REVISON OF PLECTOCYNIPINAE (HYMENOPTERA: FIGITIDAE) WITH DESCRIPTIONS OF A NEW GENUS AND THREE NEW SPECIES FROM CHILE.

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Abstract.—A revision of Plectocynipinae was initiated following the recent collections of specimens of Plectocynips Diaz and Araucocynips, new genus, from Chile. In addition to a redescription of the subfamily, we provide redescriptions, based on females, of the species of both genera. Descriptions are provided for Araucocynips ariasae, new species, Araucocynips queulensis, new species, and Plectocynips lago, new species, all from Chile. New host records are provided for Plectocynips pilosus Ros-Farré from galls of Aditrochus fagicolus Rübsaamen and Aditrochus coihuensis Ovruski (Hymenoptera: Chalcidoidea) on Nothofagus pumilio (Poepp. & Endl.) Krasser and Nothofagus dombeyi (Mirb.), respectively. In addition, males are described for Araucocynips ariasae, Araucocynips queulensis, and Plectocynips pilosus.

Key Words: Araucocynips, Plectocynips, Nothofagus, Aditrochus, galls

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Plectocynipinae (Hymenoptera: Figitidae) was established by Ros-Farré and Pujade-Villar (2007) to accommodate Pegascynips Brèthes and Plectocynips Díaz. These two genera, and the three species currently included therein, are poorly known, and this is reflected in their classification history. Brèthes (1928) classified Pegascynips barahonai Brèthes as a liopterid. Weld (1952) reported that though the holotype was badly damaged (missing all but the metasoma and legs), the drawing provided by both Brèthes (1928) and a new camera lucida illustration of the metasoma (made on request by Dr. E. E. Blanchard), were ample enough evidence for the exclusion of the taxon from Liopeteridae, and hence, Weld (1952) included the genus in Figitidae. Several years later, Díaz (1976) described Plectocynips longicornis, did not mention Pegascynips, but indicated that this new species shared some features with Thrasorus Weld, 1944. Plectocynips longicornis was reared from galls on Nothofagus dombeyi (Mirb.) (Fagaceae) (Díaz 1976), but the biology for Pegascynips barahonai was unknown (Weld 1952).

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Ronquist (1994) hypothesized \textit{Plectocynips} and \textit{Pegascynips} were part of a larger clade dubbed the ‘figitoid inquilines’. Members of this clade, which included \textit{Euceroptres} Ashmead, 1896, \textit{Myrtopsen} Rübsaamen, 1908, \textit{Pegascynips}, \textit{Plectocynips}, and \textit{Thrasorus}, share several seemingly convergent attributes with cynipids and cynipid inquilines (e.g., body generally setose, mesoscutum horizontally striate, enlarged metacoxae), resulting in some figitoid inquilines being classified both as figitids and cynipids. Ronquist (1994) suggested that perhaps the figitoid inquilines closest relatives were, in fact, their own hosts, and that this phenomenon can be considered a special case of host-parasite relationship, which he termed \textit{agastoparasitism}. Ronquist (1994) further speculated that agastoparasitism was responsible for the morphological similarity inherent between the cynipids and the figitoid inquilines. Ronquist (1999) refined his arguments for the monophyly of the figitoid inquilines and placed them into Thrasorinae. Ronquist (1999) also observed that \textit{Plectocynips} and \textit{Pegascynips} are sister taxa based on the shared presence of a single, extremely long metatibial spur. Ros-Farré and Pujade-Villar (2002) also noted that females of these two genera possess extremely long 7th metasomal sterna. Biologically, species of these two genera are associated with \textit{Nothofagus} in southern South America (Díaz 1976, Ronquist and Nieves-Aldrey 2001, Ros-Farré and Pujade-Villar 2002, present study).

Ros-Farré and Pujade-Villar (2007) circumscribed Plectocynipinae to accommodate \textit{Plectocynips} and \textit{Pegascynips}, hypothesizing that since these taxa lack a circumtorular impression, they rendered Thrasorinae paraphyletic (though the state of the circumtorular impression was not observable in \textit{Pegascynips}); Ros-Farré and Pujade-Villar (2007) hypothesized that the elongate metatibial spur is a synapomorphy supporting the monophyly of Plectocynipinae. Buffington et al. (2007) confirmed the observation of Ros-Farré and Pujade-Villar (2007) that Thrasorinae, as proposed by Ronquist (1999), was a paraphyletic assemblage of genera. Buffington and Liljeblad (2008) confirmed through improved taxon sampling that \textit{Euceroptres} rendered Thrasorinae paraphyletic, and, as a consequence, circumscribed Euceroptrinae to accommodate \textit{Euceroptres} only.

