

## Three new species of *Lachesilla* in the group *andra*, from Mexico, Guatemala and Peru (Psocodea: 'Psocoptera': Lachesillidae)

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### ABSTRACT

Three species of *Lachesilla* in the *andra* group are herein described and illustrated. One of them is known from Mexico and Guatemala, a second one is endemic to Peru, and the third one is endemic to Mexico. They are assigned in two of the subgroups, I and III, established by Mockford & García Aldrete for the group *andra*. The types are deposited in the National Insect Collection (CNIN), Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City.

**Key words:** Taxonomy, Nearctic, Neotropics, subgroups of *andra* species group.

### RESUMEN

Tres especies de *Lachesilla* del grupo *andra* son aquí descritas e ilustradas. Una de ellas se encuentra en México y en Guatemala, la segunda es endémica de Perú, y la tercera es endémica de México. Son asignadas a dos de los subgrupos, I y III, establecidos por Mockford & García Aldrete para el grupo *andra*. Los tipos están depositados en la Colección Nacional de Insectos (CNIN), ubicada en el Instituto de Biología, Universidad Nacional Autónoma de México, en México, D. F.

**Palabras clave:** Taxonomía, Región Neártica, Neotrópico, subgrupos del grupo *andra*.

### INTRODUCTION

The *andra* group is one of 18 species groups presently recognized phenetically in the large genus *Lachesilla*. It was first diagnosed by García Aldrete (1974), to include species in which the female gonapophyses are short, posteriorly directed and attached to the ninth sternum; the subgenital plate presents a pigmented area on the internal surface, and the male phallosome apodemes are fused to form a stout rod, distally bifurcate. Recently, Mockford & García Aldrete (2010), with much more information on the group, accumulated since 1974, proposed a classification of the *andra* group, based on male terminal abdominal structures, in which four subgroups were recognized, and opened the possibility to include the species of *Zonolachesillus* Li (2002) in one of the subgroups.

We deal in this paper with three undescribed species that belong in the *andra* group, one from Mexico and Guatemala, one from southern Mexico, and one from Andean Peru; their subgroup assignments are dealt with in the discussion, below.

### MATERIAL AND METHODS

The description of the new species is based on examination of 52 specimens (26 females and 26 males). Illustrations were made with the aid of a drawing tube. Measurements, in  $\mu\text{m}$ , were made on slide mounted parts with a filar micrometer. Color descriptions are based on observations through a dissecting microscope, illuminated with cold white light on specimens preserved in 80% ethyl alcohol for various periods of time.

Abbreviations used for measurements are as follows: FW: forewing, HW: hindwing, F, T, t1 and t2, respectively: femur, tibia and tarsomeres of hind leg, ctt1: number of ctenidia on

hind first tarsomere, Mx4: distal segment of maxillary palpus, f1...f4: first to fourth flagellomeres, IO: least distance between compound eyes, D and d: antero-posterior and transverse diameter of right compound eye respectively, PO: d/D.

The types of the species described are deposited in the National Insect Collection (CNIN), Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico.

*Lachesilla dentata* n. sp.

(Figs. 1-6)

**Female. Color.** Body pale reddish brown. Compound eyes black, ocelli colorless, with ochre centripetal crescents. Antennae medium brown, with distal flagellomeres more pigmented than proximal ones, maxillary palps dark brown. Tergal lobes of meso- and metathorax more pigmented than rest of the thorax. Legs medium brown, femur distally dark brown, t1 and t2 dark brown. Forewing hyaline, marked as in figure 1; dark brown spots at distal ends of veins R, M and Cu. Hindwing (Fig. 1) with a cloudy brown spot at the marginal end of each vein, and spot at end of Cu2 on basal side of vein. Abdomen creamy white, with transverse brown sub-cuticular rings, less pigmented ventrally.

**Morphology.** Forewing veins Rs-M diverging from a point or fused for a distance; pterostigma wider distally, areola postica, tall, rounded. Rs fork stem flexuous, about as long as R 4+5 (Fig. 1). Hindwing Rs-M fused for a distance (Fig. 1). Subgenital plate (Fig. 5) broad, setose as illustrated, with four mesal setae much longer than the others; plate posteriorly concave, with two stout projections, strongly sclerotized distally, each projection finely denticulate; plate with an underlying, pigmented area, almost rounded anteriorly.

