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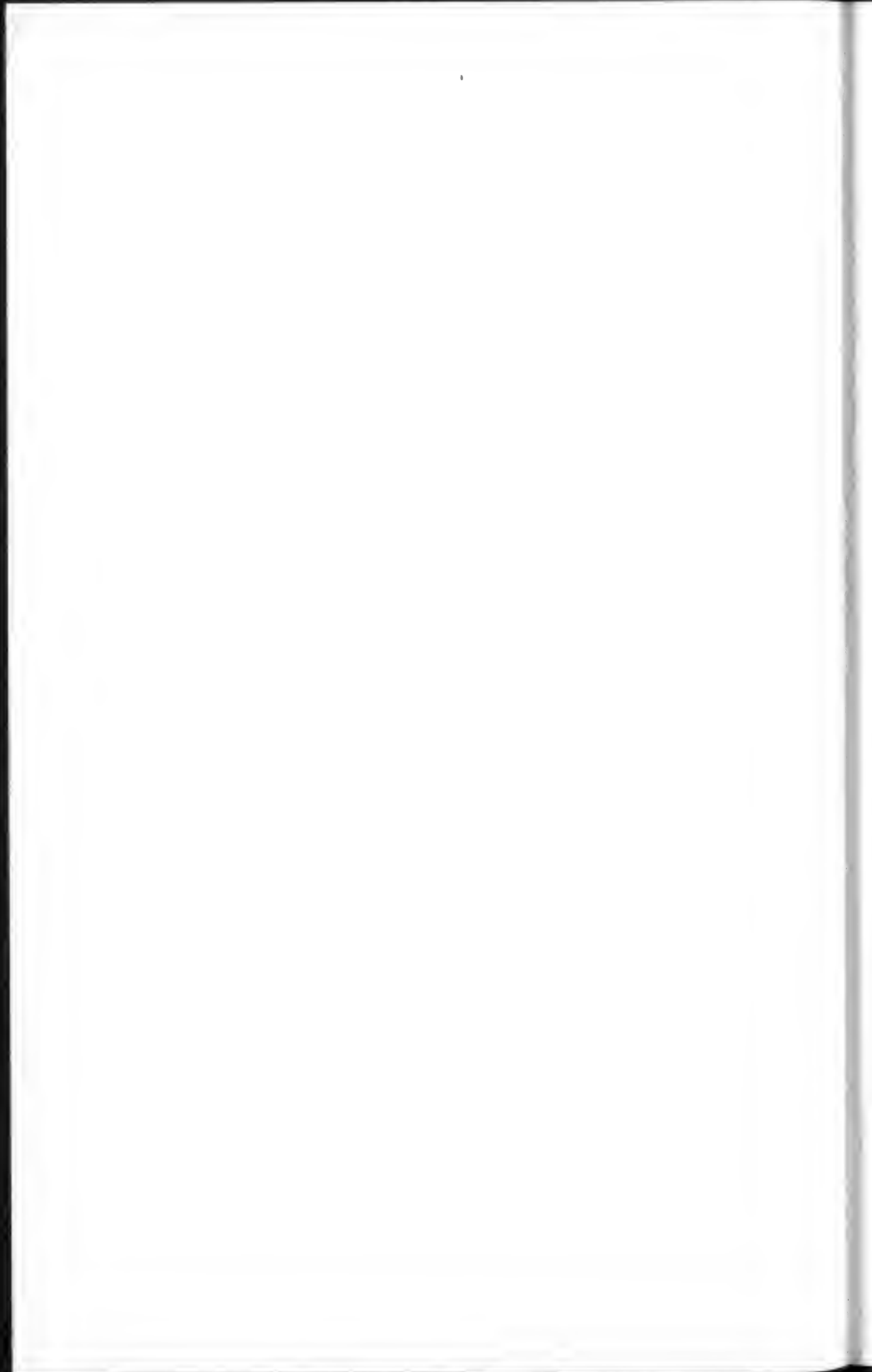


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CYNIPID GALLS  
OF THE  
EASTERN UNITED STATES

by  
Lewis H. Weld

HARVARD UNIVERSITY



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CYNIPID GALLS  
OF THE  
EASTERN UNITED STATES

by

Lewis H. Weld

Ann Arbor, Michigan  
Privately printed  
1959

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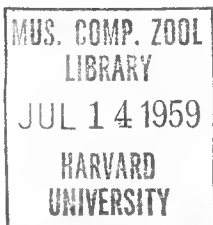
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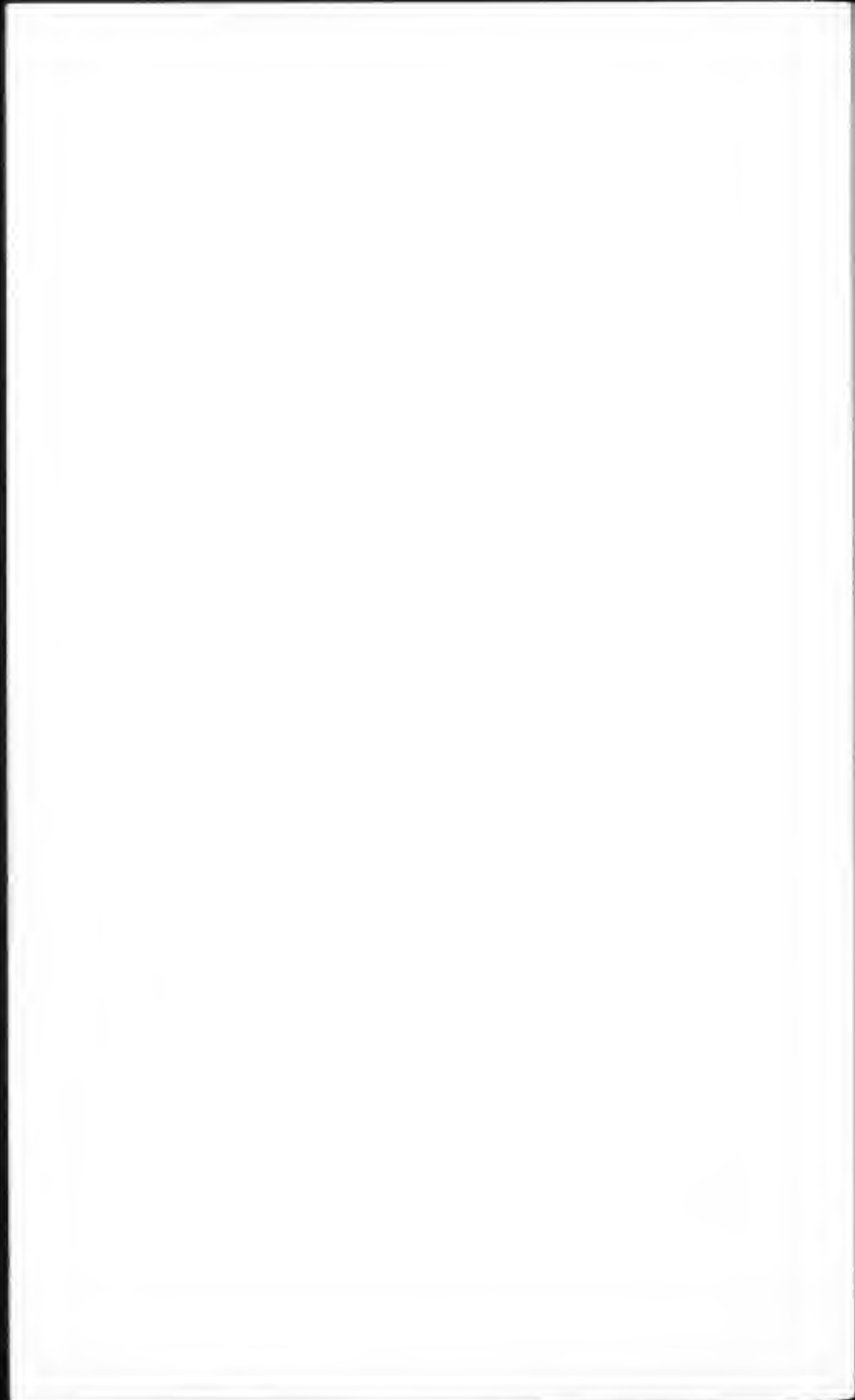
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### Introduction

The reception accorded The Cynipid Galls of the Pacific Slope (1957) has suggested the preparation of a similar work for the region east of the 100 th meridian - the Mississippi valley, the northeastern, middle and southeastern states and the Gulf Coast as far west as middle Texas. It does not include Colorado or the galls of the oaks on the desert ranges in New Mexico and Arizona. It lists all the 331 species that have been described or recorded from the area (283 on oak and 190 of these are figured) and in addition gives brief descriptions of 72 other galls on oak which have never yet been reared.

When the writer began to collect and rear cynipid galls about 1905-6 there was only one popular aid to their identification - Beutenmueller's The Insect-galls of the Vicinity of New York City (1904), published by the American Museum. With this only a few of the galls of the Chicago area could be named. A detachable stem gall might be recognized as a *Disholcaspis* but how many species in that genus had been described and from what hosts and locality one did not know. So the writer had to work up the American literature of the cynipids which was available in the Crerar library. Fully one-third of the galls of the Chicago area proved to be undescribed so the writer became a systematist instead of working on biological problems as originally intended. That preliminary work has now been done and time and effort saved for the next worker in the group.

In 1910 Dalla Torre and Kieffer published a monograph on the Cynipidae in *Das Tierreich*, Lief. 24 bringing the world literature up to 1905. They included keys to the genera of the gall makers but they had never seen the genotypes of the American genera and knew these genera only from Ashmead's descriptions. Many other new genera have since been proposed. So there is elsewhere now no up-to-date key to the genera of the gall makers of the region in any popular form.

Except in a single instance the older authors reared their adults the next spring at the latest from galls they collected. They did not know that many galls which drop off in the fall lie on the ground over two winters before any

adults emerge and that then the emergence is distributed over several seasons. Notes here record several such instances.

Here for the first time for this area the galls of each host oak are listed. Lists on some kinds of oak are very incomplete as the oak was seen only a few times and only one time of year. For example little collecting has been done on the various oaks in Florida or on the Gulf Coast in the spring. Here is an opportunity for the amateur to add to the lists.

Probably this will be most frequently used by someone wishing to learn the name of a curious growth on an oak or a rose. In that case if the host is known the place to look is in the host index and compare the short diagnosis there with the figure. Not all the described kinds are figured however. If the kind of oak is not known and, for instance, it is a detachable gall on the stem, one will find a list of all such in the check list which is combined with the notes on the illustrations. Similarly all the "root", flower, acorn and leaf galls are there listed regardless of host. Many kinds are still undescribed so one may fail to find it even here.

The amateur should be warned that a single gall casually collected is seldom worth the trouble of trying to rear. It may be the normal reaction of the host to the stimulus of a cynipid or it may be quite abnormal if it has been modified in size and structure by the attack of guests or parasites in its early stages. Only if found in numbers and on several trees is it probably the characteristic work of a cynipid and worth collecting and rearing. If one has trouble in naming galls send a number of each kind in a packet labeled with locality, date and host (if known or with a few leaves if not) to the writer at 6613 N. Washington Blvd., Arlington 13, Va. Packets are <sup>ε</sup>best made of a tough paper such as a grocery bag. Number the packets and keep a duplicate under the same number.

Sometimes a gall maker or guest is captured along with other insects in a net. It can be run in the key to genus perhaps. No keys to the species in any genus are included and in the case of the large genus *Disholcaspis* it is not possible to separate the adults altho the galls are characteristic. Members of the

parasitic subfamilies also may be taken in sweeping. They can be determined to genus only and very likely will not belong in any genus already reported from the area. The beginner will often collect galls from which the maker has already emerged and so will rear only guests and parasites. Notes on collecting on page 87 will indicate the two most profitable times of year for collecting.

For the purposes of this paper a simple Latin binomial is deemed sufficient designation of a species and the use of variety names has been largely avoided. Varieties can not usually be recognized in the field nor can the adults be separated without knowledge of host and locality. However in the Synoptic List mention is made of the fact that varieties of the species have been described in the literature. In a few cases varieties have been given tentative specific status. It is not likely that galls in Texas and Florida are varieties of a California species.

It is not within the scope of this paper to list the localities where a given gall has been collected. When a gall has been taken only once the place is mentioned so that others may look for it.

This is largely a one-man work prepared without editorial supervision. It puts on record what the writer has learned about collecting and rearing the galls of the area and suggests some life history problems yet unsolved. Some of the emergence records are from the Brodie notes which came to the U.S. National Museum. It forms the basis on which others can build. Its interpretation of what some of the older authors had before them may not always be correct. It is hoped that it may be useful to amateurs in identifying cynipid material that may come to their attention and that some with entomological background may be stimulated to undertake experimental work on life histories.

For a retirement hobby that will take one out-of-doors in the woods to study the oaks there or transplanted to the back yard, provide an excuse to travel to see other kinds of oaks and probably add to existing knowledge what better subject than these cynipids?

No new species, no new synonymy.

## C Y N I P O I D E A

Four-winged hymenoptera of small to medium size, one to six millimeters in length ( in *Ibalia* only up to 20 mm.), somber in color (black, dark red, amber, straw-yellow or particolored), dull or shining but never with the metallic colors found in the chalcids. The antennae of the female usually 13- or 14-segmented, never elbowed, usually filiform but in the parasitic forms several of the terminal segments forming a club; in the male the usual number is 14 or 15 with the third (rarely the fourth) often elongated and bent. The pronotum reaches back to the tegulae. The mesoscutum is usually separated from the scutellum by a suture and both are characteristically sculptured ( the notauli are here called the parapsidal grooves as in the descriptions of the older authors). The fore wings are without a true stigma and with a characteristic radial or marginal cell which may be open or closed on the front margin. The wing surface may be bare or pubescent, ciliate or non-ciliate and in some of the parasitic forms folds longitudinally. Tarsi are always five-segmented, the claws usually simple but toothed in certain genera of the gall makers. The first tarsal segment of the hind leg (*basitarsus*) is here called the *metatarsus* in the keys. Abdomen sessile or distinctly petioled in some of the parasitic forms where it is laterally compressed, the ovipositor issuing ventrally and normally concealed within the abdomen. Mature larvae are footless, not hairy, living as internal parasites of other insects, mainly flies or else in characteristic structures on plants called galls. The early stage larvae are often highly specialized in the parasitic forms.

Found in all countries of the world.



KEY TO SUBFAMILIES  
( based on females )

1. Radial cell at least nine times as long as broad. Last segment of hind tarsus twice as long as segments 2 to 5 united ( Figs. 1 and 2 ).  
Abdomen in female elongated, laterally compressed.  
Large ( up to 20 mm. ). For habitus of male see Fig. 280.  
Parasites in horntails. . . . . I. IBALIINAE  
Radial cell not nine times as long as broad. First segment of hind tarsus not as long as segments 2 to 5 united. . . . . 2
  
2. Largest segment of abdomen in female in side view is tergite VI preceded by four shorter ones, the petiole smooth.  
Kiefferiella ( Fig. 3 ) in . . . . . II. MESOCYNIPINAE  
Largest segment of abdomen in female tergite II or III, never more than one ( often none ) short segment in front of the large tergite. . . . . 3
  
3. Scutellum with a raised "cup" on the disk ( Fig. 4 ). . . . . VI. EUCOLLINAE  
Scutellum without such a raised "cup". . . . . 4
  
4. Tergite II liguliform ( Fig. 5 ). Thorax dull, sculptured.  
Reared from puparia of euryphide. . . . . III. ASPIOERINAE  
Tergite II not "tongue-shaped" . . . . . 5
  
5. Tergite II not forming half the abdomen. . . . . 6  
Tergite II the longest and usually at least half the abdomen. . . . . 7
  
6. Tergite II longer than III. Abdomen petioled ( Fig. 6 ).  
Reared from lace-wing flies: Chryseopa, Hemerobius, Sympherobius. . . . . IV. ANACHARITINAE  
Tergite II shorter than III ( Fig. 7 ). Abdomen sessile.  
Reared from the puparia of diptera. . . . . V. FIGITINAE
  
7. Body without sculpture. Under 2.0 mm. ( Fig. 8 ). Tergite II usually half the abdomen.  
Secondary parasites in the abdomen of aphids. . . . . VII. CHARIPINAE  
Body usually sculptured ( unless mesoscutum and scutellum are fused without a suture as in Neuroterus ). Usually larger than 2.0 mm.  
Fully-winged ( in a few genera of gall makers the wings are reduced or absent ).  
Gall makers or inquiline i.e. plant inhabiting. . . . VIII. CYNIPINAE

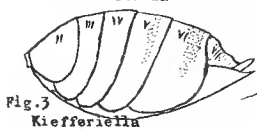
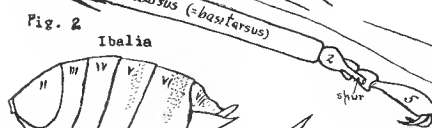
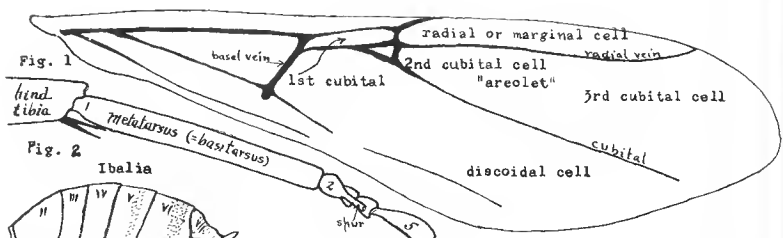


Fig. 3  
Ibalia

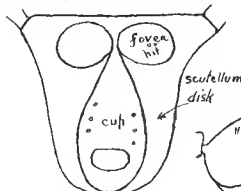


Fig. 4  
Eucoila

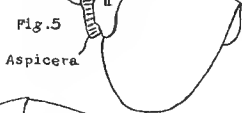


Fig. 5  
Aspicerca

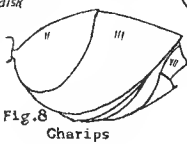


Fig. 8  
Charips

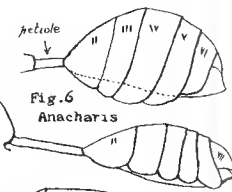


Fig. 6  
Anacharis

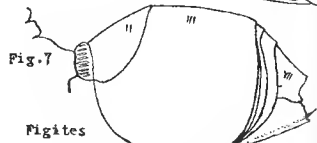


Fig. 7  
Figites

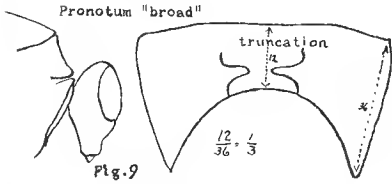


Fig. 9

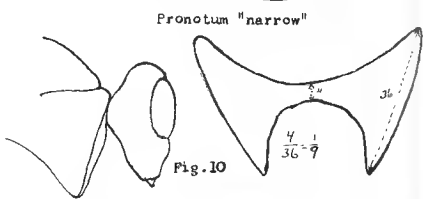


Fig. 10

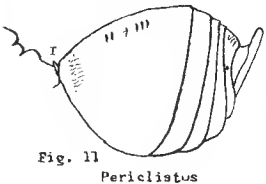


Fig. 11  
Periclistus

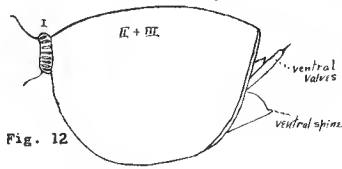


Fig. 12  
Synergus

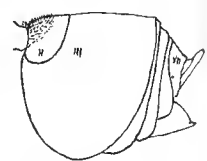
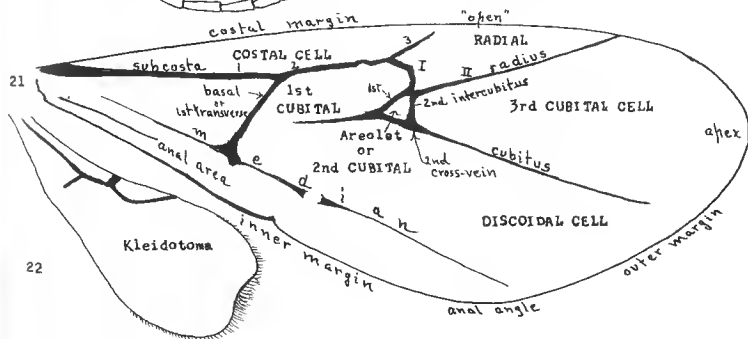
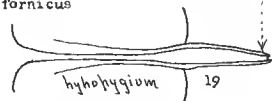
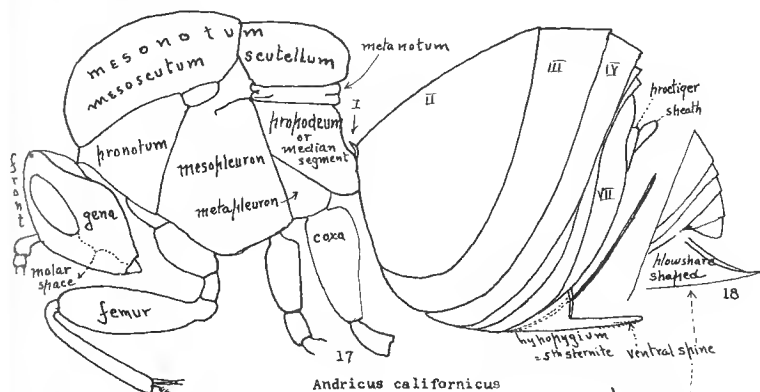
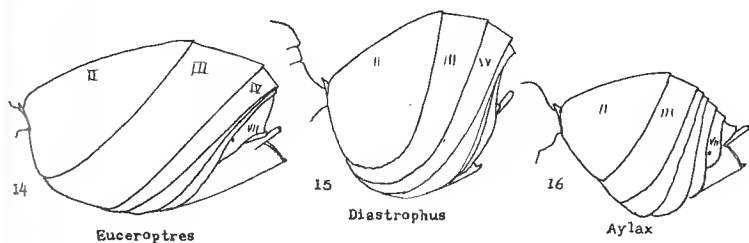
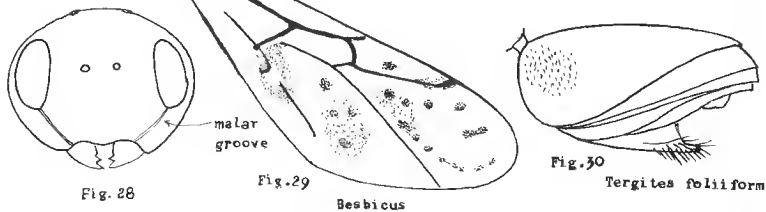
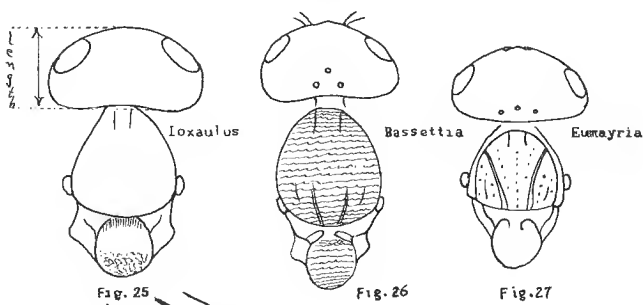
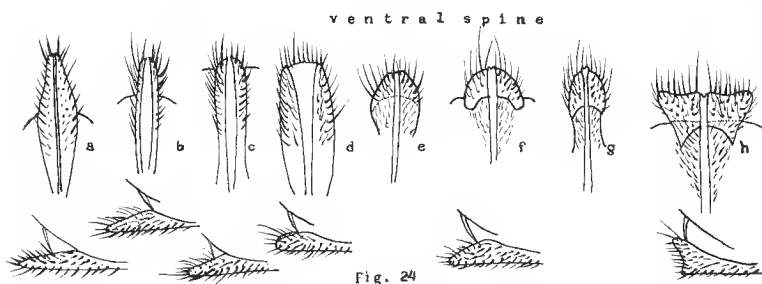
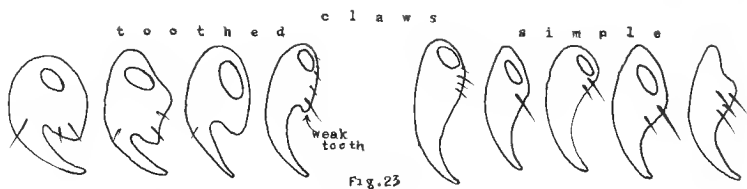


Fig. 13  
Ceroptres





KEYS TO GENERA  
( based on females )

I. I B A L I I N A E

Represented by only genus . . . . . I B A L I A Latreills

II. M E S O C Y N I P I N A E

Represented by only one species in the genus . . . . . P A R A M B L Y N O T U S Cameron

III. A S P I C E R I N A E

1. Scutellum ending in a blunt point or sharp spine. . . . . 2  
Scutellum truncate, emarginate or rounded at apex . . . . . 4
2. Spine of scutellum stout, blunt and in almost the same plane as the disk and pits, longitudinally striate. Vertex not incised. . . . . P A R A S P I C E R A Kieffer  
Spine of scutellum tapering to a sharp point and often very long . . . . . 3
3. Vertex incised. Hind half of scutellum sloping, the spine long, reaching at least to the basal vein. Veins pale. . . . . P R O S A S P I C E R A Kieffer  
Vertex not incised. Hind half of scutellum and spine in almost the same plane as the pits. . . . . A S P I C E R A Dahlbom
4. Pits not reaching back half the length of the scutellum; disk not transversely sculptured. Radial cell at least partly closed at base. . . . . O M A L A S P I S Giraud  
Pits reaching back at least half the length of the scutellum. Disk margined at sides, with a median carina, the two broad furrows transversely sculptured. Radial cell open at the base. . . . . C A L I A S P I D I A Dahlbom

IV. A N A C H A R I T I N A E

1. Scutellum from above conical, ending in a sharp point. Radial cell closed. . . . . X Y A L A S P I S Hartig  
Scutellum not ending in a sharp point. . . . . 2
2. Scutellum without pits, disk rugose, petiole long and smooth. ♀ unknown. . . . . A C O T H Y R E U S Ashmead  
Scutellum with two pits at base. . . . . 3
3. Petiole smooth, usually longer than hind coxa i.e. reaching beyond its apex. . . . . A N A C H A R I S Dalman  
Petiole sculptured, rugose or striate, usually shorter than hind coxa, not much longer than broad. . . . . A E G I L I P S Walker

V. F I G I T I N A E

1. Scutellum ending in (a) a sharp slender spine arising from margined posterior border of disk or (b) in a median triangular tooth on upturned rim of the posterior margin of the disk. Parapsidal grooves percurrent. . . . . 2  
Tergite II not hairy at the base. . . . .  
Scutellum not ending in a tooth or spine but rounded or truncate behind. . . . . 3
2. Radial cell open. Disk with a median ridge or shallow groove reaching back to base of spine. Tergite II usually striate . . . . . N E R A L S I A Cameron  
Radial cell closed or partly so. Disk rugose, margined, with parallel vertical ridges below the rim. Tergite II not usually striate. . . . . X Y A L O P H O R A Kieffer
3. Tergite II with a hairy girdle at the base. . . . . 4  
Tergite II bare. Petiole sulcate. Radial cell closed. . . . . 6
4. Scutellum with one large quadrangular depression at the base. Last segment of antenna elongated and enlarged. Radial cell of a characteristic shape, abscissa II of R sharply upturned and almost parallel with the third

- abscissa of subcosta. . . . . LONCHIDIA Thomson  
 Scutellum with two distinct foveae at the base. Radial cell closed. . . . . 5
5. Mesoscutum dull and sculptured. Wing pubescent and ciliate. .MELANIPS Giraud  
 Mesoscutum smooth and shining, sparsely pubescent from scattered punctures.  
 Abdomen much compressed, as long as head plus thorax, the hypopygium  
 prominent. Disk rugose. . . . .SARCOTHRUS Hartig
6. Disk of scutellum smooth and polished, not margined behind. Tergite II  
 smooth at the base. . . . . ZYGOSIS Foerster  
 Disk of scutellum dull, rugose. Tergite II usually striate in the female.  
 FIGITES Latreille

VI. EUCOILINAE

1. Abdomen with a hairy ring at base of tergite II. Wing of normal size. . . . . 2  
 Abdomen without a hairy girdle at base. Wing pubescent and ciliate. . . . . 13
2. Disk of scutellum longitudinally striate (use magnification of X 45). . . . . 3  
 Disk of scutellum rugose, punctate or areolate and venation not as in Fig.22. 6
3. Radial cell closed. . . . . New Genus B  
 Radial cell open. . . . . 4
4. Disk tapering into a blunt point. Antenna with a 3-to 5-seg.club. Venation  
 not as in Fig. 22. Scutellum punctate behind cup. Wing rounded at apex.  
 EUTRIAS Foerster  
 Disk rounded or truncate behind. . . . . 5
5. Venation as in Fig. 22. Wing emarginate. Antenna with a club. Subgenera  
 are based on number of segments in the club. . . . . KLEIDOTOMA Westwood  
 Venation not as in Fig. 22. Wing not emarginate. . . . . HEXACOLA Foerster
6. Wing surface bars, margin not ciliate. Cup large, well-elevated. Radial  
 cell closed. . . . . EUCOILA Westwood  
 Wing pubescent and ciliate. . . . . 7
7. Radial cell open . . . . . 8  
 Radial cell closed. . . . . 9
8. Radial cell entirely open at the base and veins pale. . . . . APOREUCOELA Kieffer  
 Radial cell closed at base and open only on front margin. Subgenera are  
 based on number of segments in the club. . . . . TRYBLIOGRAPHA Foerster
9. Radial cell short ( not 2 X as long as broad, inside measurements). . . . . 10  
 Radial cell more than twice as long as broad. . . . . 11
10. Antenna with segment 3 smaller and shorter than 4, 4-13 forming a club.  
 GANASPIDIUM Weld  
 Antenna with segment 3 longer than 4, without a distinct club.  
 PSIHACRA Foerster
11. Cup large, mirror-like, all flagellar segments long-cylindrical.  
 GANASPIS Foerster  
 Otherwise. . . . . 12
12. Abdomen longer than head plus thorax, much compressed, hypopygium prominent.  
 Antenna almost moniliform, segment 3 not as long or as large as 4.  
 HYPOLETHRIA Foerster  
 Hypopygium not prominent. Flagellum with a 7- or 9-segmented club. Radial  
 cell of characteristic shape (not figured), narrowed at base.  
 RHOPROMERIS Foerster  
 Frons protuberant in side view. Cup narrow. Antennae filiform.  
 AGLAOTOMA Foerster  
 Head not wedge-shaped. Subgenera are based on number of segments in  
 the club of the antenna. . . . . PSEUDEUCOILA Ashmead

13. Mesoscutum without a trace of parapeidal grooves. . . . COTHONASPIS Hartig  
 Mesoscutum with two parapeidal grooves anteriorly, the area between them  
 suddenly contracted into a median carina extending back to ecutellum.  
 EUCCILOIDEA Ashmead

VII. CHARIPINAE

1. Wing reduced, reaching at most slightly beyond tip of abdomen, narrow, not  
 ciliate, without basal vein or radial cell. . . males of LYTOXYSTA Kieffer  
 Wing of normal size. . . . . 2
2. Radial cell closed. . . . . CHARIPS Marshall  
 Radial cell open. . . . . 3
3. Radial cell closed at base and apex, open only on front margin.  
 ALLOXYSTA Foerster  
 Radial cell partly open at both base and apex. . . . . 4
4. Wing not ciliate Basal vein and cubitus wanting. females of LYTOXYSTA Kieffer  
 Wing pubescent and ciliate. . . . . DI LYTA Foerster

VIII. CYNIPINAE

Plant inhabiting i.e. gall makers or guests. Thirty-seven of the 68  
 genera in the subfamily have been recognized from the area. This  
 subfamily, because of the great variety of galls produced on oaks  
 and roses, contains the largest number of described species and is  
 the one most likely to come to the attention of the amateur.

Key to genera  
 (based on females)

1. Pronotum broad i.e.  $1/6$  and usually  $1/3$  as long in median dorsal line as  
 greatest length on outer lateral margin (Fig. 9). Ventral spine  
 always short (Fig. 12,13).  
 Guest flies or gall makers on herbaceous plants. . . . . 2  
 Pronotum narrowed in middle to  $1/7$  or less (Fig. 10).  
 Gall makers on oaks or roses. . . . . 13
2. Tergites II and III occupying practically the whole abdomen and either:  
 a. Completely fused as in Synergus (Fig.12),  
 b. Showing a fine suture behind the short hairy tergite II (Fig. 13),  
 c. Not fused but foliiform as in Euceroptres (Fig. 14).  
 These genera are inquiline in the galls of the true gall makers. . . 3  
 Tergites II to VII usually showing along dorsal curvature, II longest  
 and usually occupying about half the abdomen.  
 Gall makers on herbaceous plants. . . . . 7
3. Tergite I (petiole) in the form of a ring or collar which is longitudinally  
 ridged (Fig 12). Face and mesopleuron striate. . . . . 4  
 Tergite I (petiole) a short, smooth inconspicuous crescent. . . . . 5
4. Radial cell open on margin. Guests in galls on oak. . . SAPHROBECRUS D.T. & K.  
 Radial cell closed. Guests in galle on oak, . . . . . SYNERGUS Hartig
5. Radial cell open. Mesoscutum coriaceous. Parapsidal grooves percurrent.  
 Abdomen with a hairy ring at base and a faint suture between II and III.  
 Guests in galls on Rubus. . . . . SYNOPHROMORPHA Ashmead  
 Radial cell closed. . . . . 6
6. Abdomen with a big saddle-shaped suture in which there is no trace of a  
 suture (Fig.11). Mesopleuron smooth and polished. . . PERICLISTUS Foerster  
 Abdomen with a faint vertical suture between II and III (Fig.13).  
 Guests in galls on oak. . . . . CEROPTRES Hartig  
 Abdomen with hind margins of II and III oblique and parallel (Fig. 14).  
 Guests in galle on oak. . . . . EUCEROPTRES Ashmead

7. Radial cell open. . . . . 8  
 Radial cell closed. . . . . 12
8. Scutellum conical, tapering to a blunt point, foveae open behind.  
 Mesoscutum polished, parapsidal grooves percurrent. mesopleuron striate.  
 Gall on *Potentilla*. . . . . GONASPIS Ashmead  
 Otherwise . . . . . 9
9. Wing not pubescent, not ciliate, areolet absent.  
 Galls on *Lygodesmia*, *Silphium*. . . . . ANTISTROPHUS Walsh  
 Wing pubescent and ciliate ( cilia short in *Liposthenes*). . . . . 10
10. Mesoscutum smooth and polished. Face striate. Gall on *Potentilla*.  
 DIASTROPHUS Hartig  
 Mesoscutum dull and sculptured. . . . . 11
11. Mesoscutum bare and beautifully coriaceous. Areolet wanting. Mesopleuron  
 striate. Gall on *Glechoma*. . . . . LIPOSTHENES Foerster  
 Mesoscutum dull with setigerous punctures, the hairs appressed. Areolet  
 present. Galls on various herbaceous plants. . . . . AYLAX Hartig
12. Segment 3 of antenna not distinctly longer than 4. Mesoscutum dull.  
 Galls on Composites: *Lactuca*, *Prenanthes*. . . . . AULACIDEA Ashmead  
 Segment 3 of antenna longer than 4. Mesoscutum shining, coriaceous under  
 magnification of X 65. Gall on *Taraxacum*. . . . . GILLETTEA Ashmead
13. Hypopygium plow-share-shaped (Fig.18). Galls on rose. . . DIPLOLEPIS Fourcroy  
 (= *Rhodites* of authors)  
 Hypopygium not plow-share-shaped. . . . . 14
14. Mesoscutum emarginate behind and joined to scutellum without a suture, black,  
 smooth, and with at most but traces of parapsidal grooves; wings ample,  
 radial cell elongated. Body wall thin. Galls on white oaks only. There  
 is an alternation of generations in this genus. Six subgenera have been  
 proposed. . . . . NEUROTERUS Hartig  
 Mesoscutum and scutellum distinctly separated by a suture so that the scutellum  
 scutellum has a distinctly-margined, nearly straight or arcuate front  
 edge in all winged forms. . . . . 15
15. Tarsal claws with a tooth (Fig. 23). . . . . 16  
 Tarsal claws simple (Fig. 23). . . . . 29  
 Here is usually necessary to remove a last tarsal segment,  
 mount on a slide in a drop of water, crush under a cover glass  
 and examine under high power to be sure of this point as the tooth  
 is often obscured by dirt or is but weakly developed.
16. Wingless or with reduced wings reaching little beyond tip of abdomen. . . 17  
 Fully winged. . . . . 21
17. Ventral spines slender, needle-like, bare except for slight pubescence on  
 under side, several times as long as broad in side view. . . . . 18  
 Ventral spines bristly, the hairs diverging and reaching beyond the tip, of  
 various forms but not needle-like. . . . . 19
18. Antennae 13-segmented. Parapsidal grooves absent or incomplete.  
 From galls on leaves of white oaks in fall. . . . PHYLLOTERAS Ashmead  
 Antennae 14-segmented. Scutellum with a transverse groove at base, the  
 disk almost circular. From small galls in numbers on leaves of  
 white oaks in fall . . . . . XYSTOTERAS Ashmead
19. Ventral spine tapering gradually to a point (Fig.24,a,b.). Antennae stout,  
 14-segmented. Malar groove present. Abdomen longer than head plus  
 thorax. Tergite II not foliiform. . . . . agamic XANTHOTERAS Ashmead  
 Ventral spines broad distally (Fig. 24, s to h). . . . . 20



20. Scutellum tapering behind into a blunt point. Ventral spine short, rounded at end, bristly. From galle of the "hedgehog" type on leaves of white oaks in fall (Figs. 186, 187). . . . . ACRASPIS Mayr  
 Scutellum rounded behind. Ventral epine truncate or lobed, broadest at apex. From globular galls on leaves of white oaks in fall (Fig. 228).  
 PHILONIX Fitch
21. Malar groove present. . . . . 22  
 Malar groove absent. . . . . 23
22. Radial cell with abscissa II of R strongly bent. Claw with a weak tooth. From a fleshy root gall. Texas. . . . . eex.gen. XANTHOTERAS Ashmead  
 Radial cell of normal shape, elongated. Wings large. From fleshy galle on roots of white oaks. Light-colored species, over 3.0 mm.  
 sex.gen. XANTHOTERAS Ashmead
23. Ventral epine narrow, slender, almost bare. . . . . 24  
 Ventral epine stouter, bristly, triangular, tapering to a blunt point (Fig. 24, a, b). . . . . 27
24. Mesoscutum smooth, shining, bare. Parapsidal grooves percurrent. Head as broad as thorax. Abdomen nearly as high as long. . . . . LIODORA Foerster  
 Mesoscutum sculptured. . . . . 25
25. Head narrower than thorax. . . . . 26  
 Head as broad as thorax. Mesoscutum rugose, punctate or coriaceous. Without the habitus of an Amphibolips or an Adleria. . . . . ANDRICUS Hartig
26. Wing clear. Head, thorax and sides of tergites pubescent; sculpture never coarse. . . . . ADLERIA Rohwer and Fagan  
 Wing transversely banded, smoky or with a large dark cloud at base of radial cell. Sculpture coarse. . . . . AMPHIBOLIPS Reinhard
27. Robust species with whole thorax pubescent. . . . . 28  
 Smaller species with mesoscutum bare and shining. Parapeidal groove obsolete anteriorly. From bud galle on white oaks. sex.gen. ACRASPIS Mayr
28. Radial cell short, veins heavy; wing with spots. Tergites foliiform. From oak apple on white oaks. . . . . ATRUSCA Kinsey  
 Radial cell normal. Parapeidal grooves obsolete anteriorly. Tergites not foliiform. Ex detachable galls on white oaks. . . . . DISHOLCASPIS D.T. & K.
- Claws simple
29. Fore tibia with an oblique terminal spur on one side at least as long as the usual furcula opposite. Fla. and Texas. . . . . BELONOCNEMA Mayr  
 Fore tibia without such a terminal spur. . . . . 30
30. Ventral epine stout, bristly (Fig. 24). Scutellum without pits. Wing reduced or normal. From leaf galle. . . . . SPHAEROTERAS Ashmead  
 Ventral epine slender, not bristly. . . . . 31
31. Wingleess, ant-like, head broader than thorax. Under 3.0 mm. Scutellum with an elevated, knob-like disk. Parapeidal grooves percurrent and approaching each other behind. From small galls on leaves of red oaks in the fall. . . . . ZOPHEROTERAS Ashmead  
 Wing reaching little beyond tip of abdomen. From cells under the bark on *Q. myrtifolia*. . . . . agamic EUMAYRIA Ashmead  
 Fully winged. . . . . 32
32. Head from above massive (length at least half width), broader than thorax (but not with colorless veins and a woolly ring at base of abdomen which go in Callirhytis B) (Figs. 25, 26, 27). . . . . 33  
 Head from above not massive (Except a few in Callirhytis B) but transverse, rarely broader than thorax. . . . . 36

33. Malar groove present. Mesoscutum coriaceous. Wing dotted, non-ciliate, with a faint cloud on second transverse and a fainter one on basal. Light-colored small species. . . . . LOXULUS Mayr 34  
 Malar groove absent. . . . .
34. Mesoscutum with transverse sculpture. Wing non-ciliate, areolet indistinct. From elongated cells under bark in twigs. . . . . BASSETTIA Ashmead 35  
 Mesoscutum coriaceous or smooth. . . . .
35. Antennae 14-seg. with 3 not as long as 1. Tergite II with a woolly ring at base. Ventral spine short, from root galls on red oak. . . . . EUMAYRIA Ashm.  
 Antennae 14- to 16-seg., moniliform, 3 longer than 1. Mesoscutum beautifully sculptured. From bud galls. . . . . TRISOLENIELLA Rohwer and Fagan
36. Head and thorax densely pubescent with the habitus of a Disholcaspis. . . 37  
 Head and thorax bare or with short appressed pubescence or scattered hairs which do not hide the sculpture in any case. . . . . 38
37. Hind femur with large blunt lobes on distal half below. Sides of tergites pubescent. From root galls on white oak. . . . . ODONTOCYNIPS Kieffer  
 Hind femur without such a blunt lobe. Pubescence on tergites II and VII only. From root galls. . . . . HOLOCYNIPS Kieffer
38. Mesoscutum smooth or coriaceous, bare, polished. Head, sides of pronotum and disk sculptured, dull. Mesopleuron smooth. . . . . DRYOCOSMUS Giraud  
 Mesoscutum sculptured, dull, at most with scattered hairs or short appressed pubescence which does not hide the sculpture. . . . . 39
39. Wing not ciliate (except in males of sexual generation). . . . . 40  
 Wing normally ciliate on the margin. . . . . Section D CALLIRHYTIS Foerster
40. Venation normal, veins distinct beyond second cross-vein. . . . . 41  
 Venation pale, veins beyond second cross-vein barely visible.  
 Light-colored species. From stone galls in acorns or flower galls.  
 Section B CALLIRHYTIS Foerster
41. Light-colored agamic forms with short appressed pubescence on mesoscutum which does not hide the sculpture which is never coarse. From pip galls beside mature or immature acorns.  
 Section A CALLIRHYTIS Foerster  
 Reddish or black agamic forms with body mostly bare or with but sparse pubescence. From root galls. Section C CALLIRHYTIS Foerster

Note: These four sections of Callirhytis are not to be regarded as distinct genera. In the case of a known life history the agamic female out of a pip gall on acorns goes in Section A and the alternating sexual generation out of a gall on the flower goes in Section B.

SYNOPTIC LIST

All the species described from the eastern and southeastern United States, the Gulf Coast, east of the 100th meridian have been listed. The species are numbered. After the name is the reference to the original description, the sex, the type locality, host, date of collection or rearing (if stated) and collector. As varieties are not to be distinguished in the field the existence of such varieties in the literature is merely mentioned in connection with a species.

I. Subfamily I B A L I I N A E

Genus IBALIA Latreille

Only genus in subfamily. Parasites of Siricidae. Eu., Asia, N.A. Females are usually taken while ovipositing in trees infested with horn-tails; males by sweeping the surrounding vegetation. Habitus of a male is shown in Fig. 280.

1. *anceps* Say. 1824. In Keating, Narr. Long's 2nd. Exped., App. p. 325. ♀. Ark.
2. *ensiger* Norton. 1862. Ent. Soc. Phila. Proc. 1: 200. ♀. Pa. Type in Phila. Acad. Parasite of *Urocerus albicornis* in hemlock in Pa. Recorded from Quebec, N.B., Me., Mass., N.Y., Colo., Ida., Oreg., Vancouver.
3. *maculipennis* Hald. 1846. Acad. Nat. Sci. Phila. Proc. 3: 127. ♀. Host: *Tremex columba* L. In E. U. S., Ont., Quebec, O., Ill., Ia., (Fig. 280).
4. *montana* Creason. 1879. Amer. Ent. Soc. Trans. 7: Proc. p. XVII. ♀. Colo. Laborador.
5. *scalpellator* Westwood. 1837. In Guerin, Mag. d. Zool. 7: Pl. 9, Pl. 79. fig. 2. ♂. Ga. *Maculipennis* Hald. is probably a synonym of it.

II. Subfamily M E S O C Y N I P I N A E  
(Mostly exotic, habits unknown)

Genus PARAMBLYNOTUS Cameron

6. *zonatus* Weld. 1944. Ent. Soc. Wash. Proc. 46: 56, fig. 2. ♀. Texas.

III. Subfamily A S P I C E R I N A E  
(Parasites in the puparia of Syrphidae)

Genus PARASPICERA Kieffer

7. *bakeri* Kieffer. 1907. Ent. Ztschr. Stuttgart 21: 152. ♂. Wie. Ill., Md., D.C.

Genus PROSASPICERA Kieffer

8. *albihirta* (Aehm.). 1887. Amer. Ent. Soc. Trans. 14: 156. ♀. Fla.
9. *similis* (Aehm.). 1887. Amer. Ent. Soc. Trans. 14: 156. ♀. Fla., Ark., Pa.

Genus CALLASPIDIA Dahlbom

10. *provancheri* Ashm. 1887. In Provancher, Addit. Corr. Faune Ent. Canada Hym. p. 167. ♀. Quebec. Me., N.H., Mass., N.Y., Pa., Ind., Ill., Mich., Wis.

IV. Subfamily ANACHARITINAE  
(Parasites in cocoons of lace-wing flies: Chrysopa, Sympherobius)

Genus XYALASPIS Hartig

11. flavipes Aehm. 1896. Amer.Ent.Soc.Trans.23:183. ♂. Md. Va.
12. microstyla Kieffer. 1907. Ent.Ztschr.Stuttgart 21:151. ♂. Alab.

Genus ACOTHYREUS Ashmead

13. oescola Aehm. 1887. Amer.Ent.Soc.Trans.14:157. ♂. Fla.
14. mellipes Prov. 1888. Addit.Corr.Faune Canada Hym. p.438. ♀. Quebec.

Genus ANACHARIS Dalman

15. flavicornis Kieffer. 1909. Soc.Hist.nat.Metz Bul.26:80. ♂. Wis.
16. levifrons Kieffer. 1907. Ent.Ztschr.Stuttgart 21:143. ♀. Pa.
17. marginata Prov. 1887. Addit.Corr. Faune Canada Hym. p.168. ♂. Quebec.
18. melanoneura Ashm. 1887. Amer.Ent.Soc.Trans. 14:158. ♂. Fla. Ga., La., Tex., Va.
19. pediculata Prov. 1887. Addit.Corr.Faune Canada Hym. p.169. ♂. Ont.(Ottawa).
20. subcompressa (Prov.). 1881. Nat.Canad. 12:237. ♀. Quebec. Ill., Ia.

Genus AEGILIPS Walker

21. aciculatus Prov. 1881. Nat.Canad. 12:239. ♀ ♂. Canada.
22. obtusilobus Osten Sacken. 1861. Ent.Soc.Phila.Proc.1:68. ♀. D.C.
23. triescta Kieffer. 1907. Ent.Ztschr.Stuttgart 21:143. ♂. Wis.

V. Subfamily FIGITINAE  
(Parasites in the puparia of diptera)

Genus NERALSIA Cameron

24. armata (Say). 1836. Boston Jour.Nat.Hist. 1:266. ♂. E.U.S. Host: Sarcophaga.
25. hyalinipennis (Ashm.). 1887. Amer.Ent.Soc.Trans. 14:155. ♀. Fla. to Va.  
Reported on human excrement.

Genus XYALOPHORA Kieffer

26. quinquelineata (Say). 1836. Boston Jour.Nat.Hist. 1:267. ♀. Transcont. in  
the transition zone. Host: Sarcophaga sp. in cow dung.
27. singularis (Ashm.). 1896. Amer.Ent.Soc.Trans. 23:183. ♀ ♂. Ill.

Genus LONCHIDIA Thomson

28. hirta Prov. 1887. Addit.Corr. Faune Canada Hym.p.170. ♀. Quebec (Cap Rouge).

Genus MELANIPS Walker

29. lowensis Ashm. 1887. Amer.Ent.Soc.Trans.14:158. ♂ ♀. Ia.
30. esmrugosus (Crawford). 1917. Ent.Soc.Wash.Proc.19:172. ♀. Adirondack Mts.

31. *slossonae* (Crewford). 1917. Ent.Soc.Wash.Proc.19:171. ♀. Mt.Washington, N.H.

Genus SAROTHRUS Hertig

32. *canadensis* Kieffer. 1907. Ent.Ztschr.Stuttgart 21:161. ♀. Ontario.

33. *naeoni* Ashm. 1896. Amer.Ent.Soc.Trans.23:182. ♀. Ill. (Algonquin).

Genus ZYGOSIS Foerster

34. *leeviscutum* (Prov.). 1887. Addit.Corr.Feune Canada Hym. p.170. ♀ ♂ Quebec

Genus FIGITES Latreille

35. *albinervis* Kieffer. 1909. Soc.Hist.nat.Metz Bul.26:82. ♂. Wis.

36. *consobrinus* Giraud. 1860. Zool.-Bot.Gesell. Wien Abhandl.10:153. Eu. D.C.

37. *floridanus* Ashm. 1887. Amer.Ent.Soc.Trans.14:155. ♀. Fla.

38. *floridanus* var.*dubius* Kieffer. 1907. Ent.Ztschr.Stuttgart 21:161. ♂. Pa. Ark.

39. *floridensis* Weld. 1944. Ent.Soc.Wash.Proc.46:62 (n.name for *floridenus* Ashm. 1887. Amer.Ent.Soc.Trans.14:155. ♂. Preocc.

40. *impetiens* Say. 1836. Boston Jour.Nat.Hist. 1:268. ♀. Ind.

41. *inermis* (Prov.). 1887. Addit.Corr.Feune Canada Hym. p.171. ♂. Quebec.

42. *poponee* Crewford. 1915. U.S.Natl.Mus. Proc.48:582. ♀ ♂. D.C.

VI. Subfamily EUCOILINAE  
(Parasites of diptere)

Genus KLEIDOTOMA Westwood  
Subgenus *Kleidotoma* Westwood

43. *americana* Ashm. 1887. Amer.Ent.Soc.Trans.14:151, lines 6. ♀. Quebec (Cep Rouge).

44. *ashmeadi* (Kieffer). (= *C. americana* Ashm. 1887. Amer.Ent.Soc.Trans.14:151, top line. ♀. Fla. Preocc.).

45. *marginata* (Gill.). 1891. Ill.State Lab.Nat.Hist.Bul.3:203. ♀. Ill.

Subgenus *Heptameris* Foerster

46. *oscinidis* (Ashm.). 1893. Ohio Agr.Expt.Sta.Tech.Ser. Bul.1 (3):159. ♀. Ohio.  
Host: "*Oscinis veriebilis*" in wheat stems.

Not assignable to subgenus

47. *evenae* (Fitch). 1861(1860). N.Y.State Agr.Soc.Trans.20:842. ♂. N.Y.

48. *carolinensis* Kieffer. 1910. Lab.Zool. Gen. e Agr.Portici Bol.4:334. ♂. "Cer."

49. *rufitarsis* (Ashm.). 1888. Kansas Agr.Expt.Sta.Bul.3:App.p.1. ♀. Kansas.

Genus HEXACOLA Foerster

50. *subaperta* (Kieffer). 1907. Ent.Ztschr.Stuttgart 21:131. ♀. Pa.

Genus EUTRIAS Foerster

51. *tritoma* (Thomson). 1861. Ofvers.Svenska Vetensk.-Akad.Förh.18:403. Tex.  
Introduced from Europe. Host: Sepsidae in cow dung.

Genus EUCOILA Wssetwood

52. atricornis Kieffer. 1910. Lab.Zool. Gen. e Agr.Portici Bol. 4:334. ♂. "Car."  
 53. cultra (Girault). 1920. U.S.Natl.Mus.Proc.58:182. ♀. Ill.  
 54. erythropha (Ashm.). 1888. Kansas Agr.Expt.Sta. Bul.3:App.p.1. ♂. Va. to Ga.,  
 west to Mo. and Texas. Reported on human excrement.  
 55. hirticornis (Kieffer). 1910. Lab.Zool.Gen.e Agr.Portici Bol.4:330. ♀. Pa.  
 56. impatiens (Say). 1836. Boston Jour.Nat.Hist. 1:267. ♂. Host: dung fly larvae.  
 N.Y., Ill., N.Mex., Texas.  
 57. rufoscutata Kieffer. 1910. Lab.Zool.Gen.e Agr.Portici Bol. 4:332. ♂. Ark.  
 58. septemspinosa Gill. 1891. Ill.State Lab.Nat.Hist. Bul.3:204. ♀. Ill.(Quincy).  
 59. vagabunda (Ashm.). 1885. Amer.Ent.Soc.Trans.12:302. ♀. Fla. to Miss., La., Tex.

Genus APOREUCOELA Kieffer

60. floridana Ashm. 1896. Amer.Ent.Soc.Trans. 23:185. ♀. Fla. (Archer).

Genus TRYBLOGRAPHA Foerster

Subgenus Tetraplasta Ashmead

61. unica (Ashm.). 1903. Psyche 10:68. ♀. Locality not stated.

Subgenus Hexaplasta Foerster

62. fungicola (Crawford). 1915. U.S.Natl.Mus. Proc.48:581. ♀. D.C.  
 63. lucida (Rohwer). 1920. U.S.Natl.Mus.Proc. 57:219. ♀ ♂. N.Y.(Syracuse).  
 64. marlatti (Crawford). 1915. U.S.Natl.Mus. Proc.48:580. ♀ ♂. Va. (Warrenton).  
 65. minuta (Crawford). 1916. Insec.Insci.Menstr.4:101. ♀. Tenn.(Nashville).  
 66. websteri (Crawford). 1915. U.S.Natl.Mus.Proc. 48:581. ♀. D.C.  
 Host: Euxesta nitidiventris.  
 67. zig-zag (Riley). 1879. In Comstock, Rept. on Cotton Ins. p.198. ♀ ♂. Alab.  
 Host: Megastida aldiae.

Subgenus Trybliographa Foerster

68. neocera (Kieffer). 1907. Ent.Ztschr.Stuttgart 21:131. ♂ ♀. Pa.  
 69. rapas (Wssetwood). 1835. Mag.Nat.Hist. 8:178. ♂ ♀. Introduced from Europe.  
 Host: cabbage root maggot. Minn., Mich., Ill., N.Y., N.J., Colo., Wash., B.C.  
 70. ruficornis (Ashm.). 1887. In Provancher, Addit.Corr.Fauna Canada Hym.p.173.  
 ♀. Quebec (Cap Rouge).

Not assignable to subgenus

71. klagesi (Kieffer). 1907. Ent.Ztschr.Stuttgart 21:136. ♂. Pa.  
 72. melanopa (Ashm.). 1894. Cincinnati Soc.Nat.Hist.Jour. 17:40,45, ♂ Ohio.  
 73. nigricornis (Prov.). 1888. Addit.Corr.Fauna Canada Hym. p.436. ♀. Ontario.

Genus GANASPIDIUM Weld

74. pusillas Weld. 1955. Ent.Soc.Wash.Proc. 57(6):274. ♀ ♂. Texae.

Genus PSIOHACRA Foerster

75. troglodytes (Kieffer). 1909. Soc.Hist.nat.Metz Bul.26:74. ♀. Wis.

Genus GANASPIS Foerster

76. diastrophii Aehm. 1896. Amer.Ent.Soc.Trans.23:184. ♀ ♂. Nebr.

77. nigra (Kieffer). 1907. Ent.Ztschr.Stuttgart 21:121. ♀. Pa.

Genus HYPOLETHRIA Foerster

78. vitellinipectus (Kieffer). 1907. Ent.Ztschr.Stuttgart.21:138. ♂. Pa.

Genus RHOPOTROMERIS Foerster

79. nigroclavata (Kieffer). 1907. Ent.Ztschr.Stuttgart 21:138. ♂ ♀. Pa.

Genus Aglaotoma Foerster

80. texana (Crawford). 1913. U.S.Natl.Mus.Proc.45:309. ♂ ♀. Texas.

Genus PSEUDEUCOILA Ashmead

Subgenus Hexamerocera Kieffer

81. maculipes (Ashm.). 1887. Amer.Ent.Soc.Trans.14:152. ♀. Fla.

82. zimmermani (Kieffer). 1910. Lab.Zool.Gen. e Agr.Portici Bol.4:333. ♀. "Car."

Subgenus Pseudeucoila Ashmead

83. bochei Weld. 1944. Ent.Soc.Wash.Proc.46:65. ♂ ♀. Md., Va., Ohio.

Host: Drosophila spp. in decaying fruit.

84. hunteri (Crawford). 1913. U.S.Natl.Mus.Proc.45:310. : ♀. Texas.

85. stigmata (Say). 1836. Boston Jour.Nat.Hist. 1:268. ♀. Mass., N.Y., N.J., D.C., Va., Ill., Ind., Canada.

Subgenus Macrocereucoila Ashmead

86. longicornis (Ashm.). 1887. Amer.Ent.Soc.Trans.14:153. ♂. Fla.

Not assignable to subgenus

87. brunsocineta (Kieffer). 1907. Ent.Ztschr.Stuttgart 21:138. ♂. Pa.

88. clavatipalpis (Kieffer). 1907. Ent.Ztschr.Stuttgart 21:138. ♂. Toronto.

89. mellipes (Say). 1836. Boston Jour.Nat.Hist. 1:269. ♀. Ind., Ill., Ontario.

90. nudicollis (Kieffer). 1909. Soc.Hist.nat.Metz Bul.26:74. ♂ Wis.

91. pedata (Say). 1836. Boston Jour.Nat.Hist. 1:267. ♂. Ind.

92. rubripes (Ashm.). 1887. Amer.Ent.Soc.Trans. 14:153. ♂. Fla.

93. siphonophorae (Ashm.). 1887. U.S.Dept.Agr. Div.Ent.Bul.14:21. ♂. Fla.

94. xystiformis (Ashm.). 1887. Amer.Ent.Soc.Trans.14:153. ♂. Fla.

Genus COTHONASPIS Hartig

95. americana (Girault). 1920. U.S.Natl.Mus.Proc.58:182. ♀. Ill. (Urbana).