Throughout the taxonomic history of \textit{Plectocynips} and \textit{Pegascynips}, only Díaz (1976) and Ros-Farré and Pujade-Villar (2002) provided up to date diagnostic data for species of Plectocynipinae. Still lacking, however, are clearly delineated generic concepts for the Plectocynipinae. This need was underscored recently after several specimens of \textit{Plectocynips} were reared from galls of \textit{Aditrochus fagicolus} Rübsaamen and \textit{Aditrochus coihuensis} Ovruski (Hymenoptera: Chalcidoidea) on \textit{Nothofagus pumilio} (Poopp. and Endl.) Krasser and \textit{Nothofagus dombeyi} (Mirb.) Blume, respectively. These collections were made in association with a field work study of the genus \textit{Paraulax} Kieffer and the recently described genus \textit{Cecinothofagus} Nieves-Aldrey and Liljeblad (Cynipidae, Paraulacini), cynipids also associated with \textit{Nothofagus} galls (Nieves-Aldrey et al. 2009).

The goals of the present study are to: 1) describe \textit{Araucocynips}, new genus and redescribe \textit{Plectocynips} of Plectocynipinae; 2) provide up-to-date diagnosis for all described species; 3) describe three new species; 4) summarize what is known regarding host data for Plectocynipinae. In the light of the poor condition of the holotype of \textit{Pe. barahonai}, represented by only some of the legs and the metasoma, we prefer not to redescribe \textit{P. barahano} until further specimens can be obtained for redescription. While a generic redescription of \textit{Pegascynips} is impossible,
we do, however, recognize the validity of the genus and species.

**Materials and Methods**

The following repositories are referenced throughout:

EMEC - Essig Museum of Entomology, University of California at Berkeley, Berkeley, CA, USA (C. Barr)

MNCN - Museo Nacional de Ciencias Naturales, Madrid, Spain (J.L. Nieves-Aldrey)

MNHC - Museo Nacional de Historia Natural, Santiago de Chile, Chile (M. Elgueta)

NHM - The Natural History Museum, London, UK (D. Notton)

UCDC - Bohart Museum, University of California at Davis, Davis, CA, USA (L. Kimsey)

UCRC - University of California at Riverside, Riverside, CA, USA (S. Triapytsin, D. Yanega)

USNM - National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA (M. Buffington)

Field sampling was conducted by the second author during two collecting surveys in January–February 2005 and November–December 2006 in Chile. *Nothofagus* species were sampled in national parks and reserves of the VII (Maule), IX (Araucanía), X (Los Lagos) and XII (Magallanes) regions of Chile (see also Nieves-Aldrey et al. 2009). Additional material was collected by H. Ibarra in Chile and sent to the second author for study. Galls were hand-collected from *Nothofagus* spp. and taken back to the laboratory where ranges of different sized galls were dissected. Adult wasps were obtained mainly by dissection of freshly collected galls. Some adults were reared from galls and kept in rearing cages with netting lids. Aside from specimens loaned to us for this research from various collections (listed above), additional specimens of the studied taxa were collected using Malaise traps, canopy traps, and canopy fogging in several locations throughout Chile. Specimens were caught directly into 70% ethanol, and the figitids were successively sorted out from these samples.

Methods for specimen imaging using light microscopy follow those of Buffington and van Noort (2007, 2009); specimen mounting and lighting techniques follow Buffington and Gates (2009). For observation under a scanning electron microscope (SEM), adults were dissected in 70% ethanol, air dried, mounted on a stub, and coated with gold; micrographs were taken with a FEI QUANTA 200 (high vacuum technique) for several standardized views. Species for which we had few adults were not dissected but instead directly observed using SEM at low voltage without coating. Forewings were mounted in Euparal or PVA on slides; PVA mounts were cured for 72 hours at 43 °C; slides were examined with either a Wild MZ8 stereo-microscope or Leica DMRB compound microscope. Images of galls and gall dissections were obtained with a Nikon Coolpix 4500 digital camera. Measurements were made with a calibrated micrometer scale attached to an ocular of the light microscope (Wild MZ8 or Leica M10). Images SEM and LM images generated during this study are available from Morphbank (www.morphbank.com).

