

## A STUDY OF THE CYNIPIDAE.

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Unless otherwise mentioned the specimens of galls and gall-flies from which the following notes and descriptions have been made were collected and reared by myself in the vicinity of Lansing, Michigan.

The Cynipidae, on account of their peculiar habits and wonderful instincts, form one of the most interesting families of insects for study and observation; and yet they have been so neglected by entomologists that the life histories of many of our most common species are very imperfectly known. The fact that I have taken not less than twelve or fifteen new species of cynipidous galls in the past eighteen months is proof enough that there is yet much to learn concerning this little gall-producing family of Hymenoptera.

One of the most unaccountable phenomena connected with the life histories of these insects is the fact that a leaf or twig of a plant will respond to the sting of a tiny insect and at once begin to build out of its own tissue a suitable abode for the little grub to live in, and, at the same time, furnish the tender inmate with abundant and proper food. In fact the vegetable excrescences that we call galls seem often to depend on the health of the inmates for their own development. When I have found galls stunted in growth, or deformed, or turning dark in color as if about to die, I have almost invariably found the larval cynip parasitised and no longer able to assimilate food and grow.

It is hardly less wonderful that these almost microscopic insects should be able to go with such unerring precision to the same location on the identical variety of tree or plant that their ancestors chose in which to deposit their eggs. Some of the Cynipidae, it is true, attack two or even three varieties of trees or plants that are very closely related. I know of no case where a cynip, producing galls on one of the so-called white oaks, ever attacks one of the red or black oaks, or vice versa. For example, the gall-fly, *Holcaspis globulus* Fitch, produces bullet-shaped galls, which always occur on small twigs of *Quercus alba*. *Biorhiza macrocarpa* Bass., produces a gall which I have found very common on the under side of the leaves of *Quercus macrocarpa*, where they are always attached to the mid-rib or one of the veins, and it is never found on any other tree. On the other hand, *Cynips dimorphus*, Ash., ms. I have taken on the leaves of *Q. macrocarpa*, *Q. bicolor*, and *Q. prinus*, all white oaks.

Again we find no way to explain how it is that these little insects, so near alike that we are only able to separate them by the aid of a microscope, should possess the power to produce galls so different and yet so constant in size and form.

The galls produced by any of the gall-producing cynips are as characteristic of that cynip as the fruit of any plant is characteristic of that plant. There is not a perfect gall in my collection that I could not determine with ease without ever seeing the fly that produced it.

A very interesting group of the Cynipidae is the sub-family Inquilinæ or guest gall-flies. This group comprises those cynips that no longer possess the power to produce galls for their own young, if they ever had such power. These flies seek the growing galls of other insects, not necessarily of the Cynipidae, in which to deposit their eggs. The eggs are laid outside of the central cell and the little larvæ grow to maturity without interfering with the well being of the grub of the true gall-fly. I have often reared a dozen or more of these guests from a single gall. Over one-quarter of the described Cynipidae in this country belong to this sub-family.

Parthenogenesis, alternation of generation, and many other interesting peculiarities of the family might be dwelt upon, but I will pass over these topics to speak of the great number of parasites that I have reared instead of the true gall-flies that I hoped to obtain. It would seem that the larval cynip, always protected by a wall of vegetable tissue, would be almost entirely free from the attack of parasitic insects, but quite the reverse is the case. It has not been uncommon for me to bring a large number of fine appearing galls into the laboratory fully expecting to get a good number of cynips, only to be disappointed by going to my breeding cages day after day to find parasites instead. A large number of the galls of *Amphibolips inanis* O. S., were taken from *Quercus rubra* in the summer of 1887, from which I estimated that over ninety per cent of the inmates were destroyed by parasites.

## OBSERVATIONS ON DESCRIBED SPECIES.

*Rhodites radicum* O. S. My galls belonging to this species were received from a fruit grower near Lansing, Michigan, in May, 1887, and a fine lot of cynips were reared from them. The galls were taken from small roots of the raspberry and appeared as irregular knotty swellings from one-half to three-fourths of an inch in diameter. These galls, which grew beneath the surface of the ground, seem to have been better protected from the attacks of parasites and guest-flies, as only true cynips were reared.

I have never heard of the galls occurring in sufficient numbers to do serious damage. In the College garden several hundred raspberry bushes were transplanted and their roots examined for the galls but none were found.

