



New *Lachesilla* (Psocodea: 'Psocoptera': Lachesillidae) from Peru and Mexico, based on males with one clunial apophysis

Nuevas *Lachesilla* de Perú y de México (Psocodea: 'Psocoptera': Lachesillidae), basadas en machos con una apófisis clunial

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Abstract. Three species of *Lachesilla* from Peru and Mexico are described and illustrated. They are based on male specimens, characterized by having a clunial apophysis over the area of the epiproct. The Mexican species constitutes a new species group, and the 2 Peruvian species belong in the *pedicularia* group. Types are deposited in the National Insect Collection (CNIN), housed in the Instituto de Biología, Universidad Nacional Autónoma de México.

Key words: *cerorma* and *pedicularia* species groups, taxonomy, Cuzco-Peru, Chiapas-Mexico.

Resumen. Se describen e ilustran 3 especies de *Lachesilla* de Perú y de México. Están basadas en ejemplares macho, caracterizados por tener una apófisis en el clunio, en el área cercana al epiprocto. La especie mexicana constituye un nuevo grupo de especies y las 2 especies peruanas pertenecen al grupo *pedicularia*. Los tipos están depositados en la Colección Nacional de Insectos (CNIN), alojada en el Instituto de Biología de la Universidad Nacional Autónoma de México.

Palabras clave: grupos de especies *cerorma* y *pedicularia*, taxonomía, Cuzco-Perú, Chiapas-México.

Introduction

Three new species of Neotropical *Lachesilla* are described herein. One of these, from Chiapas, Mexico, is not assignable to any of the species groups recognized in the genus (García Aldrete, 1974, 1982), as the male presents a long, stout, setose mid clunial apophysis. Two closely related species from Cuzco, Peru, in which the males present a stout, glabrous, strongly sclerotized mid clunial apophysis, are assignable to the *pedicularia* species group. With 280 described species, at least 100 additional ones to be described preserved in my collection, and with 17 presently recognized species groups, *Lachesilla* may prove to be the most speciose and morphologically diverse genus of non-parasitic Psocodea ('Psocoptera').

Materials and methods

One male of each species was available for study. Color was recorded by placing the whole specimen in 80% ethyl alcohol, under the dissecting microscope, illuminated with white cold light, at 80X. Specimens

were dissected in a mixture of equal parts of 80% ethyl alcohol and glycerol, and the head, right wings and legs, and genitalia were mounted on a slide in Canada Balsam. Standard measurements, given in μm , were taken with a filar micrometer, whose measuring unit is 136 μm for wings and 53 μm for other parts (see García Aldrete, 2008). Types are deposited in the National Insect Collection, Instituto de Biología, Universidad Nacional Autónoma de México (CNIN).

Descriptions

Lachesilla carpintero n. sp. (♂) (Figs. 1-4)

Diagnosis. Belongs to the *pedicularia* species group (García Aldrete, 1974; Mockford, 1993). Distal ends of claspers fused to form a strongly sclerotized, distally blunt median prong (Fig. 3). Clunium with a median, long, posteriorly directed, wide based, distally truncate, strongly sclerotized apophysis (Figs. 2, 4). Paraprocts (Fig. 2) of 2 pieces, proximal 1 elliptic, articulated to clunium as illustrated, elliptic sensory field bearing 10 trichobothria in basal rosettes and a marginal one without basal rosette; distal piece posteriorly rounded, with a short, blunt, strongly sclerotized prong. Epiproct divided in 2 halves, each with

a field of setae on margin, and projected posteriorly into a long, acuminate extension (Fig. 2).

Color. Body reddish brown. Compound eyes black, ocelli hyaline, without pigmented centripetal crescents. Wings hyaline, with a slight reddish hue, veins brown. Abdomen with reddish brown subcuticular rings.

Morphology. As described in the diagnosis plus the following: forewing pterostigma wider and round posteriorly. Veins Rs and M fused in a point. Areola postica almost as tall as wide, apically rounded. Hindwing veins Rs-M fused for a distance. Claspers as in Fig. 3, inner edges strongly sclerotized. Phallosome apodeme (Fig. 3), long, slender, distally dilated and divided in 2 arms, each arm ending in a round, membranous body.

