

Achuarmychnus carltoni, new genus and new species of Neotropical Lycoperdininae (Coleoptera, Endomychidae)

K. Wioletta Tomaszewska¹ & Richard A. B. Leschen²

With 36 figures

Abstract

A new genus and species of Endomychidae (Coleoptera: Endomychidae, Lycoperdininae) from South America (Ecuador), *Achuarmychnus carltoni*, is described and illustrated based on larvae and adults. Adult and larval characters concerning similarities to other Endomychidae and Lycoperdininae in particular are discussed.

Key words: entomology, taxonomy, Cucujoidea, new genus, new species.

Introduction

The subfamily Lycoperdininae (= Eumorphinae) (Strohecker 1953, Lawrence and Newton 1995, Tomaszewska 2000) has always formed the largest (over 600 species) subfamily and is a fairly distinct, uniform group within Endomychidae. In the recent classification of Endomychidae based on cladistic analysis by Tomaszewska (2000), Lycoperdininae was shown to be a monophyletic taxon in having the following characters postulated as synapomorphies: stridulatory membrane on the anterior margin of the pronotum, stridulatory area (occipital file) on the head, and ovipositor with fused coxities (Tomaszewska 2000). Despite the conjectured monophyly of Lycoperdininae, the limits of this subfamily as well as the relationships of its genera requires additional work and a cladistic study is in progress by one of us (WT) based on the larval and adult characters. To this end, we describe a species and genus based on adults and associated larva collected by Chris Carlton a few years ago in Ecuador.

Material and methods

Acronyms for depositories of specimens are: LSAM – Louisiana State Arthropod Museum, Louisiana State University,

USA; RALC – Richard Leschen Collection, Auckland, New Zealand; MIZ – Museum and Institute of Zoology PAS, Warszawa, Poland.

Measurements were made using a filar micrometer as follows: body length, from apical margin of clypeus to apex of elytra; width, across elytra (at widest part); pronotal length, from the middle of anterior margin to margin of basal foramen; pronotal width, across widest part; elytral length along suture, including scutellum. The drawings of structures were made using a camera lucida attached to dissecting (Olympus SZH 10 and Leica MZ 12) and compound (Olympus BX50) microscopes.

Taxonomy

Achuarmychnus gen. n.

Figs 1–36

Type species: *Achuarmychnus carltoni* new species.

Etymology: The genus name is a combination of the name Achuar, one tribe of the indigenous people living in the Napo Region of Ecuador, and *-mychnus*, derived from the suffix of the family name Endomychidae.

Adult diagnosis: Body densely setose. Terminal antennomere with apical margin bearing small, setose tubercles/sensillae. Mandible with one, large apical tooth and without subapical

¹ Museum and Institute of Zoology, Polish Academy of Sciences, Wilcza 64, 00-679 Warszawa, Poland.
E-mail: wiolkat@robal.miiz.waw.pl

² Landcare Research, Private Bag 92 170, 120 Mt Albert Road, Auckland, New Zealand.
E-mail: leschenR@landcare.cri.nz

Received August 2003, accepted June 2004



Fig. 1. *Achuarmychus carltoni* sp. nov. Habitus of adult. Scale bar = 1.0 mm

teeth. Prosternal process moderately wide and extending beyond front coxae. Intercostal process of mesoventrite pentagonal, about twice as long as wide. Elytra at most $2.1 \times$ longer than pronotum. Wingless. Abdominal ventrite 6 partially visible. Ovipositor with well developed, separated coxities. Tegmen with basal piece encircling penis in its half length and the tegminal strut long. Ejaculatory duct long, stout and partially coiled.

