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Three new monotypic genera of Epipsocidae (Psocoptera) from Peru and Brazil

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Abstract

Three new species of Epipsocidae are described, each in a new monotypic genus: *Incapsocus penai* and *Terryerwinia acutiphallica* from Peru, and *Papillopsocus oriximinaensis* from Brazil. Relationships within the Epipsocidae are discussed.

Keywords: Psocoptera, Epipsocidae, Epipsocetae, Brazil, Peru, new genera

Introduction

Epipsocidae is the largest and most diverse family of the Epipsocetae, one of the six infraorders recognized in the suborder Psocomorpha on the basis of adult morphology, the other five being Archipsocetae, Hemipsocetae, Psocetae, Homilopsocidea and Caeciliusetae (Yoshizawa 2002). In contrast, in a molecular systematics study of the Psocomorpha, Johnson & Mockford (2003) did not find support for the Hemipsocetae, returning *Hemipsocus* to the Psocetae, from where it had been removed by Yoshizawa (2002).

Monophyly of the Epipsocetae is supported by six apomorphic character states: anterior tentorial pit separated from ventral margin of cranium; labrum with a pair of longitudinal sclerotized lines; forewing veins with more than one row of setae (reversed in the Epipsocidae); presence of vein 2A (reversed in the Epipsocidae); hindwing veins with two rows of setae, and valves 2 and 3 of the gonapophyses partly fused. In addition, a long gena and broad lacinial tip also possibly support monophyly (Yoshizawa 2002).

The taxonomy of the Psocoptera is based predominantly on wing venation and on genital characters. Mockford (1998) listed 12 characters that he considered important in distinguishing genera in the family Epipsocidae; three of these involved wing venation, and three referred to female or male genitalia. Two genera recently described in the Epipso-

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cidae were diagnosed on the basis mostly of wing venation and genitalic characters (García Aldrete 2004, 2005).

The purpose of this paper is to describe three species of Epipsocidae, each of which represents a new genus. Color description was made with direct cold light under a dissecting microscope. Drawings were made with a drawing tube, and measurements were taken with a filar micrometer and are stated in μm. Abbreviations of body parts measured are as follows: FW= right forewing, HW= right hindwing, F= right femur of hind leg, T= right tibia of hind leg, t1,t2= right hind leg tarsomeres, ctt1= number of ctenidia on t1 of hind leg, f1…fn= number of flagellomeres of right antenna, IO= minimum distance between compound eyes, D= antero-posterior diameter of right compound eye, d= transverse diameter of right compound eye, PO= d/D.

This paper brings the total number of genera currently recognized in this family to 23 (*Bertkauia* Kolbe, *Cubitiglabra* Li, *Dichoepipsocus* Li & Mockford, *Dimidistriata* Li & Mockford, *Dicropsocus* Smithers & Thornton, *Epipsocopsis* Badonnel, *Epipsocus* Hagen, *Goja* Navas, *Heteroepipsocus* Li, *Hinduipsocus* Badonnel, *Ianthorntonia* García Aldrete, *Liratepipsocus* Li, *Mesepipsocus* Badonnel, *Metepipsocus* Li, *Neurostigma* Enderlein, *Odontopsocus* Badonnel, *Parepipsocus* Badonnel, *Rogojiella* García Aldrete, *Spordoepipsocus* Li, and *Valvepipsocus* Li, in addition to the three described below) (Casasola González, *in progress*).

