PROCEEDINGS

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ENTOMOLOGICAL SOCIETY

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STATED MEETING, AUGUST 11.

Vice-President BLAND in the Chair.

Fifteen members present.

REPORT OF COMMITTEE.

The Committee on Mr. Cresson's paper, read July 14th, reported in favor of its publication in the Proceedings of the Society.

DONATIONS TO CABINET.

50 specimens of COLEOPTERA (*Cicindela marginipennis*, *Pasimachus depressus*, *Dicælus dilatatus*, *Osmoderma scabra*, *Ancylochira rufipes*, *Phellidius cornutus*, *Dacne heros*), 3 DIPTERA (*Chrysopila ornata*), 2 LEPIDOPTERA (*Ceratocampa imperialis*), and 1 HYMENOPTERA (*Peltastes pollicinctorius*), from Thomas Cox.

6 specimens of COLEOPTERA (*Corymbites micans*, *Tylonotus bimaculatus*, *Cacoplia pruinosa*), from Henry Feldman.

4 specimens of COLEOPTERA (*Dromius piceus*, *Helops americanus*), from Charles F. Parker.

Additions and corrections to the paper entitled: "On the CYNIPIDÆ of the North American Oaks and their Galls."

BY BARON R. OSTEN SACKEN.

Since the publication of my paper on the *Cynipidæ* of the North American Oaks (Proc. Entom. Soc. Phila. Oct. 1861), I have had occasion to make some additional observations, which serve to complete and often to correct, the statements of that paper.

It requires a particularly favorable situation to be able to pursue observations of this kind with some hope of attaining a certain completeness. My position in Washington, although affording me some facilities, did not always allow me to attain the accuracy which I desired. My removal to New York will probably deprive me for a long time of any opportunity of pursuing my observations. I prefer therefore, to publish now those I have on hand, following the conviction, already expressed before, that observations of nature should be made known without waiting too long for their further accumulation. The reader favorably situated may perhaps find among mine, incomplete as they are, some useful hints and suggestions. The subject is so extremely interesting and attractive that it deserves more attention than has been paid to it, not only in this country, but even in Europe.

All the observations, recorded below, have been made in Washington, unless otherwise mentioned.

Those who have paid any attention to the nomenclature of the oaks of this country, are acquainted with the difficulties attending the recognition of the species, chiefly of the red-oak group, if this recognition is to be based upon single leaves or even young trees. Thus I became aware after the publication of my paper, that the tree which I had called the red-oak (*Q. rubra*) was, *in most cases*, the scarlet-oak (*Q. coccinea*), which seems to be more abundant around Washington than the other. Most of the galls, therefore, mentioned as found on the red-oak, belong very probably to the other species. In some cases, I have been able to verify this fact, last spring. Other cases, however, are still doubtful.

I. Additions to the paragraphs on the Oak-Apple Galls. (l. c. No. 1 and No. 3, p. 56 and 58.)*

At the time of my previous publication, I took for the gall of *C. con-*

* This paragraph supersedes the NN 1 and 3 of my former paper, except the descriptions of *C. q. aciculata* and *Synophrus laeiventris* (l. c. p. 56 and 57), which have not been reproduced here.

fluens Harris all the oak-apples filled with a spongy substance, which I found in the environs of Washington.

Already then, however, I noticed two varieties of this gall, the one with a glossy, the other with an opaque surface (Compare l. c. p. 56).

These two varieties proved since to occur on two different kinds of oaks and therefore, very probably, to constitute two species, although the gall-flies, obtained from them, hardly show any difference. The gall-fly from the oak-apple No. 3 (l. c. p. 58), which I did not know at the time, but for which I proposed by anticipation the name of *C. q. inanis*, has also been reared by me since, and likewise closely resembles the other two gall-flies. Thus we have three (or perhaps four, as will be seen below) different and easily distinguished oak-apple galls, occuring on different species of the red-oak group, but all three producing uncommonly similar gall-flies.

The fourth oak-apple gall, peculiar to the same group of oaks, that of *C. q. aciculata*, discovered by Mr. Walsh, gives a totally different fly, as the ♀ has 14- and not 13-jointed antennæ.

I distinguish therefore, at present, the following oak-apple galls and their gall-flies:—

Q. COCCINEA. *Scarlet Oak? Large, more or less round gall, not attenuated towards the basis; surface glossy; shell thin and brittle; on the inside whitish filaments radiating from the kernel to the shell.* Diameter about an inch. C. Q. INANIS O. S. (Synon. l. c. No. 3, p. 58, and probably *C. confluens* Fitch, non Harris.)