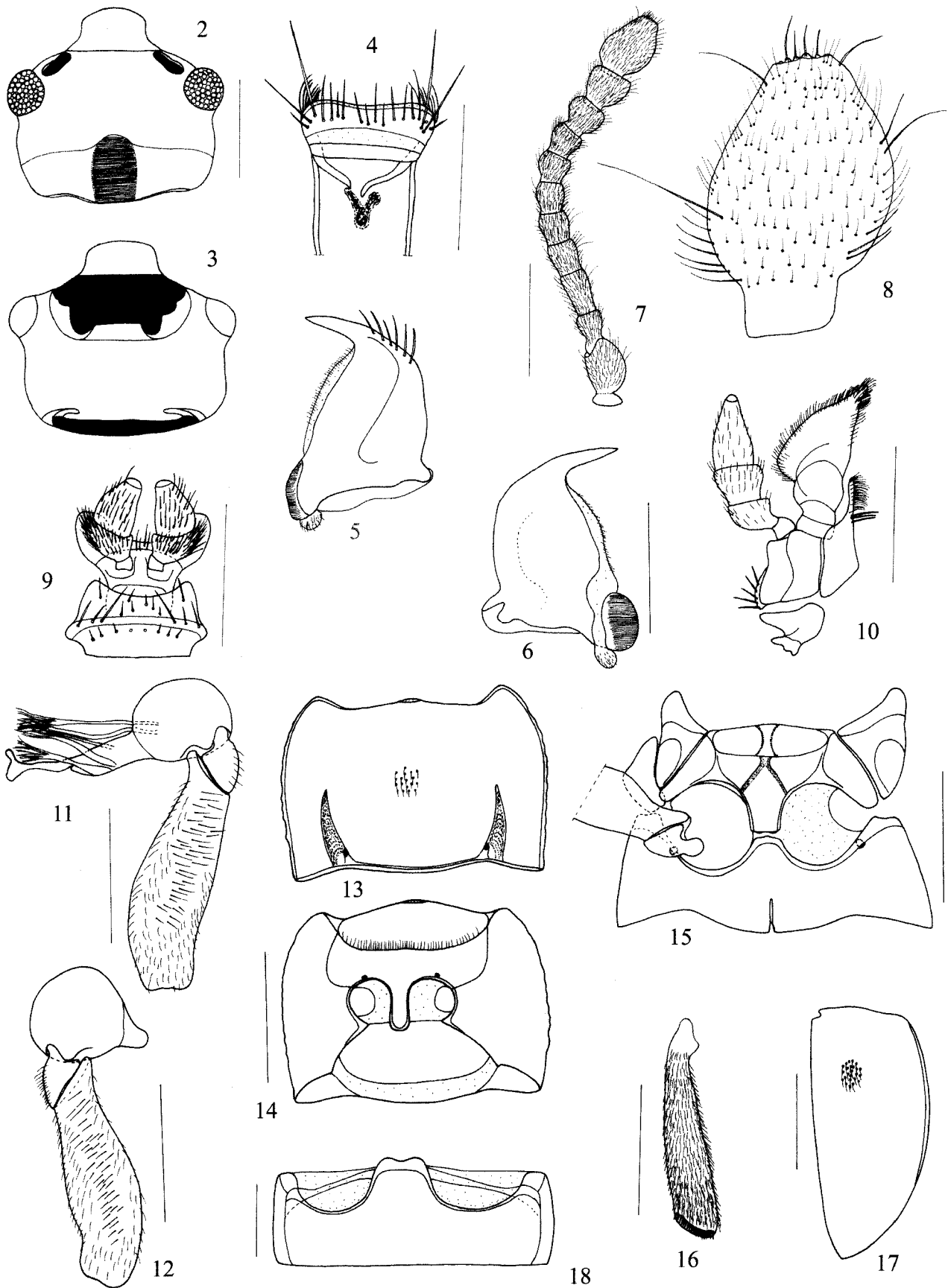
Adult description: Body (Fig. 1) elongate-oval, comparatively convex, shiny, densely setose; moderately densely and coarsely but rather shallowly, confusedly punctured; ventral surfaces with interspaces covered with distinct, reticulate microsculpture. Colour dark reddish-brown with sterna slightly darker and antenna somewhat lighter.

Head (Figs 2, 3) partially retracted in prothorax, weakly transverse. Eyes large, oval in outline, prominent, coarsely faceted. Occiput covered with reticulate microsculpture and with long-oval, finely ridged, central stridulatory area. Gular sutures rather short but distinct, widely separated, strongly convergent anteriorly. Antenna (Fig. 7) slightly shorter than half length of body, rather stout, with 3-segmented, scarcely flattened and rather narrow club; with antennomere 3 elongate (about $1.6 \times$ longer than wide); antennomeres 4–6 scarcely longer than wide and antennomeres 7–8 scarcely wider than long; terminal antennomere (Fig. 8) distinctly elongate with apical margin bearing small tubercles/sensillae. Clypeus transverse, flat, with anterior margin weakly rounded, widest at base, narrowing from

base towards about half length, thence parallel. Labrum (Fig. 4) moderately sclerotized with very narrow, membranous apex; strongly transverse, coarsely punctured, covered with long setae and with tufts of long and very long setae on sides; anterior edge weakly emarginate; tormae elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 5, 6) with strong and sharp apical tooth and without subapical teeth; mola large, well-developed, finely ridged; prosthema narrow, membranous, covered with short and fine setae; submola very small, setose, membranous. Maxilla (Fig. 10) with terminal palpomere conical, rounded apically; galea large, broadly triangular, densely setose; lacinia short and very narrow apically, fringed with stiff, slightly curved setae on inner margin, with a few straight setae along dorsal surface and three long spines below them; digitus absent. Labium (Fig. 9) with palpi rather close together; palpomere 2 transverse; terminal palpomere elongate, narrowing from half length towards apex, weakly rounded apically. Mentum transverse, widest near basal third with scarcely arcuate, weakly raised ridge transversely; covered with rather sparse setae and with reticulate microsculpture basally. Prementum short, moderately sclerotized with ligula produced into distinct, lateral lobes.