Terminology for all descriptive characters follow Ronquist and Nordlander (1989) and Buffington and Liljeblad (2008); surface sculpture terminology follows that of Harris (1979). Following the descriptions are summaries of general distribution, biology and comments on nomenclatural issues (when applicable). Exact label data is reported for holotypes. Type specimens of the newly described species are listed under Material examined. All new species are registered with ZooBank (www.zoobank.org), and registration numbers are included in each description.
RESULTS AND DISCUSSION

Plectocynipinae Ros-Farré and Pujade-Villar, 2007


Diagnosis.—Differentiated from all other Figitidae by the presence of a single metatibial spur that is at least 0.5× the length of metatarsus 1 (SR, Fig. 1D); bladelike metasoma (view dorsally); elongate 7th abdominal sternum (Figs. 2D, 5D). Additionally, plectocynipines are differentiated from Euceroptrinae by the lack of an areolet in the forewing (present in Euceroptrinae); from Thrasorinae by the lack of a circumtorular impression (present in Thrasorinae) and the presence of a well-developed pronotal plate (extremely reduced in Mikeius). Of all of these groups, Mikeius and the Euceroptrinae are the easiest to confuse with Plectocynipinae, since these groups are associated with galls and have complete notauli. Plectocynipinae, however, are known only from southern South America and are associated with Aditrochus species (Chalcidoidea: Pteromalidae: Ormocerinae) and unidentified hymenopterous gallers on Notho-fagus spp. (Fagaceae), Euceroptrinae are known only from North America and are associated with Andricus spp. (Cynipoidea: Cynipidae) on Quercus spp. (Fagaceae) (Buffington and Liljeblad, 2008), and Mikeius are known only from Australia and are associated with Ophelimus (Chalcidoidea: Eulophidae) on Eucalyptus spp. (Myrtaceae) (Buffington 2008).

Araucocynips Buffington and Nieves-Aldrey, new genus

(Figs. 1, 3, 5)

Type species: Araucocynips ariasae Buffington and Nieves-Aldrey, new species

Included species: Araucocynips ariasae Buffington and Nieves-Aldrey, new species; A. queulensis Buffington and Nieves-Aldrey, new species.

Diagnosis.—Differs from Plectocynips by the following characters: elongate ‘necklike’ propodeum (Figs. 5D–F) with a length roughly 2× the height of the propodeum (the length of the propodeum is equal to or less than its height in Plectocynips); presence of a pigmented triangle at the distal end of the marginal cell of the forewing (Figs. 3A–B, 5D); absent in Plectocynips (Figs. 3C–D); mesocutum horizontally striate (Figs. 1 B–C; mostly smooth in Plectocynips, Figs 2C, 6A, 6D); mandibular spatulate process (MSP, Fig. 2B) absent (present in Plectocynips); and metatarsal spur half the length of metatarsus (Fig. 1D) (at least 0.75× length of metatarsus in Plectocynips, (Fig. 2F); multiporous plate sensillae on terminal flagellomere of antenna button-shaped (Fig. 1H); multiporous plate sensillae in Plectocynips on terminal flagellomere of antenna ridge- or blade-like in shape (Figs. 2E and 6B).

Description.—Female. Head: Ranging from burnt orange on gena, light brown on frons, dark brown around ocelli and vertex (Figs. 5D–E), to head entirely dark brown or black. Frons smooth, densely setose; malar space costulate ventrad eye, becoming more shagreened approaching mandibular base (Fig. 1A); gena broadly rounded, smooth, sparsely setose (Figs. 1A, 5E–F). Anterior margin of clypeus straight; clypeus spatulate in profile (Fig. 1A); anterior tentorial pits (Fig. 1A) deeply inset into lower frons. Entire antenna orange, distally darker (Fig. 5D), slightly clavate, terminal 4–5 flagellomeres forming clava (Fig. 1G); scape 1.75–2× length of radicle; short appressed setae on all flagellomeres; 11 flagellomeres present,
moniliform (Fig. 1G); apical segment 1.75× length of subapical segment; placoid sensillae present on flagellomeres 4–10; multiporous plate sensillae present, button shaped, at tip of flagellomere 11 (Fig. 1H).

**Mesosoma:** Lateral surface of pronotum dorsally striate to rugulose, ventrally smooth, evenly covered in moderately long setae (Figs. 1E, 5A, E–F); lateral pronotal carina absent; lateral margins of pronotal
plate indistinct; submedial pronotal depressions deep, open laterally; interfoveal space of pronotal plate gently striate, sparsely setose; dorsolateral corners of pronotal plate extending above anterior margin of mesoscutum, posteriorly striate (Figs. 1B–C, E; 5B). Mesopleuron smooth, glabrous except for variable setal patch on anterior margin above forecoxa; mesopleural furrow extremely faint (Figs. 1E; 5A, E–F); mesopleural triangle deeply impressed, densely setose, clearly defined along all edges (Figs. 1E, 5A). Mesoscutum transversely striate anteriorly, striate to smooth posteriorly, moderate to densely setose (Figs. 1B–C, E; 5B); anteroadmedian