*Amphibolips coccinea* O. S. So far as I can find, this species has always been reported as producing galls on *Quercus coccinea*. The only tree on which I have taken the galls is a small grub oak which, I was informed by a botanist, was probably *Q. nigrum*, but, as there was no fruit on the tree, the species could not be ascertained with certainty. On this tree there were not less than thirty or forty galls, the largest of which measured one and three fourths inches in their greatest diameter by one and one-half inches in their least diameter. These galls differ from the galls of *A. spongifica*, for which they are often mistaken, by occurring on *Q. coccinea* and *Q. nigrum* (?) instead of *Q. rubra*, by having a thinner outer shell, by having the surface more glossy and covered with small pimples, and by having the inner radiating substance matted about the central cell, from which it can easily be removed with the fingers, instead of having these fibers grown into a hard

woody center surrounding the larval cell. The fly leaves the gall about the middle of June and its general color is a reddish brown. *A. spongifica* has two dates for appearing, a portion of the flies emerging in June and the remainder in October, and the general color of this species is black.

My specimens of *A. coccinae* began appearing June 16th. Neither guest nor parasites were reared.

*Amphibolips spongifica* O. S. (*Cynips confluens* Harris, and *C. aciculata* O. S.). Walsh speaks of this species in the American Entomologist as occurring plentifully on the black oak, *Q. nigrum*, but, although I have seen great numbers of these galls in both Michigan and Iowa on the leaves of *Q. rubra*, I have yet to find one on the leaves of *Q. nigrum*. The only flies that I have reared from these galls are those of the late part of the brood which began to appear October 3. On the 13th of October forty-seven galls were opened which gave seven true gall flies, twenty-seven parasitised galls and the remainder blanks.

*Amphibolips sculpta* Bass. The beautiful translucent galls produced by this species I have taken on the leaves of *Q. rubra* and *Q. coccinea*. They are attached to the under side of the leaves and may well be likened to large Delaware grapes in appearance. Galls taken in Michigan began giving flies June 21. Eight of these galls taken July 5 in the vicinity of Ames, Iowa, gave only parasites, two beautiful species of *Torymus*. No guests were reared.

*Amphibolips inanis* O. S. The gall of this fly is very common on the leaves of *Quercus rubra*. Large specimens are an inch in diameter. The galls are composed of a thin outer shell connected with the central larval cell by many thread-like radiating fibers. The flies begin to appear about the 20th of June. Over 90 per cent of the galls that I have collected have contained parasites. In the majority of cases, the central cell has been found to be crowded full of the parasitic larvæ of what I take to be a species of *Tetrastichus*. There is also a large species of *Torymus* that I have found common in these galls.

*Andricus clavula* Bass. The red swollen tips of the twigs of *Quercus alba*, which are the galls of the above named gall-fly, are very common in Michigan and Iowa. From these galls I have reared several specimens of the guest, *Ceroptes petiolicola*, but no true gall-flies.

*Andricus cornigera* O. S. When Baron Osten Sacken described the gall of this fly he had never seen the cynip that produced it. His specimens were taken on the pin oak, *Q. palustris*. The galls in my collection supposed to belong to this species were all taken on the red oak and may prove to be a new species. I have taken a considerable number of these galls and they all differ from a beautiful type which I have from the pin oak by being very much darker in color and more irregular and rough in outline. The galls appear like knotty swellings completely surrounding the small limbs. From all sides of the gall little seed-like bodies, much the shape and size of a small barley corn, are pushed out. These contain the larvæ of the gall-fly and fall to the ground some time in July, leaving the gall full of holes. I have a single imperfect fly taken from an immature gall.

*Andricus futilis* O. S. I have searched in vain for this gall in the vicinity of Lansing, but late in the fall of 1887 I found a small *Q. alba* in Ionia county, Michigan, standing in an open field, that had galls of this species on nearly every one of its dried leaves. The flies had made their escape so that no insects were reared.

*Andricus punctatus* Bass. Galls rare, but are occasionally found on small limbs of *Q. rubra*. They vary from one half of an inch to two inches in diameter and are smooth knotty swellings surrounding the limbs much the same as the galls of *A. cornigera*. From these galls I have reared the guests, *Ceroptes petiolicola*, *Synergus lignicola* and an undetermined species; also the parasite *Decatoma varians*, but no true gall-flies.

*Andricus seminator* Harr. The brown, woolly galls, so common on the twigs of *Q. alba* in midsummer, are the product of this cynip. Galls gathered early in July gave flies the seventh of the same month. A green parasitic fly, a species of *Syntomaspis*, I have reared from these galls in fully as large numbers as the true gall-maker. No guests have been reared.

*Andricus scitululus* Bass. This species seems rare. I have taken a few of the galls on *Q. rubra* in the vicinity of Lansing, Mich., and near Ames, Iowa. In the latter case the galls were taken July 5, when the flies were found to be already escaping. A few specimens of two undetermined parasites were also reared. The galls are composed of a woody enlargement of the tips of the twigs.

