

# Article VI.— THE SPECIES OF *AMPHIBOLIPS* AND THEIR GALLS.

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PLATES X–XV.

The genus *Amphibolips* seems to be confined to North America and contains the largest known species of Cynipidæ. The galls are also large and very characteristic, and these, together with the flies, are perhaps most suitable for experimental purposes. As is well known, galls from a botanical standpoint are of considerable scientific importance, in as far as their morphological structure and origin are concerned. The galls of Cynipidæ are not structureless growths and the histology of their structure and origin would prove an interesting study in itself. The origin and development of vegetable galls, particularly those occurring on the oak, is a study still in its infancy and not comprehensively understood. It was first considered by scientists that the female gall-producing Cynipid deposited simultaneously with its egg a drop of irritating liquid which caused the sap to flow, and that gall-formation was considered the result of chemical action upon the plant cells. This view, however, had to be abandoned, since it has been proved that the effect of the wound resulting from egg-laying is at once healed up, and that there is, according to the species, a considerable lapse of time from egg-deposition to hatching, and that no gall formation takes place before the hatching of the larvæ. It has been discovered by Adler that in two species of Cynipids (*Neuroterus laeviusculus* and *Trigonaspis crustalis*), gall formation commenced just as the larvæ were about to escape from the eggs, and the same observer found that as the larvæ grew and fed, so the gall increased in size.

Hence it may be inferred that gall formation is the result of the irritating action of the larva acting in conjunction with the vitality of the vegetable cells.

Another important question arises: What is the cause of the great variety of gall structure of the different species of Cynipidæ?

An important allusion to the way in which galls are developed upon plants is to be found in Weismann's 'Vorträge über Descendenztheorie,' Vol. II, 1902, p. 304. The following paragraph expresses his conception of the excitatory action of the larvæ of Cynipidæ upon the cells of the host plants. "Seidem Adler und Beyerlinck nachgewiesen haben, dass es nicht ein Gift des Mutterthiers ist, welches bei der Eiablage dem Blatt, oder

der Knospe u. s. w. eingeflösst wird, und welches nun den Reiz zur Gallenbildung setzt, ist die Sache um Einiges klarer geworden. Man kann sich nun vorstellen, dass verschiedene Reize nacheinander die die Larve einschliessenden Pflanzenzellen treffen, deren geordnete Aufeinanderfolge und genau abgestufte Reizwirkung die Zellen in verschiedener Weise zur Thätigkeit anregt, sei es zum blossen Wachsen und Sichvermehrten in bestimmter Richtung, sei es zu Abscheidung von Gerbsäuren oder Holzstoff, oder Ablagerungen von Nährstoffen u. s. w. Schon allein die schwachen Bewegungen der jungen Larve werden einen solchen Reiz bilden, der sich mit ihrem Wachsthum verstärkt, dann vor Allem die Fressbewegungen, und schliesslich, und nicht zum geringsten, verschiedenartige Sekrete, welche das Thier durch seine Speicheldrüsen ausscheidet, und welche wohl irgend welche wirksame und vermuthlich zeitlich wechselnde Stoffe enthalten; alle diese Momente werden als spezifische Zellenreize nach dieser oder jener Richtung die Stoffwechsel — und Wachsthumsvorgänge der Zellen beeinflussen und verändern. Im Prinzip wenigstens, wenn auch nicht im Einzelnen, verstehen wir so die Möglichkeit, wie durch geordnete Aufeinanderfolge und genaue Abwägung dieser verschiedenen Zellenreize der in der That wunderbare Bau der Gallen zu Stande kommt als das Produkt des direkten und einmaligen Einflusses des Gallinsektes auf den Pflanzentheil."

Dr. H. Adler, in his invaluable paper 'Über den Generationswechsels der Eichen-Gallwespen,' pages 209–215 (Zeitsch. für Wissensch. Zoologie, XXXV, pp. 151–244), makes the following observations on gall-formations: "Bei den Gallenwespen wird ebenfalls erst durch die ausschüpfende Larva die Galle erzeugt, wie sich unschwer nachweisen lässt. Bei den Zuchtversuchen wiederholt sich nämlich immer die Erscheinung, mögen die Wespen in Knospen oder in Blätter ihre Eier gelegt haben, dass nach dem Stich zunächst keine Reaktion des betreffenden Pflanzengewebes eintritt. Öffnet man die Knospen, in welche Eier gelegt sind, so findet sich im Innern der Knospe, abgesehen von dem feinen Stichkanal gar keine Veränderung, so lange die Larven noch nicht ausgeschlüpft sind. Bei den Blätter anstechenden Gallwespen lässt es sich noch leichter kontrolliren. Ist z. B. von *Spathegaster baccarum* ein Blatt angestochen, so sieht man deutlich die Stelle wo der Stachel eingedrungen ist, aber während der ersten 14 Tage tritt eine weitere Veränderung der Blattoberfläche nicht ein, sondern erst mit dem Ausschlüpfen der Larve. Unzweifelhaft wird bei dem Stechen gleichzeitig etwas Sekret der Giftdrüse in die Wunde gelangen, welches eben dem vom Stachel gemachten Schnitt in die Blattoberfläche verkleben soll; aber irgend einen Reiz auf die Zellenthätigkeit übt dieses Sekret nicht aus. Noch weit frappanter ist dieser Vorgang bei *Trigonaspis crustalis*; wenn von dieser Wespe im Mai Blätter angestochen worden

sind, so vergehen Monate, bevor eine Spur von Gallenbildung zu bemerken ist. Die Wespe schneidet mit ihrem ziemlich kräftigen Stachel in die Blattrippen hinein und hinterlässt dadurch eine deutliche Spur, wo ein Ei abgesetzt wurde. Man kann von dieser geführt leicht einige Eier aufsuchen; erst im September schlüpfen die Larven aus und dann beginnt die Gallenbildung. Natürlich wird es von Interesse sein, den Zeitpunkt wahrzunehmen, wo die Larve dem Ei entschlüpft und die Gallenbildung einleitet. Leider ist dies recht schwierig. Mag das Ei in einer Knospe oder in einem Blatte eingeschlossen sein, stets ist es dem Blicke entzogen und es hält schwer den Moment abzapassen, wo die Larva ausschlüpft. Erst ist mir gelungen einige Male bei *Neuroterus laeviusculus* und *Biorhiza aptera* dieses Stadium zu beobachten. In dem Augenblicke nun, wo die Larve die Eihaut durchbrochen hat und zum ersten Male mit den feinen Kiefern die nächstgelegenen Zellen verwundet, beginnt eine rapide Zellenwucherung. Dasselbe geht so rasch von statten, dass, während die Larve mit dem Hinterleibsende noch in der Eihaut steckt, vorn bereits eine wallartige Wucherung von Zellen sich erhebt. Man kann sich freilich diese schnelle Zellenvermehrung wohl erklären, weil der von der Larve ausgehende Reiz in höchsten Grade bildungsfähige Zellen trifft, die alle Bedingungen zu neuem Wachstume in sich vereinigen."

Gall-formation may thus very properly be considered as a pathophysiological problem and a subject for the physiological botanist to investigate in its floral aspects in conjunction with such contributions as entomological study may furnish from the analysis and determination of the toxicology derived from the secretions, and perhaps characters of anatomical value of the larvæ.

### ***Amphibolips Reinhard.***

*Cynips* (in part) HARRIS, Rep. Ins. Mass., 1841, p. 398.

*Callaspidia* (in part) FITCH, 5th Rep. Ins. N. Y., 1859, p. 38.

*Amphibolips* REINHARD, Berlin, Ent. Zeit., Vol. IX, 1865, p. 10; MAYR, Gen. Gallenb. Cynip., 1881, p. 26; CRESSON, Synop. Hymen. N. Am., pt. I, 1887, pp. 26, 31; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67; ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. 62; Psyche, Vol. X, 1903, p. 154.

Head large. Antennæ in the female 12-14-jointed, in the male 15-16-jointed. Thorax very robust, wider than the head, highly convex and very coarsely rugose, scabrous or aciculated. Parapsidal grooves distinct or indistinct, being more or less obliterated by the rugosities or coarse sculpture. Scutellum subquadrate or cushion-shaped, a little wider than long, and sometimes emarginate at the tip, with the foveæ at the base very large, deep, and wrinkled. Abdomen smooth or punctured. Claws with a tooth at the base beneath. Wings hyaline with a fuliginous cloud, bands, or almost entirely fuliginous. Radial area open at the margin.

Type. *Cynips spongifica* O. S.

***Amphibolips confluens* (Harris).**

*Cynips confluens* HARRIS, Rep. Ins. Mass. Inj. Veget., 1841, p. 397; Treat. Ins. New Engl. Inj. Veget., 2nd edit., 1852, p. 433; Treat. Ins. Inj. Veget., 3rd edit., 1862, p. 546, pl. viii, figs. 9, 10 and figs. 253, 254; *ibid.*, Flint edit., 1862, p. 546, pl. viii, figs. 9, 10, and figs. 253, 254; *ibid.*, 1863; *ibid.*, 1880. OSTEN SACKEN, Ent. Zeit. Stettin, 1861, pp. 405, 408, 410; SMITH, Ent. Month. Mag., Vol. V, 1869, p. 298; GLOVER, Ill. N. Am. Ent., 1877; pl. viii, fig. 5; Rep. U. S. Com. Agricul., 1877 (1878), p. 94, pl. i, fig. 19.

*Cynips aciculata* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. I, 1861, p. 56; *ibid.*, Vol. IV, 1865, pp. 341, 354; REINHARD, Berlin, Ent. Zeit., Vol. IX, 1865, p. 5; SMITH, Ent. Month. Mag., Vol. V, 1869, p. 298; PROVANCHER, Nat. Canad., Vol. XII, 1881, p. 232; Faun. Ent. Canad. Hymen., 1887, p. 176.

*Cynips q. aciculata* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. I, 1862, pp. 245, 247; BASSETT, Proc. Ent. Soc. Phila., Vol. II, 1863, p. 329; WALSH, Am. Ent., Vol. I, 1869, p. 103; *ibid.*, Vol. II, 1870, p. 330.

