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The genus *Amphibolips* Reinhard (Hymenoptera: Cynipidae: Cynipini) in the Neotropics, with description of three new species from Panama

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Abstract

Three new species of *Amphibolips* Reinhard 1865, *Amphibolips castroviejoi*, *A. aliciae*, and *A. salicifoliae* (Hymenoptera: Cynipidae: Cynipini) are described from Panama. The three new species induce galls on *Quercus salicifolia* Née (Fagaceae, sect. Lobatae, Red Oaks). Diagnostic characters, gall descriptions, distribution, and biological data are given. The generic limits of *Amphibolips* are re-established with adding new generic morphological characters. The presence of the genus *Amphibolips* in the Neotropical region is discussed. The new species represent the first record of this genus from Central America.

Key words: Cynipidae, oak gall wasps, Quercus, Panama

Introduction

Amphibolips Reinhard is a morphologically and biologically distinctive, well-defined, genus of oak gall wasps (Cynipidae: Cynipini). The genus includes some of the largest known adult gallwasps and "oak apple" galls (female > 6.5 mm; gall 70 mm in diameter) (Beutenmüller 1909). The known range of this genus extends from Canada to Mexico (Dalla Torre & Kieffer 1910; Weld 1952) and is thus classified as Nearctic (Liljeblad *et al.* 2008). Although Melika & Abrahamson (2002) erroneously reported that the genus was also present in Central America, it is certain that one species, *A. dampfi* Kinsey 1937, was observed in Oaxaca (southern Mexico), a geographic area belonging the Neotropical region.

According to Liljeblad *et al*. (2008), there are 40 known species in the Nearctic region: 29 from regions north of Mexico (United States and Canada) (Burks 1979; Melika & Abrahamson 2002) and 11 from Mexico (Bassett 1890; Beutenmüller 1911; Kinsey 1937). Before 1937, only two species of the genus *Amphibolips* were recorded in Mexico (*A. palmeri* Bassett 1890 and *A. nigra* Beutenmüller, 1911). Kinsey (1937) described nine additional species from Mexico; seven species, represented only by asexual forms, which were included in the "*Niger* Complex": *A. gumia* Kinsey, *A. jubatus* Kinsey, *A. elatus* Kinsey, *A. maturus* Kinsey, *A. nebris* Kinsey, *A. niger* Beutenmüller (=*A. nigra*) and *A. pistrix* Kinsey, a typical Mexican group with a unique representative in southern Arizona (Kinsey 1937). The other three species present in Mexico are *A. dampfi* Kinsey, *A. nassa* Kinsey and *A. fussus* Kinsey. Until now, the most recently described species of *Amphibolips* was *Amphibolips murata* Weld 1957, recorded from Florida.

According to Melika & Abrahamson (2002) the morphological characters of adults and their galls are very uniform in *Amphibolips*. These authors stated that the morphology of the sexual and asexual female is identical; however at least the asexual females of the *Niger* complex differ from sexual females of *Amphibolips* species in number of antennal segments (Kinsey 1937). Diagnostic characters of *Amphibolips* include antennae presenting 12–14 segments in females and 15–16 segments in males, very robust and

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coarsely rugose mesosoma and head; scabrous or aciculated, distinct or indistinct notauli more or less obliterated by the rugosities or coarse sculpture of mesoscutum; scutellum usually emarginate at the posterior end, with very large, deep, and wrinkled scutellar foveae; smooth or punctate metasomal tergites; metatarsal claws with strong basal lobes; forewings that are usually more or less smoked and exhibit a fuliginous cloud, bands, or are almost entirely fuliginous; a radial cell open at the anterior margin; and a narrow, needle-like, long projecting portion of the ventral spine of the hypopygium that is usually more robust and broader that in the closely allied genus *Andricus* Hartig (Beutenmüller 1909; Melika & Abrahamson 2002). Both sexual and asexual generations of *Amphibolips* species induce stem, bud and leaf galls (Melika & Abrahamson 2002). Galls of the species of this genus are characteristically of the spongy oak-apple type, usually globose or spindle-like. All known species induce monolocular galls; they contain a single central cell in a spongy, soft parenchima tissues; at other times, the interior of the gall is almost empty and the single central cell is supported by radiating filaments (Beutenmüller 1909; Kinsey, 1937).

Phylogenetically, *Amphibolips* was recovered as related to some Nearctic species of *Andricus*, especially to *Andricus hastatus* (formerly *Erythres* Kinsey) (Liljeblad *et al.* 2008). However unpublished molecular results seems challenge this hypothesis (Melika pers. comm.). Six species of North American *Andricus* were recently transferred to *Amphibolips* by Melika & Abrahamson (2002), but the genus has not been fully revised, though the effort is badly needed.

This paper contains the first report of the genus *Amphibolips* in Central America and includes the description of three new species from Panama. For the first time, in *Amphibolips* description of the new species' morphological characters is based on scanning electron microscopy, allowing a better illustration of some traditional characters, their use in the identification key or the discussion of some new diagnostic characters of the genus, as the shape of the metatarsal claw.

Material and methods

Study material. The adults studied were reared from galls collected on *Quercus salicifolia* Née. Samplings were made and material was collected from December 2007 to May 2009 at Volcan Baru and Boquete, Chiriqui Province, Panama. The adult insects emerged from the galls in rearing cages under laboratory conditions.

Specimen preparation. For observation under a scanning electron microscope (SEM), adult cynipids were dissected in 70% ethanol, air dried, mounted on a stub and coated with gold. Micrographs were taken with an EVO 40 Zeiss and FEI QUANTA 200 (high vacuum technique) for several standardized views. Forewings were mounted in Euparal on slides and later examined under a Wild MZ8 stereo microscope. Representatives of some species with poor representation in the samples were not dissected but instead directly observed using the same SEM at low vacuum (voltage) technique, without coating. Images of adult habitus and gall dissections were taken with a NIKON Coolpix 4500 digital camera attached to a Wild MZ8 stereo microscope. Measurements were made with a calibrated micrometer scale attached to an ocular of the light microscope. Terminology of morphological structures and abbreviations follow Ronquist & Nordlander (1989), Ronquist (1995), Liljeblad *et al.* (2008) and Nieves-Aldrey (2001).

Results

***Amphibolips castroviejoi* Medianero & Nieves-Aldrey sp. nov.**
(Figs.1, 2, 7C, 7F & 8 A–C)

Type material. Holotype ♀ (Fig. 7A) (in Museo Nacional de Ciencias Naturales, Madrid, Spain (MNCN), card-mounted. Cat. nº 2022). PANAMA, Chiriquí, Carretera de Volcancito, Boquete 8º 43' 23 07" N, 82º 27' 19 07" W, 1404 m; ex gall on twigs of *Quercus salicifolia* Née (Fagaceae), gall collected 28.i.2008, insect emerged ii.08, E. Medianero leg. Paratypes: 1♂ same data as holotype; 1♀, 1♂: same data as holotype, but

collected 12.i.2008, insect emerged i.08. One paratype in MNCN, two paratypes in Maestría en Entomología, Universidad de Panamá (MEUP).

Additionally, 1♀ paratype of the type series was dissected for SEM observation (in MNCN).