Two ♀ specimens obtained from the galls on the 20th of June, 1862, answer to the following description:—

Head black, deeply, irregularly sculptured on the front and vertex; face finely pubescent, rugose; antennæ 13-jointed, brown or reddish-brown, especially towards the tip. Thorax black, deeply, irregularly rugose, finely and sparsely pubescent; three deeper longitudinal furrows, converging towards the scutellum, may be distinguished among this rugosity; their bottom is intersected by numerous transverse ridges and wrinkles. These furrows are deepest and broadest near the scutellum: the intermediate one is gradually attenuated towards the collare; the anterior end of the lateral ones, which runs towards the shoulders, can be seen only when the insect is kept in a certain position towards the light. Near the anterior end of the intermediate furrow and parallel to it, there are smaller, rather indistinct, longitudinal furrows and ridges. The pit at the basis of the scutellum is large, divided in two by a longitudinal ridge; its bottom, although glossy, is marked with transverse ridges. Abdomen brownish-red, glossy; the large basal, in reality the second, segment (see l. c. p. 48, foot-note) is perfectly smooth, the other segments show a minute punctation; (the posterior edge of the smooth segment shows traces of a similar punctation, but they are so minute, as to be hardly

visible, requiring a strong lens to be distinguished). Legs reddish-yellow, pubescent, hind tarsi sometimes infuscated; onychia black. Wings with a brownish-black spot at the basis of the radial area; it slightly trangresses the second transverse vein, but does not touch the anterior margin of the wing.

I have found this gall more than once on young trees, belonging either to *Q. coccinea* or *Q. rubra*. (The leaves were elongate, cuneate at the basis and hardly or, at least, not deeply, sinuate; this is, I believe, one of the varieties of the scarlet oak,)

Among the specimens of my collection, I find a number of galls, collected in one locality and somewhat different in shape from the typical specimens of *C. q. inanis*. The latter are more or less globular, the leaf being, so to say, the tangent of the globe. There is no distinct point or nipple on the top. The other gall, on the contrary, is somewhat lemon-shaped, being attenuated at its basis with a corresponding elongation, ending in a minute nipple, at the opposite end. Its color is more brownish than that of *C. q. inanis;* on the inside, I did not detect any difference between both galls. The tree is also either the red, or the scarlet oak. As twelve specimens of this gall, although of different size, all show the same characters with distinctness, I can hardly believe that these are merely accidental. I obtained only parasites from this gall.

Q. COCCINEA. *Scarlet Oak. Large, more or less round gall, not attenuated at the basis, surface glossy, shell thin and brittle; on the inside with a spongy substance, surrounding a kernel in the centre.* Diameter upwards to an inch and a half. C. Q. COCCINEÆ O. S. (Syn. *C. confluens* O. S. non Harris, ex parte; gall No. 1, l. c. p. 56.)

The external appearance of this gall is very like that of the gall of *C. q. inanis*. It is more or less globular (although irregular specimens of both frequently occur), that is, not narrowed towards the basis; its surface is glossy. Internally, it is easily distinguished by the spongy mass which fills it. It seems to reach a larger size than the former gall, as among six specimens now before me, one measures an inch and a half in diameter and two others are but little smaller, whereas among eight specimens of the gall of *C. q. inanis* the largest does not much exceed an inch.

From the following gall it is distinguished by its glossy surface, its less dense and more whitish spongy internal matter, its much thinner and brittle shell and by its shape, which is more rounded on the top. From this gall I have obtained this year (about the 25th of June) only one ♀ specimen, not showing any perceptible difference from *C. q. inanis*, except that

the thorax is somewhat reddish, which is probably due to the immaturity of the specimen.

Q. TINCTORIA. *Black Oak. Large, round gall, somewhat attenuated and pointed at the top; surface more or less opaque, as if powdered or dusted; shell thick; inside, a dense, spongy, brownish substance, surrounding the kernel.* Diameter about an inch and a half. C. Q. SPONGIFICA O. S.

This is the opaque variety mentioned l. c. p. 56, under the head of *Cynips confluens*. On the 25th of May last I found four full-grown specimens of this gall on the leaves of a large black oak (*Q. tinctoria*), and have obtained, on June 15, three ♀ specimens of the gall-fly. They look exactly like *C. q. ianuis*, only they are a little larger, (the gall being also larger); the three grooves on the back of the thorax seem to be deeper and more distinct on their anterior portion; the posterior part of the scutellum, immediately behind the pit, seems to be more deeply and distinctly excised; finally, the punctation on the hind margin of the large (2nd) segment of the abdomen is somewhat more distinct.

Of these galls three, taken from a high branch of the tree, can be considered as typical specimens. They are slightly oblong, that is, somewhat extended into a point at the end, although not narrowed at the basis. Their diameter is about an inch and a half. Their color is drab, sometimes spotted with brown on one side; the surface is more or less opaque, as if powdered or sericeous, and shows very little gloss. The shell is much thicker than that of the two previous species; the spongy mass is more dense and brownish.

A fourth specimen, found on the same tree, is more irregular in its shape; its surface is without any gloss and altogether drab, without brown spots. Specimens of this kind are frequently found on young shrubs of *Q. tinctoria*, the leaves of which are very rusty-puberulent beneath.

On a shrub of this kind, apparently also belonging to *Q. tinctoria*, I found, last June, three galls, resembling exactly those just described. I cut them open and obtained from two of them perfectly mature *male specimens* of Cynips; the third also contained a mature specimen, yet contracted in the shape of a pupa and the abdomen of which was consumed by parasitical larvæ.*

There is no reason to doubt that the two males thus obtained, belong to *C. q. spongifica;* but if not for the circumstance that they were found

* This fact is worthy of remark, as it proves that some kinds of parasites begin their attacks only at a very late stage of the development of the insect.

in a similar gall, they might as well be taken for the males of the two previous species, as the slight differences they show distinguish them alike from the three species of females.