Prothorax transverse, widest near half length, parallel from base toward basal third, thence weakly rounded toward anterior margin. Pronotum (Fig. 13) narrowly bordered laterally and basally; anterior margin with very small, produced anteriorly stridulatory membrane; basal sulcus moderately deep, lateral sulci somewhat triangular, scarcely curved outwardly, deep and long with small pits at base; anterior angles shortly produced, blunt, posterior angles almost right-angled; pronotal disc comparatively convex. Prosternum (Fig. 14) with small pit at the front of each procoxal cavity; prosternal process moderately wide, extending distinctly beyond front coxae, somewhat bordered laterally and apically, weakly rounded at apex; front coxae prominent, circular in outline (Fig. 11); their cavities externally open, internally widely closed; trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum small, strongly transverse, rather sparsely punctured, angulate near base and widely rounded apically. Mesoventrite (Fig. 15) without pits near anterior margin; intercostal process almost flat, elongate, pentagonal, straight posteriorly; moderately widely separating meso-coxae, extending to about half of their length.



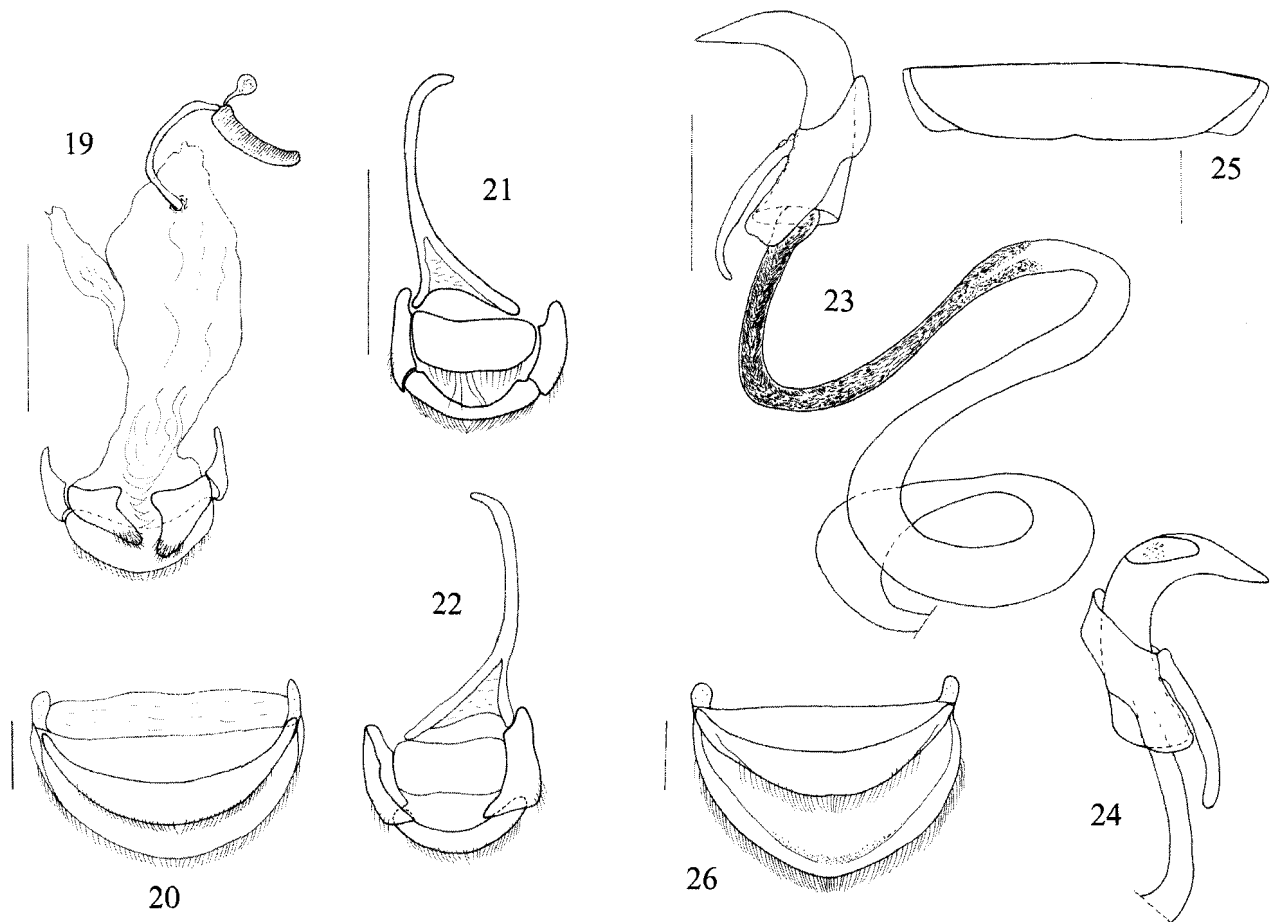
Figs 2–18. *Achuarmychus carltoni*. Adult structures. 2, head, dorsal outline; 3, head, ventral outline; 4, labrum, ventral; 5, mandible, dorsal; 6, mandible, ventral; 7, antenna; 8, terminal antennomere; 9, labium, ventral; 10, maxilla, left, dorsal; 11, fore coxa, trochanter and femur; 12, mid coxa, trochanter and femur; 13, prothorax, dorsal; 14, prothorax, ventral; 15, meso- and metathorax, ventral; 16, fore tibia; 17, elytron, right, dorsal; 18, abdominal ventrite 1. Scale bar = 0.5 mm for Figures 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 18. Scale bar = 1.0 mm for Figure 17.

