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NEW AMERICAN CYNIPIDS FROM GALLS

By LEWIS H. WELD

TWENTY-FIVE new species of American cynipids (Hymenoptera: Cynipidae) are described herein, together with a few notes on synonymy. One of the new species is an inquiline; the rest are gallmakers. Two of the latter are described from single reared specimens, but the galls are figured. One is from an unknown gall but is described from a large series of collected specimens, and paratypes are deposited in several institutions. Types of all are in the United States National Museum.

Genus SAPHONECRUS Dalla Torre and Kieffer

SAPHONECRUS FAVANUS, new species

Female.—Head (except black vertex), antennae, most of mesopleura, legs and basal region of abdomen reddish, other parts black. Head from above massive, broader than thorax, occiput concave, coriaceous with scattered punctures; from in front broader than high, with radiating striae about mouth, malar space 0.7 eye. Antennae 13-segmented, lengths as (scape) 12:6:15:12:11:11:10:10:10:10:10:10:22(6). Pronotum and mesonotum beautifully coriaceous, with scattered punctures bearing short appressed hairs. Parapsidal grooves percurrent. Anterior parallel and lateral lines depressed. Scutellum with a shallow sculptured groove at base, septum broad. Carinae on propodeum parallel. Abdomen longer than head plus thorax, collar striate, tergites II and III fused and covering the rest, its posterior third punctate, length to height to width as 38:25:17,

ventral valves protruding, ventral spine short. Wing pubescent, almost nonciliate, radial cell open, three times as long as broad, areolet present but not distinct. With width of the head used as a base, the length of mesonotum ratio is 1.0; antenna 2.0; wing 2.7. Length 2.5–3.65 mm. Average of 17 specimens 3.18 mm.

Male.—More infuscated. Antennae 15-segmented, segments 2–5 as 5:15 (slightly bent):10:11 and the last two as 9:10. Length of big tergite to height as 22:19, with only a small median dorsal group of punctures posteriorly. Length 2.05–2.85 mm. Average of 13 specimens 2.46 mm.

Types.—U. S. N. M. No. 56370: Type female, allotype, and six paratypes. Paratypes in American Museum of Natural History, Chicago Museum of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Biology.—Guests in the galls of *Dryocosmus favus* Beutenmueller. Emerged in September and October from galls collected the previous October and from which the makers had emerged the previous winter.

Habitat.—The type and allotype were selected from a series from galls collected at Washington, D. C. Paratype locality, Ironton, Mo.

Genus CEROPTRES Hartig

CEROPTRES CONFERTUS (McCracken and Egbert)

Periclistus confertus McCracken and Egbert, Stanford Univ. Biol. Ser., vol. 3, No. 1, p. 62, 1922.

The types of this species go in *Ceroptres* and differ from the other described American species in being reddish brown instead of black.

Genus NEUROTERUS Hartig

NEUROTERUS ARGENTATUS, new species

Female.—Black; antennae, coxae, femora, and tibiae brown, trochanters and tarsi almost white. Head finely coriaceous, face sparsely pubescent, malar space 0.3 eye with a groove, cheeks not broadened behind eyes. Antennae 13-segmented, lengths as (scape) 25:24(12):25(5):20:17:17:16:16:17:17:16:16:17(10). Mesonotum smooth, bare, without grooves. Mesopleura and sides of pronotum coriaceous. Wing clear, pubescence short, margin ciliate, veins brown, first abscissa of radius faintly angulate, areolet reaching one-fourth way and cubitus quite to basal, second cross vein at angle of 60° with basal. Tarsal claws weak, simple. Abdomen as long as thorax, as high as long. Ventral spine six times as long as broad in side view. With width of head used as a base, the length of mesonotum ratio is 1.0; antenna 2.0; wing 3.9; ovipositor 1.9. Range in length of 81 specimens 0.8–1.1 mm. Average 0.98 mm.

Types.—U.S.N.M. No. 56371: Type and seven paratypes. Paratypes in Chicago and American Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Host.—*Quercus gambelii*.

Gall (pl. 2, fig. 16).—Ellipsoidal, dark colored, 1.2 by 0.9 mm. by 0.6 mm. high, firmly attached to underside of leaf in numbers close to main veins. Each is covered, except in center where there is a slight papilla, with radiating straight silvery single-celled hairs about 0.5 mm. long. Exit hole near one end.

Habitat.—The type material was collected by Mrs. N. W. Capron in Oak Creek Canyon, Ariz., in November 1937 when adults were then emerging. Galls were seen at Grand Canyon also. Similar galls were collected on *Q. subturbinella* at Camp Creek and Mayer, Ariz.

NEUROTERUS CLAVENSIS, new species

Female.—Black; region around mouth, base of antennae, trochanters, knees and tarsi yellowish. Head coriaceous; from above transverse, as broad as thorax, occiput concave; from in front interocular area square, malar space 0.3 eye with groove, cheeks broadened behind eyes, antennae 13-segmented, lengths as (scape) 11(5):6:13(2):9:8:8:8:8:7:7:7:6:8. Mesoscutum as broad as long, without grooves, microcoriaceous as are scutellum, sides of pronotum, and mesopleurae. Wing pubescent and ciliate (except on proximal half of front margin), first abscissa of radius strongly angulate and clouded, areolet reaching one-fifth way to and cubitus reaching basal below middle, a faint cloud in first cubital cell and below the break in median. Abdomen collapsed, second tergite reaching about one-third way back. Ventral spine in side view scarcely longer than broad, sheaths upturned. Tarsal claws simple. With width of the head used as a base, the length of mesonotum ratio is 1.1, antenna 2.2, wing 3.7, ovipositor 3.5. Length 1.3–2.15 mm. Average of 28 specimens 1.75 mm.

Types.—U.S.N.M. No. 56372: Type and three paratypes from Flagstaff, Ariz. Other paratypes are from Prescott, Ariz., and from Las Vegas, N. Mex. Paratypes in the Chicago and American Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Host.—*Quercus gambelii*.

Gall (pl. 2, fig. 21).—Resembles the white-oak club gall externally but with a different internal structure, having a compact nest of cells on one side imbedded in brownish corky tissue.

Habitat.—Galls at Flagstaff, Ariz., contained adults on April 10 and flies emerged May 11–23 (Hopk. U. S. 15626°). Galls from Prescott, Ariz., gave adults on same dates. Galls were seen at Grand Canyon and Williams, Ariz., and in New Mexico at Tijeras and Fierro and in Colorado at Colorado Springs.

Genus TRICHOTERAS Ashmead

TRICHOTERAS FRONDEUM, new species

Female.—Brown with silvery pubescence, only the upper mesopleura and most of abdomen bare. Head coriaceous, from above transverse, broader than thorax, cheeks broadened behind eyes, occiput straight; from in front interocular area 1.28 times as broad as high, malar space 0.44 eye without groove, antenna 12-segmented, lengths as (scape) 15(5):7:14(4):14:12:10:9:8:7:6:5:11(5.5), last six with rhinaria. Mesoscutum broader than long, coriaceous, parapsidal grooves percurrent, very distinct. Scutellum longer than broad, granulate, with two shining, smooth, shallow pits at base. Area between carinae on propodeum narrower above. Mesopleura largely shining, smooth, pubescent below. Wing reduced, just reaching the tip of abdomen, pubescent, ciliate, veins brown, areolet not formed, cubitus not reaching basal. Abdomen longer than head plus thorax, longer than high, lengths of the tongue-shaped tergites as 20:6:5. Ventral spine in side view six times as long as broad, shorter than hind metatarsus. Claws with a strong tooth. With width of the head used as a base, the length of mesonotum ratio is 1.05, antenna 2.1, wing 2.2. Length 2.15–2.5 mm. Described from four specimens (one lacks head).

Types.—U.S.N.M. No. 56373: Type. Paratype in California Academy of Sciences.

Host.—*Quercus chrysolepis*.

Gall (pl. 1, fig. 6).—A transformed lateral bud, the outer brown bud scales surrounding a mass of thinner, narrower bracts. At the base in the center is a single, ovoid, thin-walled cell, 3.0 by 1.7 mm. at whose base and apex is a circle and tuft of straight, single-celled, slender white hairs 1.5 mm. long.

Habitat.—The types (dead) were cut out of galls collected at Idyllwild, Calif., on September 21, 1922. The characteristic galls have been seen on Mount Wilson, in the San Bernardino Mountains, in Sequoia National Park, at Kyburz, Los Gatos, and Shasta in California, and at Canyonville, Oreg. A similar gall on *Quercus wilcoxii* was noted in the Santa Catalina, Chiricahua, and Huachuca Mountains in Arizona.