Fig. 2. Diagnostic characters of *Plectocynips* sp. (Plectocynipinae). A–G: *Pl. pilosus*. A, head, anterior view; B, detail of mandibular base (MSP, mandibular spatulate process); C, mesosoma, dorsal view; D, metasoma, lateral view; E, female antenna (inset, arrows showing multiporous plate sensillae); F, left hind leg (inset, detail of metatarsal claw); G, mesosoma, lateral view.
signum present; median mesoscutal impression present, one-eighth to one-fourth length of mesoscutum; notauli complete, originating at anterior end of parascutal impression, widest in middle, narrower anteriorly and posteriorly (Figs. 1B–C, 5B). Disk of scutellum variable, ranging from longitudinally rugulose (Fig. 1B) to cleft posteriorly (in males of some species) (C, Fig. 1C; Figs 5B–C), medially flat, smooth, evenly setose (Fig. 5C); scutellar ridge separating scutellar fovea broad, short; scutellar fovea oval, obliquely angled relative to midline, posterior rim present (Figs. 1B–C) to absent (Fig. 5C), center gently rugulose laterally, smooth medially, sparsely setose (Figs. 1B–C, 5C).

Metapleural-propodeal complex: Metapleuron glabrous anteriorly, gently setose posteriorly; propodeum gently setose; anterior margin of upper metapleural area setose, spiracular groove indistinct (Figs. 1E, 5E–F); setal pit at ventral margin of metapleuron indistinct. Propodeum as long as deep, extended posteriorly into neck-like projection (Figs. 1E, 5D–F); lateral, posterior aspects of propodeum crenulate; parallel propodeal carinae (PC, Fig. 1B) complete, slender anteriorly, becoming wider and robust posteriorly with lateral flange fusing dorsally with nucha; area between propodeal carinae moderately setose. Nucha elongate, glabrous, deeply striate.

Fore wing: Marginal cell closed along anterior margin (Figs. 3A, 3B); distinct
break present in vein proximal to marginal cell (Fig. 3B); convergence of R1 and Rs veins marked by extended pigmented triangle (PT, Fig. 3B), areolet absent; marginal and cubital veins represented by nebulous veins; short setae present on wing surface and along margins.

Legs: Femora and tibiae dark orange to brown, with sparse, appressed setae. Tarsomeres orange-yellow to brown, covered
in short, appressed setae (Figs. 5D–F); metatarsus 1 as long as remaining metatarsomeres; metatibial spur (Fig. 1D) half as long as metatarsus 1.

Metasoma: Dark brown to black (Figs. 5D–F); petiole polished dorsally, gently striate laterally, glabrous. Anterior margin of T3 with distinct setal band/patch; posterior margins of T3 and T4 parallel, evenly rounded, T4 larger than all other terga (Fig. 5E), remaining terga short, telescoped within T4; T5–T9 with micropores;

Fig. 5. Habitus and detail images of Auracocynips. A–E: Auracocynips ariasae n. sp.; F: A. queuilensis, n. sp. A, mesosoma, lateral view; B, mesosoma, dorsal view; C, scutellum, dorsal view; D–F lateral habitus.
setae frequently present on T8 (Fig. 5D); 7th sternum elongate, extended ventrally creating a trough for ovipositor, setose along midline.

Male. As in female except in following attributes: 13 antennal flagellomeres (Fig. 1F), flagellomere 1 as long as 4th; laterally excavated, expanded slightly on distal end (inset Fig 1F); sternum 7 of metasoma not extended ventrally; aedeagus protruding, brush of setae present anterior of aedeagus.

Fig. 6. Detail images of Plectocynips. A–B, Pl. lago n. sp.; C–F, Pl. longicornis, male. A, mesosoma, dorsal view; B, sensillae on terminal flagellomere of female antenna; head, antero-lateral view; D, mesosoma, dorsal view; E, flagellomere 1, male antenna; F, head and mesosoma, lateral view.
Distribution.—Neotropical Region: Chile: Araucanía, Maule.

Biology.—Unknown; collected via canopy fogging and Malaise trapping in Nothofagus obliqua (Fagaceae) forests only. Ronquist and Nieves-Aldrey (2001) suggested the host for plectocynipines might be Paraulax (Cynipidae: Cynipini), based on circumstantial rearing evidence (De Santis et al. 1993). Araucocynips shares the same habitat with Paraulax, inhabiting only Nothofagus obliqua forests. If the biology of Araucocynips is similar to that of the related genus Plectocynips, then the galls induced by Aditrochus species (Pteromalidae) on Nothofagus obliqua may be potential hosts.

Araucocynips ariasae, Buffington and Nieves-Aldrey, new species
(Figs. 3A–B, 5A–E)
urn:lsid:zoobank.org:act:053AD09B-F4BD-4227-B8B5-DA6A43C48252

Diagnosis.—Differs from other species of Araucocynips by having a smooth anterior two-thirds of the scutellum (Fig. 5B), and having a cleft posterior margin of the scutellum on both males and females (Fig. 5C). In other species, the posterior margin of the scutellum of the female is not cleft (Fig. 1B). Additionally the face of females is predominantly orange (Fig. 5E), being black in A. queulensis (Fig. 5F).