Mesocoxa (Fig. 12) circular in outline, its cavity outwardly open; trochantin exposed. Meso-meta-ventral junction with internal knobs. Elytra (Fig. 17) widest near half length, thence abruptly narrowing towards apex; blunt apically; comparatively strongly convex with punctures dense and moderately coarse; humeri almost flat; lateral margins very narrowly flattened and scarcely visible from above; epipleuron comparatively wide, narrowing towards apex, reaching abdominal ventrite 5. Metaventrite (Fig. 15) strongly transverse, shorter than mesoventrite and abdominal ventrite 1, weakly convex, narrowing towards its anterior margin which is rather narrow and scarcely raised; provided with a pair of small postcoxal pits; discrimen extending along 1/3 length of metaventrite. Metacoxae transverse, widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Wingless.

Legs moderately long and rather stout; trochanterofemoral attachment heteromeroid (Figs 11, 12). Femur widest near half length, densely

setose; ventral surfaces of fore and mid femora bear many obliquely directed, erect, moderately long spines (Figs 11, 12); dorsal surfaces of mid and hind femora bear a few similar spines; tibia and tarsus very densely setose; tibia weakly widening towards tarsus, without apical spurs (Fig. 16); tarsi pseudotrimerous with tarsomeres 1 and 2 moderately widely flattened and ventrally lobed; terminal tarsomere about 5 times longer than tarsomere 3. Claws simple, hollowed along inner edge; empodium distinct, bisetose.

Abdomen with intercoxal process moderately wide (Fig. 18); with five freely articulated ventrites and ventrite 6 partially visible. Ventrite 1 as long as 3.5 following ventrites combined; ventrites 2–4 gradually, slightly shorter. Ventrite 5 in male with weak, median excision at apex (Fig. 25). Male abdominal segment 8 (Fig. 26) with sternite narrow and scarcely emarginate apically; tergite large with very small membranous lateral lobes at base; female segment 8 with sternite and tergite simple apically (Fig. 20). Male genital segment (Figs 21, 22) with sternite weakly emarginate;



Figs 19–26. *Achuarmychnus carltoni*. Adult structures. 19, female genitalia, ventral; 20, abdominal segment 8, female, ventral; 21, male genital segment, ventral; 22, male genital segment, dorsal; 23, aedeagus, ventral; 24, aedeagus, dorsal; 25, abdominal ventrite 5, male; 26, abdominal segment 8, male, ventral. Scale bar = 0.5 mm for Figures 19, 21, 22, 23, 24. Scale bar = 0.2 mm for Figures 20, 25, 26.

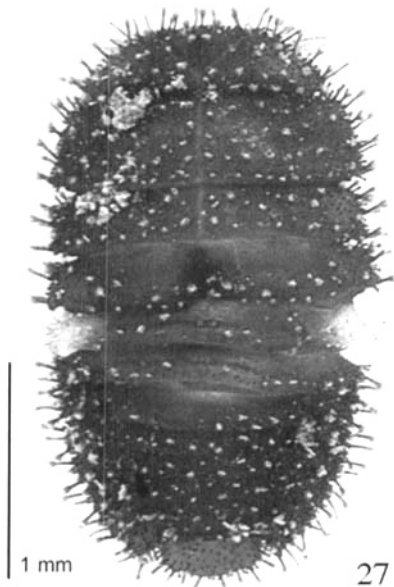


Fig. 27. *Achuarmythus carltoni*, larva, dorsal view.

nate and paired apophyses fused along at least 2/3 of their length; dorsal plate divided into two, lateral parts.

Aedeagus (Figs 23, 24) rather short and comparatively slender, resting on its side when retracted; tegmen comparatively large, placed near middle length with parameres fused and tegminal strut long. Penis strongly curved apically (curvature $\sim 90^\circ$) and pointed at apex. Ejaculatory duct long, stout and partially coiled.