Genus *PHYLLOTERAS* Ashmead*PHYLLOTERAS SIGMA*, new species

Female.—Antlike, black. Head finely coriaceous, face pubescent; from above massive, length to width to width of thorax as 19:31:19, occiput concave, slightly broadened behind eyes; from in front higher than broad, interocular area broader than high, malar space 0.5 eye without groove; antennae 13-segmented, lengths as (scape) 9:5:11:10:9:8:7:7:6:6:5:5:5:10. Sides of pronotum coriaceous. Mesonotum flattened, faintly coriaceous; mesoscutum wider than long, without distinct grooves; scutellum with a transverse groove at base. Wingless. Middle and hind coxae elongated. Hind tibia shorter than tarsus. Hind metatarsus as long as the three following. Claws with a weak tooth. Propodeum in profile continues the curvature of the thorax. Abdomen longer than head plus thorax as 73:45, its height to width as 52:23, lengths of tergites along dorsal curvature as 22:13:12:17:17:7, ventral spine five times as long as broad in side view, ventral valves protruding horizontally, ovipositor hooked at tip. With width of head used as a base, the length of mesonotum ratio is 0.55, antenna 3.1. Length of two specimens 1.7 and 2.05 mm.

Differs from *rubina* Gillette in having a narrower, nearly bare thorax without evident parapsidal grooves.

Types.—U.S.N.M. No. 56374: Type. Paratype in Weld collection.

Host.—*Quercus alba*.

Gall (pl. 2, fig. 22).—Sessile on underside of leaf near edge in the fall. Fusiform, flattened, the ends slightly curved in reverse directions, up to 4 mm. long by 2 mm. wide, with the larval cell in a depression in the center. It starts to develop late in June. Rare.

Habitat.—East Falls Church, Va., is the type locality. From galls collected October 22, 1940, a living adult was found in out-of-door breeding cage on March 7, 1942. Galls have been seen at Vienna, Va., and Cabin John, Md.; at Ithaca, Manorville (Crosby), and Nyack (Zabriskie), N. Y., and at Washington, D. C. (Pergande). Bassett collected galls in Connecticut.

Genus *LIODORA* Foerster*LIODORA VISCIDA*, new species

Female.—Pale yellow, ocellar area and flagellum brown. Head smooth, shining; from above transverse, not so broad as thorax, cheeks not broadened behind eyes; from in front interocular area as broad as high, malar space 0.28 eye without groove or striae, antennae 14-segmented, lengths as (scape) 10:6:14:11:10:10:9:8:7:7:7:6:6:9. Sides of pronotum pubescent, shining. Mesoscutum highly polished, smooth, almost bare, parapsidal grooves deep, smooth, percurrent,

anterior parallel and lateral lines not evident, no median. Disk of scutellum smooth back of the two deep, smooth pits, reticulate behind, margined at sides and behind. Carinae on propodeum converging above. Mesopleura bare, smooth. Wing subhyaline, pubescence and cilia dark, veins brown, heavy, first abscissa of radius arcuate, clouded anteriorly, one-eighth as long as second which is nearly straight, areolet reaching one-fifth way to basal, cubitus nearly from basal to margin. Tarsal claws toothed. Abdomen about as long as head plus thorax, longer than high, lengths of tergites along dorsal curvature as 40:18:17:14:7:6, pubescent patches on sides of II at base. Ventral spine seven times as long as broad in side view, shorter than hind metatarsus. With width of the head used as a base, the length of mesonotum ratio is 1.3, antenna 2.8, wing 4.3, ovipositor 2.5. Length of five specimens 1.6–2.15 mm. Average 2.05 mm. Runs in the Ashmead 1903 key to *Liodora*. Differs from genotype in its light color, larger areolet, longer radial cell, smoother disk, and bent carinae. Hardly to be distinguished from *sessilis* Weld whose gall is quite different in structure.

Types.—U.S.N.M. No. 56375: Type. Paratypes in the American and Chicago Museums of Natural History and the California Academy of Sciences.

Host.—*Quercus oblongifolia*.

Gall (pl. 1, fig. 3).—A spangle-gall sessile on veins on underside of leaf late in fall, 2–4 mm. in diameter, fleshy, pinkish, covered with stellate hairs on its sticky surface, the edge inrolled, the larval cell basal and eccentric. One to four on a leaf.

Habitat.—Mrs. N. W. Capron collected galls containing white pupae on January 21, 1935, at Nogales, Ariz. Adults emerged on February 21, 22, and 27.

LIODORA APIARIUM, new species

Female.—Black; mandibles and knees brown. Head finely coriaceous; from above transverse, almost as broad as thorax, occiput concave, cheeks broadened behind eyes; from in front broader than high, interocular area broader than high, malar space 0.28 eye without striae, face pubescent below antennae. Antennae 14-segmented, lengths as (scape) 13:6:17:14:13:12:10:9:8:7:7:7:6:7, last eight with rhinaria. Sides of pronotum pubescent, striate in part. Mesoscutum mostly bare, smooth, shining, grooves deep, narrow, percurrent, anterior and parallel lines not evident, no median. Disk of scutellum smooth, pubescent, margined, with two shallow, smooth pits at base. Mesopleura mostly bare, smooth, shining. Hind tibia longer than tarsus; claws toothed. Wing pubescent and ciliate, veins brown, first abscissa of radius angulate, radial cell elongated, areolet reaching one-sixth way to basal, cubitus almost reaching basal. Ca-

rinae on propodeum diverging below, enclosed area bare, smooth, shining. Abdomen longer than head plus thorax, length to height to width as 63:55:35; lengths of tergites along dorsal curvature as 28:15:14:11:10:5, ventral valves protruding obliquely, ventral spine seven times as long as broad in side view, pubescent below, shorter than hind metatarsus. Using width of head as a base the length of mesonotum ratio is 1.36; antenna 2.4; ovipositor 4.9; wing 4.6. Range in length of 21 specimens 1.7–2.6 mm. Average 2.2 mm. Differs from the described species of the genus in having the cheeks broadened behind the eyes.

Types.—U.S.N.M. No. 56376: Type and five paratypes. Paratypes in the American and Chicago Museums, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Host.—*Quercus alba*.

Gall.—Solitary, sessile, on underside of leaf close to edge in October, shaped like an old-fashioned straw beehive, white or pinkish, measuring up to 4.6 mm. broad by 4.0 mm. high. Inside is a large cavity with a transverse larval cell at very base. During the winter on the ground the outer fleshy layer shrivels and the gall becomes more cylindrical (pl. 1, fig. 9). Not common.

Habitat.—The type is from a series of 16 that were found alive in out-of-door breeding cage on March 7, 1942, from galls collected at East Falls Church, Va., in October 1940. In galls collected at Vienna, Va., in October 1938 living adults were found the next October and one emerged on February 12, 1940, and others had emerged and died in the cage by April 15. Galls have been seen at Bluemont and Rosslyn, Va., Cabin John, Md., and Washington, D. C.

Genus TRIGONASPIS Hartig

TRIGONASPIS PULCHELLA (Beutenmueller)

Dryophanta pulchella BEUTENMUELLER, Ent. News, vol. 22, p. 357, 1911.

Described from two specimens of which the one from Catalina Island Beutenmueller considered as the type. Both go in *Trigonaspis*.

Genus ANDRICUS Hartig

ANDRICUS BRACTEATUS, new species

Female.—Light reddish brown. Head from above transverse, not so broad as thorax, cheeks broadened behind eyes, occiput concave; from in front broader than high, malar space one-third eye without striae, interocular area 1.2 times as broad as high, antenna 14-segmented, lengths as (scape) 16:9:24(5):21:20:17:16:11:10:10:9:8:

7:11(5). Thorax uniformly but not densely pubescent. Sides of pronotum faintly striate near hind margin. Mesoscutum granulate, the punctures of the appressed pubescence very fine, anterior parallel and lateral lines bare, broad, smooth, no median. Foveae smooth, deep, separated by a distinct septum, disk rugose, broader than long. Carinae on propodeum parallel. Mesopleura not rugose. Wing pubescent and ciliate, veins brown, first abscissa of radius slightly clouded and angled, second slightly enlarged at margin of wing, proximal end of areolet faint. Tarsal claws toothed, hind femur with a slight lobe on lower side forming a flange on outer side near apex. Abdomen slightly longer than head plus thorax, length to height to width 35:29:25; lengths of tergites along dorsal curvature as 26:7:2:1:1:3, last four sometimes not visible in side view. Ventral spine 6-7 times as long as broad in side view, shorter than hind metatarsus. With width of head used as a base, the length of mesonotum ratio is 1.4, antenna 2.4, wing 4.3, ovipositor 2.6. Length 2.1-3.5 mm. Average of 12 specimens 2.91 mm.