*Cynips quercus aciculata* WALSH, Proc. Ent. Soc. Phila., Vol. II, 1864, p. 443.

*Amphibolips aciculata* MAYR, Gen. Gallenb. Cynip., 1881, p. 27; BEUTENMÜLLER, Bull. Am. Mus. Nat. Hist., Vol. IV, 1892, p. 251; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 103.

*Andricus confluens* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. 295.

*Amphibolips confluens* ASHMEAD, Trans. Am. Ent. Soc., Vol. XIV, 1887, p. 127; Bull. I, Col. Biol. Assoc., 1890, p. 38; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 105; BRIDWELL, Trans. Kans. Acad. Sci., Vol. XVI, 1899, p. 203; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67; BEUTENMÜLLER, Psyche, Vol. XV, 1908, p. 10.

*Amphibolips confluentus* BEUTENMÜLLER, Bull. Am. Mus. Nat. Hist., Vol. IV, 1892, p. 250, pl. x, fig. 4; Am. Mus. Journ., Vol. IV, 1904, p. 96, fig. 14; Ins. Galls, Vicin. N. Y., 1904, p. 10, fig. 14; COOK, 29th Rep. Dept. Geol. Nat. Hist. Indiana, 1904 (1905), p. 822, fig. 16; FELT, Ins. Affect. Park and Woodl. Trees, Vol. II, 1906, p. 625.

*Amphibolips confluentis* JARVIS, Rep. Ent. Soc. Ont., 1906 (1907), p. 70, pl. D, fig. 2.

*Agamous female.* Head black, rugose, face with fan-shaped aciculations. Antennæ black, or somewhat piceous, 13-jointed. Thorax finely rugose, with many longitudinal aciculations. Parapsidal grooves very indistinct, but traceable. Anterior parallel lines fine, rather widely separated. Median groove present, rather flat and not distinct. Pleuræ rugose with dense longitudinal grooves or aciculations. Scutellum transverse, coarsely rugose, truncately rounded at the tip. Foveæ large, distinct. Abdomen glossy, pitchy black and microscopically punctate. Legs reddish brown pubescent. Wings hyaline, with a large brown patch in the radial area, which is open at the costal margin. Areolet large, triangular. Length, 4 to 6 mm.

***Amphibolips confluens* form *spongifica* (Osten Sacken).**

*Cynips confluens* OSTEN SACKEN (non Harris), Proc. Ent. Soc. Phila., Vol. I, 1861, p. 56.

*Cynips q. coccinea* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. I, 1862, pp. 243, 247; *ibid.*, Vol. IV, 1865, pp. 344, 347.

*Cynips quercus coccinea* WALSH, Proc. Ent. Soc. Phila., Vol. II, 1864, p. 445.

*Amphibolips cocciniæ* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. 294.

*Amphibolips coccinea* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. 303; *ibid.*, Vol. XIV, 1887, p. 127; GILLETTE, 27th Rep. Agricul. Mich., 1888, p. 467; Psyche, Vol. V, 1889, p. 183; Proc. Iowa Acad. Sci., Vol. I, 1892, p. 110; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 104; BRIDWELL, Trans. Kans. Acad. Sci., Vol. XVI, 1899, p. 203; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Cynips q. spongifica* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. I, 1862, p. 244, 247; WALSH, Proc. Ent. Soc. Phila., Vol. II, 1864, p. 447, 481; Am. Ent., Vol. I, 1869, p. 103; *ibid.*, Vol. II, 1870, p. 331; PACKARD, 5th Rep. U. S. Ent. Com., 1890, p. 115.

*Cynips spongifica* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. IV, 1865, pp. 340, 344, 347, 354.

*Cynips quercus spongifica* RILEY 1st, Rep. Nox. Ins. Missouri, 1869, p. 14; SMITH, Trans. Ent. Soc. Lond., 1869, p. xi; CAMERON, Proc. Nat. Hist. Soc. Glasgow, Vol. III, 1876, p. 110.

*Amphibolips spongifica* REINHARD, Berlin, Ent. Zeit., Vol. V, 1865, p. 10; MAYR, Gen. Gallenb. Cynip., 1881, p. 27; ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, pp. 294, 304; *ibid.*, Vol. XIV, 1889, p. 127; Bull. No. 1, Colorado Biol. Assoc., 1890, p. 38; GILLETTE, 27th Rep. Agricul. Mich., 1888, p. 468; Psyche, Vol. V, 1889, p. 184; BEUTENMÜLLER, Bull. Am. Mus. Nat. Hist., Vol. IV, 1892, p. 251; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 106; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 68.

*Female.* Head black, rugose, with a few scattered hairs. Antennæ 13-jointed, black or piceous, basal joints rufous. Thorax dark rufous, coarsely and irregularly rugose, transversely wrinkled at the sides, and not aciculated as in the dimorphic female, *A. confluens*. Parapsidal grooves continuous, broad, distinct and dilating at the scutellum. Median groove rather distinct and broad. Anterior parallel line very narrow and indistinct. Pleuræ rugose. Scutellum coarsely rugose, dark rufous, rather strongly emarginate at the tip. Foveæ very large. Abdomen red, shining and microscopically punctate. Legs amber yellow, pubescent. Wings pale yellowish hyaline with a large smoky brown patch at the base of the radial cell. Length 3.50 to 5 mm.

*Male.* Head, thorax and scutellum black with the sculpturing like that in the female. Antennæ 15-jointed, abdomen varying from red to almost black. Otherwise as in the female. Length 3 to 3.50 mm.

*Gall.* (Plate X, Fig. 1; Plate XI, Figs. 1, 2.) On the leaves usually from a vein or the petiole on red oak (*Quercus rubra*), scarlet oak (*Quercus coccinea*), quercitron or yellow oak (*Quercus velutina*) in May and June. Globular or nearly so, smooth, shining or opaque with a thin outer shell. Internally filled with a juicy white spongy substance and with a large, hard, central larval cell. When fresh the gall is green, and light brown when old and dry, with the internal spongy substance dark brown. Diameter, 25 to 50 mm.

*Habitat:* Canada; New England and Middle States, south to Georgia and west to Colorado.

This well-known gall is very common and hundreds may be often found upon a single tree. It makes its appearance early in May, as soon as the

leaves put forth, on different kinds of oaks belonging to the red oak group, and is fully grown in a few weeks. It is popularly known as "oak-apple" or May-apple, owing to its superficial resemblance to a small apple. From a certain number of the galls emerge, by the middle of June, both male and female gall flies. These have been named by Osten Sacken, *Cynips (Amphibolips) spongifica*. The gall-flies which emerge in October or the following spring are all agamous females, and have been named *Cynips confluens* by Harris. I have examined the type of *confluens* in the Boston Society of Natural History, and find it to be identical with *Amphibolips aciculata* Osten Sacken. *Amphibolips coccinea* occurs on the scarlet oak, and is the same as *spongifica*, which is found on the red oak (*Quercus rubra*) and quercitron oak (*Quercus velutina*). According to Walsh (Am. Ent., Vol. I, 1869, p. 103), *A. confluens* (= *aciculata*) is the dimorphic female of *A. spongifica*. He informs us that by the fore part or middle of June both male and female gall-flies of *A. spongifica* eat their way out of a certain percentage of galls while the larvæ of others lie dormant for more than two months, when they change into pupæ state, and subsequently about October eat their way out in the form of gall-flies known as *Amphibolips confluens*. Out of thousands of these autumnal flies examined by Walsh, all were females with not a single male among them. He has experimentally ascertained, by colonizing a number of these females upon isolated black oaks (*Q. velutina*) known to be not previously infested with oak-apples, that they cause galls to be generated in the following spring upon such isolated black oaks. From galls produced in this manner, Walsh succeeded in breeding two specimens of the spring form of gall-flies (*A. spongifica*), which exists in both sexes, and five specimens of the autumnal form (*A. confluens*), which exists exclusively in the female sex. Finally, he treated these five autumnal specimens in the same manner, *i. e.*, placing them upon another isolated black oak, and obtained galls in the following spring which produced two specimens of the spring form (*spongifica*), proving that the autumnal form sooner or later reverts to the spring form.

The types of *A. confluens* are in the Boston Society of Natural History and *A. aciculata* and *spongifica* are in the Museum of Comparative Zoölogy.

### ***Amphibolips caroliniensis* Bassett.**

*Amphibolips caroliniensis* BASSETT, Trans. Am. Ent. Soc., Vol. XVII, 1890, p. 85, DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 104; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Female.* Head and thorax black. Parapsidal grooves scarcely recognizable in the coarse sculpturing of the thorax. Abdomen reddish brown with the second segment shorter than in *A. spongifica*. Legs dark reddish brown. Wings dusky hyaline

with the first cross-vein more distinctly defined than in *spongifica*, and the dark cloud in the base of the open radial area smaller and not involving the small areolet, though reaching quite to it on the anterior side. Claws two toothed. Length, 5.50 mm.

*Gall.* (Plate XI, Fig. 3.) Attached to the midrib near the base of a leaf and prevents its development beyond the point of attachment. It occurs on a species of oak probably, *Quercus minor*. Resembles the galls of *Amphibolips spongifica* and *Amphibolips cinerea*, but the surface is more coarsely reticulated and less glossy. Internally the spongy mass surrounding the larval cell is of a much darker color. The outer shell is thinner and in dried specimens is irregularly shrunken and depressed.

*Habitat:* North Carolina (Statesville).

The type of the adult is in the American Entomological Society and the gall in the American Museum of Natural History. The gall very much resembles that of *Amphibolips longicornis*.

### ***Amphibolips longicornis* Bassett.**

*Amphibolips longicornis* BASSETT, Trans. Am. Ent. Soc., Vol. XXVI, 1900, p. 321; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Male.* Head small, black, and corrugated, shining. Antennæ dull brown, 15-jointed, first and second equal, very short, second globular, third one and one half times as long as the first two, fourth three-fourths as long as the third, fifth and following scarcely shorter than the fourth. Thorax black, roughly ridged longitudinally. Parapsidal grooves indistinct in the coarse corrugations. Scutellum very short and broad, with two prominent carinæ dividing the dorsal surface into three equal coarsely wrinkled parts. Foveæ large, round, deep and smooth. Abdomen small, black, smooth. Wings pale brown, veins distinct, with a reddish brown cloud on the small areolet and at the base of the radial area. Cubitus continuous. Length 4 mm.