Description.—Female. As in description of the genus with the gena bright orange (Fig. 5E); lower face burnt-orange to pale-brown; frons, vertex, basal one-fourth of scape dark brown; antennal flagellomeres pale orange (Figs. 5D–E); mesoscutum surrounding median mesoscutal impression gently horizontally striate, moderately setose, remainder of mesoscutum with distinct horizontal striations (Fig. 5B); anterior one-third of scutellum smooth; at midpoint with gentle horizontal striations to distinct posterior cleft; posterior aspect of scutellum distinctly rugulate (Fig. 5C).

Male. As in description of the genus, with the gena and lower face bright orange; frons, vertex dark brown to black; anterior one-third of scutellum very smooth with few scattered setae.


Distribution.—Neotropical Region: Chile: IX Region.

Biology.—Unknown.

Etymology.—Named after Dr. Elizabeth Arias, whose collecting efforts in Chile yielded many specimens used in this study.

Araucocynips queulensis Buffington and Nieves-Aldrey, new species
(Figs. 1A–H, 5F)
urn:lsid:zoobank.org:act:F91D9C07-3ED4-42A0-995A-1CEC30E40E2D

Diagnosis.—This species differs from other Araucocynips by the lack of a cleft
posterior margin on the scutellum in females (Fig. 1B), and the broad, smooth, shiny posterior one-third of the mesoscutum. Other species of *Araucocynips* have a cleft posterior margin of the scutellum in both males and females (Figs. 5B–C) and a horizontally striate mesoscutum (Fig. 5B).

**Description.**—Female. As in description of the genus with the head entirely dark brown to black (Fig. 5F); basal antennal flagellomeres pale orange, apical flagellomeres dark brown; posterior two-thirds of mesoscutum smooth, shiny, moderately setose; anterior two-thirds of scutellum smooth, shiny; posterior one-third of scutellum longitudinally rugulose, not cleft, with deep pits on posterior aspect of scutellum (Fig. 1B).

Male. Gena, lower face bright orange; frons, basal 0.5× of scape dark brown; antennal flagellomeres pale orange; mesoscutum surrounding median mesoscutal impression smooth, shiny, moderately setose, remainder of mesoscutum horizontally striate (Fig. 1C); anterior two-thirds of scutellum horizontally striate; posterior one-third of scutellum cleft, gently rugulose on posterior aspect of scutellum (Fig. 1C).


**Distribution.**—Neotropical Region: Chile: Maule.

**Biology.**—Unknown.

**Etymology.**—Named after Los Queules, the nature reserve in which the holotype was collected.

Key to Species of *Araucocynips*

1. Posterior one-third of mesoscutum in females smooth (Fig. 1B); scutellum not cleft in females (Fig. 1B), margined in males (Fig. 1C); scutellar fovea with distinct posterior rim (Fig. 1B-C); gena dark brown-black (Fig. 5F) . . . . . *Araucocynips queulensis*, new species.

   – Posterior one-third of mesoscutum horizontally striate (Fig. 5B); scutellum cleft just anterior to posterior margin in both sexes (Fig. 5C); scutellar fovea lacking distinct posterior rim (Fig. 5C); gena light burnt orange (Fig. 5E) *Araucocynips ariasae*, new species.

**Pegascynips barahonai**

Brêthes, 1928

urn:lsid:zoobank.org:act:030EA6F2-0988-401F-BE61-9353E09F1BA4

The holotype for this species is in poor condition, comprised of the metasoma and legs (Ros-Farré and Pujade-Villar 2007; Weld 1952). Brêthes (1928) description and associated camera lucida illustration indicate that *Pegascynips* lacks scutellar fovea and that the propodeum is prolonged into a short cone or neck. *Araucocynips*, as described here, may in fact be *Pegascynips*. Until topotypic material of *Pegascynips* is collected, no further taxonomic treatment is possible.

**Plectocynips** Díaz, 1976

(Figs. 2, 3C–D, 4, 6)

urn:lsid:zoobank.org:act:8347555B-0492-48FD-BBA4-F31C80FFD06B

Type species: *Plectocynips longicornis* Díaz, 1976: 100–102; by original designation. Included species: *Plectocynips longicornis* Díaz; *P. pilosus* Ros-Farré; *P. lago Buffington and Nieves-Aldrey*, new species.