*Andricus flocci* Wal. (*Cynips lana* Fitch.) Walsh marks this species "rare." I took a number of the galls from the leaves of *Q. alba* and *Q. macrocarpa* in Michigan and find it to be one of the most common galls on both these oaks at Ames, Iowa. The galls appear as little bunches of brown wool growing out from the mid-rib, or one of the main veins, on the under side of the leaves. Beneath the wool is a cluster of small seed-like bodies about as large as a very small kernel of wheat. Galls taken in Michigan in the fall gave flies March 20. A few parasites, but no guests were reared. The flies appeared in abundance.

*Andricus singularis* Bass. Galls very common on *Q. rubra* leaves. In shape and structure these galls resemble the gall of *A. inanis*, but are much smaller, large specimens seldom attaining one-half inch in diameter. The galls project on both sides of the leaves, the larger portion always being below. Galls taken June 18 gave flies June 20. No guests were reared and the galls were little parasitized. Parasites undetermined.

*Andricus petiolicola* Bass. Galls found common on *Q. alba*, *Q. macrocarpa* and *Q. bicolor*. The galls are formed by the enlargement of a portion of the petiole of the leaf, and after the leaves have fallen, the galls stand out like little knotty projections. The galls that I have taken vary from 5-16 to 10-16 of an inch in diameter. Galls taken at Ames July 3 gave flies July 5. *Ceroptes petiolicola* is a very common guest in this gall.

*Cynips dimorphus* Ash. ms. Prof. W. H. Ashmead, of the Florida Exp. Station, informs me that he has this cynip and gall described in manuscript under the above name. Galls, red and globular, two to three m. m. in diameter, and arranged in clusters of from 10 to 30 or more on the under side of the leaves of *Q. prinus*, *Q. macrocarpa* and *Q. bicolor* in September and October. Rather common. Galls taken in the fall contained larval cynips on the first of July following.

*Cynips strobilana* O. S. The gall of this cynip I find quite rare. The galls are easiest found after the leaves have fallen. They have been taken from *Q. macrocarpa* and *Q. bicolor*. The individual galls are irregular, cone-shaped bodies, from fifteen to thirty of which constitute a cluster which always arises from a terminal bud. My largest cluster measures nearly two inches in diameter. Specimens taken last October still contain larvæ, (Sept. 20).

The guest, *Synergus lignicola*, has been reared from the galls in considerable numbers and also a few parasites belonging to the genus *Eurytoma*.

*Acraspis orinaceae* Wal. (*C. pisum* Fitch.) Galls common in September and October on the leaves of *Q. alba*, usually on the under side. When growing they are of a beautiful rose or straw color and are covered with short spines or hairs. The gall is exceedingly hard when dry and the surface is made up of little seed-like projections, much resembling the surface of a strawberry. The galls seldom contain less than two or more than five larval cells.

The mature insect emerges in November and is wingless, or, rather, with only stubs of wings.

A very common parasite reared from this gall is *Decatoma flavius*.

*Biorhiza forticornis* Wal. (*Cynips ficus* Fitch.) Galls occurring near the tips of the twigs of *Q. alba*, almost invariably on young second growth shoots. A hundred or more are often crowded together about the shoots and appear much like a great number of little compressed sacks. When green they are light yellow in color, but are brown when dry. Common.

A few undetermined parasites only have been reared.

*Holcaspis globulus* Fitch. Galls globular, from three to six-eighths of an inch in diameter, composed of a corky material with an egg-shaped central cell, always occurring on the twigs of *Q. alba*. The fly emerges late in October or early in November.

*Decatoma varians*, an undetermined species of the same genus, and a species of *Eurytoma* have been reared as parasites on this fly. Common.

*Holcaspis rugosa* Bass. The gall and the fly of this species resemble very closely those of *H. globulus*. I have found the galls to be more highly colored than those of the latter species, and when matured they have a shriveled surface, while *globulus* is smooth. These galls have been taken on *Q. prinus* only, and are scarce. One guest, *Synergus ficus*, and the parasites, *Decatoma varians*, *Decatoma* sp., *Eurytoma punctiventris* and *Syntomaspis* sp., have been reared from the galls of this species.

*Holcaspis duricoria* Bass. (*H. mamma* Wal.) This is probably the gall-fly referred to by Walsh in a foot-note in the American Entomologist, Vol. I, page 102, for which he suggests the specific name *mamma*. Mr. Bassett described this insect and gave it the specific name *duricoria*, a name that has been accepted by European entomologists. For this reason, and for the farther reason that Walsh's description is not sufficient to distinguish the species with any certainty, I have given Bassett's name the preference.

