

IL NATURALISTA VALTELLINESE - Atti Museo civ. Storia naturale Morbegno, 27 (2016): 37-70

Revision of *Limaytilla* Casal, 1964 (Hymenoptera: Mutillidae: Sphaerophthalmini), including the description of the first apterous male in the genus

ROBERTO A. CAMBRA¹, DIOMEDES QUINTERO A.¹, GUIDO PAGLIANO²

¹Museo de Invertebrados G. B. Fairchild, Universidad de Panamá, 0824, Estafeta Universitaria, Panamá, República de Panamá. E-mail: cambramiup60@gmail.com - dqinter666@gmail.com

² Università degli Studi di Torino-Dipartimento di Scienze Agrarie, Forestali e Alimentari. Largo Braccini 2, I-100995 Grugliasco (TO). E-mail: guido@pagliano.eu

ABSTRACT - *Limaytilla* Casal (Hymenoptera: Mutillidae) is a South American genus with three species described only from males. The following thirteen new species of *Limaytilla* Casal based on males are described and illustrated: *L. aptera* n. sp., *L. cachapoal* n. sp., *L. chilensis* n. sp., *L. copiado* n. sp., *L. fritzi* n. sp., *L. garcetei* n. sp., *L. korytkowski* n. sp., *L. larioja* n. sp., *L. martinezi* n. sp., *L. medianeroi* n. sp., *L. minima* n. sp., *L. orlandoi* n. sp., *L. windsori* n. sp. *Limaytilla aptera* is the second wingless mutillid male described from South America and the first in the genus. A key for species of the genus and phylogenetic analysis for species are given.

Key words: *Limaytilla*, Neotropical, taxonomy, distribution records, phylogeny.

RIASSUNTO – *Revisione di Limaytilla Casal, 1964 (Hymenoptera: Mutillidae: Sphaerophthalmini), e descrizione del primo maschio attero del genere.* Casal (Hymenoptera: Mutillidae) è un genere del Sud America noto in precedenza dai maschi di 3 specie. Nel presente lavoro descriviamo i maschi di altre 13 specie: *L. aptera* n. sp., *L. cachapoal* n. sp., *L. chilensis* n. sp., *L. copiado* n. sp., *L. fritzi* n. sp., *L. garcetei* n. sp., *L. korytkowski* n. sp., *L. larioja* n. sp., *L. martinezi* n. sp., *L. medianeroi* n. sp., *L. minima* n. sp., *L. orlandoi* n. sp., *L. windsori* n. sp. *Limaytilla aptera* è il secondo maschio attero descritto del Sud America ed il primo del genere. Sono infine riportate le chiavi dicotomiche e fatta l'analisi filogenetica delle specie.

Parole chiave: *Limaytilla*, Neotropica, tassonomia, distribuzione, filogenesi.

Introduction

Limaytilla Casal, 1964 is a Neotropical genus of mutillid wasps, erected to include males of three species from Argentina: *L. huarpe* Casal, *L. pampa* Casal and *L. pehuenche* Casal. Posteriorly, the genus has been reported for Peru (Quintero & Cambra 1996) and Chile (Sáiz & Carvajal 2000, Cambra & Quintero 2006). According to Casal (1964), *Limaytilla* is crepuscular-nocturnal, from arid

lands, and one specimen of *Limaytilla pampa* was collected on *Larrea* sp. (Zygophyllaceae); the hosts are unknown. Brothers (2006) presents a key to the genera of Neotropical Mutillidae where males and females of *Limaytilla* were included, but so far, description of females for any of the species of *Limaytilla* has not been published.

The purpose of this paper is to describe thirteen new species of *Limaytilla* males: eleven are exclusive from Chile, one from Argentina and one from Peru and Chile. A key for the species of the genus and a phylogenetic analysis for *Limaytilla* species are presented.

Materials and methods

Specimens were photographed with an Olympus Stylus digital camera using stereomicroscope LEICA M 165 C, with further image processing done using ArcSoft PhotoStudio. Measurements were made with a calibrated micrometer scale attached to an ocular lens of the stereomicroscope. The length of tergum one was measured from above. The right wing of the types was cut, placed on a slide and transferred to a separate box. The male genitalia of types were stored in glass vials and pinned with the specimen.

Holotypes of the three species described by Casal (1964) are deposited at the American Museum of Natural History, New York, USA (AMNH, examined) and paratypes are at the Instituto Miguel Lillo, Tucumán, Argentina. In addition, for the phylogenetic analysis we have examined male specimens of the following genera of American Sphaerophthalmini, with species known to have nocturnal activity, to verify synapomorphic characters of *Limaytilla*: *Acanthophotopsis* Schuster (5 species), *Acrophotopsis* Schuster (2), *Chilemutilla* Cambra & Quintero (6), *Chilephotopsis* Cambra & Quintero (2), *Dilophotopsis* Schuster (1), *Morsyma* Fox (1), *Odontophotopsis* Viereck (17), *Photomorphus* Viereck (9), *Scaptopoda* (1), and *Sphaerophthalma* Blake (34). Specimens of the monotypic genus *Stethophotopsis* Pitts were not examined but was included in our phylogenetic analysis because their morphological characters were reviewed in Pitts & McHugh (2000).

The following abbreviations are used: MC = marginal cell, SMC = submarginal cell, LS = anterior margin length of stigma, LM = anterior margin length between stigma

and apex of marginal cell (fig. 7), T = metasomal terga, S = metasomal sterna. All holotype specimens of the new taxa are deposited in Museo de Invertebrados G. B. Fairchild, University of Panama (MIUP); paratypes deposited in MIUP, in Pagliano collection and in the Museum of Genova (Italy).

Results

Generic characters of *Limaytilla* male: Microplumose or plumose setae present. *Head*: Eye almost circular; ocelli large, distance between eye margin and lateral ocellus 0.9 to 3.3× greatest length of latter; genal carina absent; scape elongate, with one longitudinal low carina; mandible dorsal margin with two edges that are born on dorsal condyle and diverge distally; mandible ventral margin with basal laminar process, the latter generally with large or small tooth. *Mesosoma*: usually fully winged (rarely apterous), with two submarginal cells; notaulus present (except in apterous); mesosternum simple, without ridged processes. *Metasoma*: first metasomal segment elongate and petiolate, not merging with T2; T2 and S2 with lateral felt lines; apical margin of hypopygium with a distinct median notch.

Comments: When Casal (1964) erected *Limaytilla*, two morphological characters were used as part of the generic diagnosis: presence of a lamellate protuberance on the antennal tubercle and cuspis inner face with a setose pit. These are not considered valid diagnostic characters for the genus as we found they were not present in some of the new species here described.

Key for males of *Limaytilla* Casal

1. Antennal tubercle with lamellate protuberance on mesal margin (fig. 49); dorsal plate of metapleuron sculptured; T2 and T3 apex with a transverse fringe of plumose pubescence; penis valve without a tooth in ventral caudal edge; cuspis inner face with setose pit (figs. 31-32) 2
- . Antennal tubercle with a slight smooth medioapical swelling or arcuate medioapical ridge in anterior view, sometimes simple; dorsal plate of metapleuron generally smooth; T2 and T3 apex generally without a transverse fringe of plu-

mose pubescence; penis valve with or without a tooth in ventral caudal edge; cuspis inner face with or without setose pit 5

2. Head large; vertex highly developed longitudinally and uniformly convex in frontal view; mandible abruptly widened apically, posteroventral margin with small tooth near base; digitus and cuspis of same length; penis valve short, robust, very wide dorsoventrally; distance between eye margin and lateral ocellus $1.8 \times$ greatest length of latter (Argentina) **huarpe** Casal

-. Head small; vertex of limited longitudinal development, with converging sides caudally and subangular in frontal view; mandible slightly widened distally, posteroventral margin with large tooth near base; digitus always shorter than cuspis; penis valve long and narrow; distance between eye margin and lateral ocellus $1.0\text{--}1.3 \times$ greatest length of latter 3

3. Vertex and frons foveo-reticulate; pygidial area with distinctive, high and acute, lateral carina on apical half (Argentina) **pampa** Casal

-. Vertex and frons with medium-sized punctures; pygidial area without distinctive, high and acute, lateral carina on apical half 4

4. T1-2 and S2 mostly with medium-sized contiguous punctures; mandible distinctly tridentate apically, tooth of similar size and shape (Argentina)

..... **pehuenche** Casal

-. T1-2 and S2 with very sparse micropunctures; mandible not distinctly tridentate, tooth not of similar size and shape (Peru, Chile) **medianeroi** n. sp.

5. Wings and notaulus absent; antennal tubercle with a slight smooth medioapical swelling (Chile) **aptera** n. sp.

-. Wings and notaulus present; antennal tubercle simple or with arcuate medioapical ridge in anterior view 6

6. Pygidial area with distinctive, high and acute, lateral carina on apical half; mandible with only one apical tooth, widened abruptly on anterodorsal margin (fig. 48); antennal tubercle with low arcuate medioapical ridge in anterior view (Argentina) **larioja** n. sp.