Gonapophyses (Fig. 4) short, stout, setose, attached basally to ninth sternum, this rounded anteriorly, with spermapore in the middle, with a mesal, sclerotized band on each side, and posteriorly with a distinct, pigmented, pointed area on each side. Paraprocts (Fig. 3) large, setose, posteriorly truncate; sensory fields with 11 trichobothria on basal rosettes, and a marginal trichobothrium without basal rosette; sensory field with broad, strongly sclerotized band on outer side. Epiproct (Fig. 3) straight anteriorly, rounded posteriorly, setose as illustrated.

**Measurements.** FW: 2264, HW: 1719, F: 366, T: 534, t1: 136, t2: 97, ctt1: 8, Mx4: 114, fl: 236, f2: 195, f3: 194, f4: 148, IO: 308, D: 159, d: 110, IO/d: 2.8, PO: 0.69.

**Male. Color.** Same as the female.

**Morphology.** Hypandrium broadly triangular, with field of setae on surface, apex rounded, and forming a mesal, transverse, sclerotized line (Fig. 2). Claspers (Fig. 2), proximally broad, elongate, with a field of four to six setae; distal process elongate, curved, distally acuminate, bearing medially, on inner edge, a carina of fine teeth. Phallosome (Fig. 2), an elongate, stout rod, forked distally; each arm bilobed, outer lobe (ventral), broad, straight posteriorly, with a pointed extension on outer side; internal lobe elongate, distally blunt, bearing distally on outer side a pointed, strongly pigmented projection. Paraprocts stout (Fig. 6), with broad, spatulate, strongly sclerotized prong; sensory fields with 10-12 trichobothria on basal rosettes, and a marginal trichobothrium without basal rosette. Articulation clunium-paraproct (Fig. 6): long lateral extension of clunium, directed posteriorly to join socket at paraproct base. Epiproct (Fig. 6) broadly triangular, with setae as illustrated, an apical field of sclerotized papillae, and two median, prominent fields of sclerotized papillae on inner surface, other papillae as illustrated.

**Measurements.** FW: 2340, HW: 1731, F: 457, T: 813, t1: 207, t2: 99, ctt1: 14, Mx4: 87, fl: 240, f2: 228, f3: 195, f4: 159, IO: 297, D: 216, d: 139, IO/d: 2.13, PO: 0.64.

**Etymology.** The specific name, a noun in apposition, refers to the carina of teeth on the distal process of each clasper.

**Type locality.** MEXICO. *Oaxaca.* Tehuacán-Cuicatlán Valley, Santiago Dominguillo, 760 m., 17°38'507"N: 96°54'703"W. 22.VIII.1998, light trap, Santiago Zaragoza, holotype ♂, 1 ♂ paratype, 19.VIII.1998, allotype ♀, 1 ♀ paratype. 20.IX.1998, 3 ♂ paratypes.

**Records. MEXICO.** *Guerrero.* Km. 44, rd. Tlapa-San Luis Acatlán. 2162 m., 17°17'52"N: 98°38'19"W, 14.VI.2006, beating vegetation, L. Cervantes, 1♂, 1♀. *Guanajuato.* Km. 6, rd. Dolores Hidalgo-San Luis de la Paz, 2138m., 21°08'50"N: 100°53'05"W. E. Barrera & L. Cervantes, 1♂, 1♀. *Hidalgo.* Ca. Zimapán, at Posada del Rey Hotel, 26.VII.1965. Cornell University Mexico Field Party 1965. 1 ♂. *Jalisco.* 3 km., NW Barranquillas, 3.II.1964, black light trap, Schlinger & Irwin, 1 ♀. Ca. Mazamitla, 18.IV.1980, beating dead *Yucca* leaves and herbaceous plants, A. N. García Aldrete, 7 ♀♀. El Zarzamoro, Joyas de la Sierra de Manantlán, 1.VI.1986, V. Bedoy, 1 ♀. *Michoacán.* 2 km. E Carapan, Hwy. 15, 1970 m., 20.IV.1977, on dead leaves of herbaceous plants, A. N. García Aldrete, 2 ♀♀. Puruándiro, 1905 m., 20°06'36"N:

101°34'19"W, 2.X.2008, beating thorn scrub, L. Cervantes, 1♀. *Morelos.* CEAMISH Biology Station, 2.5 km. N, 4 km. W Huautla, 940 m., 18°27.671'N: 99°107.475'W, 6.X.1996, light trap, S. Zaragoza, 1♀. *Nuevo León.* Western slope of Peña Nevada Mountain, 2200 m., 26.IV.1964, beating junipers, E. L. Mockford, 1♀. 18.VIII.1975, 1860 m., beating miscellaneous shrubs with dead leaves, A. N. García Aldrete, 1♀. 11km., S La Escondida, 2100 m., 22.III.1979, beating branches of pines and junipers, A. N. García Aldrete, 1♀. *Oaxaca.* 64 km. S Oaxaca City, 18.VIII.1968, beating dead branches of shrubbery in sparse arid scrub, E. L. Mockford & A. N. García Aldrete, 1♂. 8 km. SE Nochixtlán, Hwy. 190, 21.VIII.1972, on dead, hanging *Seloa* leaves, A. N. García Aldrete, 1♀. 4 km. SE Nochixtlán, 2140 m., 5.VIII.1975, same biotope, 1♂. *San Luis Potosí.* El Refugio, N of San Luis Potosí City, 2.IX.1958, beating roadside plants, E. L. Mockford, 1♀. 5 km. N Soledad Díaz Gutiérrez, 1600 m., Hwy. 57, 31.V. 1976, beating mesquite branches with bromeliads, A. N. García Aldrete, 1♀. 18 km. NE San Luis Potosí City, 2000 m., Hwy. 57, 10.IX.1987, beating vegetation, C. W. O'Brien, 1♀. Km. 52 San Luis Potosí City-Matehuala, 1336 m., 23°18'05"N: 100°32'44"W, 28.IX.2006, E. Barrera, 1♂. GUATEMALA. 13 km. NE Guatemala City, Hwy. to Puerto Barrios, 27.VIII.1968, beating miscellaneous shrubs and trees, A. N. García Aldrete, 1♂. 5 km. N Huehuetenango, Hwy. 9, 2.IX.1968, beating small shrubs on denuded hillside, E. L. Mockford & A. N. García Aldrete, 1♂, 1♀. 4 km. N junction to Huehuetenango, 30.VIII.1973, beating shrubs with dead hanging leaves, A. N. García Aldrete, 1♀.

*Lachesilla pisaqensis* n. sp.

(Figs. 7-13)

**Female. Color.** Body brown. Compound eyes black, ocelli colorless, with ochre centripetal crescents. Antennae medium brown, maxillary palps dark brown. Legs medium brown. Tergal lobes of meso- and metathorax more pigmented than rest of the thorax. Wings reddish brown washed. Abdomen creamy white, with reddish brown, transverse subcuticular rings, more visible dorsally.

**Morphology.** Brachypterous (Fig. 13). Forewing with venation reduced, pterostigma undefined, traces of R 2+3 and R 4+5, one M, areola postica absent. Subgenital plate (Fig. 9), with an anterior part broad, pigmented, setose as illustrated, concave anteriorly, with a pigmented band along posterior margin; posterior part membranous, fitting in the concavity of the anterior part. Gonapophyses (Fig. 12), short, with outer basal border strongly sclerotized and joined to lower end of clunium; ninth sternum broad, pigmented, slightly concave anteriorly, with spermapore almost in the middle. Paraprocts (Fig. 11), semielliptical, with setae as illustrated, sensory fields with four trichobothria on basal rosettes, and one trichobothrium without basal rosette. Epiproct (Fig. 11), almost straight anteriorly, rounded posteriorly, with setal field on posterior two thirds.

**Measurements.** FW: 704, HW: 469, F: 359, T: 637, t1: 192, t2: 86, ctt1: 12, Mx4: 74, fl: 163, f2: 138, f3: 123, f4: 106, IO: 362, D: 123, d: 76, IO/d: 4.76, PO: 0.61.