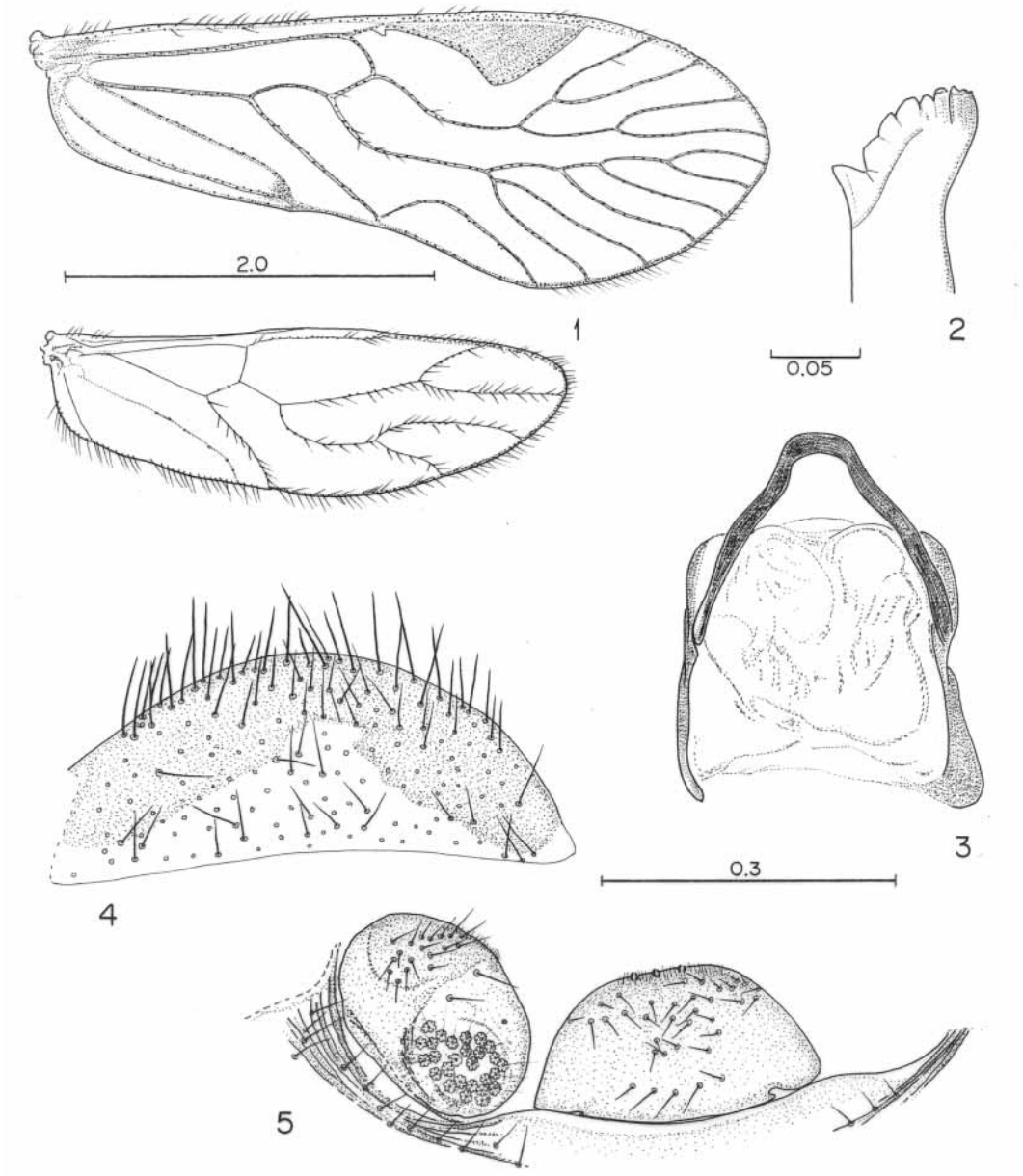
Incapsocus gen. n.

Diagnosis. Belonging in the Epipsocidae. Five distal labral sensilla, subequal in size, in line: one central placoid, flanked by one trichoid, these central three flanked by one placoid. Without row of cuticular cones on setal bases of fore- and hind femora. Forewing Rs 4-branched, M 5–6 branched; hindwing M 2-branched. Clunium projected posteriorly in area over epiproct. Phallosome simple, open anteriorly, without external parameres and without endophallic sclerites. Differing from *Cubitiglabra*, *Goja*, and *Ianthorntonia* (genera with venation supernumerary), in having Rs in forewing forked, each stem dividing again for a total of 4 R veins, in having hindwing Rs-M joined by a long fusion and having M 2-branched, and in having the phallosome simple, without external parameres and without phallic sclerites. Differing from *Bertkauia*, *Dichoepipsocus*, *Epipsocopsis*, *Epipsocus*, *Heteroepipsocus*, *Hinduipsocus*, *Liratepipsocus*, *Mesepipsocus*, *Metepipsocus*, *Odontopsocus*, *Rogojiella*, *Spordoepipsocus*, and *Valvepipsocus* (genera either with caeciliusid venation, brachypterous or apterous), in having wing venation supernumerary, and in the combination of male genital characters indicated above.