*Gall.* Allied to *A. spongifica*, and probably found in similar situations on the leaves and young twigs of oak. Monothalamous and very thin shelled. Internally it is of a soft, light and spongy consistency not unlike that of *A. spongifica*. Length .35 mm. Width 30 mm.

*Habitat:* Texas (Palestine).

The species of oak upon which the galls of this species occur is not known. The type galls are in a very poor condition and the fly is only known by a single specimen. The types are with the American Entomological Society, and a cotype gall in the American Museum of Natural History.

### ***Amphibolips acuminata* Ashmead.**

*Amphibolips acuminata* ASHMEAD, Proc. U. S. Nat. Mus., Vol. XIX, 1896, p. 127; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Female.* Closely allied to *Amphibolips spongifica*. In color and stature it is like *spongifica*, but the sculpture is more coarsely rugose, the parapsidal grooves distinct, and the hind legs are black. Length, 5 mm.

*Gall.* (Plate XI, Figs. 4, 5.) Attached to the twigs of black jack oak (*Quercus marylandica*) in May and June. Elongated, subglobular, sometimes pepper-shaped, with the apex drawn out into a point, which is sometimes bent. Yellowish brown, probably green when fresh, thin shelled as in *Amphibolips confluens* and smooth. Internally it is filled with a spongy substance, with a central, hard, larval cell. Length, 30 to 55 mm. Diameter 15 to 30 mm.

*Habitat:* Maryland; Virginia.

The types are in the United States National Museum.

### ***Amphibolips inanis* (Osten Sacken).**

*Callaspidia confluenta* FITCH (non Harris), 5th Rep. Nox. Ins. N. Y., 1859, (Trans. N. Y. Agricul. Soc., 1858 (1859), p. 817.

*Cynips q. inanis* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. I, 1862, pp. 242, 247; WALSH, Proc. Ent. Soc. Phila., Vol. II, 1864, p. 481; Am. Ent. Vol. I, 1869, p. 104, fig. 79; *ibid.*, Vol. II, 1870, p. 331.

*Cynips inanis* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. IV, 1865, pp. 344, 347, 354.

*Amphibolips inanis* MAYR, Gen. Gallenb. Cynip., 1881, p. 27; ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. 294; *ibid.*, Vol. XIV, 1887, p. 127; GILLETTE, 27th Rep. Agricul. Mich., 1888, p. 468; Psyche, Vol. V, 1889, p. 184; Proc. Iowa Acad. Sci., Vol. I, pt. II, 1892, p. 111; BEUTENMÜLLER, Bull. Am. Mus. Nat. Hist., Vol. IV, 1892, p. 251, pl. x, fig. 5; Am. Mus. Journ., Vol. IV, 1904, p. 97, fig. 15; Ins. Galls Vicin. N. Y., 1904, p. 11, fig. 15; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 105; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67; COOK, 29th Rep. Dept. Geol. Nat. Hist. Indiana, 1904 (1905), p. 823, fig. 17; FELT, Ins. Affect. Park and Wood. Trees, Vol. II, 1906, p. 625; JARVIS, Rep. Ent. Soc. Ont., 1907 (1908), p. 90.

*Amphibolips inanus* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. 303.

*Male and Female.* Head deeply black and rugose. Antennæ of the female 13-14-jointed, dark brown, basal joints and terminal joint reddish; 15-jointed in the male, reddish brown or wholly black and longer than in the female. Thorax very coarsely black, or somewhat rufous, very coarsely and deeply, irregularly rugose, with a rugose median groove and the anterior parallel lines visible. Parapsidal grooves almost lost in the rugose surface, but traceable toward the scutellum. Pleuræ rugose. Scutellum very rugose, somewhat emarginate at the tip. Foveæ large, shining with transverse wrinkles. Abdomen reddish, shining. Legs yellowish brown, posterior tibiæ and tarsi sometimes infuscated. Wings hyaline with a large brown patch at the base of the radial area, and slightly extending over the second cross-vein. Length of male 3 to 4 mm.; of female 4 to 4.5 mm.

*Gall.* (Plate XI, Figs. 6, 7.) On the leaves of scarlet and red oak (*Quercus coccinea* and *Quercus rubra*) in May and June. Bright green, sometimes with darker spots. Globular or nearly so, sometimes with a small nipple at the apex, thin shelled, with the surface glossy. Inside with a larval cell held in position by thread-like white filaments. When dry the gall becomes yellowish brown, often with darker brown patches. It is then very thin shelled and brittle. Diameter 25 to 35 mm.

*Habitat:* Canada; New England and Middle States; Maryland; Virginia; North Carolina; Ohio; Michigan; Indiana; Iowa.



Externally the gall may be mistaken for that of *Amphibolips confluens*, but it is as a rule smaller and the larval cell is held in position by radiating fibres while the galls of *confluens* are filled completely with a dense spongy substance. The adults emerge in June and early in July. The types are in the Museum of Comparative Zoölogy. Two cotypes of the galls are also in the American Museum of Natural History.

***Amphibolips ilicifoliæ* (Bassett).**

*Cynips q. ilicifoliæ* BASSETT, Proc. Ent. Soc. Phila., Vol. III, 1864, p. 682; OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. IV, 1865, pp. 344, 348.

*Cynips ilicifoliæ* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. IV, 1865, pp. 340, 355.

*Amphibolips ilicifoliæ* MAYR, Gen. Gallenb. Cynip., 1881, p. 27; ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, pp. 294, 304; BEUTENMÜLLER, Bull. Am. Mus. Nat. Hist., Vol. IV, 1892, p. 252, pl. x, fig. 6; Am. Mus. Journ., Vol. IV, 1904, p. 97, fig. 16; Ins. Galls Vicin. N. Y., 1904, p. 11, fig. 16; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 104; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67; FELT, Ins. Affect. Park and Wood. Trees, Vol. II, 1906, p. 625.

*Female.* Head black with the vertex irregularly sculptured, face rugose and pubescent, the hairs converging toward the mouth; palpi shining red. Antennæ 13-jointed, first and second joints very short, shining black, remaining joint dull black and pubescent. Thorax deeply and irregularly sculptured, with a short pubescence, grooves obliterated by the coarse, somewhat linearly arranged sculpturing. Scutellum very rugose with large foveæ. Abdomen shining black, ventral edge clear reddish brown, the segments, except the first and second, with very fine microscopic punctures. Legs: anterior and middle pair reddish brown with the upper parts of the femora and coxæ black; posterior legs black, reddish at the joints. Wings pale dusky, hyaline, veins brownish black, vein at base of the open radial area, covered by a large brownish black cloud, which covers part of the areolet, but does not reach the anterior margin of the wing. In some examples there is a very pale brown cloud in the basal cell. Areolet very small. Length 4.25 mm.

*Male.* Similar to the female, but with 15-jointed antennæ, and darker legs, the posterior pair almost entirely black. Length 3.50 mm.

*Gall.* (Plate XII, Figs. 5, 6.) On the upper side of the leaves of scrub oak (*Quercus nana*), standing erect or nearly so, sometimes entirely preventing the development of the leaf and apparently growing out of the petiole. Dark green, elongated, fusiform with the apex rather longer and more slender than the basal portion, and often curved. The outer shell is thin, smooth, and opaque. Internally with a larval cell held in position by radiating fibres as in *Amphibolips inanis*. Length 25 to 55 mm.; width 7 to 20 mm.

*Habitat:* Connecticut; New York; New Jersey; Pennsylvania; Delaware; Maryland.

The galls may be found in May and June and the adults emerge during the latter month. The types are in the American Entomological Society and type galls in the American Museum of Natural History.

***Amphibolips coelebs* (Osten Sacken).**

*Cynips quercus coelebs* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. I, 1861, p. 60; Ent. Zeit. Stettin, Vol. XII, 1861, pp. 408, 411.

*Cynips coelebs* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. IV, 1865, pp. 340, 345, 348, 355.

*Amphibolips coelebs* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, pp. 294, 304; *ibid.*, Vol. XIV, p. 128; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67; BEUTENMÜLLER, Am. Mus. Journ., Vol. IV, 1904, p. 98, fig. 17. Ins. Galls Vicin. N. Y., 1904, p. 12, fig. 17.

*Amphibolips caelebs* DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 104.

*Male.* Head and thorax black, coarsely rugose, somewhat pubescent. Antennæ 15-jointed, reddish brown, paler toward the tip, about as long as the body. Abdomen reddish brown. Legs rusty yellow, posterior femora and tibiæ infuscated. Wings hyaline with a brown spot on the second cross-vein and a pale almost obsolete brownish shade between it and the anal angle of the wing, radial area open, second cross-vein stout and angular. Areolet very small and indistinct. Length 4 mm.

*Gall.* (Plate XI, Figs. 8, 9, 10.) On the edge of a leaf of scarlet oak (*Quercus coccinea*) and red oak (*Quercus rubra*). Sometimes also found on young and tender twigs. Elongated or fusiform, narrow, with the apex prolonged into a point; base usually with a long pedicel, inserted on the edge of the leaf and being the prolongation of the leaf-vein. Pale green with a thin outer shell. Internally there is an oblong thin larval cell, held in position by radiating fibres. Length 20 to 25 mm.; width 4 to 8 mm.

Habitat: New York, New Jersey, Washington, D. C.

The fly is known only by a single male. The type, together with the gall, are in the Museum of Comparative Zoölogy. Several galls taken on *Quercus coccinea* by Mr. W. T. Davis and myself are in the American Museum of Natural History. The gall makes its appearance from about the middle of May to early in June, and the adult emerges during the latter month. It is allied to *Amphibolips inanis*, but differs by having a less distinct areolet and paler legs. The gall is somewhat similar to those of *Amphibolips citriformis* and *Amphibolips ilicifoliae*.