The galls are very common on the twigs of *Quercus bicolor* and *Q. macrocarpa*. They may appear singly but are usually crowded together in clusters about the twigs. The galls, unless much crowded in the cluster, are sub-globular in outline with a small teat-like projection. The fly, which much resembles *H. globulus*, *H. rugosa* and *H. Bassetti*, began to appear in the breeding cages Oct. 27. Fig. 3 is a full size representation of a cluster of these galls.

Two parasites, *Decatoma varians* and *Orymus ventricosus* were reared from this species.

*Dryophanta papula* Bass. These galls have been taken on *Q. rubra* and *Q. coccinea*. They consist of thickened portions of the leaves that are raised in many sharp points on the upper side. These thickened portions are lighter in color than the surrounding parts of the leaf and each little point seems to mark the location of the larval cell. Flies began to appear July 12. Rare.

The great majority of insects reared from these galls have been parasites of the genus *Tetrastychus*.

*Neuroterus noxiosus* Bass. The galls are irregular swellings of the twigs of *Q. bicolor*. Galls taken in January gave the mature insects the last of March following. Galls not at all common.

The guests *Synergus lignicola* and an undetermined species of the same genus were reared. A number of the parasite, *Orymus minutus*, were also reared.

*Neuroterus vesicula* Bass. When the larva of this species is full grown the gall is a thin shell, globular in form, almost black in color, covered with light spots, does not exceed three mm. in diameter and is supported by the bud scales of *Q. bicolor* and *Q. macrocarpa*. Galls taken April 29 gave flies May 3.

Neither guests nor parasite were reared.

#### NEW SPECIES DESCRIBED.

##### GALLS ON WHITE OAK (*Quercus alba*).

##### *Andricus foliaformis*, n. sp.

Gall: Small wart-like projections thrown out from the mid-rib on the under side of the leaves from which there grows a leafy expansion that extends on all sides like the corolla of a rotate flower. (Fig. 1.)

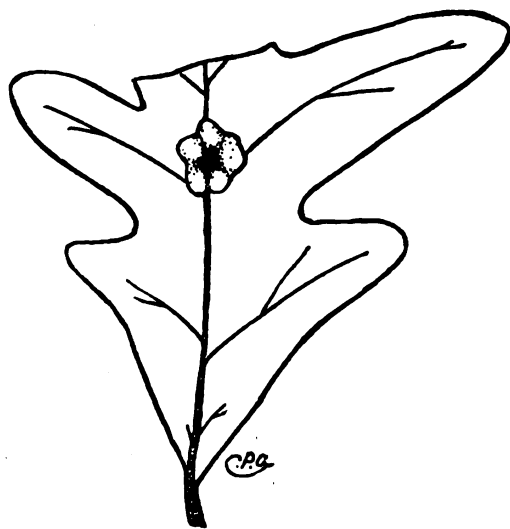


Fig. 1.

Gall-fly: Female. Head, dark reddish-brown with median line of face, vertex, and occiput almost black; front and genæ with many short gray hairs; vertex bare. Thorax from collar two-thirds of the way to the scutellum, between the parapsidal grooves, black; the remainder of the thorax brown. Parapsidal grooves distinct but not deep; outside of the grooves on either side a longitudinal patch of black is separated from the central black portion by a yellowish-brown line along either groove. Dorsal portion of thorax sparsely haired; pleuræ rather densely haired; tegulæ brown. Abdomen brown, smooth and shining, the darkest portion being on the posterior dorsal

part. With a power of 50 diameters, minute punctures can be seen on the abdominal segments; second segment sparsely haired on sides. Scutellum with two fovæ at base separated from each other by a narrow ridge; rounded behind, black at base, changing to brown at the tip, and thinly set with long hairs. Head, thorax and abdomen, when examined with a power of 50 diameters, have a scaled appearance. Antennæ three-fourths the length of the body, 13 jointed, first and second joints stout, third joint longest, last joint nearly equal to the two preceding in length; slightly clavate and rather densely ciliated throughout; basal joints, yellowish-brown. Length of body, 1.5 mm.

Described from a single specimen that issued July 30.

*Biorhiza rubinus*, n. sp.

Galls: When the leaves begin to turn in October, subglobular juicy galls about two or three mm. in diameter and rosy in color are found attached to the under side of the leaves. From a number of these galls collected in October, '87, four were selected and opened October 15, '88, from which one fully developed female cynip and three plump white larvæ were obtained.