These differences, (besides their longer and 15-jointed antennæ and a smaller abdomen, both being peculiar to the sex) consist, as far as I could perceive, only in the *dark brown*, almost black, and not *red* color of their abdomen, in their infuscated hind tibiæ and tarsi, in a somewhat deeper sculpture of the thorax and in a slightly more distinct punctation of the abdomen. These male *Cynips* also resemble the *C. q. caleb*, except that the latter is somewhat smaller and that the spot on its wing is also more small and paler.

Q. TINCTORIA. *Black oak. Large, round gall, broad and rounded at the top; surface smooth and glossy; shell thick; inside, a dense, brown, spongy substance surrounding the kernel.* Diameter upwards to an inch and a half. C. Q. ACICULATA O. S. (Syn. *C. confluens* Harris?)

This gall was communicated to me by Benj. D. Walsh Esq., in Rock Island, Ill.

The specimens which I received from him can at once be distinguished from the gall of *C. q. spongifica*, by their smooth, glossy surface and their subglobular or short-oval form, their basis being slightly attenuated, their top, on the contrary, being broad and rounded. Otherwise, their thick shell and their dense, brownish spongy substance reminds of *C. q. spongifica*.

Mr. Walsh noticed their appearance in summer (about July). The gall-flies usually remain in the gall through the winter and escape in the spring; sometimes however, especially when the weather in the fall is unusually warm, the flies leave the gall already at that season.

The synonymy of this species with *C. confluens* Harris, supposed by Mr. Walsh, is founded on the occurrence of their galls at the same season, and on the statement of Mr. Norton about the agreement of *C. q. aciculata* with the original specimens of *C. confluens* in Dr. Harris's collection. But if Dr. Harris's gall-fly really lives on the red oak (*Q. rubra*), its great resemblance to *C. q. aciculata*, occuring on the black oak (*Q. tinctoria*) would no more be a proof of their identity, than the great resemblance of *C. q. inanis* and *spongifica* is of theirs. The two latter gall-flies, although almost perfectly similar in appearance, occur on different oaks and produce quite different galls. It may be that the true *C. confluens* Harris, although closely resembling *C. q. aciculata*, produces on the red oak a

gall, sufficiently different from that of the other species, to be distinguished by constant characters. The synonymy of both therefore, although probable, seems to require further confirmation.

The gall-fly *C. q. aciculata* has been described l. c. p. 56. Its antennæ are 14-jointed, the last joint being separated from the penultimate one by a suture as distinct as that of all the other joints; the 14th joint is very slightly longer than the 13th, and without any apparent transverse impression. This character, common to *C. q. aciculata* and to *C. q. centricola* (of the oak-apple on *Q. obtusiloba*) distinguishes these species at once from *C. q. inanis*, *spongifica* and *coccineæ*, where the last (13th) joint of the antennæ is almost twice as long as the preceding, and shows two indistinct transverse sutures, foreshadowing the 14th and 15th joints of the ♂. The structure of the abdomen of these two groups of gall-flies is also very different. Seen from the side, it appears in *C. q. aciculata* and *centricola* very slightly convex above, the line of its back not rising abruptly above the petiole; the principal curve in the outline of the abdomen is on its under side, so that its side-view is not unlike that of the seed of a *Desmodium*. In *C. q. inanis* and the two other species, on the contrary, the abdomen, seen from the side, appears as convex above as below, its dorsal line rising steeply above the petiole. In the former group the largest or 2nd joint (the petiole being taken for the first) is comparatively longer, occupying almost ⅔ of the length of the abdomen, whereas in the other group (*C. q. inanis* etc.) it only reaches its middle. These differences prove that these two groups should, in a rational systematic arrangement, form two genera. It is also worthy of remark that both species of one group (*C. q. aciculata* and *centricola*) are produced by *autumnal* galls, and escape either late in the fall, or remain in the gall through the winter, whereas, the species of the other group all belong to *vernal* galls, the gall growing with the leaves and the fly passing through all the stages of its growth between the earliest spring and the end of June.

To the four oak-apple galls just described, have to be added that of *C. q. centricola* O. S., on the post-oak (l. c. p. 58, gall No. 4) and that which I found once on *Q. nigra*, the black-jack oak (see l. c. p. 53, line 14). I have not found it since, but possess in my collection a specimen of a gall-fly, closely resembling *C. q. inanis*, *spongifica* and *coccineæ* and distinguished only by a much more distinct punctation of the abdomen, which specimen, if I remember right, was reared from that gall. (Unfortunately I lost the label indicating its origin.)

I conclude the foregoing descriptions of oak-apple galls, by a synopsis of those at present known to me. I omit the species growing on the black oak, as I know it but imperfectly.

With the spongy substance inside.

Shell thick; spongy substance very dense.

Broad and rounded on the top; surface smooth and glossy; autumnal gall on *Q. tinctoria:* **C. q. aciculata** O. S.

Attenuated and pointed on the top; surface more or less opaque, as if powdered or dusted; vernal gall on *Q. tinctoria:* **C. q. spongifica** O. S.

Shell thin and brittle; spongy substance less dense.

Rounded, almost globular; surface glossy; vernal gall on *Q. coccinea:* **C. q. coccineæ** O. S.

