FIELD NOTES ON GALL-INHABITING CYNIPID WASPS WITH DESCRIPTIONS OF NEW SPECIES

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The present paper, dealing with the true gallflies (Cynipidae) of the order Hymenoptera, contains descriptions of 53 new species (of which all but two guest flies from the Philippines are from the United States), descriptions of the associated sex of 5 old species described from one sex only, and biological notes on about 180 other described species. It was prepared under the general direction of S. A. Rohwer, custodian of Hymenoptera in the United States National Museum, where types of the new species are deposited.

The beginner in the study of the gall-making Cynipidae is handicapped and often discouraged by the 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 rears nothing or gets only guests or parasites. Some general suggestions on this point, applying only to Cynipid galls, however, may be of value. Galls on herbaceous plants like *Fragaria*, *Potentilla*, *Nepeta*, *Silphium*, *Ambrosia*, *Microseris*, *Hypochoeris*, *Lactuca*, *Lygodesmia*, and *Prenanthes* may be collected in the fall if they can be put where they will not dry out too much but are better left in the open all winter and brought into the laboratory in the spring. A pasteboard box with a vial or test tube in one side makes a convenient breeding cage. Many galls on shrubby plants like *Rosa*, *Rubus*, and *Chrysothamnus* may be treated in the same way. The succulent vernal galls on the leaves, buds, and flowers of oak must, however, usually be left on the tree until the larvae within use up all the nutritive layer of plant tissue and transform into pupae but such species develop rapidly and it is a matter of leaving them some days or at most but a few weeks longer. When the larvae are about mature or the pupa stage is reached twigs 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

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not crawl into the water and become drowned. This bottle should then be set in a battery jar with muslin tied over the top—if set under a bell jar the condensation water on the glass will wet the wings of the flies. From galls of this type come active, fully-winged adults of both sexes whose adult life is short.

The more solid autumnal galls 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 should be kept under more or less natural conditions out of doors on the ground in some sort of wire cage. Select a shady spot in the woods if possible where there is a deep layer of leaf mold, safe from molestation and from fire in summer and well buried under snowdrifts in winter. Mice and squirrels are liable to destroy collections unless wire cages are used. Labels inside should give locality, date and host and may be written with waterproof ink on paper and then dipped in melted paraffin or better inclosed 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 flies appear and then some may emerge each spring for several years. The larvae transform in the fall before they emerge and remain as adults in the galls during the winter to come out when conditions are suitable in the spring. Adults may often be secured by cutting open galls in the late fall or winter but in this case it is better to let them crawl about in a vial until the chitin hardens and takes on its normal color rather than to kill them at once in a cyanide bottle. Adults from galls of this type are all agamic females and are comparatively long-lived, often surviving for a month or more in captivity. Many species normally emerge in the late fall, for example, all those of the genus *Disholcaspis* (whose galls on twigs are in general bullet-shaped, detachable but not deciduous) and many wingless agamic forms such as species of *Acraspis*, *Xanthoteras*, *Zopheroteras*, etc. Some woody stem swellings on oak become so hard after being gathered that the insects even if they have already transformed can not chew their way out and it is better to cut them out. These are but general suggestions for the beginner and their value is indicated by the fact that the writer knows many kinds of galls which he has never yet been able to rear. A single gall casually collected is seldom worth the trouble of rearing. It may be the normal reaction of the plant to the Cynipid maker and it may be quite abnormal if that structure is modified by guests or parasites and some field observation may be necessary to determine whether this is the case. Collecting of value usually requires definite search for quantities of material with the object of rearing in view. When gathering galls from

the ground in the fall especial care must be taken that no galls of other kinds are included in the cages.

For a number of years the writer lived at Evanston, Ill., and collected galls either within the city limits or along the north branch of the Chicago River 4 miles west and along the "north shore" as far north as Waukegan with occasional trips to the sand dune area at the southern end of the lake in Indiana and less frequent ones to the general region of the "sag" southwest of Chicago. In this "Chicago area" the writer found a total of 124 species of gall-making Cynipidæ of which 10 are here described as new. In addition he has field notes on some 30 other galls from this area either not determined or not reared and hence not otherwise here mentioned. Further collecting will no doubt yield still other species, for during the last year or two of residence there it was no unusual experience to find galls that years of previous collecting had never discovered. Moreover, collecting on three of the nine oaks in the region was very fragmentary, these being seen hardly more than once or twice a year. Strangely enough, *Diastrophus smilacis* Ashmead, described from the Chicago area as producing a gall on *Smilax*, the writer has never been able to find although he has looked for it for years. The oak openings at the edge of the prairie now transformed into the suburbs of a densely populated metropolitan district would not be suggested as an ideal region for Cynipid collecting and yet it will be interesting to compare its 125 species with the few published local lists available. In 1904 Beutenmueller listed 46 of the more conspicuous Cynipid galls in the vicinity of New York City. Stebbins in 1910 listed 66 from Springfield, Mass. Sixty-four are known for the Toronto area.

To make available to students the writer's experience with those species of the Chicago area which have either been reared or are felt to be determined with some certainty these field notes are prepared. Some species of the Chicago area producing galls on roots or in acorns were discussed in previous papers and are not included in the present one. To these are added selected species from other localities in cases where sufficient material was at hand for description or the writer felt he was able to make some contribution to the knowledge of the species by indicating date of emergence, supplying a host record, or adding additional hosts, or supplementing the published data of geographical distribution.

Many years ago Dr. William Brodie gave his large collection of insects reared from galls to the United States National Museum. It occupies 22 museum drawers. Each specimen bears a field note number but the notebook which would have interpreted these numbers was long supposed to have been lost. However, in the

summer of 1922 A. Cosens, of Toronto, learned of its existence and with the consent of Doctor Brodie's daughter, Miss Jessie Brodie, was able to borrow the book and send it to the museum to be copied so that the locality and emergence data for this mass of material is now available. Whenever these notes supplied additional data for the species under discussion in this paper such information has been added. Some records have also been taken from the files of the Eastern Field Station of the Bureau of Entomology for the study of forest insects.

Except for figure 18 which is from a negative in the eastern field station the photographs and drawings are by the author. The natural size of the galls is represented in the photographs except when otherwise indicated.

The generic names used are mainly those of the last monograph on the Cynipidae—that of Dalla Torre and Kieffer in Das Tierreich, Lieferung 24, 1910. The names of the oaks are those used in the monograph "The American Oaks," by William Trelease, published as a memoir of the National Academy of Science (vol. 20, 1924). This monograph did not appear until months after the manuscript was prepared and long after labels had been attached to the specimens, but the necessary changes in the names of the oaks were made after the paper went to press. Consequently the host oak label on the specimen will not always correspond with the name of the oak as published. For example a *Q. rubra* label will be found on the pin to indicate the northern red oak now known as *Q. maxima;* a *Q. prinus* label for the rock chestnut oak, *Q. montana; Q. michauxii* for the basket oak, *Q. prinus; Q. pungens* for *Q. undulata*, etc. A photographic name label on each type specimen together with the red type label should obviate any confusion as to identity of type material, despite the discrepancy in the name of the host oak.

NEUROTERUS BATATUS (Fitch)

The woody winter form of the "oak potato gall" on the stems of *Quercus alba* has been noted at Evanston, Glencoe, Ravinia, and Fort Sheridan, Ill.; Miller, Ind.; Marianna, Fla.; Washington, D. C., and Blue Hills, Mass. In the Chicago area the agamic females issued April 15–24, 1910, and were observed to oviposit in buds at end of the same twig in breeding jar. In 1913 they emerged April 20–26. At Washington they were emerging March 14, 1921. Brodie found the galls not quite full grown by the 1st of August, adults emerging in various years April 21, 1886, May 6, 1888, May 11–22, 1889, May 7–9, 1890. He "bred over 1,000 of the producers without finding one male. Some appear to come out late in the fall but the greater number early in the summer—May."

The succulent stem galls of the sexual generation on the new growth were seen at Evanston and Fort Sheridan, Ill., and Michigan City, Ind., the adults emerging at Evanston June 16–25, 1913; at Michigan City June 26, 1906. At Apple Orchard Camp in Bedford County, Va., adults of both sexes were emerging on July 1. Brodie found the new galls nearly full grown on June 9 about a month after the agamic flies had issued. On May 5, 1892, he collected galls on what seems from both notes and specimens to be the new growth and from May 24 to June 1 reared 1,431 males and 341 females.

NEUROTERUS DISTORTUS Bassett

The writer has collected galls of this species on *Quercus bicolor* at Evanston, Wilmette, Glencoe, and New Lenox, Ill. The flies issue during the first two weeks of May. A similar gall perhaps of this species was observed on the rock chestnut oak, *Q. montana*, near Alexandria, Va.

NEUROTERUS ESCHARENSIS, new species

Agamic female.—Piceous. Head coriaceous but shining, a few short white hairs on face; from above transverse, length to width as 12:28, occiput not concave, cheeks broadened behind the eyes which are not protuberant; from in front broader than high, facial area square, malar space one-fourth eye with groove, antenna 12-segmented, lengths as (scape) 23 (width 12) : 20(13) : 28(7) : 22 : 20 : 20 : 18 : 18 : 16 : 16 : 16 : 26(10), last without trace of subdivision. Pronotum microscopically coriaceous on sides. Mesonotum with a few short scattered hairs more noticeable on disk, no trace of parapsidal grooves. Wings hyaline, pubescent, and ciliate, first abscissa of radius angled and at right angle to second which is nearly straight and nearly parallel with free part of subcosta making the open radial cell about seven times as long as broad at base. Areolet reaching one-fifth way to basal, cubitus fainter but reaching basal on its lower third, second intercubitus at right angles to fore wing margin; a faint cloud about break of anal. Hind tibia and tarsus equal, claws simple. Abdomen slightly longer than thorax, higher than long, compressed, lengths of tergites about as 19 : 9 : 7 : 5 : 5, ventral valves not evident, ventral spine short, ovipositor protruding. Using width of head as a base the length of mesonotum ratio is 1.1, antenna 1.9, ovipositor 3.9, wing 4.5. Length, 1.0–1.6 mm. Average of 18 specimens, 1.25 mm.

Type.—Cat. No. 27180, U.S.N.M. Type and 7 paratypes. Paratypes in Field and American Museums.

Host.—*Quercus bicolor.*

Gall (fig. 1).—A minute cell hidden in the tissue of the twig under a leaf scar, the tip protruding so slightly as to be scarcely noticed until the adult within begins to cut out a hole by which to emerge. Sometimes two cells occur side by side under the same leaf scar and more rarely the exit hole is just above the boundary of the scar. They may be found in winter or spring in previous seasons' growth usually underneath the scars just below the terminal bud cluster.

Biology.—On April 24, 1909, flies were found at Evanston, Ill., ovipositing on the buds of *bicolor*, perched on the side of the bud with the ovipositor thrust perpendicularly through the bud scales. Investigation revealed the galls described above in the leaf scars under these buds with adults just emerging. In 1913 similar galls were collected in Wilmette and insects reared. In 1915 they were found again on April 17 when some adults had already gone and one was seen ovipositing in a bud. On April 10, 1916, twigs containing cells were collected and brought into laboratory and put in water and by April 15 several flies had issued and three were seen ovipositing in the side of buds in this indoor cage. By May 8 when the young leaves were over one-half inch long three small galls were found from which the insects had already emerged and one was found ovipositing in the axil of one of the young leaves. From such scanty evidence and material no attempt is here made to describe either the adult or the gall of an alternating generation but this may be suggestive to students who live where they can work further on this life history. A precisely similar gall was found at Ravinia on *Q. alba* after the adults had emerged.

Habitat.—The type has been selected from the flies reared in 1913 at Wilmette, Ill., where conditions are such that native trees of the host oak will long persist. Paratypes are from Evanston and include those taken ovipositing as well as those reared.

NEUROTERUS EVOLUTUS, new species

Female.—Black with knees, front tibiae, and all tarsi brownish. Head and thorax micro-coriaceous; head from above transverse, cheeks broadened behind the eyes, occiput not concave; from in front facial area broader than high, malar space one-third eye with groove, antenna 13-segmented, lengths as (scape) 7:6:10:8:7:7:6:6:6:5.5:5:5:7. Mesonotum shining, without trace of grooves. Claws simple. Wing hyaline, pubescent, ciliate, veins distinct and brownish, first abscissa of radius angled, intercubitus at angle of 52° with basal, areolet reaching one-fourth way to basal, somewhat symmetrically placed below apex, cubitus reaching basal on its lower third, a faint cloud about break in anal and in first cubital cell.

Abdomen in living specimens longer than head and thorax, collapsing in drying, tip of ventral valves and ovipositor protruding, ventral spine in side view scarcely as long as broad. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 2.4, wing 5.0, ovipositor 5.4.

Length 1.4–2.2 mm. Average of 40 specimens 1.87 mm.

Type.—Cat. No. 28057, U.S.N.M. Type and 9 paratypes. Paratypes in American Museum, Field, Harvard, Stanford, California Academy, and Philadelphia Academy.

Host.—Quercus lobata.

Gall.—A cell about 1.8 mm. long lying in the wood under a leaf or flower scar, the upper end nearly reaching but not showing at the surface until the adult begins to make the exit hole. But one or rarely two under a scar. Exit hole in the scar or near it. Found about the terminal cluster of buds or sometimes at the internodes forming the annual ring. Similar to the gall of the eastern species described above but the adult is different.

Habitat.—Cottonwood, Shasta County, Calif. Twigs collected by A. W. Gambs on December 7 gave adults indoors January 6 and from others collected late in January adults emerged February 9 and 11. The normal emergence is probably before the buds start in the spring.

NEUROTERUS EXIGUUS Bassett

Spindle-shaped fleshy enlargements of the staminate flower axis of *Quercus stellata* at Alexandria, Va., gave adults of this *Neuroterus* on May 12, 1920. The galls were also seen at Rosslyn. Along with these swellings and sometimes on them were tan-colored, thin-walled, somewhat hairy, oval galls evidently representing enlarged filaments which also seem to contain this *Neuroterus.*

NEUROTERUS FLOCCOSUS (Bassett)

Galls of this species on *Quercus bicolor* were common in fall at Evanston, Ill., often deforming all the leaves near the tip of thrifty sprouts. Adults issued April 15. Have had specimens of gall from Becker, Minn., (L. Haney) and the Pergande collection contained galls from St. Louis, Mo.

NEUROTERUS IRREGULARIS (Osten Sacken)

Galls collected at Clarendon, Va., but a few miles from the type locality of this species, on an isolated tree of *Quercus stellata* on which fully half of the leaves bore galls, gave adults May 14–20, 1923. At this time the recently emerged flies were seen resting on the leaves by hundreds, the females ovipositing on the under surface. In early September this tree bore thousands of small, nearly spheri-

cal, short-pubescent galls recently described as those which yield in March the agamic fly *Neuroterus saltatorius australis* Kinsey. No other kind of gall was noticed on the tree. In the spring of 1924 the nearly full-grown galls on the leaves were observed again and globular galls collected from the ground beneath still contained larvae indicating that some at least hold over in the galls for two winters before emerging. Adults of *irregularis* emerged May 24–6, 1924. Another tree some miles away at Takoma Park, Md., bore countless number of these spherical galls which were dropping to the ground in the latter part of September 1923, and this tree was one on which *irregularis* had been very abundant in the spring. These galls were not observed to jump. In Arlington Cemetery, Va., a tree was seen so heavily infested with *irregularis* galls in the spring of 1920 that on July 4 the tree was observed to have put forth a new crop of leaves as a result. A sending of fresh galls from Middleburg, Va., yielded 487 adults of which 136 were females and 351 or 72 per cent males.

NEUROTERUS MAJALIS (Bassett)

The writer has collected galls on *Quercus alba* at Willow Springs, Evanston (adults emerged June 11–13, 1909), Ravinia, and Fort Sheridan (adults emerging May 30, 1911), Ill.; at Miller, Ind.; at Fairfax, S. C.; at Poplar Bluff, Mo.; at Plummer Island, Md.; and Washington, D. C. The galls are much more common about Washington than in the Chicago area and are full grown early in May when the young leaves are but 5–6 cm. long. Similar galls were noted on the rock chestnut oak, *Q. montana*, at Washington and at Falls Church and Alexandria, Va., where adults emerged May 6–11, 1920 and some seemed to be ovipositing on the leaves.

NEUROTERUS MINUTISSIMUS (Ashmead)

The writer has collected galls in Florida at Jacksonville, Daytona, St. Petersburg, Clearwater, and Ocala, but has never reared adults which are said to emerge in spring. The Pergande collection had galls from St. George also.

NEUROTERUS MINUTUS (Bassett)

The galls of this species have been taken at Winnetka, Ravinia, and Moline, Ill.; at Plummer Island and Takoma Park, Md.; at Washington, D. C.; at Falls Church and Alexandria, Va.; and at Fairfax, S. C. In the Chicago area the galls are rare and contained pupae one year on May 30 and the next year on June 9. Adults were all out at Moline by June 19. About Washington the galls are very abundant especially in 1924 when two large white

oaks had almost every twig end affected. The galls contained pupae on May 4 and adults emerged May 6–12, males appearing first. Galls collected at Falls Church May 2, 1920, gave adults May 7. Brodie found galls at Toronto.

NEUROTERUS NOXIOSUS (Bassett)

The woody stem galls of the agamic generation are very conspicuous in winter on certain trees of *Quercus bicolor* at Evanston, Ill., the adults emerging April 10–14, 1909, April 1, 1910, and May 10, 1913. They were seen to oviposit in buds, thrusting the ovipositor perpendicularly through the bud scales just as the buds were beginning to swell. By May 30 a slight bulging of the midrib of the young leaves then an inch and a half long has been noted and the galls of the alternating generation are full grown by June 30, greatly deforming the leaves. The adults emerged June 12–July 3, 1906. On July 22, 1912, the young stem galls of the winter form were half grown but still green and succulent with no larvae visible. What seemed to be the galls of the sexual generation of this species were collected at Greenport, Long Island, by R. Latham.

NEUROTERUS PAPILLOSUS Beutenmueller

Parenchyma galls in the leaves of *Quercus bicolor*, agreeing with the type galls of this species, were collected at Chesterton, Ind., June 25, the adults emerging June 27–29, 1912. They occurred on the leaves of thrifty sprouts and on lower branches of a small tree near by. Exit holes on lower side. Galls were also taken at Wilmette, Ill., June 9, 1913.

NEUROTERUS PERMINIMUS Bassett

The species was described from the sexual generation emerging in late June or early July from oval parenchyma galls in the current season's leaves of *Quercus alba*. The galls the writer refers to this species differ only in being found in October and yielding adults, all agamic females, in the early spring. Galls collected at Evanston, Ill., gave flies April 1–23, 1909, and in 1910 from April 4–20. Brodie collected galls in October and reared adults May 9, 1888.

NEUROTERUS RILEYI (Bassett)

Galls determined by writer as this species were sent to the National Museum December 12, 1920, from Sulphur, Okla., host oak not given.

NEUROTERUS SADLERENSIS, new species

Female.—Head (except about mouth) and abdomen black; thorax brownish, legs yellowish with hind femur and coxa more or less in-

fuscated, antennae light yellow. Head coriaceous under lens, as broad as thorax, scarcely enlarged behind eyes, eyes not protuberant, face slightly pubescent, malar space one-fourth eye with a groove, antenna 13-segmented, lengths as (scape) 40:26:50:37:32:32:31:30:28:27:25:24:34. Mesonotum length to width as 40:28, mesoscutum about as broad as long, shining, microscopically coriaceous, without parapsidal grooves, collapsible, with a few scattered short white hairs. Disk of scutellum smooth, polished, with scattered hairs. No carinae on propodeum. Tarsal claws weak, simple. Wing subhyaline, short-pubescent, ciliate, veins brown, first abscissa of radius angulate, second nearly straight, areolet reaching one-fifth way to basal, would be bisected by a perpendicular drawn through its anterior angle, cubitus reaching basal near its lower end. Abdomen higher than long, truncate behind, much compressed and distorted, ovipositor far exserted. Ventral spine not as long as lobes of hypopygium. Using width of head as a base the length of mesonotum ratio is 1.1, antenna 2.5, ovipositor 4.1, wing 3.9. Length, 1.45–2.05 mm. Average of 32 specimens, 1.72 mm.

Male.—Thorax, legs and antennae light yellow, vertex and cheeks infuscated, eyes black, abdomen back of petiole nearly black. Cheeks not broadened behind the eyes, eyes slightly protuberant, antenna 14-segmented, lengths as (scape) 43:28:75:50:42:44:42:42:40:39:37:35:33:37, second only slightly curved. Mesonotum length to width as 54:34. Abdomen about as long as thorax, compressed to a knife-edge above, lengths of tergites along dorsal margin as (petiole) 7:21:12:10:9:9:10. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 3.2, wing 4.7. Length, 1.65–2.15 mm. Average of 24 specimens 1.91 mm.

This is the first cynipid to be reported from Sadler's oak. The species would go in the subgenus *Dolichostrophus* and is related to *Neuroterus washingtonensis* Beutenmueller.

Type.—Cat. No. 27181, U.S.N.M. Type female, allotype, 7 male and 11 female paratypes. Paratypes at American Museum, Field, Stanford, Harvard, Philadelphia Academy, and California Academy.

Host.—Quercus sadleriana.

Gall (fig. 28).—Greenish-yellow succulent enlargement of the midrib and adjacent parenchyma of the basal portions of the outermost leaves in a terminal cluster and causing a more or less complete reduction of the blade of the inner leaves in the cluster producing a conspicuous rosette at the end of the twig. In July.

Habitat.—The type material was collected July 20, 1922, on the ridge above the Oregon Caves National Monument in the Siskiyou mountains near Holland, Oreg., at an elevation of 6,000 feet. Adults of both sexes emerged by July 28.

NEUROTERUS SALTARIUS, new species

Agamic female.—Black, flagellum infuscated, lighter at base, tarsi pale, tibiae infuscated, knees pale. Head coriaceous, cheeks not enlarged behind eyes, eyes scarcely protuberant, malar space one-fourth eye, with groove, antenna 13-segmented, lengths as (scape) 23 (width 12) : 20(11) : 28(7) : 14 : 13 : 14 : 14 : 15 : 15 : 16 : 15 : 14 : 21. Mesonotum smooth, naked, polished, length to width as 31 : 21, no trace of grooves. Mesopleura polished. Claws simple. Wing hyaline, pubescent, ciliate, veins brown, first abscissa of radius angulate, second at right angles, straight, radial cell five times as long as broad, areolet indistinct, second intercubitus set at an angle of 55° with basal, cubitus faint, reaching basal half-way below middle. Abdomen as long as head and thorax, more or less collapsed, ventral spine twice as long as broad. Using width of head as a base the length of mesonotum ratio is 1.1, antenna 1.9, ovipositor 2.8, wing 4.1. Length .8–1.2 mm. Average of 42 specimens 1.0 mm.

Type.—Cat. No. 27182, U. S. N. M. Type and 13 paratypes. Paratypes in Field Museum, American Museum, and Stanford.

Host.—Quercus macrocarpa.

Gall (fig. 2).—Small, seed-like bodies, inserted in cup-like depressions on the under surface of leaf and causing a prominent light-colored bulging on the upper side of the leaf opposite, often two or three hundred on a leaf, less numerous on the basal part of leaf blade. When growing the galls are greenish-white, somewhat globular, flattened above with a papilla in center and a raised rim, not pubescent. They start to develop in June and in July or August drop to the ground where they exhibit the phenomenon of bouncing about until they lodge in some crevice in the soil where they pass the winter. When detached a large scar is left on base of gall. During the winter the galls become tan-colored and somewhat compressed laterally, one measured 1.2 mm. long by .9 mm. thick and 1.1 mm. high.

This gall seems to have been first described in 1876 by Riley who unfortunately applied to it the name of a California species with similar jumping habits. Under this name the eastern gall has been mentioned many times in literature and good figures have been published of it but up to the present no one seems to have reared the adult.

Habitat.—The types are from Hope, Ind. Galls collected on burr oak by C. J. Casey showed the bouncing when received at Washington June 26, 1923. These galls were placed in rearing and adults were cut out of them on December 5 and 12, and March 26. The writer had collected the galls in four different years at Evanston and Kenilworth, Ill., but failed to rear them. At Medina,

N. Y., they were full grown by June 30. Galls were received also from Ann Arbor (Pennington), Mich., and Corinth (Barracks), Iowa. They have also been reported in literature from Missouri and Minnesota. A similar gall occurs on *Q. bicolor.*

NEUROTERUS FUGIENS, new species

Female.—Piceous, legs pale beyond coxae, antenna infuscated except tip of pedicel, scape, and first two segments of flagellum which are pale yellowish-white. Head coriaceous, eyes slightly protuberant, cheeks not enlarged behind eyes, malar space .4 eye with groove, antenna 13-segmented, lengths as (scape) 9:7:16:8:8:8:8:7:7:7:6:6:10, last in some specimens shows trace of subdivision. Mesonotum smooth, polished, a few short hairs on scutellum, no traces of grooves, length to width as 50:32, often collapsed. Mesopleura micro-coriaceous, mesosternum bulging prominently below. Tarsal claws fine, simple. Wing subhyaline, pubescent, ciliate, first abscissa of radius scarcely angulate, radial cell five times as long as broad, areolet reaching one-fifth way to basal, second intercubitus set at angle of about 68° to basal, cubitus reaching basal which is slightly clouded. Abdomen not as long as head and thorax, higher than long, lengths of tergites as 20:12:6:5:6:4, ventral spine short, ovipositor short, protruding horizontally. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 2.1, ovipositor 1.2, wing 3.9. Length, 1.3–1.7 mm. Average of 58 specimens, 1.45 mm.

Male.—Color as in female. Antenna 14-segmented, lengths of first four segments as 9:8:22:9, third not excavated, slightly bent. Mesonotum length to width as 55:35. Abdomen triangular in side view, almost as long as head and thorax, petiole pale. Using width of head as a base the length of mesonotum ratio is 1.4, antenna 2.6, wing 3.4. Length, 1.6–2.05 mm. Average of 17 specimens, 1.79 mm.

Types.—Cat. No. 27183, U.S.N.M. Type female, allotype, 9 male and 29 female paratypes. Paratypes in Field Museum, American Museum, and Stanford.

Host.—Quercus macrocarpa.

Gall (fig. 29).—A lens-shaped thickening in the parenchyma of a leaf always adjacent to a vein. Single or more or less confluent in a row. Most conspicuous from the lower side where rose-red hairs show against its translucent white background. On upper surface showing a very slight swelling only and only a slightly lighter green color. Exit hole above where wall is thinnest. Causes wrinkling and deformation of the leaf if numerous. Occurs in spring when young leaves are about one-third grown.

Habitat.—The type material is from galls collected on *Q. macrocarpa* at Willow Springs, Ill., May 24, 1919, when some of the cells contained larvae and others pupae. The adults issued by May 30. The galls were seen also at Evanston.

Biology.—On June 16, 1916, empty galls on burr oak were seen at Evanston and on the same stump sprouts were found half-grown galls of the *saltarius* described above suggesting that this is the alternating generation of that species. On May 28, 1916, at Evanston on the small lower branches from the trunk of a tree of *Q. bicolor* these galls were found, some with exit holes and others containing pupae. Adults apparently from these galls were seen ovipositing on the under side of the leaves which were then about 3 inches long. Unfortunately none of the flies was preserved. Old leaves on the ground bore evidence of the presence of the jumping gall the previous fall. Experimental proof of this suggested life history is needed as the adults seem to go in the subgenus *Diplobius*, created for species whose alternating galls are practically identical.

NEUROTERUS UMBILICATUS Bassett

Galls on *Quercus bicolor*, agreeing with Bassett specimens, were collected at Washington, D. C., on September 23, 1923. No adults were reared, as some of the galls at least still contained larvae June 1, 1924. In late October, 1924, William Beutenmueller collected galls at Tenafly, N. J., and sent some to the writer for rearing. Up to January 1, 1926, he had reared nothing from the thousands of galls in his breeding cages, some indoors and some out, nor has the writer succeeded in rearing the adults. Galls were also seen at Ithaca, N. Y.

NEUROTERUS VERNUS Gillette

The writer has found galls of this species only once, and at Moline, Ill. The adults had all emerged before July 21.

NEUROTERUS VESICULA (Bassett)

The galls of this species were described as starting their development in the fall, maturing quickly in the spring, the adults emerging about the time the oak leaves begin to expand. The writer has no evidence to show that this succulent gall develops partially in the fall, but they do occur and become full-grown before the buds start in the spring, the adults emerging either before or just as the buds open. They have been noted on *Quercus alba*, from which the species was described, at Ravinia, Ill., containing both pupae and adults on April 24, 1915, the adults beginning to emerge April 29. Fort Sheridan galls contained pupae May 12, 1917, adults emerging May 18. In 1920 galls contained pupae at Cherrydale, Va., on

April 11; and at Chevy Chase, Md., on April 18. At Washington adults were emerging March 27, 1921, and in the late season of 1924 on April 26. In emerging the flies chew out a round piece, which often remains as a hinged lid. On *Q. montana* galls were seen at Washington, with flies emerging April 22, 1923. On *Q. bicolor* the galls were common at Evanston, Ill., being noticed as early as March 28, 1909, and March 27, 1910 (adults emerged and died in jar before April 20). In 1912 emergence was in late April, only one fly being reared from galls collected May 6. In 1913 galls were collected on April 15, some already showing exit holes, adults emerging by April 27. While gathering the galls an adult thought to be of this species was observed ovipositing in a bud. On *Q. macrocarpa* galls were found at Evanston May 1, 1913, and on April 27, 1915, three empty ones from which adults had recently emerged, and near by two adults perhaps from these galls were seen ovipositing in buds. Similar galls occur at Washington on *Q. stellata*, the flies emerging March 27–30, 1921, and April 25–29, 1924.

DIPLOLEPIS ACRASPIFORMIS, new species

Female. Almost all black, legs and some other parts brownish. Head coriaceous; from above transverse, as broad as thorax, cheeks broadened behind eyes, occiput slightly concave; from in front facial quadrangle one and four-tenths times as broad as high, malar space half eye without groove, antenna 13-segmented, lengths as (scape) 12:6:21:18:15:14:12:10:8:7:6:6:12. Thorax covered with short uniformly distributed white hairs not hiding sculpture. Mesoscutum not quite smooth, parapsidal grooves deep, narrow, smooth, percurrent, no median. Disk slightly rugose, with transverse furrow at base. Carinae on propodeum weak, curved, neck smooth. Mesopleura smooth. Hind tarsus shorter than tibia, segments as 25:12:8:5:13 (with claw 20). Claws with tooth. Wing subhyaline, pubescent, ciliate, veins brown, first abscissa of radius arcuate, second curved and swollen at free end which does not quite reach wing margin, areolet reaching nearly one-fourth way to basal, cubitus reaching basal, a cloud on break in anal, one above basal third of cubitus on first abscissa of radius and two in the apical cell, the lower one somewhat elongated, dividing the cell into thirds. Abdomen longer than head and thorax, length to height to width as 38:29:23, lengths of tergites along dorsal margin as 32:6:5, sides of second pubescent at base, dorsal margin straight and hind margin very oblique, ventral valves oblique, not protruding, ventral spine hairy, broad, abruptly tapering toward apex. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 2.5, wing 4.6, ovipositor 1.9. Length, 2.7–3.6 mm. Average of 12, 3.18 mm.

Type.—Cat. No. 27184, U.S.N.M. Type and 4 paratypes. Paratypes at American Museum, Field and Stanford.

Host.—*Quercus undulata* and *Quercus toumeyi.*

Gall (fig. 30).—Globular, spiny, single on under side of leaf on midrib in fall, monothalamous, 7–10 mm. in diameter. The wall of the gall is half a millimeter thick, hard and crystalline, covered with yellow spines 2.5 mm. long with swollen bases half a millimeter in diameter which are pinkish in color and polygonal by mutual pressure in cross-section. When detached a rosette of single-celled short colorless hairs is found about the base of each spine. The exit hole, 1.2 mm. in diameter is in the side of the gall. It is similar in structure to some of the *Acraspis* galls in the east.

Habitat.—The type is selected from galls collected November 7, 1921, in Blue Canyon west of Socorro, N. Mex., the flies being cut out of the galls a few days later. Paratypes are from Nogal Canyon south of Socorro, the flies emerging December 31 and January 13. Other paratypes are from Hackberry, Ariz., the flies having emerged and died before February 14. All the above were on *Q. undulata.* One paratype is from *Q. toumeyi*, Patagonia, Ariz., the fly emerging December 31. Galls were seen on *Q. undulata* at Ashfork, Ariz., also and in the Burro Mountains, N. Mex.

DIPLOLEPIS AGGREGATA, new species

Female.—Reddish-brown; eyes, anterior, and lateral lines, meso- and metapleurae and parts of abdomen black. Head transverse, narrower than thorax, pubescent, occiput concave, cheeks broadened behind eyes and margined, vertex rugose. Facial quadrangle broader than high, malar space one-third eye, without groove. Antennae 14-segmented, lengths as (scape) 18 (width 11) : 8 : 38(7) : 40 : 33 : 29 : 24 : 21 : 17 : 13 : 11 : 10 : 9 : 10(6), flagellum gradually tapering to apex. Sides of pronotum rugose, hairy. Mesoscutum smooth, shining, covered with setigerous punctures but pubescence not dense enough to hide sculpture. Parapsidal grooves deep, smooth, percurrent, separation behind not three times width of a groove, no median, lateral lines bare, prominent, anterior lines narrower, parallel. Scutellum coarsely rugose, margined on sides, disk rather flat, two pits at base, covered with erect pubescence. Spiracular areas of propodeum smooth, the usual carinae diverging below and suddenly constricting on to the reticulate neck, enclosed area somewhat reticulate. Mesopleura smooth below the broad striate longitudinal depression. Wing pubescent and ciliate, the veins heavily clouded, a group of connected spots in distal part of third cubital cell and a diffused cloud at its base under the radial cell, a faint cloud under the areolet, clouded also about break in the anal vein and in basal half of costal cell; areolet reaching one-fifth way

to basal, cubitus reaching basal below middle, its basal half heavier. Radius very heavy, first abscissa angled, second strongly curved toward wing margin in distal half, radial cell twice as long as broad, partially open at base and apex as well as on margin. Hind tarsus two-thirds as long as tibia, its segments as 47:20:12:7:20 (with claws), claw with a weak tooth at base. Abdomen longer than head and thorax, length to height to width as 58:33:22, obliquely placed, knife-like on ventral margin, the ventral spine unusually long and tapering, pubescent, as long as hind tarsal segments 1–4. Second tergite occupying nearly or quite all of dorsal margin, its ventral edge forming an angle of 45°, with pubescent area on each side at base. Using width of head as a base the length of mesonotum ratio is 1.6, antenna 3.2, wing 4.5, ovipositor 3.4.

Range in length, 4.0–5.5 mm. Average of 7 pinned specimens, 4.87 mm.

Separated from other spotted winged species in the genus by the long ventral spine.

Type.—Cat. No. 27185, U.S.N.M. Type and 2 paratypes. Paratypes at Field Museum and Stanford.

Host.—Quercus arizonica.

Gall (fig. 3).—Globular oak apples, up to 35 mm. in diameter, occurring in summer in clusters of sometimes as many as 12 on a twig at apex of previous season's growth. Each has an abrupt slender pedicel and usually only 2–4 galls in the cluster become well developed. The fresh galls are creamy white with a reddish blush on one side and spotted with numerous small red spots. Later they become yellowish and are often covered with a bluish bloom. The central cell is supported by a dense mass of fine silky radiating fibers and the wall is thick (0.7 mm.), seven times as thick as that of the smaller unspotted leaf-gall apple of the same region, *D. bella.*

Habitat.—The type fly is one of four bred from galls collected in the Santa Catalina Mountains, Ariz., on "white oak" (*Q. arizonica*) by M. Chrisman and sent in under Hopkins U. S. No. 13643*m*. The flies were reared November 22 and 27, 1918. Two paratypes from the Huachuca Mountains are from galls collected in Bear Canyon on *Q. arizonica* by Ed Jacot, September 28, 1919, and the flies issued before December 3. One paratype is from a gall collected on the same oak by the writer in the Chiricahua Mountains, November 26, 1922. The fly had already chewed its way out of the inner cell and was crawling about among the radiating fibers. It remained alive in a pill box without attention until some time after December 31. The writer has collected galls in Arizona at Oracle and in the Sabino Basin in the Santa Catalinas, and in the Mule, Huachuca, Tumacacori, and Santa Rita Mountains. The galls are even more common on *Q. oblongifolia* and at Patagonia were seen on *Q. toumeyi* but no

flies were reared from either host. Morrison sent galls to Washington in 1882 from Fort Grant and Hubbard sent galls from the Chiricahua Mountains in 1897.

DIPLOLEPIS AMPHORA, new species

Female.—Red, darker on abdomen and between parapsides in front. Head coriaceous, from above scarcely broadened behind eyes, occiput not concave; from in front pubescent on face, facial quadrangle one and one-fourth times as broad as high, malar space .4 eye without groove, antenna 14-segmented lengths as (scape) 10:6:11:10:9:8:7.5:7.5:7:7:7:6:5.5:8. Sides of pronotum pubescent. Mesoscutum broader than long, shining, smooth behind, coriaceous and with setigerous punctures anteriorly, parapsidal grooves deep, smooth, narrow, percurrent. Disk of scutellum smooth above, rugose behind, sides bounded by straight lines diverging behind, groove at base indistinctly divided into two pear-shaped pits. Carinæ on propodeum strongly curved, neck rugose. Mesopleura smooth. Tarsal claw with a weak tooth. Wing ample, hyaline, pubescent, ciliate, first abcissa of radius arcuate with slight cloud on upper half, second nearly straight, radial cell nearly four times as long as broad, areolet reaching one-sixth, cubitus two-thirds way to basal. Abdomen as long as head and thorax, lengths of tergites along dorsal curvature as 62:13:12:3:1:4, second pubescent at base, its hind margin oblique, ventral spine slender, in side view about six times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.4, antenna 2.6, ovipositor 2.4, wing 5.0. Length 1.4–2.2 mm. Average of 31, 1.85 mm.

Type.—Cat. No. 27186, U.S.N.M. Type and 9 paratypes. Paratypes at American Museum, Field, Stanford, and Philadelphia Academy.

Host.—Quercus undulata.

Gall (fig. 31).—A hollow cylinder, sessile at base, swollen more or less in the middle and tapering to the apex which is contracted to a small hole leading into a deep cavity in the bottom of which and in the basal third of the gall is the thin-walled larval cell below which a small cavity leads to the pedicel. Red or brownish, 4–5 mm. high by 3 mm. in diameter, the hole at apex about 1 mm. in diameter. Occurs in fall and drops with the leaves, usually only one or two on a leaf near the edge on under side.

Habitat.—The type is selected from material collected on *Q. undulata* at Tijeras, N. Mex., November 1, 1921, when some of the galls contained pupae and others adults. Paratypes are from *Q. undulata* in Blue Canyon west and Nogal Canyon south of Socorro, the living flies cut out of the galls January 3, 1922. Other paratypes are from

the same host at Hillsboro, the flies cut out November 16. Paratypes also are from Prescott, Ariz., (host not recorded), the galls collected April 13, 1918, the flies emerging before April 20 (Hopkins U. S. No. 15617*k*). The galls have been collected on *Q. undulata* at the "breaks" south of Bard, N. Mex., (E. E. Goddard), and at Ashfork, Ariz. The writer has collected what he takes to be galls of this species on *Q. grisea* at Magdalena, N. Mex.; on *Q. arizonica* at Bisbee and Oracle, Ariz.; and on *Q. oblongifolia* at Nogales, Patagonia, and in Huachuca and Santa Catalina Mountains, Ariz.

DIPLOLEPIS ATRIMENTA (Kinsey)

This species was described from imperfect specimens from galls on *Q. douglasii* from Three Rivers and Redding, Calif. The writer has collected the galls on two other California oaks also: on *Q. douglasii* at Three Rivers, Kaweah, Bagby, Placerville, Oroville, Red Bluff, Shasta, Ukiah, Lakeport (flies emerging May 12), Cloverdale, Calistoga, St. Helena, Mt. Diablo, Stanford University (flies emerged May 1–8), Los Gates, Paraiso Springs, Bradley, Jolon, Paso Robles (flies emerged April 25), Santa Margarita, and Lebec; on *Q. lobata* at Los Gatos, Stanford University, Lakeport, and Red Bluff; on *Q. dumosa* at Paso Robles, Jolon (flies emerged April 25) and Paraiso Springs. The galls are sometimes attached to the staminate flower axis as well as to leaves.

Miss Egbert reared adults of this species in April, 1917, and included a description in her manuscript thesis presented at Stanford University in May, 1917.

DIPLOLEPIS BELLA (Bassett)

Cynips bella BASSETT, Canad. Ent., vol. 13, 1881, p. 93.
Holcaspis maculipennis GILLETTE. Canad. Ent., vol. 26, 1894. p. 236.

H. maculipennis was described from a single specimen from the west slope of the Organ Mountains in New Mexico. Without seeing this type Beutenmueller and Fullaway have erroneously determined a large oak apple on *Quercus garryana* from Oregon and northern California as this species. This has since been described as *Cynips mirabilis* Kinsey (see p. 64). The writer has compared the Gillette holotype of *maculipennis* with a Bassett type of *bella* in the National Museum and finds they are the same. Because of the percurrent parapsidal grooves and very oblique hind margin of the second tergite Mayr, in 1881, placed the species in *Dryophanta*—now known as *Diplolepis*.

This species, described from an unknown oak from Tucson, Ariz., has been reared by the writer from galls on *Quercus arizonica*, *toumeyi*, *grisea*, and *undulata*, and the galls found on *oblongifolia*

and *reticulata*. Galls were seen in the Santa Catalina Mountains at Oracle and in Sabino basin, in the Santa Rita, Tumacacori, Patagonia, Huachuca, Mule, and Chiricahua Mountains, and at Nogales, Bisbee, Prescott, Hackberry, Ashfork, and Williams, Ariz. In New Mexico they were seen in the Burro Mountains, at Fierro, Kingston, Hillsboro, Nogal Canyon, Magdalena, Blue Canyon near Socorro, and in Sandia Mountains at Abo Pass and Tijeras. The galls were nearly full grown on *arizonica* in the Huachucas on July 9, and at Hackberry on *undulata* contained pupae on October 6. At Tijeras they were common on *undulata*, and on November 1 contained adults just beginning to emerge. A lot of flies cut out on that date lived in a pill-box without attention until December 30, and three were still living on January 12. Few of the galls were parasitized here. In the Chiricahuas only six adults were secured by opening 65 galls, and in the Santa Ritas only one in fifty contained a producer.