- . Pygidial area without distinctive, high and acute, lateral carina; mandible with three apical teeth, not widened on anterodorsal margin; antennal tubercle simple or not (Chile) 7

- 7. Coxa 3 with longitudinal carina on inner face; penis valve without tooth in portion of ventral caudal edge (figs. 34-36, 38-40, 42-44); notaulus complete, reaching anterior and posterior margin of mesoscutum; paramere, in lateral view, apical half narrows and curves upwards (figs. 14-15, 17) 8
- . Coxa 3 without longitudinal carina on inner face; penis valve with tooth on distal fourth of ventral caudal edge (figs. 37, 41, 45); notaulus incomplete, not reaching anterior margin of mesoscutum; paramere, lateral view, broad and almost straight (figs. 16, 18-19) 14

- 8. Mandible with obsolete posteroventral tooth near base but laminar process present; distance between eye margin and lateral ocellus at least $2.0 \times$ greatest length of latter 9
- . Mandible with distinctive posteroventral tooth near base; distance between eye margin and lateral ocellus $1.0-1.8 \times$ greatest length of latter 11

- 9. Paramere narrow in the middle (fig. 27); distance between eye margin and lateral ocellus $2.0 \times$ greatest length of latter; penis valve as (fig. 38) .. ***chilensis*** n. sp.
- . Paramere broad in the middle (figs. 25, 30); distance between eye margin and lateral ocellus at least $2.0-3.0 \times$ greatest length of latter 10

- 10. Paramere as (fig. 30); distance between eye margin and lateral ocellus $3.0 \times$ greatest length of latter; T1 $1.75 \times$ as long as wide; penis valve as (fig. 33); integument of head and mesosoma blackish to dark red ***fritzi*** n. sp.
- . Paramere as (fig. 25); distance between eye margin and lateral ocellus $2.0 \times$ greatest length of latter; T1 $1.93 \times$ as long as wide; penis valve as (fig. 39); integument of head and mesosoma red-brown ***martinezi*** n. sp.

- 11. T1 long and narrow, $2.72 \times$ as long as wide; T2 apex and T3-T4 with sparse micropunctures; SMC2 narrow, subrectangular (fig. 8); LS/LM = 5.6 ***korytkowski*** n. sp.

- T1 short and broad, 1.71-2.08× as long as wide; T2 apex and T3-T4 with small close punctures; SMC2 broad, subpentagonal or narrow subrectangular to subtriangular; LS/LM = 1.8-4.3 12

12. SMC2 broad, subpentagonal (fig. 9); LS/LM = 1.8; penis valve as (fig. 43) ***copiapo*** n. sp.

- SMC2 narrow, subrectangular to subtriangular (figs. 1, 6); LS/LM = 2.7-4-3; penis valve as (figs. 36, 40) 13

13. Mesoscutum with small sparse punctures; metasoma blackish; LS/LM = 4.3; penis valve as (fig. 40) ***cachapoal*** n. sp.

- Mesoscutum with large close punctures; metasoma red-brown; LS/LM = 2.7; penis valve as (fig. 36) ***orlando*** n. sp.

14. Cuspis inner face with setose pit; clypeus weakly emarginate in anterior margin and with two small teeth between emargination; paramere as (fig. 18); penis valve as (fig. 41); body length 8.5-15.5 mm ***windsori*** n. sp.

- Cuspis inner face without setose pit; clypeus truncate in anterior margin and without teeth; paramere as (figs. 16, 19); penis valves as (figs. 37, 45); body length 3.4-7.8 mm 15

15. Paramere narrow and long in lateral view (fig. 19); penis valve with medial projection of ventral caudal edge (fig. 37); mandible posteroventral tooth large; T1 2.92× as long as wide; mesopleuron, except anterolateral area, with very large contiguous punctures to small reticulations, without deep pit; SMC2 broad, subpentagonal; stigma narrow (fig. 2) ***garcetei*** n. sp.

- Paramere broad and short in lateral view (fig. 16); penis valve without medial projection of ventral caudal edge (fig. 45); mandible posteroventral tooth small; T1 1.38× as long as wide; mesopleuron totally smooth, with large and deep pit; SMC2 narrow, subrectangular; stigma broad (fig. 10) ***minima*** n. sp.

Limaytilla huarpe Casal

Limaytilla huarpe Casal, 1964: 90, holotype male. Argentina. AMNH, examined. Type species, Casal original designation.

Additional material examined (64 specimens): **La Rioja** Prov.: Guaconde, 13 Nov 1998, col. A. Ugarte, 8 ♂; Alpasinche, 14 Nov 1998, col. A. Ugarte, 8 ♂. **Mendoza** Prov.: 17 km SW Mendoza, 20 Nov 1998, A. Ugarte, 45 ♂. **Chubut** Prov., Gaiman, Bryn Gwyn, 3 Feb 2007, col. D. Rojas, 3 ♂.

Variation: Body length 11.0 – 17.5 mm (mean 13.9 mm, SD 1.76 mm, n = 38). *Limaytilla huarpe* is the largest species of *Limaytilla*.

Distribution: Argentina: Catamarca, La Rioja, Río Negro, Neuquén (Casal 1964, Fritz 1998), Mendoza, Chubut.

***Limaytilla pampa* Casal**

Limaytilla pampa Casal, 1964: 99, holotype male. Argentina. AMNH, examined.

Additional material examined (79 specimens): Argentina: **Mendoza** Prov.: 17 km SW Mendoza, 20 Nov 1998, A. Ugarte, 24 ♂. **La Rioja** Prov.: Alpasinche, 14 Nov 1998, col. A. Ugarte, 27 ♂; 7 km S. La Rioja, 19 Nov 1998, col. A. Ugarte, 6 ♂; Guacondo, 13 Nov 1998, col. A. Ugarte, 13 ♂. **Catamarca** Prov.: San Fernando, 16 Nov 1998, col. A. Ugarte, 4 ♂; Punta de Balesto, 8 Feb 1997, col. A. Ugarte, 2 ♂. **San Juan** Prov., 15 km E. San Juan, 27 Nov 1998, col. A. Ugarte, 1 ♂. **Tucuman** Prov., Cafayate, 16 Nov 1998, col. A. Ugarte, 2 ♂.

Distribution: Argentina: Catamarca, La Rioja, Río Negro, Córdoba (Casal 1964, Fritz 1998), Mendoza, Tucuman, San Juan.

***Limaytilla pehuenche* Casal**

Limaytilla heterogama: André 1908 (nec Burmeister 1875, nec female).

Limaytilla pehuenche Casal, 1964: 94, holotype male. Argentina. AMNH, examined.

Limaytilla puelche: Fritz (1998: 45), misspelling name.

Additional material examined (87 specimens): Argentina: **Mendoza** Prov.: 17 km SW Mendoza, 20 Nov 1998, A. Ugarte, 21 ♂; Lavalley, Telteca, Flores & Roig: 6 Nov – 3 Dec 1996, 13 ♂; 25 Nov – 25 Dec 1995, 2 ♂; 25 Sep – 5 Nov 1996, 5 ♂; 3 Dec 1996 – 6 Jan 1997, 5 ♂; 12 May – 17 Jun 1995, 1 ♂; 25 Dec 1995 – 14 Feb 1996, 1 ♂; 15 Feb – 25 Mar 1996, 3 ♂; 1-24 Nov 1995, 3 ♂; 25 Sep – 31 Oct 1995, 2 ♂. **La Rioja** Prov.: Alpasinche, 14 Nov 1998, col. A. Ugarte,

7 ♂; 7 km S. La Rioja, 19 Nov 1998, col. A. Ugarte, 1 ♂; Guacondo, 13 Nov 1998, col. A. Ugarte, 6 ♂. **Catamarca** Prov.: San Fernando, 16 Nov 1998, col. A. Ugarte, 7 ♂. **San Juan** Prov., 15 km E. San Juan, 27 Nov 1998, col. A. Ugarte, 2 ♂. **Tucuman** Prov., Cafayate, 16 Nov 1998, col. A. Ugarte, 2 ♂. **Chubut** Prov., Gaiman, Bryn Gwyn, 20 Feb 2007, col. D. Rojas, 5 ♂; Trelew, 18 Mar 2007, col. D. Rojas, 1 ♂.

Distribution: Argentina: La Rioja, Río Negro, Neuquén, Chubut, Mendoza, (Casal 1964, Fritz 1998), Catamarca, Tucuman, San Juan.

Limaytilla aptera Cambra, Quintero & Pagliano **n. sp.** (figs. 13, 21, 35, 46)

Type material: Holotype ♂. Chile, Región Atacama, Copiapo Prov., Bahía Inglesa, Rocas Negras, 18 Jan 1998, col. A. Ugarte.

Diagnosis: Antennal tubercle with a slight smooth medioapical swelling; notaulus absent; fore and hind wings absent; paramere slightly broad at its apical half and straight, apex subtruncate.

Description of holotype

Body length 3.5 mm. *Color:* integument of head, mesosoma and legs brownish-yellow, metasoma mostly dark brown; setae pale white. *Head:* Antennal tubercle with a slight smooth medioapical swelling; distance between eye margin and lateral ocellus 3.3× the greatest length of the latter; clypeus not projected medially, truncate in anterior margin and without teeth; mandible distinctly tridentate apically, posteroventral margin with small lamella, without tooth near base; frons and vertex with medium-sized punctures, integument microgranulate between punctures; setae large, microplumose and mostly erect. *Mesosoma:* notaulus absent; coxa 3 with longitudinal carina on inner face; fore and hind wings absent (fig. 46); pronotum coarsely punctate, with large, some confluent, punctures; mesoscutum and scutellum with medium-sized contiguous punctures; tegula impunctate; propodeum totally reticulate; anterolateral area of mesopleuron mostly smooth, remainder of mesopleuron with contiguous to

confluent punctures; metapleuron dorsal plate sculptured, ventral plate smooth. *Metasoma*: T1 1.55× as long as wide; T1 and S2 mostly with medium-sized contiguous punctures; T2 with small sparse punctures; T2 to T6 and S3 to S6 mostly with very small, inconspicuous, punctures; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia*: (figs. 13, 21, 35), paramere, lateral view, slightly broad at its apical half and straight, apex subtruncate (fig. 13); inner face of cuspis with setose pit; penis valve without tooth in portion of ventral caudal edge (fig. 35). Female unknown.