Measurements. FW: 1619, HW: 1300, F: 339, T: 636, t1: 228, t2: 86, ctt1: 15, Mx4: 71, f1: 166, f2: 159, f3: 135, f4: 100, IO: 302, D: 170, d: 88, IO/D: 1.77, PO: 0.51.

Taxonomic summary

Holotype ♂. Peru. Cuzco. Nuevo Mundo. Base Pluspetrol. 78°08'30''W: 11°33'02''S. VII.2004, Light trap. J. Williams.

Etymology. This species is gratefully dedicated to Diego Carpintero (Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Buenos Aires, Argentina), for the donation of numerous *Lachesilla* specimens from Cuzco, Peru, including the species herein described, and in recognition for his studies on the taxonomy of Anthocoridae, Miridae and Dipsocoromorpha (Hemiptera-Heteroptera).

Lachesilla williamsi n. sp. (♂) (Figs. 5-8)

Diagnosis. Belongs to the *pedicularia* species group (García Aldrete, 1974; Mockford, 1993). Distal ends of claspers fused to form an acuminate median prong (Fig. 6). Clunium with a median, short, posteriorly directed, strongly sclerotized, distally blunt apophysis, with parallel sides (Figs. 7, 8). Paraprocts (Fig. 7) of 2 pieces, proximal 1 elongate, strongly sclerotized, articulated to clunium as illustrated; sensory fields almost elliptic, with 10 trichobothria on basal rosettes and a marginal one without basal rosette; distal piece rounded, setose, with a mesal, stout, strongly sclerotized prong. Epiproct (Fig. 7) almost rectangular, with sides and postero-lateral corners strongly sclerotized, bearing broad posterior projection, deeply concave distally to form 2 acuminate arms, bent outwards.

Color. Body reddish brown. Compound eyes black, ocelli hyaline, with ochre centripetal crescents. Legs pale brown. Wings hyaline, with a slight orange hue, veins brown;

R1 deeply pigmented. Abdomen with reddish brown subcuticular rings.

Morphology. As described in the diagnosis, plus the following: forewing pterostigma almost rectangular, wider posteriorly; veins Rs-M fused for a distance. Areola postica tall, broadly triangular, apically rounded. Hindwing veins Rs-M fused for a distance (Fig. 5). Proximal halves of claspers almost elliptic, setose, strongly sclerotized as illustrated (Fig. 6). Phallosome apodeme long, slender, T-shaped distally (Fig. 6), bearing on each side an almost elliptic membranous extension.

Measurements. FW: 1585, HW: 1224, F: 291, T: 408, t1: 138, t2: 76, ctt1: 17, Mx4: 74, f1: 182, f2: 159, f3: 145, f4: 109, IO: 267, D: 159, d: 95, IO/D: 1.67, PO: 0.59.

Taxonomic summary

Holotype ♂. Peru. Cuzco. Nuevo Mundo. Base Pluspetrol. 78°08'30''W: 11°33'02''S. VII.2004. Light trap. J. Williams.

Etymology. This species is gratefully dedicated to its collector, J. Williams.

Lachesilla cerorma n. sp. (♂) (Figs. 9-14)

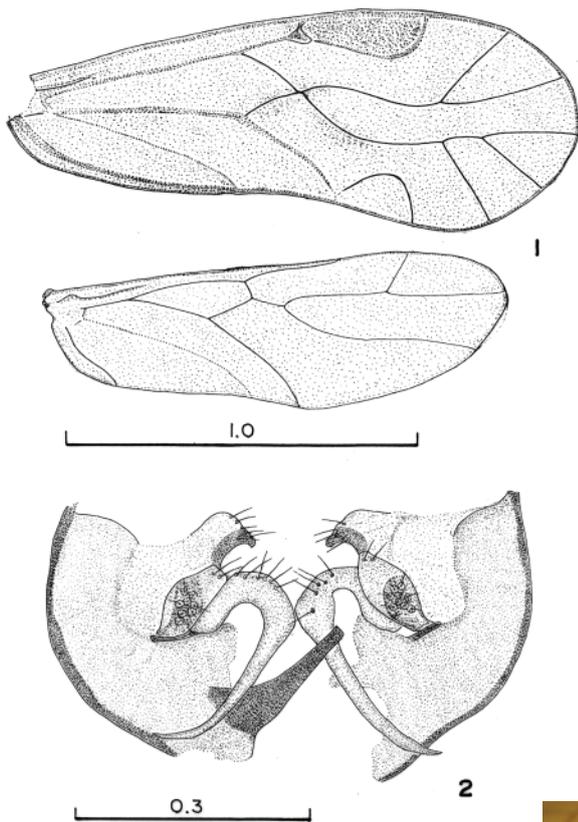
Diagnosis. Belongs to the *cerorma* species group (defined below). Clunium with stout apophysis in the middle, directed posteriorly, narrowing distally, bearing strong setae (Figs. 12, 13). Hypandrium broad, setose, with proximal halves of claspers fused to sides; claspers slender proximally, widening distally, blunt ended (Fig. 14). Phallosome V-shaped, arms long, slender, diverging from fused base; each arm with an acuminate apophysis on inner edge of distal half (Fig. 14). Distal fourth of each arm slender, curved, blunt ended.