DIPLOLEPIS BREVIPENNATA (Gillette)

This species, whose type locality is Manitou, Colo., seems to be very common on all the oaks in the region of the Spanish Peaks. It occurs on every type of oak found about Las Vegas Hot Springs, and extends as far south as the Sandia Mountains. In the Garden of the Gods on October 4, 1921, galls on *Quercus gambelii* contained both pupae and adults. At Wetmore the galls were common, and on October 6 contained adults ready to emerge which were found dead (and others living) in the box when the material was examined on December 31. Galls sent to Washington (Hopkins U. S. No. 15635*a*) gave flies October 31, November 15, and January 10. At the Alvarado ranger station near West Cliff the galls were rare. Adults were chewing out of the inner cell at La Veta on October 10 and could be found among the fibers. At Trinidad galls were seen on *Q. fendleri*. In New Mexico the galls were seen at Raton, Wagon Mound, Shoemaker, Glorieta, and at Tijeras a few occurred on *fendleri* and *grisea* and one gall was found on the same bush of *undulata* that bore the similar galls of a fully-winged species *Diplolepis bella* (Bassett). This is the most southern point where the writer found the one and the most northern locality for the other.

DIPLOLEPIS CAEPULA, new species

Female.—Reddish-brown, abdomen darker behind. Head coriaceous; from above as broad as thorax, almost semicircular in outline, occiput not concave, cheeks slightly broadened behind the eyes; from in front facial quadrangle one and two-tenths times as broad as high, malar space one-third eye without groove, slight median ridge below antennae, antenna 13-segmented, lengths as (scape) 10:7:

14:12:11:10:9:8:8:8:7:7:11. Scattered short white hairs on sides of pronotum, on mesoscutum and scutellum. Mesoscutum coriaceous, shining, parapsidal grooves deep, smooth, percurrent. Disk of scutellum smooth and bare in center, rugose behind, its sides bounded by diverging straight lines, a transverse furrow at base indistinctly showing two smooth pear-shaped pits. Carinae on propodeum arcuate, enclosed area broader than high, neck rugose. Mesopleura smooth. Tarsal claws with a tooth. Wing hyaline, pubescent, ciliate, first abscissa of radius arcuate, areolet and cubitus faint. Abdomen as long as head and thorax, lengths of tergites along dorsal margin as 55:14:2, second pubescent on sides at base, hind margin oblique, ventral spine slender, in side view five times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.4, antenna 2.5, ovipositor 3.0, wing 4.6. Range in length 1.5–2.1 mm. Average of 69 specimens 1.70 mm.

Type.—Cat. No. 27187, U.S.N.M. Type and 29 paratypes. Paratypes at American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Host.—Quercus undulata.

Gall (fig. 32).—Shaped like a small onion, tan-colored, single or scattered in small numbers on under side of leaf in the fall, persisting on the leaf through the winter. The basal third of the sessile gall is beset with long straight single-celled hairs which are mostly reflexed toward the leaf surface. The conical apex is often lop sided and an opening at the end leads into a thin-walled cavity in which are a few scattered hairs and in the base of which is the transversely placed thin-walled larval cell in the very base of the gall. Inside the larval cell at the pedicel is a thin white disk.

Habitat.—The type is selected from a series from galls collected November 14, 1921, near Hillsboro, N. Mex., the flies emerging April 5–25, 1922. Paratypes are from Tijeras, N. Mex., and of the adults cut out of the galls on November 1 some lived in a pill box until December 28. Other paratypes are from Blue Canyon west of Socorro, adults being cut out of the galls on January 2. The galls were seen also at Hackberry, Ashfork, and Williams, Ariz. Similar galls were seen on *Q. grisea* at Magdalena, N. Mex.

DIPLOLEPIS CAPILLATA, new species

Female.—Black; mandibles, base of antennae, legs and ventral spine brownish. Head coriaceous, vertex bare and shining; from above transverse, as broad as thorax, scarcely broadened behind eyes; from in front facial line .6 transfacial and area one and four-tenths times as broad as high, malar space .4 eye without groove, radiating ridges on either side of clypeus, antenna 14-segmented, lengths as (scape) 10:6:12:11:10:8:7:7:7:6:6:6:6:10, the last

six infuscated and forming a slight club. Sides of pronotum dull with fine setigerous punctures. Mesoscutum microscopically coriaceous and polished except where sparsely pubescent anteriorly, parapsidal grooves deep, smooth, percurrent, widely separated behind, no median. Scutellum finely rugose, transverse groove in front limited laterally and opening on to disk which is smoother anteriorly. Carinae on propodeum straight, diverging slightly below and slightly angled near the neck. Mesopleura polished. Hind tarsal segments as 23:8:5:4:11 (with claw 16). Claws with tooth. Wing hyaline, pubescent, ciliate, veins brown but not heavy, second abscissa of radius heaviest, slightly angled, areolet reaching one-ninth way to basal, radial cell four times as long as broad. Abdomen longer than head and thorax, oval and oblique in side view, longest length to height to width as 26:21:12, lengths of tergites along dorsal curvature as 34:12:8:10:15:7, second with pubescent areas at base and hind margin at angle of about 75°, ventral valves oblique, tips projecting, ventral spine long, slender, in side view horizontal, nine times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.25, antenna 2.3, wing 4.4 Length, 1.9–2.4 mm. Average of 6 specimens, 2.2 mm.

This species does not strictly belong in this genus on account of structure of propodeum and abdomen.

Type.—Cat. No. 27188, U.S.N.M. Type and four paratypes. Paratypes in American Museum, also in Field Museum and Stanford University.

Host.—Quercus alba.

Gall (fig. 4).—Cluster of 2–12 on midrib on under side of leaf in fall, usually on the lower leaves of strong sprouts from stumps. The individual galls are whitish or tan-colored, somewhat globular, 2–3 mm. in diameter, but slightly distorted by mutual pressure, covered with sparse short pubescence which does not hide the outline of the gall.

Habitat.—The type material was collected at Fort Sheridan, Ill., October 3, 1914. Nothing emerged before September, 1915, but when the breeding cage was next examined on November 2, 1915, six dead adults were found in the cage and a gall contained a full-grown larva, and a larva was found when another gall was opened June 2, 1916. The galls were also seen at Highland Park, Ill.; Kimmswick, Ironton, and Poplar Bluff, Mo.; Hot Springs and Texarkana, Ark.; Bluemont, Va., and Washington, D. C. A similar gall without the long scattered hairs was observed on *Q. montana* at Washington and Bluemont. Galls collected at East Falls Church, Va., in October, 1923, gave adults December 12, 1924. A series of eight of these averaged 3.2 mm. in length and they are included as paratypes.

DIPLOLEPIS CAROLINA (Ashmead)

Described from two adults from Asheville, N. C., from galls on *Quercus alba*. The writer reared two flies which agree with the types from galls collected on *Q. stellata* at Ironton, Mo. in October, 1917, the flies emerging June 1, 1918. The galls occur in clusters of 2–4 on the midrib and nearly always on *upper* side of the leaf but sometimes on the lower. They are 5–6 mm. in diameter, with a smooth surface just visible with hand lens between clumps of stellate hairs. The galls were seen at Hoxie, Hot Springs, and Texarkana, Ark.; Palestine, Houston, Boerne, College Station, and Arlington, Tex.; Madison and Ocala, Fla. What seems to be the same gall occurs at Boerne and Austin, Tex., on shin oak, *Q. breviloba*, and on *Q. chapmani* at Carabelle, Clearwater, St. Petersburg, and Daytona, Fla.

DIPLOLEPIS CAVA, new species

Female.—Red, anterior and lateral lines and eyes black, middle of face, metanotum, parts of mesopleura, dorsal portion of third tergite, and adjacent parts of second more or less infuscated. Head from above as broad as thorax, cheeks not broadened behind eyes, vertex granulate; from in front broader than high, malar space .43 eye with faint striæ, antennæ hairy, 14-segmented, lengths as (scape) 17 (width 9) :7:26(6):20:17:14:12:11:9:8:8:7:7:9 (6). Mesoscutum smooth, uniformly covered with setigerous punctures, the pubescence not dense enough to hide sculpture, parapsidal grooves deep, smooth, percurrent, anterior and lateral lines bare, smooth. Scutellum with two distinct oblique smooth pits at base, disk almost smooth in center, the rest rugose. Carinae on propodeum bowed out enclosing a smooth area broader than high. Wing pubescent and ciliate, veins brown, heavy, first abscissa of radius scarcely angled, second curved up toward wing margin in distal third and enlarged at end a little back from margin, areolet reaching about one-sixth way to basal, cubitus not quite reaching basal, a cloud in base of third cubital cell back of areolet and three groups of spots in distal end, the middle largest. Hind tibia much longer than tarsus, claws with a weak tooth. Abdomen longer than head and thorax, length to height to width as 36:29:23, lengths of tergites along dorsal margin as 104:10:3:0:0:7, hairy patches at base of second, its hind margin at angle of 45°, ventral valves oblique, ventral spine hairy, in side view four times as long as broad, broader from below than from side. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 2.2, ovipositor 1.8, wing 3.4. Length, 2.9–3.9 mm. Average of 9 pinned specimens 3.4 mm.

Type.—Cat. No. 27189, U.S.N.M. Type and 2 paratypes. Paratypes in American Museum, also in Field Museum and Stanford University.

Host.—*Quercus breviloba* and *Quercus laceyi.*

Gall (fig. 5).—An oak apple, 14–20 mm. in diameter, usually single on under side of leaf in fall. Reddish-brown, not spotted, wall thin, central cell supported by numerous silky fibers, a definite bundle of parallel fibers from cell to point of attachment of gall.

Habitat.—The type material was collected in October 1917, near Austin, Tex., on the shin oak, *Q. breviloba.* A gall opened November 10, contained a pupa which transformed November 26. By December 4, adults had chewed out of the inner cell and were found among the radiating fibers. The normal emergence date unknown. These galls were seen also at Boerne and Kerrville. A paratype fly came from a gall on *Q. laceyi* at Boerne, the gall containing a pupa on November 20, which transformed by December 7.

DIPLOLEPIS CENTRICOLA (Osten Sacken)

The gall of this species is a spotted oak apple usually found singly on under side of leaf of *Quercus stellata* in the fall. The writer has collected them at Ironton and Poplar Bluff, Mo.; Hoxie and Texarkana, Ark.; and Tuskahoma, Okla. Ashmead collected galls at Asheville, N. C., and J. Angus at West Farms, N. Y. Galls at Ironton contained adults November 14 and some had already chewed their way out of the inner cell. Some emerged November 27, and December 8. Galls at Hoxie contained pupae October 10, and adults November 17. At Washington adults were found inside the galls October 9, and 20, and on November 1, some had chewed out of the inner cell.

DIPLOLEPIS CINEREAE (Ashmead)

Dryophanta cinereae ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, 1887, pp. 144 and 129.

Andricus (*Callirhytis*) *saccularius* BASSETT, Trans. Amer. Ent. Soc., vol. 17, 1890, p. 76.

Cinereae was described as a rare species on *Quercus cinerea* at Jacksonville, Fla.; *saccularius* from *Q. coccinea* and *velutina* in Connecticut. They seem to the writer to be the same. The galls have been noticed on the following oaks also: *Q. rubra, maxima, imbricaria, marilandica,* and *phellos,* and at the following localities: Evanston, Glencoe, Ravinia, Fort Sheridan, Waukegan, Palos Park, and Moline, Ill.; North East, Pa.; East Hampton (C. R. Crosby) and Medina, N. Y.; Plummer Island, Md.; Washington, D. C.; Rosslyn and Waterford, Va.; Poplar Bluff, Mo.; Trinity, Tex.; Fairfax, S. C.; and Jacksonville, Gainesville, and Ocala, Fla.

Flies were emerging at Waukegan from galls on red oak, *Q. maxima* on May 27, 1911. The National Museum has a fly from Washington that emerged May 19, 1918.

DIPLOLEPIS CLAVULA (Beutenmueller)

This species was described from a series of flies in the National Museum reared from galls collected by Koebele in Sonoma and Napa Counties. The writer collected galls on *Quercus lobata* at following locations in California: Chico, Calistoga, Stockton, Kaweah, and Lebec. Dr. J. C. Bradley collected one at Napa. The galls are just starting in August and become full grown in September and should be collected in late fall for rearing.

DIPLOLEPIS DISCALIS, new species

Female.—Reddish-brown, some specimens darker than others. Head coriaceous; from above as broad as thorax, cheeks not broadened behind eyes, occiput not concave; from in front almost circular in outline, face pubescent, facial quadrangle one and two-tenths times as broad as high, malar space one-third eye without groove, antenna 13-segmented, lengths as (scape) 11:7:15:12:10:9:8:8:8:7.5:7:6:11. Mesonotum coriaceous to smooth, shining, with scattered hairs most prominent on disk, parapsidal grooves deep, smooth, percurrent, no median; disk with transverse groove at base, sides bounded by straight lines diverging behind. Carinae on propodeum arcuate. Mesopleura smooth. Tarsal claws with a tooth. Wing hyaline, pubescent, ciliate, first abscissa of radius arcuate, radial cell four and one-half times as long as broad, areolet and cubitus indistinct, more distinct in dark specimens. Abdomen longer than head and thorax, lengths of tergites along dorsal curvature as 62:13:16:20:6:8, second pubescent on sides, hind margin not oblique, ventral spine slender, in side view five times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.4, antenna 2.6, ovipositor 3.3, wing 4.9. Length, 1.6–2.1 mm. Average of 8 specimens, 1.88 mm.

On account of the shape of the second tergite this species is not strictly congeneric with the genotype of this genus but at present there seems to be no better place to put it.

Type.—Cat. No. 27190, U.S.N.M. Type and 2 paratypes. Paratypes in American Museum, Field and Stanford.

Host.—Quercus undulata.

Gall (figs. 6 and 33).—A thin disk, 3.6 mm. in diameter on the under side of the leaf in the fall. Monothalamous, tan-colored, convex on upper surface, margin crenate, underside concave, the transversely placed larval cell occupying the full height of the gall. Exit hole on upper surface. Single or but few on a leaf.

Habitat.—Galls were collected and living adults cut out on November 1, 1921, at Tijeras, N. Mex. The galls were also seen farther south in the Sandia Mountains at Abo Pass and in Blue Canyon near Socorro and at Hillsboro.

DIPLOLEPIS DISCULARIS, new species

Female.—Black, base of antenna and legs beyond coxae brownish, face and mesonotum with scattered appressed white pubescence. Head coriaceous; from above as broad as thorax, not broadened behind eyes, occiput not concave; from in front nearly circular in outline, facial quadrangle slightly broader than high, malar space about one-third eye without groove, antenna 14-segmented, lengths as (scape) 10:6:13:10:9:8:8:7.5:7:7:6.5:6:6:8. Sides of pronotum with fine parallel ridges near tegulae. Mesoscutum high-arched, longer than broad, finely coriaceous with setigerous punctures, parapsidal grooves deep, smooth, percurrent, a short median line visible posteriorly. Disk of scutellum rugose behind, smoother above, its sides bounded by two straight diverging lines, the two large round smooth pits at base opening on to disk behind. Carinae on propodeum strongly arcuate, enclosed area narrower above, neck rugose. Mesopleura shining, smooth except for aciculate area in front. Tarsal claws with a strong tooth. Hind tarsus 2 as long as 5 (without claw). Wing hyaline, pubescent, and ciliate, veins brown, first abscissa of radius arcuate, one-ninth length of second, areolet reaching one-eighth way to basal, cubitus indistinct. Abdomen shining, longer than head and thorax, length to height to width as 75:66:35, length of tergites along dorsal curvature as 58:15:9:5:6:5, second with sparsely pubescent areas at base and hind margin at angle of about 45°, ventral spine slender, in side view eight times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.5, antenna 3.0, wing 5.7, ovipositor 4.2. Length, 1.6–1.95 mm. Average of 6 specimens, 1.86 mm.

Type.—Cat. No. 27191, U.S.N.M. Type and 2 paratypes. Paratypes at Field and Stanford.

Host.—*Quercus garryana.*

Gall (fig. 34).—Disk-shaped, about 6 mm. in diameter by 1 mm. thick, single or scattered in small numbers on underside of leaf in fall. The upper surface is slightly concave, the edge sinuate, the margin reflexed nearly to the leaf surface. The transversely placed larval cell occupies the full height of the gall. Exit hole above.

Habitat.—The type material was collected September 8, 1922, in Sequoia National Park, Calif., near the Cedar Creek checking station on the road to Giant Forest on the Kaweah form of this Oregon oak. Living flies were cut out of the galls on November 10.

DIPLOLEPIS DUBIOSA Fullaway

The writer has collected galls on *Quercus agrifolia* at Pasadena, Santa Anita (contained adults April 20, emerged April 27, 1918), Newhall, Piru, Fillmore, Ojai (adults emerging April 27, 1918, and April 16–25, 1922), Carpinteria, Montecito, Santa Barbara, Gaviota, Santa Margarita, Paso Robles, Paraiso Springs, Monterey, San Juan, Palo Alto, Berkeley (galls developing in March, flies out before May 8), and Santa Rosa, Calif.

DIPLOLEPIS EBURNEA (Bassett)

The galls of this species were described as from the leaves of an unknown oak in southern Utah. The writer has collected them on *Quercus gambelii*, *undulata*, *grisea*. They sometimes occur on young twigs as well as on both sides of the leaves. They have been observed at Garden of the Gods (Hopkins U. S. 10781*m*), Wetmore, West Cliff, La Veta, Trinidad, and Morley, Colo.; Raton, Wagon Mound, Shoemaker, Las Vegas, Hot Springs, Glorieta, Rito de los Frijoles near Buckman, Tijeras, Magdalena, and Kingston, N. Mex.; Hackberry, Ashfork, Flagstaff, Williams, and Grand Canyon, Ariz. At Wetmore the galls could have been collected by the quart on leaves of young shoots of *gambelii* and contained adults on October 6, 1921. They emerged from early December to January 14.

DIPLOLEPIS GEMULA (Bassett)

Collected galls on *Quercus alba* at Winnetka, Ill., on June 9, 1917, when most of the flies had already emerged. Galls at Ravinia contained pupae on May 23, 1919. A similar gall exists on *bicolor* and *macrocarpa* in the Chicago area and in the South on *prinus*, *stellata*, *margaretta*, and *montana*.

DIPLOLEPIS IGNOTA (Bassett)

The galls on *Quercus bicolor* are common about Evanston and Wilmette, Ill., becoming full grown by middle of September and dropping with the leaves. During the winter the woolly covering weathers away more or less exposing the tan-colored galls which in shape and size resemble a cluster of cocoons of the braconid genus *Microplitis*. They contained pupae March 10, 1909, and adults emerged April 1–15. The next spring the flies began to emerge March 24. Similar galls on *Q. macrocarpa* were noted at Evanston and Algonquin, Ill., and Nebraska City, Nebr.

DIPLOLEPIS LAURIFOLIAE (Ashmead)

This globular leaf gall with a free-rolling cell was described from *Quercus laurifolia* from "Florida", the flies emerging in March. The

types are labeled Jacksonville. The writer collected galls at Jacksonville on April 4 from which not all the adults had yet emerged. Galls were noted on *Q. phellos* at Richmond, Falls Church, Clarendon, and Alexandria, Va., and at Chesapeake Beach, Md. In Virginia the galls appear with the opening of the buds in spring and are about full grown by the middle of April when the leaves have reached about half their normal size. For rearing they should not be gathered until they contain pupae or adults. Falls Church galls gave adults May 8–15, 1920. Clarendon galls gave flies May 14–18, 1921. It is questionable whether this name should be maintained as distinct from *palustris* (Osten Sacken).

DIPLOLEPIS NOTHA (Osten Sacken)

Galls were collected at Evanston, Winnetka, Glencoe, Fort Sheridan, and Waukegan, Ill. Adults issued June 7, 1909, before June 4, 1913, June 3, 1915. At Washington, D. C., flies issued on May 18 from galls on *Q. palustris*.

DIPLOLEPIS NUBILA (Bassett)

Cynips q. nubila BASSETT, Canad. Ent., vol. 13, 1881, p. 56.
Andricus incomptus KINSEY, Bull. Amer. Mus. Nat. Hist., vol. 42, 1920, p. 306, pl. 23, figs. 17–18.

Nubila was described from an unknown oak from Mule Pass Mountains, Ariz., the galls collected in November. The writer has collected galls in several localities in Arizona and on several hosts. The species seems to be most common on *Q. arizonica* and galls were taken at Bisbee, in Chiricahua Mountains (flies emerging January 2), in Ramsey Canyon in Huachuca Mountains, at Patagonia, in Tumacacori Mountains (flies out of January 13, February 6 and 10), in Santa Rita Mountains and at Oracle in Santa Catalina Range. Galls collected at Oracle December 17, 1921, gave adults December 31, January 3, 4, 10, 12, 14, 16, 22, 23, 24, and February 6. The forest insect collection has galls from the Santa Catalinas from which adults emerged March 30, 1916. Galls on *Q. toumeyi* were collected in the Patagonia Mountains on December 12, 1921, and flies emerged January 13 and 24 and February 4. The flies from *arizonica* range from 2.6–4.6 mm. Average of 58 specimens 2.88 mm. Those from *toumeyi* average smaller but all measured were within the range of the *arizonica* series. The writer collected the galls on *Q. oblongifolia* in the Huachuca, Patagonia, Santa Rita, and Santa Catalina Mountains and at Nogales but reared no adults. The galls were noted also on *Q. reticulata* in the Santa Catalina Mountains.

Incomptus was described from two adults cut out of galls of an unknown oak at San Luis Potosi, Mexico. The writer has examined both, comparing one directly with a Basset type of *nubila*. As the

galls were collected in September it is the writer's idea that at that time the nutritive layer had not been all used up and the larva had vitality to transform into an undersized adult but not enough to chew its way out of the hard gall. Never having been exposed to light and open air it is much paler than flies that emerge normally. Had it darkened up normally the two adjacent spots near the apex of the wing might have become connected into one double one as is the case in *nubila*, a series of which shows considerable difference in the amount of fusion that has taken place in the spots, due either to fluctuating variation or to the length of time that has elapsed or amount of exposure to light since emergence from the gall. If a *nubila* wing were bleached somewhat it would present the condition seen in *incomptus*.

DIPLOLEPIS OCCULTATA, new species

Female.—Black, the tibae, tarsi, antennae, and ventral spine honey-yellow. Head coriaceous with appressed whitish hairs; from above broader than thorax but not massive, cheeks broadened behind eyes, occiput concave; from in front facial area higher than broad, malar space .3 eye without groove, antenna 13-segmented, lengths as (scape) 11 (with 5) : 9(5) : 10(4) : 9 : 9 : 9 : 9 : 9 : 9 : 8 : 8 : 7.5 : 16(5), the last with transverse groove on one side incompletely dividing it into two segments as 6:10 in length, flagellum becoming stouter and sometimes infuscated toward tip. Thorax with sparse appressed pubescence not hiding sculpture, mesonotum coriaceous, parapsidal grooves smooth, percurrent, separation behind about width of groove, no median, anterior and lateral lines distinct; disk of scutellum rugose, groove at base indistinctly separated into two smoother pits. Carinae on propodeum straight, slightly converging above. Mesopleura with bare shining spot. Tarsal claws with distinct tooth. Wings hyaline, pubescent, ciliate, veins yellowish-brown, second abscissa of radius angled, areolet reaching one-sixth, cubitus two-thirds way to basal. Abdomen shining, shorter than head and thorax, higher than long, lengths of tergites along dorsal margin as 51:10, the rest telescoped in most pinned specimens, the second but slightly pubescent on sides at base, its hind margin at angle of about 45°. Ventral spine in side view about three times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.1, antenna 1.8, ovipositor 2.0, wing 3.1.

Length, 1.6–2.5 mm. Average of 117 specimens, 2.19 mm.

Type.—Cat. No. 27964, U.S.N.M. Type and 38 paratypes. Paratypes in American Museum, Field, Stanford, Harvard, California Academy, and Philadelphia Academy.

Host.—Quercus lobata.

Gall.—A seed-like, thin-walled cell produced inside the winter buds and usually completely hidden by the bud scales. It is 2.5–3 mm. long, slightly flattened, with a sort of scar at the blunt-pointed apex, light colored with surface slightly veined. Usually only one in a bud and excentrically placed, not injuring the growing point. If two are present the bud is usually visibly deformed. The exit hole .8 mm. in diameter is made in the side of bud through the bud scales. Wall .1 mm. thick.

Habitat.—Type locality Cottonwood, Shasta County, Calif. On December 7 at the writer's request A. W. Gambs collected small branches of the "river bottom" oak bearing twig galls of *Disholcaspis eldoradensis* Beutenmueller but the adults had all emerged. In this box of material small gall-makers were found to be emerging on January 6 and an examination disclosed these bud galls. Others emerged January 16, 20, 21, 22 and several were cut out of the galls in dissected buds. The writer has collected old buds of this oak in summer showing this characteristic exit hole at Newhall, Ojai, Santa Margarita, Paso Robles, Los Gatos, Palo Alto, St. Helena, Lakeport, Chico and Red Bluff, Calif. Similar exit holes have been noted in old buds of *Q. douglasii*, *dumosa*, *durata*, and *garryana* but no adults were reared from these hosts.

DIPLOLEPIS OPERTA, new species

Female.—Black, front tibiae and all tarsi brownish; head coriaceous: from above transverse, cheeks broadened behind eyes, occiput scarcely concave; from in front facial area wider than high, radiating ridges and scattered white pubescence about mouth, malar space .45 eye without groove, antenna 13-segmented, lengths as (scape) 10:7:11:12:9:9:7:7:7:7:7:6:12. Sides of pronotum with setigerous punctures. Mesoscutum coriaceous, anterior and lateral lines smooth, parapsidal grooves smooth, narrow, percurrent, no median, a few white hairs along grooves. Scutellum finely rugose, pits at base smooth, narrow, septum thin. Carinae on propodeum converging above. Mesopleura shining above. Claws with tooth. Wing hyaline, pubescent, ciliate, veins distinct, first abscissa of radius almost arcuate, areolet reaching one-sixth, cubitus one-half way to basal. In fresh specimens abdomen longer than head and thorax with lengths of tergites along dorsal curvature as 41:19:13:12:10; when dry but two or three tergites showing on dorsal margin, base of second slightly pubescent on sides, ventral spine unusually long and slender, in side view ten times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 2.3, ovipositor 4.3, wing 4.2.

Length, 1.5–2.4 mm. Average of 36 specimens, 1.95 mm.

Differs from the preceding species by having longer and more slender antennae which are black instead of brown and in having a much longer ventral spine.

Type.—Cat. No. 28056, U.S.N.M. Type and 7 paratypes. Paratypes in American Museum, Field, Stanford, Harvard, California Academy, and Philadelphia Academy.

Host.—Quercus lobata.

Gall.—A seed-like cell hidden under the bud scales as in the case of the preceding species but broadest at the base and tapering gradually to a conical and much more pointed apex which lacks a scar. It has a smoother tan-colored surface and a much thinner wall (.05 mm). Length 2.8 mm. by 1.2 mm. in diameter near base, reaching much nearer to the apex of the bud than the preceding. Exit hole .9 mm. in diameter, in side of bud. One or rarely two in a bud.

Habitat.—Cottonwood, Calif. Reared in January and early February from same sending of material as the preceding species.

DIPLOLEPIS PALUSTRIS (Osten Sacken)

Galls were collected at Evanston, Winnetka, Ravinia, and Willow Springs, Ill.; Miller, Ind.; Onekama (T. Hatfield), Mich.; Cedar Rapids (J. H. Scott), Iowa; East Hampton (C. R. Crosby), N. Y.; Plummer Island and Chesapeake Beach, Md.; Falls Church, Alexandria, Rosslyn, and at Apple Orchard Camp in Bedford County, Va.

The young galls appear with the leaves in the spring being as large as a pea when the leaves are an inch and a half long. Seventeen days later adults were emerging. In the Chicago area the following emergence records indicate the variation from season to season: May 31, 1906, June 19, 1907, May 28, 1908, June 12, 1909, May 26, 1911. The galls sometimes occur on the axis of the staminate flowers.

Brodie collected galls on red oak at Toronto, Canada, where adults emerged July 2–10, 1888 and June 6–9, 1889.

DIPLOLEPIS PEDUNCULATA (Bassett)

The galls of this species were collected on *Quercus coccinea* at Winnetka, Glencoe, Ravinia, Fort Sheridan, and Waukegan, Ill., and on *Q. maxima* at Rosslyn, Va., where they seemed to be full grown by May 16. Crosby collected them at East Hampton, Long Island. The writer reared adults from Winnetka galls on June 24.

DIPLOLEPIS POLITA (Bassett)

Galls have been seen at Tuxedo (F. V. Rand), Md.; Washington, D. C.; Falls Church, Va.; Jacksonville, Daytona, Ocala, and Gainesville, Fla.; Clyde, Sisco, Eastland, Ranger, Mingus, Gordon, Santo, Weatherford, Mineola, Palestine, and Trinity, Tex.; Hugo and Tus-

kahoma, Okla.; Koshkonong (R. L. Barrett) and Ironton, Mo. At Falls Church overwintering galls gave flies April 2 (Hopkins U. S. No. 11324[a]). Texas galls sent to Evanston, Ill., began to give adults April 25.

DIPLOLEPIS PULCHRIPENNIS (Ashmead)

Described as from *Quercus undulata*, the writer has collected galls and reared flies which agree with the type on *Q. undulata* and *grisea* and collected what seem to be the same galls on *arizonica*, *oblongifolia*, *toumeyi*, and *reticulata*. Galls were collected at the "breaks" south of Bard (E. E. Goddard), Wagon Mound, Las Vegas Hot Springs, Glorieta, Tijeras, and Abo Pass in the Sandia Mountains, near Socorro, Magdalena, Nogal Canyon, Hillsboro, Kingston, and in the Burro Mountains in New Mexico; at Williams, Prescott, Oracle, Patagonia, and in the Santa Rita and Chiricahua Mountains in Arizona. At Las Vegas Hot Springs galls were collected on October 17 when flies were just beginning to emerge. A lot were out and had died by January 2 and a few more emerged by January 13.

DIPLOLEPIS RYDBERGIANA (Cockerell)

The type fly and gall of this species are in the National Museum. The writer collected galls at the type locality, Las Vegas Hot Springs, N. M., in October, 1921, and cut out living flies January 2. Galls sent east for rearing gave flies December 31, January 4, 20, February 1 and 6, the flies coming out in largest numbers on last date. From galls collected at Shoemaker on October 23, 1922, flies emerged and were alive on February 16, 1923. Galls were collected at Wagon Mound also. They are saddled on the midrib on the under side of the leaf. The type fly measures 2.8 mm. The series of reared specimens ranges from 2.5–3.8 mm. Average of 88 specimens, 3.16 mm.

DIPLOLEPIS SESSILIS, new species

Female.—Honey-yellow, abdomen darker behind, eyes black. Head from above transverse, as broad as thorax, cheeks not broadened behind eyes; from in front face pubescent, facial quadrangle slightly broader than high, malar space three-eighths eye without groove, antenna 14-segmented, lengths as (scape) 12 : 7 : 16 : 15 : 14 : 13 : 11 : 10 : 8 : 8 : 7.5 : 7.5 : 7 : 10. Sides of pronotum pubescent. Mesoscutum smooth, shining, bare except for a row of hairs along each groove. Parapsidal grooves narrow, deep, smooth, percurrent. Anterior and lateral lines indistinct. No median. Transverse groove on scutellum divided into two pear-shaped pits. Disk with scattered hairs and slightly rough behind, its sides bounded by straight lines diverging behind. Carinae on propodeum diverging below and angled. Hind

tibia longer than tarsus, whose segments are as 26:9:6:5:10 (with claw 14), claw with tooth. Wing subhyaline, pubescent, ciliate, veins brown, first abscissa of radius clouded above its angle, second nearly straight, radial cell three and three-tenths times as long as broad, areolet reaching one-fifth way to basal, cubitus reaching basal. Abdomen almost as long as head and thorax, lengths of tergites along dorsal margin as 65:4, rest hidden, second pubescent at base and hind margin at angle of about 45°, ventral valves oblique, protruding, ventral spine slender, in side view six times as long as broad, ovipositor curved at the tip. Using width of head as a base the length of mesonotum ratio is 1.5, antenna 2.9, wing 5.0, ovipositor 3.2. Length, 2.1–2.5 mm. Average of 12, 2.4 mm.

Type.—Cat. No. 27192, U.S.N.M. Type and 4 paratypes. Paratypes at American Museum, Field, and Stanford.

Host.—Quercus arizonica.

Gall (figs. 7 and 35).—Cylindrical with a deep broad cup at apex, dark red, attached on under side of leaf in the fall, falling with the leaf. Usually only one or two on a leaf. The galls measure up to 5 mm. high and 5 mm. in diameter at upper end. The lower end with a sharp flaring rim is sessile on the leaf surface, the upper half dilated, not so smooth, brownish, often inrolled at top, giving the gall somewhat the appearance of a sea anemone. The basal half of the gall is occupied by a centrally placed conical cavity, above which and immediately below the floor of the cup is an excentrically placed larval cell which is cut transversely, if at all, when the gall is split lengthwise.

Habitat.—The type locality is the Santa Catalina Mountains, Ariz., where galls, then containing pupae, were collected on *Q. arizonica* on December 21, 1921, at an elevation of 5,700 feet near the Daily camp on the east side of the range. Living adults which would probably have emerged in the spring were cut out of the galls on January 13. The galls were also seen on the same host at Oracle and in Santa Rita, Huachuca, and Chiricahua Mountains, Ariz. Apparently the same galls were seen on *Q. oblongifolia* in the Santa Rita and Tumacacori Mountains.

DIPLOLEPIS SPLENDENS (Weld)

The writer collected galls of this species November 7, 1921, in Blue Canyon west of Socorro, N. Mex., on *Quercus undulata*, adults emerging April 5 and 26. More were taken near Magdalena on *Q. grisea*, the galls containing adults in December, flies emerging March 9, April 6, and many April 26. They were also taken on *Q. undulata* in Nogal Canyon south of Socorro and at Kingston on *Q. grisea*. The species was previously known in the United States only from *Q. grisea* and from Arizona.

DIPLOLEPIS SULFUREA, new species

Female.—Red, the eyes, vertex, clypeus, anterior and lateral lines, transverse groove, coxae and distal part of abdomen black. Head as broad as thorax, cheeks not enlarged behind eyes, occiput not concave, vertex coriaceous; from in front face pubescent, facial quadrangle higher than broad, malar space one-third eye without groove, antenna 13-segmented, lengths as (scape) 8:5:9:8:7:7:6:6:6:6:5.5:5:10. Mesoscutum smooth with scattered setigerous punctures, parapsidal grooves narrow, smooth, deep, percurrent. Disk of scutellum pubescent, slightly rough behind, bounded on sides by straight lines slightly diverging behind, transverse grooves at base smooth. Carinae on propodeum faint, strongly curved, spiracular areas smooth, pubescent. Mesopleura smooth. Tarsal claw with a tooth. Wing large, hyaline, pubescent, ciliate, veins brown, first abscissa of radius slightly clouded, second long and almost straight, radial cell over four times as long as broad, areolet reaching one-fifth way to basal, cubitus indistinct. Abdomen as long as head and thorax, lengths of tergites along dorsal curvature as 67:11:6:0:2:5, second pubescent at base and hind margin very oblique, ventral spine slender, five times as long as broad in side view. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 2.3, wing 4.5, ovipositor 2.7. Length 1.8–2.1 mm. Average of 3 pinned specimens, 1.95 mm.

Type.—Cat. No. 27193, U.S.N.M. Paratype at Stanford.

Hosts.—*Quercus arizonica*, *grisea*, *oblongifolia*.

Gall (figs. 8 and 36).—A hollow cone, sessile at base and open at apex, densely covered with long sulphur-yellow spines, on under surface of leaf, single or scattered, sometimes as many as nine on a leaf but usually only one to three. The cone is up to 7 mm. high by 4 mm. in diameter at base, with a crystalline surface, white or rosy when growing, the spines up to 4 mm. long and often rosy at the tip. The larval cell lies transversely just below middle of gall and below it is a small obconical cavity reaching to point of attachment. The lower part of the large distal cavity above larval cell is constricted off by a narrow circular shelf. Occurs in the fall dropping only with the leaf.

Habitat.—The type fly is selected from adults cut from galls on *Q. arizonica* collected by Ed Jacot September 28, 1919, in Bear Canyon in the Huachuca Mountains, Ariz. The flies were alive when cut out on December 4 and would probably have emerged in the spring. One paratype is from a gall on *Q. grisea* collected at Ashfork in October, 1922. The writer has also taken the galls on

Q. oblongifolia at Nogales and Patagonia and on *Q. arizonica* at Oracle, Patagonia, Ramsay Canyon in the Huachuca Mountains and at Bisbee.

DIPLOLEPIS TECTURNARUM (Kinsey)

Andricus tecturnarum KINSEY Bull. Amer. Mus. Nat. Hist., vol. 42, 1920, pp. 312, 384, pl. 25, figs. 30–33.

This species was described from an unknown oak from San Luis Potosi, Mexico. The writer found the galls very abundant on *Q. undulata* at Tijeras, N. Mex., in April, 1918, and again on November 1, 1921 (adults emerging by hundreds February 20 to March 9, 1922). Galls on this oak were seen also in Blue Canyon and Nogal Canyon near Socorro, at Hillsboro and Kingston, in the Burro Mountains and in Arizona at Hackberry and Ashfork (flies emerging February 14). The galls were also very common on *Q. grisea* at Magdalena, N. Mex., in November, 1921, the flies emerging in large numbers February 20 to March 8. Galls were seen at Williams, Ariz., also. One cluster of the galls was collected on *Q. gambelii* near Magdalena, flies emerging February 4–20. At Oracle, Ariz., a few galls occurred on *Q. arizonica*, adults emerging March 9. Here the galls are hard to distinguish from *nubila* when seen up in the tree, but in hand the difference in structure is at once apparent. At Las Vegas Hot Springs galls on an unknown oak contained pupae on October 12 and adults emerged January 13, February 20, and March 8. At Shoemaker, Rowe, Glorieta, Tijeras, and Magdalena galls were seen on what may have been *Q. fendleri*. The galls were also seen at Fierro and in Arizona in the Huachuca and Patagonia Mountains and about Prescott.

Only a badly dilapidated paratype has been available for direct comparison of the adults. Cut from a gall collected in September over forty years before it is naturally paler than fresh specimens emerging naturally. A series of fifty measured specimens from one host and locality shows a range in size of 1.75 to 2.45 mm. Average 2.12 mm.

DIPLOLEPIS TENUICORNIS (Bassett)

This species was described from an unknown oak from the Mule Pass Mountains, Ariz. The type galls in the American Entomological Society seem to be on *Q. arizonica*. The writer collected galls on *arizonica* in December at Oracle in the Santa Catalina Mountains and reared adults in March.

DIPLOLEPIS UNICA, new species

Female.—Black; the head, antennae, tegulae, margin of parapsidal grooves, and legs more or less brownish. Head coriaceous; from

above transverse, not quite as wide as thorax, cheeks not broadened behind eyes, occiput concave; from in front broader than high, facial area one and one-fourth times as broad as high, malar space one-third eye without groove, antenna 14-segmented, lengths as (scape) 20 (width 10) : 9 : 33(5) : 24 : 20 : 19 : 14 : 12 : 10 : 9(7) : 8 : 8 : 6 : 9. Pronotum pubescent on sides. Mesoscutum shining, smooth with scattered punctures, sparsely pubescent except on broad lateral and anterior lines, parapsidal grooves deep, smooth, percurrent. Scutellum rugose, not margined behind, transverse groove at base opening on to disk behind and not sharply limited laterally. Carinae on propodeum bowed out, widely separated below but close together and parallel above. Second tarsal segment shorter than fifth, claws stout and simple. Wing dusky, all veins very heavy, second abscissa of radius angled and heavily clouded, third strongly curved and not reaching margin, stouter at end: areolet lost in cloud in some specimens, cubitus reaching basal. Abdomen not quite as long as head and thorax, lengths of the three main tergites as 27 : 4 : 3, second with sparsely pubescent patches at base and hind margin at angle of 45°, ventral valves oblique but inconspicuous, ventral spine horizontal, stouter than in *Andricus*, triangular, hairy, ovipositor short, tip straight. Using width of head as a base the length of mesonotum ratio is 1.4, antenna 2.4, ovipositor 2.0, wing 4.0. Length, 2.4–3.5 mm. Average of 15 specimens, 3.0 mm.

This species is close to *D. carolina* (Ashmead) from which it is separated by its black abdomen, the longer groove at base of scutellum and more pubescent mesoscutum. Neither species strictly belongs in this genus because of the simple claws and heavy wing venation.

Type.—Cat. No. 27194, U.S.N.M. Type and 3 paratypes. Paratypes at American Museum, Field, Stanford, and Philadelphia Academy.

Host.—Quercus stellata.

Gall (fig. 9).—Spherical, 5–7 mm. in diameter, white, smooth, single, always on under side of leaf saddled on a vein so that when detached a depression (containing pedicel) and groove is left on the gall. Occurs in fall. Monothalamous. A section through a fresh gall shows a white fleshy interior containing a distinct but not free larval cell, a tinge of red or brown just under the outer layer.

Habitat.—The type material was collected at Ironton, Mo., in October, 1917, and adults emerged (in out-of-door cage near Chicago) on May 15, 1918. The writer saw galls at Poplar Bluff also, and at Hoxie, Little Rock, Hot Springs, and Texarkana, Ark; Palestine, Trinity, Cuero, Boerne, Austin, College Station, and Arlington, Tex.; and at Green Cove Springs, Fla. What seems to be the same

gall occurs on *Q. margaretta* and *lyrata* also. The Pergande collection contained a gall from Virginia and a fly which emerged April 16, 1883, determined as this species.

DIPLOLEPIS VACCINIFOLIAE (Ashmead)

Callirhytis vaccinifoliae ASHMEAD, Proc. U. S. Nat. Mus., vol. 19, 1896, p. 130.

This species was described from Truckee, Calif., from *Q. vaccinifolia*, the flies emerging October 16 and December 4. The writer collected galls at Tahoe City on August 7, 1922. Some of the galls were still fresh, pale yellowish-green with beautiful purple spots or streaks shaped like the branching pigment cells in a frog's epidermis, and best seen against the light. Most however were now dry, and contained either larvae or pupae. After the galls are picked and dried the adults do not seem to be able to chew through the thin outer wall. Living adults, which agree with the type, were cut out of the galls on November 10. Messrs. Burke and Hartman collected galls on *vaccinifolia* at Pine Crest, Tuolumne County, from which adults emerged December 13.

Koebele collected a similar gall on *Q. chrysolepis* in Placer County, Calif., and reared a similar fly. The writer collected galls (and cut out a living fly November 10) at Canyonville, Oreg., and also at Wolf Creek, and on the road to Oregon Caves above Holland, and also at Scott Bar, Calif.

DISHOLCASPIS BASSETTI (Gillette)

Galls of this species have been observed on *Quercus bicolor* at Evanston, Winnetka, Waukegan, and Blue Island, Ill. At Evanston the galls contained pupae on September 16, and adults emerged October 3, 1915.

Brodie collected the galls on *Q. macrocarpa* on several occasions at Toronto. In 1886 the adults emerged November 29–December 5, in all 247 specimens, all females. In a few days several oviposited in buds, thrusting the ovipositor between fold of bud scales. None survived the winter. In 1893 adults issued November 9–23, all females.