96. pratti (Crawford). 1913. U.S.Natl.Mus.Proc.45:310. ♂ ♀. Texas (Dallas).

Genus EUGOILIDEA Ashmead

97. *arcuata* Kieffer. 1909. Soc.Hist.nat.Metz Bul.26:65. ♂ ♀. Wis.  
98. *canadensis* Ashm. 1887. Amer.Ent.Soc.Trans. 14:154. ♀. Quebec (Cap Rouge).  
99. *longicornis* Ashm. 1887. Amer.Ent.Soc.Trans. 14:154. ♂. Fla.  
100. *rufipes* Gill. 1891. Ill.State Lab.Nat.Hist. Bul.3:205. ♀. Ill.(Morris).

VII. Subfamily CHARIPINAE  
(Parasites of braconids in the abdomen of plant  
lice i.e.hyperparasites of aphids).

Genus LYTOXYSTA Kieffer

101. *brevipalpis* Kieffer. 1909. Naturw.Ztschr. f. Forst. u. Landsw. 7:480.  
♀. Mass. ♂ in Weld, 1939. Ent.Soc.Wash.Proc.41:53.  
102. *brevipalpis* var. *nigra* Kieffer. 1909. *ibid* 7:480. Ark.

Genus CHARIPS Marshall

103. *ambrosiae* (Ashm.). 1897. Ent.Soc.Wash.Proc. 4:149,156. ♀. Mass.  
104. *areolata* Kieffer. 1909. Naturw. f. Forst. u. Landsw. 7:481. ♀ ♂. Mass.  
105. *brassicae* (Ashm.). 1887. U.S.Dept.Agr. Div.Ent.Bul.14:14. ♀ ♂. Fla.  
Host: *Brevicoryne brassicae* (L.). Ariz., Calif., N.Y., Mich., Mo., N.Dak.  
106. *hayhureti* Kieffer. 1909. Naturw.Ztschr. f. Forst. u. Landsw. 7:481. ♀ ♂. Mass.  
107. *lachni* (Ashm.). 1885. Amer.Ent.Soc.Trans. 12:302. ♀ ♂. Fla.  
108. *megourae* Ashm. 1887. U.S.Dept.Agr. Div.Ent.Bul.14:19. ♀. Fla. Reared  
from tomato aphid.  
109. *xanthopsis* (Ashm.). 1896. Amer.Ent.Soc.Trans. 23:185. ♂. Fla. Calif.

Genus ALLOXYSTA Foerster

110. *tritici* (Fitch). 1861(1860). N.Y.State Agr.Soc.Trans. 20:841. ♀. N.Y.  
Reared from *Toxoptera graminum*. Ind. Ohio, N.Car., N.J., D.C., Va.  
111. *vagans* Kieffer. 1909. Naturw.Ztschr. f. Forst. u. Landsw. 7:480. ♀. Mass.

Genus DILYTA Foerster

112. *necans* Kieffer. 1909. Naturw.Ztschr. f. Forst. u. Landsw. 7:481. ♀. Mass.

VIII Subfamily CYNIPINAE

(Plant-inhabiting species, either as gall makers or as guests  
in the galls made by other cynipid genera. The first six  
genera are all inquillines. The next seven form galls on  
various shrubs or herbaceous plants; *Diplolepis* on roses;  
*Neuroterus* and all the remaining genera form galls on oak.



Symbols after the reference indicate whether the female, male or gall was described. Type locality follows, then host of type material, date of emergence of types (if stated) and a list of any varieties which have been described. It is not usually possible to distinguish varieties in the field.

In a few cases the reference to the original detailed description of the gall by one of the older authors is cited altho the name used is not valid because it was a trinomial. The species is to be credited to the one who first used a binomial.

The names of the host oaks are not the latest names of the botanists but the ones in current use forty years ago and the ones on the pin label on the insects in collection. The following usage is here adopted:

<u>Quercus rubra</u>	for the northern red oak
<u>Quercus falcata</u>	for the Spanish oak
<u>Quercus cinerea</u>	for the blue Jack or Upland Willow
<u>Quercus catesbaei</u>	for the turkey oak
<u>Quercus prinus</u>	for the rock chestnut oak
<u>Quercus michauxii</u>	for the basket oak.

Short titles will be used for the following papers:

Genus Cynips for Kinsey 1930; Higher Categories for Kinsey 1936.

The form of specific names and authority for them conforms to the usage in Hymenoptera of America north of Mexico, 1951.

The six genera of inquilines or guests are unable to stimulate a plant to form a gall but lay their eggs in the peripheral regions of galls made by other genera and may modify its structure and often its size. Guests usually emerge after the maker. Then there are many parasites (mostly chalcids) that attack either the maker or the guests and they may modify its size and structure in a characteristic way. For example Fig. 283 is a common gall on rose from which no gall maker has ever been reared. What gall was attacked in its early stages is not known.

In some genera of the oak gall makers there is an alternation of generations. From one kind of gall only females emerge. They oviposit in another part of the host and an entirely different gall results from which both males and females emerge. These females produce the first kind of gall again. Thus an agamic and a sexual generation alternate in a cycle that takes one or more years. The agamic females are relatively long-lived and develop from firm galls that have taken months or a year to develop. The adults of the sexual generation are smaller, are short-lived and emerge from galls that have developed quickly - in a few weeks in spring. Several such alternations are listed for this area usually based on circumstantial evidence. Several genera are based on agamic females only: *Philonix*, *Phylloterax*, *Xystoterax*, *Adleria*, *Disholcaspis*, *Zopheroterax*, *Trisolieniella*, *Odontocynips*, *Holocynips*. No doubt there is an alternating generation for each.

Genus SAPHONECRUS Dalla Torre and Kieffer  
( Guests in galle on oak )

113. favanus Weld. 1944. U.S.Natl.Mus.Proc.,95:1. ♀ ♂. D.C., Mo. Guests in galls of Dryocosmus favus Beut.
114. gemmaria (Ashm.). 1885. Amer.Ent.Soc.Trans. 12:297,302. ♂. Ex galls of Callirhytis gemmaria (Ashm.).

Genus SYNERGUS Hartig  
( Guests in galls on oak )

115. atripennis Ashm. 1896. Amer.Ent.Soc.Trans,23:189. ♀. Fla. Ex galls of Disholcaspis spongiosa (Karsch).
116. batatoides Ashm. 1885. Amer.Ent.Soc.Trans. 12:297,301. ♀ ♂. Ex gall of Callirhytis batatoides (Ashm.). Fla.
117. bicolor Ashm. 1885. Amer.Ent.Soc.Trans.12:297,302. ♀ ♂. From gall of Andricus foliatus Ashm. Fla.
118. campanula O.S. 1865. Ent.Soc.Phila.Proc. 4:376. ♀. Ex galls of Disholcaspis quercus-globulus (Fitch). D.C. N.J.,N.Y.,Ill.,Wis.
119. citriformis (Ashm.). 1885. Amer.Ent.Soc.Trans. 12:300. ♂ ♀. Ex galls of Amphibolips citriformis Ashm. Fla.
120. coniferae Ashm. 1885. Amer.Ent.Soc.Trans. 12:297,301. ♀ ♂. Ex galls of Callirhytis ventricosa (O.S.). Fla.
121. davisi (Beut.). 1907. Amer.Mus.Nat.Hist. Bul. 23:463. ♀ ♂. Ex galls of Callirhytis gemmaria (Ashm.). N.J. Va.,Fla.,Tex.,Mo.,Ind.,Ill.
122. dimorphus O.S. 1865. Ent.Soc.Phila.Proc. 4:376. ♂ ♀. D.C.
123. duricoria Gill. 1896. Amer.Ent.Soc. 23:90,93. ♀. Ex gall of Disholcaspis mamma (Cresson).
124. erinacei Gill. 1896. Amer.Ent.Soc.Trans. 23:90,94. ♀ ♂. Iowa. N.Y.
125. ficigerae Ashm. 1885. Amer.Ent.Soc.Trans. 12:297,301. ♀ ♂. Ex galls of Disholcaspis virens (Ashm.). Fla.
126. levivantris (O.S.). 1861. Ent.Soc.Phila.Proc.1:57. ♀. Ex gall of Amphibolips spongifica (O.S.). D.C.
127. lignicola (O.S.). 1862. Ent.Soc.Phila.Proc. 1:252. ♀ ♂. Ex galls of Callirhytis cornigera (O.S.) and Callirhytis punctata (O.S.). D.C.
128. magnus Gill. 1891. Ill.State Lab.Nat.Hist. Bul. 3:202. Ex gall of Amphibolips cookii Gill. Mich.
129. medullae Ashm. 1885. Amer.Ent.Soc.Trans. 12:297,302. ♀ ♂. Ex gall of Callirhytis medullae (Ashm.). Fla.
130. mendax Walsh. 1864. Ent.Soc.Phila.Proc. 2:498. ♀. Ex gall of Callirhytis punctata (O.S.). Ill.
131. obtusilobae (Ashm.) . 1885. Amer.Ent.Soc.Trans. 12:300. ♀. Fla.
132. oneratus (Harrie). 1841. Rpt.Ins.Maes.Injurious Veg. p.398. Ex galle of Disholcaspis quercus-globulus (Fitch). Mass. N.Y.,N.J.,D.C.,Mich.

133. *quercus-lana* (Fitch). 1859(1858). N.Y.State Agr.Soc.Trans.18:814. ♀.  
Ex galls of *Andricus flocci* (O.S.). N.Y. Ia.
134. *succinipedis* (Ashm.). 1885. Amer.Ent.Soc.Trans. 12:300. ♀. Ex gall of  
*Disholcaspis succinipis* (Ashm.). Fla.
135. *villosus* Gill. 1891. Ill.State Lab.Nat.Hist.Bul.3:202. ♀. Ex gall of  
*Acraspis villosa* (Gill.). Mich.
136. *virentis* (Ashm.). 1885. Amer.Ent.Soc.Trans. 12:300. ♀. Ex galls of  
*Belonocnema fossoria* Weld. Fla.
137. *walshii* Gill. (= *albipes* Walsh, 1864. Ent.Soc.Phila.Proc. 2:479,476. ♀ ♂.  
Præocc.). Ill.

Genus SYNOPHROMORPHA Aehmead  
(Guests in galls on *Rubus* and perhaps on *Salix*)

138. *salicis* Ashm. 1903. Psyche 10:145. Locality not stated.
139. *eylvsstrie* (O.S.). 1861. Stettin Ent.Ztg. 22:415. ♀. Ex galls of  
*Diastrophus nebulosus* (O.S.). D.C. N.J., Conn., N.Y., Mich., Ontario.
140. *terricola* Weld. 1944. U.S.Natl.Mus.Proc. 102:316, ♀ ♂. Va., D.C.
141. *rubi* Weld. 1944. U.S.Natl.Mus.Proc.102:317. ♂ ♀. Ill.

Genus PERICLISTUS Foerster  
(Guests in galls on roses)

142. *pirata* (O.S.). 1863. Ent.Soc.Phila.Proc.2:42. ♂ ♀. Ex galls of  
*Diplolepis ignota* (O.S.). D.C.
143. *semipiceus* (Harris). 1841. Rpt.Ins.Mass.Injurious Veg. p.400. ♀ ♂. Mass.
144. *smilacis* Ashm. 1896. Amer.Ent.Soc.Trans. 23:188. ♀ ♂. Ex gall of  
*Diastrophus smilacis* Ashm. Fla.

Genus CEROPTRES Hartig  
(Guests in galls on oak)

145. *oatesbasi* Ashm. 1885. Amer.Ent.Soc.Trans. 12:301. ♀ ♂. Ex gall of  
*Baeostia oatesbasi* (Ashm.). Fla.
146. *frondosus* Ashm. 1896. Amer.Ent.Soc.Trans.23:186. ♀. Mo.
147. *inermis* (Walsh). 1864. Amer.Ent.Soc.Trans. 2:498. ♀ ♂. Ex gall of  
*Cincticornia pilulae* (Walsh). Ill.
148. *lanigerus* Ashm. 1885. Amer.Ent.Soc.Trans. 12:301. ♀. Ex gall of  
*Andricus laniger* Ashm. Fla.
149. *minutissimi* Ashm. 1885. Amer.Ent.Soc.Trans. 12:301. Ex gall of  
*Neuroterus minutissimus* Ashm. Fla.
150. *obtusilobensis* Wsld. n.nams. (= *obtusilobus* Karsch, 1880. Ztschr. f. Gesam.  
Naturw. 53:292. ♀. Præocc.). Texas. Ex gall on post oak.
151. *petiolicola* (O.S.). 1861. Ent.Soc.Phila.Proc. 1:67. ♀. Ex gall of  
*Andricus petiolicola* (O.S.). ♀. D.C. Ill.

152. politus Ashm. 1896. Amer.Ent.Soc.Trans. 23:187. ♀ ♂. Female ovipositing in leaf of red oak. Va.
153. quercus-arbos (Fitch). 1859(1858). N.Y.State Agr.Soc.Trans. 18:809. N.Y. Ex gall of Callirhytis clavula (O.S.).
154. quercus-ficus (Fitch). 1859(1858). N.Y.State Agr.Soc.Trans. 18:812. N.Y. Ex gall of Xanthoteras forticorne (O.S.). ♀ ♂.
155. quercus-pisum (Fitch). 1859(1858). N.Y.State Agr.Soc.Trans. 18:818. N.Y. Ex gall of Acraspis pezomachoides (O.S.). ♀ ♂.
156. quercus-tuber.(Fitch). 1859(1858). N.Y.State Agr.Soc.Trans. 18:806. ♀ ♂. Ex gall of Callirhytis clavula (O.S.). N.Y.
157. rufiventris Ashm. 1896. Amer.Ent.Soc.Trans. 23:186. ♀. Ex gall of Andricus ostensackenii (O.S.). Mo.

Genus EUCEROPTRES ASHMEAD  
( Guests in galls on oak )

158. primus Ashm. 1896. Amer.Ent.Soc.Trans. 23:187. ♀ ♂. Fla. Ex galls of Andricus petiolicola (O.S.) and other oak galls.

Genus GONASPIS Ashmead  
( Produce galls on Potentilla )

159. potentillae (Bass.). 1864. Ent.Soc.Phila.Proc.3:689. ♀ ♂ O. Gall on Potentilla canadensis. N.B. to Ill., Mo.; south to Va.
160. potentillae var. scutellaris (Gill.). 1891. Ill.State.Lab.Nat.Hist.Bul.3:191. ♀.

Genus ANTISTROPHUS Walsh  
( Produce galle on various Composites: Lydodesmia, Silphium )

161. bicolor Gill. 1891. Ill.State Lab.Nat.Hist.Bul. 3:197. ♀. Ill.
162. laciniatus Gill. 1891. Ill.State Lab.Nat.Hist.Bul. 3:194. ♀ ♂ O. Gall in flower head of Silphium laciniatum. Ill.
163. minor Gill. 1891. Ill.State Lab.Nat.Hist.Bul. 3:196. ♀ ♂ O. Ex stems of Silphium laciniatum. Ill.
164. pisum Ashm. Walsh, 1869. Amer.Ent. 2:73. ♀ ♂ O. Gall on Lygodesmia juncea. Nebr., Colo., N.Dak., S. Dak., Mo., Wyo.
165. rufus Gill. 1891. Ill.State Lab.Nat.Hist.Bul. 3:195. ♀ ♂ O. Gall on stem of Silphium laciniatum. Ill.
166. silphii Gill. 1891. Ill.State Lab.Nat.Hist. Bul.3:192. ♀ ♂ O. Ex stem gall on Silphium perfoliatum and Silphium integrifolium. Ill. Nebr. and Ia.

Genus DIASTROPHUS Hartig  
( Produce galle on Rubus, Fragaria, Potentilla )

167. bassetti Beut. 1892. Amer.Mus.Nat.Hist. Bul.4:248. ♀ ♂ O. Gall on running blackberry. N.J.
168. cuscuteaformis O.S. 1863. Ent.Soc.Phila.Proc. 2:39. ♀ ♂ O. Gall on blackberry. R.I. west to Muskoka and Iowa; south to S.Car.

169. *fragariae* Beut. 1915. *Canad.Ent.* 47:353. ♂ O. Gall on petiole of strawberry. R.I., N.Y., Va., Ill., Ontario.
170. *minimus* Bass. 1900. *Amer.Ent.Soc.Trans.* 26:325. ♀ ♂ O. Mass., Conn., N.J. Gall on *Potentilla canadensis*.
171. *nebulosus* (O.S.). 1861. *Stattin Ent.Ztg.* 22:415. ♀ O. Gall on stem of blackberry. Ontario to Fla.; west to Kansas.
172. *nigr* Bass. 1900. *Amer.Ent.Soc.Trans.* 26:324. ♀ O. Gall on *Potentilla canadensis*. D.C. N.Y., Mass., Mich., Ill., Mo., Ark.
173. *piceus* Prov. 1886. *Addit.Corr.Faune Canada Hym.* p.161. ♀ ♂. Ontario.
174. *radicum* Pass. 1870. *Canad.Ent.* 2:98. ♀ ♂ O. Gall on roots of *Rubus*. Conn., N.Y., N.J., N.Car., Ontario.
175. *smilacis* Ashm. 1896. *Amer.Ent.Soc.Trans.* 19:135. ♀ O. Galls said to have been on *Smilax*. Ill.
176. *tumefactus* Kinsey. 1920. *Amer.Mus.Nat.Hist.Bul.* 42:299. ♀ O. Quebec, Ontario. Gall on *Potentilla*.
177. *turgidus* Bass. 1870. *Canad.Ent.* 2:99. ♀ O. Gall on stem of red raspberry. Conn., N.Y., Ind., Ill., Qusbec, Ontario.

Genus LIPOSTHENES Foerster

178. *glechomae* (L.). 1758. *Syst.Nat.* Ed.10. p.553. (Rsaum.Ins.3:460.♀ O). Gall on *Nepeta hedsracea*. Introduced from Europe. Maine to Ill., to Va.

Genus AYLAX Hartig

179. *5-costatus* (Prov.). 1883. *Nat.Canad.* 14:19. Ontario (Toronto).

Genus AULACIDEA Ashmead  
(Produce galls on *Lactuca*, *Prenanthes*)

180. *abdita* Kinsey. 1920. *Amer.Mus.Nat.Hist.Bul.* 42:296. ♀ ♂ O. Quebec. Cells in the pith of *Lactuca*.
181. *ambrosiaeicola* (Ashm.). 1896. *U.S.Natl.Mus.Proc.* 19:134. ♀ ♂ O. Gall on *Ambrosia*. Mo. (Kirkwood).
182. *annulata* Kinsey. 1920. *Amer.Mus.Nat.Hist.* Bul.42:298. ♀ ♂ O. On *Lactuca*. Mass.
183. *harringtoni* (Ashm.). 1887. *Amer.Ent.Soc.Trans.* 14:146. ♀. Ont. to D.C., Mo.
184. *nabali* (Brodie). 1892. *Canad.Ent.* 24:12. ♀ ♂ O. Gall on *Prenanthes*. Quebec to Ill.; south to Va., N.Car.
185. *podagrae* (Bass.). 1890. *Amer.Ent.Soc.Trans.* 17:91. ♀ ♂ O. Gall on *Lactuca spicata*. N.Y., Pa., Ill., Mo., Va.
186. *tumida* (Bass.). 1890. *Amer.Ent.Soc.Trans.* 17:92. ♀ ♂ O. Gall on *Lactuca canadensis*. Ontario to Ill.; south to Va.

Genus GILLETTEA Ashmead

187. *taraxaci* Ashm. 1897. *Psyche* 8:69. ♀ ♂ O. Gall on *Taraxacum officinale*. Minn., Iowa, Ill., N.Y., Ontario.

Genus DIPLOLEPIS Fourcroy (= Rhodites of authors)  
( Produce galls on rose )

188. bicolor (Harris). 1841. Rpt.Ins.Mass. Injurious Veg. p.399. ♀ ♂ O. Mass. to Ill.; south to Va.
189. dichlocerus (Harris). 1841. Rpt.Ins.Mass. Injurious Veg. p.399. ♀ ♂ O. Ontario to Ill.; south to Va.
190. fulgens (Gill.). 1894. Canad Ent. 26:159. ♀. S.Dak.
191. fusiformans (Ashm.). 1890. Colo. Biol.Assoc. Bul. 1:14. ♀ ♂ O. Colo. Ill.,
192. gracilis (Ashm.). 1897. U.S.Natl.Mus.Proc.19:135. ♀ ♂ O. Wis., Ill., N.Y., Ont.
193. ignota (O.S.). 1863. Ent.Soc.Phila.Proc.2:45,49,63. ♀ ♂ O. Ontario to Ill.; south to Va.
194. mayri (Schlecht.). 1877(1876). Jahresb.Ver.Zwickau. 9.59. ♀ o. On an introduced rose in N.J.
195. multispinosa (Gill.). n.name 1890 (= spinosissima Gill. 1889 Iowa Agr.Expt. Sta. Bul.7:284. Preocc.). Ohio, Man., Sask., Alta., Minn., Wis., Ill.
196. nebulosa (Bass.). 1890. Amer.Ent.Soc.Trans. 17:63. ♀ O. Conn. N.Y., N.J., Ill.
197. nodulosa (Beut.). 1909. Ent.News. ♀ O. Mass., Ill.
198. pustulatoides (Beut.). 1914. Brooklyn Ent.Soc.Bul.9:89. ♀ ♂. Ind.
199. radicum (O.S.). 1863. Ent.Soc.Phila.Proc. 2:42,45,46. ♀ ♂ O. D.C. Va., N.J., N.Y., Mass., Ontario. Gall on roots of Rosa carolina.
200. radicum var.johnsoni Kinsey. 1922. Indiana Univ.Studies 53:67. ♀ ♂. Mass.
201. rosae (L.). 1758. Syst.Nat. Ed. 10. p.553. ♀ ♂. Introduced from Europe. Que. to Kansas; south to Va. On Rosa rubiginosa, the sweetbriar rose.
202. rosaefolia (Gill.). 1889. Ent.Mo.Mag. 25:324,363. ♀ O. Ont., N.Y., Mich.
203. rubicola (Kieffer). 1906. Marcellia 5:101. ♀ O. "Probably from N.A."
204. utahensis (Bass.). 1890. Amer.Ent.Soc.Trans. 17:62: ♀ ♂ O. Utah. N.Dak., Ill.
205. variabilis (Bass.). 1890. Amer.Ent.Soc.Trans. 17:61. ♀ ♂ O. Utah, N.Dak.
206. verna (O.S.). 1863. Ent.Soc.Phila.Proc. 2:41,45,47. ♀ ♂ O. D.C.

Genus NEUROTERUS Hartig  
( Produce galls on the white oak )

207. affinis (Bass.). 1881. Canad.Ent. 13:103. ♀ ♂ O. Conn. On Q.prinoides.
208. bassetti Dalla Torre .1892. n.name (= pallipes Bass. 1890. Amer.Ent.Soc. Trans.17:89. ♀ ♂ O. Preocc.). Conn.
209. clarkeae Beut. 1910. Amer.Mus.Nat.Hist.Bul 28:132. ♀ ♂ O. On Q.alba. Mass.
210. consimilis Bass. 1900. Amer.Ent.Soc.Trans.26:335. ♀ O. On Q.alba. Conn.
- 211a.contortus (Weld) agamic. 1921. U.S.Natl.Mus.Proc.59:209. ♀ O. On Q.breviloba.
- 211b.contortus (Weld) sex.gen. In Kinsey 1923 Indiana Univ.Studies 58:92. ♀ ♂ O.

212. *distortus* Baes. 1900. Amer.Ent.Soc.Trans.26:336. ♀ ♂ O. On Q.bicolor. Conn.
213. *dubius* Base. 1900. Amer.Ent.Soc.Trans.26:335. ♀ ♂. On Q.stellata. Conn.
214. *eecharensis* Weld. 1926. U.S.Natl.Mus.Proc. 68(10):5. ♀ O. On Q.bicolor. Ill.
215. *evanescens* Kinsey. 1922. Indiana Univ.Studies 53:100. ♀ ♂ O. On Q.breviloba.
216. *exiussimus* Bass. 1900. Amer.Ent.Soc.Trans. 26:332. ♀ O. On Q.alba. Conn.
217. *exiguus* Bass. 1900. Amer.Ent.Soc.Trans.26:333. ♀ ♂ O. On Q.stellata. Conn.
218. *floccosus* (Base.). 1881. Canad.Ent. 13:111. ♀ O. On Q.bicolor. Conn.
219. *fugiens* Weld. 1926. U.S.Natl.Mus.Proc.68(10):12. ♀ ♂ O. On Q.macrocampa.Ill.
220. *gillettei* Baes. 1900. Amer.Ent.Soc.Trans.26:334. ♀ ♂ O. On Q.stellata. Conn.
221. *irregularis* (O.S.). 1861. Ent.Soc.Phila. Proc.1:65. ♂ ♀. On Q.stellata.  
D.C. Kinsey described var.albipleuræ on Q.breviloba in Texas; and  
var.variegatus on Q.stellata in Oklahoma.
222. *majalis* (O.S.). 1864. Ent.Soc.Phila.Proc. 3:682. ♂ ♀ O. Tri. On Q.alba.
223. *minutissimus* Ashm. 1885. Amer.Ent.Soc.Trans. 12:Proc.VII. ♀ O. Tri.  
Gall on Q.virginiana. Fla.
224. *minutus* (Base.). 1881. Canad.Ent. 13:69. ♀ ♂ O. On Q.alba. Conn. Mass.
225. *niger* Gill. 1888. Mich.St.Bd.Agr.Rpt.27:475. ♀ O. On Q.macrocampa. Mich.  
Kinsey described var.alimas on Q.virginiana in Texas; var.grisea  
on Q.grisea in Texas; var. nigripes on Q.stellata and Q.breviloba  
in Texas; and var. pattersoni in Texas.
- 226a. *noxiosus* (Bass.) sex.gen. 1881. Canad.Ent.13:108. ♀ ♂ O. On Q.bicolor. Conn.
- 226b. *noxiosus* (Bass.) agamic. 1881. Canad.Ent.13:108. ♀ O. Conn. Mass. to Ill.
227. *pallidus* Baes. 1890. Amer.Ent.Soc.Trans.17:88. ♀ ♂ O. On Q.bicolor. Conn.
228. *papillous* Bcut. 1910. Amer.Mus.Nat.Hist.Bul.28:121. ♀ ♂ O. On Q.bicolor.
229. *perminimus* Bass. 1900. Amer.Ent.Soc.Trans. 29:332. ♀ ♂ O. On Q.alba. Conn.
230. *quercus-batatus* (Fitch) sex.gen. 1859(1858). N.Y.State Agr.Soc.Trans.18:810.  
♀ ♂. ON Q.alba. N.Y. to Ontario to Ill.; south to Fla.  
Kinsey described var. prini from R.I., sex.gen. and agamic.
231. *rileyi* Ashm. 1881. Amer.Nat.15:149. ♀ O. Tri. On Q.muehlenbergii in Ohio.  
Kinsey described var. atripleuræ and Q.prinus in Okla.; var. mutatus  
on Q.muehlenbergii in Texas; and var. thompsoni on Q.prinoides in Mass.
232. *saltarius* Weld. 1926. U.S.Natl.Mus.Proc.68(10):11. ♀ O. On Q.macrocampa. Ind.  
Mich., Ia., Minn., Mo. Kinsey (1923, Indiana Univ.Studies 58:31,51)  
described Neuroterus saltatorius australis on Q.stellata from Austin, Tex.  
and Neuroterus saltatorius texanus on Q.virginiana from Austin, Tex.  
Saltatorius is a California species.
233. *tantulus* Weld. 1952. U.S.Natl.Mus.Proc. 102:321. ♀ O. On Q.alba. Md.
234. *tectus* Bass. 1900. Amer.Ent.Soc.Trans. 26:331. ♀ ♂ O. On Q.prinoides. Conn.
235. *umbilicatus* Base. 1900. Amer.Ent.Soc.Trans. 26:330. ♀ O. On Q.bicolor. Conn.

236. vernus Gill. 1889. Iowa Agr. Expt. Sta. Bul. 7:281. ♀ O. On Q. macrocarpa. Ia.
237. verrucarum (O.S.). 1861. Ent. Soc. Phila. Proc. 1:62. Tri. On Q. stellata. ♀ O. Kinsey described var. inficiens on Q. brisviloba in Texas; var. macrocarpa on Q. macrocarpa in Texas; var. opacus on Q. stellata and Q. breviloba in Texas; var. pulvinus on Q. stellata in Texas; and var. restrictus on Q. chapmani in Florida.
238. vesicula (Bass.). 1881. Canad. Ent. 13:97. ♀ ♂ O. On Q. alba. Conn. Ontario to Ill.; south to Va. Kinsey described var. csrinus on Q. stellata in Texas; and var. ocularis on Q. stellata in Texas.

Genus PHYLLOTERAS Ashmead

239. rubinum (Gill.). 1888. Mich. Stats Bd. Agr. Rpt. 27:472. ♀ O. On Q. alba. Mich.
240. sigma Weld 1944. U.S. Natl. Mus. Proc. 95:5. ♀ O. On Q. alba. Va.

Genus XYSTOTERAS Ashmsad

241. nigrum (Fitch). 1859(1858). N.Y. State Agr. Soc. Trans. 18:782. ♀. N.Y.
242. poculum Wsld. 1922. U.S. Natl. Mus. Proc. 61(18):7. ♀ O. Mo., Ill. On Q. alba.
243. volutellas Ashm. 1897. Canad. Ent. 29:260. ♀ O. On Q. macrocarpa. Kansas.

Genus XANTHOTERAS Ashmead  
agamic

244. forticornis (O.S.). In Walsh, 1846. Ent. Soc. Phila. Proc. 2:489. ♀ O. Tri. Ill. On Q. alba.
245. politum (Bass.). 1881. Canad. Ent. 13:99. ♀ O. On Q. stellata. Conn.

sexual generation

246. ornatum (Kinsey). 1922. Indiana Univ. Stud. 53:139. ♀ ♂ O. On Q. brisviloba.
247. radicola Ashm. 1896. U.S. Natl. Mus. Proc. 19:116. ♀ O. On Q. alba. Mo.

Genus ACRASPIS Mayr

248. arida (Kinsey). 1930. Genus Cynips. p. 313. ♀ O. On Q. grissa. Texas.
249. schini Ashm. 1887. Amer. Ent. Soc. Trans. 14:140. ♀ O. On Q. bicolor. Fla.
- 250a. erinacei (Beut.) agamic. 1909. Amer. Mus. Nat. Hist. Bul. 26:247. ♀ O. On Q. alba.
- 250b. erinacei (Beut.) sex. gen. In Triggerson, 1914. Ent. Soc. Amer. Ann. 7:6. ♀ ♂ O.
251. gemula (Bass.). 1881. Canad. Ent. 13:104. On Q. prinoides. Conn. Kinsey described varieties: cruenta, fuscata, suspecta.
252. hybrida (Kinsey). 1936. Higher Categories p. 273. ♀ O. On Q. alba. Tenn.
253. hirta (O.S.). Bassett, 1864. Ent. Soc. Phila. Proc. 3:688. ♀ O. Tri. Conn. Kinsey described varieties: obtectans, opima, packorum, sclesta.
254. inflata (Kinsey). 1936. Higher Categories p. 274. agamic ♀ O. On Q. alba. Ind.



255. longicornis (Bass.). 1900. Amer.Ent.Soc.Trans. 26:327. ♂ ♀. Q.stellata. Conn.
256. macrocarpae Bass. 1890. Amer.Ent.Soc.Trans.17:84. ♀ O. On Q.macrocarpa. Conn.
257. pezomachoides (O.S.). 1862. Ent.Soc.Phila.Proc.1:250. agamic ♀ O. Q.alba.  
Kinsey described varieties: advena, cincturata, derivatus, ozark, wheeleri.
258. prinoides (Beut.). 1892. Amer.Mus.Nat.Hist.Bul.4:257. ♀ O. On Q.prinoides. N.J.
259. villosa Gill. 1888. Mich.State Bd.Agr.Rpt.27:474. ♀ O. On Q.macrocarpa. Ia.  
Kinsey described varieties: apache, calvscens, consocians, expositor.

Genus PHILONIX Fitch

260. fulvicollis Fitch. 1859(1858). N.Y.State Agr.Soc.Trans.18:783. ♀. N.Y.  
Kinsey described varieties: canadensis, major, rubricosa, vorisi,  
insulensis.
261. gigas Weld. 1922. U.S.Natl.Mus.Proc. 61(18):12. ♀ O. On Q.lyrata. Ark.
262. lanaeglobuli (Ashm.). 1887. Amer.Ent.Soc.Trans.14:139. ♀ O. "Q.bicolor". Fla.
263. nigra (Gill.). 1889. Iowa Agr.Expt.Sta.Bul.7:282. ♀ O. On Q.alba. Mich.
264. nigricollis Fitch. 1859(1858). N.Y.State Agr.Soc.Trans. 18:783. ♀. N.Y.
265. pallipes (Bass.). 1900. Amer.Ent.Soc.Trans.26:327. ♀ O. On Q.alba. Conn.  
Perhaps a synonym of Acraspis gemula (Bass.).

Genus LIODORA Foerster

266. apiarium Weld. 1944. U.S.Natl.Mus.Proc.95:6. ♀ O. On Q.alba. Va.
267. clarksei (Bass.). 1890. Amer.Ent.Soc.Trans. 17:69. ♀ ♂ O. On Q.alba, stellata.
268. comata Weld. 1952. U.S.Natl.Mus.Proc. 102:325. ♀ ♂ O. On Q.alba. Va.

Genus ADLERIA Rohwer and Fagan

269. dimorpha (Beut.). 1913. Amer.Ent.Soc.Trans. 39:245. ♀ O. Q.alba, macrocarpa.
270. flavicollis (Ashm.). 1896. U.S.Natl.Mus.Proc. 19:123. ♀. Ill.
271. nigricens (Gill.). 1888. Mich.State Bd.Agr.Rpt.27:473. ♀ O. On Q.bicolor.
272. strobilana (O.S.). In Bassett, 1864. Ent.Soc.Phila.Proc. 3:690. ♀. Tri.
273. vacciniiformis (Beut.). 1913. Amer.Ent.Soc.Trans.39:247. ♀ O. On Q.stellata.
274. weldi (Beut.). 1918. Brooklyn Ent.Soc.Bul.13:118. ♀ O. On Q.alba.

Genus AMPHIBOLIPS Reinhard

275. acuminata. Ashm. 1896. U.S.Natl.Mus.Proc. 19:126. ♀ O. On Q.cinerea. Fla.
276. arcuata (Kieffer). 1910. Lab.Zool.Gen. e Agr.Portici Bol.4:341. ♀. Ga.

277. cinerea Ashm. 1881. Amer.Ent.Soc.Trans. 9:Proc.XIX. ♀ O. Tri. On Q.cinerea.
278. citrifolmis Ashm. 1881. Amer.Ent.Soc.Trans.9:Proc.XXVIII. ♀ O. Tri.Q.phallos.
279. coslebs (O.S.). 1861. Ent.Soc.Phila.Proc. 1:60. ♀ O. On Q.coccinea. D.C.
280. confluenta (Harris). 1841. Rpt.Ins.Mass. Injurious Veg. p.397. ♀ O.
281. cookii Gill. 1888. Mich.Stats Bd.Agr. Rpt.27:475. ♀ O. On Q.rubra. Mich.
282. fuliginosa Ashm. 1885. Amer.Ent.Soc.Trans. 12:Proc.VII. ♀ O.Q.laurifolia.Tri.
283. gainesi Bass. 1900. Amer.Ent.Soc.Trans.26:322. ♀ O. On Q.marilandica. Tex.
284. globulus Beut. 1909. Amer.Mus. Nat.Hist.Bul.26:60. ♀ O. On Q.marilandica. N.J.
285. globus Wsld. 1952. U.S.Natl.Mus.Proc. 102:325. ♀ ♂ O and agamic ♀ O.  
On Q.palustris Va.
286. ilicifoliae (O.S.). In Bassett 1864. Ent.Soc.Phila.Proc.3:681. ♀ ♂ O.Tri.
287. inanis (O.S.). 1862. Ent.Soc.Phila.Proc. 1:242,247. ♀ O. On Q.rubra. D.C.
288. melanocera Ashm. 1885. Amer.Ent.Soc.Trans. 12:299,303. ♂ O. On Q.nigra. Fla.
289. murata Wsld. 1957. U.S.Natl.Mus.Proc. 107:111. agamic ♀ O. On Q.myrtifolia.
290. nubilipennis (Harris). 1841. Rpt.Ins.Mass.Injurious Veg. p.399. ♀ O. Mass.
291. prunus Cresson. In Walsh & Rilsy, 1869. Amer.Ent. 1:104. ♀ O. Tri. Q.rubra.
292. racemaria Ashm. 1881. Amer.Ent.Soc.Trans.9:Proc.XXVI. ♀ O. Tri. Q.laurifolia.
293. spinosa Ashm. 1887. Amer.Ent.Soc.Trans.14:141. On Q.laurifolia. Fla.
294. spongifica (O.S.). 1862. Ent.Soc.Phila.Proc. 1:244,247. ♀ O.Tri. Q.coccinea.
295. tinctoriae Ashm. 1896. U.S.Natl.Mus.Proc.19:125. ♀ O. Q.coccinea, vs lutina.

Genus ANDRIGOUS Hartig

296. aciculatus Beut. 1909. Ent.News 20:247. ♀ O. On Q.stellata. Texas.
297. biconicus Wsld. 1926. U.S.Natl.Mus.Proc. 68(10):68. ♀ O. On Q.stellata. Tex.
298. capillatus (Weld). 1926. U.S.Natl.Mus.Proc.68( 10):20. ♀ O. On Q.alba. Ill.
299. chinquapin (Fitch). 1859(1858). N.Y.Stats Agr.Soc.Trans.18:820. ♀ O.  
On Q.prinoides. N.Y.
300. cinnamomeus Ashm. 1887. Amer.Ent.Soc.Trans.14:137. ♀ O. On Q.chapmani. Fla.
301. oconus Beut.1907. Amer.Mus.Nat.Hist.Bul.23:464. ♀ O. On Q.palustris. N.Y.
302. crassicornis (Ashm.). 1896. U.S.Natl.Mus.Proc. 19:130. ♀ O. Fla.
303. deciduatus Wsld. 1926. U.S.Natl.Mus.Proc. 68(10):72. ♀ O. On Q.bicolor. Ill.
304. ellipsoidalis (Weld). 1926. U.S.Natl.Mus.Proc.268(10):105. ♀ O. Q.palustris.

305. femoratus Ashm. 1887. Amer.Ent.Soc.Trans.14:141. ♀ O. On Q.laurifolia. Fla.
306. flavohirtus Beut. 1913. Insec.Inscit.Mens. 1:24. ♀ O. On Q.bicolor. N.J.
307. flocci (O.S.). In Walsh 1864. Ent.Soc.Phila.Proc.2:482. ♀ O. Tri. On Q.alba.
308. foliaformis Gill. 1868. Mich.State Bd.Agr.Rpt.27:471. ♀ O. On Q.alba. Mich.
309. foliatus Ashm. 1881. Amer.Ent.Soc.Trans. 9:Proc.XII. ♀ O. On Q.virginiana.
310. formosus (O.S.). In Bassett 1864. Ent.Soc.Phila.Proc. 5:679. ♀ O.Tri. Q.rubra.
311. ignotus (Bass.). 1881. Canad.Ent. 13:106. On Q.bicolor. Conn.
312. incertus Bass. 1900. Amer.Ent.Soc.Trans. 26:317. ♀. Conn.
313. incognitus Weld. n.name for Bassett, Andricus ignotus 1900.Amer.Ent.Soc.Trans. 26:317. ♀. Procc in 1881. On Q.stellata. Conn.
314. indistinctus Bass. 1890. Amer.Ent.Soc.Trans.17:81. ♀ O. On Q.alba. Ohio.
315. laniger Ashm. 1881. Amer.Ent.Soc.Trans.9:Proc.XIII. ♀ O. Tri. On Q.virginiana.
316. mamillaformis (Weld). 1926. U.S.Natl.Mus.Proc.68(10):96. ♀ O. On Q.alba. Ill.
317. maxwelli Bass. 1890. Amer.Ent.Soc.Trans.17:83. ♀ ♂ O. Texas.
318. murtfeldtae Ashm. 1896. U.S.Natl.Mus.Proc. 19:117. ♂ O. On Q.stellata. Mo.
319. ostensackenii (O.S.). In Bassett 1864. Ent.Soc.Phila.Proc. 2:327. ♀ ♂ O. Tri. On Q.coccinea. Conn.
320. pattoni (Bass.). 1881. Canad.Ent. 13:98. ♀ O. On Q.stellata. Conn.
321. petiolicola (O.S.). In Bassett 1863. Ent.Soc.Phila.Proc. 2:325. ♀ ♂ O. Tri.
322. pisiformis Beut. 1911. Ent.News 22:70. ♀ O. On Q.bicolor. N.J.
323. pulohellus Bass. 1900. Amer.Ent.Soc.Trans. 26:314. ♀ ovipositing in Q.prinoides. Conn.
324. robustus Weld. 1926. U.S.Natl.Mus.Proc.68(10):81. ♀ O. On Q.stellata. Tex.
325. rugatus Weld. 1926. U.S.Natl.Mus.Proc.68(10):82. ♀ O. On Q.lyrata. Ark.
326. singularis (O.S.). In Bassett 1863. Ent.Soc.Phila.Proc. 2:326. ♀ ♂ O. Tri.
327. stropus Ashm. 1887. Amer.Ent.Soc.Trans.14:136. ♀ O. On Q.stellata. Fla.
328. utriculus Ashm. In Bassett 1881. Canad.Ent. 13:78. ♀ ♂ O. Tri. Q.alba.Conn.
329. vernus (Bass.). 1900. Amer.Ent.Soc.Trans.26:321. ♀ ovipositing in Quercus ilicifolia. Conn.

Genus ATRUSCA Kinsey

330. catena (Kinsey). 1936. Higher Categories p.91,102. ♀ O. On Q.grisea. Texas.
331. cava (Weld). 1926. U.S.Natl.Mus.Proc.68(10):22. ♀ O. On Q.breviloba. Texas.
332. centricola (O.S.). 1861. Ent.Soc.Phila.Proc. 1:58. ♀ O. On Q.stellata. D.C.

333. *clivorum* (Kinsey). 1930. Genus *Cynips* p.300. ♀ O. On *Q.stellata*. Ohio.  
 334. *congesta* (Kinsey). 1930. Genus *Cynips* p.292. ♀ O. On *Q.grisea*. Texas.  
 335. *pupoides* (Kinsey). 1930. Genus *Cynips* p.284. ♀ O. On *Q.grisea*. Texas.  
 336. *striata* (Kinsey). 1930. Genus *Cynips* p.304. ♀ O. On *Q.stellata*. Ill.

Genus DISHOLCASPIS Dalla Torre and Kieffer

337. *bassetti* (Gill.). 1888. Mich.State Bd.Agr.Rpt.27:472. ♀ O. On *Q.bicolor*.  
 338. *brevinota* Weld. 1921. U.S.Natl.Mus.Proc.59:197. ♀ O. On *Q.breviloba*. Texas.  
 339. *cinerosa* (Bass.). 1881. Canad.Ent. 13:10. ♀ O. On *Q.virginiana*. Texas.  
 340. *fungiformis* Kinsey. 1920. Amer.Mus.Nat.Hist.Bul.42:312. ♀ O. On *Q.virginiana*.  
 341. *globosa* Weld. 1921. U.S.Natl.Mus.Proc.59:196. ♀ O. On *Q.alba*. Ill.  
 342. *heynei* Kieffer. 1910. Lab.Zool.Gen. & Agr.Portici Bol.4:113. ♀. Texas.  
 343. *mamma* (Cresson). In Walsh 1869. Amer.Ent. 1:102 (foot note). ♀ O. Tri.  
 On *Q.macrocarpa*. Ill.  
 344. *omnivora* (Ashm.). 1885. Amer.Ent.Soc.Trans. 12:Proc.VI. ♀ O. Tri.  
 On *Q.chapmani*. Fla.  
 345. *pattersoni* Kinsey. 1922. Indiana Univ.Studies 53:78. ♀ O. On *Q.breviloba*.Tex.  
 346. *persimilis* (Ashm.). 1896. U.S.Natl.Mus.Proc. 19:126. ♀ O. Miss.  
 347. *pruniformis* Kinsey. 1920. Amer.Mus.Nat.Hist.Bul.42:315. ♀ O. *Q.breviloba*.  
 348. *quercus-globulus* (Fitch). 1859(1858). N.Y.State Agr.Soc.Trans.18:810. ♀ O.  
 349. *spongiosa* (Karsch). 1880. Ztschr.f.Gesam.Naturw. 53:295. ♀ O. Texas.  
 350. *succinipes* (Ashm.). 1881. Amer.Ent.Soc.Trans. 9:Proc.XI. ♀ O. Tri. Fla.  
 351. *terrestris* Weld. 1921. U.S.Natl.Mus.Proc.59:198. ♀ O. On *Q.stellata*. Mo.  
 352. *virens* (Ashm.). 1881. Amer.Ent.Soc.Trans.9:Proc.X. ♀ O. Tri. *Q.virginiana*.

Genus BELONOCNEMA Mayr

353. *fossorialis* Weld. (Osten Sacken 1861 Ent.Soc.Phila.Proc.1:57 gall only on the  
 leaves of *Q.virginiana*. nom.nud.). 1921 U.S.Natl.Mus.Proc.59:240. ♀ O.  
 354. *kinseyi* Weld. 1921. U.S.Natl.Mus.Proc.59:241. ♀ O. On *Q.virginiana*. Texas.  
 355. *treatae* Mayr. 1931 Genera Gallenbew.Cynip. p.17 note. ♀ O. On *Q.virginiana*.

Genus SPHAEROTERAS Ashmead

356. *caepuliforme* (Beut.). 1911. Ent.News 22:69. ♀ O. On *Q.rubra*. Indiana.  
 357. *carolina* (Ashm.). 1887. Amer.Ent.Soc.Trans.14:145. ♀ O. On *Q.alba*. N.Car.

358. melleum (Ashm.). 1887. Amer.Ent.Soc.Trans.14:128,138. ♀ O. On Q.chapmani. Fla.  
Kinsey described varieties: albicolens, anceps, bifurcum, comptum,  
concolor, craseius, litigans.
359. ocala (Weld). 1921. U.S.Natl.Mus.Proc. 59:207. ♀ ♂ O. On Q.chapmani. Fla.
360. texanum (Ashm.). 1887. Amer.Ent.Soc.Trans.14:145. ♀. Texas.
361. unicum (Weld). 1926. U.S.Nat.Mus.Proc. 68(10):34. ♀ O. on Q.stellata. Mo.

Genus ZOPHEROTERAS Ashmead

362. compressum (Gill.). 1891. Ill.Stats Lab.Nat.Hist.Bul.3:197. ♀ O. On Q.rubra.
363. cuneatum Weld. 1944. U.S.Nat.Mus.Proc. 95:14. ♀ O. On Q.alba. Va.
364. guttatum Weld. 1952. U.S.Natl.Mus.Proc.102:334. ♀ O. On Q.palustris. Va.
365. hubbardi (Ashm.). 1897. Canad.Ent. 29:262. ♀. Mich.
366. sphaerula Weld. 1926. U.S.Natl.Mus.Proc.68(10):56. ♀ O. On Q.rubra. Ill.
367. vaccinii (Ashm.). 1887. Amer.Ent.Soc.Trans. 14:136. ♀ Florida.

Genus LOXAULUS Mayr

368. ashmeadi Kieffer. 1902. Soc.Hist.nat.Metz Bul.(2)10:4. ♀ O. Q.pedunculata.
369. beutenmuelleri Weld. 1957. U.S.Natl.Mus.Proc.107:116. ♀ O. On Q.rubra. N.J.
370. ferrugineus (Gill.). 1891. Ill.State Lab.Nat.Hist.Bul.3:200. ♀. Iowa.
371. humilis (Weld). 1921. U.S.Natl.Mus.Proc. 59:190,236. ♀ O. On Q.chapmani. Fla.
372. illinoisensis (Weld). 1921. U.S.Natl.Mus.Proc. 59:191,234. ♀ O. Q.macrocarpa.
373. mammula Mayr. 1881. Bassett 1881.Canad.Ent.13:76. ♀ ♂ O. Tri. On Q.alba.
374. pattersoni (Kinsey). 1922. Indiana Univ.Studies 53:49. ♀ O. On Q.virginiana.
375. vaccinii (Ashm.). 1887. Amer.Ent.Soc.Trans. 14:134,149. ♀. Fla.

Genus BASSETTIA Ashmead

376. aquaticas (Ashm.). 1887. Amer.Ent.Soc.Trans. 14:144. On Q.nigra. Fla.
377. cateebasi (Ashm.). 1881. Amer.Ent.Soc.Trans. 9:Proc.XV. ♀ ♂ O. Q.cateebasi.
378. ceropteroides (Bass.). Amer.Ent.Soc.Trans.26:324,1900. ♀ O. On Q.velutina.
379. floridana Ashm. 1887. Amer.Ent.Soc.Trans.14:147. ♀. On Q.champani. Fla.
380. gemmae Ashm. 1896. U.S.Natl.Mus.Proc. 19:128. ♀. Mo.
381. pallida Ashm. 1896. U.S.Natl.Mus.Proc. 19:128. ♀. Ga.

Genus EUMAYRIA Ashmead

382. *floridana* Aehm. 1887. Amer.Ent.Soc.Trans. 14:147. ♀ ♂ O. On Q.rubra. Fla.  
383. *invia* Weld. 1952. U.S.Natl.Mus.Proc. 102:335. ♀ O. On Q.myrtifolia. Fla.  
384. *longipennis* (Aehm.). 1887. Amer.Ent.Soc.Trans. 14:132,140. ♂ O.Q.laurifolia.

Genus TRISOLENIELLA Rohwer and Fagan

385. *brevicornis* (Beut.). 1913. Amer.Ent.Soc.Trans. 39:245. ♀. N.J.  
386. *enigma* (Weld). 1921. U.S.Natl.Mus.Proc. 59:219. ♀ O. On Q.rubra. Ill.  
387. *punctata* (Ashm.). 1896. U.S.Natl.Mus.Proc. 19:129. ♀. N.Y.  
388. *ealtata* (Ashm.). 1887. Amer.Ent.Soc.Trans. 14:142. ♀ O. On Q.cinerea.Fla.

Genus ODONTOCYNIPS Kieffer

389. *nebulosa* Kieffer. 1910. Lab.Zool.Gen. e Agr.Portici Bol.4:112. ♀. Ga.

Genus HOLOOCYNIPS Kieffer

390. *badia* (Bass.). 1900. Amer.Ent.Soc.Trans. 26:323. ♀. Conn.  
391. *maxima* (Weld). 1921. U.S.Natl.Mus.Proc. 59:191,217. ♀ O. On Q.alba. Ill.

Genus DRYOCOSMUS Giraud

392. *albidus* Weld. 1944. U.S.Natl.Mus.Proc.95:15. ♀ O. On Q.coccinea. Va.  
393. *cinerea* (Ashm.). 1887. Amer.Ent.Soc.Trans.14:144. ♀ O. On Q.cinerea. Fla.  
394. *deciduus* (Beut.). 1913; Inesc.Inecit.Mens. 1:131. ♀ O. On Q.rubra. N.Car.  
395. *favus* Beut. 1911. Ent.News 22:197. ♀ O. On Q.rubra. La.  
396. *floridensis* (Beut.). 1917. Canad.Ent. 49:349. ♀ O. On red oaks. Fla.  
397. *imbricariae* (Aehm.). 1896. U.S.Natl.Mus.Proc. 19:122. On red oaks. Mo.  
398. *laurifoliae* (Aehm.). 1881. Amer.Ent.Soc.Trans. 9:Proc.XVII. Tri. ♀ ♂ O.  
On Q.laurifolia. Fla.  
399. *notha* (Aehm.). In Osten Sacken, 1870. Amer.Ent.Soc.Trans.3:55. ♀ ♂ O. Tri.  
On Q.palustris. N.Y.  
400. *palustris* (Ashm.). In Osten Sacken, 1861. Ent.Soc.Phila.Proc. 1:62. ♀ ♂ O.  
Tri. On red oaks. D.C.  
401. *rileyi* (Aehm.). 1896. U.S.Natl.Mus.Proc. 19:121. ♀ O. On Q.rubra. Mo.

Genus CALLIRHYTIS Foerster

402. *attigua* Weld. 1926. U.S.Natl.Mus.Proc.68(10):88. ♀ O. On Q.texana. Texas.  
403. *balanacea* Weld. 1944. U.S.Natl.Mus.Proc. 95:16. ♀ O. On Q.palustris. Va.

404. *balanaspis* Weld. 1922. U.S.Natl.Mus.Proc. 61(19):22. ♀ O. Q.marilandica.
405. *balanoides* Weld. 1922. U.S.Natl.Mus.Proc. 61(19):27. ♀ O. On Q.velutina. Mo.
406. *balanopeis* Weld. 1922. U.S.Natl.Mus.Proc. 61(19):26. ♀ O. On Q.marilandica.
407. *balanosa* Weld. 1922. U.S.Natl.Mus.Proc. 61(19):19. ♀ O. On Q.coccinea.
408. *bataoides* (Ashm.). 1881 Amer.Ent.Soc.Trans. 9:Proc.XI. Tri. Q.virginiana.
409. *bipapillata* Weld. 1944. U.S.Natl.Mus.Proc. 59:17. ♀ ♂ O. Q.ilicifolia. Va.
410. *blastophaga* (Ashm.). 1887. Amer.Ent.Soc.Trans. 14:143. ♀ O. On Q.cinerea.
411. *clarkei* (Baes.). 1890. Amer.Ent.Soc.Trans. 17:79. ♀ O. Q.ilicifolia. Mass.
412. *clavigera* (Ashm.). 1881. Amer.Ent.Soc.Trans. 9:proc.XXVII. ♀ O. Tri. Fla.
413. *clavula* (O.S.). 1865. Ent.Soc.Phila.Proc. 4:351. ♀ O. On Q.alba. D.C.
414. *confusa* (Ashm.). 1881. Amer.Ent.Soc.Trans. 9:Proc.XVIII. ♀ O. Tri. Fla.
415. *cornigera* (O.S.). 1865. Ent.Soc.Phila.Proc. 4:358. ♀ O. On Q.palustris. D.C.
416. *corrugie* (Baes.). 1881. Canad.Ent. 13:109. ♀. Conn.
417. *cressoni* (Bsut.). 1913. Amer.Ent.Soc.Trans. 39:247. ♀ O. Q.stellata. Texas.
418. *crypta* (Ashm.). 1887. Amer.Ent.Soc.Trans. 14:145. ♀ O. On Q.cinerea. Fla.
419. *cryptica* Weld. 1922. U.S.Natl.Mus.Proc. 61(18):19. ♀ O. On Q.myrtifolia. Fla.
420. *difficilis* (Ashm.). 1887. Amer.Ent.Soc.Proc. 14:143. ♀ O. On Q.cinerea. Fla.
421. *electra* Weld. 1944. U.S.Natl.Mus.Proc. 95:18. ♀ O. On Q.prunus. Va.
422. *ellipsoida* Wsld. 1921. U.S.Natl.Mus.Proc. 59:227. ♀ O. On Q.bicolor. Ill
423. *elliptica* Weld. 1921. U.S.Natl.Mus.Proc. 59:228. ♀ O. On Q.alba. Ill.
424. *elongata* (Kiney). 1922. Indiana Univ.Studies 53:125. ♀ O. Q.breviloba. Tex.  
Kiney described varieties: rufopleuras and stellatae.
425. *excavata* (Ashm.). 1896. U.S.Natl.Mus.Proc. 19:121. ♀ O. On Q.rubra. N.Car.
426. *exigua* (Baes.). 1900. Amer.Ent.Soc.Trans. 26:318. ♀ ♂ O. On Q.stellata. Conn.
427. *favosa* (Baes.). 1890. Amer.Ent.Soc.Trans. 17:87. ♀ ♂ O. On Q.velutina. Ohio
428. *flavipes* (Gill.). 1889. Iowa Agr.Expt.Sta.Bul. 7:281. ♀ ♂ O. Q.macrocarpa. Ia.
429. *florensii* Weld. 1944. U.S.Natl.Mus.Proc. 95:19. ♀ ♂ O. On Q.marilandica. Va.
430. *floridana* (Ashm.). 1887. Amer.Ent.Soc.Trans. 14:137. ♀ ♂ O. On Q.chapmani.
431. *fructicola* Ashm. 1896. U.S.Natl.Mus.Proc. 19:131. ♀ O. On Q.velutina. Mich.
432. *fructuosa* Weld. 1922. U.S.Natl.Mus.Proc. 61(19):14. ♀ O. On red oaks. Mo.
433. *furva* Wsld. 1952. U.S.Natl.Mus.Proc. 102:341. ♀ O. On Q.palustris. Va.

434. *futilis* (O.S.). 1861. Ent.Soc.Phila.Proc. 1:63. ♂ O. Tri. On Q.alba. D.C.
435. *gallaestriatae* Weld. 1926. U.S.Natl.Mus.Proc.68(10):92. ♀ O. Q.rubra. Ill.
436. *gemmaria* (Ashm.). 1885. Amer.Ent.Soc.Trans.12:Proc.IX. ♀ O. Tri. Q.cinerea.
437. *gemmiformis* (Beut.). 1917. Canad.Ent. 49:346. ♀ O. On Q.alba. N.J.
438. *glandulus* (Beut.). 1913. Brooklyn Ent.Soc.Bul.8:103. ♀ ovipositing in Quercus prinoides. N.J.
439. *glomerosa* Weld. 1957. U.S.Natl.Mus.Proc. 107:119. ♀ O. On Q.coccinea. Va.
440. *hopkinsi* Weld. 1952. U.S.Natl.Mus.Proc. 102:339. ♀ O. On Q.imbricaria. W.Va.
441. *infuscata* (Ashm.). 1887. Amer.Ent.Soc.Trans.14:144. ♀ O. On Q.catesbaei. Fla.
442. *intersita* Weld. 1957. U.S.Natl.Mus.Proc.107:119. ♀ ovipositing in Q.alba. Va.
443. *lanata* (Cill.). 1891 Ill.State Lab.Nat.Hist.Bul.3:198. ♀ O. On Q.rubra. Ill.
444. *lapillula* Weld. 1922. U.S.Natl.Mus.Proc. 61(19):18. ♀ O. On Q.bicolor. Ill.
445. *lustrans* (Beut.). 1913. Amer.Ent.Soc.Trans. 39:244. ♀. Texas.
446. *marginata* Weld. 1921. U.S.Natl.Mus.Proc.59:225. ♀ O. On Q.coccinea. Ill.
447. *medularis* Weld. 1957. U.S.Natl.Mus.Proc. 107:121. ♀ ♂ O.  
On Q.rubra, velutina, coccinea. Pa.
448. *medullae* (Ashm.). 1885. Amer.Ent.Soc.Trans.12:Proc.VIII.Tri. ♀ O.  
On Q.cinerea. Fla.
449. *middletoni* Weld. 1922. U.S.Natl.Mus.Proc. 61(19):25. ♀ O. On Q.phellos. D.C.
450. *modesta* (O.S.). 1861. Ent.Soc.Phila.Proc.1:65. ♀ O. Tri. On Q.rubra. D.C.
451. *myrtifoliae* (Beut.). 1917. Canad.Ent. 49:346. ♀ ♂ O. On Q.myrtifolia. Fla.
452. *nigrae* (Ashm.). Osten Sacken 1861. Ent.Soc.Phila.Proc.1:66. ♀ ♂ O. Tri.  
On Q.marilandica. D.C.
453. *oblata* Weld. 1952. U.S.Natl.Mus. Proc.102:340. ♀ O. Q.coccinea, falcata. Va.
454. *obtusilobae* (Bass.). 1900. Amer.Ent.Soc.Trans.26:316. ♀. Conn.
- 455a. *operator* (O.S.) sex.gen. 1862. Ent.Soc.Phila.Proc. 1:256. ♀ ♂ O. Tri.  
On Q.marilandica. D.C.  
Kinsey described varieties: austrior, falsa, illustrans.
- 455b. *operator* (O.S.) agamic. Bassett 1900. Amer.Ent.Soc.Trans.26:315. ♀.
456. *ovata* Weld. 1921 U.S.Natl.Mus.Proc. 59:222. ♀ O. On Q.catesbaei. Fla.  
Kinsey described var. melanica.
457. *parva* Weld. 1922 U.S.Natl.Mus. Proc.61(18):23. ♀ ♂ O. On Q.imbricaria. Va.
458. *parvifoliae* Ashm. 1887. Amer.Ent.Soc.Trans. 14:138. ♀ O. On Q.chapmani. Fla.