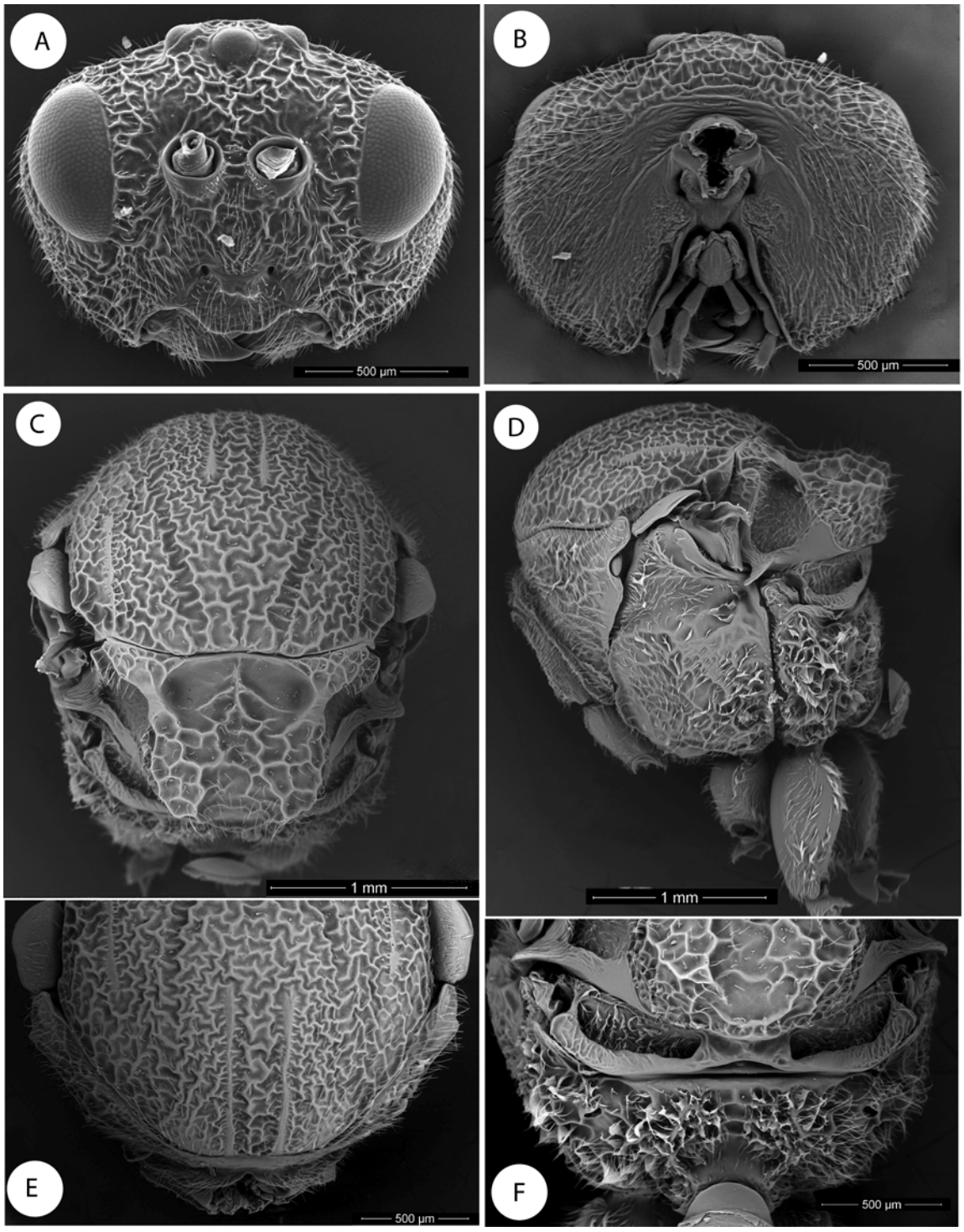

FIGURE 1. *Amphibolips castroviejoi*: (A) Head anterior view. (B) Head posterior view. (C) Mesosoma dorsal view. (D) Mesosoma lateral view. (E) Pronotum antero-dorsal view. (F) Propodeum.

Etymology. Named after Dr. Santiago Castroviejo, dear colleague and friend, a recently deceased eminent botanist who worked for many years in the Flora of Coiba National Park (Panama).

Diagnosis and comments. Closely allied to *A. dampfi* Kinsey, from Mexico, being similar in color and a majority of morphological characters. Males of the two species share a similar forewing coloration pattern,

which is almost entirely smoky, with a clear crossing band extending from the radial cell to the discoidal cell. The species differ mainly in the sculpture of the thorax. *A. dampfi* have a very coarse sculpture, forming a series of small, rectangular spaces (Kinsey 1937: p. 429), whereas the sculpture of the thorax is very irregular, even shapeless, in *A. castroviejoi*. The new species has a wide band extending across the forewing from the tip of radial cell to posterior part the apical margin (Fig.7C), whereas the band does not extend as far across the ventral margin of the wing in *A. dampfi* (Kinsey, 1937). Additionally, *A. castroviejoi* have complete notauli, only lost in the coarse surface in anterior one third, and the anteroadmedian signa visible. In *A. dampfi*, the notauli are indicated but nearly lost in sculpture and the anteroadmedian signa are less visible.

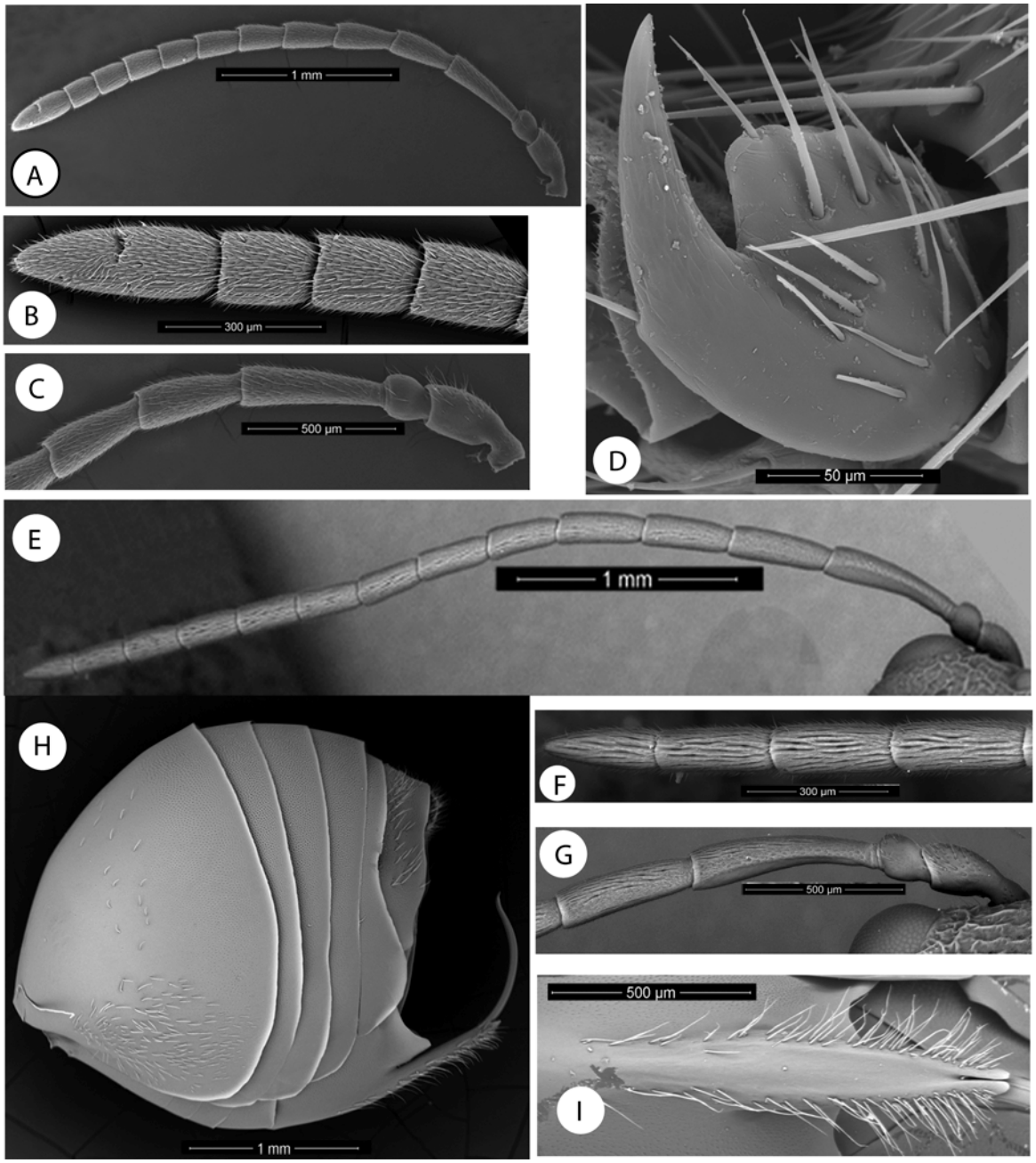

FIGURE 2. *Amphibolips castroviejoi*: (A) Female antenna. (B) Detail of last flagellomeres. (C) Detail of basal flagellomeres. (D) Metatarsal claw. (E) Male antenna. (F) Detail of terminal flagellomeres of male antenna. (G) Detail of basal flagellomeres male antenna. (H) Metasoma lateral view. (I) Detail of ventral spine of hypopygium.

Description. Body length (measured from anterior margin of head to posterior margin of metasoma) 5.0 mm (N = 2) for females; 4.45 mm (range 4.33–4.58; N = 2) for males. Head and mesosoma of female shiny and black. Metasoma, clypeus, mandibles, antenna and legs rufo-piceous; with scape, pedicel, F1, F2, coxae

and femora more darkened. Forewing almost entirely and very heavily smoky, especially in medial half of basal and radial cells, with a wide clear band extending across wing from tip of radial cell to the apical area between the medial and cubital veins; small clear clouds present on Cu-a and R1 +Sc. Male with coloration similar to female, but legs uniformly rufo-piceous.