Distribution: Only known from the holotype locality in Chile.

Comments: *Limaytilla aptera* represents the first wingless mutillid male described in the genus. Male apterity in mutillid males from South America are known only from *Chilemutilla aptera* (Cambra & Quintero 2007) and *L. aptera*. Both species are found in the same locality. The apterous males of *Limaytilla* and *Chilemutilla* lack notauli, but these mesoscutum lines are present in all winged males of both genera. The loss of the notauli seems to be associated with the loss of wings in these two species.

At the same site and date *L. aptera* was captured, males of the following three species of *Limaytilla* were also captured: *L. copiapo*, *L. garcetei* and *L. orlandoi*. The genitalia of these three species and that of other species of *Limaytilla* are distinctly different from *L. aptera*. These recognized genitalic differences indicate to us that *L. aptera* does not represent a polymorphic male of any of these other *Limaytilla* species, but rather it is a distinct species.

Etymology: From the latin apterus, in reference to the wingless male.

Limaytilla cachapoal Cambra, Quintero & Pagliano **n. sp.** (figs. 6, 40)

Type material: Holotype ♂. Chile: Cachapoal Prov., Rio Cipreses, 24 Jan 1998, col. A. Ugarte. Paratype: Chile, Ñuble Prov., Las Trancas, 16 Jan 1987, 1 ♂.

Diagnosis: Antennal tubercle simple; notaulus reaching anterior margin of mesoscutum; mesoscutum with small sparse punctures; coxa 3 with longitudinal carina on inner face; SMC2 narrow and subtriangular; metasoma blackish; paramere narrow in its apical half and curved upwards; penis valve without tooth in portion of ventral caudal edge.

Description of holotype

Body length 7.0 mm. *Color:* integument of head and mesosoma red-brown, metasoma blackish; antenna and legs mostly yellow-pale brown; setae pale white. *Head:* Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus 1.6× the greatest length of the latter; clypeus not projected medially, emarginate in anterior margin and with two distinctive teeth between emargination; mandible tridentate apically, posteroventral margin with tooth near base, frons and vertex with medium-sized contiguous punctures; setae large, microplumose and mostly erect. *Mesosoma:* notaulus complete, reaching anterior and posterior margin of mesoscutum; coxa 3 with longitudinal carina on inner face; pronotum with large, contiguous to confluent, punctures; mesoscutum and scutellum with small sparse punctures; tegula impunctate; propodeum totally reticulate; mesopleuron mostly with medium-sized contiguous punctures to small reticulations; metapleuron dorsal plate sculptured, ventral plate smooth; SMC2 narrow and subtriangular; forewing venation and stigma as (fig. 6); LS/LM = 4.3. *Metasoma:* T1 2.08× as long as wide; T1 with medium-sized contiguous punctures; T2 and S2 mostly with small sparse punctures; T2 and S2 apex, metasomal segments 3 to 6 totally with small contiguous punctures; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia:* paramere, lateral view, narrow in its apical half and curved upwards, ending in a sharp point; inner face of cuspis with setose pit; penis valve without tooth in portion of ventral caudal edge (fig. 40). Female unknown.

Etymology: This species is named after the Cachapoal Province in Chile, where the holotype was collected. Cachapoal means in Mapudungun language “grass makes raving”.

Limaytilla chilensis Cambra, Quintero & Pagliano **n. sp.** (figs. 3, 17, 27, 38)

Type material: Holotype ♂. Chile, Curico Prov., Los Niches, Mar 1992, col. J. Barriga. Paratype: Chile: same data as holotype, 1 ♂.

Diagnosis: Antennal tubercle simple; mandible posteroventral margin lamellate near base, without tooth; notaulus reaching anterior margin of mesoscutum; SMC2 narrow, subtriangular; LS/LM = 4.9 to 5.2; paramere narrow in its apical half and curved upwards; ending in a sharp point; penis valve without tooth in portion of ventral caudal edge. This species is closely related to *L. fritzi* and *L. martinezi*; they can be separate by morphological characters given in the key of species.

Description of holotype

Body length 6 mm. *Color:* integument of head, mesosoma and metasomal segment one red-brown, segments two to seven blackish; antenna and legs mostly pale brown; setae pale white. *Head:* Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus 2.0× the greatest length of the latter; clypeus not projected medially, emarginate in anterior margin and with two distinctive teeth between emargination; mandible tridentate apically, posteroventral margin lamellate near base, without tooth; frons and vertex with medium-sized contiguous punctures; setae large, microplumose and mostly erect. *Mesosoma:* notaulus complete, reaching anterior and posterior margin of mesoscutum; coxa 3 with longitudinal carina on inner face; pronotum with medium-sized, contiguous to confluent, punctures; mesoscutum and scutellum with medium-sized contiguous punctures; tegula impunctate; propodeum totally reticulate; mesopleuron mostly with medium-sized contiguous punctures; metapleuron dorsal plate sculptured, ventral plate smooth; SMC2 narrow, subtriangular; forewing venation and stigma as fig. 3; LS/LM = 4.9 to 5.2. *Metasoma:* T1 1.78× as long as wide; T1 with medium-sized contiguous punctures; T2 with small sparse punctures; S2 mostly with medium-sized spaced punctures; metasomal segments 3 to 6 with small punctures; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia:* (figs. 17, 27, 38),

paramere, lateral view, narrow in its apical half and curved upwards, ending in a sharp point (fig. 17); inner face of cuspis with setose pit; penis valve without tooth in portion of ventral caudal edge (fig. 38). Female unknown.

Etymology: This species is named after Chile, the country where the holotype was collected.

Limaytilla copiado Cambra, Quintero & Pagliano **n. sp.** (figs. 9, 43)

Type material: Holotype ♂. Chile, Región Atacama, Copiapo Prov., Bahía Inglesa, Rocas Negras, 18 Jan 1998, col. A. Ugarte. Paratypes: Chile: same data as holotype, 16 ♂.

Diagnosis: Antennal tubercle simple; mandible posteroventral margin with tooth near base; notaulus reaching anterior margin of mesoscutum; SMC2 broad, sub-pentagonal; coxa 3 with longitudinal carina; paramere narrow in its apical half and curved upwards; penis valve without tooth in portion of ventral caudal edge.

Description of holotype

Body length 6.0 mm. *Color:* integument of head, mesosoma and metasoma brownish-yellow; antenna and legs pale yellow; setae pale white. *Head:* Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus 1.4× the greatest length of the latter; clypeus not projected medially, emarginate in anterior margin and with two distinctive teeth between emargination; mandible tridentate apically, posteroventral margin with tooth near base; frons and vertex with medium-sized punctures, integument weakly microgranulate between punctures; setae large, microplumose and mostly erect. *Mesosoma:* notaulus complete, reaching anterior and posterior margin of mesoscutum; coxa 3 with longitudinal carina on inner face; pronotum with medium-sized, contiguous to confluent, punctures; mesoscutum and scutellum with medium-sized contiguous punctures; tegula impunctate; propodeum totally reticulate; mesopleuron mostly with large contiguous punctures; metapleuron dorsal plate sculptured, ventral plate smooth;

SMC2 broad, subpentagonal; forewing venation and stigma as (fig. 9); LS/LM = 1.8. *Metasoma*: T1 1.71× as long as wide; T1 and T2 discal area with small sparse punctures, lateral areas with medium-sized contiguous punctures; T2 and S2 apex and metasomal segments 3 to 6 totally with very small contiguous punctures; S2 mostly with medium-sized inconspicuous punctures; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia*: paramere, lateral view, narrow in its apical half and curved upwards, ending in a sharp point; inner face of cuspis with setose pit; penis valve without tooth in portion of ventral caudal edge (fig. 43). Female unknown.

Etymology: This species is named after the Copiapo Province in Chile, where all the types were collected. Copiapo means in Aymara language “green farmland”.

Limaytilla fritzi Cambra, Quintero & Pagliano **n. sp.** (figs. 5, 12, 30, 33, 47)

Type material: Holotype ♂. Chile, Curico Prov., Hueca-Huecan, 18 Mar 2001, col. A. Ugarte. Paratypes: Chile, same data as holotype 7 ♂.

Diagnosis: Integument totally blackish to dark red; notaulus reaching anterior margin of mesoscutum; SMC2 subtriangular; LS/LM = 3.5; paramere basal two thirds broad, more widened in middle, gradually tapering on distal third and slightly curved upwards; penis valve without tooth in portion of ventral caudal edge. This species is closely related to *L. martinezi*.