DISHOLCASPIS CINEROSA (Bassett)

The large pointed-bullet galls of this species, described from an unknown oak, occur on *Q. virginiana* and have been seen at various points in Texas: Houston, Wharton, Victoria, Cuero, Boerne, Austin, Sabinal, Kerrville, Beeville, Tiger Mills, Columbia (E. A. Schwarz), and Quincy. A tree at Wharton contained hundreds of them in October, 1917. While growing they secrete honeydew and wasps frequent them in large numbers. J. D. Mitchell reared the adults at Victoria December 5–25.

DISHOLCASPIS CONALIS, new species

Female.—Pale yellowish-red. Whole body densely covered with short silky yellowish-white pubescence except on vertex and a star-shaped dorsal spot on second tergite. Head coriaceous; from above narrower than thorax, cheeks greatly broadened behind eyes, occiput not concave: from in front facial quadrangle 1.2 times as broad as high, malar space one-third eye without groove, antenna 14-segmented, filiform, lengths as (scape) 14:9:27:22:17:16:14:12:10:10:9:8:7:15. Sides of pronotum smooth. Mesoscutum broader than long, broadly rounded in front, coriaceous with setigerous punctures, parapsidal grooves deep, smooth, reaching forward halfway, no median, anterior and lateral lines slightly darker. Scutellum with transverse groove at base, disk broader than long, rugose behind. Neck of propodeum rugose and above it are fragmentary carinae. Mesopleura smooth. Tarsal claws with a tooth. Wing slightly dusky, pubescent, ciliate, veins brown, first abscissa of radius angulate with a slight cloud above angle, free portion of subcosta reaching about halfway to margin, areolet reaching one-fifth way to basal. Abdomen as long as head and thorax, length of tergites along dorsal margin as 38:10:2, hind margin of second at angle of 45°, ventral spine short, broad, hairy, sides parallel with triangular apex, gouge-shaped in cross-section; ovipositor short, straight at tip. Using width of head as base the length of mesonotum ratio is 1.6, antenna 2.4, ovipositor 2.3, wing 4.3. Length, 2.8–4.4 mm. Average of 30 specimens, 3.65 mm.

This would run in Dalla Torre and Kieffer key to *Cynips* on account of the pubescent abdomen but with this exception it has the characters of *Disholcaspis*.

Type.—Cat. No. 27195, U.S.N.M. Type and 12 paratypes. Paratypes in American Museum, Field, and Stanford.

Host.—Quercus garryana.

Gall (fig. 37).—Conical, 10–18 mm. high, with a clasping base 8–12 mm. in diameter, the tapering apex often lopsided, single or in small clusters on small twigs in the fall. Greenish when growing and covered with dense short white pubescence which rubs off after the galls begin to harden. They start to develop late in May and mature in September. Old galls are tan-colored. The interior consists of dense cellular tissue with a transversely placed larval cell, not separable and without a distinct lining wall.

Habitat.—The type material was collected September 8, 1922, in Sequoia National Park, Calif., just above the Cedar Creek checking station on the road from Kaweah to Giant Forest. Some flies issued and died in the packet before October 1, while others died inside, not being able to chew out of the hard galls.

DISHOLCASPIS GLOBULUS (Fitch)

On *Quercus alba* these round bullet galls were seen at Glencoe, Ravinia, Glen Ellyn, and Moline, Ill.; Cedar Rapids, Iowa; Poplar Bluff and Ironton, Mo.; Tuskahoma, Okla.; Texarkana, Ark.; Troy, Ala.; Marianna and River Junction, Fla.; Bluemont, Va.; Blue Hills, Mass.; Pitman (Bradley) N. J.; Syracuse (Crosby) and East Hampton (Schradieck), N. Y.; Elyria, Ohio. On rock chestnut oak, *Q. montana* they were seen at Ithaca, N. Y.; North East, Pa.; Bluemont, Bedford County, and Falls Chuch, Va. In the Chicago area the young galls appear in July, contain pupae September 23, and adults emerge October 20–November 1. Brodie says the adults emerge at Toronto from October 12–November 1 and at once commence to oviposit in white oak twigs. Some which emerged October 17 lived until November 10 but none survived the winter. He reared about two hundred without finding a male. He received galls from Brainbridge, Muskoka, from which adults emerged at Toronto on November 5.

DISHOLCASPIS MAMMA (Walsh)

Galls on *Quercus macrocarpa* are here recorded from the following localities: Mandan (H. F. Bain), N. Dak.; Walnut Grove (C. J. W.) and Becker (L. Haney), Minn.; Evanston, New Lenox, Glen Ellyn, and Moline, Ill.; Corinth (C. Barracks), Iowa; Cedar Point, Kan.; Nebraska City, Nebr.; Surry (C. Chupp), and Waterloo, Ind.; Manistee, Mich., and Medina, N. Y. On *Q. bicolor* at Evanston, Ill. On *Q. lyrata* similar galls yielding similar adults at Hoxie and Texarkana, Ark., and Poplar Bluff, Mo.

In the Chicago area the galls start about the middle or end of July and some are full grown by end of August, adults emerging in different years from October 20 to November 10. At Poplar Bluff galls contained pupae October 8 and adults emerged November 13–December 3. Brodie found the galls at Toronto on *Q. macrocarpa*, the adults emerging in 1896 from October 17 to November 6. Some lived until November 22, but they do not survive the winter. In order to determine the next season's galls he "put 25 females in a muslin bag tied around a couple of low branches of burr oak from which the leaves had fallen on November 10 and for some days noted them ovipositing. They stood upon the tops of the buds grasping them firmly, then curving up the abdomen they pushed the ovipositor between the scales of the buds and remained a few minutes but they do not place more than one to three eggs in a bud." On May 30, 1897, he found numerous galls, the petiole or midvein beginning to bulge. By July 1 they were full grown and adults emerged July 11–17. "These galls were similar in form and texture to galls of *H. petiolicola* from white oak, contained from 3–10 cells,

the producers emerge in the same way as *A. petiolicola.* Producers sexual, sexes about equally numerous." So far as the writer is aware this is the first published indication of an alternating generation for a *Disholcaspis*—a genus whose species are all known by agamic females emerging in the late fall.

DISHOLCASPIS PATTERSONI Kinsey

The writer collected the galls of this species on shin oak, *Quercus breviloba* at Austin, Boerne, and Kerrville, Tex. Galls at Boerne contained adults October 25, adults November 13, and when galls were placed in out-of-door cage at Evanston, Ill., adults emerged November 20 and December 1. Five living flies were found in cage February 19 after six weeks without a thaw, four more March 23 and one April 22.

DISHOLCASPIS PEDUNCULOIDES, new species

Female.—Honey-yellow, distal half of antenna and abdomen reddish-brown. Head transverse, broader than thorax, coriaceous, covered except on vertex with appressed pubescence. Facial quadrangle 1.27 times as broad as high. Malar space .4 eye, without groove. Cheeks widened behind eyes. Antennae 13-segmented, flagellum filiform, lengths as (scape) 13 (width 7) : 7(6) : 16(4) : 15 : 13 : 11 : 10 : 8 : 7 : 6 : 6 : 6 : 13(4). Mesoscutum, mesopleura, and sides of prothorax smooth between the setigerous punctures. Parapsidal grooves not reaching forward halfway. No median. Anterior and lateral lines scarcely darker. Scutellum becoming rugose behind, transverse groove at base bounded laterally and with longitudinal ridges in bottom. Propodeum without usual carinae, spiracular areas smooth, two strong carinae from abdominal fossa to each hind coxa. Hind tibia longer than tarsus, hind tarsal segments as 30 : 13 : 9 : 5 : 17, claw with tooth. Wing pubescent and ciliate, radial cell three and seven-tenths times as long as broad, open slightly at base and apex as well as on margin, first abscissa of radius angled, second almost straight, areolet reaching one-fifth and cubitus two-thirds way to basal. Abdomen shows ratio of length to height to width as 23 : 25 : 15. Lengths of tergites along dorsal curvature as 50 : 16 : 4 : 0 : 9 : 13. Second with large sparsely pubescent area on each side at base, its hind margin at angle of about 80° to long axis of abdomen. Ventral spine hairy, in side view conical, twice as long as broad. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 2.3, ovipositor 3.0, wing 4.4.

Range in length 1.7–2.9 mm., average of 130 specimens 2.24 mm.

Related to *Disholcaspis virens* (Ashmead) from which it differs in the more uniform coloration of the thorax.

Type.—Cat. No. 27196, U.S.N.M. Type and 69 paratypes. Paratypes in American Museum, Field, Stanford, and Philadelphia Academy.

Host.—*Quercus grisea*, *undulata*, *arizonica*, *oblongifolia.*

Gall (fig. 38).—In clusters of 2–20 on the peduncle. Individual galls slender, conical, 10–12 mm. long, sharp at tip, tapering below to about 3 mm. in diameter and more or less clasping at its star-shaped base. Monothalamous, wall .3 mm. thick, exit hole in side 1.2 mm. in diameter. Colored like the bark, darker at apex.

Biology.—While growing in the late summer the galls are green but by November 1 in the Sandia Mountains they were turning brown and contained adults which emerged during last week in December and first two weeks of January.

Habitat.—The type locality is Magdalena, N. M. (*Q. grisea*) and paratype localities: Tijeras, N. M. (*Q. undulata*) and Oracle, Ariz. (*Q. arizonica*). The writer has also collected galls at Socorro, Nogal Canyon, Hillsboro, Kingston, and in the Burro Mountains, N. M.; and at Prescott, Hackberry, Nogales, Patagonia, Bisbee, and in the Chiricahua, Huachuca, Tumacacori, and Santa Rita Ranges in Arizona. The University of Arizona has galls on an herbarium specimen of oak from Ashfork, Ariz.

DISHOLCASPIS PERNICIOSA (Bassett)

The galls were observed at Trinidad, Morley, Wetmore, and Garden of the Gods, Colo.; Las Vegas, Glorieta, Rowe, and Tijeras, N. M.; Flagstaff, Williams, Prescott, and Grand Canyon, Ariz. They were just starting at Trinidad on July 10 and at Wetmore contained adults on October 6. The flies probably emerge in November or early December. The galls were observed on *Q. gambelii*, *fendleri*, and *grisea.*

DISHOLCASPIS PRUNIFORMIS Kinsey

The galls of this species were collected on *Q. stellata* and *laceyi* at Austin, Boerne, and Kerrville, Tex. Galls at Austin contained pupae on October 30, November 13 and 21, 1917. Adults were cut out of the galls on December 10.

DISHOLCASPIS SILERI (Bassett)

The gall of this species, described from an unknown oak in southern Utah, is a monothalamous stem swelling resembling the eastern club gall on white oak. Galls which agree with the Bassett types have been collected by the writer on *Quercus gambelii*, *grisea*, *undulata*, and *reticulata* at the following localities: Wetmore, West Cliff, Trinidad, and Morley, Colo.; Wagon Mound, Rowe, Tijeras, Socorro, Magdalena, Nogal Canyon, and Fierro, N. Mex.; Prescott,

Flagstaff, Williams, Grand Canyon, and in Santa Catalina, Chiricahua, and Huachuca Mountains, Ariz. In all cases the collecting has been done at such a time that the maker has not been reared. The flies probably emerge just as the new wood begins to harden in midsummer.

DISHOLCASPIS SPONGIOSA (Karsch)

The galls of this species were collected on *Quercus stellata*, *margaretta*, and *chapmani* at the following localities: Thebes (E. Schwab) and Floyd's Island in Okefenokee Swamp (Dr. J. C. Bradley), Ga.; Green Cove Springs, Daytona, St. Petersburg, Clearwater, Ocala, Gainesville, Madison, Marianna, River Junction, and Tallahassee, Fla.; Montgomery and Troy, Ala.; Mineola, Palestine, Trinity, and Houston, Tex.; Texarkana, Hoxie, and Hot Springs, Ark.; Hugo and Tuskahoma, Okla.; Poplar Bluff and Ironton, Mo. In 1917 adults had emerged at Poplar Bluff by November 3, at Hoxie they contained pupae on October 10 and emerged November 16, at Palestine they contained pupae and adults on October 16. They emerged from Daytona galls on December 5.

DRYOCOSMUS COXII (Bassett)

Cynips coxii BASSETT, Canad. Ent., vol. 13, 1881, p. 112.
Andricus coxi BASSETT, Trans. Amer. Ent. Soc., vol. 26, 1900, p. 320.
Andricus bassettianus DALLA TORRE and KIEFFER in Wytsman, Gen. Ins. Hym. Cynipidae, 1902, p. 61.
Plagiortrichus coxii (*Bassett*), KINSEY, Ind. Univ. Study 53, 1922, pp. 122–5.

The writer has collected the common fusiform stem swelling of this species on *Quercus emoryi* at Fierro, Kingston, and in the Burro Mountains, N. Mex.; in the Chiricahua, Huachuca, Mule, Patagonia, Tumacacori, Santa Rita and Santa Catalina Mountains, and at Bisbee, Nogales, Oracle, and Prescott, Ariz. The galls were seen on *Quercus hypoleuca* in the Santa Catalina, Patagonia, Huachuca, and Mule Mountains and at Fierro and Kingston. In April, June and July only old galls were found. E. Jacot collected a fresh gall in the Huachucas September 17, too immature to rear. The writer collected mature fresh galls on *emoryi* at Oracle on December 17 containing both pupae and adults which emerged January 4–24. Galls on *emoryi* from the Mule Mountains collected early in December gave adults December 31, January 13, 24, February 4 and 14. These flies run to *Dryocosmus* in the Tierreich key.

DRYOCOSMUS DECIDUUS (Beutenmueller)

Andricus decidua BEUTENMUELLER, Insect. Inscit. Menstr., vol. 1, 1913, p. 131.

These galls long known in literature under the name *decidua* before the adult was reared are the ones to which Dr. A. D. Hop-

kins referred under the name of "black oak wheat" in a note.[1] These specimens were from Wescott, Mo., and Texarkana, Ark. Doctor Hopkins collected galls at Kanawha Station, W. Va., September 25, 1923. The writer collected galls at Evanston and Highland Park, Ill.; Ironton and Poplar Bluff, Mo., and at Bluemont, Va. Galls collected at Evanston on October 8, 1916 contained pupae on September 22, 1917 and adults on November 16 which emerged March 23–April 22, 1918. After the galls drop they change shape somewhat as the thick nutritive layer is used up, becoming distinctly spindle-shaped and only a thin brittle shell is left in the swollen central region. As the flies reared agree with the type in having the mesoscutum smooth, parapsidal grooves complete, head sculptured, no malar groove, antennal segment 3 longer than 4 and claws simple, the species is here transferred to *Dryocosmus*.

DRYOCOSMUS FLORIDENSIS (Beutenmueller)

Dryophanta floridensis BEUTENMUELLER, Canad. Ent., vol. 49, 1917, p. 349.
Andricus peltatus WELLS and METCALF, Canad. Ent., vol. 53, 1921, pp. 212–3. figs. 2, 1–5.

The rearing of adults from the *peltatus* gall in the spring of 1923 enables the writer to supplement the original description of the female and describe the hitherto unknown male.

The female has the cheeks scarcely broadened behind the eyes, malar space without groove. Prothorax narrow in the middle. Parapsidal grooves percurrent. No median groove. Mesoscutum microscopically coriaceous but shining with a sparsely pubescent area about the anterior end of each parapsidal groove. Scutellum without distinct pits, the indistinct transverse groove bounded laterally by carinae which diverge back on to margin of disk. Disk finely rugose. Carinae on propodeum weak, enclosing a transversely elliptical area. Wing pubescent and ciliate. Abdomen of freshly killed specimen shows ratio of length to height to width as 30:32:22. Second tergite longer than 3–7, its hind margin making an angle of about 80° to longitudinal axis of abdomen. Ventral spine in side view conical, three times as long as broad. Length 2.7–3.2 mm. Average of 15, 3.06 mm.

Male.—Differs from female in having 15-segmented antennae, the third longest and slightly bent. The abdomen is shorter than the thorax and laterally compressed. Length 2.0–2.3 mm. Average of 10, 2.14 mm.

As the four type flies were almost wholly destroyed by pests before reaching the National Museum a female reared by the writer from the characteristic gall is chosen as a neotype. It is labeled "Alexan-

[1] Proc. Ent. Soc. Wash., vol. 5, 1903, pp. 151–2.

dria, Virginia, June, 1923, *Quercus palustris*," and from it the above notes were made.

William Beutenmueller has suggested in correspondence that this *peltatus* would prove to be the same as his *floridensis* and the rearing of adults of *peltatus* now enables me to compare them with cotypes of *floridensis* and they seem to me to be the same, even when compared in balsam mounts. *Peltatus* thus becomes a synonym of the older name *floridensis* and from the characters given it will be seen that the species goes in the genus *Dryocosmus* where it is evidently the vernal sexual form in an alternation.

Host.—*D. floridensis* was described from Spanish oak, *Q. rubra* (=*digitata*=*falcata*) and from Blue-jack oak, *Q. cinerea* (=*brevifolia*) from Florida; *peltatus* from *Q. marilandica*, and the writer here adds the following unrecorded hosts: *Q. nigra*, *Q. imbricaria*, *Q. phellos*, and *Q. palustris*. He has reared adults from *palustris*, *rubra*, and *imbricaria*.

Biology.—About Washington the galls may be found just starting in early May. They are then bright scarlet. As they develop the bracts become green and unless gall is parasitized turn brown about the time the adults emerge which is about the middle of June. For rearing the galls must be left on the tree until the pupa stage is reached and the living flies cut out of the dry galls later. May 27 was the earliest date at which a pupa was noted. By June 19, 1921, almost all the flies were out.

Habitat.—The species seems to belong to the Atlantic coast plain. The writer has seen galls at Chesapeake Beach, Md.; East Falls Church, Rosslyn, and Fredericksburg, Va.; Fairfax, S. C.; Marianna, River Junction, and Gainesville, Fla.; Troy and Dothan, Ala.; Palestine, Houston, Trinity, and Texarkana, Tex.; and at Tuskahoma, Okla. J. L. Zabriskie collected galls at Flatbush, N. Y.

DRYOCOSMUS IMBRICARIAE (Ashmead)

Andricus imbrecariae ASHMEAD, Proc. U. S. Nat. Mus., vol. 19, 1896, p. 122.
Holcaspis fasciata BASSETT, Trans. Amer. Ent. Soc., vol. 26, 1900, p. 328.
Dryocosmus fasciatus (Bassett) WELD, Proc. U. S. Nat. Mus., vol. 61, 1922, art. 18, p. 7.

William Beutenmueller calls the attention of the writer to the fact that *fasciata* Bassett, described from *Q. ilicifolia*, is the same as *imbrecariae* Ashmead described from *Q. ilicifolia* and *imbricaria*. A comparison of the types confirms this conclusion. The original spelling *imbrecariae* is a typographical error and Ashmead had corrected it in his own copy of the paper to conform it with the name of the host oak. This "banded bullet" gall was reported by Miss Stebbins from two other host oaks, *Q. coccinea* and *velutina*. The writer here records as additional hosts, *Q. rubra*, *marilandica*,

cinerea, *catesbaei*, *texana*, and *laurifolia* and the following localities where the galls have been seen: Ithaca, N. Y.; Evanston, Wilmette, Winnetka, Glen Ellyn, and Kingston, Ill.; Kilbourn City and Delevan (D. Watt), Wis.; Webster Groves, Ironton, and Poplar Bluff, Mo.; Little Rock, Hot Springs, and Texarkana, Ark.; Hugo, Okla.; Palestine, Wharton, Victoria, and Boerne, Tex.; Troy and Dothan, Ala.; Cottondale, Marianna, River Junction, Madison, Live Oak, Gainesville, and Ocala, Fla.; Bluemont, Va.; Kanawha Station (A. D. Hopkins), W. Va., and Washington, D. C. Brodie collected galls on *Q. coccinea* at Toronto.

Galls collected at Evanston in fall of 1916 gave adults September 22, 1917, but a few galls still contained larvae indicating that the emergence is distributed over at least two seasons. From galls collected in fall of 1917 at Ironton flies issued before October 10, 1918, and some still contained larvae. Galls from Poplar Bluff in fall of 1917 gave flies October 10, 1918. From galls collected at Victoria, Tex., J. D. Mitchell reared flies November 20, 1906. The Ashmead types emerged September 6 and October 12 and Bassett's type flies also emerged in the fall.

DRYOCOSMUS PIPEROIDES (Bassett)

Andricus piperoides BASSETT, Trans. Amer. Ent. Soc., vol. 26, 1900, p. 314.

Galls of this species were noted on the leaves of *Quercus maxima* at Evanston, Wilmette, Ravinia, Fort Sheridan, and New Lenox, Ill.; at Medina and Ithaca, N. Y.; and at Bluemont, Va. Some specimens sent from Cape Porpoise, Me., were determined by the writer as those of this species. Galls collected at Evanston in October, 1916, contained both pupae and larvae on September 17, 1917, and adults and larvae on November 15. Adults emerged April 22 to May 11, 1918. The emergence is evidently distributed over at least two seasons. From galls collected by William Beutenmueller at Fort Lee, N. J., in the fall of 1916 and sent to the writer for rearing flies emerged April 6, 11, and May 11, 1918. He writes that the galls were very common in the fall of 1916 and again in 1918, but none was noticed in 1917. Brodie collected galls at Toronto, but failed to rear the adults.

As the Bassett types have simple claws, a malar groove, mesoscutum bare and shining and head sculptured the species is here transferred to *Dryocosmus*.

DRYOCOSMUS RILEYI (Ashmead)

Andricus rileyi ASHMEAD, Proc. U. S. Nat. Mus., vol. 19, 1896, p. 121.

This species was described from St. Louis, Mo., from *Q. maxima* only. The writer has collected the galls on ten other oaks as fol-

lows: *Q. velutina*, *coccinea*, *marilandica*, *rubra*, *cinerea*, *nigra*, *catesbaei*, *imbricaria*, *texana*, and *laurifolia*, and records the following localities: Evanston, Winnetka, and Ravinia, Ill.; Ironton and Poplar Bluff, Mo.; Little Rock, Hot Springs, and Texarkana, Ark.; Palestine, Trinity, Wharton, Richmond, Boerne, and Kerrville, Tex.; Hugo and Tuskahoma, Okla.; Troy, Ala.; Cottondale, Marianna, and Ocala, Fla.; Washington, D. C.; Bluemont, Va.; Kanawha Station, W. Va. (A. D. Hopkins); Riverhead, N. Y. (C. R. Crosby); New York City (Beutenmueller).

Galls collected at Poplar Bluff in fall of 1915 gave adults Septemerb 25–October 21, 1916. From galls collected at Ironton in fall of 1918 by S. A. Rohwer two flies emerged March 15, 1920. From galls of 1911 on *coccinea* at Evanston adults emerged June 15, 24, 1912, and others in spring of 1913. As the mesoscutum of the type is smooth, the head sculptured, claws simple, no malar groove and third segment of antenna longer than fourth the species is here transferred to *Dryocosmus*.

LOXAULUS MAMMULA (Bassett)

Galls on *Quercus alba* collected at Apple Orchard Camp in Bedford County, Va., on June 27, 1920, had the nutritive layer used up and larvae full grown. Adults emerged some time in July.

LOXAULUS SPICATUS Bassett

Galls, agreeing with the Bassett type described from Arizona on "*Quercus virens*," have been collected by the writer from *Q. arizonica*, *oblongifolia*, and *toumeyi* in the Santa Catalina Mountains at Oracle and in Sabino Basin, in the Huachucas at mouth of Carr Canyon, in the Mule Mountains, in the Santa Ritas, and in Patagonia Mountains. From galls collected in December flies emerged December 31, January 1 and 24. They do not seem to be congeneric with the genotype of this genus but the species is left in *Loxaulus* for the present.

LOXAULUS TRIZONALIS, new species

SEXUAL GENERATION

Female.—Yellowish-brown, tip of antenna and mesonotum darker than head, abdomen darker behind; almost bare. Head coriaceous, from above semicircular in outline, broader than thorax, cheeks broadened behind eyes, occiput concave; from in front facial quadrangle one and three-tenths times as broad as high, malar space .44 eye with groove, antenna filiform, 14-segmented, lengths as (scape) 18 : 7 : 20 : 20 : 19 : 18 : 16 : 14 : 13 : 13 : 12 : 11 : 10 : 17. Pronotum narrowed to one-ninth in middle, sides coriaceous. Mesoscutum

wider than long, finely and uniformly rugose, parapsidal grooves complete, no median. Disk of scutellum more coarsely rugose, the transverse groove at base rugose, not bounded laterally. Carinae on propodeum almost straight and parallel with a trace of a median in inclosed area. Mesopleura coriaceous, shining. Hind tarsus shorter than tibia, its segments as 37:15:10:7:11 (with claw 14). Claws weak and simple. Wing pubescent, ciliate, with three prominent transverse bands of cloud and three clear areas. The narrowest cloud lies on the basal vein, the next begins at costal hinge and includes the basal half of the radial cell extending back to the anal vein, the largest occupies more than the apical fourth of the wing. The first abscissa of radius is arcuate, the second strongly curved and transparent, no areolet. Abdomen longer than head and thorax, length to height to width as 38:27:15, inserted obliquely, lengths of tergites along dorsal margin (knife-edged behind second) as 54:22:7:10:15:10, second bare at base, ventral valves slender, prominently protruding obliquely upward, the sheath over the valves of an unusual type, hypopygium long and prominent, the ventral spine slender, in side view two and one-half times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.1, antenna 2.8, ovipositor 5.3, wing 3.0. Length 1.65–3.45 mm. Average of 102 specimens 2.66 mm.

Male.—Differs in having 15-segmented antennae, lengths as 15:6:17:19:16:14.5:12:12:12:11:11:10:10:9:11. Abdomen shorter than thorax, triangular in side view, lengths of tergites as 6:42:14:3:0:2:12. Lengths, 1.9–2.6 mm. Average of 36 specimens, 2.23 mm.

Type.—Cat. No. 27197, U.S.N.M. Type, allotype, 12 male and 50 female paratypes. Paratypes at American Museum, Field, Stanford, Harvard, California Academy, and Philadelphia Academy.

Host.—Quercus chrysolepis.

Biology.—The flies were reared from a lot of galls (Hopkins U. S. No. 15613*b*) which were supposed at the time of collection, April 18, 1918, to have all been those of a species of *Disholcaspis.* When these flies emerged July 15–August 1, 1918, they were at first thought to be guest flies in the above gall whose maker does not emerge until late in the fall. But these flies have not at all the structure of guests and the gall from which they came is therefore not recognized or here described.

Habitat.—The type locality is Camp Baldy, Calif. Paratypes are from galls collected on the road from Holland, Oreg., to the Oregon Caves July 21, 1922, the flies emerging about August 1.

AGAMIC GENERATION

Female.—Similar in appearance to the female of the sexual generation except that freshly killed specimens from a breeding cage kept out-of-doors for three winters in the humid climate of Washington are darker in color than the seven-year-old museum material reared in the dry climate of California in July, only a short time after the galls were collected. The ovipositor ratio, however, is 3.3 and wing 3.5. Length 2.6–3.7 mm. Average of 97 specimens, 2.98 mm.

Host.—Quercus chrysolepis.

Gall.—A mass of easily separated contiguous single cells lying on one side of a nature acorn between the cotyledons and the acorn wall. There is no visible external sign of infection, but very large acorns in exposed situations on the tree seemed more liable to attack. The individual galls are irregular in shape, slightly flattened, blunt-pointed at the ends, 4–5 mm. long with exit hole 0.12 mm. in diameter.

Biology.—There is no experimental proof that this is the alternating generation, but the circumstantial evidence is strong. It would be strange to find two series of adults with such unusually marked wings emerging at different seasons from two strikingly different galls on this host oak, which has almost a unique cynipid fauna, unless they were so related. The longer ovipositor of the sexual female seems adapted for piercing acorns and the shorter one of the agamic female for laying eggs in small twigs. Because the author considers these as one species no specific name is given to the agamic form or type designated. The gall on the pin, the locality label, and the field-note number 1577 will serve to identify the agamic series before the author.

Habitat.—The affected acorns were collected at Idyllwild, Calif., on September 21, 1922, and the adults emerged at Washington, D. C., March 12–21, 1925. Others will emerge in spring of 1926.

PLAGIOTROCHUS SUBERI, new species

Female.—Black, legs yellow. Head coriaceous, radiating ridges about mouth, face pubescent; from above slightly broader than thorax, length to width as 21:40, cheeks not broadened behind eyes; from in front nearly circular, facial area slightly higher than broad, malar space 0.3 eye, antenna filiform, 14-segmented, lengths as (scape) 9:5:10:10:9:9:8:7:7:6:6:5:5:8, first two yellow, rest piceous. Sides of pronotum reticulate. Mesoscutum coriaceous, parapsidal grooves deep, smooth, percurrent, broader behind, no median, a few setigerous punctures along grooves. Scutellum with two large deep smooth pits at base, disk coriaceous. Carinae on propodeum widely diverging below and angled, enclosing an area in which there is a

distinct median carina. Mesopleura coriaceous with a smooth area at upper hind margin, sloping backward so that anterior legs are widely separated from second and third pairs. Hind tibia longer than tarsus, claws simple. Wings ample, hyaline, pubescent, ciliate, veins brown, first abscissa of radius arcuate, second nearly straight, radial cell five times as long as broad at base, areolet reaching one-fifth way and cubitus to the basal. Abdomen shorter than head and thorax, length to height to width as 17 : 15 : 9, lengths of tergites along dorsal curvature as 35 : 12 : 12 : 4 : 5 : 8, second bare at base. Ventral valves oblique, tip of ovipositor straight, ventral spine directed horizontally, slender, in side view three times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 2.5, ovipositor 1.8, wing 4.4. Length, 1.6–2.2 mm. Average of 200 measured specimens, 1.85 mm.

Types.—Cat. No. 27198, U.S.N.M. Type and 99 paratypes. Paratypes at American Museum, Field, Harvard, Stanford, Philadelphia Academy, California Academy, British Museum, Paris Museum of Natural History, and with Professor Tavares.

Host.—*Quercus suber*, the European cork oak introduced into California.

Gall (fig. 10).—Cells imbedded in the wood immediately under the normal bark on small slender twigs, sometimes occurring in such great numbers that the twig is uniformly hypertrophied to twice its normal diameter for several inches. The individual cells are elongated, 2.5 mm. long by 0.7 mm. in diameter, lying parallel to the axis of the twig, the exit hole through the bark 0.5 mm. in diameter.

Habitat.—The type is selected from material from a cork oak tree on the grounds of the Cottage City Nursery Co., north of San Jose, Calif. Paratype locality, Pasadena.

Biology.—When the San Jose tree was visited in company with Dr. H. E. Burke on May 16, 1918, it was almost in full bloom, the young leaves not yet half grown. Some of the cells were in the previous season's growth but most were in the two-year-old wood and a few in that still older. Almost every twig on the tree was more or less infested. When badly infested so as to be hypertrophied the twigs are killed and fully half of the small twigs in the upper part of the tree seemed to be dead. No other kind of gall was seen on the tree. A few adults had already emerged and were seen resting on the foliage but most were still in the pupa state. From twigs collected on that date and sent to the Eastern Field Station for rearing (Hopkins U. S. No. 15608*a*) adults emerged May 21 to June 5. Adults emerged at Evanston June 3–11. This tree had a trunk diameter of about 15 inches but nothing was learned as to its history.

On May 7, 1924, A. O. Larson collected more material of this species from a cork oak tree on North Orange Grove Avenue, Pasadena. Flies were emerging when this was received at Washington, May 17. When he revisited the tree on May 22 practically all had emerged and many of the twigs had died but still retained their leaves, badly disfiguring the tree. This tree is about 18 inches in diameter and undoubtedly planted about 25 years ago by the architect, not by the gardener who planted most of the ornamentals on the place.

As the gall resembles that of a European *Fioriella* on cork oak, galls and flies were sent to Prof. J. S. Tavares in Spain, who is familiar with the galls of the Iberian peninsula, thinking possibly this might be that European species which had been brought over years ago in the twigs of a young tree imported from Spain. But he did not know the gall, nor was the insect a *Fioriella*. No record is at hand of the introduction of the cork oak except by importation of acorns. There are said to be over 1,000 cork oak trees in the San Gabriel Valley descended from two trees on the Richardson farm at Alhambra grown from acorns sent to Don Benito Wilson by the Commissioner of Agriculture in 1860. It seems probable that this is a native Cynipid which has come over from the native oaks on to this introduced exotic ornamental tree, although all the galls of this type known to the writer on the native oaks are produced by entirely different genera.

Another tree infested with the galls of this species was discovered by Louis Kroeck in May, 1924, standing in a lumber yard—once a recreation park—in Santa Clara on land that once belonged to the mission. In April, 1924, Eric Walther found another infested tree in Golden Gate Park in San Francisco. He writes:

> This tree is about 35 years old and has evidently been suffering severe injury for years, the 2-year-old twigs being so heavily infested that they die and the first heavy storm causes them to break off, and so the tree looks as if it had been pruned annually.

PLAGIOTROCHUS SERRICORNIS (Kinsey)

Andricus serricornis KINSEY, Bull. Amer. Mus. Nat. Hist., vol. 46, 1922, p. 288, pl. 24, fig. 3.

The galls of this species have been collected by the writer on *Q. agrifolia* in the Santa Ana, Santa Monica, and San Gabriel Ranges, at Pasadena, Santa Anita (contained pupae April 20, adults emerging April 27), Newhall, Piru (flies emerging April 25, 1918), Fillmore, Ojai (galls about half grown on April 7, 1922), Carpinteria, Montecito, Santa Barbara, Gaviota, Santa Margarita, Paraiso

Springs, Los Gatos, Palo Alto, and St. Helena; on *Q. wislizenii* at Camp Baldy, Bagby, California Redwood Park, and Ukiah (adults out May 10–13, 1922).

TRIGONASPIS CUPELLA, new species

Agamic female.—Black. Head coriaceous; from above massive, twice as broad as long, cheeks broadened behind eyes, occiput concave; from in front elliptical in outline, width to height as 36:30, interocular space .58 transfacial and area 1.2 times as broad as high, malar space one-fourth eye with a slight groove, antenna 13-segmented, lengths as (scape) 12(width 5) : 8(5) : 14(3.5) : 13 : 9 : 9 : 8 : 8 : 7.5 : 7.5 : 7 : 6 : 10(4) last sometimes subdivided, flagellum gradually stouter to tip, faint median carina below median ocellus, broad low median ridge antennae to clypeus. Mesonotum nearly flat, as broad as long, without grooves or lines or transverse groove or suture between mesoscutum and scutellum, the disk with a few setigerous punctures. Carinae on propodeum diverging below around on to the sides of neck, spiracular areas pubescent. No trace of wings. Hind tarsus shorter than tibia, its segments as 16:7:4:3:8, claws with an obscure tooth at base. Abdomen longer than head and thorax, length to height to width as 78:61:20, lengths of tergites measured along dorsal curvature as 46:19:8:14:10:8, second bare at base, dorsal margin behind second knife-edged, ventral spine slender, six times as long as broad in side view. Using width of head as a base the length of mesonotum ratio is .57, antenna 2.3, ovipositor 4.3. Length, 1.3–2.0 mm. Average of 100 measured specimens, 1.58 mm.

Type.—Cat. No. 27199, U.S.N.M. Type and 39 paratypes. Paratypes at American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Host.—Quercus grisea, undulata, arizonica.

Gall (fig. 39).—A small black cup-shaped spangle scattered on upper and under surface of leaf in the fall and dropping with the leaf. From one to a dozen on a leaf. Galls measure up to 2.6 mm. in diameter and 2 mm. high, the exit hole in the shallow cup at apex, the mouth of the cup sometimes slightly constricted by the inrolled edges of the thick wall, the larval cell lying transversely at base of gall.

Habitat.—The type is selected from material on *Quercus grisea* from Magdalena, N. Mex., where the galls were very common in November 1921. Paratypes are from galls on *Q. undulata* at Tijeras in the Sandia Mountains. Flies emerged from both lots of galls from January 24 to February 6, 1922. Other paratypes are from *Q. arizonica* from the Mule mountains and from Oracle in the Santa Catalina Mountains, Ariz. Galls were observed on

these hosts at Nogal Canyon south of Socorro, Hillsboro, Kingston, and in Burro mountains, N. Mex., and at Prescott, Ariz. Similar galls were observed on *Q. oblongifolia* in the Huachuca and Patagonia Mountains.

TRIGONASPIS OBCONICA Weld

Galls of this species were observed on a dozen or more trees of *Quercus lobata*, a previously unrecorded host, at Cloverdale and Santa Rosa, Calif., on May 7, 1922, usually at the base of small trees. The galls were rosy when only slightly buried but white or yellowish if deeper. At this date the galls contained both pupae and adults, the flies emerging May 13, 17, 20.

BIORHIZA ELDORADENSIS (Beutenmueller)

The writer noted the occurrence of cells of this species in acorns of *Quercus agrifolia* at Ojai, Paraiso Springs, and Mount Diablo; on *Q. wislizenii* at Ukiah, in California Redwood Park, in the Santa Lucia Mountains, in the San Bernardino and Santa Ana (adults out September 23) Ranges, and at Idyllwild were adults emerged September 21 to October 1; on *Q. kelloggii* in the Sequoia National Park, in the California National Forest along the road from Upper Lake to Bartlett Springs, at Fort Jones, Scott Bar, and Milford, Calif., and at Siskiyou, Oreg.

BIORHIZA RUBINA Gillette

White or rosy translucent depressed spherical galls 2–3 mm. in diameter on under side of leaves of *Quercus alba* in fall, agreeing with the original description of the galls of this species, have been noted at Evanston, Lake Forest, and Clinton, Ill.; Ironton, Mo.; Medina, N. Y., and Bluemont, Va. Similar galls have been seen on the rock chestnut oak, *Q. montana*, at Bluemont and East Falls Church, Va. The writer has not reared the adult.

XANTHOTERAS FORTICORNIS (Walsh)

The oak-fig gall on *Quercus alba* has been observed at Cayuta Lake, Riverhead (Crosby), and Ithaca, N. Y.; Pitman (Bradley), N. J.; Ironton, Mo.; Tuskahoma, Okla.; Evanston, Glencoe, and Fort Sheridan, Ill.; Washington, D. C.; and Bluemont, Va. At Miller, Ind., it was just beginning to develop on June 30 and at Toronto Brodie says they begin to appear toward the end of June. At Riverhead they contained pupae on September 30. Galls collected at Ironton in October, 1917, containing adults were put out of doors in cage on ground on November 26 at Evanston, Ill. On

December 10 the thermometer registered —14° F. On December 18, when thawing again, dozens of flies were actively crawling about in the cage, having emerged either since November 26 or since December 10. More were found in cage February 19, 1918, and more March 11 and March 23. Brodie found the gall common at Toronto where adults issued November 4, 1885, and from November 12–21, 1886, over 300 were reared from another lot of galls. Some lived till January 29 but none survived winter. He examined over 800 specimens without finding a male. He says they oviposit in the roots. He received galls from 100 miles west of Winnipeg in Manitoba and says the producers could not be separated from Ontario specimens. He also had galls from Port Sidney, Muskoka, from which flies issued November 9.

XANTHOTERAS CALIFORNICA (Beutenmueller)

Philonix californica BEUTENMUELLER, Ent. News, vol. 22, 1911, p. 69.

The type material of this species was collected by Coquillett in Kern County, Calif., November 1, 1892, the flies emerging January 21 and February 2, 1893, the gall apparently on a leaf of *Q. dumosa.* The types have not the characteristic ventral spine of a *Philonix* and seem to go best in *Xanthoteras.* The writer has collected the galls on *Q. dumosa* at Bartlett Springs, Jolon, Paso Robles, and on Cajon Pass. From galls collected on Liebre Summit on the Ridge boulevard to Bakersfield on September 13 living flies were cut out on November 10. At Boulevard in March both old and empty galls were found and also new ones still thin as tissue paper and on the last season's leaves, as the new leaves had not yet appeared. The galls seem to be always on the upper side of the leaf. At Lebec a gall was collected on *Q. douglasii* and a living fly cut out November 10.

XANTHOTERAS TERES, new species

Female.—Head and thorax reddish-brown, the occiput, middle of face, antennae, mesopleura, and region of anterior lines infuscated, abdomen black. Head and thorax uniformly sparsely pubescent. Head granulate; from above broader than thorax, cheeks broadened behind eyes, occiput slightly concave; from in front facial quadrangle one and two-tenths times as broad as high, malar space .4 eye with groove, antennae 14-segmented, lengths as (scape) 12:6:16:13.5:11:10:9:8:7:6:6:5:5:7. Sides of pronotum and mesoscutum smooth with setigerous punctures, parapsidal grooves deep, smooth, percurrent, their separation behind only 3 times the width of a groove, no median. Disk smooth above, rugose behind, sides bounded

by diverging straight lines, transverse groove at base not distinctly divided into pits. Carinae on propodeum arcuate, enclosed area broader than high. Tarsal claws with a tooth. Wing reaching back to about the middle of second tergite, blunt, pubescent, venation normal as far out as costal hinge, a balsam mount of a favorable specimen shows the free part of subcosta, the first abscissa of radius and areolet obsolete, the second turning sharply upward toward wing margin, the cubitus represented by a linear cloud. Abdomen as long or longer than head and thorax, length to height to width as 26:21:17, lengths of tergites along dorsal curvature as 83:15:5:0:0:8, pubescent patches at base of second, its hind margin oblique, dorsal edge of next two knifelike. Ventral spine bristly, broad at base and tapering toward apex, mounted in balsam as broad as long. Using width of head as a base, the length of mesonotum ratio is .8, antenna 2.6, ovipositor 2.4, wing 1.1. Length 1.25–2.45 mm. Average of 14 specimens 1.97 mm.

Type.—Cat. No. 27200, U.S.N.M. Type and 5 paratypes. Paratypes in American Museum, Field, and Stanford.

Host.—Quercus garryana.

Gall (fig. 40).—A globular knob on a cylindrical stalk hanging from a vein on under side of leaf in autumn, dropping with the leaf, single or but few on a leaf, covered with a dense short woolly white pubescence which weathers away in old galls. They measure up to 5.5 mm. long by 2.5 mm. in diameter. Monothalamous. The pubescence consists of a dense layer of short brownish hairs like an inner fur at base of the long white hairs. Underneath is a thick brownish stony-hard layer and within a thin layer of light colored tissue in which is the larval cavity.

Habitat.—The type material was collected in Sequoia National Park on September 8, 1922, on the scrubby Kaweah oak above the Cedar Creek checking station on the Giant Forest road. Living flies were cut out of the galls on November 13. The galls were also collected at Fort Jones and Scott Bar, Calif., and at Siskiyou, McLeod, Wolf Creek, Oakland, Cottage Grove, and Salem, Ore. Fresh galls reach their full growth in late July.

