh and Riley, Amer. ent., 1869, v. 1, p. 250, fig. 187; 1870, v. 2, p. 71, fig. 45.

Andricus seminator Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 379.

Cook, Ohio nat., 1903, v. 3, p. 420, fig. 35-36; 1904, v. 4, p. 144, fig. 131.

Andricus (Callirhytis) seminator Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 294.

Packard, 5th rept. U. S. ent. comm., 1890, p. 105, 112.

Gillette, Psyche, 1889, v. 5, p. 185.

Callirhytis seminator Beutenmüller, Psyche, 1908, v. 15, p. 10.

These small seed-like monothalamous galls are massed together on the twig and covered with fibers forming a mass 15-45 mm. in diameter. White dotted with red when young, turning brown in the fall. On white oak, *Quercus alba*. Common. Insect in early summer.

Cynips strobilana Osten Sacken. Pine-cone oak-gall.

Cynips quercus-strobilana Osten Sacken, Proc. Ent. soc. Phil., 1862, v. 1, p. 254.

Cynips strobilana Beutenmüller, Ins. galls vicin. N. Y., 1904, p. 18, fig. 33.

A cluster of monothalamous galls so crowded together as to become pointed below, forming a subglobular mass, about a common center on the twig. Woody, corky within. Brown. Rare. On white oak, *Quercus alba*. Reported from *Q. platanoides*. September.

Acraspis pezomachoides Osten Sacken. Oak pea-gall.

Cynips pezomachoides Osten Sacken, Proc. Ent. soc. Phil., 1862, v. 1, p. 250; 1865, v. 4, p. 352.

Acraspis pezomachoides Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 303.

Cynips pisum Fitch is a guest-fly of *Acraspis pezomachoides*, and Fitch described the gall under the name of the guest-fly: 5th rept. ins. N. Y. for 1858, 1859, p. 818.

To this the following references may be added:

Osten Sacken, Proc. Ent. soc. Phil., 1861, v. 1, p. 59; 1865, v. 4, p. 352.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 258-259; Ins. galls vic. N. Y., 1904, p. 18, fig.

Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 840.

Spherical gall with rough or netted surface, with slight elevations. Usually two-celled, sometimes as many as six or even eight cells (Ashmead). From 3 to 6 mm. in diameter. Green becoming light brown. Easily separated from the leaf. Common on under, sometimes on upper, side of leaf of white oak, *Quercus alba*.

Xanthoheras forticornis Walsh. Oak fig-gall.

Cynips quercus-forticornis Walsh, Proc. Ent. soc. Phil., 1864, v. 2, p. 490.

Cynips forticornis Walsh and Riley, Amer. ent., 1869, v. 1, p. 251.

Teras forticornis Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 379.

Cynips quercus-ficus Packard (not Fitch), Packard, 5th rept. U. S. ent. comm., 1890, p. 111.

- Biorhiza forticornis* Bassett, Amer. nat., 1882, v. 16, p. 246.
 Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 296.
 Gillette, Psyche, 1889, v. 5, p. 186.
 Packard, 5th rept. U. S. ent. comm., 1890, p. 106.
 Bentenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 259, pl. 13, fig. 3.
 Cook, Ohio nat., 1904, v. 4, p. 142, fig. 126.
 Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 90, fig.
- Xanthoterus forticornis* Ashmead, Psyche, 1903, v. 10, p. 149.

Many of these galls are pressed together so closely on the twig as to lose all normal form, becoming flattened. Thin-walled, one-celled, the larval cell held in place by radiating fibers. Yellow, sometimes with red sides, turning brown. Common on white oak, *Quercus alba*. Insects emerged from July 1 to 13.

Holcaspis globulus Fitch.

Bullet gall.

- Callaspidia globulus* Fitch, 5th rept. ins. N. Y., for 1858, 1859, p. 811.
 Packard, 5th rept. U. S. ent. comm., 1890, p. 106, 111.
- Cynips quercus-globulus* Osten Sacken, Proc. Ent. soc. Phil., 1861, v. 1, p. 67.
 Bassett, Proc. Ent. soc. Phil., 1863, v. 2, p. 328.
- Cynips globulus* Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 339, 350.
- Holcaspis globulus* Bassett, Amer. nat., 1882, v. 16, p. 246.
 Gillette, Psyche, 1889, v. 5, p. 187.
 Bentenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 260, pl. 12, fig. 4.
 Ashmead, Psyche, 1903, v. 10, p. 153.
 Cook, Ohio nat., 1903, v. 3, p. 419, fig. 34; 1904, v. 4, p. 127, fig. 109; p. 143, fig. 128; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 835, fig. 27.
- Cynips oneratus* Harris (now known as *Synërgus oneratus*) is a guest-fly of *Holcaspis globulus*, and Harris described the gall under the name of the guest-fly: Rept. ins. Mass. inj. veg., 1841, p. 398; Treat. ins. N. E. inj. veg., 1842, p. 398; same, 1852, p. 434; Treat. ins. inj. veg. (Flint ed.), 1862, p. 548.

Spherical, smooth, corky, monothalamous galls on twigs. Two or three in a cluster, 10-15 mm. in diameter. Yellow with red tints, turning brown when mature. Larval cell oval with thin shell. Common on white oak, *Quercus alba*. Insects emerge in November.

Neuroterus batatus Fitch.

Oak potato-gall.

- Cynips quercus-batatus* Fitch, 5th rept. ins. N. Y. for 1858, 1859, p. 810.
 Osten Sacken, Proc. Ent. soc. Phil., 1861, v. 1, p. 71; 1864, v. 4, p. 340, 353.
 Bassett, Proc. Ent. soc. Phil., 1864, v. 3, p. 684.
- Neuroterus batatus* Bassett, Amer. nat., 1882, v. 16, p. 246.
 Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 296.
 Packard, 5th rept. U. S. ent. comm., 1890, p. 11, 107, 111, 113.
 Bentenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 262, pl. 13, fig. 1.

Irregular, "potato-shape," hard, woody, polythalamous gall, sometimes 6 or 7 cm. long by 2-3 cm. thick. Reddish brown with pale blue bloom. Common on twigs of white oak, *Quercus alba*. Insects emerge in May or June.

Neuroterus exiguissimus Bassett.

Fig. 51.

- Neuroterus exiguissimus* Bassett, Trans. Amer. Ent. soc., 1900, v. 26, p. 332-333.

A hairy gall on under side of leaf along the veins with a slight elevation above. Monothalamous. Leaves usually deformed. About 2 mm. Much like the gall of *Neuroterus floccosus* on *Quercus platanoïdes*. On white oak, *Quercus alba*. August.

Neuroterus vesiculus Bassett.*Cynips vesiculus* Bassett, Can. ent., 1881, v. 13, p. 97-98.*Neuroterus vesicula* Bassett, Amer. nat., 1882, v. 16, p. 246.*Neuroterus vesiculus* Packard, 5th rept. U. S. ent. comm., 1890, p. 107, 109.

A monothalamous, subglobular gall appearing late in the fall in the center of a bud at or near the tip of the twig. Slightly corrugated, with a small projecting tip. Of the color of the bud. Cell comparatively large. Develops rapidly in the following spring. On white oak, *Quercus alba*. Rare.

Cynips? sp.

A monothalamous cynipid gall is common on the under side of the leaves of the white oak, occurring singly. It is spherical, covered with dense pubescence. Color yellow, often with a rosy tinge. Diameter 3-8 mm. Falls to the ground during the last half of September. (This gall resembles closely that of *Cynips prinoides* Beutenmüller, which occurs on *Quercus prinoides*, but the latter usually is on the upper surface of the leaf.)

Quercus platanoides.*Cynips strobilana* Osten Sacken. See p. 28.*Halcaspis duricoria* Bassett.

Pointed bullet-gall.

Fig. 53.

Halcaspis duricoria Bassett, Trans. Amer. ent. soc., 1890, v. 17, p. 64-65.

Bassett, Amer. nat., 1882, v. 16, p. 246.

Gillette, Psyche, 1889, v. 5, p. 187.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 261, pl. 12, fig. 5.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 71.

Globular with short point at apex. Somewhat rough, woody, monothalamous galls. Larval cell oval with rather thin shell. 10-15 mm. in diameter. Yellow with tint of red, turning brown when mature. Singly, or in groups, on twigs of swamp white oak, *Quercus platanoides*. Insects emerge in November.

Neuroterus floccosus Bassett.

Oak flake-gall.

Cynips floccosa Bassett, Can. ent., 1881, v. 13, p. 111.*Neuroterus floccosus* Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 296.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 262, pl. 12, fig. 2;

Ins. galls vicin. N. Y., 1904, p. 22, fig.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 71.

Hemispherical, hairy monothalamous galls on under side of leaf. Found in numbers. Upper side of leaf reveals their presence by smooth blister-like projections. About 3 mm. in diameter including hairs. Hairs white. On swamp white oak, *Quercus platanoides*. Insects emerge in the succeeding spring.

Neuroterus noxiosus Bassett.

Noxious oak-gall.

Cynips noxiosa Bassett, Can. ent., 1881, v. 13, p. 108.*Neuroterus noxiosus* Bassett, Amer. nat., 1882, v. 16, p. 246.

Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 296.

Gillette, Psyche, 1889, v. 5, p. 187.

Packard, 5th rept. U. S. ent. comm., 1890, p. 107.

Beutenmüller, Ins. galls vicin. N. Y., 1904, p. 21, fig. 42.

Irregular, rounded, woody, polythalamous twig gall. Sometimes quite small, sometimes almost 10 cm. long. Common on swamp white oak, *Quercus platanooides*. Bassett says that only females emerge before leaves appear in the succeeding spring. These females produce a vernal crop of green, smooth grape-like galls on leaves of same oak. From these galls about June 20 emerge great numbers of male and female flies the bisexual generation.

Quercus prinus.

Eriophyes querci Garman. See p. 24.

Andricus petiolicola Bassett. See p. 27.

Callirhytis papillata Osten Sacken. Oak nipple-gall.

Cynips quercus-papillata Osten Sacken, Proc. Ent. soc. Phil., 1861, v. 1, p. 64-65.

Cynips papillata Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 352.

Andricus papillata Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 379.

Andricus (Callirhytis) papillata Ashmead, Trans. Amer. ent. soc., 1885, v. 12, p. 295.

Packard, 5th rept. U. S. ent. comm. 1890, p. 105.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 255;

Ins. galls vicin. N. Y., 1904, p. 14, fig.

Callirhytis papillatus Cook, Ohio nat., 1902, v. 2, p. 269, fig. 30; 1903, v. 3, p. 427, fig. 64; 1904, v. 4, p. 119, 120, 124, 126-127, 141, fig. 81, 107-108.

Rounded, highest at middle, projecting on both sides of the leaf. Light green, surrounded on the under side by a reddish ring. Two or more larval cells are held in place by radiating fibers. Rather common on chestnut oak, *Quercus prinus*. Insect in June.

Quercus prinoides.

Eriophyes querci Garman. See p. 24.

Andricus petiolicola Bassett. See p. 27.

Cynips caducus. Fig. 58.

Cynips caducus Walsh, according to Packard, 5th rept. U. S. ent. comm., 1890, p. 115.

A spherical gall occurring in clusters on midrib on under side of the leaf. 2-5 mm. in diameter. Sometimes so crowded as to lose their shape. One-celled. Falling from the leaf, the larvae change on the ground. On dwarf chestnut oak, *Quercus prinoides*. Cited from other oaks. August.

Cynips frondosa Bassett. Leafy oak-gall. Fig. 57.

Cynips quercus-frondosa Bassett, Proc. Ent. soc. Phil., 1864, v. 3, p. 688-689.

Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 350, 361.

Walsh and Riley, Amer. ent., 1869, v. 2, p. 25, fig. 20; p. 72-73, fig. 46.

This gall is formed by the development of a leaf bud, in the fall instead of the following spring. The leaves grow in a crowded mass and attain about one fifth their normal length and breadth. Monothalamous. Color the same as normal leaves. On dwarf chestnut oak, *Quercus prinoides*.

Cynips prinoides Beutenmüller. Spring oak-gall. Fig. 59.

Cynips prinoides Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 257, pl. 11, fig. 6; Ins. galls vicin. N. Y., 1904, p. 17, fig.

A rough, globular gall on the upper side of the leaf. Hard, woody, one-celled. Green with red tint, becoming brown. About 1 cm. in diameter. On dwarf chestnut oak, *Quercus prinoides*.

Holcaspis rugosa Bassett.

Fig. 56.

Cynips rugosa Bassett, Can. ent., 1881, v. 13, p. 100.

Holcaspis rugosa Gillette, Psyche, 1889, v. 5, p. 187.

Round, somewhat roughened, woody galls on branch of dwarf chestnut oak, *Quercus prinoides*. Frequently several are so crowded as to lose the spherical shape. Green with red side when young, turning brown. Free larval cell surrounded by brown hard-spongy mass. Diameter about 10-12 mm. Insects emerge in the fall.

URTICALES.

ULMACEAE.

Ulmus americana.

Eriophyes ulmi Garman.

Elm mite-gall.

Fig. 61.

Phytoptus ulmi Garman, 12th rept. state ent. Ill., 1883, p. 136.

Paekard, 5th rept. U. S. ent. comm., 1890, p. 281-282.

Cook, Ohio nat., 1902, v. 2, fig. 8; 1904, v. 4, p. 117.

Eriophyes ulmi Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 861.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 59, pl. B, fig. 5.

A small globular gall on the upper surface of the leaf. The neck constricted somewhat. Not common. On elm, *Ulmus americana*.

Schizoneura americana Riley.

Elm-leaf louse-gall.

Schizoneura americana Riley, Bull. U. S. geol. and geog. surv. terr., 1879, v. 5, p. 4-9, pl. 1, fig. 1.

Oestlund, Bull. 4, Geol. and nat. hist. surv. Minn., 1887, p. 27.

Paekard, 5th rept. U. S. ent. comm., 1890, p. 279.

Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 851.

Houard, Les Zoocécidies des plantes d'Europe, 1908, p. 364.

A gall which is simply a wrinkling and rolling of the leaf, caused by the attacks of the insects on the under side of the leaf. White elm, *Ulmus americana*. Common.

Colopha ulmicola Fitch.

Cock's-comb elm-gall.

Byrsocrypta ulmicola Fitch, 5th rept. ins. N. Y. for 1858, 1859, p. 843.

Thelaxes ulmicola Walsh, Proc. Ent. soc. Phil., 1862, v. 1, p. 305.

Walsh and Riley, Amer. ent., 1869, v. 1, p. 108-109, fig. 90.

Pemphigus ulmicola Paekard, Guide study ins., 1869, p. 524, fig. 525.

Colopha ulmicola Monell, Can. ent., 1877, v. 9, p. 102-103.

