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Hoplatessara luxuriosa (Silvestri, 1895) (Diplopoda, Polydesmida, Paradoxosomatidae) is native to Australia, not New Guinea

Robert Mesibov[1], Catherine A. Car[2]

1 *Queen Victoria Museum and Art Gallery, 2 Invermay Road, Launceston, Tasmania 7248, Australia*
2 *Department of Terrestrial Zoology, Western Australian Museum, Locked Bag 49, Welshpool DC, Western Australia 6986, Australia*

Corresponding author: *Robert Mesibov* (mesibov@southcom.com.au)

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Abstract

Hoplatessara luxuriosa (Silvestri, 1895) is partly redescribed and illustrated. Its native range is shown to be in the cool-climate uplands of New South Wales, Australia. *H. luxuriosa* was originally labelled as collected by L.M. D'Albertis at Sorong in New Guinea. D'Albertis collected on Sorong Island in 1872 and spent the following year in Sydney, New South Wales, before returning to Europe with his New Guinea specimens. It is possible that D'Albertis himself collected *H. luxuriosa* in 1873, and that the mislabelling occurred later.

Keywords

Diplopoda, Polydesmida, Paradoxosomatidae, New South Wales, Australia, L.M. D'Albertis

Introduction

The native range of the millipede *Hoplatessara luxuriosa* (Silvestri, 1895) has long been uncertain. It was first described as *Strongylosoma luxuriosum* by Silvestri (1895) from a male collected by L.M. D'Albertis at Sorong in New Guinea (now in Indonesia's West Papua province) and deposited in the Museo Civico di Storia Naturale, Genoa, Italy.

Jeekel (1956, 1967, 1968, 1984, 2003) doubted this record, as all other species assigned to *Hoplatessara* Verhoeff, 1928 had been collected in Australia. Jeekel (1956, 1968) suggested that Silvestri's material had been mislabelled, and that *H. luxuriosa* 'will be found sooner or later to occur in New South Wales' (Jeekel 2003, p. 28).

Car (2009) listed *H. luxuriosa* as a New South Wales native on the basis of specimens collected in that State and deposited in the Australian Museum. Here we give details of those and more recent collections, make minor additions to the excellent redescriptions by Jeekel (1956, 1967), and suggest a possible reason for the 'Sorong' confusion.

Materials and methods

Specimens are stored in ethanol in the Australian Museum. Fig. 1 was taken with a Ricoh GX200 and Figs 2 and 3 with a Canon EOS 1000D digital SLR camera mounted on a Nikon SMZ800 binocular dissecting microscope equipped with a beam splitter. Figs 1-3 are manually stacked composites processed with Zerene Stacker 1.04. Figs 5-8 were generated with a Leica MZ16A automontage imaging system using Leica Application Suite Version 3.7.0. Final figures were prepared using GIMP 2.8 image editing software. The latitude/longitude datum for collection details is WGS84. Abbreviations: AM = Australian Museum, Sydney, Australia; MCG = Museo Civico di Storia Naturale, Genoa, Italy; NSW = New South Wales, Australia.

Results

Order Polydesmida Pocock, 1887
Suborder Strongylosomatidea Brölemann, 1916
Family Paradoxosomatidae Daday, 1889
Subfamily Australiosomatinae Brölemann, 1916
Tribe Australiosomatini Brölemann, 1916

***Hoplatessara luxuriosa* (Silvestri, 1895)**
http://species-id.net/wiki/Hoplatessara_luxuriosa
Figs 1–3, 5–8

Strongylosoma luxuriosum Silvestri 1895: 643.
Strongylosoma luxuriosum Attems 1898: 318.
Strongylosoma luxuriosum Attems 1914: 221.
'Strongylosoma' (?) luxuriosum Attems 1915: 22.
Strongylosoma luxuriosum Chamberlin 1920: 119.
Antichiropus luxuriosus Attems 1937: 271. [comb. n.]
Hoplatessara luxuriosum [sic] Jeekel 1956: 184; figs 1–4, p. 186. [comb. n.]
Hoplatessara luxuriosa Jeekel 1967: 377. [Lectotype chosen]

Hoplatessara luxuriosa Jeekel 1968: 23, 25.
Hoplatessara luxuriosa Jeekel 1981: 51.
Hoplatessara luxuriosa Jeekel 1984: 38, 43.
Hoplatessara luxuriosa Jeekel 2003: 28.

Lectotype. Male, lacking segments 8 and 9, Sorong, New Guinea [see Discussion], L.M. D'Albertis, MCG.

Paralectotypes. 1 female, 1 female fragment, 1 male fragment, same details, MCG.

Material examined. 1 male, Sunny Corner State Forest near Bathurst, NSW, 33°24'S, 149°51'E ±2 km, 4 December 1972, J.S. Disney, under pine log, AM KS.18542; 1 male, near Merrill, SW of Crookwell, NSW [locality text not on label], 34°40'S, 149°17'E ±2 km, 20 April 1990, [collector uncertain], AM KS.106310; 6 males, 2 females, 1 juvenile, 5 km NE of Colo, NSW [locality text not on label], 33°45'S, 149°17'E ±2 km, 653 m a.s.l., 20 April 1990, L. Kirwan, AM KS.106320; 2 males, Sunny Corner near Bathurst, NSW, 33°24'S, 149°53'E ±2 km, 24-27 January 1997, S.J. Fellenberg, AM KS.96088; 1 male, 1 female, 1 stadium 7 female, Daylight Creek Road near Sunny Corner, NSW, 33°21'51"S, 149°53'39"E ±100 m, 1050 m a.s.l., 30 April 2013, R. Mesibov and T. Moule, AM KS.120531; 1 male, 1 female, Sunny Corner Road near Sunny Corner, NSW, 33°23'58"S, 149°54'22"E ±25 m, 1210 m a.s.l., same date and collectors, AM KS.120532.

Description. Jeekel (1956, 1967) gave admirably complete redescriptions of the specimens examined by Silvestri (1895), and here we add only a few details:

Live and freshly preserved males and females (Figs 1, 2) with pale brownish-yellow ground colour, lighter ventrally; darker brown on prozonites and anterior portion of metazonites, darkest at waist and dorsally; head dark brown dorsally, lightening ven-

Figures 1–2. *Hoplatessara luxuriosa* (Silvestri, 1895), female ex AM KS.120531. Whole animal (**1**, scale bar = 10 mm) and dorsal view of midbody rings (**2**, scale bar = 1 mm).

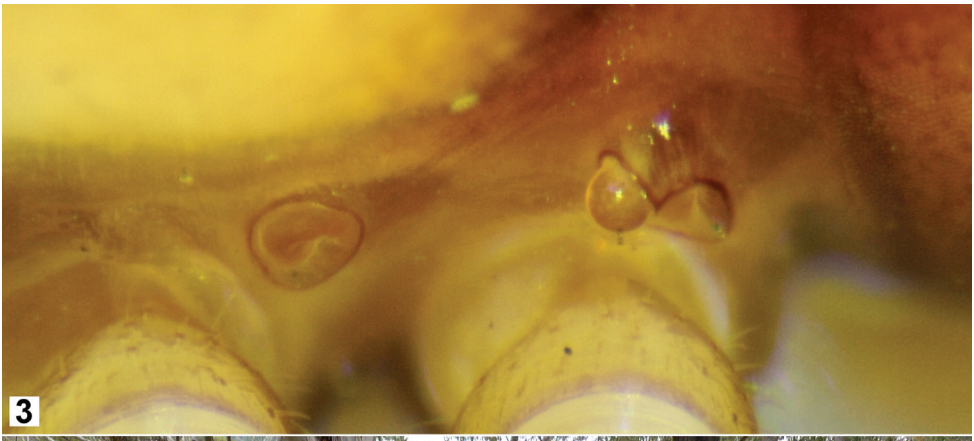

Figure 3–4. 3 *Hoplatessara luxuriosa* (Silvestri, 1895), female ex AM KS.120531, right lateral view of midbody spiracles (anterior to right) **4** Grassy forest habitat of *Hoplatessara luxuriosa* (Silvestri, 1895) along Daylight Creek Road near Sunny Corner, NSW, on 30 April 2013.

trally; collum dark brown ringed with pale brownish-yellow; antennae dark brown, lighter basally; legs with coxae, prefemur and basal portion of femur pale yellow, and postfemur, tibia and tarsus brown, darkening distally; preanal ring dark brown with

Figures 5–8. *Hoplatessara luxuriosa* (Silvestri, 1895), male ex AM KS.120532. Posterior (**5**), medial (**6**), anterior (**7**) and lateral (**8**) views of left gonopod, not to same scale. Scale bar in Fig. **6** = 1 mm.

Figure 9. Localities for *Hoplatessara luxuriosa* (Silvestri, 1895) as of 30 April 2013 (black squares). Inset shows location of main map. Base map from the Spatial Information Exchange, New South Wales Department of Finance and Services (http://maps.six.nsw.gov.au/; accessed 9 July 2013), showing named localities mentioned in text.

pale yellow epiproct; hypoproct light brown, anal valves dark brown ringed with pale brownish-yellow.

Small pleural keels on female rings 2–4, more prominent on rings 3 and 4; traces of keels on male rings 2–4.

Male ring 6 sternite with transverse brushes of long setae between legpairs 6 and 7. Male ring 5 sternite with sparse transverse brush of long setae between legpair 5, well-separated from sternal lamella between legpair 4.

Spiracles on diplosegments of males and females well-separated (Fig. 3); posterior spiracle crater-like, anterior spiracle rim oval (long axis more or less dorsoventral), dorsal portion of rim extended posterolaterally around emergent, finely textured, subspherical spiracle.

Gonopods (Figs 5–8) as described by Jeekel (1956) and illustrated in posterior view (Fig. 4 in Jeekel 1956); the slight bulge on the medial side of the femoral process is partly obscured in posterior view (Fig. 5) and is shown more clearly in anterior view (Fig. 7).

Distribution and habitat. Occurs in the high country west of the Blue Mountains in New South Wales (Fig. 9) in grassy eucalypt forest (Fig. 4) and plantations of *Pinus radiata*, where adults were found in 2013 sheltering under logs and small pieces of fallen wood or bark. We have not yet confirmed by further collecting the two 1990 localities south of Bathurst (Fig. 9); if these are correct, the north-south range of *H. luxuriosa* is ca 150 km.

Remarks. The structure of the anterior spiracle on diplosegments (Fig. 3) is very similar to that found in other australiosomatine paradoxosomatids [see figs 2A, 2B, 3C in Mesibov (2009)].

Discussion

The known *H. luxuriosa* range (Fig. 9) is in the cool, dry 'Central Tablelands' region of New South Wales.

Long-term climate averages for the town of Lithgow, ca 25 km southeast of the collection localities near Sunny Corner and ca 250 m lower in elevation, are 0.7/10.4°C (mean minimum/mean maximum) in the coldest month (July) and 11.9/25.5 in the warmest month (January), with a mean annual rainfall of 858 mm well-distributed through the year (Australian Bureau of Meterorology, http://www.bom.gov.au/climate/averages/tables/cw_063224.shtml; accessed 9 May 2013). Frosts and light winter snowfalls are common events in the area.

In comparison, average night/day temperatures in Sorong, Indonesia are ca 25/31°C throughout the year, and the well-distributed annual rainfall is 2840 mm (http://www.weatherbase.com/weather/weather.php3?s=20579; accessed 9 May 2013). It seems highly unlikely that *H. luxuriosa* could occur naturally in Sorong, or establish there if introduced. How, then, did the New South Wales specimens examined by Silvestri and Jeekel come to be labelled 'Sorong'?

On his first expedition to New Guinea, the Italian naturalist and explorer L.M. D'Albertis arrived on Sorong Island (close to the coast and near the modern-day city of Sorong) at the end of April 1872 and based himself there until mid-July, collecting birds and insects (D'Albertis 1880). He returned to Sorong Island for several days in mid-November. D'Albertis arrived in Sydney on 1 February 1873 (D'Albertis 1880), took up residence in Double Bay and began a ten-month recovery from fevers and other ailments suffered during his first New Guinea expedition. He left Sydney on 20 December 1873, 'not yet completely restored to health' (D'Albertis 1880, vol. 1, p. 224), on a voyage ending in Italy (Gibbney 1972). His Sorong and other specimens became part of the collection at the newly established Museo Civico di Storia Naturale 'Giacomo Doria', where they were later examined by Silvestri.

It is possible that D'Albertis himself collected *H. luxuriosa* during his long stay in New South Wales in 1873, and that the specimens were unintentionally mixed with those from Sorong Island, or kept separate and later mislabelled. The Main Western line of the New South Wales railways had reached the eastern edge of the known *H. luxuriosa* range at Wallerawang in 1870 and Tarana in 1872 (http://www.nswrail.net/lines/show.php?name=NSW:main_west; accessed 11 May 2013; see Fig. 9). Landscape photographs taken at Wallerawang ca 1871 (http://investigator.records.nsw.gov.au/asp/photosearch/photo.asp?17420_a014_a014001362; accessed 11 May 2013) and Tarana in the period 1870-1880 (http://nla.gov.au/nla.pic-vn5748868; accessed 11 May 2013) show open eucalypt forest, a habitat type known to be occupied by *H. luxuriosa*. The recuperating D'Albertis could have travelled to either place from Sydney in the comfort of a passenger train in half a day.

D'Albertis returned to Sydney in 1876, 1877 and 1878 but did not revisit 'Sorong' during his four later New Guinea expeditions (D'Albertis 1880). We have not been able to locate any documents relating to D'Albertis' movements in New South Wales during his time there in the 1870s, and our explanation for the 'Sorong' confusion remains speculative.

Acknowledgements

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Hydraena (Hydraenopsis) ateneo, new species (Coleoptera, Hydraenidae) and other aquatic Polyphaga from a small habitat patch in a highly urbanized landscape of Metro Manila, Philippines

Hendrik Freitag[1,†]

1 *Ateneo de Manila University, Department of Biology, School of Science & Engineering, Loyola Heights, Quezon City 1101, the Philippines*

† *http://zoobank.org/8365AA9B-3DA5-4539-96EF-451BA4BAE2C4*

Corresponding author: *Hendrik Freitag* (hfreitag@ateneo.edu)

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Abstract

Seven species of Hydraenidae, Hydrophilidae and Elmidae are recorded from temporary freshwater habitats at the Ateneo de Manila University Campus in the metropolitan area of Manila, Philippines. They were identified as *Enochrus* (*Lumetus*) *fragiloides* d'Orchymont, *Helochares* (*Hydrobaticus*) *lepidus* d'Orchymont, *Helochares* (*Helochares*) *pallens* (MacLeay), *Hydraena* (*Hydraenopsis*) *scabra* d'Orchymont, *Hydraena* (*Hydraenopsis*) *palawanensis* Freitag & Jäch (new record for Luzon Island), *Stenelmis* sp. A further hydraenid species was unknown to science and is newly described: *Hydraena* (*Hydraenopsis*) *ateneo* Freitag, **sp. n.** Aedeagus, gonocoxite, spermatheca, and female tergite X are illustrated by computer-based line drawings. Habitus images of all three *Hydraena* Kugelann species recorded and a checklist of the Philippine *Hydraena* are provided. The presence of these seven species in the Ateneo campus is briefly discussed in regard to the area's history. Measures to maintain and extend semi-natural islands of biodiversity in urban areas are suggested.

Keywords

Water Beetles, Coleoptera, *Hydraena*, Manila, Luzon, Philippines, taxonomy, urban biodiversity

Introduction

The National Capital Region (NCR) of the Philippines, known as Metro Manila, had about 12 Mio inhabitants as of 2010 (NSO 2012) and is among the most populous metropolitan regions of the world when the highly urbanized neighboring areas are included. Its largest administrative unit is Quezon City with more than 2.7 Mio inhabitants (NSO 2012), where the study site, the campus of the Ateneo de Manila University, is situated (Fig. 1A).

Semi-natural aquatic habitats within the campus of the university (Figs 1B, C) have been sampled for aquatic insects during a training of Ateneo BSc. Life Science students in 2012. Subsequent identification revealed the presence of three *Hydraena* Kugelann species, of which one was undescribed. This discovery is not surprising as the genus is mega-diverse and the hydraenid fauna of many islands of the Philippines is not yet thoroughly studied. Only Palawan and Busuanga were rather comprehensively studied (Freitag and Jäch 2007). Another survey of the Ateneo de Manila University in Mindoro is currently ongoing.

Only two *Hydraena* species were previously recorded from Luzon: *Hydraena* (*Hydraenopsis*) *scabra* d'Orchymont, 1925 and *H.* (*Hydraenopsis*) *boettcheri* d'Orchymont, 1932.

Three species of the predominantly aquatic beetle family Hydrophilidae were recorded too. This species-rich family has more than 60 species recorded from the Philippines in about 30 genera (Hansen 1999). Moreover, a single specimen of the family Elmidae was recorded. Less than 30 Elmid species are known from the country so far. They are usually found in lotic freshwater habitats.

Materials and methods

Three permanently water-filled ponds, five temporary rock pools and three temporary creeks, most of them in small forest-like patches of secondary vegetation, were sampled for aquatic insects. All temporary pools and creeks contained at least some water for most of the time of the year except for a few months (January to May) in the dry season.

The first survey was done at the beginning of the dry season in November 2012 when the water bodies were still filled with water. A replicate sampling was performed in June 2013, the second month of the wet season.

Bottom substrates were physically disturbed in a way that drifted arthropods could be collected by the use of a fine-meshed hand net. Additionally, submerged coarse particulate organic matter, mainly leaves, were manually taken off from the water and checked for benthic organisms. Surprisingly, aquatic beetles were almost exclusively caught in temporary pools and creeks (except for two specimens from a permanent pond). The collection method used might have been less suitably for pond-dwelling beetles. However, a single specimen of an aquatic beetle was caught by an insect light trap near a permanent pond and is also included in this study. Only adults of True Water Beetles (*sensu* Jäch 1998) of the suborder Polyphaga are treated in this taxonomic report.

The material was initially preserved in 95% ethyl alcohol. All type material designated herein and other dissected voucher specimens were glued on entomological

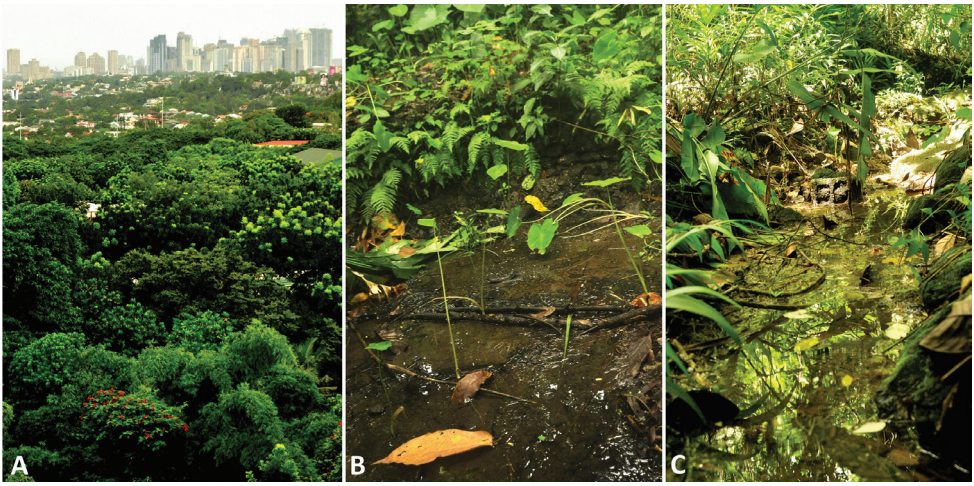

Figure 1. A View of Metro Manila from the well-vegetated campus of the Ateneo de Manila University with the collecting sites **B** Temporary pool (label code: ADM2e) where *Stenelmis* sp., *Hydraena scabra*, and *Helochares lepidus* were collected **C** Temporary headwater creek (label code: ADM3d) where all three *Hydraena* spp. were collected.

paper and pinned. Further material was examined at the Natural History Museum Vienna, Austria (NMW), the Senckenberg Museum of Zoology, Germany (SMTD), and the Zoological Museum of the University Copenhagen, Denmark (ZMU). Previously unidentified *Hydraena* specimens in these collections were checked for the presence of the new taxon. All additional records were designated as types. The same applies for material collected in Cavite (Luzon) in April 2013 during the "Philippine Aquatic Biodiversity Workshop" of the Ateneo de Manila University.

Specimens were examined with the help of an OLYMPUS SZ 61 stereo microscope. Habitus photographs were taken with the same microscope equipped with a digital photo adapter DINO-EYE. Dissected body parts were transferred in lactic acid for one day and then photographed under an OLYMPUS CX21 compound microscope with the same photo adapter. For each illustration, a series of photographs taken at various focus layers was stacked using the "stack" function (habitus) and "pyramid weighted average" function (dissected body parts) of COMBINEZP software (Hadley 2010). The taxonomic key characters were drawn at the computer as vector graphics in COREL DRAW 10 with the help of an underlay of the respective stacked images and by comparison with the actual microscopic specimen (e.g. aedeagus, gonocoxite). Biometric measurements were done by the use of a calibrated ocular micrometer.