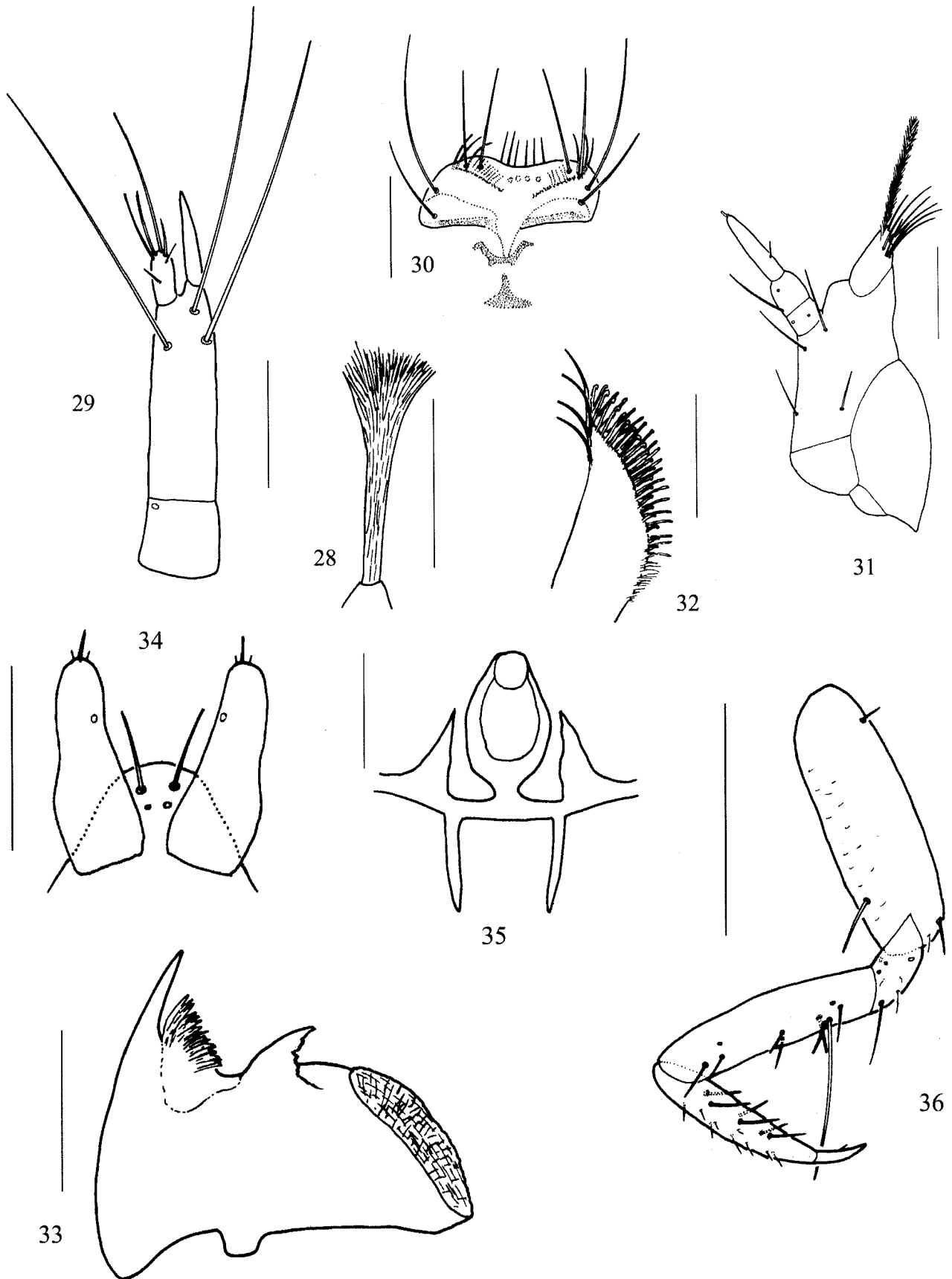
Female genitalia (Fig. 19). Ovipositor moderately sclerotized, with coxities separated, styli absent. Spermatheca small, strongly elongate, membranous; accessory gland minute, rounded, membranous; sperm duct short, slender; bursa copulatrix elongate with lateral outlet of common oviduct and apical outlet of sperm duct.

Larval diagnosis: Head with 4 stemmata per side. Hypostomal rods elongate. Antennal segment III shorter than sensorium. Mandible with "prosthema" present as two widely separate and fixed parts. Cardo divided. Mala fimbriate. Labial palps narrowly separated at base, each 1-segmented. Ecdysial suture present on thoracic terga 1–3. Terga lacking dorsal tubercles, sublateral lobes, or obvious glands. Tergum 9 without urogomphi.

Larval description: Mature larva 2.8 mm long, 1.5 mm wide. Body broadly ovate (Fig. 27), moderately dorsoventrally flattened, lacking dorsal lobes or scoli, gradually narrowing posteriorly, constricted between segments; color dark yellow tan, tips of frayed setae, mouthparts, antennae, legs, and lateral lobes of abdominal segment 1 lighter. Surface texture microgranulate.