**Diagnosis.**—Differs from *Araucocynips* by the following characters: shorter propodeum, ranging from subequal in height:length to slightly higher than long (Figs. 2 G, 4A–C) whose length is roughly
twice the height of the propodeum (propodeum elongate in *Araucocynips*; Figs 5D–F); marginal cell deeper, tip not characterized by a pigmented triangle (Fig. 3C; marginal cell shallower and elongate, and with a pigmented triangle, in *Araucocynips*, Fig. 3A); mesoscutum smooth (Figs. 2C, 6A, D); horizontally striate in *Araucocynips*, Figs. 1B–C); base of mandible excavated and spatulate (MSP, Fig. 2B; rounded and not spatulate in *Araucocynips*; Fig. 1A); metatarsal spur three-quarters length of metatarsus (Fig. 2F) (half length of metatarsus in *Araucocynips* (Fig. 1D)); males with 17 antennal flagellomeres (males with 13 flagellomeres in *Araucocynips*; Fig. 1F).

Redescription.—Female. Head: Entirely dark brown to black (Figs. 4A–C). Frons smooth, moderately setose; malar space gently striate ventrad of eye, becoming more shagreened approaching mandibular base (Figs. 2A, 6C); gena broadly rounded (Figs. 4B–C), smooth, sparsely setose. Anterior margin of clypeus slightly bifurcate to rounded, extended anteriorly into spatulate lamina (Figs. 2A, 6C). Mandibular base extended ventrally, forming spatulate process (MSP, inset Fig. 2B); distinct line of setae present from anterior margin of spatulate process through midline of mandible. Entire antenna dark orange/drown, distally darker (Fig. 4A), slightly clavate (Fig. 2E); scape one and three-quarters to twice length of radicle (Fig. 2E); short appressed setae on all flagellomeres; 11 flagellomeres present, moniliform (Fig. 2E); apical flagellomere one and three-quarters length of subapical flagellomere; placoid sensillae present on flagellomeres 2–11; paired microsensors present on distal end of flagellomeres 3–10; blade-shaped multiporous plate sensillae present on terminal flagellomere (inset, Fig. 2E; Fig. 6B).

**Mesosoma:** Lateral surface of pronotum dorsally striate/rugulose, ventrally smooth, densely covered in moderately long setae (Figs. 2G, 6F); lateral pronotal carina absent; lateral margins of pronotal plate distinct; submedial pronotal depressions deep, open laterally; interfoveal space of pronotal plate smooth, sparsely setose; dorsolateral corners of pronotal plate posteriorly striate, not extending above anterior margin of mesoscutum. Mesopleuron smooth, glabrous except for variable setal patch on anterior margin above forecoxa; mesopleural furrow ranging from distinct to extremely weak to faint (Figs. 2G, 4B–C, 6F); mesopleural triangle deeply impressed, densely setose, clearly defined along all edges (Figs. 2G, 6F). Mesoscutum smooth, moderate to densely setose (Figs. 2C, G; 6A, D); anteroadmedian signum present; median mesoscutal impression present, reduced to effaced notch; notauli complete, originating at anterior end of parascutal impression, widest posteriorly (Figs. 2C, 6A, D). Disk of scutellum ranging from smooth to rugulose anteriorly, entirely rugulose/costulate posteriorly (Figs. 2C, 6A, D), evenly setose; scutellar ridge separating scutellar fovea ranging from indistinct (Fig. 2C) to broad (Figs. 6A, D), short, smooth to gently striate; scutellar fovea oval, obliquely angled relative to midline, posterior rim present, entirely smooth, glabrous (Figs. 2C, 6A, D).

**Metapleural-propodeal complex:** Metapleuron entirely setose except for small patch on metepisternum; setae short anteriorly, long posteriorly (Figs. 2G, 6F); propodeum covered in long, thin setae; spiracular groove shallow, bordered dorsally by distinct ridge; setal pit at ventral margin of metapleuron indistinct, covered by dense setae. Propodeum shorter than deep; postero-lateral aspects of propodeum crenulate; parallel propodeal carinae (Fig. 2C) complete, equal in width throughout, distinctly angled midway between metascutellum and nucha; area
between propodeal smooth, covered with dense setal patch. Nucha short, glabrous, deeply striate laterally, dorsally.

**Fore wing:** Marginal cell closed along anterior margin (Figs. 3C–D); distinct break present in vein proximal to marginal cell (Fig. 3D); areolet absent; marginal and cubital veins represented by trace veins; short setae present on wing surface and along margins.

**Legs:** Femora and tibiae dark orange to brown, with sparse, appressed setae (Figs. 4A–C). Tarsomeres orange-yellow to brown, covered in short, appressed setae (Figs. 4A, C). Metatarsal spur three-quarters length of metatarsus (Fig. 2F); metatarsus 1 equal to combined length of remaining metatarsomeres.

**Metasoma:** Dark brown to black; petiole polished dorsally, gently striate laterally, glabrous. Anterior margin of T3 mostly glabrous with 3–5 stray setae (Fig. 2D); posterior margins of T3 and T4 parallel, evenly rounded, T4 larger than all other terga (Fig. 2D), remaining terga short, telescoped within T4; T5–T9 with micropores; setae frequently present on T8 (Fig. 2D); 7th sternum elongate, extended ventrally creating a trough for ovipositor, setose along midline (Fig. 2D).