With the filaments radiating from the kernel to the shell; the latter thin and brittle.

More or less globular, not attenuated towards the basis; surface glossy; vernal gall on *Q. coccinea* (or *Q. rubra*): **C. q. inanis** O. S.

Somewhat lemon-shaped, that is, attenuated at both ends, with a distinct nipple on top; perhaps a variety of the preceding, as it occurs apparently on the same kind of oak? Gall-fly unknown.

Perfectly globular, smooth, smaller than all the preceding galls, not drab, but more reddish-yellow when ripe; shell although thin, but harder; filaments on the inside more dense and silky; autumnal gall on *Q. obtusiloba:* **C. q. centricola** O. S.

II. General remarks on the Oak-Apple Galls.

The foregoing chapter records my recent observations on the oak-apple galls of this country. These observations being, however, yet incomplete, leave open several questions to which I now call the attention of future observers. Such questions are:—

1. Are *Cynips q. inanis, C. q. coccineæ* and *C. q. spongifica* one and the same species?
2. Have the gall-flies of the oak-apples one or two yearly generations?
3. The question of the sexes.

1. ARE CYNIPS Q. INANIS, C. Q. COCCINEÆ AND C. Q. SPONGIFICA ONE AND THE SAME SPECIES?

We have seen above, that these gall-flies are so similar that I could not find any important characters to distinguish them. Still, it does not follow hence that such characters do not exist. The comparison of a larger number of specimens would probably lead to their discovery.

The supposition that they *are* the same species would involve another one, that the difference between the galls described under the above names is merely due to the organic reaction of different kinds of oak against the sting of one and the same insect. It is obvious however, that this last supposition must be dropped if it is proved that *C. q. coccineæ* and *C. q. inanis* both occur on *Q. coccinea*, of which, as shown already, I am as yet uncertain.

Another fact apparently proving that they are really different species, is the close resemblance of *C. q. calebs* ♂ to the male of *C. q. spongifica*. The former is only smaller, otherwise it does not differ from the latter more than the females of the three species in question differ from each other. Now *C. q. calebs* seems to be undoubtedly a different species, as its spindle-shaped gall occurs also on a species of oak about which I am uncertain whether it is *Q. coccinea* or *rubra*. Thus we have *three* different galls, occuring, at the utmost, on *two* kinds of oak, so that, by all means *two* of the galls, and perhaps all the three grow on the *same* kind of oak. It seems obvious, hence, that gall-flies, however similar they may be, must belong to different species if they produce different galls on the same tree and that, at the same season. Mr. Ratzeburg (in his work: *Forst-Insecten*) asserts, from personal observation, that a species of *Cynips* produces the same gall even on different kinds of oak. The european *C. fecundatrix* of the *Quercus pedunculata* gave this result, when it attacked some american oaks in his garden.

For all these reasons, I believe, therefore, that *C. q. inanis, coccineæ, spongifica* and *calebs* are different, although closely allied, species of the same genus.

2. HAVE THE GALL-FLIES OF THE OAK-APPLES ONE OR TWO GENERATIONS?

If they have but one generation, what becomes of the gall-flies escaping in June and the larvæ of which begin to develope nearly a year later, in the buds of the following spring? They may lay their eggs in the buds destined to be developed on the next year, which eggs may remain dormant, till the buds begin to grow. But this remains to be proved. I do

not recollect now having observed any instance of the same kind of oak-apple being sometimes *vernal* (that is, beginning to grow early in the spring, together with the growth of the leaves and producing the fly towards midsummer) sometimes *autumnal* (that is, reaching its full growth later in the summer or in the fall; the fly either escaping late in the fall or remaining in the gall till the following spring). In my former paper I said on p. 56 "I am inclined to agree with Dr. Fitch, who supposes that there are annually two generations of this fly (*C. confluens*)." But I do not remember now whether I founded this opinion on a fact or on a mere probability, and rather believe the latter, as otherwise I would have recorded that fact. The question remains, therefore, undecided.

3. Sexes of the CYNIPIDÆ.

When I first reared *C. q. cælebs* ♂, its resemblance to the females obtained from the oak-apples, which, at that time, I called *C. confluens*, started the idea in my mind that they might belong together and that the question of the sexes of the *Cynipidæ* might thus find its solution in the occurrence of the males in galls different in shape from those of the females. The discovery of the four exceedingly similar species recorded above diminishes the importance of the resemblance on which I have based my hypothesis. The latter is moreover apparently altogether unsettled by the rearing of *male specimens* of *Cynips* from oak-apples. I now possess ♂ and ♀ of *C. q. spongifica*, and Mr. Walsh has reared a ♂ of what seems to be *C. q. coccineæ*. It follows hence that if ♂ and ♀ gall-flies can be reared from oak-apples, the as yet unknown ♀ of *C. q. cælebs* may also be obtained from a spindle-shaped gall, resembling that of the male. It follows also that the gall-flies, produced by the *vernal* oak-apples of *C. q. coccineæ*, *inanis* and *spongifica* do *not* belong to the agamous genera of Hartig. The case is different with the *autumnal* oak-apples. Mr. Walsh informs me that he has now reared over 100 *Cynips aciculata* from oak-apples gathered in the fall, without a single ♂ among them. I have shown already (p. 246) that this species, as well as *Cynips q. centricola* O. S., which is also produced by an autumnal oak-apple, both belong to a genus different from the above vernal gall-flies. This genus therefore must be the true agamous *Cynips sensu strictiori* of Hartig and the question of the male sex remains open for it.