XANTHOTERAS TUBIFACIENS, new species

Female.—Dark reddish-brown; face, sides of pronotum, and mesonotum covered with appressed white pubescence. Head coriaceous; from above as broad as thorax, cheeks not broadened behind eyes, occiput slightly concave: from in front facial quadrangle one and three-tenths times as broad as high, malar space .55 eye without groove, antenna 14-segmented, lengths as (scape) 11:6:12:10:9:8:7:7:6.5:6:6:6:5.5:7. Mesoscutum smooth with setigerous punctures,

parapsidal grooves smooth, deep, percurrent, no median. Pits of scutellum pear-shaped, smooth, widely separated, disk smooth in front, rugose behind. Carinae on propodem arcuate, enclosed area smooth, broader than high. Mesopleura smooth, bare. Tarsal claw with a strong tooth. Wing just reaching tip of abdomen, hyaline, pubescent, ciliate, venation normal, brown, second abscissa of radius nine and one-half times first, no areolet, cubitus indistinct. Abdomen longer than head and thorax, length to height to width as 95:79:56; lengths of tergites along dorsal margin as 58:20. 18:9:6:7, second with small pubescent areas at base, ventral spine slender, in side view about eight times as long as broad. Using width of head as a base, the length of mesonotum ratio is 1.0, antenna 2.7, ovipositor 5.4, wing 2.8. Length 1.5–2.35 mm. Average of 100 specimens 1.85 mm.

Type.—Cat No. 27201, U.S.N.M. Type and 39 paratypes. Paratypes in American Museum, Field, Stanford, Harvard, California Academy, and Philadelphia Academy.

Host.—*Quercus garryana.*

Gall (fig. 41).—A convex mass of tubular galls standing side by side in a compact cluster on the under side of the leaf in the fall. The mass measures up to 25 mm. long by 15 mm. wide. The individual galls are easily detached, especially in preserved specimens, white or cream-colored, up to 9 mm. long, tapering gradually from the base to a diameter of about 3 mm. at the distal open end, the distal portion beset with tapering spines which are often rosy at the tip. The single larval cell lies midway of the length of the gall and measures about 2 mm. long by 1.2 mm. in diameter. The tissue of the dried galls is of crystalline hardness so that the insects are unable to chew their way out of preserved specimens.

Habitat.—The type material was collected September 8, 1922, in Sequoia National Park, Calif., just above the Cedar Creek checking station on the road to Giant Forest. At that time the galls contained full-grown larvae. Living flies were cut out of the galls on November 10. These galls were seen just starting to develop at McLeod, Oreg., on July 22. They were also seen at Yreka, Calif., and the Stanford collection has galls from Siskiyou, Oreg.

TRICHOTERAS COQUILLETTI Ashmead

The writer collected galls on *Quercus chrysolepis* at Camp Baldy, June 16, 1918, when they seemed too immature to rear but flies, agreeing with the types, emerged January 15, 1919. In September, 1922, galls were collected in the Santa Ana Mountains (a living fly cut out November 14) and at Idyllwild and adults were cut out on January 23.

XYSTOTERAS VOLUTELLAE Ashmead

This species, the genotype of *Xystoteras*, was described from a single specimen from Manhattan, Kans., from *Quercus macrocarpa*. The type galls are in the National Museum, but the type fly can not be found there, nor did Ashmead return it to Manhattan, as he is known to have done with certain species sent him from there.

The writer has collected galls which agree with the Ashmead types, and reared flies which agree with the original description except that balsam mounts show a tooth on the tarsal claws, which were described as simple. As the type seems to be lost it seems advisable to designate this series of reared flies as neotypes, and to add a few notes on the species to supplement the original description. The galls were collected in October, 1917, at Texarkana, Ark., on *Q. lyrata;* and, when a few were opened on November 21, some contained pupae and others living adults. The flies emerged (out-of-doors at Evanston, Ill.) on February 19, March 20, April 6, May 23, June 14 and 21, 1918. The same galls were seen at Poplar Bluff, Mo., on *Q. lyrata.*

The head from in front is as high as broad, malar space .28 eye with groove, antennal segments as (scape) 10:6:13:9:8.5:8:7:7:7:6.5:6:5.5:5:7. Hind tarsal segments as 22:9:6:5:10 (with claw 15). Lengths of tergites along dorsal curvature as 68:20:19:14:15:10. Ventral spine in side view four times as long as broad. Using width of head as a base the length of mesonotum ratio is .8, antenna 2.5, ovipositor 4.9. Range in length, 1.5–2.2 mm. Average of 100 specimens, 1.88 mm.

Cotypes of this series are in the National, American, and Field Museums, at Stanford, Harvard, and in Philadelphia Academy.

ZOPHEROTERAS COMPRESSA (Gillette)

Acraspis compressus GILLETTE, Bull. Ill. St. Lab. Nat. Hist., vol. 3, 1891, p. 197.

This species was described from two specimens cut from galls. The gall in the Illinois State laboratory is ellipsoidal, 2.7 mm. by 1.8 mm. by 1.8 mm., with a slightly wrinkled brown surface, the wall thin (.2 mm.) and made up of two about equal layers, the outer brown, the inner whitish. Their type fly has been lost. The remaining gall and fly in the Gillette collection have now been deposited in the National Museum. The following may be added to the published description: Malar groove present, hind tarsus shorter than tibia, claws simple. It is a *Zopheroteras.* Never having reared this species, which seems to be distinct from the following, the writer does not recognize the fresh galls in the field.

ZOPHEROTERAS SPHAERULA, new species

Agamic female.—Reddish-brown; antennae infuscated distally, abdomen posteriorly black. Head coriaceous; from above much broader than thorax, length in axial line to breadth as 18:55, occiput concave, cheeks ample but scarcely broadened behind eyes; from in front broader than high, facial area one and nineteen hundredths times as broad as high, malar space .3 eye with shallow groove, antenna 14-segmented, length as (scape) 15 (width 8) :7(6) :20(4.5) :15: 13:12:11:10:9:9:8:8:7:12(5). Sides of pronotum coriaceous and protruding. Mesonotum coriaceous. Mesoscutum .49 width of head with two distinct percurrent grooves well separated behind, with a hump behind middle when seen in profile. Scutellum reaching .6 way back to petiole with a large smooth deep laterally bounded pit at base in which is a slight septum, the disk narrow, elevated, and somewhat pointed behind when seen from above, rounded and knoblike in profile. Sides of metanotum almost horizontal. Carinae on propodeum curved outward, well separated above, enclosing the base of the reticulate neck. Mesopleura coriaceous. Wings wanting. Legs well developed. Hind tibia longer than tarsus, whose segments are as 33:11:8:6:13, claws large, simple. Abdomen large, attached to thorax near end of its short axis so that in side view it is elliptical in outline and obliquely placed, length to height to thickness as 39:29:15, lengths of tergites along dorsal margin as 16:7:5:5:4:1, dorsal edge knifelike behind second. Ventral valves oblique, tips exserted, tip of ovipositor strongly curved. Ventral valve slender, tapering, horizontal, in side view five times as long as broad. Using width of head as a base the length of mesonotum ratio is .7, antenna 3.0, ovipositor 7.1. Length, 2.0–3.5 mm. Average of 75 measured specimens, 2.44 mm.

Type.—Cat. No. 27202, U.S.N.M. Type and 29 paratypes. Paratypes in American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Host.—*Quercus maxima*, red oak.

Gall.—Spherical or slightly ellipsoidal, not depressed, found in fall on both upper and lower surface of leaf attached to a vein, singly or 3–4 in a row, about 3 mm. in diameter, greenish or yellowish-green often tinged with red above, dropping to the ground before the leaves. Monothalamous, fleshy, apparently solid when fresh, the larval cavity scarcely visible.

Habitat.—Type locality, Evanston, Ill. The galls were also seen at Wilmette, Ravinia, and Moline, Ill.; Medina, N. Y.; and at Bluemont, Va.

Biology.—Galls collected on ground under two large forest trees on the bank of the Chicago River four miles west of Evanston on

October 8, 1916, contained pupae when examined September 17, 1917, and adults November 16, 1917, which emerged in numbers and were found alive in out-of-door breeding cage on March 13, 1918, others emerging before April 6.

KEY TO SPECIES OF ZOPHEROTERAS

1. Parapsidal grooves very indistinct especially posteriorly_____ 2
   Parapsidal grooves distinct and percurrent_____ 3
2. Carinae meeting above to form an arch below upper margin. Scutellum from above slightly pointed behind. Head slightly broadened behind eyes. Facial area one and fifty-six hundredths times as broad as high. Mesoscutum in profile showing hump behind_____ **compressa** (Gillette).
   Carinae widely separated at margin above. Scutellum rounded behind. Head not broadened behind eyes. Facial area one and thirty-seven hundredths times as broad as high. In profile the arch of mesoscutum is low and curvature uniform_____ **hubbardi** (Ashmead).
3. Mesoscutum, sides of pronotum, disk and mesopleura almost smooth. Mesoscutum in profile without hump behind. Body red___ **vaccinii** (Ashmead).
   Above parts distinctly coriaceous. Mesoscutum in profile with hump behind. Abdomen largely black_____ **sphaerula** Weld.

ACRASPIS ERINACEI (Beutenmueller)

The hedgehog galls of the agamic generation have been collected at Waterport, Syracuse (Crosby), and Ithaca, N. Y.; Elyria, Ohio; Porter, Ind.; Winnetka, Evanston, Glen Ellyn and Moline, Ill., Bluemont, Va., and Washington, D. C. At St. Louis, Mo., flies emerged December 4, 5, 23, 25, and January 3. Brodie found galls just starting at Toronto on June 28 and adults began to emerge October 20, 1886, and in 1892 they emerged October 24–28. In 1887 the galls were exceedingly abundant and he reared several thousands of the wingless flies without finding a male. In the Chicago area pupae were found inside the galls on September 8, 1906. On November 1, 1908, a cool day when scattered flakes of snow were flying, flies were emerging and observed ovipositing in the buds. Most of the leaves were still on the trees and they had only to crawl down the petioles to the terminal cluster of buds. Brodie found the galls everywhere common about Toronto on second growth trees, appearing about the last of June and falling with the leaves, the producers beginning to emerge November 20, in 1886, and from October 24–28, in 1892, not surviving the winter. He bred several thousand producers without finding a male.

The galls of the sexual generation of this species are thin and brittle-walled, whitish, blister-like swellings on the inner or concave face of some of the outer or lower bud-scales in the buds of the terminal cluster on *Quercus alba* in early spring. They are not usually visible until the buds have opened and the insects have escaped.

The easiest way to rear the flies is to locate a tree in the fall well-infested with the hedge hog gall and from this tree gather twigs in the spring just before the buds start, putting them in a bottle of water and setting the whole in a battery jar with a cloth over the top. The galls are common in the Chicago area, having been collected at Winnetka, Glencoe, and Willow Springs, Ill., and Miller, Ind. In 1909 adults issued May 17. In 1913 pupae were found in the galls on April 28 and adults issued May 1–20. At Washington an adult emerged May 6, 1924.

ACRASPIS HIRTA (Bassett)

Galls agreeing with the Bassett types on rock chestnut oak were collected on *Q. montana* at Storm King (M. D. Leonard), and Ithaca, N. Y., and at Bluemont, Va. They are found in September and October. No adults reared. Probably emerge in late fall.

ACRASPIS MACROCARPAE Bassett

Galls of this species on *Quercus macrocarpa* are here recorded from Evanston, Winnetka, Libertyville, Glen Ellyn, Fountaindale, and Moline, Ill. They contained pupae early in September, and living adults were cut from galls the last week of the month. Some emerged naturally November 14. From galls collected at Medina, N. Y., an adult emerged before December 5. Galls were seen also from Corinth, Iowa (C. Barracks); Cedar Point and Holton, Kans. Brodie collected galls at Toronto and producers emerged November 9–14, 1885, November 15–30, 1892, November 9, 1893, all apterous fertile females.

ACRASPIS PEZOMACHOIDES (Osten Sacken)

This species is here recorded from following localities: Medford and Pitman, N. J.; Syracuse (Crosby) (contained adults Sept. 30), Manorville (Crosby), Riverhead (Crosby), N. Y.; Falls Church, Va., Washington, D. C. (contained pupae September 19 and adults October 20), River Junction, Fla., Texarkana, Ark., Ironton and Poplar Bluff (cut out adults November 16), Kimmswich, Mo. Adults probably emerge in late November or early December.

ACRASPIS VILLOSA Gillette

Galls of this species were collected at Evanston and Winnetka, Ill., where living adults were cut out of the galls on November 1; and at Medina, N. Y., where pupae were found August 24 and September 4 and adults were cut out early in October. Professor Dudley collected galls on the shores of Seneca Lake, preserved in Cornell collection.

ACRASPIS GUADALOUPENSIS (Fullaway)

Callirhytis guadaloupensis FULLAWAY, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 363, pl. 23, fig. 4.

Because of the rudimentary wings and the structure of the ventral spine this species is here transferred to *Acraspis*, although the wings are not reduced so much as in the eastern species of the genus, the mesonotum consequently being more robust, broader, and not so pointed behind. The galls are of a different type from those of the eastern species. The thin round disk-shaped galls are widely distributed in California on *Q. chrysolepis*. The writer has collected them at Idyllwild, in the San Bernardino, San Gabriel, and Santa Lucia Ranges, on Mount Diablo, in California Redwood Park, in Sequoia National Park, at Los Gatos, Calistoga, Ukiah, Shasta, Baird and Scott Bar, and at Canyonville, Oreg. The date of emergence is unknown but from galls collected in late September, living flies were cut out November 9.

What seem to be the same galls were collected on *Q. wilcoxii* in the Santa Catalina Mountains in Arizona.

ACRASPIS INSOLENS, new species

Agamic female.—Reddish-brown, more or less infuscated, abdomen black; face and thorax covered with appressed white pubescence. Head coriaceous, becoming rugose around mouth; from above broader than thorax, cheeks broadened behind eyes, occiput concave; from in front nearly circular in outline, facial quadrangle 1.1 times as broad as high, malar space nearly .4 eye without groove, antenna filiform, 14-segmented, lengths as (scape) 10:6:15:12:11:10:9:8:7:7:6:6:5:11. Mesoscutum broader than long, smooth with setigerous punctures, parapsidal grooves extending over one-half way, no median. Scutellum with smooth transverse groove at base bounded laterally, disk rugose behind, its sides bounded by diverging straight lines. Carinae on propodeum short, arcuate, not prominent, neck large, rugose. Mesopleura smooth. Hind tarsus as long as tibia, its segments as 26:12:7:5:18 (with claw 24), claw with a strong tooth. Wing reaching or slightly surpassing tip of abdomen, subhyaline, pubescent, ciliate, veins brown, first abscissa of radius straight, second strongly curved, free part of subcosta represented by a cloud, areolet and first abscissa of radius faint. Abdomen longer than head and thorax, truncate behind, length to height to width as 92:70:50, lengths of tergites along dorsal margin as 45:14:9:5:5:12, second pubescent at base, its hind margin at right angle to long axis of abdomen; ventral valves oblique, scarcely protruding; ventral spine hairy, short and broad, rounded at end. Using width of head as a base the length of mesono-

tum ratio is 1.1, antenna 2.7, ovipositor 2.8, wing 2.3. Length 2.0–2.6 mm. Average of 5 specimens 2.3 mm.

Type.—Cat. No. 27203, U.S.N.M. Type and one paratype. Paratypes at American Museum, Field, and Stanford.

Host.—Quercus chrysolepis.

Gall (fig. 42).—Somewhat wedge-shaped, hanging singly or in small numbers from the under surface of the leaf in the fall. The galls measure up to 10 mm. long by 5 mm. wide by 3 mm. thick, concave on the two broad sides, deeply grooved around the edge, nearly the color of the leaf, the flanges often reddish. The larval cavity is placed transversely at the apex of the gall and from it a long cavity runs up the center of the gall toward the pedicel.

Habitat.—The type material was collected September 21, 1922, near Idyllwild, Calif., on the slopes of Taquitz peak in the San Jacinto Mountains. Living adults were cut out of the galls on November 11.

ACRASPIS PATELLOIDES, new species

Agamic female.—Head and thorax yellowish-brown, antennae, tibiae and tarsi, median region of head from ocelli to clypeus, between anterior lines and disk of scutellum darker, abdomen reddish-brown to black. Head and thorax with dense appressed pubescence. Head granulate, broader than thorax, cheeks broadened behind eyes, occiput concave, malar space one-half eye without groove, antenna 14 segmented, lengths as (scape) 14:6:18:16:13:12:11:10:9:8:7:6:6:12. Mesoscutum broader than long, covered with setigerous punctures, parapsidal grooves incomplete. Disk of scutellum finely rugose, sloping and slightly pointed behind, an indistinct arcuate groove at base without pits. Carinae on propodeum arcuate but weak. Tarsal claws with a strong tooth. Wing reduced, reaching about to tip of abdomen, subhyaline, pubescent, ciliate, veins brown, second abscissa of radius faint, no areolet. Abdomen longer than head and thorax, length to height to width as 32:25:16, lengths of tergites along dorsal margin (knife-edged back of second) as 56:20:17:9:4:14, second pubescent on sides, exposed parts of tergites 3–6 aciculate ventrally, tuft of hair on sheath over ventral valves, ventral spine short, broad, rounded at end, bristly. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 2.6, ovipositor 2.6, wing 2.7. Lengths of four pinned specimens 2.7, 2.75, 2.0, and 2.95 mm.

Type.—Cat. No. 27204, U.S.N.M. Paratypes in Field and Stanford museums.

Host.—Quercus chrysolepis.

Gall (fig. 43).—Trotter described and figured the gall under the name *?Andricus patelloides*[2] in 1911. The galls are solitary or in groups of but two or three on under side of leaf. The underside is bowl-shaped, sessile, the top flat with a deep depression in center, measuring up to 13 mm. in diameter by 7 mm. high. When growing they are gray green like the leaf with a red line around the rim, maturing to a surface which in color and texture resembles that of an old and polished bone. The larval chamber, 2.9 mm. by 1.5 mm. lies transversely under the central depression and the exit hole is made through the thin roof into the bottom of this depression. Under the larval chamber a median cavity reaches to the point of attachment. The walls consist of dense brittle cellular tissue which, near the exterior, becomes more compact and forms a very hard thin peripheral layer.

Habitat.—The types are from galls collected September 7, 1922, in Sequoia National Park, Tulare County, Calif. The two living flies were cut out of the galls November 10. A paratype in balsam is from Idyllwild in the San Jacinto range and others are from Kern County galls collected October 23, 1892 (U. S. D. A. 5527), the adults emerging November 26, 1892. The writer collected the galls at Camp Baldy (Hopkins U. S. 15614*d*) and at Kyburz.

PHILONIX GIGAS Weld

In the paragraph on habitat in the original description of the species the following biological data were omitted. The galls were collected October 10, 1917, when some already contained pupae. A few adults were cut out of galls on November 16 and the rest of the galls put in an out-of-door breeding cage at Evanston, Ill. Here eight adults issued by December 1, and on December 18 three more living adults were found in the cage, the thermometer having registered −14° F. in the interval. Others issued early the next spring. The emergence must be distributed over at least two or three seasons, for normal larvae were found when the last of the galls were cut open December 2, 1919.

PHILONIX NIGRA (Gillette)

This species is here recorded from Evanston, Glencoe, Glen Ellyn, and Fountaindale, Ill.; Manistee, Mich.; Porter, Ind.; Kimmswick, Ironton, and Poplar Bluff, Mo.; Corinth (C. Barracks), Iowa; Nebraska City, Nebr.; Tuskahoma, Okla.; Marianna and River Junction, Fla.; Bluemont, Va.; Ithaca, Riverhead (C. R. Crosby), and New York City (Beutenmueller), N. Y. From galls collected at

[2] Boll. Laboro. Zool. Portici, vol. 5, p. 106, fig. 6, and Marcellia, vol. 10, 1911, p. 35, fig. 6.

Glencoe under a tree of *Q. alba* in October, 1916, two adults issued November 23 and five before December 11, 1916; about twenty-five emerged November 1–19, 1917 (one more was found alive in cage February 19, 1918); two December 2, 1919, the emergence being distributed over three seasons but beginning the first fall. An adult, determined as this species, was captured at Washington, D. C., December 9, 1923, by H. S. Barber. Brodie collected galls at Toronto October 10, 1886, and reared adults November 24, 1888. He collected others December 1, 1887, and reared adults November 24, 1888. From other galls gathered in December, 1896, the first emergence of the apterous females was on April 17, five months from collection of the galls and the last emergence was November 10–16, 1899.

A similar gall occurs on *Q. muehlenbergii* at Holton and Manhattan, Kans.

CYNIPS DIMORPHUS Beutenmueller

The type flies of this species are said to have emerged in the spring from galls collected the preceding year. In the fall of 1914 the writer collected galls at Highland Park, Ill., and reared adults on April 20 and 25, 1916. On October 1, 1916, some of the galls in the cage were opened and living flies found which would have emerged in the spring of 1917 but some of the largest galls still contained larvae which would not have transformed until the fall of 1917 and not have emerged as flies until at least as late as 1918. Thus the emergence does not seem to begin until the second spring and is distributed over at least three seasons.

The writer adds the following localities for the species, based on the observation of the galls on *Q. macrocarpa*, except when otherwise stated: Bluemont, Virginia, on *Q. alba;* Washington, D. C., on Q. *alba* and *Q. montana*; Forth Worth, Tex.; Ithaca, N. Y.; Cedar Point and Holton, Kans.; Nebraska City, Nebr.; Walnut Grove and Becker, Minn.; Wilmette, Winnetka, Glen Ellyn, Glencoe, and Moline, Ill. William Beutenmueller writes that the galls were very common at Highwood, N. J., in the fall of 1922.

CYNIPS HELDAE Fullaway

The original description gave no indication on what part of the plant the galls of this species are produced (the types are detached specimens). The writer has collected the galls at Chico, Lakeport, and Bartlett Springs, Calif. They are stem galls attached in clusters to the drooping branches of large trees. In August they were full grown but too immature for rearing, and in May only empty galls were seen. A. W. Gambs, of Cottonwood, in Shasta County, collected galls in January from which some flies had escaped, and others were still engaged in chewing their way out on January 23. About half of the galls still contained full-grown larvae.

CYNIPS MACULOSA, new species

Female.—Red, tips of antennae and abdomen darker; whole body except abdomen dorsally covered with silky yellowish-white pubescence. Head from above narrower than thorax, cheeks broadened behind eyes, occiput concave; from in front facial quadrangle nearly one and one-half times as broad as high, malar space half eye without groove, antenna filiform, 14-segmented, lengths as (scape) 15:8:25:21:18:17:13:12:10:9:9:8:8:12. Mesonotum smooth with setigerous punctures, parapsidal grooves deep, narrow, percurrent, no median. Sides of disk bounded by diverging straight lines, transverse groove at base. Usual carinae on propodeum wanting, neck rugose. Mesopleura smooth. Tarsal claws with a tooth. Wing subhyaline, with two clouds and many small spots, pubescent, ciliate, first abscissa of radius angulate, second curved upward distally and enlarged at apex but not reaching wing margin, areolet reaching one-seventh, cubitus five-sevenths way to basal, apical cell with about 13 small spots, mostly round, one or two elongated as though two spots had fused and in the base of the cell a cloud underneath an elongated spot; under the areolet in the discoidal cell a larger cloud and six or seven fainter spots. Abdomen longer than head and thorax, length to height to width as 44:31:31, lengths of tergites along dorsal curvature as 31:9:5:3:2:6, hind margin of second very oblique, ventral spine truncate, very broad with lateral lobes, bristly. Using width of head as a base, the length of mesonotum ratio is 1.4, antenna 2.2, ovipositor 2.8, wing 4.5. Length 3.1–4.3 mm. Average of 22 specimens, 3.79 mm.

Type.—Cat. No. 27205, U.S.N.M. Type and 9 paratypes. Paratypes in American Museum, Field, and Stanford.

Host.—Quercus dumosa.

Gall (figs. 11 and 44).—Globular, 5–7 mm. in diameter, attached by a short stout stalk to the midrib on the underside of the leaf in the fall. Greenish, mottled with white while growing, turning brown as they mature, a very thin papery epidermal layer becoming loosened and peeling off in fragments in old specimens. Inside is a darker stony-hard shell one-half millimeter in thickness, and within this a single larval cell supported by dense radiating fibers.

Habitat.—The type material was collected in Sequoia National Park, Calif., on September 9, 1922, between the western gate and the Cedar Creek checking station, on the Giant Forest Road. Some of the galls were still green and others turning brown. At that date they contained full-grown larvae, which pupated about October 1. The living flies were cut from the galls on November 10. The galls were also seen at Los Gatos and Lakeport and Ukiah. H. Morrison collected galls on Black Mountain, San Mateo County, in December.

1910, and reared an adult the next summer. Koebele collected galls in the Santa Cruz Mountains and others in Sonoma County.

CYNIPS MIRABILIS Kinsey

The writer collected galls of this species at Victoria, British Columbia; on San Juan Island, at Tillicum and Shelton, Wash.; at Albany, Corvallis, Eugene, Odell, Cottage Grove, Oakland, Canyonville, Wolf Creek, Kirby, Holland, McLeod, and Siskiyou, Oreg.; at Yreka, Fort Jones, Scott Bar, and Sequoia National Park, Calif. The National Museum has galls from Grants Pass and Goble (E. J. Perkins), Oreg., and O. J. Murie collected galls at Cottage City.

The young galls may be found in early July, becoming full-grown in August; they contain pupae in mid-September and the writer cut out living adults from the dry galls on November 10, January 13, and February 14. The forest-insect collection has flies from Ashland, Oreg., which emerged November 6 and April 1.

CYNIPS NIGRICENS Gillette

This species was described from Iowa and Michigan. The writer has found the galls at Bluemont, Va.; at Ironton, Mo.; and they were fairly common in the Chicago area, having been taken at Evanston, Wilmette, and Kenilworth, Ill. They start to develop about Chicago about August 1 and begin to drop late in September. They are much distorted in shape by mutual pressure in the cluster and inside the larval cavity is scarcely visible in the thick nutritive layer. During the winter on the ground the galls change shape, becoming plumper. From galls collected at Ironton in fall of 1917 adults issued April 11 and May 1, 1920.

The fly is described as having 13-segmented antennae. William Beutenmueller, who has seen the type, writes me that this is evidently a mistake. Flies he has reared and those I have reared all have the antennae 14-segmented. A fly from Algonquin, Ill., April 16, 1896 (Nason), determined by Gillette as "*Cynips nigricens*," has 14-segmented antennae.

CYNIPS PLUMBEA, new species

Female.—Red, slightly infuscated on anterior and lateral lines, ocelli and eyes black. Head coriaceous above, face pubescent; from above transverse, cheeks broadened behind the eyes; from in front facial quadrangle one and one-fourth times as broad as high, malar space .4 eye without groove, antenna filiform, 13-segmented, lengths as (scape) 16 (width 10) : 9(7) : 32(6) : 26 : 21 : 18 : 14 : 12 : 10 : 9(6.5) : 8 : 8 : 16, last with incomplete transverse groove on one side below middle. Sides of pronotum smooth, pubescent. Mesoscutum shin-

ing, granulate in front smoother behind with indistinct setigerous punctures, parasidal grooves deep, narrow, no median, hind margin arcuate. Scutellum disk finely rugose, its sides halfway back bounded by diverging carinae, no pits at base. Neck of propodeum rugose, the outwardly curved carinae discontinuous and branched. Mesopleura smooth, pubescent. Hind tarsus .7 as long as tibia, claws with a tooth. Wing hyaline, pubescent, ciliate, veins yellowish, first abscissa of radius angled and clouded, second nearly straight and enlarged near wing margin and parallel with it a linear cloud in upper third of third cubital cell and a shorter, less distinct one in lower third, both pointing toward the areolet. In some specimens these clouds are missing, especially in specimens cut from gall and killed at once. Areolet reaching one-sixth way to basal, cubitus reaching basal. Abdomen longer than head and thorax, length to height to width as 42:30:25, lengths of tergites along dorsal curvature as 36:8:5, hind margin very oblique, sides of all the tergites covered with white pubescence, ventral spine short, broad, rounded at end, bristly. Using width of head as a base, the length of mesonotum ratio is 1.3, antenna 2.4, ovipositor 1.9, wing 4.6. Length, 2.7–4.65 mm. Average of 102 measured specimens, 3.67 mm.

Type.—Cat. No. 27206, U.S.N.M. Type and 49 paratypes. Paratypes at American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Host.—*Quercus oblongifolia, arizonica*.

Gall (fig. 12).—Globular, 8–11 mm. in diameter, produced singly in the fall on the under side of leaf saddled on midrib. Lead color when fresh with a whitish bloom that easily rubs off and leaves a shining surface. Green or rosy on one side when growing, tan-colored when old. Monothalamous, the larval cavity surrounded by a wall about one-third the diameter of gall thick.

Habitat.—The type is selected from a series of 46 flies from galls on *Q. oblongifolia* collected November 27, 1917, by Hofer and Edmonston in Esperara Canyon (East) in the Santa Catalina Mountains, Ariz., the flies emerging December 14, January 8 and 25 (Hopkins U S. No. 13687*b*). One paratype is from Santa Catalina Mountains (Hopkins U. S. No. 13643*s*) reared November 22, 1915, M. Chrisman, collector; six are from galls on *Q. oblongifolia* collected by the writer in the Santa Rita Mountains December 7, 1921, when the galls contained pupae. The flies emerged January 12, 13, and February 3, 4. Forty-eight are from galls on *Q. arizonica* collected at Oracle on December 17, 1921 (Hopkins U. S. No 15639*b*), the flies emerging December 30, January 24, and February 6. One is from the Chiricahua Mountains, cut out of a gall on *Q. arizonica*

on November 24 and it lived in a pill-box until January 1. Galls have been observed at Nogales and in the Mule, Huachuca, Patagonia, and Tumacacori Mountains.

CYNIPS STROBILANA Osten Sacken

Galls of this species were collected on *Quercus bicolor* at River Grove and New Lenox, Ill.; at Ironton, Mo.; and at Great Falls, Va. They were found on *Q. macrocarpa* at Algonquin, Ill., at Fort Worth, Tex., and Miss Howe collected them at Ithaca, N. Y. William Beutenmueller writes that they were very abundant in the fall of 1922 at Highwood, N. J. Galls collected in Chicago area November 1, 1914, then contained a few adults as well as larvae. When opened April 24, 1916, larvae and living flies were found in about equal numbers. It is inferred that some flies emerge each spring for at least three seasons and Packard records finding an adult and a pupa in galls six years old. Galls were collected on *Q. lyrata* at Poplar Bluff, Mo., and at Hoxie and Texarkana, Ark., in November, 1917, when the fresh galls were almost solid and cut like cheese and the old galls contained pupae or adults which emerged and died in breeding cage before the middle of the next May.

CYNIPS SULCATA Ashmead

Described from "live oak" from Fort Grant, Ariz., the writer has collected galls and reared flies which agree with the Ashmead types from *Quercus arizonica*, *oblongifolia*, and *reticulata*. The Ashmead type galls seem to be on *Q. arizonica*. Galls on *arizonica* collected December 17 at Oracle contained pupae, adults emerging April 1–27. Galls from the Mule Mountains contained adults and pupae on January 13, flies emerging April 25. Adults emerged April 16–26 from galls collected in the Chiricahua Mountains. Galls from the Tumacacori Mountains gave flies March 8, April 6 and 26. In the Santa Rita Mountains on December 7 galls on *Q. oblongifolia* were greenish or if in the sun mottled with pink and just beginning to harden, containing full-grown larvae. Living flies were cut out on February 4. Galls were observed at Prescott, Nogales, Bisbee, and Patagonia.

CYNIPS WASHINGTONENSIS Gillette

The species was described from one specimen from Olympia, Wash., from *Q. garryana*. McCracken and Egbert reported it on *Q. lobata*, *dumosa*, and *durata*. The writer has collected galls on all these hosts and on *Q. douglasii* also as follows: on *Q. garryana* at Shelton and Tillicum, Wash., at Odell, Albany, Corvallis (adults nearly all emerged by August 24, 1916), Cottage Grove (some in pupa state July 18), Oakland, Wolf Creek, Holland, and Siskiyou.

Oreg., at Scott Bar and Yreka, Calif.; on *Q. lobata* at Chico (adult emerged after August 20), Ukiah, Cloverdale, Calistoga, St. Helena, Santa Rosa, Stockton (adult cut out August 29), Three Rivers, Palo Alto (contained adults August 16), Los Gatos, and Santa Margarita, Calif.; on *Q. dumosa* at Ukiah, Lakeport, St. Helena, Cloverdale, Palo Alto, Los Gatos, Paraiso Springs, Jolon, Paso Robles, Santa Margarita, Ojai, Liebre Summit on Ridge boulevard, in Santa Barbara National Forest, Bagby, Camp Baldy, San Bernadino Mountains (flies emerging September 30), San Jacinto Mountains (contained adults September 2), Santa Ana Range (contained adults September 18), and on Santa Catalina Island; on *Q. durata* at Bartlett Springs, Cloverdale, St. Helena, and Los Gatos; on *Q. douglasii* at Shasta, Red Bluff, Oroville, Placerville, Bagby, Three Rivers, Ukiah, Lakeport, Calistoga, St. Helena, Palo Alto, Los Gatos, Paraiso Springs, Bradley, and Lebec.

CYNIPS WELDI Beutenmueller

After the description of this species in 1918 more flies issued from the original lot of galls (collected in fall of 1914) on March 24 and April 10, 1919. The next spring the cage was not examined until May 1, when molded flies were found that probably emerged some weeks earlier. This makes it certain that the emergence of the species was distributed over at least five seasons and probably six. In addition to the published data on distribution, the writer has seen galls at Washington, D. C.; Bluemont, Va.; Marianna, Fla.; Texarkana, Ark.; Ironton and Poplar Bluff, Mo.; Porter, Ind.; and in Illinois at Evanston, Fort Sheridan, Lake Forest, Glen Ellyn, and Moline. Prof. C. R. Crosby collected galls at Syracuse and Riverhead, N. Y. Galls collected at Moline in fall of 1914 gave flies April 24, 1916. Galls collected at Glencoe in fall of 1916 gave flies March 23, 1918, and more March 24, 1919. Galls collected at Ironton in fall of 1917 gave flies March 20 to April 11, 1919, and more April 11, 1920. Brodie collected galls at Toronto in October, 1892, and found larvae alive in the galls May 24, 1894, but failed to rear the maker. Another lot collected at the same time he buried in the earth in a flower pot, and when dug up April 10, 1895, after 30 months, the galls were in good condition, with living larvae inside.

ANDRICUS ACICULATUS Beutenmueller

The galls of this species, described from *Q. stellata*, have been collected from two other host oaks, *Q. durandii* and *lyrata*, at Poplar Bluff, Mo.; Hoxie and Texarkana, Ark.; Trinity, Houston, Wharton, Cuero, Austin, Boerne, and College Station, Tex. From galls collected on *Q. lyrata* at Poplar Bluff in November, 1917, flies had

emerged by June 1, 1918. Galls at Hoxie on *lyrata* contained pupae November 16, and adults emerged at Evanston, Ill., May 16–20. On the twigs the old galls may be found from which the wool has weathered away, leaving a hard woody mass with exit holes in.

ANDRICUS ALBOBALANI, new species

Female.—Black, abdomen, legs and base of antenna red. Head from above transverse, broad as thorax, broadened behind eyes; from in front transversely elliptical, malar space one-half eye, with fan ridges, antennae 14-segmented, lengths as (scape) 12 (width 5) : 7(4) : 12(3.5) : 11 : 10 : 9 : 8 : 7.5 : 7 : 7 : 7 : 6.5(4.5) : 6 : 7(4). Thorax covered with appressed whitish pubescence. Mesoscutum broader than long, rugose, parapsidal grooves narrow, deep and smooth behind, becoming lost in sculpture anteriorly, no median. Disk rugose with two incompletely closed and separated pits at base. Carinae on propodeum bent outward enclosing a smooth area broader than high. Polished spot on mesopleura. Hind tarsus shorter than tibia, its segments as 24 : 11 : 7 : 5 : 12, claws weak, bidentate. Abdomen equal to head and thorax, length to height to width as 30 : 24 : 17, second and third tergites showing dorsally in proportion of 22 : 10, second with pubescent patches at base, ventral valves protruding, ventral spine tapering, in side view five times as long as broad, slightly hairy. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 1.9, wing 3.5, ovipositor 2.4.

Range in length, 2.2–2.9 mm. Average of five, 2.6 mm.

Type.—Cat. No. 27207, U.S.N.M. Type and one paratype. Paratypes at American Museum, Field, and Stanford.

Host.—*Quercus dumosa.*

Gall (fig. 45).—A single non-separable cell developed in the wall of acorn toward its base. Affected acorns are undersized, lopsided, firmly fastened in cup and remain on tree. Sometimes two in an acorn. Exit hole in wall of acorn near apex. Found in fall and winter.

Habitat.—Type locality, Boulevard, Calif., where affected acorns were collected on March 2, 1922, and seven living adults cut out. Transformation probably occurs in the fall and emergence in the spring. The finding of larvae in a few of the galls in March indicates that some individuals hold over and emerge the second spring. Similar galls were seen on the same oak at Descanso, Paraiso Springs, Los Gatos, St. Helena, and Lakeport.

ANDRICUS BICONICUS, new species

Female.—Black; mandibles, antennae, parts of legs brownish; abdomen reddish below. Head finely coriaceous with setigerous punctures, face pubescent; from above transverse, as broad as thorax,

occiput concave, cheeks broadened behind eyes; from in front widest above level of antennae, facial area one and six-tenths times as broad at high, malar space half eye with fine radiating ridges on either side of clypeus, antennae 13-segmented, length as (scape) 18 (width 7) : 9 (5) : 21 : 15 : 12 : 10 : 8 : 8 : 8 : 7 : 7 : 7 : 12 (6). Thorax sparsely pubescent, bare spot on mesopleurae and between parapsides behind. Pronotum with denser white pubescence, parallel ridges on sides. Mesoscutum coriaceous, the setigerous punctures not prominent, parapsidal grooves narrow, smooth, not quite reaching pronotum, separation behind four times width of groove, lateral lines smooth, anterior indistinct. Scutellum pubescent, rugose, the two widely separated pits at base opening out on to disk behind. Carinae on propodeum almost straight, bent in above and out below, enclosing area as high as broad. Tarsal claws with a tooth. Wing hyaline, pubescent, ciliate, veins beyond second cross-vein pale, second abscissa of radius angled, areolet reaching one-fifth way to basal, cubitus indistinct. Abdomen shorter than head and thorax, length to height to width as 29 : 28 : 18, lengths of tergites along dorsal curvature as 80 : 20 : 7 : 1 : 0 : 12, second with hairy patches at base, ventral valves oblique but scarcely protruding, ventral spine tapering, in side view five times as long as broad, nearly horizontal. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 1.7, ovipositor 3.1, wing 3,6. Length, 2.5–3.75 mm. Average of 200 measured specimens, 3.19 mm.

Type.—Cat. No. 27208, U. S. N. M. Type and 89 paratypes. Paratypes in American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Host.—Quercus stellata.

Gall (fig. 13).—Cluster at base of petiole of leaf in autumn. The clusters consist of as many as 20 individual galls which are closely packed, the basal half of each more or less distorted by mutual pressure. The individual galls are spindle-shaped, with pyramidal base and conical apex, up to 8 mm. long by 5 mm. in diameter, brownish, covered with stellate hairs, dropping when mature. Monothalamous, consisting almost entirely of nutritive material in which a larval cavity is scarcely evident when the galls drop. When the larvae finish feeding the wall left is only about 0.2 mm. thick. Diameter of exit hole 1.2 mm. This is the gall described by Wells.[3]

Habitat.—The types were reared from galls collected in fall and winter of 1919 at Denton, Tex., by R. L. Marquis (Hopkins U. S. No. 10767*c*[1]). A gall opened on November 7, 1920, contained a pupa which transformed November 12 and adults issued (at Washington) before March 12, 1921.

[3] Psyche, vol. 28, 1921, p. 44, fig. 27.

Galls have been collected at Poplar Bluff and Ironton, Mo.; Hoxie, Little Rock, Hot Springs, and Texarkana, Ark.; Palestine, Houston, Cuero, Boerne, College Station, and Arlington, Tex.; Tallahassee, Fla.; East Falls Church, Va.; Washington, D. C.

ANDRICUS CASTANOPSIDIS Beutenmueller

The writer collected galls on Mount Tamalpais, August 6, 1915. Some had already dropped to the ground. The growing galls are of a rosy-red color, fading to yellowish and tan as they mature. These galls were kept in a breeding cage out-of-doors and living flies were cut out of some August 13, 1917, while others still contained larvae. The collection at Stanford has flies which emerged July 7. Galls from Truckee were sent to the writer, collected by L. E. Hildebrand, September 10, 1915. A dead fly was found in the cage in August, 1918, and some of the galls still contained larvae. The emergence may be delayed evidently until as late as the fourth spring in some cases. Dr. E. C. Van Dyke sent galls from Inverness, in Marin County, and the National Museum has galls from Placer County. The writer saw the galls in California Redwood Park, on the Martis Peak trail at north end of Lake Tahoe, on Mount St. Helena in Lake County, and they were very common in the fall of 1922 on Taquitz Peak in the San Jacinto Mountains. Old galls were seen on top of the mountain above Siskiyou, Oreg. Prof. W. L. Jepson collected galls at Monterey and in Mendocino County.

ANDRICUS CHINQUAPIN (Fitch)

Figites chinquapin Fitch, 5th Rept. Nox. Ins. N. Y., 1859, p. 820.
Cynips fusiformis Osten Sacken, Proc. Ent. Soc. Phila., vol. 1, 1861, p. 61.
Cynips capsula Bassett, Canad. Ent., vol. 13, 1881, p. 101.

The two type galls of *chinquapin* in the National Museum from *Q. prinoides* are similar to those of *capsula* from *Q. bicolor* (another chestnut oak) and the two type flies of *capsula* sent by Bassett can not be separated from Fitch's type fly which, however, lacks the abdomen.

The holotype of *fusiformis* in the Museum of Comparative Zoology has not been compared directly with the above types but flies bred from the precisely similar gall on *Q. alba* can not be separated from them and the writer concludes that these three names all refer to one species making galls on different white oaks. This view has also been expressed by William Beutenmueller in letter.

The writer has taken the gall on *Q. montana*, rock chestnut oak, at Ithaca, N. Y.; Alexandria and Great Falls, Va.; Washington, D. C., where a fly ready to emerge was cut out of gall on May 31. On *Q. alba* at Evanston, New Lenox, (fly emerged June 7), and Fort

Sheridan, Ill.; Ironton, Mo.; Falls Church and Rosslyn, Va.; Plummer Island, Md.; Washington, D. C. Barlow collected them at Cadet, Mo., Miss Howe at Ithaca and Crosby at Farmingdale, N. Y. On *Q. bicolor* common at Wilmette and Evanston, Ill., where flies emerged June 15–23, 1909, and June 10–16, 1912. At Washington galls contained pupae May 6, 1914. These galls have also been seen on *Q. macrocarpa* at Winnetka, Ill. and on *Q. stellata* at Rosslyn, Va.