459. *parvula* (Bass.). 1900. Amer.Ent.Soc.Trans.26:236. ♀ ovipositing in Quercus ilicifolia. Conn.
460. *patiens* (Bass.). 1900. Amer.Ent.Soc.Trans. 26:312. ♀ ovipositing in Quercus ilicifolia. Conn.
461. *pedunculata* (Bass.). 1890. Amer.Ent.Soc.Trans. 17:72. ♀ ♂ O. On Q.rubra.
462. *perditor* (Bass.). 1900. Amer.Ent.Soc.Trans. 26:313. ♀ O. On Q.ilicifolia.
463. *perobscura* Weld. 1957. U.S.Natl.Mus.Proc.107:122. ♀ ovipositing in Q.valutina. Va.
464. *perplexa* (Ashm.). 1896. U.S.Natl.Mus.Proc. 19:122. ♀ O. Mo.
465. *perrugosa* Weld. 1944. U.S.Natl.Mus.Proc.95:22. ♀ ovipositing in Q.alba. Va.
466. *petrosa* Weld. 1922. U.S.Natl.Mus.Proc.61(19):15. ♀ O. On Q.cinerea. Texas.
467. *phellos* (Ashm.). In Osten Sacken 1861. Ent.Soc.Phila.Proc.1:70. ♀ O. Tri.
468. *pigra* (Bass.). 1881. Canad.Ent. 13:105. ♀ O. On Q.valutina. Conn.
469. *piperoideus* (Bass.). 1900. Amer.Ent.Soc.Trans.26:314. ♀ O. On Q.rubra. Conn.
470. *pulchra* (Bass.). 1890. Amer.Ent.Soc.Trans. 17:73. ♀ ♂ O. On Q.rubra. Conn.
471. *punctata* (O.S.). Bassett 1863. Ent.Soc.Phila.Proc.2:323. ♀ O. Tri. Q.velutina.
472. *quercifolias* (Ashm.). 1885. Amer.Ent.Soc. Trans.12:299. ♂ O. Q.catesbasi. Fla.
473. *rubida* Weld. 1921. U.S.Natl.Mus.Proc. 59:224. ♀ O. On Q.coccinea. Ill.
474. *rugosa* (Ashm.). 1881. Amer.Ent.Soc.Trans. 9:Proc.XVIII. ♀ ♂ O. Tri. On Q.laurifolia. Fla.
475. *rugulosa* (Beut.). 1911. Canad.Ent. 43:211. ♀ O. On Q.rubra. N.J.
476. *scitula* (O.S.). In Bassett 1864. Ent.Soc.Phila.Proc.3:683. Tri. Q.velutina.
477. *seminator* (Harris). 1841. Rpt.Ins.Mass.Injurious Vag. p.399. ♀ O. Q.alba.
478. *seminosa* (Bass.). 1890. Amer.Ent.Soc.Trans. 17:76. ♀ O. On Q.coccinea. Ohio.
479. *similis* (O.S.). In Bassett 1864. Ent.Soc.Phila.Proc.3:685. ♀ ♂ O. Tri. On Q.ilicifolia. Conn.
480. *subcostata* Weld. 1952. U.S.Natl.Mus.Proc. 102:341. ♀ O. On Q.stellata. Va.
481. *tuberosa* (Bass.). 1900. Amer.Ent.Soc.Trans. 26:311. ♀ ♂ O. Q.ilicifolia.
482. *tubicola* (O.S.). 1861. Ent.Soc.Phila.Proc. 1:60. ♀ O. On Q.stellata. D.C.
483. *tumifica* (O.S.). 1865. Ent.Soc.Phila.Proc. 4:356. ♀ ♂ O. On Q.velutina.
484. *turnerii* (Ashm.). 1881. Amer.Ent.Soc.Trans. 9:Proc.XVI. ♀ O. Tri. Q.nigra.
485. *ventricosa* (O.S.). In Bassett 1864. Ent.Soc. Phila.Proc.681. ♀ O. Tri. On Q.ilicifolia. Conn.

Genus undetermined

486. *Cynipe* (*Neuroterus*) *crassitellus* Prov. 1881. Nat.Canad. 12:233. ♀.  
Unique type in Quebec in bad condition.
487. *Cynips* (*Andricus*) *gibbosus* Prov. 1881. Nat.Canad.12:232. ♀ ♂.  
Types in Quebec.
488. *Neuroterus laurifoliae* Ashm. 1887. Amer.Ent.Soc.Trans. 14:140. ♀.  
Type lost.
489. *Cynips maculatus* Blanchard. 1840. Hist.Nat.Ins. 3:250. "Carolina."
490. *Cynips* (*Rhodites* ?) *tuberculosa* Oeten Sacken. 1861. Stettin Ent.Ztg. 22:415.  
♀ ♂ O.

## H O S T I N D E X

It is assumed that anyone with the curiosity to learn the name of a casually collected gall will know the name of the host plant on which it occurred, or at least the common name of the native oak. Therefore the first place to look is in this host index under the name of the oak where the galls are grouped according to the part of the plant on which they occur. "Root" galls simply means that they occur at the crown, often buried out of sight by forest litter. The name of each described species is followed by its number in the SYNOPTIC LIST where the original description is cited and where, if one has access to the entomological literature, a more complete description may be found. Otherwise the short characterization and the figure are the beginner's main reliance for identification.

In addition to the described species there are also included brief descriptions of several of the more common kinds that have never been described or reared, many of these with a figure. Here is opportunity for the amateur to make some contribution to science. The primary purpose of this popular paper is to stimulate interest in the group and point out some of the taxonomic and biological problems involved.

In descriptions it is of significance whether a gall occurs in spring or in fall, whether single or in numbers, on upper or lower side of leaf and whether it contains many cells (polythalamous) or only one larval cell (monothalamous).

In case the name of the oak is not known then the place to look is in the NOTES ON ILLUSTRATIONS where all the root galls, regardless of host, are grouped together. So also the flower, acorn, stem and leaf galls. A single collected specimen may not fit any description here. It may not be a normal cynipid structure. A gall is sometimes attacked in its early stages by guests or parasites and its size and structure greatly modified. If several specimens are found and on different trees it is probably the normal reaction of the tree to the stimulus of the gall maker.

A stone gall is a hard, many-celled mass inside a mature acorn in late fall. A pip gall is one produced between the acorn and the cup of a mature or immature acorn. A plum gall is red, globular, attached to the side of the acorn cup.

GALLS ON QUERCUS - OAK

Quercus alba - white oak

"Root" galls

- Xanthoterus radicola (Ashm.) sex.gen. 247. Fig.51. Cluster of fleshy white galls at base of sprouts which bear old oak fig galls. In early spring.
- Dieholcaspis globoosa Weld. 341. Fig.50. Cluster of 3-40 reddish bullet galls 8-12 mm. in dia., at base of sprouts, usually hidden by debris.
- Loxaulus illinoiensis (Weld). 372. Fig.43. Cells in greatly thickened bark at base of saplings underground, in the fall.
- Holocynips badia (Bass.). 390. Figs.41,52. Hemispherical, rugose, 12-15 mm. in dia., usually single, at base of sproute in the fall.
- Holocynips maxima (Weld). 391. Fig.44. Rounded, many-celled mass, up to 50 by 95 mm. growing out of side of big roots in the fall.
- Callirhytis elliptica Weld. 423. Fig.33. Single or in cluster of three or four on rootlets just under surface of ground in fall.
- Callirhytis futilis (O.S.) agamic. 434. Fig.45. Cells in greatly thickened bark at base of the tree in fall.
- Callirhytis perrugosa Weld. 465. Taken ovipositing in terminal buds of sprouts Apr.13-May 3. Probably from a root gall like Fig.37.

Flower galls

- Callirhytis exigua (Bass.). 426. Fig.54. Small, dark tan, oval cells scattered in among normal stamens in a shortened axis.

Acorn galls

- Cell in side of acorn cup, dropping in Sept. and has a circle of white hairs at base. Fig.63. Never reared.
- Group of 2-18 separate cells inside mature acorn beside the cotyledons in Oct. Adults emerge second spring - a Callirhytis. Never described.
- Undersized acorn (cup 7 mm. in dia.) containing a single larval cell which occupies the whole interior. In fall (L.I., N.Y.).

Bud galls

- Acraspis erinacei (Beut.) sex.gen. 250b. Fig.80. Thin-walled blister on the inner face of bud scales as buds start to open in the spring.
- Acraspis gemula (Bass.). 251. Fig.108. Oval, black, at apex of new growth, 2.5 by 1.25 mm., in May.
- Neuroterus vesicula (Bass.). 238. Fig.82. Almost globular, smooth, bare, brown, 2-3 mm., thin walled, in early spring. Some slightly larger and light green and projecting beyond bud scales may be different.
- Andricus pisiformis Beut. 322. Figs.85-88. Globular, 3-6 mm., white, mottled, outer wall fleshy, inner hard and brittle.
- Andricus mamillaformis (Weld). 316. Fig.89. Greenish-brown, protruding from bud scales in fall. Usually in terminal buds on sprouts from stumps.
- Andricus flavohirtus Beut. 306. Fig.100. Globular, smooth, surrounded by bracts which persist and enlarge after gall drops in June (=frondosa).
- Callirhytis gemmiformis (Beut.). 437. Fig.91. Dormant bud gall on twigs or trunk, conical or blunt, greenish or red, cavity large, in fall.
- Liodora clarkii (Bass.). Many-celled, smooth, bare, half-hidden by bud scales, usually terminal. May 31, Boston, Mass.
- Neuroterus minutus (Bass.). 224. Fig.105. Cells in greatly enlarged petioles without a leaf blade, puberulent, often pinkish, in early spring.
- Philonix pallipes (Bass.). 265. Black, at apex of new growth, like gemula in shape, surrounded by thread-like bodies. May. Included from literature.
- Conical, 3.8 by 2.5 mm., red with green tip, wall thick, at apex of new growth June 24 (D.C.).
- Blunt, thin-walled, white cell hidden inside a weak lateral bud. Apr.15. (D.C.). Adult emerged Apr.26 - genus undetermined.

## Stem galls

### Woody stem swellings

- Neuroterus quercus-batauae* (Fitch). 230. Fig.125.  
Sex.gen. Green, covered with pale blue bloom, 15 mm. in dia., on new growth in June.  
Agamic. Woody, covered with normal brown bark, persisting over winter.  
*Callirhytis clavula* (O.S.). 413. Fig.122. Abrupt swelling at apex of the year's growth, bearing several leaves.  
*Loxaulus mammula* Mayr. 373. Fig.295. Short abrupt swellings at base of lateral branches in June. Many-celled.  
*Neuroterus consimilis* Bess. 210. Fig.118. Leafy, foreshortened, lateral branchlet, 12 mm. in dia. by 18 mm. long in midsummer, many-celled.

### Detachable

- Disholcaspis quercus-globulus* (Fitch). 348. Round Bullet Gall., 8-15 mm. in dia., single or in small clusters, in the fall.  
*Xanthoterax forticorne* (O.S.). 244. Fig.136. Oak Fig Gall. Dense cluster usually on sprouts from stumps, persisting over winter.  
*Callirhytis eeminator* (Harris), 477. Fig.139. Oak Seed Gall. Wool Sower. Globular, 20 mm. in dia., white with pink spots. May. Many-celled.  
*Disholcaspis spongiosa* (Karech). 349. Fig.148. Globular cluster, 20-30 mm. in dia., with a rusty-brown surface. Rare on *Quercus alba*.  
*Adleria strobilana* (O.S.) 272. Figs.151,152. Terminal cluster of angular galls in fall, dropping when mature. Rare on *Quercus alba*.  
*Andricus indistinctus* Bess. 314. Small, round, smooth, sessile on small twig. Oct. N.Chio. Entered from literature. Types are a *Disholcaspis*.

### Cells hidden under bark, little or no swelling

- Neuroterus eoharonsis* Weld. 214. Fig.172. Cell under and exit hole just above the leaf scar.  
Cells in the pith. Adult chewing out in June (D.O.).

## Leaf galls

### Detachable

- Acraspis erinacei* Bout. agamic. 250a. Fig.187. Hedgehog Gall. Ellipsoid, to 15 mm. in dia., tuberculate with red hairs, 3-5 celled, in fall.  
*Acraspis pezomachoides* (O.S.). 257. Fig.186. Globular, 5-8 mm. not hairy, two celled, usually single.  
*Philonix nigra* (Gill.). 263. Fig.228. Globular, 5-8 mm., covered with grey felt, on under side Sept.-Oct. Deciduous. One-celled.  
*Xystoterax nigrum* (Fitch). 241. Depressed sphere, 3.5 by 1.8 mm. on under side of leaf, with a white bloom. Sept. Va. Fig.207 (as det. Weld).  
*Xystoterax poculum* Weld. 242. Figs.214-216. Spangle, 3-4.5 mm. in dia. with a whitish bloom, on under side leaf in Sept.-Oct.  
*Phylloterax rubinum* (Gill.). 239. Fig.311. Depressed sphere up to 5.2 mm. by 3.1 mm. high, on under side as leaves are turning in the fall.  
*Phylloterax sigma* Weld. 240. Fig.241. Flat, sessile, 6-7 mm. long, on the under side of leaf near the edge in the fall. Rare.  
*Zopheroterax cuneatum* Weld. 363. Fig.235. Conical, red, 4 mm. long, attached at the base of the petiole in the fall. Rare.  
*Xanthoterax politum* (Bess.). 245. A small oak apple, red or brown, 6-18 mm. in dia., group of 1-20 on upper or lower side of leaf in fall.  
*Liodora apiarium* Weld. 266. Fig.304. Solitary, sessile, 4 mm. high, cell basal, on under side close to edge in fall on vigorous shoots six or 7 ft. from the ground.  
*Andricus capillatus* (Weld). 298. Fig.199. Midrib cluster of 2 to 12, such about 2 mm., pale yellow, not so hairy as to hide the outline, on the under side on lower leaves of strong sprouts from stumps in the fall.  
*Sphaeroterax carolina* (Ashm.). 357. Fig.234. Globular, hard, pubescent, 5 mm. in dia., slightly attached to the petiole in Sept.-Oct. N.Car.  
*Neuroterus bassetii* D.T. 208. Oval, thin-walled, nearly hidden by pubescence, on very young leaves dwarfing and distorting them. Conn. Entered from literature.

- Adleria dimorpha* (Beut.). 269. Fig.194. Midrib cluster of 20-30 pear-shaped light brown, fleshy galls, finely pubescent except on rounded end, on under side on basal third of leaf in the fall.
- Adleria weldi* (Beut.). 274. Fig.193. Cluster of 6-10 brown galls, 10 mm. in dia. closely pressed together at junction of petiole and leaf blade in fall, dropping singly when mature.
- Similar but galls smaller and truncate at end. Fig.202. In Ark. in Oct.
- Andricus flocci* (O.S.). 307. Fig.208. Woolly, dirty white, of 2-10 seed-like bodies attached by one end on midrib on upper or lower side, in fall.
- Neuroterus tantulus* Weld. 233. Fig.306. Saucer-shaped, 0.9-1.6 mm. in dia., in numbers, on under side dropping in early summer leaving a scar on the gall and a brown spot on the leaf.
- Neuroterus umbilicatus* Bass. 235. Figs.217,314. Cup-shaped with inrolled edge 3-4 mm. in dia., covered with short whitish hair, on under side in fall.
- Spherical, white, 1.2 mm. almost bare, scattered on under side, a papilla at the apex, a deep hilum below with a pedicel in center. Fig.236. July-August. Similar to above but red and hairy. Fig.238. Sept.-Oct.

Integral i.e. not detachable

- Andricus petiollicola* (O.S.). 321. Fig.256. Abrupt, almost woody, with a scar at apex, 10-15 mm. in dia., at base of leaf blades in early spring.
- Neuroterus majalis* (O.S.). 222. Fig.260. Fleshy, green parenchyma thickening projecting on both sides of leaf in very early spring, 9-11 mm. thick.
- Andricus utriculus* Ashm. 328. Fig.270. Globular, thin-walled, green, 3-4 mm. in dia., projecting on both sides of leaf, usually single, in May-June.
- Neuroterus clarkeae* Beut. 209. Fig.315. Light-colored, ellipsoid, sessile, at edge, covered with short wool, 2-3 mm. long, in early spring.
- Liodora comata* Weld. 268. Fig.316. Similar but pointed at end, 3 by 1.2 mm. covered with crinkly white hairs, tan, thin-walled, at edge of leaf. May.
- Neuroterus bassettii*. D.T. 208. See above under detachable galls.
- Neuroterus niger* Gill. 225. Fig.269. Round parenchyma thickenings, 2 mm. in dia., more prominent above, nipple below, along main veins in fall.
- Neuroterus perminimus* Bass. 229. Fig.266. Elliptical parenchyma thickenings 1 mm. long, in numbers in fall, producing the agamic generation. Similar but larger lighter colored galls, single or few in number on leaf in spring when leaf is 2-3 in. long and producing ♀ & ♂ in Apr. may be the alt.gen.
- Neuroterus exiguissimus* Bass. 216. Hairy, brown, 2.5 mm., on under side in numbers along veins, sessile, leaf smooth above. In fall.
- Callirhytis futilis* (O.S.) sex.gen. 434. Oak Wart Gall. Fig.261. Blister, 6-9 mm. projecting on both sides of leaf, containing 2-3 cells supported by radiating fibers.
- Andricus chinquapin* (Fitch), 299. Fig.189. Cell at end of a prolonged vein above upper surface of leaf or beyond the edge.
- Andricus foliaformis* Gill. 308. Known only from original description of a single specimen from Mich. reared July 26. Type fly and gall lost.
- Andricus foliosus* Weld. Fig.259 on *A. bicolor* is a synonym of it.

Gall unknown

- Trisolieniella brevicornis* (Beut.). 385. Taken ovipositing in buds of white oak on April 22 in New Jersey.
- Callirhytis intersita* Weld. 442. Taken ovipositing in internodes of the new growth in late April (.D.C.).
- Callirhytis perrugosa* Weld. 465. Taken ovipositing in terminal buds of white oak saplings April 13 to May 3 in the D.C. area. Probably from a gall on the roots.
- Bassettia gemmae* Ashm. 380. Adults determined as this species were ovipositing in white oak buds in April in the Chicago area.
- Philonix fulvicollis* Fitch. 260. Gall thought to be on roots.
- Philonix nigricollis* Fitch. 264. Gall thought to be on roots.

Quercus bicolor - Swamp White Oak

"Root" galls

- Holocynips badia* (Bass.). 390. Figs.41,52. Hemispherical, rugose, 12-15 mm. in dia., usually single at base of sprouts in the fall.  
*Holocynips maxima* (Weld.). 391. Fig.44. Rounded, many-celled mass up to 50 by 95 mm. growing out of the side of one of the big roots in fall.  
*Callirhytis ellipsoida* Weld. 422. Fig.37. Single or in small clusters on the rootlets just below surfaces of the ground in the fall.

Flower galls

- Neuroterus pallidus* Baes. 227. Smooth, globular, tan, thin-walled in a compact cluster at or near the end of a staminate axis. Conn. Entered from literature.

Acorn galls

- Callirhytis lapillula* Weld. 444. Fig.71. Separate cells in a group inside a matured lop-sided acorn in the fall.  
*Andricus incertus* Bass. 312. Figs.77,79. Gall 6.6 by 4 mm., with a nipple at apex formed in a depression in side of cup surrounded by a fringe. Single cell in cup at base of a lop-sided acorn in the fall. Fig.67.

Bud galls

- Acraspis gsmula* (Baes.). 251. Fig.108. Black, 2.5 by 1.25 mm., at apex of new growth in spring.  
*Neuroterus vesicula* (Baes.). 238. Fig.82. Almost globular, reddish-brown and mottled, base, 2-4 mm. in dia., fleshy, thin-walled, in early spring.  
*Andricus flavohirtus* Beut. 306. Fig.100. Globular, smooth, surrounded by green bracts which persist and enlarges after the gall drops in June and become the "*frondosa*" of old literature.  
*Andricus pisiformis* Beut. 325. Figs.85-88. Globular, 3-6 mm., white and mottled, outer wall fleshy, inner hard and brittle. Early spring.  
*Andricus deciduatus* Weld. 303. Fig.92. Almost globular, 4 mm. in dia., developed usually from a weak lateral bud, in September.

Stem galls

Woody stem swellings

- Neuroterus noxiosus* (Baes.) agamio. 226b. Fig.121. Woody, covered with normal brown bark, persisting over winter.  
*Neuroterus dietortus* Baes. 212. Fig.123. An enlargement on one side of the new growth causing the branch to bend abruptly. Several-celled.

Detachable

- Disholcaspis mamma* (Oresson). 345. Fig.135. Pointed Bull's Gall. Green to reddish, darker at apex, covered with very short pubescence, in fall.  
*Disholcaspis baesetti* (Gill.). 337. Fig.160. Conical, sessile, clasping at the base, single or in small numbers, in fall.  
*Adleria strobilana* (O.S.). 272. Figs.151,152. Terminal cluster of angular galls, dropping when mature in the fall.

Cells hidden under bark- no noticeable swelling of twig

- Neuroterus escharensis* Weld. 214. Fig.172. Cell under and exit hole just above the leaf scar. Usually near terminal cluster of buds in spring.

Leaf galle

Detachable

- Adleria nigricans* (Gill.). 271. Fig.195. Midrib cluster of closely-packed, reddish-brown galls, dropping in September.
- Philonix nigra* (Gill.). 265. Fig.228. Globular, 5-8 mm. in dia., covered with grayish felt, scattered on the under side of leaf in Sept.-Oct. Central cell is supported by coarse radiating fibers.
- Philonix lanaeglobuli* (Ashm.). 262. Globular, 7.6 - 8.9 mm., grayish pubescent, on under side of leaf. Fla. Entered from literature.
- Acraspis echini* Ashm. 249. Similar to the hedgehog gall (Fig.187) but is smaller, usually two-celled. Fla. Entered from literature.
- Andricus ignotus* (Baes.). 511. Fig.207. Woolly, 2.5 by 1.25 mm., single or in groups along midrib or main veins, on under side, dropping with the leaves after which the hairs weather away.
- Neuroterus oaltarlus* Weld. 252. Figs.225,226. Saucer-shaped, on under side in numbers in June. Leaf surface opposite is smooth, lighter in color. After dropping in August they bounce about for some time.
- Neuroterus umbilicatus* Baes. 235. Figs. 217, 214. In numbers on under side covered with short stiff hairs. Easily detached and leave a dead spot on leaf.
- Spangle, 3 mm. in dia., in numbers on under side in fall. Fig.222.

Integral

- Andricus potillicola* (O.S.). 521. Fig.256. An abrupt firm enlargement, 10 mm. in dia., with a scar at apex, at base of leaf blade, green and many-celled.
- Callirhytis rutillie* (O.S.) sex.gen. 434. Fig.261. Oak Wart Gall. Scattered blisters, 6 mm. in dia., projecting on both sides of the leaf, containing 2-3 cells supported by radiating fibers. May-June.
- Andricus chinquapin* (Fitch). 299. Fig.189. Cell at end of a vein prolonged above surface or beyond edge of the leaf. May.
- Andricus foliaformis* Gill. 308. Fig.259. A thickening of the midrib bearing a rosette of green filaments which hide the swelling, containing 1-6 cells, in June.
- Neuroterus floccosus* (Baes.). 218. Fig.272. Small, woolly, in numbers on under side of leaves on vigorous shoots from stump in fall.
- Neuroterus fugiens* Weld. 219. Fig.318. Single or scattered parenchyma thickenings more prominent below, sparingly hairy. May. Exit holes on upper surfaces.
- Neuroterus noxiosus* (Baes.) sex.gen. 226a. Fig.121. Fleshy enlargement of midrib, green, smooth, bare. In May.
- Neuroterus papillosum* Bout. 228. Fig.271. Elliptical cells in parenchyma in numbers in the fall, more prominent above. Exit hole on lower side.
- Neuroterus perminimus* Baes. 229. Fig.266. Elliptical parenchyma thickenings in numbers in fall, more prominent above.
- Lenticular thickenings of parenchyma, thin-walled, green, in June. Fig.278. Work of a leaf minor?



Quercus breviloba - Texas Shin Oak

"Root" galls

*Disholcaspis brevinata* Weld. 338. Fig. 285. A bullet gall, usually single, at base of sprouts in fall.

*Neuroterus contortus* (Weld) agamic. 211a. Fig. 52. Gnarled woody swelling, at base of small young sprouts in October, then containing pupae.

Flower galle

*Neuroterus evanescons* Kinsey. 215. A swelling, 5 mm. long, of the staminate axis in early March, Austin, Tex. Adults emerged Apr. 4 and oviposited on under side of leaves. Entered from literature.

Acorn galls

Cell in side of acorn cup, dropping out in Sept. Like Fig. 73. Never roared.

Stem galls

Woody stem swellings

*Callirhytis elongata* (Kinsey). 424. A slight elongated twig swelling up to 6 mm. in dia. containing many cells. Kinsey described var. *rufoploaurae* from short globoid galls on same host with at most 4 cells. Cells were noticed in Dec.; contained pupae in Jan. and adults emerge in March. Entered from literature.

*Neuroterus contortus* (Weld) sex. gen. 211b. Short, abrupt stem swelling with deformed leaves and twisted petioles of young leaves. Entered from lit.

*Neuroterus* sp. A stem swelling 10 by 30 mm. like the summer form of *Neuroterus quercus-batatus* (Fitch). (Fig. 125).

Detachables

*Disholcaspia pattersoni* Kinsey. 345. Fig. 158. Dark rod, tip darker, sessile, clumping at base, secreting honeydew.

*Disholcaspie pruniformis* Kinsey. 347. Fig. 150. Single or cluster of 2 to 5, soft and spongy when fresh, 22-30 mm. in dia.

*Disholcaspis* sp. Fig. 141. Rugose, 5-6 mm. in dia. Contained pupae Nov. 21 and an adult on Dec. 12. Boerne, Texas.

Cells hidden under bark

*Callirhytis* sp. Fig. 169. Cells just under bark in wood of current year's growth in the fall. More common on *Quercus stellata*.

Leaf galls

Detachable

*Atrusca cava* (Weld). 331. Fig. 179. An oak apple, 14-20 mm. in dia., usually single on under side of leaf in fall, not spotted.

*Callirhytis lustrans* Bout. 445. Fig. 203. Midrib cluster on under side of leaf in fall.

*Andricus robustus* Weld. 324. Fig. 204. Midrib cluster on under side of leaf in fall.

*Sphaersteras carolina* (Ashm.). 357. Fig. 234. Midrib cluster of 2-4 usually on upper side in fall, covered with stellate hairs. More often on post o.

Cup-shaped, 7 mm. in dia. Fig. 239. On under side of leaf in Oct. Boerne, Tex.

Cup-shaped spongy, 3 mm. in dia. Fig. 227. On under side of leaf in fall.

Globular, 1 mm. in dia. Fig. 245. (Like Fig. 236 on white oak). This may be *Neuroterus saltatorius australis* Kinsey described from *Q. stellata* from Austin, Tex.

Woolly midrib cluster on under side of leaf in fall. Fig. 213. Boerne, Tex. Contained adults in late fall.

Integral

*Andricus utriculus* Ashm. 328. Fig. 270. Globular, thin-walled, green, 3-4 mm. in dia., projecting on both sides of the leaf, usually single.

*Neuroterus varrucarum* (O.S). 237. Fig. 310. Compact woolly mass, 2 mm. in dia. by 1 mm. high on under side of leaf in numbers in fall.

*Xanthoteras armatum* (Kinsey). 246. Spindle-shaped, at end of midrib, 6 by 11.

*Quercus catesbaei* - Turkey Oak, Fork-Leaf Black Jack Oak

"Root" galls

- Eumayria floridana* Ashm. 382. Fig.42. Abrupt rounded mass with botryoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.  
*Sphasroteras caspuliniformis* (Beut.). 356. Fig. 31. Onion-shaped, in clusters surrounding stem below ground, cream-colored to brown, 7-9 mm. high.  
*Dryocosmus favus* Beut. 395. Figs.46-7. Dense clusters at or below surface, up to 60 mm. in dia., consisting of up to 250 individual cells, 11 mm.  
*Callirhytis ovata* Weld. 456. Fig.49. Ellipsoidal, sessile, single or groups, 6 mm. high by 5 mm. in dia., colored like normal bark.  
*Triscoleniella enigma* (Weld). 388. Fig.35. Cluster of up to 150 at the base of sprouts.

Flower galls

Acorn galls

- Callirhytis fructicola* Ashm. 431. A stone gall inside mature acorns not to distinguished in field from *Callirhytis fructuosa* Weld (Fig.70).  
*Callirhytis balanopsis* Weld. 406. Fig.76. A pip gall in fall on small acorns of current season, green, smooth, 4 mm. in dia., secreting honeydew.  
*Callirhytis balanaspis* Weld. 404. Fig.68. A pip gall in fall on immature acorn, 6 mm. in dia., larger than the normal young acorns.

Bud galls

- Triscoleniella saltata* (Ashm.). 388. Fig.96. Ribbed, thin-walled, 9 by 3 mm., occurring 2-3 together from a bud axil in early spring, easily detached. After dropping in late Mar. in Fla. has power of jumping for some weeks. Globular, white, on small vigorous shoots in fall. Gainesville, Fla. Oct.31. Cell completely hidden inside bud.

Stem galls

Stem swellings

- Callirhytis msdullae* (Ashm.). 448. Fig.134. Gradual swelling on one side of twig in spring. "Adults the next Feb. and Mar." Has never reared it.  
*Callirhytis cornigera* (O.S.). 418. Fig.117. Tests Bassett.

Detachable

- Dryocosmus imbricarius* (Ashm.). 397. Banded Bullet Gall. Globular, 7-10 mm. in dia., single or group on twigs, dropping when mature in fall.  
*Callirhytis gemmaria* (Ashm.). 436. Figs.155-6. Small ribbed galls in early spring, secreting honeydew when young, dropping when mature in fall. When parasitized they do not drop but enlarge, become woody and persist over winter.  
*Andricus formosus* (Bass.). 310. Fig.147. Fig-shaped galls in cluster on twig in spring, dropping when mature in June.  
*Dryocosmus floridensis* (Beut.). 396. Fig.297. A rosette of green bracts sessile or clasping small twigs, the larval cell in center.

Cells hidden under bark

- Callirhytis crypta* (Ashm.). 418. Fig.162. Cells just under bark in the wood. If numerous the twig may be hypertrophied.  
*Bassettia catesbaei* (Ashm.). 377. "Slight wavy swellings at the base of the new shoots, hardly visible to naked eyes. Reared Apr.28." Type host. Entered from literature.

Leaf galls

Detachables

- Dryocosmus rileyi* (Ashm.). 401. Fig.237. Globular, brown, 3 mm. in dia. attached singly to a main vein usually on under side leaf in fall.

- Callirhytis infuscata* (Ashm.). 441. Woolly midrib cluster on under side in fall dropping in late Nov. When wool weathers away each element is white and flat-topped.
- Callirhytis furva* Weld. 433. Fig.212. Small cluster of globular galls, 3-4 mm. in dia., each covered with short, straight brown hairs, on upper side of leaf in fall.
- Ellipsoid, white, bare, single, on under side in fall. Resembles the gall of *Zopheroterus compressum* (Gill.) (363). Seen at Ocala, Fla. in Oct.

Integral

- Callirhytis quercifoliae* (Ashm.). 472. Rounded, with a free-rolling cell inside, on leaf in spring. Smaller than *Dryocosmus laurifoliae* (Ashm.) (399). Reared in May. Type host.
- Dryocosmus cinereae* (Ashm.). 393. Fig.183. Hemispherical, thin-walled, with a free-rolling cell inside, sessile on under side of leaf.

*Quercus chapmani* - Chinquapin Oak

"Root" galle

- Loxaulus humilis* (Weld). 371. Fig.287. Cells at the base of the swollen current year's growth of runner sprouts in the fall. Cells not nested.
- Bassetia floridana* Ashm. 379. Cells elongated and nested at the base of slightly swollen shoot of current year's growth in the fall.
- Sphaeroteræ ocala* (Weld). 359. Fig.286. Somewhat spherical, single, pale yellow, fleshy, thin-walled, on exposed roots in April. Fla.
- Holocynips badia* (Base.). 390. Figs.41,52. Hemispherical, rugose, 12-15 mm. in dia., usually single. In fall.
- Xanthoteræ radicola* (Ashm.) sex.gen. 247. Fig.51. Cluster of fleshy white galls at base of sprouts in early spring.

Flower galls

- A fusiform thickening of the staminate axis.

Acorn galls

- A pip gall in acorn cup beside the acorn in the fall. Never reared.
- Gall in side of acorn cup, dropping when mature. Like Fig.73. Never reared.

Bud galls

- Andricus pieiformis* Beut. 322. Figs.85-88. Globular, 3-6 mm., white, mottled, outer wall fleshy, inner hard and brittle. In early spring.
- Andricus stropus* Ashm. 327. Figs.109,110. Terminal. surrounded by narrow bracts. The figure agrees with the types (cell having dropped).
- Andricus cinnamomeus* Ashm. 300. Fig.293. Terminal enlarged bud with dead bud scales enclosing a single cell. In fall.
- Green, ovoid, smooth, in axil of leaf in Oct. At Ocala, Fla. Never reared.

Stem galls

Woody stem swellings

- Callirhytie floridana* (Ashm.). 430. Fig. 132. Lop-sided stem swelling usually close to the ground covered with normal bark.. Type host.
- Stem swelling like the winter form of *Neuroterus quercus-batatus* (Fitch). See Fig.125.

Detachable

- Disholcaspis omnivora* (Ashm.). 344. Fig.14 O. A big smooth bullet gall, 15-20 mm. in dia.
- Disholcaspis spongiosa* (Karsch). 349. Fig.148. Globular cluster, 20-30 mm. in dia. with a rusty surface,

Leaf galls

Detachables

- Xanthoteras politum* (Bass.). 245. Oak apple, 6-18 mm. in dia., not spotted, in numbers on leaf in fall.
- Sphaeroterus carolina* (Ashm.). 357. Fig. 234. Midrib cluster of 2-4 usually, on upper side of leaf in fall, covered with stellate hairs.
- Sphaeroterus melleum* (Ashm.). 358. "Small, brownish yellow, globular, single or cluster of three or more, on upper side, easily detached, fleshy, shrivel in drying, 2.5-3.8 mm. in dia. Entered from literature. Similar to *carolina* above, but smoother, pink, single, saddled on midrib on the basal third of leaf on under side. This may be *melleum*. Midrib cluster like *Callirhytis lustrans* Beut. 446 (Fig. 203).
- Andricus pattoni* (Bass.). 320. Woolly midrib cluster in fall like Fig. 208. Spangle with an inrolled pubescent edge, 1 mm. in dia., in numbers on the under side of leaf in the fall.
- Globular, white, almost bare, 1.2 mm. in dia., scattered on under side of the leaf in the fall. Fig. 236.

Integral

- Andricus utriculus* Ashm. 328. Fig. 270. Globular, thin-walled, green, 3-4 mm. in dia., projecting on both sides of leaf, usually single, in early spring.
- Neuroterus irregularis* (O.S.). 221. Abrupt fleshy thickening of large areas of leaf parenchyma, many-celled, in early spring. Like Fig. 260 on *Q. alba*.
- Neuroterus verrucarum* (O.S.). 237. Fig. 310. Compact woolly mass, 2 mm. in dia. by 1 mm. high, in numbers on under side in fall.
- Like *Andricus petiolicola* (O.S.). 321. Fig. 256. Enlargement of midrib at base of leaf blade, projecting on both sides of leaf and usually with scar at apex, many-celled. This figure is like the type galls of *Callirhytis parvifoliae* Ashm. 458 described from this host. Adults out in April.
- Conical, not woolly, projecting on both sides of leaf in fall.

*Quercus cinerea* - Blue Jack, Upland Willow Oak

"Root" galls

- Eumayria floridana* Ashm. 382. Fig. 42. Abrupt rounded mass with a botryoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.
- Sphaeroterus caepuliformis* (Beut.). 356. Fig. 36. Onion-shaped, in clusters surrounding stem below ground, cream-colored to brown, 7-9 mm. high.
- Dryocosmus favus* Beut. 395. Figs. 46-47. Dense clusters at or below surface up to 60 mm. in dia., consisting of up to 250 individual galls.
- Callirhytis ovata* Wsld. 456. Fig. 49. Ellipsoidal, sessile, single or in groups, 6 mm. high by 5 mm. in dia., colored like normal bark.

Flower galle

- Callirhytis blaetophaga* (Ashm.). 410. "Minute, smooth, oval cells on the staminate flowers." Type galle are pointed at end and pubescent under a lens. Adults bred in May. Type host. Included from literature.

Acorn galle

- Callirhytis petrosa* Wsld. 466. A stone gall inside a mature acorn in fall. Type host. Adults emerged Apr. 20-26 the third spring.
- Callirhytis balanopsis* Weld. 406. Fig. 76. A pip gall in fall on young acorn of current season, green, 4 mm. in dia., secreting honeydew.
- Pip gall like *Callirhytis operator* (O.S.) agamic. Fig. 65 beside mature acorn in the fall. Never reared.

## Bud galls

- Trisolieniella saltata* (Ashm.). 388. Fig. 96. Ribbed, thin-walled, 9 by 3 mm. occurring 2-3 together from a bud axil in early spring.
- Amphibolips murata* Weld. 289. Fig. 115. Lemon-shaped, tan, smooth, 8-12 mm. in dia., in fall. Wall thick, spongy tissue about the larval cell.
- Amphibolips acuminata* Ashm. 275. Fig. 112. Spindle-shaped, up to 58 mm. long by 14 mm. in dia., Mid-April to early May.
- Green, smooth, bursting out of bud in fall, not secreting honeydew.
- Gall hidden inside bud, pointed, thin-walled, exit hole thru bud scales.
- Seen in April. Never reared.

## Stem galls

### Woody stem swellings

- Callirhytis clavigera* (Ashm.). 412. Fig. 116. A horned knot gall but the horns do not drop out. Described from *Quercus laurifolia*.
- Callirhytis punctata* (O.S.). 471. Fig. 129. Oak Knot Gall. Abrupt, completely encircling branch. Immature galls cut like cheese.
- Callirhytis medullae* (Ashm.). 448. Fig. 134. Gradual swelling on side of the twig in spring. "Adults the next Feb. and Mar." I have never reared it.

### Detachable

- Amphibolips cinerea* (Ashm.). 277. Fig. 149. A large oak apple, 20-30 mm. in dia. in spring; usually wrinkles in drying. Type host.
- Amphibolips globulus* Beut. 284. Fig. 102. Globular, thick-walled with a slight nipple at apex, 14-17 mm. in dia. Sept. Described from N.J.
- Dryocosmus imbricariae* (Ashm.). 397. Banded Bullet Gall. Globular, 7-10 mm. in dia., single or in groups on twigs, dropping in fall.
- Callirhytis gemmaria* (Ashm.). 436. Figs. 155-6. Small ribbed galls in a cluster in early spring, secreting honeydew when young, then drop.
- Callirhytis difficilis* (Ashm.). 420. Fig. 139. Small, rugose, grayish, in a cluster or rows from furrows in bark, dropping when mature in Oct.
- Callirhytis ventricosa* (O.S.). 485. Figs. 144-5. Conical, short-pubescent, sessile, single or small cluster bursting out of bark.
- Andricus formosus* (O.S.). 310. Fig. 147. Fig-shaped galls in cluster on twigs in spring, dropping when mature (in June in D.C. area).
- Dryocosmus floridensis* (Beut.). 396. Fig. 197. A rosette of green bracts on twigs, sessile or partly clasping, larval cell in center. April-May.

### Cells hidden under bark

- Callirhytis crypta* (Ashm.). 418. Fig. 162. Cells just under the bark in the wood; if very numerous the twig may be hypertrophied.
- Bassettia catesbaei* (Ashm.). 377. "Slight swelling at base of new shoots. Reared April 28." Described from literature, on *Q. catesbaei*.

## Leaf galls

### Detachable

- Dryocosmus rileyi* (Ashm.). 401. Fig. 237. Brown, globular, 3 mm. in dia., attached singly to a main vein usually on under side of leaf in fall and dropping when mature.
- Callirhytis infuscata* (Ashm.). 441. Globular, fleshy, densely covered with yellow wool, on upper surface in fall, dropping when mature.

### Integral

- Callirhytis quercifoliae* (Ashm.). 472. Rounded, wall thin, with a free-rolling cell, on surface of leaf in spring. Adult reared in May. Described from *Quercus catesbaei*.
- Smaller than *Dryocosmus laurifoliae* (Ashm.). 399.

Quercus coccinea - Scarlet Oak

"Root" galls

- Eumayria floridana* Ashm. 382. Fig.42. Abrupt, rounded mass with a botryoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.  
*Callirhytis marginata* Weld. 446. Abrupt, cushion-like swellings in bark at or below surface on sprouts which are 5-10 mm. in dia., in the fall.  
*Callirhytis rubida* Weld. 473. Fig.40. Abrupt local swellings on stem below ground with cells in the thick brown bark. In the fall.

Flower galls

- Callirhytis pulchra* (O.S.). 470. Fig.57. Green when fresh, the size of red currants, containing 4-5 cells, dropping in June.  
*Callirhytis operator* (O.S.) sex.gen. 455a. Fig.58. A woolly gall on the staminate flowers in May-June.

Acorn galls

- Callirhytis operator* (O.S.) agamic. 455b. Fig.65. A pip gall beside mature acorns, dropping out in Sept.  
*Callirhytis balanosa* Weld. 407. Figs.75,78. In spring on immature acorns of previous year, mottled, stunting the acorn.  
*Callirhytis fructuosa* Weld. 432. Fig.70. A stony-hard, many-celled mass inside mature acorns in the fall.  
*Amphibolips prunus* Cresson. 291. Fig.59. A plum gall produced on the side of the acorn cup in the fall, dropping when mature.

Bud galls

- Andricus ellipsoidalis* (Weld). 304. Fig.94. Spindle-shaped, blunt at both ends, up to 14 mm. long, smooth, mottled, dropping in April-May.  
*Callirhytis rugulosa* Beut. 475. Fig.93. Ovate, 7-10 mm. long, ridged, with a knot of reflexed hairs at apex, stellate hairs on surface, wall thin, from weak lateral buds, dropping in April-May.  
*Callirhytis gallaestriatas* Weld. 435. Fig.107. Spindle-shaped with a long stalked base, up to 31 mm. long, in late summer from weak lateral buds.  
*Callirhytis oblata* Weld. 453. Fig.292. Green, smooth, bars, at apex of new growth in May, 4-5 by 3.5 mm., not at all hidden by bud scales. When detached without a girdle of hairs at the base.  
*Callirhytis glomerosa* Weld. 439. Fig.114. Smooth, green or brown (in sun), in fall, about 3 mm. in dia., over half projecting beyond bud scales.  
*Amphibolips tinctoriae* Ashm. 295. Fig.103. Compressed ovate, brown, the opposite sides keeled, single, wall thick, dropping in Oct.  
An *Amphibolips* similar to *cooki* Gill. 281. Green, 7-10 mm. protruding from side of a bud in terminal cluster in fall, not spotted. Adults out Jan.1 and 14 the second spring. Never described.  
Smooth, bare, tan, barely protruding beyond bud scales in May.  
Like a single *gemmaria* (Ashm.). 436. 4.4 by 2.2 mm. Blain, Pa. in July.

Stem galls

Woody stem swellings

- Callirhytis scitula* (O.S.). 476. Fig.119. An abrupt enlargement of new growth bearing normal leaves, 12 by 35 mm. Full grown in June.  
*Bassettia ceropteroides* (Bass.). 378. Slight enlargement at base of new growth in July, containing a few cells. Entered from literature.  
*Callirhytis punctata* (O.S.). 471. Fig.129. Teste Beutenmueller.

Cells hidden under the bark

*Callirhytis modularis* Weld. 447. Fig.166. Cells in the pith of current year's growth; no evidence until exit holes are seen.

Leaf galls

Detachable

- Amphibolips nubilipennis* (Harris). 290. Fig.509. Like a green grape, succulent, almost translucent, up to 21 mm. in dia., in May-June.
- Callirhytis lanata* (Gill.). 445. Fig.206. Woolly midrib cluster on under side of leaf in fall, dropping before the leaves.
- Callirhytis piperoides* (Bass.). 469. Fig.201. Cluster of upper or lower side, each spherical, red, pubescent, 1-4 mm. in dia., dropping in fall.
- Callirhytis furva* Weld. 435. Fig.212. Small cluster of globular galls, 3-4 mm., each covered with short, straight brown hairs, upper side, fall.
- Dryocosmus rileyi* (Ashm.). 401. Fig.257. Globular, brown, 3 mm., in dia., on a main vein, under side in fall, dropping when mature.
- Dryocosmus albidus* Weld. 392. Figs.242, 312. Depressed sphere, white or rosy, fleshy up to 5.4 mm. in dia., on under side, single, late fall.
- Zopheroteras compressum* (Gill.). 362. White, on under side as leaf is turning brown. Type gall is ellipsoidal, 2.7 by 1.8 mm., brown, the surface slightly wrinkled. Included from literature.
- Zopheroteras hubbardi* (Ashm.). 365. Fig.308. Ellipsoidal, white, 2.3 by 1.85 by 1.7 mm. From this gall an adult determined as this species was reared.
- Zopheroteras guttatum* Weld. 364. Fig.248. Spherical, 1.45 -2.5 mm. with purple spots, single on under side on secondary vein in fall.
- Dryocosmus deciduus* (Beut.). 394. Fig.205. Black Oak Wheat. Cluster of up to 40 bursting out of midrib in early Oct.

Integral

- Amphibolips confluenta* (Harris). 280. Fig.174. Spongy Oak Apple. Aborts the development of the leaf.
- Amphibolips coelebs* (O.S.). 279. Fig.191. Spindle-shaped, 28 by 4.5 mm., green, the prolongation of a vein.
- Callirhytia pedunculata* (Bass.). 461. Fig.190. Spindle-shaped but small, with an inner free-rolling cell, the prolongation of a vein.
- Dryocosmus palustris* (Ashm.). 400. Fig.181. Globular, 10-17 mm. in dia., with a free-rolling cell, wall thick, in very early spring.
- Andricus ostensackianii* (O.S.). 319. A small oak apple, 7-9 mm. in dia., projecting on both sides of leaf.
- Dryocosmus notha* (Ashm.). 399. Fig.182. Green, wall thin and transparent, with a free-rolling cell, tip prolonged into a sharp point on upper surface of the leaf. Single. In May-June.
- Dryocosmus cinereae* (Ashm.). 393. Fig.183. Hemispherical, thin-walled, with a free-rolling cell, sessile on under side of leaf in May-June.
- Callirhytis modesta* (O.S.). 450. Fig.265. Hard, confluent parenchyma thickenings projecting on both sides of leaf in June.
- Callirhytia bipapillata* Weld. 409. Figs.267, 317. Isolated parenchyma thickenings in large numbers, projecting on both sides of the leaf in June. Rare on this host.
- Callirhytia pigra* (Bass.). 468. Fig.257. Fleshy, smooth midrib swelling on the basal half of the leaf in midsummer.
- Callirhytis tumifica* (O.S.). 483. Fig.255. Midrib swelling at base of leaf blade or on petiole, many-celled, green, in May-June.
- Swollen base of petiole remaining attached to stem over winter, 2 mm. in dia.; sometimes bears a scar.

"Root" galls

- Eumayria floridana* Ashm. 382. Fig.42. Abrupt, rounded mass with botryoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.  
*Sphaeroterus caepuliforme* (Beut). 356. Fig.31. Onion-shaped in clusters surrounding stem below ground, cream-colored to brown, 7-9 mm. high.

Flower galls

- Like *Callirhytis operator* (O.S.) sex.gen.455a. Fig.58. Woolly staminate flower gall. Fla. and Miss. Needs to be reared and compared.

Acorn galls

- A pip gall like *Callirhytis operator* (O.S.).455b. Fig.65. Seen in Ark.  
*Amphibolips gainesi* Bass. 283. Fig.61. A plum gall on side of acorn cup, up to 37 mm. in dia. Does not wrinkle in drying. Tex. to Ark.  
*Amphibolips prunae* Creeeon. 291. Fig.59. A plum gall in eastern and northern states, 13-19 mm. in dia., wrinkles in drying.  
*Callirhytis fructuosa* Weld. 432. Fig.70. Stony hard, many-celled mass inside mature acorns in fall, crowding the cotyledons.  
*Callirhytis balanopsis* Weld. 406. Fig.76. A pip gall in the fall on small acorn of current season, green, secreting honeydew, 4 mm. in dia.

Bud galls

- Callirhytis cryptica* Weld. 419. Gall in center of enlarged and seemingly dead bud scales which are elongated and narrow, in Oct.  
*Callirhytis oblata* Weld. 453. Fig.292. Green, smooth, bare, at apex of new growth in May, 4-5 mm. in dia. by 2.5 mm. high., not hidden by bud scales.  
*Amphibolips globus* Weld. 285. Fig.294. Agamic galls slightly pointed, up to 14 mm. in dia., wall thin, dropping in late Aug.  
*Amphibolips globulus* Beut. 284. Fig.102. Type galls are like the figure and are labeled: "VI, Lakehurst, N.J." on *Q. marilandica*.  
*Callirhytis glomerosa* Weld. 439. Fig.114. Smooth, green or brown (in sun) in fall, about 3 mm. in dia. over half exposed beyond the bud scales.  
*Triecoloniella saltata* (Ashm.). 388. Fig.96. Ribbed, thin-walled, 9 by 3 mm., occurring 2-3 together from a bud axil in early spring, easily detached; after dropping has power of jumping about on ground for some time.  
Probably *Andricus ellipsoidalis* (Weld). 304. Fig.94. From weak lateral buds on previous year's growth in April, dropping when mature. Fla. and D.C.

Stem galle

Woody stem swellings

- Callirhytis cornigera* (O.S.). 415. Fig.117. Horned Knot Gall. Abrupt, cuts like cheese when growing in May-June, becoming woody, the horn finally protruding and even dropping out.  
*Callirhytis similis* (Bass.). 479. Fig.120. Woody, club-shaped when terminal, with 1-4 cells. Described from *Quercus ilicifolia*.  
*Callirhytis medullae* (Ashm.). 448. Not distinguished in field from above. "Adults the next Feb. and Mar." Fig.134. I have never reared it.  
Spindle-shaped or lumpy thickenings of the bark containing many cells, 50 by 10 mm. Seen in Mo. Never reared.

Detachable

- Amphibolips acuminata* Ashm. 275. Fig.112. Spindle-shaped, up to 60 mm. long, green to red, with a glaucous bloom. In spring.  
*Amphibolips* sp. Fig.104. Adults out Nov.20 & Mar.24. Never described.  
*Dryocoemus imbricariae* (Ashm.). 397. Banded Bullet Gall. Globular, 7-10 mm. in dia., red, single or groups on twigs in fall.  
*Callirhytis gemmaria* (Ashm.). 436. Figs.155-6. Small, ribbed galle in clusters around twigs in early spring, secreting honeydew when young.  
*Callirhytis ventricosa* (O.S.). 485. Figs.144-5. Conical, short-pubescent, sessile, single or in small cluster bursting out of bark on trunk or twigs, turning brown and dropping in June.



*Dryocosmus floridensis* (Beut.). 396. Fig.297. A rosette of green bracts sessile on trunk or twigs, partly clasping small twigs, larval cell in center, usually single. In May.

Cells hidden under the bark

*Callirhytis crypta* (Ashm.). 418. Figs.162, 301. Cells under bark in the wood. If numerous the twig may be hypertrophied.

#### Leaf galls

##### Detachable

- Amphibolips nubilipennis* (Harrie). 290. Fig.309. Like a green grape, almost translucent, succulent, up to 21 mm. in dia., in May-June.
- Dryocoemus rileyi* (Ashm.). 401. Fig.237. Globular, brown, 3 mm. in dia., single on a main vein usually on under side of leaf in fall.
- Dryocosmus deciduus* (Beut.). 394. Fig.205. Black Oak Wheat. Cluster of up to 40 bursting out of midrib and dropping in early Oct.
- Callirhytis lanata* (Gill.). 443. Fig.206. Woolly midrib cluster on under side of leaf in fall, dropping before the leaves.
- Callirhytis furva* Weld. 433. Fig.212. Small cluster of globular galls, 3-4 mm. in dia., each covered with short, straight brown hairs, upper side, fall.

##### Integral

- Amphibolipe confluenta* (Harrie). 280. Fig.174. Spongy Oak Apple. Aborts the development of the leaf. Agamic femalee emerge in Oct.
- Dryocosmus paluetrie* (Ashm.). 400. Fig.181. Globular, 10-17 mm. in dia., wall 1 mm. thick, with a free-rolling cell inside, appearing with the leaves in early epring.
- Andricus oetensackenii* (O.S.). 319. A small oak apple, 7-9 mm. in dia., larval cell supported by fibers, projecting on both sides of the leaf.
- Dryocosmus notha* (Ashm.). 399. Fig.182. Green, wall thin and transparent, with a free-rolling cell, tip prolonged into a sharp point on upper surface of the leaf. Single. In May-June.
- Dryocosmus cinereae* (Ashm.). 393. Fig.183. Hemispherical, thin-walled with a free-rolling cell inside, sessile on under side of leaf in May-June.
- Callirhytis modesta* (O.S.). 450. Fig.265. Hard, confluent parenchyma thickenings projecting on both sides of the leaf in June.

*Quercus geminata* - Scrub Live Oak

See list under *Quercus virginiana*, Live Oak

*Quercus ilicifolia* - Bear Oak, Barren Oak, Scrub Oak

#### "Root" galle

- Eumayria floridana* Ashm. 382. Fig.42. Abrupt rounded mass with a botryoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.
- Sphaeroterax caespuliforme* (Beut.). 356. Fig.31. Onion-shaped, in clusters on stem below ground, cream-colored to brown, 6-9 mm. high.

#### Flower galle

- Callirhytis operator* (O.S.) sex.gen. 455a. Fig.58. Woolly white gall on the staminate flowers.
- Callirhytie clarkei* (Baes.). 411. A etaminate flower gall resembling an elongated blackberry, each containing 1-4 cells. In April and May. I have never reared it.

### Acorn galls

- Callirhytis operator* (O.S.) agamic. 455b. Fig.65. A pip gall beside mature acorns in the fall.
- Callirhytis perditor* (Bass.). 462. A pip gall in spring on small acorns of previous year, secreting honeydew, dropping when mature.
- Callirhytis fructuosa* Weld. 432. Fig.70. Story hard, many-celled mass inside a mature acorn in the fall.
- Callirhytis fructicola* Ashm. 431. A stone gall not distinguished from the above in the field.
- Callirhytis* sp. Fig.74. A pip gall in Sept. on acorns of current season. Adults emerged the second spring. Never described.
- Amphibolips prunus* Cresson. 291. Fig.59. A plum gall on side of acorn cup in fall, dropping when mature.

### Bud galls

- An *Amphibolips* similar to *Amphibolips cookii* Gill. 28 l. Green, 7-10 mm., not spotted, from side of one of terminal buds in the fall. Adults emerged Jan. 2, 14 and in second spring. Never described.
- Callirhytid glomerosa* Weld. 439. Fig.114. Smooth, green or brown (in sun), in fall, about 3 mm. in dia., over half projecting beyond bud scales.

### Stem galls

#### Woody stem swellings

- Callirhytis cornigera* (O.S.). 415. Fig.117. Horned Knot Gall. Abrupt, cuts like cheese in May-June, becomes woody, horns finally protrude and drop.
- Callirhytis tuberosa* (Bass.). 481. A much shortened thickened portion of the new growth bearing many leaves, many-celled, up to 15 mm. long by 6 mm. in dia. In June. Rare. The type host. Fig.299. Have never reared it.
- Callirhytis similis* (Bass.). 479. Fig.120. Woody, club-shaped when terminal, containing 1-4 cells. June. The type host.

#### Detachable

- Dryocosmus imbricariae* (Ashm.). 397. Banded Bullet Gall. Globular, red, 7-10 mm., in dia., single or group on twigs, dropping when mature, fall.
- Callirhytis ventricosa* (O.S.). 485. Fig.144. Conical, short-pubescent, sessile, single or group bursting out of bark, green when young in May.
- Callirhytis gemmaria* (Ashm.). 436. Figs.155,156. Small ribbed galls in cluster surrounding twig in early spring, secreting honeydew when young and dropping when matures.
- Callirhytis excavata* (Ashm.). 425. Figs.154, 282. Lenticular, polished, bursting out of bark and dropping when matures in Sept. Difficult to rear.

#### Cells hidden under bark

- Callirhytis medularis* Weld. 447. Fig.166. Cells in the pith of current year's growth.

### Leaf galls

#### Detachable

- Amphibolips nubilipennis* (Harris), 290. Fig.309. Like a green grape almost translucent, succulent, up to 21 mm. in dia. In May-June.
- Dryocosmus deciduus* (Beut.). 394. Fig.205. Black Oak Wheat. Cluster of up to 4, bursting out of midrib on upper or lower side, dropping later.
- Dryocosmus rileyi* (Ashm.). 401. Fig.237. Globular, brown, 3 mm. in dia., on one of main veins on under side of leaf in fall.
- Callirhytis pipsoides* (Bass.). 469. Fig.201. Cluster on upper or lower side of leaf, each red, pubescent, 1.4 mm. in dia., dropping in the fall.
- Callirhytis lanata* (Gill.). 443. Fig.206. Woolly midrib cluster on under side of leaf in fall, dropping before the leaves.
- Callirhytis furva* Weld. 433. Fig.212. Small cluster of globular galls, 3-4 mm., covered with short, straight brown hairs, on upper surface in fall.