**Male. Color.** Same as the female.

**Morphology.** Macropterous (Fig. 7). Forewing pterostigma long, wider distally, rounded; veins Rs-M fused; Rs fork stem as long as R 4+5; areola postica wide, almost semi-circular. Hindwing Rs-M fused (Fig. 7). Hypandrium (Fig. 8) broad, with setae as illustrated, with two long, stout posterior projections, distally truncate. Phallosome (Fig. 8), consisting of two long, independent apodemes, each basally slender, dilated ante-distally, with apex acuminate. Paraprocts (Fig. 10) with short, almost triangular mesal prong; sensory fields with ten trichobothria on basal rosettes and a marginal trichobothrium without basal rosette. Clunial posterior lateral extension medium long, posteriorly directed to articulate with socket of paraproct base. Epiproct (Fig. 10) wide, bilobed, each lobe ending in a short sclerotized cone; a distinct tuft of long setae anteriorly in the middle

**Measurements.** FW: 2673, HW: 2029, F: 414, T: 804, t1: 239, t2: 98, ctt1: 15, Mx4: 79, fl: 232, f2: 199, f3: 173, f4: 135, IO: 310, D: 142, d: 93, IO/d: 3.33, PO: 0.65.

**Type locality.** PERU. Cuzco. Sacred Valley of the Incas. Písaq, 3081 m., 13°25.093'S: 71°50.983'W. Beating *Senecio* and other shrubs with dead leaves on mountain slope. 15.IV.2004. A. N. García Aldrete. Holotype ♂, allotype ♀.

**Etymology.** The specific name is derived from the name of the type locality, famous for its handicrafts market.

*Lachesilla zaragozai* n. sp. ♂  
(Figs. 14-17)

**Color.** Body pale orange. Compound eyes black, ocelli colorless, without pigmented centripetal crescents. Antennae medium brown. Mx 1-3 creamy white, Mx4 dark brown. Tergal lobes of meso- and metathorax slightly more pigmented than rest of the thorax. Membrane of wings hyaline, forewing marked as in Fig. 14; with dark brown spots at distal ends of veins R, M and Cu. Abdomen creamy white, genital segments dark brown.

**Morphology.** Forewing pterostigma elongate, wider distally, veins Rs-M fused, areola postica broad, almost triangular. Rs fork stem about as long as R 2+3 (Fig. 14). Hindwing Rs-M fused (Fig. 14). Hypandrium (Fig. 17) broad, with setae as illustrated; two broad posterior projections, each with a slender, slightly curved, distally blunt extension (clasper?). Phallosome (Fig. 17), with two long, slender apodemes, fused basally, distally acuminate. Paraprocts (Fig. 16), with a stout, sclerotized prong, bearing two setae; sensory fields with 9-10 trichobothria on basal rosettes and one marginal trichobothrium, without basal rosette. Clunial posterior arms medium long, articulated with socket at base of each paraproct (Fig. 16). Epiproct (Fig. 16) deeply bilobed, each lobe triangular, with a field of setae as illustrated.

**Measurements.** FW: 2025, HW: 1500, F: 307, T: 664, t1: 166, t2: 88, ctt1: 10, Mx4: 71, fl: 198, f2: 159, f3: 146, IO: 243, D: 128, d: 85, IO/d: 2.85, PO: 0.66.

**Type locality.** MEXICO. Morelos. CEAMISH Biology Station, 2.5 km N, 4 km W Huautla, 940 m., 18°27'N: 99°02'W, 5.VIII.1996, light trap, S. Zaragoza, holotype ♂, 6 paratypes ♂. 14.II.1996, 2 paratypes ♂. 7.VII.1996, 1 paratype

♂. 8.VIII.1996, 1 paratype ♂.

**Record.** Oaxaca. Santiago Domingullo (Tehuacán-Cuicatlán Valley). 26.XI.1997, light trap, S. Zaragoza, 1♂.

**Etymology.** The specific name is a noun in the genitive case. The species is dedicated, with great pleasure, to Dr. Santiago Zaragoza Caballero, of the Instituto de Biología, Universidad Nacional Autónoma de México, in recognition of his many and varied contributions to the study of Mexican Coleoptera, particularly Cantharidae, Lampyridae, Lycidae, Phengodidae and Telegeusidae.