Riley, Bull. U. S. geol. and geog. surv. terr., 1879, v. 5, p. 9-13, pl. 1, fig. 2.

Cook, Ohio nat., 1902, v. 2, p. 265, fig. 13; 1903, v. 3, p. 425, fig. 50; 1904, p. 118, 125, 130.

Beutenmüller, Ins. galls vicin. N. Y., 1904, p. 37, fig.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 63-64, pl. C, fig. 5.

Glyphina ulmicola Thomas, Trans. Dept. agr. Ill., f. 1878, 1879, n. s., v. 8 (Thomas, 3d rept. ins. Ill.), p. 142.

This gall consists of a cock's-comb-shaped pouch on the upper side of the leaf of white elm, *Ulmus americana*. Early summer. Common.

Undetermined gall.

A monothalamous, subglobular gall at union of blade and petiole. Rough, rather thick-walled, brown. About 7 mm. in diameter. One specimen. On elm, *Ulmus americana*.

Ulmus fulva.

Pemphigus fusus Walsh and Riley. Elm spindle-gall. Fig. 60.

Pemphigus ulmi-fusus Walsh and Riley, Amer. ent., 1869, v. 1, p. 109.

Cook, Ohio nat., 1902, v. 2, p. 265, fig. 14; 1903, v. 3, p. 425, fig. 49; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 849.

A spindle-shaped, hollow gall on the upper side of the leaf with the opening below. Varying in size, about 15 mm. long. Not common. On slippery elm, *Ulmus fulva*. Summer.

Celtis occidentalis.

Pachypsylla cucurbita Riley. Hackberry melon-gall.

Pachypsylla celtidis-cucurbita Riley, 5th rept. U. S. ent. comm., 1890, p. 621-622.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 276, pl. 16, fig. 2.

An oval gall with truncated apex and concave above with a small nipple. Usually on under side of the leaf. About 2 mm. in diameter at base, 4 mm. in height. On the upper side of the leaf there is a cup-shaped depression. Color yellow green. On the hackberry, *Celtis occidentalis*.

Pachypsylla mamma Riley.

Pachypsylla celtidis-mamma Riley, Johnson's universal cyclop., 1876, p. 425; Proc. Biol. soc. Wash., 1884, v. 2, p. 73-75; 5th rept. U. S. ent. comm., 1890, p. 619-620, fig. 202-203.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 275; Ins. galls vicin. N. Y., 1904, p. 35-36, fig.

Cook, Ohio nat., 1903, v. 3, p. 426, fig. 59-60; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 845, fig. 37.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 65.

A nearly cylindrical gall on the under side of the leaf, with the apex rounded. A cup-shaped depression on the upper side shows presence of the gall. Varying considerably in size, about 7 mm. high, 5 mm. in diameter. Color yellow green. Very abundant on hackberry, *Celtis occidentalis*.

Pachypsylla vesiculum Riley. Hackberry blister-gall.

Pachypsylla celtidis-vesiculum Riley, 5th rept. U. S. ent. comm., 1890, p. 618.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 275; Ins. galls vicin. N. Y., 1904, p. 35, fig.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 65.

A circular, blister-like gall. Slightly rounded above, beneath convex with a small central projection. Green. About 4-6 mm. in diameter. Numerous on the leaves of hackberry, *Celtis occidentalis*.

MAGNOLIACEAE.

Liriodendron tulipifera.

Contarinia liriodendri Osten Sacken. Tulip-tree spot-gall.

Cecidomyia liriodendri Osten Sacken, in Loew's Mon. dipt. N. A. 1862, pt. 2, p. 202.

Hagen, Can. ent., 1886, v. 18, p. 159.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 265; Ins. galls vicin. N. Y., 1904, p. 25, fig.

Contarinia liriodendri Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 383, 393.

Circular brown spots with surrounding circle of yellow or light green, showing on both sides of the leaf, 1-3 mm. in diameter. Not uncommon on leaf of tulip tree, *Liriodendron tulipifera*.

RANALES.

RANUNCULACEAE.

Clematis virginiana.*?Dasyneura clematidis* Felt.

Fig. 62.

Dasyneura clematidis Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 336, 344, 345.

This gall (possibly of the above species) consists of an elliptical enlargement of the stem, between the nodes, about twice the normal diameter. The inside, pithy and much roughened, looks in places as if eaten or gnawed thin. A round hole is evidently an exit. On wild clematis, *Clematis virginiana*.

ROSALES.

GROSSULARIACEAE.

Ribes rubrum.*Myzus ribis* Linné.

Currant leaf gall.

Fig. 63.

Aphis ribis Linné, Syst. naturae, 1767, 12th ed., v. 2, p. 733.

Walsh and Riley, Amer. ent., 1869, v. 1, p. 249.

Myzus ribis Oestlund, Bull. 4, Geol. and nat. hist. surv. Minn., 1887, p. 74.

*Lintner, 9th rept. ins. N. Y., 1893, p. 370-371.

This gall consists merely of a wrinkling and pouching of the leaf. The insect acts on the under side of the leaf surrounded by the induced pubescence and the tissues increase so rapidly as to make the gall rise above. On currant, *Ribes rubrum*. Common, sometimes causing damage.

HAMAMELIDACEAE.

Hamamelis Virginiana.*Hamamelistes spinosus* Shimer.

Spiny witch-hazel gall.

Hamamelistes spinosus Shimer, Trans. Amer. ent. soc., 1867, v. 1, p. 284-285.

Pergande, Bull. 9, tech. series, Div. ent., U. S. dept. agr., 1901, p. 25-44, fig. 12-23.

Hormaphis spinosus Riley, Bull. U. S. geol. and geog. surv. terr., 1879, v. 5, p. 14-15, pl. 2, fig. 4. Thomas, Trans. Dept. agr. Ill., f. 1878, 1879, n. s., v. 8, (Thomas, 3d rept. ins. Ill.), p. 207.

Bentennüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 276, pl. 16, fig. 4; Ins. galls vicin. N. Y., 1904, p. 37, fig.

Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 847, fig. 39.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 64, pl. C, fig. 1.

Hormaphis papyraceae Oestlund, Bull. 4, Geol. and nat. hist. surv. Minn., 1887, p. 19.

A monothalamous, globular, spiny gall, which is a deformed fruit bud. The opening below, funnel-shaped. Spines long. Green, becoming nearly black. Common on witch hazel, *Hamamelis virginiana*. Pergande gives a full account of the life history, with the generations found on the birch leaf, in this region on black birch, *Betula lenta*.

Hormaphis hamamelidis Fitch.

Witch-hazel cone-gall.

Byrsocrypta hamamelidis Fitch, 4th ann. rept. regents Univ. state of N. Y. on State cabinet nat. hist., 1851, p. 69.*Hormaphis hamamelidis* Osten Sacken, Stettin ent. ztg., 1861, p. 422. (Translation by Walsh, Proc. Ent. soc. Phil., 1866-1867, v. 6, p. 281.)

Thomas, Trans. Dept. agr. Ill., f. 1878, 1879, n. s., v. 8, (Thomas, 3d rept. ins. Ill.), p. 199.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, p. 276, pl. 16, fig. 5; Ins. galls vicin. N. Y., 1904, p. 36, fig.

Pergande, Bull. 9, tech. series, Div. ent., U. S. dept. agr., 1901, p. 7-25, fig. 1-11.

Cook, 29th ann. rept. Dept. geol. and nat. hist. res. Indiana f. 1904, 1905, p. 845-846, fig. 38.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 64, pl. C, fig. 2.

Hamamelistes cornu Shimer, Trans. Amer. ent. soc., 1867, v. 1, p. 283.

A conical, monothalamous gall on the upper side of the leaf with the opening underneath. Very common on witch hazel, *Hamamelis virginiana*.

ROSACEAE.

Spiraea salicifolia.

Cecidomyia? lappa, n. s.

Terminal mass of brown or, when quite young, green, mossy in appearance, strongly resembling *Rhodites rosae*, but coarser. Each gall consists of an undeveloped bud, the leaves of which have the tips much elongated. The central cavity is enclosed by the overlapping leaves. Not rare. On meadow-sweet, *Spiraea salicifolia*.

Cecidomyia salicifoliae Osten Sacken. Meadow-sweet pod-gall. Fig. 64.

Cecidomyia salicifoliae Osten Sacken, Proc. Ent. soc. Phil., 1866, v. 6, p. 220.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 68; 38th ann. rept. . . . 1907, p. 88.

A pod-like gall formed by folding of the leaf along the midrib, lower side out, the edges united and the blade bulging out, the sac curving usually with midrib on convex side. 7-8 mm. long. Brown, with the pubescence of the under side of the leaf. On hard hack, *Spiraea tomentosa*. Not rare. Summer.

Same on *Spiraea salicifolia*, from which it was first described. Smooth instead of pubescent.

Spiraea tomentosa.

Cecidomyia salicifoliae Osten Sacken. See above.

Rubus nigrobaccus.

Cecidomyia? muscosa n. s. Mossy leafy-gall of blackberry. Fig. 66.

A subglobular gall, covered densely with filaments, making a mass about 1 cm. in diameter. Green turning light brown. Polythalamous. Found in Aug. 1900 on blackberry, *Rubus nigrobaccus*, some at union of leaflets, some on midvein.

Lasioptera farinosa Osten Sacken. Fig. 65.

Lasioptera farinosa Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 204.

Smith, Insect life, 1891, v. 4, p. 30.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 273; *op. cit.*, 1907, v. 23, p. 397-398, pl. 15, fig. 12-13.

Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 321, 323, 325.

Irregular, rounded, roughened galls on midrib or at base of leaflets. Woody, polythalamous. Sometimes several apparently confluent. About

7 mm. in diameter. Green, becoming brown early. On high blackberry, *Rubus nigrobaccus*.

Lasioptera nodulosa Beutenmüller.

Lasioptera nodulosa Beut., Bull. Amer. mus. nat. hist., 1907, v. 23, p. 397, pl. 15, fig. 5-6.
Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 321, 325.

“Knot-like or gouty, elongate or rounded swelling on terminal branches of blackberry, *Rubus nigrobaccus*. Often several galls on a single twig. Elongate chamber inhabited by a single larva which transforms in the gall, and emerges in May or June.”

Diastrophus cuscutaeformis Osten Sacken. Blackberry seed-gall. Fig. 68.

Diastrophus cuscutaeformis Osten Sacken, Proc. Ent. soc. Phil., 1863, v. 2, p. 33-34, 39-40.

Walsh and Riley, Amer. ent., 1869, v. 1, p. 188.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 249, pl. 10, fig. 1.

Jarvis, 35th ann. rept. Ent. soc. Ontario, 1907, p. 89.

Small subglobular galls, many crowded together along and around the stem of the blackberry. Monothalamous. Same color as stem. Each bears one (or sometimes more) spines, some rather stiff, others filamentous. On high blackberry, *Rubus nigrobaccus*. Rather common.

Diastrophus nebulosus Osten Sacken. Blackberry knot-gall. Fig. 67.

Diastrophus nebulosus Osten Sacken, Proc. Ent. soc. Phil., 1863, v. 2, p. 36-39.

Riley, Pract. ent., 1867, v. 2, p. 83, 84.

Walsh and Riley, Amer. ent., 1869, v. 1, p. 188.

Riley, Amer. ent., 1870, v. 2, p. 159-160, fig. 103.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 249, pl. 10, fig. 2.

Cook, Ohio nat., 1904, v. 4, p. 119, 143, fig. 129.

A large oblong pithy gall on stem, furrowed lengthwise, abrupt from union with stem. Polythalamous. Green, changing more or less completely to red-brown when old. On stems of high blackberry, *Rubus nigrobaccus*. Common. Insects emerge the following spring.

Rubus procumbens.

Diastrophus bassettii Beutenmüller. Bassett's blackberry gall. Fig. 69-70.

Diastrophus bassettii Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 248-249, pl. 9, fig. 7.

A subspherical red-brown gall, sometimes with considerable green. Pithy, polythalamous, 8-12 mm. in diameter. Quite common at base of stem of running blackberry, *Rubus procumbens*, and swamp blackberry. *R. hispidus*.

Rubus hispidus.

Diastrophus bassettii Beutenmüller. See above.

Fragaria virginiana.

Cecidomyia? reniformis, n. s.

Fig. 71-72.

A polythalamous gall, somewhat reniform, attached by end or side to base of petiole of strawberry, *Fragaria virginiana*, so close to the ground as to usually escape observation. 8-21 mm. long by 11-20 mm. thick. The color is like that of the petiole. Light-colored pith in which are imbedded the spherical hard-walled cells, each containing one or occasionally two larvae.

Potentilla canadensis.

Cecidomyia? potentillaecaulis, n. s.

This gall consists of the much enlarged internodal space of stem. Apparently one-celled, altho with several longitudinal cavities not connected with main cell. Outside surface and color like remainder of the stem. One specimen. September. On cinquefoil, *Potentilla canadensis*.

Gonaspis potentillae Bassett. Cinquefoil axil-gall.

Diastrophus potentillae Bassett, Proc. Ent. soc. Phil., 1864, v. 3, p. 689-690.

Osten Sacken, Proc. Ent. soc. Phil., 1865, v. 4, p. 361.

Cook, Ohio nat., 1904, v. 4, p. 120, fig. 87.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 88, pl. B, fig. 5.

Gonaspis potentillae Ashmead, Psyche, 1897, v. 8, p. 68.

A subspherical gall in axil of leaf of *Potentilla canadensis*. 8-11 mm. in diameter. Monothalamous. Green with sometimes a tinge of red, turning brown in autumn. Common. Insect emerges the following spring.

Rosa.

Rhodites bicolor Harris. Spiny rose-gall.

Cynips bicolor Harris, Rept. ins. Mass. inj. veg., 1841, p. 399; Treat. ins. N. E. inj. veg., 1842, p. 399; same, 1852, p. 435; Treat. ins. inj. veg. (Flint ed.), 1862, p. 548-549.

Rhodites bicolor Osten Sacken, Proc. Ent. soc. Phil., 1863, v. 2, p. 43, 48-49.

Riley, Amer. ent., 1870, v. 2, p. 246, 309, fig. 192.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 246, pl. 9, fig. 1.

Townsend, Psyche, 1895, v. 7, p. 272, 307.

Cook, Ohio nat., 1904, v. 4, p. 123, 141, fig. 120.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 70, pl. E, fig. 2.

Spherical, 10-14 mm. in diameter, covered with long spines. Monothalamous. In summer green with tinge of red usually, brown later. Frequently deforms the whole leaf of wild roses, *Rosa*, several species. Common. Insect emerges in late summer.

Rhodites dichlocerus Harris. Long rose-gall.