Female. Head, coarsely rugose, pubescent; in dorsal view about 2.6 times wider than long. POL 1.1 times longer than OOL, posterior ocellus separated from inner orbit of eye by 2.5 times its longest diameter. Head in anterior view (Fig. 1A) transversely ovate, 1.29 times wider than high, gena slightly broadened behind eye. Vertex, frons, lower face, gena, and occiput with strong reticulate-rugose sculpture, irradiating carinae from clypeus not discernible; head moderately pubescent, with relatively long setae, except vertex and frons with sparse and shorter setae. Clypeus trapezoid, 1.5 times wider than high, shiny and smooth, moderately pubescent, ventral margin strongly projecting over mandibles and slightly sinuate. Anterior tentorial pits well visible; epistomal sulcus and clypeo-pleurostomal lines slightly distinct. Malar space 0.6 times height of compound eye. Toruli situated slightly below mid-height of compound eye; distance between antennal rim and compound eye 0.7 times width of antennal socket including rim. Ocellar plate slightly raised. Occipital carina lacking; strong transverse wrinkles present on occiput . A carina, dorso-laterad to occipital foramen, present, which is long and continues ventrally past posterior tentorial pits. Gula short; distance between occipital and oral foramina less than height of occipital foramen (Fig. 1B). Hypostomal sulci well separate at oral fossa.

Mouthparts (Fig. 1B): mandibles strong, exposed; with dense setae in base, right mandible with three teeth; left with two teeth. Cardo of maxilla not visible, maxillary stipes about 3.3 times longer than wide. Maxillary palp five-segmented. Labial palp three-segmented.

Antenna (Fig. 2A), of moderate length, as long as 1/2 body length; with 13 antennomeres ; flagellum not broadening towards apex; with relatively long, erect setae, and elongate placodeal sensilla hardly visible (Fig. 2B). Relative lengths of antennal segments: 17:12:38:26:25:22:19:18:16:15:15:13:28. Pedicel (Fig. 2C), globose, small, 0.7 as long as scape; F1 1.4 times as long as F2. F6-F10 longer than wide, F11 2.7 times longer than wide, 2.1 times as long as F10 (Fig. 2B). Placodeal sensillae on F8-F11 disposed in one row of 2–4 sensillae in half dorsal area of each flagellomere.

Mesosoma. Strongly, coarsely rugose, in lateral view as high as long. Pronotum, moderately pubescent; lateral surface of pronotum with strong rugose sculpture; moderately pubescent, with relatively long setae. Ratio of length of pronotum medially/laterally = 0.24. Pronotal plate indistinct dorsally (Fig. 1E).

Mesonotum (Fig. 1C). Mesoscutum barely pubescent and with strong rugose-reticulate sculpture. Notauli distinct posteriorly and medially, broad and convergent posteriorly, crossed by transversal rugose sculpture; median mesoscutal impression indistinct, lost in the coarse sculpture. Anteroadmedian signa clearly visible. Transscutal fissure narrow, well-visible, deeply impressed. Scutellar foveae ellipsoidal, deep, about 1/3 as long as scutellum, smooth and separated by a septum; their anterior and posterior margins marked. Scutellum (Fig. 1C) subquadrate from above, about 0.4 as long as mesoscutum, strongly reticulate-rugose and deeply emarginate at posterior margin, emargination reaching posterior one third of scutellum length; in lateral view extending posteriorly slightly over the dorsellum. Axillula moderately pubescent, their anterior and posterior margins marked. Mesopleuron coarsely rugose and moderately pubescent, excepting the posterodorsal area (Fig. 1D).

Metanotum (Fig. 1F). Metapectal-propodeal complex. Metapleural sulcus reaching posterior margin of mesopectus at about mid-height of metapectal-propodeal complex (Fig. 1D). Lateral propodeal carinae indistinct, slightly divergent anteriorly, (Fig. 1F). Median propodeal area rugose and densely pubescent. Nucha rugose.

Legs. Densely pubescent; femora and tibiae robust; metatarsal claws with strong triangular basal lobe or teeth (Fig. 2D).

Forewing (Fig. 7C): As long as body, radial cell 3.4 times longer than wide; open along anterior margin; areolet small, ovoid, closed and distinct. R1, Rs and M nearly straight, not reaching wing margin. Rs+M reaching basalis at its mid-height. First abscissa of radius (2r) and 2r-m curved. Apical margin with short hair fringe.

Metasoma (Fig. 2H), large as long as head and mesosoma combined, in lateral view as high as wide. Second metasomal tergite covering about two third of metasoma, with band of micropuntures clearly visible in posterior one third; punctures visible on subsequent tergites; ventral area of second metasomal tergite moderately pubescent. Projecting part of hypopygial spine long (Fig. 2I); about 3 times as long as wide in ventral view; laterally with long setae, longer than spine width but not forming an apical patch.

Male (Fig. 7B). Similar to female except as follows: Antenna with 13 flagellomeres (Fig. 2E); F1 slightly curved, posteriorly flattened and expanded apically (Fig. 2G). Placodeal sensillae present on flagellomeres 1–13, increasing in number towards apex (Fig. 2F). Relative length of antennomeres: 15:9:35:27:23:23:19:19:17:17:17:16:15:14:13. Metasoma smaller than in female; T2 0.7 of metasoma length.

Gall (Fig. 8A–C). , Irregularly spherical or globose, a bit elongated at its basis, monothalamic, with smooth and mottled surface. Light green when fresh (Fig. 8A) and light cream when mature (Fig. 8B); the outer shell is thin but firm. Internally it is of a soft, uniformly spongy consistence, filling the entire gall (Fig. 8C). The larval cell is rounded and is embedded in the soft internal substance. Diameter 58 to 45 mm (on average 54 x 43 mm). Formed in twigs of *Quercus salicifolia* Nee. The gall most closely resembles that of *Amphibolips murata* Weld, 1957 known from Florida (USA).

Distribution. *A. castroviejoi* was found between 1000–2681 m a.s.l. at Chiriqui, Panama.

Biology. Only the sexual generation is known, inducing galls on *Quercus salicifolia* and likely on other *Quercus* species (section Lobatae). The galls are found between December and May, during the dry season in Panama. The insects studied emerged in January and February.

Amphibolips aliciae Medianero & Nieves-Aldrey sp. nov.

(Figs.3, 4, 7D–E & 8D–F)

Type material. Holotype ♀ (Fig. 7D) (in Museo Nacional de Ciencias Naturales, Madrid, Spain, card mounted. Cat nº 2023). PANAMA, Chiriquí, Carretera de Volcancito, Boquete 8º 46' 23 7" N, 82º 27' 19 7" W, 1404 m; ex gall on twigs of *Quercus salicifolia* Née (Fagaceae), gall collected 25.i.2009, insect emerged 25.i.09, E. Medianero leg. Paratypes: 2♂, same data as holotype, but one ♂ ex gall collected 12.i.2008, insect emerged ii.08, E. Medianero leg. One paratype in MNCN, one paratype in Maestría en Entomología, Universidad de Panamá (MEUP).

Etymology. Named after our good friend, the botanist Alicia Ibañez, in memory of unforgettable field sampling experiences in Panama.

Diagnosis and comments. *Amphibolips aliciae* is characterized by complete notauli, broad posteriorly; sub-quadrate deep scutellar foveae; the scutellum only slightly emarginated posteriorly, micropunctures on metasomal T3 very faint, hypopygial spine long; wings are not heavily smoked, only with a smoky brown patch at the base of the radial cell. The new species closely resembles *A. castroviejoi* in coloration, and most morphological characters but differs in some features as stated in the identification key, especially in the morphology of mesoscutum and scutellum and coloration of forewings. Furthermore, the inner structure of their respective galls is different. From the related sexual forms described by Kinsey from Mexico (Kinsey, 1937), *A. aliciae* is readily distinguishable mainly by less heavily infuscate forewing. By this late morphological character, the new species resembles some Nearctic species of *Amphibolips,* namely *A. melanocera* Ashmead, 1885; *A. cookii* Gillette, 1888; *A. globulus* Beutenmüller, 1909; *A. acuminata* Ashmead, 1896, but differs from all of them by distinct combinations of several features, such as type of gall, legs and metasoma coloration, mesoscutum and scutellum sculpture type, shape and sculpture of the scutellar foveae, number of male antennal segments, and other morphological characters (Beutenmüller 1909).

Description. Female. Body length (measured from anterior margin of head to posterior margin of metasoma) 4.58 mm (N = 1) for females; 4.08 mm (range 4.0–4.16; N = 2) for males. Head and mesosoma of female shiny and black. Metasoma, reddish brown. Antenna black with five last flagellomeres clearer. Legs black, with tibiae dark brown and tarsi light brown. Forewing slightly smoky brown, with veins dark brown and large brown patch at base of radial cell. Male with coloration similar to female.