Vestiture consisting of apically branching frayed setae (Fig. 28), longer on the lateral lobes and denser on lateral lobes, and head.

Head transverse in dorsal view and triangular in anterior view, hypognathous, and visible in dorsal view. Epicranial stem present and short, frontal arms v-shaped. Median endocarina absent. Hypostomal rods present, single, and elongate extending to edge of cranium (length about equal to stipes); paragular area well developed and bordered posteriorly by a transverse endocarina. Stemmata 4 per side; 1 directly ventral to antennal insertion, the remaining stemmata positioned posterior to insertion. Antenna (Fig. 29) inserting into a well developed circular membrane (retracted in specimens examined), length about 0.25 length of head, ratio: A1:A2:A3 = 1.9:2.2:0.6; surface slightly granulate; antennomere 1 with a single campaniform sensillum; antennomere 2 with three apical and subapical setae; antennomere 3 shorter than sensorium with 4 apical scoloidia and two short setae along shaft. Frontoclypeal suture present, and nearly straight. Clypeus transverse and glabrous. Labrum (Fig. 30) free; slightly longer (about 1/4) than clypeus and $2 \times$ wider than long, glabrous and very weakly emarginate with 4 pairs of long setae, 3 pairs of shorter anterior setae, 6 apical setae. Epipharynx with 4 anteromedial campaniform sensillae; tormae transverse; sclerotised brace present posteriorly. Mandible (Fig. 33) more or less transverse with a simple incisor lobe lacking subapical ridges or teeth; "prosthema" present as two widely separate and fixed parts, apically brushy and posteriorly hyaline and falcate; mola well developed and finely tuberculate. Maxillolabial complex retracted; well developed articulating area present; maxilla (Fig. 31) with stipes about $2 \times$ longer than wide, cardo divided by an internal ridge, distal portion triangulate and proximal portion diminutive, well defined and longitudinally ovate; mala (Fig. 32) fimbriate and flattened distally bearing two inner rows of elongate rake-like setae and an outer uncus, unmodified present on the inside base (7) and outer apical margins (4); maxillary palpomere 1 short with 2 campaniform sensillae; palpomere 2 $1.2 \times$ longer and slightly wider than palpomere 1, unisetose with campaniform sensillum; palpomere 3 narrow and longer than 1 and 2 combined, unisetose, bearing an apical elongate conical sensillum. Labium (Fig. 34) with mentum and submentum fused, demarcated by a weak transverse line; prementum rather short with ligula narrowly rounded at apex; labial palp 1-segmented (palpiger not present?), elongate (over $2 \times$



Figs 28–36. *Achuarmyachus carltoni*. Larval structures. 28, frayed seta; 29, left antenna, dorsal view; 30, labrum and epipharynx, dorsal view; 31, maxilla, ventral view; 32, mala, lateral view; 33, mandible, dorsal view; 34, labium, ventral view; 35, hypopharyngeal sclerome, dorsal view; 36, middle leg, lateral view. Scale bar = 0.1 mm for Figure 28. Scale bar = 0.01 mm for Figures 29, 30, 31, 32, 33, 34, 35. Scale bar = 0.05 mm for Figure 36.

longer than basal width), bases approximate, 1 subapical campaniform sensillum present, apical elongate conical sensillum present. Hypopharynx with 4 longitudinal rows of laterally directed trichia; sclerites consisting of a well developed lantern-shape hypopharyngeal sclerome (Fig. 35), bracon, and slightly convergent posteriorly directed hypopharyngeal rods.

Thorax and abdomen. Thorax about $0.5 \times$ as long as body length, widest across mesothorax; prothorax as long as meso- and metathorax together. Terga transverse with plates absent; ecdysial suture present on segments T1–3. Terga lacking dorsal tubercles or sublateral lobes, expanded laterally to form lateral lobes (absent from T1); obvious glands absent. Lateral lobes weakly developed on T2, well developed on T3 and A1–8; lobes on A1–7 delimited by a line of granules; long frayed setae arising from well developed lateral tubercles. Laterosterna of abdominal segments 1–8 bearing posterolateral lobes delimited by a furrow at their bases (especially A4–8) and smaller than tergal lobes. Abdominal sterna mainly with evenly distributed unmodified setae: S1, aetose; S2, 4 very short frayed setae at middle and 2 at each side; S3, 2 very short simple setae at middle; S4, 4 elongate (= primary) setae at middle and 4 very short frayed setae at each side; S5, 4 primary and 6 smaller (secondary) setae at middle and 3 very short frayed setae at each side; S6, 4 primary and 16 secondary setae at middle and 1 very elongate seta at each posterolateral corner; S7, 4 primary and 10 secondary setae at middle and 1 very elongate seta at each posterolateral corner; S8, 4 primary and 1 very elongate seta at each posterolateral corner. Tergum 9 without urogomphi. Sternum 9 with 4 primary setae. Segment A10 bearing simple setae. Spiracles annular, raised on very short tubercles; hidden between tergal and sternal lobes; perispiracular setae or sensillae absent.