***Amphibolips citriformis* (Ashmead).**

*Cynips q. citriformis* ASHMEAD, Trans. Am. Ent. Soc., Vol. IX, 1881, p. xxviii.

*Amphibolips citriformis* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, pp. 294, 303; *ibid.*, Vol. XIV, 1887, p. 130; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 104; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Female.* Head and thorax brownish black, deeply and coarsely punctate, slightly pubescent; palpi brownish. Antennæ reddish brown, 13-jointed. Parapsidal grooves indistinct, lines obsolete. Scutellum rounded, rugoso-punctate and somewhat pubescent. Foveæ distinct. Pleuræ rugose. Abdomen bright, reddish brown, shining, minutely punctate with a few hairs at the base of the second segment.

Legs reddish brown, posterior pair somewhat darker, pubescent. Wings hyaline, veins yellowish, radial area open, a dark brown spot extending across the base from tip of subcostal vein, basal vein thick, along subcostal for a short distance dark brown, areolet closed, petiolated. Length 5 mm.

*Gall.* (Plate XIII, Figs. 6–10). On the twigs of willow oak (*Quercus phellos*). Varying considerably in shape from narrow spindle shaped to globular, with the apex attenuated to a sharp point. Smooth, shining, yellowish, and rather thin shelled. Internally is a larval cell held in position by a few thin, radiating filaments. Length 12 to 24 mm.; width 6 to 12 mm.

*Habitat:* Florida.

The types of the fly and galls of this species are in the United States National Museum, and cotype galls in the American Museum of Natural History.

### ***Amphibolips melanocera* Ashmead.**

*Amphibolips melanocera* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, pp. 299, 303; *ibid.*, Vol. XIV, 1887, p. 130; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 105; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Male and Female.* Head, antennæ and thorax black, abdomen shining reddish brown. Anterior and middle legs pale yellowish brown, femora to near the tip; hind legs dark brown or nearly black with the knees yellowish brown; all the coxæ black. Head rugoso-punctate. Antennæ 14-jointed in the male, 13-jointed in the female. Thorax coarsely rugose with some raised irregular markings, anterior parallel lines present, rather short, a rugose median groove and the parapsidal grooves lost in the coarse surface anteriorly, and traceable posteriorly. Pleuræ rugose. Scutellum rugose, with the foveæ at base transversely wrinkled, scarcely emarginate at the tip. Wings hyaline, veins dark, and a large brown patch at the base of the radius with a pale center. Length 4.50 to 5 mm.

*Gall.* (Plate XII, Figs. 1–4.) Issuing from the bud axilis of water oak (*Quercus nigra*). Globular or elongate oval, sometimes with a very short nipple at the apex. Greenish brown and yellowish green when fresh. Coffee brown and very glossy when dry. The outer shell is very thin, and internally there is a central kernel held in place by some very thin hair-like filaments. When dry the gall is very brittle, and may be easily crushed with the fingers. Diameter 7–15 mm.

*Habitat:* Florida.

This species resembles *Amphibolips citrifformis*, but is easily distinguished by its dark antennæ and dark posterior legs. The gall is constructed on the same plan as in that species but is rounded or elongate oval and without a long pointed terminal prolongation at the apex.

The types are in the United States National Museum and a number of co-type galls are in the American Museum of Natural History.

### ***Amphibolips cinerea* (Ashmead).**

*Cynips q. cinerea* ASHMEAD, Trans. Am. Ent. Soc., Vol. IX, 1881, p. xix.

*Amphibolips cinerea* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, pp. 294, 303; *ibid.*, Vol. XIV, 1887, p. 294; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 104; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Female.* Head brown, small, slightly pubescent, coarsely rugose; eyes brown, mandibles black. Antennæ 13-jointed, short, not reaching back of the scutellum. Thorax brown, broad, robust and convex; very coarsely rugoso-punctate. Parapsidal grooves almost obsolete. Anterior lines widely separated and almost parallel, indicated by coarse punctures. A deep transverse furrow dividing the mesothorax from the scutellum. A few microscopical whitish hairs toward the head, disc free. Scutellum round, elevated, deeply irregularly, rugoso-punctate. Foveæ deep, round, not quite separated. Pluræ rugoso-punctate, pubescent. Abdomen bright, reddish brown, smooth, very minutely punctate under a high power lens, globular and regularly rounded posteriorly, a high ridge at base of second segment, ventral sheath not projecting. Venter hairy the whole length. Legs reddish brown. Wings hyaline, rather hairy, veins reddish, a large brown patch at the base of the radial area and apical third of the areolet, also extending slightly along the cubitus. Basal vein thick and clouded. Anal vein brown from opposite the tip of the areolet; tip of radial vein pale; subcostal vein becomes brown as it approaches the basal vein and becomes pale again just before joining the large brown patch. Length 5 mm.

*Gall.* (Plate XII, Figs. 7-10.) Attached to the twigs and limbs of blue-jack or upland willow oak (*Quercus brevifolia*). Large, spherical or elongate oval, with a small nipple at the apex and of a dark crimson, mottled with small spots of a lighter color. The outer shell is rather thick, and when old it is brown, hard and brittle. Internally there is a central larval cell held in position by very dense brownish, spongy filaments. Length 24 to 35 mm.; width 20 to 30 mm.

*Habitat:* Florida.

The types are in the United States National Museum.

### ***Amphibolips cooki* Gillette.**

*Amphibolips cookii* GILLETTE, 27th Rep. Agricul. Mich., 1888, p. 495, fig. 6; Psyche, Vol. V, 1889, p. 220, fig. 6; Proc. Iowa Acad. Sci., Vol. I, 1890, p. 56; *ibid.*, pt. II, 1892, p. 110; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 104.

*Amphibolips cooki* DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Female.* Head black, face rugoso-aciculate, the furrows spreading out like a fan from either side of the clypeus; vertex and sides coarsely rugose. Antennæ 13-jointed. Thorax black and rather closely aciculated. Parapsidal grooves indistinct, and scarcely traceable. Anterior parallel lines very indistinct. Pléuræ finely and obliquely aciculated. Scutellum coarsely rugose, with the foveæ large, deep and shining. Abdomen dark reddish brown to almost black, smooth and shining, and exceedingly minutely punctate. Legs dark reddish brown, pubescent; coxæ blackish. Wings slightly dusky, hyaline, with a large dark brown patch at the base of the radial cell. Length 5.50 mm.

*Gall.* (Plate XIII, Figs. 1-5.) Issuing from a bud on the terminal twigs of red oak (*Quercus rubra*) in September and October. Almost globular and usually with a small nipple at the apex. Green and succulent and spotted with red when fresh, and with the outer shell moderately thick. Internally with a central larval cell held in position by radiating fibres. When old the gall becomes brown and shriveled in appearance. Diameter about 16 to 18 mm.

*Habitat:* Connecticut; New York; New Jersey; North Carolina (Black Mts.); Pennsylvania; Michigan; Iowa.

The gall somewhat resembles that of a *inanis*, but differs by being smaller, a thicker outer shell and much stouter radiating fibres. It is an autumnal species and the galls readily break off when touched, or it falls with the leaves or before them. It is a bud gall, while that of *A. inanis* occurs on the leaves in spring. The adult emerges late in August and early in September. The types are in the Iowa Agricultural College, and the adult was kindly sent to me for examination by Prof. H. E. Summers. Cotypes of the galls from Prof. C. P. Gillette are in the American Museum of Natural History.

### ***Amphibolips tinctoriæ* Ashmead.**

*Amphibolips tinctoriæ* ASHMEAD, Proc. U. S. Nat. Mus., Vol. XIX, 1896, p. 125; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 68.

*Female.* Head black rugose. Antennæ 13-jointed, dark brown. Thorax striate-rugose more or less distinctly striated; the striæ are sometimes oblique and irregular. Parapsidal grooves obliterated, or only slightly indicated anteriorly. Scutellum coarsely rugose with the foveæ large, deep and separated by a carina. Pleuræ rugose, usually pubescent and sometimes with a raised polished area. Abdomen black, dark brown beneath, and margins of second and following segments brown. Legs reddish yellow. Wings hyaline, veins distinct, dark brown, first cross-vein angulated and enclosed in a brown patch. Areolate large. Length 4.6 to 5 mm.

*Gall.* (Plate XIV, Figs. 1, 2.) Issuing from a bud on quercitron or yellow oak (*Quercus velutina*) and red oak (*Quercus rubra*) in autumn. Almond-shaped, acuminate, at tip, compressed with the opposite sides keeled. Green or red when fresh and brown when old. Rather thick shelled and smooth. Internally it is hollow with a central larval cell held in position by radiating fibres. Length 12 to 20 mm.

*Habitat.* Connecticut; New Jersey; Pennsylvania.

Allied to *Amphibolips spongifica*, but the peculiar striated rugose thorax readily distinguishes it from that species. The gall is a deformation of a bud and the characteristic keel shaped sides and compressed form, separates it at once from all other known galls of *Amphibolips*. The types are in the United States National Museum, and specimens of the gall are in the American Museum of Natural History.

### ***Amphibolips spinosa* Ashmead.**

*Amphibolips spinosa* ASHMEAD, Trans. Am. Ent. Soc., Vol. XIV, 1887, pp. 127, 141; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 105; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 68.

*Female.* Reddish brown, finely and sparsely pubescent, and closely allied to *Amphibolips citriformis*. The legs are more densely pubescent and the head and thorax less coarsely rugose. The basal vein of the wing, tip of submarginal vein

and the cloud at base of radius are distinctly black. The areolet is smaller than in *A. citriformis*. Length 4.50 mm.

*Gall.* On leaves of laurel oak (*Quercus laurifolia*). Brown, globular, covered with prickles or spines. The outer shell is thick and internally it is composed of a slight spongy substance, which surrounds the thin central larval cell. Diameter 7.50 mm.

*Habitat:* Florida.

The types are in the United States National Museum.