Types.—U.S.N.M. No. 56377: Type and four paratypes. Paratypes in California Academy of Sciences and Chicago and American Museums of Natural History.

Gall (pl. 2, fig. 11).—A terminal bud gall, globular, up to 8.4 mm. in diameter, more or less covered with leafy bracts, which are green when young, becoming tan. Occurs in fall. Monothalamous, with a thick cavernous wall.

Host and habitat.—The type is selected from a series from galls collected by Mrs. N. W. Capron on November 1, 1935, at Young, Ariz., on an undetermined oak, the adults emerging some time before April 1936. Two paratypes are from galls on *Quercus oblongifolia*, which she sent from Nogales on February 4, 1935, then containing living adults. Two others are from Wolf Creek Camp, 10 miles from Prescott, Ariz. One is from a gall the writer collected in the Santa Rita Mountains, Ariz., on December 7, 1921, on *Q. diversicolor* containing a living adult and one from a gall from the Huachuca Mountains on the same host. These galls were seen on *Q. arizonica* also at Oracle and on *Q. toumeyii* at Patagonia, Ariz.

ANDRICUS COORTUS, new species

Female.—Black, with more or less red on mandibles, legs, and ventral abdomen, especially on specimens cut out of the galls in November. Head coriaceous; from above transverse, cheeks broadened behind eyes; from in front malar space 0.4 eye, striate, antennae 13-segmented, segments as (scape) 15:9:14:14:11:11:10:9:8:8:8:7:15. Sides of pronotum pubescent, with faint striae. Mesoscutum covered with short appressed hairs, which do not hide the coriaceous sculpture,

parapsidal grooves deep, narrow, smooth, percurrent, anterior and lateral lines smooth, no median. Disk of scutellum finely rugose, pubescent, with two smooth oblique pits at base. Mesopleura mostly bare, shining, with faint striae. Carinae on propodeum straight, parallel. Wing pubescent and ciliate, veins brown, first abscissa of radius arcuate, areolet reaching one-sixth way to basal. Tarsal claws with a tooth. Abdomen longer than head plus thorax, lengths of tergites along dorsal curvature as 52:18:7:5:1:7, exposed parts of tergites smooth, II with pubescent patches on sides at base, ventral spine in side view seven times as long as broad, shorter than hind metatarsus. With the width of the head used as a base, the length of mesonotum ratio is 1.3, antenna 2.3, wing 4.2. Length 1.9-2.35 mm. Average of 20 specimens 2.17 mm.

Types.—U.S.N.M. No. 56378: Type and three paratypes. Paratypes in the American and Chicago Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Gall (pl. 1, fig. 5).—A bud gall in the fall consisting of 1 to 7 elongated, vertical, parallel cells each with a dense, thick, dark-colored wall, the whole forming an elongated or rounded mass projecting above the bud scales, the surface not smooth, covered with short pubescence.

Hosts.—*Quercus douglasii* and *Q. dumosa*.

Habitat.—The type is from a series of seven living adults cut out of galls on *Quercus douglasii* at Colfax, Calif., on November 18, 1935. Four paratypes are from same host at Ukiah, Calif., cut out February 2, 1940, and six from Lakeport; one is from *Q. dumosa* at Banning, Calif.

ANDRICUS COSTATUS, new species

Female.—Head dorsally, base of antennae, sides of pronotum, median area of mesoscutum, disk of scutellum and legs reddish brown, rest of body almost black. Head coriaceous; from above transverse, occiput only slightly concave; from in front broader than high, cheeks broadened behind eyes, interocular area broader than high, malar space 0.4 eye and faintly striate, antennae 14-segmented, lengths as (scape) 14:6:11:11:10:9:8:8:8:7:7:6:6:9, the last conical. Sides of pronotum bulging. Mesoscutum microcoriaceous, shining, almost bare, parapsidal grooves deep, narrow, percurrent, anterior and lateral lines obscure, no median. Disk of scutellum circular, rugose; pits narrow, deep, smooth. Carinae on propodeum straight, parallel, enclosed area smooth, broader than high. Mesopleura bare, shining, smooth in large part. Wing pubescent and ciliate, veins brown, not clouded, first abscissa of radius angled, areolet reaching one-seventh way to basal, cubitus almost reaching basal, a faint cloud in first cubital cell. Claws

toothed. Abdomen shining, bare except on tergites VII and sides of II, length to height to width as 26:23:21, lengths of tergites along dorsal curvature as 51:19:14:9:8:11. Ventral spine tapering, as long as hind metatarsus. With width of head used as a base, the length of mesonotum ratio is 1.3, antenna 4.1, wing 4.4. Length 2.55 mm.

Type.—U.S.N.M. No. 56379: Holotype.

Host.—An undetermined oak.

Gall (pl. 2, fig. 17).—A depressed ribbed sphere produced in July on the side of acorn cup of several species of white oaks in the Southwest. The gall measures 3.0 mm. in diameter, the ribbed structure showing best on underside when detached.

Habitat.—The single adult emerged on April 5, 1942, from a gall collected on an undetermined oak by Mrs. N. W. Capron in July 1940 at Indian Creek, near Prescott, Ariz. Similar galls have been seen by the writer on *Q. fendleri* at Trinidad, Colo., and Shoemaker, N. Mex.; on *Q. subturbinella* at Tijeras, N. Mex., and on *Q. gambelii* at Flagstaff, Ariz.

ANDRICUS FLAVOHIRTUS Beutenmueller

Andricus flavohirtus BEUTENMUELLER, Insecutor Inscitiae Menstruus, vol. 1, p. 124, 1913.

In Proc. U. S. Nat. Mus., vol. 68, art. 10, p. 91, 1926, I erroneously transferred this species to *Collirhytis*. An examination of the holotype now in the National Museum shows that the claws are toothed, and the species should be retained in *Andricus*.

ANDRICUS FORMOSALIS, new species

Female.—Black; front and middle tibiae, all tarsi, and antenna beyond scape yellowish. Head from above transverse, not quite so broad as thorax, vertex granulate, cheeks broadened behind eyes. occiput concave; frons in front higher than broad. malar space one-third eye, radiating ridges about mouth, antennae 14-segmented, lengths as (scape) 12(5):7:10(3):9:8:8:7:7:6(5):6:6:5.5:5.5:8(4). Pronotum medially smooth, sides rugose with parallel ridges at posterior margin. Mesoscutum bare, coriaceous, more or less rugose behind, parapsidal grooves percurrent but deeper, broader, smoother, and margined behind, median short, becoming an almost percurrent streak, anterior parallel and lateral lines distinct, depressed. Disk of scutellum rugose, pits deep, smooth, triangular, widely separated. Carinae on propodeum straight, included area rugose. Mesopleura entirely covered with parallel ridges. Tarsal claws weak, toothed. Wing hyaline, nonciliate, pubescence short, veins yellowish, first abscissa of radius arcuate, radial cell slightly open at base and apex, areolet reaching about one-fifth way to basal, cubitus reaching basal. Abdomen (somewhat swollen in degreasing)

longer than head plus thorax, length to height to width as 35:34:27; lengths of tergites along dorsal curvature as 19:8:7:7:5:5, small pubescent areas on sides of II, a few hairs on VII, hind margin of II and exposed areas of rest beautifully and closely punctate. Ventral spine in side view 4 times as long as broad. With width of head used as a base, the length of mesonotum ratio is 1.3, antenna 1.6, wing 3.2. Length 2.55–3.3 mm. Average of six specimens 2.86 mm.

Andricus formosus (Bassett), which produces a somewhat similar gall on various eastern red oaks, differs in having 15-segmented antennae, the mesopleura more finely sculptured, a percurrent median groove, and a red abdomen with tergite II relatively longer.

Types.—U.S.N.M. No. 56380: Type and one paratype. Paratypes in California Academy of Sciences and Chicago and American Museums of Natural History.

Gall (pl. 2, fig. 13).—Ovoid, 8 by 5 mm., whitish with a velvety surface when young, a button-shaped mass of pubescence at apex. Produced in clusters of 3–5 on the previous year's growth early in spring, dropping to the ground early in July. A cross section of a mature gall shows a larval cavity in the center, 2 mm. in diameter, the thick surrounding wall cellular and traversed by 11–13 rather large canals.