Description of holotype

Body length 5.5 mm. *Color*: integument totally blackish to dark red; setae pale white. *Head*: Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus 3.0× the greatest length of the latter; clypeus not projected medially, emarginate in anterior margin and with two distinctive teeth between emargination; mandible tridentate apically, posteroventral margin lamellate near base, without tooth; frons and vertex with medium-sized contiguous punctures; setae large, microplumose

and mostly erect. *Mesosoma*: notaulus complete, reaching anterior and posterior margin of mesoscutum; coxa 3 with longitudinal carina on inner face; pronotum with medium-sized, contiguous to confluent, punctures; mesoscutum mostly with small sparse punctures; scutellum with medium-sized contiguous punctures; tegula impunctate; propodeum totally reticulate; mesopleuron mostly with medium-sized contiguous punctures; metapleuron dorsal plate weakly sculptured, ventral plate smooth; SMC2 subtriangular; forewing venation and stigma as (fig. 5); $LS/LM = 3.5$. *Metasoma*: T1 1.75× as long as wide; T1 with medium-sized contiguous punctures; T2 with small sparse punctures; S2 mostly with medium-sized spaced punctures; metasomal segments 3 to 6 with small punctures; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia*: (figs. 12, 30), paramere, ventral view, basal two thirds broad, more widened in middle (fig. 30), then gradually tapering on distal third and slightly curved upwards (fig. 12); inner face of cuspis with setose pit; penis valve without tooth in portion of ventral caudal edge (fig. 33). Female unknown.

Etymology: Named to the memory of Manfredo Fritz, for his contributions to the knowledge of Neotropical Hymenoptera.

Limaytilla garcetei Cambra, Quintero & Pagliano **n. sp.** (figs. 2, 19, 23, 37)

Type material: Holotype ♂. Chile, Coquimbo Prov., Samo Alto, 13 Oct, 1997, col. A. Ugarte. Paratypes: Chile: same data as holotype, 1 ♂; Región Atacama, Copiapo Prov., Bahía Inglesa, Rocas Negras, 18 Jan 1998, col. A. Ugarte, 1 ♂; Huasco Prov., Carrizalillo, 5 Nov 1991, col J. Barriga, 2 ♂.

Diagnosis: Clypeus truncate in anterior margin and without teeth; mandible posteroventral margin with large tooth near base; notaulus not reaching anterior margin of mesoscutum; coxa 3 without longitudinal carina; inner face of cuspis without setose pit; penis valve with tooth in portion of ventral caudal edge. Closely related to *L. minima*, they are the only two species of *Limaytilla* with inner face of cuspis without setose pit.

Description of holotype

Body length 7.8 mm. *Color*: integument of head, mesosoma and metasomal segments one and two red-brown, T3 to T7 dark brown; antenna and legs pale yellow; setae pale white. *Head*: Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus $1.3\times$ the greatest length of the latter; clypeus not projected medially, truncate in anterior margin and without teeth; mandible tridentate apically with medial tooth small, posteroventral margin with large tooth near base; frons and vertex with small, inconspicuous, sparse punctures; setae large, microplumose and mostly erect. *Mesosoma*: notaulus incomplete, not reaching anterior margin of mesoscutum; coxa 3 without longitudinal carina on inner face; pronotum weakly rugose to punctate; mesoscutum and scutellum with small, inconspicuous, sparse punctures; tegula impunctate; propodeum totally reticulate; anterolateral area of mesopleuron mostly smooth, remainder of mesopleuron with very large contiguous punctures to small reticulations; metapleuron smooth and impunctate; SMC2 broad, subpentagonal; forewing venation and stigma as (fig. 2); $LS/LM = 4.0$. *Metasoma*: T1 $2.92\times$ as long as wide; T1 with medium-sized contiguous punctures; T2 discal area with small sparse punctures, lateral areas with medium-sized contiguous punctures; T2 to T6 and S2 to S6 mostly with very small, sparse and inconspicuous, punctures; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia*: (figs. 19, 23, 37), paramere, lateral view, broad and straight, almost same broad on basal and apical half, apex subrounded (figs. 19, 23); inner face of cuspis without setose pit; penis valve with tooth on distal fourth and medial projection of ventral caudal edge (fig. 37). Female unknown.

Comments: One paratype has a part of T2 apex with transverse fringe of plumose pubescence. Specimens can easily lose this plumose pubescence, thus we must be very careful when using this morphological character to separate species.

Etymology: Named in honor of Bolivar Garcete, Museo Nacional de Historia Natural de Paraguay, for his contributions to our knowledge of Neotropical Hymenoptera and for valuable help provided in the study of the Mutillidae of Paraguay.

Limaytilla korytkowski Cambra, Quintero & Pagliano **n. sp.** (figs. 8, 32, 42)

Type material: Holotype ♂. Chile, Región Atacama, Copiapo Prov., La Guardia, 15 Jan 1998, 3500m, col, A. Ugarte. Paratypes: Chile: same data as holotype, 2 ♂.

Diagnosis: Antennal tubercle simple; notaulus reaching anterior of mesoscutum; coxa 3 with longitudinal carina; SMC2 narrow, subrectangular; T1 long and narrow, 2.72× as long as wide.

Description of holotype

Body length 7.5 mm. *Color:* integument of head, mesosoma and metasomal segment one red-brown, metasomal segments two to seven dark brown; antenna and legs mostly brownish-yellow; setae pale white. *Head:* Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus 1.4× the greatest length of the latter; clypeus not projected medially, truncate in anterior margin and with two very small teeth; mandible distinctly tridentate, tooth of similar size and shape, posteroventral margin with large tooth near base; frons and vertex with small, inconspicuous, sparse punctures, integument between punctures almost smooth; setae large, microplumose and mostly erect. *Mesosoma:* notaulus complete, reaching anterior and posterior margin of mesoscutum; coxa 3 with longitudinal carina on inner face; pronotum with large, contiguous to confluent, punctures; mesoscutum and scutellum with small, inconspicuous, sparse punctures; tegula impunctate; propodeum totally reticulate; mesopleuron mostly with large contiguous punctures; metapleuron smooth; forewing SMC2 narrow, subrectangular; stigma and MC as (fig. 8), LS/LM = 5.6. *Metasoma:* T1 2.72× as long as wide; T1 with large contiguous punctures; metasomal segments 2 to 6 mostly with small, sparse and inconspicuous, punctures; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia:* (figs. 32, 42), paramere, in lateral view, narrow in its apical half and curves upwards, ending in a sharp point (fig. 32); inner face of cuspis with setose pit; penis valve without tooth in portion of ventral caudal edge (fig. 42). Female unknown.

Etymology: Named in memory of Cheslavo Korytkowski, Universidad de Panamá, who contributed to the professional training of many entomologists, and for his contributions to the knowledge of the Neotropical entomofauna.

Limaytilla larioja Cambra, Quintero & Pagliano **n. sp.** (figs. 15, 29, 44, 48)

Type material: Holotype ♂. Argentina, La Rioja Prov., Alpasinche, 14 Nov 1998, col. A. Ugarte. Paratypes: Argentina: same data as holotype, 16 ♂.

Diagnosis: Antennal tubercle with low arcuate medioapical ridge; distance between eye margin and lateral ocellus $0.9\times$ the greatest length of the latter; mandible with only one apical tooth and widened abruptly on anterodorsal margin; SMC2 broad, subquadrate; pygidial area with high and acute lateral carina on apical half. Related to *L. pampa*, the only other *Limaytilla* species with acute lateral carina on apical half of pygidium.

Description of holotype

Body length 10.0 mm. *Color:* integument of head, mesosoma and metasomal segment one red-brown, metasomal segments two to seven dark brown; antenna and legs mostly brownish-yellow; setae pale white. *Head:* antennal tubercle with low arcuate medioapical ridge in anterior view; distance between eye margin and lateral ocellus $0.9\times$ the greatest length of the latter; clypeus not projected medially, truncate in anterior margin and with two very small teeth; mandible with only one apical tooth, mandible widened abruptly on anterodorsal margin (fig. 48), posteroventral margin with tooth near base (fig. 48); frons and vertex with medium-sized punctures, integument microgranulate between punctures; setae large, microplumose and mostly erect. *Mesosoma:* notaulus complete, reaching anterior and posterior margin of mesoscutum; coxa 3 with longitudinal carina on inner face; pronotum with medium-sized, contiguous punctures; mesoscutum and scutellum with medium-sized spaced punctures; tegula impunctate; propodeum totally reticulate; mesopleuron with medium-sized contiguous punctures; metapleuron dorsal plate sculptured, ventral plate smooth; SMC2 broad, subquadrate; LS/LM = 1.3. *Metasoma:* T1 $1.57\times$ as long as wide; T1 mostly with large contiguous punctures, T2 mostly with small punc-

tures; metasomal segments to 6 with very small sparse and inconspicuous punctures; S2 mostly with large contiguous punctures, except apex with small sparse punctures; T2 and T3 apex with a transverse fringe of plumose pubescence; pygidial area with distinctive, high and acute, lateral carina on apical half. *Genitalia*: (figs. 15, 29, 44), paramere, in lateral view, narrow in its apical half and curves upwards, ending in a sharp point (fig. 15); inner face of cuspis with setose pit; penis valve without tooth in portion of ventral caudal edge (fig. 44). Female unknown.

Etymology: This species is named after La Rioja Province in Argentina, where all the type specimens were collected.