ANDRICUS CHRYSOBALANI, new species

Female.—Red, distal part of antenna and posterior portion of abdomen infuscated. Head broad as thorax, broadened behind eyes, malar space five-eighths eye with fan striae, antennae 13-segmented, lengths as (scape) 12(width 5) : 7(4) : 10 : 12 : 11 : 11 : 10 : 9 : 8 : 8 : 8 : 7.5 : 14(4.5). Sides of pronotum coriaceous, mesoscutum finely rugose, parapsidal grooves percurrent, faint median line extending to parallel lines. Disk coarsely rugose except for a finely rugose area behind the pits. Carinae on propodeum parallel. Hind tarsus shorter than tibia, its metatarsus as long as 2–4 united, claws with stout tooth. Fore wing hyaline, short pubescent, margin not ciliate, veins very pale, areolet faint and reaching one-sixth way to basal, cubitus scarcely visible. Abdomen as long as head and thorax, length to height to width as 23 : 23 : 14, second tergite occupying two-thirds, ventral valves oblique, ventral spine short, slightly hairy. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 2.5, wing 3.7, ovipositor 2.1. Range in length, 1.8–2.4 mm. Average of 33, 2.1 mm.

Male.—Similar to female but head darker, antennae 15-segmented, third slightly excavated and bent, the short pubescence on wing darker and veins more distinct, abdomen shorter than thorax, claws simple. Range in length, 1.6–2.0 mm. Average of 4, 1.8 mm.

Type.—Cat. No. 27209, U.S.N.M. Type female, allotype, one male and 11 female paratypes. Paratypes in American Museum, Field, Stanford, Harvard, Philadelphia Academy, and California Academy.

Host.—Quercus chrysolepis.

Gall (fig. 14).—Consists of a larval cell horizontally placed inside of and in very base of young acorns in midsummer. Affected acorns are those of the current season whose growth has been so retarded that they are undersized (10–18 mm.), often lopsided, with the cup more or less distorted. The cotyledons do not develop inside. The exit hole is in the top of the acorn and the cup is not involved.

Habitat.—The type locality is Kyburz, Eldorado County, Calif., where infected acorns of the current season were collected August 4, 1922. Some already contained fresh exit holes and one gall of those cut open contained a pupa. Flies emerged from the galls on August

19, 20, and 28, 1922, and when some of the galls were cut open the next July a few contained larvae indicating that the emergence of the species is probably distributed over two seasons..

Similarly affected acorns were observed on the middle fork of the Kaweah River in Sequoia National Park, on Mount St. Helena, on Mount Diablo, at Los Gatos, in California Redwood Park, in Palo Colorado Canyon in the Santa Lucia Mountains, at Camp Baldy in the San Gabriel Mountains, in Waterman Canyon in the San Bernardino Mountains, at Idyllwild in San Jacinto Mountains, and on trail to Santiago Peak in the Santa Ana Mountains.

ANDRICUS CORONUS Beutenmueller

Galls of this species were collected on the Capitol Grounds at Washington on *Q. phellos* by J. C. Crawford. They were beginning to drop on May 4. He reared adults April 23, 1910. The writer collected galls from a tree of *Q. palustris* on the Smithsonian grounds on May 16, 1920. Flies emerged April 10, 1921.

Galls have also been collected on *Q. phellos* at Clarendon and Cherrydale, Va.; Anniston, Livingston (J. W. A. Wright), and Montgomery, Ala.; and Rome (U. S. D. A. 5733), Ga.; and Tupelo (R. B. Deen), Miss.

ANDRICUS DECIDUATUS, new species

Female.—Head, anterior and parallel lines, pleurae, pits, propodeum, and abdomen black; antennae, sides of pronotum, rest of mesoscutum, disk of scutellum, and legs reddish-brown, much lighter in specimens cut out of gall in fall and killed at once than in those that emerged naturally in out-of-door breeding cage in spring. Head from above as broad as thorax, cheeks scarcely broadened behind eyes, vertex coriaceous; from in front transverse, interocular space .53 transfacial and area one and one-tenth times as broad as high, malar space .4 eye, antennae 13-segmented, lengths as (scape) 11:7:16:14:11:10:8:7.5:7:6:6:6:11, malar space faintly rugose, face and genae pubescent. Pronotum pubescent. Mesonotum with tawny appressed pubescence not dense enough to hide sculpture, lateral and parallel lines bare. Mesoscutum smooth and shining between the punctures, the parapsidal grooves deep, smooth, narrowing in front and not reaching as grooves much over half-way to pronotum. Scutellum rugose behind with slight tooth on each side, disk smoother with two distinctly separated smooth transverse pits at base. Carinae on propodeum slightly converging above, inclosing a smooth area broader than high, spiracular areas pubescent. Wing pubescent and ciliate, veins not heavy, second abscissa of radius not quite angled, radial cell three and one-half times as long

as broad, areolet reaching one-seventh and cubitus one-half way to basal. Hind tarsus shorter than tibia, its segments as 25:11:7:5:12, claws with a tooth. Abdomen as long as head and thorax, length to height to width as 25:21:15, lengths of tergites along dorsal margin as 57:18:8:4, all highly polished, second with patch of hair on each side at base, ventral spine slender, bare, in side view six times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 2.2, ovipositor 3.5, wing 4.0. Length, 2.0–3.3 mm. Average of 29 specimens, 2.58 mm.

Type.—Cat. No. 27210, U.S.N.M. Type and 10 paratypes. Paratypes in American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Host.—Quercus bicolor.

Gall (fig. 15).—A small ellipsoidal deciduous bud gall on small twigs in the fall. Greenish-gray with longitudinal purple streaks, the surface pebbled under lens, 4.5 mm. long by 4 mm. in diameter, slightly pointed at apex with a heart-shaped base when detached in which is a round impressed scar. They are found in September, produced usually from one of the small lateral buds near the base of the current season's growth but sometimes occur as far back as on five-year-old wood, very rarely from a small bud in the terminal cluster on a weak branch. About the end of September they drop to the ground and the thin fleshy layer decays leaving a longitudinally ribbed hard thin-walled shell with a large larval cavity.

Habitat.—The type material was collected at Wilmette, Ill., September 10, 1917. Opened some of the galls September 3, 1918, and found living adults and left the rest to emerge naturally, which they did by April 10, 1919. These same galls were seen at Evanston, Winnetka, Ravinia, and Fort Sheridan.

ANDRICUS EXCAVATUS Ashmead

Galls agreeing with the types of this species on red oak, *Q. maxima* have been seen at New Lenox, Illinois on *Q. imbricaria;* at Ironton, Missouri on *Q. velutina;* at Mineola, Texas on *Q. marilandica;* and at Washington, D. C., on *Q. maxima.* No adults reared.

ANDRICUS EXIGUUS Bassett

This species has been reared from flower galls on *Q. stellata* at Washington, D. C., the flies emerging May 11, 1914, and in 1920 on May 9. The same species of adults was also reared from galls collected at Rosslyn, Va. In both cases the collection yielded flies of a *Neuroterus* and the writer has not definitely associated the *Andricus* with the gall from which it came.

ANDRICUS FEMORATUS Ashmead

Described from a female reared in May from gall on *Q. laurifolia* from "Florida," the type is labeled Jacksonville. The writer collected galls on *Q. laurifolia* and *phellos* at Jacksonville, Daytona, Gainesville, River Junction, and Tallahassee and secured a couple of adults which emerged some time after April 7.

ANDRICUS FIMBRIALIS, new species

Female.—Black, base of antenna, ventral spine and legs beyond coxae brown. Head granulate; from above transverse, broad as thorax, cheeks not broadened behind eyes, occiput slightly concave; from in front malar space .4 eye without groove, with radiating ridges from corners of clypeus, antenna 13-segmented, lengths as (scape) 11:7:13:13:12:11:10:10:9:9:8:8:17, last with trace of subdivision on one side. Sides of pronotum rugose. Mesoscutum coriaceous, dull except for shining smooth anterior and lateral lines, parapsidal grooves smooth, percurrent, median groove reaching forward half-way. Scutellum disk uniformly rugose with two smooth pits at base. Carinae on propodeum arcuate, neck rugose. Mesopleura striate. Tarsal claws with a tooth. Wing hyaline, pubescent, ciliate, veins brown, first abscissa of radius arcuate, areolet reaching one-sixth way to basal, cubitus barely reaching basal. Abdomen as long as head and thorax, length to height to width as 68:50:40, lengths of tergites along dorsal curvature as 37:10:1, second but slightly pubescent on sides at base, ventral valves prominent, oblique, ventral spine normal, slender, in side view 3 times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 2.4, ovipositor 2.8, wing 4.0. Length, 1.55–2.0 mm. Average of 25 specimens, 1.86 mm.

Male.—Similar to female, but antenna 15-segmented and not lighter at base, first five segments as 11:7:15:15:13, third slightly bent, tapering from fourth to apex. Abdomen shorter than thorax, length to height to width as 40:30:21. Length, 1.1–1.65 mm. Average of 14 specimens, 1.46 mm.

Types.—Cat. No. 27211, U.S.N.M. Type female, allotype, 4 male and 10 female paratypes. Paratypes at Stanford, California Academy, American Museum, and Field Museum.

Host.—*Quercus dumosa, douglasii, lobata.*

Gall (fig. 16).—Globular, green, 2 mm. in diameter, produced at side of midrib of young leaves in early spring, stunting the development of the leaf, whose blade is much reduced, its margin prominently fimbriate.

Habitat.—The type is selected from galls collected on *Q. dumosa* May 3, 1922, along Pierce Mill Road, near Palo Alto, Calif., the

adults emerging May 10. Flies were emerging at Lakeport May 27. Three paratypes are from galls on *Q. douglasii;* two from galls collected at Paraiso Springs May 9, 1918, date of emergence not recorded, and one from Paso Robles, the fly emerging May 23, 1918. One paratype is from a gall on *Q. lobata* collected on May 20, 1922, the fly out and dead before May 27. The galls were seen on *Q. durata* also. In addition to the localities given above, the galls were also seen at Boulevard, in Santa Ana Mountains, on Santa Catalina Island, Camp Baldy, Bagby, Newhall, Santa Margarita, Jolon, Los Gatos, St. Helena, Calistoga, Ukiah, Bartlett Springs, Oroville, Red Bluff, Shasta, and Baird, Calif.

ANDRICUS FLOCCI (Walsh)

Galls were collected on *Quercus alba* at Evanston, Glencoe, Glen Ellyn, New Lenox, and Moline, Ill.; Porter, Ind.; Ironton and Poplar Bluff, Mo.; Texarkana, Ark.; Marianna, Fla.; and Bluemont, Va. Crosby collected them at Riverhead and Zabriskie at Nyack, N. Y. Brodie had galls sent to him from Manitoba from which flies emerged at Toronto May 20.

From galls collected at Ironton in October, 1917, adults emerged May 16–28, 1918. The forest-insect collection has flies that emerged April 22, 24, 30, and May 2 and 5, 1915, from galls collected at Lyme, Conn., by A. B. Champlain and flies that emerged April 14–16, 1915, from galls from Harrisburg, Pa. On April 15 William Middleton liberated some of the latter in a cage on a white oak tree and observed oviposition in one of the subapical buds. From the resulting gall he reared adults of both sexes on June 19—a suggestion for further experimentation.

ANDRICUS FOLIATUS (Ashmead)

This species was described from "Florida." Its galls occur on *Q. geminata* as well as on *virginiana*. Galls have been collected at Atlanta (E. A. Schwarz) and Savannah, Ga.; Jacksonville, Green Cove Springs, Crescent City, Daytona, Miami, Paradise Key (Hoppins U. S. No. 15580), Clearwater, St. Petersburg, Ocala, Gainesville, Live Oak, Marianna, Carrabelle, and Cottondale, Fla.; Mobile Bay (J. Hayes), Ala.; Wharton, Victoria, Cuero, Austin, Boerne, Kerrville, and Sabinal, Tex.

The galls may be found in various stages of growth in October, the galls and bracts being then green. Later in fall they turn brown. A gall collected at Paradise Key gave an adult February 26. Galls at Jacksonville contained adults ready to emerge on April 4, 1914.

ANDRICUS FOLIOSUS, new species

Female.—Dark red, legs and antennae yellowish, lines on mesoscutum and posterior part of abdomen often infuscated. Head as broad as thorax, coriaceous, face slightly pubescent, cheeks not broadened behind eyes, interocular space .6 transfacial and area one and four-tenths times as broad as high; malar space .54 eye, without groove; antennae 13-segmented; lengths as (scape) 12:6:15:12:11:10:9:9:8:8:7:7:14, not tapering toward tip. Pronotum with white pubescence. Mesoscutum coriaceous, with a few setigerous punctures, parapsidal grooves narrow, deep, smooth, shining, percurrent; anterior and parallel lines smooth; median groove developed posteriorly and continued forward as a percurrent line. Scutellum pubescent, coarsely rugose, with two large, well-separated, smooth, transverse pits at base. Carinae on propodeum slightly bent and inclosing a rugose area as broad as high, spiracular areas pubescent. Mesopleura aciculate below, polished above. Wing pubescent and ciliate; veins yellowish; second abscissa of radius arcuate; radial cell three times as long as broad, areolet reaching one-sixth and cubitus one-half way to basal, but both faint. Hind tarsus shorter than tibia; claws with tooth. Abdomen nearly as long as head and thorax; length to height to width as 85:65:51; lengths of tergites along dorsal curvature as 44:15, the rest hidden or showing but slightly; tip of ventral valves projecting dorsally; hypopygium long, pubescent; ventral spine slender, five times as long as broad in side view; second tergite with pubescent patch on each side at base, its posterior margin nearly at right angle to long axis of abdomen. Using width of head as a base, the length of mesonotum ratio is 1.2, antenna 2.3, wing 3.4, ovipositor 3.0. Length, 2.0–2.6 mm. Average of 104 pinned specimens, 2.3 mm.

Male.—Differs from female in having antennae 15-segmented, lengths as 9:6:15:11:10:9:8:8:8:7:6:6:6:6:7, last two-thirds tapering to tip, ratio 2.5. Abdomen shorter than head and thorax, lengths of tergites as 42:15:8:4:2:6, last four not always visible. Length 1.6–2.0 mm. Average of 22, 1.7 mm.

Types.—Cat. No. 27212, U.S.N.M. Type female, allotype, 9 male and 49 female paratypes. Paratypes at American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Host.—*Quercus bicolor* and *macrocarpa*.

Gall (fig. 17).—A fleshy green enlargement of the midrib or one of lateral veins usually on basal third of leaf blade, usually only one on a leaf. When seen from below there is a bend in midrib at this point and a small depressed spot. On upper side of leaf it shows a rosette of leaf-like rudiments hiding the gall; on the lower a smaller rosette on the concave side of the bend. The gall contains 1–6 larval cavities and the larva is much elongated like those in rose

galls. The young galls begin to show about the middle of May when the young leaves are not one-third grown.

Habitat.—The type locality is a tree of *Q. bicolor* four miles west of Evanston, Ill., out Emerson Street. Here the galls were observed year after year for several years. Galls collected June 6, 1909, gave flies in numbers June 29 and in early July. In 1912 adults emerged June 20–28. In 1913 they emerged on June 26. In 1916 the flies were mostly out by June 28 and galls beginning to dry up. In 1917 they contained pupae on June 24. The paratype locality is a tree of *Q. macrocarpa* in Winnetka, Ill. Miss Howe found galls at Ithaca and Geneva (see thesis) and the writer has seen them at Medina, N. Y., as well as at Evanston and Moline, Ill., on *Q. macrocarpa*.

ANDRICUS HOWERTONI Bassett

This species was described from a gall on an unknown oak in New Mexico. The writer has collected galls, which agree with a Bassett type gall, on *Q. undulata* and *grisea* at Las Vegas, Tijeras, Magdalena and Kingston, N. Mex. and at Williams, Ashfork, and Prescott, Ariz. Galls collected at Williams on April 11 gave adults by May 11 and some held over and emerged the next spring.

ANDRICUS INCERTUS Bassett

Andricus incertus BASSETT, Trans. Amer. Ent. Soc., vol. 26, 1900, p. 317.
Andricus fimbriatus WELD, Proc. U. S. Nat. Mus., vol. 61, 1922, art. 19, p. 29–30.

The holotype of *incertus* was taken ovipositing in bud of *Q. bicolor* on April 22 at Waterbury, Conn., and is preserved in the Bassett collection in Philadelphia. In June 1921 S. A. Rohwer at my request took a paratype of *fimbriatus* to Philadelphia to compare with *incertus* and could see no difference. This species producing a gall in a fimbriate cup on acorn cup of *Q. bicolor* should henceforth be known as *incertus* Bassett. These galls have been noted at Washington, D. C. The alternating generation is unknown.

ANDRICUS LANIGER (Ashmead)

The live oak woolly midrib gall has been observed at Billy's Island in Okefenokee Swamp (Dr. J. G. Needham) and Savanah, Ga.; at Jacksonville, Green Cove Springs, Gainesville, Ocala and Clearwater, Fla.; at Sulphur (E. S. Tucker) and Audubon Park (E. R. Barber), La.; at Houston, Richmond, Wharton, Cuero, Sabinal, Austin, Boerne and Kerrville, Tex.

Galls were seen starting to develop at Sabinal as early as July 19. They become full grown before October, when certain trees contain incredible numbers of them, almost every leaf being infested. Such

a tree was seen at Richmond in the fall of 1917, and two years later the owner wrote:

> It is a pleasure to report that the infestation has disappeared wholly and that the tree is thriving and one of the prettiest in the row. No remedial measures at all were taken, so it appears that the insects were either affected climatically or were of a migratory nature. Following your visit, we had the severest winter of some years and then the driest summer for some time.

Pupae and adults were found in the galls December 8, and adults may be obtained by opening galls in winter. Galls from Billy's Island gave adults February 25 to March 9, but adults had not yet emerged on April 4 from galls collected on fallen leaves in the gutters on the streets of Jacksonville. Ashmead reared flies March 21, 1881. The alternating sexual generation is unknown.

ANDRICUS MURTFELDTAE Ashmead

This species was described from males only and no host oak was given for the galls. The description of the female is here given and some notes on the biology.

Female.—Head and thorax black; abdomen red, darker anterodorsally; legs and antennae honey-yellow. Face striate above mouth; malar space .5 eye, without groove; vertex coriaceous. Antennae 13-segmented, lengths as (scape) 15 (width 7) : 8(7) : 16(5) : 12 : 11 : 10 : 9 : 8 : 7 : 7 : 7 : 7 : 13(5). Mesoscutum coriaceous with a few setigerous punctures, shining. Parapsidal grooves deep, smooth, narrow, percurrent, wider behind, a faint trace of a median behind. Scutellum rugose, including the pits. Carinae on propodeum converging above. Wing pubescent and ciliate, radial cell 3.2 times as long as broad, open; areolet small, reaching about one-seventh way to basal, cubitus reaching basal; first abscissa of radius angled. Hind tarsus shorter than (.8) tibia, its metatarsus not equal to 2–5 (without claw). Claws with a tooth. Abdomen shorter than head and thorax, length to height to width as 30 : 26 : 22; relative lengths of tergites along dorsal curvature as 62 : 20 : 12 : 10 : 10 : 13, second bare at base. Ventral spine bare, about twice as long as broad in side view. Using width of head as a base the length of mesonotum ratio is 1.16, antenna 2.0, wing 3.5, ovipositor 2.47. Range in length, 1.7–3.2 mm. Average of 24 pinned specimens, 2.54 mm. Range in length of 17 males, 1.5–2.9 mm. Average of 17, 2.24 mm.

Host.—Quercus stellata.

Galls.—Produced in clusters about small twigs at base of the new growth, usually only 2–4 galls becoming well developed. It is an early spring gall, full grown but green and succulent soon after the tree is in blossom. Adults issue from the galls during the last of April in South Carolina and in late May and early June at Wash-

ington. The galls are then brownish and the interior has become quite hard. Easily detached.

Habitat.—The writer has collected fresh galls at Fairfax, S. C.: East Falls Church, Great Falls, and Rosslyn, Va.; and at Washington, and reared the adults in each case. Old galls were seen at Palestine, Cuero, and Arlington, Tex., still attached to the twigs in the fall. The National Museum has males from galls collected by A. D. Hopkins May 6, 1919, at Kanawah Station, W. Va. The type locality is Kirkwood, Mo.

ANDRICUS OSTEN SACKENII (Bassett)

Galls on *Q. coccinea* have been collected at Ithaca, East Hampton (C. R. Crosby), Farmingdale (C. R. Crosby), N. Y.; Evanston, Fort Sheridan, and La Grange, Ill.; and East Falls Church and Rosslyn, Va. In the Chicago area adults emerge July 8–15.

ANDRICUS PATTERSONAE Fullaway

The writer has collected the galls of this species on *Q. douglasii* at Kaweah, Palo Alto, Calistoga, Oroville, Red Bluff, and Shasta, Calif. Field museum has a gall from Chico, and Cornell has galls from Napa (J. C. Bradley). Only old and empty galls are found in May. Partly grown fresh ones were seen in August and full-grown ones in September. They should be gathered in late fall for rearing. Bethel collected galls determined by the writer as this species at Oakville, Wash., on *Q. garryana*.

ANDRICUS PATTONI (Bassett)

Galls of this species are common on *Quercus stellata* and were collected at Webster Groves, Ironton and Poplar Bluff, Mo.; Hoxie, Little Rock and Texarkana, Ark.; Cleveland (L. Haney), Okla.; Palestine, Trinity, Houston, College Station, and Arlington, Tex.; Troy, Ala.; Cottondale, Marianna, River Junction, and Madison, Fla.; Madisonville (W. L. Gordon), Ky.; and Washington, D. C. The galls occur in the fall dropping with the leaves. The larvae transform in late November, the adults remaining in the galls to emerge in the spring. Galls collected at Ironton October 5, 1917, gave adults (at Evanston) May 16, 28, June 2, 1918. Flies emerged (at Evanston) from Arlington galls May 16, 1918, and from Marianna galls May 1, 1920. Galls collected at Washington gave flies March 14, 1921, and in 1924 they emerged April 10–17. Galls sent to Washington from Kentucky gave adults March 14, 1921.

The similar galls on *Q. margaretta* give flies which do not seem to be different. The similar gall on *Q. chapmani* may also be due to this species. It is questionable whether this is specifically different from *Andricus floccі* (Walsh).

ANDRICUS PETIOLICOLA (Bassett)

Galls of this species were noticed at several localities and on several hosts. On the rock chestnut oak, *Q. montana*, at Watkins Glen, Ithaca (adults beginning to emerge July 10, 1913), and Storm King (Leonard), N. Y.; North East (contained pupae July 12, 1914), Pa.; Blue Hills, Mass.; Washington, D. C.; Alexandria and Bedford County, Va. Middleton reared adults at Falls Church, Va., on June 28. On *Q. macrocarpa* at Evanston, Willow Springs, and Clinton, Ill.; and Medina, N. Y., where they contained pupae June 30, 1914. Middleton reared flies at Falls Church, Va., June 27. On *Q. bicolor* at Evanston, Ill., where adults began to emerge June 23, 1906. On *Q. alba* at Willow Springs, Ill.; Poplar Bluff, Mo.; Alexandria and Bedford County, Va.; Forest Hills, Mass.; Ithaca, Farmingdale (Crosby), and East Hampton (Schradieck), N. Y. At Toronto Brodie found adults of both sexes emerging July 5–13, 1888. At East Falls Church, Va., flies emerged July 5, 1924. On *Q. stellata* at Hugo and Tuskahoma, Okla.; Arlington, Tex.; Troy and Dothan, Ala.; Marianna, River Junction, Carrabelle, Madison, Ocala, St. Petersburg, Daytona, and Green Cove Springs, Fla. At Rosslyn, Va., galls were full grown by June 1 and adults issued June 21–27, 1923. In 1924 adults emerged July 5 and were observed ovipositing in terminal buds.

ANDRICUS PISIFORMIS Beutenmueller

The writer has collected these vernal galls on *Q. alba* at Ravinia, Fort Sheridan and Willow Springs, Ill., and at Miller, Ind., in May; at Falls Church and Richmond, Va., and Jacksonville, Fla., in April. In the Chicago area a gall opened November 26 the same fall contained a pupa and at Falls Church adults were found as early as October 26, indicating that the larvae transform in the fall, the adults remaining inside the galls to emerge in the spring. They emerged from Jacksonville galls on February 27. Galls were noted on *Q. bicolor* at Evanston, Ill., just starting to develop on May 2, 1916. The twigs were cut off and put in a jar of water in laboratory where the galls became full grown and dropped off by May 28. On *Q. stellata* in Florida the galls were full grown on April 15. Many were badly deformed by guest flies, especially in basal half. They were also noted on this oak at Tuskahoma, Okla.; Rosslyn, Va.; and Washington, D. C.

This gall may be found in the spring just as the new leaves are unfolding. They develop from the weaker lateral buds usually on previous season's growth. When mature they drop to the ground showing a deep brown scar at point of attachment. The outer white

fleshy layer soon rots away leaving a hard, smooth, thin, brittle shell. For rearing they should be kept out-of-doors on the ground until spring.

ANDRICUS ROBUSTUS, new species

Female.—Black and red. In some the head and thorax are red, infuscated on anterior and parallel lines, others show all stages of coloration to black. Head punctate and pubescent except for bare area just above antennae; seen from above transverse, massive, as broad as thorax, cheeks strongly widened behind eyes; from in front broader than high, malar space .55 eye with striae on either side of depressed clypeus, facial area 1.4 times as broad as high, antenna 14-segmented, lengths as (scape) 19(width 7) : 8(6) : 22(5) : 18 : 14 : 12 : 9 : 8 : 8 : 7(7) : 7 : 7 : 7 : 14(6). Thorax with the aspect of a *Dischlocaspis* but parapsidal grooves are narrow, smooth and reach nearly to pronotum and scutellum has two distinctly separated small transverse pits at base. Mesoscutum coriaceous with uniformly distributed setigerous punctures, anterior and lateral lines shining, no median. Scutellum rugose behind, disk finely punctate. Carinae on propodeum nearly straight, slightly converging above. Bare polished spot on mesopleura. Tarsal claws with tooth. Wing hyaline, pubescent, ciliate, veins brown, second abscissa of radius angled, areolet reaching one-fifth way to basal, cubitus faint, reaching basal. Abdomen as long as head and thorax, length to height to width as 38 : 39 : 30, its longest dimension (45) oblique to main axis of body; lengths of tergites along dorsal curvature as 83 : 27 : 19 : 15 : 7 : 17, second with pubescent patches at base, seventh pubescent, ventral spine long and tapering, pubescent below, in side view eight times as long as broad and placed at angle of 45° to axis of body. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 2.4, ovipositor 4.4, wing 4.0. Length 3.0–4.1 mm. Average of 64 specimens 3.51 mm.

Type.—Cat. No. 27213, U.S.N.M. Type and 4 paratypes. Paratypes in American Museum, Field, Stanford, Harvard, Philadelphia Academy, and with Beutenmueller.

Host.—Quercus stellata.

Gall (fig. 18).—A midrib cluster on under side of leaf in fall, the galls dropping to the ground when mature. The individual galls are somewhat globular, tapering to a pedicel at base and pointed with a slight scar at apex, greenish and mottled with white when fresh, turning brown during winter on ground. This is the gall described in connection with the fly of *Cynips vacciniformis* Beutenmueller which seems to have come from an accidentally included gall of a different sort in the breeding cage.

Habitat.—The type material was collected at Arlington, Texas, November 3, 1917, when the galls were still dropping to the ground. On December 1, 1919, living flies (that would probably have emerged in spring of 1920) were cut from the galls. Some of the same lot of fresh galls were sent to William Beutenmueller, who reared adults January 10, February 14, 15, 20, 21, 1919, and more in February, 1920. Paratype flies were cut out December 1, 1919, from galls collected at Texarkana, Ark., in October, 1917. The galls have been collected also at Webster Groves, Poplar Bluff, and Ironton, Mo.; Hoxie, Little Rock, and Hot Springs, Ark.; Palestine, Cuero, and Austin, Tex.; Cottondale, Fla.; Washington, D. C.; Falls Church, Va. Galls collected at Washington in late October, 1923, gave adults February 22, March 1, 14, 17, 1925, and these have been included among the paratypes.

ANDRICUS RUGATUS, new species

Female.—Black; mandibles red; antennae and parts of legs brownish. Head coriaceous with setigerous punctures; from above transverse, as broad as thorax, occiput concave, cheeks broadened behind eyes; from in front broadest above level of antennae, median ridge from antennae to clypeus, facial area one and three-tenths times as broad as high, malar space 0.4 eye, antennae 13-segmented, lengths as (scape) 13 (width 6) : 7 : 15(4) : 11 : 8 : 7 : 6 : 6 : 5 : 5 : 5 : 5 : 11(6). Thorax sparsely pubescent, bare spot on mesopleura and between parapsides posteriorly. Pronotum with parallel ridges on sides. Mesoscutum coriaceous, parapsidal grooves narrow, smooth, not quite reaching pronotum, separation behind five times the width of a groove. Scutellum rugose, smoother just back of the well separated pits which open on to disk behind. Carinae on propodeum nearly straight, converging above. Tarsal claws with tooth. Wing hyaline, pubescent, ciliate, veins brown, second abscissa of radius angled, areolet reaching one-fifth way to basal, cubitus indistinct. Abdomen shorter than head and thorax, length to height to width as 28 : 26 : 19, lengths of tergites along dorsal curvature as 75 : 23 : 14 : 1 : 3 : 7, second with sparsely pubescent patches at base, its hind margin making angle of 60° with long axis of abdomen, ventral spine tapering, in side view five times as long as broad, directed almost straight backward. Using width of head as a base the length of mesonotum ratio is 1.2, antennae 1.8, ovipositor 2.5, wing 3.6. Length, 2.8–3.1 mm. Average of 4 specimens, 3.0 mm.

Type.—Cat. No. 27214, U.S.N.M. Type and one paratype. Paratype in Field Museum.

Host.—*Quercus lyrata.*

Gall (fig. 19).—A midrib cluster of a few galls on under side of leaf in fall, dropping to ground when mature. The individual galls are nearly globular, up to 6 mm. in diameter, dark red in color, covered with short blunt tubercles, have a scar at apex and are drawn out at base into a short pedicel. Monothalamous.

Habitat.—The type material was collected at Hoxie, Ark., October 10, 1917. Two adults issued April 11, 1920, and both larvae and pupae were found inside of galls opened October 10, 1920, indicating that the emergence is distributed over at least three seasons. Galls were seen also at Texarkana and at Poplar Bluff, Mo.

ANDRICUS SALTATUS Ashmead

Described from *Q. cinerea* from "Florida," the writer collected galls like the types at Jacksonville and Ocala in April on *Q. rubra*, the Spanish oak, but failed to rear adults.

ANDRICUS SINGULARIS (Bassett)

These galls on red oak, *Q. maxima*, were collected at Evanston, Glen Ellyn, and Willow Springs, Ill.; Delevan (D. Watt), Wis.; North East, Pa.; Medina and Ithaca, N. Y.; Bluemont, Alexandria, and Bedford County, Va. At Medina adults issued July 3, 1914. Brodie found the galls at Toronto and says the flies are usually all out by the middle of July but in 1891 they emerged July 14–27, males appearing first. Middleton reared flies July 6 from galls collected at Plummer Island, Md.

ANDRICUS SPECTABILIS Kinsey

This species was described from *Q. chrysolepis*. The writer has collected galls on *Q. wilcoxii* in the Santa Catalina and Chiricahua Mountains, Ariz., where on November 28, 1921, the galls on the current year's wood were but partly grown and those on 1920 wood still without exit holes but containing living adults. The writer collected galls on *Q. chrysolepis* in Waterman Canyon in the San Bernardino Mountains on March 18, 1922, and cut out living adults apparently nearly ready to emerge. Other nearly full-grown galls contained much nutritive material in the cells and small larvae. Galls on *chrysolepis* were collected at Idyllwild, in Santa Ana Range, on Mount Lowe (J. Martin), in Sequoia National Park, in Fresno County on Horse Corral trail, in Yosemite National Park (J. C. Bradley), Placerville, Kyburz, Pulga, in Santa Lucia Range, Los Gatos, on Mount Diablo, St. Helena, Ukiah, in Lake County above Upper Lake, Baird, Scott Bar, California; and in Oregon at Holland and Canyonville. Adults of the species were captured on

the foliage of *chrysolepis* in California Redwood Park on April 22, 1922. Partly grown galls may be found from early May on through the summer and it seems probable that the insects do not emerge from them until the second spring.

ANDRICUS STELLARIS, new species

Female.—Red, with tip of antenna, vertex, scutellum, propodeum, and tip of abdomen infuscated, face slightly pubescent. Head finely coriaceous; from above as broad as thorax, cheeks scarcely broadened behind eyes, occiput not concave; from in front malar space .35 eye without groove, antenna 14-segmented, filiform, lengths as (scape) 9:6:11:8:7:7:6:6:6:5.5:5:5:5:6. Mesonotum finely coriaceous with a few scattered setigerous punctures, shining, parapsidal grooves deep, narrow, smooth, percurrent, no median. Scutellum with two large smooth pits at base, disk rugose, its sides bounded by diverging lines. Carinae on propodeum diverging below on to sides of the rugose neck. Hind tarsus shorter than tibia, tarsal claws with a tooth. Wing hyaline, pubescent, ciliate, veins very pale, cubitus and areolet scarcely visible. Abdomen length to height to width as 62:55:33, lengths of tergites along dorsal margin as 50:15, ventral valves oblique, ventral spine slender, 7 times as long as broad in side view. Using width of head as a base the length of mesonotum ratio is 1.4, antenna 2.8, ovipositor 4.3, wing 4.6. Length 1.6–1.85 mm. Average of 7 specimens, 1.74 mm.

Type.—Cat. No. 27215, U.S.N.M. Type and 2 paratypes. Paratypes in American Museum, Field and Stanford.

Host.—Quercus garryana.

Gall (fig. 46).—A hemispherical gall, 3–4 mm in diameter and 2 mm. high, covered with short, blunt crystalline protuberances with a circle of 12–15 longer, broad and flat projections at the base resembling an open specimen of a many-rayed species of the fungus *Geaster*, attached singly or scattered in small numbers on the under side of the leaf in the fall. The galls are yellowish-white, often tinged with red. The larval cell lies transversely in the very base of the gall and above it is a cavity above which the crystalline wall of the upper part of the gall is very thick.

Habitat.—The type material was collected September 8, 1922, in Sequoia National Park, Calif., just above the Cedar Creek checking station on the Giant Forest road. The flies were cut out of the galls the next spring, having died inside, unable to chew their way out of the hard preserved galls. Koebele collected galls in Sonoma County.

ANDRICUS STROPUS Ashmead

The types of this species were reared in March. The writer has collected galls like the types at Daytona, St. Petersburg, Clearwater, Marianna, and Ocala, Fla., on *Q. chapmani* and at Palestine, Tex., on *Q. stellata*, but has never reared adults.

ANDRICUS TOUMEYI, new species

Female.—Red, slightly infuscated on anterior and lateral lines, on sternum and ventral part of abdomen in these recently transformed specimens cut from galls, no doubt still darker in those emerging normally. Head coriaceous, with radiating striae about mouth, face, and occiput pubescent; from above transverse, as broad as thorax, cheeks broadened behind eyes; from in front facial area higher than broad, malar space three-eighths eye, antenna 13-segmented, lengths as (scape) 14:8:14:13:12:11:10:10:9:9:9:8:15. Sides of pronotum with parallel ridges, pubescent. Mesoscutum coriaceous with scattered setigerous punctures, the hairs short and white, not hiding sculpture, parapsidal grooves deep, smooth, percurrent, wider behind, no median. Scutellum rugose with two deep smooth pear-shaped pits at base. Carinae on propodeum straight and parallel, enclosed area broader than high. Mesopleura aciculate except for smooth hind margin. Hind tibia longer than tarsus, claws with a weak tooth. Wing hyaline, short-pubescent, ciliate, veins yellowish, first abscissa of radius angled, areolet incomplete, cubitus indistinct. Abdomen longer than head and thorax, length to height to width as 120:98:80, lengths of tergites along dorsal curvature as 104:16:5:5:4:12, second with small pubescent areas at base, ventral valves hidden, ventral spine slender, in side view 7 times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 2.0, ovipositor 2.0, wing 3.8. Length 2.7–3.3 mm. Average of eight, 3.0 mm.

Named for Professor Toumey, to whom also the host oak is dedicated. Closely related to *Andricus howertoni* Bassett, from which it may be separated by the aciculate mesopleura and the more scattered pubescence on the mesoscutum.

Type.—Cat. No. 27216, U.S.N.M. Type and 3 paratypes. Paratypes in American Museum, Field, and Stanford.

Host.—Quercus toumeyi.

Gall (fig. 20).—A sessile, egg-shaped and somewhat one-sided stem swelling, representing a much shortened lateral branch which seldom continues beyond the gall, densely covered with small leaves. It measures up to 15 mm. long by 10 mm. in diameter, is covered with bark of normal thickness, its single rather small cell is placed

somewhat radially without any false chamber and the exit hole is in one side.

Habitat.—Type material collected at Patagonia, Arizona, on December 12, 1921, when the galls contained pupae. The adults were cut out of the galls on January 1. One paratype was cut from a gall collected in the Chiricahua Mountains. Similar galls have been seen on *Q. undulata* on Abo Pass in the Sandia Mountains, near Socorro, in Nogal Canyon, and in Burro Mountains in New Mexico.

ANDRICUS TUBALIS, new species

Female.—Dark reddish-brown, mesonotum and posterior third of second tergite nearly black, antenna yellowish. Head granulate, coriaceous above antennae; from above transverse, broad as thorax, cheeks narrow, but slightly broadened behind eyes, occiput not concave; from in front malar space .4 eye without groove but fine ridges from corners of clypeus, antenna filiform, 13-segmented, lengths as (scape) 14:6:12:12:11:10:10:9:9:8.5:8:7:12. Sides of pronotum rugose, pubescent. Mesoscutum dull, coriaceous with scattered setigerous punctures, parapsidal grooves smooth, wider behind, obsolete anteriorly, no median. Scutellum with two pits at base, disk rugose, sloping laterally from a median coriaceous ridge. Carinae on propodeum short, stout, slightly arcuate. Mesopleura striate between shining coriaceous areas above and below. Hind coxa and femur stout. Claws with tooth. Wing hyaline, pubescent, ciliate, veins yellowish-brown, cubitus and anal scarcely visible, first abscissa of radius angulate, areolet large but faint. Abdomen as long as thorax, length to height to width as 36:35:22, lengths of tergites as 34:2, rest telescoped, valves oblique, ventral spine slender. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 1.9, ovipositor 2.0, wing 3.1. Length, 2.8 mm.

Type.—Cat. No. 27217, U.S.N.M. Paratype in balsam with author.

Host.—*Quercus arizonica.*

Gall (fig. 21).—Arising from a weak bud on small twigs, usually on wood of previous year, easily detachable. Trumpet-shaped, the outside fluted, tapering to a sessile or clasping base, the flaring end forming a shallow cup in the bottom of which is the exit hole, 5–8 mm. long, cup up to 7 mm. in diameter, yellowish-white in color. The single larval cell lies longitudinally in the cylindrical stem of the gall, no false cavity present.

Habitat.—The type material was collected June 22, 1918, at Oracle, Ariz. The two adults emerged and died before August 23. Empty galls were seen at the same locality in December, 1921. Precisely similar galls were observed on *Q. oblongifolia* at Nogales.

ANDRICUS TUBULARIUS, new species

Female.—Head and thorax reddish-brown, infuscated about metanotum, abdomen red. Some have vertex and whole thorax more or less infuscated. Face, sides of thorax and scutellum with short white pubescence. Head granulate, broad as thorax, cheeks broadened behind eyes, occiput concave, malar space .35, eye without groove, fine radiating ridges at corners of clypeus, antenna filiform, darker distally, 15-segmented, lengths as (scape) 12:8:19:19:15:14:11:11:9:9:9:8:8:8:11. Mesoscutum shining, microscopically coriaceous with scattered setigerous punctures, parapsidal grooves narrow, smooth, complete, no median groove but a median pebbled streak extends halfway back to scutellum. Scutellum rugose with two smooth transverse pits at base. Carinae on propodeum nearly straight, slightly converging above, neck rugose. Mesopleura with a smooth bare area. Tarsal claws with a tooth. Wing hyaline, pubescent, ciliate, veins brown, radius heavy, first abscissa angulate and slightly clouded, areolet reaching one-fifth, cubitus three-fourths way to basal. Abdomen as long as thorax, length to height to width as 20:18:13, lengths of tergites along dorsal margin as 52:16, rest hidden, second with pubescent areas on sides, ventral spine short, in side view three times as long as broad, pubescent, from below tapering from base to apex. Using width of head as a base, the length of mesonotum ratio is 1.3, antenna 2.5, ovipositor 2.8, wing 4.0. Length, 1.65–2.5 mm. Average of 42 specimens, 2.18 mm.

Type.—Cat. No. 27218, U.S.N.M. Type and 15 paratypes. Paratypes at American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Host.—Quercus undulata.

Gall (fig. 22).—Smooth, tan-colored, blunt, cylindrical cells bursting out through the bark singly or in vertical rows of 2–6, only the upper third or less protruding, not deciduous. Single cells measure 3.2 mm. long by 1.7 mm. in diameter with wall .1–.2 mm. thick. Occur in early summer on small twigs of previous season's growth. Exit hole at apex and old galls show as a row of holes.

Habitat.—The type material was collected April 6, 1918, near mouth of Tijeras canyon in the Sandia Mountains, N. Mex. (Hopkins U. S. No. 15626*e*). Adults emerged April 12. Galls were seen at same locality in November, 1921, the cells then just bursting through the bark. Galls were collected in the Magdalena Mountains also.

ANDRICUS UTRICULUS (Bassett)

These galls on *Q. alba* leaves have been seen at Winnetka, Ravinia, Fort Sheridan, New Lenox, Utica (Starved Rock), and Moline, Ill.; at Ithaca, N. Y.; at Rosslyn and Alexandria, Va.; at Plummer

Island, Md.; and Washington, D. C. Flies emerged from the Ithaca galls on June 15, New Lenox, June 16. Similar galls on *Q. stellata*, giving similar flies, have been seen in Virginia and Texas. William Beutenmueller collected them at New York City, the flies emerging June 5, 1915.

ANDRICUS WILTZAE Fullaway

This species was described from Palo Alto, Calif., from *Q. lobata*. The writer has collected galls on this oak at Palo Alto, Paraiso Springs, Paso Robles, Kaweah, Visalia, Stockton, Oroville, Chico, Red Bluff, Upper Lake, Lakeport, Ukiah, and Santa Rosa. Dr. J. C. Bradley collected galls at Sacramento and Davis, March 9, 1918, and reared adults, some of which were still alive in the box on May 10. The young galls may be found developing in early September. The writer reared flies which agree with the Stanford type from galls on *Q. dumosa*, flies emerging April 5 from galls collected at Descanso on March 6 and from galls collected in the Santa Ana range on March 16. On March 18 a living fly was cut from a gall collected in Waterman Canyon in the San Bernardino Mountains. The galls were seen also at Boulevard, Ojai, and Palo Alto.