Female. Head, coarsely reticulate-rugose, pubescent, in dorsal view about 3 times wider than long. POL 0.8 times longer than OOL, posterior ocellus separated from inner orbit of eye by 2.2 times its longest diameter. Head in anterior view (Fig. 3A) more or less oval, 1.17 times wider than high. Genae slightly expanded, mostly smooth and pubescent. Vertex, frons, face, and occiput reticulate-rugose, moderately pubescent. Clypeus, trapezoidal, smooth and moderately pubescent; ventral margin projecting over mandibles, its margin slightly sinuate. Anterior tentorial pits visible; epistomal sulcus and clypeo-pleurostomal lines indistinct; some irradiating strigae from clypeus visible, although obscured by coarse sculpture. Malar space 0.6 times height of compound eye. Distance between antennal rim of torulus and compound eye 0.6 times width of antennal socket including rim. Ocellar plate not raised. Mouthparts. Mandibles strong, exposed, with dense setae in base.

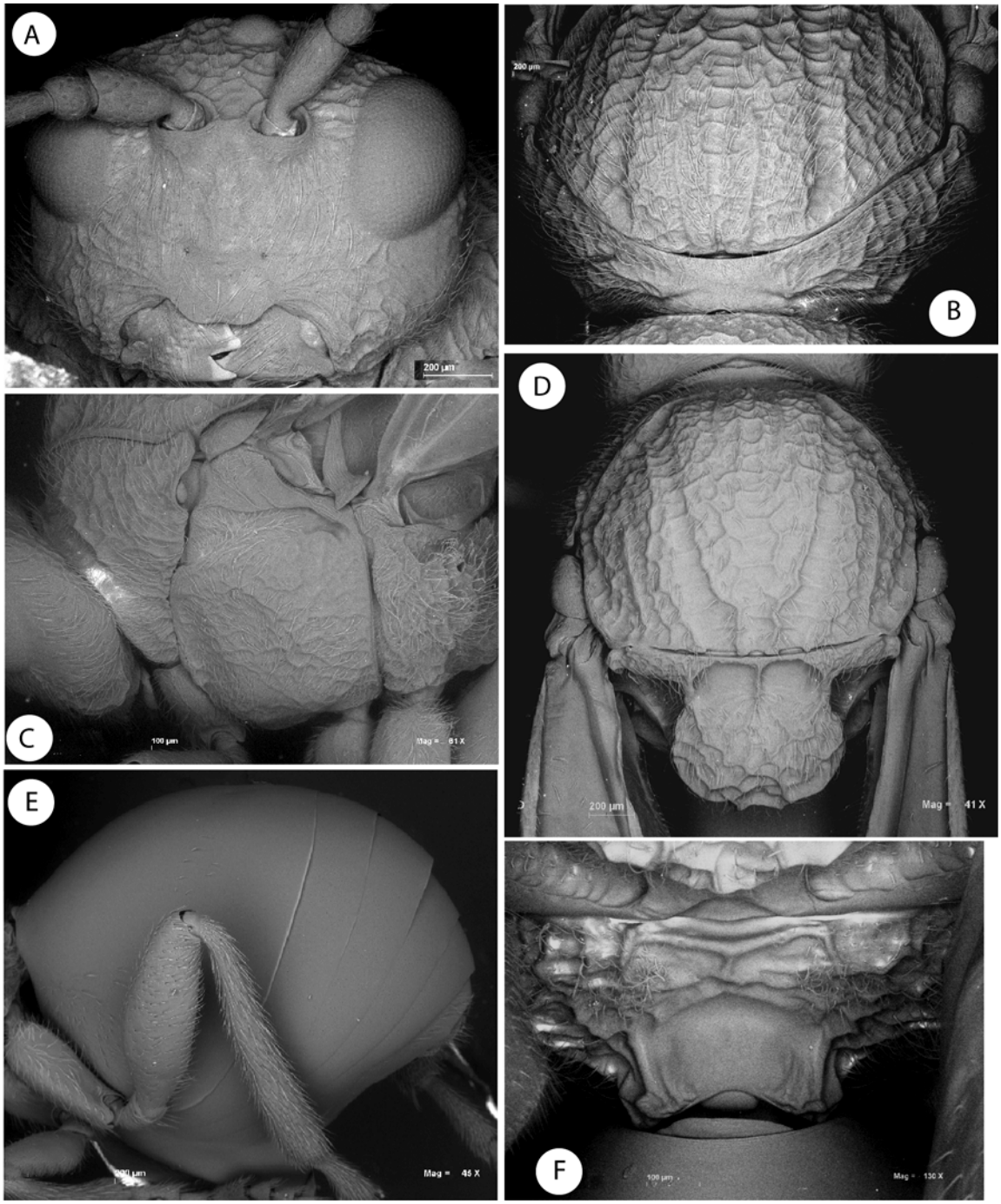

FIGURE 3. *Amphibolips aliciae*: (A) Head anterior view. (B) Pronotum anterior view. (C) Mesosoma lateral view. (D) Mesosoma dorsal view. (E) Metasoma lateral view. (F) Propodeum.

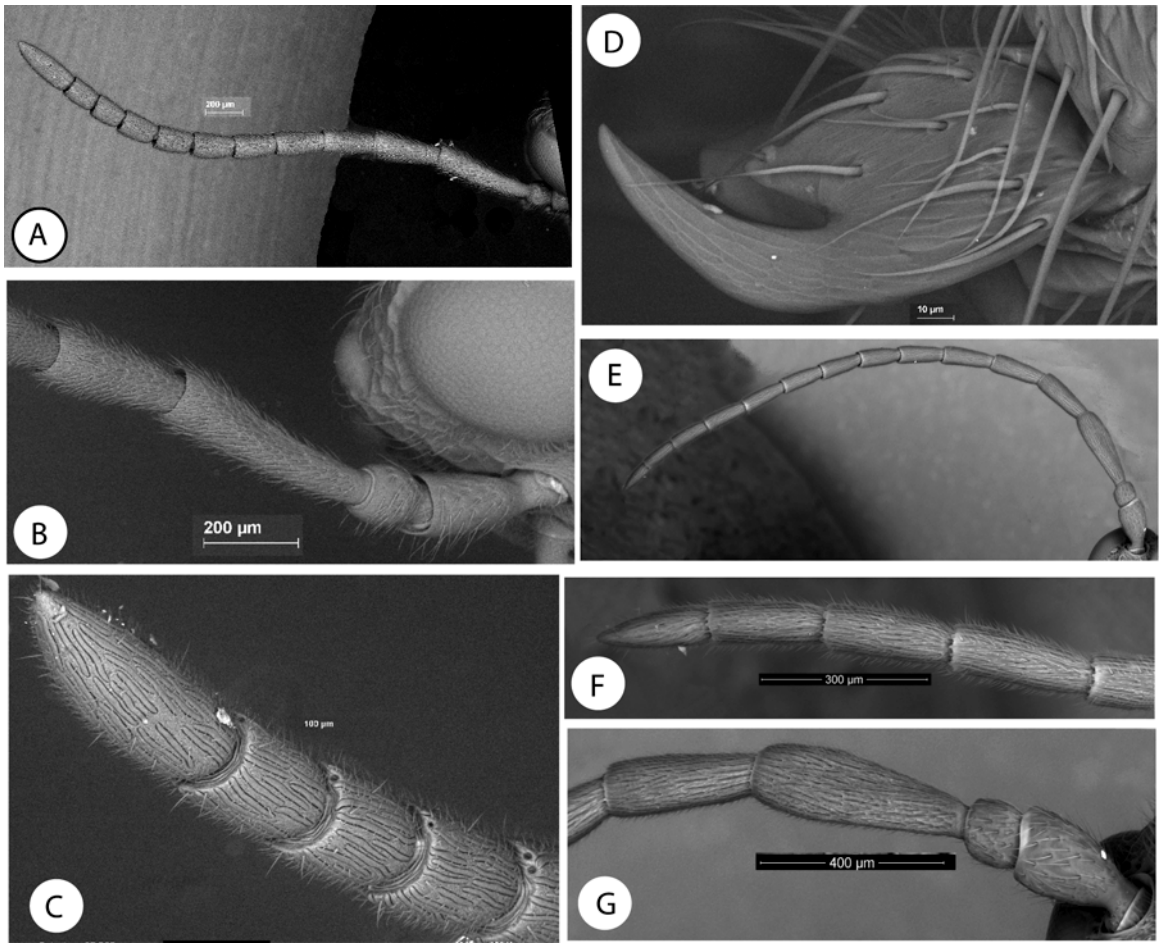

FIGURE 4. *Amphibolips aliciae*: (A) Female antenna. (B) Detail of basal flagellomeres. (C) Detail of last flagellomeres. (D) Metatarsal claw. (E) Male antenna. (F) Detail of last flagellomere of male antenna. (G) Detail of basal flagellomeres of male antenna.