Type species. *Incapsocus penai*

***Incapsocus penai,* sp. n. (Figs. 1–5)**

Color (in 80% alcohol). Body pale brown. Compound eyes black, ocelli hyaline, without pigmented centripetal crescents. Epicranial sulcus ochre, well defined. Wings almost hyaline, with a faint yellowish hue; veins pale brown, forewing pterostigma dark brown. Abdomen dirty white, with ochre, transverse subcuticular rings.



FIGURES 1–5. *Incapsocus penai*. Male. 1. Fore- and hindwing. 2. Lacinial tip. 3. Phallosome. 4. Hypandrium. 5. Posterior border of clunium, right paraproct and epiproct. Scales in mm. Figs. 3–5 to common scale.

Morphology. Epicranial sulcus with very short lateral arms. Outer cusp of lacinial tip broad, with 6 denticles (Fig. 2). Five distal inner labral sensilla, of same size, in line: one central placoid and on each side of it one trichoid and one placoid. Forewing (Fig. 1) with pterostigma broadly triangular, narrow anteriorly and widening distally; Rs forked, each stem divided in two branches. Right forewing with M 5-branched, left forewing with M 6-branched. Areola postica low, elongate. Hindwing (Fig. 1) with Rs-M joined by a long fusion, M forked. Hypandrium (Fig. 4) rounded distally, pigmented area concave, setae as illustrated, continuous along posterior border, without defined lateral fields. Phallosome (Fig. 3) simple, open anteriorly, aedeagal arch broad-tipped; without external parameres, phallic sclerites absent. Clunium projected posteriorly in area over epiproct (Fig. 5). Paraprocts robust, with setae as illustrated, a field of microspines mesally on outer edge, and sensory field slightly elliptic, with 29–30 trichobothria issuing from basal rosettes (Fig. 5). Epiproct trapeziform, with 3 setae and a field of microspines along posterior border, a field of postero-mesal setae, and a group of 5 setae, on line, near anterior border.

Measurements. FW: 4039, HW: 2920, F: 901, T: 1734, t1: 695, t2: 183, ctt1: 28, f1: 799, f2: 795, f3: 602: IO: 495, D: 302, d: 233, IO/D: 1.63, PO: 0.77.

Material studied. Holotype ♂. PERU. Department of Cuzco. Quincemil (13.2°S: 70°77'W, 619 m), IX.1962, in tropical forest (Luis E. Peña), E. L. Mockford collection, Illinois State University, Normal, Illinois, U. S. A.

Etymology. The genus name is a composite word from Inca, a dominant ethnic Peruvian group, and psocus= psocid. The species is dedicated to its collector.

Remarks. Preliminary results of a phylogenetic analysis of the 40 genera that comprise the infraorder Epipsocetae (Casasola González, *in progress*), place *Incapsocus* in a clade as sister group to an assemblage constituted by *Cubitiglabra*, *Goja*, and *Ianthorntonia*. The clade is supported by having wing venation supernumerary (=forewing with Rs more than 2-branched, M more than 3-branched, and hindwing with M forked). *Incapsocus* stands apart from the above 3 genera on account principally of genital differences and wing venation details: *Cubitiglabra* has a closed phallosome and distinct external parameres; *Goja* and *Ianthorntonia* are sister genera, presenting a complex phallosome, with external parameres and well defined phallic sclerites.

Geographically, *Incapsocus*, some species of *Goja*, and *Ianthorntonia* are Andean, while the two known species of *Cubitiglabra* are Chinese.

Papillopsocus gen. n.

Diagnosis. Belonging in the Epipsocidae. Five distal labral sensilla, almost in line: a central placoid, with one pair trichoid-placoid on each side. Wing venation caeciliusid (FW Rs 2-branched, M 3-branched; HW Rs 2-branched, M unbranched). Hindwing Rs-M fused basally for a distance. Phallosome semi-closed anteriorly, aedeagal arch stout, slightly projected apically, without external parameres; a distinct endophallus, formed by an elongate

sheet, posteriorly concave, bearing a field of papillae on distal third, not reaching the posterior border; strongly pigmented on the sides, underlaid by two elongate, slender, distally acuminate sclerites. Endophallic sheet basally with a large, rounded, papillose pigmented body on each side. Female gonapophyses without v1, v3 an elongate, setose lobe on side of v2; ninth sternum thick, pigmented. Differing from the described epipsocid genera (*Bertkauia*, *Cubitiglabra*, *Dichoepipsocus*, *Dicropsocus*, *Epipsocopsis*, *Epipsocus*, *Goja*, *Heteroepipsocus*, *Hinduipsocus*, *Ianthorntonia*, *Liratepipsocus*, *Mesepipsocus*, *Metepipsocus*, *Odontopsocus*, *Rogojiella*, *Spordoepipsocus*, and *Valvepipsocus* Li), by the combination of wing venation and genital characters listed above; the phallosome structure is unique in the family.