Legs (Fig. 36) slender, relatively long, setose, and isomorphic. Coxae widely separated at their bases; lateral surfaces with short frayed setae and a few unmodified setae. Trochanter short with 1 primary seta, at least 2 secondary setae, and 6 campaniform sensillae. Femur with two pores, 1 very long seta, 8 shorter primary setae, and 2 campaniform sensillae. Tibiotarsus narrower and about equal to femur with several setae along inner surface; tarsungulus with single subapical seta.

Comments: The Neotropical Lycoperdininae includes four endemic genera: *Acinaces* Gerstaecker, *Amphix* Laporte, *Archipines* Strohecker

and *Achuarmychus*. Among them, *Achuarmychus* is most similar to adults of the genus *Archipines* in having the body densely setose, the terminal antennomere with apical margin bearing small, setose tubercles/sensillae, the abdominal ventrite 6 partially visible, the ovipositor with separated coxities, the tegmen with basal piece encircling penis in its half length and the tegminal strut comparatively long. *Archipines*, however, differs from *Achuarmychus* in many aspects, like: mandible with very small apical and subapical teeth, the elytra more than $2.9 \times$ longer than the pronotum, the prosternal process vestigial, the intercoxal process of mesoventrite very narrow and short, the hind wings most often present and well developed, the ovipositor with reduced coxities and the male tibiae with sexually dimorphic characters. Among other Lycoperdininae, *Achuarmychus* seems to be most similar to setose species of *Lycoperdina* by the overall body appearance. This similarity is, however, superficial, because there are many differences between both genera. The antennal club 2-segmented, the mandible with small subapical tooth, the prosternal process narrowly separating front coxae, the intercoxal process of mesoventrite narrow and carinate, the ovipositor with fused coxities, apex of tergite 10 (proctiger) acutely produced backwards, the tegmen with basal piece encircling penis at base and with vestigial tegminal strut, and the male tibiae bearing sexually dimorphic characters separate easily *Lycoperdina* from *Achuarmychus*. It is interesting to note that the long, stout and coiled ejaculatory duct was also observed in *Acinaces* and Oriental *Beccariola*.

The larva of *A. carltoni* can be distinguished from all described endomychid larvae by the combination of characters listed in the diagnosis, particularly the form of the mandibular "prosthema," the shape of the mala, and the lack of tergal sclerotisations or verrucae which will distinguish it from similar-looking lycoperdinine larvae (*Aphorista* and *Mycetina*; see Smith 1886 and Burakowski 1997). Among Lycoperdininae, a 1-segmented labial palp is also present in *Archipines* but *Achuarmychus carltoni* can be distinguished from it by the absence of dehiscent tergal lobes. The form of the mala is very similar to that described in *Trochoideus* (Pleganophorinae; see Kemner 1924), but many other characters, including the presence of 4 stemmata on each side of the head, will distinguish *A. carltoni* from this genus.

To date, no larval synapomorphies have been proposed for Lycoperdininae, and as more larvae

are described (e.g., Tomaszewska 2002), it appears that many characters do not corroborate the monophyly of some of the endomychid subfamilies. Some subfamilies, in particular, Epipocinae, Stenotarsinae, and Lycoperdininae, share many larval similarities in common (Burakowski and Ślipiński 2000), but do not have any recognizable synapomorphies. Members of these groups tend to be dorsoventrally flattened and feed externally on Polyporaceae (Basidiomycetes) and other fungi (Lawrence 1991; McHugh and Pakaluk 1997), and such features such as the presence of dorsal and lateral lobes and having modified frayed or multibranching setae may be convergent. The orientation of the head in these groups, and in most others Endomychidae, are hypognathous (Beutel et al. 2000) and is probably a feature that may be primitive for the group because the character is shared with many members of Coccinellidae. (Note that Leiestinae are internal feeding and have more or less prognathous heads (Burakowski and Ślipiński 2000)). Despite the lack of character congruence among larval and adult characters, there are many larval features that vary considerably and could be very informative for phylogenetic relationship if subjected to cladistic analysis. These used in combination with adult characters would be an interesting test of the phylogenetic relationships proposed by Tomaszewska (2000).

The biology of *A. carltoni* is poorly known, but the gut of a dissected larva contained undetermined material, hyphae, and a few fungal spores, confirming the larva, at least, is mycophagous. It is interesting to note that there are other flightless Lycoperdininae, in particular, apterous/brachypterous individuals have been reported in 13 species of *Lycoperdina* (Pakaluk 1984) and in two species of *Archipines* (Tomaszewska 2002).

Achuarmychnus carltoni, sp. n.

Figs 19, 23, 24

Etymology: The species is dedicated to Dr. Christopher Carlton, the collector of this species.