Host.—*Quercus emoryi*.

Habitat.—The type material was collected at Wolf Creek Camp near Prescott, Ariz., July 13, 1935, by Mrs. N. W. Capron. Living adults were cut out of the galls on April 15, 1936. She also sent old galls from Young, Ariz., and clusters just starting to develop on February 4 from Nogales. The writer collected these galls at Oracle, Nogales, Patagonia, and in the Huachuca Mountains, Ariz.

ANDRICUS NIGRIDIVS, new name

Callirhytis nigra FULLAWAY, Ann. Ent. Soc. Amer., vol. 4, p. 362, 1911.

Diptolepis operla WELD, Proc. U. S. Nat. Mus., vol. 68, art. 10, p. 29, 1926.

Not *Andricus luteicornis* var. *niger* TAVARES, Broteria, vol. 1, p. 10, 1902.

Not *Andricus niger* TAVARES, Broteria, ser. zool., vol. 14, No. 2, pp. 84–87, 1916.

C. nigra was described as from a twig swelling on *Quercus lobata* and being thought to have simple claws was placed in *Callirhytis*. The unique type at Stanford University examined in 1935 has the claws toothed and was found to agree with paratypes of *Diptolepis operla* Weld, which came from galls inside the buds of *Q. lobata*. The type gall at Stanford is a twig swelling, which also bears a large bud with an exit hole in the side, and the type fly evidently came from a gall inside the bud rather than from the twig swelling. As the name *niger* was preoccupied in *Andricus* by Tavares in 1902, the new name *nigrivus* is here proposed for *nigra* Fullaway.

ANDRICUS FURNESSULUS, new species

Female.—Reddish brown, with black markings on thorax and dorsal abdomen. Head from above transverse, finely rugose, not quite so broad as thorax, cheeks broadened behind eyes; from in front broader than high, malar space one-third eye with radiating ridges, antennae 14-segmented, lengths as (scape) 13(6):8:20(4):16:13:13:12:12:10:9:8:7:7:14(5). Sides of pronotum pubescent, with parallel ridges. Mesoscutum very finely rugose, coarser posteriorly, anterior parallel and lateral line areas black, parapsidal grooves percurrent but deeper, smooth, and wider posteriorly, no median. Foveae narrow, shining, oblique, disk coarsely rugose. Carinae on propodeum arcuate. Mesopleura pubescent, entirely covered with parallel ridges. Tarsal claws toothed. Wing hyaline, pubescent, ciliate, veins brown, first abscissa of radius slightly clouded, radial cell slightly open at base, tip of radius slightly bent at margin, areolet reaching one-fifth way to basal, cubitus reaching basal. Abdomen nearly as long as head plus thorax, length to height to width as 30:23:21, lengths of tergites along dorsal margin as 24:7, tergite II entirely aciculate, III finely rugose with confluent punctures, 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 1.4, antenna 2.5, wing 3.8, ovipositor 3.0. Length 2.65–3.15 mm. Average of 20 specimens 2.86 mm.

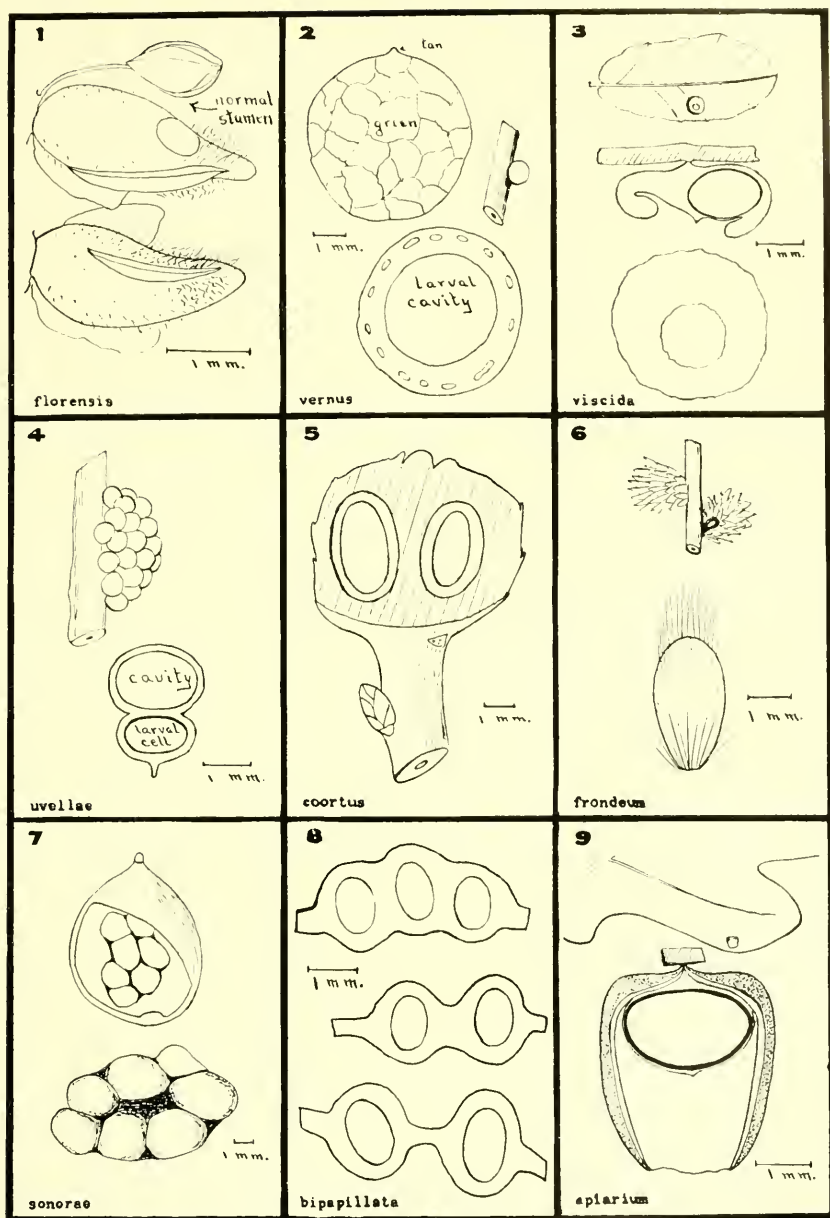
Related to *Andricus furnessae* (Weld) from a similar but larger gall in Michoacan, Mexico, but differing in its smaller size, part-colored thorax without median groove, and in the aciculate second tergite.

Types.—U.S.N.M. No. 56381: Type and four paratypes. Paratypes in the California Academy of Sciences and the Chicago and American Museums of Natural History.

Gall (pl. 2, fig. 10).—A woolly mass partly or entirely encircling small twigs, measuring up to 30 by 25 mm., pure white or rosy when young, consisting of a large number of separate biconical cells attached at a common point, each covered with long hairs. These measure about 7 by 5 mm., shorter and broader than in *furnessae*.