Antenna (Fig. 4A) as long as 1/2 body length; with 11 flagellomeres; flagellum not broadening towards apex; with erect setae and elongate placodeal sensilla visible on F2–F11, placodeal sensillae increasing in number towards apex, on F6-F11 closely arranged in two rows (Fig. 4C); 1–2 pores visible on apex of F4–F10 (Fig. 4C). Relative lengths of antennal segments: 22:16:52:32:19:16:12:15:15:15:15:15:35. Pedicel, globose, small, 0.7 as long as scape; F1 1.6 times as long as F2 (Fig. 4B). F6-F10 longer than broad; ultimate flagellomere 2.5 times longer than broad, 2.3 times as long as F10.

Mesosoma. In lateral view as high as long, with strong coarse rugose sculpture. Pronotum (Fig. 3B), densely pubescent and with strong coarse sculpture in lateral areas. Ratio of length of pronotum medially/ laterally = 0.3. Pronotal plate indistinct.

Mesonotum. Mesoscutum (Fig. 3D), moderate and uniformly pubescent, with strong reticulate-rugose sculpture. Notauli, complete, deep and wide, wider and strongly converging posteriorly, crossed by transversal rugae of the mesoscutum sculpture. Median mesoscutal impression faint in the coarse sculpture. Anteroadmedian signa visible. Transscutal fissure straight, narrow. Scutellum (Fig. 3D), rounded, narrower basally, about 0.3 as long as mesonotum, strongly reticulate-rugose and slightly emarginate at tip, moderately pubescent. Scutellar foveae more or less square, large, about 0.4 as long as scutellum, smooth, separated by a septum, the anterior margin marked, and posteriorly the margin more diffuse. Axillula moderately pubescent, their anterior and posterior margins marked. Mesopleuron (Fig. 3C) coarsely rugose and moderately pubescent; posterodorsal area less coarsely rugose and hairless.

Metanotum (Fig. 3F). Metapectal-propodeal complex. Metapleural sulcus reaching posterior margin of mesopectus at about mid-height of metapectal-propodeal complex (Fig. 3C). Lateral propodeal carinae

distinct, broad, slightly divergent. Median propodeal area with rugose sculpture, and some hairs (Fig. 3F). Nucha dorsally smooth.

Legs strong, densely pubescent; metatarsal claw with strong basal acute lobe, the secondary tooth measuring less than 1/3 of length of apical tooth (Fig. 4D).

Forewing (Fig. 7E). As long as body, veins strong and very pigmented. Radial cell 3.3 times longer than wide; open along anterior margin; areolet small, triangular, closed and distinct. Rs slightly bowed, M nearly straight, not reaching wing margin. R1 depigmented. Rs+M reaching basalis about at its mid-height. First abscissa of radius (2r) and 2r-m straight. Wing fringe on distal margin short.

Metasoma (Fig. 3E). In greater part smooth and shiny, large, as long as head and mesosoma combined, in lateral view 1.14 times longer than high. Second metasomal tergitecovering about 2/3 of metasoma, posteriorly with a band of fine micropunctures hardly visible. Following tergites with micropunctures well visible. Anteroventral area of T3 with a patch of long setae. Projecting part of hypopygial spine long; in lateral view 4 times as long as high; lateral margins of hypopygial spine with long setae but do not reach apex of spine or form an apical tuft of setae .

Male. Similar to female except as follows: Antenna with 13 flagellomeres (Fig. 4E); F1 slightly curved, flattened and expanded distally (Fig. 4G). Placodeal sensillae on F1-F13 (Figs. 4F & 4G). Relative length of antennomeres: 12:4:35:24:23:22:20:18:18:18:20:19:17:15:14. Metasoma smaller; T2 0.5 of metasoma length.

Gall. (Figs. 8D–F) Elongate, ovate or spindle-shaped, with a very short nipple at the apex (Fig. 8D). Greenish when fresh, coffee brown and very glossy when dry (Fig. 8F). The outer shell is very thin, and internally there is a single central larval cell held in place by very thin hair-like filaments (Fig. 8E). When dry the gall is very brittle, and may be easily crushed with the fingers (Fig. 8E). On average, the gall measures 2.5 mm long. Externally the gall is similar to the gall of *A. castroviejoi*. However the inner structure is different, the later being soft, juicy while the gall of *A. aliciae* is composed of radiating filaments supporting the central larval chamber.

Distribution. *A. aliciae* was found between 1000–2681 m a.s.l.at Chiriqui, Panama. Galls are rare.

Biology. Only the sexual generation of *A. aliciae* is known, inducing galls on twigs of *Quercus salicifolia* Née and likely other *Quercus* species (section Lobatae). The galls are found between December-April during the dry season in Panama. Adults emerged in January and February.

***Amphibolips salicifoliae* Medianero & Nieves-Aldrey sp. nov.**
(Figs.5, 6, 7F, 7G & 8G–H)

Type material. Holotype ♀ (Fig. 7F) (in Museo Nacional de Ciencias Naturales, Madrid, Spain, card-mounted. Cat nº 2024). PANAMA, Chiriquí, Volcan Baru 8º 47' 50 8" N, 82º 29' 35 9" W, 1800–2070m; ex gall on leaf of *Quercus salicifolia* Née (Fagaceae), gall collected 27.i.2009, insect emerged ii.09, E. Medianero leg. Paratypes: 2♀, 2♂: same data as holotype. Two paratypes in MNCN, two paratypes in Maestría en Entomología, Universidad de Panamá (MEUP).
Additionally, 1♀ of the type series was dissected for SEM observation (in MNCN).

Etymology. Named after the hosp plant species *Quercus salicifolia.*

Diagnosis and comments. The coarsely rugose sculpture of head and mesosoma, trapezoid shape of clypeus projecting ventrally, short gula, antenna with 11 flagellomeres, with first flagellomere long, the robust and short mesosoma, with coarse rugose sculpture, the lateral carinae of propodeum slightly divergent, and the shape and setation of the hypopygial spine include the new species within the genus *Amphibolips*. Additionally, the general structure of the male, especially the 15-segmented antenna with the first flagellomere flattened and slightly expanded dorsally, and the structure of the gall, fit also well with the characters of the *Amphibolips* species. However, *A. salicifoliae* differs from all known species of *Amphibolips* by its simple metatarsal claws. From the other Panamanian *Amphibolips* species described here, *A. salicifoliae* differs, besides in claw structure, in its predominantly brown-rufous coloration, almost hyaline wings (F6-F10 at most as long as wide), its broad and smooth posterior notauli, a posterior scutellum margin that is not

emarginate, metasomal tergites that are not micropunctate and by the relatively shorter projection of the hypopygial spine.

The Nearctic species *A. quercusracemaria* (Ashmead, 1881) and *A. nubilipennis* (Harris, 1841) induce similar spherical leaf galls as the galls of the new species from Panama, although the inner structure of the former is different (Melika pers. comm.). However, *A. salicifoliae* differs from *A. quercusracemaria* in at least wing coloration, the number of antennal flagellomeres and the absence of micropunctures on the metasoma. The new species is different from *A. nubilipennis* in coloration; shape of notauli, smooth scutellar foveae and absent metasomal micropunctures.