## DISCUSSION

*Lachesilla dentata* belongs in Subgroup I of the *andra* group, as diagnosed by Mockford & García Aldrete (2010). This subgroup includes *L. andra* Sommerman, *L. dona* Sommerman, *L. nubilis* (Aaron), *L. nubiloidea* García Aldrete and *L. punctata* (Banks). The males of *L. andra* and *L. punctata* also have the epiproct extended posteriorly in the middle, but *L. dentata* differs from them in having the distal process of the claspers curved, with a denticulate carina on inner edge; the paraproctal prongs are broad, spathulate, and the epiproct has papillar fields as described. Oddly, the female subgenital plate is quite similar to that of *L. dona*, rather than to those of *L. andra* or *L. punctata*.

*L. pisaquensis* belongs in Subgroup III of the *andra* group, which includes *L. ambigua* Badonnel, *L. kola* Sommerman, *L. mayorgae* García Aldrete, *L. tehuautlensis* García Aldrete, *L. texana* Mockford & García Aldrete, *L. bilobata* García Aldrete, *L. castrii* Badonnel, *L. chiapensis* García Aldrete and *L. zapoteca* García Aldrete. It differs from them (except for the last four species, in which the male is not known), in the structure of the hypandrium and phallosome, and in the unique male epiproct, with a field of large setae anteriorly. The female subgenital plate, with a posteriorly concave basal piece, and a membranous distal piece is reminiscent of the subgenital plate of *L. kola*. With *L. ambigua*, *L. kola*, and *L. tehuautlensis*, the males of which also have two independent phallosome apodemes, and hypandrium with two posterior projections, *L. pisaquensis* constitutes an assemblage in which it stands closer to the latter two, on the basis of the posterior small projections of the epiproct (*L. ambigua* stands apart, as it has a totally different epiproct, projected posteriorly in the middle). *L. pisaquensis* is the only species in group *andra* in which the female is brachypterous and the male is macropterous. In *L. nubiloidea*, of Subgroup I, the female is micropterous and the male is macropterous (Mockford, 1993).

*L. zaragozai* also belongs in Subgroup III of the *andra* group, where it stands near *L. mayorgae* and *L. texana*, differing from them in the structure of the hypandrium and in the peculiar, deeply bilobed male epiproct.

The Angolan *L. micrura* Badonnel, known only from one female, clearly belongs in group *andra*, but, since the male is unknown, it can not be assigned to any of its subgroups.

Group *andra* is now known to constitute a morphologically well-defined species assemblage, including eight Nearctic species, five Palearctic species, ten Neotropical species, two Himalayan species and one African species.

**ACKNOWLEDGMENTS**

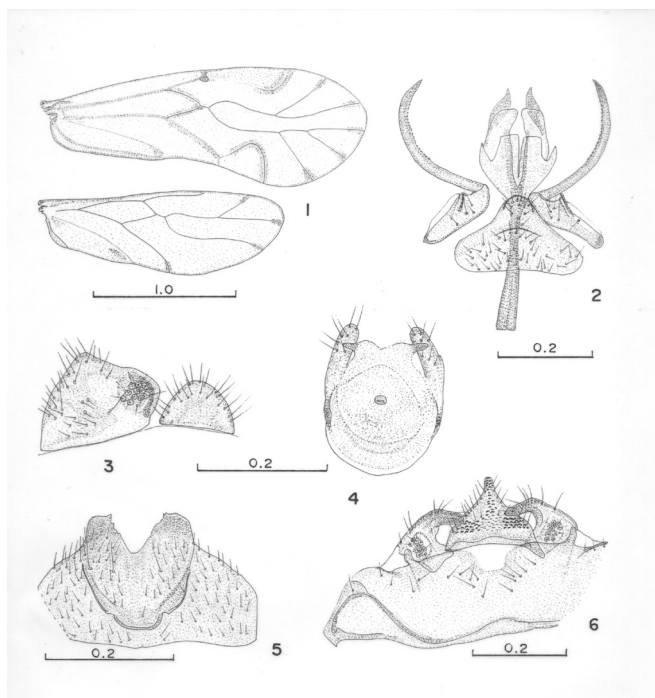
We wish to thank Dr. Santiago Zaragoza Caballero (Instituto de Biología, UNAM), for the donation of numerous specimens of Psocoptera, some of them studied in this work, collected by him and his team in the CEAMISH Biology Station, Huautla, Morelos, and in the Tehuacán-Cuicatlán Valley. Felipe Villegas (Instituto de Biología, UNAM), provided ample support with the illustrations. ANGA wishes to thank Instituto de Biología, UNAM, for continuous research support throughout the years.