Limaytilla martinezi Cambra, Quintero & Pagliano **n. sp.** (figs. 4, 25, 39)

Type material: Holotype ♂. Chile, Curico Prov., Camino 12, Apr 1998, col. A. Ugarte. Paratypes: Chile, Curico Prov., Hueca-Huecan, 18/30 Apr. 1998, 3 ♂; ibidem 24 Feb.-8 mar. 1998 ♂; ibidem 24 Feb.-8 Mar. 1998 ♂; ibidem 14/23 Feb. ♂.

Diagnosis: Antennal tubercle simple; mandible posteroventral margin lamellate near base, without tooth; notaulus reaching anterior margin of mesoscutum; coxa 3 with longitudinal carina; SMC2 narrow, subtriangular; LS/LM = 3.0; paramere almost straight, more widened in middle, then gradually tapering on distal third.

Description of holotype

Body length 6.2 mm. *Color*: integument of head and mesosoma red-brown, metasomal segment one red-brown on basal two-thirds, his apical third and metasomal segments three to seven all blackish; antenna and legs mostly yellow; setae pale white. *Head*: Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus 2.0× the greatest length of the latter. clypeus not projected medially, emarginate in anterior margin and with two distinctive teeth between emargination; mandible tridentate apically, posteroventral margin lamellate near base, without

tooth; frons and vertex with medium-sized contiguous punctures; setae large, microplumose and mostly erect. *Mesosoma*: notaulus complete, reaching anterior and posterior margin of mesoscutum; coxa 3 with longitudinal carina on inner face; pronotum with medium-sized, contiguous to confluent, punctures; mesoscutum and scutellum with medium-sized contiguous punctures; tegula impunctate; propodeum totally reticulate; mesopleuron mostly with medium-sized contiguous punctures; metapleuron smooth and impunctate; SMC2 narrow, subtriangular; forewing venation and stigma as (fig. 4); $LS/LM = 3.0$. *Metasoma*: T1 $1.93\times$ as long as wide; T1 with medium-sized contiguous punctures; T2 with small sparse punctures; S2 mostly with medium-sized spaced punctures; metasomal segments 3 to 6 with small punctures; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia*: (figs. 25, 39), paramere, lateral view, almost straight and ending in a sharp point; paramere, in ventral view, basal two thirds broad, widening in middle, then gradually tapering on distal third (fig. 25); inner face of cuspis with setose pit; penis valve without tooth in portion of ventral caudal edge (fig. 39). Female unknown.

Etymology: Named in memory of Antonio Martínez, for his contributions to the knowledge of Neotropical Hymenoptera.

Limaytilla medianeroi Cambra, Quintero & Pagliano **n. sp.** (figs. 11, 14, 28, 31, 34, 49)

Diagnosis: Antennal tubercle with lamellate protuberance; mandible not distinctly tridentate apically; notaulus reaching anterior margin of mesoscutum; coxa 3 with longitudinal carina; SMC2 broad, subpentagonal; $LS/LM = 1.6$; terga and sterna almost totally smooth, with inconspicuous punctures; penis valve without tooth in portion of ventral caudal edge.

Type material: Holotype ♂. Chile, Iquique Prov., Canchones, 1 Nov 1993, col. J. Barriga. Paratypes: Chile: same data as holotype, 6 ♂; Peru: Arequipa, 7 km E. Chaparra, 1450 m., 14 Sep 1988, col. G. Lamas, 1 ♂.

Description of holotype

Body length 9.0 mm. *Color*: integument of head, mesosoma and metasoma brownish-yellow; antenna and legs pale yellow; setae pale white. *Head*: Antennal tubercle with lamellate protuberance on mesal margin (fig. 49); distance between eye margin and lateral ocellus 1.4× the greatest length of the latter; clypeus not projected medially, emarginate in anterior margin and with two distinctive teeth between emargination; mandible not distinctly tridentate apically, tooth not of similar size and shape, posteroventral margin with large tooth near base; frons and vertex with medium-sized punctures, integument microgranulate between punctures; setae large, microplumose and mostly erect. *Mesosoma*: notaulus complete, reaching anterior and posterior margin of mesoscutum; coxa 3 with longitudinal carina on inner face; pronotum and scutellum with medium-sized contiguous punctures; mesoscutum with medium-sized sparse punctures; tegula impunctate; propodeum totally reticulate; mesopleuron with medium-sized punctures, separated on anterolateral area and contiguous on remainder of mesopleuron; metapleuron dorsal plate sculptured, ventral plate smooth; SMC2 broad, subpentagonal; forewing venation and stigma as (fig. 11); $LS/LM = 1.6$. *Metasoma*: T1 1.82× as long as wide; terga and sterna almost totally smooth, with very small, sparse and inconspicuous, punctures; T2 and T3 apex with a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia*: (figs. 14, 28, 31, 34), paramere, in lateral view, narrows in its apical half and curves upwards (fig. 14), ending in a sharp point; inner face of cuspis with setose pit (fig. 31); penis valve without tooth in portion of ventral caudal edge (fig. 34). Female unknown.

Comments: Some paratypes have lost the T2 and T3 apical transverse fringe of plumose pubescence. *Limaytilla medianeroi*, *L. huarpe*, *L. pampa*, and *L. pehuenche* are the only species in the genus with a lamellate protuberance on mesal margin of antennal tubercle. Outside of Argentina, *Limaytilla medianeroi* is the only species of the genus with lamellate protuberance on the antennal tubercle.

Etymology: Named in honor of Enrique Medianero S., Universidad de Panamá, for his contributions to the knowledge of the Hymenoptera of Panama.

Limaytilla minima Cambra, Quintero & Pagliano **n. sp.** (figs. 10, 16, 22, 45, 50)

Type material: Holotype ♂. Chile, Región Atacama, Copiapo Prov., P[arque] Nac[ional] Pan de Azúcar, Chañaral, 14 Feb 1998, col. A. Ugarte.

Diagnosis: Clypeus anterior margin without teeth; notaulus incomplete, not reaching anterior margin of mesoscutum; mesopleuron with large and deep pit; SMC2 narrow, subrectangular; LS/LM = 8.7; coxa 3 without longitudinal carina; inner face of cuspis without setose pit; penis valve with tooth in portion of ventral caudal edge.

Description of holotype

Body length 3.4 mm. *Color:* integument of head and metasomal segments two to seven brown, mesosoma and metasomal segment one orange-red, antenna and legs mostly pale yellow; setae pale white. *Head:* Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus 1.3× the greatest length of the latter; clypeus slightly projected medially, anterior margin of the projection truncate, without tooth; mandible distinctly tridentate, tooth of similar size and shape, posteroventral margin with small tooth near base; frons and vertex with very small, inconspicuous, sparse punctures, integument between punctures smooth; setae large, microplumose and mostly erect. *Mesosoma:* notaulus incomplete, not reaching anterior margin of mesoscutum; coxa 3 without longitudinal carina on inner face; pronotum and mesoscutum almost smooth, with very small, inconspicuous, punctures; mesopleuron totally smooth, with large and deep pit (fig. 50); metapleuron smooth; tegula impunctate; propodeum totally reticulate; SMC2 narrow, subrectangular; forewing venation and stigma as (fig. 10); LS/LM = 8.7. *Metasoma:* T1 1.38× as long as wide; metasomal segments almost smooth, with very few and sparse micropunctuation; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia:* (figs. 16, 22, 45), paramere, lateral view, very broad, short and straight, apex almost rounded (fig. 16); inner face of cuspis without setose pit; penis valve with tooth on distal fourth of ventral caudal edge (fig. 45). Female unknown.

Comments: *Limaytilla minima* is the only species of the genus with a large and deep pit in the mesopleuron (fig. 50). *Limaytilla garcetei*, *L. minima* and *L. windsori* are the only species of *Limaytilla* that have notaulus incomplete, coxa 3 without longitudinal carina and penis valve with tooth on distal fourth of ventral caudal edge.

Etymology: From the latin word *minimus*, meaning the lowest value, in reference to being the smallest species of *Limaytilla*.

Limaytilla orlandoi Cambra, Quintero & Pagliano **n. sp.** (figs. 1, 20, 26, 36)

Type material: Holotype ♂. Chile, Región Atacama, Copiapo Prov., Bahía Inglesa, Rocas Negras, 18 Jan 1998, col. A. Ugarte. Paratypes: Chile: same data as holotype, 24 ♂; Copiapo Prov., P[arque] Nac[ional] Pan de Azúcar, 14 Feb 1998, col. A. Ugarte, 14 ♂.; Copiapo Prov., Qbda. La Pino, 18 Jan 1998, 1500m, 2 ♂.

Diagnosis: Antennal tubercle simple; mesoscutum with large close punctures; notaulus reaching anterior margin of mesoscutum; coxa 3 with longitudinal carina; SMC2 narrow and subrectangular; metasoma red-brown; paramere narrow in its apical half and curved upwards; penis valve without tooth in ventral caudal edge. This species is closely related to *L. cachapoal* (see bracket 13 in key for species of *Limaytilla*).