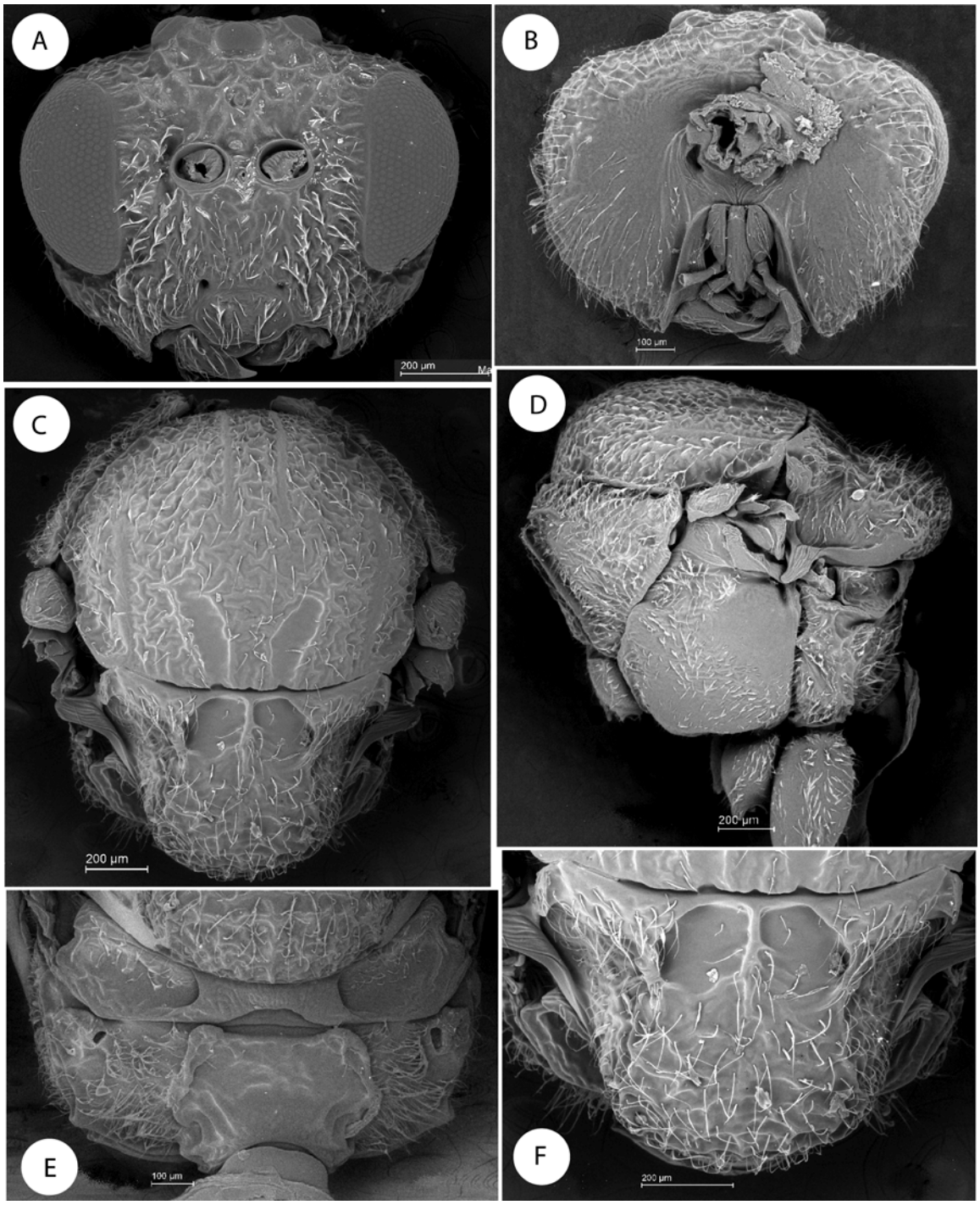

FIGURE 5. *Amphibolips salicifoliae*: (A) Head anterior view. (B) Head posterior view. (C) Mesosoma dorsal view. (D) Mesosoma lateral view. (E) Propodeum. (F) Scutellum dorsal view.

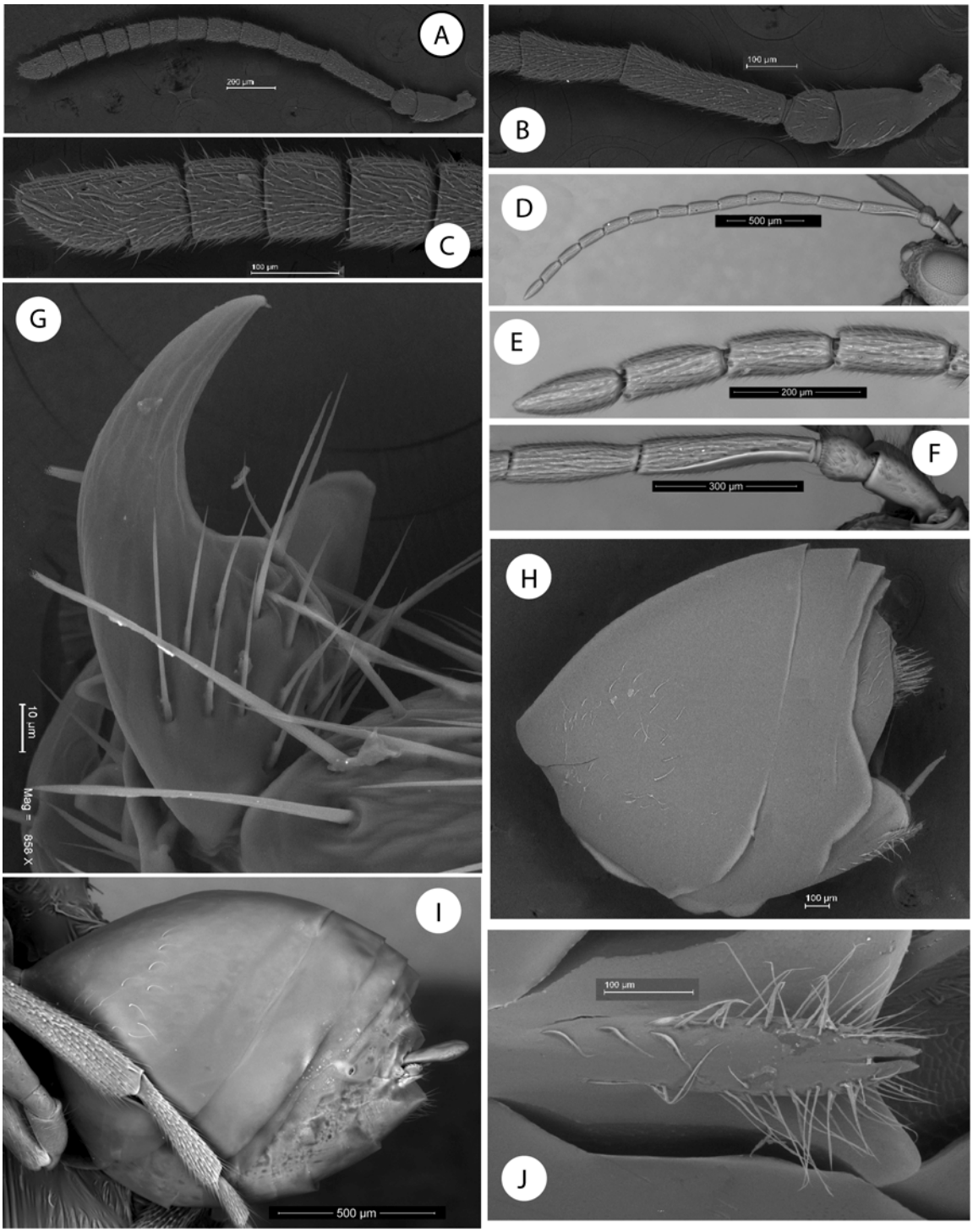

FIGURE 6. *Amphibolips salicifoliae*: (A) Female antenna. (B) Detail of basal flagellomeres. (C) Detail of last flagellomeres. (D) Male antenna. (E) Detail of last flagellomeres male antenna. (F) Detail of basal flagellomeres of male antenna. (G) Metatarsal claw. (H) Metasoma lateral view. (I) Matasoma male lateral view. (J) Detail of ventral spine of hypopygium.

Description. Body length 3.77 mm (range 3.58–3.91; N = 3) for females; 3.15 mm (range 2.91–3.4; N = 2) for males. Head, mesosoma, metasoma and coxae of female shining brownish-rufous. Antenna and fore and middle legs, excepting coxae light yellowish hind legs yellowish brown. Forewing hyaline, with some very light infumation, veins dark brown. Male: head and mesosoma black. Metasoma black to dark brown. Mandibles, antenna and legs dark brown, excepting anterior and middle light brown tibiae and tarsi.