#### Integral

- Amphibolips confluenta* (Harris). 280. Fig.174. Spongy Oak Apple. Aborts the development of the leaf. Agamic females emerge in Oct.

- Amphibolips ilicifoliae* (O.S.). 286. Fig.192. Spindle-shaped, up to 35 by 15 mm., attached to upper surface of leaf. June.
- Dryocosma palustris* (Ashm.). 400. Fig.181. Globular, 10-17 mm., with a free-rolling cell, appearing with the leaves in early spring.
- Dryocosma cinereae* (Ashm.). 395. Fig.183. Hemispherical, thin-walled with a free-rolling cell, sessile on under side of leaf in May-June.
- Callirhytis modesta* (O.S.). 450. Fig.265. Hard, confluent parenchyma thickening projecting on both sides of the leaf in June.
- Callirhytis pigra* (Bass.). 468. Fig.257. A fleshy, smooth midrib swelling on basal half of leaf in midsummer.
- Callirhytis bipapillata* Weld. 409. Figs.267,317. Isolated parenchyma swellings in large numbers, projecting on both sides of leaf in June. Type host.

Gall unknown

- Callirhytis patiens* (Bass.). 460. Taken ovipositing in buds Apr.8-11 in Conn. Types have the habitus of a species from pip galls in acorns.
- Callirhytis parvula* (Bass.). 459. Type was taken ovipositing in bud on May 26 in Conn. Type goes in *Callirhytis* Group B.
- Andricus vernus* (Bass.). 329. Taken ovipositing in bud on Apr.9 in Conn.

*Quercus imbricaria* - Shingle Oak, Laurel Oak

"Root" galls

Flower galle

- Callirhytis parva* Weld. 457. Globular, 1-2-celled, covered with short crinkly hairs, dropping about the middle of May. Adults were cut out June 11 (D.C.). Type host.
- Callirhytis operator* (O.S.) sex.gen. 455a. Fig.58. A woolly white gall on staminate flowers.

Acorn galls

- Callirhytis operator* (O.S.) agamic. 455b. Fig.65. A pip gall beside a mature acorn inside the cup, dropping out in Sept.
- Amphibolips prunus* Cresson. 291. Fig.59. A plum gall on side of acorn cup in the fall.
- Callirhytis hopkinei* Weld. 440. Fig.69. A pip gall beside young acorns of current season, secreting honeydew, broader than high.
- Callirhytis balanacea* Weld. 403. Fig.64. A pip gall in the fall beside small acorns of current season, spherical, up to 6.3 mm. smooth, bare, secreting honeydew, dropping in Oct. and turning black.
- Callirhytis balanosa* Weld. 407. Fig.75. In spring on immature acorns of previous year, pushing out from within the cup and stunting the acorn, not mottled.
- Callirhytis fructicola* Ashm. 431. A stone gall inside mature acorn in fall. Not distinguished from *fructuosa* Weld in the field.
- Callirhytis corrugis* (Bass.). 416. A stone gall inside a mature acorn in fall and not distinguished from *fructuosa* Weld in the field. Fig.70. Like Fig.72. Seen at Poplar Bluff, Mo. Sept.4. Never reared.

Bud galls

- Amphibolips globus* Weld. sex.gen. 285. Fig.294. Globular, green with a waxy bloom, up to 18 mm. in dia., wall 1 mm. thick, from lateral buds in June, not deciduous.
- Probably *Callirhytis glomerosa* Weld. 439. Fig.114. Green, smooth, half exposed beyond the bud scales, in fall. Never reared.
- Probably *Andricus ellipsoidalis* (Weld). 303. Fig.94. From weak buds on the proximal part of previous year's growth. Seen at Joliet, Ill. Never reared.
- Like *Amphibolips coelebs* (O.S.). Fig.251. 20-28 by 6-8 mm.. Old galls seen in Va. in Oct.

## Stem galls

### Woody etem swellings

- Callirhytie cornigera* (O.S.). 415. Fig.117. Horned Knot Gall. Abrupt, cute like cheese when growing in May-June, horns finally projecting.
- Callirhytis punctata* (O.S.). 471. Fig.129. Oak Knot Gall. Abrupt, completely encircling branch, covered with normal bark.
- Callirhytis similie* (Bass.). 479. Fig.120. Woody, club-shaped when terminal, containing one to four cells.
- Callirhytis phallos* (Ashm.). 467. Fig.124. Terminal on new shoots in spring, the larval cell supported by inconspicuous fibers.
- Callirhytis scitula* (O.S.). 476. Fig.119. Abrupt enlargement of new growth bearing normal leaves, 12-25 mm. in dia. May.
- Callirhytis tuberosa* (Bass.). 481. Fig.299. A much shortened thickened portion of the new growth bearing many leaves, many-celled, up to 15 mm. long by 6 mm. in dia. In June. Rare. I have never reared it.

### Detachable

- Callirhytis ventricosa* (O.S.). 485. Figs.144-5. Conical, short-pubescent, sessile, single, green when young in May, turning brown and dropping, in June.
- Callirhytis gemmaria* (Ashm.). 456. Figs.155-6. Small ribbed galls in cluster on twigs in early spring, secreting honeydew when young, dropping later.
- Callirhytis excavata* (Ashm.). 425. Figs.154, 282. Lenticular, polished galls bursting out of bark and dropping in Sept. Difficult to rear.
- Dryocosmoe imbricariae* (Ashm.). 397. Banded Bullet Gall. Globular, 7-10 mm., red, single or in groupe, dropping in fall.
- Dryocosmus floridensis* (Beut.). 396. Fig.297. A rosette of green bracts on trunk or twigs, larval cell in center. Usually single.
- Amphibolips acuminata* Ashm. 275. Fig.112. Spindle-shaped, up to 60 mm. long, green to red with a glaucous bloom. In spring.
- Bursting out thru bark in Oct., on vigorous sprouts from stumps. Fig.161. Seen in Mo. and D.C. Never reared.

### Cells hidden under the bark

- Cell just under the bark in the wood of the current year's growth; this may be *Callirhytis crypta* (Ashm.). 418. Fig.162.

## Leaf galle

### Detachable

- Amphibolips nubilipennie* (Harris). 290. Fig.309. Like a green grape, almost translucent, succulent, up to 21 mm. in dia. May-June.
- Dryocosmus rileyi* (Ashm.). 401. Fig.237. Globular, brown, 3 mm. in dia., attached singly to a main vein usually on under side of leaf in fall.
- Dryocosmoe deciduus* (Beut.). 394. Fig.205. Black Oak Wheat. Cluster of up to 40 bursting out of midrib in early Oct.
- Callirhytis furva* Weld. 433. Fig.212. Small cluster of globular galle, 3-4 mm. in dia, each covered with short, straight brown hairs, in fall.
- Zopheroteras guttatum* Weld. 364. Fig.248. Spherical, 1.45-2.25 mm in dia. with purple spots, attached singly on under side of leaf in fall.
- Ellipoidal, 3 mm. high by 1.7 mm. in dia. standing erect on upper surface in a group of about 20, nearly black. Cincinnati, O. and St. Louis, Mo.
- Woolly midrib cluster on under side of leaf in fall. Wool comes off clean leaving a conical gall with a sunken crenate top. Fig.209.

### Integral

- Dryocosmus palustris* (Ashm.). 400. Fig.181. Globular, 10-17 mm. with a free-rolling cell, wall 1 mm. thick, appearing with leaves in early spring.
- Andricus oetensackenii* (O.S.). 319. Small oak apple, 7-9 mm. in dia. and projecting on both sides of the leaf.
- Callirhytis nigrae* (Ashm.). 452. Fig.254. Smooth elongated midrib swelling on under side of leaf in June.
- Callirhytis modesta* (O.S.). 450. Fig.265. Hard confluent parenchyma thickening projecting on both sides of the leaf.

*Callirhytis rugosa* (Ashm.). 474. Figs.262-3. Hard, lenticular blister on under surface, usually two-celled, the leaf sunken above.  
*Dryocosmus cinereae* (Ashm.). 393. Fig.183. Hemispherical, thin-walled with a free-rolling cell, sessile on under side of leaf.  
An oak apple like *Andricus singularis* (O.S.). Fig.176. Old gall seen in Oct. Swollen base of petiole remaining attached to twig over winter, 2 mm. in dia.

*Quercus laceyi* - Lacey Oak

(On north-facing talus elopes in canyon on Edwards plateau in Texas)

"Root" galls

Fig.39. Pubescent, on a large root in fall. Boerne, Tex. Never reared.  
Fig.48. Cluster at base of stump in spring. Old galls seen in Oct.

Stem galls

Detachable

*Disholcaspis pruniformis* Kinsey. 347. Fig.150. Single or cluster of 2-5. Soft and spongy when fresh.  
*Disholcaspis* sp. Fig.158. Adults were cut out Dec.11. This may prove to be *Disholcaspis mamma* (Cresson) 344.

Leaf galls

Detachable

*Atrusca cava* (Weld). 331. Fig.179. An oak apple, 14-20 mm. in dia., usually single on under side of leaf in fall, not spotted.  
Fig.200. Midrib cluster like *Adleria dimorpha* (Beut.). 269. Boerne, Tex. Oct.  
Fig.249. Spangle with long straight hairs, on under side. Oct.  
Small spangle like *Neuroterus umbilicatus* Beut. 235, Fig.220. Boerne, Tex. Oct.

Integral

Scattered blisters in parenchyma, exit holes above. Fig.275. Boerne, Tex., Oct.

*Quercus laurifolia* - Laurel Oak

"Root" galle

*Eumayria floridana* Ashm. 382. Fig.42. Abrupt rounded mass with bortyoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.  
*Sphaeroteræ caespuliforme* (Beut.). 356. Fig.31. Onion-shaped, in cluster surrounding stem below ground, cream-colored to brown, 7-9 mm. high.  
*Dryocoemus favus* Beut. 395. Figs.46-7. Dense cluster at or below surface, up to 60 mm. in dia., consisting of up to 250 individual galls 11 mm. long.

Flower galls

*Callirhytis* sp. Like *Callirhytis operator* (O.S.) sex.gen. 455a. Fig.58.

Acorn galle

*Amphibolipe fuliginosa* Ashm. 282. A plum gall on side of acorn cup, 7-10 mm. in dia, dropping when mature (before October).  
*Callirhytis balanopsis* Weld. 406. Fig.76. A pip gall in fall on young acorn of current season, secreting honeydew.  
*Callirhytis middletoni* Weld. 449. Fig.62. A pip gall dropping in early May after which an outer fleshy layer decays leaving a hard shell with a rough surface as in photo.  
Stone gall inside acorn. Like *Callirhytis fructuosa* Weld. 432. Fig.70.

Bud galls

*Amphibolips epinosa* Ashm. 293. Fig.99. Lemon-shaped. Collected on ground Oct. to Feb. Type host.

- Amphibolips murata* Weld. 289. Fig.115. A smooth tan bud gall, 8-12 mm. in dia. in fall with spongy tissues about the larval cell.
- Amphibolips citriformis* Ashm. 278. Fig.250. Spindle-shaped, thin-walled, 22 by 12 mm. A gall of early spring.
- Amphibolips* sp. Like *Amphibolips coelebs* (O.S.). Fig.251. 20 by 6 mm.
- Amphibolips* sp. Spindle-shaped, 15-20 mm. long, green, in Oct. Green, smooth, 4-6 mm. in dia., in fall, not secreting honeydew.

#### Stem galls

##### Woody stem swellings

- Callirhytis clavigera* (Ashm.). 412. Fig.116. A horned knot gall but the horns do not drop out. Type host.
- Callirhytis medullae* (Ashm.). 448. Fig.134. Gradual swelling on one side of twig in spring. I have never reared it.
- Callirhytis phellos* (Ashm.). 467. Fig.124. Club-shaped at end of new shoots in spring with radiating fibers about the larval cell, 3-5 mm. in dia.
- Eumayria longipennis* (Ashm.). 384. Fig.300. Woody enlargement at base of lateral branches or on new shoots, 8-10 mm. long by 3.5-4 mm. in dia. Types reared in May. Type host. Entered from literature.

##### Detachable

- Callirhytis ventricosa* (O.S.). 486. Figs.144-5. Conical, short-pubescent, sessile, bursting out thru bark. Green when young, dropping later.
- Callirhytis gemmaria* (Ashm.). 436. Figs.155-6. Small ribbed galls in clusters surrounding twigs in early spring, secreting honeydew, dropping later.
- Andricus formosus* (O.S.). 310. Fig.147. Fig-shaped galls in cluster on twig in spring, dropping when mature in June (D.C.).
- Callirhytis difficilis* (Ashm.). 420. Fig.139. Small, rugose, grayish, bursting out thru bark, dropping when mature in Oct.
- Dryocosmus imbricariae* (Ashm.). 397. Banded Bullet Gall. Globular, 7-10 mm., red, single or group on twigs, dropping when mature in fall.

#### Leaf galls

##### Detachable

- Amphibolips racemaria* Ashm., 292. Like a green grape on under side of leaf in April, 7-8 mm. in dia. Adults (all males) emerged in May.
- Andricus femoratus* Ashm. 305. Fig.177. A small oak apple, 7.5 mm. in dia., in spring. Type host.
- Dryocosmus rileyi* (Ashm.). 401. Fig.237. Globular, brown, 3 mm. in dia., on a main vein usually on under side of leaf, in fall.
- Callirhytis furva* Weld. 433. Fig.212. Small cluster of globular galls, 3-4 mm. in dia., each covered with short, straight brown hairs, on upper side.
- Callirhytis infusata* (Ashm.). 441. Globular, fleshy, densely covered with yellowish wool, single or cluster on midrib on upper side in fall, dropping when mature, then the wool coming away clean.

##### Integral

- Callirhytis rugosa* (Ashm.). 474. Figs.262-3. Hard lenticular blister on under side, usually two-celled, the leaf concave above.
- Callirhytis confusa* (Ashm.). 414. Small, ellipsoid, greenish-yellow, on a main vein on under side, with a free-rolling cell. Exit hole on upper side. Adults emerged the last of April. Type host. Entered from literature.
- Dryocosmus laurifoliae* (Ashm.). 398. Green, globular, hollow, projecting equally on both sides of the leaf, 5-6 mm. long, sometimes three on the newly formed leaf, containing a free-rolling cell. Adults in March. Type host. Entered from literature.

*Quercus lyrata* - Overcup Oak, Swamp Post Oak

"Root" galle

*Odontocynips nebulosa* Kieffer. 389. Fig.38. Woody nodules closely grown together into a large mass on roots of runner sprouts.

Acorn galls

*Andricus incertus* Base. 312. Fig.77. Gall in a fimbriate depression on the side of acorn cup, dropping in early Sept.

Cell in side of acorn cup like Fig.63. Specimen on herbarium sheet of this oak from Mt. Carmel, Ill. in Chicago Mus. Nat. Hist.

Separable cells inside a mature acorn in fall similar to those of *Callirhytie lapillula* Weld, Fig.71. From Americus, Ga. Feb. 12.

Stem galls

*Disholcaspis mamma* (Cresson). 343. Fig.135. Pointed Bullet Gall. Described from *Quercus bicolor*.

*Adleria strobilana* (O.S.). 272. Figs.151-2. Terminal cluster of angular galls dropping in fall or remaining attached.

*Andricus aciculatus* Beut. 296. Fig.146. A many-celled woody mass covered with with dense white of reddish wool, in the fall.

Leaf galls

Detachable

*Philonix gigas* Weld 261. Fig.229. Globular, 15-20 mm. in dia., with a thick wall and pubescent surface, dropping in the fall.

*Sphaeroterus unicus* (Weld). 362. Figs.232-3. Globular, white, up to 7 mm. in dia., eadled on a vein on under side of leaf in fall.

*Andricus rugatus* Weld. 325. Fig.198. Midrib cluster of dark red rugose galle on under side of leaf in the fall.

Midrib cluster like *Adleria nigricans* (Gill.). 271, Fig.195. In fall.

*Xystoteras volutellae* Ashm. 243. The type gall is like Fig.247.

*Xystoteras* sp. Figs.218-9. Galls like this figure from *Quercus macrocarpa*, Manhattan, Kansas gave adults in Feb., May, and June and were erroneously designated and distributed as neotype of *Xystoteras volutellae* Ashm. whose type turned up later in the Beutenmueller collection and bears Ashmead's label: "*X. volutellae* Ashm. Jan. Riley Co., Kan. Marlatt."

Integral

*Callirhytie futilis* (O.S.) sex. gen. 434. Fig.261. Oak Wart Gall. Scattered blisters 6 mm. in dia., containing 2-3 cells supported by fibers.

Like *Neuroterus floccosus* (Bass.). 218, Fig.272. Small, woolly, in numbers on under side of leaf on vigorous shoots in fall.

*Quercus macrocarpa* - Bur Oak, Mossycup Oak

"Root" galls

*Holocynips maxima* (Weld). 391. Fig.44. Rounded, many-celled mass up to 95 by 50 mm., growing out of side of one of big roots at base of tree.

*Holocynips badia* (Bass.). 390. Figs.41, 52. Button-shaped, rugose, sessile, usually single, at base of thrifty sprouts.

*Loxaulus illinoisensis* (Weld). 372. Fig.43. Cells in the greatly thickened bark at crown of saplings hidden by debris. In fall.

Flower galls

*Neuroterus* sp. A thickened staminate axis almost hidden by stamens.

May 20. Ashmead gave it a manuscript name but never described it.

Acorn galls

Cell drops out of depression in side of acorn cup. Fig.63. Never reared.

#### Bud galls

- Andricus pisiformis* Beut. 322. Figs.85-88. Globular, 3-6 mm., white, mottled, outer wall fleshy, inner hard and brittle, dropping when mature in April.  
*Andricus flavohirtus* Beut. 306. Figs.100-101. Globular, smooth, surrounded by bracts which persist and enlarge after gall drops in June.  
*Acraspis gemula* (Bass.). 251. Fig.108. Black, at apex of new growth in spring, 2.5 by 1.25 mm.  
*Neuroterus vesicula* (Bass.). 238. Fig.82. Globular, smooth, reddish-brown, bare, 2-3 mm. in dia., thin-walled, in early spring.  
Tan, ribbed, with nipple at apex, projecting beyond bud scales. Oct. Fig.90.

#### Stem galls

##### Woody stem swelling

- Irregular, covered with normal bark, at base of last year's growth. Seen at Joliet, Ill. in May. Fig.127.

##### Detachable

- Disholcaspis mamma* (Cresson). 343. Fig.135. Pointed Bullet Gall.  
*Disholcaspis bassetti* (Gill.). 337. Fig.160. Conical, sessile with a clasping base. Single or small clusters in the fall.  
*Xanthoteras forticorne* (O.S.). 244. Fig.136. Oak Fig Gall.  
*Adleria strobilana* (O.S.). 272. Figs.151-2. Terminal cluster of angular galls dropping in the fall.

##### Cells hidden under bark

- Cells just under bark in wood of current season. Seen in Nebr. in Nov. Fig.163.

#### Leaf galls

##### Detachable

- Philonix gigas* Weld. 261. Fig.229. Globular, 15-20 mm. in dia., surface covered with fine pubescence, dropping in early Sept. (Ft. Worth, Tex.).  
*Philonix nigra* (Gill.). 263. Fig.228. Globular, 5-8 mm. in dia., with gray pubescence, dropping in the fall.  
*Acraspis macrocarpae* Bass. 256. Fig. 184. Ellipsoidal, 3 by 4 mm., on the secondary veins in summer.  
*Acraspis villosa* Gill. 259. Fig.185. Globular, 7-8 mm., hairy, single on the under side in summer. Contains one larval cell.  
*Adleria dimorpha* (Beut.). 269. Fig.194. Midrib cluster of 20-30 brown fleshy galls, puberulent except on rounded end, on under side on basal third of leaf in fall.  
*Andricus ignotus* (Bass.). 311. Fig.207. Woolly midrib cluster on under side of leaf in fall.  
*Xystoteras volutellae* Ashm. 243. The type gall is like Fig.247.  
*Xystoteras* sp. Figs.218-9. Erroneously determined as the above species and distributed as neotypes of it. See on p.114.  
Cylindrical spangle on ground at Ft. Worth, Tex. on Nov.2. Fig.247.  
*Neuroterus umbilicatus* Bass. 235. Figs.217, 314. Cup-shaped with inrolled edge, on under side of leaf in fall.  
*Neuroterus saltarius* Weld. 232. Figs.225-6. Small spangle in a cup-shaped depression on under side of leaf in numbers in fall and dropping out.

##### Integral

- Andricus petiolicola* (O.S.). 321. Fig.256. Abrupt firm swelling with a scar at apex on basal third of leaf in spring, green, many-celled.  
*Callirhytis flavipes* (Gill.). 428. Elongated, bare, fleshy midrib swelling in June, containing several cells.  
*Andricus foliaformis* Gill. 308. Fig. 259. Midrib swelling bearing bracts above and below, containing 16 cells. June.  
*Callirhytis futilis* (O.S.) sex.gen. 434. Fig.261. Oak Wart Gall.  
*Neuroterus floccosus* (Bass.). 218. Fig.272. Small, woolly, in numbers on under side of leaf in fall.



- Neuroterus fugiens* Weld. 219. Fig. 318. Parenchyma thickening next to a vein on under side of leaf in spring when the leaves are about one-third grown.
- Neuroterus vernus* Gill. 236. Swollen petiole dwarfed and deformed on young leaves. Type host. Adults May 16-June 10. Entered from literature.
- Neuroterus niger* Gill. 225. Fig. 269. Parenchyma thickening in the fall. Tests the Thompson collection.
- Small blister on a secondary vein on under side of leaf in fall. Elgin, Ill.

*Quercus margaretta* - Post oak, Runner oak

"Root" galls

- Disholcaspis terrestris* Weld. 351. Fig. 36. Large bullet galle on runner shoots under larger trees in fall, galle up to 17 mm. in dia.
- Sphaeroterus ocala* (Weld). 359. Fig. 286. Almost globular, grayish, fleshy, covered with short pubescence, thin-walled, on roots. Adults out in Apr.

Flower galls

Acorn galls

Bud galls

- Andricus stropus* Ashm. 327. Figs. 109-110. Gall hidden in a mass of elongated narrow brown bud scales.
- Like *Acraspis gemula* (Baes.). 251. Fig. 108.
- Like *Andricus flavohirtus* (Bout.) 306, Figs. 100, 101. (= *frondosa* of old lit.)

Stem galls

Woody stem swellings

- Callirhytis floridana* (Ashm.). 430. Fig. 132. Thickening of bark on one side of twig, many-celled.

Detachable

- Disholcaspis quercus-globulus* (Fitch). 348. Round Bullet Gall.
- Disholcaspis spongiosa* (Karsch). 349. Fig. 148. Globular cluster, 20-30 mm. in dia., with a rusty surface.

Leaf galls

Detachable

- Sphaeroterus carolina* (Ashm.). 357. Fig. 234. Cluster of 2-4 usually on upper surfaces of leaf, covered with stellate hairs.
- Sphaeroterus unicum* (Weld). 361. Figs. 232-3. Globular, white, up to 7 mm. in dia., saddled on a vein on under side of leaf in fall.
- Andricus pattoni* (Baes.). 320. Woolly midrib cluster in the fall.
- Midrib cluster like *Callirhytis luetrans* Bout. 446. Fig. 203.

Integral

- Like *Andricus petiolicola* (O.S.). 321. Fig. 256.
- Andricus utriculus* Ashm. 329. Fig. 370.
- Neuroterus verrucosus* (O.S.). 236. Fig. 310. Scattered compact woolly masses 2 mm. in dia., on under side of leaf in fall.
- Spherical, white, bare, fleshy, 1.2 mm. in dia., on under side of leaf in fall. Fig. 236. Never reared.

Quercus marilandica - Black Jack, Jack Oak

"Root" galle

- Eumayria floridana* Ashm. 382. Fig. 42. Abrupt rounded masses with a botryoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.  
*Sphaeroterax caepuliforme* (Beut.). 356. Fig. 31. Onion-shaped, in a cluster surrounding stem below ground, cream-colored to brown, 7-9 mm. high.  
*Dryocoemus favus* Beut. 395. Figs. 46-7. Dense clusters at or below surface up to 60 mm. in dia., consisting of up to 250 individual galle,

Flower galls

- Like *Callirhytis operator* (O.S.) sex. gen. 455a. Fig. 58.  
*Callirhytis florensis* Weld. 429. Fig. 288. Galls scattered among the stamens in a shortened catkin, conical, 2.2 mm. long. Types host.

Acorn galls

- Like *Callirhytis operator* (O.S.) agamic. 455b. Fig. 65.  
*Amphibolips gainesi* Bae. 283. Fig. 61. A plum gall, up to 32 mm. in dia., and does not wrinkle in drying.  
*Callirhytis balanopsis* Weld. 404. Fig. 68. A pip gall in fall on immature acorns 6 mm. in dia. and larger than normal young acorns, secreting honeydew.  
*Callirhytis balanopsis* Weld. 406. Fig. 76. Pip gall in fall on small acorns of current season, secreting honeydew.  
*Callirhytis fructicola* Ashm. 431. A stone gall like Fig. 70 inside mature acorn in fall, not distinguishable in field from *Callirhytis fructuosa* Weld and sometimes reared along with it.  
*Callirhytis fructuosa* Weld. 432. Fig. 70. Stone gall inside mature acorn.  
*Callirhytis* sp. Ex gall like above from Batesburg, S. Car. reared Apr. 17 - May 3 the second spring.

Bud galls

- Amphibolips globulus* Beut. 284. Fig. 102. The type gall is like the figures and labeled: "VI, Lakehurst, N.J." and was on *Q. marilandica*.  
*Amphibolips murata* Weld. 289. Fig. 115. Lemon-shaped, tan, smooth, 8-12 mm. in dia., in fall, wall thick, spongy tissue about larval cell.  
*Andricus ellipsoidalis* (Weld). 304. Fig. 94. Spindle-shaped, blunt at both ends, up to 14 mm. long, smooth, mottled, dropping when mature.  
Cell inside bud. Exit hole thru bud scales. Seen in Fla. in April.

Stem galls

Woody stem swellings

- Abrupt hemispherical swellings, 10-11 mm. in dia. In Texas in Sept.  
Spindle-shaped or lumpy swelling containing many cells in thickened bark, 50 by 10 mm. Seen in Texas and Mo. in Sept.

Detachable

- Dryocoemus imbricariae* (Ashm.). 397. Banded Bullet Gall. Globular, 7-10 mm. in dia., red, single or group on twigs, dropping in fall.  
*Callirhytis ventricosa* (O.S.). 485. Figs. 144-5. Conical, short-pubescent, sessile, single or small group, green when young, turning brown and dropping later.  
*Andricus formosus* (O.S.). 310. Fig. 147. Fig-shaped, in cluster off twig in spring, dropping when mature (in June in D.C.).  
*Dryocoemus floridensis* (Beut.). 396. Fig. 297. A rosette of green bracts sessile on trunk or twigs, larval cell in center.

Cells hidden under bark

- Callirhytis crypta* (Ashm.). 418. Figs. 162, 301. Cells just under bark in the wood. If numerous the twig may be hypertrophied.  
Fig. 167. Cell under a very slight blister in the bark. Texas in Sept.

Leaf galls

Detachable

- Amphibolipe nubilipennis* (Harris). 290. Fig.309. Like a green grape, almost translucent, up to 21 mm. in dia., in May-June.  
*Dryocosmus rileyi* (Ashm.). 401. Fig.237. Globular, brown, 3 mm. in dia., on a main vein usually on under side of leaf in fall, dropping when mature.  
*Dryocosmus deciduus* (Beut.). 394. Fig.205. Black Oak Wheat. Cluster of up to 40 bursting out of midrib and dropping in Oct.  
*Callirhytis lanata* (Gill.). 443. Fig.206. Woolly midrib cluster on under side of leaf in fall, dropping before the leaves.  
*Callirhytis infuscata* (Ashm.). 441. Globular, fleshy, covered with dense yellow wool, on upper side of leaf in fall, dropping when mature.  
*Callirhytis furva* Weld. 433. Fig.212. Small cluster of globular galle, 3-4 mm. in dia., each covered with short, straight brown hairs,

Integral

- Amphibolipe confluenta* (Harris). 280. Fig.174. Spongy Oak Apple.  
*Dryocosmus palustris* (Ashm.) 400. Fig.181. Globular, 10-17 mm., in dia. with a free-rolling cell, wall 1 mm. thick, appearing with leaves in spring.  
Globular, similar to *Andricus utriculus* Ashm. Fig.270. In Tex. in Apr.  
*Callirhytis nigrae* (Ashm.). 452. Fig.254. Smooth bare midrib swelling, green, succulent, many-celled. June.  
*Callirhytis modesta* (O.S.). 450. Fig.265. Hard, confluent parenchyma thickenings projecting on both sides of the leaf.  
Like *Dryocosmus notha* (Ashm.). Fig.182. Green, with a free-rolling cell, single. Old galle seen in Texae in Nov.  
*Dryocosmus cinereae* (Ashm.). 393. Fig.183. Hemispherical, with a free-rolling cell inside, sessile on under side of leaf.  
Cell in swollen petiole base. Seen in Fla. in April.

*Quercus michauxii* - Basket Oak, Swamp Chestnut Oak, Cow Oak  
(List very incomplete - this oak seen only a few times)

"Root" galls

Flower galls

Acorn galls

Cell in side of acorn cup as in Fig.73.

Bud galls

Like *Acraepis gemula* (Bass.). 251. Fig.108. Black, at apex of new growth.

Stem galls

Detachable

*Callirhytis seminator* (Harris). 477. Fig.137. Oak Seed Gall. Wool Sower.  
*Disholcaspis* sp. Small bullet gall. Old galle only seen, in Fla.

Leaf galls

Detachable

Spherical, white, 1.2 mm. in dia., almost bare. Fig.236.

Integral

*Andricus petiolicola* (O.S.). 321. Fig.256. Abrupt, almost woody, green, with a scar at apex, 10-15 mm. in dia., at base of leaf blade in early spring.  
Bliester on petiole or midrib causing leaf to curl badly.

*Quercus muehlenbergii* - Yellow Oak, Chinquapin Oak, Yellow Chestnut Oak  
(list very incomplete - this oak seen only a few times)

"Root" galls

Flower galls

Acorn galls

Cell in side of acorn cup as in Fig. 36. Never reared.

Stem galle

Woody stem swellings

*Neuroterus rileyi* Ashm. 231. Fig. 296. Local thickenings of the bark in late summer, confluent, one-to many-celled, covered with normal bark.

Leaf galls

Detachable

*Acraepis hirta* (O.S.). 253. Fig. 188. Globular, 4-6 mm. in dia., on under side of leaf on a secondary vein, one to three on a leaf, one-celled.

*Philonix nigra* (Gill.). 263. Fig. 228. Globular, 5-8 mm., covered with gray felt, on under side of leaf in fall, dropping when mature.

*Phylloteras sigma* Weld. 240. Fig. 241. Flat, sessile, 6-7 mm. long, on under side of leaf near the edge, in the fall. Rare.

Similar to *eigma* above but straight and without a scar in center, green, on a vein. Fig. 313. Manhattan, Kansas, June 27 (B.W. Wells).

Integral

*Neuroterus majalis* (O.S.). 222. Fig. 260. Fleshy green parenchyma thickening projecting on both sides of leaf when it is hardly half-grown.

*Neuroterus niger* Gill. 225. Fig. 269. Round parenchyma thickening, 2 mm. in dia., more prominent above with a nipple below, in numbers along the main veins in the fall.

*Quercus myrtifolia* - Myrtle Oak, Seaside Scrub Oak

"Root" galle

*Eumayria floridana* Ashm. 382. Fig. 42. Abrupt rounded mass with a botryoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.

*Sphaeroterax caepuliforme* (Beut.). 356. Fig. 31. Onion-shaped, in cluster surrounding stem below ground, cream-colored to brown, 7-9 mm. high.

*Dryocoetes faveus* Beut. 395. Figs. 46-7. Dense cluster at or below surface, up to 60 mm. in dia., consisting of up to 250 individual galls, 11 mm. long.

*Trisoleniella enigma* (Weld.). 386. Figs. 34-5. Cluster of up to 150 at the base of sprouts.

*Callirhytis ovata* Weld. 456. Fig. 49. Ellipsoidal, sessile, single or in group, 6 mm. high by 5 mm. in dia., colored like normal bark.

Flower galls

*Callirhytis operator* (O.S.) sex. gen. 455a. Fig. 58. Woolly, white.

*Callirhytis myrtifoliae* (Beut.). 451. Fig. 56. Arrowhead-shaped, one-celled, scattered along among normal stamens on staminate axis, drying to black. Globular, short-pubescent. Fig. 55.

Acorn galls

*Amphibolips fuliginosa* Ashm. 282. A plum gall on side of acorn cup, 7-10 mm. in dia., dropping in the fall.

*Callirhytis balanopsis* Weld. 406. Fig. 76. A pip gall in fall on young acorns of current season, green, 4 mm., secreting honeydew.

A pip gall in Oct. like *Callirhytis operator* (O.S.) Fig. 65.

A stone gall inside a mature acorn like Fig. 70.

Bud galls

- Callirhytis cryptica* Weld. 419. Gall hidden in center of an enlarged and seemingly dead bud with elongated narrow bud scales. Terminal. Oct.  
*Amphibolips murata* Wsld. 289. Fig.115. Lemon-shaped, smooth, tan, 8-12 mm. in dia., in fall. Wall thick, spongy tissue about larval cell.  
Small, smooth, green, not secreting honeydew, in fall.  
Spindle-shaped, 15-20 mm. long, green, in Oct.

Stem galls

Woody stem swellings

- Callirhytis cornigera* (O.S.). 415. Fig.117 or *Callirhytis clavigera* (Ashm.). 413. Fig.116. A horned knot gall.  
*Callirhytis similis* (O.S.). 479. Fig.120. Woody, club-shaped when terminal, with 1-4 cells. Described from *Quercus ilicifolia*.  
*Callirhytis medullae* (Ashm.). 448. Fig.134. Not distinguished in field from the above. "Adults the next Feb. and Mar." I have never reared it.

Detachable

- Callirhytis gemmaria* (Ashm.). 436. Figs.155-6. Small, ribbed galls in cluster around twig in early spring, secreting honeydew when young, & dropping.  
*Callirhytis difficilis* (Ashm.). 420. Fig.139. Small, rugose, grayish galls bursting out thru bark, dropping when mature.  
*Callirhytis ventricosa* (O.S.). 485. Figs.144-5. Conical, short-pubescent, sessile on trunk or twigs, green when young, brown and dropping later.  
*Amphibolips* sp. Like *Amphibolips acuminata* Ashm. 275. Fig.112 but wall is thick, 35 mm. long. Old and empty galls seen in Oct.

Cells hidden under bark

- Eumayria invisus* Weld. 383. Cells just under bark. Adults cut out Nov.17.

Leaf galls

Detachable

- Amphibolips racemaria* Ashm. 292. Like a green grape on under side of leaf in Apr., 7-8 mm. in dia., sour, succulent, adults (all males) in May.  
*Callirhytis furva* Weld. 433. Fig.212. Small cluster of globular galls, 3-4 mm. in dia., covered with short, straight brown hairs, on upper side, fall.  
*Callirhytis infusata* (Ashm.). 441. Globular, densely covered with yellow hairs, on upper surface in fall, dropping when mature.

Integral

- Conical, wall thin and translucent, with a free-rolling cell, on under side in early spring. Full-grown in mid-Feb. at Ft. Myers, Fla. Fig.303.  
Like *Dryocosmus notha* (Ashm.). 399. Fig.182. Green, wall thin and translucent, with a free-rolling cell, tip prolonged into a sharp point on upper side of leaf.  
Like *Dryocosmus cinereae* (Ashm.). 393. Fig.183. Hemispherical, thin-walled, with a free-rolling cell, sessile on under side of leaf.

*Quercus nigra* - Water Oak

"Root" galls

- Dryocosmus favus* Bcut. 395. Figs.46-7. Dense cluster at or below surface of ground, up to 60 mm. in dia., consisting of up to 250 individual galls.  
*Trisoleniella enigma* (Weld). 386. Figs.34-5. Cluster of up to 150 at base of sprouts.

Flower galls

- Callirhytis turnerii* (Ashm.). 484. Woolly, globular, as large as a cherry, consisting of several two-celled kernels. Adults out Apr.29. Type host. Fla. Entered from literature.

#### Acorn galls

- Amphibolipe prunus* Cresson. 291. Fig. 59. A plum gall on side of acorn cup in fall. It wrinkles in drying.  
*Callirhytie balanopie* Weld. 406. Fig. 76. A pip gall in fall on small acorns of the current season, secreting honeydew, green smooth, 4 mm. in dia.

#### Bud galls

- Amphibolips melanocera* Aehm. 288. Globular, 6-12 mm. in dia., yellowish-green, from axillary buds in June, outer wall very thin, larval cell supported by very fine fibers. Only males reared. Entered from literature.  
Small, tan, smooth, in leaf axil. Seen in Oct. in Fla.

#### Stem galls

##### Woody stem swellings

- Callirhytie punctata* (O.S.). 471. Fig. 129. Oak Knot Gall. Abrupt, completely encircling branch.  
*Baeocettia aquatica* (Aehm.). 376. Slight swelling at base of small twig, 8.8 to 19 mm. long by 7.5 to 10 mm. in dia. Adult was cut out in March. Entered from literature.

##### Detachable

- Callirhytie ventricosa* (O.S.). 485. Figs. 144-5. Conical, short-pubescent, bursting out thru bark, single or small group, green when young, turning brown and dropping later.  
*Callirhytie gemmaria* (Ashm.). 436. Figs. 155-6. Small ribbed galle in cluster in early spring, secreting honeydew when young, dropping when mature.  
*Callirhytie diffilis* (Ashm.). 420. Fig. 139. Small, rugose, grayish in color, in clusters or rows on twig, dropping when mature.  
*Andricus coronus* Beut. 300. Terminal cluster in early spring, green, ridged galle pointed at both ends, solid with a central larval cell, dropping.  
*Dryocoemue floridensis* (Beut.). 396. Fig. 297. A rosette of green bracts sessile on trunk or twig, larval cell in center.

##### Cells hidden under bark

- Callirhytie crypta* (Aehm.). 418. Fig. 162, 301. Cells just under the bark in the wood. If very numerous the twig may be hypertrophied.

#### Leaf galls

##### Detachable

- Amphibolipe racemaria* (Ashm.). 292. Like a green grape on under side of leaf in April, 7-8 mm. in dia. Adults emerged in May (all males).  
*Callirhytie furva* Weld. 433. Fig. 212. Small cluster of globular galle, 3-4 mm. in dia., each covered with short, straight brown hairs, in fall.  
*Dryocoemue rileyi* (Ashm.). 401. Fig. 237. Globular, brown, 3 mm. in dia., on a main vein usually on under side of leaf in fall, dropping when mature.

##### Integral

- Dryocoemue palustris* (Aehm.). 400. Fig. 181. Globular, fleshy, 10-17 mm. in dia., with a free-rolling cell, appearing with leaves in early spring.  
*Dryocoemue notha* (Aehm.). 399. Fig. 182. Green, wall thin, with a free-rolling cell, tip prolonged into a sharp point on upper surface or beyond edge.

#### *Quercus palustris* - Pin Oak

#### "Root" galle

- Dryocoemue favus* Beut. 395. Figs. 46-7. Dense cluster at or below surface of ground, up to 60 mm. in dia., of up to 250 individual galls, 11 mm. long.

#### Flower galle

- Callirhytis operator* (O.S.) ex. gen. 455a. Fig. 58. Teete Baeett.

### Acorn galls

- Callirhytis balanacea* Weld. 403. Fig. 64. A pip gall on small acorns of the current season, 6.3 mm. in dia., green, bare, secreting honeydew, dropping in Oct.
- Callirhytis fructuosa* Weld. 432. Fig. 70. A stone gall inside a mature acorn in the fall.
- Callirhytis corrugis* (Bass.). 416. A stone gall not distinguished from above.
- Amphibolips prunus* Cresson. 291. Fig. 59. A plum gall on side of acorn cup.

### Bud galls

- Amphibolips globus* Weld. 285. Fig. 294. Agamic gen. galls slightly pointed at end, green, up to 14 mm. in dia., wall thin, dropping in late August.
- Amphibolips acuminata* Ashm. 275. Fig. 112. Spindle-shaped, up to 58 mm. long by 14 mm. in dia., from mid-April to early May.
- Andricus ellipsoidal* (Wald). 304. Fig. 94. Spindle-shaped, blunt at both ends, up to 14 mm. long, smooth, mottled, dropping when mature in May.
- Callirhytis gallasatriatae* Wald. 435. Fig. 107. Spindle-shaped with a long stalked base, up to 31 mm. long, in late summer, from weak lateral buds.

### Stem galls

#### Woody stem swellings

- Callirhytis cornigera* (O.S.). 415. Fig. 117. Horned Knot Gall. Abrupt, cuts like cheese when growing in May-June, becoming woody, horns finally protruding and soon dropping out.
- Callirhytis punctata* (O.S.). 471. Fig. 129. Oak Knot Gall. Abrupt, completely encircling branch, cuts like cheese when immature.
- Callirhytis seminosa* (Bass.). 478. Fig. 128. Abrupt, surface very irregular, cells very numerous.

#### Detachable

- Andricus coronus* Beut. 301. Terminal cluster of green ribbed galls pointed at both ends in early spring, larval cell central, dropping when mature.
- Dryocosmus floridensis* (Beut.). 396. Fig. 297. A rosette of green bracts sessile on trunk or twigs, larval cell in center.
- Terminal cluster of spindle-shaped galls with reflexed hairs at apex, not ridged, 6 mm. long, not smooth. From Philadelphia, Pa. in Apr. Fig. 302.

#### Cells hidden under bark

- Callirhytis medularis* Weld. 447. Fig. 166. Cells in the pith.
- Bassetia crosotroides* (Bass.). 378. Slight enlargement of base of the annual growth in July, containing a few larval cells just under the bark in the wood. Entered from literature.

### Leaf galls

#### Detachable

- Callirhytis furva* Weld. 433. Fig. 212. Small cluster of globular galls, 3-4 mm., each covered with short, straight brown hairs, upper side, fall.
- Zophrotaras guttatum* Wald. 364. Fig. 248. Spherical, 1.45-2.5 mm. with purple spots, single on secondary vein on under side in fall.

#### Integral

- Andricus ostensackenii* (O.S.). 319. Small oak apple, 7-9 mm., projecting on both sides of leaf, larval cell supported by fibers.
- Callirhytis modesta* (O.S.). 450. Fig. 265. Hard confluent parenchyma thickenings projecting on both sides of leaf.
- Dryocosmus palustris* (Ashm.). 400. Fig. 181. Globular, 10-17 mm. in dia, with a free-rolling cell, wall 1 mm. thick, in early spring.
- Dryocosmus notha* (Ashm.). 399. Fig. 182. Green, wall thin, with a free-rolling cell, tip prolonged into a sharp point on upper surface.
- Callirhytis favosa* (Bass.). 427. A parenchyma thickening projecting on both sides of leaf, inner structure in cross-section suggests a honeycomb, not succulent. Adults emerge in late July or August.
- Amphibolips spongifica* (O.S.). 294. Spongy Oak Apple.

"Root" galls

Flower galle

- Callirhytis operator (O.S.) sex.gsn. 455a. Fig.58. Woolly, white.  
Callirhytis myrtifoliae (Beut.). 451. Fig.56. Arrowhead-shaped, one-celled,  
scattered along staminate axis, drying to purple-black.  
Globular, short-pubescent. Fig.55.

Acorn galle

- Callirhytis operator (O.S.) agamic. 455b. Fig.65. A pip gall in fall beside  
a mature acorn.  
Amphibolips fuliginosa Ashm. 282. A plum gall on side of acorn cup, 7-10 mm.  
in dia., dropping in the fall.  
Amphibolips sp. larger, light-colored, not wrinkled; adult 2nd.epring.  
Callirhytis middletoni Weld. 449. Fig.62. A pip gall dropping in early May.  
An outer fleshy layer decaye leaving a hard shell with a rough surface  
as in the photo.  
Callirhytis balanopsis Weld. 406. Fig.76. A pip gall in the fall on young  
acorns of the current season, secreting honeydew.  
Callirhytis balanacea Weld. 403. Fig.64. A pip gall on small acorns of the  
current season, 6.3 mm. in dia., green, bare, secreting honeydew.  
A stone gall in a mature acorn in fall like Fig.70.  
A pip gall on young acorne on new growth in June. Lanham, Md.

Bud galls

- Amphibolips spinosa Ashm. 293. Fig.99. Lemon-shaped. Collected on ground  
Oct. to Feb.  
Amphibolips citrififormis Ashm. 278. Fig.250. Spindle-shaped, thin-walled,  
22 by 12 mm., in early epring.  
Amphibolips globulosa Beut. 284. Fig.102. Type galle are liks photo and  
labeled: "VI. Lakehurst, N.J." and on Q. marilandica.

Small, gresn, smooth, not secreting honeydsw, in fall.  
Amphibolips sp. Spindle-shaped, 15- 20 mm. long, green, in Oct.

Stem galle

Woody stem swellinge

- Callirhytis clavigera (Ashm.). 412. Fig.116. A horned knot gall but the  
horns do not drop out.  
Callirhytis medullae (Ashm.). 448. Fig.134. Gradual swelling on side of the  
twig in spring. "Adults the next Feb. and Mar.". I have nsvar reared it.  
Callirhytis phellos (Ashm.). 467. Fig.124. Club-shaped at end of new ehoote  
in spring with radiating fibers about the larval cell. 3-5 mm. in dia.  
Eumayria longipennis (Ashm.). 384. Woody enlargement at the base of lateral  
branchee or on shoots, 8-10 mm. long by 3.5-4 mm. in dia. Types reared  
in May. Entered from literature. Fig.300.

Detachable

- Dryocosmus imbricariae (Ashm.). 397. Banded Bullet Gall. Globular, 7-10  
mm. in dia., red, in group on twigs, dropping when mature in fall.  
Callirhytis ventricosa (O.S.). 485. Figs.144-5. Conical, short-pubescent,  
sessile on trunk or twigs, green when young, turning brown & dropping.  
Andricus formosus (Base.). 310. Fig.147. Fig-shaped galls in cluster on the  
twigs in epring dropping when mature in Juns.  
Callirhytis difficilis (Ashm.). 420. Fig.139. Small, rugose, grayish, in rows  
from furrows in bark, dropping when matures in Oct.  
Andricus coronae Beut. 301. Terminal cluster of ridged galls pointed at both  
ends in early spring, wall thick with central larval cell.  
Dryocosmus floridensis (Beut.). 396. Fig.297. A rosette of green bracts  
sessile on trunk or clasping twigs, larval cell in center.



Cells hidden under bark  
*Callirhytis medularis* Weld. 447. Fig.166. Cells in pith of current year's wood.

#### Leaf galls

##### Detachable

- Amphibolips racemaria* (Ashm.). 292. Like a green grape on under side of leaf in April, 7-8 mm. in dia. Adults emerged in May (all males).  
*Amphibolips* sp. Spindle-shaped, 30-45 mm. long at end of a leaf in spring. Old galls only seen. Fig.253. Never reared.  
*Andricus femoratus* Ashm. 305. Fig.177. Small oak apple in spring, 7.5 mm.  
*Callirhytis infusata* (Ashm.). 441. Globular, densely covered with yellow wool, on midrib on upper side in fall, dropping when mature.  
*Callirhytis furva* Weld. 433. Fig.212. Small cluster of globular galls, 3-4 mm. in dia., each covered with short, straight brown hairs, on upper side.  
Erect club on under side of leaf, single, 4 mm. high, in spring. Fig.276.  
Almost globular, 1 mm. high, in row beside vein on under side. Old galls only seen in Ark. in Oct.  
Almost globular, white, small, single, on under side in fall. Fla.

##### Integral

- Callirhytis rugosa* (Ashm.). 474. Figs.262-3. Hard lenticular blister on under side, usually two-celled, the leaf sunken above.  
*Dryocosmus laurifoliae* (Ashm.). 398. Green, globular, hollow, projecting on both sides of leaf, 5-6 mm. sometimes 3 on a newly formed leaf, containing a free-rolling cell. Adults in March. Entered from literature.  
Midrib swelling, green, fleshy, in May. Fig. 264.  
*Callirhytis confusa* (Ashm.). 414. Small, ellipsoid, greenish-yellow, attached to a main vein on under surface, with a free-rolling cell. Exit hole on upper surface. Adults emerged the last of April. Entered from literature.  
Conical, wall thin and translucent, with a free-rolling cell, on under side of leaf in early spring. Full-grown in mid-Feb. at Ft. Myers, Fla. Fig.303.

#### *Quercus prinoides* - Dwarf Chinquapin Oak

##### "Root" galle

- Callirhytis futilis* (O.S.). agamic. 454. Fig.45. Cells in thickened bark at crown in the fall.

##### Acorn galls

- Callirhytis glandulus* (Beut.). 438. Types captured ovipositing in young acorns in pine barrens of N.J. in early May. Entered from literature.  
Cell in side of acorn cup. Fig.73. Never reared.  
Cell in the cup under an aborted acorn (5 mm. in dia.) in fall. Fig.67.

##### Bud galls

- Acraspis gemula* (Bass.). 251. Fig.108. Black, 2.5 by 1.25 mm. at apex of the new growth.  
*Neuroterus vesicula* (Bass.). 238. Fig.82. Globular, smooth, bare, brown, 2-3 mm. in dia., thin walled, in early spring.  
*Neuroterus affinis* (Bass.). 207. "Monothalamous, round, thin-walled, in the buds, usually hidden by bud scales, brown. Half-grown in the fall. Adults emerge as leaves begin to expand." Type host. Entered from lit.  
Like *Andricus mamillaformis* Weld. 316. Fig.89 but smaller, green, in the terminal cluster or in a lateral bud, in fall.  
*Andricus flavohirtus* Beut. 306. Figs.100-101. Globular, smooth, surrounded by bracts.

##### Stem galls

##### Woody stem swellings

- Neuroterus tectus* Bass. 234. Cells in the scarcely swollen base of the new growth in early spring. Type host. Entered from literature.

#### Detachables

- Disholcaspis quercus-globulus* (Fitch). 348. Round Bullet Gall  
*Xystoteras forticorne* (O.S.). 244. Fig.136. Oak Fig Gall.  
Cluster like *Adleria dimorpha* (Beut.). 269. Fig.194. But on twig in Sept.-Oct.; light colored, wrinkle in drying, dropping in fall.

#### Leaf galls

##### Detachable

- Adleria weldi* (Beut.). 274. Fig.193. Cluster, 10 mm. in dia., of 8-10 brown galls closely pressed together at junction of petiole and leaf blade in the fall and dropping when mature.  
*Adleria dimorpha* (Beut.). 269. Fig.194. Midrib cluster of 20-30, each pear-shaped, light brown, fleshy, finely puberulent except on rounded end.  
*Acraaspis prinoides* (Beut.). 258. Globular, 12 mm. in dia., covered with cone-shaped projections, on upper side of leaf in late Aug. Light green tinged with red, one-celled. Type host. Adults emerge in Dec.  
*Philonix nigra* (Gill.). 263. Fig.228. Globular, 5-8 mm. covered with gray felt, on under side of leaf in Sept.-Oct. Tests Wm.Beutenmueller.  
*Xystoteras pookulum* Weld. 242. Figs. 214-5. Spangle, 3-4.5 mm. with a whitish bloom, on under side of leaf in Sept.-Oct.

##### Integral

- Andricus petiolicola* (O.S.). 321. Fig.256. Abrupt, almost woody, with scar at apex, 10-15 mm. green, many-celled, at base of leaf blade, early spring.  
*Neuroterus floccosus* (Bass.). 218. Fig.272. Small, woolly, in numbers on under side of leaf in fall.

#### Ovipositing in buds

- Andricus pulchollus* Bass. 323. Gall unknown. Female taken ovipositing in buds. No data given. Probably Waterbury, Conn.

#### *Quercus prinus* - Rock Chestnut Oak

#### "Root" galls

- Disholcaspis globosa* Weld. 341. Fig.50. Cluster of 3-40 reddish bullet galls, 8-12 mm. in dia., at base of sprouts, usually hidden by debris.  
*Holocynips badia* (Bass.). 390. Figs.41,52. Hemispherical, rugose, 12-15 mm. in dia., usually single, at base of sprouts in fall.  
*Holocynips maxima* (Weld). 391. Fig.44. Rounded, many-celled mass, up to 50 by 95 mm. growing out of side of one of big roots at base of tree..  
*Callirhytis futilis* (O.S.) agamio. 434. Fig.45. Cells in greatly thickened bark at base of the tree.

#### Flower galls

#### Acorn galls

- Callirhytis electra* Weld. 421. Fig.291. A group of cells in a depression in the cotyledons in a mature acorn in the fall.  
Cell in side of acorn cup, dropping in Sept., has a circle of white hairs at the base. Fig.73. Never reared.

#### Bud galls

- Neuroterus vesicula* Bass. 238. Fig.82. Globular, smooth, bare, brown, 2-3 mm. in dia., thin-walled, in early spring.  
*Neuroterus minutus* (Bass.). 224. Fig.105. Cells in the greatly enlarged petioles without a leaf blade, puberulent, often pinkish, in early spring.  
*Acraaspis gemula* (Bass.). 251. Fig.108. Black, 2.5 by 1.25 mm. at apex of new growth in spring.  
*Andricus mamillaformis* (Weld). 316. Fig.89. Greenish-brown, protruding beyond bud scales in fall. Usually on terminal buds on sprouts from stumps.

## Stem galls

### Woody stem swellings

- Neuroterus distortus* Bass. 212. Fig. 123. An enlargement on one side of the new growth causing the branch to bend abruptly. Many-celled.  
*Neuroterus rileyi* Ashm. 231. Fig. 296. Late summer local thickenings of the bark, confluent, one- to many-celled. covered with normal bark.

### Detachable.

- Disholcaspis quercus-globulus* (Fitch). 348. Round Bullet Gall.  
*Callirhytis seminaria* (Harris). 477. Fig. 137. Oak Seed Gall. Wool Sower. Globular, 20 mm. in dia., white with pink spots at apex of seed-like bodies, in May-June.  
*Xanthoterus forticornis* (O.S.). 244. Fig. 136. Oak Fig Gall. Dense cluster usually on sprouts from stumps, persisting over winter.

### Celle hidden under the bark

Cells just under bark in wood. Only evidence is the exit hole.

## Leaf galls

### Detachable

- Acraspis hirta* (O.S.). 253. Fig. 188. Globular, 4-6 mm. in dia., on under side of leaf on a secondary vein, one to three on a leaf, one-celled.  
*Adleria dimorpha* (Beut.). 269. Fig. 194. Midrib cluster of 20-30 pear-shaped light brown galls on under side in fall, puberulent except on end.  
*Andricus capillatus* (Weld). 298. Fig. 199. Midrib cluster of 2-12, each 2 mm. in dia., pale yellow, not so hairy as to hide the outline, on under side of lower leaves on strong sprouts from stumps in fall.  
*Phylloteras rubinum* (Gill.). 239. Fig. 311. Depressed sphere up to 5.2 by 3.1 mm., on under side as leaves are turning in fall, often on young trees.  
*Neuroterus tantulus* Weld. 233. Fig. 306. Saucer-shaped, 0.9-1.6 mm. in dia., in numbers on under side, dropping in early summer leaving a scar on gall and a brown spot on leaf.  
*Xystoterus poculum* Weld. 242. Figs. 214-6. Spangle, 3-4.5 mm. in dia., with a whitish bloom, on under side of leaves in Sept.-Oct.  
*Andricus flocci* (O.S.). 307. Fig. 208. Woolly, dirty white, of 2-10 seed-like bodies attached by one end on midrib, on upper or lower side of leaf, dropping with the leaf.  
Spherical, white, 1.2 mm. almost bare, scattered on under side, a papilla at apex and a deep hilum below with a pedicel in center. Fig. 236. Aug.

### Integral

- Callirhytis futile* (O.S.) sex. gen. 434. Fig. 261. Blieter, 6-9 mm. in dia., projecting on both sides of leaf, containing 2-3 cells supported by radiating fibers.  
*Andricus petiolicola* (O.S.). 321. Fig. 256. Abrupt, almost woody swellings with a scar at apex, 10-15 mm. in dia., at base of leaf blade in spring, green, many-celled.  
*Andricus chinquapin* (Fitch). 299. Fig. 189. Cell at end of a prolonged vein above surface or beyond edge of leaf.  
*Neuroterus majalis* (O.S.). 222. Fig. 260. Fleshy, green parenchyma thickening projecting on both sides of leaf when it is hardly half-grown.  
*Neuroterus noxiosus* (Bass.) sex. gen. 226a. Fig. 121. Fleshy parenchyma thickening deforming the leaf in May.  
*Neuroterus papilloeus* Beut. 228. Fig. 271. Elliptical cells in parenchyma in numbers in the fall, more prominent above.  
Thin-walled blisters in numbers in June. Fig. 278.  
Like *Callirhytis bipapillata* Weld. 409. Figs. 267, 317. L.I., N.Y. Empty in Sept.

Quercus pumila - Running Oak  
(Sandy barren soil near Gulf Coast)

"Root" galls

Flower galls

Acorn galle

Bud galls

- Amphibolipe murata Weld 289. Fig. 115. Lemon-shaped, tan, smooth, 8-12 mm. in dia., in fall. Wall thick, tissue about larval cell spongy.  
Amphibolips sp. Spindle-shaped, 15-20 mm. long, green, in Oct.

Stem galls

- Callirhytis gemmaria (Ashm.). 436. Figs. 155-6. Small ribbed galls in cluster surrounding twig in early spring, secreting honeydew when young.

Leaf galls

- Callirhytis infuscata (Ashm.). 441. Globular, densely covered with yellow wool, in cluster on midrib in upper side in fall, dropping when mature and becoming plump on ground, the wool easily detached.

Quercus rubra - Red Oak, Northern Red Oak  
( = borealis of modern botanists )

"Root" galle

- Eumayria floridana Ashm. 382. Fig. 42. Abrupt rounded mass with a botryoidal surface, up to 25 mm. in dia. at surface of ground on sprouts.  
Sphaeroteræ caepuliforme (Beut.). 356. Fig. 31. Onion-shaped, in cluster surrounding stem below ground, cream-colored to brown, 7-9 mm. high.  
Dryocosmus favus Beut. 395. Figs. 46-7. Dense cluster of up to 250 individual galls, 11 mm. long by 3 mm. in dia., at or below surface of ground.  
Callirhytis marginata Weld 446. Abrupt cushion-like swelling in bark at crown on sprouts, covered with normal bark. Adults emerged April 25 and were observed ovipositing in the swelling buds.

Flower galls

- Callirhytis operator (O.S.) sex.gen. 455a. Fig. 58. Woolly, white.  
Callirhytis pulchra (Baes.). 476. Fig. 57. Green when fresh, the size of red currant, containing 4-5 cells, dropping in June.