Description of holotype

Body length 7.8 mm. *Color:* integument of head, mesosoma and metasoma red-brown, antenna and legs pale yellow; setae pale white. *Head:* Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus 1.8× the greatest length of the latter; clypeus not projected medially, emarginate in anterior margin and with two distinctive teeth between emargination; mandible tridentate apically, posteroventral margin with large tooth near base; frons and vertex with medium-sized punctures,

integument microgranulate between punctures; setae large, microplumose and mostly erect. *Mesosoma*: notaulus complete, reaching anterior and posterior margin of mesoscutum; coxa 3 with longitudinal carina on inner face; pronotum with medium-sized, contiguous to confluent, punctures; mesoscutum with large close punctures, scutellum with medium-sized contiguous punctures; tegula impunctate; propodeum totally reticulate; mesopleuron mostly with medium-sized contiguous punctures; metapleuron dorsal plate sculptured, ventral plate smooth; SMC2 narrow, subrectangular; forewing venation and stigma as (fig. 1); $LS/LM = 2.7$. *Metasoma*: T1 1.77× as long as wide; T1 with medium-sized contiguous punctures; T2 discal area with small sparse punctures, lateral areas with medium-sized contiguous punctures; T2 apex, T3 to T6 totally with small punctures; S2 with medium-sized contiguous punctures, S3 to S6 with small inconspicuous punctures; T2 and T3 apex without a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia* : (figs. 20, 26, 36), paramere in lateral view is narrow in its apical half and curved upwards, ending in a sharp point (fig. 20); inner face of cuspis with setose pit; penis valve without tooth in portion of ventral caudal edge (fig. 36). Female unknown.

Etymology: Named in honor of Orlando Cambra, brother of the first author.

Limaytilla windsori Cambra, Quintero & Pagliano **n. sp.** (figs. 7, 18, 24, 41)

Type material: Holotype ♂. Chile, Región Atacama, Copiapo Prov., La Guardia, 15 Jan 1998, 3500m, col. A. Ugarte. Paratypes: Chile: same data as holotype, 19 ♂; Copiapo Prov., P. Nac. Pan de Azucar, Chañaral, 14 Feb 1998, col. A. Ugarte, 6 ♂; Coquimbo Prov., 13 Oct 1997, col. A. Ugarte, 34 ♂; Copiapo Prov., Qbda. La Pino, 18 Jan 1998, 1500m, 6 ♂.

Diagnosis: Antennal tubercle simple; clypeus with two small teeth between emargination; coxa 3 without longitudinal carina on inner face; paramere very broad and almost straight penis valve with tooth on distal fourth of ventral caudal edge; cuspis inner face with setose pit.

Description of holotype

Body length 14.0 mm. *Color*: integument of head, mesosoma and metasoma red-dark brown, antenna and legs mostly brownish-yellow; setae pale white. *Head*: Antennal tubercle simple, without lamellate protuberance on mesal margin; distance between eye margin and lateral ocellus $1.1\times$ the greatest length of the latter; clypeus not projected medially, weakly emarginate in anterior margin and with two small teeth between emargination; mandible tridentate apically with medial tooth very small to obsolete, posteroventral margin with small tooth near base; frons and vertex with medium-sized contiguous punctures; setae large, microplumose and mostly erect. *Mesosoma*: notaulus incomplete, not reaching anterior margin of mesoscutum; coxa 3 without longitudinal carina on inner face; pronotum with medium-sized, contiguous to confluent, punctures; mesoscutum and scutellum with medium-sized contiguous punctures; tegula impunctate; propodeum totally reticulate; mesopleuron dorsal half mostly smooth except, dorsoposterior margin and ventral half mostly with large contiguous punctures; metapleuron smooth; SMC2 broad, subpentagonal; forewing venation and stigma as (fig. 7); $LS/LM = 1.4$ to 1.7 . *Metasoma*: T1 $1.97\times$ as long as wide; T1 with large contiguous punctures; metasomal segments 2 to 6 mostly with small, sparse and inconspicuous, punctures; T2 and T3 apex with a transverse fringe of plumose pubescence; pygidial area without distinctive, high and acute, lateral carina. *Genitalia*: (figs. 18, 24, 41), paramere, in lateral view, very broad and almost straight (fig. 18); inner face of cuspis with setose pit; penis valve with tooth on distal fourth and medial projection of ventral caudal edge (fig. 24). Female unknown.

Comments: Some paratypes have lost the transverse fringe of plumose pubescence on apex of T2 and T3. *Limaytilla windsori*, *L. garcetei* and *L. minima* are the only species in the genus having the penis valve with a tooth on distal fourth of ventral caudal edge, notaulus incomplete, not reaching anterior margin of mesoscutum and coxa 3 without longitudinal carina on inner face. *Limaytilla windsori* and *L. garcetei* are the only species in the genus with a medial projection on the ventral edge of penis valve (figs. 37, 41).

Variation in body length 8.5 – 15.5 mm (mean 11.43 mm, SD 1.76 mm, n = 40). *Limaytilla windsori* and *L. huarpe* are the two largest species of *Limaytilla*.

Etymology: Named in honor of Donald Windsor, Smithsonian Tropical Research Institute, for his many valuable collaborations to our studies of Neotropical Mutillidae.

Phylogenetic Analysis

To test the phylogenetic affinities of the 16 species of *Limaytilla*, we have selected *Sphaerophthalma* as the outgroup genus. Fourteen binary characters of adult male external morphology and male genitalia were coded for analysis; all were treated as unweighted and unordered. No autapomorphies were used.

A heuristic search of trees derived from parsimony analysis was carried out using NONA version 2.0 using WinClada version 1.00-08 (Nixon 2002), resulting in six cladograms. We preferred one of these minimal-length cladograms (fig. 51). The following options were used: maximum trees to keep = 1000; number of replications (mult*N) = 1000; starting trees per rep (hold/) = 100; random seed = 1000; unconstrained search; search strategy of multiple TBR + TBR (mult*max*). Consensus Majority Fools Search of tree is also presented (fig. 52). The character matrix used is given in Table 1. The following characters were employed for cladistic analysis:

Head:

Antennal tubercle: 0- without lamellate protuberance; 1- with lamellate protuberance.

Distance between eye margin and lateral ocellus: 0- Less of two times the greatest length of ocellus; 1- Two or more times the greatest length of ocellus.

Mandible laminar posteroventral margin: 0- with large or small tooth; 1- without tooth.

Mandible apex: 0- distinctly tridentate apically, tooth of similar size and shape; 1- not distinctly tridentate apically, tooth not of similar size and shape.

Mandible dorsal margin: 0- not widened abruptly anterodorsally; 1- widened abruptly anterodorsally

Clypeus anterior margin: 0- with two teeth; 1- without teeth

Mesosoma

Notaulus: 0- complete; 1- incomplete.

dorsal plate of metapleuron: 0- sculptured; 1- not sculptured

Posterior coxa: 0- With longitudinal carina on inner face; 1- without longitudinal carina on inner face.

Wing 2SMC: 0- subpentagonal; 1- not subpentagonal.

Metasoma

Terga two and three apex: 0-with a transverse fringe of plumose pubescence; 1- without a transverse fringe of plumose pubescence

Pygidium lateral carina on apical half: 0-absent; 1-present.

Parameres: 0- curved; 1- not curved

Cuspis: 0- inner face without setose pit; 1- inner face with setose pit.

Penis valve: 0- without tooth on ventral caudal edge; 1.with tooth on distal fourth of ventral caudal edge.

Penis valve: 0- without protuberance on ventral medial edge; 1.with tooth on ventral caudal edge.

Table 1 Data matrix for the 16 characters used in the phylogenetic analysis of *Limaytilla*. Character states not used because of the condition of male apterity were coded as (-).

<i>Taxon</i>	<i>Characters</i>															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Sphaerophthalma</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>L. aptera</i>	0	1	1	0	0	1	-	0	0	-	1	0	1	1	0	0
<i>L. cachapoal</i>	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0
<i>L. chilensis</i>	0	1	1	0	0	0	0	0	0	1	1	0	0	1	0	0
<i>L. copiapo</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
<i>L. fritzi</i>	0	1	1	0	0	0	0	0	0	1	1	0	0	1	0	0
<i>L. garcetei</i>	0	0	0	1	0	1	1	1	1	0	1	0	1	0	1	1
<i>L. huarpe</i>	1	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0
<i>L. korytkowski</i>	0	0	0	0	0	0	0	1	0	1	1	0	0	1	0	0

<i>L. larioja</i>	0	0	0	1	1	0	0	0	0	1	0	1	0	1	0	0
<i>L. martinezi</i>	0	1	1	0	0	0	0	1	0	1	1	0	0	1	0	0
<i>L. medianeroi</i>	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
<i>L. minima</i>	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0
<i>L. orlandoi</i>	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0
<i>L. pampa</i>	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0
<i>L. pehuenche</i>	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
<i>L. windsori</i>	0	0	0	1	0	0	1	1	1	0	0	0	1	1	1	1

Discussion

Limaytilla Casal has two synapomorphic characters not present in other genera of American Sphaerophthalmini with species known to have nocturnal activity: apical margin of hypopygium with a distinct median notch, and mandible dorsal margin with two edges that are born on a dorsal condyle and diverge distally. *Acrophotopsis* has hypopygium broadly concave distally instead of having the median notch.