CALLIRHYTIS ATTIGUA, new species

Female.—Red, infuscated on distal half of antenna, metanotum, metapleura, propodeum, base of metacoxa; eyes and ventral valves black. Head coriaceous, face pubescent; from above transverse, broad as thorax, cheeks broadened behind eyes, occiput straight; from in front wider than high as 74:54, facial area one and three-tenths times as broad as high, malar space .38 eye, antennae filiform, 14-segmented, lengths as (scape) 16 (width 9) : 9(7.5) : 22(6) : 18 : 14 : 13 : 12 : 11 : 10 : 9 : 9(7) : 8 : 8 : 13, last pointed. Sides of pronotum finely rugose. Mesoscutum bare, coriaceous, parapsidal grooves narrow, deep, percurrent, separation behind about four times width of groove, scarcely a trace of a median behind, anterior lines smooth and shining. Scutellum rugose, two deep smooth pits at base. Carinae on propodeum bent slightly outward. Mesopleura coriaceous. Hind tarsus about two-thirds length of tibia, claws simple. Wings yellowish, pubescent, ciliate, first and second cross-veins clouded, first abscissa of radius faintly angled, areolet reaching one-ninth and cubitus seven-tenths way to basal. Abdomen equal to head and thorax, length to height to width as 32:30:19, lengths of tergites along dorsal margin as 78:21:6:5:6:3, second with sparsely pubescent areas at base and hind border and exposed parts of all other tergites coriaceous like mesoscutum. Ventral valves oblique, ventral spine slender, tapering, in side view about 5 times as long as broad.

Entire ovipositor sometimes extruded. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 2.1, wing 3.5, ovipositor 3.7. Length, 2.8–3.3 mm. Average of 39, 3.05 mm.

Type.—Cat. No. 27219, U.S.N.M. Type and 19 paratypes. Paratypes in American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Host.—Quercus texana.

Gall (fig. 23).—Spherical, 6–9 mm. in diameter, produced in the fall, attached to the side of the petiole just below the leaf blade and dropping when mature. They are red in color and fleshy inside without a separable larval cell.

Habitat.—The type galls were collected at Boerne, Tex., October 25, 1917, when most of the galls had already dropped to the ground under the clumps of small trees growing on the slopes of limestone hills. The galls were sent to the Eastern Field Station at East Falls Church, Va., for rearing (Hopkins U. S. No. 13686*c*) where adults emerged August 20 to September 23, 1918. Galls were also seen at Kerrville and were nearly full grown on July 21.

CALLIRHYTIS CLAVULA (Osten Sacken)

The oak club gall on *Quercus alba* has been collected at Kenilworth, Winnetka, Glencoe, Ravinia, Fort Sheridan, Waukegan, La Grange, Willow Springs, Utica, and Moline, Ill.; Miller, Ind.; Onekama (T. Hatfield), Mich.; Syracuse and Farmingdale (Crosby), N. Y.; Popular Bluff, Mo.; Plummer Island, Md.; Washington, D. C.; East Falls Church, Va., and Blue Hills, Mass. About Chicago pupae were found in the galls in various years on June 11, July 12, and July 16. One emerged July 12, 1912. At Washington living adults were cut out of galls on July 16, 1920 and in 1924 they emerged July 9, 13, and 14. Beutenmueller has had adults emerge at New York City July 14–30. Brodie collected galls at Toronto but seems not to have reared adults. Girault reared adults at Blacksburg, Va., July 12, 1901.

What seems to be the same gall has been taken on *Quercus stellata* at Mineola, Tex.; Poplar Bluff, and Washington.

CALLIRHYTIS CONGREGATA (Ashmead)

No date of emergence seems to be recorded for this species. Galls collected on *Q. wislizenii* on May 16, 1922, gave one fly June 3 and two emerged later. Galls on this host were seen at Lakeport, Upper Lake and Baird and in California Redwood Park. Galls on *Q. agrifolia* were about half-grown and secreting honeydew on May 3.

CALLIRHYTIS CORNIGERA (Osten Sacken)

The following localities are here recorded for this species: Ravina, Fort Sheridan, and Palos Park, Ill.; Miller and Chesterton, Ind.; Poplar Bluff, Mo.; DeWitt, Ark.; Mineola, Palestine, and Richmond, Tex.; Troy, Ala.; Waterford, Alexandria, and Richmond, Va.; Raleigh, N. C.; Washington, D. C.; Chesapeake Beach, Md.; Blue Hills, Mass. R. S. Walker collected a fine lot of galls near Chattanooga, Tenn.

In the Chicago area the nearly grown fresh galls in middle of May are covered with normal bark and look hard and woody, but with a knife the tissue cuts like cheese, the pinkish horns inside not quite reaching the surface, the basal part of the horn filled with translucent nutritive matter with no larval cavity evident. The tips of these horns soon break through the surface and they come to protrude a considerable distance dropping to the ground early in July. Some of these gathered from the ground in July were put in breeding cage July 16, 1917, and found to contain living adults November 26, 1917, which emerged normally May 12, 1918. If attacked by parasites these horns do not slip out. *Sesia scitula* Harris feeds on the tissue of the gall. Brodie collected galls at Toronto.

CALLIRHYTIS CRYPTA (Ashmead)

Described as forming galls on *Q. catesbaei*, similar galls determined as those of this species have been found on *Q. marilandica*, *cinerea*, and *rubra*. They have been collected at Fairfax, S. C.; Jacksonville, Gainesville, Marianna, River Junction, and St. Petersburg, Fla.; Dothan, Ala.; Laurel (M. L. Polk), Miss.; Victoria, Cuero, and College Station, Tex. At Jacksonville flies were emerging from galls on *Q. catesbaei* on April 4, 1914, and ovipositing in the internodes of the new growth.

CALLIRHYTIS DIFFICILIS (Ashmead)

The galls of this species were described from *Q. cinerea*, but they occur also on *Q. phellos*, *laurifolia*, *nigra*, and *myrtifolia*. They have been noted at Jacksonville, Daytona, Clearwater, St. Petersburg, Ocala, Gainesville, Madison, Carabelle, River Junction, Marianna, and Cottondale, Fla.; Troy and Montgomery, Ala.; Houston, Palestine, and Trinity, Tex.; Texarkana and Hoxie, Ark.; Tuskahoma, Okla.; and Poplar Bluff, Mo. Galls on *Q. phellos* at Hoxie had mostly all dropped to the ground on October 10, 1917. Kept in out-of-door breeding cage, they contained pupae August 22, 1919, and adults September 27. Some flies issued December 3, 1919, but some galls still contained larvae, and another fly emerged October 10, 1920. The emergence is thus delayed for two winters and

is then distributed over at least two seasons. Ashmead called it the "difficult gall" because he was six years in trying to rear the maker, "collecting them either too early or too late." He probably did not keep them in a suitable breeding cage long enough.

CALLIRHYTIS FLAVIPES (Gillette)

Neuroterus flavipes GILLETTE, Iowa Agr. Expt. Sta. Bull. 7, 1889, p. 281.

This species produces a fleshy midrib swelling on the leaves of *Quercus macrocarpa* in spring. Galls containing pupae were collected in Illinois at Evanston June 17, 1911, and at Winnetka June 28, 1907. Galls at Moline contained pupae June 20, 1915, and adults began to emerge June 23. From galls at Palos Park the adults had already emerged on July 2, 1917. The galls were seen also at Miller, Ind., and Brodie collected galls at Toronto. The species has previously been reported only from Ames, Iowa. The adults reared agree with paratypes in the National Museum and the species is here transferred to *Callirhytis*, where because of the very short-pubescent, non-ciliate, hyaline-veined wings, it is related to those species bred from the flowers of oak. The forest-insect collection has flies, determined by the writer as this species, reared June 19, 1915, at Falls Church, Va., from a gall on *Q. alba*.

CALLIRHYTIS FLAVOHIRTA (Beutenmueller)

Andricus flavohirtus BEUTENMUELLER, Inscut. Inscit. Menst., vol. 1, 1913, p. 124.

On July 20, 1912, the writer collected a number of these bud galls in clusters on *Q. bicolor* at the ends of the new growth on the banks of the Chicago River, west of Ravenswood, at Chicago, Ill. They were then full grown and the bracts about the galls were narrow and inconspicuous. As the bracts develop they eventually dislodge the gall and continue to grow until by fall there is a conspicuous terminal rosette of bracts. If the gall is attacked by guests or parasites, it does not drop to the ground, and when such galls are gathered in fall or winter one fails, of course, to rear the maker from them. These galls collected in July were put in a box in a terrarium in the laboratory, where by October 6 the mass moulded and was about to be thrown away when one of the galls was opened and a living adult obtained. The outer smooth fleshy layer of the gall had rotted away, leaving a hard, rough, thin brittle shell. This fly lived in a vial in laboratory until November 1. The flies probably emerge normally in the spring. This fly has been compared with the type of *flavohirtus* and seems to be the same. As the claws are simple, the species is here transferred to *Callirhytis*. These galls on *bicolor* have been seen at Evanston, Wilmette, and Ravinia, Ill.

CALLIRHYTIS FLORIDANA (Ashmead)

Andricus? floridanus Ashmead, Trans. Amer. Ent. Soc., vol. 14, 1887, pp. 132, 137.

This species was described from *Q. chapmani* from Florida. As the types have the claws simple the species is transferred to *Callirhytis*. The stem swellings of this species are found in the fall covered with normal bark. They look hard and woody but when cut into they are found to consist of a thick layer of soft white parenchymatous tissue which cuts like cheese, the numerous cells being deeply imbedded next to the true wood. The writer has collected them on *Q. stellata* and reared flies which agree with the types. Galls from Poplar Bluff, Mo., contained pupae when examined in November, the adults emerging in the spring. Galls were seen also at Texarkana, Ark., and Trinity, Tex. Galls collected at Washington on April 3, 1921, had adults emerging and they continued to emerge until April 18. A moth, *Nola phylla* Dyar, whose larva feeds on the tissue of the gall, emerged April 16. W. Middleton collected galls at East Falls Church, Va., on March 14, 1920, and reared adults April 19 (Hopkins U. S. No. 14636[b]). To test the powers of flight of a Cynipid some recently emerged flies of this species were carried in a vial to a dimly lighted corridor which had a north window at the end and allowed to escape one by one at various distances from the window, on a cloudy day. One was seen to make a straight-away flight to the window at a distance of 45 feet. In 1924 the makers emerged April 26.

CALLIRHYTIS FUTILIS (Osten Sacken)

SEXUAL GENERATION

The wart galls on the leaves of *Quercus alba* have been observed at Williams Bay, Wis.; Evanston, Winnetka, Fort Sheridan, and Moline, Ill.; Cedar Rapids, Iowa; Poplar Bluff, Mo.; Tuskahoma, Okla.; Texarkana, Ark.; Elyria, Ohio; Farmingdale (Crosby), N. Y.; Rosslyn and East Falls Church, Va. Brodie collected the galls at Toronto and adults emerged July 17–29, 1893, and July 7–12, 1896. For rearing the galls should not be gathered until the producer has reached the pupa stage, which in the North would be about the first of July. The galls have been observed on *Quercus bicolor* at Evanston, Ill., and on the rock chestnut oak, *Quercus montana*, at Ithaca, N. Y., and Alexandria and Bluemont, Va. The galls were very common on the leaves of white oak about Washington in the spring of 1924.

CALLIRHYTIS GALLAESTRIATAE, new species

Female.—Black, except for the reddish-brown antennae, palpi, legs, and all the abdomen except dorsal part of second tergite. Head

covered with short white pubescence, except on vertex, finely rugose, from above as broad as thorax and broadened behind the eyes, malar space .5 eye, antennae 14-segmented, lengths as (scape) 15 (width 7) : 9 : 20(4.5) : 15 : 13 : 12 : 10.5 : 10 : 10 : 9 : 8 : 8 : 8 : 13.5(7). Pro- and mesonotum rugose, the white pubescence not quite hiding the sculpture. Parapsidal grooves narrow, percurrent, between them posteriorly several longitudinal ridges in the sculpture, but no distinct median: anterior and parallel lines inconspicuous; foveae deep, large, and distinctly separated, the septum breaking up into fine ridges running out on to disk. Carinae on propodeum nearly straight, converging slightly above. Mesopleura striate below, with small shining spot above. Wing subhyaline, pubescent, and ciliate; veins brown, the two cross-veins heavy; second abscissa of radius slightly angled; radial cell three and one-fourth times as long as broad; areolet nearly round, reaching one-eighth way to basal; cubitus reaching basal. Hind tarsus 5 shorter than 1, claws simple. Abdomen slightly longer than head and thorax, length to height to width as 35 : 28 : 20; lengths of tergites along dorsal margin as 26 : 6 : 3 : 2 : 1 : 4, second with two large pubescent patches at base; exposed parts of 3–7 punctate, seventh pubescent; ventral valves projecting posteriorly; tip of ovipositor hooked; ventral spine slender, six times as long as broad in side view, with scattered hairs below. Using width of head as a base, the length of mesonotum ratio is 1.4, antenna 2.4, wing 4.2. Length of the single specimen, 3.3 mm.

Type.—Cat. No. 27220, U.S.N.M. Holotype.

Host.—*Quercus maxima*, red oak.

Gall (fig. 24).—The gall was described by Miss Stebbins in 1910.[4] but she failed to rear the adult. The galls are spindle-shaped with a long tapering base, the largest measuring 31 mm. long by 4 mm. in diameter, longitudinally ridged with from 9–12 rounded ridges. They are found in late summer sticking out at an angle of 45° on the twigs, produced from weak lateral buds toward the base of the current season's growth, greenish at first and often tinged with red, later turning brown and dropping to ground early in September.

Habitat.—The type material was collected at Ravinia, Ill., September 15, 1917. Galls were opened at intervals and on September 2 and March 25, 1919, those opened contained full-grown larvae. On June 9, 1919, the dead adult was found in the last of the galls in the cage. Date of normal emergence unknown. These galls were also collected at Evanston, Fort Sheridan, and Glen Ellyn, Ill. William Beutenmueller has collected them at New York City. There is a similar gall on *Q. texana* at Boerne, Tex.

[4] Springfield Mus. Nat. Hist. Bull. 2, p. 23, pl. 9, fig. 34.

CALLIRHYTIS GEMMIFORMIS (Beutenmueller)

Andricus gemmiformis BEUTENMUELLER, Canad. Ent., vol. 49, 1917, pp. 346–7.

Galls of this species have been collected on *Q. alba* at Fort Sheridan, Ravinia, and Glen Ellyn, Ill., and on *Q. bicolor* at Fort Sheridan and Wilmette. Galls collected October 29, 1916, contained pupae on September 17, 1917, and adults on November 15. These would probably have emerged in the spring of 1918. From galls collected in October, 1918, living flies were cut December 2, 1919, which agree with the type. As the claws are simple the species is here transferred to *Callirhytis*.

CALLIRHYTIS HUMICOLA (Kinsey)

Andricus humicola KINSEY, Bull. Amer. Mus. Nat. Hist., vol 46, 1922, p. 283, pl. 24, fig. 13.

The gall of this species was described by the writer in 1921 as Weld 1501.[5] The next year the species was described from a single female from a gall on *Q. kelloggii* at Ashland, Oreg. The writer collected galls on this host at Siskiyou, Oreg.; and in California at Scott Bar and at Baird (where fresh galls seemed nearly full grown in late May), at Fort Jones, at Placerville, and at Milford, in Lassen County, on August 2 some cells were full of translucent nutritive matter while others contained full-grown larvae. The galls are common also on *Q. wislizenii*, being seen at Baird, Bartlett Springs, Lakeport, Ukiah, Santa Rosa, on Mount Diablo, at Los Gatos, in Palo Colorado Canyon in the Santa Lucia Mountains, in the Santa Ana Mountains, and in Waterman Canyon in the San Bernadino Mountains. In California Redwood Park galls were found at the base of sprouts which had come up about the base of stumps on the fire trail around the rim of the Big Basin and adults were already emerging on April 20; others came out April 25, 27, 28, 1922. Ten measured individuals range from 3.6–4.1 mm. Average, 3.83 mm.

CALLIRHYTIS INFUSCATA (Ashmead)

Andricus infuscatus ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, 1887, pp. 128, 144.

This species was described from Jacksonville, Fla., from galls on *Quercus catesbaei*, the adults emerging in March. As the tarsal claws are simple the species is here transferred to *Callirhytis*. The writer has collected the galls on the above host at Green Cove Springs, Marianna, River Junction, Madison, Tallahassee, Carabelle, Gainesville, Ocala, St. Petersburg, and Clearwater, Fla. Similar galls were seen at Marianna on *Q. marilandica* and *Q. cinerea* and on

[5] Proc. U. S. Nat. Mus., vol. 59, p. 243.

Q. laurifolia at Gainesville, Ocala, and Clearwater. Galls collected November 20, 1919, at Daytona on *Q. laurifolia* and sent to Washington and Evanston for rearing gave flies May 23, 26, June 3 and 15, 1920. From galls collected at Savannah, Ga., November 26, 1919, living flies were cut March 14, 1921, having pupated the previous November. Galls on *Q. myrtifolia* collected at Daytona November 20, 1919, gave flies May 23, 1920, but some galls still contained larvae as late as September 4, 1920, so that the emergence may be distributed over at least two seasons. The writer has been unable to separate these reared specimens from the types of *infuscata*.

CALLIRHYTIS LANATA (Gillette)

Dryophanta lanata GILLETTE, Bull. Ill. St. Lab. Nat. Hist., vol. 3, 1891, pp. 198–9, pl. 9, fig. 5.

This species is here recorded from two new host oaks, *Q. rubra* and *Q. texana*, and from the following localities: Evanston, Wilmette, Glencoe, Ravinia, Fort Sheridan, Waukegan, and Glen Ellyn, Ill.; Minneapolis (C. J. Weld), Minn.; Delevan (D. Watt), Wis.; North East, Pa.; Ithaca (J. C. Bradley), Riverhead (C. R. Crosby), and Medina, N. Y.; Bluemont, Va.; Poplar Bluff, Mo.; Hugo, Okla.; Palestine, Austin, and Mineola, Tex.; and Troy and Dothan, Ala. Galls collected at Evanston in fall of 1916 contained pupae and larvae on September 17, 1917, and adults and larvae on November 26. Adults issued April 6 and April 22, 1918, and about 50 more came out April 10 and April 18, 1919. These agree with the type in National Museum. As the claws are simple, the second and third tergites not tongue-shaped, the carinae on propodeum not angled, the species is here transferred to *Callirhytis*.

Brodie found the galls common about Toronto on red and black oak, forest trees as well as second growth. They appear in August, mature in October dropping before the leaves, the producers emerging May 8 and June 24, 1888, May 1, 1889, and April 4–July 24, 1898, in each case from galls collected on the ground under the trees the previous fall. Beutenmueller collected galls on red oak near Fort Lee, N. J., in October, 1922, and cut flies out of the galls in January, 1924.

CALLIRHYTIS LUSTRANS (Beutenmueller)

Andricus lustrans BEUTENMUELLER, Trans. Amer. Ent. Soc., vol. 39, 1913, p. 244.
Andricus impositus BEUTENMUELLER, Ent. News, vol. 29, 1918, p. 329.
Andricus dimorphus verifactor KINSEY, Indiana Univ. Studies 53, 1922, p. 15.
Acraspis vaccinii (gall only), ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, 1887, p. 136.

Lustrans was described from two adults captured at Austin, Texas, gall and host unknown. One of these specimens was given in 1921 to the writer, who recognized its close relation to *impositus*. *Lus-*

trans is described as without a median groove, but this specimen in certain positions shows a faint median line, while the groove in some of the many available parataypes of *impositus* is fully as faintly defined. The writer is unable to separate paratypes of *verifactor* from *lustrans*. The gall of this species was first described by Osten Sacken in 1862, but Ashmead was evidently in error in thinking he had reared it in 1887, associating the wingless fly he reared with the wrong gall. These galls occur as midrib clusters on under side of leaves of *Quercus stellata* in the fall, dropping when mature. When fresh the individual galls are shaped like huckleberry flowers, somewhat cylindrical with the end distinctly truncate and depressed, but during the winter on the ground they become globular except for a short pedicel, and the depressed end becomes a flattened circular scar at apex with a slightly raised rim, and the greenish or reddish color changes to brown.

Beutenmueller sent the writer galls from New York City which contained pupae on November 1 and adults on November 25 (age of galls unknown). The writer collected galls at Poplar Bluff and Ironton, Mo.; Wharton, Trinity, Arlington, and Boerne, Tex.; Hugo, Okla. At Hugo they were just starting to develop on July 25. Galls collected in October, 1917, at Trinity, Tex., gave two adults May 18, 1919. In galls collected at Ironton in fall of 1917 pupae were found in October, 1918, and in March, 1919, flies emerging before May 12, 1919. S. A. Rohwer collected galls at Ironton in October, 1918, and reared adults April 9–16, 1919, and a few more were found dead in cage May 12, 1920 (Hopkins U. S. No. 10777*j*).

A precisely similar gall on the shin oak, *Q. breviloba*, was seen at Austin and Boerne, Tex., and may prove to be that of this species.

CALLIRHYTIS MAMILLAFORMIS, new species

Female.—Reddish-brown, the head, antennae, anterior and lateral lines, and dorsal part of abdomen infuscated (in the type the abdomen is a clear dark red). Head coriaceous, pubescent on face; from above transverse, as broad as thorax, cheeks scarcely broadened behind eyes; from in front facial area one and one-fifth times as broad as high, malar space 0.37 eye, without grooves, antennae 13-segmented, lengths as (scape) 16:6:18:15:13:11:9:8:7:7:7:7:7:16. Thorax covered with white pubescence, mesoscutum coriaceous with uniformly distributed setigerous punctures, parapsidal grooves narrow, deep, smooth, percurrent, well-separated behind, no median. Scutellum rugose the two oblique smooth pits at base almost confluent. Carinae on propodeum straight and parallel. Mesopleura with large smooth bare area. Hind tibia longer than tarsus, claws simple. Wing hyaline, pubescent, ciliate, veins beyond second cross-vein pale,

areolet reaching about one-sixth way to basal, cubitus indistinct. Abdomen longer than head and thorax, length to height to width as 27:23:17, length of tergites along dorsal curvature as 53:18:9:5:6:4, ventral spine long, slender, in side view eight times as long as broad. Using width of head as a base, the length of mesonotum ratio is 1.3, antenna 2.5, wing 4.1. Length, 1.8–2.1 mm. Average of four, 2.1 mm.

Type.—Cat. No. 27221, U.S.N.M. Paratypes in American Museum and Field Museum.

Host.—*Quercus alba.*

Gall (fig. 25).—A bud gall half protruding beyond the bud scales, produced in the fall and probably dropping to the ground when mature. Somewhat globular with a nipple at apex, green or brownish, smooth, truncate at base when detached without circlet of white hairs.

Habitat.—The type specimens were from galls collected at Ravinia, Ill., from terminal buds on vigorous sprouts from stumps, October 22, 1916, and four living flies cut from the galls November 16, 1917, would probably have emerged in the spring of 1918. The galls have also been seen at Bluemont, Va., and Washington, D. C. A similar gall has been observed on *Q. stellata* at Poplar Bluff, Mo.; Hoxie, Ark.; and College Station, Tex., but not yet reared.

CALLIRHYTIS MILLERI Weld

Since describing the species the writer has collected affected acorns on *Q. agrifolia* at Ojai (flies emerging April 26), Calistoga, and on Mount Diablo; on *Q. kelloggii* at Calistoga, Baird, Milford, Kyburz, Placerville, and in Santa Lucia Mountains; on *Q. wislizenii* in the Santa Ana Range, on Mount St. Helena, at Lakeport, Ukiah, Santa Rosa, Shasta, and Red Bluff, Calif.

CALLIRHYTIS MODESTA (Osten Sacken)

This hard parenchyma gall on leaves of red oak, *Q. maxima*, was collected at Ames, Iowa; Moline, Ill.; Evanston, Ill. (adults emerging June 24, 1912); Chesterton, Ind. (containing adults nearly ready to emerge June 25).

CALLIRHYTIS NIGRAE (Osten Sacken)

The writer has collected galls of this species on *Q. marilandica* at Ironton, Mo., Hot Springs and Texarkana, Ark., but never reared adults.

CALLIRHYTIS OPERATOR (Osten Sacken)

The acorn pip galls of the agamic generation have been collected at Blue Hills, Mass., and Riverhead (Crosby), N. Y., on *Quercus*

ilicifolia; at Medina, N. Y., Ironton. Mo., and Bluemont, Va., on red oak, *Q. maxima;* at Ithaca, N. Y., Webster Groves and Ironton, Mo.. and Washington, D. C., on *Q. velutina.* The writer has never been able to rear adults which emerge from the galls the second spring. Brodie collected galls at Toronto.

The woolly galls on the staminate flowers of the red oaks, yielding the sexual generation, were seen on *Q. coccinea* at Miller, Ind., where adults were emerging and females ovipositing in the 1-year-old acorns. In 1913 the larvae had not begun to pupate on May 25 and adults issued in breeding cage June 15–28. In 1912 females were seen ovipositing in immature acorns on June 26. The galls were seen also at Evanston, Ill. Crosby collected galls on *Q. ilicifolia* at East Hampton. Long Island, from which adults emerged June 21. Galls have been seen on red oak at Rosslyn, Va. The writer determines as this species a lot of flies from Halifax, Nova Scotia, reared July 10, 1913.

CALLIRHYTIS PHELLOS (Osten Sacken)

The writer has collected galls of this species on *Q. imbricaria*, a previously unrecorded host, at Rosslyn, Va., June 25, 1923, and adults emerged June 26 and 28. Similar galls, containing pupae, were taken at same locality on *Q. phellos* on May 14 and living adults cut out June 20. These galls are terminal enlargements of the new growth and scarcely noticeable in June, being green and only about 5 mm. in diameter. When cut open they show a central cell surrounded by short radiating fibers. For rearing they must be left until at least the pupal stage is reached, and even then the drying out of the gall may so harden the tissues that it will be necessary to cut out the adult. If attacked by guests or parasites, and perhaps even after the escape of the maker, the galls continue to increase in size up to a diameter of 8–10 mm., lose the narrow radiating layer inside, become woody and covered with normal bark, and then are quite conspicuous and frequently collected.

Galls have been collected at Blue Hills, Mass.; Riverhead (Crosby) and Farmingdale (Crosby), N. Y.; Chesapeake Beach, Md.: Washington, D. C.; Falls Church, Va.; Daytona, Clearwater, Ocala, Gainesville, Marianna, and Tallahassee, Fla.; Palestine, Austin, Boerne, and Kerrville, Tex.; and Poplar Bluff, Mo.

CALLIRHYTIS PIGRA (Bassett)

At Evanston, Ill., these galls on *Q. velutina* and *coccinea* contained adults September 3, 1906; at Poplar Bluff, Mo., contained pupae September 6, 1915. Said to emerge in autumn or next spring. Brodie collected galls at Toronto on two occasions on small second-growth trees of red oak, *Q. maxima*, and states that many producers of both sexes emerged October 7–24, 1888, and October 10–16, 1892.

CALLIRHYTIS PULCHRA Bassett

These flower galls have been collected at Evanston, Winnetka, Fort Sheridan, and Willow Springs, Ill., on *Q. coccinea*, a previously unrecorded host, and at Wilmette on red oak, *Q. maxima*. They drop to the ground about the last of May after the aments have shed their pollen and are drying up. Flies issued June 6, 1911, June 10–24, 1912, and before June 16, 1913. Galls were seen on *Q. velutina* at Falls Church, Va.

CALLIRHYTIS PUNCTATA (Bassett)

Galls were collected at Michigan City, Ind.; Evanston, Ill.; Poplar Bluff, Mo.; Texarkana, Ark.; Mineola and Palestine, Tex. S. A. Rohwer collected galls at Ironton, Mo., in October, 1918, from which flies emerged April 16, 1919. The species transforms in the fall as adults have been cut out of galls in December and once as early as September 6. Brodie collected galls at Toronto.

CALLIRHYTIS RUGOSA (Ashmead)

Described from *Q. laurifolia*, the writer has taken galls of this species on *Q. phellos* at Gainesville, Ocala, and Tallahassee, Fla.; on *Q. imbricaria* at Rosslyn, Va.; and on red oak, *Q. maxima*, at Palos Park and Ravinia, Ill.; Plummer Island, Md.; and Rosslyn, Va. Schradieck collected galls on *Q. maxima* at East Hampton, N. Y., and Barlow on *Q. imbricaria* at Cadet, Mo. A gall from Long Island contained a pupa on June 15, and one from Chicago area contained a pupa on July 2. No adults reared. The gall is much rarer in the North than in the South.

CALLIRHYTIS RUGULOSA (Beutenmueller)

Andricus rugulosus BEUTENMUELLER, Canad. Ent., vol. 43, 1911, p. 211.

Galls of this species have been taken in May at Winnetka, Ravinia, Glencoe, and Fort Sheridan, Ill.; Miller, Ind.; Falls Church, Va.; and Washington, D. C., on *Q. coccinea*. The greenish young galls secrete honey dew, which attracts ants. Later they often become straw-yellow with rosy longitudinal streaks on the ridges, the surface showing scattered stellate hairs and with a slight nipple and crown of reflexed hairs at apex. Galls collected at Miller on May 19, 1917, gave flies before May 16, 1918, the larvae transforming to adults in the fall before middle of November. The galls have been seen just starting at Washington as early as April 24.

CALLIRHYTIS SCITULA (Bassett)

Galls of this species were collected at Winnetka and Fort Sheridan, Ill., and at Chesterton, Ind., on *Q. coccinea*. Adults of both

sexes emerged July 3, 1912, and May 22, 1913. Osten Sacken collected galls at New Rochelle and Barrytown, Zabriskie at Nyack and Flatbush, N. Y.; Thompson at Woods Hole, Mass. The writer has collected a similar gall on *Q. imbricaria* at New Lenox, Ill., Rosslyn and Bluemont, Va., and at Washington, D. C.

CALLIRHYTIS SEMINATOR (Harris)

Galls of this species are here recorded on *Quercus alba* from the following localities: Williams Bay, Wis.; Fort Sheridan, Glencoe, Evanston, La Grange, Glen Ellyn, Willow Springs, Kankakee, and Utica (Starved Rock Park), Ill.; Cedar Rapids (Scott), Iowa; Miller and Porter, Ind.; Poplar Bluff, Mo.; Texarkana, Ark.; Tuskahoma, Okla.; Troy, Ala.; Fairfax, S. C.; Richmond, Rosslyn, Alexandria, and Bedford County (Apple Orchard Camp), Va.; Plummer Island (McAtee), Md.; Gettysburg, Pa.; Ithaca, Industry (Crosby), East Hampton (Crosby), and Farmingdale (Crosby), N. Y. At Evanston the galls were found just starting on May 17 and adults issued June 29–July 12. At Washington the galls start to develop early in April. Middleton reared adults at Falls Church, Va., June 13, 1913, June 13, 1914, and June 18–29, 1915. Galls from Kanawha Station, W. Va., collected by Hopkins gave adults June 21–25, 1912. The writer has seen the gall on the rock chestnut oak, *Q. montana*, at Falls Church, Va., and on the basket oak, *Q. prinus*, at Gainesville and Jacksonville, Fla., the latter host being previously unrecorded for this species.

CALLIRHYTIS SEMINOSA Bassett

Galls like the Bassett types have been collected on *Quercus palustris* at East Falls Church, Va., but no adults were reared. Zabriskie collected a gall on the same host at Nyack, N. Y. Beutenmueller has taken it in Bronx Park, New York City, on red oak, *Q. maxima*.

CALLIRHYTIS TUBICOLA (Osten Sacken)

The galls of this species start to develop late in July and become full grown during September. The writer has observed them on *Quercus stellata* at Poplar Bluff and Ironton, Mo.; Hugo and Tuskahoma, Okla.; College Station and Trinity, Tex.; East Falls Church and Clarendon, Va., and Washington, D. C. Galls collected in October, 1917, at Ironton gave adults May 16, 28, and June 8, 1918. Galls at College Station contained pupae on November 1, 1917, and adults issued May 11, 16, 26, 28, 1918. Galls at Clarendon contained adults November 29, 1923, which emerged indoors March 1, 1924. S. A. Rohwer collected galls at Ironton in October, 1918, and reared adults (at Washington) April 9, 16, 26, 1919 (Hopkins U. S. No. 10774*f*).

CALLIRHYTIS TUMIFICA (Osten Sacken)

This large, smooth fleshy swelling of base of midrib and petiole of red oak, *Quercus maxima*, was collected at Evanston, Ill., on June 28, the adults emerging during July. At Apple Orchard Camp in Bedford County, Va., they were merging July 1, 1920. The galls have also been observed at Rosslyn, Va., and Washington, D. C.

CALLIRHYTIS VENTRICOSA (Bassett)

Cynips q. ventricosus BASSETT, Proc. Ent. Soc. Phila., vol. 3, 1864, p. 681.
Cynips q. conifera ASHMEAD, Trans. Amer. Ent. Soc., vol. 9, 1881, Proc. p. XXVII.

Bassett's galls were collected at Waterbury, Conn., on *Quercus ilicifolia* in June and the insects cut out of the galls in October "else they would probably have remained until spring." The writer has collected galls which agree with Bassett's description and types on several red oaks: On *ilicifolia* at Blue Hills, Mass.; on *coccinea* at Miller, Ind.; Evanston, Winnetka, Ravinia, and Fort Sheridan, Ill.; on *rubra*, at East Falls Church, Va.; Washington, D. C., Fairfax, S. C., and Dothan, Ala.; on *imbricaria* at Joliet and New Lenox, Ill., and Waterford and Rosslyn, Va. The galls are green, fleshy, densely short-pubescent, with a broad base and tapering apex, growing often on scar tissue on the main trunk as well as on the smaller branches. In the Chicago area they may be found developing in June, turning brown and dropping off about the middle of July. They are often eaten into by squirrels or woodpeckers. About Washington galls have been seen just starting in late March, becoming full grown by middle of May and dropping in early June. They seem to be nowhere common. Although easiest found during the developing stage they should not be gathered for rearing until they turn brown or begin to drop. From galls on *imbricaria* gathered from ground in June at Rosslyn living adults were cut out October 9. A *Q. rubra* gall from Dothan contained a pupa December 6 which transformed by December 12. Date of emergence in spring not determined.

The type galls of *conifera* Ashmead are smaller and were collected in Florida in April after they had turned brown on *Q. phellos* and *laurifolia*. The fly was cut out of a dried gall. The galls were said to issue from bud axils, but the writer found galls at Jacksonville on *phellos* like the types which were not bud galls but burst out through the bark singly or in clusters of two or three in the internodes, and some were already turning brown on April 4. The flies never emerged from these galls, but dead ones agreeing with the type were cut out in June of the next year. These galls were also seen on *phellos* at Carabelle and Lake City, Fla., and at Clarendon,

Va. They were seen on *laurifolia* at Clearwater, Fla. A Lake City gall contained a pupa on December 6, and two adults emerged May 23, giving a date for the normal emergence. The flies from *phellos* galls from Florida do not seem to differ from those reared from the larger galls on *imbricaria*, *rubra*, and *coccinea* in the north, and so *conifera* is here made a synonym of *ventricosus*. As the tarsal claws are simple, the species is transferred to *Callirhytis*, to which it would run in the Dalla Torre and Kieffer key. Brodie collected galls at Toronto which the writer would determine as this species, the host oak not recorded.

AMPHIBOLIPS ACUMINATUS Ashmead

This species was described but briefly from a single female. Some additional notes are here given and a description of the male.

Female.—Black, abdomen red, fore and middle tibae and tips of their femora not infuscated. Head rugose; antennae 13-segmented, last incompletely divided by transverse groove. Thorax coarsely rugose; parapsidal grooves rugose, percurrent, no distinct median, the anterior lines fine and parallel. Pits on scutellum large, shallow, bottom shining but sculptured, separated by a distinct septum; disk rugose, its median groove not deep. Mesopleura finely rugose. Wing pubescent and ciliate, clear except for heavy black cloud on basal half of radial cell above the small areolet. Basal vein heavy. Cubitus reaching basal. Abdomen smooth and polished, second tergite bare, occupying over .8 of abdomen. Ventral spine four times as long as broad in side view. Length of four specimens, 4.3–5.0 mm.

Male.—Differs from female in having 15-segmented antennae; third segment longest and slightly bent and stoutest, the flagellum tapering to tip. Abdomen black, smooth, and polished, and bare, except for slight pubescence on seventh tergite. Size, 3.2–4.0 mm.

Described from five specimens: Washington, D. C., 1921 (H. S. Barber); Alexandria, Va., June 11, 1923; reared from a gall collected June 3; and June 29, 1924.

Gall.—A bud gall to be found just starting about Washington from mid-April to early May. The young galls are red. They soon become greenish with a grayish bloom and often with wine-colored spots. The larvae become full grown and change to pupae in early or mid-June, when the galls begin to turn brown. Adults emerge June 11–24. The galls are heavily parasitized.

Host.—*Quercus cinerea*, and *rubra*, the Spanish oak. It was described as from the black-jack oak on which the writer has never found it as yet.

Habitat.—The gall is common on the coast plain region near Washington on *Q. rubra*. Farther south it occurs on *Q. cinerea* also. The writer has also seen galls at Ocala, Cottondale, Mari-

anna, River Junction, and Madison, Fla.; at Dothan, Ala.; at Fairfax, S. C.; at Fredericksburg and East Falls Church, Va.; at Chesapeake Beach, Md.; at Palestine, Mineola, and Trinity, Tex.; and at Hugo, Okla. Dr. J. C. Bradley collected galls in Georgia and A. B. Gahan at Berwyn, Md.

AMPHIBOLIPS CINEREA (Ashmead)

The writer has collected galls on *Q. cinerea* at the following Florida localities: Jacksonville, Gainesville, Ocala, St. Petersburg, and Madison. The National Museum has some from Brooksville and from "Georgia." At Gainesville April 23, 1914, the flies were about ready to emerge and a supply was secured by cutting open the galls. Some galls were noticed in which was a little hole as though a parasite had recently issued. When one of these was cut open a small chalcid was found inside among the fibers and a living producer in the central cell. It soon became evident that the chalcid was chewing a way in instead of out in order to attack the maker even after it had completed its transformations. Fragments of adults inside the cell frequently showed that the dangers of parasitism are not entirely over until the maker actually gets out of the gall.

AMPHIBOLIPS CITRIFORMIS (Ashmead)

This species was described from *Q. phellos* from "Florida," the adults emerging the first week in May. The type galls are bud galls. The writer has collected galls at Jacksonville and Daytona but never reared the flies.

AMPHIBOLIPS COELEBS (Osten Sacken)

As this species has been known from a single male from a gall on the red oak, *Q. maxima* at Washington a description is here given of the female from a gall on the same oak and from nearly the same locality.

Female.—Head nearly black; thorax, legs, antennae, mandibles, and abdomen red, the latter infuscated posteriorly. Head narrower than thorax, rugose with fine radiating ridges on malar space, antennae 13-segmented, filiform, face slightly pubescent. Thorax covered with pubescence not dense enough to obscure the sculpture. The indistinct median and parapsidal grooves rugose like rest of mesoscutum, separation between parapsidal grooves behind not greater than width of groove. Disk of scutellum reticulate, scarcely grooved in median line, two pits at base. Pleurae rugose. Wing subhyaline with first cross-vein heavy and a heavy cloud in base of the radial cell and about the indistinct areolet, cubitus reaching basal. Legs without infuscation, claws with tooth. Abdomen not quite as long as head and thorax, lengths of tergites along dorsal curvature as

98:20:9:3:0:7, second smooth at base and with slightly pubescent areas on sides, exposed parts of rest microscopically punctate except for a narrow smooth and polished hind margin. Ventral valves directed backward, ventral spine tapering, pubescent underneath, about as long as first segment of hind tarsus. Using width of head as a base the length of mesonotum ratio is 1.4, antenna 2.4, wing 3.6. Length of three specimens, 3.5, 3.7, 3.8 mm.

Two of the above specimens were reared July 13 and 24, 1914, by W. Middleton from galls on *Q. maxima* collected at Falls Church, Va. The third was from a gall collected June 15, 1914, by H. E. Schradieck at East Hampton, Long Island, the fly emerging before July 20. He also sent galls from Riverhead, Long Island. The writer has collected galls at Blue Hills, Mass., and also at Washington on *Q. velutina*.

AMPHIBOLIPS CONFLUENTUS (Harris)

Galls at Ithaca, N. Y., contained full-grown larvae on July 14, 1908, when collected, pupae on August 1 and adults September 12 when 86 specimens, all females, were cut out of the galls. A gall at Waterport, N. Y., contained a pupa August 14. Galls at Manistee, Mich., contained adults when opened September 20. At Miller, Ind., galls just turning brown were gathered on June 3, 1911, then containing full-grown larvae which had transformed into adults by September 16. Flies emerged on November 21, 1918, from galls on *Quercus velutina* from Lyme, Conn. (Hopkins U. S. No. 10767[b]). Brodie collected galls on *Quercus coccinea* at Toronto in October and producers emerged November 10, 1892, all females.

AMPHIBOLIPS SPONGIFICA (Osten Sacken)

At Washington, which is the type locality for this vernal sexual form, the galls appear with the leaves in the spring, having been observed on April 24, 1921, 3 cm. in diameter when the leaves were scarcely 15 mm. wide. In 1923 they were full grown by May 6, but with the nutritive layer only partly used up. One contained a living male ready to emerge on June 16. At Porter, Ind., galls were beginning to turn brown on June 19, 1912, and a male issued July 1. At Evanston, Ill., males and females issued June 16 and 20, 1913. Galls collected June 16, 1918, on *Q. coccinea* at Lyme, Conn., gave adults of both sexes June 12, 21, 29, 1918 (Hopkins U. S. No. 10767[a]). Flies emerged from galls from Rosslyn, Va., on June 12–14. Brodie collected galls at Toronto on *Quercus maxima*. "They appear as an expansion of the leaf early in May, always attached to the end of a vein. Ova placed in bud in fall." Adults all out by end of June, 1886, and in 1887, he records that the producers had nearly all emerged by July 3, and in 1893 all out by July 1.

AMPHIBOLIPS COOKII Gillette

The following additions to the published distribution data for the species are here made: Ithaca and Medina, Atwater (Howe), West Point (Osten Sacken), Katonah (Beutenmueller), N. Y.; Evanston, Ravinia, Waukegan, Kingston, Willow Springs, and Moline, Ill.; Kilbourn, Wis., where the galls were so common in the fall of 1908 that over 800 were collected; Poplar Bluff and Ironton, Mo.; Tuskahoma, Okla.; and Bluemont, Va. Brodie collected galls at Toronto. In the fall of 1887 he put 187 galls on the ground in garden where they lay all winter and the next summer. The adults "began to come out October 25, 1888, fifty specimens in all, some alive and ovipositing on December 1. They oviposit in buds, the female surmounting the bud and grasping it with all her feet, pushing the ovipositor between the scales of the bud." He did not find a male. His notes describe the gall as nearly spherical, 11–23 mm. in diameter, yellowish-green, thickly dotted with slightly elevated reddish-brown spots. They may there be collected on ground after middle of September usually under trees of large size. The National Museum has galls from Elkhart, Ind.