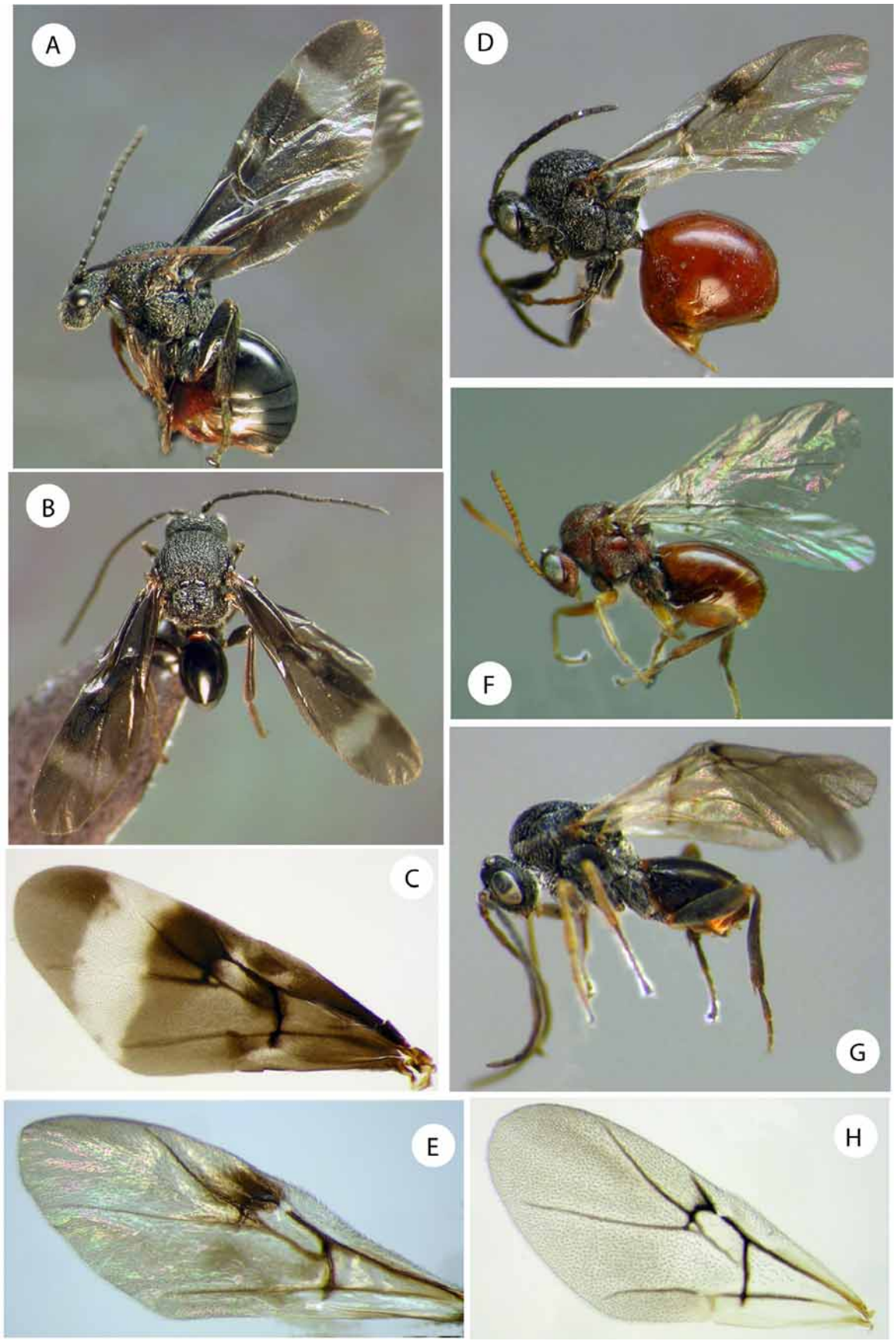

FIGURE 7. Habitus and forewings of *Amphibolips* species: (A) *Amphibolips castroviejoi*, female (B) *A.castroviejoi*, male (C) forewing of female. (D) *Amphibolips aliciae.* (E) forewing of female. (F) *A. salicifoliae*, female. (G) *A. salicifoliae*, male. (H) forewing of female.

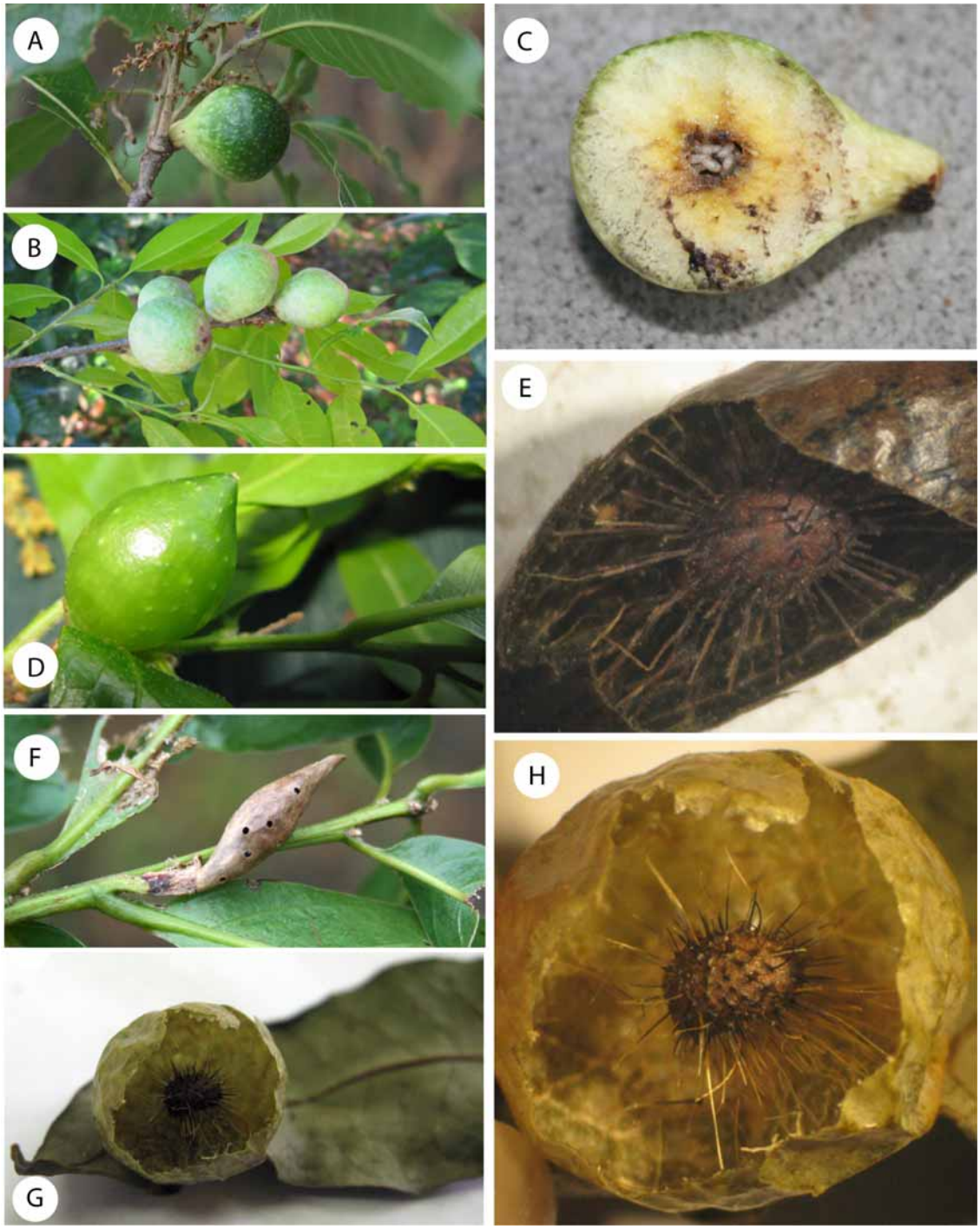

FIGURE 8. Galls of *Amphibolips* species from Panama: (A) Immature gall of *Amphibolips castroviejoi*. (B) Group of mature galls. (C) Section of a gall showing the central cell with the larvae of a gregarious parasitoid. (D) Mature gall of *Amphibolips aliciae*. (E) Section of a dry gall. (F) An old *A. aliciae* gall showing the exit holes of parasitoid species. (G) *Amphibolips salicifoliae* leaf gall. (H) Section of a mature gall.

Female. Head, wrinkled to coarsely rugose, pubescent, in dorsal view about 2.9 times wider than long. POL 1.3 times longer than OOL, posterior ocellus separated from inner orbit of eye by 2.5 times its longest diameter. Head in anterior view more or less oval (Fig. 5A), 1.25 times wider than high. Genae not expanded behind eyes. Vertex, frons, and occiput coarsely rugose; sculpture less strong medially on face; vertex and frons barely pubescent with sparse and shorter setae, occiput with relatively long setae. Clypeus trapezoid, 1.2 times wider than high, shining smooth, moderately pubescent, ventral margin slightly sinuate and projecting over mandibles. Anterior tentorial pits conspicuous; epistomal sulcus and clypeo-pleurostomal lines

indistinct. Malar space 0.38 times as height of compound eye. Distance between antennal rim of torulus and compound eye 0.8 times its width including rim. Ocellar plate slightly raised. Head, posterior view (Fig. 5B). Gula relatively short; distance between occipital and oral foramina shorter than height of the occipital foramen. Occiput without occipital carina, with some strong transverse wrinkles. . A carina dorso-lateral to occipital foramen present, curved, ventrally continuing pass posterior tentorial pits. Hypostomal sulci separated at hypostoma.