**Male.** As in female except in following attributes: 17 antennal flagellomeres, flagellomere 1 as long as 4th, laterally excavated, expanded slightly on distal end (Fig. 6E); scape dark brown as are terminal 5 flagellomeres, remaining flagellomeres light brown to orange; sternum 7 of metasoma not extended ventrally, aedeagus protruding, brush of setae present anterior of aedeagus.

**Distribution.**—Neotropical Region: Chile: Region IX, X.

**Biology.**—Specimens in this study were collected emerging from galls of *Aditrochus coihuensis* and *Aditrochus fagicolus* (Chalcidoidea: Pteromalidae: Ormocerinae) on *Nothofagus dombeyi* (Mirb.) and *N. pumilio* (Poepp. & Endl.) Krasser (Fagaceae). Ronquist and Nieves-Aldrey (2001) suggested the host for *Plectocynips* might be a species of *Paraaulax* (Cynipidae: Cynipini), based on circumstantial rearing evidence (De Santis et al. 1993). Nieves-Aldrey et al. (2009) recorded species of *Cecinotheragmus*, a genus closely allied with *Paraaulax* (Cynipidae, Paraulacini), emerging from *Aditrochus* galls together with the *Plectocynips* species.

**Plectocynips lago Buffington and Nieves-Aldrey, new species** (Figs. 4B, 6A, B) urn:lsid:zoobank.org:act:9140E62C-F936-41BE-B684-78D4BA63105D

Diagnosis.—This species differs from all other species of *Plectocynips* by the presence of a complete circumscutellar ridge along the lateral and posterior margins of the scutellum (Fig. 6A). In the other species of *Plectocynips*, the lateral and posterior margins of the scutellum are evenly rounded and lack a ridge (Figs. 2C, 6D). Further, *P. lago* possess a distinctly costulate posterior two-thirds of the scutellum (Fig. 6A), whereas other species of *Plectocynips* have more rugose sculpturing on the posterior two-thirds of the scutellum (Figs. 2C, 6D).

Description.—As in description of the genus with the anterior one-third of scutellum distinctly rugulose, gently rounded, posterior two-thirds costulate (Fig. 6A); circumscutellar ridge present along lateral, posterior aspects of scutellum; scutellum entirely costulate from circumscutellar ridge to mesofurca (Fig. 6A). Mesopleural carina complete, distinct, running entire length of mesopleuron (Fig. 4B).

Material examined.—**HOLOTYPE,** female: CHILE: HE2, Puerto Eden, Isla Wellington, 49°S, 40ft, 30.XI.1958, Royal Society Chilean Expedition, 1959,

**Distribution.**—Neotropical Region: Chile: IX Region

**Biology.**—Unknown.

**Etymology.**—Named for the type locality, Flor del Lago, where the holotype was collected.

*Plectocynips longicornis* Díaz, 1976

(Figs. 4C, 6C–F)

urn:lsid:zoobank.org:act:5D8069F1-D825-4FD7-9907-66A16FDBD6AD

Diagnosis.—This species differs from all other species of *Plectocynips* by the smooth, flat antero-median area of the scutellum (Fig. 6D). In all other species, the entire scutellum is rugose to crenulate (Figs. 2C, 6A). Figure 2A in Ros-Farré and Pujade-Villar (2002) suggests *Pl. longicornis* also lacks setae on the mesoscutum; specimens used in this study possess the same setal patterns on the mesoscutum as other species of *Plectocynips* (Fig. 6D). This species further differs from *Pl. pilosus* by the presence of a distinct mesopleural carina (Fig. 6F) (reduced/absent in *Pl. pilosus*, Fig. 2G).

Redescription.—As in description of the genus with: the antero-median area of scutellum gently rounded, smooth (Fig. 6D); antero-lateral aspects of scutellum rugulose dorsally, costulate ventrally; posterior aspects of scutellum entirely costulate to mesofurca. Mesopleural carina complete, distinct, running entire length of mesopleuron (Fig. 6F).


**Distribution.**—Neotropical Region: Chile: Regions IX, X.

**Biology.**—Reared from galls of an unknown inducer on *Nothofagus dombeyi* (Mirb.) (Fagaceae) (Díaz 1976).

*Plectocynips pilosus* Ros-Farré, 2002

(Figs. 2, 3C–D, 4A, 4D–F)

Diagnosis.—Distinguished from other species of *Plectocynips* by the evenly rugose scutellum (Fig. 2C); in *Pl. longicornis*, the antero-medial area of the scutellum between the scutellar foveae is smooth (Fig. 6D), and in *Pl. lago*, the anterior one-third of the scutellum is rugose, posterior two-thirds deeply costulate with a distinct circumsutellar ridge (Fig. 6A). Further differentiated from *Pl. longicornis* by the frequently absent mesopleural carina at anterior margin of mesopleuron (Fig. 2G).