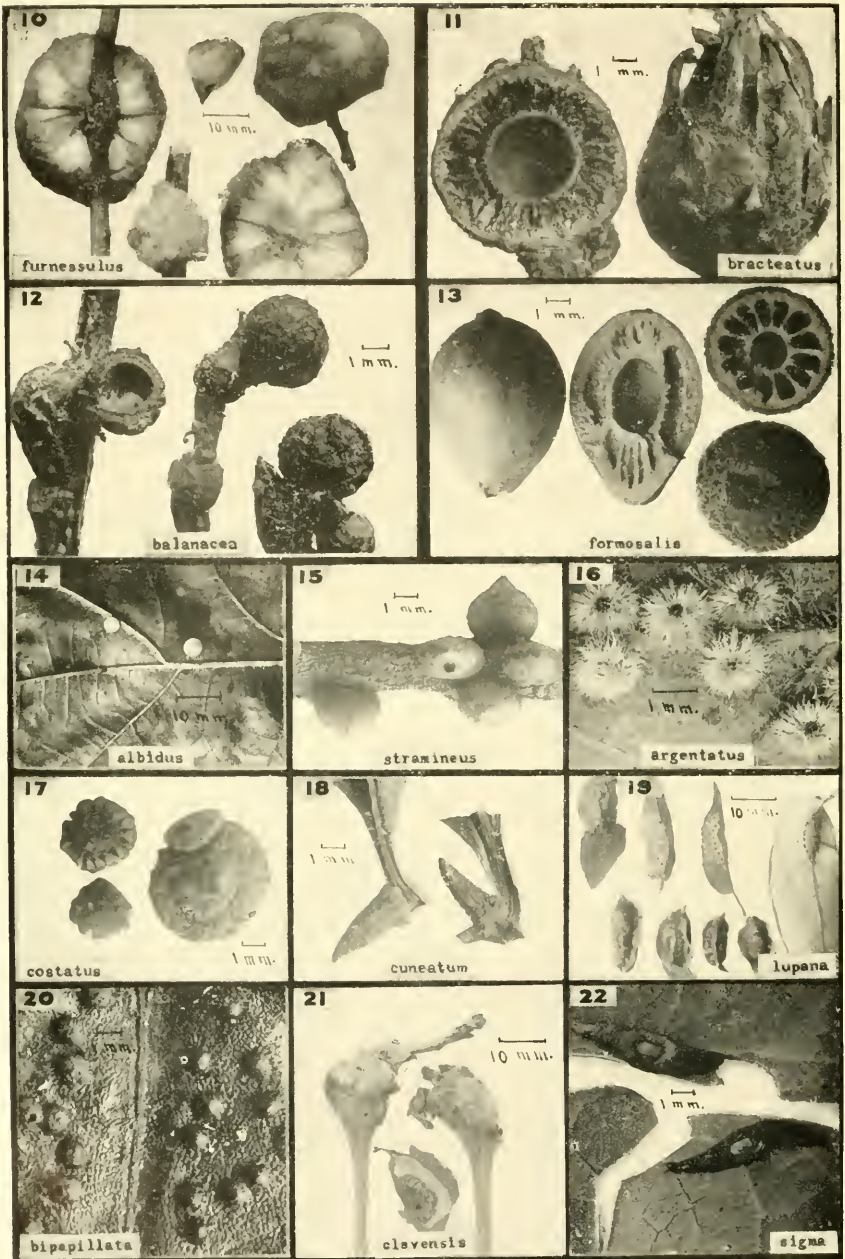
Host.—*Quercus oblongifolia*.

Habitat.—The type is selected from a series from a gall sent from Nogales, Ariz., by Mrs. N. W. Capron on February 4, 1935. Paratypes also are from a gall sent by Ed Jacot from Bear Canyon in the Huachuca Mountains, Ariz., March 30, 1919, the adults emerging May 10–28. The writer collected galls at Nogales and Patagonia, Ariz., and in the Santa Rita Mountains.



GALLS OF NEW AMERICAN CYNIPIDAE

- 1, *Callirhytis florensis* on *Quercus marilandica*; 2, *Andricus vernus* on *Q. garryana*; 3, *Liodora viscida* on *Q. oblongifolia*; 4, *Callirhytis uellae* on *Q. wislizenii*; 5, *Andricus coortus* on *Q. douglasii*; 6, *Trichoterus frondeum* on *Q. chrysolepis*; 7, *Callirhytis sonorae* on *Q. emoryi*; 8, *Callirhytis bipapillata* on *Q. ilicifolia*; 9, *Liodora apiarium* on *Q. alba*.



GALLS OF NEW AMERICAN CYNIPIDAE

10, *Andricus furnessulus* on *Quercus oblongifolia*; 11, *Andricus bracteatus* on *Q. sp.*; 12, *Callirhytis balanacea* on *Q. palustris*; 13, *Andricus formosalis* on *Q. emoryi*; 14, *Dryocosmus albidus* on *Q. coccinea*; 15, *Andricus stramineus* on *Q. oblongifolia*; 16, *Neuroterus argentatus* on *Q. gambelii*; 17, *Andricus costatus* on *Q. sp.*; 18, *Zopheroteris cuneatum* on *Q. alba*; 19, *Callirhytis lupana* on *Q. emoryi*; 20, *Callirhytis bipapillata* on *Q. ilicifolia*; 21, *Neuroterus clavensis* on *Q. gambelii*; 22, *Phylloteras sigma* on *Q. alba*.

ANDRICUS STRAMINEUS, new species

Female.—Uniform light amber or with infuscations on thorax and occiput. Head granulate; from above transverse, cheeks broadened behind eyes, occiput not concave; from in front interocular area higher than broad, malar space one-fourth eye, faint striae about mouth, antennae 15-segmented, filiform, segments as (scape) 16:8:23 (4.5):21:17:16:14:12:10:9:9:8:8:7:13 (5). Sides of pronotum bulging in front of tegulae, pubescent. Mesoscutum coriaceous, shining, with short appressed pubescence without evident punctures, parapsidal grooves narrow, deep, smooth, percurrent; disk of scutellum coriaceous back of the narrow, smooth, oblique pits, rugose behind, pubescent. Carinae on propodeum straight and parallel. Mesopleura in part with faint striae. Wing pubescent and ciliate, veins brown, first abscissa of radius angulate, areolet reaching one-fifth and cubitus three-fourths way to basal. Claws with a strong tooth. Abdomen longer than head plus thorax, as high as long, lengths of tergites along dorsal curvature as 47:18:8:15:9:12, II with pubescent areas on sides at base, III and IV punctate. Ventral spine in side view three times as long as broad, from below triangular. Sheaths projecting at tip. Ovipositor stout, straight at tip. With the width of the head used as a base, the length of mesonotum ratio is 1.3; antenna 2.6, wing 3.6. Lengths of the four specimens 2.1, 2.5, 2.8, and 2.95 mm.

Types.—U.S.N.M. No. 56382: Type. Paratypes in the Chicago Museum of Natural History and the California Academy of Sciences.

Gall (pl. 2, fig. 15).—A tan-colored, bare, smooth, ellipsoidal gall, bursting out of the bark along the internodes of small twigs, drawn out to a blunt point at apex, 2 by 3 mm. by 3 mm. high, single or in small groups in fall. Contains a single larval cell with a wall 0.2 mm. thick.

Host.—*Quercus oblongifolia*.

Habitat.—Mrs. N. W. Capron collected galls containing pupae on February 4, 1935, at Nogales, Ariz. One adult was cut out of the gall on February 14 and three emerged on March 5. She collected galls also at Young, Ariz., on an undetermined oak. Galls have been seen at Patagonia, Ariz.

ANDRICUS VERNUS, new species

Female.—Red; head and tips of antennae and of ventral valves darker. Head from above transverse, as broad as thorax, cheeks broadened behind eyes, occiput concave; from in front broader than high, malar space 0.5 eye with radiating ridges from corners of clypeus, face pubescent, punctured, front coriaceous, antennae 13-segmented, lengths as (scape) 15(8):9:20(5):19:16:14:11:10:9:9:9:9:16(6).

Pronotum medially bare, sides pubescent, punctate with low parallel ridges near hind margin. Mesoscutum very finely coriaceous, uniformly but sparsely pubescent from scattered punctures, parapsidal grooves percurrent, smooth, deep, broader behind, no median; pits of scutellum deep, smooth, separated by a distinct septum, disk rugose, richly pubescent. Carinae of propodeum bowed outward below, parallel above. Mesopleura smooth, polished and bare above, pubescent below. Wing pubescent, ciliate, veins brown, first abscissa of radius faintly angled, areolet reaching one-fifth way to basal. Tarsal claws with a tooth. Abdomen as long as head plus thorax, length to height to width as 37:29:23; lengths of tergites along dorsal curvature as 21:6:3:1, a few hairs on VII, usual pubescent patches on sides of II, exposed parts of others bare, smooth. Ventral spine slender, in side view 10 times as long as broad, as long as hind metatarsus; ventral valves projecting obliquely upward. With the width of the head used as a base, the length of mesonotum ratio is 1.3; antenna 2.3; wing 3.75; ovipositor 3.3. Length 2.3-3.4 mm. Average of 41 specimens 2.92 mm.

Types.—U.S.N.M. No. 56383: Type and 10 paratypes. Paratypes in the California Academy of Sciences and the American and Chicago Museums of Natural History.

Host.—*Quercus garryana*.

Gall (pl. 1, fig. 2).—A smooth, globular, green axillary bud gall, 4-5 mm. in diameter, with a very slight nipple at apex early in spring as new leaves are developing. When detached showing a small whitish sunken scar. After dropping the thin outer fleshy layer becomes wrinkled and soon weathers away, leaving a smooth, slightly elongated, light tan cell whose wall is 0.6-0.7 mm. thick, not brittle, containing about 15 small longitudinal passages.

Habitat.—Galls were collected on May 23, 1922, at Fort Jones, Calif., and sent to Washington under Hopkins U. S. No. 15640^a. The nutritive layer was then used up and the larvae full grown. Adults emerged on April 27, 1923, April 21, 1924, and April 3, 1925. These galls were seen on this host at Yreka and Scott Bar, Calif., and at Siskiyou, Oreg. Similar galls were seen on *Quercus dumosa* at Lakeport, Bartlett Springs, and Ukiah, Calif.