Acorn galls

- Callirhytis operator (O.S.) agamic. 455b. Fig. 65. A pip gall beside a mature acorn, dropping out in the fall.  
Callirhytis fructuosa Weld. 432. Fig. 70. A stone gall inside mature acorn.  
Callirhytis corrugis (Baes.). 416. A stone gall not distinguished in the field from the above.  
Callirhytis balanacea Weld 403. Fig. 64. A pip gall on small acorns of the current season, 6.3 mm. in dia., green, bare, secreting honeydew and dropping in Oct.  
Amphibolips prunus Creseon. 291. Fig. 59. A plum gall produced on side of acorn cup, dropping in fall and becoming wrinkled.

Bud galls

- Callirhytis rugulosa (Beut.). 475. Fig. 93. Ovate, 7-10 mm. long, ridged, with a knot of reflexed hairs at apex, stellate hairs on surface, the wall thin, from weak lateral buds, single or in cluster, drops later.  
Amphibolipe cookii Gill. 281. Spherical, 11-25 mm. in dia., spotted, dropping when full-grown in early Sept. and becoming wrinkled.

- Callirhytis glomerata* Weld. 439. Fig. 114. Smooth, green, brown in sun, in fall, about 3 mm. in dia., over half projecting beyond bud scales.
- Callirhytis gallaestriatae* Weld. 435. Fig. 107. Spindle-shaped with a long stalked base, up to 31 mm. long, in late summer from weak lateral buds dropping in Sept.

#### Stem galle

##### Woody stem swellings

- Callirhytis cornigera* (O.S.). 415. Fig. 117. Horned Knot Gall. Abrupt, cute like cheese in May-June, becoming woody, horn finally protruding.
- Callirhytis punctata* (O.S.). 471. Fig. 129. Oak Knot Gall. Abrupt, completely encircling branch, covered with normal bark.
- Callirhytis seminosa* (Bass.). 478. Fig. 128. Abrupt, surface very irregular, cells near surface and very numerous.

##### Detachables

- Dryocoemus imbricariae* (Ashm.). 397. Banded Bullet Gall. Globular, 7-10 mm. in dia., single or in groups on twigs, dropping when mature in fall.
- Callirhytis gemmaria* (Ashm.). 436. Figs. 155-6. Small ribbed galls in cluster in early spring, secreting honeydew when young, dropping when mature.
- Callirhytis excavata* (Ashm.). 425. Figs. 154, 282. Lenticular polished cells bursting out thru cracks in bark and dropping in Sept. Type host. An isolated, deeply imbedded gall like *gemmaria* from Blain, Pa.

##### Cells hidden under the bark

- Callirhytis medularis* Weld. 447. Fig. 166. Cell in the pith.
- Callirhytis crypta* (Ashm.). 418. Figs. 162, 301. Cells just under the bark in the wood. If numerous the twig may be hypertrophied.
- Bassetia ceropteroides* (Bass.). 378. Slight enlargement at base of the annual growth in July, containing a few cells under the bark in wood.

#### Leaf galls

##### Detachables

- Amphibolips nubilipennie* (Harris). 290. Fig. 309. Like a green grape, almost translucent, succulent. up to 21 mm. in dia., single on under side.
- Amphibolips inanie* (O.S.). 287. Fig. 175. Empty Oak Apple. Produced singly on under side of leaf, 18-32 mm. in dia., light green, spotted. June.
- Dryocosmus rileyi* (Ashm.). 401. Fig. 237. Globular, brown, 3 mm. in dia., single on a main vein, usually on upper side, dropping in the fall.
- Dryocoemus deciduus* (Beut.). 394. Fig. 205. Black Oak Wheat. Cluster of up to 40 bursting out of midrib in Oct.
- Callirhytis piperoides* (Bass.). 469. Fig. 201. Cluster on upper or lower side, each spherical, red, pubescent, 1-4 mm. in dia. & dropping in fall.
- Callirhytis lanata* (Gill.). 443. Fig. 206. Woolly midrib cluster on under side of leaf, dropping before the leaves.
- Zopheroteras compressum* (Gill.). 362. White, subglobular, on under side in fall just as leaves are turning. Type gall is ellipsoidal, 2.7 by 1.8 by 1.8 mm, tan, slightly wrinkled. Included from literature.
- Zopheroteras sphaerula* Weld. 366. Nearly spherical, greenish or tinged with red, on upper or lower side of leaf, single or 3-4 in a row, dropping in Oct. Adults emerged Mar. 13 and Apr. 6 the next spring.
- Loxaulue beutenmülleri* Weld. 369. Reared from a midrib cluster looking like *Callirhytis piperoides* (Bass.) Fig. 201. Adults emerged Apr. 6, 22 and May 11 the second spring.

##### Integral

- Amphibolips confluenta* (Harris). 280. Fig. 174. Spongy Oak Apple.
- Amphibolips coelebe* (O.S.). 279. Fig. 191. Spindle-shaped, 28 by 4.5 mm., green, the prolongation of a vein.
- Dryocoemus palustris* (Ashm.). 400. Fig. 181. Globular, 10-17 mm., with a free-rolling cell, wall 1 mm. thick, appearing very early in the spring.
- Andricus singularis* (O.S.). 326. Fig. 176. Small Oak Apple. 10-14 mm. in dia.

- Callirhytis modesta* (O.S.). 450. Fig.265. Hard, confluent parenchyma thickenings projecting on both sides of the leaf, in June.
- Callirhytis favosa* (Ashm.). 427. Parenchyma thickening projecting on both sides of leaf, many-celled, inner structure in cross-section suggesting a honeycomb, not succulent. Adults out in late July or August.
- Callirhytis rugosa* (Ashm.). 474. Figs.262-3. Hard lenticular thickenings on under side, usually two-celled, the leaf concave above.
- Callirhytis tumiflora* (O.S.). 483. Fig.255. Midrib swelling at base of leaf blade or on petiole, many-celled, green, in May-June.
- Callirhytis pedunculata* (Bass.). 461. Figs. 190, 180. Prolongation of a vein containing a free-rolling cell.
- Dryocosmus notha* (Ashm.). 399. Fig.182. Green, wall thin and translucent, with a free-rolling cell, sessile on under side of leaf.
- Dryocosmus cinereae* (Ashm.). 393. Fig.183. Hemispherical, thin-walled with a free-rolling cell, sessile on under side of leaf.
- Like *cinereae* above in size and shape but with no free-rolling cell. Wis. Elongated, thin-walled cell on midrib. Va. Pergande Collection.

Ovipositing in galls of *Callirhytis lanata* (Gill.).  
*Loxaulus ferrugineus* (Gill.). 370. On Sept.1 at Ames, Ia.

*Quercus stellata* - Post Oak

"Root" galls

- Odontocynips nebulosa* Kieffer. 389. Fig.38. Woody nodules closely grown together into a large mass on roots of runner sprouts.
- Disholcaspis terrestris* Weld. 351. Fig.36. Large bullet galls in clusters of 2-5 on runner shoots under larger trees in fall, dia. up to 17 mm.
- Holocynips badia* (Bass.). 390. Figs.41,52. Hemispherical, rugose, 12-15 mm. in dia., usually single, at base of sprouts in fall.
- Like *Holocynips maxima* (Weld) Fig.44. A disintegrated gall only seen. Ark.
- Xanthoteras radicola* (Ashm.) sex.gen. 247. Fig.51. Cluster of fleshy white galls at base of sprouts in early spring.
- Loxaulus humilis* (Weld). 371. Fig.287. Cells at base of current year's growth in fall, not nested.
- Neuroterus contortus* (Weld) agamic. 211a. Fig.32. Gnarled woody swellings on small young sprouts in Oct, then containing pupae.
- Bassettia floridana* Ashm. 379. Cells over twice as long as broad nested at base of slightly swollen shoots of current year's growth in fall. Cells in thick bark at crown like Fig.45.

Flower galls

- Callirhytis exigua* (Bass.). 426. Fig.54. Small, dark tan, oval cells scattered in among normal stamens on a shortened axis.
- Neuroterus exiguus* Bass. 217. Fig.289. Fusiform enlargement of staminate axis, green, succulent, many-celled.

Acorn galls

- Callirhytis subcostata* Weld. 480. Fig.290. Produced on side of acorn cup in May, green, ribbed like a melon, 2.5-3.0 mm. in dia.  
 Cell in side of acorn cup as in Fig. 73.  
 Probably from separate cells inside a mature acorn. Sp.#82 in *Andricus*.

Bud galls

- Andricus pisiformis* Beut. 322. Figs.85-8. Mottled, 3-6 mm., outer wall fleshy, inner hard and brittle, in early spring, dropping later.
- Andricus murtfeldtae* Ashm. 318. Fig.98. Cluster of a few hard brown galls at base of new growth in spring, dropping in May.
- Neuroterus vesicula* (Bass.). 238. Fig.82. Globular, smooth, brown, 2-3 mm. in dia., thin-walled, in very early spring.

*Andricus stropus* Ashm. 327. Figs.109-110. Leafy Wreath Gall. Cell drops out in mid-Oct. (Tex.) and has a circle of white hairs at base. Bracts continue to grow. I have never been able to rear it.  
Similar to *Andricus mamilliformis* (Weld) Fig.89. Cell 3.6 by 3.6, truncate at base. No girdle of hairs at base. Ark. and Tex. Never reared.  
*Callirhytis cressoni* (Beut.). 417. Cell 1 mm. in dia., inside young buds and hidden by bud scales. Austin, Tex.  
Like *Acraepis gemula* (Base.). 251. Fig.108.  
Bunched bracts in summer, the gall having dropped out and bud scales have continued to grow. Very common. Like *frondosa* of old literature.  
Oblong, 13 by 5 mm., projecting beyond bud scales, containing pupae in late June in N.J. Never reared.

#### Stem galle

Woody stem swellings  
*Callirhytis floridana* (Ashm.). 430. Fig.132. Puffy thickenings of the bark on one side of the twig, often confluent, many-celled.  
*Callirhytis elongata* (Kinsey). 424. An elongate slight twig swelling containing a score of larval cells, up to 8 mm. in dia. Austin, Tex.  
Adults emerged from Mar.14 to Apr.3. Entered from literature.  
*Neuroterus rileyi* Ashm. 231. Fig.237. Local thickenings of the bark, confluent, one- to many-celled, covered with normal bark, in summer.  
*Acraepis longicornis* (Base.). 255. Slight enlargements of upper portion of very young and tender shoots. Entered from literature.  
A terminal club like *Callirhytis clavula* (O.S.). 414, Fig.122. Never reared.

#### Detachable

*Dicholcaspis epongiosa* (Karsch). 349. Fig.148. Globular cluster, 20-30 mm. in dia., of closely packed galls with a rusty surface.  
*Dicholcaspis prunifformis* Kinsey. 347. Fig.150. Ovoid, 28 by 21 mm., yellow to reddish brown, soft and spongy when fresh.  
*Dicholcaspis quercus-globulus* (Fitch). 348. Round Bullet Gall.  
*Andricus aciculatus* Beut. 296. Fig.146. A many-celled woody mass covered with white or reddish wool, in the fall.  
*Andricus maxwelli* Base. 317. (det. Peterson). Polythalamous galls similar to those of *Andricus murtfeldtae* Ashm. (Fig.98) in size and shape. Often only a single gall on a tree. 1 to 27 adults emerged from a single gall in Apr. Some galls produce males others females, a few both.

#### Cells hidden under the bark

Cells in the wood just under the bark in the fall. Adults out in Apr. Fig.169.

#### Leaf galls

##### Detachable

*Atrusca centricola* (O.S.). 332. Fig.178. A spotted oak apple on under side of leaf in fall, usually single.  
*Xanthoteras politum* (Base.). 245. Reddish oak apple, not spotted, 6-19 mm. in dia., in numbers on both sides of leaf in fall. Adults emerge the next spring March to June.  
*Andricus robustus* Weld. 324. Fig.204. Midrib cluster on under side of leaf in fall, each pointed at apex, dropping when mature.  
*Andricus biconicus* Weld. 297. Fig.197. Cluster at base of petiole in fall, brown, covered with stellate hairs, dropping when mature.  
*Callirhytis lustrans* (Beut.). 445. Fig.203. Midrib cluster on under side in fall, each with a short stalk, end truncate and depressed.  
*Adleria vacciniiformis* (Beut.). 273. Midrib cluster of thick-walled, one-celled galls shaped like a huckleberry or hackberry fruit, with nipple at apex, stalk 1-2.5 mm. long, gall 4-7 mm. in dia. Entered from lit.  
Midrib cluster of pentagonal galls on under side in fall. Fig.196.  
*Zopheroteras vaccinii* (Ashm.). 367. Galle shaped like those of *Callirhytis lustrans* (Beut.), Fig.203 in numbers in rows on either side of the midrib in the fall. Turn black in drying. Entered from literature.

- Sphaeroterus unicum* (Weld). 361. Fig.232. Globular, white, up to 7 mm. in dia., eadled on a vein on under side of leaf in the fall.
- Callirhytis tubicola* (O.S.). 482. Fig.240. Cluster of yellow tubular galle bearing red spines, erect on under side of leaf in fall, 12 mm. high.
- Andricus ignotus* (Bass.). 311. Fig.207. Woolly midrib cluster on under side of leaf in fall.
- Andricus pattoni* (Bass.). 320. Woolly midrib clusters similar to *Andricus flocci* (O.S.) 307. Fig.208.
- Sphaeroterus melleus* (Ashm.). 358. "Small, brownish-yellow, globular,, single or in cluster of three or more, on upper side, easily detached, fleshy, shrivel in drying, 2.5-3.8 mm. in dia." Entered from lit.
- Neuroterus tantulus* Weld. 233. Fig.306. Saucer-shaped, 0.9-1.6 mm. in dia. in numbers on under side dropping in early summer leaving a scar on gall and a brown spot on the leaf.
- Spherical, white, 1 mm. in dia. Fig.245. This may be the *Neuroterus ealtatorius australianus* Kinsey described from this host at Austin, Tex. Cup-shaped spangle in the fall. Fig.224. Ark., Mo., Tex. Never reared.
- Lik *Neuroterus verrucarum* (O.S.). 257. Fig.310 but detachable, with short hairs, with scarcely a trace on leaf above. Seen in Mo., Tex.
- Spangle, 3-1 mm. in dia., edge cream-colored and slightly inrolled, a slight nipple in center above. Long Island, N.Y. in Sept.

#### Integral

- Andricus petiolicola* (O.S.). 321. Fig.256. Abrupt, firm, green swelling with ear at apex, at base of leaf blades in early spring.
- Andricus utriculus* Ashm. 328. Fig.270. Globular, green, thin-walled, 3-4 mm. in dia., projecting on both sides of leaf.
- Andricus chinquapin* (Fitch). 299. Fig.189. Cell at end of a prolonged vein above or beyond the edge of the leaf.
- Neuroterus irregularis* (O.S.). 221. Succulent thickened areas of leaf projecting on both sides in early spring. 9-11 mm. thick.
- Neuroterus niger* Gill. 225. Fig.269. Round parenchyma thickenings, 2 mm. in dia., more prominent above, in numbers along main veins in fall.
- Neuroterus gillettei* Bass. 220. Blisters on main veins and midrib, usually in groups, containing a few cells. Contained pupae Apr. 26 (Va.).
- Neuroterus verrucarum* (O.S.). 237. Fig.310. Compact woolly mass, 2 mm. in dia. by 1 mm. high. in numbers on under side of leaf in fall.
- Lik *Liodora comata* Weld. 268. Fig.316. Tan, covered with stellate hairs. In May in Va.

Reared from unknown gall on this host.

- Neuroterus dubius* Bass. 213. Both sexes found in box of galle of *Andricus utriculus* Ashm. "but no galls appear from which they came."
- Callirhytis obtusilobus* (Bass.). 454. Described from two females found in the breeding box with *Andricus utriculus* Ashm. The types in Philadelphia has non-ciliate wings and goes in *Callirhytis* Group B.
- Andricus incognitus* Weld. 313. New name for *Andricus ignotus* Bass. 1900 whose types in Philadelphia is a single female from New Haven, Conn.

#### *Quercus texana* -- Texas Red Oak ( on Edwards Plateau )

#### "Root" galls

- Eumayria floridana* Ashm. 382. Fig.42. Abrupt rounded mass with a botryoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.
- Sphaeroterus caspiformis* (Beut.). 356. Fig.31. Onion-shaped, in cluster around stem below ground, cream-colored to brown, 7-9 mm. high.
- Dryocosmus favus* Beut. 395. Figs.46-7. Dense cluster at or below surface up to 60 mm. in dia., consisting of up to 250 individual galle, 11 mm.



*Trisolieniella enigma* (Weld). 386. Fig. 34. Cluster of up to 150 at base of sprouts, pale yellow, 6-7 mm. long, ribbed.  
*Callirhytis ovata* Wsld. 456. Fig. 49. Ellipseoidal, sessile, single or in groups, 6 mm. high by 5 mm. in dia., colored like normal bark.

Flower galle

*Callirhytis operator* (O.S.) sex.gen. 455a. Fig. 58. Woolly, white.

Acorn galle

*Callirhytis operator* (O.S.) agamic. 455b. Fig. 65. Pip gall beside acorn.  
*Callirhytis fructuosa* Weld. 432. Fig. 70. A stone gall beside mature acorn.  
Like *Amphibolips gainei* Base. 283. Fig. 61. Seen at Boerne, Tex. in Oct.  
A pip gall in the fall on acorns of the current season like Fig. 76.

Bud galle

*Callirhytis glomerosa* Weld. 439. Fig. 114. Smooth, green or brown (in sun) in fall, about 5 mm. in dia., over half projecting beyond bud scales.  
*Andricus gallaestriatae* Weld. 435. Fig. 107. Spindle-shaped with a long-stalked base, up to 31 mm. long, in late summer from weak lateral buds.  
Like *Amphibolips cookii* Gill. 281. Fig. 252 but smaller. Found on ground. Oct.

Stem galle

Woody stem swellinge

*Callirhytis eimilis* (O.S.). 479. Fig. 120. Woody, club-shaped when terminal, containing one to four cells.  
*Callirhytis cornigera* (O.S.). 415. Fig. 117. Horned Knot Gall. Abrupt, cute like cheese in May-June, later becoming woody, horns finally protruding.

Detachable

*Dryocosmæ imbricariae* (Ashm.). 397. Banded Bullet Gall. Globular, red, 7-10 mm., in dia., single or group on twig, dropping in fall.  
*Andricus formosus* (O.S.). 310. Fig. 147. Fig-shaped, in cluster on twig in spring, dropping when mature in June.  
*Callirhytis gemmaria* (Ashm.). 436. Figs. 155-6. Small, ribbed galls in cluster around twig in spring, secreting honeydew, dropping later.  
Like *Callirhytis excavata* (Ashm.). 428. Fig. 154, 282 in habitus but two-horned, rugose, not polished. Many had dropped in Oct. Fig. 157. Texas.

Leaf galle

Detachable

*Callirhytis attigua* Weld. 402. Fig. 231. Globular, smooth, 6-8 mm. in dia., attached to petiole, dropping in Oct.  
*Amphibolipe nubilipennie* (Harris). 290. Fig. 309. Like a green grape, almost translucent, succulent, up to 21 mm. in dia., single on under side.  
*Zopheroterae guttatum* Weld. 364. Fig. 248. Spherical, 1.45-2.5 mm. in dia., with purple spots, single on under side on a secondary vein in fall.  
*Callirhytis lanata* (Gill.). 443. Fig. 206. Woolly midrib cluster on under side of leaf in fall, dropping before the leaves.  
Similar to gall of *Dryocosmus rileyi* (Ashm.). 401. Fig. 237. attached singly to a main vein in the fall.

Integral

*Amphibolips confluenta* (Harris). 280. Fig. 174. Spongy Oak Apple.  
*Dryocosmus palustris* (Ashm.). 400. Fig. 181. Globular, 10-17 mm. with a free-rolling cell, appearing with leaves in very early spring.  
*Dryocosmæ notha* (Ashm.). 399. Fig. 182. Green, wall thin, with a free-rolling cell, tip prolonged into an upturned point.  
*Dryocosmæ cinerea* (Ashm.). 393. Fig. 183. Hemispherical, thin-walled with a free-rolling cell, sessile on under side of leaf.  
*Callirhytis modeeta* (O.S.). 450. Fig. 265. Hard confluent parenchyma thickening, projecting on both sides of the leaf.

Quercus velutina - Black Oak

"Root" galls

- Eumayria floridana* Ashm. 381. Fig.42. Abrupt rounded mass with a botryoidal surface, up to 25 mm. in dia., at surface of ground on sprouts.  
*Sphaeroterax caepuliformis* (Beut.). 356. Fig.31. Onion-shaped, in cluster around stem below ground, cream-colored to brown, 7-9 mm, high.  
*Callirhytis rubida* Weld. 473. Fig.40. Abrupt local swellings on stem below ground with cells in the thick brown bark, in fall.

Flower galls

- Callirhytis pulchra* (Bass.). 470. Fig.57. Green when fresh, the size of red currants, containing 4-5 cells, dropping in June.  
*Callirhytis operator* (O.S) sex.gen. 455a. Fig.58. Woolly, white.

Acorn galls

- Callirhytis operator* (O.S.) agamic. 455b. Fig. 65. A pip gall beside the mature acorn inside the cup.  
*Amphibolips prunus* Cresson. 291. Fig.59. A plum gall on side of acorn cup dropping in fall and becoming wrinkled.  
*Callirhytis balanacea* Weld. 403. Fig.64. A pip gall on side of small acorn of current season in fall, excreting honeydew, green, bare, dropping.  
*Callirhytis balanaspis* Weld. 404. Fig.68. Pip gall in fall on immature acorns, 6 mm. in dia., larger than normal young acorne.  
*Callirhytis balanoides* Weld. 405. Fig.72. Pip gall in fall on acorns of current season, secreting honeydew.  
*Callirhytis fructuosa* Weld. 432. Fig.70. Stone gall inside mature acorn.  
*Callirhytis corrugis* (Bass.). 416. Stone gall inside mature acorn not distinguished in the field from *fructuosa* above.  
*Callirhytis balanosa* Weld. 407. Fig.75. Pip gall in spring on immature acorns of previous year, smooth, mottled, secreting honeydew.

Bud galls

- Amphibolips tinctoriae* Ashm. 295. Fig.103. Compressed ovate, the opposite sides keeled, single, wall thick, dropping in Oct.  
An *Amphibolips* like *cooki* Gill. Green, 7-10 mm., not spotted, protruding from one of the terminal buds in fall. Adults out Jan.1 and 14 the second spring. Never described.  
*Andricus gallaestriatae* Weld. 435. Fig.107. Spindle-shaped with a long-stalked base, up to 31 mm. long, in late summer from weak lateral buds, dropping in Sept.  
*Callirhytis rugulosa* (Beut.). 475. Fig.93. Ovate, 7-10 mm. long, ridged with a knot of reflexed hairs at apex, stellate hairs on surface, the wall thin, from weak lateral buds, single or in groups, dropping.  
Melon-shaped, pink, fleshy, May 1 in Chicago area. Fig.81. Never reared.  
*Andricus ellipsoidal* (Weld). 303. Fig.94. Spindle-shaped, blunt at both ends, up to 14 mm. long, smooth, mottled, dropping in April.

Stem galls

Woody stem swellings

- Callirhytis punctata* (O.S.). 471. Fig.129. Oak Knot Gall. Abrupt, woody, completely encircling branch.  
*Callirhytis scitula* (O.S.). 476. Fig.119. An abrupt enlargement of new growth bearing normal leaves, 12 by 35 mm., full-grown by June.

Detachable

- Dryocosmus imbricariae* (Ashm.). 397. Banded Bullet Gall. Globular, 7-10 mm. in dia., red, single or in groups, dropping in fall.  
*Dryocosmus floridensis* (Beut.). 396. Fig.297. A rosette of green bracts sessile on trunk or twigs, larval cell in center, usually single.

- Andricus formosus* (Bass.). 310. Fig. 147. Fig-shaped, in cluster on twig in spring, dropping when mature in June.  
*Callirhytis excoavata* (Ashm.). 425. Figs. 154, 282. Lenticular polished cells bursting out thru bark, dropping when mature in Sept.  
*Callirhytis ventricosa* (O.S.). 485. Figs. 144-5. Conical, short\_pubescent, sessile, single or small group, green when young in May, dropping later.

Cells hidden under bark

- Callirhytis medularis* Weld. 447. Fig. 166. Cells in pith of current year.  
*Callirhytis crypta* (Ashm.). 418. Figs. 162, 301. Cells just under bark in the wood; if numerous the twig may be hypertrophied.  
*Baesettia oeropsaroides* (Bass.). 378. Slight enlargement at base of the annual growth, containing a few cells. In July. Entered from lit.

Leaf galle

Detachable

- Amphibolips nublilipennie* (Harris). 290. Fig. 309. Like a green grape, almost translucent, succulent, up to 21 mm. in dia., on under side, May-June.  
*Dryocosmus deciduus* (Beut.). 394. Fig. 205. Black Oak Wheat. Cluster of up to 40 bursting out of midrib in early Oct., dropping when mature.  
*Callirhytis piperoides* (Bass.). 469. Fig. 201. Cluster on upper or lower side of leaf, each spheroidal, red, pubescent, 1-4 mm. in dia.  
*Callirhytis furva* Weld. 433. Fig. 212. Small cluster of globular galls, 3-4 mm. in dia., each covered with short, straight brown hairs, upper side.  
*Dryocosmus rileyi* (Ashm.). 401. Fig. 237. Globular, brown, 3 mm. in dia., single on main vein on under side, dropping when mature in fall.  
*Dryocosmus albidus* Weld. 392. Figs. 242, 312. Depressed sphere, white, bare, fleshy, up to 5.4 mm. in dia., on under side of leaf in late fall.  
*Zopheroteræ hubbardi* (Ashm.). 365. Fig. 308. Ellipsoidal, pure white, 2.3 by 1.85 by 1.7 mm. From this gall an adult det. as this sp. was reared.  
*Callirhytis lanata* (Gill.). 443. Fig. 206. Woolly midrib cluster on under side of leaf in fall, dropping before the leaves.

Integral

- Callirhytis tumefica* (O.S.). 483. Fig. 255. Midrib swelling at base of leaf blade or on petiole, many-celled, green, in May-June.  
*Callirhytis modeeta* (O.S.). 450. Fig. 265. Hard, confluent parenchyma thickenings projecting on both sides of the leaf.  
*Callirhytis favosa* (Bass.). 427. Parenchyma thickening projecting on both sides of leaf, many-celled, inner structure in cross-section suggests a honeycomb, not succulent. Adults in late July-August.  
*Andricus ceteaseckenii* (O.S.). 319. Small oak apple, 7-9 mm., projecting on both sides of leaf, larval cell supported by fibers.  
*Callirhytis pigra* (Bass.). 468. Fig. 257. Fleshy, smooth midrib swelling on basal half of leaf in midsummer.  
*Amphibolips coelebs* (O.S.). 279. Fig. 191. Spindle-shaped, 28 by 4.5 mm., green, the prolongation of a vein.  
*Dryocosmus palustris* (Ashm.). 400. Fig. 181. Globular, 10-17 mm., with a free-rolling cell, appearing with the leaves in early spring.  
*Dryocosmus notha* (Ashm.). 399. Fig. 182. Green, wall thin and translucent, with a free-rolling cell, the tip prolonged into a sharp point.  
*Dryocosmus cinereæ* (Ashm.). 393. Fig. 183. Hemispherical, thin-walled, with a free-rolling cell, sessile on under side of leaf.  
*Amphibolips confluenta* (Harris). 280. Fig. 174. Spongy Oak Apple.

Ovipositing in buds, gall unknown.

- Callirhytis perobscura* Weld. 463. Taken ovipositing in buds in the D.C. area on Apr. 18, 20, 1927; Apr. 22, 1930; Apr. 23, 1932; Apr. 23, 1947 and Apr. 13, 1925.

Quercus virginiana - Live Oak

"Root" galls

- Belonocnema treatae* Mayr. 355. Cluster of wedge-shaped, soft, fleshy yellowish galls, 12-19 mm. long on rootlets in March. Like Fig. 56.  
*Loxaulus pattersoni* (Kinsey). 374. Slight swelling of small roots containing several closely clustered spherical calls 1.0 mm. in dia. Gall 20 mm. long by 4 mm. wide or larger. Adults emerged Feb. 9. Entered from lit.  
*Odontocynips* sp. Seen at Cuero, Tex. Gall similar to Fig. 38.  
Cluster of pubescent galls attached to a large root. Fig. 39. Boerne, Tex.

Flower galls

Acorn galls

Separate cells inside a mature acorn

Bud galls

- Andricus foliatus* Ashm. 309. Fig. 111. Call in center of elongated, narrow bud scales, not deciduous.  
Terminal, hollow. Fig. 164. Seen at Austin, Tex. in Oct.

Stem galls

Woody stem swellings

- Callirhytis batatoides* (Ashm.). 408. Fig. 133. Abrupt swellings of twigs varying in form and size, many-celled.

Detachable

- Disholcaspis cinerosa* (Bass.). 339. Fig. 142. Diameter 19-24 mm., covered with a mealy gray powder which gradually weathers away.  
*Disholcaspis fungiformis* Kinsey. 340. Fig. 298. A cluster of mushroom-shaped galls, the top a flattened cone, 7-10 mm. in dia. and 4 mm. high above a broad base in which is the larval cell. Tex. Entered from literature.  
*Disholcaspis virans* (Ashm.). 352. Fig. 143. Cluster of hard, brown matte-surfaced galls crowded around a twig.  
*Disholcaspis eucicnips* (Ashm.). 350. Cluster of 5-20 crowded around a terminal twig. Globular, yellowish brown, surface like buckskin, hard, 3-6 mm. in dia., Entered from literature.

Cells hidden under bark, some swelling

- Bassettia pallida* Ashm. 381. Described from a single female from Savannah, Ga. Apr. 15 without gall or host. Agreeing with type is a specimen from cells just under the bark of live oak in Fla. Fig. 319.  
Small group of non-separable nested cells firmly fixed to matrix in a slightly hypertrophied twig. New Orleans, La.  
Hard white call which can be dug out intact from a slight twig swelling. New Orleans, La. Jan.

Leaf galls

Detachable

- Belonocnema fossoria* Weld. 353. Fig. 230. Tan, smooth, globular galls on under side of leaf in numbers in the fall.  
*Belonocnema kinssyi* Weld. 354. Similar to the above on live oak in Texas.  
*Andricus laniger* Ashm. 315. Fig. 210. Woolly midrib cluster on under side.  
*Neuroterus saltatorius texanus* Kinsey. 232. Fig. 244. Adults out Mar. 8.  
*Neuroterus* sp. In numbers, their dropping in April suggesting pattering rain. San Antonio, Tex.

Integral

- Neuroterus minutissimus* (Ashm.). 223. Small, 1.25-2.5 mm., covered with coarse, brown mossy pubescences, on under side in numbers in the fall.  
*Neuroterus niger alimas* Kinsey. 225. Fig. 281. Adults Apr. 16, Austin, Tex.  
Like gall of *Andricus utriculus* Ashm. Fig. 274. Empty in Oct. Tex.

Host oak unknown

"Root" galls

*Trisolieniella punctata* (Ashm.). 387. Type is a female captured at Nyack, N.Y. *Trisolieniella montana* (Beut.), a synonym of it, was captured at an elevation of 5000 ft. on Mt. Graybeard, Blue Ridge, N.Car. where red oaks grow in abundance.

Flower galls

Acorn galle

Bud galls

Stem galls

Detachable

*Amphibolips arcuata* (Kieffer). 276. ♀. Ga. Type in Berlin.  
*Andricus crassicornis* (Ashm.). 302. ♀. Fla. Gall is shaped like a single *Andricus biconicus* Weld. Fig. 197 and is partially imbedded in the twig.  
*Disholcaspis heynei* Kieffer. 342. ♀. Tex. Type in Berlin.  
*Disholcaspis persimilis* (Ashm.). 346. ♀. Miss. Type is a *Disholcaspis*.  
The gall is 8 mm. in dia. and agrees in color and structure with the common bullet gall on post oak. The host record of *Quercus marilandica* is wrong for there is no *Disholcaspis* on a red oak.

Stem with but slight or no swelling

*Bassettia floridana* Ashm. 379. ♀. Fla. Captured. Adults cut out of galls like *Loxaulus humilis* (Weld), Fig. 287 on *Quercus chapman* agree with the types.  
*Bassettia gemmae* Ashm. 380. ♀. Taken ovipositing in buds of an unknown oak at Cadet, Mo. on April 27. Females agreeing with the types have been taken ovipositing in buds of *Quercus alba* at Clinton, Ill. on April 21.  
*Bassettia pallida* Ashm. 381. ♀. Captured at Savannah, Ga. on April 15. Agreeing with the type are specimens reared from cells just under the bark of twigs of *Quercus virginiana* in Fla. in Jan. and Feb.  
*Loxaulus vaccinii* (Ashm.). 375. ♀. Reared the last of Feb. in Fla. The type must have come from an inadvertently included oak gall in breeding cage (not from the kidney-shaped chalcid gall of *Hamadas nubilipennis* (Ashm.) on *Vaccinium* spp.).

Leaf galls

*Callirhytis perplexa* (Ashm.). 464. ♀. From near St. Louis, Mo., reared Nov. 21. The galls is flat-topped, once covered with gray wool. Probably once a midrib cluster.  
*Adleria flavicollis* (Ashm.). 270. ♀. Probably from Illinois, near St. Louis.  
*Zopheroterus hubbardi* (Ashm.). 365. ♀. From Detroit, Mich. Type in U.S.N.M.  
Adults agreeing with the type have been reared from a small white ellipsoidal gall on leaves of black and scarlet oaks in fall. Fig. 308.  
*Sphaeroterus texanum* (Ashm.). 360. ♀. Captured in Texas. Length 4.3 mm. Type in U.S.N.M.

HOST PLANTS OTHER THAN OAK

Gall on *Smilax rotundifolia* - Common Green Brier  
*Smilax herbacea* - Carrion Flower

*Diastrophus smilacis* Ashm. 175. "Irregularly rounded, abrupt smooth swelling on and usually surrounding stem. Pithy, polythalamous. About one inch long by one-half inch in diameter. Adults in Jan. and Feb." Chicago, Ill. is the type locality. The writer collected in the Chicago area for many years but was never able to find it. Host record questioned.

Gall on *Fragaria virginiana* - Strawberry

*Diastrophus fragariae* Beut. 169. Fig. 320. Cylindrical enlargement of the petiole 25-30 mm. long by 3-5 mm. in dia., containing a single row of 5-20 cells. Found on wild and cultivated varieties.

Galls on *Potentilla* - Cinquefoil

Stem swellings

*Diastrophus niger* Bass. 172. Figs. 325-6. Spindle-shaped enlargements of the stem containing a dozen or more cells not in a single row.

*Diastrophus minimus* Bass. 170. Smooth oval blisters on internodes containing only one or two larval cells. Entered from literature.

*Diastrophus tumefactus* Kinsey. 176. Gall similar to niger above but on Potentilla monspeliensis var. norvegica from Quebec.

Axil gall

*Gonaspis potentillae* (Bass.). 159. Fig. 327. Globular, 8-13 mm. in dia., green in summer, bearing rudiments of leaves, fleshy, spongy when dry, one-celled.

*Gonaspis potentillae* var. *scutellaris* (Gill.). 160. Gall unknown. Captured in a wheat field, May 20 at Danville, Ill. Probably not distinct from type.

Galls on *Rubus*

On Blackberry

*Diastrophus cuscutasformis* O.S. 168. Fig. 328. Blackberry Seed Gall. Cluster of seed-like bodies closely set about the stem for several inches, on weaker canes near the ground.

*Diastrophus nebulosus* (O.S.). 171. Fig. 331. Blackberry Knot Gall. Abrupt, pithy, elongated subterminal stem swelling, 1-3 inches long by an inch in dia., longitudinally grooved, green or reddish brown, many-celled.

*Diastrophus bassetii* Beut. 167. Fig. 321. Irregularly globose, half-buried in the ground at tip of running blackberry or dewberry. Adults emerging July 7.

On raspberry

*Diastrophus turgidus* Bass. 177. Fig. 329. Abrupt stem swelling up to 65 by 30 mm. and covered with prickles.

*Diastrophus radicum* Bass. 174. Fig. 332. An irregular "root" gall on black raspberry.

Galls on *Rosa* spp. - Rose

( These species are the Rhodites of authors )

"Root" galls

*Diplolepis utahensis* (Bass.). 204. Fig. 334. Deeply incised on top, half-buried, up to 55 mm. in dia., when mature light in weight, spongy within, the larval cells deeply buried.

*Diplolepis radicum* (O.S.). 199. Fig. 332. Large dark red galls at base of Rosa carolina usually hidden by debris.

*Diplolepis fulgens* (Gill.). 190. Fig. 333. The species was described from specimens from S. Dak. but the galls were lost or confused with others. The types agree with adults reared from this root gall on Rosa blanda in the Chicago area.

#### Stem swellings

- Diplolepis dichlocerus* (Harris). 189. Fig. 322. Fusiform, up to 50 by 13 mm. covered with prickles, rarely smooth.
- Diplolepis fusiformans* (Ashm.). 191. Fig. 335. Smaller fusiform or abrupt one-sided corky enlargements of the stem, up to 30 by 7 mm.
- Diplolepis multispinosa* (Gill.). 195. Fig. 338. Abrupt, irregularly lobed, spiny subterminal stem swellings.
- Diplolepis nodulosa* (Beut.). 197. Fig. 323. Scarcely noticeable enlargement at base of lateral branches and bearing many leaf scars, the distal end of the branch dead, containing from one to five cells.
- Diplolepis verna* (O.S.). 206. Fig. 324. Rounded swellings on small branches described from the D.C. area. Nodulosa is probably a synonym of it.
- Diplolepis mayri* (Schlecht.). 194. A specimen reared from a gall on a rose in a nursery in N.J. was determined as this European species. Similar adults have been reared from a lobed terminal stem gall on Rosa rubiginosa in Ohio, the adults emerging May 12-18.

#### Leaf galls

- Diplolepis rosae* (L.). 201. Fig. 337. Mossy Rose Gall. On Sweetbriar and occasionally on Rosa rugosa. An European species on an introduced European host plant. Erodie records that the galls first appeared at Toronto in 1868.
- Diplolepis bicolor* (Harris). 188. Fig. 336. Spherical, 7-10 mm. in dia., covered with spines about as long as diameter of the gall, the leaf obliterated if the cluster is large.
- Diplolepis nebulosa* (Bass.). 196. Fig. 339. Similar but smaller, 5-6 mm. in dia, the spines weak, on under side of leaf.
- Diplolepis pustulatoidea* (Beut.). 198. Similar but smaller, 4-5 mm. in dia., wall thin, on upper side of leaf and dropping with it.
- Diplolepis ignota* (O.S.). 193. Fig. 341. Mealy Rose Gall. Globular, up to 15 mm. in dia, several often coalescing into a mass, covered with a mealy white bloom, hard, many-celled, attached on under side of leaf.
- Diplolepis gracilis* (Ashm.). 192. Fig. 340. Regal Rose Gall. Globular with a flattened top like a patty-pan squash, single or in cluster on under side of leaflets, dropping with leaf in fall.
- Diplolepis roseae-folii* (Gill.). 202. Fig. 342. Rose Lentil Gall. Lentil-shaped thickening of parenchyma, more conspicuous on under side, single or in small group, 3 mm. in dia., dropping with the leaf.

#### Gall unknown

*Diplolepis rubicola* (Kieffer). 203. "Probably North American."

Gall on *Nepeta* L. - Oat Mint, Ground Ivy

*Liposthenes glechomae* (L.). 178. Fig. 344. Globular, green, fleshy, 8-11 mm. in dia., turning brown in August. An introduced European species on an introduced European host plant, Nepeta hederacea, Gill-over-the-ground.

Galls on *Silphium* L. - Rosin Weed, Compass Plant

*Antistrophus laciniatus* (Gill.). 162. Fig. 348. Galls hidden among the disk florets in flower head and found only when the head is broken open

*Antistrophus rufus* Gill. 165 and

*Antistrophus minor* Gill. 163. Fig. 347. Oells hidden in stem of Silphium laciniatum.

*Antistrophus silphii* Gill. 166. Fig. 353. Club-shaped subterminal stem swelling on stem of Silphium perfoliatum.

*Antistrophus bicolor* Gill. 161. Described from one specimen from Normal, Ill. The type in Ill. Nat.Hist.Sur. bears the date July 6, 1884. Accession catalogue says: "From Silphium integrifolium."

Gall on *Ambrosia* L. - Ragweed

*Aulacidea ambrosiaeicola* (Ashm.). 161. "Issued Oct. 18 and Jan. 15." No galls were sent with the types to the U.S. Natl. Mus. From Kirkwood, Mo. No cynipid gall has since been found on this host plant.

Gall on *Taraxacum* - Dandelion

*Gillettea taraxaci* Ashm. 187. Fig. 343. Fusiform enlargements of petiole, along midrib or at base of peduncle. An European species on an introduced European host plant, *Taraxacum officinale*.

Galls on *Lactuca* L. - Wild Lettuce

*Aulacidea tumida* (Baes.). 186. Fig. 345. Fusiform pithy stem swellings high on the stem of *Lactuca canadensis*, bearing many leaves or branches. Dia. up to 30 mm.

*Aulacidea annulata* Kinsey. 182. Fig. 346. From Sharon, Mass. Doubtfully distinct from the above.

*Aulacidea podagrae* (Pass.). 185. Fig. 352. Knotty enlargements scattered along stem at bases of leaves. On *Lactuca canadensis*.

*Aulacidea harringtoni* (Ashm.). 183. Fig. 350. H.L. Viereck "could see no difference between the type, captured at Ottawa, and paratype of *mulgeiicola* "reared from cells in the pith of *Lactuca villosa* (= *Mulgedium acuminatum*).

*Aulacidea abdita* Kinsey. 180. Fig. 351. This species was described from adults cut out of cells in the pith of *Lactuca elongata* from Quebec. Doubtfully distinct from the above.

Gall on *Lygodesmia*

*Antistrophus piceus* Ashm. 164. Fig. 349. Pea-shaped galls scattered along stems of *Lygodesmia juncea* in autumn in N. Dak., S. Dak., Kan., Nebr., Wyo., Mo., Colo.

Gall on *Prenanthes*

*Aulacidea nabali* (Brodie). 184. Fig. 354. Abrupt, hemispherical swellings just below surface of ground at base of plant so grouped often as to surround the stem. Has consistency of a raw potato in summer, pithy in fall.

Galls unknown - Host Plant Unknown.

*Aylax 5-costatus* Prov. 179. "Type not located" in Public Museum in Quebec (1917).  
*Diastrophus piceus* Prov. 173. Type in Public Museum in Quebec (1917).



## COLLECTING GALLS

The beginner in the study of the gall-making cynipids is handicapped and often discouraged by lack of published information as to the date of emergence of the maker of the gall. Not knowing what time of year to collect the galls to get the maker he gets nothing at all or rears only guests and a great variety of chalcids and other parasites. Some general suggestions from the writer's experience are thought to be of value to the amateur.

Galls occur on a great variety of plants and are caused by mites as well as by many kinds of insects: plant lice, psyllae, gall midges, trypetid flies, moths, beetles, sawflies as well as by the true gall flies (cynipids). It is with the last that we are here concerned and their galls are restricted to only a few host plants, mainly oaks, roses, with a few on composites. In the cynipid galls the larvae are always in closed cavities. The larvae are never hairy as in the case of the chalcid. Larvae of guest cynipids are not to be distinguished from those of the maker.

There are two main periods in the year for collecting cynipid galls. Those on the few herbaceous plants like *Lactuca* or *Silphium* may be collected in the fall if they can be put where they will not dry out during the winter but are better left out in the open over winter and brought into the laboratory in the spring. A pasteboard box with a vial in one side makes a good breeding cage. The galls on *Rubus* may be treated the same way.

The succulent vernal galls on the leaves, buds and flowers of oak, however, must be left on the tree until the larvae within have used up all the nutritive layer and it is a matter of leaving them some days or at most but a few weeks longer. When the larvae are full-grown, or better have changed to pupae, twig bearing such galls can be put in a bottle of water with cotton plugged tightly around the stems at the mouth of the bottle so that the emerging flies can not get into the water. This bottle is set into a battery jar with muslin over the top - if under a bell-jar condensation water will wet the wings and spoil the specimens. If flower galls are not gathered until pupae are inside a small pill-box is a sufficient breeding cage. From these vernal galls come active, fully-

winged adults of both sexes whose adult life is short.

The more solid and usually more conspicuous autumnal galle on oak, maturing and dropping just before or with the leaves, contain at that time when they are usually gathered a scarcely visible larval cavity in a thick translucent nutritive layer which is used up slowly during the winter. Such galls must be kept under more or less natural conditions out-of-doors in some sort of breeding cage. Select a shady spot in the woods or under shrubs in the garden where there is a deep layer of leaf mold safe from molestation and from fire. Mice and squirrels are apt to destroy collections unless some sort of wire cage is used. A convenient one can be made from a square or oblong piece of fine-mesh copper screening. Fold over a half inch at each end. Roll into a cylinder and solder the long seam. A cork in each end completes a cage. It should be made in several sizes. The label inside should give locality, date and host on durable paper in waterproof ink, then dipped in melted paraffin or better, enclosed in a well-corked 7 by 25 mm. vial. The year of collection should not be omitted in the date. Two winters often pass before any adults emerge and then some may emerge each spring for several years. Larvae transform in the fall before they emerge and remain in the gall as adults during the winter to come out when conditions are suitable in the spring. Adults from galls of this type are all agamic females and comparatively long-lived often surviving for a month in captivity.

Many species emerge normally in late fall, for example all the species of the genus *Disholcaspis* (whose galls on twigs are in general bullet-like, detachable but not deciduous). The adults are all agamic females. Such galls indoors often become so dry and hard the adults are not able to chew their way out and it is better to cut them out. In this case let them crawl about in a muslin-covered bottle for a few days until the body wall takes on its normal coloration instead of killing them at once. Some woody stem swellings on oak soon become so hard the flies have to be cut out. If very old twigs containing dead adults are soaked in water over night the adults can be cut out with less danger of damage and the wings can be straightened out on a slide and left to dry before mounting.

## MOUNTING

Cynipids should be mounted on their left sides on points with the dorsal side away from the pin. Points should be short enough so that a 2/3 objective can be focused down on the face if necessary. If Duco is used instead of shellac, the specimen can be removed clean in Amyl acetate and remounted if that ever becomes necessary. It saves time if the insect is oriented on table on its right side, head toward one, then the point, held in forceps, is touched to medium and then to insect. After it sets the point is pinned. Labels should include locality, date, host and an identifying field-note number. Labels can be written by hand in waterproof ink or printed from small hand-set type on a heavy rag paper with enough bearing on the pin so that it will not wobble about. Or a typed page of names of oaks can be reduced by photography to a width of about 65 mm. This gives an individual label about 8-10 mm. long.

A typed page of localities can be similarly reduced leaving only the date to be filled in with a pen. Prints from these negatives should be made on double-weight glossy paper. The bodies of some large pubescent forms, especially species of *Disholcaspis*, contain much fat which in time breaks down into glycerine which wets the hair and obscures the sculpture. Before mounting such kinds should be degreased in ether.

Cynipid galls have so many guests and parasites that one should gather a large quantity of each kind to be sure of rearing the maker. A single gall, occasionally collected, is seldom worth the trouble of placing in rearing. It may be the normal reaction of the plant to the stimulus of the cynipid maker or it may be quite abnormal if that structure has been modified during its development by the attacks of guests and parasites. Here field experience helps. If the thing occurs in numbers, on different trees in different localities it is probably a normal gall. Collecting of value requires definite search for quantities of material with the object of rearing in view. In the field one can not hope to keep each kind separate. It is better to have a receptacle for the galls from each kind of oak liable to be seen in the locality and then sort them out to species for rearing at home. When gathering galls from the ground under a tree

care must be taken that only one kind get into a breeding cage.

There are 72 kinds listed herein which have never yet been reared. Fifty-eight of these are figured. They have been included under the respective oaks in the host index and also in the Notes on Illustrations. Described species are apt to have been the more conspicuous autumnal kinds which produce agamic females. Little collecting has been done, and that at one season only, on Q. muehlenbergii or Q. michauxii or on Q. prinoides. The early spring galls of Florida and the Gulf Coast are little known and it is here one would expect to find the alternating form of the known agamic forms. These vernal forms complete their development in a few weeks at most and then dry up and disappear. The Genus *Disholcaspis* with a dozen species in the area is known from agamic females only which emerge in late fall from detachable stem galls on white oaks. Where they oviposit is not known nor is the alternating generation for any one of the species known. Yet such an alternate undoubtedly exists in an entirely different sort of gall on young leaf, bud or flower. Life history problems of this sort can be worked out only by those who live year after year in the same place with ready access to native vegetation.

On sunny days in spring just as the winter buds on the oaks are beginning to swell another sort of collecting may be had in an area where sprouts from stumps are a few feet high so that large buds are within easy reach. Females may be found ovipositing in these buds and may be picked off with the fingers. Keep those from each kind of oak separate (in vial of 70 % alcohol), at least keep those from red oaks separate from those from white oaks. They may be run to genus in the key but not to species. The writer would like to see such. Cases are known where a species has been thus taken in numbers but the gall from which they came was not discovered nor was the gall which the oviposition produced. Buds in which females are ovipositing can be marked with a bit of colored string and visited later to see what developed.

Still another kind of collecting is possible in early winter (late December or early January) on snow on sunny days when thawing has revealed scattered bare areas. Several species have been "taken on snow."

List of the 282 oak gall makers described from the area arranged by part of the plant on which the galls occur.

#### "Root" galls

##### On rootlets

*Callirhytis elliptica* Weld. 423. Fig. 33.  
*Callirhytis ellipsoida* Weld. 422. Fig. 37.  
*Callirhytis perrugosa* Weld. 465.

##### Fleshy, white, in clusters at crown in early spring

*Xanthoteras radicola* (Ashm.) sex.gen. 247. Fig. 51.  
*Belonocnema treatae* Mayr. 355. On *Q. virginiana*. Gall similar to above.

##### Bullet galls in cluster at base of sprouts

*Disholcaspis globosa* Weld. 341. Fig. 50. On white oak.  
*Disholcaspis brevinota* Weld. 338. Fig. 285. On *Q. brevilooba*. Tex.  
*Disholcaspis terrestris* Weld. 351. Fig. 36. On post oak.

##### Large rounded mass containing many cells

*Holocynips maxima* (Weld). 391. Fig. 44. On white oak.  
*Eumayria floridana* Ashm. 382. Fig. 42. On red oak.  
*Odontocynips nebulosa* Kieffer. 389. Fig. 38. On post oak.

##### Large, made up of many separate cells

*Dryocosmus favus* Beut. 395. Figs. 46-7. On red oaks.  
*Trisoleniella enigma* (Weld). 386. Figs. 34-5. On red oaks.

##### One-celled, single or in small group

*Holocynips badia* (Bass.). 390. Figs. 41, 52. On white oaks.  
*Sphaeroterus caepuliforme* (Beut.). 356. Fig. 31. On red oaks.  
*Callirhytis ovata* Weld. 456. Fig. 49.  
*Sphaeroterus ocala* (Weld). 359. Fig. 286. Fla.

##### Greatly thickened bark at crown

*Loxaulus illinoisensis* (Weld). 372. Fig. 43.  
*Callirhytis futilis* (O.S.) agamic. 434. Fig. 45. On white oak.  
*Callirhytis marginata* Weld. 446.  
*Callirhytis rubida* Weld. 473. Fig. 40.  
*Neuroterus contortus* (Weld). agamic. 211a. Fig. 32.

##### Slight swelling at base of sprouts, containing a few cells.

*Loxaulus humilis* (Weld). 371. Fig. 287. On *Q. chapmani*. Fla.  
*Bassetia floridana* Ashm. 379. Fla.  
*Loxaulus pattersoni* (Kinsey). 374. Tex.

#### Flower galls

##### Woolly, on red oaks

*Callirhytis operator* (O.S.) sex.gen. 455a. Fig. 58.  
*Callirhytis turneri* (Ashm.). 484. On *Q. nigra*. Similar to above.

##### Enlargement of the staminate axis

*Neuroterus exiguus* Bass. 217. On post oak.  
*Neuroterus evanescens* Kinsey. 215. On *Q. brevilooba*. Tex.

##### Globular containing several cells

*Callirhytis pulchra* (O.S.). 470. Fig. 57. Smooth, bare.  
*Callirhytis parva* Weld. 457. On shingle oak, Pubescent.

##### Small, thin-walled, one-celled

*Callirhytis exigua* (Bass.). 426. Fig. 54. On white oak.  
*Callirhytis florensis* Weld. 429. Fig. 288. On black jack oak.  
*Callirhytis blastophaga* (Ashm.). 410. On *Q. cinerea*.  
*Callirhytis clarkel* (Bass.). 411. On scrub oak. Resembles a blackberry.  
*Callirhytis myrtifoliae* (Beut.). 451. Fig. 56. Fla.  
*Neuroterus pallidus* Bass. 227. Ovoid, in dense cluster, on swamp white.

#### Acorn galls

##### Cell in a depression in side of acorn cup

*Andricus incertus* Bass. 312. Fig. 77. On swamp white oak.  
*Callirhytis glandulus* (Beut.). 438.

- Plum galls, large, globular, attached to side of acorn cup  
*Amphibolips prunus* Cresson. 291. Fig.59. On red oak.  
*Amphibolips gainesi* Bass. 283. Fig.61. On *Q.marilandica*.  
*Amphibolips fuliginosa* Ashm. 282. On willow oak.
- Stone galls inside a mature acorn in the fall  
*Callirhytis fructuosa* Weld. 432. Fig.70. On red oaks.  
*Callirhytis fructicola* Ashm. 431. Gall similar to above. On red oaks.  
*Callirhytis corrugis* (Bass.). 416.  
*Callirhytis petrosa* Weld. 466. On *Q.cinerea*.  
*Callirhytis slectra* Weld. 421. Fig.291. On *Q.prinus*.  
*Callirhytis lapillula* Weld. 444. Fig.71. On swamp white oak.
- Fip galls, beside mature or immature acorns, inside the acorn cup  
*Callirhytis operator* (O.S.) agamic. 455b. Fig.65. Red oaks, Fall.  
*Callirhytis balanopsis* Weld. 406. Fig.76. In fall.  
*Callirhytis balanaspis* Weld. 404. Fig.68. On *Q.marilandica*. Fall.  
*Callirhytis hopkinsi* Weld. 440. Fig.69. On *Q.imbricaria*. Fall.  
*Callirhytis balanacea* Weld. 403. Fig.64. On pin oak. Fall.  
*Callirhytis perditor* (Bass.). 462. Fig.74. Secretes honeydew, In spring.  
*Callirhytis malanosa* Weld. 407. Figs.75,78. Secretes honeydew. Spring.  
*Callirhytis middletoni* Weld. 459. Fig.62. On willow oak. In May.  
*Callirhytis subcostata* Weld. 480. Fig.290. On post oak. Ribbed. May.  
*Callirhytis balancidss* Weld. 405. Fig.72. On black oak. In fall.

#### Bud galls

##### In spring

- Acraepis erinacei* (Beut.) ssp.gen. 250b. Fig.80. On bud scales.  
*Acraepis gemula* (Bass.). 251. Fig.108. At end of new growth. White oak,  
*Neuroterus vesicula* (Bass.). 238. Fig.82. Brown, bare.  
*Neuroterus affinis* (Bass.). 207. Partly hidden by bud scales. Fig.83 ?  
*Philonix pallipes* (Bass.). 265. Like Fig.108 with strap-like bodies.  
*Andricus pisiformis* Beut. 322. Figs.85-8. Mottled.  
*Liadora clarkei* (Bass.). 267. Globular, 5 mm., many-celled.  
*Andricus flavohirtus* Beut. 306. Figs.100,101. On swamp white oak,  
*Callirhytis oblata* Weld. 453. Fig.292. On scarlet oak.  
*Callirhytis cressoni* (Beut.). 417. Hidden by bud scales, Tex.  
*Neuroterus minutus* (Bass.). 224. Fig.105. On white oak.  
*Callirhytis rugulosa* Beut. 475. Fig.93. On scarlet and black oaks. May.  
*Trisoleniella saltata* (Ashm.). 388. Fig.96. On Spanish oak. Apr.  
*Andricus ellipsoidalis* (Weld). 304. Fig.94. On scarlet and black oaks.  
*Andricus murtsfeldtae* Ashm. 318. Fig.98. Terminal. On post oak, Apr.  
*Amphibolips globus* Weld. ssp.gen. 285. Fig.294. On pin oak.  
*Amphibolips citrifformis* Ashm. 278. Fig.250. On willow oak. Fla.  
*Amphibolips acuminata* Ashm. 275. Fig.112.  
*Amphibolips melanocera* Ashm. 288. On water oak.

##### In fall

- Andricus mamilliformis* (Weld). 316. Fig.89. On white oak.  
*Callirhytis gemmiformis* (Beut.). 437. Fig.91. On white oak.  
*Andricus deciduatus* Weld. 303. Fig.92. On swamp white oak.  
*Callirhytis glomerosa* Weld. 439. Fig.114. On red oaks.  
*Andricus stropus* Ashm. 327. Figs.109-110. On post oak.  
*Callirhytis gallaestriatae* Weld. 435. Fig.107. On red oaks.  
*Callirhytis cinnamomeus* Ashm. 300. Fig.293. On *Q.chapmani*. Fla.  
*Callirhytis cryptica* Weld. 419. On *Q.myrtifolia*. Fla.  
*Andricus foliatus* (Ashm.). 309. Fig.111. On live oak. Fla.  
*Amphibolips globus* Weld agamic. 285. Fig.294.  
*Amphibolips cookii* Gill. 281. Fig.84. Spotted. On red oaks.  
*Amphibolips tinctoriae* Ashm. 295. Fig.103. Flanged.  
*Amphibolips murata* Weld. 289. Fig.115.  
*Amphibolips spinosa* Ashm. 293. Fig.99. On *Q.laurifolia*.  
*Amphibolips globulus* Beut. 284. Fig.102. On black jack oak.