Acronyms

ADMU Ateneo de Manila University, Quezon City, Philippines
CFM Collection Hendrik Freitag, Manila, Philippines, currently deposited in ADMU

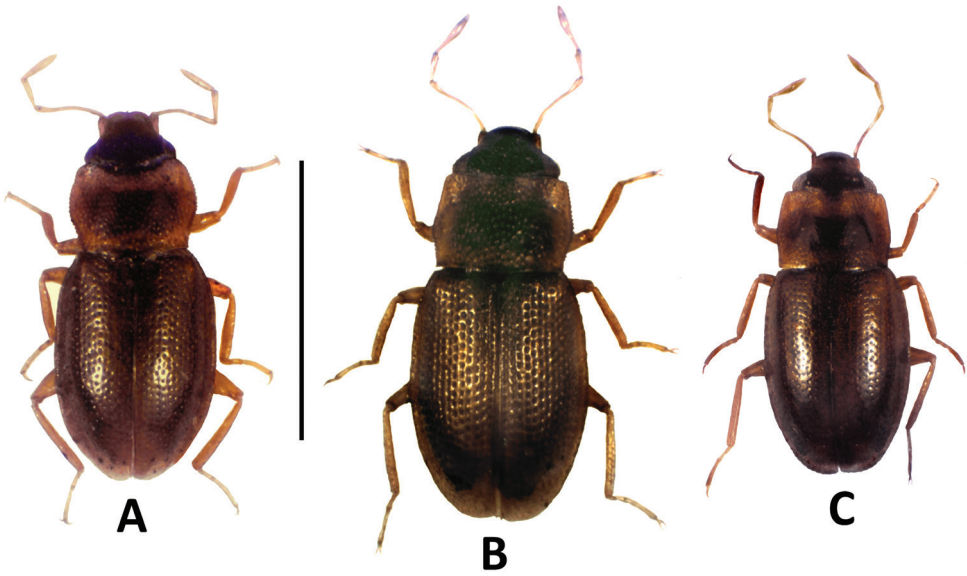

Figure 2. Digital photographs of the habitus of **A** *Hydraena ateneo* sp. n., paratype ♂ **B** *H. scabra* ♀ **C** *H. palawanensis* ♂ (all collected from the Ateneo de Manila University Campus); scale bar = 1.0 mm.

NMW Natural History Museum Vienna, Austria
PNM Philippine National Museum Manila, Philippines
SMTD Senckenberg Natural History Collections Dresden, Museum of Zoology, Germany

The morphological terminology used herein follows mainly Jäch et al. (2005).

Data resources

The data underpinning the analysis reported in this paper are deposited at GBIF, the Global Biodiversity Information Facility, http://ipt.pensoft.net/ipt/resource.do?r=polyphaga_ateneo_manila_data

Results

Updated check list of the Philippine species of Hydraena

1. *Hydraena* (*Hydraenopsis*) *ateneo* Freitag, sp. n. (Luzon)
2. *Hydraena* (*Hydraenopsis*) *boettcheri* d'Orchymont, 1932 (Luzon)
3. *Hydraena* (*Hydraenopsis*) *busuanga* Freitag & Jäch, 2007 (Busuanga)
4. *Hydraena* (*Hydraenopsis*) *castanescens* Freitag & Jäch, 2007 (Palawan)

5. *Hydraena* (*Hydraenopsis*) *claudia* Freitag & Jäch, 2007 (Palawan)
6. *Hydraena* (*Hydraenopsis*) *hosiwergi* Freitag & Jäch, 2007 (Palawan)
7. *Hydraena* (*Hydraenopsis*) *jojoorculloi* Freitag & Jäch, 2007 (Palawan)
8. *Hydraena* (*Hydraenopsis*) *kodadai* Freitag & Jäch, 2007 (Palawan)
9. *Hydraena* (*Hydraenopsis*) *manguao* Freitag & Jäch, 2007 (Palawan)
10. *Hydraena* (*Hydraenopsis*) *nielshaggei* Freitag & Jäch, 2007 (Palawan)
11. *Hydraena* (*Hydraenopsis*) *palawanensis* Freitag & Jäch, 2007 (Luzon, Mindoro, Palawan)
12. *Hydraena* (*Hydraenopsis*) *pseudopalawanensis* Freitag & Jäch, 2007 (Palawan)
13. *Hydraena* (*Hydraenopsis*) *scabra* d'Orchymont, 1925 (Bohol, Camiguin, Luzon, Marinduque, Mindanao, Mindoro, Negros, Palawan, Panay, Siargao)
14. *Hydraena* (*Hydraenopsis*) *zetteli* Freitag & Jäch, 2007 (Palawan)

Taxonomy

Family HYDRAENIDAE (Minute Moss Beetles)

***Hydraena* (*Hydraenopsis*) *ateneo* sp. n.**
http://zoobank.org/3A99B262-09F7-43C1-9EA5-A557B2A763E4
http://species-id.net/wiki/Hydraena_ateneo
Figs 2A, 3A–E

Etymology. The species is named for the Ateneo de Manila University, Quezon City, Philippines, in special recognition of the fiftieth anniversary of the university's Department of Biology. The type locality of this species lies inside the university campus. The epithet is a proper noun in apposition.

Type material. Holotype ♂ (PNM): PHIL: Luzon, NCR, Quezon City, Ateneo de Manila Campus; spring creek N of Jesuit Residence, leaf packs; 14°38'29.6"N, 121°04'53.6"E, 62m asl; leg. Vidal, Go & Freitag 16.Nov.2012 (ADM3d)M", terminal parts of abdomen and aedeagus glued separately. **Paratypes:** 1 ♂, 2 ♀♀ (PNM): same data as holotype; 1 ♂ (CFM): "PHIL.: Luzon, Quezon City, Ateneo de Manila Campus, near San Jose Seminary, temporary headwater creek, leaf litter; 14°38'06.4"N, 121°04'50.2"E, 38m asl.; leg. H. Freitag 28.Jun.2013 (ADM2d)M"; 2 ♂♂, 2 ♀♀ (NMW, SMTD): "leg. Jäch (15) PHILIPPINEN – Luzon Los Banos 24.11.1992 Mt. Makiling 100m"; 1 ♀ (NMW): "leg. Jäch (16) PHILIPPINEN – Luzon W Los Banos 25.11. Rainbow Falls 1992"; 1 ♂, 1 ♀ (CFM): "PHIL.: Luzon, Cavite, Ternate, Lamesang Bato River; hygropetric; sec. forest. 340m asl. 14°14'02"N, 120°38'56"E; coll. R Lagat, M Lagat, JP Bala 16 Apr. 2013 (Ter1j)M"; 5 ♂♂, 3 ♀♀ (CFM): "PHIL.: Luzon, Cavite, Ternate, Lamesang Bato River; littoral pool; sec. forest. 340m asl. 14°14'02"N, 120°38'56"E; coll. Pangantihon 16 Apr. 2013 (Ter1j)M".

Description. Combined length of pronotum and elytra approximately 1.10–1.14 mm; entire specimen about 1.25–1.33 mm long, 0.58–0.62 mm wide. Dorsal habitus as

in Fig. 2A. Elytra brown; pronotum gold-brown with brown sub-rectangular median pattern; frons dark brown; legs, maxillary palpi, and antennae distinctly paler yellowish brown.

Head partly retracted; labrum very slightly excised medially; clypeus moderately densely micropunctate; fronto-clypeal suture slightly concave; frons densely punctate; punctures small and slightly impressed, interstices glabrous; gula rugulose, rest of head venter almost glabrous.

Pronotum about 1.4 times as wide as long, widest at the middle, narrower than elytra; entire pronotum densely punctate; punctures moderately large and moderately deeply impressed, interstices glabrous; anterior margin concave; anterior angles slightly rounded; lateral rim entirely denticulate; lateral margins anteriorly convergent, posteriorly sinuously convergent; pronoto-elytral angle obtuse; posterior margin slightly convex; lateral hypomeron about as wide as profemur. Prosternite carinate, rugulose; mesoventrite with rather indistinct longitudinal ridges, rugulose; mesoventral intercoxal process narrow, distinctly narrower than pseudepipleuron.

Elytra elongately oval, about 1.55 times as long as wide; each elytron with a tiny apical excision next to sutural keel, with about nine, more or less regular rows of punctures between suture and shoulder; punctures moderately large and moderately deeply (apically shallowly) impressed; interstices and intervals glabrous; lateral portion explanate from anterior 0.1 to posterior 0.2; pseudepipleuron anteriorly almost as wide as metafemur, reaching posterior 0.15; epipleuron narrow, short. Metaventral disc slightly impressed; metaventral plaques hardly discernible with stereoscopic microscope, appear as narrow, flat bands; intercoxal segment (abdominal sternite II) slightly wider than long; prosternite, meso-, metaventrite and ventrites 1–4 densely pubescent and rugulose; ventrites 5–6 more or less glabrous, only slightly pubescent.

Femora with almost straight inner margin, outer margin distinctly convex; meso- and metatibiae almost straight, outer faces with few long trichoid setae (sometimes broken off); mesotibia additionally with conspicuous row of short, spine-like setae at inner and outer margin; protibia entirely slightly bent inwards, outer margin slightly convex, inner margin slightly concave to almost straight.

Aedeagus (Figs 3A, B): Elongate and distinctly bent; main piece more or less straight in ventral view, sinuously curved in lateral view, without setae (some micropores present); phallobase almost symmetrical. Distal lobe long and more or less straight, but bent in 45° angle from main axis, distally tapered, appearing entirely densely freckled or stippled by microstructures; distal lobe embedded in a membranous, transparent, elongate structure. Flagellum very long, bisinuously curved, inserted laterally near right paramere. Parameres firmly fused to main piece; left paramere moderately long and moderately wide, inserted at about basal 0.65 of main piece, latero-apically with approximately five and apically with about four moderately long setae; right paramere extremely short, wider than long; inserted at about basal 0.9 of main piece, with ca. four, almost parallel, long setae.

Gonocoxite (Fig. 3D): Roundly subtrapezoidal, lateral margin slightly convex; setae of subapical tufts straight; margin between apical and basal area uneven, but well developed; apical area moderately densely pubescent; basal area of ventral plate almost

Figure 3. *Hydraena ateneo* sp. n.: **A, B** aedeagus (holotype) in ventral (**A**) and lateral (**B**) view **C** spermatheca **D** gonocoxite **E** female tergite X; scale bars = 0.1 mm.

without setae; condyles conspicuous; dorsal plate not surpassing outer plate, with two indistinct, separate cavities (hardly discernible in some specimens).

Spermatheca as in Fig. 3C.

Secondary sexual characters. Male profemur with three tiny denticles at basal 0.3 of ventral face (compound microscope recommended). Male terminal sternite sub-

symmetrically pyriform to elongately subtriangular; base slender, slightly produced laterad; spiculum gastrale almost twice as long as terminal sternite, slightly bent. Male tergite X apically distinctly excised, slightly asymmetrical. Female tergite X (Fig. 3E) subsemicircular; lateral margins evenly rounded; disc moderately densely covered with trichoid setae; setae of subapical fringe short, more or less truncate; each lateral side with one long and several short trichoid setae; hyaline apical margin notched medially.

Differential diagnosis. This species resembles externally *Hydraena castanescens* from which it can be easily distinguished by the smaller size and by its straight metatibiae in both sexes. Furthermore, it can easily be recognized by its aedeagus (distal lobe elongate, freckled, enveloped in a membrane; flagellum very long, bisinuously curved). From the two syntopic species, *H. scabra* and *H. palawanensis*, it can be distinguished by the medium size (1.25–1.33 mm long), the moderately large and moderately deeply impressed elytral punctures, and the shape of aedeagus, gonocoxite and tergite X.

Distribution. So far only known from central Luzon (Quezon City, Cavite, Laguna).

Ecology. This species was collected from small, slow flowing headwater creeks with secondary vegetation cover, where it was found among submerged leaf litter.

Hydraena (*Hydraenopsis*) *scabra* d'Orchymont, 1925

http://species-id.net/wiki/Hydraena_scabra
Fig. 2B

Hydraena scabra d'Orchymont 1925: 200 (orig. descr.); Freitag and Jäch 2007 and references therein (redescr., first records from many islands).

Material examined. 1 ♂, 1 ♀ (PNM): "PHIL.: Luzon, Quezon City, Ateneo de Manila Campus, near San Jose Seminary, temporary headwater creek, leaf litter; 14°38'06.4"N, 121°04'50.2"E, 39m asl.; 16.Nov.2012, leg. Go, Vidal & Freitag (ADM2d)M"; 3 ♂♂, 1 ♀ (CFM): "PHIL.: Luzon, Quezon City, Ateneo de Manila Campus, near San Jose Seminary, creek side pool, leaf litter; 14°38'05.5"N, 121°04'49.8"E, 37m asl.; leg. Go, Vidal & Freitag 16.Nov.2012 (ADM2e)M"; 1 ♂, 1 ♀ (PNM): "PHIL: Luzon, NCR, Quezon City, Ateneo de Manila Campus; spring creek N of Jesuit Residence, leaf packs; 14°38'29.6"N, 121°04'53.6"E, 62m asl; leg. Vidal, Go & Freitag 16.Nov.2012 (ADM3d)M"; 4 ♂♂, 1 ♀ (CFM): "PHIL: Luzon, NCR, Quezon City, Ateneo de Manila Campus; creek side pool N of Jesuit Residence, subm. leaf litter; 14°38'29.5"N, 121°04'53.6"E, 62m asl; leg. Vidal, Go & Freitag 16.Nov.2012 (ADM3e)M".

Distribution. *Hydraena scabra* is known from many islands all over the Philippines (see checklist).

Ecology. *Hydraena scabra* is an abundant representative in disturbed lotic water systems, but occurs also in stagnant waters like paddy fields and ponds. On the other

hand, this species is often rare or lacking in undisturbed natural sites, where several other species of *Hydraena* can be found syntopically. This suggests a high ecological potency, but low competitiveness.

***Hydraena* (*Hydraenopsis*) *palawanensis* Freitag & Jäch, 2007**
http://species-id.net/wiki/Hydraena_palawanensis
Fig. 2C

Hydraena (*Hydraenopsis*) *palawanensis* Freitag & Jäch, 2007: 26 (orig. descr.); Freitag and Pangantihon 2010: 140–141.

Material examined. 1 ♂ (CFM): "PHIL: Luzon, NCR, Quezon City, Ateneo de Manila Campus; spring creek N of Jesuit Residence, leaf packs; 14°38'29.6"N, 121°04'53.6"E, 62m asl; leg. Vidal, Go & Freitag 16.Nov.2012 (ADM3d)M"; 2 ♂♂, 1 ♀ (PNM): "PHIL.: Luzon, Quezon City, Ateneo de Manila Campus, near San Jose Seminary, temporary headwater creek, leaf litter; 14°38'06.4"N, 121°04'50.2"E, 39m asl.; 16.Nov.2012, leg. Vidal, Go & Freitag (ADM2d)M".

Distribution. *Hydraena palawanensis* is known from Palawan and Mindoro. It is hereby recorded from Luzon for the first time.

Ecology. This comparatively widely distributed Philippine species occurs in calm zones of undisturbed and moderately disturbed lotic waters. This might indicate a rather high ecological potency. Highest abundances are usually found in the littoral gravel or in residual pools of lowland creeks.

Family HYDROPHILIDAE (Water Scavenger Beetles)

***Enochrus* (*Lumetus*)? *fragiloides* d'Orchymont, 1925**
http://species-id.net/wiki/Enochrus_fragiloides

Enochrus (*Lumetus*) *fragiloides* d'Orchymont 1925: 202 (orig. descr.), 1926: 382; Hansen 1999: 192 (cat.).

Material examined. 1 ♀ (CFM): "PHIL: Luzon, NCR, Quezon City, Ateneo de Manila Campus; rock pool near Animal House, subm. leaf litter; 14°38'18.4"N, 121°04'45.7"E, 63m asl; leg. H. Freitag 28.Jun.2013 (ADM5e)M".

Distribution. This Philippine endemic species is recorded from Palawan and Luzon.

Ecology. As all members of the hydrophilid genera recorded here, this lentic species occurs mostly at the littoral edge of small, calm, temporary water bodies among leaf litter. It probably prefers mesosaprobic waters.

Remarks. This single female cannot be identified with absolute certainty.

***Helochares* (*Hydrobaticus*) *lepidus* d'Orchymont, 1943**
http://species-id.net/wiki/Helochares_lepidus

Helochares lentus lepidus d'Orchymont 1943: 5 (orig. descr.).
Helochares lepidus d'Orchymont – Hebauer 1995: 4; Hansen 1999: 168 (cat.) and references therein; Freitag and Pangantihon 2010: 147.

Material examined. 2 ♂♂ (CFM): "PHIL: Luzon, NCR, Quezon City, Ateneo de Manila Campus; spring creek near JM Lucas Infirmary, helocrene, leaf packs; 14°33'16.3"N, 121°04'51.7"E, c.45m asl; leg. H. Freitag 16.Nov.2012 (ADM1d) M"; 2 ♂♂, 2 ♀♀ (CFM): "PHIL.: Luzon, Quezon City, Ateneo de Manila Campus, near San Jose Seminary, creek side pool, leaf litter; 14°38'05.5"N, 121°04'49.8"E, 37m asl.; leg. Vidal, Go & Freitag 16.Nov.2012 (ADM2e)M"; 1 ♂, 3 ♀♀ (CFM): "PHIL.: Luzon, Quezon City, Ateneo de Manila Campus, near San Jose Seminary, creek side pool, leaf litter; 14°38'05.5"N, 121°04'49.8"E, 37m asl.; leg. H. Freitag 28.Jun.2013 (ADM2e)M"; 2 ♂♂ (CFM): "PHIL: Luzon, NCR, Quezon City, Ateneo de Manila Campus; pond near CTC, subm. leaf litter; 14°38'18.5"N, 121°04'33.3"E, c.56m asl; leg. H. Freitag 28.Jun.2013 (ADM4e)M"; 1 ♀ (CFM): "PHIL: Luzon, NCR, Quezon City, Ateneo de Manila Campus; rock pool near Animal House, subm. leaf litter; 14°38'18.4"N, 121°04'45.7"E, 63m asl; leg. Go, Vidal & Freitag 16.Nov.2012 (ADM5e)M"; 1 ♂ (CFM): "PHIL: Luzon, NCR, Quezon City, Ateneo de Manila Campus; rock pool near Animal House, subm. leaf litter; 14°38'18.4"N, 121°04'45.7"E, 63m asl; leg. H. Freitag 28.Jun.2013 (ADM5e)M".

Distribution. This species is endemic to the Philippines, where it is widely distributed, but not yet recorded from Palawan.

Ecology. As in *Enochrus* (*Lumetus*) *fragiloides.*

***Helochares* (s.str.) *pallens* (MacLeay, 1825)**
http://species-id.net/wiki/Helochares_pallens

Enhydrus pallens MacLeay 1825: 35 (orig. descr.).
Helochares pallens (MacLeay) – d'Orchymont 1932: 688; Hansen 1999: 162 (cat.); Hendrich et al. 2004: 128 and references therein.

Material examined. 1 ♀ (CFM): "Phil.: Luzon, Quezon City, Ateneo de Manila Campus, San Jose Seminary, semi-stagnant pool, mesosaprobic, light trap; 14°38'05.3"N, 121°04'50.2"E, 37m asl.; leg. L. Quilab, D. Raga & H. Freitag 28.Sep.2012 (ADM2)L".

Distribution. This species is distributed from New Guinea to the Afrotropical Region and the southern Palaearctic (Hansen 1999).

Ecology. As in *Enochrus* (*Lumetus*) *fragiloides.*

Family ELMIDAE (Riffle Beetles)

***Stenelmis* sp.**

Material examined. 1 ♀ (CFM): "PHIL.: Luzon, Quezon City, Ateneo de Manila Campus, near San Jose Seminary, creek side pool, leaf litter; 14°38'05.6"N, 121°04'50.2"E, 38m asl.; leg. H. Freitag 28.Jun.2013 (ADM2e)M".

Remarks. Surprisingly, this specimen was collected from an almost stagnant (feeder rivulet present) and temporary pool. *Stenelmis* species are usually restricted to streams. Although a single female specimen does not allow a proper determination, it is not unlikely that it belongs to a new species as well since only *S. palawana* Delève is known from the country, while several Philippine *Stenelmis* s.l. are still undescribed (Freitag and Pangantihon 2010; material at NMW, SMTD and CFM).

Discussion

The Philippines Islands are one of the most species-rich areas in the world, but suffer from an enormous destruction of their natural habitats and a loss of biodiversity at the same time. Several new species are reported every year from the country. They are usually discovered in the last few remaining natural forests and remote mountain ranges. However, this study has shown that even in a megacity new discoveries are possible, as long as remnants of semi-natural vegetation and more or less unpolluted waters are present.