III. Additions to some other Galls described in the paper on the CYNIPIDÆ etc.

To No. 5. CYNIPS QUERCUS PISUM Fitch (l. c. p. 59).

Last winter Dr. Morris, in Baltimore, gave me an oak leaf, apparently that of a white oak, with several galls on its underside, resembling very much those of *C. q. pisum* Fitch, only that the intervals between the cracks of the net-work were less convex, so that the galls seemed somewhat smoother. On opening the box which contained them, on the 7th of January, I found a wingless gall-fly walking in it. I immediately cut one of the galls open and found that it contained two other similar apterous flies, both alive. Each gall, like those of *C. q. pisum*, contained two cavities, separated by a partition. I am unable to decide whether these gall-flies are the true producers of the gall or merely parasites. The three gall-flies were females. Not knowing exactly to what genus this species should be referred, I call it provisionally:—

Cynips pezomachoides n. sp.—*Brown, mixed with reddish on head and thorax; legs reddish; wings rudimental; length about* 0.12.

Head brown on front and vertex and in the middle of the face, reddish around the eyes; antennæ 14-jointed, brown, somewhat mixed with reddish at the basis, but little shorter than the body; sculpture of the head hardly apparent. Thorax comparatively small, reddish on the back, brown on the pleuræ and the shoulders; finely pubescent; wings reduced to the size of small scales; scutellum small, without any apparent basal pits; its tip somewhat pointed and recurved upwards; feet reddish; basal part of the coxæ brown; the middle of the femora, the external side of the tibiæ and the tarsi, especially their tip, more or less brownish; last joint of tarsi rather large. Abdomen dark brown, shining, with a somewhat bluish (opalizing) reflection. The large 2nd (apparently first) segment, with a yellowish spot on each side. The four following segments are short, slightly, but gradually diminishing in length, the last of them bears below a short double projection, with a fan-shaped pencil of yellowish hairs. The following (in fact the 7th) segment is longer than the preceding but, being narrower, forms an abrupt angle with the hind margin of the latter; it is sparsely pubescent on its surface; the eighth segment above is connected with the preceding by a triangular, whitish membrane; the ovipositor is short and bears a few hairs.

Three ♀ specimens.

To No. 6. CYNIPS QUERCUS TUBICOLA O. S. (l. c. p. 60).

On the first of March, 1862, I obtained a new brood of this insect, from galls collected in autumn. The coloring of the body is variable, being more or less mixed with brown; some of the specimens are altogether dark brown. The antennæ appear to me now 14-jointed and as the abdomen

has the same shape as those of *C. q. centricola* and *aciculata*, it is probable that *C. q. tubicola* has a generic affinity with them, the more so as all these galls are autumnal and produce only females.

To No. 11. CYNIPS QUERCUS PALUSTRIS O. S. (l. c. p. 63).

Galls perfectly similar to those described as occuring on the pin-oak, were observed by me this spring on *Quercus falcata*, *tinctoria* and *coccinea*. I succeeded in rearing the gall-flies from the two former and could not discover any perceptible difference between them and that of *Q. palustris*, so that my description applies to all. Still, I do not consider my inability to distinguish them as a proof of their specific identity.

My description stated erroneously that the antennæ are 15-jointed *in both sexes*. In reality they are, as they ought to be, 14-jointed in the females. The last joint, however, is, in most specimens, distinctly divided in two by a slight annular incision. As this incision is more distinct in dry specimens, this was the cause of the error in my description, which I became aware of, as soon as I obtained fresh specimens. In the same way female gall-flies with 13-jointed antennæ generally have an indication of *two* subdivisions on their last, elongated joint.

Mr. Walsh, in Rock Island, writes me that he also discovered the gall on *Q. tinctoria*. He became likewise aware of my error as to the number of joints of the ♀ antennæ.

IV. Oak-Galls not mentioned in the paper: On the CYNIPIDÆ etc.

The following galls have been partly observed by myself, partly communicated to me by other persons since the publication of my paper on the *Cynipidæ*. About some of them, as will be seen below, I am not quite sure, whether they are really the produce of this class of insects.

Quercus palustris. *Pin Oak. Woody knots on the limbs, emitting pale yellow, conical, brittle projections.* Cynips quercus cornigera n. sp. (as yet unknown).

Of all excrescences on oaks in general, the present one, wherever it occurs, is perhaps the most conspicuous, as by its abundance it deforms the tree and seems to cause considerable injury. (It has already been alluded to l. c. p. 55, foot-note.) It consists of woody knots on the limbs, looking usually as if many of them were closely packed together and thus forming

an oblong, woody irregular mass, sometimes two inches or more long. Its most striking character are its slightly curved conical projections, hollow on the inside, which bud forth from all sides of the gall. On dry, dead galls, these horn-shaped projections are for the most part broken off, so that their bases alone are visible, projecting like short tubes from the cracks of the woody tubercle. In order to be able to designate this gall, the development of which I have not been able to investigate completely, I give its as yet unknown originator the provisional name of *C. q. cornigera* n. sp.