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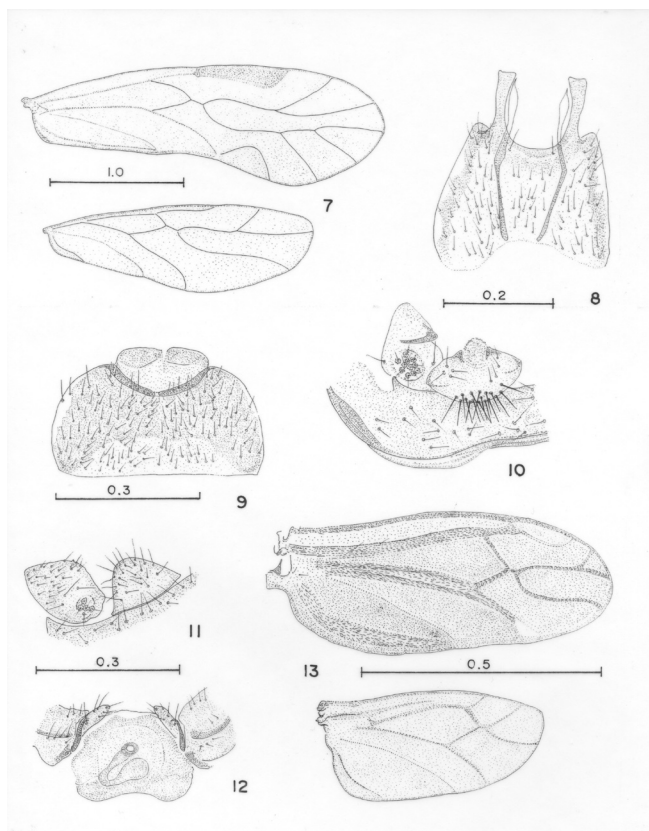
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**LITERATURE CITED**

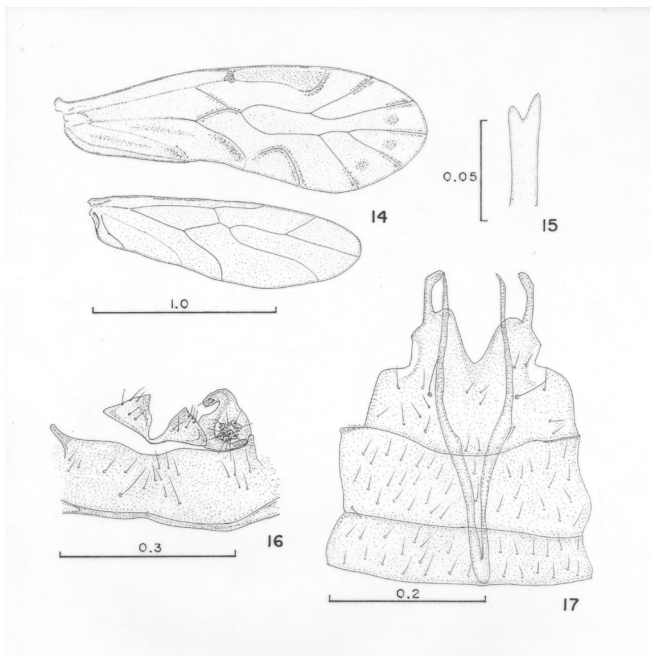
García Aldrete, A. N. 1974. A classification above species level of the genus *Lachesilla* Westwood (Psocoptera: Lachesillidae). *Folia Entomológica Mexicana* 27: 1-88.  
 Li Fasheng. 2002. *Psocoptera of China*. Science Press, Beijing, xlv + 1976 pp, plates I-X (In Chinese with English appendix).  
 Mockford, E. L. & A. N. García Aldrete. 2010. A new species of *Lachesilla* Westwood (Psocoptera: Lachesillidae) in the *andra* group with a proposed classification of the *andra* group. *Zootaxa* 2335: 49-58.