Although it must be assumed that only euryoecious species inhabit such isolated freshwater habitats, the presence of three *Hydraena* species including one new record for Luzon Island (*H. palawanensis*) and one new species (*H. ateneo* sp. n.) in a small habitat patch amidst a highly urbanized landscape is astonishing.

Based on the copious Palawan records available (AQUA Palawana database, unpubl.), *H. scabra* is often the only species of the genus that can be found especially in disturbed habitats (in 40% of the records *H. scabra* was not collected along with any other *Hydraena* species). If it was collected along with just one other species (in 38% of the records), then this second species was *H. palawanensis* in most cases. The highest *Hydraena* species numbers observed syntopically at the same time was five, in all cases without the occurrence of *H. scabra*.

Photographs and verbal descriptions of the Ateneo campus sampling area before the campus was established are available from the Ateneo Archives (Cruz 1959: pp. 68, 112). The unbuilt area was described as "spacious and rolling grasslands" in 1952. This proves that the sampling sites have been entirely deforested in the last century. Such conditions are unlikely to support assemblages of true aquatic beetles as recorded by now. It can be assumed that the three hydraenids have recolonized the campus area after a tree cover has reestablished and the periods when the creeks and pools contained water became longer.

The presence of an elmid in a temporary pool is interpreted as a recent movement into this habitat from other, somewhat distant running waters, e.g. creeks in

the foothills of the Sierra Madre in the neighboring Rizal Province. Flight abilities of water beetles, including *Stenelmis* and other Elmidae, are proven when they are caught at light or in isolated temporary water bodies (pers. obs.). This demonstrates the recolonization abilities of aquatic insects once they reach suitable habitats. However, the pool where the specimen was collected cannot be considered as an enduring habitat for *Stenelmis*, but clean streams in the campus might potentially be.

Nevertheless, this should not lead to the illusion that the dramatic loss of biodiversity can be reversed. A large proportion of endemic insect taxa such as many other *Hydraena* species is closely associated with indigenous forests with a high diversity of tree species and endemic to a single or few islands (Freitag and Jäch 2007; Freitag and Zettel 2013). When these original habitats are lost, a local mass extinction of animal species is the consequence (e.g. Brook et al. 2003).

To be able to support urban biodiversity and the ecosystem services that these organisms provide, and last but not least to conserve places where students and inhabitants can experience, study, and enjoy nature near their places of residence, the following measures are recommended:

– Minimizing the discharge of untreated sewage into surface waters (e.g. by reed bed treatment);
– Cessation of dumping of wastes into water bodies and forested landscape patches; and
– Planting of indigenous tree species.

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A redescripton of *Lyrosoma pallidum* (Eschscholtz) and distributional range extension of *Lyrosoma* Mannerheim (Coleoptera, Agyrtidae)

In-Seong Yoo[1], Derek Sikes[2], Kee-Jeong Ahn[1]

1 *Department of Biology, Chungnam National University, Daejeon 305-764, Republic of Korea* **2** *University of Alaska Museum, 907 Yukon Dr., Fairbanks, Alaska, 99775, USA*

Corresponding author: *Kee-Jeong Ahn* (kjahn@cnu.ac.kr)

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Abstract

A redescription with illustrations of the species *Lyrosoma pallidum* and a key to the Korean species of the family Agyrtidae are provided. New distributional data, including a range extension, of the two *Lyrosoma* Mannerheim species are presented. *Lyrosoma pallidum* (Eschscholtz) is recorded for the first time in Korea.

Keywords

Lyrosoma pallidum, *L. opacum*, distribution range, coastal, Agyrtidae

Introduction

The genus *Lyrosoma* Mannerheim, containing two species worldwide, is confined to coastal habitats, such as under stones, seaweeds, and carcasses of various coastal animals along the seashore. They have also been reported in nests of maritime birds, but little is known regarding their immature stages and bionomics. They can be recognized by the combination of the following characters: mandibles without subapical teeth; antennomeres 9–10 each with apical grooves including compact distribution of sensilla; elytron with 9 striae; hind wings absent; pro- and mesotarsi dilated in males; aedeagus without parameres (Newton 1997; Schawaller 1998).

We collected a good series of *Lyrosoma pallidum* (Eschscholtz) along the seashores of Korea, Hokkaido (Japan), and Kamchatka (Russia). This species is a new addition

to the Korean fauna. Newton (1997) classified *Lyrosoma* under Agyrtinae (one of the three subfamilies, *sensu* Newton 1997) based on abdominal-elytral interacting system and structure of aedeagus, and discussed its phylogenetic relationships with other genera. Later, Schawaller (1998) revised the genus *Lyrosoma*, synonymizing six species, thereby reducing the genus from eight species to only two species, and also reported its distributional range along northern Pacific coasts. However, the description of *L. pallidum* was insufficient, lacking important features such as mouthparts and body sculpture and the distributional data were sparse and incompletely mapped. Here, we present a redescription with a habitus photograph and illustrations of *Lyrosoma pallidum*, provide improved distribution data for both species, a range extension for *L. pallidum*, and a key to the Korean species of Agyrtidae.

Material and methods

All *L. pallidum* specimens used in this study are deposited in the Chungnam National University Insect Collection (CNUIC), Daejeon, Korea. New data for *L. opacum* are from specimens deposited in the University of Alaska Museum Insect Collection (UAM), Fairbanks, Alaska, USA. These data and all literature records reported here for *L. opacum* are available online at http://arctos.database.museum/saved/Lyrosoma_opacum. Digital images of habitus were merged using image stacking software (Combine ZP). For measurement, we selected 10 males and 10 females (2♂1♀ from Korea; 5♂6♀ from Japan; 3♂3♀ from Russia) with maximum body size variation. The following abbreviations were used in the text: BL, body length (HL+PL+EL); HL, length of head from the anterior margin of the clypeus to the posterior margin of head; HW, width of head, including the eyes; PL, maximum length of pronotum; PW, maximum width of pronotum; EL, length of elytron from the base to the posterior margin of elytron; EW, width of elytra.

Results

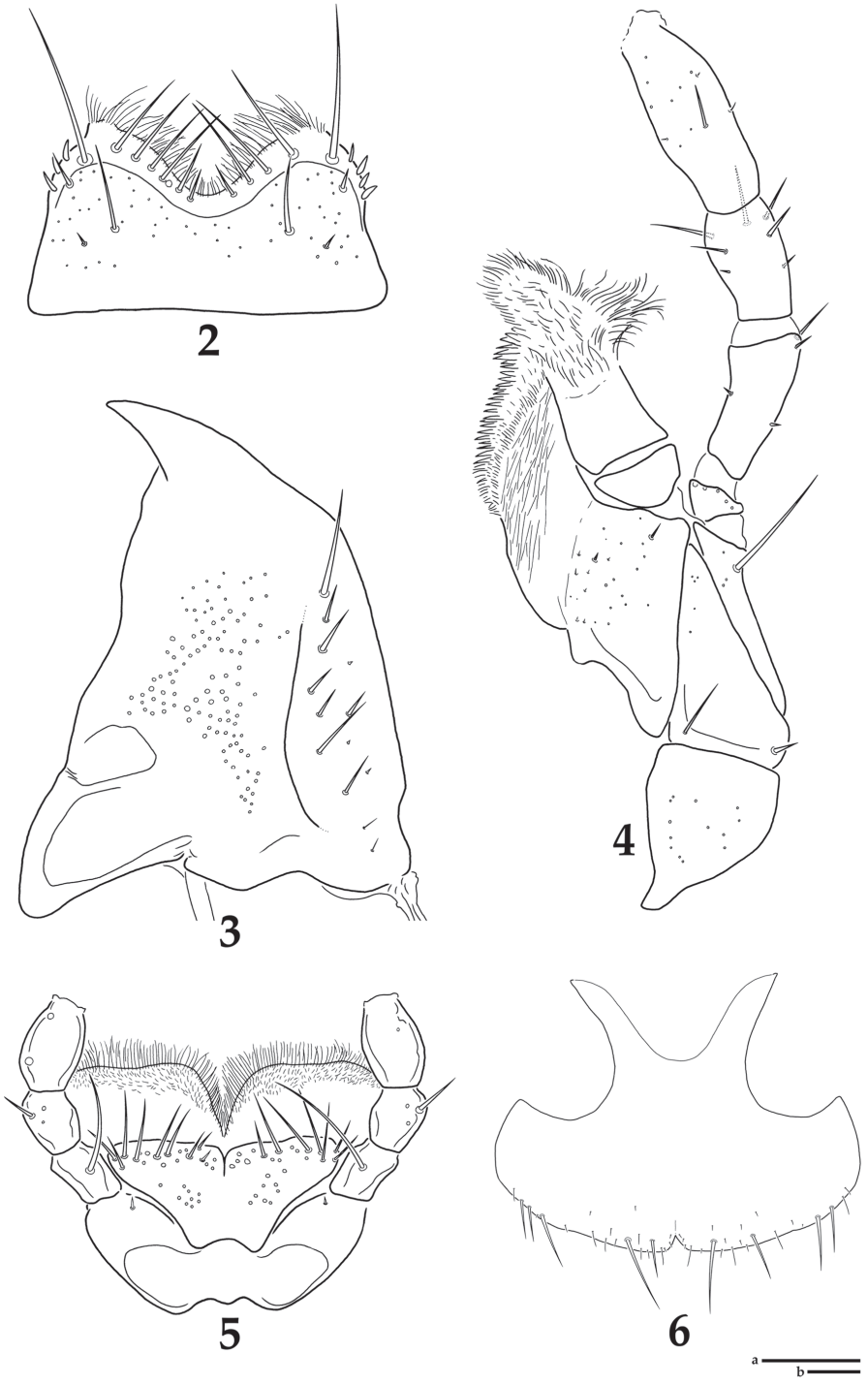
***Lyrosoma pallidum* (Eschscholtz)**
http://species-id.net/wiki/Lyrosoma_pallidum
Figs 1–10

Pteroloma pallidum Eschscholtz, 1829: 7.
Lyrosoma ovipenne Lewis, 1893 (synonymy by Schawaller 1998)
Lyrosoma suturale Lewis, 1893 (synonymy by Schawaller 1998)
Lyrosoma chujoi Mroczkowski, 1959 (synonymy by Schawaller 1998)
Lyrosoma ituropense Hlisnikovský, 1964 (synonymy by Schawaller 1998)

Material. KOREA: Gangwon Prov.: 1♂1♀, Goseong-gun, Hyeonnae-myeon, Daejin-harbor, N38°29'59.1", E128°25'46.2" 9 m, 29 V 2012, IS Yoo, JH Song, seaweeds

Figure 1. *Lyrosoma pallidum* (male from Goseong, Korea), body length 4.8 mm.

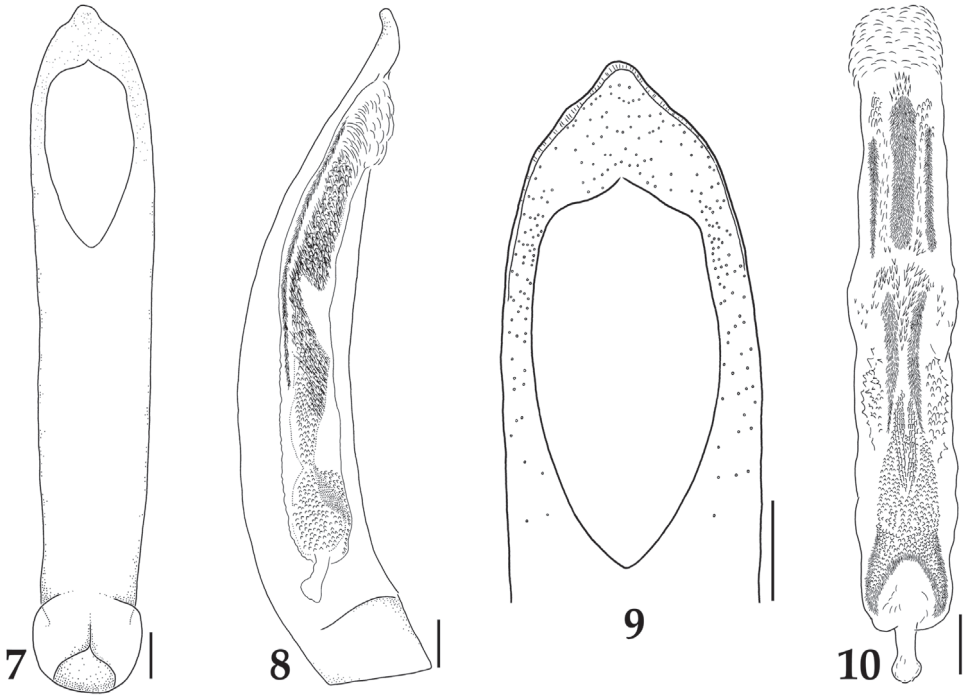
on seawall; 1♂ (dissected), Sokcho-si, Daepo-dong, Oeongchi-beach, N38°11'01.3", E128°36'31.9" 21 m, 28 V 2012, IS Yoo, JH Song, under seaweeds; **RUSSIA:** 15♂15♀ (1♂1♀ on slide, 8♂7♀ in 80% EtOH), Kamchatka, Petropavlovsk-kamchatsky, Avacha Bay, N53°01'26.4", E158°38'31.3", 25 VII 2011, KJ Ahn, IS Yoo, under debris on seashore; 2♂2♀ (7♀ in 80% EtOH), Kamchatka, Petropavlovsk-kamchatsky, Rescue Bay, N52°49'31.8", E158°35'51.1", 27 VII 2011, KJ Ahn, IS Yoo, seaweeds on rocky shore; 1♀ (in 80% EtOH), Kamchatka, Petropavlovsk-kamchatsky, Rescue Bay, N52°49'31.8", E158°35'51.1", 27 VII 2011, KJ Ahn, IS Yoo, seaweeds on sandy beach; **JAPAN:** 44♂54♀ (1♂1♀ on slide, 24♂30♀ in 80% EtOH), Hokkaido, Os-



Figures 2–6. *Lyrosoma pallidum*. **2** labrum, dorsal aspect **3** right mandible, dorsal aspect **4** left maxilla, ventral aspect **5** labium, ventral aspect **6** female sternite VIII, ventral aspect. Scale bars, 0.1 mm (a: Figs **2–5**; b: Fig **6**).

hima, Minami-kayabe, Ôfuna, N42°00'01.9", E140°52'55.4", 7 VI 2012, KJ Ahn, IS Yoo, decaying seaweeds/starfish on seawall; 1♂, Hokkaido, Akkeshi, Tokotan, 15 VI 1994, K. J. Ahn, on rock crevice in high tide; 3♂18♀, Hokkaido Prov., Nemuro City, Hamamatsu, 26 IX 2000, H.-J. Kim, M.-J. Jeon, under stones.

Redescription. Body (Fig 1) general carabid-shape, yellowish brown to reddish brown, surface glossy with microsculpture. Male. BL: 4.3–5.1 mm. Head as long as wide or slightly wider than long (HL/HW: 0.94–1.00); eyes medium and prominent, separated by about 5 times of eye width; eye about 0.8 times as long as temple; short setae present between facets, shorter than facet diameter; vertex of head without pale mounds; epistomal suture indistinct; epicranial suture more or less Y-shaped; dorsal surface with rather dense isodiametric microsculpture, ventral surface with transverse microsculpture. Antenna filiform, about 3 times as long as HW, antennomere 2 shortest, 3 and 11 longest, 4–7 similar in shape and length, 9–10 with dense sensilla in apical grooves, 9–11 very weakly clubbed. Labrum (Fig 2) transverse; anterior margin deeply and broadly emarginate; anterior and each anterolateral margin distinctly membranous and transparent; 4–6 long setae and single very long seta present on membranous part of each side of midline; 3–4 spinose setae present on each anterolateral region of membranous part; anterior margin of membranous part with dense micro setae; sclerotized part with two setae on each side of midline and one seta on each anterior corner; surface of sclerotized part with many pores scattered sparsely. Mandibles (Fig 3) symmetrical, inner regions without tooth; broad at base and pointed at apex; dorsal and ventral surface with many pores on medial area. Maxilla (Fig 4) with 4 palpomeres; palpomeres 2–4 with distinct setae. Labium (Fig 5) with 3 palpomeres; palpomeres 1–2 with long setae, last palpomere asetose; ligula caudal fin-like shape and bilobed, each lobe with 7–10 long setae on subapical region; ligula with many pores on medial and subapical regions of each lobe; paraglossa broadly developed, anterior margin with many setae densely distributed. Mentum trapezoidal narrowing apically; anterior margin straight; single long seta present on each anterolateral region; many pores scattered sparsely and microsculpture transverse. Submentum with many pores, short setae present sparsely. Pronotum broad cordiform, wider than long (PL/PW: 0.81–0.84); pronotum widest near anterior third; anterior corners round, posterior corners angled; pronotum without mid-basal fovea; disc with shallow and broad medial-longitudinal depression. Elytra oval and convex, gradually increased to posteriorly in convexity; longer than wide (EL/EW: 1.41–1.59); each elytron with 9 striae; intervals as wide as width of first antennomere, weakly convex and impunctate, dense isodiametric microsculpture present; basal lateral margin weakly serrate; epipleura without distinct punctures. Hind wings absent. Mesoventrite glabrous and sculptured strongly; mesoventral process sharp, contiguous to metaventral process. Metaventrite covering many setae sparsely, metaventral process sharp. Pro- and mesotarsi dilated, tarsomere 1–4 with numerous setae ventrally. Metatarsi simple and long; last tarsomere about 1.8 times as long as tarsomere 4. Tarsal claws simple, basal part with very feeble tooth; two empodial setae present, as long as tarsal claws. Abdominal sternites covering many setae, surface with dense isodiametric microsculpture. Aedeagus (Figs 7–10) without paramere; median lobe long and slender, mid-



Figures 7–10. Aedeagus of *Lyrosoma pallidum*. **7** median lobe, ventral aspect **8** median lobe, lateral aspect **9** apex of median lobe, ventral aspect **10** internal sac, ventral aspect. Scale bars, 0.1 mm.

dle part of apex slightly protruded (Fig 9); structure of internal sac as in Figs 8 and 10. Female. BL: 4.6–5.2 mm. Basically not differ to male. Pro- and mesotarsi not dilated. Sternite VIII (Fig 6) with posterior margin emarginate narrowly, a few setae present on marginal region; spiculum ventrale broad, deeply emarginate anteriorly.

Distribution. Korea (new record), Russia (Kamchatka, Kuriles, Magadan, Sakhalin) and Japan (Hokkaido, Honshu), Figure 11.

***Lyrosoma opacum* Mannerheim**
http://species-id.net/wiki/Lyrosoma_opacum

Lyrosoma snowi Lewis, 1893 (synonymy by Schawaller 1998)
Lyrosoma tripartitum Lewis, 1893 (synonymy by Schawaller 1998)

New records. See also http://arctos.database.museum/saved/Lyrosoma-opacum-new. **USA: Alaska**: 1 ex. Amatignak Isl., Ulva Cove, 3.9624m el. 51.26002° -179.07718° ±5m ryegrass pebble beach, pitfall, 6JUN-31JUL 2009 D.S. Sikes; 16 ex. Bogoslof Isl., 1-44m el. 53.9308°, -168.03633° ±720m 16-17JUL 2008 D.M. Collet; 2 ex. Chirikof Isl, 55.82461°, -155.73598° ±3km back beach, hand, 30MAY-3JUN 2012

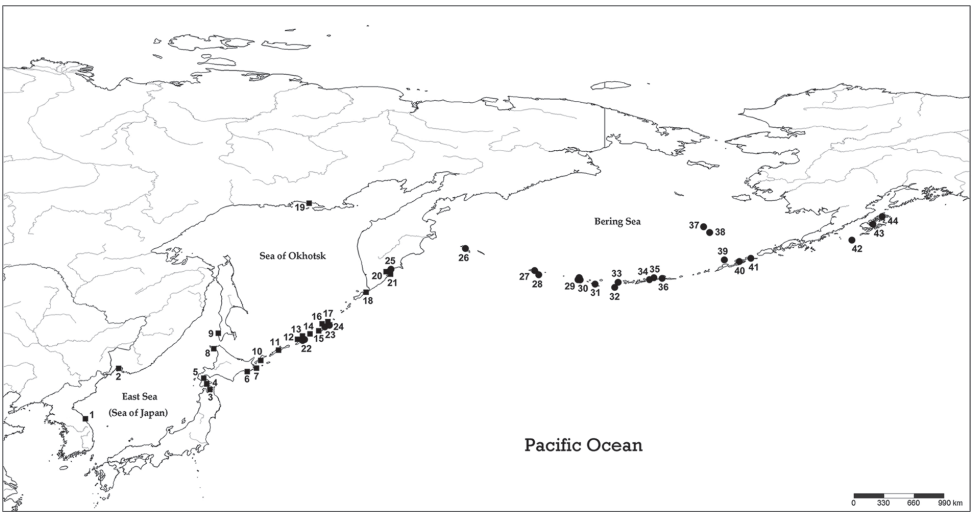


Figure 11. Distribution map of *Lyrosoma pallidum* (solid square, 1–21) and *L. opacum* (solid circle, 22–44). **1 Korea: Gangwon Prov.: Goseong, Sokcho 2** Russia: Chasan: Barabasch **3** Japan: Honshu: Aomori **4** Japan: Hokkaido: Hakodate **5 Japan: Hokkaido: Oshima 6 Japan: Hokkaido: Akkeshi, Nemuro 7** Japan: Hokkaido: Cape Nosappu **8** Japan: Hokkaido: Rishiri-tô Island **9** Russia: Sakhalin: Pravda **10** Russia: Kurile Island Kunashir **11** Russia: Kurile Island Iturup **12** Russia: Kurile Island Urup **13** Russia: Kurile Island Cirpoi **14** Russia: Kurile Island Brouton **15** Russia: Kurile Island Simushir **16** Russia: Kurile Island Ketoi **17** Russia: Kurile Island Yanchika **18** Russia: Kurile Island Shumshu **19** Russia: Magadan **20** Russia: Kamchatka: Petropavlovsk **21 Russia: Petropavlovsk-Kamchatsky 22** Russia: Tairu nr Urup / Kurile Island Cirpoi **23** Russia: Kurile Island Ketoi **24** Russia: Kurile Island Yanchika **25** Russia: Kamchatka coast **26** Russia: Bering Island **27** United States: Attu Island **28** United States: Agattu Island **29 United States: Kiska Island 30** United States: Little Kiska **31** United States: Amchitka Island **32 United States: Amatignak Island 33** United States: Gareloi Island **34 United States: Ulak Island 35** United States: Kasatochi Island **36** United States: Atka Island **37** United States: St. Paul Island **38** United States: St. George Island **39** United States: Bogoslof Island **40** United States: Unalaska Island **41 United States: Rootok Island 42 United States: Chirikof Island 43** United States: Kodiak Island **44** United States: Afognak Island. **Bold** records: present study; others: previous distributional sites based on Hamilton 1894; Van Dyke 1921; Hatch 1938; Mroczkowski 1959; Shibata 1969; Nishikawa 1997; Schawaller 1998; Sikes and Slowik 2010.