Type species. *Papillopsocus oriximinaensis*

Papillopsocus oriximinaensis, sp. n. (Figs. 6–12)

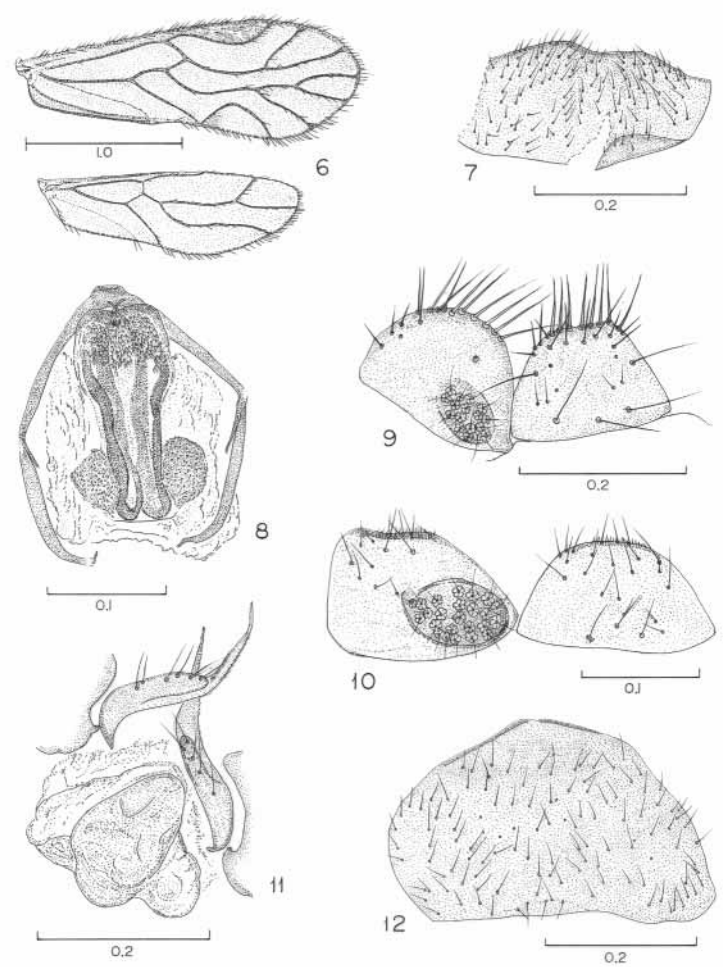
Male. Color (in 80% alcohol). Body pale brown. Compound eyes black, ocelli hyaline, with ochre centripetal crescents. Wings almost hyaline, with a tenuous yellowish hue, veins pale brown, pterostigma more pigmented. Abdomen whitish, with brown, transverse subcuticular rings.

Morphology. Epicranial sulcus well defined, with lateral arms short. Outer cusp of lacinial tip broad, with 4 denticles. Forewing (Fig. 6), with pterostigma narrow anteriorly, smoothly rounded, wider in the middle. Areola postica wide, rounded apically; wing venation caeciliusid. Hindwing (Fig. 6) with Rs-M fused basally for a length. Hypandrium (Fig. 7) broad, setose, slightly concave posteriorly. Phallosome (Fig. 8) semi-closed anteriorly, aedeagal arch stout, slightly projected apically. Endophallus distinct, concave posteriorly, with a field of mesal papillae on posterior third, underlaid by one pair of elongate longitudinal sclerites, distally acuminate; endophallus sheet flanked basally by rounded, pigmented, papillose bodies. Paraprocts (Fig.10) robust, setose, with field of small spines mesally on border, sensory fields elliptic, with 23–24 trichobothria, issuing from basal rosettes. Epiproct (Fig. 10) trapeziform, with a group of 3 setae anteriorly, almost in line, posterior border with a row of 3 setae and a field of microspines, other setae as illustrated.

Measurements. FW: 2196, HW: 1632, F: 560, T: 1006, t1: 430, t2: 113, ctt1: 30, Mx4: 119, IO: 274, D: 234, d: 160, IO/D: 1.17, PO: 0.68.