Color. Body pale brown. Compound eyes black, ocelli hyaline, with ochre centripetal crescents. Antennae pale brown, with flagellomeres 3-11 more pigmented than scape, pedicel and flagellomeres 1-2. Maxillary palps brown, legs pale brown. Wings hyaline, veins pale brown. Abdomen with ochre subcuticular rings, less pigmented ventrally.

Morphology. As described in the diagnosis, plus the following: forewing veins Rs and M fused in a point. Pterostigma long, wider distally. Areola postica wide, tall, rounded apically (Fig. 9). Hindwing veins Rs-M fused for a distance. Paraprocts broad, setose, bearing mesally a short, curved prong; sensory fields almost circular, bearing 16-18 trichobothria on basal rosettes, plus a marginal one, without basal rosette (Fig. 13). Epiproct (Fig. 13) rounded posteriorly; anteriorly with 1 small, sclerotized cone on each side of longitudinal midline, setae as illustrated.

on the epiproct. The following species in the *pedicularia* group have a pair of long clunial apophyses; these are mostly slender and smooth, but in some species they are rugose, bearing small tubercles, or may be serrate along the outer edge, and none bear setae: *L. anomala* Badonnel (Congo), *L. aquilina* Badonnel (Cameroon), *L. bugiriana* Smithers (Uganda), *L. cameruna* Badonnel (Cameroon), *L. cornisterna* Broadhead and Richards (Kenya), *L. cornuta* Badonnel (Congo), *L. crutifurca* Li Fasheng (China) (for spelling of species name, see Lienhard, 2003), *L. gigantea* Badonnel (Congo), *L. meinanderi* Lienhard

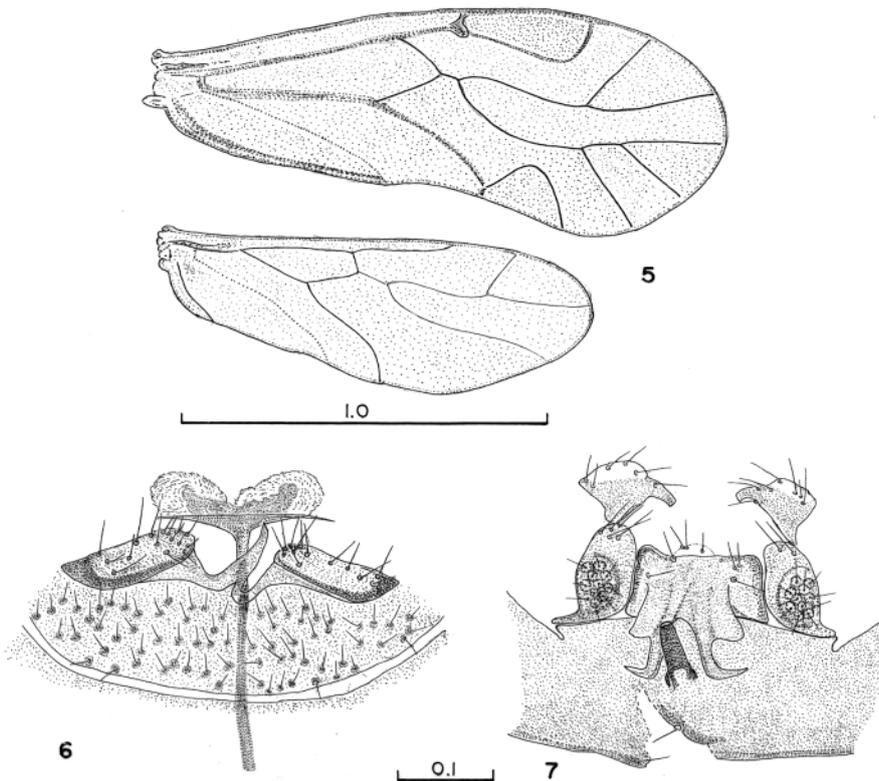
(Canary Islands, not Italy, see Lienhard, 1998: 227), *L. intrans* Li Fasheng (China), *L. kahuziana* Badonnel (Congo), *L. keniensis* Broadhead and Richards (Kenya), *L. loisae* García Aldrete (Pakistan), *L. mucronata* Badonnel (Angola, Congo, Uganda), *L. pedicularia* (Linnaeus) (Cosmopolitan), *L. rectigladia* Broadhead and Richards (Kenya), *L. septenaria* Li Fasheng (China), and *L. ximaensis* Li Fasheng (China). The following species have one median short, stout, glabrous clunial apophysis: *L. assymetriproctus* García Aldrete (Peru), *L. convexicornis* García Aldrete (Peru), and *L. macropudenda* García