After having very frequently observed dead galls of this kind, I finally succeeded on the 13th of May, 1862, to find some young and growing ones. They were of moderate size; their back was greenish and their wood soft and succulent. The conical projections were just beginning to bud forth; when laid bare, by removing with a knife the wood around them, they appeared to extend deep inside of the gall, almost down to the twig. Their color was whitish, their consistency soft, apparently fibrous, and not woody. At that time, they were not hollow yet, and I could not find any larvæ in them. When I brought the galls home, numerous gall-flies, evidently parasitical, began to escape from them. They emerged from hollows in the woody substance between the horn-shaped bodies and had nothing in common with the latter. They resemble the *Cynips* (Synerges?) *oneratus* Harris and evidently belong to the same parasitical genus. When I visited the same spot during the latter part of June, I found some of the horn-shaped bodies already projecting about one-tenth of an inch; their substance had become harder and more woody; their inner end had become club-shaped, distinctly isolated from the surrounding wood, so that the whole of these bodies could be easily removed by cutting away the wood around them. On the inside, the inner end was hollow and contained a small larva. This larva is probably that of the true gall-producing *Cynips*, but, unfortunately, I was prevented from watching its growth further.

Cynips (Synerges?) lignicola O. S.— Yellow, black spot on the vertex; upper part of thorax and of the abdomen black; length, ♂ about 0.1; ♀ 0.12.

Head pale yellow with a black spot on the vertex; tips of mandibles black; ♂ antennæ 15-jointed, the third joint with the usual excision below; ♀ antennæ 13-jointed, the last being elongated and showing two slight subdivisions. Collare and pectus yellow; upper and hind part of the thorax black. Legs, including the coxæ, yellow, onychia brown; abdomen brownish-red, black above; it consists apparently of a single, smooth, shining segment, the following segments being

contracted under it, so that its posterior margin projects beyond them. The neck (or first segment) of the abdomen is turgid and longitudinally grooved. The wings are hyaline, the radial area closed; the stout veins pale yellow; the areolet narrow, triangular, its two anterior sides rather indistinct, almost obsolete; the origin of the cubital vein (from the first transverse vein) is obsolete.

Numerous ♂ and ♀ specimens.

Cynips oneratus Harris is somewhat larger than this species, it has a black spot on the pectus, so that the middle coxæ are inserted on a black ground; the yellow color is not strictly confined to the collare, as in *C. lignicola*, but extends across the suture on both sides of the dorsum of the mesothorax; at the same time the black of this dorsum encroaches anteriorly on the middle part of the collare, reaching the head; the abdomen is more light yellow, and the black on its upper part is less extended. These characters belong at least to the only specimen of *C. oneratus* in my possession.

Quercus palustris. *Pin Oak. Rounded, woody gall on the upper side of the leaves, along the principal ribs.* Diameter upwards to 0.4 to 0.5. Gall-fly unknown.

These excrescenses, occuring frequently in autumn, vary in size from 0.15 to 0.4 or 0.5; most of them, however, are about 0.2 or 0.3 long and narrower than their length. Their color is brownish, sometimes more or less yellow, or reddish or with a grey efflorescence; their surface has irregular, more or less deep wrinkles, according to the age or size of the gall; otherwise it is smooth, and has nothing of the deep and regular sculpture of *C. q. pisum*. They somewhat resemble the gall of *Cecidomyia symmetrica* O. S. (see Monographs of N. A. Diptera, p. 200), but project only on one side of the leaf; besides, their outline is more regularly rounded and less deeply cracked. When cut open they show several (commonly three) cells, divided by partitions, somewhat converging towards the middle of the base.

I am not sure whether they are produced by a *Cynips*, the more so as *Cynips*-galls usually occur *on the under side* of the leaves.

Quercus palustris. *Pin Oak. Round, wart-like, rusty-puberlent excrescences on the upper side of the leaf, growing several together.* Diam. of single ones about 0.1.

These galls are not unlike those of *C. q. verrucarum* O. S. (l. c. p. 61, No. 9) of the post oak and similar galls, found on the white and the swamp

chestnut oak, with the important difference, however, that they occur on the upper side of the leaf, whereas, the others are found on the under side. This makes me uncertain, whether they are the produce of *Cynips* or of *Cecidomyia*. I had no opportunity of observing fresh specimens, as those in my possession were communicated to me by Dr. Foreman, who had found them in Maryland. I did not find anything in the hard kernel of those which I cut open.

QUERCUS PRINOS, var. BICOLOR. *Large gall, at the tip of twigs, consisting of a number of wedge-shaped bodies, fastened by their pointed ends to a common centre.* Diameter about an inch and a half. C. Q. STOBILANA n. sp. (as yet not reared).

This gall, one of the most remarkable in my collection, was kindly communicated to me by Dr. Samuel Lewis, in Philadelphia, as found on young branches of this oak, in Hoope's Garden, near West Chester, Penn. For another specimen I am indebted to Dr. Morris, in Baltimore. These specimens measure rather more than an inch and a half in diameter and look somewhat like the cones of some kinds of pine, for instance, of the scrub-pine, as they consist of a number from 20 to 25 or more of wedge-shaped bodies, closely packed together, with their pointed ends attached to a common centre. These wedges are hard and corky and break off very easily when the gall is dry. Each of them contains a hollow kernel with a plump, large larva inside. This gall is evidently produced by the sting of the insect on the single leaves of a bud, each leaf growing into the shape of a wedge. I did not succeed in rearing the larvæ, which were still living when I received the gall. I call the *Cynips* by anticipation *C. q. strobilana*.