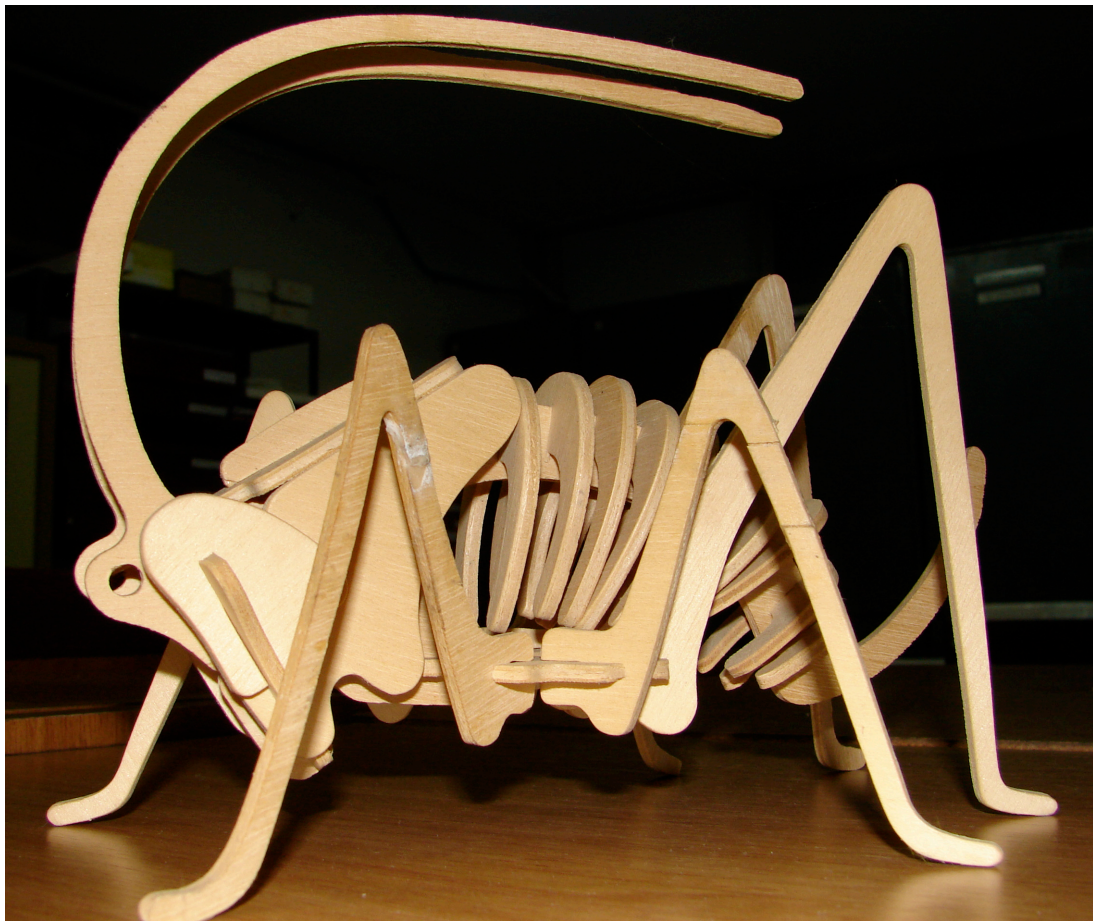
Figures 1-6. *Lachesilla dentata* n. sp. 1. Fore- and hind- wings, female. 2. Phallosome, hypandrium and claspers, male. 3. Epiproct and right paraproct, female. 4. Gonapophyses and ninth sternum, female. 5. Subgenital plate, female. 6. Epiproct, paraprocts and clunium, male. Scales in mm.



Figures 7-13. *Lachesilla pisaqensis* n. sp. 7. Fore- and hind- wings, male. 8. Hypandrium and phallosome apodemes, male. 9. Subgenital plate, female. 10. Epiproct, right paraproct and clunium, male. 11. Epiproct and right paraproct, female. 12. Gonapophyses and ninth sternum, female. 13. Fore- and hind- wings, female. Scales in mm.



Figures 14-17. *Lachesilla zaragozai* n. sp., male. 14. Fore- and hind-wings. 15. Lacinial tip. 16. Epiproct, left paraproct and clunium. 17. Hypandrium, adjacent abdominal sternites and phallosome apodemes. Scales in mm.



Artesanía y logo con escarabajo. Calí, Colombia. Septiembre, 2009. Fotografías: José Luis Navarrete-Heredia.