J.J. Withrow; 1 ex. Kasatochi E coast, upper shore, 52.17165°, -175.49229° ±2m under algae, 18JUN 2010 J. Slowik 1430-1515; 1 ex. Kasatochi, 1.524m el. 52.15905°, -175.4993° ±5m under kelp wrack, 13JUN 2009 J. Williams; 5 ex. Kasatochi, 12m el. 52.17177°, -175.52917° ±11m under rocks, scree, & grass, hand collected, 11JUN 2008 D.S. Sikes; 16 ex. Kasatochi, 3m el. 52.17912°, -175.49708° ±5m above beach, 12JUN 2009 J. Williams; 20 ex. Kasatochi, 3m el. 52.1796°, -175.49722° ±5m bird carcass, 12AUG 2009 D.S. Sikes; 8 ex. Kasatochi, 4.572m el. 52.17912°, -175.49708° ±5m above beach, under crested auklet carcass, 12JUN 2009 J. Williams; 2 ex. Kasatochi, E side, 18m el. 52.17416°, -175.49448° ±25m Peregrine falcon nest, carcasses of prey, 11AUG 2010 J. Williams; 2 ex. Kasatochi, E side, 4m el. 52.17371° -175.49289°

±5m bird carcass, cliff base, 11AUG 2010 D.S. Sikes; 1 ex. Kasatochi, NE coast, 4m el. 52.18058°, -175.49878° ±8m fish carcass, back beach, 11AUG 2010 D.S. Sikes; 1 ex. Kiska Harbor, 3m el. 51.97823°, 177.53963° ±7m beach cave, 3m deep, 6AUG 2010 D.S. Sikes; 2 ex. Kiska Is., Sirius Pt., 15m el. 52.13293°, 177.59668° ±15m sand, *Honkenya peploides*, 5 pitfalls, 2-15JUL 2008 A. Bond; 5 ex. Rootok, 1m el. 54.05005°, -165.5112° ±5m in cracks back beach rocks, 12JUL 2009 D.S. Sikes; 1 ex. Ulak Isl., 1-160m el. 52.04187°, -175.90281° ±800m *Elymus* stand, 20JUL 2008 D.M. Collet.

Distribution. Russia (Kurile Islands from Urup northwards, Kamchatka, Commander Islands), United States (Aleutian, Pribilofs, Kodiak, Afognak, and Chirikof islands), Figure 11.

Discussion

The coastal genus *Lyrosoma* includes only two valid species. *Lyrosoma pallidum* can be distinguished from *L. opacum* by its smaller body size, absence of epistomal suture and an elytral disc without distinct reticulation (Schawaller 1998). While examining five specimens on slides, we discovered variation in the number of setae on the labrum and ligula of *L. pallidum*. These features we consider to be intraspecific variation.

Schawaller (1998) reported that the genus *Lyrosoma* has been recorded on the northwestern Pacific coasts, from the western Aleutian Islands to the southernmost parts of northern Honshu, Japan. Our collection revealed that the distributional range of this genus extends to South Korea, representing a new southernmost boundary (Fig 11). Additionally, although Schawaller (1998) reported records for *L. opacum* from Kodiak and Afognak islands, Alaska, based on citations of Lafer (1989) and specimens in the Natural History Museum (London), he excluded these records from his map and his summary of the distribution of this species. Along this species' eastern range Schawaller described its distribution as restricted to the western Aleutians and just one of the two Pribilof islands (St. Paul). We have corrected this exclusion and based on our collections (n=6) and literature records not included in Schawaller (1998) (n=17) increased the number of islands on which *L. opacum* is known from the seven reported in Schawaller (1998) to twenty-three (Fig. 11). The two *Lyrosoma* species are apparently sympatric on Kamchatka and on the Kurile Islands Ketoi, Cirpoi, and Yanchika.

Key to the known species of Korean Agyrtidae

The key is modified from Newton (1997), Cho et al. (2001), and Lafer (2002).

1 Antennomeres 2–5 each with apical grooves including compact distribution of sensilla (see Newton 1997: fig 3); mandibles without subapical teeth [Agyrtinae]; seashore habitats.....***Lyrosoma pallidum* (Eschscholtz)**

– Antennomeres without apical grooves, sensilla sparsely present at the tip (see Newton 1997: fig 41); mandibles with large subapical teeth [Pterolomatinae]; terrestrial habitats **2**

2 Vertex of head without mounds analogous to ocelli; tibiae not carinate; aedeagus without parameres ..... ***Apteroloma kozlovi* Semenov & Znojko**

– Vertex of head with one pair of mounds analogous to ocelli; tibiae carinate dorsally; aedeagus with parameres **3**

3 Pronotum cordate, widest at anterior third, dense punctures present mostly along marginal region; aedeagus as in fig 2F (Lafer 2002) .... ***Pteroloma forsstromii* (Gyllenhal)**

– Pronotum transverse, widest at the middle, dense punctures present excluding small part of central region; aedeagus as in figs 2A–B (Cho et al. 2001) .... ***Pteroloma koebelei* Van Dyke**

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RESEARCH ARTICLE

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A revision of the Larainae (Coleoptera, Elmidae) of Venezuela, with description of nine new species

Crystal A. Maier[1,†]

1 *Division of Entomology, Biodiversity Institute & Department of Ecology and Evolutionary Biology, University of Kansas, Lawrence, KS, 66045, USA*

† *http://zoobank.org/E777AD0C-E27A-4C2A-B09E-37ACEA60F00C*

Corresponding author: *Crystal A. Maier* (cmaier@ku.edu)

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Abstract

The species of the riffle beetle subfamily Larainae occurring in Venezuela are revised. Examination of 756 specimens yielded 22 species in nine genera occurring throughout the country. Seven species are newly recorded from the country: *Phanoceroides* sp. 1, *Phanocerus clavicornis* Sharp, 1882, *Phanocerus congener* Grouvelle, 1898, *Pharceonus volcanus* Spangler & Santiago-Fragoso, 1992, *Disersus dasycolus* Spangler & Santiago-Fragoso, 1992, *Disersus chibcha* Spangler & Santiago-Fragoso, 1987, and *Disersus inca* Spangler & Santiago-Fragoso, 1992. Nine species are found to be new to science, which are here described: *Hexanchorus dentitibialis* **sp. n.**, *H. falconensis* **sp. n.**, *H. flintorum* **sp. n.**, *H. homaeotarsoides* **sp. n.**, *H. inflatus* **sp. n.**, *Phanocerus rufus* **sp. n.**, *Pharceonus grandis* **sp. n.**, *Pharceonus ariasi* **sp. n.**, *Potamophilops bostrychophallus* **sp. n.** Additionally, a key to species, distribution maps, and photographs and genitalia illustrations are provided for all species.

Resumen

Los escarabajos de la subfamilia Larainae de Venezuela son revisados. Se examinaron 756 especimenes, se reportan 22 especies en nueve géneros. Siete especies son nuevos registros para el pais – *Phanoceroides* sp. 1, *Phanocerus clavicornis* Sharp, 1882, *Phanocerus congener* Grouvelle, 1898, *Pharceonus volcanus* Spangler & Santiago-Fragoso, 1992, *Disersus dasycolus* Spangler & Santiago-Fragoso, 1992, *Disersus chibcha* Spangler & Santiago-Fragoso, 1987, y *Disersus inca* Spangler & Santiago-Fragoso, 1992. Se describen nueve especies nuevas – *Hexanchorus dentitibialis* **sp. n.**, *H. falconensis* **sp. n.**, *H. flintorum* **sp. n.**, *H. homaeotarsoides* **sp. n.**, *H. inflatus* **sp. n.**, *Phanocerus rufus* **sp. n.**, *Pharceonus grandis* **sp. n.**, *Pharceonus ariasi* **sp. n.**, *Potamophilops bostrychophallus* **sp. n.** Adicionalmente se presenta, una clave para las especies, mapas de distribución son presentadas. Fotografías e ilustraciones genitales se proporcionan para todas las especies.

Keywords
Aquatic insects, Neotropical Region, riffle beetle, tepui, taxonomy

Introduction

The Elmidae, or "riffle beetles" are a widespread family of aquatic beetles common in a variety of running water habitats. Within Elmidae, there are two subfamilies, Larainae and Elminae. Species of Larainae are generally not found in the benthos, as with most elmine riffle beetles, but on water-splashed rocks and detritus just beyond the water's edge, carrying with them an air bubble under a thin film of water. As adults, they are agile fliers and enter and exit the water with great ease (Kodada and Jäch 2005). These unique habitat requirements make laraines difficult to collect unless one is seeking them out specifically.

Currently, there are 27 genera of laraines described, with eleven of these known from the Neotropical Region. Most work on the Neotropical fauna has been relatively recent, with Spangler and Santiago-Fragoso (1987, 1992) revising the Central American and West Indian fauna and three genera. Three other genera have been described from the Guiana Shield in southern Venezuela, *Roraima* Kodada & Jäch, 1999 (Mount Roraima), and *Neblinagena* Spangler, 1985 and *Hypsilara* Maier & Spangler, 2011 (both from Cerro de Neblina). Additionally, new species of *Pharceonus* Spangler & Santiago-Fragoso, 1992 and *Potamophilops* Grouvelle, 1896 have been described from Ecuador and Brazil, respectively (Monte and Mascagni 2012; Fernandes and Hamada 2012).

Recent fieldwork to Venezuela has yielded a large volume of laraine specimens (756 individuals) that were unidentifiable to species using current literature. I assembled material from other collections, including types, and discovered several more new species in that material. Herein I describe all of the new species found on these and prior expeditions, record several new distribution records for Venezuela, and present a key to species of Larainae in Venezuela.

Methods

Specimens were examined using an Olympus SZX7 dissecting microscope at various magnifications, from 8–56× magnification and described following terminology from Spangler and Santiago-Fragoso 1992. Specimens were photographed using a Canon EOS 70D with a Visionary Digital imaging system and photos were stacked using CombineZP image editing software (Hadley 2012).

The genitalia were extracted from relaxed specimens through the caudal opening in the abdomen. The genitalia were then cleared in heated potassium hydroxide for thirty minutes, rinsed with water, and temporarily mounted in glycerin gelatin (Zander 1997) for observation and illustration. The cleared genitalia were then placed

in a plastic genitalia vial below the specimen for storage. Illustrations were made in pen and ink using a camera lucida attached to the compound microscope and scanned into the computer. Images were edited in Adobe® Illustrator® and Adobe® Photoshop®.

Label information in the material examined is quoted exactly from the original labels, with quotations ("…") indicating breaks between labels and semicolons (;) indicating line breaks. Where label data are ambiguous or incorrect, interpretations of label data are given in brackets ([...]).

Specimens are deposited in the following collections:

CKB	Jan Kodada Collection, Bratislava, Slovakia
FCC	Fedor Čiampor Collection, Bratislava, Slovakia
MAIC	Michael A. Ivie Collection, University of Montana, Bozeman, Montana, USA
MALUZ	La Universidad del Zulia, Maracaibo, Venezuela
MIZA	Museo del Instituto de Zoología Agrícola Maracay, Venezuela
NMPC	National Museum, Prague, Czech Republic
NMW	Naturhistorisches Museum, Vienna, Austria
SEMC	Snow Entomological Collection, University of Kansas, Lawrence, Kansas, USA
USNM	Smithsonian Institution, Washington, DC, USA

Taxonomy

Larainae species from Venezuela

Disersus chibcha Spangler & Santiago-Fragoso, 1987
Disersus dasycolus Spangler & Santiago-Fragoso, 1987
Disersus inca Spangler & Santiago-Fragoso, 1987
Hexanchorus dentitibialis sp. n.
Hexanchorus falconensis sp. n.
Hexanchorus flintorum sp. n.
Hexanchorus homaeotarsoides sp. n.
Hexanchorus inflatus sp. n.
Hexanchorus mcdiarmidi Spangler & Staines, 2003
Hypsilara breweri Ciampor et al., 2013
Hypsilara royi Maier and Spangler, 2011
Neblinagena doylei Kodada & Jäch, 1999
Neblinagena prima Spangler, 1985
Phanoceroides sp. 1
Phanocerus clavicornis Sharp, 1882
Phanocerus congener Grouvelle, 1898
Phanocerus rufus sp. n.
Pharceonus ariasi sp. n.
Pharceonus grandis sp. n.

Pharceonus volcanus Spangler & Santiago-Fragoso, 1992
Potamophilops bostrychophallus sp. n.
Roraima carinata Kodada & Jäch, 1999

Disersus Sharp, 1882

http://species-id.net/wiki/Disersus
Figs 1, 2, 9–22

Diagnosis. This genus can be distinguished from all other genera of Larainae that occur in South America by the following combination of characters: its large size (5.6–10.1 mm), distinct pronotum, which lacks a transverse depression across the apical third (Fig. 21), and elytron lacking an accessory stria (Fig. 18).

Distribution. Members of this genus occur in Central and South America, as far north as Costa Rica and as far south as Cuzco, Peru (Spangler and Santiago-Fragoso 1987).

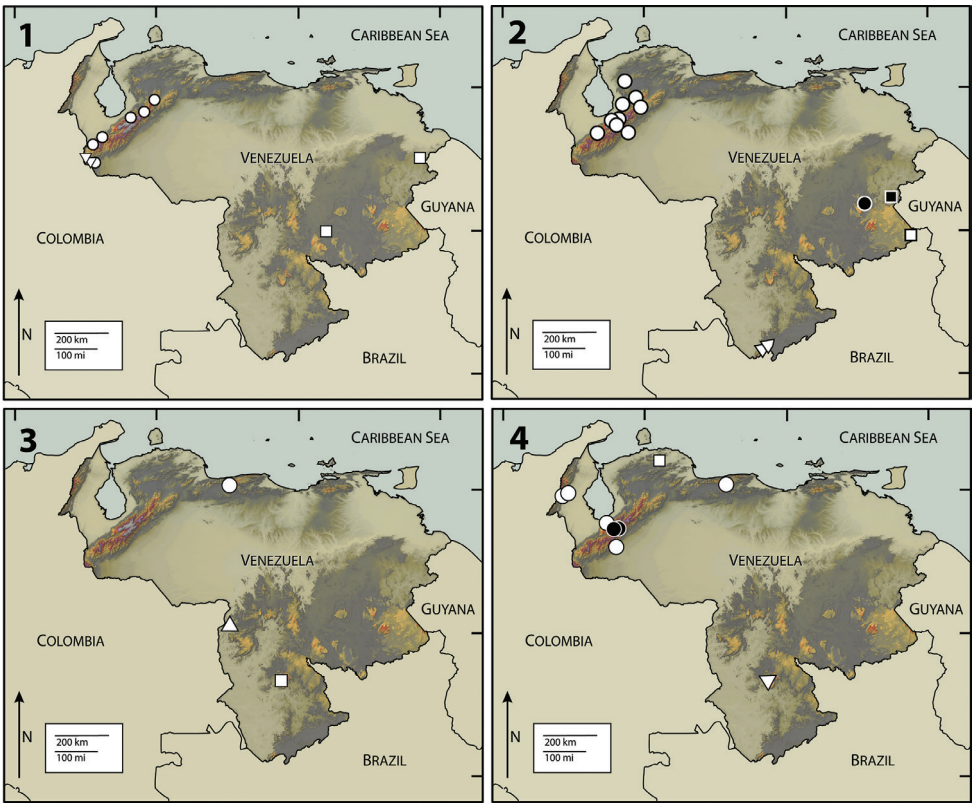
Habitat. *Disersus* species can be found in fast-flowing streams and rivers, clinging to rocks and flying upstream in riffles and cascades. They rapidly enter and exit the water with great ease, carrying with them a silvery air bubble. They can be found in streams by looking for moving teardrop shaped air bubbles on the downstream sides of rocks with water cascading over them. Individuals of this genus are also commonly found at UV and mercury vapor lamps (pers. obs.).

Disersus chibcha Spangler & Santiago-Fragoso, 1987

http://species-id.net/wiki/Disersus_chibcha
Figs 1, 9, 10, 11, 12

For complete description and genitalia illustrations see Spangler and Santiago-Fragoso 1987.

Material examined. COLOMBIA: Valle del Cauca: "COLOMBIA: Dept Valle; 4km W. Cisneros; 28-II-69; R.E. Woodruff; Blacklight trap" (2 paratypes USNM). **VENEZUELA: Mérida State:** "VENEZUELA: Mérida State; 8°44.114'N, 71°26.898'W, 873m; ca. 2 km S La Azulita; Cascada la Palmita; 21.vii.2009; leg. Shepard; VZ09-0721-01Z" (1 specimen SEMC). "Venezuela Mérida ; Dtto. Justo Briceño; Cañada de San Jose; 14/15-VII-1990" "Colector:; J. Camacho" (1 specimen MALUZ). **Táchira State:** "Rio Frio; Venezuela, Tachi-; ra [Táchira State]. 600m.; 2–10-IX-1981" "F. Fernandez. Y; J. Clavijo; A. Chacon" (5 specimens MIZA). "Rio Frio; Venezuela, Tachi-; ra [Táchira State]. 600m.; 20–24-IV-1982" "Expedicion; Zoologia; Agricola" (2 specimens MIZA). "Venezuela: Táchira; Quebrada La Uraca San; Felix 300m 17–22-vi-1998; J. DeMarmels y A. Chacon" (1 specimen MIZA). "Venezuela: Táchira; Quebrada La Uraca San; Felix 300m 7–16-v-2002; J. DeMarmels y A. Chacon" (2 specimens MIZA). "Venez. Táchira; Sn. Felix Rio Uraca; 350m; 12–19-iv-1996" "J. DeMarmels, A.; Chacon" (2 specimens MIZA). "Venezuela Táchira; La Blanca cr. Colon; La Fria



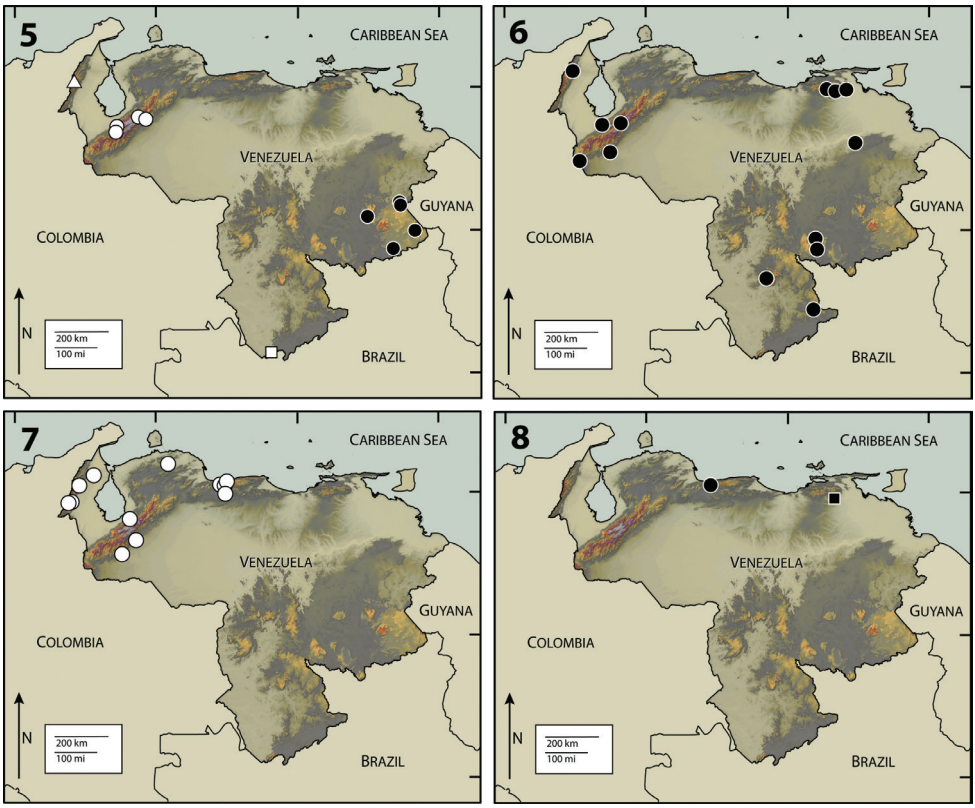
Figures 1–4. 1 Map of Venezuela, showing collection localities for *Disersus inca* (Triangle), *Disersus chibcha* (Circle), and *Potamophilops bostrychophallus* (Square) **2** *Disersus dasycolus* (White Circle), *Hypsilara royi* (White Triangle), *Roraima carinata* (White Square), *Hypsilara breweri* (Black square), *Hypsilara* sp. (Black Circle) **3** *Hexanchorus dentitibialis* (Circle), *Phanoceroides* sp. 1 (Triangle), *H. homaeotarsoides* (Square) **4** *Hexanchorus falconensis* (White Square), *H. mcdiarmidi* (White Circle), *H. flintorum* (Black Circle), *H. inflatus* (White Triangle).