Redescription.—As in the description of the genus with: entire scutellum evenly rugulose dorsally, transitioning to costulate ventro-laterally and ventro-posteriorly (Fig. 2C); posterior aspects of scutellum entirely costulate to mesofurca. Mesopleural carina absent (Fig. 2G).

EMEC); IX Region, PN Conguillio, Laguna Captren, 1280m, 38°38'29" S, 71°42'04" W, 23.II.2005, J. Pinto (1 ♀, UCRC); CHILE, Villarrica NP, 25.I.1985, I. D. Gauld (1 ♂, NHM); CHILE, Osorno, ex gall Aditrochus coihuensis on Nothofagus dombeyi 07 to 01/1993, H. Ibarra leg. (2 ♂, 3 ♀, MNCN); CHILE, P.N. Conguillio, Laguna Captrén, ex gall Aditrochus fagicolus on Nothofagus pumilio (30/01/2005); 9/02/05, J. L. Nieves leg. (4 ♀, MNCN).

Distribution.—Neotropical Region: Chile: Region IX.

Biology.—Reared from Aditrochus fagicolus on Nothofagus pumilio, and from Aditrochus coihuensis on Nothofagus dombeyi; label data on the paratypes of P. pilosus indicate that the specimens were reared by I. Gauld from galls on Nothofagus dombeyi caused by Cynipidae; rearing data presented in this study indicate that the gall inducer is likely to be a species of Aditrochus.

Key to Species of Plectocynips

1. Circumscutellar ridge complete along the lateral and posterior two-thirds of scutellum distinctly costulate (Fig. 6A) . . . . . . . Plectocynips lago, new species
   — Circumscutellar ridge incomplete, posterior margins of the scutellum evenly rounded (Fig. 2C); posterior two-thirds of scutellum variously rugose (Fig. 2C) . . . . . 2

2. Antero-median area of the scutellum smooth, flat (Fig. 6D); distinct mesopleural carina present (Fig. 6F) . . . . . . . . . . . . . Plectocynips longicornis
   — Scutellum even more rugose (Fig. 2C); mesopleural carina extremely reduced to absent (Fig. 2G). . . . . . . . . . . . . . Plectocynips pilosus

DISCUSSION

Together with Euceroptrinae and Thrasorinae, the Plectocynipinae represent what appear to be vestigial lineages of Figitidae that retain strong host associations with gall-inducing Hymenoptera. These groups have recently emerged from taxonomic chaos and obscurity (Euceroptrinae: Buffington and Liljeblad, 2008; Thrasorinae: Buffington, 2008; Plectocynipinae: Ros-Farré and Pujade-Villar, 2007; present study). Due to either evolutionary convergence or simply retention of plesiomorphic traits, these groups have been difficult to understand taxonomically and phylogenetically, and yet, they are likely the ‘missing links’ between the entomophagous cynipids and the remaining entomophagous figitids.

Two character systems need to be explored further within the Plectocynipine. Firstly, the occurrence of multiporous plate sensillae need to be further surveyed not only within Plectocynipinae but also in the thrasorines and euceroptrines. Basibuyuk and Quicke (1999) surveyed several cynipoids in their seminal work on the subject, but they did not treat these more ‘intermediate’ taxa, focusing more on more derived cynipids (Diplolepidini, Synergini and Cynipini), figitids (Aspicerinae and Anacharitinae) as well as the more plesiomorphic ibaliids and liopterids. Multiporous plate sensillae such as those in Figs 1H, 2E (inset), and 6B, located only on the terminal flagellomere, have not been documented in other figitids. The possibility also exists that these structures are multiporous gustatory sensillae (MSG, Isidoro et al. 1996). The MSGs are only found on females, and are likely associated with host location and recognition. In the plectocynipines, these structures have only been observed on females.

The second system that warrants further research is the association of plectocynipines with the Nothofagus forests of South America. Considering thrasorines (including Mikeius) are associated with Eucalyptus and Acacia in Australia (Mikeius and Thrasorus) and Mimosa in North America (Myrtopsis), and euceroptrines are associated with Quercus in North America, the association of
plectocynipines with *Nothofagus* in South America adds another puzzling biological attribute to an already confusing evolutionary history. Two factors may be responsible for this mystery: 1) lack of data on extant species (collection artifact), and 2) a great deal of extinction has taken place within this part of the cynipoid clade. We hope that the present study helps stimulate further research on the systematics and evolution of the Plectocynipinae.

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**LITERATURE CITED**


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