### ***Amphibolips globulus* sp. nov.**

*Female.* Head black finely and rather evenly rugoso-punctate. Thorax black, large, finely and evenly rugose, almost granulose. Parapsidal and median grooves distinct from the scutellum to about the middle, thence obliterated. Anterior parallel lines, fine and widely separated. Grooves at base of wings distinct, but not prominent. Scutellum black, more roughly rugose than the thorax, distinctly emarginate at the tip. Foveæ large and wrinkled. Abdomen dark reddish brown, smooth and polished. Legs reddish brown. Wings hyaline with a dark brown patch at the base of the radial area. Areolet large and brown. Length 6 mm.

*Gall.* (Plate XIV, Figs. 3, 4, 5.) On the twigs of black jack oak (*Quercus marylandica*) in September. Globular, thick shelled, with a small nipple at the apex. Filled with a very dense mass of radiating spongy substance. Green when fresh, brown when dry. Diameter 14 to 17 mm.

*Habitat:* Lakehurst, New Jersey.

The gall very much resembles that of *Holcaspis globulus* externally, but the internal structure is very different. The types are in the American Museum of Natural History.

### ***Amphibolips nubilipennis* (Harris).**

*Cynips nubilipennis* HARRIS, Rep. Ins. Mass. Inj. Veget., 1841, p. 399; Treat. Ins. New Engl. Inj. Veget. 2nd edit., 1852, p. 434; Treat. Ins. Inj. Veget. 3d edit., 1862, p. 548; *ibid.*, Flint edit., 1862, p. 548; *ibid.*, 1863, p. 548; *ibid.*, 1880, p. 548; OSTEN SACKEN, Ent. Zeit. Stettin, 1861, pp. 409, 412; Proc. Ent. Soc. Phila., Vol. I, 1861, p. 63; WALSH, Proc. Ent. Soc. Phila., Vol. II, 1864, p. 484.

*Callaspidea nubi ipennis* FITCH, 5th Rep. Ins. N. Y. 1859 (Trans. N. Y. Agric. Soc., 1858 (1859), p. 818).

*Amphibolips nubilipennis* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, pp. 294, 304; *ibid.*, Vol. XIV, 1887, p. 128; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 105; BEUTENMÜLLER, Psyche, Vol. XV, 1908, p. 10.

*Cynips quercus sculptus* BASSETT, Proc. Ent. Soc. Phila., Vol. II, 1863, p. 324; *Cynips quercus sculpta* WALSH, Proc. Ent. Soc. Phila., Vol. II, 1864, p. 484.

*Cynips sculpta* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. IV, 1865, pp. 347, 356.

*Cynips q. sculpta* PACKARD, 5th Rep. U. S. Ent. Com., 1890, p. 114.

*Amphibolips sculp'a* MAYR, Gen. Gallenb. Cynip., 1881, p. 27; ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, pp. 294, 304; *ibid.*, Vol. XIV, 1887, p. 127; GILLETTE,

27th Rep. Agric. Mich., 1888, p. 468; Psyche, Vol. V, 1889, p. 184; Proc. Iowa Acad. Sci., Vol. I, 1892, p. 111; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 105; COOK, 29th Rep. Dept. Geol. Nat. Hist. Indiana, 1904 (1905), p. 825; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 68.

*Female.* Head black, irregularly and coarsely rugose. Antennæ 13-jointed, black, piceous or very dark rufous. Thorax black coarsely and irregularly sculptured. Parapsidal grooves continuous, rugose, widely separated at the collar and converging toward the scutellum where they are not widely separated. Anterior parallel lines exceedingly fine and scarcely visible on the rugose surface. From the scutellum to the collar there is a rather broad, rugose median groove. Pleuræ finely and evenly rugose. Scutellum rugose, broadly emarginate posteriorly. Foveæ very large occupying about one half of the scutellum, somewhat shining and transversely wrinkled. Abdomen varying from rufous to piceous microscopically punctate, except at the smooth base. Legs yellowish brown, coxæ piceous. Wings hyaline with a brown cloud from the second cross-vein to the tip of the wing, veins rather delicate. Areolet triangular. Length 2.50 to 3.50 mm.

*Male.* Head, thorax and scutellum similar to that of the female, black. Antennæ 15-jointed and longer than the female, rufous. Abdomen polished with the punctation exceedingly minute and not visible without a strong lens. Wings evenly hyaline, without and dark cloud, veins very delicate. Legs yellowish brown. Length 2.50 to 3 mm.

*Gall.* (Plate XIV, Figs. 8-10.) Attached to the under side of leaves of red oak (*Quercus rubra*), and scarlet oak (*Quercus coccinea*). Globular or oblong oval and the color of a green grape sometimes with a tinge of pink, succulent and translucent. Internally there is a single cell which can be seen when held up to the sunlight, Diameter 6 to 18 mm.

*Habitat:* New York; New Jersey; Connecticut; Massachusetts; Pennsylvania; Michigan; Iowa; Indiana; Illinois.

The galls of this distinct species may be found fully developed from about the middle of June to early in July, the fly appearing during the latter month.

The gall when fresh is almost exactly like a green grape and is sometimes partly or wholly pinkish. It is juicy and soft with a hard central larval cell.

When dry the gall is shriveled, and very distorted in shape. It is then hard and woody and contains a rounded larval cell in surrounding substance. I have examined Harris' types of the fly and galls and found them to be identical with the types of *Amphibolips sculptus* Bassett. The types of *A. nubilipennis* are in the Boston Society of Natural History, and the types of *A. sculptus* are in the American Museum of Natural History and the American Entomological Society.

### ***Amphibolips racemaria* (Ashmead).**

*Cynips q. racemaria* ASHMEAD, Trans. Am. Ent. Soc., Vol. IX, 1881, p. xxvi.  
*Amphibolips racemaria* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, pp.

294, 303; *ibid.*, Vol. XIV, 1887, p. 127; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 105; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 68.

*Female.* Head black, rather small, and deeply rugoso-punctate, face very slightly pubescent and a long tuft of pubescence back of the eyes. Antennæ 14-jointed, black. Thorax deeply coarsely and irregularly punctate. Pleuræ less deeply and coarsely punctate. Abdomen large, black and shining, apical half of second segment, and following segment excepting at the base, finely and densely punctate; second segment with a few hairs; ventral sheath very long. Legs reddish brown, coxæ black, pubescent. Wings smoky or brownish black, apices paler, veins black; radial area rather narrow. Areolet present. Length 4 to 4.25 mm.

*Gall.* (Plate XIV, Figs. 6, 7.) On the under side of leaf of laurel oak (*Quercus laurifolia*) in April and May. Globular or spherical, crisp, sour and succulent. Green when fresh, and brown and shriveled when dry. Internally with a reddish larval cell. Diameter 8 to 10 mm.

*Habitat:* Florida.

The gall very much resembles that of *Amphibolips nubili pennis*. The types are in the United States National Museum and one cotype gall is in the American Museum of Natural History.

### ***Amphibolips prunus* (Walsh).**

*Cynips quercus juglans* OSTEN SACKEN, Proc. Ent. Soc. Phila., Vol. I, 1862, p. 255; GLOVER, Ill. N. Am. Ent., 1878, pl. viii, fig. 6 (gall only); DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 71.

*Cynips juglans* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. 296.

*Cynips quercus prunus* WALSH, Proc. Ent. Soc. Phila., Vol. III, 1864, p. 639; Am. Ent. Vol. I, 1869, p. 104, fig. 80.

*Amphibolips prunus* MAYR, Gen. Gallenb. Cynip., 1881, p. 27; ASHMEAD, Trans. Am. Ent. Soc., Vol. XIV, 1887, p. 130; Bull. 1, Col. Biol. Assoc., 1890, p. 38; LINTNER, 4th Rep. Inj. Ins. N. Y., 1888, p. 24, figs. 18, 19; GILLETTE, Psyche, Vol. V, 1889, p. 184; PACKARD, 5th Rep. U. S. Ent. Com., 1890, p. 115; BEUTENMÜLLER, Bull. Am. Mus. Nat. Hist., Vol. IV, 1892, p. 252; Am. Mus. Journ., Vol. IV, 1904, p. 98, fig. 18; Ins. Galls Vicin. N. Y., 1904, p. 12, fig. 18; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 105; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67; COOK, Proc. Indiana Acad. Sci., 1904, p. 225; 29th Rep. Dept. Geol. and Nat. Hist. Ind., 1904 (1905), p. 824, fig. 18; FELT, Ins. Affect. Park and Wood. Trees, Vol. II, 1906, p. 628.

*Female.* Head and thorax deep black, evenly and rather finely rugose. Antennæ 12-jointed, black, short, rather stout. Parapsidal grooves not visible, median groove present, but not distinct. Anterior parallel lines fine, and slightly diverging posteriorly. Lines near base of wings, rather long. Pleuræ finely rugose. Scutellum rugose, foveæ at base large, broad and scarcely separated by a ridge. Abdomen blackish, subopaque, finely and densely punctate; base shining, and not punctate, pubescent. Legs yellowish brown. Wings dusky with a brown shade from the base of the radial area to the apex. Length about 6 mm.

*Gall.* (Plate XV, Figs. 1, 2, 3.) On acorn cups of red oak (*Quercus rubra*), Scrub oak (*Quercus nana*), quercitron oak (*Quercus velutina*) and scarlet oak (*Quer-*



*cus coccinea*) in August and September. Bright red, more or less globular, smooth, and sometimes looking almost like a marble. When fresh it is solid but fleshy and of a pink color inside, shading into yellow toward the middle, where there is a single large larval chamber. Subsequently it becomes mature and it turns blood red, and when old and dry it becomes so hard as to be cut with difficulty. Diameter 15 to 25 mm.

*Habitat:* New England and Middle States; south to Georgia; and west to Colorado.

### ***Amphibolips gainesi* Bassett.**

*Amphibolips gainesi* BASSETT, Trans. Am. Ent. Soc., Vol. XXVI, 1900, p. 322; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Cynip., 1902, p. 67.