Figures 1-3. *Lachesilla carpinteroii* García Aldrete. 1. Fore- and hindwings. 2. Clunium, epiproct and paraprocts. 3. Hypandrium, claspers and phallosome apodeme. Scales in mm.



Figure 4. *Lachesilla carpinteroii* García Aldrete. Side view.



Figures 5-7. *Lachesilla williamsi* García Aldrete. 5. Fore- and hindwings. 6. Hypandrium, claspers and phallosome apodeme. 7. Clunium, epiproct and paraprocts. Scales in mm. Figures 6-7 to common scale.

Figure 8. *Lachesilla williamsi* García Aldrete. Side view of abdomen.



Measurements. FW: 2511, F: 469, T: 1060, t1: 307, t2: 111, ctt1: 18, Mx4: 123, f1: 357, f2: 301, f3: 243, f4: 198, IO: 319, D: 265, d: 176, IO/D: 1.20, PO: 0.66.

Taxonomic summary

Holotype ♂. Mexico. Chiapas. Km 10 Altamirano-Comitán, 16°39'06''N: 93°03'06''W, 1615 m. 28.VI.2007. Disturbed vegetation in pine forest. L. Cervantes, G. Ortega and C. Mayorga.

Etymology. The specific name is a compound word, formed with the first syllable of the last name of the collectors of the holotype of this peculiar species (see above).

Definition of the cerorma species group (♂)