Limaytilla is related to *Scaptodactyla* (Casal 1964, Quintero & Cambra 2006) and *Sphaerophthalma*. Absent in males of *Scaptodactyla* and *Sphaerophthalma*, but males of *Limaytilla* present: the apical margin of hypopygium with a distinct median notch and have mandible dorsal margin with two edges that are born on a dorsal condyle and diverge distally. S2 has lateral felt lines in *Limaytilla* and *Sphaerophthalma* (absent in *Scaptodactyla*). *Scaptodactyla* clypeus has the anterior margin projecting and rounded or acute medially (*Limaytilla* and *Sphaerophthalma* otherwise). Most species of *Limaytilla* have the inner face of cuspis with a setose pit (setose pit absent in *Scaptodactyla* and probably also in *Sphaerophthalma*). Some species of *Limaytilla* have on the mesal margin of the antennal tubercle a lamellate protuberance, but in some species the protuberance is slight and appears as a smooth medioapical swelling or with an arcuate medioapical ridge in anterior view. *Scaptodactyla* and few species of *Photomorphus* [e. g. *Photomorphus johnsoni johnsoni* Viereck, 1903 and *P. paulus* (Bradley, 1906)] have an arcuate medioapical ridge in anterior view. This morphological character is

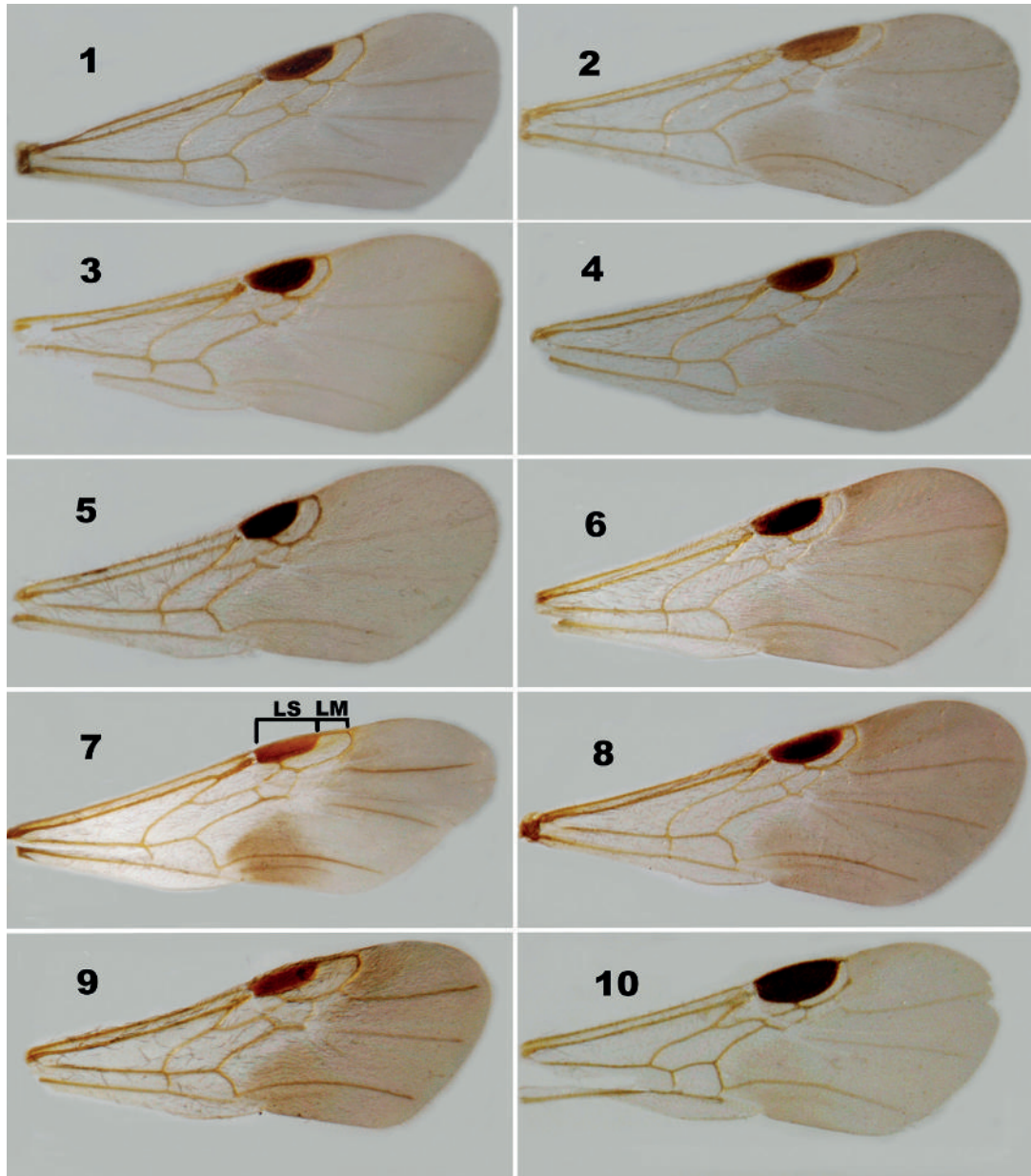
absent in nine other nocturnal Sphaerophalmini of America (*Acanthophotopsis*, *Acrophotopsis*, *Chilemutilla*, *Chilephotopsis*, *Dilophotopsis*, *Morsyma*, *Odontophotopsis*, *Sphaerophthalma* and *Stethophotopsis*).

According to Casal (1964) *Sphaerophthalma* is a complex group, obscurely defined. Pitts *et al.* (2004) decide to put in synonymy all the subgenera of *Sphaerophthalma*. *Sphaerophthalma* is widely distributed in America; it is the only genus with representatives of nocturnal species in North, Central and South America, probably indicating an ancient origin. *Limaytilla* and *Scaptodactyla* include species distributed mostly in the southwestern South America.

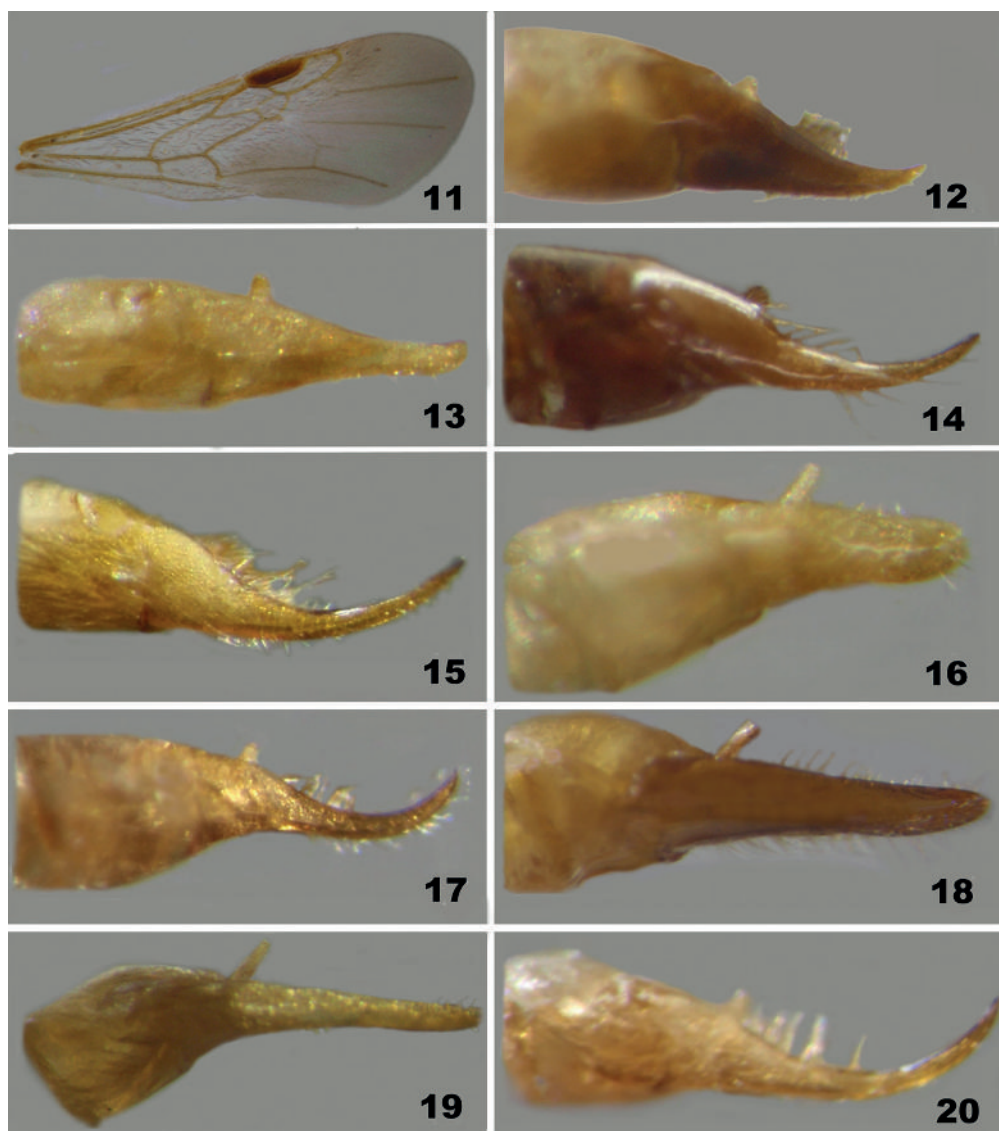
Our phylogenetic analysis of *Limaytilla* (figs. 51-52) indicates two clusters of species supported by two or three synapomorphies. The first cluster consisting of three species: *L. garcetei*, *L. minima* and *L. windsori*. This cluster of species is supported by the following three synapomorphies: notaulus incomplete, posterior coxa simple and penis valve with tooth on distal fourth of ventral caudal edge. The second cluster consists of four species: *L. aptera*, *L. chilensis*, *L. fritzi* and *L. martinezi* and is supported by two synapomorphies: distance between eye margin and lateral ocellus two or more times the greatest length of ocellus, and mandible laminar posteroventral margin without tooth. Our two clusters of species are supported by few characters, and are from a single sex (male). Therefore, our phylogenetic analysis results are preliminary; with future sexual associations and descriptions of the females, more information will clarify the relationships of these groups.