QUERCUS PRINOS. *Swamp-chestnut Oak. Globular galls on the under side of the leaf, along the principal ribs.* Diameter upwards to 0.3. Gall-fly unknown.

They were communicated to me by Dr. Foreman, who found them in Maryland. Not having seen any fresh specimen, I can only describe the dry and somewhat shrivelled ones. Their surface is finely downy, which gives them a peculiar brownish-cream-colored shade. They contain a kernel in the middle, nearer to their bases, from which numerous woody fibres radiate toward the stout woody shell. They occur in numbers on the same leaf, a moderate sized leaf which is in my possession, bearing eight of them, the largest of which has 0.3, the smallest hardly 0.1 in diameter.

I have no doubt, on account of their structure, that they are the produce of a *Cynips*.

Quercus obtusiloba. *Post Oak. Clusters of small, somewhat bell-shaped, petiolate, greenish galls on the under side of the leaves, along the midrib.*

Their shape may be compared to that of the flowers of *Vaccinium*. They are attenuated at the basis into a short petiole, fastened to the midrib of the leaf; the opposite end is truncated, the truncature being excavated; the length, from the foot of the petiole to the truncated end, is from 0.12 to 0.15. They grow in numbers, sometimes of ten or more together, so that six, for instance, form a row on one side of the midrib and four or five on the opposite side. When found by me on the tree in October, 1861, these galls were pale green; the dry specimens are brownish. Inside of each was a small whitish larva, probably of a *Cynips*.

Quercus alba. *White Oak. Clusters of small, round, reddish galls on the petioles of the white oak leaves; inside compact, with a hard kernel.* Diameter about 0.15.

Found quite abundantly in October, 1861. I did not describe them at once and the specimens now before me are brown and shrunken. The kernels of those which I opened at that time seemed empty. Still, I believe that the galls belong to *Cynips*, as I found in the box, containing them, a parasitical Cynipideous insect, apparently escaped from them.

Quercus alba. *White Oak? Large, round gall of a hard corky substance, growing on the branches; a round, hollow space in the centre.* Diameter 0.75–0.95. Cynips quercus juglans n. sp. (as yet unknown).

I found a couple of these galls in winter, on the ground, under an oak, the species of which I was unable to ascertain. Afterwards, Mr. Hitz, of the Maryland Agricultural College, communicated to me a number of these galls, with the statement that they grow on the branches of the white oak. All these galls, as well as those found by myself, were somewhat shrunken and wrinkled on the surface, probably from the effects of dryness. They are easily distinguished from the galls of *C. q. globulus* Fitch by their large size and their much harder substance. It requires some effort to cut them open, whereas, the dry galls of *C. q. globulus* can be easily cracked. For the same reason the kernel of the latter gall can be more easily detached from the surrounding corky substance, than that of the other gall. The greater part of the galls which I cut open contained a cluster of small

evidently parasitical larvæ. In two or three, however, I found a single Cynipideous larva. I did not succeed in rearing it, but obtained several kinds of parasites.

QUERCUS COCCINEA. *Scarlet Oak. Round, somewhat oblong, hollow, pale greenish-yellow gall on the under side of the leaf, slightly projecting on the opposite side; internally, an oblong kernel, kept in its position by filaments, radiating towards the shell.* Diameter of the gall about 0.25.

This gall occurs frequently along the margins of the leaf, although sometimes in the middle, near the principal ribs. The shell is rather thin; the kernel 0.1–0.15 long, oblong in shape. Having found this gall in June, I obtained only a parasite.

UNKNOWN OAK. *Round gall of a hard, corky substance, growing on the branches, its tip drawn out in a point; a hollow kernel in the centre.* diameter of the full-grown specimens 0.4–0.5.

These galls were communicated to me by Dr. Morris, in Baltimore, Md. The branches to which they are attached, belong apparently to an oak (they have no leaves). The galls are not unlike those of *C. q. globulus* Fitch in size and structure; only instead of being altogether globular, their tip is extended into a point; their color is more reddish. They are attached in the same way to the young branches, only they seem to occur in much larger numbers crowded together. Whereas, the galls of *C. q. globulus*, observed by me occur either singly, or in clusters of two or three, symmetrically arranged round the limb; one of the branches given to me by Dr. Morris, which is 6 inches long, bears 19 of the galls of the other kind, crowded together in irregular clusters of full-grown and abortive specimens. Another branch 3 inches long bears 9 specimens.

From this gall I have reared a parasitical Cynips and another parasitical hymenopteron.

QUERCUS NIGRA. *Black-jack Oak. Round mass, resembling wool, on the twigs, with numerous seed-like grains inside.* CYNIPS QUERCUS OPERATOR O. S.