AMPHIBOLIPS ELLIPSOIDALIS, new species

Female.—Head and thorax black, abdomen dark red, antennae, mandibles, legs beyond femora brownish. Head rugose, pubescent, not as broad as thorax, from above transverse, occiput concave, cheeks greatly broadened behind eyes; from in front broader than high, as 32:26, facial area square, malar space half eye, antennae filiform, 15-segmented, lengths as (scape) 21 (width 10):11(8.5):36(7):23:18:16:12:11:10:9:9:9:8:8:15(8). Thorax and legs with white pubescence, dense and erect on sides of the rugose pronotum, closely appressed on mesoscutum, but not hiding sculpture. Mesoscutum rugose in low relief, the tops of ridges shining; parapsidal grooves reaching forward to hind end of the fine anterior parallel lines, lateral lines wider than anterior, a slight trace of a median line in the sculpture. Scutellum rounded behind, with two smooth oblique pits at base distinctly separated by a septum which is continued back as a median carina in the sculpture of the broad rugose disk. Carinae on propodeum straight, converging slightly above. Mesopleura with a small bare polished spot. Legs stout, hind tibia longer than tarsus, its segments as 45:22:14:9:27 (with claw 33). Claws toothed. Wing slightly dusky, pubescent, ciliate, subcosta, and two cross-veins clouded, free part of subcosta not reaching margin, second abscissa of radius angled, areolet reaching one-fifth way to basal, cubitus reaching basal. Abdomen not as long as head and thorax, length of tergites on dorsal margin as 43:5:2:1.

second with large pubescent areas on sides, hind margin at angle of 45°, ventral valves oblique, ventral spine slender, tapering, pubescent underneath, in side view about five times as long as broad. Using width of head as a base, the length of mesonotum ratio is 1.34, antenna 1.7, wing 3.4. Length of the single specimen, 5.3 mm.

Type.—Cat. No. 27222, U.S.N.M. Holotype.

Host.—*Quercus palustris.*

Gall (fig. 26).—A bud gall of early spring as new growth is starting. Spindle-shaped, blunt at both ends, up to 14 mm. long by 5 mm. in diameter, smooth, mottled with white when fresh, falling to ground when mature. Produced from weak lateral buds.

Habitat.—The type fly was reared from a gall collected May 9, 1920, on *Q. palustris* at "Dyche" on the wooded banks of the Potomac below Alexandria, Va. The fly was found dead in breeding cage April 10, 1921. Similar galls have been found in spring on *Q. coccinea* at Ravinia and Fort Sheridan, Ill.; Miller, Ind.; and Washington, D. C. A shorter and broader gall with the same structure was seen on *Q. imbricaria* at Joliet, Ill.

AMPHIBOLIPS ILICIFOLIAE (Bassett)

Crosby and Schradieck collected galls on *Q. ilicifolia* at Riverhead and East Hampton, Long Island, on July 20, from which all but one of the flies had already emerged. Probably the normal emergence period is late June or early July.

AMPHIBOLIPS INANIS (Osten Sacken)

The "empty oak apple" has been collected at the following localities: Evanston, Lake Zurich, Glen Ellyn, La Grange, New Lenox, Joliet, Palos Park, Willow Springs, and Moline, Ill.; Porter, Ind.; Manistee and Onekama (T. Hatfield), Mich.; Delevan (D. Watt), Wis.; Ironton, Mo.; Tuskahoma, Okla.; Plummer Island, Md.; Apple Orchard Camp, in Bedford County (C. J. W.), and Bluemont, Va.; Blue Hills, Mass.; Medina and Ithaca, N. Y.; and Ottawa (F. Johansen), Canada. Brodie collected galls at Toronto.

The galls are 18–32 mm. in diameter, light green with irregularly scattered purplish spots, wall thin and somewhat translucent, produced singly on under side of leaf. At Evanston adults issued in various seasons on June 25, June 11, July 6; at Ottawa, July 8; in mountains of Virginia on July 9.

AMPHIBOLIPS NIGRA Beutenmueller

This species, whose gall was described as on an unknown oak in Durango, Mexico, occurs in Arizona where the writer has collected galls on *Quercus emoryi* and *Q. hypoleuca* in Huachuca Mountains,

near Bisbee in Mule Mountains, and in the Santa Catalina Mountains. The National Museum has galls from the Santa Rita and Chiricahua Mountains and from Fort Grant. The writer has not reared adults. Seventeen of the types range from 5.2–6.3 mm. Average 5.6 mm.

AMPHIBOLIPS NUBILIPENNIS (Harris)

This species forms a fleshy translucent yellowish-white gall resembling a green grape attached to the under side of leaf in spring. A gall on *Quercus coccinea* at Miller, Ind., contained a pupa on May 30 and another found June 30 showed an exit hole where the maker had recently escaped. Galls were seen on red oak, *Q. maxima*, at Fort Sheridan, Ill., and at Indian Falls, N. Y. Crosby collected a lot of fresh galls 10–22 mm. in diameter at Farmingdale, N. Y., on June 14, 1914, on *Q. coccinea* and *velutina* and from these a male issued June 22, another June 23, and two females June 24, and one June 25. Four-fifths of the galls were parasitized.

AMPHIBOLIPS RACEMARIA (Ashmead)

This species was described from females from "Florida" on *Q. laurifolia*. The types are labeled "Jacksonville" and with them is a male of a subsequent rearing determined by Ashmead. The writer collected galls on *Q. laurifolia* at Daytona, Clearwater, and Ocala; also on *Q. phellos* at Jacksonville, Carrabelle, and Gainesville, rearing one adult, a female, some time after April 23. The flies are closely related to *nubilipennis* (Harris) and a comparison of a larger series of specimens may show that it is not worth while to maintain the name *racemaria* for individuals attacking southern oaks. There is a similar gall on *Q. nigra* at Texarkana, Ark., and on *Q. imbricaria* about Washington but no adults have been reared.

AMPHIBOLIPS SPINOSA Ashmead

This species was described from one specimen from "Florida" reared in January, the gall on *Q. laurifolia*. The writer has found the gall on *Q. phellos* also and at the following localities: Jacksonville, Daytona, Live Oak, Madison, River Junction, Tallahassee, Gainesville, and Clearwater. Among galls collected on ground at Madison on October 21, 1919 some contained pupae but the adults never emerged. When the galls were cut open October 10, 1920 moulded adults, a pupa and a larva were found. These adults were females.

AMPHIBOLIPS TINCTORIAE Ashmead

Galls on *Q. velutina* have been collected in the fall at Poplar Bluff, Mo.; Moline, Ill.; and Washington, D. C. The type flies emerged October 16, locality unknown. The writer has never reared adults.

BASSETTIA CEROPTEROIDES (Bassett)

A gall agreeing with the Bassett type galls of this species was collected at Miller, Indiana, on *Quercus coccinea* on May 19, but the adults had escaped.

BASSETTIA GEMMAE Ashmead

The species was described from flies taken ovipositing in buds April 27, at Cadet, Mo. Gall unknown. The writer captured flies agreeing with the types ovipositing in the buds of *Q. alba* at Clinton, Ill., April 21, 1916, Evanston, Ill., April 9, 1910, Washington D. C. March 27, 1920, April 24, 1921, April 15, 1924.

BASSETTIA TENUANA Weld

Galls collected on *Q. undulata* at foot of bluff 17 miles east of Hillsboro, N. Mex., on November 14, 1921, contained adults and living flies were cut out of the galls on January 13 and February 6, 1922. Galls were collected on *Q. fendleri* at Las Vegas, October 17, 1921, some containing adults and others larvae. At Shoemaker on October 23, 1922, on *Q. gambelii* some contained living adults and others were partly grown with a thick translucent nutritive layer in the cells.

EUMAYRIA HERBERTI, new species

Female.—Red, eyes and ventral valves black. Head and thorax opaque, the sculpture apparently coriaceous but the polygonal areas are bounded by ridges. Head from above broader than thorax, massive, occiput slightly concave; from in front face pubescent, malar space .46 eye without groove, antenna 13-segmented, lengths as (scape) 15 (width 6) : 7(5.5) : 11(4) : 10 : 9 : 9 : 9 : 8 : 8 : 8 : 8 : 7 : 15(5), flagellum gradually becoming stouter toward apex. Parapsidal grooves smooth, deep, percurrent, wider behind with a trace of a median. Mesoscutum broader than long. Scutellum with two large deep smooth pits, the sculpture on disk becoming coarser behind. Carinae on propodeum straight and parallel. Hind tarsus shorter than tibia, segments as 28 : 7 : 5 : 3 : 9, claws simple. Wing hyaline, covered with very short brown pubescence, margin not ciliate, veins very pale, first abscissa of radius arcuate, no areolet. Abdomen as long as head and thorax, lengths of tergites along dorsal curvature as 52 : 7 : 4 : 4 : 3 : 6, second with interrupted ring of wool as base, hind margin not oblique, ventral valves oblique and protruding, ventral spine slender and in side view 8 times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.2, antenna 2.3, ovipositor 3.3, wing 3.8. Length, 1.9–2.4 mm. Average of 75, 2.17 mm.

Types.—Cat. No. 27223, U.S.N.M. Type and 39 paratypes. Paratypes in American Museum, Field, Stanford, Harvard, California Academy, and Philadelphia Academy.

Host.—Quercus kelloggii.

Gall (fig. 27).—Cells in the peripheral layer of wood just under the normal bark of vigorous shoots 2 cm. or less in diameter. Single cells measure 3 mm. by 1 mm., the long axis parallel with long axis of twig, the exit holes .7 mm. in diameter. If several cells lie close together their shape is somewhat distorted and a slight swelling may be visible on surface.

Habitat.—The type material was collected at Placerville, Calif., May 7, 1918, by Mr. Frank B. Herbert; adults emerging May 21–27 and June 7, 1918 (Hopkins U. S. No. 13687*d* and 15608*c*). The writer collected galls at Los Gatos, in Palo Colorado canyon in the Santa Lucia range, and in the Sequoia National Park near Colony Mill.

The same sort of cells were noted in the twigs of *Q. agrifolia* at Boulevard, Pasadena, Soledad, Monterey, Los Gatos, Berkeley, and Santa Rosa; and in twigs of *Q. wislizenii* at Idyllwild, Camp Baldy, and Santa Margarita.

Genus SAPHONECRUS Dalla Torre and Kieffer

No species of this genus has hitherto been described from the Philippines. As the known species of this genus are guests in Cynipid galls on oak, the finding of these guests makes it certain that such galls occur in the islands but none has as yet been reported.

The only described species of the genus from the United States is *Saphonecrus gemmariae* (Ashmead) from Florida. It was described from male bred from gall of *Callirhytis gemmaria* (Ashmead) and the type seems to be lost.

A key is given below to the three species here described.

1. Areolet absent ..... **serratus** Weld.
   Areolet present ..... 2.
2. Radial cell three times as long as broad. Median groove evident posteriorly ..... **areolatus** Weld.
   Radial cell twice as long as broad. No median ..... **brevis** Weld.

SAPHONECRUS BREVIS, new species

Female.—Vertex, eyes, tips of mandibles and part of occiput black, rest of head honey-yellow, darker in some individuals than in others. Sides of pronotum lighter yellow, median dorsal area black. Pectus black, the mesopleura more or less infuscated, showing much variation in different individuals. Metapleura, propodeum, mesonotum, and abdomen black. Parts of coxae black, femora more or less infuscated dorsally, other parts of legs yellow.

Vertex coriaceous with scattered punctures. Cheeks broadened behind eyes. Malar space .56 eye, radiating ridges above mouth. Antenna 14-segmented, lengths as (scape) 17 (width 7) : 8(5) : 16(4) : 10 : 10 : 10 : 9 : 9 : 8 : 8 : 8 : 7 : 7 : 11(4). Pronotum "broad," one-fifth as long in middle as on sides, rugoso-punctate, slightly pubescent. Mesoscutum broader than long, with discontinuous sharp transverse ridges, the intervals rather smooth and shining; parapsidal grooves narrow, percurrent, crossed by the ridges anteriorly, the enclosed area rounded behind, no median; anterior and lateral lines fine but distinct. Scutellum rugose, disk faintly margined behind, no distinct pits at base. Carinae on propodeum broad, straight, diverging above. Hind tibia longer than tarsus whose segments are as 36 : 14 : 8 : 5 : 13, claws simple. Wing hyaline, pubescent and ciliate, radial cell open, twice as long as broad, first abscissa of radius arcuate, one-third length of second, which is slightly curved, areolet reaching one-fourth, cubitus three-fourths way to basal and if prolonged would reach it slightly below the middle; veins brown.

Abdomen as long as head and thorax, length to height to width as 36 : 25 : 18, petiole stout, sulcate, second tergite bare, highly polished, longest on median dorsal line, pointed behind, slightly crackled under high magnification near tip, other tergites hidden. Hypopygium long but not conspicuous, ventral spine almost bare, in side view three times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.1, antenna 1.7–1.9, wing 2.8–3.0, ovipositor 2.9–3.1.

Length, 2.7–3.8 mm. Average of 77 pinned specimens, 3.2 mm.

Male.—Similar to female in coloration and sculpture. Antenna 15-segmented, first five segments as 15 : 8 : 17 : 9 : 10, third as stout as the second and strongly curved. Abdomen shorter than head and thorax.

Length, 2.2–3.8 mm. Average of 36, 2.9 mm.

Type.—Cat. No. 27224, U.S.N.M. Type female, allotype, 15 male and 30 female paratypes. Paratypes at American Museum, Field, Stanford, Harvard, and Philadelphia Academy.

Biology.—The type is selected from a series reared March 17, 1923, from the large abrupt woody stem galls of *Andricus ruginosus* Bassett collected at Magdalena, N. Mex., the previous October on *Quercus grisea*. Paratype material reared April 6 from the same species of galls collected in the Santa Rita Mountains, Arizona, on *Quercus oblongifolia*. Paratype material also reared from the same galls collected in Tumacacori Mountains, Arizona, on *Quercus arizonica*. The flies issued March 8 and April 5 and 20.

Determined as this species the Museum has flies from Silver City, N. Mex., reared February, 1881; Las Cruces, N. Mex., Fort Grant, Ariz., reared April 19, 1882, all from twig swellings on oak. Also flies from gall of *Andricus durangensis* Beutenmueller, Durango, Mexico, reared March 1, 1897.

SAPHONECRUS SERRATUS, new species

Female.—Black, legs, antennae, mandibles, and tegulae reddish-brown. Head from above broad as thorax, median length .35 width, occiput concave, cheeks not enlarged behind the eyes, not margined; from in front broader than high, interocular line .5 transfacial, malar space as long as eye, without groove, whole face covered with fine ridges radiating from clypeus but partially obscured by white pubescence, parallel vertical ridges on vertex above antennae on each side of median ocellus, antennae filiform, 14-segmented, lengths as (scape) 14 (width 6) : 7(5) : 16(3.5) : 14: 14: 14: 13: 12: 11 : 10: 10 : 9 : 9 : 15(3.5), maxillary palpus 5- and labial 3-segmented. Pronotum "broad" as in all the guest flies, median length one-fourth that on lateral margin, somewhat truncate in front with two small pits, emarginate behind, sides coarsely punctate. Mesoscutum broader than long, traversed by sharp transverse interrupted ridges which are higher on anterior third, parapsidal grooves are indicated in the coarse sculpture and in certain positions a median is indicated posteriorly. Scutellum subtruncate and coarsely rugose, slightly margined behind, with parallel longitudinal ridges in transverse groove at base. Carinae on propodeum straight, diverging above, enclosing a smooth area broader than high, a prominent ridge on each side also laterad of the spiracle. Mesopleurae entirely longitudinally striate. Hind tarsus shorter than tibia, segments as 37 : 10 : 7 : 6 : 15 (including claw). Claws simple. Hind tibia with the two usual apical ventral spurs and a shorter dorsal one. Fore wing pubescent and ciliate, radial cell open on margin and partially so at base and apex, cubitus reaching basal at its lower end, no areolet, anal vein clouded as far as the usual break. Abdomen shorter than head and thorax, length to height to width as 27 : 22 : 14, second tergite one-fourth as long as third much as in *Ceroptres* but the two grown together without a visible suture (determined by dissection and balsam mount), the combined plate occupying the whole of the abdomen in side view, its hind margin distinctly punctate, base almost bare; petiole short, longitudinally sulcate as in *Synergus*, ventral valves scarcely protruding, ventral spine in side view twice as long as broad. Using width of head as a base the length of mesonotum ratio is 1.1, antenna 2.3, wing 3.4, ovipositor 3.3. Range in length 2.4–3.4 mm. Average of 18 specimens 2.8 mm.

Male.—Differs from the female in having 15-segmented antennae, filiform like those of female, length of third to fourth as 15:12, slightly flattened on outer side but almost straight. Abdomen as long as thorax, only the fused second and third tergites visible in side view.

Lenth 2.3–2.5 mm. Average of 3 specimens 3.38 mm.

Type.—Cat. No. 27225, U. S. N. M. Type female, allotype, and 7 female paratypes. One male and 7 female paratypes in collection of Prof. C. F. Baker, Los Baños. One female paratype at American Museum.

Habitat.—Baguio, Benguet, Island of Luzon in Philippines (Baker). Collected at Haight's place at 8,000 feet in mountains near Baguio. Crawling on leaves on forest floor among oaks in freezing weather. No oak galls seen.

SAPHONECRUS AREOLATUS, new species

Female.—Differs from *serratus* in the absence of vertical ridges above the antennae, in the less sharply ridged mesoscutum, the transverse ridges not being distinctly higher anteriorly, the parapsidal grooves narrow, deep and distinct, not so much lost in the sculpture, median more distinct posteriorly. The transverse groove at base of scutellum without longitudinal ridges and indistinctly divided into two pits. Fore wing with a distinct areolet reaching one-fifth way to basal. Abdomen with punctation on hind border of big tergite almost entirely wanting, visible only under high magnification, ventral valves protruding obliquely. Length of two specimens 3.1 and 3.2 mm.

Male.—Distinguished from the male of *serratus* by same differences in sculpture mentioned above for the female and also by the shorter, stouter antennae, the third segment more distinctly excised. Length of 3 specimens, 2.3, 2.65 and 2.65 mm.

Type.—Cat. No. 27226, U.S.N.M. Type female and allotype. One male and one female paratype in collection of Prof. C. F. Baker, Los Banos.

Habitat.—Baguio, Benguet, Island of Luzon in the Philippines (Baker). Collected at Haight's place with preceding species.

SYNERGUS CASTANOPSIDIS (Beutenmueller)

Periclistus castanopsidis BEUTENMUELLER, Ent. News, vol. 29, 1918, p. 251.

A paratype female in the National Museum is a *Synergus* to which genus the species is here transferred.

Genus EUCEROPTRES Ashmead

This genus was proposed in 1896 for *Euceroptres primus* Ashmead whose type female was reared as a guest in a gall on scrub oak,

Georgiana, Florida. Dalla Torre and Kieffer in 1902 and again in 1910 have made the genus a synonym of *Ceroptres* Hartig. A study of the type and of two congeneric species here described leads me to believe that the genus should be maintained and in this opinion Dr. J. J. Tavares, who has published extensively on the Cynipid guests of the Iberian peninsula and who has examined sketches showing the generic characters and specimens of one of the new species, agrees. The genus may be recognized by the long pronotum which is broadly truncated, by the absence of the two parallel ridges on the face below the antennae which Doctor Tavares says are found only in the genus *Ceroptres*, and by the character of the abdomen which is made up largely of tergites two and three whose hind margins are parallel and oblique, forming an angle of about 45° with the long axis of the abdomen; tergite two is highly polished almost bare at base and three is microscopically punctate. The petiole is short and smooth, the ventral spine very short. Radial cell closed, cubitus directed toward lower end of basal. Tarsal claws weak but toothed.

KEY TO SPECIES OF EUCEROPTRES

1. Mesoscutum smooth or coriaceous rather than rugose without more than mere suggestion of transverse sculpture. Antenna of female 13-segmented, scape only infuscated. Tergite III highly polished and under ordinary magnification without punctures. Under 2.5 mm. Eastern United States and Japan ---------- 2.
   Mesoscutum more or less rugulose with evident transverse sculpture. Antenna of female 12–14 segmented. Over 2.5 mm ---------- 3.
2. Mesoscutum smooth, parapsidal grooves obsolete, scutellum disk smooth. Segment 3 of female antenna is to 4 as 19 : 8 ------ **japonicus** (Ashmead).
   Mesoscutum coriaceous, parapsidal grooves distinct and percurrent, disk of scutellum rugose. Segment 3 of female antenna is to 4 as 9 : 8. **primus** Ashmead.
3. Antenna of female 14-segmented, all infuscated, scape nearly black. Areolet reaching one-fifth way to basal. Punctation on tergites III and IV very distinct on sides. Transverse sculpture on mesoscutum only slight. Length 1.8–3.3 mm., from galls on *Q. chrysolepis* ---**montanus** Weld.
   Antenna of female 12-segmented, scape only infuscated. Areolet reaching one-tenth to one-seventh way to basal. Punctation on tergites III and IV very fine and not conspicuous. Mesoscutum more distinctly transversely rugulose. Larger species, 2.9–4.0 mm., from galls on *Q. agrifolia*. **maritimus** Weld.

EUCEROPTRES JAPONICUS (Ashmead)

Ceroptres japonicus ASHMEAD, Journ. New York Ent. Soc., vol. 12, 1904. p. 78.

The species was described from three specimens said to be males. One of the types has been lost from the card and the two remaining are females as Dalla Torre and Kieffer suspected. They belong to the genus *Euceroptres*, to which genus the species is here transferred.

EUCEROPTRES PRIMUS Ashmead

The following notes on the types are made to supplement the original description.

Seen from above the body has a wedge shape, narrowing gradually from the head which is the broadest part of the body. Head broadest behind the eyes. Lengths of segments of female antenna as (scape) 9 (width 4) : 5(3) : 9(2.5) : 8 : 7 : 7 : 6.5 : 6 : 5.5 : 5 : 5 : 5 : 9(4.5). In the male the third is to fourth as 12 : 10 and the third is strongly excavated. The pronotum is not "narrow" in the middle as in the gallmakers but relatively long as in all the genera of guest flies, broadly truncate, the trucation not margined, however, either above or on sides. Mesoscutum broader than long, coriaceous rather than rugulose with scarcely a suggestion of transverse sculpture, median groove short, about twice as long as broad. Carinae of propodeum curved slightly outward. Radial cell closed, two and one-fourth times as long as broad, first abscissa of radius arcuate. Areolet reaching about one-fifth way to basal, its distal vein showing a break, cubitus directed toward lower quarter of basal. Middle and hind coxae each with a bare and polished area, tarsal claws with tooth. Abdomen of female in side view showing length to height as 58 : 40, the hind margins of tergites II and III being parallel and oblique, making an angle of about 45° with the longitudinal axis of abdomen, the third showing a much larger area in side view; lengths of tergites along dorsal curvature as (petiole) 2 : 34 : 20 : 6, rest not visible dorsally, tips of ventral valves projecting slightly behind, petiole smooth, second, and third bare and highly polished with a dorsal patch of fine punctures on third, scattered punctures on fourth, hypopygium punctured and pubescent, ventral spine very short. In male lengths of tergites along dorsal curvature as (petiole) 3 : 33 : 17 : 3 : 0 : 0 : 11, third faintly punctate, last plainly so and pubescent, hind margins of two and three parallel and oblique as in female.

Biology.—The types were reared March 24 and April 7 from a gall on leaves of scrub oak at Georgiana, Florida. Two paratypes which are smaller and brownish but similar in structure are from a gall on *Q. alba* from Massachusetts. A male and female of what the writer determines as this species were found among the unmounted cotype material of *Cynips cicatricula* Bassett, now regarded as a synonym of *Andricus petiolicola* (Bassett). These were from *Q. alba* at Waterbury, Conn. The writer has bred specimens from the oak petiole gall on *Q. stellata* as Rosslyn, Virginia, July 1, 1923. The National Museum has one captured at Washington July 5, and the writer captured one at Ocala, Florida, on April 17, 1914.

EUCEROPTRES MONTANUS, new species

Female.—Black, tarsi, and antenna beyond scape brownish, all femora and tibiae lighter brown. Head and thorax in certain positions showing appressed whitish pubescence. From above head is transverse, occiput concave, cheeks not broadened behind eyes: from in front broader than high, broadest above at level of antennae, malar space .57 eye without groove, antennae 14-segmented, lengths as (scape) 14(width 7) : 6(6) : 15(5.5) : 17 : 15 : 14(6) : 13 : 12 : 11 : 10 : 9 : 9 : 8 : 14(5), or 15-segmented with the last two as 7 is to 9. Sides of pronotum finely rugose. Mesoscutum broader than long, parapsidal grooves narrow, smooth, percurrent, anterior and lateral lines short and smooth, traces of median groove posteriorly, surface faintly transversely ridged. Pits of scutellum open behind on to disk which is more coarsely rugose posteriorly. Carinae on propodeum parallel, enclosing a nearly square smooth area. Mesopleura with polished bare area posteriorly. Middle and hind coxae with a polished bare spot. Hind tarsus and tibia subequal, tarsal segments as 33 : 15 : 10 : 8 : 11 (including claw 16), claws weak with a weak tooth. Fore wing pubescent and ciliate, veins brown, radial cell closed, length to breadth as 23 : 8, areolet reaching one-fifth, cubitus about one-half way to basal. Abdomen shorter than head and thorax, length to height to width as 40 : 28 : 22. Lengths of tergites measured along dorsal curvature as (petiole) 5 : 61 : 23 : 10 : 0 : 0 : 8, petiole smooth, third and fourth microscopically punctate, seventh pubescent, ventral valves projecting horizontally well beyond tergites, ventral spine very short. Using width of head as a base the length of mesonotum ratio is 1.1, antenna 2.3, wing 3.0, ovipositor 1.5.

Range in length, 1.8–3.3 mm. Average of 58 specimens, 3.0 mm.

Male.—Differs from female in having antennae 15-segmented, lengths as (scape) 13 : 5 : 17 : 19 : 17 : 16 : 15 : 14 : 13 : 12 : 11 : 10 : 10 : 9 : 13 or 16 segmented by the division of the last into two of almost equal length, third incised, flagellum tapering gradually from about middle to apex. Abdomen shorter than thorax, length to height to width as 94 : 70 : 53. Lengths of tergites measured along dorsal curvature as (petiole) 5 : 55 : 22 : 2 : 0 : 0 : 20, petiole smooth, seventh conical with white pubescence dorsally. Length of antenna ratio, 2.7.

Range in length, 2.4–3.2 mm. Average of 48, 2.77 mm.

Types.—Cat. No. 27228, U.S.N.M. Type female, allotype, 18 female and 20 male paratypes. Paratypes in American Museum, Field, Stanford, Philadelphia Academy, and California Academy.

Biology.—Reared from gall of *Disholcaspis truckeensis* (Ashmead) on *Quercus chrysolepis*. Emerged April to June from galls collected the fall before.

Habitat.—Type locality, Idyllwild, Calif. Paratype localities: Camp Baldy, and Butte County (Big Bar Station on Western Pacific), Calif.; and Canyonville, Oreg. Determined as this species the Museum has two from Kern County, Calif., which were reared April 20, 1893.

EUCEROPTRES MARITIMUS, new species

Female.—Black, antenna beyond scape and legs beyond trochanters yellowish, tibiae and tarsi darker. Antennae 12-segmented, filiform, stout, lengths as (scape) 22 (width 9):8 (7):21 (7.5):21:18:17:16:13:10:9:8:20 (6.5), the last in some specimens showing a faint trace of a transverse furrow dividing it into two parts with lengths as 7 is to 13. Mesoscutum with sharp and distinct transverse ridges. Areolet reaching one-tenth to one-seventh way to basal, cubitus reaching basal at its lower end. Using width of head as a base the length of mesonotum ratio is 1.1, antenna 1.9, wing 2.9, ovipositor 2.0.

Range in length, 2.9–4.0 mm. Average of 13 specimens, 3.7 mm.

Male.—Antennae stout, 16-segmented, third excavated and equal to fourth, tapering to tip from about middle of flagellum. Lengths of tergites along dorsal curvature as (petiole) 5:60:33:10:3:6:20, the last with coarse setigerous punctures dorsally. Antennal ratio 2.25. Range in length 3.3–3.9 mm. Average of 10 specimens 3.6 mm.

Type.—Cat. No. 27229, U.S.N.M. Type female, allotype, 4 male and 4 female paratypes. Paratypes in American Museum, Field and Stanford.

Biology.—Two females and two males (including type and allotype) bred from a large woody gall of *Callirhytis suttoni* (Bassett) collected on *Q. agrifolia* on University of California campus by Mrs. G. D. Louderback, March 11, 1912. The guests emerged April 20. The paratype series also includes two males found among the Bassett cotypes of *Callirhytis suttoni* (Bassett) which was described from Oakland, and nine reared from galls determined as *Callirhytis suttoni* (Bassett) collected at Montecito, May 1, 1918, and sent in under Hopkins No. 15605^{c1}. The guests emerged May 13, June 8 and 17, 1918.

MYRTOPSEN MIMOSAE, new species

Female.—Brown, thorax and abdomen nearly black. Head and thorax covered with white pubescence and from above wedge-shaped. Head granulate, from above transverse, broader than thorax, cheeks not enlarged behind eyes, occiput concave with oblique striae on

each side; from in front broadest above middle, malar space .55 eye without groove, antenna 13-segmented lengths as (scape) 13 (width 5.5) : 8 (5) : 13 (4) : 10 : 9 : 9 : 9 : 9 : 9 : 9 : 8.5 : 8 : 13 (6). Pronotum broad in middle and subtruncate. Mesoscutum broader than long, coarsely transversely rugose, parapsidal grooves percurrent, broader behind, no median, anterior and lateral lines not prominent. Disk of scutellum rugose, tapering toward apex which is slightly truncate, with two distinct smooth pits at base. Carinae on propodeum heavy, arcuate with a spur on outer side of each to spiracle, neck smooth. Mesopleura bare, polished. Hind tarsus about as long as tibia, its segments as 18 : 9 : 7 : 5 : 9 (with claw 11), claws weak, simple. Wing hyaline, pubescent, ciliate, veins brown, first abscissa of radius arcuate, half as long as second, radial cell closed, two and four-tenths times as long as broad, no areolet, cubitus directed toward and reaching half-way to lower end of basal. Abdomen as long as head and thorax, length to height to width as 86 : 60 : 45, almost truncate posteriorly, first tergite smooth, the big tergite on dorsal margin and the fourth on the posterior with lengths as 77 : 21, the fourth and posterior portion of the big one microscopically punctate, pubescent patches at base, ventral valves parallel with long hypopygium, ventral spine very short. Using width of head as a base the length of mesonotum ratio as 1.1, antenna 2.2, wing 3.0, ovipositor 3.4. Length, 1.9–2.4 mm. Average of 8 specimens, 2.27 mm.

Male.—Differs from female in having 14-segmented antennae, lengths of first five as 13 : 8 : 28 : 11 : 11—the third bent, swollen at apex, stouter than scape, flagellum tapering from third to tip. Abdomen shorter than head and thorax, truncate behind big tergite, lengths along dorsal and posterior curvature as 55 : 20 : 2 : 1 : 13, last coarsely punctate and pubescent, punctation of big tergite and following one as in female. Length, 2.1–2.45 mm. Average of 9 specimens, 2.26 mm.

Type.—Cat. No. 27227, U.S.N.M. Type female, allotype, 3 female and 3 male paratypes. Paratypes at Field Museum and Stanford.

Biology.—Living flies were cut out of galls on *Mimosa biuncifera* on August 10, 1918. The galls are abrupt stem swellings produced on one side of the twigs, globular or ellipsoidal in shape, measuring up to 20 mm. in diameter, covered with normal bark and consisting of parenchymatous tissue in which are many cells. The preserved galls become very hard but contain no true wood. The flies are thought to be guests but the maker of the gall is yet to be determined.

Habitat.—The type material is from the Huachuca Mountains, Ariz. The galls were collected July 10, 1918 at the mouth of Carr Canyon. The galls have been observed in the Chiricahua, Mule, Patagonia, Santa Rita and Santa Catalina Mountains.

DIASTROPHUS BASSETTII Beutenmueller

The gall of this species, produced at the crown of the trailing blackberry, has been collected at Rosslyn and East Falls Church, Va., and at Glen Echo (J. C. Bridwell), Md. The galls are full grown before end of August. Only guests were reared. Beutenmueller has taken galls at Tenafly, N. J., adults emerging June 20.

DIASTROPHUS FRAGARIAE Beutenmueller

This species producing a spindle-shaped gall on the petiole of wild strawberry leaf was described from males only. The female is here described.

Female.—Face with radiating ridges, malar space about .7 eye, interocular space .6 transfacial and area one and six-tenths times as broad as high, antenna 13-segmented, lengths as (scape) 13:7:13:13:12:12:11:11:10:9:9:9:16, last with transverse groove on one side, incompletely dividing it in proportion of 7:9. Pronotum with a median transversely elliptical truncation. Mesoscutum broader than long, highly polished, bare except for a few hairs scattered along parapsidal grooves which are deep and percurrent. Scutellum rugose, with two large pits at base. Propodeum with a network of fine ridges in place of usual carinae. Radial cell open, three and six-tenths times as long as broad, first abscissa of radius arcuate, second nearly as long as third abscissa of cubitus, no areolet, hind tarsus shorter than tibia, claws toothed. Legs about same color as antennae. Abdomen black, length to height to width as 87:65:58. Lengths of tergites along dorsal curvature as 2:39:19:10:0:0:12, hypopygium projecting back farther than the tergites, ventral spine very short. Using width of head as a base the length of mesonotum ratio is 1.3, antenna 2.48, wing 3.7, ovipositor 1.7.

Length, 2.3–2.7 mm. Average of five specimens, 2.5 mm.

Biology.—The galls are usually seen in June and July when if gathered they are too immature to rear. One may either mark the spot and come back in the fall or early spring for the galls or transplant the affected plants to home garden where it can be easily found. The writer transplanted to a city back yard two plants with galls found at Fort Sheridan, Ill., July 16, 1917. In the fall after the foliage had turned brown the galls were put in a breeding cage and left out-of-doors all winter. The flies emerged June 2, 1918. The writer has also seen galls at Glencoe and Kenilworth, Ill., and at East Falls Church, Va. The unpublished Walsh journal records finding the gall at Rock Island, Ill., on August 27, 1866. A specimen from Kingston, Rhode Island, was sent to Bureau of Entomology for determination. Brodie records the gall at Toronto in 1887, 1891, and in 1893 reared producers May 18–25.

DIASTROPHUS CUSCUTAEFORMIS Osten Sacken

Galls were collected at Evanston, Winnetka, Waukegan, and Willow Springs, Ill.; Batesburg (E. H. McGregor) and Fairfax, S. C.; Bedford County, Va.; Washington, D. C.; and New York City (Beutenmueller). About Chicago adults emerged June 6–11 and at Washington April 25. Brodie collected galls at Toronto, adults emerging May 29. He also reports the gall common on *Rubus villosus* at Aspdin and Port Sidney, Muskoka, where adults emerged May 30 to June 3.

DIASTROPHUS NEBULOSUS (Osten Sacken)

This gall on blackberry canes has been collected at Poplar Bluff, Mo. (adults emerged June 1–11); Chesterton, Ind.; Willoughby, Ohio; Farmingdale (Crosby) and New York City (Beutenmueller) (adults emerged April 20), N. Y.; College Park (Gahan), Md. (emerged April 24); Washington, D. C. (emerged May 1–30, 1912); Fairfax county (Cushman) (emerged May 27), Fredericksburg and Bluemont, Va.; Fairfax, S. C.; Billy's Island in Okefenokee Swamp (J. C. Bradley), Ga.

DIASTROPHUS NIGER Bassett

This spindle-shaped enlargement of the stem of *Potentilla canadensis* has been collected at Evanston (adults emerged April 15–May 1) and Fort Sheridan, Ill.; Poplar Bluff, Mo.; Hoxie, Ark.; (adults emerged at Evanston June 1–11); Onekama (T. Hatfield), Mich.; Ithaca, N. Y.; Washington, D. C. (flies emerged April 10–25).

DIASTROPHUS TURGIDUS Bassett

Galls collected at Glencoe, Ill.; in early May began to yield adults on May 20, 1907. From galls collected at Evanston flies emerged in 1909 on June 10. In 1912 they emerged May 1–15. Brodie collected galls on *Rubus strigosus* at Toronto and reared adults May 25–27, 1890, and in 1891 on May 21, 23, 24. In 1892 the new galls were full grown by July 17. He had galls sent to him from Grimsby from which flies emerged May 15–24. He reports the galls as common in 1892 around Port Sidney and at Whitechurch and common throughout Muskoka.

AYLAX GLECHOMAE (Linnaeus)

The writer has collected galls of this species at Evanston, Waukegan, Joliet, and Moline, Ill.; La Porte, Ind.; North East, Pa.; Medina and Ithaca, N. Y.; and Rosslyn and East Falls Church, Va. The green and succulent galls may be found developing in June,

turning brown in July, containing pupae at Evanston August 1 and 12 and adults on September 20. These adults remain in the galls over winter, emerging in the spring.

AYLAX GILLETTEI (Kieffer)

This species produces no visible gall but forms cells in the pith of stems of the compass plants, *Silphium laciniatum* and *terebinthinaceum*. From old dead stems collected at Evanston, Ill., in spring of 1912 flies of this and the following species emerged May 15, 30, June 11, 15, 17, 22, 24, 1912.

AYLAX RUFUS (Gillette)

Reared at Evanston, Ill., together with above species from stems of compass plant.

AYLAX HYPOCHOERIDIS (Kieffer)

Early in 1920 A. C. Burrill collected galls on the introduced European plant known locally as the false dandelion (*Hypochoeris radicata* Linnaeus) at Albany, Oreg., and sent some to the Bureau of Entomology and some to William Beutenmueller who reared adults in large numbers April 15 to May 15 and was the first to suspect that it was the work of a European cynipid introduced along with the plant. He sent galls and adults to the writer who has in turn submitted them to Prof. J. S. Tavares in Spain for direct comparison with European material. Doctor Tavares writes that "it is without doubt the European species. The gall is also the same." He sent specimens he had reared in Spain for the Museum collection. Prof. C. Houard, of Strassburg, to whom galls were submitted confirms this determination. This adds another to the small list of gall-making Cynipidae common to Europe and America—all on introduced European plants.

In the month of June 1922 the writer saw the galls growing at the following localities in Oregon: Cottage Grove, Walker, Creswell, Eugene, Corvallis, Albany, Jefferson, Salem, Brooks, Woodburn, Hubbard, Aurora, Barlow, Canby, New Era, Oregon City, Portland, Newberg, McMinnville, Sheridan, Willamina, Grande Ronde, Goble, and Troutdale. The plant without any galls on it was noted along the Columbia highway as far east as The Dalles, and as far south along Pacific highway as Grants Pass but not on road from Medford to Crater Lake, and not on road from Grants Pass to Holland. In Washington the plants are very common about Seattle and on road from Tacoma to Ashford but no galls were seen. Thus the cynipid has not kept up with the spread of the plant but wherever it does occur its galls are helping to check the plant by stunting the growth of the flower stalks.

In 1921 E. S. Gourlay sent a gall and adults which the writer determines as this species from Christchurch, New Zealand. Evidently the plant and its gall have been introduced there also in recent years as they have been on our own Pacific coast. Kirk's Students flora of New Zealand (1899) speaks of the plant as "naturalized throughout the colony."

AYLAX LACINIATUS (Gillette)

The writer collected these galls in the flower heads of *Silphium laciniatum* at Glen View, Ill., on September 3, 1914. They were kept in greenhouse during winter and adults emerged before April 27, much earlier than would have been the case out-of-doors.

AYLAX TARAXACI (Ashmead)

This species producing galls on petiole, midrib and flower stalk of the dandelion was described from Winona, Minn., and has been reported from Ontario by Cosens and at Hudson Falls, N. Y., by Felt. The gall has long been known in Europe. The writer has collected galls at Medina, N. Y., in Illinois at Evanston, Wilmette, and near Ottawa, and in Iowa at Davenport and Ames. The galls are most noticeable in June when they are green and fleshy but they should not be gathered for rearing until they have turned brown in the fall. Galls collected at Wilmette in September and kept out-of-doors during the winter gave flies in numbers on June 1, 1918. A visit to the same locality on June 7, 1919, showed both old galls and fresh ones about half-grown.

AULACIDEA HARRINGTONI (Ashmead)

Aulax harringtoni ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, 1887, p. 146.
Aulax bicolor GILLETTE, Bull. Ill. St. Lab. Nat. Hist., vol. 3, 1891, p. 201.
Aulax mulgediicola ASHMEAD, Journ. Cincinnati Soc. Nat. Hist., vol. 17, 1895, p. 36.
Aulax cavicola ASHMEAD, Proc. U. S. Nat. Mus., vol. 19, 1896, p. 134.

Beutenmueller in 1910 wrote that the type of *harringtoni* was in the National Museum. The species was described from a single captured female sent to Ashmead by W. H. Harrington of Ottawa, Canada and through the kindness of H. L. Viereck we have recently learned that the Entomological Branch of the Department of Agriculture at Ottawa has a specimen labeled in Harrington's hand "Aulax Harringtoni Ashm. nov. sp." which must be the type. This specimen is an *Aulacidea* and Mr. Viereck has run it through a provisional key to the species and compared it with paratypes of *mulgediicola* and *podagrae* and with determined specimens of *tumida* and *ambrosiaecola* and "can see no difference between the paratypes of *mulgediicola* and the type of *harringtoni*. Beutenmueller has examined the types of *bicolor* Gillette and says they are the same as

mulgediicola. The type of *cavicola* Ashmead seems to the writer to be the same as *mulgediicola*. In certain positions the face shows a median ridge and in each case the hind basitarsus is equal to the remaining segments.

The writer reared flies from *Lactuca* stems at Evanston, Ill., which agree with types of *mulgediicola* Ashmead and which were determined by Beutenmueller as *bicolor* Gillette.

AULACIDEA NABALI (Brodie)

This species which forms galls at the base of the stem of *Prenanthes alba* was described from Toronto and has been reported from Quebec and Massachusetts. The writer has collected galls at Evanston, Ill., and reared the adults in numbers June 8–11, 1918. The American museum has a gall from Nyack, N. Y. (Zabriskie). After publishing the description of the species in 1892 Brodie collected more galls and reared adults June 10–18, 1892, and in 1893 they emerged June 1–19, 177 males and 151 females.