Adult description: Length 3.65–3.70 mm. Body 1.80–1.84 × as long as wide; pronotum 0.64–0.67 × as long as wide; elytra 1.11–1.14 × as long as wide; 2.00–2.10 × longer than pronotum, 1.17–1.20 × wider than pronotum.

Colour uniformly dark reddish-brown with only sterna somewhat darker and antenna yellowish-brown. Vestiture pale, moderately dense

and rather long, suberect. Antenna with scape about 1.70 × as long as pedicel; antennomere 3 1.35 × as long as 4; antennomeres 4–6 equal in length; antennomeres 7–8 gradually slightly shorter. Pronotum with lateral edges weakly sinuate, with base slightly narrower than base of elytra; punctures setigerous, moderately coarse but sparser than those on elytra – 2–3 diameters apart. Elytra with punctures as large as pronotal ones, 1–2 diameters apart, setigerous. Female genitalia as in Fig. 19. Aedeagus as in Figs 23, 24.

Larval description: See above generic description.

Distribution: Neotropical Region (Ecuador).

Type material: Holotype (♂) labelled: "Ecuador, Napo Pr, 15 km S. Baeza on rd. to Tena, elev. 1800 m., primary forest litter berlesate, 28 April 1990, C. Carlton, 28-037004-1, LSAM0020616/ Holotype *Achuarmychnus carltoni* Tomaszewska & Leschen". The specimen is deposited in the Louisiana State Arthropod Museum, Louisiana State University, USA.

Paratypes: 1 ♂, same data as holotype, but 28-037004-2, LSAM0020617 (LSAM); 2 ♀, 2 larvae, same data as holotype, but elev. 2200 m. (1 ♀: LSAM; 1 ♀ completely dissected on slide and 1 larva: MIZ; 1 larva: RALC).

Acknowledgements

We are indebted to Dr. Christopher E. Carlton (LSAM) for collecting this curious and interesting species of beetle and for arranging loans to WT and RABL for this study. Adam Ślipiński and one anonymous reviewer are sincerely acknowledged for their valuable comments on the manuscript.

References

- Beutel, R. G., D. Weide & D. Bernhard 2000. Characters of the larval head of *Mycetina cruciata* (Schaller) (Coleoptera: Endomychidae) and their phylogenetic implications. – *Annales Zoologici* **50**: 7–14.
- Burakowski, B. 1997. Descriptions of larva and pupa of *Mycetina cruciata* (Schaller) (Coleoptera, Endomychidae). – *Annales Zoologici* **47**: 209–214.
- Burakowski, B. & S. A. Ślipiński 2000. The larvae of Leiestinae with notes on the phylogeny of Endomychidae (Coleoptera: Cucujoidea). – *Annales Zoologici* **50**: 559–573.
- Kemner, N. A. 1924. Über die Lebensweise und Entwicklung des angeblich myrmecophilen oder termitophilen Genus *Trochoideus* (Col. Endomych.), nach Beobachtungen über *Trochoideus termitophilus* Roepke auf Java. – *Tijdschrift voor Entomologie* **67**: 18–194.
- Lawrence, J. F. 1991. Endomychidae. Pp. 482–485. In F. W. Stehr (ed.). *Immature Insects*, Vol. 2. Kendall-Hunt, Dubuque.
- Lawrence, J. F. & A. F. Newton 1995. Families and subfamilies of Coleoptera (with selected genera, notes, references

- and data on family-group names), pp. 779–1006. In J. Pakaluk & S. A. Ślipiński (eds). Biology, phylogeny and classification of Coleoptera. Papers celebrating the 80th Birthday of Roy A. Crowson. Volume 2, Muzeum i Instytut Zoologii PAN, Warszawa.
- McHugh J. V. & J. Pakaluk 1997. Review of the larval stages of Epipocinae (Insecta: Coleoptera: Endomychidae). – *Annales Zoologici* **47**: 59–77.
- Pakaluk J. 1984. Natural history and evolution of *Lycoperdina ferruginea* (Coleoptera: Endomychidae) with description of immature stages. – *Proceedings of the Entomological Society of Washington* **86**: 312–325.
- Smith, J. B. 1886. Larva of *Aphorista vittata* Fabr. – *Entomologica Americana* **2**: 85–87.
- Strohecker, H. F. 1953. Coleoptera Fam. Endomychidae. In Wytsman P. (ed.). *Genera Insectorum*. Desmet-Verneuil, Bruxelles, 140 pp., 5 pls.
- Tomaszewska, K. W. 2000. Morphology, phylogeny and classification of adult Endomychidae (Coleoptera: Cucujoidea). – *Annales Zoologici* **50**: 449–558.
- 2002. A review of the genus *Archipines* Strohecker (Coleoptera: Endomychidae), with descriptions of new taxa and immature stages of *Archipines championi* Gorham. – *Annales de la Société Entomologique de France* **38**: 363–383.