Gall-fly: Shining black in color except the joints of the legs which are yellowish-brown. Head and thorax appear to be covered with shiny black scales. Clypeus with a number of rather stout hairs; a very few short hairs on front border of epicranium and on occiput; vertex bare. Antennæ 13 jointed, reaching the middle of the abdomen, first and second joints nearly equal in length and rather stout, the first somewhat stouter than the second, third joint longest and most slender, third to 12th gradually shortened, 13th once and a half as long as the 12th; brown-black in color and covered with a short gray pubescence. Parapsidal grooves are shallow and indistinct, but can be traced about one-third of the way from the scutellum to the collar. Scutellum much rounded behind and with two shallow fovæ at base. Abdomen a smooth glossy black. Legs rather thinly set with a gray pubescence; femurs with the same scaled appearance as the head and thorax; thorax sparsely set with short gray hairs. Length 1.5 m m.

SWAMP OAK (*Quercus bicolor*).

*Holcaspis Bassetti*, n. sp.

Gall: The gall occurs, sometimes singly, but usually in clusters about the twigs. The cluster represented at Fig. 2 was composed of 30 of these galls closely crowded together. The galls resemble very much the galls of *Holcaspis duricoria* Bass.

(*Cynips mamma* Wal.) (Fig. 3). The galls are very much the shape that a thick waxy material would take if dropped on the twigs and then suddenly congealed, leaving stout, teat-like projections standing out from each drop. The central cell is placed low in the gall and can usually be seen protruding when the latter is broken off. Some entomologists have thought this gall to be identical with Walsh's *C. mamma*, but I have examined a large number of both forms and find the following points

of difference, which convince me that this, if not a new species, is certainly a well marked variety:

*H. Bassetti* as compared with *H. duricoria*, is rather larger and is more irregular in outline. The teat-like

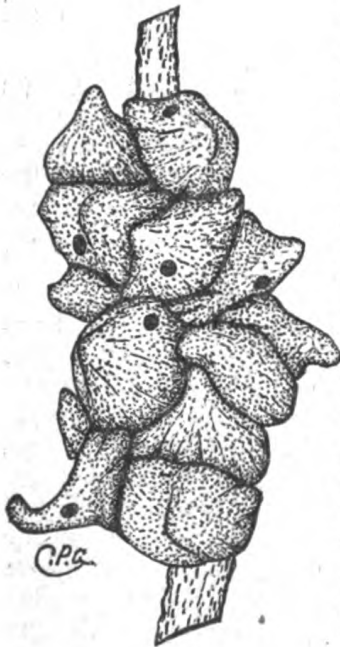


Fig. 2.



Fig. 3.

projection is much heavier and longer in proportion to the size of the gall and appears to be a drawn-out portion of the substance of the gall, while in *duricoria* it is a small, hard pointed projection much resembling a spine in many cases, and often almost entirely wanting. In Bassetti the substance of the gall is more corky and easy to cut. The central cell, as before stated, is at the base of the gall, and when the latter is removed the point of the cell can usually be seen protruding below. Before the gall is detached the central cell is situated with its greatest diameter perpendicular to the limb at the point of attachment of the gall. In *duricoria* the cell is situated at the center of the gall; it never protrudes from below when the gall is detached; and it always has its greatest diameter parallel with the limb at the point of attachment of the gall. The central or larval cells are also differently shaped. In *duricoria* the cell is egg-shaped, while in *Bassetti* the end towards the twig is somewhat pointed, so that the cell is very much the shape of a plump apple seed with the point rounded off.

Gall-fly: Female. Median line of the face black, the black portion being broadest between the eyes; vertex dark brown to black; occiput black; orbits and genæ cinnamon brown; clypeus and lower border of epicranium black; mandibles black at base and tip, with the median portion brown; palpi a light amber color, with the terminal joints of the maxillary palpi infuscate; and all the joints set with gray hairs. The epicranium joining the clypeus is finely rugose. Antennæ 13 jointed; third joint the longest; joints from 3-12 gradually shorter; the 13th equal to the two preceding in length. The terminal joints, under a power of 50 diameters, appear distinctly fluted longitudinally. Color of the antennæ black, except the first two joints which are brown-black. All the joints are rather thickly set with a fine pubescence. Parapsidal grooves begin midway on the thorax and extend back to the scutellum. They are very shallow and to the unaided eye appear like two narrow black lines. A little forward of the grooves two parallel black lines arise and extend forward to the collar. Near the base of the wings on either side there begins another black line that runs to the scutellum. In the two latter cases the black lines are narrow, strips of the thorax that have no hairs growing upon them. Scutellum without fovæ or grooves, rounded and elevated posteriorly, covered with a yellowish brown pubescence, very irregularly rugose and black in color, except the tip, which is usually brown. Tegulæ brown. Abdomen shining black with silky pubescence on the sides of the second segment. Under a power of fifty diameters the sides of the abdominal segments appear crackled or scaled and finely punctate. Wings hyaline; cross veins black and heavy; radial nervure not reaching the costal margin. Length of wing 5.2 to 5.7 m m. Legs very dark cinnamon brown and rather thickly set with a gray pubescence. Terminal joints of tarsi black. Length 4.2 mm.