1000m; 14–21-iv-1998; Cols. J. DeMarmels; A. Chacon" (1 specimen MIZA). **Trujillo State:** "Venezuela Trujillo; Mcpio. Escuque; El Prado. Rio Buena Vista; 05-IV-1992" "J. Camacho; O. Lisano; Colectores" (2 specimens MALUZ).

Diagnosis. This species of *Disersus* can be distinguished from its congeners by the combination of an almost entirely bare metatibia (Fig. 12); blackish-brown femora; and indistictly produced elytral apices (Fig 9), as well as its large size (~8.5 mm) (see Spangler and Santiago-Fragoso 1987).

Intraspecific variation. This species varies slightly in size and coloration, from dark brown to nearly black. Additionally, the last abdominal ventrite of the male is notched, while the last abdominal ventrite of the female is slightly sinuate, and the elytral apices of the female are more acute than those of the male (see Spangler and Santiago-Fragoso 1987).

Habitat and distribution. Previously, *D. chibcha* was known only from a black-light trap at Valle del Cauca, Colombia (Spangler and Santiago-Fragoso 1987). Sub-



Figures 5–8. 5 Map of Venezuela, showing collection localities for *Pharceonus volcanus* (White Triangle), *Pharceonus grandis* (White Circle), *Neblinagena prima* (White Square), and *Neblinagena doylei* (Black Circle) **6** *Phanocerus clavicornis* (Black Circle) **7** *Phanocerus congener* (White Circle) **8** *Phanocerus rufus* (Black Circle), *Pharceonus ariasi* (Black Square).

sequent collections of this species, given here, were from high gradient, medium-sized streams and waterfalls throughout the Mérida Andes in Venezuela (Fig. 1).

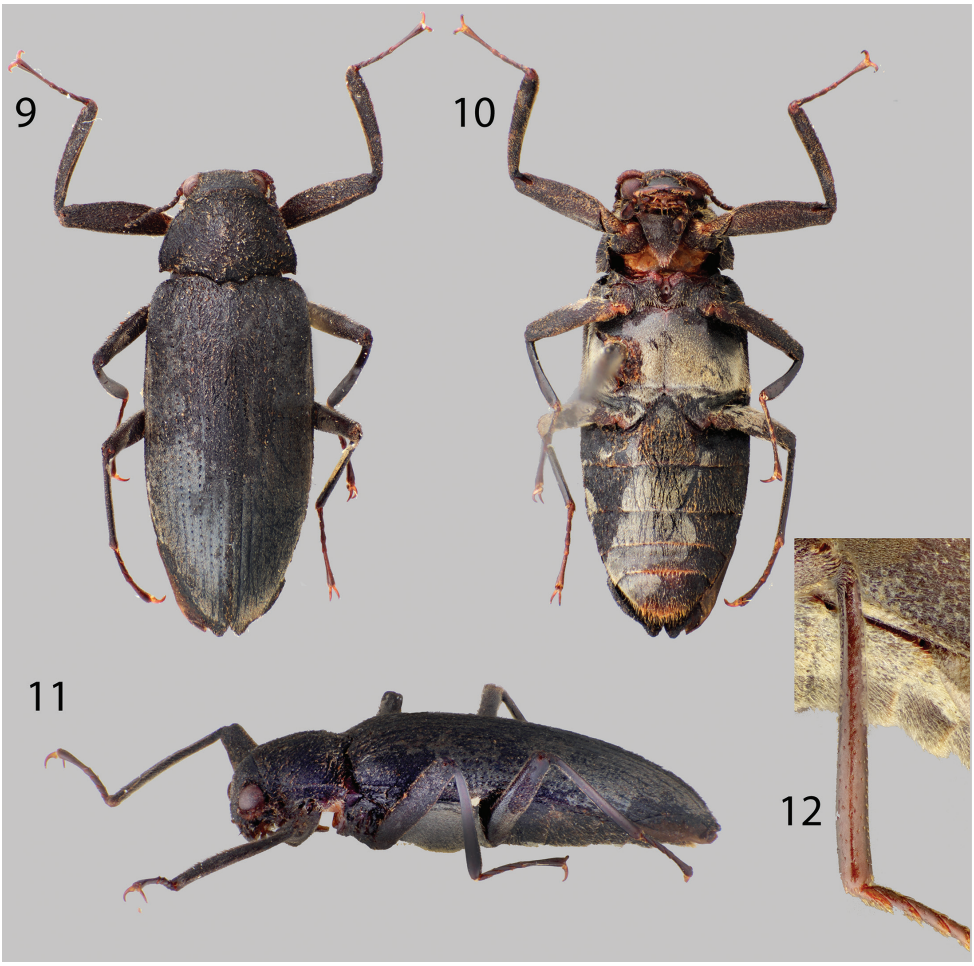
Associated species. No other laraine species were collected with *D. chibcha*.

Disersus dasycolus Spangler & Santiago-Fragoso, 1987

http://species-id.net/wiki/Disersus_dasycolus
Figs 2, 13, 14, 15, 16, 17

For complete description and genitalia illustrations see Spangler and Santiago-Fragoso 1987.

Material examined. VENEZUELA: Mérida State: "VENEZUELA: Mérida State; 8°35.355'N, 71°13.926' W 1646m; N. of Ejido, Rt. 4 river x-ing; 10.vii.2009; leg. Shepard; gross sample; VZ09-0720-02Z" (3 specimens SEMC). "VENEZUELA: Mérida State; 8°14.393'N, 71°48.672'W, 1862m; Bailadores; 18.vii.2009; Cascada; de Bailadores – stream margins; leg. Short et al.; VZ09-0718-02A" (1 specimen SEMC).



Figures 9–12. *Disersus chibcha*: **9** Dorsal habitus **10** Ventral habitus **11** Lateral habitus **12** Metatibia, male.

"VENEZUELA: Mérida State; 8°38.006'N, 71°09.762'W, 2037m; Monte Zerpa area; 20.vii.2009; leg. W. Shepard; stream margin; gross sample; VZ09-0720-01Z" (3 specimens SEMC). "VENEZUELA: Mérida State; Rio Montealban, Rt. 4; 19 km. W. Mérida ; 20 Feb 1976; C.M. & O.S. Flint Jr." (2 specimens USNM). "Venezuela. Mérida ; Mcipo. Rangel. P.N. Sierra; Nevada; La Mucuy; 2200m. 05/07-XI-1992" "Colector:; J. Camacho" (1 specimen MALUZ) "Via Jaji; Me. Vzla; 15-IX-77" "Cols:; J.M. Osario; A. Escalona" (1 specimen MALUZ). "La Pedregosa; Venezuela-Meri-; da. 1800m; 18-IX-1966" C.J. Rosales; J. Salcedo" (1 specimen MIZA). **Trujillo State:** "Bocono; Venezuela, Tru-; jillo. m.; 21-VII-1974" "F. Fernandez; H.M. Giani" (3 specimens MIZA). "Bocono; Trujillo Venz.; 13-VIII-1964" "E. Osuna; M. Gelbes" (1 specimen MIZA). "VENEZUELA: Trujillo State; 9°11.935'N; 70°45.233'W, 1601m; ca. 6 km E. Monte Carmelo; 22-vii-2009; leg. W. Shepard; VZ09-0722-03Z; gross sample" (1 specimen SEMC). "VENEZUELA, Trujillo; Parque N. Guaramacal; Mpio. Bocono, Laguna;

Figures 13–17. *Disersus dasycolus*: **13** Dorsal habitus **14** Ventral habitus **15** Lateral habitus **16** Metatibia, male **17** Protibia, male.

Aguas Negras 1740; msnm. 26–28/V/1995" "Colectores:; J. Camacho; M. Garcia" (3 specimens MALUZ). "VENEZUELA: Trujillo; Paq. Nac. Guaramacal; Mpio. Bocono Laguna; de Aguas Negras, 1800; msnm. 20–25/VIII/ 1995; Trampa de Luz" "Colectores:; J. Camacho; M. Garcia" (2 specimens MALUZ). "VENEZUELA, Trujillo; Mcipo. Sta. Ana. Via; Bocono-Trujillo 1000; msnm. 28/V/1995" "Colectores:; Garcia, M.; Camacho, J." (18 specimens MALUZ). **Lara State:** Anzoátegui; (Qda. Guago); Venezuela- Lara; 1440m 13–16-VI-72" "J. Salcedo; F. Zambrano" (10 specimens MIZA, 2 specimens MALUZ). **Barinas State:** "Venezuela: Barinas; San Isidro, 14 kms Sur; La Soledad. 1500m; 30–31-V-1975" "E.E. Dietz; leg." (7 specimens MIZA).

Diagnosis. *Disersus dasycolus* is unique among the species of *Disersus* and can be distinguished from all other species by the fuzzy protibiae of the male (Fig. 17). Males have a patch of dense, long, curly setae on the distal third of the ventral side of the protibia that is found in no other species of *Disersus* (Fig. 17) (See Spangler and Santiago-Fragoso 1987).

Intraspecific variation. This species varies slightly in color and size, from a medium to dark brown. Females do not possess the patch of setae apicoventrally on the protibiae, and instead bear setae that resemble those of the other legs.

Habitat and distribution. Previously, this species was only known from a single specimen collected at blacklight trap in Pastaza Province, Ecuador. Somewhat surprisingly, this species is quite common in streams in the Mérida Andes of Venezuela above 1000m elevation, and seems to prefer stream margins (Fig. 2).

Associated species. A single species of *Hexanchorus*, *H. flintorum* sp. n. was collected at the same localities as *Disersus dasycolus*. *Disersus* spp. are often collected in conjunction with *Hexanchorus* spp. as they seem to prefer the same rocky cascades as habitat. Other aquatic beetles collected at the same localities include: *Andogyrus* spp. (Gyrinidae).

***Disersus inca* Spangler & Santiago-Fragoso, 1987**
http://species-id.net/wiki/Disersus_inca
Figs 1, 18, 19, 20, 21, 22

For complete description and genitalia illustrations, see Spangler and Santiago-Fragoso 1987.

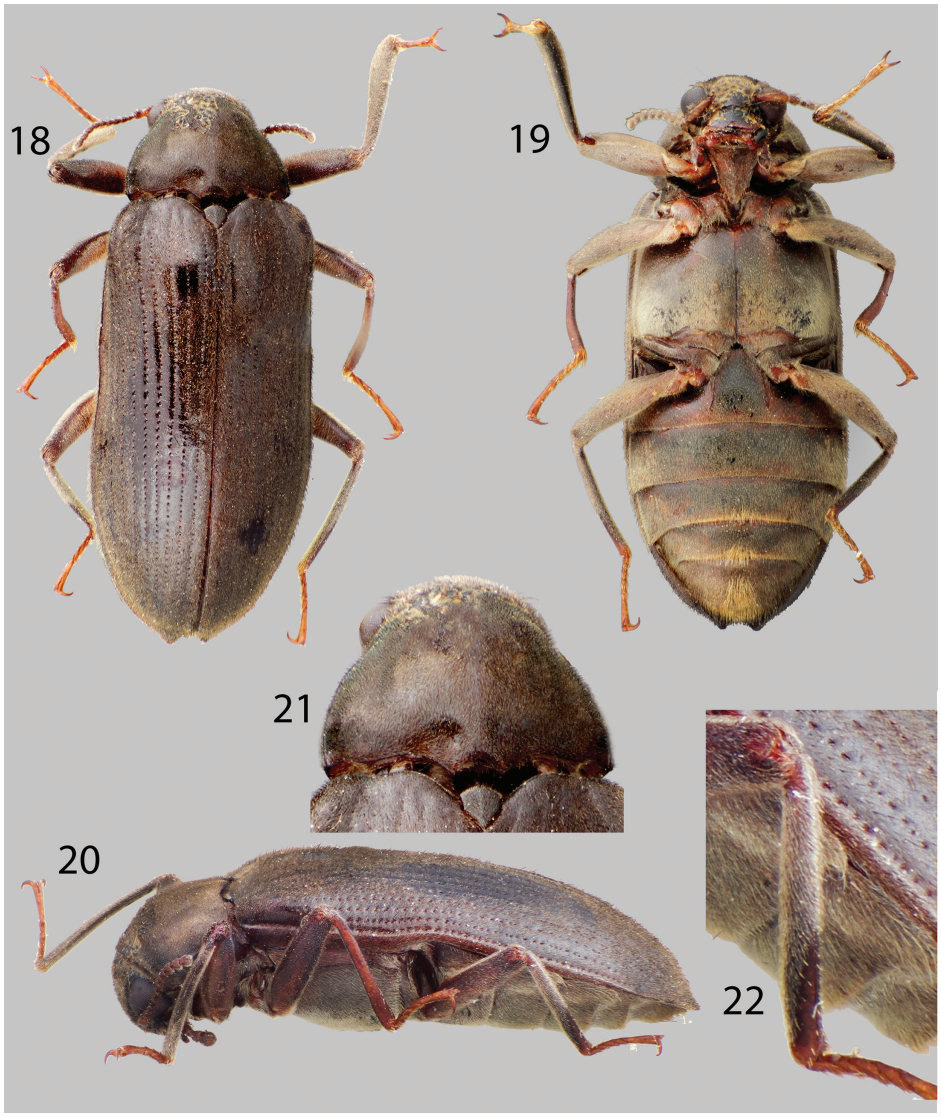
Material examined. ECUADOR: Napo Province: "ECUADOR. Napo; San Francisco; de Borja; 15 May 1975; at blacklight" "Collected by; Spangler, Gurney; Langley, & Cohen" (2 paratypes USNM). **VENEZUELA: Táchira State:** "Delicas; Venezuela – Tachi-; ra. 1500m; 27-IX-1966" "C.J. Rosales; J. Salcedo" (1 specimen MIZA). "VENEZUELA Táchira; La Pesa San Vincente de; La Revancha 2950m; 7–16-V-2002; J. DeMarmels, A. Chacon" (2 specimens MIZA). "VENEZUELA Táchira; La Provencia La; Revancha 1340m; 7–16-V-2002; J. DeMarmels, A. Chacon" (4 specimens MIZA).

Diagnosis. *Disersus inca* can be distinguished from all other *Disersus* by the combination of the entirely pubescent metatibia, except for a narrow glabrous patch apically (Fig. 22) and the rounded elytral apices of the male.

Intraspecific variation. Members of this species vary slightly in size and color, from a reddish-brown to medium brown, and in total length from 6.6–7.6 mm. The female differs from the male in having slightly produced elytral apices and a rounded apical abdominal ventrite (see Spangler and Santiago-Fragoso 1987).

Habitat and distribution. Previously, *D. inca* was only collected in blacklight traps near montane streams in Ecuador, Colombia, and Peru (Spangler and Santiago-Fragoso 1987), this species is known to occur in the Cordillera Oriental in southwestern Venezuela from streams above 1000m in elevation (Fig. 1).

Associated species. No other laraine species were collected with *D. inca*.



Figures 18–22. *Disersus inca*: **18** Dorsal habitus **19** Ventral habitus **20** Lateral habitus **21** Pronotum, dorsal view **22** Metatibia, male.

***Hexanchorus* Sharp, 1882**
http://species-id.net/wiki/Hexanchorus
Figs 3, 4, 23–49

Diagnosis. *Hexanchorus* can be distinguished from all other Larainae genera that occur in South America by its small size (<5.1 mm) and the deep transverse groove across the apical third of the pronotum.

Distribution. Species of *Hexanchorus* are widespread in the neotropics and can be found as far north as southern Mexico and as far south as Argentina. Additionally, a single species, *Hexanchorus caraibus* (Coquerel, 1851) is known from the West Indies south to Brazil (Spangler and Santiago-Fragoso 1992, Passos et al. 2009, Segura et al. 2012).

Habitat. Often, *Hexanchorus* spp. can be found in the same habitats as *Disersus* spp. They are agile fliers and cling to rocks in fast flowing streams and rivers, flying into and out of the water quite readily.

Remarks. Only a single species of *Hexanchorus* (*H. mcdiarmidi*) was recorded from Venezuela prior to this study. Here I describe five new species from older museum material as well as specimens collected on recent expeditions to Venezuela.

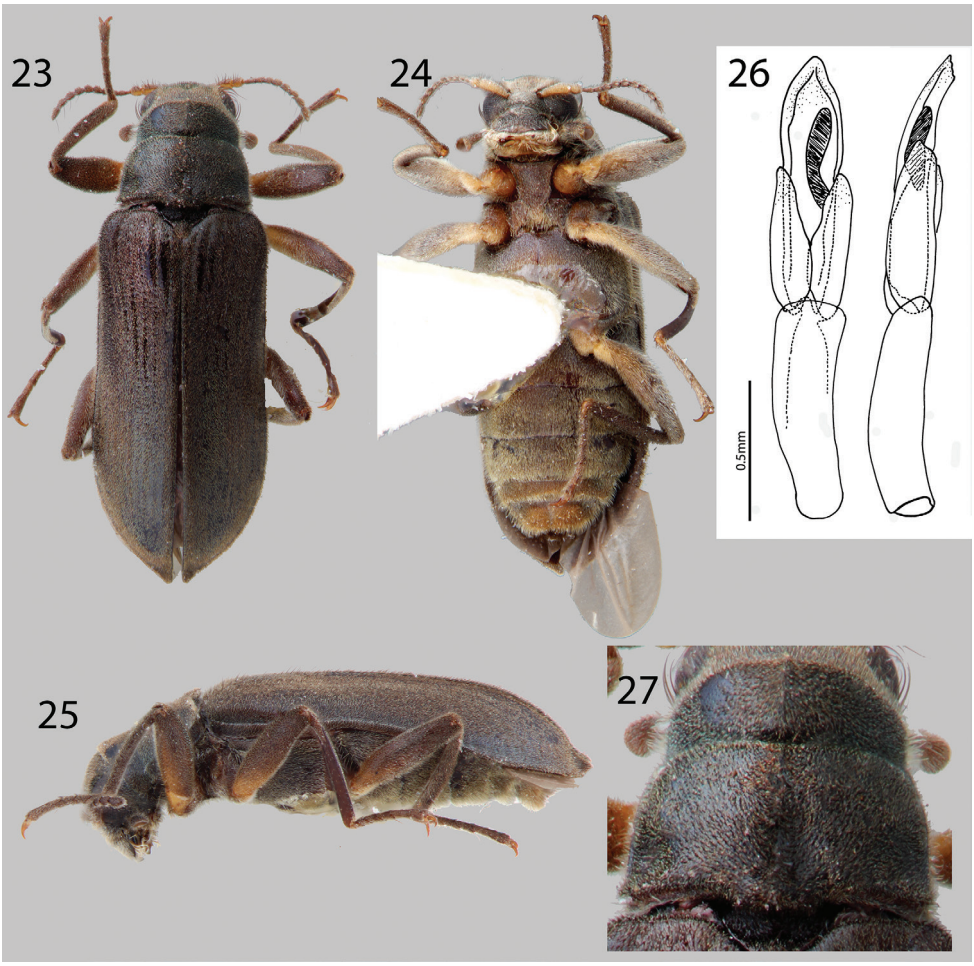
***Hexanchorus dentitibialis* sp. n.**
http://zoobank.org/675D8273-EE2C-4C81-B603-794E519445E9
http://species-id.net/wiki/Hexanchorus_dentitibialis
Figs 3, 23, 24, 25, 26, 27

Type material. Holotype Male. "Guayabita Cr.; Turmero: AR [Aragua State]; Venezuela; 466m 21-I-71; J. Salcedo; colr." Holotype deposited in MIZA. **Paratypes (2):** Same locality data as holotype. Paratypes will be deposited in: 1 in SEMC, 1 in MIZA.