Female. Color (in 80% alcohol). Same as the male.

Morphology. Head missing. Subgenital plate (Fig. 12) broad, setose. Gonapophyses (Fig. 11): v1 absent, v3 an elongate lobe on side of v2, with 5–6 setae on line; v2 stout, with a short anterior heel, and a long acuminate process. Paraprocts (Fig. 9) robust, with a row of stout setae on margin, and a field of microspines, sensory fields elliptic, with 18–19 trichobothria issuing from basal rosettes. Epiproct (Fig. 9) trapeziform, with a group of 3 setae anteriorly, a row of 6 stout setae along posterior border, and a field of microspines; other setae as indicated



FIGURES 6–12. *Papillopsocus oriximinaensis*. 6. Fore- and hindwing, ♂. 7. Hypandrium, ♂. 8. Phallosome, ♂. 9. Right paraproct and epiproct, ♀. 10. Right paraproct and epiproct, ♂. 11. Gonapophyses and ninth sternum, ♀. 12. Subgenital plate, ♀. Scales in mm.

Measurements. FW: 2253, HW: 1701.

Material studied. Holotype ♂. Brazil. Pará. Oriximiná (1°44'S:55°52'W). Rio Trombetas, ALCOA mines, in Malaise trap, 17–26.XI.1982 (Joao Vidal). Paratypes, 1♀, 5♂, collected with holotype. The holotype, paratype ♀ and three paratypes ♂ deposited in the Invertebrate Collection, Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazônas, Brasil. Two paratypes ♂ are deposited in the Colección Nacional de Insectos (CNIN), Instituto de Biología, Universidad Nacional Autónoma de México, México City.

Etymology. The generic name makes reference to the field of papillae in the endophallus of the male phallosome, and psocus= psocid, that is, psocid with papillae. The species name refers to the type locality, in the NE Amazon basin.

Remarks. The structure of the endophallus makes this genus unique in the Epipsocidae. So far, the genus is known only from the type locality. A cladistic analysis of the Epipsocetae (Casasola González, *in progress*), places this genus as sister group of *Terryerwinia* gen. n. described below, with *Epipsocus argutus* New (1980) from Reserva Ducke, Amazonas, Brazil, as sister group to that pair of genera.

Terryerwinia gen. n.

Diagnosis. Belonging in the Epipsocidae. Five distal labral sensilla, almost in line: one central placoid, flanked by one trichoid and one placoid. Without row of cuticular cones on setal bases of fore- and hind-femora. Wing venation caeciliusid, hindwing Rs-M fused basally for a distance. Clunium slightly projected posteriorly in area over epiproct. Phallosome simple,semi-closed anteriorly, without external parameres, with lateral struts slender, with a subquadrate apical projection, flanked by straight, acuminate projections, directed outwards. Endophallus constituted by a dense radula, formed by numerous individual corns. Hypandrium with distinct, postero-lateral prominences, bearing each a setal field. Gonapophyses with v1 absent, v3 an elongate, setose lobe on side of v2. Ninth sternum complex, with a well defined central piece. Differs from the other epipsocid genera with caeciliusid venation (*Bertkauia*, *Epipsocopsis*, *Epipsocus*, *Heteroepipsocus*, *Mesepipsocus*, *Rogojiella*, and *Spordoepipsocus*), by the posterior lateral projections of the phallosome, the posterior hypandrial prominences and absence of external parameres in the males, and in the females by the lack of v1 and structure of the ninth sternum.