## Stem galls

## Stem swellings

- Abrupt, fleshy, on new growth  
*Neuroterus quercus-batatus* (Fitch) sex.gen. 230. Fig.125. Pale bloom.  
*Callirhytis scitula* (O.S.). 476. Fig.119. On new growth, Red oaks.
- Abrupt, woody, large, covered with normal bark  
*Neuroterus quercus-batatus* (Fitch) agamic. 230. Fig.125.  
*Neuroterus noxiosus* (Bass.). agamic. 226b. Fig.121. On swamp white oak.  
*Callirhytis cornigera* (O.S.). 415. Fig.117. Horned Knot Gall.  
*Callirhytis clavigera* (Ashm.). 412. Fig.116.  
*Callirhytis punctata* (O.S.). 471. Fig.129. Oak Knot Gall.  
*Callirhytis seminosa* (Bass.). 478. Fig.128.  
*Callirhytis batatoides* (Ashm.). 408. Fig.135. On live oak. Fla.  
*Callirhytis clavula* (O.S.). 413. Fig.122. Oak Club Gall. White oak.  
*Callirhytis floridana* (Ashm.). 430. Fig.132. On post oak,  
*Callirhytis similis* (Bass.). 479. Fig.120. On scrub oak.  
*Callirhytis medullas* (Ashm.). 448. Fig.134.  
*Loxaulus mamilla* Mayr. 375. Fig.295. On white oak. May.  
*Neuroterus consimilis* Bass. 210. Fig. 118. On white oak.  
*Neuroterus contortus* (Weld) agamic. 211a. Fig.32. *Q.breviloba*. Tex.  
*Neuroterus rileyi* Ashm. 231. Fig.296. On rock chestnut oak.
- Slight enlargement  
*Callirhytis tuberosa* (Bass.). 481. Fig.299. On scrub oak. June.  
*Callirhytis phellos* (Ashm.). 467. Fig.124. On willow oak. May.  
*Neuroterus distortus* Bass. 212. Fig.123. On swamp white oak.  
*Callirhytis elongata* (Kinsey). 424. On *Q.breviloba*, stellata. Tex.  
*Bassetia oosproptroides* (Bass.). 378. At base of new growth. Black oak,  
*Bassetia aquatica* (Ashm.). 376. At base of small twigs. Water oak.  
*Eumayria longipennis* (Ashm.). 384. Fig.300. *Q.laurifolia*, On new wood.  
*Acraspis longicornis* (Bass.). 255. On very young shoots. On post oak.  
*Neuroterus tectus* Bass. 234. On *Q.prinoides*.

## Detachable

## Bullet galls

- Disholcaspis quercus-globulus* (Fitch). 348. Round Bullet Gall.  
*Disholcaspis mamma* (Cresson). 343. Fig.135. Pointed Bullet Gall.  
*Disholcaspis bassetti* (Gill.). 337. Fig.160. On swamp white oak.  
*Disholcaspis omnivora* (Ashm.). 344. Fig.140. Fla.  
*Disholcaspis pattersoni* Kinsey. 345. Fig.138. On *Q.breviloba*. Tex.  
*Disholcaspis pruniformis* Kinsey. 347. Fig. 150. On *Q.breviloba*. Tex.  
*Disholcaspis cinerea* (Bass.). 339. Fig.142. On live oak. Tex.  
*Disholcaspis virans* (Ashm.). 352. Fig.143. On live oak. Fla.  
*Disholcaspis fungiformis* Kinsey. 340. Fig.298. On live oak. Tex.  
*Disholcaspis suocinipis* (Ashm.). 350. 3-6 mm. in dia. On live oak. Fla.  
*Disholcaspis haynei* Kieffer. 342. Tex. Gall unknown.  
*Disholcaspis persimilis* (Ashm.). 346. 8 mm., rugose. Miss.  
*Dryocosmus imbricariae* (Ashm.). 397. Banded Bullet Gall. On red oaks.

## Terminal cluster of angular galls

- Disholcaspis spongiosa* (Karsch). 349. Fig.148. With rusty surface.  
*Adleria strobilana* (O.S.). 272. Figs.151-3. On swamp white oak. Fall.  
*Andricus coronus* Beutt. 301. On pin and willow oak. In May.  
*Andricus maxwelli* Base. 317. Tex. Galls resemble those of Fig.98.

## Larval cell supported by radiating fibers

- Amphibolips cinerea* Ashm. 277. Fig.149. Fla. In Apr.  
*Amphibolips acuminata* Ashm. 275. Fig.112. In May-June.  
*Amphibolips arcuata* (Kieffer). 276. Ga. Gall unknown

## Single, not large

- Dryocosmus floridensis* (Beut.). 396. Fig.297. Rosette of green bracts.  
*Andricus indistinctus* Bass. 314. Round, smooth, 5 mm. On white oak.

## Otherwise

- Xanthoteras forticorne* (O.S.). 244. Fig.136. Oak Fig Gall.  
*Callirhytis seminator* (Harris). 477. Fig.137. Oak Seed Gall.  
*Callirhytis gemmaria* (Ashm.). 436. Figs.153-6. On red oaks. Spring.

*Callirhytis difficilis* (Ashm.). 420. Fig. 139. Fla.  
*Callirhytis ventricosa* (O.S.). 485. Figs. 144-5.  
*Callirhytis excavata* (Ashm.). 425. Figs. 154, 282.  
*Andricus formosus* (O.S.). 510. Fig. 147.  
*Andricus aciculatus* Bout. 296. Fig. 146.  
*Andricus crassicornis* (Ashm.). 502. Gall shaped like Fig. 197.  
 Cells hidden under bark, little or no deformation evident  
*Callirhytis medullaris* Weld. 447. Fig. 166. Cells in pith.  
*Callirhytis crypta* (Ashm.). 418. Figs. 162, 501. Cell in the wood.  
*Bassettia catesbaei* (Ashm.). 577. Cells in the wood.  
*Bassettia floridana* Ashm. 579. Cells nested at base of sprouts.  
*Bassettia gemmae* Ashm. 580. Host and gall unknown.  
*Bassettia pallida* Ashm. 581. Fig. 519. Gall on live oak. Mo., Fla.  
*Bassettia ceropteroidea* (Bass.). 578. At base of annual growth.  
*Eumyria invia* Weld. 585. On *Q. myrtifolia*. Fla.  
*Neuroterus eucharonis* Weld. 214. Fig. 172. Cell under leaf scar.  
*Neuroterus tectus* Bass. 254. On *Q. prinoides*. June. 2nd entry.  
*Loxaulus vaccinii* (Ashm.). 575. Gall unknown. Not on *Vaccinium*.

#### Leaf galls

##### Detachable

##### Oak apples

*Amphibolips inanis* (O.S.). 287. Fig. 175. Empty Oak Apple.  
*Amphibolips centricola* (O.S.) 332. Fig. 178. On post oak.  
*Atrusca cava* (Weld). 331. Fig. 179. On *Q. brevilooba*. Tex.  
*Xanthoterus politum* (Bass.). 245.  
*Andricus femoratus* Ashm. 505. Fig. 177.

##### Like a green grape

*Amphibolips nubilipennis* (Harris). 290. Fig. 509.  
*Amphibolips racemaria* Ashm. 292. On *Q. laurifolia*. Fla.

##### Acraeopsis galle

*Acraeopsis orinaeaei* Bout. agamic. 250a. Fig. 187. Hedgehog Gall.  
*Acraeopsis pezomachoides* (O.S.). 257. Fig. 186.  
*Acraeopsis hirta* (O.S.). 255. Fig. 188.  
*Acraeopsis macrocarpa* Bass. 256. Fig. 184.  
*Acraeopsis prinoides* (Bout.). 258. On *Q. prinoides*.  
*Acraeopsis villosa* Gill. 259. Fig. 185. On bur oak.  
*Acraeopsis echini* Ashm. 249. On *Q. bicolor*. Fla.

##### Globular, one-celled, cell surrounded by a thick spongy layer, in fall

*Philonix nigra* (Gill.). 263. Fig. 228.  
*Philonix gigas* Weld. 261. Fig. 229. Mo. and Tex.  
*Philonix lanaglobuli* (Ashm.). 262. On "Q. bicolor." Fla.  
*Sphaeroterus carolina* (Ashm.). 357. Fig. 254.  
*Sphaeroterus unicum* (Weld). 361. Fig. 252.  
*Sphaeroterus melleum* (Ashm.). 358.  
*Belonocnema fossaria* Weld. 355. Fig. 250. On live oak. Fla.  
*Belonocnema kinseyi* Weld. 354. Calls similar to the above. Tex.  
*Callirhytis attigum* Weld. 402. Fig. 251. On *Q. texana*. Tex.

##### Pure white, depressed sphere or ellipsoid, single, in late fall

*Dryocosmus albidus* Weld. 392. Figs. 242, 512. On scarlet and black oaks.  
*Phylloterus rubinum* (Gill.). 259. Fig. 311. On white oak.  
*Zopheroterus compressum* (Gill.). 362.  
*Zopheroterus hubbardi* (Ashm.). 365. Fig. 308.

##### Single, small, in late fall, of various shapes

*Zopheroterus sphaerula* Weld. 366.  
*Zopheroterus guttatum* Weld. 364. Fig. 248. On pin oak.  
*Liodora apiarium* Weld. 266. Fig. 304. On white oak.



*Xystoteras volutellae* Ashm. 243. On bur oak. Kansas. Like Fig. 247.  
*Zopheroteras cuneatum* Weld. 363. Fig. 2355.  
*Phylloterae sigma* Weld. 240. Fig. 241.  
*Dryococcinae rileyi* (Ashm.). 401. Fig. 237.

#### Midrib slumbers

*Adleria dimorpha* (Beut.). 269. Fig. 194.  
*Adleria weldi* (Beut.). 274. Fig. 193.  
*Adleria vacuiformis* (Beut.). 273. On post oak. Tex.  
*Andricus capillatus* (Weld). 298. Fig. 199.  
*Adleria nigricens* (Gill.). 271. Fig. 195.  
*Andricus robustus* Weld. 324. Fig. 204.  
*Andricus rugatus* Weld. 325. Fig. 198.  
*Andricus bicinctus* Weld. 297. Fig. 197.  
*Andricus flocci* (Bass.). 307. Fig. 208. Woolly. On white oak.  
*Andricus pattoni* (Bass.). 320. Similar to above. On post oak.  
*Andricus laniger* Ashm. 315. Fig. 210. Woolly. On live oak. Fla.  
*Andricus ignotus* (Bass.). 311. Fig. 207. Woolly.  
*Callirhytis infusata* (Ashm.). 442. Woolly. See Fig. 209.  
*Callirhytis furva* Weld 433. Fig. 212. Woolly.  
*Callirhytis lanata* (Gill.). 443. Fig. 206. Woolly.  
*Callirhytis lustrans* (Beut.). 445. Fig. 203.  
*Callirhytis piperoidea* (Bass.). 469. Fig. 201.  
*Loxaulus beutenmulleri* Weld. 369. Gall similar to Fig. 201.  
*Dryococcus deciduus* (Beut.). 394. Fig. 205.  
*Callirhytis perplexa* (Ashm.). 464. Woolly. Mo. See Fig. 209.  
*Zopheroteras vaccinii* (Ashm.). 367. On post oak. D.C.

#### Spangle galls

*Xystoteres poculum* Weld. 242. Figs. 214-6.  
*Neuroterus tantulus* Weld. 233. Fig. 306.  
*Neuroterus saltarius* Weld. 232. Figs. 225-6. On bur oak.  
*Neuroterus saltatorius texanus* Kinsey. 232. Fig. 244. On live oak. Tex.  
*Neuroterus umbilicatus* Bass. 235. Figs. 217, 314.  
*Xystoterae nigrum* (Pitch). 241. Fig. 307. Gall was unknown. Q. alba.

#### Miscellaneous

*Callirhytis tubicola* (O.S.) 482. Fig. 240.  
*Adleria flavicollis* (Ashm.). 270. Gall unknown. Ill.  
*Sphaeroterae texenum* (Ashm.). 360. Gall unknown. Tex.

#### Integral

##### Oak Apple

*Amphibolips confluenta* (Harrie). 280. Fig. 174. Spongy Oak Apple.  
*Amphibolips spongifica* (O.S.). 294. Gall like Fig. 174.  
*Andricus singularis* (O.S.). 326. Fig. 176.  
*Andricus oetenuckenii* (O.S.). 319.

##### Gall on a prolongation of a vein

*Amphibolips coelebs* (O.S.). 279. Fig. 191.  
*Amphibolips ilicifolia* (O.S.). 286. Fig. 192.  
*Andricus chinquapin* (Pitch). 299. Fig. 189.  
*Callirhytis pedunculata* (Bass.). 461. Fig. 190.

##### Pustules in very early spring

*Neuroterus clarkeae* Beut. 209. Fig. 315. May. On white oak.  
*Liodora comata* Weld. 268. Fig. 316. May. On white oak.  
*Neuroterus bassettii* D.T. 208. On white oak.  
*Andricus utriculus* Ashm. 328. Fig. 270.

Midrib or petiole thickenings

- Andricus petiolicola* (O.S.). 321. Fig.256.  
*Andricus foliaformis* Gill. 308. Fig.259.  
*Callirhytis pigra* (Bass.). 468. Fig.257.  
*Callirhytis tumiflca* (O.S.). 483. Fig.255.  
*Callirhytis nigrae* (Ashm.). 452. Fig.254.  
*Callirhytis flavipes* (Gill.). 428. Midrib swelling. On bur oak.  
*Xanthoteras ornatum* (Kinsey). 246. On *Q.breviloba*, Tex.  
*Neuroterus gilllettei* Bass. 220. On post oak. Conn.  
*Neuroterus vernus* Gill. 236. On bur oak. Iowa.

Parenchyma thickenings

- Neuroterus majalis* (O.S.). 222. Fig.260. On white oak.  
*Neuroterus irregularis* (O.S.). 221. Similar to above. On post oak.  
*Neuroterus noxiosus* (Bass.) sex.gen. 226a. Fig.121.  
*Neuroterus fugiens* Weld. 219. Fig.318. On swamp white oak. May.  
*Neuroterus perminimus* Bass. 229. Fig.266. On white oak. In fall.  
*Neuroterus papilloeus* Beut. 228. Fig.271. On swamp white oak. In fall.  
*Neuroterus niger* Gill. 225. Fig.269. On white oak. In fall.  
*Neuroterus niger alimas* Kinsey. 225. Fig.281. On live oak. In fall.  
*Neuroterus niger pattersoni* Kinsey. 225. On post oak. In fall.  
*Callirhytis futilis* (O.S.) sex.gen. 434. Fig.261.  
*Callirhytis modesta* (O.S.). 450. Fig.265.  
*Callirhytis bipapillata* Weld. 409. Figs.267,317.  
*Callirhytis rugosa* (Ashm.). 474. Figs.262-3.  
*Callirhytis favosa* (Bass.). 427. Cross-section suggests a honeycomb.

With a free-rolling cell inside

- Dryocosmus palustris* (Ashm.). 400. Fig.181.  
*Dryocosmus laurifolias* (Ashm.). 398. Similar to above on *Q.laurifolia*.  
*Dryocosmus cinerea* (Ashm.). 393. Fig.183.  
*Dryocosmus notha* (Ashm.). 399. Fig.182.  
*Callirhytis confusa* (Ashm.). 414. Like Fig.183. On *Q.laurifolia*.  
*Callirhytis quercifolias* (Ashm.). 472. On *Q.catesbaei*. Fla.

Woolly galls in numbers on leaf in fall

- Neuroterus floccosus* (Bass.). 218. Fig.272.  
*Neuroterus verrucarum* (O.S.). 237. Fig.310.  
*Neuroterus exigulissimus* Bass. 216. On white oak.  
*Neuroterus minutissimus* Ashm. 223. On live oak.

Gall unknown

Probably at crown or on roots

- Trisolieniella brevicornis* (Beut.). 385.  
*Trisolieniella punctata* (Ashm.). 387.  
*Philonix fulvicollis* Fitch. 260.  
*Philonix nigricollis* Fitch. 264.  
*Callirhytis perrugosa* Weld. 465.

Probably stem or leaf galls

- Neuroterus dubius* Bass. 213. On *Q.stellata*. Type found in box.  
*Andricus incognitus* Weld. 318. On *Q.stellata*. Type found in box.  
*Andricus pulchellus* Bass. 323. On *Q.prinoides*. Ovipositing in buds.  
*Loxaulus ferrugineus* (Gill.). 370. On one of red oaks. Iowa.  
*Sphaeroterus texanum* (Ashm.). 360. Captured. Texas.  
*Baeoettia gemmae* Ashm. 380. Host unknown. Mo.  
*Callirhytis intersita* Weld. 442. Ovipositing in internode. *Q.alba*.  
*Callirhytis obtusilobae* (Bass.). 454. On post oak. Conn.  
*Callirhytis perobscura* Weld. 463. Ovipositing in buds of black oak.

NOTES ON ILLUSTRATIONS OF GALLS

All the described (and many undescribed) species of the area are included in the list (not all are figured), arranged by part of plant affected, together with notes on hosts, rearing records and biology.

The galls were originally photographed either natural size or X 5. As here reduced those marked X 1 are now about two-thirds and those X 5 are about three times natural size.

After each named species is: the magnification; the number in the Synoptic List; the name of the oak; a list of the other oaks on which the species occurs. The host from which the species was described was often stated in the original description and sometimes the date of the emergence of the types. Here for the benefit of the amateur it is stated whether the emergence is to be expected the first spring or not until the second and whether the emergence is then distributed over several seasons. Pupae usually transform in the fall before the emergence takes place and adults can often be cut out of the galls in the fall. Adults were alive when cut out on a date mentioned. Date of cutting out dead adults is of little significance. These notes may guide one as to the time of year to collect galls, otherwise one may rear only guests and parasites.

DC indicates the general vicinity of Washington, D.C.

Chi indicates the Chicago area where much of the writer's rearing was done.

"Root" galls

31. *Sphaeroterus caespuliforme* (Beut.). X 1. 356. On *Q. rubra*. Also on *Q. velutina*, *marilandica*, *ilicifolia*, *falcata*, *cinerea*, *catesbaei*, *myrtifolia*, *texana*, *laurifolia*. Galls are full-grown by Aug. 1, contain pupae by Sept. 1 and adults by Oct. 3 (Chi). Adults emerged Nov. 23-Dec. 2 (all females). Alternating generation unknown.
32. *Neuroterus contortus* (Weld) agamic. X 1. 211a. On *Q. brevilooba*. Also on *Q. stellata*. Galls contained pupae on Oct. 30 and adults were cut out Dec. 12 (Austin, Tex.). The similar gall of the sexual generation is said to develop quickly in the spring, adults emerging Apr. 3.
33. *Callirhytis elliptica* Weld. X 5. 423. On rootlets of *Q. alba*. Contained adults Oct. 31 (DC). Adults were seen ovipositing in the buds of white oak in different years on Mar. 26, 28, Apr. 3, 9, 18, 19, 20. Some such buds were marked but what gall (if any) resulted was never determined. This is perhaps a synonym of *Callirhytis ellipsoida* Weld.
34. *Trisolieniella enigma* (Weld). X 1. 386. On *Q. catesbaei*. Also on *Q. myrtifolia*, *rubra*, *nigra*, *texana*. Fig. 35 is of individual galls from a disintegrated old specimen. Galls may take two years to develop. Adults can be cut out Nov. 1 (Fla.); Oct. 22 (Chi). Normal emergence date unknown.
36. *Disholcaspis terrestris* Weld. X 1. 351. On *Q. stellata*. Also on *Q. margareta*. Adults were alive in out-of-door breeding cage on Dec. 18, the thermometer having registered -14°F on Dec. 10 (Chi).
37. *Callirhytis ellipsoida* Weld. X 1. 422. On *Q. bicolor*. Galls probably take two years to develop. Larvae transform the second fall and adults emerge the following spring between Apr. 15 and May 7 and oviposit in swelling buds on the same tree, all females.

- Callirhytis ferruginea* Weld. 466. Thought to have come from a similar gall on roots of *Q.alba*. Ovipositing in buds of saplings Apr.13- May 3.
38. *Odontocynips nebulosa* Kieffer. X 1. 389. On *Q.stellata*. Also on *Q.lyrata*. Galls probably take two years to develop. Adults have been captured Mar.18-Apr.13 (Atlanta, Ga.); Feb.22-Mar.8 (Ark.).
39. Never reared. X 5. On *Q.virginiana*. Also on *Q.laceyi*. Empty in Oct. Tex.
40. *Callirhytis rubida* Weld. X 1. 473. On *Q.coccinea*. Also on *Q.rubra*. Galls cut open on Sept.21 contained full-grown larvae, pupae and adults (DC). An adult was cut out May 19 (Chi).
- Callirhytis marginata* Weld. 446. On *Q.coccinea, rubra*, similar to Fig.40 above. Adults emerged Apr.25 (Chi). Others were seen ovipositing in swelling buds on the same clump of scarlet oak sprouts. Further study may prove *marginata* to be synonym of *rubida* which has page precedence.
41. *Holocynips badia*. (Base.). (= *corallosa* Weld). X 1. 390. On *Q.chapmani*. Also on *Q.stellata, prinus, alba, bicolor, macrocarpa*. See Fig.52. The type was taken ovipositing in buds of *Q.alba* in early spring (Conn.). Adults were reared Apr.13 (DC) and emergence was distributed over two seasons.
42. *Eumyria floridana* Ashm. X 1. 382. On *Q.catesbaei*. Also on *Q.coccinea, rubra, velutina, ilicifolia, falcata, cinerea, myrtifolia, texana*. Adults emerged Apr.12-May 3 (Fla.).
43. *Loxaulus illinoensis* (Weld). X 1. 372. On *Q.macrocarpa*. Adults emerged Nov.1-14 (Chi).
44. *Holocynipe maxima* (Weld). X 1. 391. On *Q.alba*. Also on *Q.prinus, bicolor, macrocarpa*. Gall probably takes two or perhaps three years to develop. Transformation takes place in the fall and emergence the next spring in late April or early May. They have been taken ovipositing in buds of *Q.alba* on Apr. 6, 13, 19, 20, 23 (DC).
45. *Callirhytis futilis* (O.S.) agamic. X 1. 434. On *Q.alba*. Also on *Q.prinus, prinoides*. Adults emerged May 12 (Chi). Adults were ovipositing in buds of *Q.alba* on Mar.27, Apr.3, 6, 15, 19, 20, 22, 27, 28 in different years when Kieffer pears were in bloom, dogwood not, bloodroot over.
- 46-7. *Dryocosmus favus* Beut. X 1. 395. On *Q.rubra*. Also on *Q.marilandica, nigra, catesbaei, laurifolia, myrtifolia, texana*. Galls become full-grown in the late fall, larvae transform the next autumn and galls turn brown; during the winter the fleshy distal half becomes converted to spongy tissue as in Fig.47 X 5 and finally decays leaving the wedge-shaped base to persist for years. Adults, all females, emerge in late autumn (Dec.3-Feb. 27, Fla.); Dec.28 (after -14° F), Feb.19 (after six weeks without a thaw) and Mar.2 (Chi) from galls collected in Mo. in Oct.
48. Never reared. X 5. On *Q.laceyi*. Empty in Oct. Boerne, Tex.
49. *Callirhytis ovata* Weld. X 1. 456. On *Q.myrtifolia*. Also on *Q.catesbaei, cinerea, texana*. Contained both pupae and adults on Dec.3 (Fla.). Galls were empty on Apr.15.
50. *Disholcaspis globosa* Weld. X 1. On *Q.alba*. Also on *Q.prinus*. Adults emerge in late Oct. and early Nov. (Chi).
51. *Xanthoteras radicola* (Ashm.) sex.gen. X 1. 247. On *Q.alba*. Also on *Q.chapmani*. Galls are found in late May. Adults emerged June 12-26 (Chi). In 36 cases these galls were found at the base of stumps whose sprouts carried last year's Oak Fig. Galls (*Xanthoteras forticornis* (O.S.)).

- Belonocnema treatae* Mayr sex.gen. 355. *Q.virginiana*. Fleahy white galls in a cluster similar to the above, in early spring.
52. *Holocynips badia* (Bass.). X 1. 390. Single gall in situ on *Q.macrocarpa* and isolated galle. See Fig.41 above.
- Disholcaspis brevinota* Weld. 338. *Q.breviloba*. A bullet gall at the base of sprouts. Adults were cut out Nov.13 (Austin, Tex.). Fig.285.
- Sphaeroterax ocala* (Weld). 359. Fig.286. *Q.chapmani, margareta*. Thin-walled, fleshy, 4-6 mm. in dia., covered with short dense pubescence, single and sessile on side of roots 5-15 mm. in dia., in early spring. Adults emerged Apr.17-19 (Fla.).
- Bassetia floridana* Ashm. 379. *Q.chapmani*. Also on *Q.stellata*. Cells are nested at base of current year's growth in fall. Cells are 3.25 mm. long by 1.25 mm. wide. A gall cut open Feb.23 contained bath pupas and adults.
- Loxaulus humilis* (Weld). 371. Fig.287. *Q.chapmani*. Also on *Q.stellata*. Not distinguished from above in the field except by the shape of the cells which are not elongated in this case or nested. Contain larvae and pupae on Oct.30. A type was cut out Jan.12 and some emerged Jan.20.
- Loxaulus pattersoni* (Kinsey). 374. Cells clustered in a slight enlargement of small roots on *Q.virginiana*. Perhaps a synonym of *floridana* above.
53. *Dryocosmus favus* Beut. X 1. 395. On *Q.rubra*. Fresh galls. See Figs.46-7.

#### Flower galls

54. *Callirhytis exigua* (Base.). X 5. 426. On *Q.stellata*. Also on *Q.alba, prinus*. A small black filament gall. Adults emerged May 12 (DC).
55. Never reared. X 5. On *Q.myrtifolia*. Also on *Q.phellos*
56. *Callirhytis myrtifoliae* (Beut.). X 5. On *Q.myrtifolia*. Also on *Q.phellos*. Adults out in early June (DC from galls on *Q.phellos*). 451.
57. *Callirhytis pulchra* (Bass.). X 1. 470. On *Q.coccinea*. Also on *Q.velutina*. Galls drop in late May and shrivel slightly; adults emerged June 10-20 (Chi); May 28-June 6 (DC).
58. *Callirhytis operator* (O.S.) sex.gen. X 1. 455a. On *Q.rubra*. Also on *Q.coccinea, velutina, imbricaria, ilicifolia, falcata, texana*. Galls turn brown about the time the adults emerge June 11-30 (DC); July 10 (Nova Scotia). On June 26 adults were ovipositing in last year's acorns of *Q.velutina* (Fig.66) then about one-fourth of an inch in diameter.
- Neuroterus pallidus* Bass. 227. *Q.bicolor*. Dense cluster near end of ament.
- Neuroterus exiguus* Bass. 217. *Q.stellata*. A fusiform enlargement of staminate axis. Adults emerged May 16, May 28-June 6; May 10-13 (DC).
- Neuroterus evanescens* Kinsey. 215. *Q.breviloba*. Gall an enlargement of the staminate axis similar to Fig.289 but shorter. Adults began to emerge Apr.4 and were observed ovipositing on under side of the leaves. Entered from literature.
- Callirhytis clarkei* (Bass.). 411. *Q.ilicifolia*. Galls resemble an elongated blackberry.

- Callirhytis blaetophaga* (Ashm.). 410. *Q. cinerea*. A filament gall pointed at end like Fig.288. Reared in May.
- Callirhytis florensis* Weld. 429. *Q. marilandica*. Fig.288. An enlarged filament. Adults of both sexes emerged May 18-25 (DC). Next fall nearly every acorn on this tree had a gall of *Callirhytis balanaspis* Weld (whose maker emerged the second spring).
- Callirhytis parva* Weld. 457. *Q. imbricaria*. Galls globular, greenish-white, usually two-celled, covered with crinkly hairs. The galls began to drop May 16; adults out June 11 (DC). Some adults came out and had died by June 1 and others were cut out June 4 (W.Va.).
- Callirhytis tarnerii* (Ashm.). 484. *Q. nigra*. A woolly white gall on staminate flowers as in Fig.58. Adults Apr.28 (Jacksonville, Fla.).
- Never reared. *Q. chapmani*. A swollen staminate axis.

#### Acorn galls

59. *Amphibolips prunus* Cresson. X 1. 291. On *Q. velutina*. Also on *Q. voccinaea*, *rubra*, *palustris*, *imbricaria*, *ilicifolia*, *falcata*, *nigra*. Transformation takes place in the fall; emergence in the spring Feb.17-May 14. Mo. and is distributed over more than one season. Galls contain the highest per cent of tannin (40%) of any that have been analysed but fluctuates from year to year.
60. Never reared. X 1. On *Q. texana*.
61. *Amphibolips gainesi* Bass. X 1. 283. On *Q. marilandica*. Also on *Q. falcata*. One emerged May 4, another May 25 from galls collected the fall before; others the second spring. Tannic acid content is about half of that in the Aleppo gall and is an iron bluing variety suitable for the making of a writing ink.
62. *Callirhytis middletoni* Weld. X 5. 459. On *Q. phellos*. Galls drop in early May (DC) and an outer layer decays leaving a hard shell as in photo. Adults emerged the next spring Apr.9-16 and the second spring Apr.17.
63. Never reared. X 1. On *Q. prinus*. Also on *Q. prinoides*, *michauxii*, *chapmani*, *muehlenbergii*, *alba*, *breviloba*, *durandii*. A gall on *Q. stellata*, ready to drop Sept.13 (Baltimore, Md.), measured 6.1 by 3.2 mm. with a girdle of wool at base and a slight nipple at apex. For rearing a bit of cloth should be tied about the acorn so the gall will not be lost when it matures and drops.
64. *Callirhytis balanacea* Weld. X 5. 403. On *Q. palustris*. Also on *Q. velutina*, *phellos*. Outer layer turns black, wrinkles, dries down on the hard inner shell (photo), drops Oct.12 (DC); adults emerged the second spring Mar.26-Apr.2 and the third spring in April.
65. *Callirhytis operator* (O.S.) agamic. X 1. 455b. On *Q. rubra*. Also on *Q. velutina*, *coccinea*, *imbricaria*, *ilicifolia*. The original material of this species was collected at Waterbury, Conn. Aug.23, 1871 on *Q. ilicifolia* during Riley's visit to Bassett. Bassett kept his galls a year and rearing nothing threw them away. Riley kept his longer and the second spring reared the maker "just as the oak buds were bursting." His label bears the date Apr.5, 1873. This established an alternation of generations in the cynipidae.
66. Female of *Callirhytis operator* (O.S.) sex.gen. X 5. ovipositing in the one-year old acorn of *Q. velutina* on June 26 (Chi) to produce the pip gall of Fig.65.

67. Never reared. X 1. On Q. bicolor. Sept. (Chi). Also on Q. prinoides.
68. Callirhytis balanaspis Weld. X 5. 404. On immature acorn of Q. marilandica. Also on Q. velutina, catesbaei. Galls drop in early Oct. Adults emerged the second spring Apr.9 and the third spring Apr.3 (DC).
69. Callirhytis hopkinsi Weld. X 5. 440. On Q. imbricaria. Galls drop in early Sept. (W.Va.). Adults emerged the second spring Mar.29-Apr.14; third spring Mar.29-Apr.15; fourth spring Apr.13. Dr. Hopkins estimated there were 50-100 galls per square foot on ground under tree or over a bushel under one tree.
70. Callirhytis fructuosa Weld. X 5. 432. On Q. coccinea. Also on Q. velutina, rubra, palustris, marilandica, ilicifolia, falcata, texana. In August the red squirrels cut open the affected acorns for the well-developed larvae. From acorns of Q. marilandica from Batesburg, S.Car. another Callirhytis emerged the second spring Apr.17-May 3.
- Callirhytis petrosa Weld. 466. A similar stone gall on Q. cinerea. Adults emerged Apr.20-26 the third spring.
- Callirhytis fructicola Ashm. 431. Has been reared along with Callirhytis fructuosa Weld from stone galls in acorns of Q. ilicifolia and Q. marilandica. Galls similar to Fig.70.
- Callirhytis corrugis (Bass.). 416. Has been reared along with Callirhytis fructuosa Weld from stone galls in acorns of Q. palustris, imbricaria, rubra, velutina. This species was taken ovipositing in buds of Q. velutina Apr.1-29 in ten different seasons (DC).
71. Callirhytis lapillula Weld. X 1. 444. On Q. bicolor. Adults emerged the second and third springs between Apr.25 and May 16. There is a similar gall in the acorns of Q. alba not described.
72. Callirhytis balanoides Weld. X 1. 405. On Q. velutina in fall dropping in early Sept.(Chi); adults emerged the second spring May 5.
73. Never reared. X 1. On Q. macrocarpa. Also on Q. lyrata. Sept.
74. Callirhytis perditor (Bass.). X 5. 462. On Q. ilicifolia. Galls collected Oct.5 1944 gave adults Mar.21-29, 1946.
75. Callirhytis balanosa Weld. X 1 and Fig. 78. X 5. 407. On immature acorns of Q. coccinea in spring, secreting honeydew. Also on Q. velutina and imbricaria. Galls drop about the middle of June. Adults the next spring Apr.22 - May 1.
76. Callirhytis balanopsis Weld. X 5. 406. On Q. marilandica in autumn. Also on nearly all the red oaks. Adults emerged the second spring Mar.23-Apr.15.
77. Andricus incertus Bass. X 5 and Fig.79. X 1. 312. On Q. bicolor. Galls drop in early Sept. and adults emerged the second and third springs in late March and April. A similar gall occurs on nine other white oaks where the recess in the cup is not fimbriate and the gall protrudes for half its length or more. None of these has been reared. A bit of cloth would have to be tied about an affected acorn to prevent loss of the gall when it matures and drops.
- Amphibolips fuliginosa Ashm. 282. Q. phellos, laurifolia, myrtifolia. A plum gall, 7-10 mm. in dia., dropping in Aug. Only rearing record May 1.
- Never reared. A plum gall on Q. phellos, not wrinkled, up to 25 mm. in dia. An Amphibolips sp. was cut out Dec.3.

*Callirhytis glandulus* (Beut.). 438. Types are from the pine barrens of N.J. in early May on *Q.prinoides* presumably ovipositing in young acorns and agreeing with one reared by Riley supposedly from a fimbriate cavity in the side of an acorn cup.

*Callirhytis electrea* Weld. 421. *Q.prinus*. Fig. 291. Adults emerged the third spring Apr.20-29 and May 6. An undescribed black species also emerged in small numbers from two lots of scorns.

Never reared. Similar separable cells inside acorns of *Q.alba*.

*Callirhytis subcostata* Weld. 480. Fig.290. *Q.stellata*. a ribbed gall 2.5 to 3.0 mm. in dia., produced on the side of the acorn cup when the latter is about 4.0 mm. in diameter and dropping in mid June (DC). Adults emerged the next spring April 1.

Never reared. Undersized acorn of *Q.alba* in fall (cup 7 mm. in diameter), containing a single larval cell (Long Island, N.Y.).

#### Bud galls

80. *Acraspis erinacei* (Beut.) sex.gen. X 5. 250b. On *Q.alba*. When the new growth elongates the affected bud scales are left adhering at its base. Developed in winter buds on trees where the hedgehog gall was common the fall before and where the wingless agamic females were seen on Nov. 1 ovipositing in the buds. Adults of both sexes emerged May 17 (Chi).

81. Never reared. X 5. On *Q.velutina*. May 1. (Chi).

82. *Neuroterus vesicula* (Bass.). X 5. 238. On *Q.bicolor*. Also on *Q.macrocarpa*, *alba*. They agree with specimens and photos from Bassett in U.S.Natl. Museum. *Neuroterus affinis* (Bass.). is probably a synonym of it. Bassett's idea that these galls are partially developed in the fall needs verification. Hervey Brackbill marked three branches of white oak on Mar. 3 on which there were 4 galls. On Mar.10 there were 10 galls. In the interval six had developed into visibility. He noted that field sparrows, goldfinches, tufted titmice and a cardinal seemingly fed on these galls (Baltimore, Md.). Adults emerged May10-6 (Chi); Apr.14-23.

83. *Neuroterus* sp. X 5. On *Q.bicolor*. Also on *Q.alba*. This may be *Neuroterus affinis* (Bass.). but galls are light green instead of brown. Adults of both sexes emerged Apr.27-May 6 (Chi); Apr.14-23 (DC). Blackburnian warblers seemed to be opening these galls for the larvae inside.

84. *Amphibolips cookii* Gill. X 1. 281. An immature gall on *Q.rubra*. They are spotted when full-grown, 11-23 mm. in dia., wrinkled after dropping. Brodie put 187 galls on ground over winter and fifty adults emerged the next Oct.25 and oviposited in buds on Dec.1 (Toronto). Miss Knox at Cornell reared the maker Oct.29-Nov.4. 54% of the galls were parasitized. The acorn moth, *Valentinia glandulella* was in 23% of the galls, the maker in 14.5%. Eight species of chalcids were reared and a guest cynipid, *Synergus* sp. emerged May 22 after a pupal period of 10 days from chambers formed in the central cell. Occurs on *velutina* too.

*Amphibolips* sp. Gall smaller than fig.84, not spotted, on *Q.velutina*, *coccinea*, *ilicifolia* in late fall. Adults emerged the second spring.

85-8. *Andricus pisiformis* Beut. X 1, 322 On *Q.alba*; X 5 single galls; X 5 the inner structure; X 5 deformed by guests. Also on *Q.bicolor*, *macrocarpa*, *chapmani*, *stellata*, *margaretta*. They drop in April. Adults emerged the next Mar.24-26; second spring Apr.6 and third spring Mar.29.

89. *Andricus mamillaformis* (Weld). X 5. 316. On *Q.alba*. Also on *Q.prinus* and probably *prinoides*. Drop in Oct. Adults the second and third springs.



90. Never reared. X 5. On Q. macrocarpa in October in Chicago area.
91. Callirhytis gemmiformis (Beut.). X 4. 437. On Q. alba. Adults emerged the second spring in March and some the third spring. Females were twice seen ovipositing in buds of Q. alba in Apr. 11, 1938 and Apr. 9, 1944.
92. Andricus deciduatus Weld. X 5. 303. On Q. bicolor. Galle drop in September. Adulte emerged Mar. 20 the second spring and Apr. 10 the third spring (Chi). An adult, det. as this sp. was taken ovipositing in bud of Q. alba on Apr. 7 (DC).
93. Callirhytis rugulosa (Beut.). X 5. 475. On Q. coccinea. Also on Q. velutina. Galle drop in May. Some collected May 19, 1917 gave adults May 16, 1918 (Chi). Adulte emerged Mar. 20, 29 (DC).
94. Andricus ellipsoidalis (Weld). X 5. 304. On Q. palustris. Also on Q. coccinea, velutina, marilandica. Galls drop in late April (DC). The type was found in breeding cage Apr. 10 the next spring.
95. Never reared. X 5. Galls found on ground under Q. velutina June 19 on the sand dunes in northern Indiana.
96. Trisolieniella saltata (Ashm.). X 5. 388. On Q. falcata. Described from Q. cinerea. The writer has never reared it. Gall appears the last of Mar. and is easily detached and has power of jumping for several weeks. Ashmead reared one adult after 11 months and some days.
97. Never reared. X 5. Q. falcata. Ocala, Fla. From galle collected in Va. on Apr. 4 a pupa was cut out in June after gall had been out of doors for three winters.
98. Andricus murtfeldtae Ashm. X 4. 318. On Q. stellata. Adults of both sexes issued the last week in April (S. Car.), and in early June (DC). The type was from Kirkwood, Mo.
- Andricus maxwelli Bass. 317. Described from an unknown oak. As det. by Patterson the gall is produced at end of twigs of Q. stellata. The type galls in Philadelphia resemble those of murtfeldtae above. From one to 27 adults were reared from a single gall; 16 galls yielded males, 18 yielded females, 7 gave both. Of 15 similar galls on Q. breviloba all but two gave flies of one sex. The types are not murtfeldtae.
99. Amphibolips spinosa Ashm. X 5. 293. On Q. phellos. Also on Q. laurifolia, cinerea. Collected on ground in Oct. Contained pupae Dec. 5.
100. Andricus flavohirtus Beut. X 1. 306. On Q. bicolor. Also on Q. stellata, alba, macrocarpa. Galls attacked by guests do not drop, the bud scales enlarge and this "frondosa" mass is conspicuous in winter but yields only guests in May. The maker emerges from galls that drop in the spring but normal date of emergence is not known. Fig. 101 shows the appearance in winter.
102. Amphibolips globulus Beut. X 1. 284. The type galls are like those in photo collected in Texas in September under Q. marilandica.
103. Amphibolips tinctoriae Ashm. X 1. 295. On Q. velutina. Also on coccinea. Galls drop in September. An adult emerged the next fall on Nov. 20.
104. Amphibolips sp. X 1. On Q. velutina. Also on Q. falcata. Adults emerged the next fall.
- Neunoterus vernus Gill. 236. Q. macrocarpa. Resembles Fig. 105. May-June.

105. *Neuroterus minutus* (Bass.) .X 5. 224. On *Q.alba*. Also on *Q.prinus*. Adults of both sexes out May 7-10 (DC). Galls on *Q.alba* were bagged on May 6. No result visible when the bag was taken off on June 13. In July there were hundreds of translucent spots on the leaves.
106. Never reared. X 5. On *Q.imbricaria* May 10 Joliet, Ill. Compare Figs.94,95.
107. *Callirhytis gallaestriatae* Weld. X 2. 435. On *Q.rubra*. Also on *Q.coccinea*, *velutina*, *palustris*, *texana*. A dead adult was found in cage June 9 the second spring.
108. *Acraspis gemula* (Bass.) . X 5. 251. On *Q.alba*. Also on *Q.prinoides*, *pinus*, *bicolor*, *macrocarpa*, *margaretta*. Adults emerged Apr.2-3, 1945; May 5, 1935; Apr.27, 1927 (DC); Apr.20-25 (Chi).
109. *Andricus stropus* Ashm. X 5. 327. On *Q.stellata*. Also on *Q.lyrata*, *chapmani*. Galls drop in Oct. The writer has not been able to rear it.
110. *Andricus stropus* Ashm. X 5. 327. On *Q.chapmani*. Photo agrees with Ashmead type galls in Amer.Ent.Soc. in Phila. and with galls in Amer.Museum. This is interpreted as being a later stage of the figure 109 above.
111. *Andricus foliatus* (Ashm.). X 1. 309. On *Q.virginiana*. Also on *Q.geminata*, *fusiformis*. Galls start to develop in Oct. Adults the next August.
112. *Amphibolips acuminata* Ashm. X 1. 275. On *Q.falcata*. Also on *Q.imbricaria*, *cinerea*. In *D.C.area* galls start to develop from mid-Apr. to early May. Young ones are red and later develop a grayish bloom and often spots. Larvae pupate in June and galls turn brown. Adults emerged June 7, 12, 13, 14, 16, 17, 20 - nine adults from over 100 galls, being heavily parasitized.
113. Never reared. X 5. On *Q.stellata* in Oct. in Texas. Gall 3.6 by 3.6 mm.
114. *Callirhytis glomerosa* Weld. X 5. 439. On *Q.rubra*. Also on *Q.coccinea*, *ilicifolia*, *falcata*, *texana*. Galls drop when mature in early Oct. (Chi). Galls are pubescent at the base. An adult emerged the second spring Apr.11, another Apr.20.
115. *Amphibolips murata* Weld. X 1. 289. On *Q.marilandica*. Also on *Q.myrtifolia*, *cinerea*, *laurifolia*, *pumila*. Adults were cut out in November. The only emergence records are Dec.4, 8 and April 11.
- Andricus cinnamomeus* Ashm. 388. Fig.293. *Q.chapmani*. An enlarged terminal bud with seemingly dead brown bud scales in Oct., containing a single eccentric thin-walled cell. Adult the next spring June 16-30.
- Callirhytis cressoni* (Beut.). 417. Cell hidden inside bud. *Q.atellata*. Tex.
- Amphibolips globus* Weld. 285. Fig.294. *Q.palustris*. Galls of the agamic generation (a) at end of the season's growth in Aug. and Sept., up to 14 mm. in dia., dropping when mature and becoming slightly wrinkled. Adults were cut out in Oct. and Nov. the next fall. Galls of the sex. gen. are found in June, produced from weak lateral buds on growth of the previous year (b), 18-20 mm. in dia, green with a waxy bloom, not deciduous. Galls collected June 26 gave adults June 28, 30, July 2, 4 - twenty from 200 galls. Heavily parasitized.
- Callirhytis oblata* Weld. 453. Fig.292. *Q.coccinea*, *falcata*. Galls drop about May 15, bare at base. Adults the next spring Mar.21, Apr.6 (DC).
- Philonix pallipes* (Base.). 265. *Q.alba*. Similar to Fig.108 but with thread-like bodies about its base, blackish-brown, 2.25 mm. long. Adults in May.

*Liodora clarkii* (Bass.). 267. Q. alba. Globular bud gall, many-celled, usually terminal, in early spring. Adults May 31 (Mass.).

*Callirhytis cryptica* Weld. 419. Q. myrtifolia, falcata. An enlarged terminal brown bud in Oct. Hidden within is a thin-walled eccentric cell with a tuft of hairs at apex. Adults emerged the next spring May 1.

Never reared. Cell hidden inside a weak lateral bud of Q. alba similar to Fig. 293.

Never reared. Cell hidden inside an enlarged lateral bud of Q. alba. Cell 2.9 mm. long by 2.0 mm. in dia. Found in October.

Never reared. Conical, 3.8 by 2.5 mm. with a green tip, wall thick, at apex of new growth in June on Q. alba.

Never reared. Cell hidden inside bud of Q. marilandica, cinerea. Exit hole thru bud scales. Empty in April.

### Stem galls

#### Woody stem swellings

116. *Callirhytis clavigera* (Ashm.). X 1. 412. On Q. phellos (horns have been broken off in photo). Also on Q. laurifolia, myrtifolia. Adults emerged Feb. 14, 21 (Tex.).
117. *Callirhytis cornigera* (O.S.). 415. Horns X 5 picked up on ground under Q. rubra July 15, 1917 (Chi). Horned Knot Gall. Similar to above. Adults were out Nov. 26 and some emerged May 12, 1918. Occurs also on Q. palustris, imbricaria, ilicifolia, cinerea, catesbaei, texana.
118. *Neuroterus consimilis* Bass. X 1. 210. On Q. alba. A foreshortened, thickened lateral branch, bearing leaves, woody, polythalamous. The writer has never reared it. Type locality: Waterbury, Conn.
119. *Callirhytis scitula* (O.S.). X 1. 476. On Q. ilicifolia. Also on Q. velutina, imbricaria. Full-grown in June. Adults emerged July 3 (Chi); June 10, 11, 16 (DC).
120. *Callirhytis similis* (Bass.). X 1. 479. On Q. ilicifolia. Also on imbricaria, falcata, cinerea, myrtifolia. Green and fleshy in May, becoming woody later. Adults emerged June 26, 28, 30 and July 3 (DC).
121. *Neuroterus noxiosus* (Bass.). X 1. agamic 226b. On Q. bicolor. The woody galls persist over winter. Adults emerged in April (Chi) and were observed ovipositing in buds just as the bud scales elongate enough to show a little green at the base. Photo also shows the smooth fleshy galls of the alternating generation on the leaves.
122. *Callirhytis clavula* (O.S.). X 1. 413. On Q. alba. Oak Club Gall. Adults emerged July 9, 13, 15 (DC). A similar gall (never reared) occurs on Q. stellata in Texas, Mo., and on Long Island, N.Y.
123. *Neuroterus distortus* Bass. X 1. 212. On Q. bicolor. Also on Q. prinus. Adults emerge in May of the current season.
124. *Callirhytis phellos* (Ashm.). X 5. 467. On Q. phellos. Also on Q. imbricaria. Terminal on new growth. Maker emerges in late June (DC).
125. *Neuroterus quercus-batatus* (Fitch). X 1. 230Q. On Q. alba. The woody gall persists over winter. Adults emerge Apr. 16-24; Apr. 20-26 (Chi); May 6 (DC). Photo also shows the alternating sex. gen. covered with bluish bloom. Adults emerge June 16-25, 1913 (Chi); May 21, 1945 (DC).

126. Never reared. Woody stem swelling X 1 on Q.chapmani. Resembles the woody form of Neuroterus quercus-batatus (Fitch).
127. Never reared. Woody enlargement X 1 at base of new growth of Q.macrocarpa, persisting over winter.
128. Callirhytis seminosa (Bass.). X 1. 478. On Q.palustris. Also on Q.rubra. Date of emergence of maker unknown.
129. Callirhytis punctata (O.S.). X 1. 471. On Q.velutina. Also on Q.palustris, rubra, imbricaria, cinerea, nigra. Twig beyond gall usually dies and this has been known to kill isolated trees. Adults emerged Apr.16(Mo.,N.Y.). The alternating generation is a small blister on main veins about May12.
130. Burl on Q.velutina X 1. Thought to be due to the fungus Phomopsis.
131. Never reared. X 1. On Q.chapmani. Probably Callirhytis floridana (Ashm.).
132. Callirhytis floridana (Ashm.). X 1. 430. On Q.stellata. Also on margaretta. In the fall the tissue cuts like cheese. Adults out the next April. Gall is usually larger than in photo.
133. Callirhytis batatoides (Ashm.). X 1. 408. On Q.virginiana. Also on Q.geminata, fusiformis. Adults out in Feb., Mar., Apr.25-May 1 (Fla.).
134. Callirhytis medullae (Ashm.). X 1. 448. On Q.falcata. Also on Q.coccinea, phellos, laurifolia, catesbaei, myrtifolia. "Adults the next Feb. and Mar." The writer has never reared it.
- Callirhytis elongata (Kinsey). 424. Q.breviloba, stellata. Slight many-celled twig swellings, 6-8 mm. in dia., near tip of twig. Texas. Adults emerged Mar.14-Apr.3.
- Callirhytis tuberosa (Bass.). 481. Fig.299. Q.ilicifolia, imbricaria. A much shortened thickening of the new growth, bearing leaves and containing several cells. The writer has never reared it.
- Eumayria longispennis (Ashm.). 384. Fig.300. Q.laurifolia, phellos. Small oblong swellings at base of new growth. Bred in May. Entered from lit.
- Bassettia aquaticae (Ashm.). 376. Q.nigra. Hard knotty swellings at the base of small twigs, 8-19 mm. long by 7-10 mm. in dia. An adult was cut out in March. Entered from literature.
- Loxaulus mammula Mayr. 373. Q.alba. Fig.295. Abrupt enlargement at the base of lateral branches in spring, many-celled, Adults emerge in July.
- Neuroterus tectus Bass. 234. Q.prinoides. Galls in the slightly swollen new growth. Entered from literature.
- Acraspis longicornis (Bass.). 255. Q.stellata. Slight enlargement of young and tender shoots, shriveling after the adults emerge. Entered from literature.
- Neuroterus rileyi Bass. 231. Fig.296. Q.prinus, muehlenbergii, stellata. Confluent, corky puffy swellings along twigs, developing in late summer. Adults emerge the next April and May.

Detachable

135. Disholcaspis mamma (Cresson). X 1. 343. On Q.bicolor. Also on Q.lyrata, macrocarpa. Adults in Nov.(Chi).

136. *Xanthoterus forticornis* (O.S.). X l. 244. On *Q.alba*. Oak Fig Gall. Also on *Q.prinus, prinoides*. Adults emerged in Jan. and Feb. See Fig.51 for the alternating sexual generation at the base of stump on whose sprouts was this gall the fall before.
137. *Callirhytis eeminator* (Harris). X l. 477. On *Q.alba*. Oak Seed Gall. Also on *Q.michauxii, prinus*. Adults emerge in late June after which the gall dries up.
138. *Disholcaspis pattersoni* Kinsey. X l. 345. On *Q.breviloba*. Galls appear in late July, secrete honeydew, mature in August, contain pupae in Oct. and adults by Nov.5. Some emerged Dec.2 (Austin, Tex.). Galls collected at Boerne, Tex. and kept out of doors on ground in wire breeding cages at Evanston, Ill. contained living adults on Feb.19 after six weeks without a thaw; others emerged Mar.25 and Apr.22.
139. *Callirhytis difficilis* (Ashm.). X l. 420. On *Q.cinerea*. Also on *Q.nigra, myrtifolia, phellos, laurifolia*. Collected in Oct.1917 in Ark. galls gave adults Sept.29 and Dec.8, 1919 and Oct.10, 1920.
140. *Disholcaspis omnivora* (Ashm.). X l. 344. On *Q.chapmani*. Adults were cut out Jan.10.
141. *Disholcaspis* sp. X 5. On *Q.breviloba*. Contained pupae on Nov.21 and an adult Dec.12 (Boerne, Tex.). Never described.
142. *Disholcaspis cinerosa* (Bass.). X l. 339. On *Q.virginiana* in Texas. Gall secretes honeydew. Some trees are loaded with hundreds of these galls. They contain 40% of tannic acid. An adult emerged indoors Dec.30.
143. *Disholcaspis virens* (Ashm.). X l. 352. On *Q.virginiana*. Also on *Q.geminata*. Adults emerge in December.
144. *Callirhytis ventricosa* (O.S.). X l. 485. On *Q.imbricaria*. Has been seen on all the red oaks except *Q.texana*. Green when growing, in May, turning brown and dropping in June (DC), or July (Chi). Adults emerged the next spring May 25 (Fla.).
145. *Callirhytis ventricosa* (O.S.). X 5. On *Q.coccinea*. June 16 at Ft. Sheridan, Ill.
146. *Andricus aciculatus* Beut. X l. 296. On *Q.lyrata*. Also on *Q.stellata* and *durandii*. Adults emerged the next spring.
147. *Andricus formosus* (O.S.). X l. 310. On *Q.coccinea*. Occurs on all the red oaks. Galls drop when mature in June (DC). From galls collected in 1914 adults emerged Feb.24, 1915 and Feb.15, 1916.
148. *Disholcaspis spongiosa* (Karsch). X l. 349. On *Q.stellata*. Also on *chapmani, margareta, alba* (rare). Adults emerged in Nov. and Dec. (Fla.).
149. *Amphibolips cinerea* Ashm. X l. 277. On *Q.cinerea*. Adults in late April.
150. *Disholcaspis pruniformis* Kinsey. X l. 347. On *Q.breviloba*. Also on *Q.stellata, lacevi*. Contained pupae Oct.30 and Nov.13; adults Dec.10.
151. *Adleria strobilana* (O.S.). X l. 272. On *Q.lyrata*. Adults out the second spring.
152. *Adleria strobilana* (O.S.). X l. 272. On *Q.macrocarpa*.
153. *Adleria strobilana* (O.S.). X 5, 272. Galls picked up on ground under *Q.bicolor*. Adults emerged the second and third springs in April.

154. *Callirhytis excavata* (Ashm.). X 1. 425. On *Q.imbricaria*. Also on *Q.rubra* (type host), *velutina*, *ilicifolia*. From galls picked up on ground in Oct. 1944 a living adult was found in the cage Jan.1, 1946. Normal emergence date unknown. A bit of cloth tied about the twig will prevent the galls from being lost when they mature and drop. Fig.282 shows the individual gall X 5.
155. *Callirhytis gemmaria* (Ashm.). X 1. 436. On *Q.cinerea*. On all the red oaks. Galle secrete honeydew, drop when mature. Rearing record needed. Gates observed galls on Wayah Bald, N.Car. in 1937. Galls were on previous year's growth of every twig of every tree affected over an area of 600 acres, on red oak, none affected below 5100 feet. From 20-2000 galls on one twig. Most mature by early July. Start dropping by the middle of August. If the twig is girdled by the galls the new growth dies and turns brown and the extent of the infestation is visible from a distance because of the color. Trees were 70-75% defoliated. No galls were found in 1938 or in 1939. In 1940 there was a heavy infestation again, the area larger and the line of demarcation not so sharp. This will kill the trees and create a bald he thinks.
156. *Callirhytis gemmaria* (Ashm.). X 1. 436. On *Q.rubra*. When attacked by guests the galls do not drop, enlarge, become woody and remain on tree over the winter. These were once described as an Andricus but the types were all Synergus. These woody galls often bear traces of the truncate end and ribbed surface of the original gall.
157. Never reared. X 5. On *Q.texana*. Drops to ground in Oct. Boerne, Texas.
158. *Disholcaspis* sp. X 1. On *Q.laceyi*. On top of sprouts from stump. Contained adults on Nov.20. Boerne, Tex. Never described.
159. *Disholcaspis* sp. X 1. On *Q.margaretta*. Also on *Q.etellata*. Contained pupae Sept.15. Adults were cut out Nov.13. Living adults were in breeding cage on Mar.1. Galls are harder, occur in larger groups and have a rougher surface than the bullet gall on white oak, *Disholcaspis quercus-globulus* (Fitch) of which it has been made a synonym in literature. Baesett described it from *Q.prinoides* under the name of *rugosa*. The life history needs to be worked out.
160. *Disholcaspis bassetti* (Gill.). X 1. 337. On *Q.bicolor*. Also on *macrocarpa*. Contained pupae Sept.16, adults Oct.2.
161. Never reared. X 5. On *Q.imbricaria*. On vigorous sprouts from stump in Oct. Found only once in Mo. and once in D.C.
- Disholcaspis quercus-globulus* (Fitch). 348. On *Q.alba*. Round Bullet Gall. Smooth, about 8 mm., corky, single or few in a cluster on small twigs in fall. Contain pupae Sept.23 and adults emerged Oct.20-Nov.1 (Chi). Brodie says they emerged Oct.12-Nov.1 at Toronto and oviposited at once in white oak twigs.
- Disholcaspis succinipis* (Ashm.). 350. On *Q.virginiana*. Cluster of 5-20 globular galls, 3-6 mm. in dia., with a buckskin surface. Described from one adult (Fla.). Gall not recognized in the field.
- Disholcaspis fungiformis* Kinsey. 340. On *Q.virginiana*, in Texas. Fig.298. A two-story gall in a cluster. The types were cut out of galls collected 35 years previously.
- Andricus indistinctus* Bass. 314. On *Q.alba*. The type gall in Philadelphia is globular, slightly wrinkled, dark colored, 4 mm. in dia., Adult was nearly mature in Oct. The type and the two others belong in the genus *Disholcaspis* (unpublished).

*Dryocoemus imbricariae* (Aehm.). 397. On all the red oaks. Banded Bullet Gall. Globular, red, budding out in bark in a group in fall. Adults emerge the next summer but rearing record is needed.

*Dryocoemus floridensis* (Beut.). 396. Seen on all the red oak except *Q. texana*. A leafy green rosette usually single on twigs, containing one or two cells. Fig. 297. Adults emerged June 11-19 (DC).

*Andricus coronus* Beut. 301. On *Q. palustris*, *phellos*, *nigra*. A cluster of green, fleshy ribbed thick-walled galls, 8-12 mm. long in early spring, dropping when mature in early May (DC). Adults the next spring Apr. 25, Apr. 26 and Apr. 10 in different years.

Never reared. Cluster of spindle-shaped galls 11.6 mm. long with reflexed hairs at apex. Fig. 302. On *Q. palustris* at Philadelphia, Pa. in spring.

Never reared. Small bullet gall on *Q. michauxii* in Fla. Old galls only.

*Disholcaspis persimilis* (Aehm.). 346. Globular, rugose, under 7 mm. in dia., Host not "black-jack" as described. Misc.

*Disholcaspis heynei* Kieffer. 342. captured in Texas. Host unknown. Type in Berlin.

*Amphibolips arcuata* (Kieffer). 276. Captured in Georgia. Gall unknown. Type in Berlin.

Celle hidden under bark, little or no swelling

162. *Callirhytis crypta* (Aehm.). X 1. 418. On *Q. marilandica*. Also on *catesbaei*, *falcata*, *nigra*, *velutina*, *rubra*. Cell 2.5 by .9 mm. just under bark in wood. Adults emerged Mar. 31-Apr. 20 (N.J.). When cells are numerous and close together the exit holes weaken the twig so it breaks off thus causing an ill-shaped tree in a nursery row and larger trees are sometimes killed. There have been many reports of damage to trees in Va. and N.J. The adults are all females. Alternating generation is not known. See Fig. 301 also.