Genus ZOPHEROTERAS Ashmead

ZOPHEROTERAS CUNEATUM, new species

Agamic female.—Light brown; ocellar area, front, and a transverse band on each tergite darker. Face granulate, front coriaceous; head from above transverse, cheeks slightly broadened behind eyes, occiput concave; from in front broader than high, facial area broader than

high, malar space 0.4 eye with groove, a faint ridge on front from between antennae, antennae 13-segmented, lengths as (scape) 13:6:18:15:12:11:9:9:8:8:7:7:11. Sides of pronotum bulging. Mesoscutum shining and coriaceous between the distinct parapsidal grooves. Distal part of scutellum rugose, pubescent, not broader than groove at base, overhanging metanotum behind. Mesopleura smooth and shining. Wings wanting. Hind tibia and its tarsus about equal. Claws simple. Carinae on propodeum not distinct. Abdomen longer than head plus thorax, all tergites visible, ventral spine slender, about 20 times as long as broad in side view, longer than hind metatarsus. With width of the head used as a base, the length of mesonotum ratio is 0.7; antenna 2.8. Length 2.55 mm.

Differs from described species in the longer ventral spine and in having 13-segmented antennae.

Type—U.S.N.M. No. 56384; Holotype.

Gall (pl. 2, fig. 18).—Conical, red, 3.0–4.4 mm. long by 1.5 mm. broad at base, attached to the very base of the petiole in fall just as the leaves are turning. On young trees or sprouts from stumps. Rare.

Host.—*Quercus alba*.

Habitat.—On October 17, 1938, the living adult was cut out of a gall collected just a year previously at East Falls Church, Va. Galls have been seen at Ironton, Mo., and at Hot Springs and Texarkana, Ark.

Genus DRYOCOSMUS Giraud

DRYOCOSMUS ALBIDUS, new species

Agamic female.—Black; scape, mandibles, and legs beyond coxae brownish. Head coriaceous, dull; from above transverse, not quite as broad as thorax, cheeks broadened behind eyes, occiput concave; from in front malar space one-fourth eye without groove or ridges. antennae 14-segmented, lengths as (scape) 12:7:24:18:10:9:8:8:7:7:7:7:6:9. Sides of pronotum pubescent, with parallel ridges. Mesoscutum shining, smooth except for microcoriaceous sculpture along the percurrent grooves, bare except for a few scattered hairs. Pits of scutellum large, shallow, shining, separated by a thin septum; disk coriaceous back of septum, rugose peripherally, overhanging metanotum behind. Mesopleura largely bare, coriaceous with a few faint striae. Wing hyaline, pubescent and ciliate, veins brown, first abscissa of radius angulate, areolet reaching one-sixth way to basal, cubitus almost reaching basal. Tarsal claws simple. Carinae on propodeum parallel. Abdomen longer than head plus thorax, not gibbous below petiole, length to height to width as 39:29:23; lengths of tergites along dorsal curvature as (petiole) 2:51:24:32:30:19:6, all shining although IV–VI have fine punctures and II and VII have scattered hairs on

sides; sheaths projecting, ventral spine 8 times as long as broad in side view, shorter than hind metatarsus. With width of head used as a base, the length of mesonotum ratio is 1.3; antenna 2.2; wing 4.4; ovipositor 5.9. Length 2.15–3.65 mm. Average of 20 specimens 2.8 mm.

Types.—U.S.N.M. No. 56385: Type and four paratypes. Paratypes in American and Chicago Museums of Natural History, Museum of Comparative Zoology, and Academy of Natural Sciences of Philadelphia.

Hosts.—*Quercus coccinea*, *Q. velutina*.

Gall (pl. 2, fig. 14).—A depressed sphere, fleshy, bare, smooth, pure white or pinkish on one side, measuring up to 5 mm. in diameter by 3.8 mm. high. On underside of leaf in October. Not common. Similar in external appearance to *Biorhiza rubina* Gillette on white oaks but with a different internal structure, the larval cell and nutritive layer being central instead of basal.

Habitat.—The type is from galls collected on *Q. coccinea* in October 1933 at East Falls Church, Va., adults emerging on March 20, 1935. Five paratypes are from galls on the same host collected at Vienna, Va. (Hunter), in October 1940, adults emerging on March 23, 1942, and March 31, 1943. Other paratypes are from galls on *Q. velutina* collected at East Falls Church in October 1940 and at Black Mountain, N. C., in 1941, and the adults emerged March 23, 1942, and March 31, 1943. Galls on this oak have been seen at Evanston and Glencoe, Ill., and at Burdett, N. Y.

Genus CALLIRHYTIS Förster

CALLIRHYTIS BALANACEA, new species

Agamic female.—Reddish brown, with eyes, clypeus, lateral and anterior parallel lines, foveae, propodeum, mesosternum, and dorsal abdomen black. Mesonotum covered with short, appressed pubescence. Venation distinct, wing surface covered with short, dark pubescence, margin nonciliate, areolet lacking. Mesoscutum uniformly granulate, grooves narrow, deep, obsolete anteriorly, median wanting. Scutellum finely rugose on a coriaceous background, disk high-arched. Antennae 14- or 15-segmented, first five segments as 23:10:25:21:15, the fourth not stouter than third. With the width of head used as a base, the length of mesonotum ratio is 1.4, antenna 2.2, ovipositor 3.1, wing 3.5. Length of 104 specimens 3.0–4.5 mm. Average 3.64 mm. Mode 3.6 mm.

Closely related to *U. patiens* (Bassett), which is smaller and has a flatter disk and smaller foveae; also to *C. balanopsis* Weld, which has a flatter disk and smaller foveae, less stout hind femora, a short median groove, and the fourth segment of antenna stouter than third.

Types.—U.S.N.M. No. 56386: Type and 18 paratypes. Paratypes in American and Chicago Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Host.—*Quercus palustris*.

Gall.—A pip gall produced late in fall beside small acorns of the current season. Almost spherical, up to 6.3 mm. in diameter, smooth, bare, green with a small black papilla at apex, secreting honeydew. Full grown and dropping off during October after which a thin, fleshy, outside layer soon turns black, wrinkles (pl. 2, fig. 12), and dries down on the hard inner shell, 3.5 by 4.0 mm., within which is a thick nutritive layer containing the larval cavity.

Biology.—Galls were collected in October 1930. During October 1931 most of the larvae transformed into adults, which remained within the galls on the ground during the winter and emerged March 26 to April 2, 1932. A few larvae hung over and adults emerged on April 1, 1933. From galls collected in October 1931 adults emerged March 14–28, 1933. October 1935 galls gave adults on March 28, 1937. On March 20 and April 1, 1940, adults emerged from galls collected in October 1938. One was captured at Mount Vernon, Va., on March 21, 1915, by W. L. McAtee.

Habitat.—The type material was collected from two trees at East Falls Church, Va. Galls were seen at Waterford and Bluemont, Va., and at Poplar Bluff, Mo. William Beutenmueller collected galls in Woodlawn Cemetery, New York City, but failed to rear adults.

CALLIRHYTIS BIPAPILLATA, new species

Female.—Body dark brown, antennae and legs lighter. Head, sides of pronotum, and mesopleura coarsely coriaceous. Antennae 11-segmented, lengths as (scape) 18:15(9):20(6):17:14:15:16:17:13:-13:38(13). Malar groove present. Parapsidal grooves very short, no median. Foveae small, deep, well separated, disk as broad as long. No distinct carinae on propodeum. Surface of wing short-pubescent, margin at first sight nonciliate but under magnification of $\times 65$ there are short cilia on hind margin, veins beyond second cross vein pale, no areolet. Abdomen as high as long, lengths of tergites on dorsal curvature as 22:8:6:7:4:3, ventral spine in side view slightly over twice as long as broad, ovipositor exerted and very long. With width of head used as a base, the length of mesonotum ratio is 1.0, antenna 1.8, ovipositor 12.4, wing 3.5. Length of 50 specimens 0.85–1.45 mm. Average 1.15 mm.

Male.—Sculptured like female, legs and antennae almost colorless. Antennae 15-segmented, ratio 3.15. Wing ratio 3.6, margin distinctly

long-ciliate. Length of 50 specimens 0.75–1.15 mm. Average 0.88 mm.

Types.—U.S.N.M. No. 56387: Type female, allotype, 13 male and 13 female paratypes. Paratypes in the American and Chicago Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Host.—*Quercus ilicifolia*.