*Female.* Head black, coarsely rugose with sparse, short, pale hairs. Antennæ rather short, 14-jointed. Mesothorax coarsely rugose, stout, parapsidal grooves very indistinct and scarcely discernible in the coarse rugosity of the surface. Anterior pair of parallel lines short, narrow and quite indistinct. Line of the base of wing rather broad and deep, but not pronounced. Pleuræ rugose, black. Scutellum rather large and rugose, truncately rounded posteriorly. Foveæ large, somewhat shining. Abdomen black, subopaque, very finely and densely punctate, basal half rather densely hairy, posterior margins of all the segments very narrowly smooth and shining. Legs reddish brown, hairy, tarsi dark brown. Wings dark smoky brown with a darker cloud from the first cross-vein to the apex. Veins dark brown, cross-veins very stout and shining. Areolet very large. Radial area open. Length 6 to 7 mm.

*Gall.* (Plate XV, Figs. 4, 5.) Attached by a small point to the sides of an acorn cup of black jack oak (*Quercus marylandica*). Perfectly round and smooth and of a dense corky substance. Internally it is rusty brown, contains a large central larval chamber, which is firmly imbedded in, and adherent to the surrounding mass. Diameter 24 to 42 mm.

*Habitat:* Texas (Austin).

The fly is one of the largest species and is closely allied to *Amphibolips prunus* Walsh. The gall is considerably larger than that of *A. prunus* and it does not shrivel up like *prunus*.

The types of the fly and gall are with the American Entomological Society, and type specimens of galls are also in the American Museum of Natural History. A fine series of galls of *A. gainesi* were kindly sent to me by Mr. C. Hartman, collected at Austin, Texas, the type locality for this species. I succeeded in rearing four females from these galls.

### ***Amphibolips fuliginosa* (Ashmead).**

*Cynips q. fuliginosa* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. vii.

*Amphibolips fuliginosa* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. 294; *ibid.*, Vol. XIV, 1887, p. 130; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 104; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Holcaspis fuliginosa* ASHMEAD, Trans. Am. Ent. Soc., Vol. XII, 1885, p. 303.

*Female.* Head black, rugose, and slightly pubescent. Antennæ black, 13-

jointed. Thorax almost evenly and uniformly rugose with the parapsidal grooves slightly traceable posteriorly. Anterior parallel lines rather long, and distinct. Pleuræ like the thorax. Scutellum more coarsely rugose with two large foveæ, tip rounded. Abdomen blackish, subopaque and rather finely and densely punctate, shining and smooth basally. Legs reddish brown, femora rather stout. Wings wholly smoky brown, veins darker. Length 4 to 5 mm.

*Gall.* (Plate XV, Figs. 6, 7.) On the twigs or possibly on the acorns of willow oak (*Quercus laurifolia*), in August. Rounded or spherical, smooth, and of a corky texture, with a central larval cell. Reddish brown and rather hard when dry. Diameter 8 to 12 mm.

*Habitat:* Georgia; Florida.

The adult is allied to *Amphibolips prunus* and *Amphibolips gainesi*, but differs in having the wings entirely smoky brown and by being considerably smaller. The gall has the appearance of a miniature gall of *Amphibolips prunus*, and is similar in structure. W. H. Ashmead states that the galls drop from large trees in August and that he was unable to find out whether they grow on the twigs or leaves. I am of the opinion that it is an acorn gall owing to the resemblance of the adult and structure of the gall to that of *A. prunus*.

The types are in the United States National Museum and cotype galls in the American Museum of Natural History.

### ***Amphibolips palmeri* Bassett.**

*Amphibolips palmeri* BASSETT, Trans. Am. Ent. Soc., Vol. XXVI, 1900, p. 322; DALLA TORRE, Cat. Hymen., Vol. II, 1893, p. 105; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Female.* Head black, face unevenly wrinkled, vertex deeply and irregularly wrinkled. Antennæ black, very short, 13-jointed, first joint heavy, second joint short, third joint one-half longer than the first and second together, fourth joint one half as long as the third, remaining joints short, last joint a little longer than the twelfth. Mesothorax deeply and irregularly wrinkled with two obscure parallel lines and a line at the base of each wing. Parapsidal grooves faint and scarcely interrupt the rugosity of the surface. Scutellum very coarsely wrinkled and is much broader in the middle than on the anterior side, truncate and emarginate posteriorly; foveæ large, rugose with a low irregular line separating them and a high ridge bounding them at the sides, the whole polished and shining. Abdomen black, second segment covering one-half of the whole, anterior half smooth and shining and with a few scattered hairs. The posterior half and the visible parts of the other segments distinctly reticulated or punctate, except a narrow polished band on the margin of each. Legs black, shining with a few scattered hairs. Wings dark, smoky brown, with a very dark brown cloud covering the areolet and the lower half of the radial area; beyond this and extending across the radial area to almost the posterior margin is a light colorless spot and the anterior margin from the dark, broad, first cross-vein to a short distance beyond the second cross-vein is of the same light color; tip of wing beyond the pale spot, dark smoky brown as below this spot. Areolet very small, but well defined. Radial area open, large and broad. Length 6.5 mm.

*Gall.* (Plate XV, Figs. 10, 11.) On the terminal small twigs of a species of oak (*Quercus* sp.). Monothalamæ, round, with the surface uneven, or somewhat wrinkly, sometimes with a few scattered very short projections. Light yellowish brown; the outer shell is thin, but firm. Internally it is of a soft, uniform porous or spongy consistence, filling the entire gall. The larval cell is rounded and is embedded in the soft internal substance. Diameter 35 to 70 mm.

*Habitat:* Summit of Sierra Madre, Chihuahua, and Guadalajara, Jalisco, Mexico.

The largest known species of gall-fly and "oak apple gall." The types are in the collection of the American Entomological Society, and a specimen of the gall from Guadalajara, Mexico, is in the American Museum of Natural History.

### ***Amphibolips trizonata* Ashmead.**

*Amphibolips trizonata* ASHMEAD, Proc. U. S. Nat. Mus., Vol. XIX, 1896, p. 125; DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 68.

*Male and female.* Entirely black, antennæ, face, tibiæ, and tarsi dark brown; ocelli red; antennæ of the female 13-jointed, of the male 15-jointed. Head and thorax very coarsely rugose. Eyes large. Parapsidal grooves entirely wanting, anterior parallel lines and grooves on the shoulders present. Scutellum very coarsely rugose, with the foveæ large and almost confluent, separated only by a slight carina. Abdomen globose, polished, the apical portion of the second segment and the following segments minutely punctate. Wings hyaline with three smoky brown transverse bands, the one at the base not as distinct as the one across the middle and the one at the apex of the wing; veins pitchy brown. Areolet wanting. Length 5 to 6 mm.

*Gall.* (Plate XV, Figs. 8, 9.) On the young twigs of a species of oak in June. Almost or entirely globular with a moderately thick outer shell. Yellowish and almost smooth. Internally it is completely filled with a soft, pithy substance like *Amphibolips palmeri*. Centrally there is a larval cell which is fastened to the surrounding mass. Diameter 20 to 35 mm.

*Habitat:* Arizona (Fort Grant).

The types of the flies and galls of this distinct species are in the United States National Museum and cotype galls in the American Museum of Natural History. The characteristic band on the wings readily distinguishes it from all other known *Amphibolips*. The gall very much resembles that of *Andricus spongiola* Gillette, but the internal substance of *trizonata* is much softer and separable from the outer shell. According to W. H. Ashmead, the gall is said to grow on the blossoms of an oak.

### ***Amphibolips badia* Bassett.**

*Amphibolips badius* BASSETT, Trans. Am. Ent. Soc., Vol. XXVI, 1900, p. 323.

*Amphibolips badia* DALLA TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 67.

*Female.* "Head, antennæ, thorax and legs dark brownish red. Head and thorax covered with short, appressed hairs. Antennæ short, only half as long as the body, thirteen jointed, first joint short, second very short and globular, third one third longer than the two preceding taken together, fourth one third shorter than the third, fifth and sixth gradually shorter; joints 3, 4, 5, and 6 larger at the apex than at the base. Face covered with appressed hairs, and there is an obscure, converging line from the base of each antennæ to the mouth. Head rather small, not broader than the thorax. Prothorax anteriorly a very narrow shining band. Mesothorax full and rounded in front, finely and evenly but rather sparsely punctate. Parapsidal grooves and other lines very indistinct, mainly because of the short, dense and closely appressed hairs. These obscure completely the parapsidal grooves posteriorly. Scutellum small, rounded and slightly elevated posteriorly, and the hairiness coarser and more dense than on the mesothorax. Foveæ small, almost obsolete. Legs darker than the thorax, densely covered with short, fine and closely appressed hairs. Abdomen large, black and shining, second segment dorsally very long, nearly concealing the other segments, but retreating ventrally to less than one-half the dorsal length. The sides of this segment are covered with a dense patch of shining reddish hairs. Wings shining, dark smoky brown, veins dark, almost black. Areolet small. Cubitus disappearing a short distance from the first cross-vein. Length 6 mm. H. F. Bassett."

*Gall.* Unknown.

*Habitat:* Connecticut (Waterbury).

This species was described from a single female captured at large by H. F. Bassett, on a terminal bud of a shoot of a thrifty clump of white oak sprouts. The type is in the American Entomological Society.

### ***Amphibolips verna* Bassett.**

*Amphibolips verna* BASSETT, Trans. Am. Ent. Soc., Vol. XXVI, 1900, p. 321; DALLE TORRE and KIEFFER, Gen. Ins. Hymen. Fam. Cynip., 1902, p. 68.

*Female.* Head small, rugose, black. Antennæ black, 14-jointed, first joint long, stout, second one-half as long as the first, third a little longer than the first and second together and slightly curved, fourth two-thirds, and the fifth one-half as long as the third, sixth to thirteenth equal, fourteenth one half longer than the thirteenth. Thorax small, rugose and thinly covered with short hairs. Anterior parallel lines extending more than half way to the scutellum. Parapsidal grooves very obscure and the lines over the base of the wings rather less so, all short. Scutellum small, rugose. Foveæ large, shallow and not smooth. Abdomen large dusky black, shining, and minutely punctate, hairy basally, as is also the posterior margin of the last segment and the sheath of the ovipositor. Legs uniform dark red. Wings pale fuscous, veins reddish brown, not heavy. Areolet large and nearer the anterior margin than in most species. Cubitus slender, reaching the first cross-vein. Length 4.50 mm.