Acknowledgements

We thank James M. Carpenter, curator Entomology, AMNH, New York, for providing access to material, extended loans and help for many years.



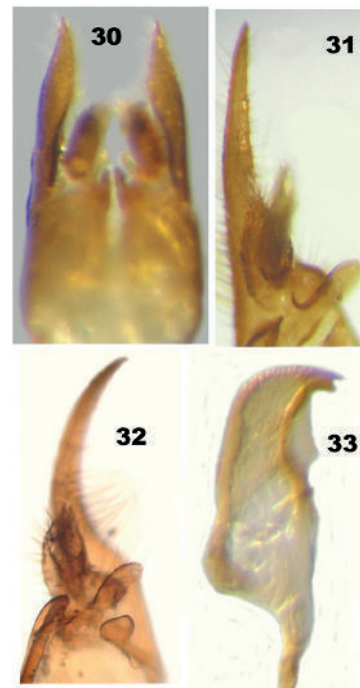
Figures 1-10 *Limaytilla* forewings. 1. *L. orlandoi*; 2. *L. garcetei*; 3. *L. chilensis*; 4. *L. martinezi*; 5. *L. fritzi*; 6. *L. cachapoal*; 7. *L. windsori*; 8. *L. korytkowski*; 9. *L. copiapo*; 10. *L. minima*.



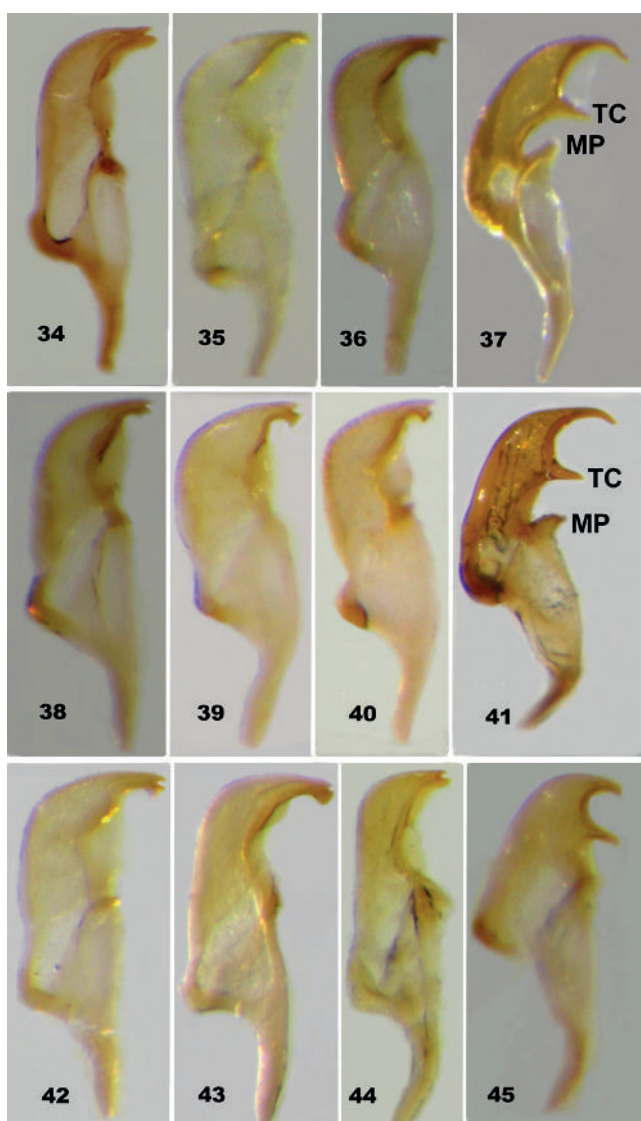
Figures 11-20 Limaytilla. 11. Forewing, *L. medianeroi*. 12-20. Genitalia, *lateral view of paramere*; 12. *L. fritzi*; 13. *L. aptera*; 14. *L. medianeroi*; 15. *L. larioja*; 16. *L. minima*; 17. *L. chilensis*; 18. *L. windsori*; 19. *L. garcetei*; 20. *L. orlandoi*.



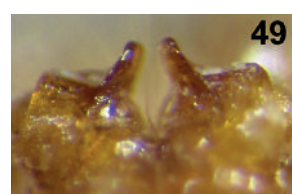
Figures 21-29 *Limaytilla* genitalia, parameres, ventral view. 21. *L. aptera*; 22. *L. minima*; 23. *L. garcetei*; 24. *L. windsori*; 25. *L. martinezi* (left paramere apex lost); 26. *L. orlandoi*; 27. *L. chilensis*; 28. *L. medianeroi* (right paramere apex lost); 29. *L. larioja*.



Figures 30-33 *Limaytilla* genitalia. 30. *L. fritzi*, ventral view; 31. *L. medianeroi*, paramere and volsella; 32. *L. korytkowski*, paramere and volsella; 33. *L. fritzi*, penis valve, lateral view.

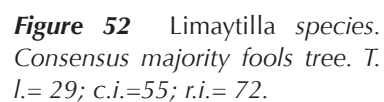
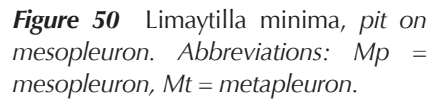


Figures 34-45 Limaytilla genitalia, penis valves, lateral view. 34. *L. medianeroi*; 35. *L. aptera*; 36. *L. orlandoi*; 37. *L. garcetei*; 38. *L. chilensis*; 39. *L. martinezi*; 40. *L. cachapoal*; 41. *L. windsori*; 42. *L. korytkowski*; 43. *L. copapo*; 44. *L. larioja*; 45. *L. minima*. Abbreviations: TC = tooth on distal fourth of ventral caudal edge, MP = projection on medial area of ventral edge.



Figures 46-47 Limaytilla, habitus, lateral view. 46. *L. aptera*; 47. *L. fritzi*.

Figures 48-49 48. Limaytilla larioja, head and mandible; 49. Limaytilla medianeroi, antennal tubercles with lamellate protuberances on mesal margin.



69

BIBLIOGRAPHY

- BROTHERS D. J. 2006. Familia Mutillidae. Pp. 577-593. In: *Introducción a los Hymenoptera de la Región Neotropical*. Fernández, F., Sharkey, M. J. (eds.). Sociedad Colombiana de Entomología y Universidad Nacional de Colombia, Bogotá D. C., xxx + 894 pp.
- CAMBRA T. R. A., QUINTERO A. D. 2007. *Chilemutilla*, a new genus of Mutillidae (Hymenoptera) from Chile, and the description of the first wingless mutillid male from South America. *Transactions of the American Entomological Society* 133 (1): 167-180.
- CASAL O. H. 1964. Revisión de *Limaytilla* nuevo género erémico y nocturno de Sphaerophthalmini (Hymenoptera, Mutillidae). *Acta Zoologica Lilloana* 20: 81-103.
- FRITZ M. A. 1998. Mutillidae. Pp. 445-451. In: Morrone, J. J. & Coscarón, S. (eds.). *Biodiversidad de Artrópodos Argentinos. Una Perspectiva Biotaxonómica*. Ediciones Sur. Argentina, 599 pp.
- NIXON K. C. 2002. Winclada version 1.00-08. Published by the author, Ithaca, NY.
- PAGLIANO G. 2008. *Elenco mondiale dei generi di Hymenoptera con specie tipo*. Monografie XLIII. Museo Regionale di Scienze, 465 pp.
- PITTS J. P., MCHUGH J. V. 2000. *Stethophotopsis*, a new genus of Sphaerophthalmini (Mutillidae: Sphaerophthalminae) with a brachypterous male from Arizona. *Journal of Hymenoptera Research* 9(1): 29-33.
- PITTS J. P., PARKER F. D., PITTS-SINGER T. 2004. A review of the *Sphaerophthalma* uro species-group (Hymenoptera: Mutillidae), with taxonomic changes. *Journal of the Kansas Entomological Society* 77(3): 222-234.
- QUINTERO A. D., CAMBRA R. A. 1996. Contribución a la sistemática de las Mutílidas (Hymenoptera) del Perú, en especial las de la Estación Biológica BIOLAT, Río Manu, Pakitza. Pp. 327-357. In: D. E. Wilson and A. Sandoval (eds.). *Manu: The biodiversity of Southwestern Peru*. Washington D.C., Smithsonian Institution Press, 679 pp.
- QUINTERO A. D., CAMBRA R. A. 2006. The genus *Allotilla* Schuster (Hymenoptera: Mutillidae): Phylogenetic analysis of its relationships, first description of the female and new distribution records. *Journal of Hymenoptera Research* 15(2): 270-276.
- SÁIZ F., CARVAJAL C. 2000. Incendios forestales en el Parque Nacional La Campana, Sector Ocoa, V Región, Chile. V. Blattodea, Formicidae y Mutillidae. *Impacto y Recuperación*. *Anales Museo de Historia Natural* 21: 51-61.

Lavoro pervenuto il 30/09/2016, accettato il 23/02/2017