Gall (pl. 1, fig. 8; pl. 2, fig. 20).—Leaf parenchyma galls, not detachable, not confluent, on several leaves derived from the same leaf bud and as many as 200 or 300 on a leaf. Individual galls are ellipsoidal, 1.2 mm. high, projecting equally on upper and lower surfaces of the leaf, 0.8–0.9 mm. in diameter, bare above, pubescent below. Exit hole on upper surface.

Habitat.—Type material was collected on July 5, 1930, and June 27, 1933, at elevation of 2,000 feet on the trail to Signal Knob at north end of Three Top Mountain southeast of Strasburg, Va. Adults issued June 30–July 8. Galls were seen also 3 miles northwest of Vienna, Va. Prof. C. R. Crosby collected old galls at Riverhead, N. Y., in September 1913.

CALLIRHYTIS ELECTREA, new species

Female.—Amber, only tips of mandibles and of antennae darker. Head from above transverse, occiput concave, cheeks broadened behind eyes; from in front broader than high, interocular area reticulate, malar space 0.3 eye, striate; antennae 14-segmented, lengths as (scape) 15(7) : 8 : 15(5) : 12 : 11 : 11 : 10 : 10 : 9(6) : 8 : 8 : 8 : 8 : 12(5). Pronotum, mesonotum, and propodeum reticulate. Parapsidal grooves more distinct posteriorly, no median. Pits distinct, not quite smooth. Mesopleura coriaceous above and below a few striae. Tarsal claws weak, simple. Wing pubescent and ciliate, veins brown, first abscissa of radius arcuate, areolet reaching one fifth way to basal. Abdomen shorter than head plus thorax, length to height to width as 27 : 27 : 18, lengths of tergites along dorsal curvature as 63 : 21 : 17 : 14 : 7 : 6, exposed areas bare, smooth. Ventral spine in side view three times as long as broad. With the width of the head used as a base, the length of mesonotum ratio is 1.18, antenna 2.1, wing 3.6, ovipositor 1.5. Length of 14 specimens 2.2–2.8 mm. Average 2.44 mm. Differs from all known species of this genus bred from galls of this sort in acorns by having the wings ciliate.

Types.—U.S.N.M. No. 56397: Type and two paratypes. Paratypes in the American and Chicago Museums of Natural History, Museum of Comparative Zoology, and Academy of Natural Sciences of Philadelphia.

Host.—*Quercus montana*, rock chestnut oak.

Gall.—A group of a few hard, stony, cells inside full-grown acorns in the fall, lying close to the wall in depressions in normal cotyledons, usually at or above the center of the acorn.

Habitat.—The type is from a series bred from acorns collected in October 1934 on the Blue Ridge, 5 miles north of Bluemont, Va., adults emerging on May 8, 1937. Two paratypes are from galls collected on Marshall Peak near Washington, Va. Others are from galls collected at East Falls Church, Va., in October 1930, the adults emerging on April 20, 30, 1934. From two of these lots of collected acorns the emergence of an undescribed black species in small numbers suggests that there are two species infesting the acorns of this oak.

CALLIRHYTIS FLORENSIS, new species

Female.—Uniform light yellowish brown. Head, sides of prothorax, mesoscutum, and mesopleura beautifully coriaceous; disk rugose. Antennae 13-segmented, the first five segments as 12:6:14:12:9, the last two as 5:7. Parapsidal grooves percurrent, median short. Wing short-pubescent, nonciliate, veins beyond second cross vein colorless, areolet absent. Carinae on propodeum sharply bent. Abdomen almost as long as head plus thorax, tergites II and III forming the dorsal margin, their lengths as 41:5, their hind margins impunctate. Ventral valves not conspicuous. Ventral spine in side view about twice as long as broad. Using width of head as a base the length of mesonotum ratio is 1.16, antenna 2.55, ovipositor 2.5, wing 3.5. Length of 45 specimens 1.35–1.65 mm. Average 1.45 mm. Closely related to *C. clarkei* Bassett, which differs from it in having 12-segmented antennae and the mesopleura not entirely coriaceous.

Male.—Head, thorax, abdomen, scape, coxae, hind femora, and tibiae black; rest of antenna, mandibles, fore and middle femora and tibiae, and all tarsi yellowish. Sculptured like the female. Antennae 15-segmented, lengths of first five as 12:6:16:13:11; last two as 8:9. Ratio 2.9. Wing with short cilia on posterior margin, ratio 3.2. Length of 50 specimens 1.15–1.5 mm. Average 1.35 mm.

Type.—U.S.N.M. No. 56388: Type female, allotype, 13 female and 13 male paratypes. Paratypes in the American and Chicago Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Host.—*Quercus marilandica*.

Gall (pl. 1, fig. 1).—Scattered about among the stamens in a shortened catkin; conical, slightly curved, blunt at apex, 2.2 mm. long by 1.0 mm. in diameter, of same color as the anthers but with longi-

tudinal purple streaks, the surface sparsely covered with tangled hairs. Exit hole 0.6 mm. in diameter near apex.

Habitat.—The type material was collected at East Falls Church, Va., from a *Q. marilandica* on May 10, 1931. Adults of both sexes emerged May 18 to 25, the largest number coming out on May 20. In the fall of 1932 nearly every acorn on this tree had a gall of *Callirhytis balanaspis* Weld, and the galls gathered on the ground in October produced adults that emerged on April 9, 1934.

CALLIRHYTIS JUVENCA, new species

Female.—Black; mandibles, knees, and ventral abdomen brown. Head from above transverse, vertex bare, shining, occiput pubescent, not concave; from in front broader than high, cheeks broadened behind the eyes, malar space coriaceous, 0.6 eye, frons shining, pubescent, antennae 13-segmented, lengths as (scape) 13:7:15:12:10:9:8:7:6:6:6:6:13. Pronotum pubescent. Mesoscutum with scattered fine setigerous punctures on a microcoriaceous surface, parapsidal grooves narrow, obliterated anteriorly. Disk of scutellum rugose, pits separated by a septum. Carinae of propodeum almost straight and parallel. Mesopleura largely bare, shining. Wing pubescent and ciliate, veins brown, first abscissa of radius heaviest, arcuate, areolet reaching one-eighth way to basal. Tarsal claws simple. Abdomen longer than head plus thorax, lengths of tergites along dorsal curvature as 20:6:4:4:3:1, exposed parts of III–VII finely punctate, II with pubescent patches on sides at base. Ventral spine slender, tapering, about 7 times as long as broad in side view. With width of head used as a base, the length of mesonotum ratio is 1.2, antenna 2.4, wing 4.4, ovipositor 5.0. Length 2.5–3.3 mm. Average of 20 specimens 2.89 mm.

Types.—U.S.N.M. No. 56389: Types and three paratypes. Paratypes in the Chicago and American Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Host.—An undetermined oak.

Gall.—A midrib cluster on underside of leaf in fall similar to gall of *C. lustrans* (Beutenmueller), but smaller, mottled white and greenish with often a pinkish tinge when fresh, with a scar at apex.

Habitat.—The type locality is Young, Ariz., where Mrs. N. W. Capron collected galls on an undetermined oak November 1, 1935. Four flies emerged on March 20, 15 more by March 24, and one more by April 3, 1937. Agreeing with these is an adult taken ovipositing on *Quercus gambelii* at Williams, Ariz., on April 11, 1918.

CALLIRHYTIS LUPANA, new species

Female.—Head, pronotum, mesoscutum, and front legs reddish brown, rest of body darker. Head from above transverse, as broad as thorax, vertex coriaceous, cheeks broadened behind eyes, occiput concave; from in front broader than high, malar space one-third eye, radiating ridges from corners of clypeus, face granulate, antennae 13-segmented, lengths as (scape) 7 (4) : 5 : 8(2) : 7 : 7 : 6 : 6 : 5 : 5 : 5 : 5 : 5 : 10(4). Sides of pronotum finely rugose. Mesoscutum bare, coriaceous, slightly rugose behind, parapsidal grooves percurrent, sculptured, anterior parallel lines smooth, distinct. Scutellar groove with fine longitudinal ridges, disk distinctly rugose, margined behind. Median area of propodeum with several longitudinal ridges. Mesopleura bare, faintly striate anteriorly. Wing hyaline, pubescence short, brown, margin nonciliate (under high power very short cilia on hind margin), veins brownish, first abscissa of radius arcuate, not clouded, radial cell slightly open at base and apex, areolet reaching one-eighth way to basal, cubitus reaching basal. Tarsal claws weak, simple. Abdomen about equal to head plus thorax, length to height to width as 67 : 63 : 42; lengths of tergites along dorsal margin as 30 : 11 : 12 : 7 : 5, sides of II almost bare, a few hairs on VII, exposed parts of III–VI coriaceous. Ventral spine 3 times as long as broad in side view. Ovipositor very long. With width of the head used as a base, the length of mesonotum ratio is 1.0, antenna 1.6, wing 3.4. Length 1.35–1.9 mm. Average of 17 specimens 1.70 mm.