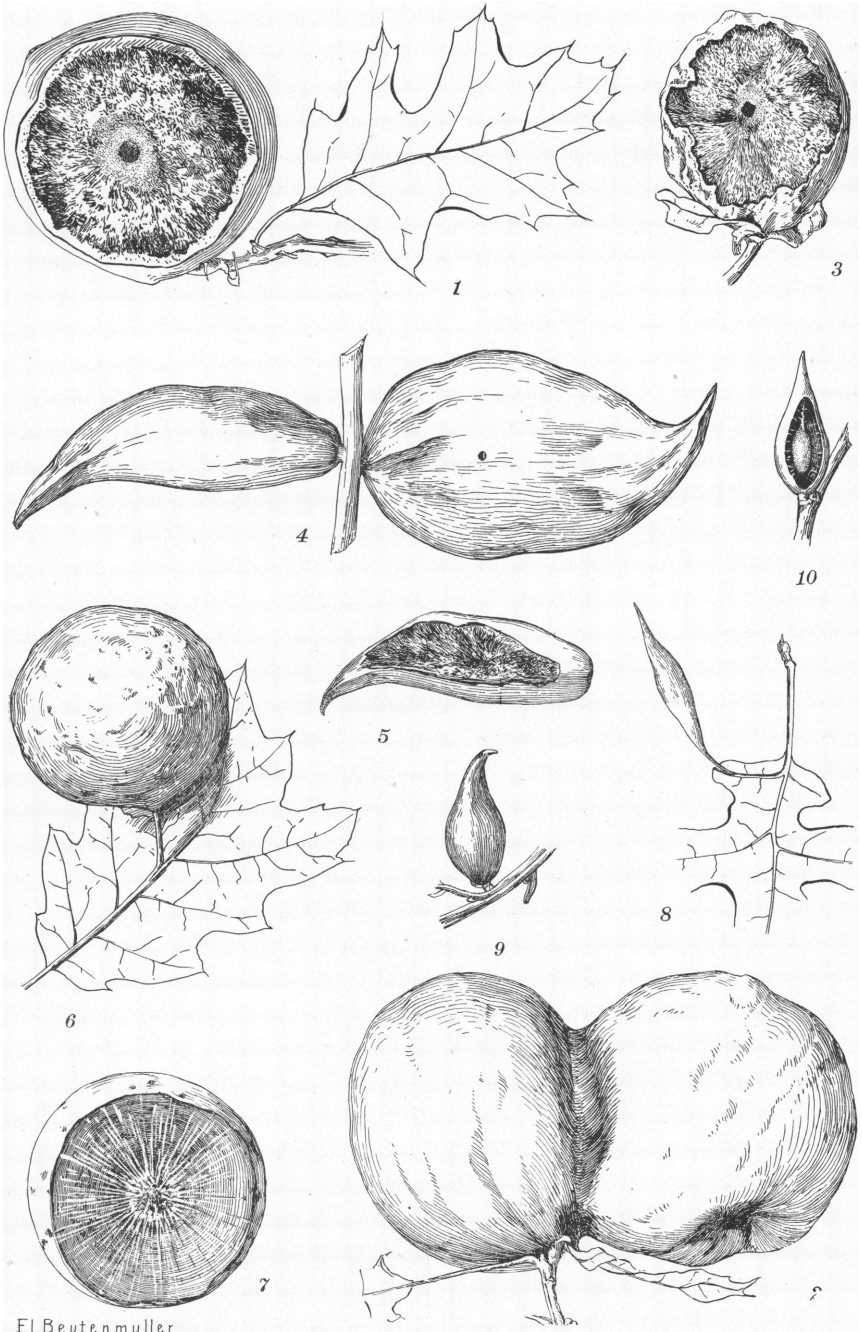
*Habitat:* Connecticut (Waterbury).

Only known by a single female taken by H. F. Bassett, ovipositing in the buds of scrub oak (*Quercus nana*) on April 9, 1897. The type is with the American Entomological Society.



*Amphibolips confluens* (Harris).



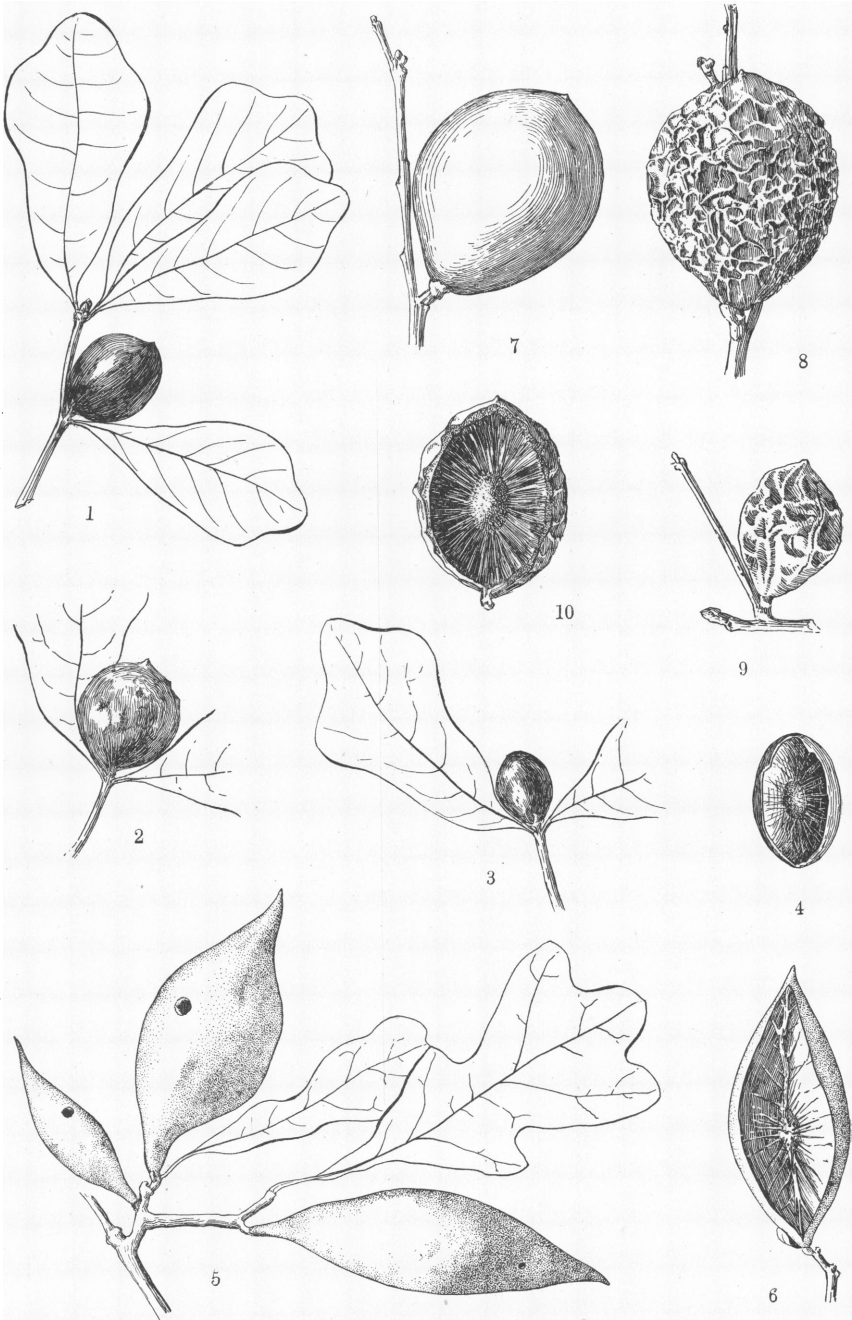


1, 2. *Amphibolips confuens* (Harris). 4, 5. *Amphibolips acuminata* Ashm.  
3. " *carolinensis* Bassett. 6, 7. " *inanis* (O. S.).  
8-10. *Amphibolips coelebs* (O. S.).