Cynips dichlocerus Harris, Rept. ins. Mass. inj. veg., 1841, p. 399-400; Treat. ins. N. E. inj. veg., 1842, p. 399-400; same, 1852, p. 435; Treat. ins. inj. veg. (Flint ed.), 1862, p. 549, pl. 8, fig. 6-8.

Rhodites dichlocerus Osten Sacken, Proc. Ent. soc. Phil., 1863, v. 2, p. 41, 46.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 247, pl. 9, fig. 5.

Diastrophus dichlocerus Beutenmüller, Psyche, 1908, v. 15, p. 10.

Woody, elongated, roughened gall, tapering to union with stem. Polythalamous. About 2-3 cm. long; 1 cm. wide. On stem of several species of wild rose, *Rosa*.

Rhodites ignota Osten Sacken. Mealy rose-gall. Fig. 73.

Rhodites ignota Osten Sacken, Proc. Ent. soc. Phil., 1863, v. 2, p. 43, 49.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 246, pl. 9, fig. 2.

A spherical woody gall covered with white mealy substance. From 5-8 mm. in diameter. Sometimes two or more galls grow together. One or several on leaves of wild roses. Common.

Rhodites lenticularis Bassett. Rose lentil-gall. Fig. 77.

Rhodites lenticularis Bassett, Trans. Amer. ent. soc., 1890, v. 17, p. 59-60.

Beutenmüller, Ins. galls vic. N. Y., 1904, p. 8, fig.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 89.

A disc-shaped gall of the color of the leaf in which it is found; sometimes lighter colored. About 6 mm. in diameter and 2 mm. in thickness. Monothalamous. Abundant in some localities. On several species of rose, *Rosa*.

Rhodites multispinosus Gillette. Large spiny rose-gall. Fig. 76.

Rhodites multispinosus Gillette, Bull. 7, Iowa agr. exp. sta., 1889, p. 284.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 88, pl. B, fig. 3.

Oblong or ovate, on stem. 25-50 mm. long; 16-25 mm. thick, and clothed with numerous prickles about 8 mm. long. Light brown, becoming gray later. Surface sometimes rough, with depressions and elevations. In emergence the insects make 30-50 round holes about 1.5 mm. in diameter. Polythalamous. On wild rose, *Rosa*.

Rhodites radicum Osten Sacken. Rose root-gall.

Rhodites radicum Osten Sacken, Proc. Ent. soc. Phil., 1863, v. 2, p. 42, 46-47.

Walsh, Pract. ent., 1866, v. 1, p. 114.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 246, pl. 9, fig. 3.

Cook, Ohio nat., 1904, v. 4, p. 123.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 70.

A large, irregular, red-brown gall with smooth surface. Polythalamous. 5-8 cm. in diameter. With deep indentation where it is attached to the root of wild roses. May be common, as some report, but not frequently seen, from its position. On *Rosa*, several species. Insects emerged April 28. From a single specimen in my collection insects emerged about a year after it was sent to me.

Rhodites verna Osten Sacken. Knotty rose-gall. Fig. 74.

Rhodites verna Osten Sacken, Proc. Ent. soc. Phil., 1863, v. 2, p. 41, 47-48.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 248, pl. 9, fig. 6.

Usually several rounded galls, running together, forming an elongated, knotty mass along the stem. Woody, tinged with red. Polythalamous. On several species of wild rose, *Rosa*.

Rosa carolina.

Rhodites globulus Beutenmüller. Globular rose-gall.

Without name, Osten Sacken, Proc. Ent. soc. Phil., 1863, v. 2, p. 42.

Rhodites globulus Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 247, pl. 9, fig. 4.

Cook, Ohio nat., 1904, v. 4, p. 123.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 70, pl. E, fig. 4.

A smooth, irregularly rounded, brown gall, sharply contracted at its union with the stem. Pithy, polythalamous. About 2 by 3 cm. On swamp rose, *Rosa carolina*.

Rhodites sphaericus, n. s. Fig. 75.

A spherical hard gall attached to either side of the leaflet by a single point. Rough, veiny surface. About 5 mm. in diameter. Filled by a dozen or more larval cells, each with woody walls. Brown. On swamp rose, *Rosa carolina*. September.

Rosa rubiginosa.

Rhodites rosae Linnaeus. Mossy rose-gall. Bedeguar gall.

Cynips rosae Linnaeus, Syst. nat., 12th ed. 1767, v. 2, p. 917.

Rhodites rosae Osten Sacken, Proc. Ent. soc. Phil. 1863, v. 2, p. 47.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 70, pl. D. fig. 4.

There are numerous references to this gall in European publications, as it occurs in Europe.

A conspicuous mass formed by several hard cells around the stem, and covered with long filaments, mostly green but frequently strongly tinged with red. Brown and persistent in winter. Common on sweetbrier rose, *Rosa rubiginosa*. Insects emerge in June.

Amelanchier canadensis.

Eriophyes amelanchieri n. s. June-berry mite-gall. Fig. 78.

These rounded galls occur in great numbers upon the leaves. On the upper side they are globular, below they open by a prolonged tube which on maturity splits in two at the end, allowing the insect to emerge. Usually red above, light yellow-green below. About 2 mm. above, 1-8 mm. below. On June-berry, *Amelanchier canadensis*, June.

Crataegus.

Cecidomyia bedeguar Walsh. Tufted thorn-gall. Fig. 80.

Cecidomyia crataegi-bedeguar Walsh, Can. ent., 1869, v. 1, p. 79-80.

Cecidomyia bedeguar, Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 67.

A polythalamous gall found along the veins, several on a leaf. Below hemispherical, opening above. The upper side more conspicuous, as the opening is surrounded by dense tufts of finely branched projections browner than the leaf. Under side light green-yellow. Pithy, about 4 mm. in diameter below, 6-10 mm. above. Not rare. On leaves of *Crataegus* sp. June.

Cecidomyia? venae, n. s. Fig. 79.

An irregularly oval fleshy gall on midribs or chief veins, above or below, opening by a slit on opposite side, retaining marks of vein along length; contracted towards ends so running out to substance of vein. 5-8 mm. long. Color yellow, sometimes with red tinge. Slightly to densely pubescent. June and later. Several on one leaf. Two or more larvae in a cell. On thorn, *Crataegus*.

Undetermined gall.

An irregular rounded polythalamous gall at base of thorns, 5-10 mm. long, color of bark. Spongy within, dark red-brown, with fibers at right angles to surface. Several on thorn, *Crataegus* sp.

DRUPACEAE.**Prunus virginiana.**

Cecidomyia? racemi, n. s. Fig. 81.

An elliptical, polythalamous gall, consisting of a swelling of the axis of raceme of choke-cherry, *Prunus virginiana*, 27 mm. long, 10 mm. wide

in widest part, tapering gradually to either end. Green, turning brown upon maturity. No distinct larval cells, but inside pithy with borings in various directions. July.

Contarinia virginiana Felt. Cherry pocket-gall. Fig. 82.

Cecidomyia virginiana Felt, 21st rept. ins. N. Y. f. 1905, 1906, p. 130-131.

Cecidomyid larva, Lintner, Bull. 6, n. s., Div. ent. U. S. Dept. agr., 1896, p. 57-58; same 12th rept. ins. N. Y., f. 1896, 1897, p. 313.

Cecidomyia sp., Cook, Ohio nat., 1904, v. 4, p. 116, fig. 75.

Cecidomyia virginiana Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 67.

Contarinia virginianiae Felt, 23 rept. ins. N. Y. f. 1907, 1908, p. 383, 392.

A malformation of the fruit. The stone is absent and the fruit enlarged and elongated. 1 cm. long, 5 mm. wide; walls 1.5 mm. thick. Monothalamous. Larvae leave the gall in June or July. On *Prunus virginiana*, choke cherry, common. In every one of large numbers examined the hole by which the insect left the gall was very close to the insertion of the stem.

Prunus serotina.

Eriophyes serotinae Beutenmüller. Wild cherry pouch-gall.

Acarus serotinae Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 278, pl. 16, fig. 7; Ins. galls vicin. N. Y., 1904, p. 38, fig. 87.

Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 858, fig. 49.

Without scientific name, Buckhout, Proc. Amer. assoc. adv. sci. f. 1882, 1883, v. 31, p. 475.

Hagen, Can. ent., 1885, v. 17, p. 27.

Eriophyes serotinae Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 61; probably as *Eriophyes*, sp., *op. cit.*, 1907, p. 94.

A pouch-like gall on upper side of the leaf, the neck constricted, the opening on under side of the leaf. 5-10 mm. long. Green or red. Common on wild cherry, *Prunus serotina*.

Eriophyes padi, Nal., of cultivated cherry of Europe, seems identical. Compare C. Houard, Les Zoocécidies des plantes d'Europe, 1908, p. 565.

Cecidomyia serotinae Osten Sacken. Wild-cherry bud-gall.

Cecidomyia serotinae Osten Sacken, Trans. Amer. ent. soc., 1871, v. 3, p. 346-347.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 265; Ins. galls vicin. N. Y., 1904, p. 25-26, fig.

Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 838. Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 66.

Club-shaped, fleshy enlargement of terminal bud, sometimes with one or two leaves growing out. Tip shows end of deformed leaves. About 2 cm. long, 1 cm. wide. Bright red becoming brown in fall. Monothalamous, containing several leaping larvae. Found in May. Common on black cherry, *Prunus serotina*.

PAPILIONACEAE.

Crotalaria sagittalis.

Cecidomyia? crotalariae, n. s. Rattlebox stem-gall. Fig. 83.

A fusiform swelling of the winged stem. Orange larvae, sometimes several in one gall. Often eaten into by the larva of *Uteltheisa bella* (an arctiid moth) which devours the cecidomyid larvae. On rattlebox, *Crotalaria sagittalis*. Common. September.

Robinia pseudacacia.

Ecdytolopha insiticihana Zeller. Locust twig-borer gall. Fig. 84.

Ecdytolopha insiticihana Zeller, Verh. Zool.-bot. ges. Wien, 1875, v. 25, p. 266.

Packard, 5th rept. U. S. ent. comm., 1890, p. 359-360.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 65, pl. F, fig. 2.

Swellings of twig, somewhat sticky on surface, with hole at base, through which castings fall. About 2 cm. long, 7-8 mm. thick. Larvae leave the gall about Oct. 1, spin thin cocoons among leaves on the ground; the moth emerges late in October. On common locust, *Robinia pseudacacia*.

SAPINDALES.**ANACARDIACEAE.****Rhus hirta.**

Pemphigus rhois Fitch. Sumac tomato-gall. Fig. 87.

Byrsocrypta rhois Fitch, Month. Journ. N. Y. agr. soc. f. Aug., 1866, p. 73.

Melaphis rhois Walsh, Proc. Ent. soc. Phil., 1867, v. 6, p. 282.

Pemphigus rhois Walsh and Riley, Amer. ent., 1869, v. 1, p. 108, fig. 89.

Packard, Guide study ins., 1869, p. 524, fig. 523.

Oestlund, Bull. 4, Geol. and nat. hist. surv. Minn., 1887, p. 23.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 277, pl. 16, fig. 6; Ins. galls vicin. N. Y., 1904, p. 37-38, fig. 84.

Lintner, 12th rept. ins. N. Y. f. 1896, 1897, p. 290-292, pl. 14, fig. 1.

Cook, Ohio nat., 1904, v. 4, p. 140, fig. 113.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 65.

A smooth, rounded hollow gall on the under side of the leaf, varying greatly in size. Color yellow-green with orange and much red. Insects fully grown in September. Not very common. On smooth sumac, *Rhus glabra*. Reported on *Rhus hirta*.

Rhus glabra.

Pemphigus rhois Fitch. See above.

Rhus radicans.

Eriophyes rhois, n. s. Poison ivy mite-gall. Fig. 88.

Phytoptus, sp., Garman, 12th rept. state ent. Ill., 1883, p. 138.

Eriophyes, sp., Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 862.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 60, pl. A, fig. 5.

Without scientific name, Buckhout, Proc. Amer. assoc. adv. sci. f. 1882, 1883, v. 31, p. 476.

Hagen, Can. ent., 1885, v. 17, p. 28.

Corrugations upon the upper and lower surfaces of the leaf of poison ivy, *Rhus radicans*. These are pubescent with whitish hairs similar to those upon other parts of the leaf, but more plentiful upon the upper surface, and extremely so on the under side. The projections above are raised more and somewhat constricted at the point of attachment, somewhat like the gall of *Colopha ulmicola*.

CELASTRACEAE.**Celastrus scandens.**

Cecidomyia? celsatri, n. s. Bittersweet root-gall.

Irregular enlargement of roots of bittersweet, *Celastrus scandens*, somewhat pear-shaped. Polythalamous. 25 mm. long, 10 mm. greatest diam-

eter. Color as of the root, orange with traces of green. Pithy, soft. Contained small white larvae Sept. 1907. Cells well filled.

ACERACEAE.

Acer saccharinum.

Eriophyes quadripedes Shimer. Silver maple mite-gall.

Vasates quadripedes Shimer, Trans. Amer. ent. soc., 1869, v. 2, p. 319.

Phytoptus quadripes Garman, 12th rept. state ent. Ill., 1883, p. 135; Psyche, 1892, v. 6, p. 243.

Paekard, 5th rept. U. S. ent. comm., 1890, p. 422-423, fig. 154-155.

Cook, Ohio, nat. 1902, v. 2, fig. 10; 1903, v. 3, p. 423, fig. 43.

Eriophyes quadripes Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 860.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 59, pl. F, fig. 1.

A small gall, pouch-like with constricted neck, on upper side of the leaf. Green, becoming dark violet and black. Common on silver maple, *Acer saccharinum*.

Acer rubrum.

Cecidomyia ocellaris Osten Sacken. Maple spot-gall.

Cecidomyia ocellaris Osten Sacken in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 199.

Sciara ocellaris Comstock, Rept. Comm. agric. f. 1881 and 1882, (1883), p. 202-204, pl. 17.

Paekard, 5th rept. U. S. ent. comm. 1890, p. 411-412, pl. 38.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 273.

Cook, Ohio nat., 1904, v. 4, p. 141, fig. 119; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 843, fig. 35.

Sciara ocellata Beutenmüller, Ins. galls viein. N. Y., 1904, p. 33, fig.

Cecidomyia ocellata Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 66, pl. E, fig. 6.

An eye-like spot, red center surrounded by yellow or green and this by red, 7 mm. in diameter, more or less. Larva probably drops to the ground to transform. Very common on leaves of red maple, *Acer rubrum*.

Acer saccharum.

Eriophyes crumena Riley.

Acarus aceris-crumena Riley, Amer. ent., 1870, v. 2, p. 339.

Phytoptus acericola Garman, 12th Rept. state ent. Ill., 1883, p. 135.

Paekard, 5th rept. U. S. ent. comm. 1890, p. 424.