Described from nine specimens reared from the galls.

*Cynips nigricens* n. sp.

Galls in clusters attached to the mid-rib on the under side of the leaves. The galls are cone-shaped, and resemble very small galls of *C. strobilana*. The galls fall to the ground a little before the leaves drop in the fall. From a large number of these galls gathered in October, 1887, I obtained one perfectly developed female late in September, 1888. The fly may be described as follows:

Color, except joints of legs, tarsi, and venter, black.



All parts of the insect except the dorsal portion of the first two or three abdominal segments, and compound eyes, are rather densely and evenly covered with a short gray pubescence set in minute punctures.

Head: vertex and occiput appear to be covered with minute thick scales; clypeus and front rather coarsely punctate. Antennæ 13 jointed; first joint stout, third joint longest, third to seventh gradually shorter, eighth to twelfth sub-equal, thirteenth as long as the two preceding and with a slight indication of a division at its middle. The last five or six joints form a slight club and are fluted longitudinally. Length 2 mm. Thorax: parapsidal grooves distinct but narrow; widely separated at collar, and forming a double curve as they pass over the thorax to the scutellum. Two black parallel lines begin midway on the thorax between the parapsides and extend to the collar. Another slightly depressed line begins on either side of the thorax near the base of the wings and runs towards the scutellum. Thorax and scutellum with the same scaled appearance as the epicranium. Scutellum broad as long, obtusely rounded posteriorly and with two shallow fovæ at base. Wings: areolet small and indistinct; cubital nervure rather faint; cross veins rather heavy; radial nervure not reaching the costal margin. Length, 2 m m. Abdomen: the large second segment occupies about one-third of the abdomen; all of the segments punctured and set with many short gray hairs. Length of insect 3 m m.

BURR OAK (*Quercus macrocarpa*).

*Acraspis villosus* n. sp.

Gall: Hard globular excrescences on the under side of the leaves and always attached to the midrib. (Fig. 4) Medium sized specimens measure 5-16 of an inch in diameter. The galls resemble rather closely the galls of *A. erinaceae* but differ from it by having a much heavier pubescence, by always being single-celled and by being light yellow in color.

Gall-fly: Sub-apterous females only have been reared.

Head: Median line of face, including clypeus, vertex and occiput, black. Orbits and genæ dark cinnamon brown. In dark specimens nearly the entire face is black. Jaws and terminal joints of palpi black. Head and mouth parts sparsely pubescent. Epicranium, bordering clypeus, rugose; remainder of head punctate. Thorax, brown, bordered anteriorly and posteriorly with black. Parapsidal grooves wanting. Thorax and



Fig. 4.

scutellum punctate and finely pubescent. Abdomen thickly set with a yellowish-gray pubescence that gives a decided velvety luster to the sides of the abdomen. The anterior dorsal portion of the second segment has a large bare spot that is continued in a narrow line back over the succeeding segments. The borders of the segments show as black rings crossing the velvety surface. Legs, brown; tarsi infusate. Antennæ 13 jointed; third joint longest; last joint as long as the two preceding, and all of the joints rather densely haired. Length, 4 mm.

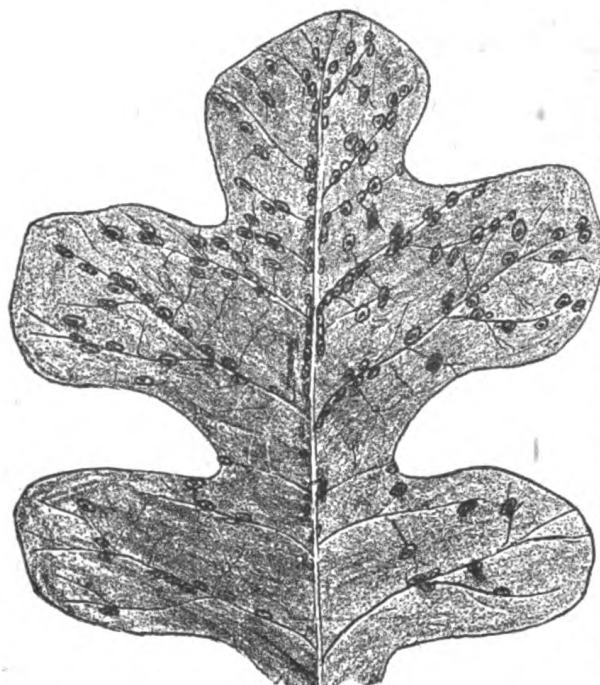


Fig 5.