163. Never reared. X 5. On *Q. macrocarpa*. Also on *Q. bicolor*, *alba*. Cell in the wood just under the bark.

164. Never reared. X 5. On *Q. virginiana*, Austin, Texas in Oct.

165. On *Q. alba*. X 5. Dune Park, Ind. June 18 on same tree with the oak seed gall, *Callirhytis seminator* (Harris) (Fig. 157). Adults (all males) emerged July 2-12. Interpreted as an abnormal specimen of that species.

166. *Callirhytis medularis* Weld. X 5. 447. On *Q. velutina*. Also on *Q. coccinea*, *rubra*, *ilicifolia*, *palustris*, *marilandica*, *phellos*. Cell in pith of the current year's growth. Exit holes close together weaken the twig so it breaks off. Nurseries in Ohio and Pa. have reported leaders of scarlet and pin oaks broken off resulting in a badly shaped tree. On Duke Univ. campus 200 twigs were broken off or left hanging on a single willow oak tree. Adults, male and female, emerged July 15-Aug. 1 (Pa.).

Never reared. Cells in the pith of *Q. alba*. Adults probably emerge in June.

167. Never reared. X 5. On *Q. marilandica*. Empty in Oct. Texas.

168. Never reared. X 5. On *Q. stellata*. Empty in October. Mo. and Texas.

169. *Callirhytis* sp. X 5. On *Q.stellata*. Also on *Q.breviloba, durandii*. Cell 2.1 by 1 mm. just under the bark in wood of current year's growth. Adults were cut out Apr.11, all females, and the writer is unable to separate them from *Callirhytis crypta* (Ashm.). If they are that species it is the first case of a red oak species being reared from a gall on a white oak.
170. Never reared. X 1. On *Q.chapmani*. Cell in the wood. Empty in Apr. (Fla.).
171. On *Q.alba*. X 1. This is interpreted as being *Andricus flocci* (O.S.) on a twig instead of on midrib of a leaf.
172. *Neuroterus excharensis* Weld. X 5. 214. On *Q.bicolor*. Also on *Q.alba*. Adults emerged Apr.15 (indoors) and were apparently ovipositing in the side of buds.
173. Never reared. X 5. On *Q.coccinea*. Also on *Q.imbricaria, palustris*. Cell in wood just under bark. Possibly *Bassettia ceropteroides* (Bass.).

*Bassettia catesbaei* (Ashm.). 377. Described from *Q.catesbaei*. "Slight wavy swellings at the base of tender new shoots." Type galls show cells in twig with only exit hole to indicate location. Bred Apr.28.

*Bassettia ceropteroides* (Bass.). 378. Described from *Q.velutina*. An inconspicuous enlargement of the annual growth containing but a few cells. Found in July. Included from literature.

*Bassettia pallida* (Ashm.). 381. Described from a single specimen from Ga. Apr.15 without host. Determined as this species are specimens from cells in twigs of *Q.virginiana* from E.N.P., Fla., adults out Feb.3.

*Eumayria invisa* Weld. 383. Cells under bark of *Q.myrtifolia*. Living adults with short wings were cut out Nov. 17.

*Loxaulus pattersoni* (Kinsey). 374. Slight swellings of roots (and stems, Patterson) of *Q.virginiana*, the cells closely clustered, spherical, 1 mm. in dia., Entered from literature.

Never reared. Single globular cell in slight swelling on twig of McDonald duelling oak, *Q.virginiana*, in City Park, New Orleans, La. Entire tree covered with this gall in Jan.1932.

*Loxaulus vaccinii* (Ashm.). 376. Gall unknown. Not on *Vaccinium* as stated.

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### Conspectus

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Oak Applee

174. *Amphibolips confluenta* (Harris). X l. 280. Spongy Oak Apple. On Q. velutina. Also on Q. coccinea, rubra, falcata, marilandica, texana. Galls at Ithaca, N.Y. contained pupae Aug. 1 and adults Sept. 12. Adults emerged Nov. 21 (Conn.) and Brodie reared them at Toronto Nov. 10 - all females.
- Amphibolips spongifica* (O.S.). 294. Gall similar in size and appearance to the above on Q. velutina, coccinea, ilicifolia, palustris, rubra, falcata. Galls appear with the leaves in spring. Adults of both sexes emerged June 16-20 (Chi); June 1-15 (DC); June 12, 21, 29 (Conn.); all out by July 1 (Toronto).
175. *Amphibolipe inanis* (O.S.). X l. 287. On Q. rubra. Empty Oak Apple. Adults emerged June 25 (Chi); June 19-23 (Va.); June 21 (DC).
176. *Andricus singularis* (O.S.). X l. 326. On Q. rubra. Adults emerged about July 10, (DC); June 20 (Mich.).
177. *Andricus femoratus* Ashm. X l. 305. On Q. laurifolia. Also on Q. phellos. The type was reared in May.
178. *Atrusca centricola* (O.S.). X l. 332. On Q. stellata. Adults Nov. 27-Dec. 8.
179. *Atrusca cava* (Weld). X l. 331. On Q. brevilooba. Pupae had transformed by Nov. 26 and adults had chewed out of the inner cell in Dec. Normal emergence date unknown.
- Xanthoteræ politum* (Bass.). 245. Q. stellata, chapmani, alba (rare). In Fla. galls develop in May and adults emerge the last of Feb. and in Mar. Galls from Texas gave adults the next spring Apr. 25.
- Andricus ostensackenii* (O.S.). 319. Ellipsoid, 7-8 mm., projecting on both sides of leaf, usually single. On Q. coccinea, velutina, palustris, falcata, imbricaria. Adults emerged July 8-15 (Chi); May 27-June 17. Never reared. Q. laceyi. Galle similar in size and structure to those of Atrusca cava (Weld) (Fig. 179).
- Galle with a free-rolling larval cell inside
180. *Callirhytis pedunculata* (Baes.). X 5. 461. On Q. rubra. Also Fig. 190 on Q. velutina. Adults emerged May 26-June 5 (Conn.); June 5 (Chi).
181. *Dryocoemus paluetrie* (Ashm.). X l. 400. On Q. velutina. On all the red oaks. In Chicago emergence varied from year to year: May 31, 1906; June 19, 1907; May 28, 1908; June 12, 1909. Kinsey liberated adults on a small tree covered with a net in a greenhouse and females oviposited on the under side of the leaves. In Sept. galle which he determined as those of Zopheroteræ compressum (Gill.) were found.
182. *Dryocoemus notha* (Ashm.). X l. 399. On Q. coccinea. Also on Q. velutina, rubra, palustris, ilicifolia, falcata, texana. Adults emerged in June (Chi). There is a similar gall on Q. myrtifolia and on Q. marilandica.
183. *Dryocoemus cinereae* (Ashm.). X 5. 393. On Q. rubra. On all the red oaks. Adults emerged May 14 (DC); May 27 (Chi).
- Dryocosmus laurifoliae* (Ashm.). 398. On Q. laurifolia, phellos. Galls appear with the leaves in Feb and Mar. and are similar to paluetris.
- Callirhytis quercifoliae* (Ashm.). 472. Q. cateebaei. Galls are similar to those of paluetris above but are smaller. Rare.

Callirhytis confusa (Ashm.). 414. Q. laurifolia. Gall 2.5 by 1.5 mm. on the under side, on a main vein. Adult emerged the last of April.

Never reared. Fig. 303. Conical, 6.7 mm. high, on under side of leaf in early spring. On Q. phellos and myrtifolia.

#### Acraeopsis galls

184. Acraeopsis macrocarpa Bass. X 5. 256. On Q. macrocarpa. Maker emerged Nov. 9-14, 1885; Nov. 15-30, 1892; Nov. 1 (Toronto).

185. Acraeopsis villosa Gill. X 1. 259. On Q. macrocarpa. Types emerged Oct. 29 (Mich.). Adults were cut out on the galls Nov. 1 (Chi).

186. Acraeopsis pezomachoides (O.S.). X 5. 257. On Q. alba. Galls are full-grown in early July. In D.C. area galls contained pupae on Sept. 1 and adults Oct. 20. They probably emerge in Nov and Dec. The type was found in box on Jan. 7.

187. Acraeopsis erinacei Beut. agamic. X 1. 250a. On Q. alba. The Hedgehog Gall. Adults emerge in Oct. (Ia.); in Nov. (Mich.); in Dec. (N.Y.). In the Chicago area on Nov. 1 leaves were still on trees and the adults had only to crawl to the buds near by where they were seen to oviposit during an early flurry of snow.

188. Acraeopsis hirta (O.S.). X 5. 253. On Q. prinus. Also on Q. muehlenbergii. An adult was cut out Sept. 12 (Va.); and Sept. 21 (Long Island). Normal emergence probably in late fall. An adult was captured on snow Dec. 20 (DC).

Acraeopsis prinoides (Beut.). 258. On Q. prinoides. On Long Island galls were just starting on July 23. Galls from the pine barrens of New Jersey contained adults Oct. 21; some emerged Dec. 26.

Acraeopsis echini Ashm. 249. On Q. bicolor. Galls similar to but smaller than the Hedgehog Gall, Acraeopsis erinacei above. Adults "bred in Nov." Fla.

#### Gall on a prolonged vein

189. Andricus chinquapin (Fitch). X 1. 299. On Q. bicolor. Also on Q. alba, prinus, stellata. Adults emerged May 18-24 (DC); June 10-16 (Chi).

190. Callirhytis pedunculata (Bass.). X 1. 461. On Q. velutina. Also on Q. coccinea. Adults emerged May 26-June 5 (Conn.); June 5 (Chi). See also Fig. 180.

191. Amphibolips coelebs (O.S.). X 1. 279. On Q. coccinea. Also on Q. velutina, rubra. Adults emerged June 9-17 (DC).

192. Amphibolips ilicifoliae (O.S.). X 1. On Q. ilicifolia. 286. Adults emerged June 23-25 (Va.); July (L.I., N.Y.). Heavily parasitized.

Petiole or midrib clusters (of more than 4)

193. Adleria weldi (Beut.). X 1. 274. On Q. alba. Also on Q. prinoides. Galls drop in Oct. Emergence is distributed over three seasons beginning the second spring, Mar 20; Mar. 21; April 6 (DC).

194. Adleria dimorpha (Beut.). X 1. 269. On Q. alba. Also on Q. prinus, prinoides, macrocarpa. Adults emerged the second, third and fourth springs: Mar. 20; Mar. 21; Apr. 6 (DC). There is a similar gall on Q. laceyi.

195. *Adleria nigricens* (Gill.). X 1. 271. On *Q. bicolor*. From galls collected on ground in Oct. 1938 adults emerged Mar. 20-Apr. 7, 1940; Mar. 16-Apr. 7, 1941; Mar. 23 and Apr. 21, 1942.
196. *Callirhytis* sp. X 5. On *Q. stellata*. Also on *Q. durandii*. From galls on *Q. stellata* at Texarkana, Ark. Oct. 13, 1917 an adult emerged May 12, 1919.
197. *Andricus biooniscus* Weld. X 5. 297. On *Q. stellata*. Adults emerged the 2nd spring Mar. 5 and Feb. 21 the third spring (DC).
- Andricus oraeicornis* (Ashm.). 302. Gall shaped like Fig. 197. No locality or host.
198. *Andricus rugatus* Weld. X 5. 325. On *Q. lyrata*. Adults out Apr. 11 the third spring and a pupa in the fall indicated there would be some the fourth.
199. *Andricus capillatus* (Weld). X 5. 298. On *Q. alba*. Also on *Q. prinus*. Adults emerged Jan. 22 the second spring.
200. Never reared. X 5. On *Q. laceyi*. Collected on ground, Boerne, Tex. in Oct.
201. *Callirhytis pipericeae* (Bass.). X 4. 469. On *Q. rubra*. Also on *Q. ilicifolia*, *Q. coccinea*, *Q. texana*. Adults emerged Apr. 22-May 11 the second spring and Apr. 16 the third spring.
202. Never reared. X 5. On *Q. alba*. Probably immature. Oct. 12, Little Rock, Ark.
203. *Callirhytis lustrans* (Beut.). X 5. 445. On *Q. stellata*. Also on *Q. breviloba*. Galls from *Q. breviloba* gave adults the second and third springs in April. There is a similar gall on *Q. margareta* and on *Q. chapmani* which has never been reared.
204. *Andricus robustus* Weld. X 5. 324. On *Q. stellata*. Also on *Q. breviloba*. Adults emerged Feb. 22, Mar. 11-19, 1925 and one was cut out Jan. 11, 1926. from galls collected in Oct. 1923 (DC).
205. *Dryocosmus deciduus* (Beut.). X 5. 394. On *Q. velutina*. Also on *Q. coccinea*, *Q. ilicifolia*, *Q. imbricaria*, *Q. rubra*, *Q. falcata*, *Q. marilandica*. Adults emerged Mar. 13-Apr. 22 the second spring (Chi). Galls burst out of a crack in the midrib in a group and drop early in Oct. Dr. Hopkins referred to them as "black oak wheat" as poultry were feeding on them. They are said to contain 63.9 % carbohydrates and 9.34 % protein. The photo is of isolated galls after a winter outside in breeding cage.
206. *Callirhytis lanata* (Gill.). X 5. 443. On *Q. velutina*. Also on *Q. coccinea*, *Q. rubra*, *Q. ilicifolia*, *Q. falcata*, *Q. marilandica*, *Q. texana*. Galls drop in Oct. and the wool weathers away during the winter. Adults emerged the second, third and fourth springs Apr. 1-7 (DC); Apr. 4-13 (Chi).
207. *Andricus ignotus* (Bass.). X 5. 311. On *Q. bicolor*. Also on *Q. macrocarpa*. Galls drop with the leaves in the fall and wool weathers away during the winter as shown in photo. Adults out Mar. 24-Apr. 27 and oviposited in buds.
208. *Andricus flocci* (O.S.). X 1. 307. On *Q. alba*. Also on *Q. prinus*. Galls fall with the leaves and remain on them over winter. Adults emerge the next spring Apr. 22, 24, 30 and May 2, 5 (Conn.); Apr. 14-16 (Pa.). Have been observed ovipositing in subapical buds Apr. 15 (Pa.).
- Andricus pattoni* (Bass.). 320. A similar midrib woolly cluster on *Q. stellata* and *Q. margareta* and *Q. breviloba*. Adults the next April 10-16.

209. This gall X 1 on Q.imbricaria with the wool easily detached may be what Ashmead, as the "Laurel-oak Woolly Gall," Neuroterus laurifoliae Ashm., 489 (the type now lost) (no Neuroterus on a red oak) or Callirhytis perplexa (Ashm.), 465 from an unknown oak in Mo. or Callirhytis infucata (Ashm.) 442 described from Q.catesbaei.
210. Andricus laniger Ashm. X 1. 315. On Q.virginiana. Also on Q.geminata. Adults emerged Feb.28-Mar.10.
211. Never reared. X 1. On Q.texana. Collected at Boerne, Tex. in October.
212. Callirhytis furva Weld. X 1. 455. On Q.marilandica. Probably on all the red oaks. Galls drop in Oct. Adults emerged the second and third spring Mar.20-29 (DC).
213. Never reared. X 1. On Q.breviloba. Collected at Boerne, Tex. in October.
- Loxaulus beutenmuelleri Weld. 369. A midrib cluster similar to Dryocosmus piperoides (Bass.). (Fig.201) collected in N.J. under a red oak tree. Adults emerged the second spring Apr.6-May 11.
- Adleria vacciniiformis (Beut.). 273. Globular, 4-7 mm. in dia., with a petiole in a loose midrib cluster on Q.stellata, Austin, Texas.

#### Spanglee

- 214-6. Xystoterae poculum Weld. X 1 and X 5. 242. On Q.alba. Also on Q.prinus, prinoideae. Full-grown in early Sept. Adults emerged in Jan, the second spring and some came out the fourth spring.
- Xystoterae nigrum (Fitch). 241. On Q.alba. Fig.307. From galle collected in Sept. adults were found in breeding cage Feb.15 the second spring which agree with the types.
- Neuroterus tantulue Weld. 233. On Q.alba. Fig.306. Also on Q.stellata, pinus. Galls drop when mature in June. Adults emerged the next spring about April.
217. Neuroterus umbilicatus Baes. X 5. 235. On Q.alba. Also on Q.bicolor. Neither Beutenmueller nor the writer has been able to rear it. Perhaps the good galls (i.e. those without guests) drop early. See also Fig.314.
- 218-9. These galls X 1 and X 5 collected on Q.lyrata at Texarkana, Ark. in Oct. 1917 produced adults May 23-June 14-21, 1918 and were erroneously designated and distributed as neotypes of Xystoterae volutellae Ashm. the type fly of which turned up in the Beutenmueller collection in 1935 labeled: "Jan. Riley Co. Kan. Marlatt. Xystoterae volutellae Ashm." The type gall however is much like Fig.247 in structure.
220. Never reared. X 5. On Q.laceyi. From Boerne, Texae in October.
221. Never reared. X 1. On Q.chapmani. Collected in April at Ocala, Fla.
222. Never reared. X 1. On Q.bicolor. Found in Chicago area in September.
223. Never reared. X 10. On Q.macrocampa. From Peru, Nebr. June 9.
224. Xystoterae sp. X 5. On Q.stellata. Collected in Texas in October. Wingless adults emerged Mar.25 the second spring. Never described.

225-6. *Neuroterus saltarius* Weld. 232. X 1 on *Q. macrocarpa*; X 5 on *Q. bicolor*. After galls drop in June they jump about on the ground for some time as do the related species, *Neuroterus saltatorius* (Edwards) in Calif. Adults emerged the second spring in March.

227. Never reared. X 5. On *Q. breviloba*. Collected at Boerne, Texas in October.

Never reared. On *Q. prinus*. Fig. 305. White, 4 mm. in dia., depressed. Oct.

*Zopheroterae hubbardi* (Ashm.). 365. Fig. 308. is of a gall from which an adult determined as this species was reared. Gall white, 2.3 by 1.85 mm. by 1.7 mm. high on under side of leaf of *Q. velutina* in October. Adult emerged the second spring Apr. 15 (DC).

Otherwise and detachable

228. *Philonix nigra* (Gill.). X 1. 263. On *Q. alba*. Also on *Q. bicolor*, *prinoides*, *macrocarpa*, *muhlenbergii*. Galls drop before the end of July altho some as late as Oct. Emergence in Nov. and Dec. distributed over three seasons beginning the first fall. In Baltimore, Md. 30 adults emerged Nov. 27-Dec. 9 the first fall from 100 galls. Emergence mostly in daylight. Some placed on ground a few inches from base of a white oak tree simply wandered away.

229. *Philonix gigas* Weld. X 1. 261. On *Q. lyrata*. Also on *Q. macrocarpa*. Adults emerged Dec. 1 and Dec. 15 after  $-14^{\circ}$  F. More were found dead in breeding cage in March.

*Philonix lanaeglobuli* (Ashm.). 262. On *Q. bicolor* in Fla. Gall similar to *Philonix nigra* (Gill.) above, 7.5 - 8 mm. in dia.

*Amphibolips nubilipennis* (Harris). 290. Fig. 309. On all the red oaks. Gall resembles a green grape, 14-22 mm. in dia., single on under side of leaf. Adults emerged June 1-18 (DC); June 22 -25 (Medina, N.Y.). Out of 180 galls only 5 of the maker were reared. Very heavily parasitized.

*Amphibolipe racemaria* Ashm. 292. Gall similar to the above but smaller, 8-15 mm. in dia. On *Q. laurifolia*, *phellos*, *myrtifolia*, *nigra*. Adults emerged in May (Fla.); June 1 (Ga.)- all females.

230. *Belonocnema fossoria* Weld. X 1. 353. On *Q. virginiana*. Also on *Q. geminata*. Adults emerged Dec. 8-13. In two cases where the galls were numerous on the leaves in the fall shriveled old galls of *Belonocnema treatae* Mayr were found on the roots.

*Belonocnema kinseyi* Weld. 354. Galls are similar to those of *fossoria* above on *Q. virginiana* in Texas. Galls are full-grown by end of July. Contained pupae and adults Oct. 26. Adults emerged before Nov. 15 (Boerne, Tex.)

231. *Callirhytis attigua* Weld. X 1. 402. On *Q. texana*. Most had dropped by Oct. 26. Adults emerged Aug. 20-Sept. 23 the next year.

232-3. *Sphaeroterax unicum* (Weld). X 5. 361. On *Q. stellata*. Also on *Q. margareta*, *lyrata*. Adults emerged the next spring by May 25.

234. *Sphaeroterax carolina* (Ashm.). X 5. 357. On *Q. stellata*. Also on *Q. chapmani*, *margareta*, *breviloba*. Galls collected in Va. in Oct. 1943 gave adults Mar. 24, Apr. 7, 18, 1944 and one was cut out in late October.

Similar but smoother, pink, up to 10 mm. in dia., saddled on a vein of *Q. chapmani* on basal third of leaf on under side may be *Sphaeroterax melleum* (Ashm.).

- Sphaeroterus melleum* (Ashm.). 258. Cluster of one to three on upper surface of leaf of *Q. chapmani*, 2.5 -3.8 mm. in dia.; they shrivel in drying. "Reared in Feb." Not recognized in the field.
235. *Sphaeroterus cuneatum* Weld. X 5. 363. On *Q. alba*. Adults emerged the second spring and also the third.
- Zopheroterus hubbardi* (Ashm.). 365. Described from a captured specimen from Detroit, Mich. See Fig. 308 and *Q. velutina* and *Q. coccinea* in host index. Entered also on p. 115 under spangle galls.
- Zopheroterus compressum* (Gill.). 362. Described from *Q. rubra* in Iowa. The type gall in Ill. St. Nat. Hist. Sur. is 2.7 by 1.8 by 1.8 mm. The type fly is in the U.S. Natl Mus. Gall was described as pure white, on the under side of leaf in fall as leaves begin to turn, dropping with or before the leaves.
- Zopheroterus sphaerula* Weld. 366. On *Q. rubra*. Slightly ellipsoidal, not depressed, on upper or lower surface, single or 3-4 in a row, about 3 mm. in dia., dropping before the leaves. Adults emerged Mar. 13-Apr. 6 the next spring.
236. Never reared. X 1. On *Q. alba*. Also on *Q. prinus*, *michauxii*, *chapmani*.  
Never reared. Fig. 276. An erect club, 5 mm. high, single on under side of leaf of *Q. phellos* in October in Florida.
237. *Dryocosmus rileyi* (Ashm.). X 1. 401. On *Q. rubra*. On all the red oaks. After the galls drop in October the fleshy knob at top shrivels leaving a hilum-like scar. Adults emerged June 15-24 (Chi). The type emerged July 2 at St. Louis, Mo. from a gall on red oak.
238. Never reared. X 10. On *Q. alba*. Red, hairy. Sept.-Oct.
239. Never reared. X 5. On *Q. breviloba*. On under side of leaf. Boerne, Tex. Oct.
240. *Callirhytis tubicola* (O.S.). X 5. 482. On *Q. stellata*. Galls stand erect in a group on under side of leaf. Adults May 11-28 the next spring.
241. *Phylloterus sigma* Weld. X 5. 240. On *Q. alba*. Always on under side of leaf near the edge on saplings 8-10 feet high. Also on *Q. muhlenbergii*. Galls drop in late Oct. An adult was found alive in cage on Mar. 7 the second spring.
- Liodora apiarium* Weld. 266. Fig. 304. On *Q. alba*. Always on under side near edge of leaf in fall on vigorous shoots. Adults emerged Jan. 22 and Feb. 4 the second spring.
242. *Dryocosmus albidus* Weld. X 1. 392. On *Q. velutina*. Also on *Q. coccinea*. Galls drop before the leaves. Adults emerged Mar. 23 the second spring and Mar. 22 the third spring (DC). See Fig. 312 for structure of gall.
- Phylloterus rubinum* (Gill.). 239. Similar to above in size and appearance but on *Q. alba* and *Q. prinus* in the fall. See Fig. 311 for structure. Galls drop early in Oct just as leaves are turning. Adults the second spring in January.
243. Never reared. X 5. On *Q. marilandica* in Mo. in September.
244. Described as *Neuroterus saltatorius texana* Kinsey. X 10. 232. On *Quercus virginiana*. In late fall in Texas. Adults emerged Mar. 8.
245. Never reared. X 5. On *Q. breviloba* in Texas in October.

246. Never reared. X 5. On Q.coccinea. Single or group of two or three. On the upper side of leaf in October.
247. Never reared. X 5. On Q.macrocarpa. Found on ground Sept.1 at Fort Worth, Tex. The type gall of Xyloterae volutellae Aehm. is similar to this.
248. Zopheroetax guttatum Weld. X 10. 364. On Q.palustris, also on Q.imbricaria, texana. With purple spots, single on under side of leaf on a secondary vein, dropping in Oct. Adults emerged Mar.6-Apr.7 the second spring.
249. Never reared. X 5. On Q.laceyi. Boerne, Tex. in October.
250. Amphibolipe citrififormis Aehm. X 1. 278. On Q.phellos. Also on Q.laurifolia. Adults issued the first week in May.
- Amphibolipe melanocera Aehm. 288. On Q.nigra. Globular bud gall 6-12 mm. in diameter. Adults in June.
251. Never reared. X 1. On Q.imbricaria. Really a bud gall.
252. Never reared. X 1. On Q.texana in October.
253. Never reared. X 1. On Q.phellos. Old galle seen in Mo. and Ark. in Oct.
- Never reared. Fig. 313. On Q.muhlenbergii in Kansas. 2.6 mm. long by 1 mm.

#### Integral

##### Fleehy midrib thickenings

254. Callirhytis nigrae (Aehm.). X 1. 452. On Q.marilandica. Also on Q.imbricaria. Adults emerged June 21-24 (DC).
255. Callirhytis tumifica (O.S.). X 1. 483. On Q.rubra. Also on Q.coccinea, velutina. Adults were emerging June 15 (Ill.); July (Va.).
256. Andricus petiolicola (O.S.). X 1. 321. On Q.prinus. Also on Q.michauxii, bicolor, prinoideae, macrocarpa. Adults of both sexes emerged June 21 (Va.); June 27 (DC); July 5-13 (Toronto). Females were observed ovipositing in terminal buds.
257. Callirhytis pigma (Bass.). X 1. 468. On Q.velutina. Also on Q.coccinea, ilicifolia. Galle contained adults ready to emerge Oct.2; some came out Oct.25. Some galle produced males only.
- Callirhytis flavipes (Gill.). 428. On Q.macrocarpa. Adults were emerging July 6 when the galle were gathered (Ames, Ia.). Emerged June 23 (Chi.).
258. Never reared. X 1. On Q.etellata, margaretta, chapmani. Still immature on June 1 (DC). This may be Callirhytis parvifoliae Ashm., 459 described from Q.chapmani.
259. Andricus foliaformis Gill. X 1. 308. Described from Q.alba in Mich., the holotype and gall now lost. Description of adult and gall agree with Andricus foliosus Weld (synonymy published) described from Q.bicolor (see photo) from Evanston, Ill., the adults emerging June 20-25, 1912.

##### Fleshy parenchyma thickeninge

260. Neuroterus majalis (O.S.). X 1. 222. On Q.alba. Also on Q.prinus. Adults of both sexes out by May 6-11 (DC); June 12 (Chi.).

*Neuroterus irregularis* (O.S.). 221. Gall similar to the above; on *Quercus stellata, chapmani*. Galls mature before the leaves are full-grown. Adults out May 16-20, 1923; May 24-26, 1924 (DC). A heavy infestation practically defoliates the tree so that it puts forth a new set of leaves. Females were observed ovipositing on the under surface of the leaves and in September the leaves bore numbers of small galls like *Neuroterus saltatorius australis* Kinsey.

261. *Callirhytis futilis* (O.S.) sex.gen. X 1. 434. Oak Wart Gall. On *Q. bicolor* (left) and *Q. alba*. Also on *Q. prinus, macrocarpa, lyrata*. Adults July 3.
262. *Callirhytis rugosa* (Ashm.). X 1. 474. On *Q. phellos.*, Also on *Q. laurifolia, imbricaria*. Adults emerged June 14 (DC).
263. *Callirhytis rugosa* (Ashm.). X 5. 474. On *Q. rubra*. Also on *Q. coccinea*.
264. Never reared. X 5. On *Q. phellos*.

*Neuroterus noxiosus* (Bass.). sex.gen. X 1. 226a on Fig. 121. On *Q. bicolor*. Also on *Q. prinus*. Adults were emerging July 3 (Chi).

265. *Callirhytis modesta* (O.S.). X 1. 450. On *Q. rubra*. Also on *Q. ilicifolia, coccinea, velutina, imbricaria, marilandica, falcata, texana*. Adults emerged June 27 (Chi); June 17-19 (DC).

*Callirhytis favosa* (Bass.). 427. On *Q. palustris, velutina, rubra*. Adults emerged Aug. 2-9 (DC). A cross-section thru gall suggests a honeycomb.

#### Small parenchyma thickenings in numbers

266. *Neuroterus perminimus* Bass. X 1. 229. On *Q. alba*. Also on *Q. bicolor*. The agamic females emerged the next spring Apr. 4-20 (Chi).
267. *Callirhytis bipapillata* Weld. X 5. 409. On *Q. ilicifolia*. Also on *Q. coccinea* (rare). Adults emerged June 30-July 5 (Va.). Fig. 317 for structure.
268. *Neuroterus niger pattersoni* Kinsey. X 5. 225. On *Q. stellata* in Texas. Galls first appeared on Mar. 10. Adults began to emerge on May 7. A single leaf usually yields adults of one sex only.
269. *Neuroterus niger* Gill. X 5. 225. On *Q. alba*. Also on *Q. stellata* (tests the Thomson collection). Agamic females emerge the next spring.
271. *Neuroterus papillosus* Beut. X 5. 228. On *Q. bicolor*. Also on *Q. prinus*. Adults emerged June 27-29 (Ind.); June 9 (DC).
- Neuroterus fugiens* Weld. 219, Fig. 318. On *Q. bicolor, macrocarpa*. Adults emerged May 28 and were observed to oviposit on under side of leaves then about two inches long.
- Never reared. Fig. 275. Slight blisters in numbers in *Q. laceyi, prinus*.

#### Otherwise and integral

270. *Andricus utriculus* Ashm. X 5. 328. On *Q. alba*. Also on *breviloba, chapmani, stellata, margaretta*. Adults emerged Apr. 25 (DC); June 16 (Ill.).

*Neuroterus bassetti* D.T. 208. On *Q. alba*. Types are from Mass. where the adults emerged June 2. They emerged May 25 when the young leaves were one to two inches long (DC).



272. *Neuroterus floccosus* (Bass.). X 1. 218. On *Q. macrocarpa*. Also on *bicolor*, *prinoideae*, *lyrata*. Adults probably emerged the next spring.
- Neuroterus* *exiguissimus* Bass. 216. On *Q. alba*. Adults emerged the next spring in April (DC).
- Neuroterus minutissimus* Bass. 223. On *Q. virginiana*, *geminata*. In numbers on under side of leaf, pubescent, the size of a pinhead.
- Neuroterus verrucarum* (O.S.). 237. Fig. 310. On *Q. stellata*, *margaretta*, *chapmani*. In numbers on under side in fall, pubescent. Adults emerged May 25 and June 1 the next spring.
- Neuroterus clarkeae* Beut. 209. Fig. 315. On *Q. alba*. Single, sessile on edge of leaf before it is full-grown. Adults emerged May 5 (DC).
- Liodora comata* Weld. 268. Fig. 316. On *Q. alba*. Gall similar to the above. Adults emerged May 4, 10, 12, 14 (DC).
- Xanthoteria ornatum* (Kinsey). 246. On *Q. brisviloba*. Adults emerged Apr. 15 from galls collected Mar. 3 (Austin, Tex.).
273. Never reared. X 1. On *Q. virginiana*. Boerns, Texas in October.
274. Never reared. X 1. On *Q. virginiana*, *fusiformis*. Boerns, Texas in October.
275. Never reared. X 1. On *Q. laevis* in Texas. Galls empty in October. There is a similar gall on *Q. prinus* on Long Island, N.Y.
276. Never reared. X 5. On *Q. phellos*. Empty in October in Florida.
277. Never reared. X 1. On *Q. phellos*. Arkansas. Cynipid ?
278. Never reared. X 1. On *Q. bicolor*. Photographed on June 11 (Chi). Perhaps the work of a gall midge ?
279. Never reared. X 1. On *Q. stellata*. In Texas and Missouri in October.
280. *Ibalia maculipennis* Haldeman. Male. Length 11-15 mm.
281. *Neuroterus niger* almas Kinsey. X 5. 225. On *Q. virginiana*. Types emerged Apr. 16 (Austin, Tex.).
282. *Callirhytis excavata* (Ashm.). 425. An individual gall picked up on ground under *Q. velutina* Oct. 5 at Wolf Gap on the Blue Ridges, Va. See also Fig. 154. Adult the second spring.
- Neuroterus gillettei* Bass. 220. On *Q. stellata*. Blisters on the petiole and main veins, in a group, in early spring. Contained pupae on Apr. 26 (Va.).
283. Never reared. Gall on rose from which no maker has ever been reared. What gall was attacked by guests in an early stage and modified in size and structure is not known.
284. Gall on rose, X 1, produced by the gall midge, *Rhabdophaga rosacea* Felt.
285. *Disholcaspis brevinota* Weld. 338. A bull's gall on *Q. breviflora* usually single at base of sprouts.
286. *Sphaeroterus ocala* (Wald). 359. See p. 49. Single, sessile, on exposed roots of *Q. chapmani* in April.

287. *Loxaulus humilis* (Weld). 371. Cells at base of swollen current year's growth of runner sprouts of *Q.chapmani*. Cells not nested.
288. *Callirhytis florensis* Weld. 439. Galls scattered among normal stamens in a shortened catkin of *Q.marilandica*, cells 2.2 mm. long.
289. *Neuroterus exiguus* Fass. 217. Fusiform enlargement of the staminate axis of *Q.stellata*, green, succulent, many-celled.
290. *Callirhytis subcostata* Weld. 480. Gall ribbed like a melon, 2.5-3.0 mm. in dia., produced on side of acorn cup in May on *Q.stellata*.
291. *Callirhytis electrea* Weld. 421. A group of cells in a depression in side of cotyledon in a mature acorn of *Q.prinus* in the fall.
292. *Callirhytis oblata* Weld. 453. Green, smooth, bare, not hidden by bud scales, at apex of new growth of *Q.coccinea* and *Q.falcata* in May. Without a girdle of hairs at base when detached.
293. *Andricus cinnamomeus* Ashm. 300. A terminal enlarged and seemingly dead bud of *Q.chapmani* and containing a single larval cell.
294. *Amphibolips globus* Weld. 2857. Galls of the agamic generation slightly pointed at end, green, up to 14 mm. in dia., wall thin, dropping in late Aug. Galls of sexual generation produced from weak lateral buds of the previous year's growth on pin oak saplings or on sprouts from stumps. Green, fleshy, bare, wall 1 mm. thick, up to 18 mm. in dia., not deciduous. Adults emerged June 28, 30, July 2, 4 (Va.). They are very heavily parasitized.
295. *Loxaulus mammula* Mayr. 373. Short abrupt swellings of at the base of lateral branches of *Q.alba* in June, many-celled. Adults emerged in July (Va.).
296. *Neuroterus rileyi* Ashm. 231. Local thickenings of the bark, confluent and covered with normal bark. On *Q.stellata*.
297. *Dryocosmus floridensis* (Beut.). 396. A rosette of green bracts sessile on trunk or partly clasping small twigs, larval cell in center. Usually single. Found on all the red oaks in early spring.
298. *Disholcaspis fungiformis* Kinsey, 340. A cluster of two-story galls; the upper part a flattened cone, 7-10 mm. in dia. and 4 mm high; the lower part containing the larval cell. On *Q.virginiana* in Texas.
299. *Callirhytis tuberosa* (Bass.). 481. A much shortened thickened portion of the new growth of *Q.ilicifolia* bearing many leaves, many-celled, up to 15 mm. long by 6 mm. in dia., in June. Rare.
300. *Eumayria longipennis* (Ashm.). 384. Woody enlargement at base of lateral branches of *Q.phellos*, 8-10 mm. long by 3.5-4.0 mm. in dia. The types were reared in May.
301. *Callirhytis crypta* (Ashm.). 418. See Fig. 162 and text on page 109. Cells just under bark in the wood. On several of the red oaks.
302. Terminal cluster of spindle-shaped galls, 11.6 mm. long on *Q.palustris* in Philadelphia, Pa.
303. Conical gall on *Q.phellos*, wall thin and translucent, with a free-rolling cell inside. On under side of leaf in mid-Feb. at Ft. Myer, Fla.
304. *Liodora apiarium* Weld. 266. Solitary, sessile, 4 mm. high, on under side of leaf of white oak close to the edge on sprouts a few feet from the ground.

305. A spangle gall on Q.prinus. White, 4 mm. in dia., depressed, in October when the nutritive layer was almost used up.
306. Neuroterus tantulus Weld. 233. Saucer-shaped, 0.9-1.6 mm. in dia., in numbers on under side of leaf of Q.alba dropping in early fall leaving a scar on the gall and a brown spot on the leaf.
307. Xystoteras nigrum (Fitch). 241. A depressed sphere 3.5 by 1.8 mm on under side of leaf of Q.alba in Va. in Sept.; covered with a white bloom ( as determined Weld).
308. Zopheroteras hubbardi (Ashm.). 365. The figure is of a gall from which an adult determined as this species was reared. Gall white, 2.3 by 1.85 by 1.7 mm. high on under side of leaf of Q.velutina in October. The adult emerged the second spring Apr.15 (DC).
309. Amphibolipe nubilipennis (Harris). 290. Like a green grape, 14-22 mm. in dia., succulent, almost translucent. On under side of leaf of Q.ilicifolia and other red oaks in June. Adults emerged June 22-25 at Medina, N.Y. Four-fifths of them were parasitized.
310. Neuroterus verrucarum (O.S.). 237. Compact woolly mass 2 mm. in dia. by 1 mm. high in numbers on under side of leaf of Q.stellata in the fall.
311. Phylloteras rubinum (Gill.). 239. A depressed white sphere up to 5.2 mm. in dia. by 3.1 mm. high on under side of leaf of Q.alba just as the leaves are turning in the fall.
312. Dryocosmus albidus Weld. 392. Fig.242. A depressed white sphere, fleshy, bare, up to 5.4 mm. in dia. on under side of leaf of Q.velutina in the late fall, similar in external appearance to the above but internal structure is different and on a different host.
313. Similar to Phylloteras sigma Weld (Fig.241) but straight and without a scar in center, green, on a vein on Q.muehlenbergii in June at Manhattan, Kan.
314. Neuroterus umbilicatus Bass. 235. Fig.217. Cup-shaped with inrolled edge, 3-4 mm. in dia., covered with short whitish hairs, on under side of leaf of Q.alba in the fall.
315. Neuroterus clarkeae Beut. 209. Light-colored, ellipsoid, sessile, covered with short wool, 2-3 mm. long, at edge of young leaf of Q.alba in the early spring.
316. Idodora comata Weld. 268. Similar to Neuroterus clarkeae Beut. above but pointed at end, 3.0 by 1.2 mm. and covered with crinkly white hairs, tan, thin-walled, at edge of leaf of Q.alba in early spring.
317. Oallirhytis bipapillata Weld. 409. Fig.267. Parenchyma thickenings in numbers on leaf of Q.ilicifolia projecting on both sides of the leaf in June.
318. Neuroterus fugiense Weld. 219. Single or scattered parenchyma thickenings more prominent below, sparingly hairy, on Q.bicolor in May.
319. Bassettia pallida Base. 381. Described from a single specimen from Savannah, Ga. April 15 without gall or host. Agreeing with the type are specimens from cells just under the bark of small twigs of Q.virginiana in Florida, the adults emerging in Feb. and Mar. (Homestead).

GALLS ON PLANTS OTHER THAN OAK

320. *Diastrophus fragariae* Beut. 169. A fusiform enlargement of the petiole. See page 84.
321. *Diastrophus bassetti* Beut. 167. On running blackberry. See page 84.
322. *Diplolepis dichlocerus* (Harris). 189. On stem of wild rose. See p. 85.
323. *Diplolepis nodulosa* (Beut.). 197. See page 85.
324. *Diplolepis verna* (O.S.). 206. On stem of a wild rose. See page 85.
- Diastrophus smilacis* Ashm. 175. On "Smilax sp." in the Chicago area. Reared in Jan. and Feb. The writer collected for a dozen years in the Chicago area and was never able to find it. No other gall has yielded adults that agree with the types. Determination of the host questioned.
- Diastrophus fragariae* Beut. 169. On wild and cultivated strawberry. See Fig. 320 above. For rearing dig up the plant when the gall is seen in June and transplant to pots or where it can be found in the fall. Adults emerged the next spring June 2 (Chi). Brodie reared the maker May 18-25 at Toronto.
- 325-6. *Diastrophus niger* Bass. X 1 and X 5. 172. On *Potentilla canadensis*. The adults emerged the next spring Apr. 15-May 1 (Chi); Apr. 10-25 (DC).
- Diastrophus tumefactus* Kinsey. 176. On *Potentilla monspeliensis* var. *norvegica*. Types were cut out of galls collected 40 years previously in Quebec.
328. *Diastrophus cuscuteaeformis* O.S. X 1. 168. On wild blackberry. Adults out in May (Chi).
327. *Gonaspis potentillae* (Bass.). X 1. 159. On *Potentilla canadensis*. Adults emerged May 15-18 (Chi); July 1 (Me.); June 16 (Great Smoky Mts.).
- Diastrophus bassetti* Beut. 167. On running blackberry. Full-grown by end of Aug. Adults the next year in early July.
- Diastrophus minimus* Bass. 170. On *Potentilla canadensis*. Small oval blisters on the stem.
329. *Diastrophus turgidus* Bass. X 1. 177. On wild raspberry. Adults emerged May 1-June 10 (Chi). Brodie reared the maker May 21-27 (Toronto).
330. *Diastrophus radicum* (O.S.). X 1. 174. On wild raspberry. Adults May 2-21.
331. *Diastrophus nebulosus* (O.S.). 171. On wild blackberry. Adults out May 5-13 (DC); June 1-11 (Mo.); guests emerged Apr. 12-May 5 (Ill.).
332. *Diplolepis radicum* (O.S.). X 1. 199. On *Rosa carolina*. Adults emerged June 10 (Medina, N.Y.); June 2-16 (Va.).

333. *Diplolepis fulgens* (Gill.). X 1. 190. On *Rosa blanda*. Adults May 1-21 and May 15-June 1 (Chi). Brodie reared the maker May 18-29 (Toronto). Similar adults were reared from galls on a cultivated *Rosa rugosa* on May 17 and June 8-12 (Chi).

334. *Diplolepis utahensis* (Bass.). X 1. 204. On *Rosa* sp. Adults emerged May 12-June 1 (Chi).

*Diplolepis dichlocerus* (Harris). 189. Fig. 322. On a wild rose. Adults out May 22-June 21 (Chi). Some females were liberated on a small wild rose recently transplanted to a greenhouse and having fresh shoots 5-6 in. high. On May 23 a female was seen ovipositing near the top of one of these shoots. On June 5 a belt of glandular hairs at this point was the first evidence of gall formation and by June 18 the gall was 5 mm. in diameter. Adults emerged from this gall in the greenhouse the next spring before March 15.

335. *Diplolepis fusiformans* (Ashm.). X 1. 191. On a wild rose. Adults emerged May 13-23; May 30-June 17 (Chi). Brodie reared the maker from galls on *Rosa blanda* June 18-20 and June 24-July 7 (Toronto).

*Diplolepis nodulosa* (Beut.). 197. Fig. 323. On *Rosa rubiginosa*, sweetbrier. Adults emerged May 25 to early June (Chi).

336. *Diplolepis bicolor* (Harris). X 1. 188. On *Rosa blanda*. In the Chicago area galls are full-grown but still succulent the last of June, turning brown in July, after which they may be gathered for rearing. Kept in greenhouse adults emerged Apr. 30, May 17, May 20.

*Diplolepis pustulatoides* (Beut.). 198. On a wild rose. Adults out May 24.

337. *Diplolepis rosae* (L.). X 1. 201. Mossy Rose Gall. On *Rosa rubiginosa*, the sweetbrier rose. Adults emerged Apr. 27-May 4 (Chi). Brodie reared adults May 21; May 25; May 24 (Toronto). An European species on an introduced European host.

338. *Diplolepis multispinosa* (Gill.). X 1. 195. On a wild rose. Adults emerged May 10-15; Apr. 25-May 13 (Chi); May 5 (Wis.); Apr. 3-6 and May 20-30 (Minn. on *Rosa rugosa*). Brodie reared the maker from gall on *Rosa blanda* June 21; May 5-31; Apr. 19-25 and May 19-June 2 (Toronto).

339. *Diplolepis nebulosa* (Bass.). X 5. 196. On a wild rose. Determination is questioned for the description says galls are 5-6 mm. in dia. and close to midrib on the under side of the leaf. Galls of this sort on rose in summer need further study.

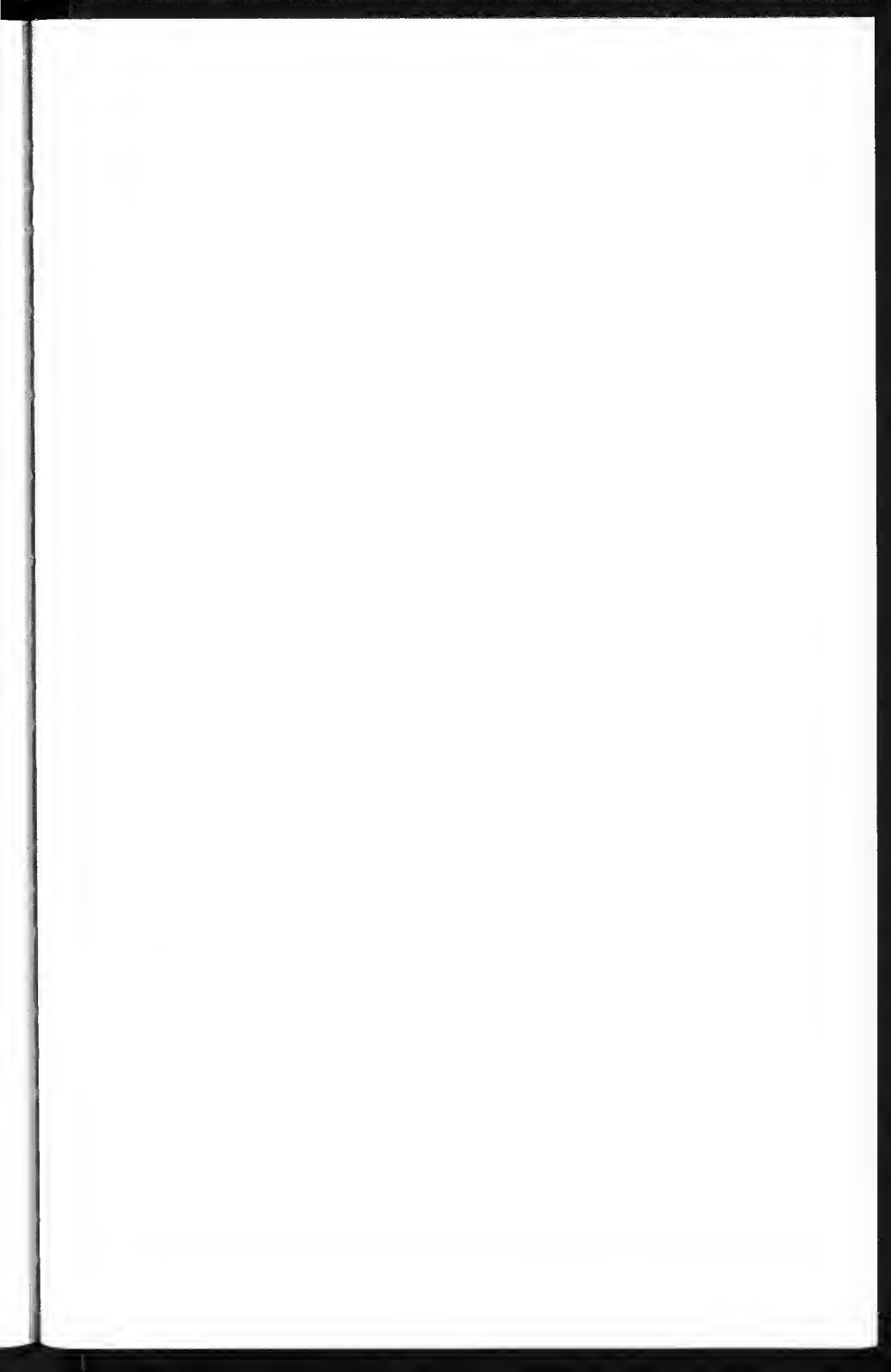
*Diplolepis mayri* (Schlecht.). 194. A single female determined as this European species was reared in May from a rose of European origin in nursery in New Jersey. Others from galls on *Rosa rubiginosa* at Dayton, Ohio were reared May 12, 13, 15, 18.

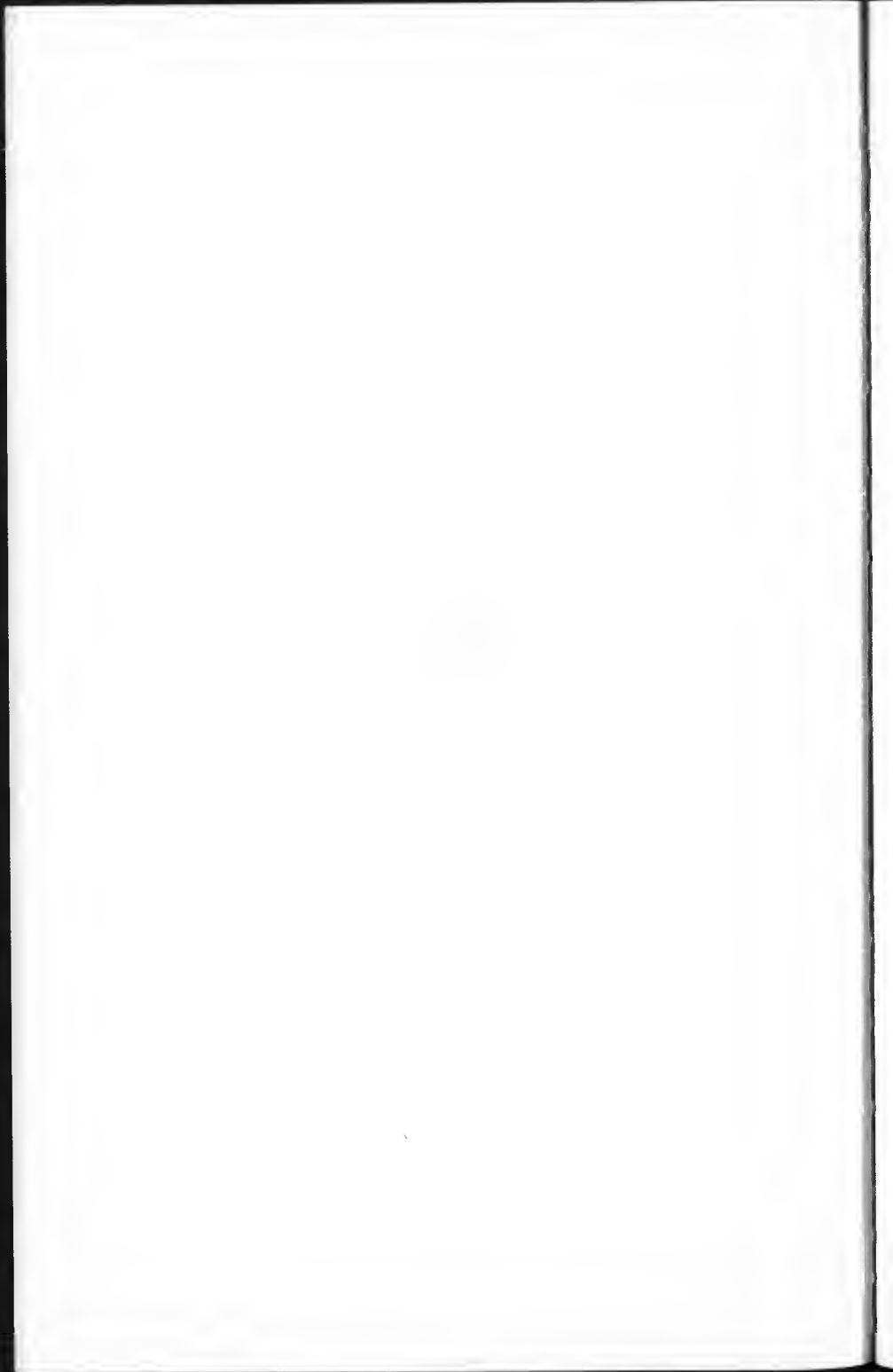
340. *Diplolepis gracilis* (Ashm.). X 1. 192. On a wild rose. Adults emerged the next spring May 15-June 10 (Chi).

341. *Diplolepis ignota* (O.S.). X 1. 193. On a wild rose. Adults began to emerge Apr. 15 (Chi); May 14-25 (Long Island, N.Y.).

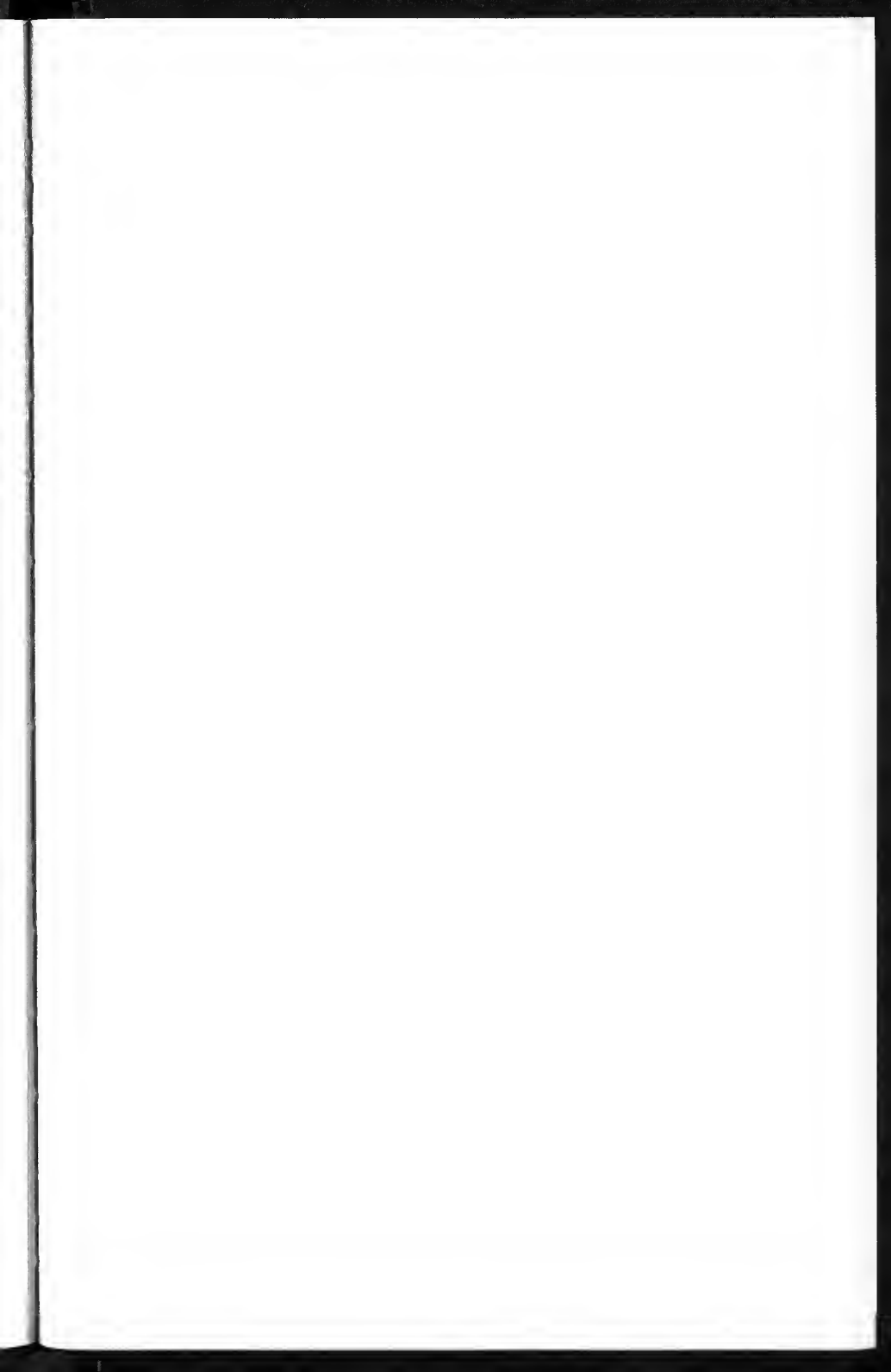
342. *Diplolepis rosaefolii* (Ckll.). X 5. 202. On a wild rose. Adults emerged May 11-June 14 (Chi). Brodie reared adults from galls on *Rosa blanda* in June.