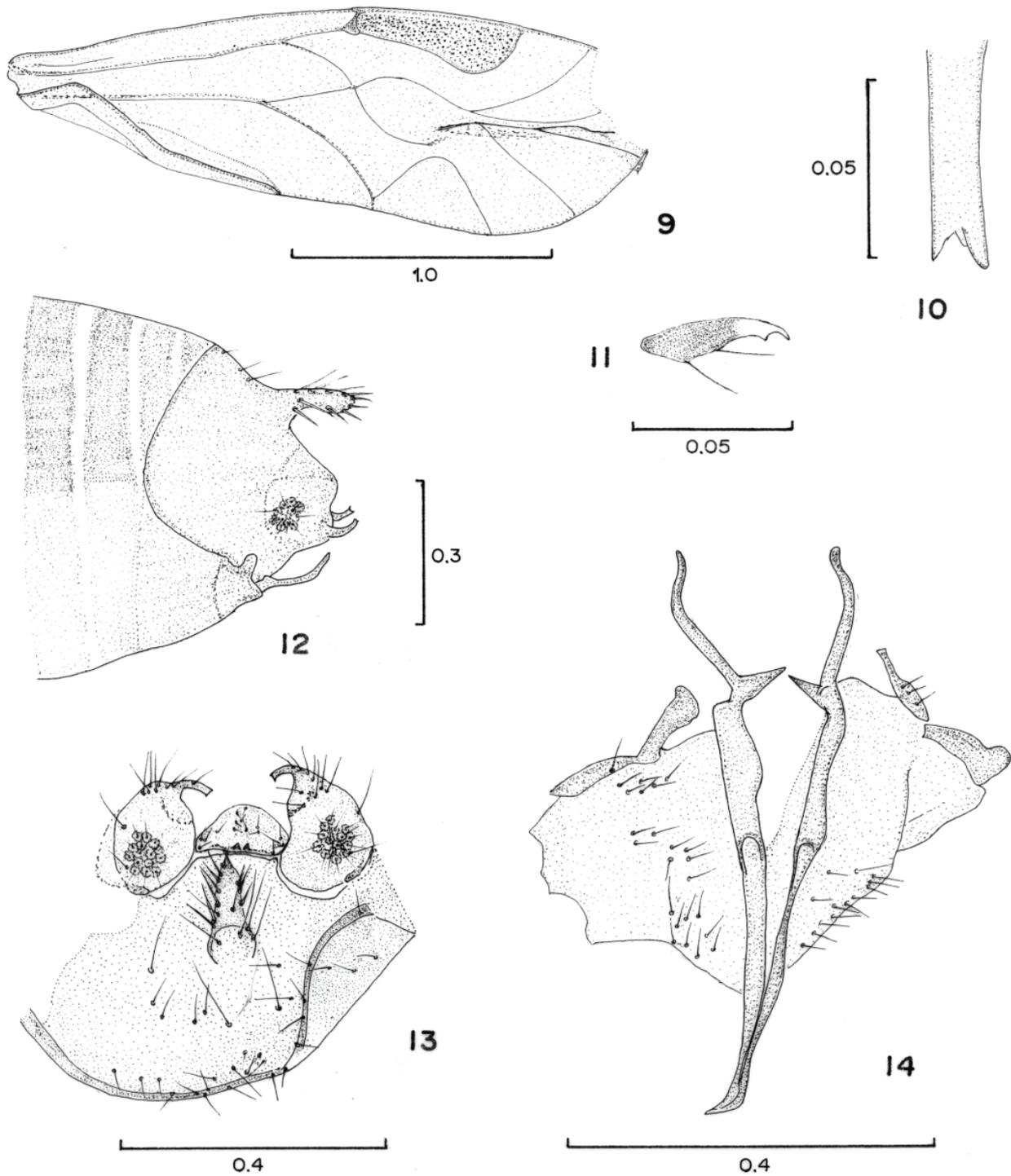
Wings clear. Clunium with a stout, setose apophysis over the area of the epiproct. Paraprocts with a mesal, curved prong. Epiproct with 2 anterior sclerotized cones.

Proximal halves of claspers fused to sides of hypandrium, distal halves free. Phallosome V-shaped, each arm with an acuminate apophysis mesally on inner edge of distal half.

Remarks

Nature and distribution of clunial apophyses in Lachesilla

The presence of 1 or 2 mid clunial apophyses over the area of the epiproct in males has only been observed in the Chinese *Ceratolachesillus quinquecornus* Li Fasheng (for spelling of species name, see Lienhard, 2003), and in the *pedicularia* species group (García Aldrete, 1974; Mockford, 1993) of the genus *Lachesilla*. The single apophysis in *C. quinquecornus* is totally different from those of the Afro-Eurasian species of *Lachesilla*; in these, the paired clunial apophyses are directed posteriorly, usually flanking a posteriorly directed hook-like prong



Figures 9-14. *Lachesilla cerorma* García Aldrete. 9. Forewing. 10. Lacinial tip. 11. Pretarsal claw. 12. Side view of abdomen. 13. Clunium, epiproct and paraprocts. 14. Hypandrium, claspers, and phallosome apodemes. Scales in mm.

Aldrete (Peru). See García Aldrete (2008), Lienhard and Smithers (2002) and Li Fasheng (2002) for more data on each of the above species. It appears then, that species with one clunial apophysis are predominantly American (Neotropical region), with 1 Chinese Palearctic species, while species with 2 clunial apophyses (not considering the cosmopolitan *L. pedicularia*), occur in Africa, Europe and China (Aethiopian and Palearctic regions).

The literature on the Psocoptera (Lienhard and Smithers 2002) is overwhelmingly dominated by taxonomic papers. As a result, much is known about the morphology of the order, but very little is known about the biological significance of most of the characters that have been described. An example of the above is the presence of apophyses on the male clunium, a character very rare in the Psocoptera, and of unknown function. To my knowledge it only occurs in 2 genera (*Lachesilla* and *Ceratolachesillus*), of the 19 that presently constitute the Lachesillidae. In *Lachesilla*, male clunial apophyses are known to occur only in 2 species groups of the 17 species groups presently recognized in the genus, in which males are known (the Chinese *Ceratolachesillus* is monotypic).