*Neuroterus nigrum* n. sp.

Galls: The galls are little pimples about 2 mm. in diameter on the surface of the leaves (Fig. 5) and show equally well from above and below. There are usually a large number on a single leaf. The galls appear late in August but the flies do not emerge until the following summer. Few of these galls were noticed in Michigan, but they are very common about Ames, Iowa. My specimens were reared from the leaves of the burr oak, but in a number of instances I have taken galls that seem exactly similar on the leaves of the white oak, *Q. alba*.

Gall-fly: Color, except the tarsi, joints of the legs and antennæ, black. Head and thorax shining and with a

scaled appearance when viewed with a high power. Thorax almost entirely free from hairs and without parapsidal grooves. The meso-thorax is notched posteriorly making it appear as if the scutellum was unifovente. Scutellum broadly rounded behind; without fovæ or grooves; with a very few hairs; and with the same scaly appearance as the head and the thorax. Abdomen, shining black in color, with the ovipositor sheathes projecting. Antennæ with the first and second joints very stout and sub-equal in length; third joint longest, and the last four or five joints forming a slight club. The basal joints are sparsely and the terminal joints rather thickly set with short hairs; number of joints, 13. Eyes coarse; ocelli rather obscure. Wings, hyaline; areolet large; radial nervure reaching the costal margin; marginal cell open. Length 1.3 mm. Length of body, 1 mm.

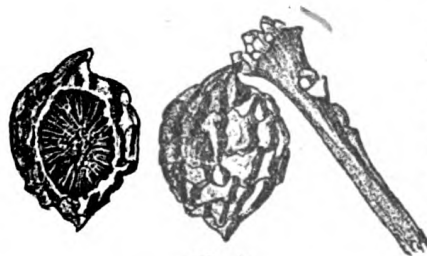
RED OAK (*Quercus rubra*).

Fig 6.

*Amphibolips Cookii* n. sp.

Galls, (Fig. 6) globular, with a central larval cell held in place by stout radiating fibers. When green, the galls resemble very much the growing galls of *Amphibolips inanis* O. S. The gall differs from that of *A. inanis* by having a thicker outer shell, by having much stouter radiating fibres, by being somewhat drawn out into a point at either extremity, and by occurring on the buds instead of the leaves. The galls fall with the leaves or before them, and, when dried, the outer surface is much shriveled in appearance. About a pint of these galls were gathered,

some late in the fall and others early in the spring, under a large red oak. On cutting into these galls the first day of September following, five fully developed flies and one pupa were found, all females.

Gall-fly: Head small; clypeus and jaws punctate; vertex, occiput, and median line of front coarsely pitted or sculptured; genæ and sides of the face deeply rugose, the furrows spreading out like a fan from either side of the clypeus; entire head jet black and rather thinly set with a grayish pubescence, except on the vertex, where it is bare. Jaws black; palpi brown. Antennæ reach the middle of the abdomen; 13 jointed; third joint longest; joints 3-12 gradually shorter; 13th joint next to the third in length and as long as the 11th and 12th together. Thorax entirely black. Parapsidal grooves present but very indistinct and can be traced about one-third of the way from the scutellum to the collar. Between and a little in front of these grooves arise two parallel black ridges that appear as minute shiny lines which extend forward to the collar. Two other similar lines start midway on the thorax a little outside of the parapsidal grooves near the base of the wings and extend back to the scutellum. Thorax and scutellum deeply sculptured and sparsely set with short gray hairs. Scutellum with two large fovæ at the base separated by a narrow septum; subquadrangular in outline and rounded and elevated posteriorly. Abdomen varies from a very dark amber to almost black; segments densely and finely punctate when examined with a power of 20 diameters; lateral portions of second segment very sparsely pubescent. Legs dark amber in color except the tips of the tarsi which are black; finely pubescent throughout; coxæ black. Wings seven to eight m. in length; somewhat smoky, and with a large stigmal spot at the base of the marginal cell. Length of body five and one-half mm.