Male.—Uniform dark brown, antennae and legs lighter, antennae 15-segmented. Mesonotum coriaceous. Wing pubescent and ciliate. Abdomen half as long as head plus thorax. Length 1.15–1.3 mm. Average of five specimens 1.23 mm.

Callirhytis flora Weld, producing a similar gall on *Q. wislizenii*, is distinguished by its larger size, relatively longer antennae, heavier cross veins, larger areolet, and disk not margined behind.

Types.—U.S.N.M. No. 56390: Type female, allotype, and four female paratypes. Paratypes in the Chicago and American Museums of Natural History and the California Academy of Sciences.

Host.—*Quercus emoryi*.

Gall (pl. 2, fig. 19).—A rather abrupt fusiform polythalamous enlargement on the underside of the midrib, stunting the development of the leaf. June.

Habitat.—The type material was collected on June 28, 1935, at Wolf Creek Camp, 10 miles from Prescott, Ariz., by Mrs. N. W. Capron. Adults were then emerging. She later sent empty galls from Cherry, Young, and Nogales, Ariz. A similar gall occurs on *Q. hypoleuca* at Patagonia, Ariz.

CALLIRHYTIS PERRUGOSA, new species

Female.—Head and thorax yellowish brown, abdomen reddish brown. Entire head and thorax almost uniformly rugose but not so coarsely so as in *Amphibolips*. Head as broad as thorax, interocular space broader than high, cheeks strongly broadened behind eyes, occiput from above concave. Antennae 14-segmented, lengths as (scape) 20(9):10:20(6):14:12:11:10:10:9:9:9:8:7:8. Parapsidal grooves scarcely visible in the sculpture, median slightly visible. Scutellum longer than broad, foveae deep, sculptured, septum broad. Area between carinae on propodeum rugose. Wing with yellowish tinge, margin not ciliate, surface short-pubescent, veins yellowish brown, areolet reaching one-eighth way to basal. Abdomen with triangular pubescent patches on sides at base, longer than high, lengths of first two tergites as 27:6. Ventral spine in side view three times as long as broad. With width of head used as a base, the length of mesonotum ratio is 1.36; antenna 2.1; ovipositor 1.9; wing 3.5. Length of 89 measured specimens 3.3–5.1 mm. Average 4.1 mm.

Related to the species in this genus reared from root galls but differing from them all in the very rugose mesonotum in which parapsidal grooves are not distinct even in part.

Types.—U. S. M. M. No. 56391: Type and seven paratypes. Paratypes in the American and Chicago Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Host.—*Quercus alba*.

Habitat.—The type is selected from a series of over 50 specimens collected at East Falls Church, Va., in seven different years at dates from April 13 to May 3. They were taken while ovipositing in the topmost buds of 3–6-foot saplings or strong sprouts from stumps of white oak, but attempts to determine the resulting gall have so far failed and so have attempts to find the gall from which these flies must have just emerged. Paratypes are from Washington, D. C., Great Falls, Md., Malaga, N. J., and Castle Rock and State College (May 7), Pa.

CALLIRHYTIS SONORAE, new species

Female.—Black, with reddish brown on base of antenna and on more or less of head, mesonotum and side of pronotum. Head coriaceous; from above transverse, as broad as thorax, occiput concave, cheeks distinctly broadened behind eyes; from in front broader than high, interocular area 1.3 times as broad as high, malar space 0.4 eye with distinct groove. Antennae 13-segmented, lengths as (scape) 18:7(5.5):14(4.5):11:10:10:9:8.5:8:8:7:7:14(5). A few par-

allel ridges on sides of pronotum. Mesonotum bare, coriaceous, slightly rugose in low relief posteriorly between grooves. The latter percurrent, broader behind. Anterior and lateral lines distinct, narrow. A faint trace of a median behind. Mesopleura bare, coriaceous. Scutellum rugose, the sculptured transverse groove at base with but an indistinct septum, disk margined behind. Carinae on propodeum parallel. Wing hyaline, veins pale, cross veins not clouded, pubescence short, margin nonciliate. Abdomen about equal to head plus thorax, all tergites visible on dorsal curvature and each with a broad coriaceous band posteriorly, base of II bare, ventral spine not projecting beyond lobes of hypopygium. Tarsal claws simple. Using the width of the head as a base the length of mesonotum ratio is 1.2, antenna 1.7, wing 3.4, ovipositor 2.2. Range in length of 150 specimens 1.85–3.0 mm. Average 2.29 mm. Closely related to *C. lupana* of present paper, a sexual generation from a midrib swelling on same host, emerging late in June.

Types.—U.S.N.M. No. 56392: Type and 45 paratypes. Paratypes in the American and Chicago Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Host.—*Quercus emoryi*.

Gall (pl. 1, fig. 7).—A flattened brown mass of 3–10 cells inside the acorn beside the much-reduced cotyledons, the number of cells evident on the surface. Masses measure up to 10 mm. long.

Habitat.—The type is selected from a series bred from acorns from Santa Ana, Sonora, Mexico, taken from baggage at quarantine at Nogales, Ariz., on September 28, 1935 (No. 10348). Adults issued on April 10, 1937, April 2, 1938, April 3, 10, 15, 1939, April 7, 17, 1940, April 7, 12, 1941, April 12, 15, 1942, and April 16, 1943. Paratypes are from Hermosillo, Magdalena, and other points in the state of Sonora. Earliest emergence was March 10. Galls from Cusion, Cuchuta, Esqueda, Guaymas, Fronteras, and Nogales (all in Sonora) have been found in "bellotas" in the personal baggage of Mexicans crossing the border. Over 60 lots have been intercepted, mostly at Nogales, Ariz., a few at Naco and Douglas, Ariz., and a few at El Paso and Ysleta, Tex.

CALLIRHYTIS UVELLAE, new species

Female.—Reddish brown, legs and antennae yellow. Head transverse, broader than thorax, shagreened; from above not broadened behind eyes; from in front malar space about one-fourth eye without groove or striae, antenna 14-segmented, segments as (scape) 11 (6) : 6:16(3) : 12:10:10:9:9:8.5:8:7:7:7:9 (4.5). Mesoscutum longer than broad, bare, microcoriaceous, parapsidal grooves percurrent, an-

terior and lateral lines obscure, no median. Scutellum longer than broad, disk rugose, with two distinct round pits at base. Carinae on propodeum arcuate. Mesopleura striate above with a polished area below. Tarsal claws weak, simple. Wing pubescent and ciliate, veins brown, first abscissa of radius arcuate, slightly clouded, areolet reaching one-ninth way to basal, cubitus reaching basal. Abdomen as high as long, all tergites visible dorsally, II longest, smooth and bare on sides at base, its hind margin oblique. Ventral spine three times as long as broad in side view. With the width of the head used as a base, the length of mesonotum ratio is 1.4; antenna 2.8; ovipositor 1.6; wing 4.4. Length 1.3-2.1 mm. Average of 20 specimens 1.95 mm.

Male.—Similar to female in color; antenna filiform, 15-segmented, malar space one-seventh eye; abdomen small, with a distinct pedicel. Length 1.6-2.0 mm. Average of four 1.8 mm.

Types.—U.S.N.M. No. 56393: Type female, allotype, and four female paratypes. Paratypes in the American and Chicago Museums of Natural History, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, and California Academy of Sciences.

Gall (pl. 1, fig. 4).—Two-chambered, fleshy, reddish, 2.0 mm. in diameter, from bud on side of twigs in spring, single or usually in small clusters. The larva occupies the basal cavity. After the adults emerge the walls of the upper shrivel.

Host.—*Quercus wislizenii*.

Habitat.—The type series was reared from galls collected at Lakeport and Ukiah, Calif., on May 10 and 12, 1922, when the galls contained pupae. Adults issued a few days later and were found dead in the box on May 26. Galls were seen at Upper Lake and at Santa Rosa, Calif. Similar galls were seen on *Q. agrifolia* at Santa Anita, Santa Barbara, Newhall, Fillmore, and Ojai, Calif.