Diagnosis. This species most closely resembles *Hexanchorus mcdiarmidi*, but can be distinguished from that species by the presence of a deep posteromedian impression on the pronotum (Fig. 27) and the extended elytral apices on the male (Fig. 23), which *H. mcdiarmidi* lacks. Additionally, species identity can be confirmed by the distinctive aedeagus, which is truncate in lateral view (Fig 26). This character does not occur in any other *Hexanchorus* species.

Description. Holotype Male. Body elongate, subparallel, dorsum moderately convex (Fig. 23). Length, 3.1 mm; greatest width, 0.9 mm. Body dark brown dorsally; venter dark brownish black. Base of antenna testaceous ventrally, and base of femur trochanter testaceous (Fig. 24). Dorsal surface densely covered with short recumbent setae; ventral surface densely covered with slightly longer, golden, recumbent setae (Fig. 23). Setae lacking greenish iridescence. Surface microreticulate, with dense fine punctures; fine punctures separated by distance equal to puncture diameter.

Head moderately coarsely, densely punctate; punctures separated by their diameter; cuticle microreticulate. Clypeus with anterior margin straight; angle on each side acute; lateral angles of clypeus with dense tuft of golden setae. Labrum with anterior margin entire and broadly rounded, covered with setae approximately twice as long as setae on head; lateral margins of clypeus with thick brush of curly, dark brown setae. Eyes hemispherical, narrowed posteriorly and bordered by long black curved setae ("eyelashes") that arise near dorsal and ventral sides of eyes and extend toward middle of eye. Antenna pubescent, filiform; basal antennomeres I and II testaceous ventrally, with dense recumbent setae and long, dark brown setae (Fig. 23). Antennae without club, but thickening slightly towards apex. Antennae long, reaching past transverse



Figures 23–27. *Hexanchorus dentitibialis* sp. n.: **23** Dorsal habitus **24** Ventral habitus **25** Lateral habitus **26** Aedeagus, dorsal and lateral views **27** Pronotum, dorsal view.

groove of pronotum (Fig. 23). Apical antennomeres dark brownish black, with dense recumbent setae. Apical antennomere square.

Pronotum 0.8 mm long, 0.9 mm wide; with strong sublateral groove; lateral margins slightly sinuate; anterolateral angles square, not explanate; base of pronotum slightly sinuate and with broad lobe medially; posterolateral angles square, slightly explanate, declivous, depressed adjacent to each angle; discal area with fine, dense punctures, punctures separated by a distance equal to or less than their diameter; cuticle microreticulate (Fig. 27). Pronotal disc lacking median longitudinal depression, with slight postero-medial impression; disc covered with short, dense, recumbent setae (Fig. 27). Lateral projection of hypomeron truncate. Prosternum short in front of procoxae; lacking tuft of setae apicomedially. Prosternal process triangular, broad at base and tapering to apex; disc slightly impressed, with V-shaped groove; lateral margins reflexed;

middle concave; apex acute (Fig. 24). Scutellum slightly longer than broad, flat, not distinctly elevated above the adjacent elytral intervals (Fig. 23). Mesoventrite short, depressed, with a deep, broad, V-shaped depression for reception of apex of prosternal process. Metaventrite with disc inflated on posterior three-fourths, finely punctate behind mesocoxae, punctures becoming more sparse laterally, with large, rounded depressions scattered on disc; with deep longitudinal groove on midline of disc, groove deepest and broadest on posterior third of disc; with short, dense pubescence; cuticular surface of metaventrite finely microreticulate.

Legs long and slender, dark brown (Fig. 24). Procoxae and metacoxae moderately widely separated; mesocoxae slightly more widely separated (Fig. 24). Protibia with deep excavation for reception of tarsi, with apical tooth (as in Fig. 46). Protarsus of male not expanded apicomedially (Fig. 24). Mesotibiae of male with medial pubescent area very long; lateral pubescent area only at extreme base (Fig. 23); with fine, short, nearly longitudinal carina on inner apex. Tarsal claws long and stout, light brown. Metafemur of male lacking internal glabrous patch.

Elytron with ten rows of fine punctures; punctures separated by a distance three to four times the diameter of the puncture; intervals with short, dense, recumbent pubescence and sparse erect setae; humeral area swollen (Fig. 23). Elytral striae visible apically. Elytron widening to about posterior two-thirds before converging to rounded apex. Apical third of elytron not inflated. Elytron without strong impression at basal third. Lateral bead of elytron slightly sinuate (Fig. 25). Elytra three times as long as pronotum; broadest point across humeri. Inner side of apex rounded; lateral margins smooth; humeri gibbous; elytral intervals slightly elevated; punctures on intervals no larger than finest punctures of head and pronotum and separated by 2–5 times puncture diameter.

Abdomen with five ventrites (Fig. 24). First three ventrites broadly, deeply depressed and distinctly carinate adjacent to metacoxae; carinae extending longitudinally behind metacoxae for almost entire length of first ventrite; cuticle densely covered with short, recumbent setae. Last ventrite shallowly and broadly emarginate (Fig. 24). Aedeagus wide, with truncate tip in lateral aspect, parameres reaching a little more than halfway up length of aedeagus (Fig. 26).

Female. Externally similar to male except elytral apices strongly pointed and slightly upturned (Fig. 23). Protibiae are slightly less curved than those of male. Mesotibiae without carina on inner apex. Metaventral disc not as deeply and less extensively concave. Abdominal sterna 1–3 convex, not concave.

Intraspecific variation. This species varies slightly in color, length (3.1–3.3 mm), and degree of setation.

Etymology. This species is named "dentitibialis", meaning "toothed tibia" to describe the protibia, which has an excavation for reception of the tarsus and an apical tooth.

Distribution and habitat. This species is only known from the type locality at Guayabita Creek, near Turmero, Aragua State, Venezuela (Fig. 3). The exact microhabitat is unknown.

Associated species. No other Larainae species were collected with *Hexanchorus dentitibialis*.

***Hexanchorus falconensis* sp. n.**
http://zoobank.org/4CA60E93-212C-4590-BC59-A692DC515A83
http://species-id.net/wiki/Hexanchorus_falconensis
Figs 4, 28, 29, 30, 31

Type Material. Holotype Male. "Venezuela: Falcón State; 11°10.667'N, 69°33.695'W 563 m; Cataratas del Hueque; scrubbing flat rocks in flow; leg. A. Short; VZ09-0709-01A" Holotype Deposited in MIZA. **Paratypes (9): VENEZUELA: Falcón State:** Same locality data as holotype (7 specimens SEMC). "Venezuela: Falcón State; 11°10.667'N, 69°33.695'W 563 m; Cataratas del Hueque; Short & Gustafson; leaf-packs/roots; at river margin; VZ09-0709-01B" (1 specimen SEMC). "Venezuela: Falcón State; 11°10.667'N, 69°33.695'W 563 m; Cataratas del Hueque; leg. Shepard; mud puddles/pools; gross sample; VZ09-0709-01Z" (1 specimen SEMC). Paratypes will be deposited in: 1 in MALUZ, 1 in USNM, 7 in SEMC.

Diagnosis. *Hexanchorus falconensis* can be distinguished from all other species of *Hexanchorus* by the distinctive aedeagus, with a "can-opener" tooth at apex (Fig. 31), and the extremely elongated elytral apices of the female (Fig. 28). Additionally, the pronotum lacks a median longitudinal impression (Fig. 28).

Description. Holotype Male. Body elongate, subparallel, dorsum moderately convex. Length, 4.5 mm; greatest width, 1.1 mm. Body dark brown dorsally; venter dark brownish black (Fig. 28). Base of antenna testaceous ventrally, base of femur, trochanter testaceous (Fig. 29). Dorsal surface densely covered with short recumbent setae; ventral surface densely covered with longer, golden, recumbent setae. Setae with greenish iridescence (Fig. 28). Surface microreticulate, with dense fine punctures; fine punctures separated by distance equal to puncture diameter.

Head moderately coarsely, densely punctate; punctures separated by their diameter; cuticle microreticulate. Clypeus with anterior margin straight; angle on each side square; lateral angles of clypeus with dense turt of golden setae. Labrum with anterior margin entire and broadly rounded; labrum expanded laterally, covered with setae approximately three times as long as setae on head; lateral margins of clypeus with thick brush of curly, golden setae. Eyes hemispherical, narrowed posteriorly and bordered by long black curved setae ("eyelashes") that arise near dorsal and ventral sides of eyes and extend toward middle of eye. Antenna pubescent, clubbed; basal antennomeres I and II testaceous ventrally, with dense recumbent setae and long, dark brown setae (Fig. 29). Antennae serrate, thickening slightly towards apex (Fig. 28). Antennae long, reaching past transverse groove of pronotum. Apical antennomeres dark brownish black, with dense recumbent setae. Apical antennomere pointed (Fig. 29).

Pronotum 1.0 mm long, 0.9 mm wide; with strong sublateral groove; lateral margins slightly sinuate; anterolateral angles square, not explanate; base of pronotum slightly sinuate and with broad lobe medially; posterolateral angles obtuse, slightly explanate, declivous, depressed adjacent to each angle; discal area with fine, dense punctures, punctures separated by a distance equal to or less than their diameter; cuticle microreticulate (Fig. 28). Pronotal disc lacking median longitudinal depression,

with slight postero-medial impression; disc covered with short, dense, iridescent setae (Fig. 28). Lateral projection of hypomeron reduced, nearly absent. Prosternum short in front of procoxae; lacking tuft of setae apicomedially (Fig. 29). Prosternal process broadly triangular, broad at base and slightly tapering to apex; disc slightly impressed, without V-shaped groove; lateral margins reflexed; middle concave; apex broadly acuminate (Fig. 29). Scutellum slightly longer than broad, strongly convex, distinctly elevated above the adjacent elytral intervals. Mesoventrite short, depressed, with a deep, broad, V-shaped depression for reception of apex of prosternal process. Metaventrite with disc inflated on posterior three-fourths, finely punctate behind mesocoxae, punctures becoming more sparse laterally, with large, rounded depressions scattered on disc; with deep longitudinal groove on midline of disc, groove deepest and broadest on posterior third of disc; with short, dense pubescence; cuticular surface of metaventrite finely microreticulate.

Legs long and slender, dark brown (Fig. 29). Procoxae and metacoxae moderately widely separated; mesocoxae slightly more widely separated (Fig. 29). Protibia lacking excavation for reception of tarsi, lacking apical tooth. Protarsus of male strongly expanded apicomedially. Mesotibiae of male with medial pubescent area long; lateral pubescent area only at extreme base; with fine, short, nearly longitudinal carina on inner apex. Tarsal claws long and stout, light brown. Metafemur of male with small internal glabrous patch.

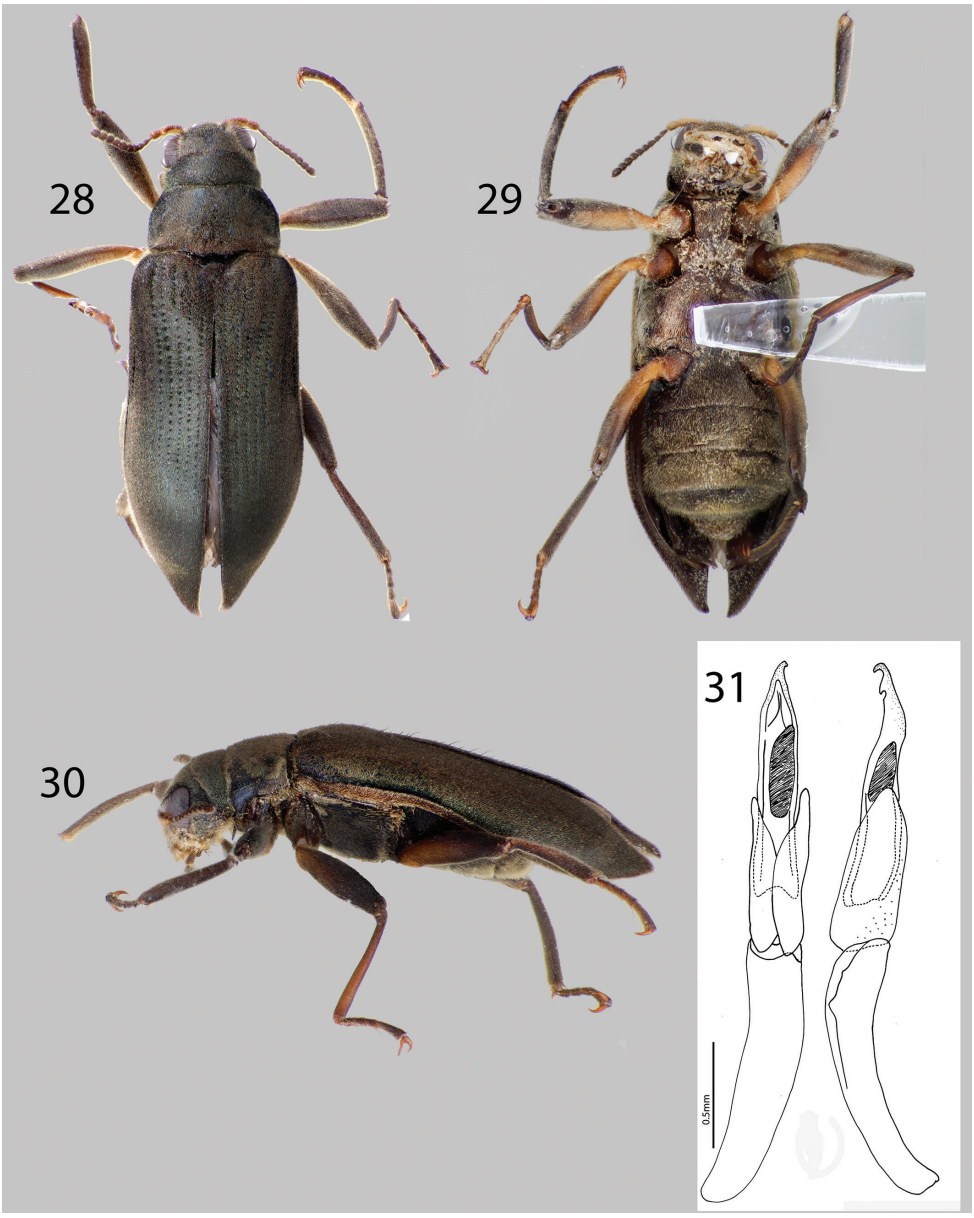
Elytron with ten rows of fine punctures; punctures separated by a distance three to four times the diameter of the puncture; intervals with short, dense, iridescent pubescence; humeral area swollen (Fig. 28). Elytral striae obscured apically. Elytron widening to about posterior two-thirds before converging to rounded and acute apex. Apical third of elytron not, or just barely inflated. Elytron without strong impression at basal third. Lateral bead of elytron sinuate. Elytra three times as long as pronotum; broadest point across humeri. Inner side of apex rounded; lateral margins smooth; humeri gibbous; elytral intervals slightly elevated; punctures on intervals no larger than finest punctures of head and pronotum and separated by 2–5 times puncture diameter.

Abdomen with five ventrites. First three ventrites broadly, deeply depressed and distinctly carinate adjacent to metacoxae; carinae extending longitudinally behind metacoxae for almost entire length of first ventrite; cuticle densely covered with short, recumbent setae. Last ventrite deeply and broadly emarginate. Aedeagus distinctive, with two small notches at tip ("can-opener" apex), parameres reaching more than halfway up length of aedeagus.

Female. Externally similar to male except elytral apices strongly acuminate and extended posteriorly (Fig. 28). Protibiae slightly less curved than those of male. Mesotibiae without carina on inner apex. Metaventral disc not as deeply and less extensively concave. Abdominal sterna 1–3 convex, not concave.

Intraspecific variation. This species varies slightly in color, length (4.0–4.3 mm), and degree of setation.

Etymology. This species is named "falconensis" in reference to the type locality in Falcón State, Venezuela.



Figures 28–31. *Hexanchorus falconensis* sp. n.: **28** Dorsal habitus **29** Ventral habitus **30** Lateral habitus **31** Aedeagus, dorsal and lateral views.

Habitat and distribution. *Hexanchorus falconensis* is only known from Cataratas del Hueque in Falcón State, Venezuela (Fig. 4). Specimens were collected in leaf packs and at stream margins, as well as in bulk samples and by scubbing rocks in the flowing water on flat, waterslide-like rocks.

Associated species. This species was collected in association with *Phanocerus congener*. Other water beetles collected in the same habitat include: *Lutrochus vestitus* (Lutrochidae) (Maier & Short, 2013), *Heterelmis* spp., *Microcylloepus* spp., and *Onychelmis* spp. (Elmidae: Elminae), and the larvae of Psephenidae.

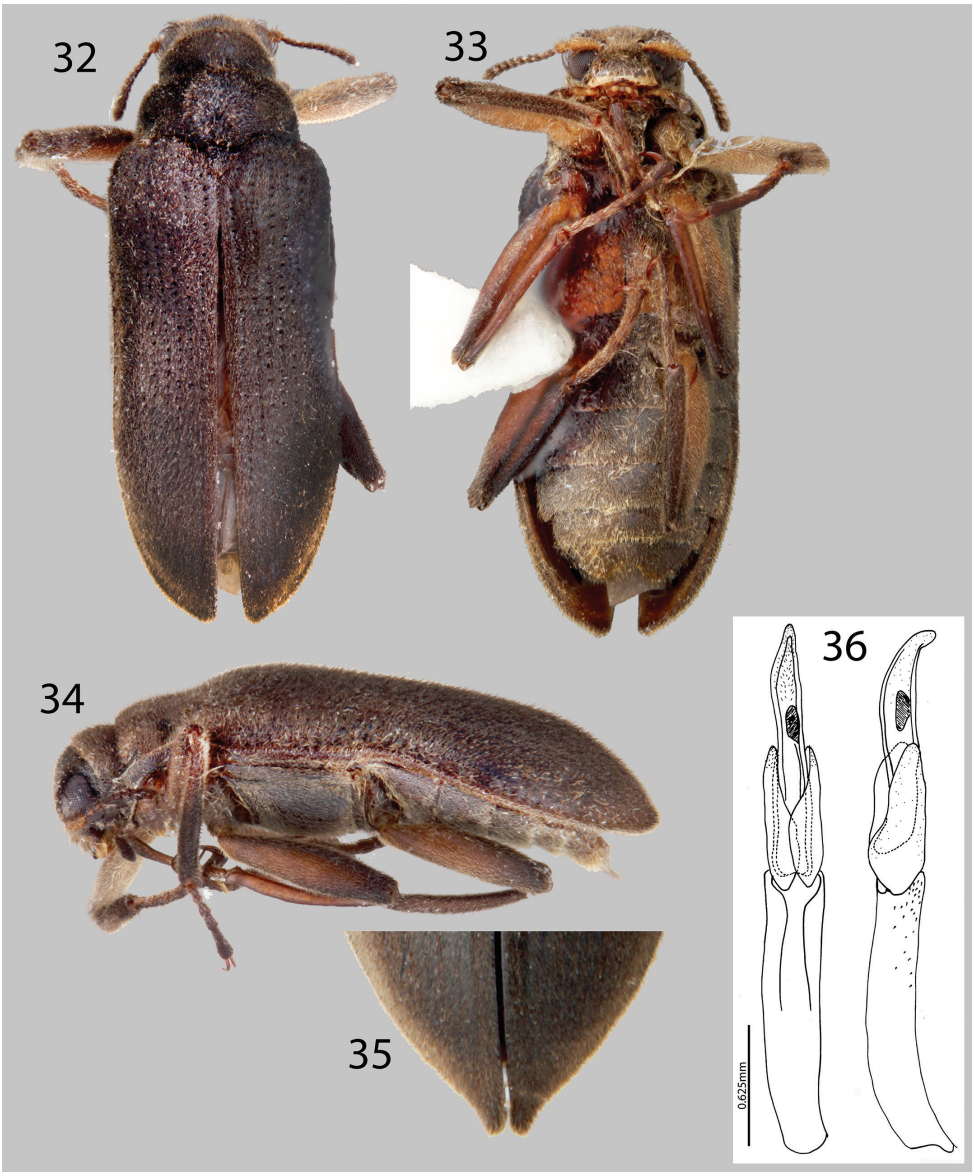
***Hexanchorus flintorum* sp. n.**
http://zoobank.org/F6569AD8-7377-443F-B861-1210404C9BB3
http://species-id.net/wiki/Hexanchorus_flintorum
Figs 4, 32, 33, 34, 35, 36.