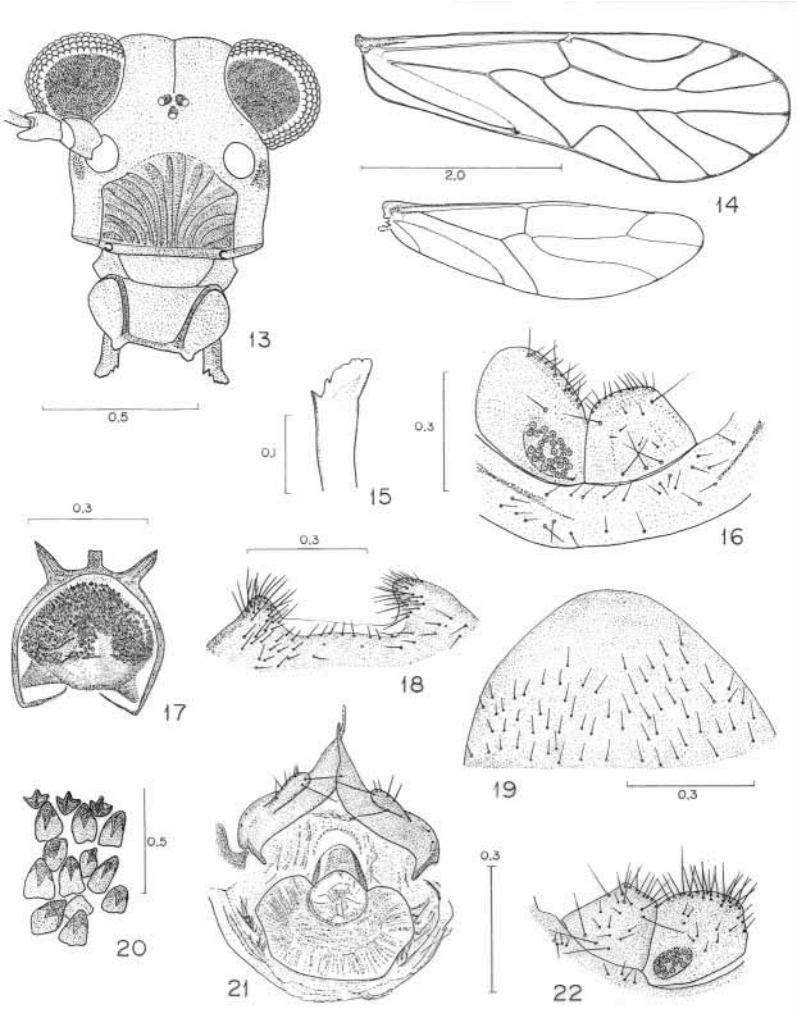
Type species. *Terryerwinia acutiphallica*

Terryerwinia acutiphallica sp. n. (Figs. 13–22)

Male. Color (in 80% alcohol). Body pale brown. Compound eyes black, ocelli hyaline, with ochre centripetal crescents. An irregular ochre spot on each gena, next to antennal fossae. Antennae and maxillary palps pale brown, Mx4 slightly more pigmented than the other palpomeres. Legs pale brown. Thorax pale brown, with some irregular ochre spots on pleurae. Wings hyaline, veins brown, with distal dark brown spots at wing margin. Abdomen whitish, with ochre, transverse, subcuticular rings.

Morphology. Labral tubercles prominent, each with two small, apical projections. Outer cusp of lacinial apex broad, with 6 denticles (Fig. 15). Forewing pterostigma long, narrow anteriorly, wider in the middle; areola postica long, shaped like an scalene triangle (Fig. 14). Hindwing Rs-M fused basally for a distance (Fig. 14). Hypandrium (Fig. 18), broad, setose, posteriorly straight, with distinctly protruding, setose, postero-lateral corners. Phallosome (Fig. 17), semi-closed anteriorly, lateral struts slightly curved, aedeagal arch with an apical, stout, truncate projection, flanked by much longer, stout, acuminate

projections, directed outwards. Endophallus constituted by a radula, formed by many wide-based, pointed, individual corns (Figs. 17, 20). Paraprocts (Fig. 16) broad, setose, with sensory fields elliptic, with 26–27 trichobothria issuing from basal rosettes. Epiproct (Fig. 16) trapeziform, with a group of 3 mesal setae next anterior border, a row of setae along posterior border, and other setae as illustrated.



FIGURES 13–22. *Terryerwinia acutiphallica*. 13. Front view of head, ♂. 14. Fore- and hindwing, ♂. 15. Lacinial tip, ♂. 16. Clunium, right paraproct and epiproct, ♂. 17. Phallosome, ♂. 18. Posterior border of hypandrium, ♂. 19. Subgenital plate, ♀. 20. Corns of phallosome radula, ♂. 21. Gonapophyses and ninth sternum, ♀. 22. Posterior border of clunium, epiproct and left paraproct, ♀. Scales in mm. Figs. 21 and 22 to common scale.

Measurements. FW: 4363, HW: 3187, F: 1118, T: 1359, t1: 691, t2: 142, ctt1:42, Mx4: 285, f1: 1282, IO: 294. D: 318, d: 308, IO/D: 0.92, PO: 0.96.

Female. Color (in 80% alcohol). Same as the male.