Cook, Ohio nat., 1902, v. 2, fig. 11; 1903, v. 3, p. 423, fig. 45; 1904, v. 4, p. 118.

Without scientific name, Buckhout, Proc. Amer. assoc. adv. sci. f. 1882, 1883, v. 31, p. 475.

Eriophyes acericola Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 860.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 59.

A tapering small gall on the upper side of the leaf. About 5 mm. long. Green or red. On sugar maple, *Acer saccharum*.

Eriophyes rosea Schult. Red frost gall of maple.

Eriophyes, sp., Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 61, pl. B, fig. 1.

These galls look like red frost on the upper side of the leaf, where they form clusters extending in the general direction of the smaller veins. An occasional solitary one shows a distinct pouch shape, somewhat constricted at the base. On sugar maple, *Acer saccharum*. Common.

Undetermined gall.

This gall consists of enlargement of the veins, swollen and fleshy below, opening by a slit above. Of very irregular length. Gaping widely when old. Not common. On sugar maple, *Acer saccharum*.

Acer spicatum.

Eriophyes spicati, n. s. White frost gall of mountain maple.

Without scientific name, Garman, Psyche, 1892, v. 6, p. 242.

Eriophyes, sp., Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 62.

The clusters of these galls are formed commonly in the angles of the veins on the under side of the leaf. Small, white. On mountain maple, *Acer spicatum*. Common. Russell and Mt. Holyoke, Mass.

BALSAMINACEAE.***Impatiens biflora.***

Cecidomyia impatientis Osten Sacken. Touch-me-not gall. Fig. 85.

Cecidomyia impatientis Osten Sacken, in Loew's Mon. dipt. N. A. 1862, pt. 1, p. 204.

Walsh and Riley, Amer. ent., 1869, v. 2, p. 63, fig. 42.

Beutenmüller, Ins. galls vicin. N. Y., 1904, p. 30, fig.; Bull. Amer. mus. nat. hist., 1907, v. 23, p. 392, pl. 16, fig. 7-8.

Polythalamous, spherical, smooth, juicy galls, apparently formed at base of flower. Extremely perishable. 5-8 mm. in diameter. Green, with darker markings occasionally. August on *Impatiens biflora*. Abundant but local. Larvae leave galls to pupate about September 1.

Lasioptera impatientifolia Felt. Midrib gall on touch-me-not. Fig. 86.

Without scientific name, Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 69.

Lasioptera impatientifolia Felt, 22nd rept. ins. N. Y. f. 1906, 1907, p. 105-106; 23d rept. ins. N. Y. f. 1907, 1908, p. 320, 323, 324, 327.

Cecidomyia impatientis Cook, Ohio nat., 1904, v. 4, p. 140, fig. 115.

On petiole or midrib, on both sides. 1 cm. long, 4 mm. wide. Green, smooth, monothalamous, containing several larvae. On *Impatiens biflora*. Common.

RHAMNALES.**VITACEAE.*****Vitis.***

Phylloxera vitifoliae Fitch. Grape phylloxera gall.

Pemphigus vitifoliae Fitch, Trans. N. Y. state agr. soc. f. 1854, 1855, v. 14, p. 862. (1st rept. ins. N. Y., 1855)

Byrsocrypta vitifoliae Walsh, Proc. Ent. soc. Phil., 1862, v. 1, p. 305.

Phylloxera vastatrix Planchon, Compt. rend. Acad. sci. Paris, 14 Sept. 1868.

Walsh and Riley, Amer. ent., 1869, v. 1, p. 248, fig. 184; v. 2, p. 61.

Phylloxera vitifoliae Riley, 3d rept. ins. Mo., 1871, p. 84-96, fig. 39-40.

Phylloxera vastatrix Riley, Repts. ins. Mo.: 4th, 1872, p. 55-70; 5th, 1873, p. 57-73; 6th, 1874, p. 30-86; 7th, 1875, p. 90-121; 8th, 1876, p. 157-168. Numerous figures.

Phylloxera vastatrix Saunders, Can. ent., 1882, v. 14, p. 121-128, fig. 14-19.

Smith, Econ. ent., 1896, p. 128-130, fig.

Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 855-856, fig. 46-47.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 65.

(The foregoing cites but few of the accounts of this insect so very destructive to the vineyards of southern Europe. The European bibliography would itself fill a good-sized volume.)

A small rough gall on either side of the leaf, usually, when present, in vast numbers. Another generation forms galls on the roots, causing considerable damage, especially in Europe. Common on wild and some cultivated grapes.

Lasioptera vitis Osten Sacken. Grape-vine tomato-gall.

- Lasioptera vitis* Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 202.
Walsh and Riley, Amer. ent., 1869, v. 1, p. 247, fig. 183.
Riley, 5th rept. ins. Mo., 1873, p. 117, fig.
Williams, 8th ann. rept. Ent. soc. Ontario, 1877, p. 50, fig. 40.
Reed, 13th ann. rept. Ent. soc. Ontario, 1882, p. 49, fig. 33.
Saunders, Ins. inj. fruit, 1883, p. 294-295, fig. 306.
Lintner, 4th rept. ins. N. Y., 1888, p. 63-67, fig. 29.
Bentenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 272.
Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 322, 323, 324.

This gall consists of a bunch of swellings, very irregular as to size and shape, on new growth. Soft and juicy. Surface smooth, green with red tinge or all red. Polythalamous. May and early June. Common on wild grapes. Larvae enter ground to pupate. Fly late in June.

Vitis labrusca.*Schizomyia pomum* Walsh and Riley. Grape-vine apple-gall. Fig. 89.

- Cecidomyia vitis-pomum* Walsh and Riley, Amer. ent., 1869, v. 1, p. 106, fig. 85.
Williams, Ann. rept. Ent. soc. Ontario, 1877, p. 48-49, fig. 38.
Schizomyia pomum Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 374, 379.

An irregular gall, apparently the deformation of a bud. Somewhat pointed at apex, flattened at base where attached. Ribbed slightly. Woolly pubescent. Polythalamous with larval cells arranged lengthwise in two "stories," pithy. About 2 cm. in diameter. Green, turning brown when mature. On northern fox-grape, *Vitis labrusca*.

Vitis cordifolia.*Schizomyia coryloides* Walsh and Riley. Grape-vine filbert-gall. Fig. 90.

- Cecidomyia vitis-coryloides* Walsh and Riley, Amer. ent., 1869, v. 1, p. 106-107, fig. 86.
Riley, 5th rept. ins. Mo., 1873, p. 116-117, fig.
Williams, Ann. rept. Ent. soc. Ontario, 1877, p. 49, fig. 39.
Schizomyia coryloides Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 374, 379.

Irregular, fusiform, monothalamous galls, occurring in clusters of from 10 to 50, apparently deformation of a bud. Within they are pithy, the larval cell long, with woody shell, lying lengthwise in gall. Green when young, brown when mature, covered, especially towards the tip, with wooly pubescence. 15-20 mm. long, 6-10 mm. wide. On stem of frost grape, *Vitis cordifolia*.

Parthenocissus quinquefolia.*Cecidomyia? parthenocissi*, n. s. Midrib gall of Virginia creeper. Fig. 91.

- Without scientific name, Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 68-69, pl. D, fig. 7.
On under side of midrib of woodbine *Parthenocissus quinquefolia*, opening by slit on upper side of leaf. About 9 mm. long, 6 mm. wide, others about 5 cm. \times 7 mm. Highest in middle. Red and green.

MALVALES.

TILIACEAE.

Tilia americana.*Eriophyes abnormis* Garman. Linden pouch-gall.

- Phytoptus abnormis* Garman, 12th rept. state ent. Ill., 1883, p. 134.
Packard, 5th rept., U. S. ent. comm., 1890, p. 480.
Cook, Ohio nat., 1902, v. 2, fig. 9; 1903, v. 3, p. 423, fig. 44.

Without scientific name, Buckhout, Proc. Amer. assoc. adv. sci. f. 1882, 1883, v. 31, p. 475.

Hagen, Can. ent., 1885, v. 17, p. 28.

Eriophyes abnormis Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 860-861, fig. 51.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 59, pl. C, fig. 6.

A pouch-like gall usually on upper side of the leaf with the opening below, neck constricted. The upper end of the gall folded into notches. Common on basswood, *Tilia americana*.

Cecidomyia? citrina Osten Sacken.

Cecidomyia citrina Osten Sacken, Trans. Amer. ent. soc., 1870, v. 3, p. 53.

Irregular, fleshy galls on terminal buds of young shoots. Polythalamous. Color of bark. Sometimes with leaves growing out. 5-8 mm. in diameter. July and August. Not rare. On linden, *Tilia americana*.

Cecidomyia verrucicola Osten Sacken. Basswood wart-gall.

Cecidomyia verrucicola Osten Sacken, Can. ent., 1875, v. 7, p. 201-202.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 264.

Cook, Ohio nat., 1902, v. 2, p. 267, fig. 24; 1903, v. 3, p. 427, fig. 62-63.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 67.

Rounded, wartlike galls showing on both sides of the leaf. About 3 mm. in diameter, 1-2 mm. thick. Red above, green below. Open in the fall by a lid below. On linden, *Tilia americana*. Common. A gall that appears to be the same differing only in size, appears on the fruit and on the bract.

PARIETALES.

VIOLACEAE.

Viola sagittata.

Cecidomyia semenivora Beutenmüller. Fig. 92.

Cecidomyia semenivora Beutenmüller, Bull., Amer. mus. nat. hist., 1907, v. 23, p. 390-391, pl. 15, fig. 1-4.

Without name, Bramerd, Rhodora, 1904, v. 6, p. 15.

A monothalamous, subglobular gall, the apex prolonged to a slender point, found in the midst of the crown of leaves of *Viola sagittata*. The color and surface are similar to those of the surrounding petioles. The mediumly thick walls enclose several light yellow larvae, none of which have been reared. Only three specimens have been collected by me. Also on *Viola cucullata*.

Viola cucullata.

Cecidomyia semenivora Beutenmüller. See above.

UMBELLALES.

CORNACEAE.

Cornus florida.

Lasioptera clavula Beutenmüller. Dogwood club-gall.

Cecidomyia clavula Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 269, pl. 15, fig. 5;

Ins. galls. vicin. N. Y., 1904, p. 29, fig.

Townsend, Proc. Ent. soc. Wash., 1893, v. 2, p. 390.

Cook, 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 841.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 69.

Lasioptera clavula Beutenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 396, pl. 14, figs. 5-6.

Club-shaped, monothalamous gall terminating twig. 2-3 cm. long. Color of twig. Larval cell elongated. Found in July and later. Not rare. On flowering dog-wood, *Cornus florida*. Larvæ leave the gall in September or October and enter the ground to transform. Adults emerge during May and June.

Cornus amomum.

Cecidomyia? tuba, n. s.

On leaf of *Cornus amomum*. Hemispherical above, about 3 mm. in diameter, projecting like a curved tube beneath, about 8 mm., open at end. Light green below, red-brown above. Bright orange larva. Three galls on each leaf.

Cornus candidissima.

Lasioptera corni Felt. Dogwood leaf-gall.

Lasioptera corni Felt. 22d rept. ins. N. Y. f. 1906, 1907, p. 107; 23d rept. ins. N. Y. f. 1907, 1908, p. 318, 324.

On leaf of *Cornus candidissima*, projecting slightly on each side, 6-7 mm. in diameter, several on a leaf. Light green or yellow in the middle, shading into deep red. Wilbraham, Mass.

ERICALES.

VACCINIACEAE.

Polycodium stamineum.

Cecidomyia vaccinii Osten Sacken. Fig. 93.

Cecidomyia vaccinii Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 196.

Beutenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 392, pl. 16, fig. 10-12.

A cock's-comb shaped gall on the under side of the leaf, on the veins. Green. Opens by a slit when mature, when the larvæ leave the gall to transform in the ground. September. South Hadley, Mass. On deer-berry, *Polycodium stamineum*.

Vaccinium pennsylvanicum.

Solenozopheria vaccinii Ashmead. Huckleberry gall.

Solenozopheria vaccinii Ashmead, Trans. Amer. ent. soc., 1887, v. 14, p. 149.

Beutenmüller, Ins. galls vicin. N. Y., 1904, p. 22, fig.

Reniform, polythalamous, twig-gall, concave side attached to the stem. Pithy. Green with sometimes a tinge of red, turning brown and harder in the fall. 2-3 cm. long. Common on blueberry, *Vaccinium pennsylvanicum*. Insects emerge the following spring.

GENTIANALES.

OLEACEAE.

Fraxinus americana.

Phylloxera? fraxini n. s.

A fleshy rounded gall on upper side of the leaflet, opening by a slit on the under side. About 5 mm. in diameter. Green, becoming yellow with red-brown tinge. On white ash, *Fraxinus americana*. Not common.

Cecidomyia pellex Osten Sacken. Ash midrib-gall.

Cecidomyia pellex Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 199.

Cook, Ohio, nat., 1904, v. 4, p. 140, fig. 114; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 838-839, fig. 31.

Beutenmüller, Ins. galls vicin. N. Y., 1904, p. 26, fig.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 67, pl. E, fig. 5.

Consists of the swollen midrib of the leaflet. One or several leaflets may be deformed. Reniform, smooth, juicy, mainly on under side of the leaflet, 15-30 mm. long. Pale green, frequently with much red. Rather common on white ash, *Fraxinus americana*. May and June.

POLEMONIALES.

CONVOLVULACEAE.

Convolvulus sepium.

Lasioptera convolvuli Felt.

Fig. 94.

Lasioptera convolvuli Felt, 22d rept. ins. N. Y. f. 1906, 1907, p. 149-150; 23d rept. ins. N. Y. f. 1907, 1908, p. 318, 326.

An elliptical swelling of the main stem. About 1 cm. long and two and one-half times the diameter of the stem. The outer portions are pithy with some longitudinal spaces. The orange larva apparently occupies the pith-cavity, surrounded by the unchanged walls. September. On upright bindweed, *Convolvulus spithamaeus*, and on hedge bindweed, *C. sepium*.

Convolvulus spithamaeus.

Lasioptera convolvuli Felt. See above.

LABIATAE.

Trichostema dichotomum.

Stagmatophora sexnotella Chambers. Blue-curls stem-gall. Fig. 95-96.

Gelechia sexnotella Chambers, Bull. U. S. geol.-geogr. surv., 1878, v. 4, p. 88.

Mompha sexnotella Busck, Journ. N. Y. ent. soc., 1902, v. 10, p. 97-98, pl. 12, fig. 7.

Dyar, List N. A. lepid. (Bull. 52, U. S. nat. mus.) 1902, p. 543, no. 6168.

Stagmatophora sexnotella Walsingham, Proc. U. S. nat. mus., 1907, v. 33, p. 219-220.