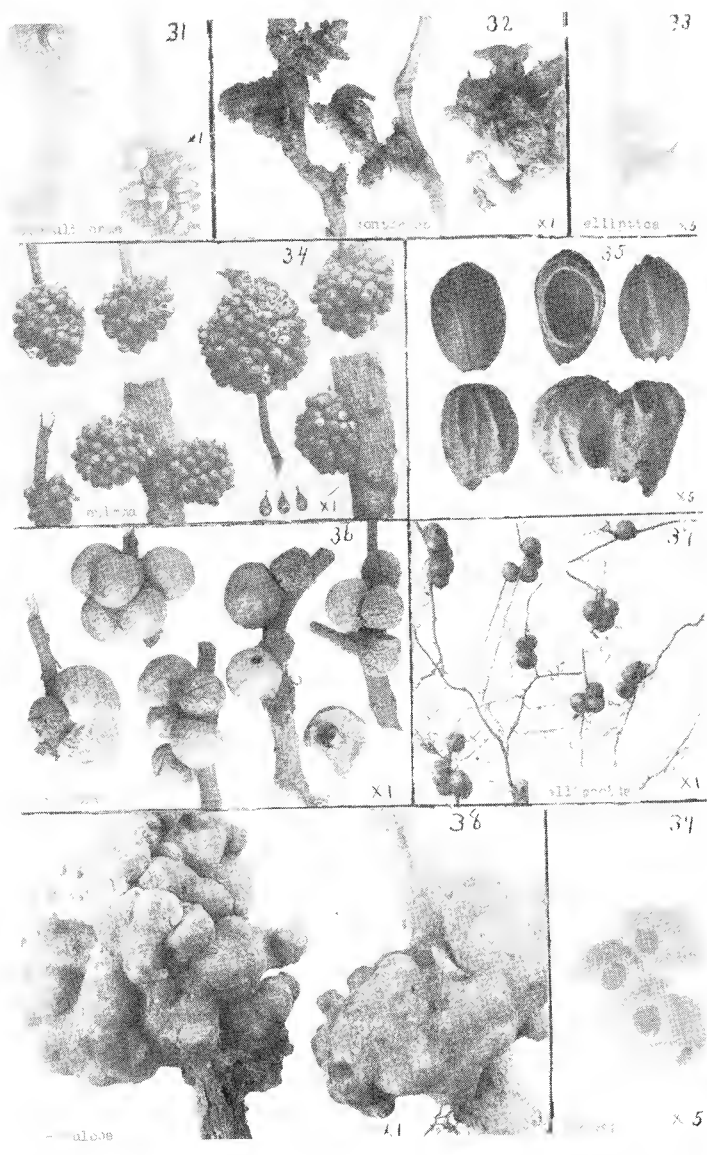
- Diplolepis verna* (O.S.). 206. Fig. 324. Washington, D.C. is the type locality for this species. *Diplolepis nodulosa* (Beut) may be a synonym of it.
343. *Gillettea taraxaci* Ashm. X 1. 187. On wild dandelion, *Taraxacum officinale*. Green and fleshy in June, becoming brown and pithy later. The maker emerged the next spring.
344. *Liposthenes glechomae* (L.). X 1. 178. On ground ivy, *Nepeta hederacea*. Larvae transform in the fall. Adults emerged Apr. 8-15 (Va.); Apr. 13 (Md.); Apr. 2-7 (Va.) the next spring.
345. *Aulacidea tumida* (Bass.). X 1. 186. On *Lactuca canadensis*. Adults emerged May 15-27; May 25-27 (DC).
346. *Aulacidea annulata* Kinsey. X 1 (Kinsey photo). 182. On *Lactuca*. Adults emerged June 5-12, 1912, Sharon, Mass. Probably a synonym of the above.
347. *Antistropheus rufus* Gill. X 1. 165.  
*Antistropheus minor* Gill. 165. On *Silphium laciniatum*. Adults emerged May 15-June 24 (Ill.).
348. *Antistropheus laciniatus* Gill. X 1. 162. On *Silphium laciniatum*. Adults emerged the next spring.
349. *Antistropheus pleum* Ashm. X 1. 164. On *Lygodeemia juncea*. Adults emerged from galle from North Dakota on Apr. 10.
350. *Aulacidea harringtoni* (Ashm.). X 1. 183. On *Lactuca canadensis*. Adults emerged the first week in June (Chi).
351. *Aulacidea abdita* Kinsey. X 2 (Kinsey photo). 180. On *Lactuca elongata*. Types were cut out of 40 year old galle from Quebec. Probably a synonym of the above.
352. *Aulacidea podagrae* (Bass.). X 1. 185. On *Lactuca canadensis*. The adults emerged the first week in June (Chi); in May (Va.).
353. *Antistropheus gilphii* Gill. X 1. 166. On *Silphium perfoliatum*. The adults emerged May 2-June 12 (Nebr.).
354. *Aulacidea nabali* (Brodie). X 1. On *Prenanthea alba*. Adults emerged the next spring June 8-11 (Chi).

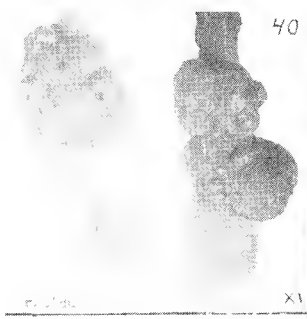




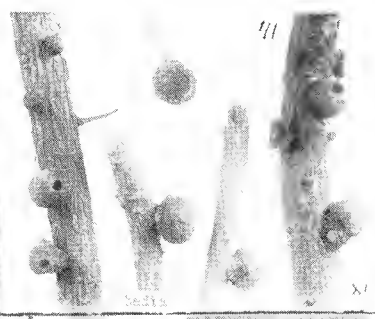








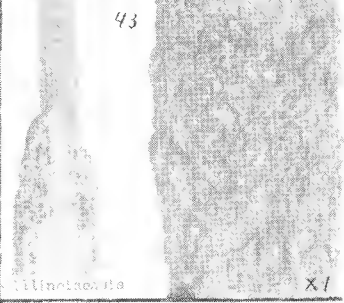
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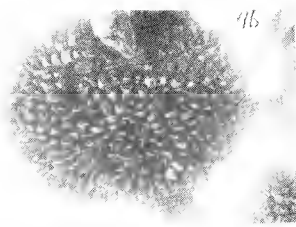
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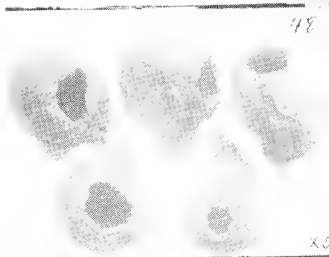
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X1



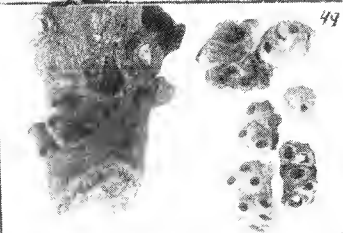
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X5



48

X10



49

ovata

X1



50

lobosa

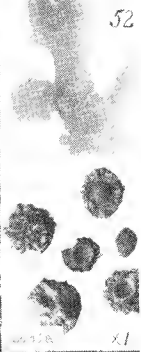
X1



51

radiata

X1



52

ovata

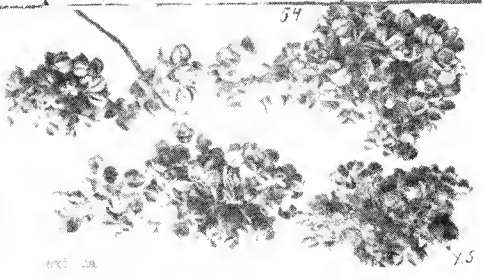
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53

ovata

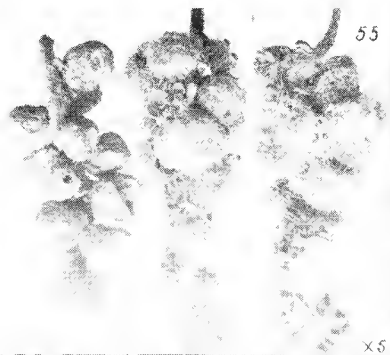
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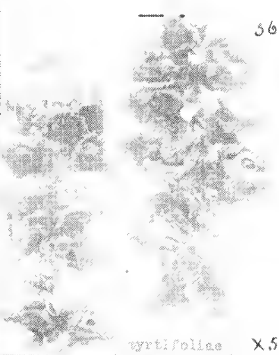
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X5



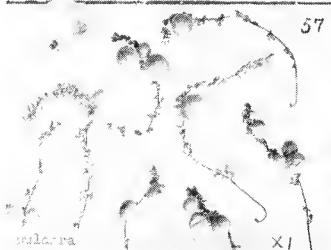
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X5



56

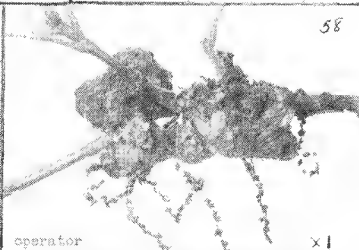
pyrifoliae X5



57

X1

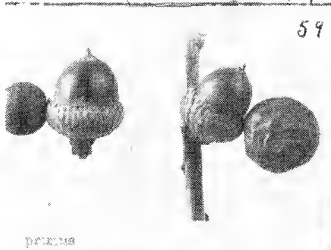
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58

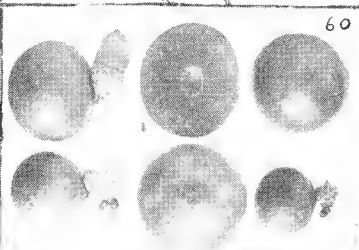
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X1

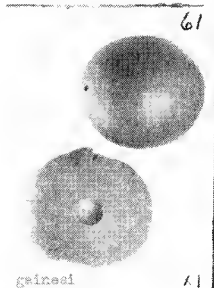


59

perkins



60



61

gainesi

X1



62

middletoni

X5



63

X1



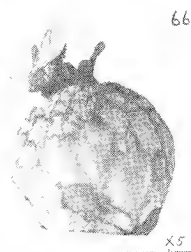
balanensis

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balanensis

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66

x5



67

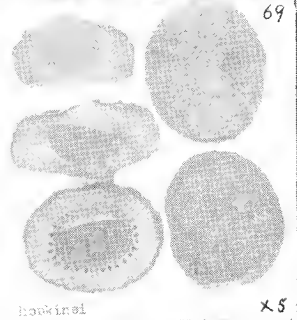
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68

balanensis

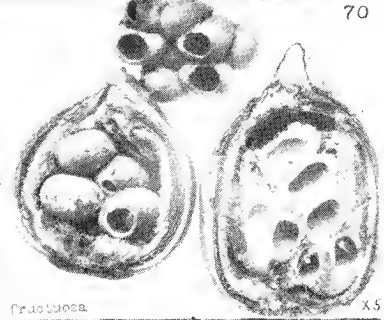
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69

x5

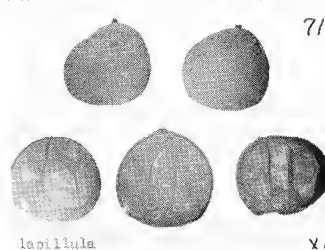
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70

fructuosa

x5



71

x1

lapillula



72

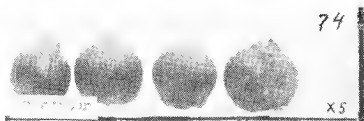
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balanoides



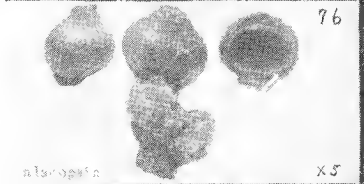
73

x1



74

x5



76

x5

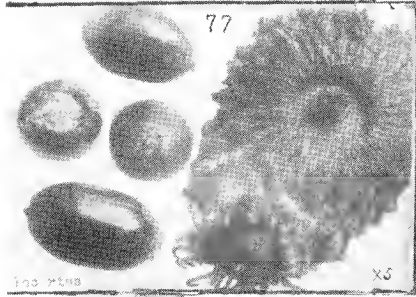
nitropata



75

x1

balauza



77

x5

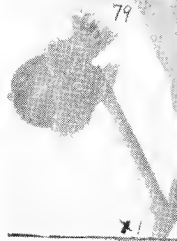
pacinas



78

x5

bolanone



79

x1



80

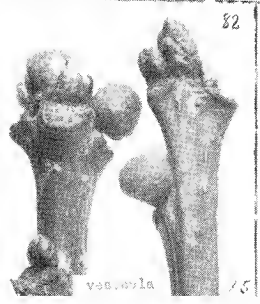
x5

erinacci



81

x5



82

x5

vac.olla



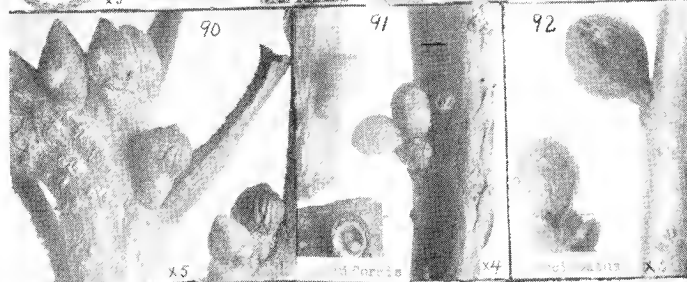
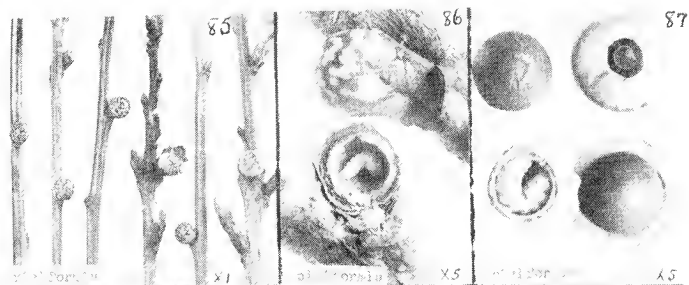
83

x5

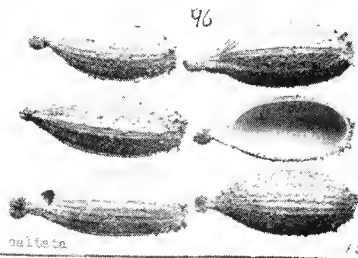


84

x1



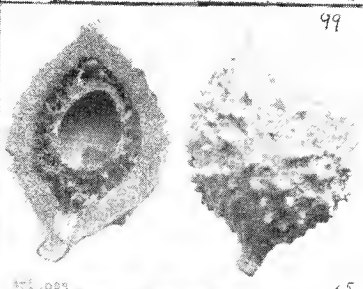
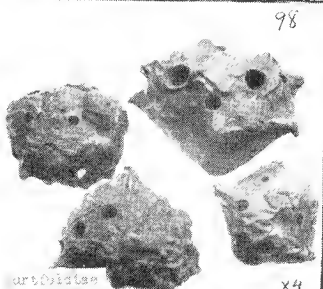




salicaria

18

x5

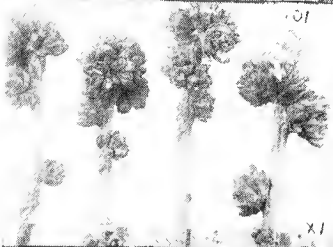


artichoides

x4

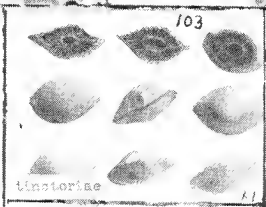
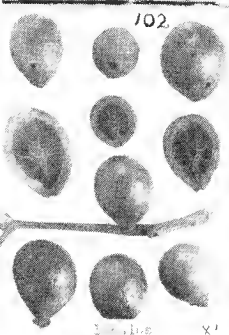
artichoides

x5



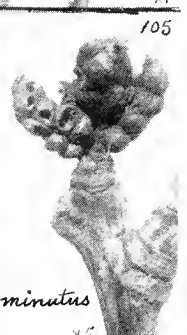
flavifrons

x1



unicoloris

x1



minutus

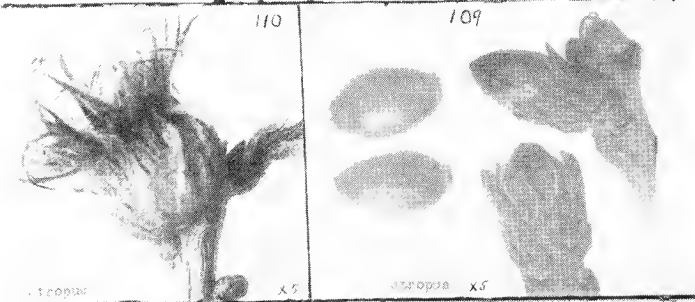
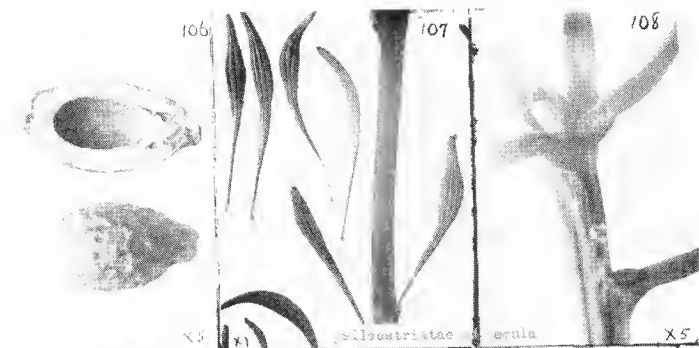
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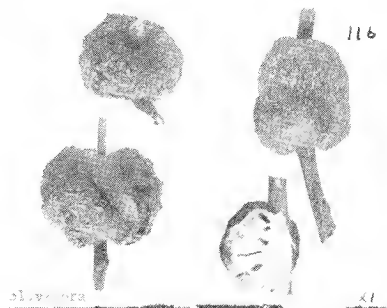


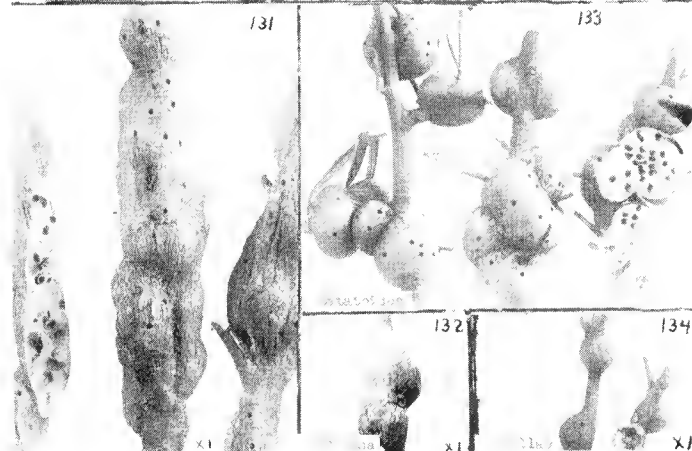
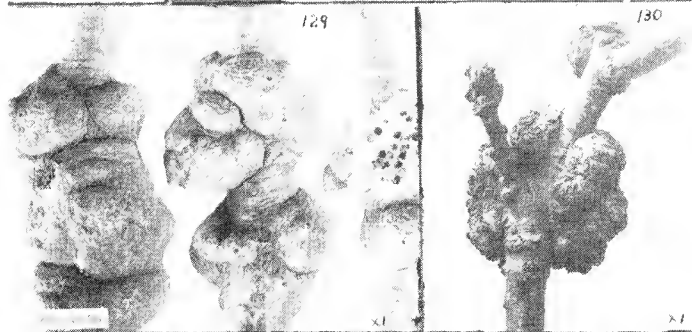
102

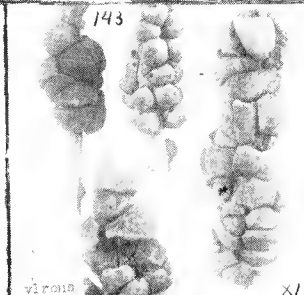
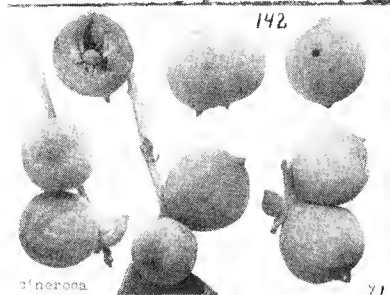
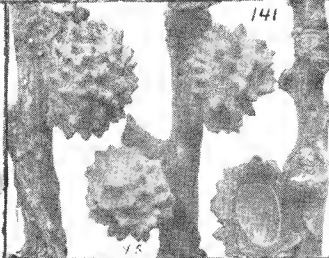
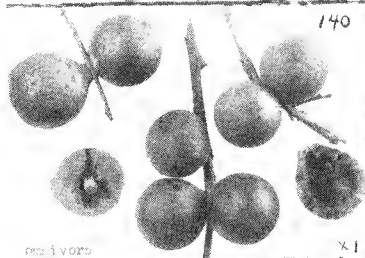
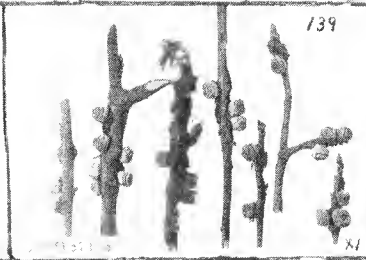
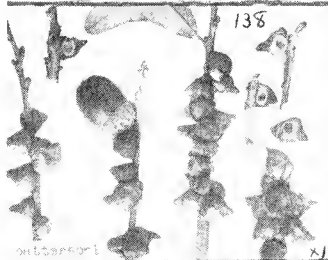
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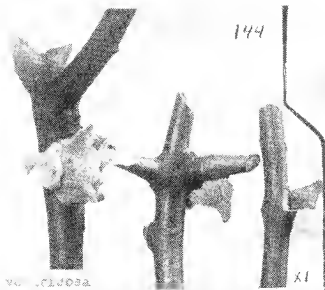
x1





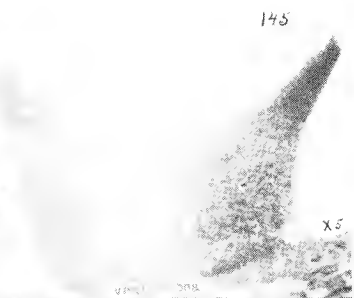






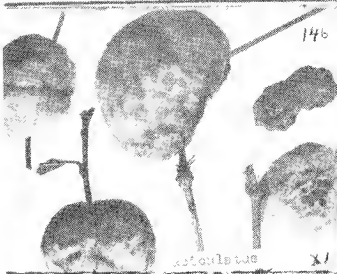
144

X1



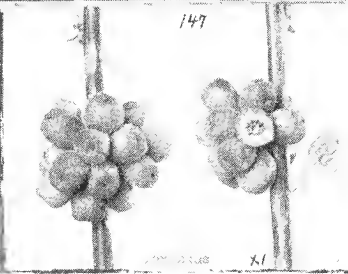
145

X5



146

X1



147

X1



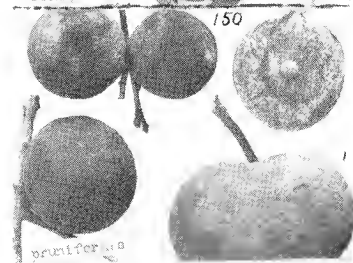
148

X1



149

X1



150

X1

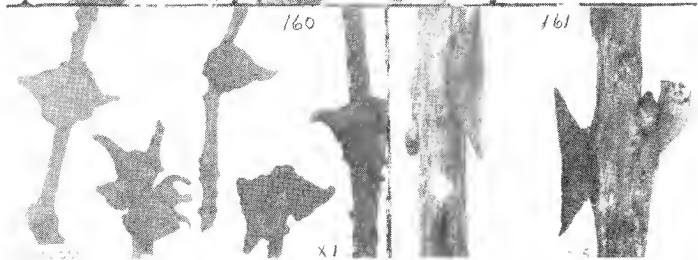
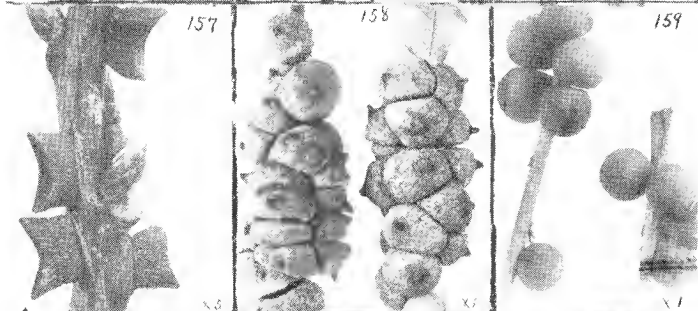
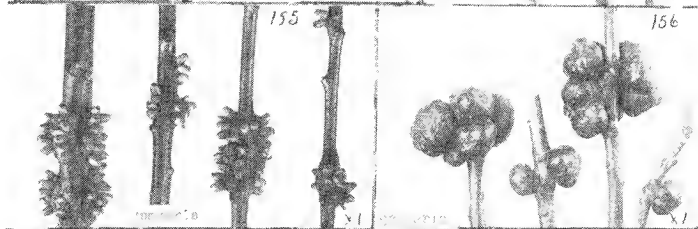
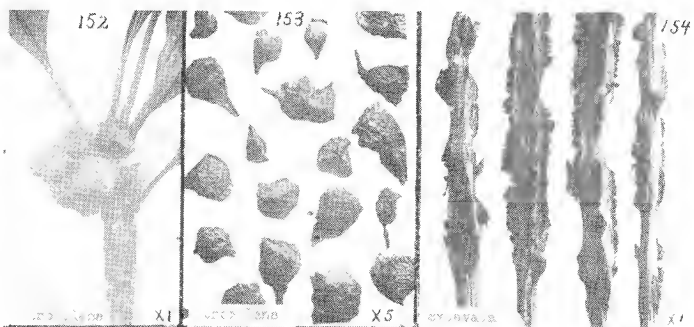
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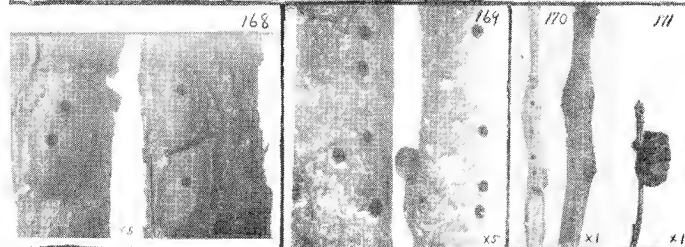
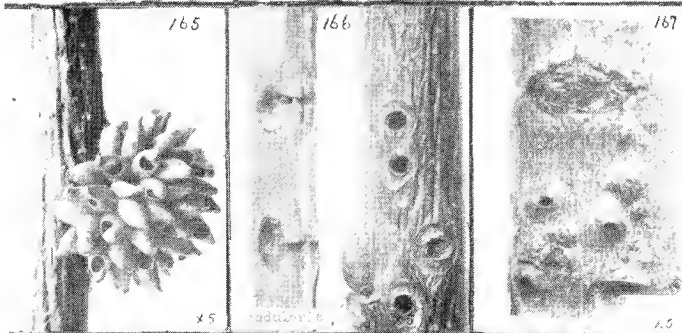


151

X1

strobilana





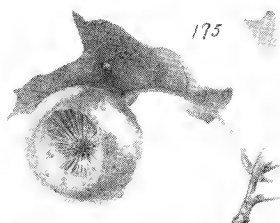




174

*concolorata*

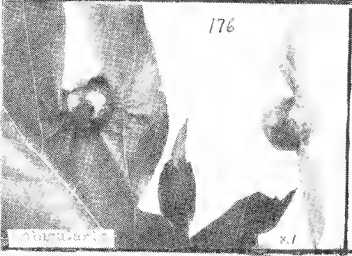
x1



175

*glabra*

x1



176

*obovata*

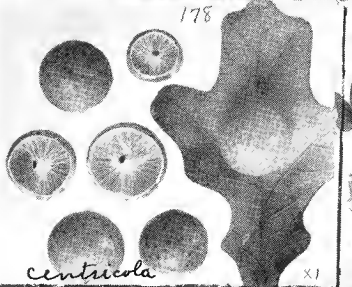
x1



177

*obovata*

x1



178

*centricola*

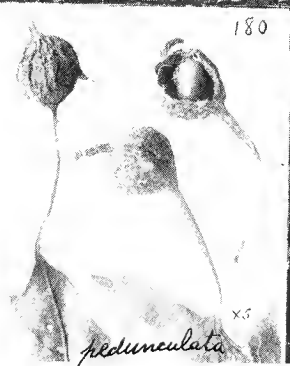
x1



179

*glabra*

x1



180

*pedunculata*

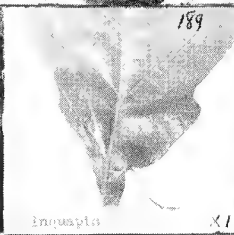
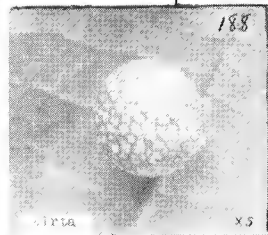
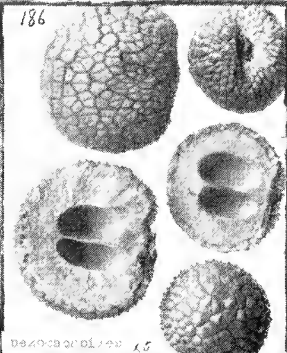
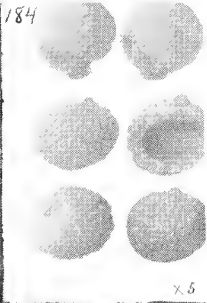
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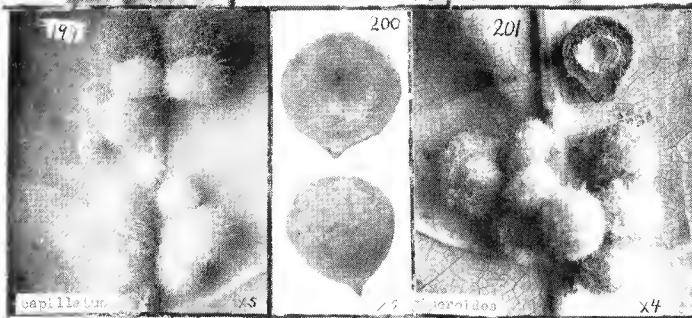
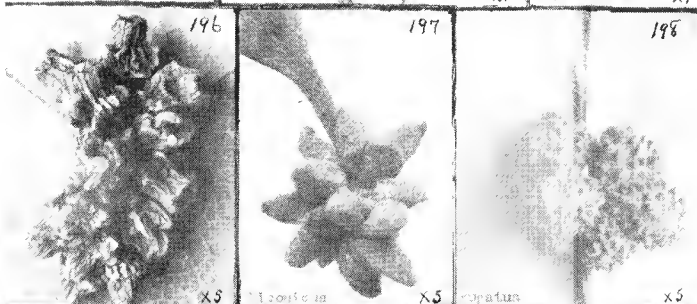
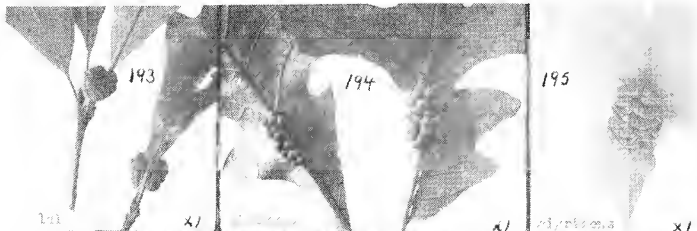


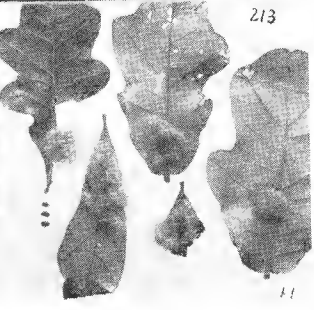
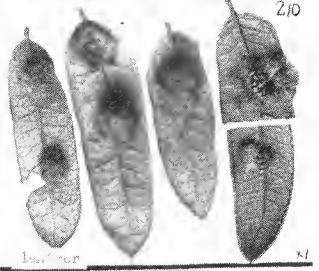
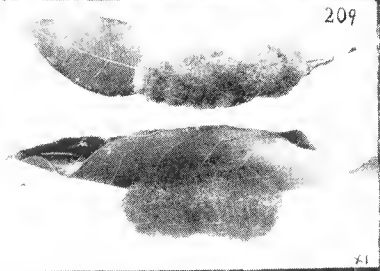
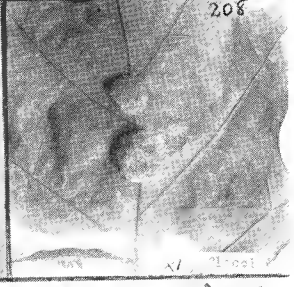
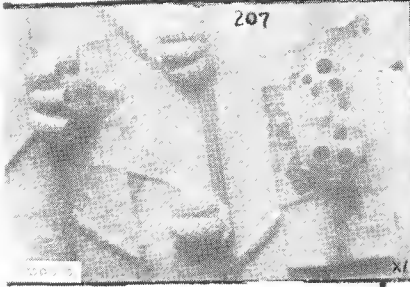
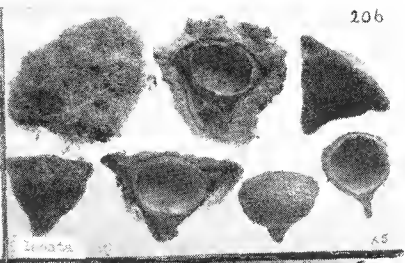
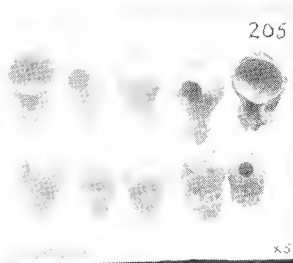
181

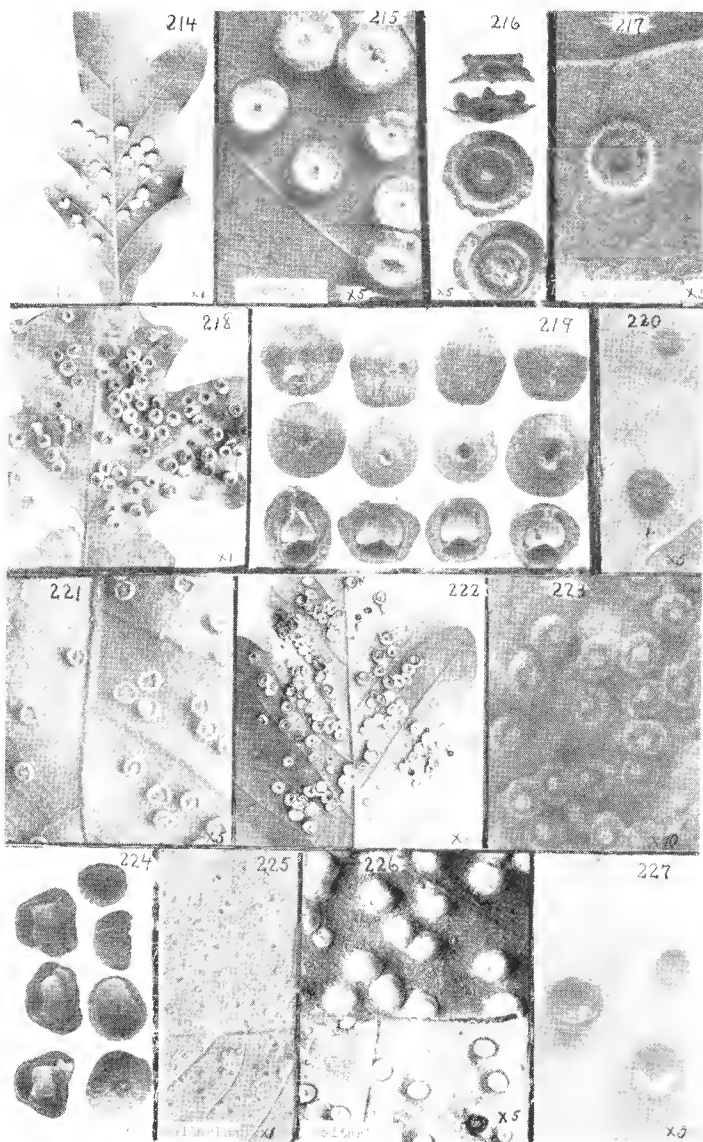
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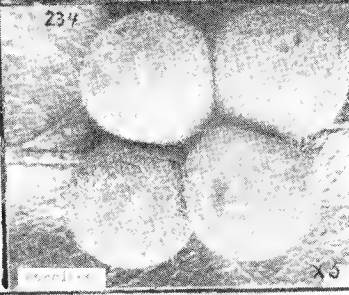
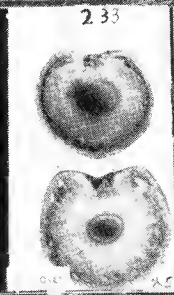
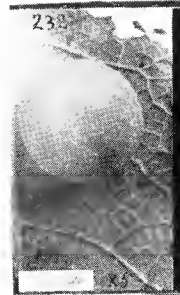
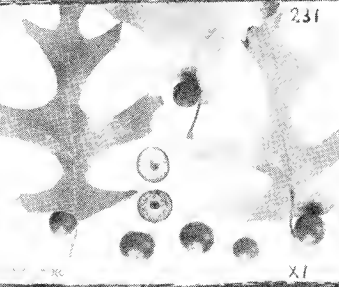
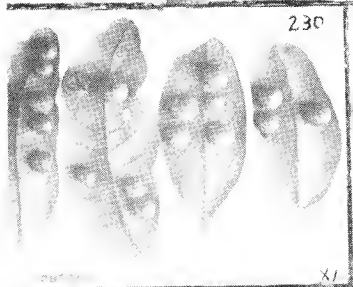
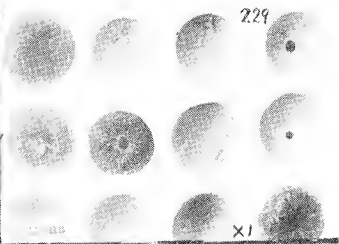
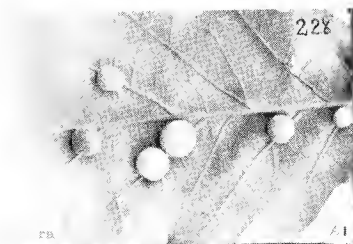
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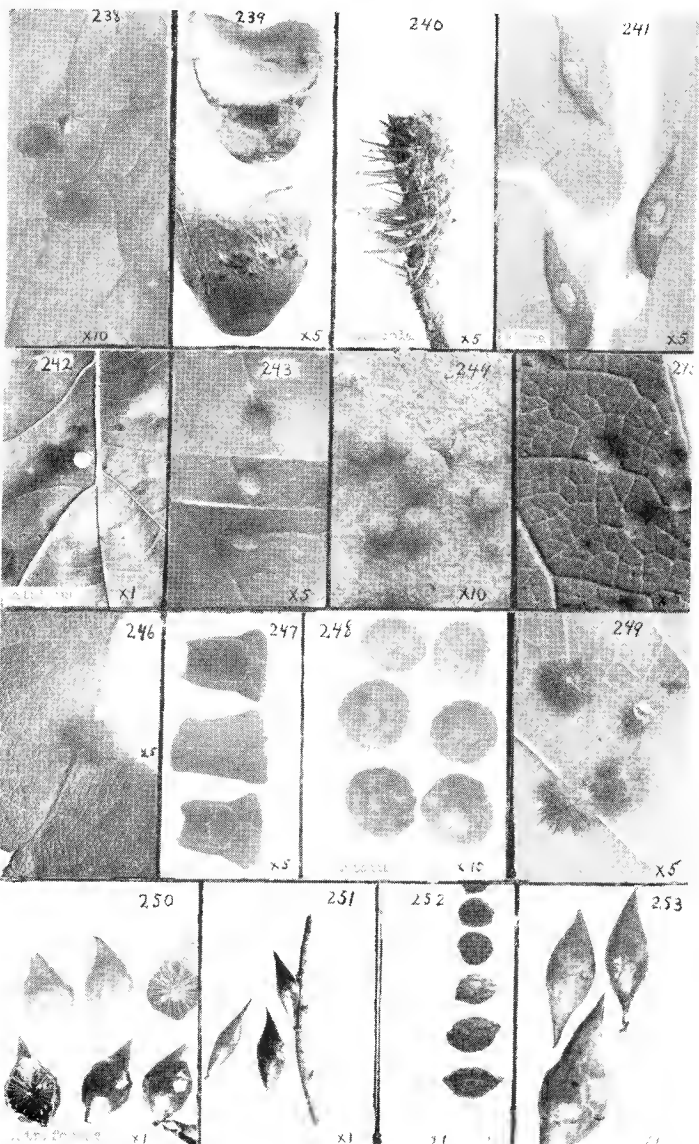














254

x1



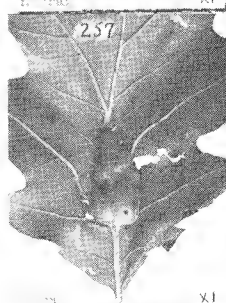
255

x1



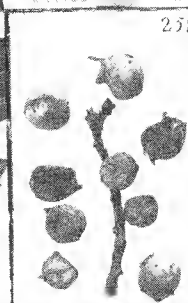
256

x1



257

x1



258

x1



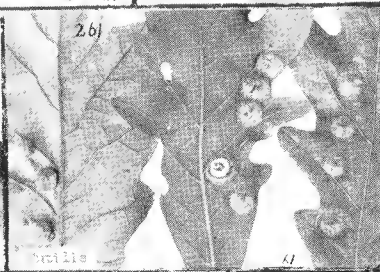
259

x1



260

x1



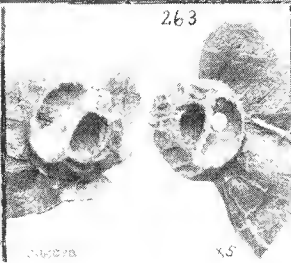
261

x1



262

x1



263

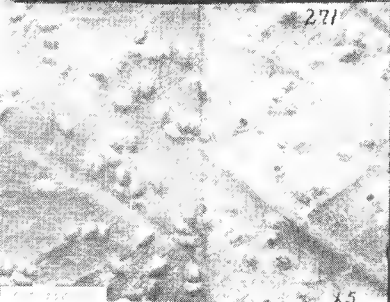
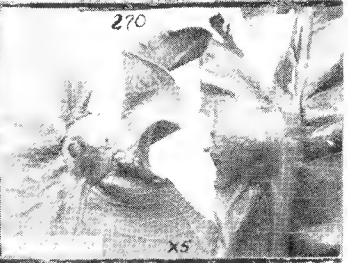
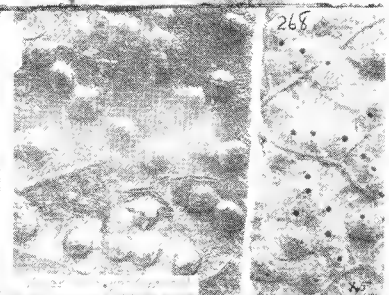
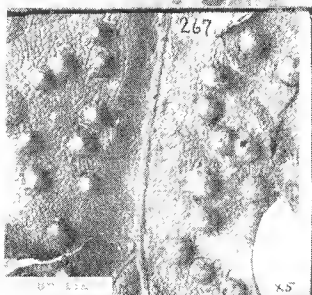
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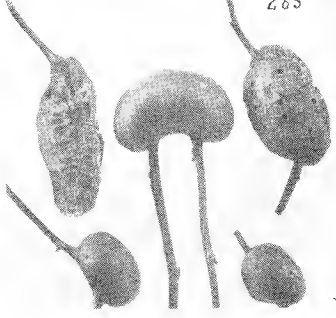
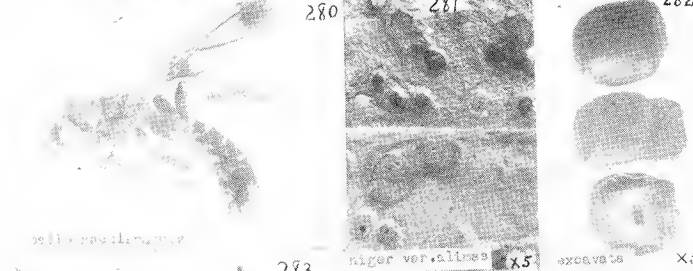
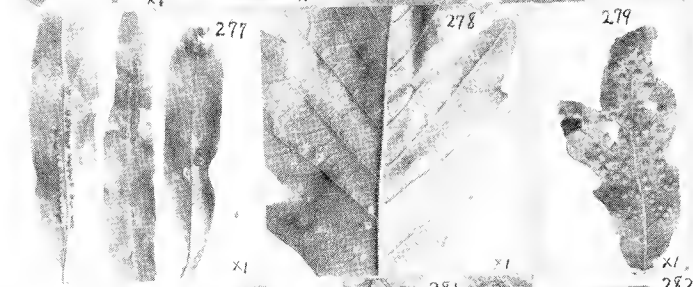
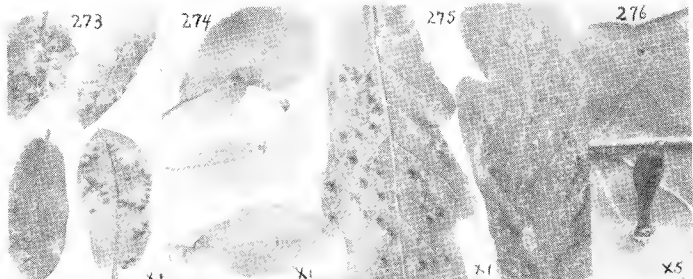


264

x5







273

274

275

276

x1

x1

x1

x5

277

278

279

x1

x1

x1

280

281

282

*pell. papilionacea*

283

*niger* var. *albus*

x5

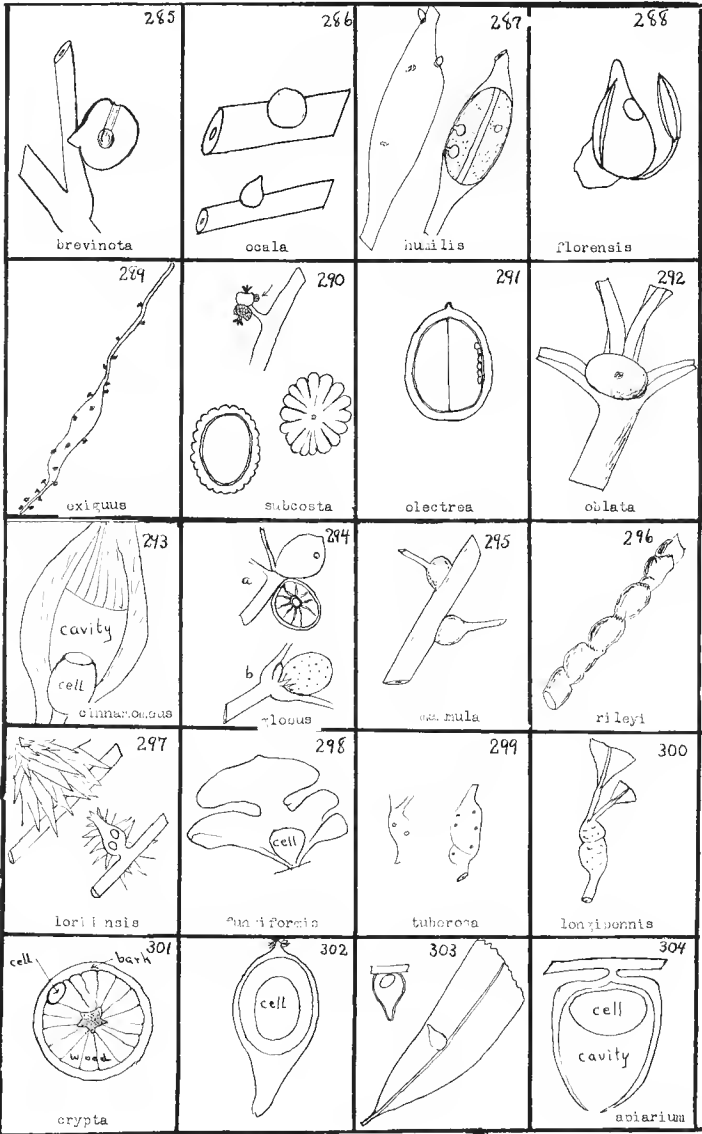
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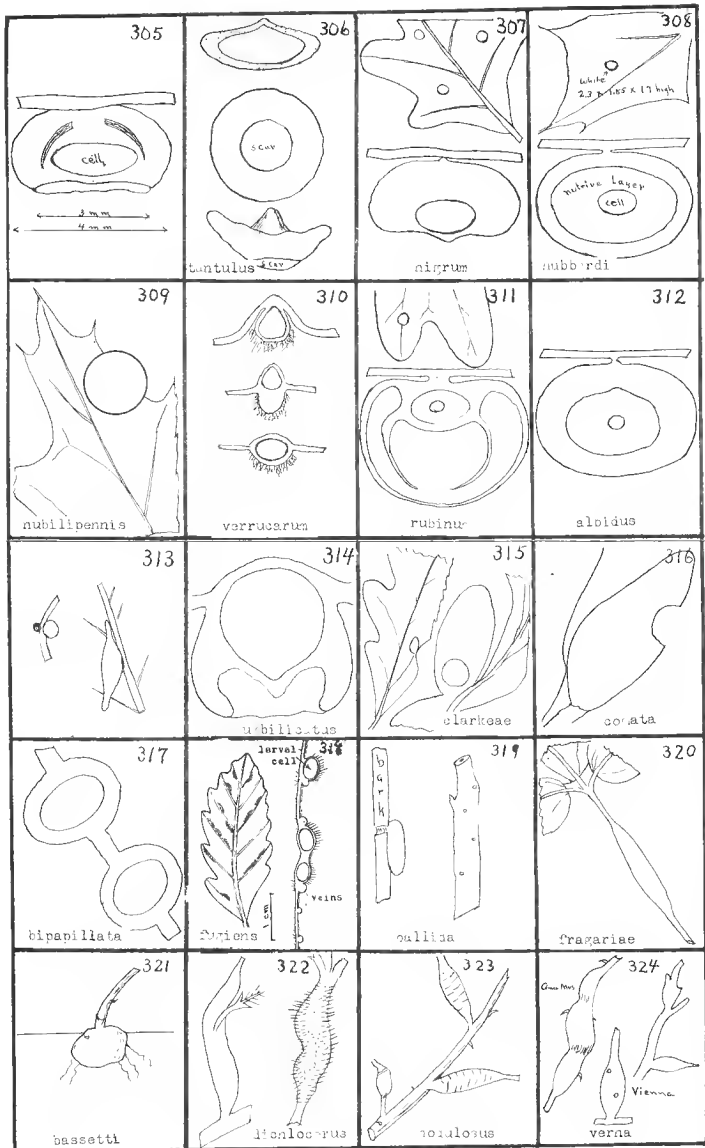
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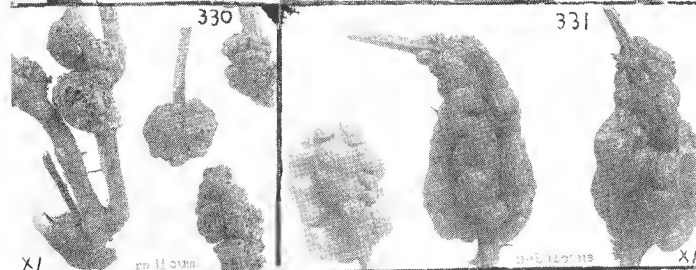
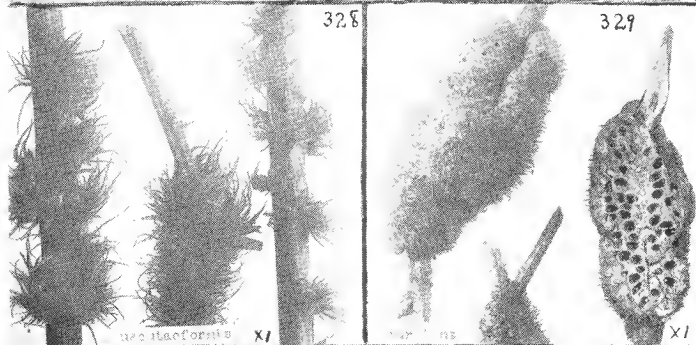
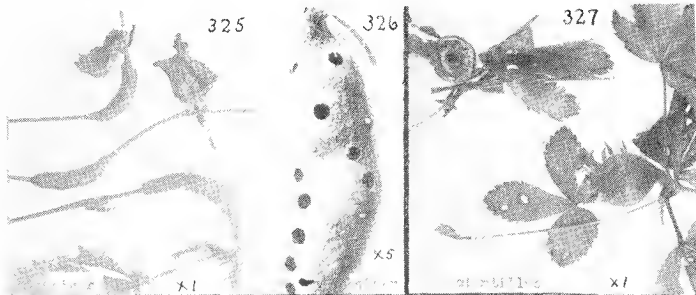
284

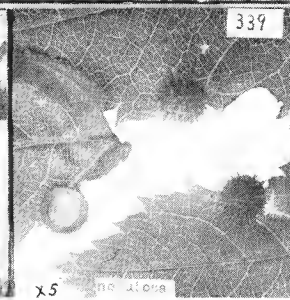
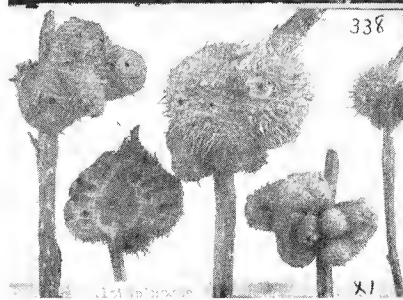
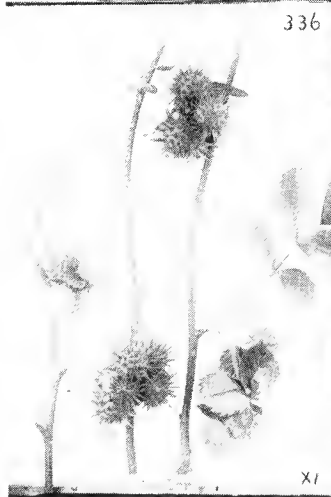
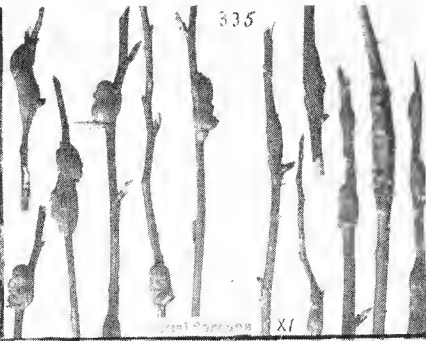
x1 *Anakletochloa rosacea*

x1











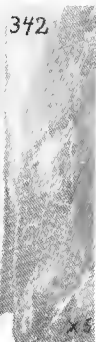
...reolip

XI



...rosta

XI



...oneafolii

XI



343

...paxi

XI



344

...lo...

XI



345

XI

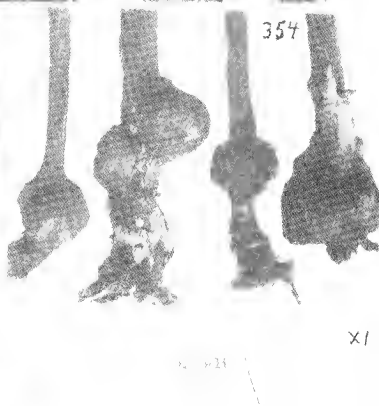
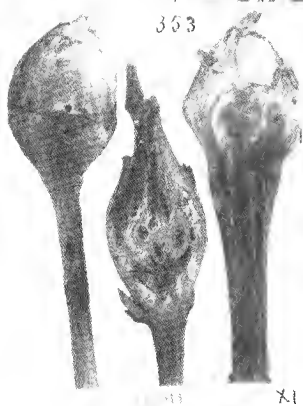
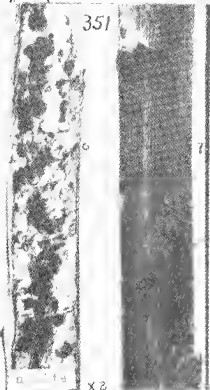
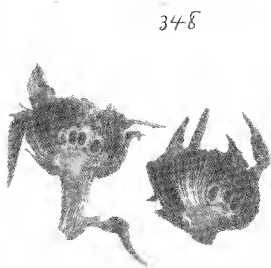
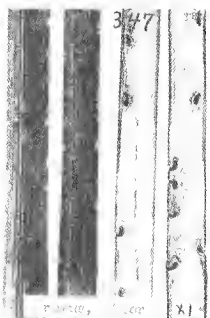
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346

...lata

XI





**Date Due**

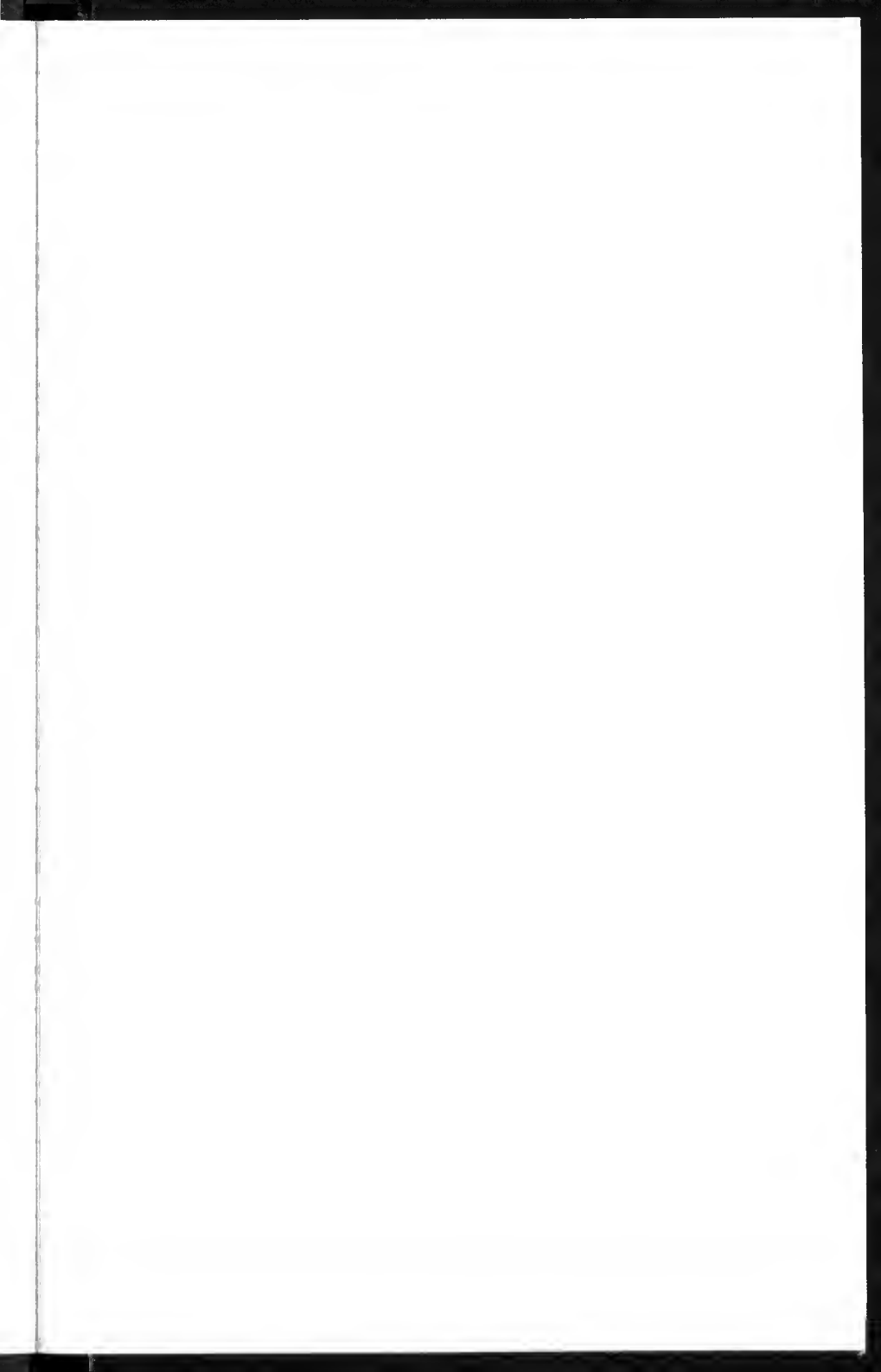
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11. 3  
al

The history of biology is a complex and multifaceted field, encompassing the evolution of scientific thought and the development of biological theories over time. This paper explores the historical context of biological research, focusing on the contributions of key figures and the evolution of scientific paradigms. The study of life's origins and the mechanisms of inheritance have been central themes in the history of biology, with significant milestones marked by the work of scientists such as Darwin, Mendel, and Crick. The paper also discusses the impact of social and cultural factors on the development of biological science, highlighting the role of institutions and the scientific community in shaping the field. The historical perspective provides valuable insights into the current state of biological research and the challenges it faces in the future.







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