Morphology. Lacinial tip, labral tubercles and wing venation as described for the male. Subgenital plate (Fig. 19) broad, setose, posteriorly rounded, glabrous on posterior third. Gonapophyses (Fig. 21): v1 absent, v3 an elongate lobe on side of v2, with 8–9 setae; v2 robust, with short anterior heel and short acuminate distal process. Ninth sternum membranous with a thick central area, this with three posterior lobes and an elongate, elliptic posterior projection (Fig. 21). Clunium slightly projected in area over epiproct. Paraprocts (Fig. 22) broad, setose; sensory fields elliptic, with 18–19 trichobothria issuing from basal rosettes. Epiproct (Fig. 22) trapeziform, with a group of 3 mesal setae next to anterior border, a dense field of setae posteriorly and other setae as illustrated.

Measurements. FW: 4153, HW: 3019, F: 1253, T: 2051, t1: 1015, t2: 159, ctt1: 41, Mx4: 283, f1: 1403, f2: 1011, IO: 335, D: 296, d: 286, IO/D: 1.13, PO: 0.96.

Material studied. Holotype ♂. PERU. Madre de Dios. Río Tambopata Reserved Area. 30 km (air) SW Puerto Maldonado, 230 m, 12°50'S: 69°17'W. Smithsonian Institution Canopy Fogging Project, 10 May, 1984 (04/02/062), (Terry L. Erwin *et al.*). Paratypes: Same locality and collectors, 9 March, 1984, 1♂, 2♀ (04/02/065, 04/02/064, and 04/02/052). 10 May, 1984, 1♂, 4♀♀ (04/02/077, and 01/03/089, 04/02/049, 04/02/050, 04/02/066). 8 Nov. 1983 , 1♂ (04/02/069). Holotype, two paratypes ♂, and five paratypes ♀, deposited in the Smithsonian Institution Collection, Washington, D. C. One paratype ♂, and one paratype ♀ (9 March, 1984, 04/02/064 and 10 May, 1984, 04/02/050) deposited in the Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México, México City, México.

Etymology. The genus name honors Dr. Terry L. Erwin (Smithsonian Institution, Washington, D. C.), and constitutes a small tribute to his seminal and heuristic work in several areas of entomology, particularly in systematics of the Carabidae. The species name refers to the acuminate projections of the aedeagal arch (*acutiphallica* = having an acuminate phallus).

Remarks. The posterior, acuminate apophyses of the aedeagal arch, the postero-lateral projections of the hypandrium, the absence of v1, and the structure of the female ninth sternum, make this genus unique in the Epipsocidae. A cladistic analysis of the Epipsocetae (Casasola González, *in progress*), place this genus as sister group to *Papillopsocus* García Aldrete, the two genera having *Epipsocus argutus* New as sister group.

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References

Casasola González, J.A. (in progress) Relaciones filogenéticas de los géneros de Epipsocetae Pearman, 1936 (Psocoptera: Psocomorpha). Disertación doctoral. Posgrado en Ciencias Biológicas, Universidad Nacional Autónoma de México, México, D. F. México.

García Aldrete, A.N. (2004) A new epipsocid genus (Psocoptera: Epipsocidae) from Bolivia. Pp. 99–113. *In*: García Aldrete, A. N., Lienhard, C. & Mockford, E. L. (Editors). *Thorntoniana. A commemorative volume for Ian W. B. Thornton (1926–2002)*. Publicaciones Especiales 20. Instituto de Biología, Universidad Nacional Autónoma de México. México, D. F. México.

García Aldrete, A.N. (2005) A new genus of Bolivian Epipsocidae (Psocoptera). *Journal of the New York Entomological Society*, 112, 217–220.

Johnson, K. P. & Mockford, E.L. (2003) Molecular systematics of Psocomorpha (Psocoptera). *Systematic Entomology*, 28, 409–416.

Mockford, E.L. (1998) Generic definitions and species assignments in the Family Epipsocidae (Psocoptera). *Insecta Mundi*, 12, 81–91.

New, T. R. (1980) Epipsocetae (Psocoptera) from the Reserva Ducke, Amazonas. *Acta Amazonica*, 10, 179–206.

Yoshizawa, K. (2002) Phylogeny and higher classification of suborder Psocomorpha (Insecta: Psocodea: 'Psocoptera'). *Zoological Journal of the Linnean Society*, 136, 371–400.