Type material. Holotype Male. "VENEZUELA: Me. [Mérida State]; Rio Montealban, Rt. 4; 19km W. Mérida ; 20 Feb. 1976; C.M. & O.S. Flint, Jr." Holotype deposited in USNM. **Paratypes (22): VENEZUELA: Mérida State:** Same data as holotype (2 specimens USNM). "VENEZUELA: Mérida State; 8°35.355'N, 71°13.926'W, 1646m; N. of Ejido, Rt. 4 river x-ing; 10.vii.2009; leg. Shepard; gross sample; VZ09-0720-02Z" (20 specimens SEMC). Paratypes will be deposited in: 5 in USNM, 2 in MIZA, 1 in MALUZ, 14 in SEMC.

Diagnosis. *Hexanchorus flintorum* can be distinguished from all other species of *Hexanchorus* that occur in Venezuela by the following combination of characters: pronotum without median longitudinal impression (Fig. 32), but with strong posteromedian impression; parameres of male short, reaching less than half the length of the aedeagus (Fig. 36).

Description. Holotype Male. Body elongate, subparallel, dorsum moderately convex. Length, 4.3 mm; greatest width, 1.5 mm. Body dark brown dorsally; venter dark brownish black (Fig. 32). Base of antenna, basal half of tibiae, and basal two thirds of femora light to medium brown (Fig. 33). Dorsal surface densely covered with short recumbent setae; ventral surface densely covered with short, recumbent setae and long, golden setae. Setae golden, and lacking greenish iridescence. Surface microreticulate, with dense fine punctures; fine punctures separated by distance equal to puncture diameter.

Head moderately coarsely, densely punctate; punctures separated by their diameter; cuticle microreticulate. Clypeus with anterior margin slightly concave; angle on each side acute. Labrum with anterior margin entire and gently concave; angle on each side acute, with row of dense, long golden setae. Eyes hemispherical, narrowed posteriorly and bordered by long black curved setae ("eyelashes") that arise near dorsal and ventral sides of eyes and extend toward middle of eye. Antenna pubescent, clubbed; basal antennomeres I and II medium to light brown, with long setae, longer than width of segments, and dense recumbent setae; antennal club very loose, just slightly thickened towards apex (Fig. 32). Antennae short, reaching transverse groove of pronotum (Fig. 33). Apical antennomeres dark brownish black, with dense recumbent setae. Apical antennomere rounded.



Figures 32–36. *Hexanchorus flintorum* sp. n.: **32** Dorsal habitus **33** Ventral habitus **34** Lateral habitus **35** Apices of elytra, female **36** Aedeagus, dorsal and lateral views.

Pronotum 1.1 mm long, 1.0 mm wide; with weak sublateral groove; lateral margins slightly sinuate; anterolateral angles obtuse, slightly explanate; base of pronotum slightly sinuate and with broad lobe medially; posterolateral angles obtuse, slightly explanate, declivous, depressed adjacent to each angle (Fig. 33); discal area with fine, dense punctures, punctures separated by a distance equal to or less than their diameter; cuticle microreticulate. Pronotal disc with slight median longitudinal drepression, with

strong postero-medial impression; disc covered with golden setae. Lateral projection of hypomeron very acute, nearly absent. Prosternum short in front of procoxae; with tuft of dense golden setae apicomedially (Fig. 33). Prosternal process triangular, broad at base and tapering to apex; disc slightly impressed, without V-shaped groove; lateral margins reflexed; middle moderately longitudinally cariniform; apex narrow, acute (Fig. 33). Scutellum slightly longer than broad; flat, not at all convex, not distinctly elevated above the adjacent elytral intervals. Mesoventrite short, depressed, with a deep, broad, V-shaped depression for reception of apex of prosternal process. Metaventrite with disc inflated on posterior three-fourths, finely punctate behind mesocoxae, punctures becoming more sparse laterally, with large, rounded depressions scattered on disc; with deep longitudinal groove on midline of disc, groove deeper and broader on posterior third of disc (Fig. 33); with short, dense, short pubescence; cuticular surface of metaventrite finely microreticulate.

Legs long and slender, dark brown (Fig. 33). Procoxae and metacoxae moderately widely separated; mesocoxae slightly more widely separated (Fig. 33). Protibia only with very slight excavation for reception of tarsi, lacking apical tooth. Protarsus of male not expanded apicomedially. Mesotibiae of male with medial pubescent area long; lateral pubescent area only at extreme base; with fine, short, nearly longitudinal carina on inner apex (Fig. 33). Tarsal claws long and stout, light brown. Metafemur of male with internal glabrous patch.

Elytron with ten rows of fine punctures; punctures separated by a distance three to four times the diameter of the puncture; intervals with fine, golden, dense pubescence; humeral area swollen (Fig. 32). Elytral striae obscured apically. Elytron widening to about posterior two-thirds before converging to acute apex. Apical third of elytron not inflated. Elytron without strong impression at basal third. Lateral bead of elytron slightly sinuate. Elytra 3.5 times as long as pronotum; broadest point across humeri. Inner side of apex straight (Fig. 32); lateral margins smooth; humeri gibbous; elytral intervals slightly elevated; punctures on intervals no larger than finest punctures of head and pronotum and separated by 2–5 times puncture diameter.

Abdomen with five ventrites (Fig. 33). First three ventrites broadly, shallowly depressed and distinctly carinate adjacent to metacoxae; carinae extending longitudinally behind metacoxae for almost entire length of first ventrite; cuticle densely covered with long, golden setae (Fig. 33). Last ventrite deeply and broadly emarginate. Aedeagus strongly curved toward apex; parameres short, reaching less than half the length of the aedeagus (Fig. 36).

Female. Externally similar to male except inner apex of each elytron expanded posteriorly and slightly turned upward (Fig. 35). Protibiae slightly less curved than those of male. Metaventral disc not as deeply and less extensively concave. Abdominal sterna 1–3 convex, not concave.

Intraspecific variation. This species varies slightly in color, length (3.9–4.2 mm, and degree of setation.

Etymology. This species is named in honor of Dr. Oliver S. Flint and Mrs. Carol M. Flint who collected the specimens.

Distribution and habitat. This species is only known from the mountains to the West of the Rio Chama valley near Ejido and Mérida, Mérida State, Venezuela, specifically, at Rio Montealban (Fig. 4). The largest series was collected from stream margins and pools at a river crossing north of Ejido.

Associated species. The laraine elmid species *Disersus dasycolus* and *Pharceonus grandis* were collected in the same samples as *Hexanchorus flintorum*. Other aquatic beetles collected at the same localities include: *Andogyrus* spp. (Gyrinidae).

Hexanchorus homaeotarsoides sp. n.

http://zoobank.org/B1A05166-6309-4C12-A135-12033D6360BB
http://species-id.net/wiki/Hexanchorus_homaeotarsoides
Figs 3, 37, 38, 39, 40, 41, 42

Type material. Holotype Male. "Venezuela; Amazonas; P.N. Duida; Marahuaka" "Cabeceras del; Rio Yameduaca; 3°38'N, 65°28'W; 1–3-II-92, 1230m" "Exp. Terramar; J. Clavijo; A. Chacon" Holotype deposited in MIZA. **Paratypes (12): VENEZUELA: Amazonas State:** Same data as holotype (12 specimens MIZA). Paratypes will be deposited in: 7 in MIZA, 1 in MALUZ, 1 in USNM, 2 in SEMC.

Diagnosis. *Hexanchorus homaeotarsoides* is distinctive in the genus, as it is one of only two species to possess a median projection on the third abdominal ventrite of the female. It differs from the only other species which bears this character, *Hexanchorus inflatus*, by its evenly rounded elytra and aedeagus with a saw tooth apex. Additionally, the antennae are short, not extending behind transverse impression of pronotum; and the pronotum has a strong median longitudinal impression and the apical third of the elytra are not inflated posteriorly.

Description. Holotype Male. Body elongate, subparallel, dorsum moderately convex. Length, 4.2 mm; greatest width, 1.5 mm. Body dark brown dorsally (Fig. 37); venter dark brownish black (Fig. 38). Base of antenna light to medium brown. Dorsal surface densely covered with short recumbent setae; ventral surface densely covered with dense, short, recumbent setae. Setae lacking greenish iridescence (Fig. 38). Surface microreticulate, with dense fine punctures; fine punctures separated by distance equal to puncture diameter.

Head moderately coarsely, densely punctate; punctures separated by their diameter; cuticle microreticulate. Clypeus with anterior margin straight; angle on each side square. Labrum with anterior margin entire and gently rounded; angle on each side obtuse, covered with setae approximately twice as long as setae on head. Eyes hemispherical, narrowed posteriorly and bordered by long black curved setae ("eyelashes") that arise near dorsal and ventral sides of eyes and extend toward middle of eye, setae not as prominent as in other species. Antenna pubescent, clubbed; basal antennomeres I and II medium to light brown, with dense recumbent setae and dense brushy light brown setae, lacking long setae (Fig. 39). Antennal club very loose, just slightly thickened towards apex. Antennae short, reaching transverse groove of pronotum.

Apical antennomeres dark brownish black, with dense recumbent setae. Apical antennomere rounded.

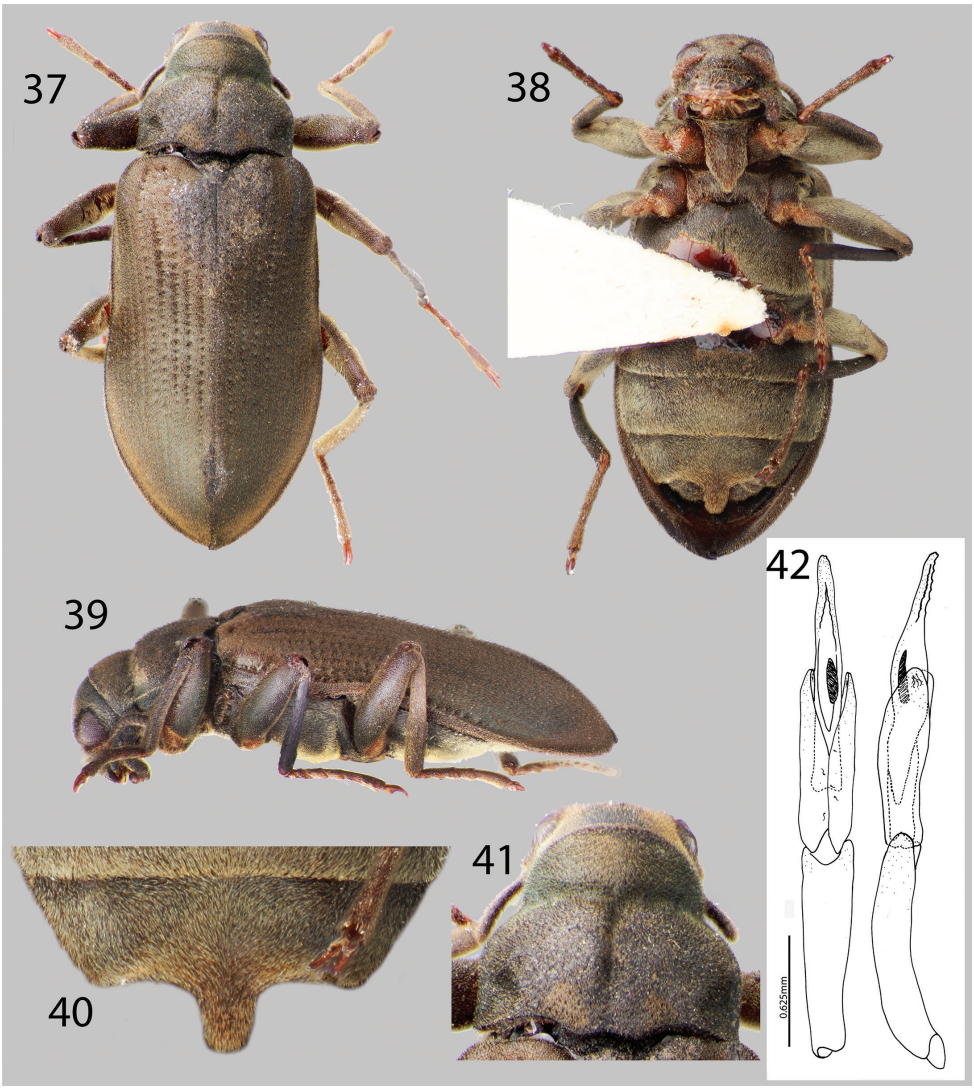
Pronotum 1.1 mm long, 1.0 mm wide; with strong sublateral groove (Fig. 41); lateral margins slightly sinuate; anterolateral angles square, not explanate; base of pronotum slightly sinuate and with broad lobe medially; posterolateral angles obtuse, slightly explanate, declivous, depressed adjacent to each angle (Fig. 41); discal area with fine, dense punctures, punctures separated by a distance equal to or less than their diameter; cuticle microreticulate. Pronotal disc with strong median longitudinal depression, with strong postero-medial impression (Fig. 41); disc covered with short, dense setae. Lateral projection of hypomeron truncate. Prosternum short in front of procoxae; without tuft of dense golden setae apicomedially (Fig. 38). Prosternal process broadly triangular, broad at base and slightly tapering to apex; disc slightly impressed, without V-shaped groove; lateral margins reflexed; middle flattened; apex broadly, acuminate (Fig. 38). Scutellum slightly longer than broad, strongly convex, distinctly elevated above the adjacent elytral intervals. Mesoventrite short, depressed, with a deep, broad, V-shaped depression for reception of apex of prosternal process. Metaventrite with disc inflated on posterior three-fourths, finely punctate behind mesocoxae, punctures becoming more sparse laterally, with large, rounded depressions scattered on disc; with shallow longitudinal groove on midline of disc, groove deepest and broadest on posterior third of disc; with short, dense pubescence; cuticular surface of metaventrite finely microreticulate.

Legs long and slender, dark brown. Procoxae and metacoxae moderately widely separated; mesocoxae slightly more widely separated. Protibia lacking excavation for reception of tarsi, lacking apical tooth. Protarsus of male expanded apicomedially. Mesotibiae of male with medial pubescent area long; lateral pubescent area only at extreme base; with fine, short, nearly longitudinal carina on inner apex. Tarsal claws long and stout, light brown. Metafemur of male with internal glabrous patch.

Elytron with ten rows of fine punctures; punctures separated by a distance three to four times the diameter of the puncture; intervals with short, dense pubescence; humeral area swollen (Fig. 37). Elytral striae visible apically. Elytron widening to about posterior two-thirds before converging to rounded apex (Fig. 37). Apical third of elytron not, or just barely inflated. Elytron without strong impression at basal third. Lateral bead of elytron strongly sinuate. Elytra 3.5 times as long as pronotum; broadest point across humeri. Inner side of apex angled; lateral margins smooth; humeri gibbous; elytral intervals slightly elevated; punctures on intervals no larger than finest punctures of head and pronotum and separated by 2–5 times puncture diameter.

Abdomen with five ventrites. First three ventrites broadly, shallowly depressed and distinctly carinate adjacent to metacoxae; carinae extending longitudinally behind metacoxae for almost entire length of first ventrite; cuticle densely covered with short, recumbent setae. Last ventrite deeply and broadly emarginate. Aedeagus unique in configuration, acute, with row of small teeth at apex; parameres long, extending past halfway up aedeagus (Fig. 42).

Female. Externally similar to male, except inner apex of each elytron acute and slightly turned upward (Fig. 37). Protibiae slightly less curved than those of male.



Figures 37–42. *Hexanchorus homaeotarsoides* sp. n.: **37** Dorsal habitus **38** Ventral habitus **39** Lateral habitus **40** Abominal ventrite 3, female **41** Pronotum, dorsal view **36** Aedeagus, dorsal and lateral views.

Mesotibiae without carina on inner apex. Metaventral disc not as deeply and less extensively concave. Abdominal sterna 1–3 convex, not concave; apicomedial margin of third ventrite with distinct posterior projection (Fig. 40).

Intraspecific variation. This species varies slightly in color, length (4.1–5.1 mm), and degree of setation.

Etymology. The specific epithet, "homaeotarsoides" is a reference to the third ventrite of the female, which bears resemblance to the abdominal ventrite 4 of the male in the rove beetle (Staphylinidae) genus *Homaeotarsus*.

Distribution and habitat. This species is known only from the type locality at Rio Yameduaca in Amazonas State, Venezuela (Fig. 3). Nothing is known about its habits and exact microhabitat preferences.

Associated species. *Hexanchorus inflatus* sp. n. occurs in the same region of Venezuela, but no other species of laraine elmid has been collected at this locality.

***Hexanchorus inflatus* sp. n.**
http://zoobank.org/3C6A344A-9613-43E6-A4D6-7DD05204A98A
http://species-id.net/wiki/Hexanchorus_inflatus
Figs 4, 43, 44, 45, 46, 47

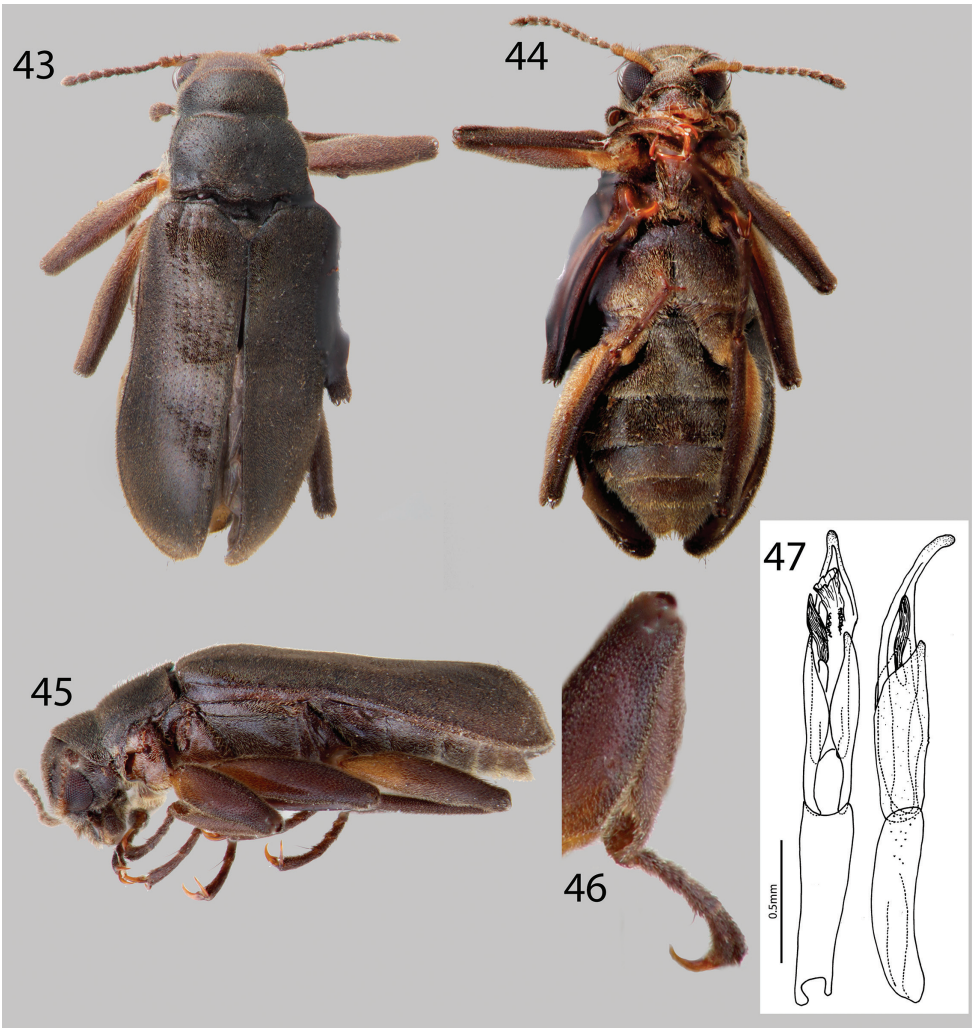
Type material. Holotype Male. "Venezuela Exp[edition].; Territ. Amazonas; Upper Cunucunuma; Tapara Apr. 20, 1950" "J. Maldonado; Capriles Coll." Holotype deposited in USNM. **Paratypes (5): VENEZUELA: Amazonas State:** Same data as holotype (5 Specimens). Paratypes will be deposited in: 4 in USNM, 1 in SEMC.

Diagnosis. This species can be distinguished from all other *Hexanchorus* species that occur in Venezuela by the following combination of characters: antennae long (Fig. 44), extending behind transverse impression of pronotum; pronotum lacking median longitudinal impression (Fig. 43); and protibia with deep excavation apically (Fig. 46). It most closely resembles *Hexanchorus homaeotarsoides* in distribution and that the female bears a median projection of the third ventrite, but can be distinguished from the former species by the distinctly inflated elytral apices (Fig. 45), and aedeagus with a smooth apex (Fig. 47).