This monothalamous gall is an enlargement of the stem, often just below the flowering branches of blue-curls, *Trichostema dichotomum*. It is irregularly reniform, tapering somewhat above, ending bluntly below. They average about 18 by 6 mm. The surface and coloring are similar to those of the stem. The thick spongy walls enclose a cavity following the general curl of the gall, extending below however, through the wall to a projection at the base of the concave side, where it is separated from the exterior by the epidermis of the stem only, thus providing for the escape of the adult which could not eat its way out, having no mandibles. Abundant.

RUBIALES.

CAPRIFOLIACEAE.

Sambucus canadensis.

Cecidomyia umbellicola Osten Sacken. Fig. 98.

Cecidomyia sambuci-umbellicola Osten Sacken, Trans. Amer. ent. soc., 1870, v. 3, p. 52, 347.
 Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 269;
 1907, v. 23, p. 393, pl. 16, fig. 9.

Galls existing as a deformity of the flower buds of common elder. Round, monothalamous, white when young, turning dark. About five times the diameter of the bud. Abundant where found. On common elder, *Sambucus canadensis*. Found in June. Described as on *Sambucus pubens* by Osten Sacken.

Neolasioptera sambuci Felt. Fig. 97.

Cecidomyia sambuci Felt, 21st rept. ins. N. Y. f. 1905, 1906, p. 131, fig. 46-48.
Lasioptera sambuci Beutenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 396.
Neolasioptera sambuci Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 321, 331.

An irregular elliptical swelling of the main stem and side shoots. About three times the normal diameter of the stem. Roughened, corrugated. Within brown and pithy about woody part. On common elder, *Sambucus canadensis*. The larvae remain in the gall over winter, transforming and emerging in May or June.

Sambucus pubens.

Cecidomyia umbellicola Osten Sacken. See above.

Viburnum dentatum.

Eriophyes viburni, n. s. Mite gall of viburnum.

Corrugations of leaf causing entire change of appearance. Apparently caused by action of insect on under side, as the upper side arches over abnormally. Both within and without densely clothed with short white hairs. Similar in appearance to galls of *Schizoneura americana* of the elm. On *Viburnum dentatum*.

Viburnum nudum?

Undetermined gall.

Oval enlargement of stem, mainly below but including the node. Monothalamous, woody, thick-walled. Cavity brown-lined, curved out above a side branch and opening through a side-swelling. Castings noticeable. Color slightly redder than normal stem. One specimen. August. On *Viburnum nudum*.

Diervilla diervilla.

Cecidomyia? inaequalis, n. s.

The enlarged fruit of *Diervilla diervilla*. Most are larger on one side causing a bending in other direction, some almost sickle-shaped. Color same as fruit. Mt. Holyoke, Mass.

CAMPANULALES.

CICHORIACEAE.

Lactuca canadensis.

Aulax tumidus Bassett. Lettuce tumor-gall.

Aulax tumidus Bassett, Trans. Amer. ent. soc., 1890, v. 17, p. 22.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 263.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 72.

This gall consists of an irregular, rough, knotty enlargement of the main stem. Sometimes 5-7 cm. long, 2-3 cm. thick, sometimes smaller. Polythalamous. Common on wild lettuce, *Lactuca canadensis*.

AMBROSIACEAE.

Ambrosia artemisiaefolia.

Undetermined lepidopterous gall.

A spindle-shaped woody gall on the main stem or side shoots, below the raceme. Same color as the stem. 15-20 mm. long, 5-7 mm. wide. Monothalamous, cell-walls about 2 mm. thick, rough within. An opening near the top provided for emergence. Lepidopterous larva, full-grown in late September. Not rare on rag-weed, *Ambrosia artemisiaefolia*.

COMPOSITAE.

Eupatorium perfoliatum.

Neolasioptera perfoliata Felt. Boneset stem-gall. Fig. 99.

Choristoneura perfoliata Felt, 22d rept. ins. N. Y. f. 1906, 1907, p. 156-157.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 88, pl. A, fig. 5.

Neolasioptera perfoliata Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 319, 332.

A monothalamous, elliptical swelling of the stem, varying much in size, usually twice the diameter of the stem. Walls about natural thickness. Cavity contains a brown cellular mass. Late summer, common. On thoroughwort, *Eupatorium perfoliatum*.

Eupatorium ageratoides.

Cecidomyia? eupatoriiflorae Beutenmüller. Fig. 100.

Cecidomyia? eupatoriiflorae Beutenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 391, pl. 16, fig. 4-5.

An irregularly spherical gall, sometimes indented at the top. A deformation of a flower-head, some portions of which are to be seen. Fleshy, downy, green. Diameter 1-2 cm. Singly or in groups on white snake-root, *Eupatorium ageratoides*. September. Springfield, Mass. and Suffield, Conn.

Solidago.

Cecidomyia? bifolia, n. s.

A small, monothalamous gall, binding together two leaves. Rounded, showing a little more above. The leaves grow together. The insect emerges in early summer. Not common. On goldenrod *Solidago*.

Rhopalomyia anthophila Osten Sacken. Downy flower-gall of goldenrod.
Fig. 104.

Cecidomyia anthophila Osten Sacken, Trans. Amer. ent. soc., 1869, v. 2, p. 302-303.
Bentenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 272.
Cook, Ohio nat., 1904, v. 4, p. 116, fig. 73.

Rhopalomyia anthophila Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 358, 364, 365; Ottawa nat., 1909, v. 22, p. 246.

These downy galls are deformations of flowers. Conical, with blunt tip, as if truncated. Monothalamous, 7-8 mm. long. Green covered with pale hairs. Abundant in heads of goldenrod, *Solidago*, several species. Insects emerge about the first of September.

Rhopalomyia racemicola Osten Sacken. Beaked goldenrod-gall. Fig. 109.

Cecidomyia racemicola Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 196.
Bentenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 393, pl. 17, fig. 14.
Rhopalomyia racemicola Felt, 22d rept. ins. N. Y. f. 1906, 1907, p. 120-121; 23d rept. ins. N. Y. f. 1907, 1908, p. 358, 364, 366; Ottawa nat., 1909, v. 22, p. 246.

Globular, smooth, beaked gall, deformation of a flower, 2-3 mm. in diameter. Monothalamous. Green, becoming brown. Insects emerge in early September. On goldenrod, *Solidago*.

Dasyneura solidaginis Loew. Goldenrod bunch-gall. Fig. 108.

Cecidomyia solidaginis Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 194-195, pl. 1, fig. 4-7.

Bentenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 271; Ins. galls vicin. N. Y., 1904, p. 31, fig.
Cook, Ohio nat., 1902, v. 2, p. 272, fig. 31.
Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 68.

This gall is a deformation of terminal buds producing a mass of hundreds of leaves, the outer ones little changed, the inner ones successively more and more narrow, a single small gall at the tip of each branch. On goldenrod, *Solidago*, several species. Very common.

Baldratia carbonifera Osten Sacken. Goldenrod leaf-gall.

Cecidomyia carbonifera Osten Sacken, in Loew's Mon. dipt. N. A., 1862, pt. 1, p. 195.
Trelease, Psyche, 1884, v. 4, p. 196-200.

Baldratia carbonifera Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 321, 328; Ottawa nat., 1909, v. 22, p. 248.

Pale, circular spots in leaf surrounded by a dark ring. Several larvae in each gall. 4-6 mm. in diameter. Some of the galls contain a substance like powdered charcoal. On goldenrods, *Solidago*. Very common.

Eutreta sparsa Wiedemann.

Trypeta sparsa Wiedemann, Ausserenr. zweifl. ins., 1830, v. 2, p. 492.

Loew, Mon. dipt. N. A., 1862, pt. 1, p. 78, pl. 2, fig. 13.

Trypeta caliptera Say, Journ. Acad. nat. sci. Phil., 1830, v. 6, p. 187.

Platystoma latipennis Macquart, Mém. soc. sci. Lille, 1842 (1843), p. 355; Dipt. exotiques, 1843, v. 3, p. 200, pl. 26, fig. 8.

Acinia noraeboracensis Fitch, 1st rept. ins. N. Y., 1855, p. 67.

Eutreta sparsa Thompson, Psyche, 1907, v. 14, p. 72, 74, fig. 2.

Gall on growing shoot of *Solidago*, above ground; full size in April. Larva grew in May, pupated in June, flies emerged about 20th of June.

Eurosta commá Wiedemann.

Trypeta comma Wiedemann, Ausserenr. zweifl. ins., 1830, v. 2, p. 478.

Loew, Mon. dipt. N. A., 1862, pt. 1, p. 93-94, pl. 2, fig. 28.

Acinia comma Macquart, Mém. Soc. sci. Lille, 1842, (1843), p. 386; Dipt. exotiques, 1843, v. 3, p. 229.

Rather irregular, more or less spherical galls at base of stems of *Solidago*, 15 by 10 mm., when fresh somewhat green and plump; later dry and wrinkled, brown. Produced a large fly, some smaller galls produced no insects. July.

Eurosta solidaginis Fitch. Goldenrod ball-gall.

Acinia solidaginis Fitch, 1st rept. ins. N. Y., f. 1854, 1855, p. 771.

Tephritis asteris Harris, Rept. ins. Mass. inj. veg., 1841, p. 417; Treat. ins. N. E. inj. veg., 1842, p. 417; same 1852, p. 497-498; Treat. ins. inj. veg. (Flint ed.), 1862, p. 620-621. (Incorrect determination of host-plant as aster.)

Trypeta solidaginis Loew, Mon. dipt. N. A., 1862, pt. 1, p. 82.

Walsh, Pract. ent., 1866, v. 1, p. 114.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 274, pl. 15, fig. 6:

Ins. galls vicin. N. Y., 1904, p. 34, fig.

Baker, Ent. news, 1895, v. 6, p. 174.

Fyles, Can. ent., 1894, v. 26, p. 120-122.

Snyder, Can. ent., 1898, v. 30, p. 99-100.

Cook, Ohio nat., 1903, v. 3, p. 422, fig. 40; 29th ann. rept. Dept. geol. and nat. res. Indiana f. 1904, 1905, p. 844, fig. 36.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 68, pl. F, fig. 3.

Eurosta solidaginis Brodie, Can. ent., 1892, v. 24, p. 137-139.

Harrington, Can. ent., 1895, v. 27, p. 197.

A solid, globular, monothalamous gall on the stem. About 2 cm. in diameter. Round larval cell. This gall is frequently found in winter broken open, usually by the chickadee (*Parus atricapillus* Linn.) Insect, of about the size of a house-fly, emerges in the spring. Very common on goldenrod, *Solidago*.

Undetermined lepidopterous gall.

Fig. 105.

An oval, one-celled gall around the base of the stem, apparently lepidopterous. Ridged lengthwise. About three times the diameter of the stem and 25 mm. long. Rather thin-walled when mature. July. On goldenrod, *Solidago*.

Gnorimoschema gallaesolidaginis Riley. Elliptical goldenrod gall.

Gelechia gallaesolidaginis Riley, 1st rept. ins. Mo., 1869, p. 173-178, fig.

Kellicott, Can. ent., 1878, v. 10, p. 201.

Cook, Ohio nat., 1903, v. 3, p. 422, fig. 41; 1904, v. 4, p. 127, fig. 111.

Jarvis, 37th ann. rept. Ent. soc. Ontario, 1906, p. 65, pl. F, fig. 2.

Gnorimoschema gallaesolidaginis Busek, Proc. U. S. nat. mus., 1900, v. 23, p. 227.

Brodie, Can. ent., 1909, v. 41, p. 7-8.

An elongated stem-gall, 2-4 cm. long. Monothalamous. Larval chamber large. Remains over winter as a pupa, and in spring the adult emerges through a hole made by the larva. On goldenrods, *Solidago*. Common.

Eucosma scudderiana Clemens. Scarred goldenrod gall.

Hedya scudderiana Clemens, Proc. Acad. nat. sci. Phil., 1860, p. 358.

Euryptychia saligneana Clemens, Proc. Ent. soc. Phil., 1865, v. 5, p. 141. (Incorrectly supposed the moth was reared from a willow gall.)

Grapholitha saligneana Packard, Guide study ins. 1869, p. 337.

Riley, 2d rept. ins. Mo., 1870, p. 134-135, fig. 99.

Paedisca affusana Zeller, Verh. Zool.-bot. ges. Wien, 1875, v. 25, p. 307.

Paedisca saligneana Kellicott, Can. ent., 1878, v. 10, p. 202.

Paedisca scudderiana Kellicott, Can. ent., 1882, v. 14, p. 161-163.

Eucosma scudderiana Dyar, List N. A. lepidopt.—Bull. 52, U. S. nat. mus., 1902, p. 459.
Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 91, pl. C, fig. 7.
Brodie, Can. ent., 1909, v. 41, p. 73-74.

A monothalamous stem-gall, scarred with brown furrows on the outside. The larval cavity fills the inside, and sometimes reaches into the stem-pith above and below. Not as common as the two larger stem-galls of the golden-rod. On goldenrods, *Solidago*.

Solidago rugosa.

Oedaspis polita Loew. Goldenrod gall.

Trypeta polita Loew, Mon. dipt. N. A., 1862, pt. 1, p. 77, pl. 2, fig. 12.

Osten Sacken, Trans. Amer. ent. soc., 1869, v. 2, p. 301-302.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 274; Ins. galls vicin. N. Y., 1904, p. 33-34, fig.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 88.

A monothalamous gall, consisting of undeveloped leaves of side bud, massed together. About 15 mm. long. Usually several galls are grouped. Common on goldenrod, *Solidago rugosa*.

Lasioptera tumifica Beutenmüller.

Fig. 107.

Lasioptera tumifica Beutenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 394, pl. 14, fig. 1-4.

Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 321, 327; Ottawa nat., 1909, v. 22, p. 249.

This is an irregular, rounded or kidney-shaped gall at the base of the stem. Sometimes at one side of the stem, sometimes encircling it. Leathery outside, pithy within. Many celled, with orange-colored larvae. About 10 by 15 mm., although varying considerably in size. When young green, becoming brown. On goldenrod, *Solidago rugosa*.

Solidago juncea.

Eurosta reticulata Snow.

Fig. 106.

Eurosta reticulata Snow, Kans. univ. quart., 1894, v. 2, p. 170, pl. 7, fig. 6.

Thompson, Psyche, 1907, v. 14, p. 71-72, fig. 1.

An ovate, monothalamous gall growing on the underground stem. It is evidently a deformed bud. About 3 cm. long, 1 cm. wide. Overlapping scales show some green. Walls fleshy, rather thick. The insect emerges from the tip in May or June. Galls found in the fall. Common. On goldenrod, *Solidago juncea*.

Rhopalomyia ?hirtipes Osten Sacken.

Fig. 101.

Cecidomyia hirtipes Osten Sacken, Mon. dipt., N. A., 1862, pt. 1, p. 195.