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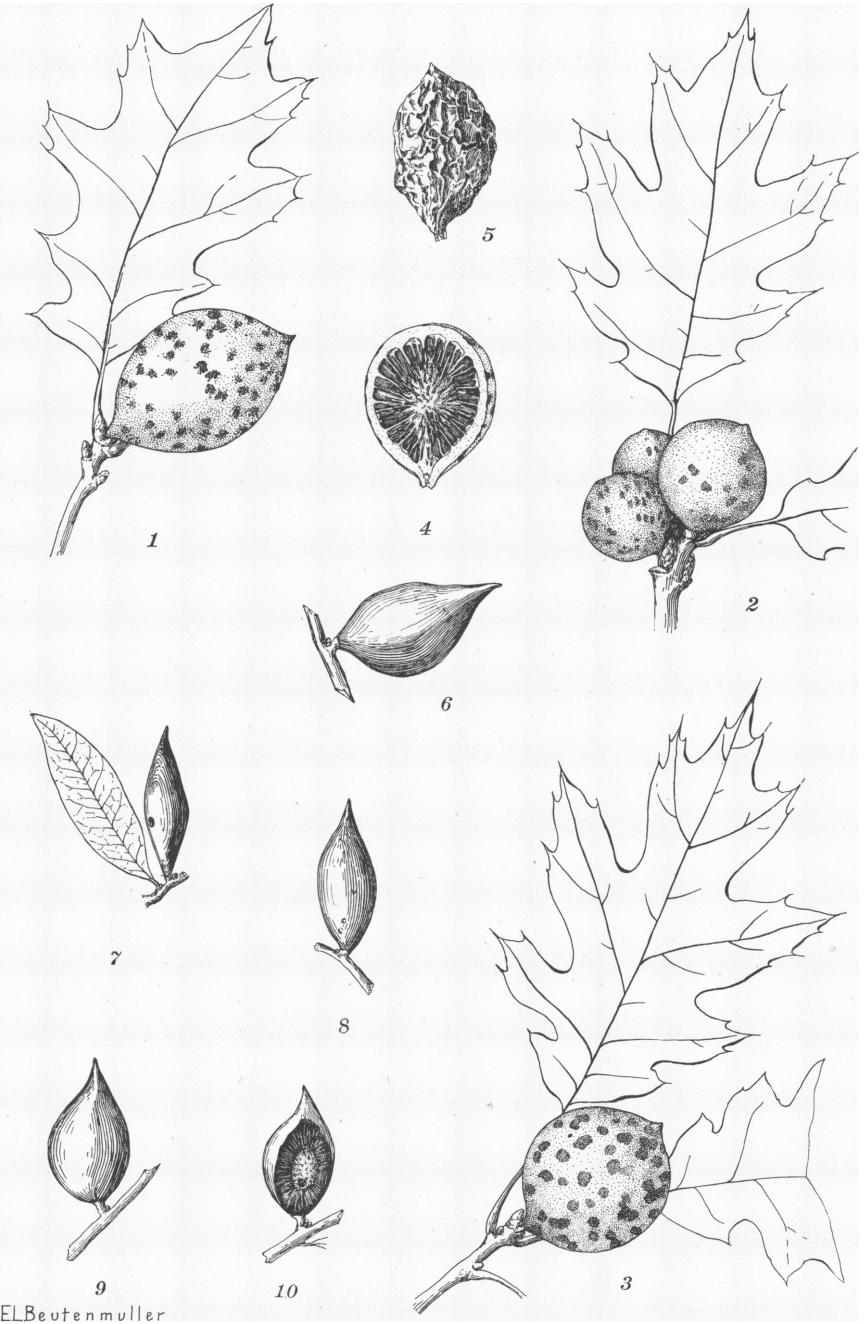




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1-4. *Amphibolips melanocera* Ashm.      5, 6. *Amphibolips ilicifoliae* (Bass.).  
7-10. *Amphibolips cinerea* Ashm.



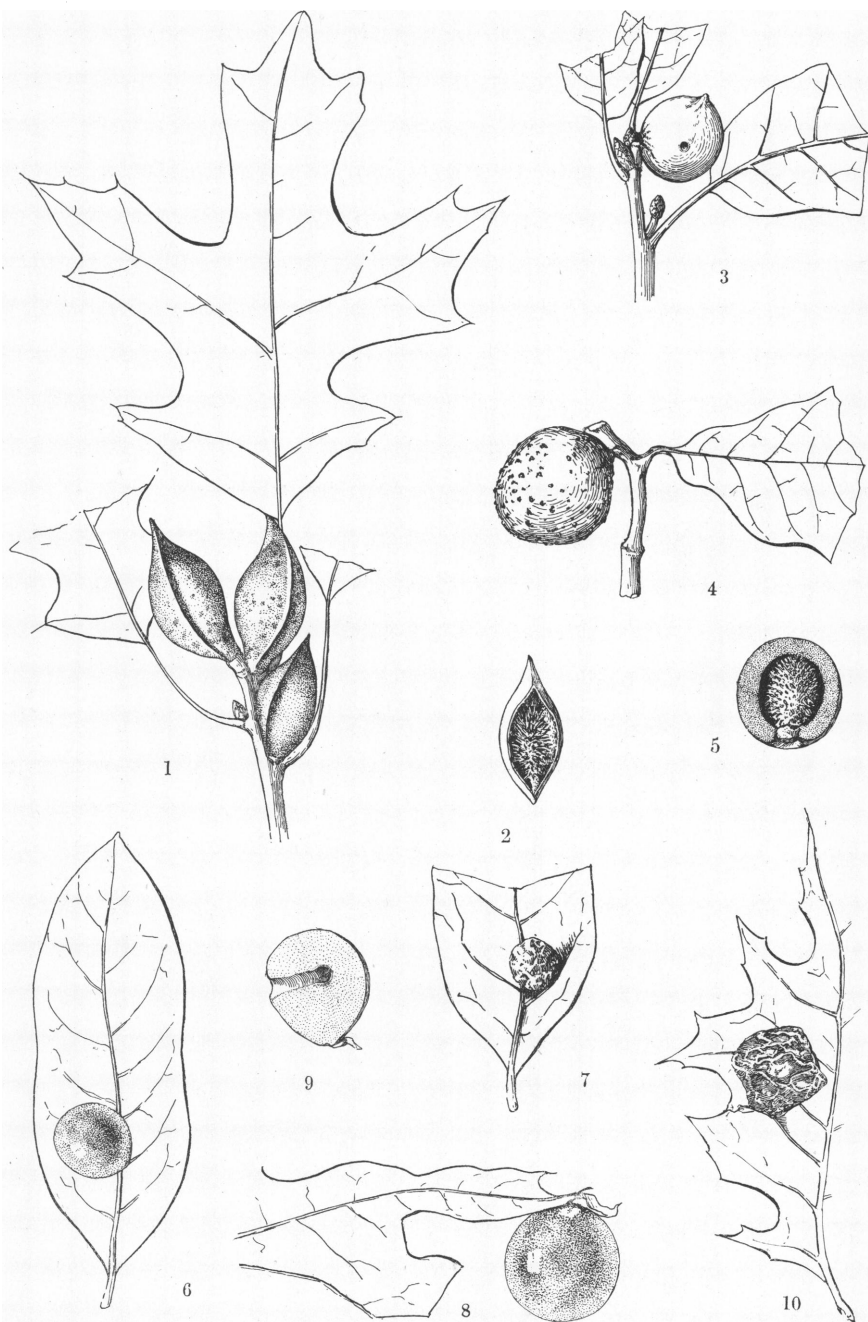


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1-5. *Amphibolips cooki* Gill.

6-10. *Amphibolips citrifomis* (Ashm.).



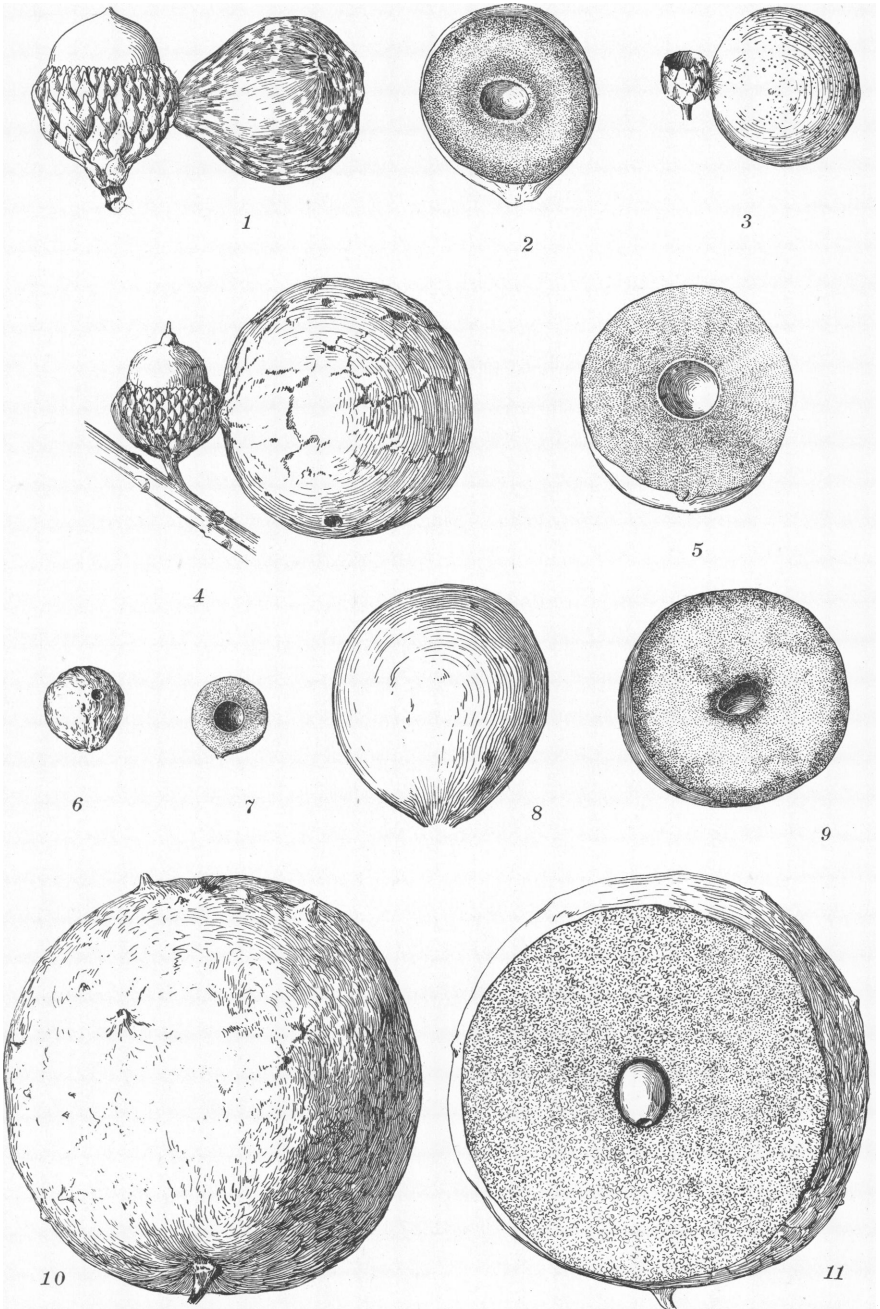


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1, 2. *Amphibolips tinctoriae* Ashm.  
3-5. " *globulus* sp. nov.

6, 7. *Amphibolips racemaria* (Ashm.).  
8-10. " *nubilipennis* (Harr.).





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1-3. *Amphibolips prunus* (Walsh).

4, 5. " *gainesi* Bass.

6, 7. *Amphibolips fuliginosa* (Ashm.).

8, 9. " *trizonata* Ashm.

10, 11. *Amphibolips palmeri* Bass.