Mouthparts (Fig. 5B). Mandibles strong, exposed; with dense setae in base, right mandible with three teeth; left with two teeth. Cardo of maxilla not visible, maxillary stipes about 2.1 times longer than wide. Maxillary palp 5-, labial palp 3-segmented.

Antenna 0.4 times as long as body (Fig. 6A); with 11 flagellomeres, flagellum not broadening towards apex; with relatively long, erect setae and elongate placodeal sensilla visible only on F5–F11. Relative lengths of antennal segments: 25:15:49:31:25:26:19:17:15:15:14:13:30. Pedicel, globose, small, 0.6 as long as scape; F1 1.5 times as long as F2 (Fig. 6B). F7-F10 as long as wide or slightly transverse; F11 2.0 times longer than wide, 2.3 times as long as F10 (Fig. 6C).

Mesosoma. Coarsely rugose, 1.2 times as long as high in lateral view. Pronotum, with rugose sculpture and densely pubescent laterally. Ratio of length of pronotum medially/laterally = 0.23.

Mesonotum. Mesoscutum (Fig. 5C), moderately and uniformly pubescent, with moderately strong rugose sculpture. Notauli traceable only in posterior one third of mesoscutum length; deep, very broad, smooth and abruptly terminated. Median mesoscutal impression indistinct. Anteroadmedian signa visible. Transscutal fissure narrow. Scutellum (Fig. 5F), rounded, about 0.3 as long as mesoscutum, coarsely rugose, posterior margin not emarginate. Scutellar foveae ovoid, deep and smooth, their anterior margins forming an arc contra to transscutal fissure; posterior margins diffuse about 0.3 as long as scutellum, separated by septum. Scutellum, in lateral view, overlapping dorsellum. Mesopleuron (Fig. 5D) sculptured and setose only in medial and basal areas, smooth and bare posterodorsally.

Metanotum (Fig. 5E). Metapectal-propodeal complex. Metapleural sulcus reaching posterior margin of mesopectus at mid-height of metapectal-propodeal complex (Fig. 5D). Lateral propodeal carinae distinct, slightly divergent (Fig. 5E). Median propodeal area smooth and glabrous (Fig. 5E).

Legs. Metatarsal claws simple, without basal lobe or tooth (Fig. 6G).

Forewing (Fig. 7H). As long as body, hyaline, without conspicuous darkened spots or infuscate areas, veins strongly pigmented. Radial cell 3.6 times longer than wide; open along anterior margin; areolet small, triangular. Rs slightly bowed, M nearly straight, not reaching wing margin. Rs+M reaching basalis at its mid-height. First abscissa of radius (2r) curved, 2r-m straight. Hair fringe on apical margin short.

Metasoma (Fig. 6H). Smooth and shiny; large, as long as head and mesosoma combined; in lateral view 1.12 times as long as high. T3 covering about 2/3 of metasoma; without micropunctures; with sparsed long setae anteromedially. Projecting part of hypopygial spine, beyond attachment of lateral flap, relatively short (Fig. 6J); about 0.8 times as long as basal height of spine; in ventral view the spine is about 4 times as long as wide; lateral margins of hypopygial spine with long setae not projecting over apical end of the spine.

Male (Fig. 7G). Besides coloration, similar to female except as follows: antenna with 13 flagellomeres (Fig. 6D); F1 slightly curved and flattened (Fig. 6F). Placodeal sensillae present on all flagellomeres (Fig. 6D–F), micropores visible distally on flagellomeres 4–13. Relative length of antennomeres: 13:6:32:23:21:18:16:17:16:16:14:15:14:14:15.

Gall (Fig. 8 G–H) Regular spherical, smooth, greenish when fresh, dark brown and very glossy when dry. The outer shell is thin; internally the larval cell is central and supported by thin hair-like radiating filaments (Fig. 8 H). When dry the gall is very brittle, and may be easily crushed with the fingers. Diameter of the gall measures 30 mm on average.

Distribution. *A. salicifoliae* was found between 1870–2680 m a.s.l. at the single site of Volcan Baru, Panama. In comparison with *A. castroviejoi* is a rare species.

Biology. Only the sexual generation of *A. salicifoliae* is known, inducing galls on the underside of *Quercus salicifolia* leaves. Galls are found between January–April, during the dry season, and the insects emerge in the same season. This species displays a remarkable sexual dimorphism in coloration.

Key to *Amphibolips* species of Panama

1. Metatarsal claw with large acute basal lobe or secondary tooth (Figs. 2D, 4D); sculpture of mesoscutum and mesopleuron strongly and coarsely rugose; notauli complete or slightly faint in anterior one third of mesoscutum, crossed by transversal sculpture (Figs. 1C, 3D); median area of propodeum sculptured and pubescent (Figs. 1F, 3F). Metasomal tergites with micropuntures (Figs. 2H, 3E). Forewing strongly infuscate or with smoky area in radial cell (Figs. 7C, 7E). Galls globose or spindle-shaped on twigs (Figs. 8A, 8D)..... 2
- Metatarsal claws simple (Fig. 6G), without basal lobe or tooth; sculpture of mesoscutum and mesopleuron weaker; notauli traceable only in posterior one third, deep, broad and smooth (Fig. 5C); median propodeal area smooth and glabrous (Fig. 5E). Metasomal tergites without micropunctures (Fig. 6H). Forewing almost hyaline, only slightly smoked (Fig. 7H). Galls spherical, on leaves (Fig. 8G)..... *A. salicifoliae*
2. Notauli complete, slightly faint along coarse surface of anterior one third of mesoscutum; posteriorly narrow and slightly convergent (Fig. 1C); scutellum deeply emarginate at the posterior margin (Fig. 1C); scutellar foveae ellipsoid, with well defined posterior margins. Posterior 1/3 of T2 with a band of well-visible micropunctures (Fig. 2H); forewing very heavily and entirely smoky, except clear and wide band extending across wing from radial cell to ventral margin (Fig. 7C). Gall globose, oak apple type, with inner structure soft, juicy (Figs. 8B, 8C) .... *Amphibolips castroviejoi*
- Notauli complete and broad; posteriorly broader and strongly convergent (Fig. 3D); scutellum only slightly emarginate at the posterior margin; scutellar foveae relatively larger, with straight anterior margins and faint posterior margins (Fig. 3D). Posterior 1/3 of T2 with a band of hardly visible micropunctures; forewing only slightly smoked, with a large brown patch at the base of the radial cell (Fig. 7E). Gall spindle-shaped (Fig. 8 D–E) .... *Amphibolips aliciae.*

Discussion

The new species described here represent advancement in knowledge of the taxonomy, biology and distribution of the genus *Amphibolips*. Regarding the morphological diagnosis of *Amphibolips*, the use of few and problematic characters (e.g., the metatarsal claw) for the separation of Cynipini genera is well documented in the literature on the group (Nieves-Aldrey 1992, 2001), especially with reference to some Nearctic genera of that tribe (Melika & Abramhason 2002; Liljeblad *et al*. 2008, and references cited therein). The genus *Amphibolips,* defined, among other characteristics, by its toothed metatarsal claws, should be now included among the genus that are variable for this character because the new species, *Amphibolips salicifoliae,* has simple metatarsal claws without a basal lobe or tooth. However, the new species show all the clear diagnostic morphological characters of *Amphibolips*. Their galls are of the typical form shared by all the species of this genus.

The discovery of the presence of *Amphibolips* in Panama represents the southernmost known distribution of this genus in America, confirming that it is well represented in Central America and the Neotropical Region. We predict that the genus could be revealed to be even more species-rich in this biogeographical region after new collections are made in neighboring countries in Central America and South America; for example, the presence of Cynipidae on *Quercus humboldtii* has been recently documented in Colombia (Nieves-Aldrey, 2005).

The species of *Amphibolips* are only found on *Quercus* species in the section Lobatae, a host plant association reinforced by the three new species from Panama, which induce galls on *Q. salicifolia*. This pattern is also present in other undescribed species collected in Mexico (E. Pascual, pers. comm.).

The inquiline and parasitoid community associated with the galls.

The galls of the new species of *Amphibolips* here described host an interesting community of cynipid inquilines and chalcidoid parasitoids. One undescribed species of *Synergus* was reared from galls of *Amphibolips castroviejoi* and *A. aliciae*, while another undescribed species was reared from the galls of *A. salicifoliae*. A striking torymid species (*Torymus* Dalman: Torymidae) was reared from the galls of *A. castroviejoi*. These species are being studied and results will be published elsewhere.

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