Dasymeura hirtipes Aldrich, Catal. N. A. dipt., 1905, p. 155.

Rhopalomyia hirtipes Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 358, 363, pl. 34, fig. 6.

An irregularly oval, fleshy gall, attached to stems underground. Light brown with rough, darker spots. 1-2 cm. in either diameter. Shrivelled quickly. Very abundant on goldenrod, *Solidago juncea*. July. The insects reared from these galls agree so closely with *Rhopalomyia hirtipes* O. S. as to seem identical, but the typical gall of that species is so dissimilar as to make their identity doubtful.

Solidago canadensis.

Asphondylia monacha Osten Sacken. Goldenrod terminal gall. Fig. 103.

Asphondylia monacha Osten Sacken, Trans. Amer. ent. soc., 1869, v. 2, p. 299-301; 1871, v. 3, p. 347.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 273.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 87.

Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 374, 375, 376, pl. 36, fig. 8-9; Ottawa nat., 1909, v. 22, p. 246, 247, 248.

This is a conical gall on the tip of the stem, 1-2 cm. long. There are many leaves, with thickened bases, clustered together. The larvae, yellowish or orange, live between the bases of the leaves. On goldenrod, *Solidago canadensis*. Common.

Baldratia flavolunata Felt. Lunate marginal gall. Fig. 102.

Choristoneura flavolunata Felt, 22d rept. ins. N. Y. f. 1906, 1907, p. 154-155.

Jarvis, 38th ann. rept. Ent. soc. Ontario, 1907, p. 88, pl. A, fig. 6.

Baldratia flavolunata Felt, 23d rept. ins. N. Y. f. 1907, 1908, p. 321, 330; Ottawa nat., 1909, v. 22, p. 248.

This blister-like gall projects equally from the two sides of the leaf. 4-8 mm. in diameter. Smooth. The central portion yellow surrounded by a ring, which is usually dark violet, sometimes black. Monothalamous. On goldenrod, *Solidago canadensis*. June.

Euthamia graminifolia.

Cecidomyia? euthamiae, n. s.

A curved, fusiform, striate gall found usually among the flower heads, infrequently in the axils of the upper leaves or branchlets. Deep violet-red, a few showing some green. Stem 1 cm.; gall 10-13 mm. long, 1 mm. wide. Thin-walled, one-celled. Rather common about Springfield, Mass. on fragrant goldenrod, *Euthamia graminifolia*. August to September. Very abundant at Southport, Maine.

Aster.

Lasioptera asterifoliae Beutenmüller.

Lasioptera asterifoliae Beutenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 395, pl. 14, fig. 15.

A circular, blister-like gall, showing about equally on the two sides of the leaf. Monothalamous. 3-4 mm. in diameter. Black surrounded by a red ring, a few with black dot at center with red ring, then a black ring, then a red ring, the surrounding portions of the leaf a very deep red; color beneath similar but lighter. Larva white or very light yellow; full-grown, Oct. 17. Several on each leaf of aster, *Aster*. Mt. Tom, Mass.

Aster ericoides.

Cecidomyia? gemmaria, n. s.

Fig. 110.

The deformed bud of an aster constitutes this gall. It is one-celled, ovate, pointed and in some cases mucronate, green with a dense white pubescence. Length 4-7 mm., width 3-5 mm. Walls of the conical cell 1 mm. thick. Abundant on *Aster ericoides*. Collected by Dr. Geo. Dimmock, Aug. and Sept. 1908. Found in October in great abundance when it had turned dark gray.

Cecidomyia? strobiligemma n. s.

Fig. 111.

* This ovate gall is the result of the arrest of development of a side branch near the top of the stem. One to several may be found on one plant. The leaves are closely lapped over the one cell. Green. 8-10 mm. long, 6-8 mm. wide. On white heath aster, *Aster ericoides*. September.

Aster dumosus.*Cecidomyia? ramuscula* Beutenmüller.*Cecidomyia? ramuscula* Beutenmüller, Bull. Amer. mus. nat. hist., 1907, v. 23, p. 392, pl. 17, fig. 7-9.

“This is a fusiform swelling on the branches of Asters, *Aster dumosus* and *A. patens*. Inside is an elongate, narrow chamber inhabited by a single larva, which remains in the gall to pupate. 10-20 mm. by 5-8 mm. N. C. Adult unknown.”

Aster patens.*Cecidomyia? ramuscula* Beutenmüller. See above.**Rudbeckia laciniata.***Asphondylia conspicua* Osten Sacken.

Fig. 112.

Asphondylia rudbeckiae-conspicua, Osten Sacken, Trans. Amer. ent. soc., 1870, v. 3, p. 51-52.

Beutenmüller, Bull. Amer. mus. nat. hist., 1892, v. 4, p. 272; 1907, v. 23, p. 387, pl. 16, fig. 6.

A very irregularly spherical fleshy gall found on flower heads of golden glow, *Rudbeckia laciniata*, in late summer. Green. Varying in size, 1-4 cm. in diameter.

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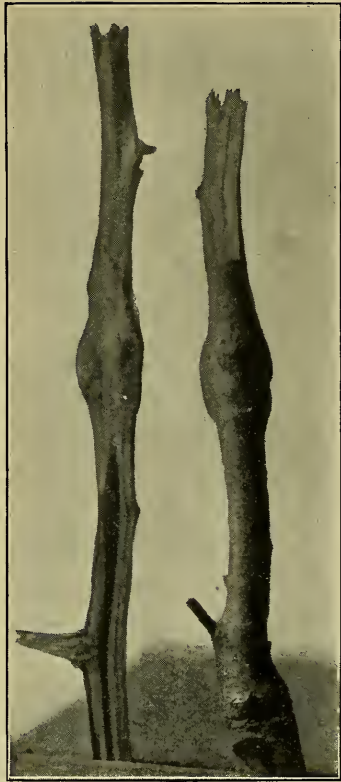
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PLATE 1.

- Fig. 1. *Adelges abietis*, black spruce.
— 2. *Mecas inornata*, aspen.
— 3. *Pemphigus? rileyi*, aspen.
— 4. *Rhabdophaga gnaphalioides*, willow.



1



2



4



3

PICEA, POPULUS, SALIX.

PLATE 2.

- Fig. 5. *Rhabdophaga strobiloides*, willow.
— 6. *Rhabdophaga brassicoides*, willow.
— 7. *Rhabdophaga batatas*, willows. Exterior and section.
— 8. *Eriophes aenigma*, willow.



5

6



7

8

SALIX.

PLATE 3.

- Fig. 9. *Mayetiola rigidae*, willow.
— 10. *Cryptocampus cooperae*, willow. Section.
— 11. *Cryptocampus cooperae*, willow.
— 12. *Euura ovum*, willow.
— 13. *Cecidomyia caryaecola*, hickory.



9

10

11



12



13

SALIX, HICORIA.

PLATE 4.

- Fig. 14. *Cecidomyia? squamulicola*, hazelnut.
— 15. *Eriophyes betulae*, yellow birch.
— 16. *Dasyneura serrulatae*, alder.



14



15



16

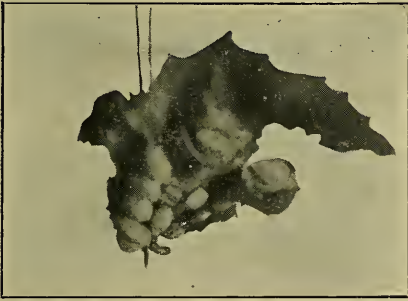
CORYLUS, BETULA, ALNUS.

PLATE 5.

- Fig. 17. *Eriophyes dentatae*, chestnut.
— 18. *Cecidomyia? castaneae*, chestnut.
—19-20. Sections of *Amphibolips tinctoriae*, scarlet oak. 1.9 ×
— 21. Section of *Cynips? obovata*, scarlet oak. 1.9 ×
— 22. Section of *Cynips? aspera*, scrub oak. 1.9 ×
— 23. *Amphibolips nubilipennis*, black oak.



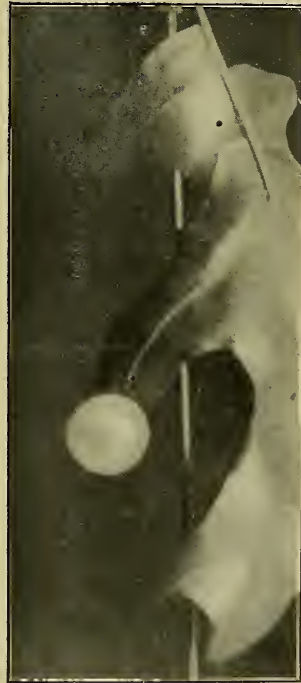
17



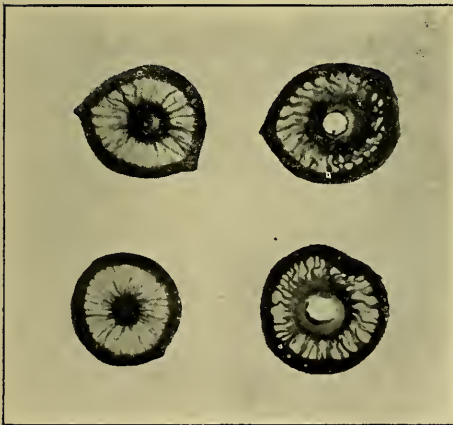
18

19

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23



21

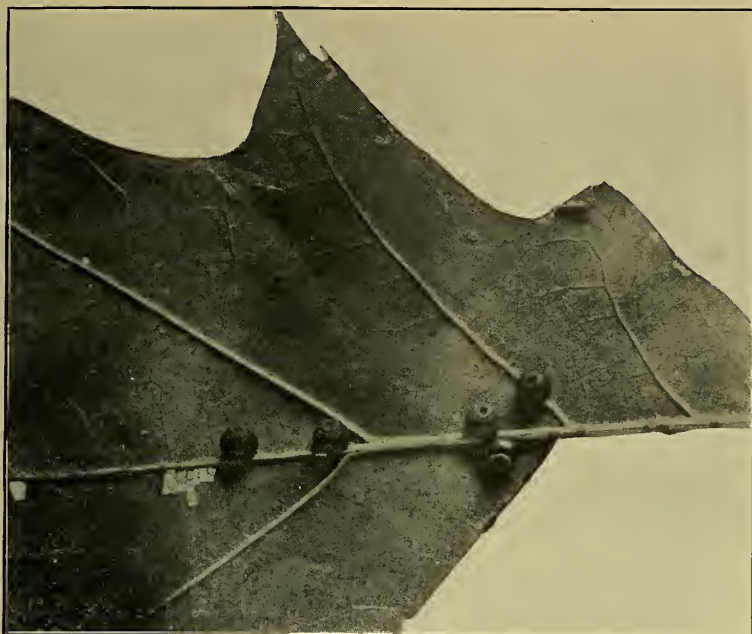
22

CASTANEA, QUERCUS.

PLATE 6.

Fig. 24. *Cynips? constricta*, red oak.

— 25. *Dryophanta lanata*, red oak.



24



25

QUERCUS.

PLATE 7.

Fig. 26-29. *Amphibolips coelebs*, scarlet oak.

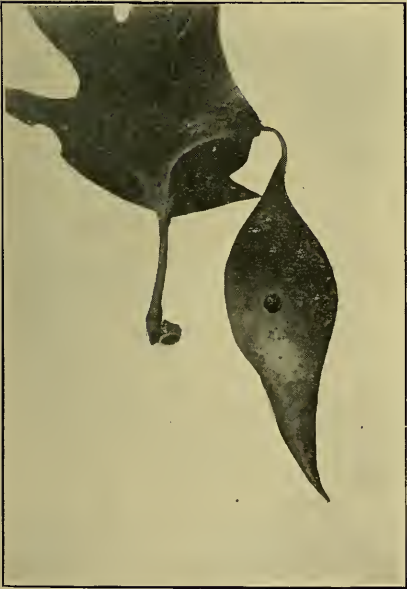
- 26. Ordinary size, on midrib.
- 27. Ordinary size, at end of vein.
- 28. Unusual size.
- 29. Opened to show larval cell and radiating fibers.



26



27



28



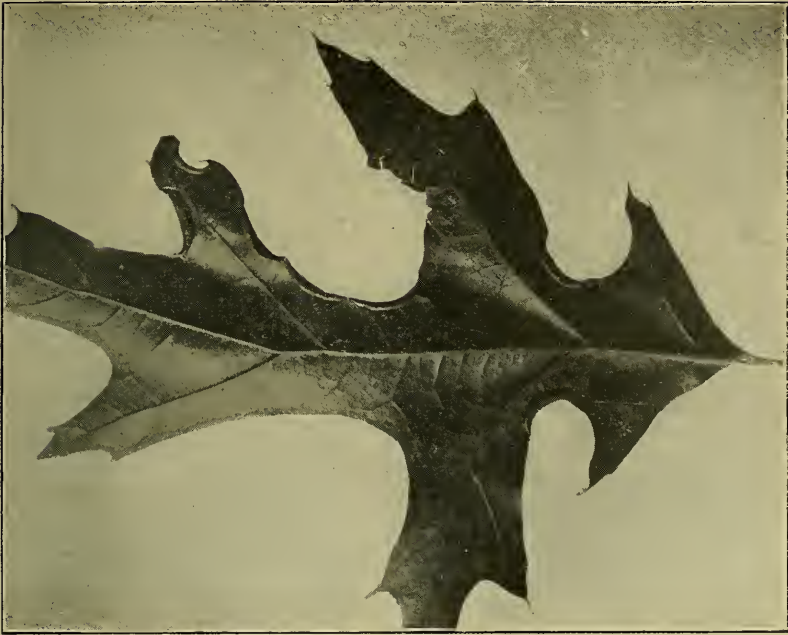
29

QUERCUS.

PLATE 8.

Fig. 30. *Cecidomyia foliora*, scarlet oak.

— 31. *Amphibolips tinctoriae*, scarlet oak.



30

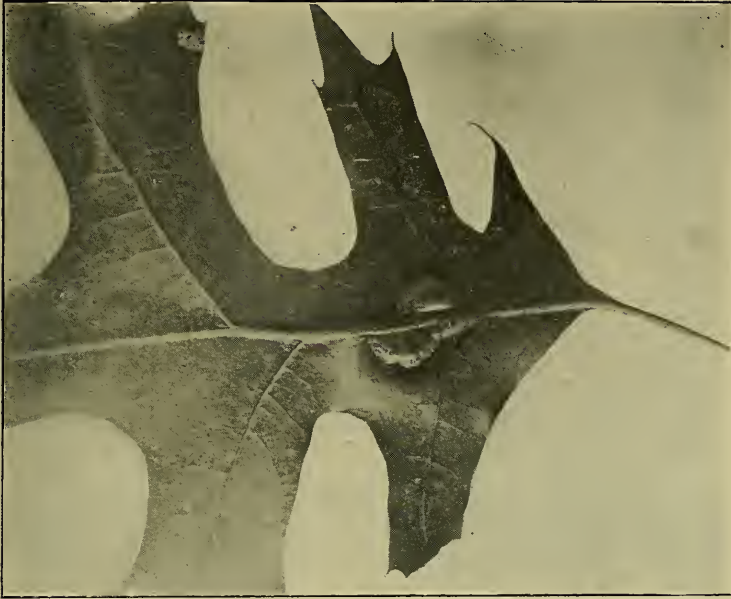


31

QUERCUS.