The character state of the mid clunial apophysis in *L. cerorma*, as well as its distinct genitalic characters, makes it so different as to constitute a new species group in the genus *Lachesilla*. The hypandrium, claspers, and phallosome apodemes are reminiscent of those in most species in the *rufa* species group (see García Aldrete, 1990), although the paraproctal prongs are not conical, and the epiproct is not bell-shaped and bears 2 anterior small sclerotized cones.

Relationships of the pedicularia species group

L. carpintero and *L. williamsi*, collected at the same locality, are close to each other, differing in genital details, as shown in Figs. 2-3 and 6-7. Within the *pedicularia* species group, they stand close to *L. asymmetriproctus* García Aldrete, *L. convexicornis* García Aldrete and *L. macropudenda* García Aldrete, also from Peru, all of them having a median glabrous clunial apophysis over the area of the epiproct (García Aldrete, 2008). Both *L. carpintero* and *L. williamsi* have the clasper tips fused, and share this character with *L. asymmetriproctus* and *L. convexicornis*, as well as with the North American species *L. pacifica* Chapman (a species with a median sclerotized plate on the clunium, at the base of the epiproct, representing the raised apodeme). The fused clasper tips are a synapomorphy for this set of species. All of them retain, as a plesiomorphy, a long pair of forward-directed epiproctal processes. These are lost, constituting an apomorphy, in *L. macropudenda*, which has the clunial process, but its clasper tips are free, representing a plesiomorphous character. The clunial

apophyses in these species present the same character state: “glabrous, strongly sclerotized”, as opposed to the state “setose, not sclerotized” in *L. cerorma*; in the former 2 species they look similar to that of the Chinese *Ceratolachesillus quinquecornus* Li Fasheng.

Acknowledgments

I thank Diego Carpintero (Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Buenos Aires, Argentina), Luis Cervantes Peredo (Instituto de Ecología, A. C., Xalapa, Veracruz, México), Guillermina Ortega and Cristina Mayorga (Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City) for the donation of the specimens here studied. Felipe Villegas (Instituto de Biología, UNAM) provided valuable support in preparing the illustrations. Charles Lienhard (Muséum d'Histoire Naturelle, Genève) read a previous draft of the manuscript and provided useful comments. I thank 2 anonymous reviewers for their valuable comments on the content and organization of the material presented in this paper. I also thank the Instituto de Biología, UNAM, for supporting my research over the years.

Literature cited

- García Aldrete, A. N. 1974. A classification above species level of the genus *Lachesilla* Westwood (Psocoptera: Lachesillidae). *Folia Entomológica Mexicana* 27:1-88.
- García Aldrete, A. N. 1982. Descriptions of new *Lachesilla* species and description of the female *L. magnifica* García Aldrete (Psocoptera: Lachesillidae). *Folia Entomológica Mexicana* 53:43-65.
- García Aldrete, A. N. 1990. Sistemática de las especies de *Lachesilla* en el grupo *rufa*: Distribución geográfica y afinidades (Insecta: Psocoptera: Lachesillidae). *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología* 61:13-97.
- García Aldrete, A. N. 2008. Lachesillidae (Insecta: Psocoptera) from the Tambopata Reserved Zone, Madre de Dios, Peru. *Publicaciones Especiales del Instituto de Biología* 21. Universidad Nacional Autónoma de México. México, D. F. 92 p.
- Li Fasheng, 2002. Psocoptera of China. National Natural Science Foundation of China. Two volumes (in Chinese). 1976 p.
- Lienhard, C. 1998. Psocoptères euro-méditerranéens. *Faune de France* 83. 517 p.
- Lienhard, C. 2003. Nomenclatural amendments concerning Chinese Psocoptera (Insecta), with remarks on species richness. *Revue Suisse de Zoologie* 110:695-721.
- Lienhard, C. and C. N. Smithers. 2002. Psocoptera (Insecta). *World Catalogue and Bibliography. Instrumenta Biodiversitatis* V. Muséum d'Histoire Naturelle, Genève. 745 p.
- Mockford, E. L. 1993. North American Psocoptera (Insecta). *Flora & Fauna Handbook* No. 10. Sandhill Crane Press, Inc. Gainesville, Florida. Leiden. 455 p.