AULACIDEA PODAGRAE (Bassett)

This species has been reared at Wilmette, Ill., the flies emerging the first week in June. It makes rounded swellings at the nodes scattered along the stem of *Lactuca canadensis* and its cells also seem sometimes to be scattered in the pith without external evidence of a gall. Brodie collected the nodular gall at Toronto. Cells in the pith without external swelling were common at East Falls Church, Virginia, in fall of 1923.

AULACIDEA TUMIDA (Bassett)

The spindle-shaped leafy swellings of the stem of *Lactuca canadensis* collected at Wilmette, Ill., in March gave adults May 4–June 1, 1907. In 1908 the flies began to emerge May 20 and in 1913 they were emerging in May 30. In 1913 they emerged April 15–May 15. At Washington, D. C., flies began to emerge May 1. Brodie collected galls at Toronto, adults emerging June 8, 1892.

ANTISTROPHUS PISUM Walsh

This species is here recorded from the following unpublished localities: Greely, Nebr. (J. Q. Rood); Hebron, N. Dak.; Mandan, N. Dak. (H. F. Bain); Belford, S. Dak.; Garden City, Kans. (C. H. Popenoe); and Rexford, Kans. At the latter place the writer found the galls very numerous on roadside plants on October 1, but they were still green and too immature for rearing.

ANTISTROPHUS SILPHII Gillette

On June 23, 1915 the writer collected old galls of what he determines as this species on roadside plants of *Silphium perfoliatum* at Valley, Nebr. In 1917 galls from this locality were collected early in May and sent to Evanston, Ill., where adults emerged May 26, 31, and June 12. The National Museum has two galls from Omaha. The species was previously recorded only from Illinois. Beutenmueller erroneously used the name *leavenworthi* Bassett for this species instead of the older name *silphii* Gillette.

GONASPIS POTENTILLAE (Bassett)

Galls were seen on *Potentilla* at New York City (Sanford and Griffith); Bluemont, Va; Miller Ind.; and Glen Ellyn, Ravinia, and Kenilworth, Ill. In the Chicago area flies issued May 28, 1907: galls contained pupae on May 2 and adults began to emerge May 22, 1909; adults began to emerge before May 20 in 1912 and emerged May 15–18, 1913. P. R. Myers reared adults at Harrisburg, Pa., on May 17, 1908.

RHODITES BICOLOR (Harris)

This spiny rose gall has been taken at the following localities: Evanston, Glencoe, Ravinia, Fort Sheridan, and Waukegan, Ill.; Miller and Michigan City, Ind.; Medina, Ithaca and East Hampton (Schradieck), N. Y.; Alexandria, Va.; Landgraff (G. C. Ray), W. Va. In the Chicago area the new galls are full grown but still succulent the last of June, turning brown in July, after which they may be gathered for rearing. Galls kept in cage in greenhouse gave adults the next spring April 30, May 17, May 30. All emerge the first season. Brodie collected galls at Toronto and had galls sent to him from Calgary, Alberta.

RHODITES DICHLOCERUS (Harris)

The spiny form of this gall was common at Winnetka, Ravinia, and Waukegan, Ill., and was taken also at North East, Pa. Galls in Chicago area collected in early spring gave adults of both sexes May 27, June 7, 11, 21, 1909. In 1911 they emerged May 22 and 24. On May 24 some of the females were liberated on small wild rosebushes recently transplanted to greenhouse and having fresh shoots 5–6 inches high. On May 25 a female was seen ovipositing near the tip of one of these shoots. On June 5 a belt of grandular hairs at this point was the first evidence of gall formation and by June 18 the developing gall was 5 mm. in diameter. Adults issued from it in greenhouse the next spring before March 15. Brodie collected the gall at Toronto.

The smooth form of the gall was taken but rarely at Ravinia and New Lenox, Ill. and at Medina, N. Y. Mr. A. B. Gahan collected galls at College Park, Md. and adults began to emerge May 21, 1914.

RHODITES FUSIFORMANS Ashmead

Galls were collected at Evanston and Winnetka, Ill., where adults issued May 13–23, 1908, in first week of June in 1909, May 30–June 17, 1912; at West Cliff (the type locality) and Colorado Springs, Colo.; at Flagstaff, Ariz., where adults issued June 2 and 11. H. Y. Gouldman collected galls at Mandan, N. Dak. and Paul B. Sears at Lincoln, Nebr. on *Rosa pratincola.* Brodie collected galls on *Rosa blanda* at Toronto and reared adults June 18–20, 1890, and June 24–July 7, 1891.

RHODITES GRACILIS Ashmead

Galls of this species were collected at Evanston, Wilmette, and Winnetka, Ill., and at Kilbourn, Wis. From over-wintering galls collected early in May at Winnetka, adults emerged on May 15, 22, June 6 and 10. Another year living flies were found in breeding cage on June 2. Brodie collected galls on *Rosa blanda* at Toronto and reared adults June 23, 1888, July 12, 1892, June 12 to July 1, 1894.

RHODITES IGNOTUS Osten Sacken

The mealy rose gall was taken at Waukegan, Ill. (adults emerged in April); Miller and Dune Park (began to emerge April 15), Ind.; Webster Groves and Ironton, Mo., Troy, Ala.; East Falls Church, Va.; Washington, D. C.; College Park (Gahan), Md. (adults emerged April 24); and Shelter Island (Crosby), Queens County, N. Y.

RHODITES MULTISPINOSUS Gillette

Galls collected on a wild rose at Fort Sheridan, Ill. in April gave adults from April 27 to May 13, 1915. Galls taken at Wilmette on April 13, 1919, contained pupae and adults emerged May 10–18. Galls from Madison, Wis., gave flies May 5, 1919. Brodie collected galls on *Rosa blanda* at Toronto and reared adults June 21, 1888, May 5–31, 1890, April 19–25, 1893, and May 19 to June 2, 1904. He received galls also from Neepawa and Portage la Prairie, Manitoba; Prince Albert, Saskatchewan; and Calgary, Alberta.

Galls on *Rosa rugosa* collected at Minneapolis, Minn., in September, 1916, contained pupae April 28 and adults issued May 20–30, 1917. These flies seem to be the same as Gillette's type. A gall was collected on this cultivated rose at Evanston, Illinois and H. Y. Gouldman took some at Mandan, N. Dak. from which was reared *Orthopelma luteolator* (Gravenhorst).

RHODITES NODULOSUS Beutenmueller

Evanston, Ill., is one of the type localities for this species, the galls being collected on sweetbriar rose May 11, 1909, when they contained pupae. Adults emerged from May 25 until early in June. Galls collected in Wilmette April 13, 1919 contained pupae and adults emerged May 12 and 17. Similar galls on *Rosa rugosa* at Vicksburg, Mich., gave flies which seem to be this species.

RHODITES PUSTULATOIDES Beutenmueller

The two type flies of this species were reared May 24, 1913 from an unknown rose gall from Miller, Ind. The writer has reared flies which agree with the above types from galls collected at East Falls Church, Va., in July 1920, the flies emerging April 9, 1921. The galls were globular, thin-walled, armed with weak spines, smaller than those of *bicolor* and similar to those of *nebulosus*.

RHODITES RADICUM Osten Sacken

Large dark red galls were collected in summer of 1907 about the base of *Rosa carolina* growing in creek bottom 2 miles south of Medina, N. Y., adults emerging June 10, 1908. The galls were not underground but partially hidden by the debris that had become entangled about the base of the bushes at time of high water. More galls were collected from the same bushes August 29, 1908, adults emerging in out-of-door cage at Evanston, Ill., the next July. These flies agree with Osten Sacken paratypes.

RHODITES ROSAE (Linnaeus)

The mossy rose gall on the sweetbriar rose was collected at Evanston, Kenilworth, and Waukegan, Ill.; Adrian (O. Clark), Mich.; North East, Pa.; Medina, Albion and Ithaca, N. Y.; Chesapeake Beach (L. Haney), Md.; and East Falls Church, Va. About Chicago the adults issued April 27 to May 4, 1907, and the new galls were developing on the leaves by June 28. In 1909 adults began to emerge May 25.

The Brodie notes say that the gall is said to have been seen at Toronto in the fall of 1868 but he first noticed it in summer of 1872. Adults emerged there May 21, 1884, May 20, 1885, May 24, 1886. He received galls from Grimsby, Ontario, from which producers emerged May 13–16, 1892. "Old residents of Grimsby agree in saying that the gall first appeared there in the year 1889."

RHODITES ROSAEFOLII Cockerell

Galls were collected at Leadville, Colo.; Thistle, Utah; Flagstaff, Ariz. (adults emerged April 18 and 24); Waukegan (adults emerged May 11 and June 14), Ravinia and Evanston, Ill.; and Medina, N. Y.

Brodie collected galls on *Rosa blanda* at Toronto in August when the larvae appeared to be mature and reared adults the next spring in June.

RHODITES SEMIPICEUS (Harris)

Galls of this species (=*fulgens* Gillette) on the roots of wild rose were collected at Wilmette, Kenilworth, Winnetka, and Glencoe, Ill., and at Miller, Ind. Adults emerged May 29, 1912; May 1–21, 1913; May 15–June 10, 1915. Brodie collected galls on roots of *Rosa blanda* at Toronto and reared adults, 370 females and 4 males, May 18–29, 1892. The National Museum has flies from New Haven, Conn.; Hackensack, N. J. (emerged May 12, 1915); Flatbush (M. Kenny), N. Y. (emerged May 7); South Dakota (Baker); Canada (Baker); Ashland (T. A. Williams) and Raymond (P. B. Sears), Nebr.

Galls yielding similar flies were taken on *Rosa rugosa* at Evanston, Winnetka, Glencoe, and Lockport, Ill., and at Minneapolis, Minn. Winnetka galls collected in November and kept moist in laboratory began to yield flies January 27. In the field at the same locality flies had not yet begun to issue on May 12 when two more galls were collected, flies emerging on May 17, 1907. Evanston galls of the previous season were collected in May and flies emerged June 8–12, 1916.

RHODITES UTAHENSIS Bassett

The writer has taken large deeply-cleft root galls on rose at Thistle, Utah; Colorado Springs, Colo.; and at Winnetka and Glencoe, Ill., where adults emerged May 12–June 1, 1915, and in greenhouse April 2, 1916. Cornell has some fine galls from Logan Canyon, Utah. Brodie collected similar galls on *Rosa blanda* at Toronto and found the larvae pupating on April 17, the adults emerging May 19–June 5, 1892.

EXPLANATION OF PLATES

PLATE 1

FIG. 1—Galls of *Neuroterus escharensis* Weld. × 5.
2—Galls of *Neuroterus saltarius* Weld. Natural size.
3—Galls of *Diplolepis aggregata* Weld. Detached. Natural size.
4—Galls of *Diplolepis capillata* Weld. × 5.

PLATE 2

FIG. 5—Galls of *Diplolepis cava* Weld. Natural size.
6—Galls of *Diplolepis discalis* Weld. × 5.
7—Galls of *Diplolepis sessilis* Weld. Natural size.
8—Galls of *Diplolepis sulfurea* Weld. Natural size.
9—Gall of *Diplolepis unica* Weld and longitudinal sections. × 5.

PLATE 3

FIG. 10—Galls of *Plagiotrochus suberi* Weld. × 2.
11—Galls of *Cynips maculosa* Weld. × 2.
12—Galls of *Cynips plumbea* Weld. Natural size.
13—Galls of *Andricus biconicus* Weld. ×5.
14—Galls of *Andricus chrysobalani* Weld. × 5.

PLATE 4

FIG. 15—Galls of *Andricus deciduatus* Weld. × 5.
16—Galls of *Andricus fimbrialis* Weld. × 5.
17—Gall of *Andricus foliosus* Weld. Natural size.
18—Gall of *Andricus robustus* Weld. Natural size.
19—Gall of *Andricus rugatus* Weld. × 5.

PLATE 5

FIG. 20—Gall of *Andricus toumeyi* Weld. × 5. Leaves removed.
21—Gall of *Andricus tubalis* Weld. × 5.
22—Galls of *Andricus tubularius* Weld. Natural size.
23—Galls of *Callirhytis attigua* Weld. Natural size.

PLATE 6

FIG. 24—Galls of *Callirhytis gallaestriatae* Weld. × 5.
25—Galls of *Callirhytis mamillaformis* Weld. × 5.
26—Gall of *Amphibolips ellipsoidalis* Weld. × 5.
27—Galls of *Eumayria herberti* Weld. Natural size.

PLATE 7

FIG. 28—Gall of *Neuroterus sadlerensis* Weld, natural size; also base of male and female antenna and part of venation, greatly enlarged.
29—Gall of *Neuroterus fugiens* Weld; also an enlarged longitudinal section of gall.
30—Gall of *Diplolepis acraspiformis* Weld; also enlarged longitudinal section of gall.
31—Longitudinal section of gall of *Diplolepis amphora* Weld. Enlarged.
32.—Gall of *Diplolepis caepula* Weld; also longitudinal section. Both enlarged.
33—Gall of *Diplolepis discalis* Weld; also longitudinal section. Enlarged.
34—Gall of *Diplolepis discularis* Weld; also a longitudinal section. Enlarged.
35—Gall of *Diplolepis sessilis* Weld; also a longitudinal section greatly enlarged.
36—Gall of *Diplolepis sulfurea* Weld; also a longitudinal section greatly enlarged.

PLATE 8

FIG. 37—Galls of *Disholcaspis conalis Weld.* Natural size.

38—Galls of *Disholcaspis pedunculoides* Weld, slightly reduced.

39—Galls of *Trigonaspis cupella* Weld; also an enlarged view of gall and a longitudinal section of same.

40—Gall of *Xanthoteras teres* Weld; also longitudinal section enlarged.

41—Longitudinal section of gall of *Xanthoteras tubifaciens* Weld. Enlarged.

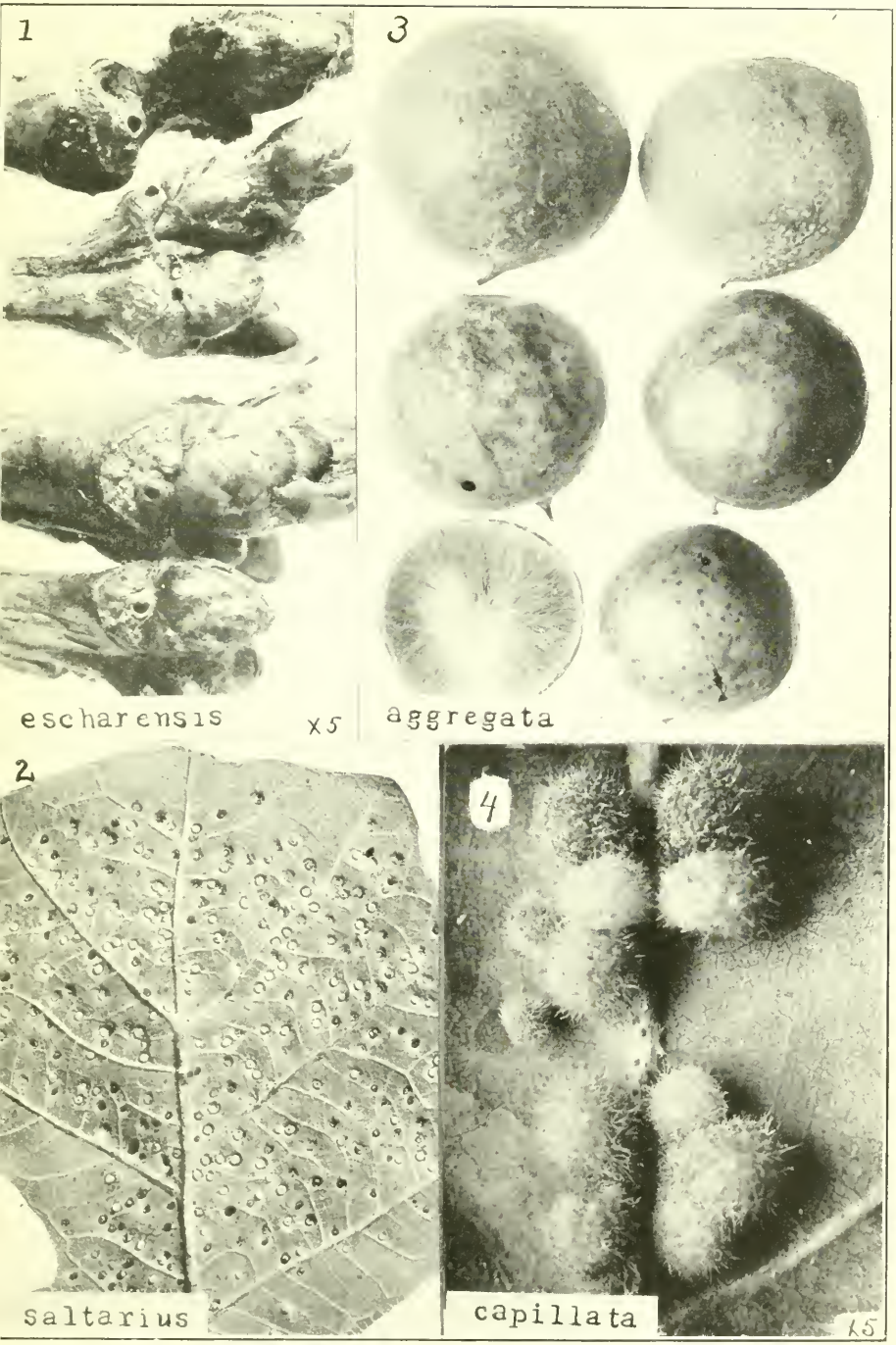
42—Gall of *Acraspis insolens* Weld; also a side view and longitudinal section, greatly enlarged.

43.—Galls of *Acraspis patelloides* Weld; also an enlarged longitudinal section.

44—Gall of *Cynips maculosa* Weld; also enlarged section showing internal structure.

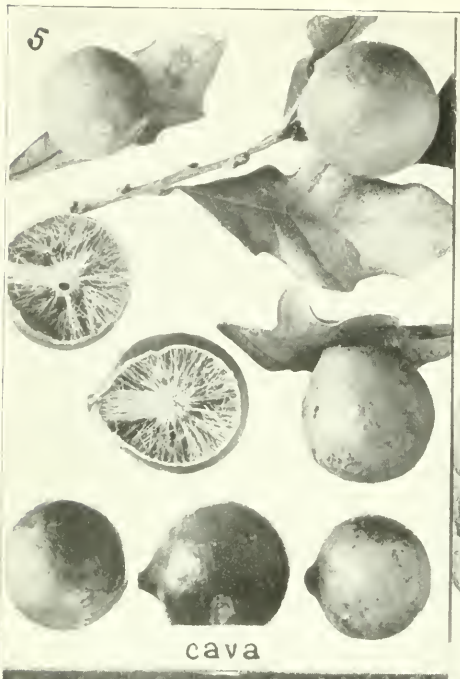
45—Galls of *Andricus albobalani* Weld, inside acorn. Enlarged.

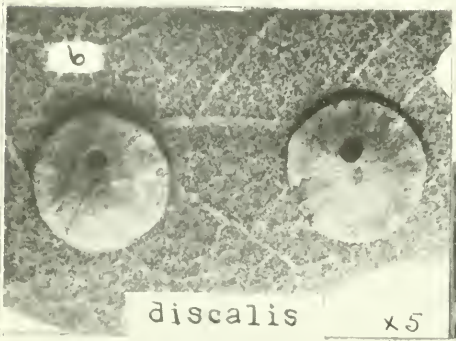
46—Dorsal view of gall of *Andricus stellaris* Weld; also longitudinal section. Both enlarged.

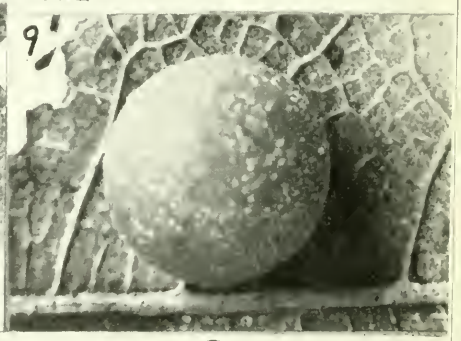


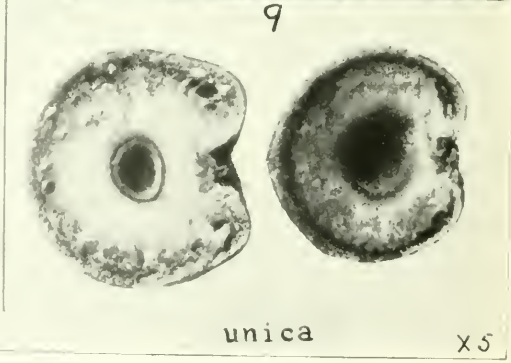
GALLFLIES OF THE FAMILY CYNIPIDAE

FOR EXPLANATION OF PLATE SEE PAGE 127



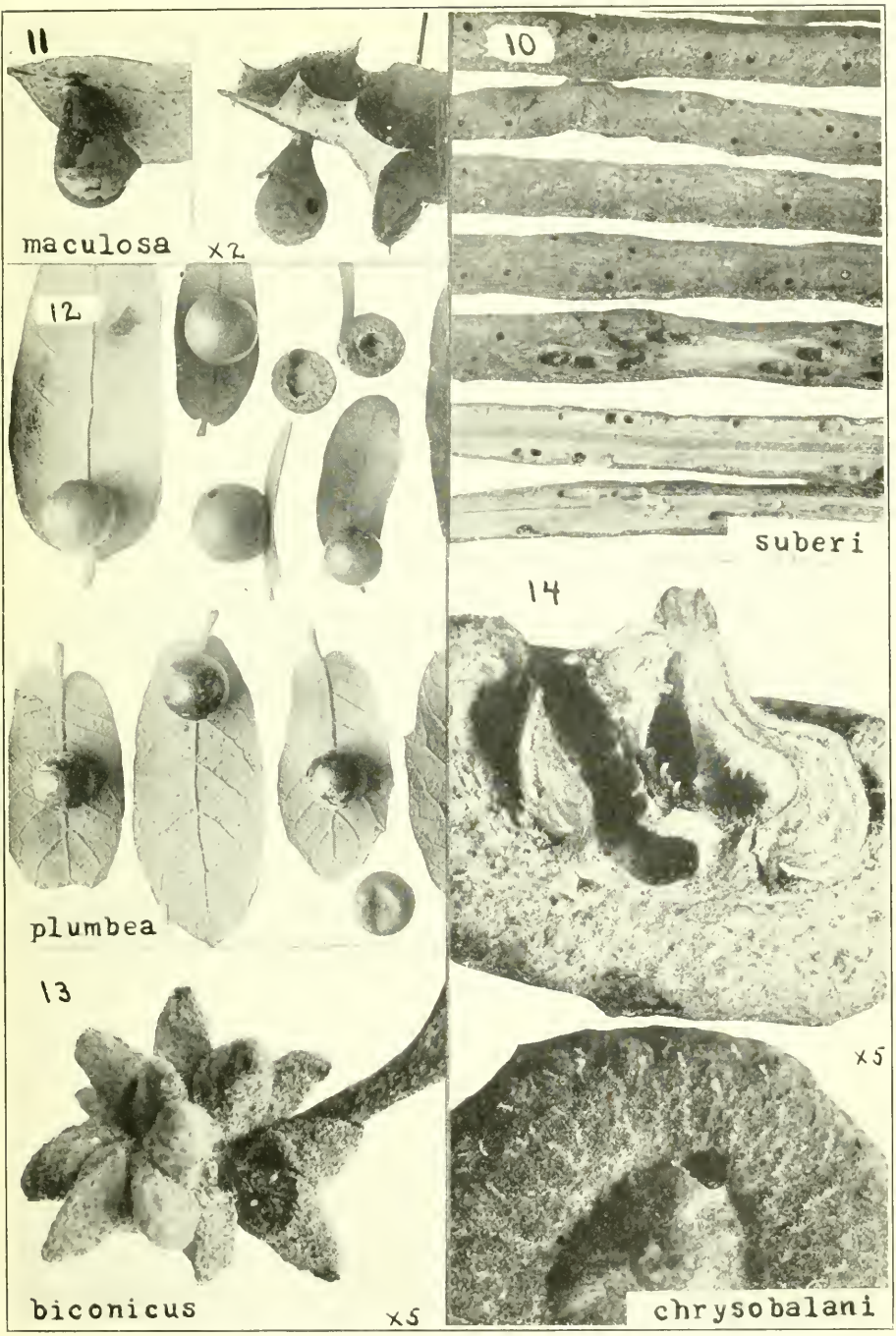






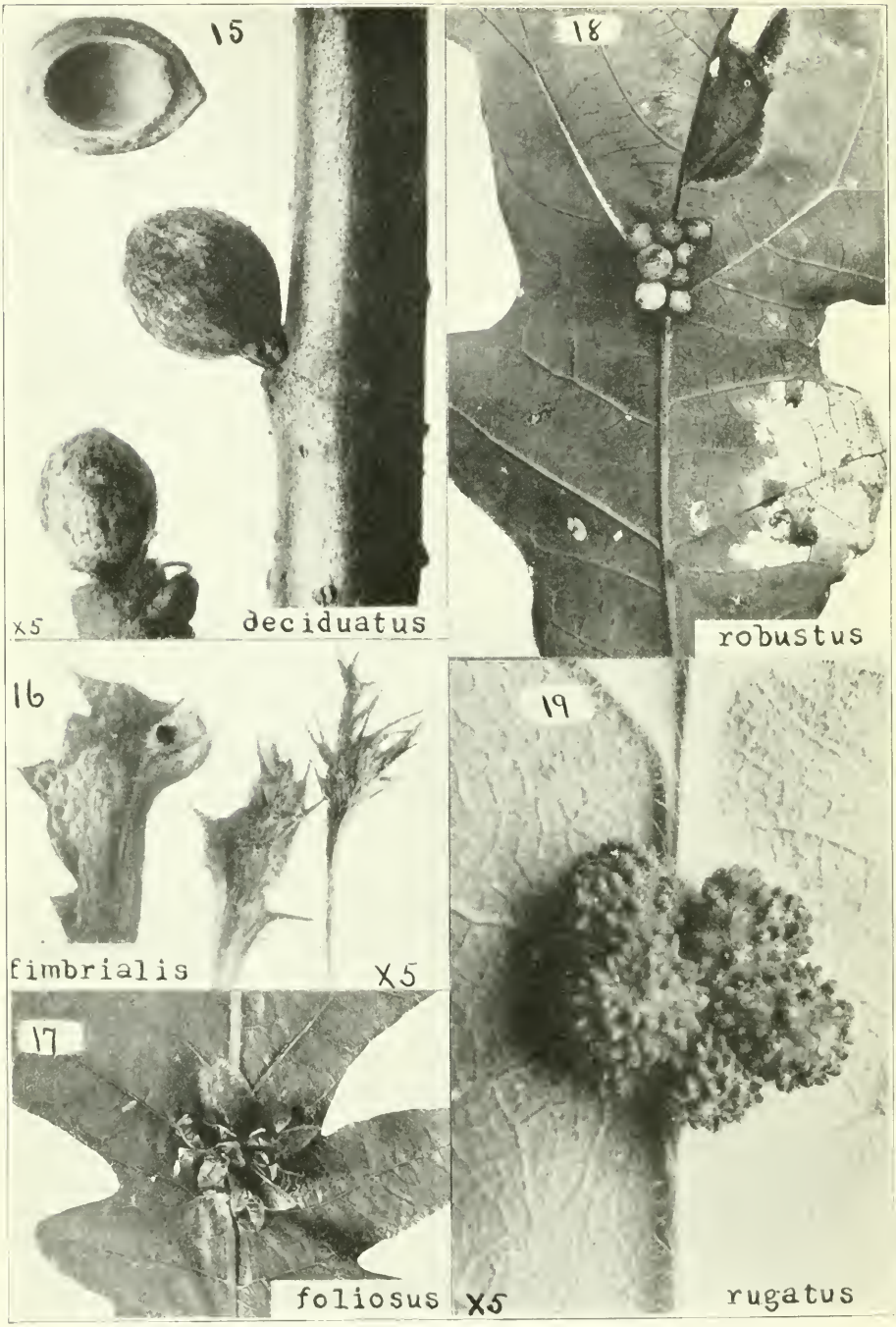
GALLFLIES OF THE FAMILY CYNIPIDAE

FOR EXPLANATION OF PLATE SEE PAGE 127



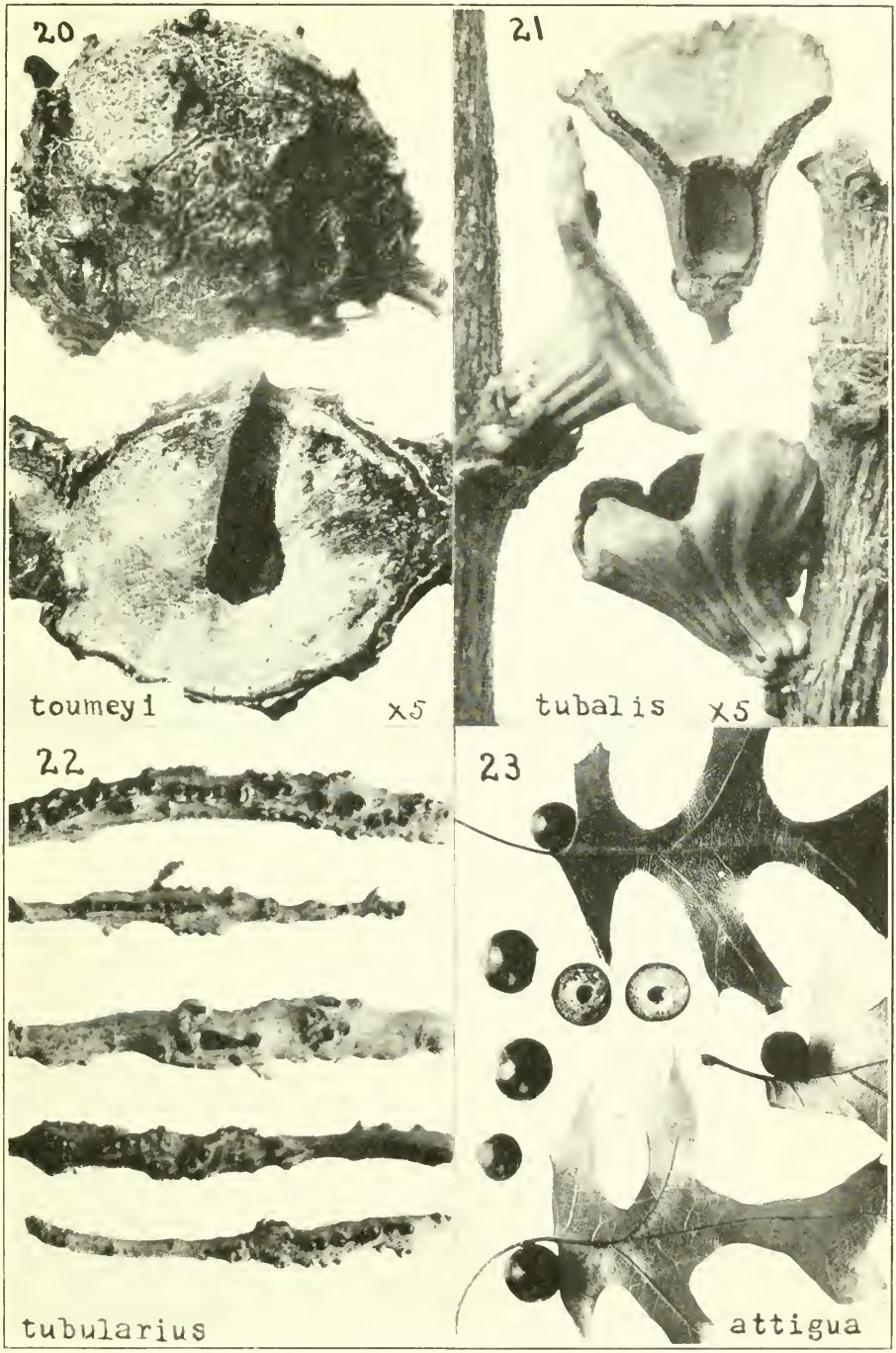
GALLFLIES OF THE FAMILY CYNIPIDAE

FOR EXPLANATION OF PLATE SEE PAGE 127



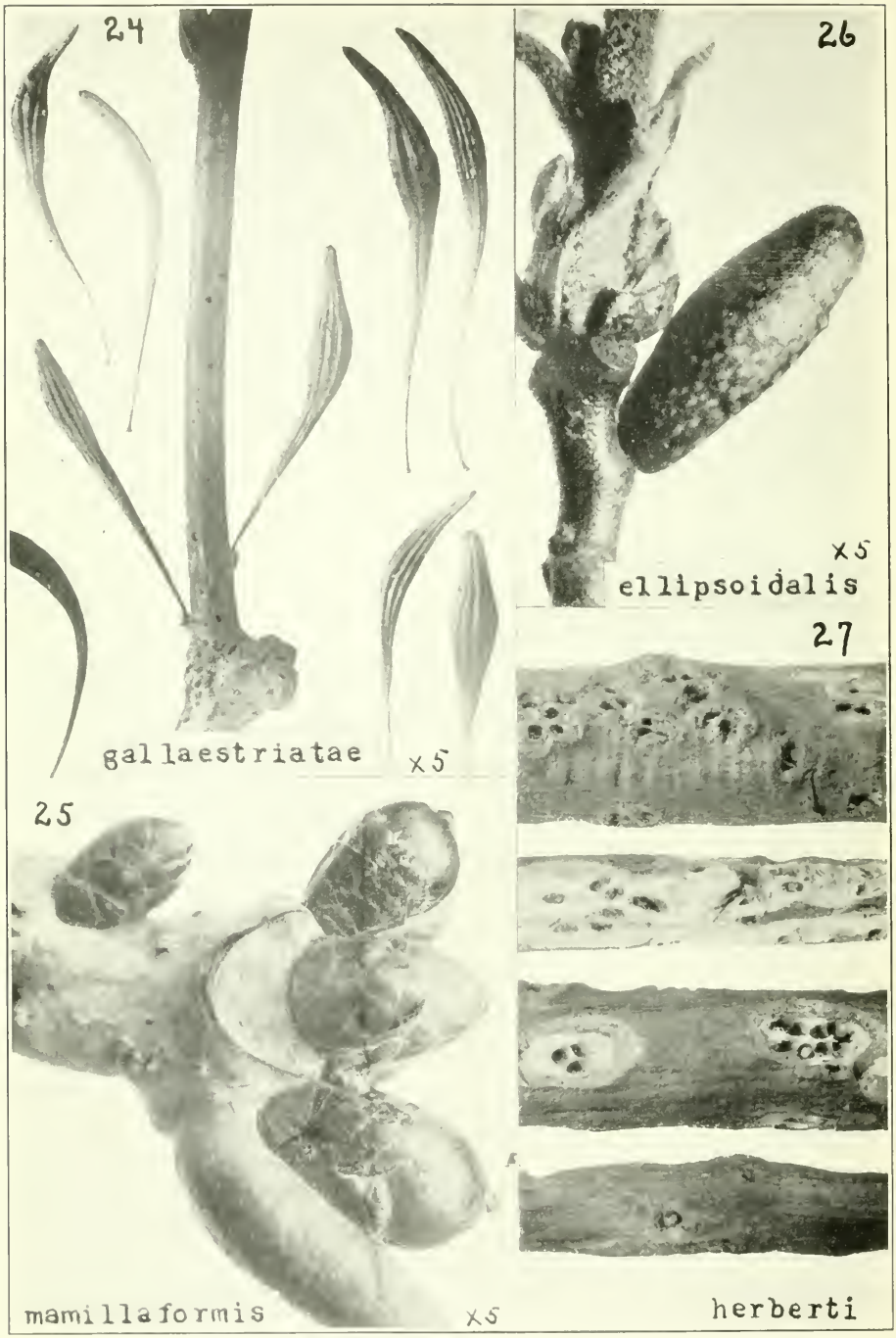
GALLFLIES OF THE FAMILY CYNIPIDAE

FOR EXPLANATION OF PLATE SEE PAGE 127



GALLFLIES OF THE FAMILY CYNIPIDAE

FOR EXPLANATION OF PLATE SEE PAGE 127



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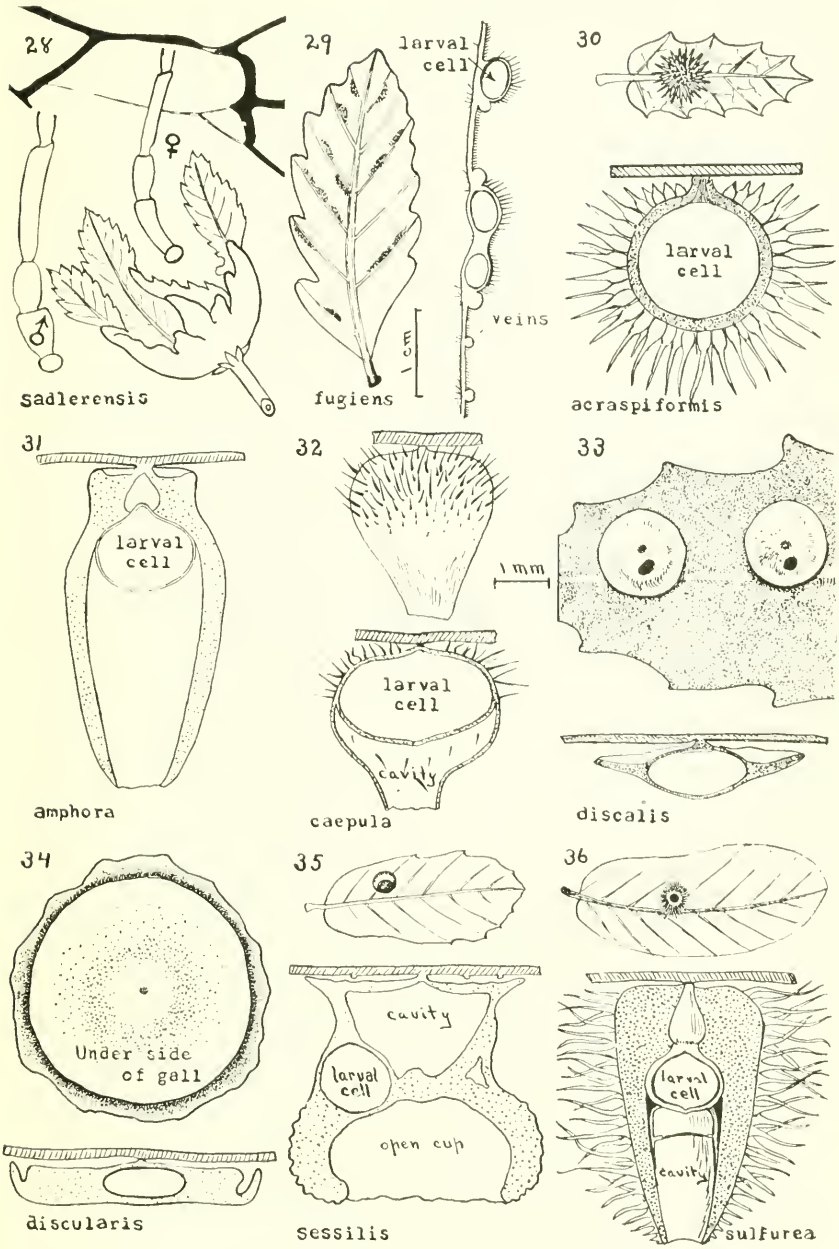
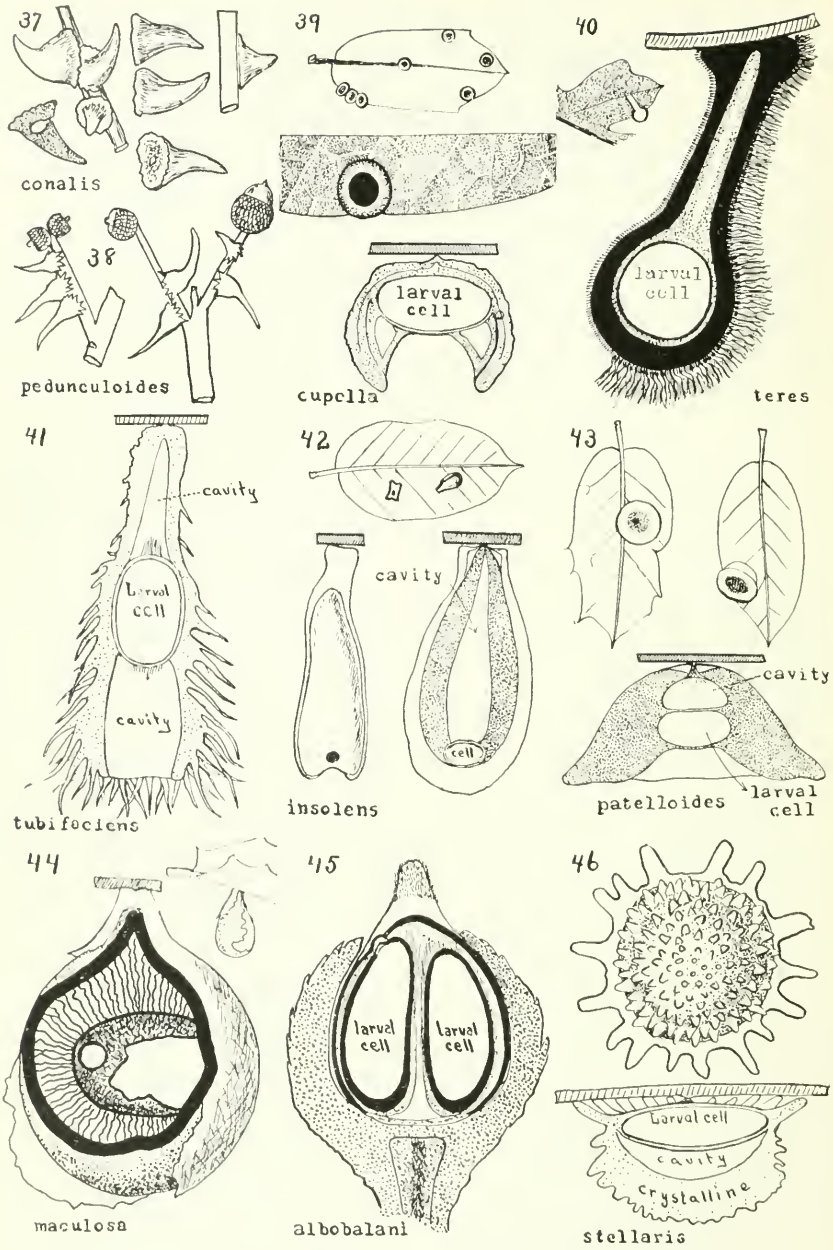


GALLFLIES OF THE FAMILY CYNIPIDAE

FOR EXPLANATION OF PLATE SEE PAGES 127 AND 128



GALLFLIES OF THE FAMILY CYNIPIDAE

FOR EXPLANATION OF PLATE SEE PAGE 123

INDEX

This index includes all species referred to in this paper. Generic names are in bold face and synonyms in italics.