PLATE 9.

- Fig. 32. *Cecidomyia majalis*, scarlet oak.
— 33. Section of acorn to show *Callirhytis fruticola*, scarlet oak.
— 34. *Andricus? gallaestriatae*, scarlet oak.



32



33



34

QUERCUS.

PLATE 10.

- Fig. 35. *Cynips? obovata*, scarlet oak.
— 36. *Cecidomyia pustuloides*, black oak.
— 37. *Callirhytis palustris*, aments of scrub oak. Also found on leaves
of pin oak and of scarlet oak.



35



36



37

QUERCUS

PLATE 11.

Fig. 38-40. *Amphibolips prunus*, scrub oak. Shows that the larger the gall the less the development of the acorn.

— 41. *Cynips? cristata*, scrub oak.

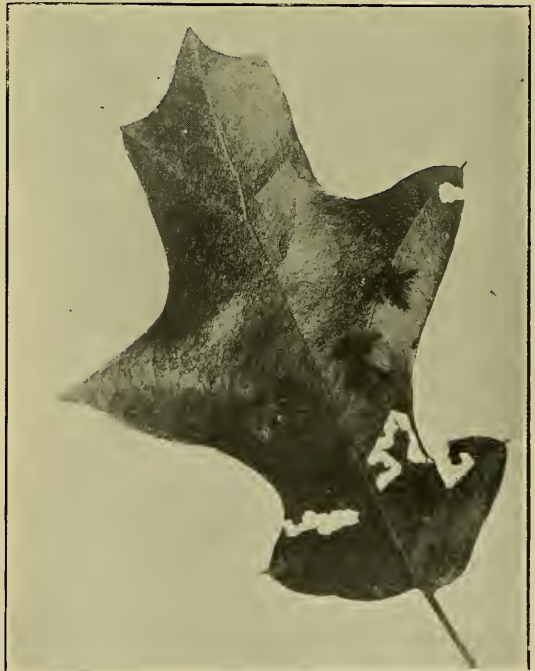


38

39



40



41

QUERCUS.

PLATE 12.

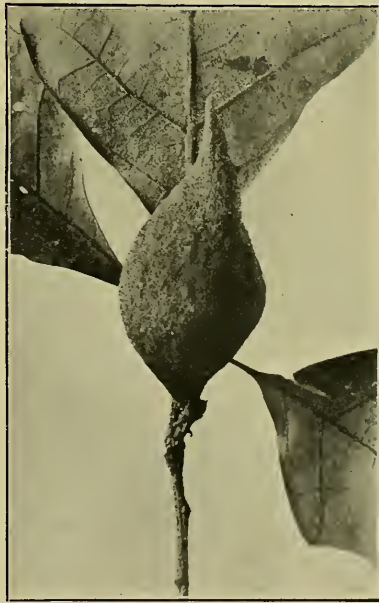
- Fig. 42. *Cynips? aspera*, scrub oak.
— 43. *Holcaspis fasciata*, scrub oak.
— 44. *Amphibolips ilicifoliae*, scrub oak.



42



43



44

QUERCUS.

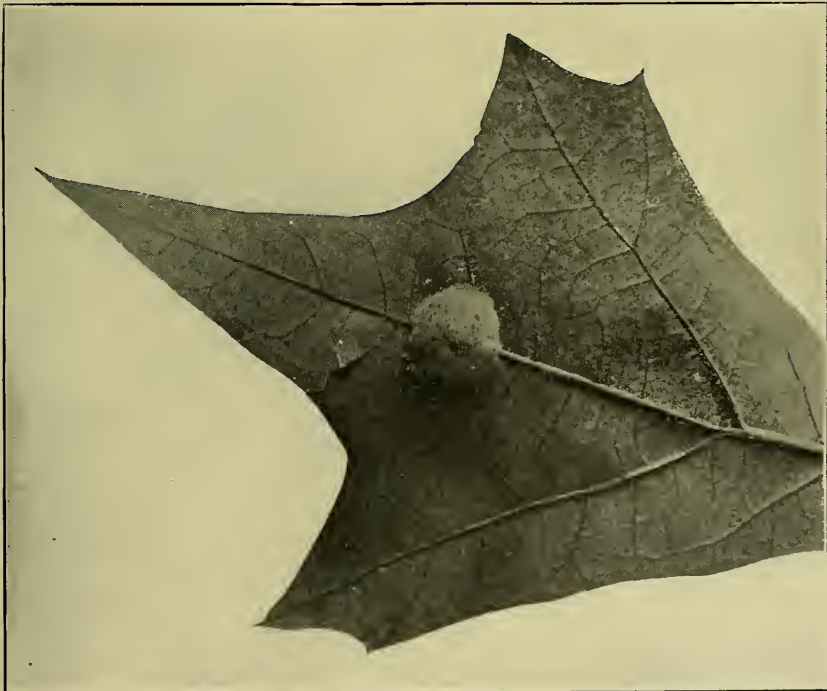
PLATE. 13.

Fig. 45. *Callirhytis similis*, scrub oak.

— 46. Apparently *Andricus flocci*, scrub oak. Usually occurs on white oak.



45



46

QUERCUS.

PLATE 14.

Fig. 47-48. *Callirhytis operator*, scrub oak.

— 47. Spring form on aments.

— 48. Fall form in cup of acorn.

Fig. 49-50. *Andricus ventricosus*, scrub oak.

— 49. Typical shape.

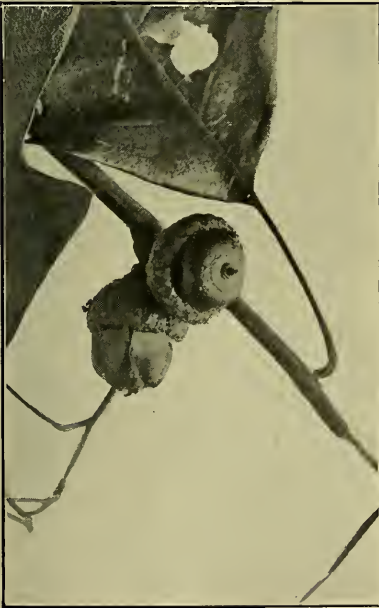
— 50. Typical arrangement.



47



49



48



50

QUERCUS.

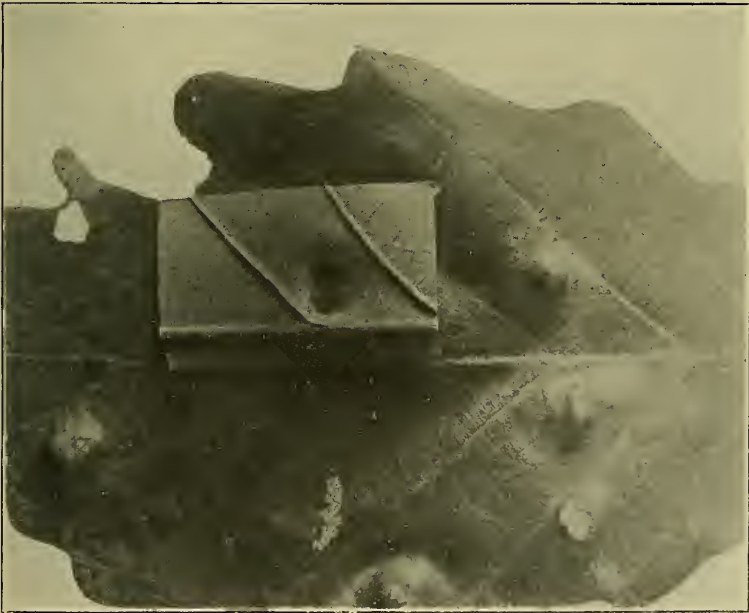
PLATE 15.

Fig. 51. *Neuroterus exquisitissimus*, white oak.

— 52. *Eriophyes querci*, chestnut oak.



51



52

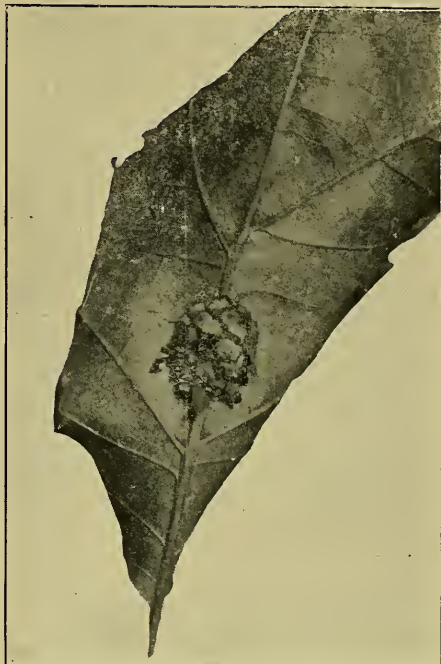
QUERCUS.

PLATE 16.

- Fig. 53. *Holcaspis duricoria*, swamp white oak.
— 54. *Cynips decidua*, red oak.
— 55. *Andricus petiolicola*, dwarf chestnut oak.
— 56. *Holcaspis rugosa*, dwarf chestnut oak.



53



54



55



56

QUERCUS.

PLATE 17.

- Fig. 57. *Cynips frondosa*, dwarf chestnut oak.
— 58. *Cynips caducus*, dwarf chestnut oak.
— 59. *Cynips prinoïdes*, dwarf chestnut oak.



57



58



59

QUERCUS

PLATE 18.

- Fig. 60. *Pemphigus fusus*, slippery elm.
— 61. *Eriophyes ulmi*, elm.
— 62. ?*Dasyneura clematidis*, clematis.
— 63. *Myzus ribis*, currant.



60



61



62



63

ULMUS, CLEMATIS RIBES.

PLATE 19.

- Fig. 64. *Cecidomyia salicifoliae*, hardhack.
— 65. *Lasioptera farinosa*, blackberry.
— 66. *Cecidomyia ? muscosa*, blackberry.



64



65



66

SPIRAEA, RUBUS.

PLATE 20.

- Fig. 67. *Diastrophus nebulosus*, high blackberry.
— 68. *Diastrophus cuscutaeformis*, blackberry.
— 69. *Diastrophus bassettii*, running blackberry.
— 70. *Diastrophus bassettii*, running swamp blackberry.
— 71-72. *Cecidomyia ? reniformis*, strawberry.
— 71. Ending leaf growth.
— 72. At base of petiole.



67



68



71



69



72



70

RUBUS, FRAGARIA

PLATE 21.

- Fig. 73. *Rhodites ignota*, rose.
— 74. *Rhodites verna*, rose.
— 75. *Rhodites sphaericus*, swamp rose.
— 76. *Rhodites multispinosus*, rose.
— 77. *Rhodites lenticularis*, rose.



73



74



75



76



77

ROSA.

PLATE 22.

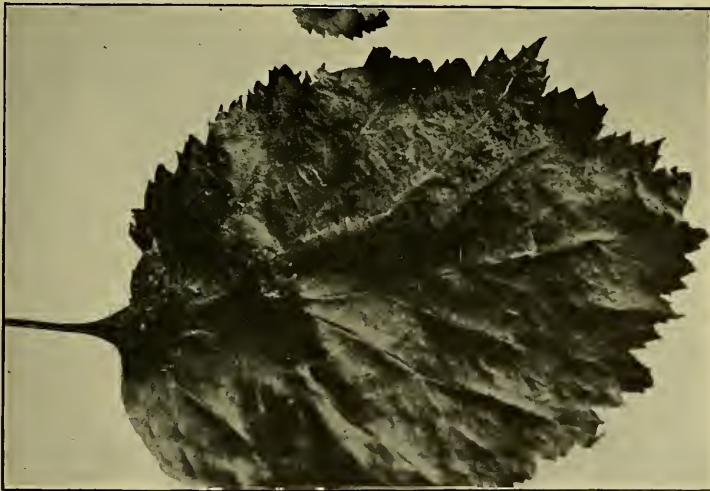
- Fig. 78. *Eriophyes amelanchieri*, shad-bush.
— 79. *Cecidomyia? venae*, thorn.
— 80. *Cecidomyia bedeguar*, thorn.



78



79



80

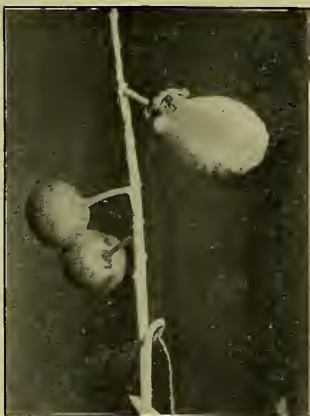
AMELANCHIER, CRATAEGUS.

PLATE 23.

- Fig. 81. *Cecidomyia? racemi*, choke-cherry.
— 82. *Contarinia virginiana*, choke-cherry.
— 83. *Cecidomyia? crotalariae*, rattle-box.
— 84. *Ecdytolopha insiticihana*, locust.



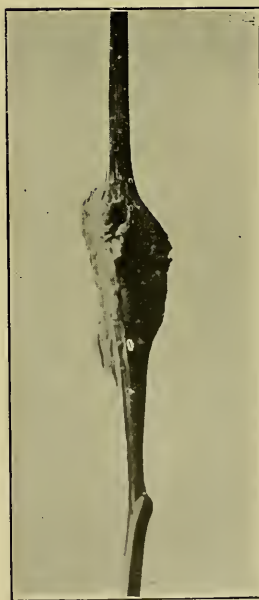
81



82



83



84

PRUNUS, CROTALARIA, ROBINIA.

PLATE 24.

Fig. 85. *Cecidomyia impatientis*, spotted touch-me-not.

— 86. *Lasioptera impatientifolia*, spotted touch-me-not.



85



86

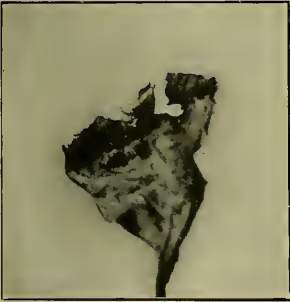
IMPATIENS.

PLATE 25.