The following is a list of the cynipidous galls taken in the vicinity of the Michigan Agricultural College. I have in each case given the variety of oak upon which they were taken, the date that the flies emerged, when reared, and the guests and parasites reared from the different species:

Name of Gall-fly.	Taken From.	Gall Taken.	Fly Emerged.	Guests.	Parasites.
Rhodites radicum O. S.	Raspberry roots	May	May 24		
Amphibolips coccinea O. S.	Q. coccinea leaves	June 14	June 16		
Amphibolips Cookii n. sp.	Q. rubra buds	November 10, '87	September 1, '88		An undetermined species.
Amphibolips inanis O. S.	Q. rubra leaves	June 16	June 21		Torymus sp.
Amphibolips nubilipennis H.	Q. rubra leaves	June 20	June 25		An undetermined species.
Amphibolips sculpta Bass.	Q. rubra leaves	June 18	June 20		Syntomaspis sp.
Amphibolips spongifica O. S.	Q. rubra leaves	July	October 3		An undetermined species.
Callirhytis clavula Bass.	Q. alba twigs	March		Ceroptes petiolicola O. S.	
Callirhytis cornigera O. S.	Q. rubra twigs	November			
Callirhytis futillis O. S.	Q. alba leaves	December			
Callirhytis punctatus Bass.	Q. rubra limbs	April		{ Synergus lignicola O. S. } { Ceroptes petiolicola O. S. }	Decatoma varians Wal.
Callirhytis scitulus Bass.	Q. rubra twigs	November			An undetermined species.
Callirhytis seminator Harr.	Q. alba limbs	July 5	July 7		Syntomaspis sp.
Andricus foliaformis n. sp.	Q. alba leaves	July 29	July 30		
Andricus flocci Bass.	{ Q. alba and Q. macrocarpa leaves }	December	March 5		{ Tetrastychus sp. } { Eurytoma sp. }
Andricus futillis O. S.	Q. alba leaves	December			
Andricus petiolicola Bass.	{ Q. bicolor and Q. macrocarpa leaves }	July 3	July 5		An undetermined species.
Andricus singularis Bass.	Q. rubra leaves	June 5	June 8		An undetermined species.
Cynips dimorphus Ash.	{ Q. prinus leaves } { Q. bicolor } { Q. macrocarpa leaves }	September 24			An undetermined species.
Cynips nigricens n. sp.	{ Q. bicolor and Q. macrocarpa twigs }	October 10, '87	September 25, '88		An undetermined species.
Cynips strobilana O. S.	Q. alba leaves	March		Synergus lignicola O. S.	Eurytoma sp.
Acraspis crinaceae Wal.	Q. alba leaves	October 20	November 5		Decatoma flavus.
Acraspis villosus n. sp.	Q. macrocarpa leaves	October 20	October 29		Eurytoma sp.
Biorhiza forticornis Wal.	Q. alba twigs	September			An undetermined species.
Biorhiza rubinus n. sp.	Q. alba leaves	October 12, '87	October 15, '88		

<i>Biorhiza macrocarpae</i> Bass.....	Q. macrocarpa leaves.....	October 1.....	October 10.....	{ } <i>Decatoma varians</i> Wal. } <i>Eurytoma</i> sp.
<i>Holcaspis globulus</i> Fitch.....	Q. alba twigs.....	October 15.....	October 29.....	{ } <i>Orymus ventricosus</i> .
<i>Holcaspis turicoria</i> Bass.....	{ Q. macrocarpa and Q. } bicolor twigs.....	October 18.....	October 23.....	{ } <i>Decatoma varians</i> Wal. } <i>Orymus ventricosus</i> .
<i>Holcaspis Bassetti</i> n. sp.....	Q. bicolor twigs.....	October 18.....	October 31.....	{ } <i>Orymus</i> sp.
<i>Holcaspis rugosa</i> Bass.....	Q. prinus twigs.....	October 15.....	October 20.....	{ } <i>Decatoma varians</i> Wal. } <i>Eurytoma punctiventris</i> Wal.
<i>Dryophanta papula</i> Bass.....	{ Q. rubra leaves and Q. } coccinea leaves.....	July 8.....	July 12.....	An undetermined species.
<i>Neuroterus nigrum</i> n. sp.....	Q. macrocarpa leaves.....	October 20.....	May 10.....	An undetermined species.
<i>Neuroterus noxiosus</i> Bass.....	Q. bicolor twigs.....	January 8.....	March 24.....	{ } <i>Ceroples</i> sp. } <i>Orymus minutus</i> .
<i>Neuroterus vesicula</i> Bass.....	{ Q. bicolor and Q. macro- } carpa buds.....	April 29.....	May 3.....	