This gall resembles very much the beautiful gall produced on the white oak by *C. seminator* Harris (l. c. p. 69, No. 21). When fresh and growing, it also consists of whitish filaments, forming a white, round body with beautiful pink spots. The inside also contains seed-like kernels. I found the gall in June, on young, flowering branches and obtained on the 23rd of that month the gall-fly which I call:—

Cynips quercus operator n. sp.—Reddish: posterior part of the abdomen brownish; wings without discal areolet: ♂ antennæ 14-, ♀ 12-jointed; length of ♂ 0.1, of ♀ 0.12—0.13.

Head yellowish-red, especially on the underside; tip of mandibles brown; antennæ of ♂ 14-jointed; 3rd joint distinctly excised inferiorly; the 4 following joints of about the same length, slightly shorter than the 3rd; the other joints gradually, but slightly diminish in length towards the tip; ♀ antennæ 12-jointed, gradually diminishing in length from the 3rd joint, the longest, except the last joint, which is a little longer and shows a slight indication of a subdivision in three joints. Thorax reddish, very minutely sculptured; the two usual furrows between the collare and scutellum delicate, but distinctly marked; a short groove on each side between them and the basis of the wing; an indication of a pair of other intermediate furrows beginning at the collare and not running farther than the middle of the thorax; scutellum roughly sculptured; its basal pits rather small. Feet pale reddish, except the ungues, the hind tibiæ and the base of the hind tarsi, which are brown. Abdomen brownish-red; its posterior part, especially above, more brown; large (2nd) segment smooth and shining; the other segments with a microscopic punctation. Ovipositor rather long, projecting from its elongated sheath, which is directed upwards. Wings hyaline, very transparent; areolet none; subcostal vein, first and second transverse veins, stout, pale yellowish: last segment of the subcostal vein (usually forming an angle with the remainder of the vein and running towards the anterior margin) obsolete; radial vein and latter part of cubitus pale and subobsolete; the anterior part of cubitus (between the first and second transverse veins), altogether obsolete; anal vein hardly indicated.

2 ♂ and 11 ♀ specimens.

This species is, at first glance, somewhat like *C. q. nigræ* O. S. (l. c. p. 66, No. 17) which produces a swelling on the leaf of the same kind of oak. Their resemblance consist principally in the coloring and in the neuration of the wings, which, in both species have no areolet. The differences, however, are the following (the description of *C. q. nigræ* given in my former paper may be completed from this comparison):—

C. Q. OPERATOR.	C. Q. NIGRÆ.
Size: ♂ 0.1; ♀ 0.12—0.13.	*Size:* ♂ 0.05; ♀ 0.09.
Antennæ: ♀ 12-jointed, with a distinct indication of a 13th joint.	*Antennæ:* ♀ 14-jointed; or, if the two last joints are taken for one, 13-, but by no means 12-jointed.
Abdomen: ovate, its dorsal ridge smooth, the segments being closely applied to each other;	*Abdomen:* much shorter, its dorsal ridge much more convex, the segments being at angles to each other and with intervals between their

	hind margins and the next segment;
its punctation microscopic; its color more or less reddish at the basis and on the underside.	its punctation much more distinct; its color altogether brown.
Sheath of the ovipositor long, projecting above the abdomen.	*Sheath* short, not projecting above the abdomen.
Hind tibiæ brownish.	*Hind femora* and *tibiæ* brownish.
Subcostal and *both transverse veins* pale yellowish.	These veins pale, colorless.
The subcostal forms with the second transverse vein a rounded angle; the branch usually running from it towards the anterior margin is obsolete.	The branch of the subcostal, running towards the anterior margin is distinct and well defined, although it is abruptly truncated before reaching that margin.
The *radial vein* gradually disappears before reaching the margin.	The *radial vein* abruptly stops before reaching the margin.

The aments of the same kind of oak (*Q. nigra*) are sometimes deformed by swellings, covered with white and pink filaments exactly similar to those of the gall of *C. seminator* and *operator*; I suppose, therefore, that they are produced by the sting of the latter gall-fly, although I did not succeed to watch their development.

QUERCUS VIRENS. *Live Oak. Clusters of galls crowded together round a limb, not unlike* C. q. ficus Fitch *in appearance, but much harder.*

It was communicated to me by Mr. Glover, who brought it from Florida. The specimen before me is a branch round which, on a length of 2½ inches, 21 galls are crowded together. Their shape seems originally to be round, but from being close together they have assumed all kinds of irregular shapes, the appearance of the whole cluster being well represented by Dr. Fitch's figure of the gall of *C. q. ficus.* Their color is brownish-yellow, mixed with brown. They are much harder than the galls of *C. q. ficus.* Having broken one open, I found in the kernel the remains of a *Cynips.*

QUERCUS VIRENS. *Live Oak. Woody swelling of the limb.*

The specimen, communicated by Mr. Glover, is a fragment of a branch about 1½ inches long with two such swellings; the one is rounded about

0.7 long and 0.5 broad; the other much smaller. I opened the latter and found on the inside a small empty hollow from the structure of which I have no doubt that the gall is the produce of a *Cynips*.

Quercus virens. *Live Oak. Small, round, wooly galls on the underside of the leaves.*

They are not unlike the galls of *C. q. verrucarum* and the analogous galls, only the wool is much longer. It seems that each gall consists of a hard kernel, covered with this pale yellow wool and that they occur in numbers together. Communicated by Mr. Glover. Undoubtedly a *Cynips*.