- Fig. 87. *Pemphigus rhois*, smooth sumac.
— 88. *Eriophyes rhois*, poison ivy.
— 89. *Schizomyia pomum*, fox grape. Section to show two
“stories” of cells.
— 90. *Schizomyia coryloides*, frost grape.



87



88



89



90

RHUS, VITIS.

PLATE 26.

- Fig. 91. *Cecidomyia?* *parthenocissi*, woodbine.
— 92. *Cecidomyia semenivora*, arrow-leaved violet.
— 93. *Cecidomyia vaccinii*, deerberry.
— 94. *Lasioptera convolvuli*, hedge bindweed.



91



93



92



94

PARTHENOCISSUS, VIOLA, POLYCODIUM, CONVULVULUS.

PLATE 27.

Fig. 95-96. *Stigmatophora searotella*, blue curls.

— 95. In summer.

— 96. In winter; typical shape.

— 97. *Neolasioptera sambuci*, elder.



95



96



97

TRICHOSTEMA, SAMBUCUS.

PLATE 28.

Fig. 98. *Cecidomyia umbellicola*, elder.

— 99. *Neolasioptera perfoliata*, thoroughwort.



98



99

SAMBUCUS, EUPATORIUM.

PLATE 29.

- Fig. 100. *Cecidomyia? eupatoriiflorae*, white snake-root.
— 101. *Rhopalomyia ?hirtipes*, goldenrod.
— 102. *Baldratia flavolunata*, goldenrod.



100



101



102

EUPATORIUM, SOLIDAGO

PLATE 30.

- Fig. 103. *Asphondylia monacha*, goldenrod.
— 104. *Rhopalomyia anthophila*, goldenrod.
— 105. Undetermined gall from goldenrod.
— 106. *Eurosta reticulata*, goldenrod.



103



104



105



106

SOLIDAGO.

PLATE 31.

- Fig. 107. *Lasioptera tumifera*, goldenrod.
— 108. *Dasyneura solidaginis*, goldenrod.
— 109. *Rhopalomyia? racemicola*, goldenrod.
— 110. *Cecidomyia? gemmaria*, heath aster.



107



108



109



110

SOLIDAGO ASTER.

PLATE 32.

Fig. 111. *Cecidomyia? strobiligemma*, heath aster.

— 112. *Asphondylia conspicua*, golden glow.



111



112

ASTER, RUDBECKIA.

SYSTEMATIC INDEX OF GALL-INSECTS.

(This index will also serve as list of plants inhabited by the gall-insects; the figures indicate the page on which the gall is described or mentioned.)

GALL-PRODUCING ACARINA.

The nomenclature of the gall-mites is, as far possible, in accordance with Bank's Catalogue of the Acarina, or mites, of the United States. (Proc. U. S. nat. mus., 1907, v. 32, p. 595-625.) They all belong to the family *Eriophyidae*, and those mentioned below to the genus *Eriophyes*.

Eriophyes

- abnormis (*Tilia americana*), 44-45.
- crumena (*Acer saccharum*), 42.
- aenigma (*Salix*), 10, 68.
- amelanchieri (*Amelanchier canadensis*), 39, 108.
- avellanae (*Corylus americana*), 15.
- betulae (*Betula lutea*), 16, 72.
- coryli (*Corylus americana*), 15-16.
- dentatae (*Castanea dentata*), 16, 74.
- ferruginea (*Fagus americana*), 16.
- padi (*Prunus*), 40.
- quadripedes (*Acer saccharum*), 42.
- querci (*Quercus nana*, *Q. alba*, *Q. prinus*, *Q. prinoides*), 24, 94.
- rhois (*Rhus radicans*), 41, 114.
- rosea (*Acer saccharum*), 42.
- semen (*Salix*), 10.
- serotinae (*Prunus serotina*), 40.
- spicati (*Acer spicatum*), 43.
- ulmi (*Ulmus americana*), 32, 100.
- viburni (*Viburnum dentatum*), 48.

GALL-PRODUCING HEMIPTERA.

APHIDIDAE.

Myzus

- ribis (*Ribes rubrum*), 34, 100.

Schizoneura

- americana (*Ulmus americana*), 32.

Colopha

ulmicola (*Ulmus americana*), 32.

Pemphigus

fuscus (*Ulmus fulva*), 33, 100.
 populicaulis (*Populus*), 8.
 rhois (*Rhus hirta*, *R. glabra*), 41, 114.
 rileyi (*Populus tremuloides*), 9, 66.
 transversus (*Populus*), 8.
 vagabundus (*Populus deltoides*), 9.

Hamamelistes

spinus (*Hamamelis virginiana*), 16, 34.

Hormaphis

hamamelidis (*Hamamelis virginiana*), 34-35.

Adelges

abietis (*Picea canadensis*, *P. mariana*), 5, 8, 66.

Phylloxera

caryaecaulis (*Hicoria*), 12-13.
 fallax (*Hicoria alba*), 14.
 fraxini (*Fraxinus americana*), 46.
 globuli (*Hicoria*), 13.
 pilosula (*Hicoria alba*), 15.
 semen (*Hicoria glabra*), 15.
 caryaevenae (*Hicoria alba*), 14-15.
 vitifoliae (*Vitis*), 4, 43.

PSYLLIDAE.**Pachypsylla**

cucurbita (*Celtis occidentalis*), 33.
 mamma (*Celtis occidentalis*), 33.
 vesiculum (*Celtis occidentalis*), 33.

GALL-PRODUCING COLEOPTERA.**CERAMBYCIDAE.****Mecas**

inornata (*Populus grandidentata*, *P. tremuloides*), 9, 66.

GALL-PRODUCING DIPTERA.**AGROMYZIDAE.****Agromyza**

simplex (*Populus tremuloides*), 9.

TRYPETIDÆ.

Eutreta

sparsa (Solidago), 50.

Eurosta

comma (Solidago), 50-51.

reticulata (Solidago juncea), 52, 124.

solidaginis (Solidago), 51.

Oedaspis

polita (Solidago rugosa), 52.

CECIDOMYIDÆ.

Cecidomyia

(Under this genus are arranged many species which have been described as galls only, hence their assignment to the genus is provisional.)

bedeguar (Crataegus), 39, 108.

bifolia (Solidago), 49.

caryaecola (Hicoria), 13, 70.

castaneae (Castanea dentata), 17, 74.

celastri (Celastrus scandens), 41-42.

citrina (Tilia americana), 45.

crotalariae (Crotalaria sagittalis), 40, 110.

erubescens, *see* foliora.

eupatoriflorae (Eupatorium ageratooides), 49, 122.

euthamiae (Euthamia graminifolia), 53.

foliora (Quercus palustris, Q. coccinea, Q. velutina), 21, 80.

gemmaria (Aster ericoides), 53, 126.

impatiens (Impatiens biflora), 43, 112.

inaequalis (Diervilla diervilla), 48.

irregularis (Populus grandidentata), 9.

lappa (Spiraea salicifolia), 35.

majalis (Quercus rubra, Q. palustris, Q. coccinea, Q. velutina), 17-18, 82.

muscosa (Rubus nigrobaccus), 35, 102.

niveipila (Quercus), 17.

ocellaris (Acer rubrum), 42.

parthenocissi (Parthenocissus quinquefolia), 44, 116.

pellex (Fraxinus americana) 47.

persicoides (Hicoria), 13.

poculum (Quercus alba), 27.

potentillaecaulis (Potentilla canadensis), 37.

pudibunda (Carpinus caroliniana), 15.

pustuloides (Quercus coccinea, Q. velutina), 22, 84.

racemi (Prunus virginiana), 39-40, 110.

ramuscula (*Aster dumosus*, *A. patens*), 54.
 reniformis (*Fragaria virginiana*), 36, 104.
 salicifoliae (*Spiraea salicifolia*, *S. tomentosa*), 35, 102.
 sanguinolenta (*Hicoria*), 13.
 semenivora (*Viola cucullata*, *V. sagittata*), 45, 116.
 serotinae (*Prunus serotina*), 40.
 squamulicola (*Corylus americana*), 16, 72.
 strobiligemma (*Aster ericoides*), 53, 128.
 tuba (*Cornus amomum*), 46.
 umbellicola (*Sambucus canadensis*, *S. pubens*), 48, 120.
 vaccinii (*Polycodium stamineum*), 46, 116.
 venae (*Crataegus*), 39, 108.
 verruca (*Salix*), 10.
 verrucicola (*Tilia americana*), 45.

Diplosis

rigidae (*Pinus rigida*), 5, 7.

Contarinia

liriodendri (*Liriodendron tulipifera*), 33.
 virginiana (*Prunus virginiana*), 40, 110.

Hormomyia

caryae (*Hicoria ovata*), 14.
 holotricha (*Hicoria*), 13-14.
 tubicola (*Hicoria*), 14.

Cincticornia

pilulae (*Quercus rubra*), 18.

Schizomyia

coryloides (*Vitis cordifolia*), 44, 114.
 pomum (*Vitis labrusca*), 44, 114.

Asphondylia

conspicua (*Rudbeckia laciniata*), 54, 128.
 monacha (*Solidago canadensis*), 52-53, 124.

Mayetiola

rigidae (*Salix*), 10, 70.

Rhopalomyia

anthophila (*Solidago*), 50, 124.
 ?hirtipes (*Solidago juncea*), 52, 122.
 racemicola (*Solidago*), 50, 126.

Rhabdophaga

batatas (*Salix*, 11, 68.
 brassicoides (*Salix*), 11, 68.
 gnaphalioides (*Salix*), 11, 66.
 strobiloides (*Salix*), 11, 68.

Dasyneura

- clematidis (*Clematis virginiana*), 34, 100.
 serrulatae (*Alnus rugosa*), 16, 72.
 solidaginis (*Solidago*), 50, 126.

Neolasioptera

- perfoliata (*Eupatorium perfoliatum*), 49, 120.
 sambuci (*Sambucus canadensis*), 48, 118.

Baldratia

- carbonifera (*Solidago*), 50.
 flavolunata (*Solidago canadensis*), 53, 122.

Lasioptera

- asterifoliae (*Aster*), 53.
 clavula (*Cornus florida*), 45-46.
 convolvuli (*Convolvulus sepium*, *C. spithameus*), 47, 116.
 corni (*Cornus candidissima*), 46.
 farinosa (*Rubus nigrobaccus*), 35-36, 102.
 impatientifolia (*Impatiens biflora*), 43, 112.
 nodulosa (*Rubus nigrobaccus*), 36.
 tumifica (*Solidago rugosa*), 52, 126.
 vitis (*Vitis*), 44.

GALL-PRODUCING LEPIDOPTERA.**TINEIDAE.****Ectoedemia**

- populella (*Populus tremuloides*), 10.

ELACHISTIDAE.**Stagmatophora**

- sexnotella (*Trichostema dichotomum*), 47, 118.

GELECHIIDAE.**Gnorimoschema**

- gallaesolidaginis (*Solidago*), 51.

TORTRICIDAE.**Ecdytolopa**

- insiticiiana (*Robinia pseudacacia*), 41, 110.

Eucosma

- seudderiana (*Solidago*), 51-52.

GALL-PRODUCING HYMENOPTERA.

TENTHREDINIDAE.

Cryptocampus

- cooperae (Salix), 11-12, 70.
 nodus (Salix), 12.
 ovum (Salix), 12, 70.

Nematus

- pomum (Salix cordata), 12.

INQUILINE CYNIPIDAE.

(These species have been mistaken for gall-makers.)

Synergus

- lana (see *Andricus flocci*), 25.
 oneratus (see *Holcaspis globulus*), 29.

Cynips

- pisum (see *Acraspis pezomachoides*), 28.

GALL-MAKING CYNIPIDAE.

Rhodites

- bicolor (Rosa), 37.
 dichlocerus (Rosa), 37.
 globulus (Rosa carolina), 38.
 ignota (Rosa), 37, 106.
 lenticularis (Rosa), 37-38, 106.
 multispinosus (Rosa), 38, 106.
 radicum (Rosa), 38.
 rosae (Rosa rubiginosa), 39.
 sphaericus (Rosa carolina), 38, 106.
 verna (Rosa), 38, 106.

Gonaspis

- potentillae (*Potentilla canadensis*), 37.

Diastrophus

- bassettii (*Rubus procumbens*, *R. hispidus*), 36, 104.
 cuscutaeformis (*Rubus nigrobaccus*), 36, 104.
 nebulosus (*Rubus nigrobaccus*), 36, 104.

Amphibolips

- coelebs (*Quercus rubra*, *Q. coccinea*), 18, 78.
 confluentus (*Quercus rubra*, *Q. coccinea*, *Q. velutina*), 18-19.
 ilicifoliae (*Quercus nana*), 25, 88.
 inanis (*Quercus rubra*, *Q. coccinea*), 19.
 nubilipennis (*Quercus rubra*, *Q. coccinea*, *Q. velutina*), 19, 74.

prunus (*Quercus rubra*, *Q. nana*), 19, 86.
 tinctoriae (*Quercus coccinea*, *Q. velutina*), 22, 74, 80.

Andricus

excavatus (*Quercus*), 17.
 flocci (*Quercus nana*, *Q. alba*), 25, 90.
 gallaestriatae (*Quercus coccinea*), 23, 82.
 imbricariae (*Quercus nana*), 25.
 petiolicola (*Quercus alba*, *Q. prinus*, *Q. prinoides*), 27, 96.
 piperoides (*Quercus rubra*), 19-20.
 singularis (*Quercus rubra*), 20.
 ventricosus (*Quercus nana*), 25, 92.

Callirhytis

clavula (*Quercus alba*), 27.
 cornigera (*Quercus palustris*), 21.
 fruticola (*Quercus coccinea*), 23, 82.
 futilis (*Quercus alba*), 27-28.
 operator (*Quercus nana*), 4, 25-26, 92.
 palustris (*Quercus palustris*, *Q. coccinea*, *Q. nana*), 21-22, 84.
 papillata (*Quercus prinus*), 31.
 punctata (*Quercus rubra*, *Q. coccinea*, *Q. velutina*), 3, 20.
 pusulatoides (*Quercus coccinea*), 23.
 saccularius (*Quercus coccinea*, *Q. velutina*), 23.
 seminator (*Quercus alba*), 28.
 similis (*Quercus nana*), 26, 90.
 tuberosa (*Quercus nana*), 26.

CYNIPS.

(Most of the species arranged under this generic name have been described as galls only, hence their assignment to the genus is provisional.)

aspera (*Quercus nana*), 26, 74, 88.
 caducus (*Quercus prinoides*), 31, 98.
 constricta (*Quercus rubra*), 20, 76.
 cristata (*Quercus coccinea*, *Q. nana*), 24, 86.
 decidua (*Quercus rubra*), 20, 96.
 frondosa (*Quercus prinoides*), 31, 98.
 obovata (*Quercus coccinea*), 24, 74, 84.
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