Description. Holotype Male. Body elongate, subparallel, dorsum moderately convex (Fig 43). Length, 2.5 mm; greatest width, 1.1 mm. Body dark brown dorsally; venter dark brownish black (Fig. 44). Base of antenna and base of femora light to medium brown. Dorsal and ventral surface densely covered with short recumbent setae (Figs 43 and 44). Setae golden, and lacking greenish iridescence. Surface microreticulate, with dense fine punctures; fine punctures separated by distance equal to puncture diameter and coarse punctures confluent to separated by 1–3 times puncture diameter.

Head moderately coarsely, densely punctate; punctures separated by their diameter; cuticle microreticulate. Clypeus with anterior margin truncate; angle on each side broadly rounded. Labrum with anterior margin entire and gently arcuate; angle on each side broadly rounded, with row of dense, long golden setae. Eyes hemispherical, narrowed posteriorly and bordered by long black curved setae ("eyelashes") that arise near dorsal and ventral sides of eyes and extend toward middle of eye. Antenna pubescent, filiform, nearly serrate (Fig. 44); basal antennomeres I and II medium to light brown, with long setae, longer than width of segments, and dense recumbent setae; antenna lacking club. Antennae long, reaching past transverse groove of pronotum. Apical antennomeres dark brownish black, with dense recumbent setae (Fig. 44). Apical antennomere rounded.

Pronotum 1.2 mm long, 1.1 mm wide; lacking sublateral groove (Fig. 43); lateral margins slightly sinuate; anterolateral angles square, not explanate or depressed; base of pro-



Figures 43–47. *Hexanchorus inflatus* sp. n.: **43** Dorsal habitus **44** Ventral habitus **45** Lateral habitus **46** Protibia, male, showing apical excavation **47** Aedeagus, dorsal and lateral views.

notum slightly sinuate and with broad lobe medially; posterolateral angles obtuse, slightly explanate, declivous, depressed adjacent to each angle; discal area with fine, dense punctures, punctures separated by a distance equal to or less than their diameter; cuticle microreticulate. Pronotal disc lacking median longitudinal depression, with weak postero-medial impression; disc with sparse, short setae (Fig. 43). Lateral projection of hypomeron acute. Prosternum short in front of procoxae; lacking tuft of setae and dense golden setae apicomedially (Fig. 44). Prosternal process triangular, broad at base and tapering to apex; disc with V-shaped groove; lateral margins reflexed; middle moderately longitudinally cariniform; apex narrow, acute (Fig. 44). Scutellum slightly longer than broad; very strongly convex, distinctly elevated above the adjacent elytral intervals. Mesoventrite short, depressed, with a deep, broad, V-

shaped depression for reception of apex of prosternal process. Metaventrite with disc inflated on posterior three-fourths, finely punctate behind mesocoxae, punctures becoming more sparse laterally, with large, rounded depressions scattered on disc; with shallow longitudinal groove on midline of disc, groove deepest and broadest on posterior third of disc; with dense, short pubescence; cuticular surface of metaventrite finely microreticulate (Fig. 44).

Legs long and slender, dark brown (Fig. 45). Procoxae and metacoxae moderately widely separated; mesocoxae slightly more widely separated. Protibia with apical rounded excavation for reception of tarsi, with apical tooth (Fig. 46). Protarsus of male expanded apicomedially. Mesotibiae of male with medial pubescent area long; lateral pubescent area only at extreme base; with fine, short, nearly longitudinal carina on inner apex. Tarsal claws long and stout, light brown. Metafemur of male with internal glabrous patch.

Elytron with ten rows of fine punctures; punctures separated by a distance three to four times the diameter of the puncture; intervals with fine, short, dense pubescence; humeral area moderately swollen (Fig. 43). Elytral striae obscured apically. Elytron widening to about posterior two-thirds before converging to strongly rounded apex (Fig. 43). Apical third of elytron strongly inflated, most evident in lateral view (Fig. 45). Elytron with strong impression at basal third. Lateral bead of elytron straight. Elytra three times as long as pronotum; broadest point across humeri but only slightly broader than broadest point at apical third; inner side of apex rounded; lateral margins smooth; humeri gibbous; elytral intervals flat; punctures on intervals no larger than finest punctures of head and pronotum and separated by 2–5 times puncture diameter.

Abdomen with five ventrites (Fig. 44). First three ventrites broadly, shallowly depressed and distinctly carinate adjacent to metacoxae; carinae extending longitudinally behind metacoxae for almost entire length of first ventrite; cuticle densely covered with setae. Last ventrite deeply and broadly emarginate (Fig. 44). Aedeagus broadly curved, with smooth apex, parameres long, reaching more than halfway up length of aedeagus (Fig. 47).

Female. Externally similar to male except inner apex of each elytron acute and slightly turned upward. Protibiae slightly less curved than those of male. Mesotibiae without carina on inner apex. Metaventral disc not as deeply and less extensively concave. Abdominal sterna 1–3 convex, not concave; apicomedial margin of third ventrite with distinct posterior projection.

Intraspecific variation. This species varies slightly from black to dark brown in color. There are differences in size (2.5– 2.9 mm TL) and slight differences in punctation and setation.

Etymology. This species is named "inflatus" for the distinct elytra, which appear inflated posteriorly.

Habitat and distribution. This species is only known from specimens collected on an expedition by the University of Puerto Rico in 1950. They were collected at one locality from the upper Rio Cunucunuma in Amazonas State, Venezuela, north of Cerro Duida (Drake and Capriles 1952) (Fig. 4). The habits and microhabitat preferences of this species are unknown.

Associated species. *Hexanchorus homaeotarsoides* sp. n. occurs in the same region of Venezuela, but no other species of laraine elmid has been collected at this locality.

***Hexanchorus mcdiarmidi* Spangler & Staines, 2003**
http://species-id.net/wiki/Hexanchorus_mcdiarmidi
Figs 4, 48, 49

For a complete description and illustrations of genitalia, see Spangler and Staines 2003.

Material examined. VENEZUELA: Barinas State: "VENEZUELA: Barinas State; 8°03.341'N, 70°56.597'W, 203m; nr. Quiri, Rio Quiu; 15.vii.2009; leg. W. Shepard; ex. bulk sample; VZ09-0715-03Z" (99 specimens SEMC). **Distrito Capital:** "VENEZUELA, Dto. Federal; Los Caracas; 19 January 1985; P. Spangler, R. Faitoute; W. Steiner, & A. Conover" (6 paratypes USNM) **Mérida State:** "VENEZUELA: Mérida State; 8°57.205'N, 71°17.620'W, 88m; W. of Tucani; 21.vii2009; Gross sample from river; leg. Shepard; VZ09-0721-04Z" (17 specimens SEMC). **Zulia State:** "VENEZUELA: Zulia State; 9°50.513'N, 72°48.334'W. 252m; Perija N.P. Tukuko: Rio Tukuko; 5.vii.2009; leg. Short & Gustafson; riffle/rocks in river; VZ09-0705-01B" (96 specimens SEMC). "VENEZUELA: Zulia State; P.N. Perija: Tukuko; 18 vii.2008; Rio Marpito" "Andrew E. Z.; Short, leg." (5 specimens SEMC). "VENEZUELA: Zulia El; Tucuco (51 km S.O. de; Machiques); 24-VI-1992" "Colector:; J. Camacho" (11 specimens MALUZ).

Diagnosis. *Hexanchorus mcdiarmidi* can be disinguished from all other *Hexanchorus* species in Venezuela by the presence of a greenish iridescent sheen on the dorsal setae (Fig. 48), the narrow parameres, and pronotum with only a shallow posteromedian impression (Fig. 48).

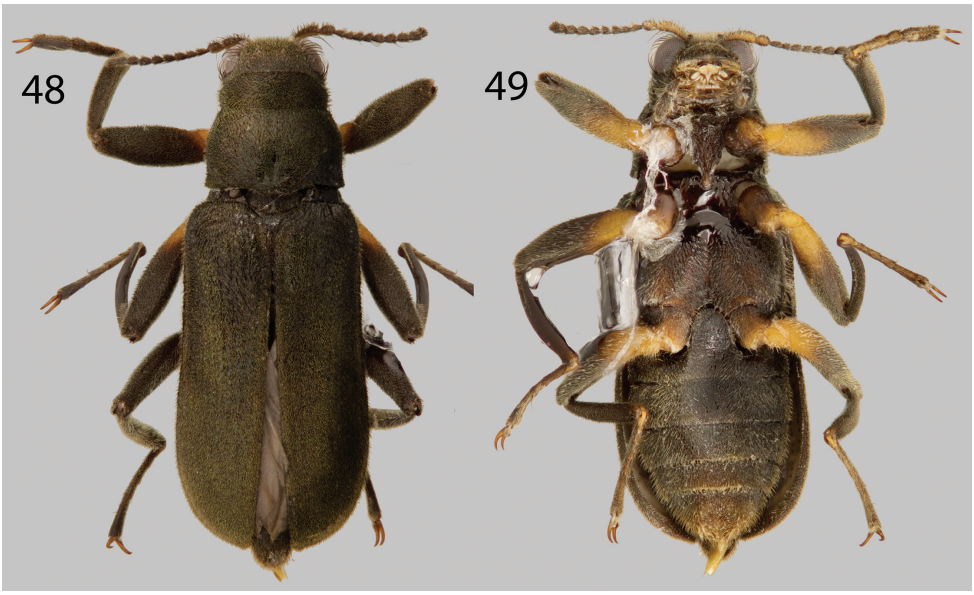
Intraspecific variation. This species varies slightly from black to dark brown in color, additionally, there may be slight variation in the greenish iridescence of the elytral setae. *Hexanchorus mcdiarmidi* has a purplish and orange iridescent sheen while submerged in alcohol (Short, pers. comm.). There is variation in size (2.9–3.4 mm TL) and slight differences in punctation among specimens.

Habitat and distribution. *Hexanchorus mcdiarmidi* is widespread in lower altitude (<300 m elevation) streams throughout western Venezuela (Fig. 4). They can be found in dense aggregations on water-splashed emergent rocks in small to medium sized swift-flowing streams and rivers with rocky substrate.

Associated species. While no other species of *Hexanchorus* were collected at the same localities as *H. mcdiarmidi*, other laraines collected in the same habitats include *Disersus dasycolus*, *Phanocerus congener* and *Phanocerus clavicornis*, and *Pharceonus volcanus*. Other water beetles collected at the same sites include: *Anacaena* spp. and *Enochrus* spp. (Hydrophilidae).

***Hypsilara* Maier & Spangler, 2011**
http://species-id.net/wiki/Hypsilara
Figs 2, 50, 51, 52, 53

Diagnosis. This genus can be distinguished from all other laraine genera by its small size (ca. 4.5 mm), and the presence of a shallow, wide, V-shaped groove across apical third of the pronotum, which lacks strong gibbosities or protuberances (Fig. 53).



Figures 48–49. *Hexanchorus mcdiarmidi*: **48** Dorsal habitus **49** Ventral habitus.

Distribution. Currently, *Hypsilara* is only known from near the base of Cerro de Neblina, Amazonas State and Gran Sabana, Venezuela (Fig. 2).

Habitat. From Maier and Spangler 2011 "These are known a small, shallow brook about one to two meters wide and with occasional pools about one meter deep, with a substratum of sand, boulders, and bedrock. This small tributary originates on Cerro de la Neblina and feeds the Rio Baria, which drains most of the massif. The high water marks and polished boulders along the stream bed indicate that in times of heavy rainfall, the brook becomes scoured by flash flooding. Paratypes were collected from similar small streams at high elevations.

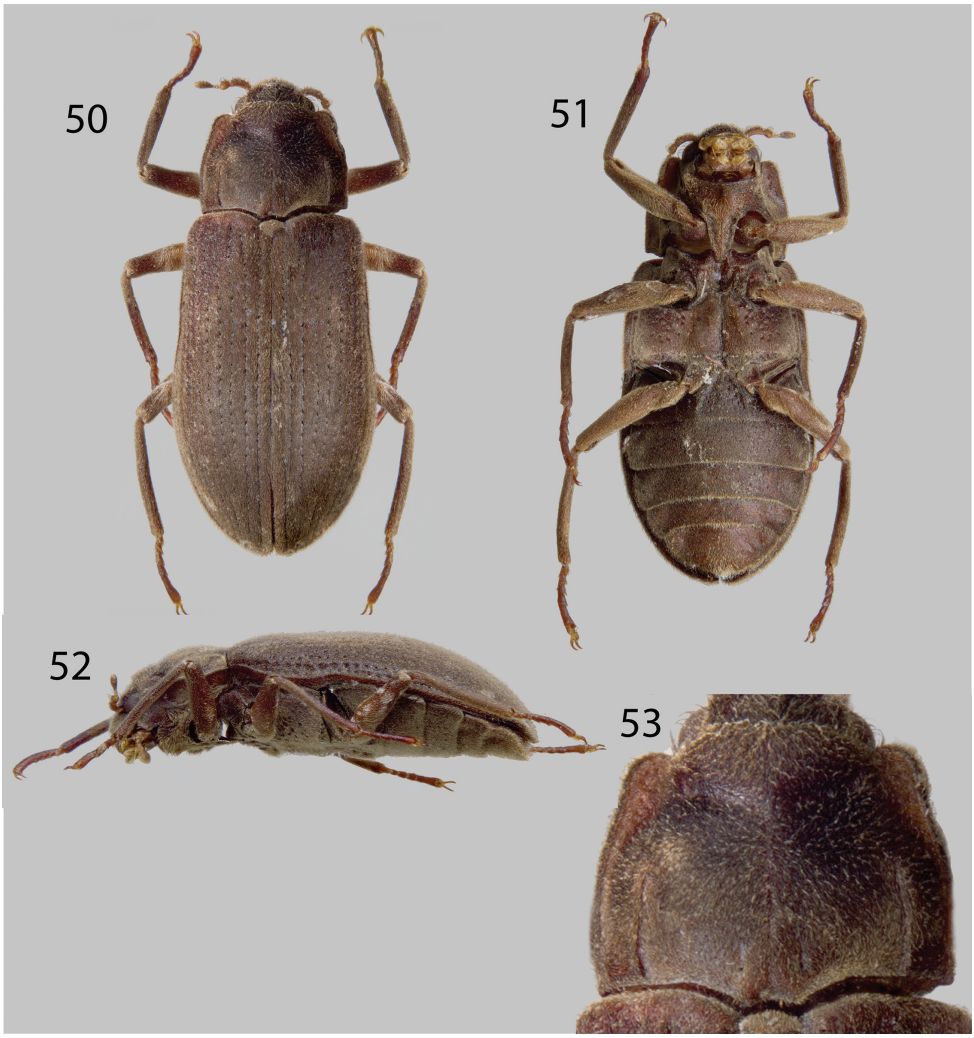
Water quality data obtained by using colorimetric analyses of the brook at the type-locality are as follows; pH: 4, hardness: 0, oxygen: 9 ppm. The air temperature was 21°C and the water temperature was 17°C when the analyses were made."

***Hypsilara breweri* Čiampor et al., 2013**
http://species-id.net/wiki/Hypsilara_breweri
Fig. 2 (See figures 1–9 in Čiampor et al. 2013)

For complete species descriptions and genitalia illustrations, see Čiampor et al. 2013.

Diagnosis. This species can be distinguished from all other species of *Hypsilara* by the unique adeagus, possessing the following characters: long phallobase (ca. 0.6x as long as median lobe) and short parameres (ca. 0.67x as long as median lobe) (Čiampor et al. 2013).

Distribution and habitat. This species is known only from the type locality at a small, tannic stream flowing in degraded forest at Sierra de Lema, Gran Sabana, Ven-



Figures 50–53. *Hypsilara royi*: **50** Dorsal habitus **51** Ventral habitus **52** Lateral habitus **53** Pronotum, dorsal view. (Modified from Maier and Spangler 2011).

ezuela (Fig. 2). The species was collected from submerged woody debris, roots, and leaf litter (Čiampor et al. 2013)

Notes. This species was described in a recent paper by Čiampor et al. (2013) and represents the second species described in the genus *Hypsilara*. A third species was also discovered at Auyán tepui, but not named, as it is known only from a single female (Fig. 2). Additionally, based on analysis of the *cox*1 gene, they found that this genus is likely to be closely related to *Phanoceroides*, an unusual laraine of north and central South America (Čiampor et al. 2013).

Hypsilara royi **Maier & Spangler, 2011**
http://species-id.net/wiki/Hypsilara_royi
Figs 2, 50, 51, 52, 53

See Maier and Spangler 2011 for complete description and genitalia illustrations.

Type material examined. "VENEZUELA: T. F. AMAZ. [Amazonas State]; Cerro de la Neblina; Camp XI 1450 m; 00°52'N 65°58'W" "at stream; 26–27 February 5 l985; P. J. and P. M. Spangler, R. A. Faitoute; collector". (1 Holotype MIZA, 15 Paratypes). "VENEZUELA: T. F. AMAZ.; Cerro de la Neblina; Camp X, 00°54'N, 60°2'W, 1690m, 12–13 February l985, W. Steiner" (16 paratypes). "VENEZ., T.F.A. [Amazonas State];C.d.l. [Cerro de la] Neblina; Base camp; 26–31 Jan. 1985; Flite [sic] intercept Pan; Trap" (1 paratype). "VENEZUELA: T. F. AMAZ. [Amazonas State]; Cerro de la Neblina; Camp X, 1690m; 00°54'N, 60°2'W; 12 February l985" "Small sunlit stream; leaf packs in falls; between boulders; W. E. Steiner; collector" (3 paratypes).

Diagnosis. This species can be distinguished from all other described laraines by the following combination of characters: small size (ca. 4.5 mm), the presence of a shallow, wide, V-shaped groove across apical third of the pronotum (Fig. 53), and pronotum 1.3 mm long, and 1.5 mm wide, with posterolateral angles obtuse.

Intraspecific variation. This species exhibits only minor variations in length, which ranges from 4.2 to 4.5 mm, and varies from a medium brown to light brown in color. Additionally, the parameres can be straight to slightly curved.

Distribution and habitat. This species is known only from the type locality at Cerro de Neblina, Amazonas State, Venezuela (Fig. 2), see genus description for detailed habitat information.

Associated species. The Cerro de Neblina endemic species *Neblinagena prima* was the only laraine elmid species collected in association with *Hypsilara royi*.

Neblinagena **Spangler, 1985**
http://species-id.net/wiki/Neblinagena
Figs 5, 54, 55, 56, 57, 58, 59, 60, 61

Diagnosis. *Neblinagena* can be distinguished from all other laraine genera by its large size (5.5–6.6 mm), slender body form (Fig. 54), dark color, and distinctive pronotum with a lateral longitudinal carina or arcuate-sinuate groove on basal third and two short, converging, prescutellar carinae, each with a deep pit laterally (Figs 57 and 61).

Distribution. *Neblinagena* species are endemic to the Guiana Shield region in eastern Venezuela, though presumably they also occur across the borders in Guyana and Brazil (Fig. 5).

Habitat. Based on the collecting events of specimens examined, *Neblinagena* spp. seem to prefer small, high elevation streams (>400m elevation), with rocks and

Figures 54–57. *Neblinagena doylei*: **54** Dorsal habitus **55** Ventral habitus **56** Lateral habitus **57** Pronotum, dorsal view.

forested cover. They have been found in leaf packs and clinging to rocks in the water flow. Their habits are most likely extremely similar to those of *Disersus* spp. and *Hexanchorus* spp.

***Nebilinagena doylei* Kodada & Jäch, 1999**
http://species-id.net/wiki/Nebilinagena_doylei
Figs 5, 54, 55, 56, 57

For complete species descriptions and genitalia illustrations, see Kodada and Jäch 1999.

Material examined. VENEZUELA: Bolívar State: "SE-Venezuela, Bolívar State; Quebrada Wiwiparu, the stream; near Paratepui village, which; crosses the tourist pathway to Mt." "Roraima, ca. 1000m a.s.l.; 31 Jan 1999; T. Derka & R. Reilmaier, lgt." (1 Holotype NMW). "VENEZUELA: Bolívar State; 6°5' 14.1"N, 61°23'55.8"W 400m; Piedra de la Virgen, 31.vii.2008; leg. A. Short, M. Garcia, L. Joly; AS-08-056,

small forest stream" (4 specimens SEMC). "VENEZUELA: Bolívar State; 6°1'38"N; 61°23'41.1"W, 690m; Along La Escalera; 31.vii.2008; leg. A. Short, M. Garcia, L. Joly; AS-08-059; rocky stream" (4 specimens SEMC). "VENEZUELA: Bolívar State; 06°04'54.7"N, 61°23'52.7"W, 509 m; Along La Escalera, Highway 10; 14.vii.2010; leg. Short, Tellez, & Arias; VZ10-0714-01C" (2 specimens SEMC – frozen tissue collection) "VENEZUELA: Bolívar; Municipio Gran Sabana; El Pauji. 25/IV/2004 al 02/V/2004 J. Camacho; J. Perozo, Col." "04°28' 66"N; 61°35'38" W; 880msnm." (9 specimens MALUZ). "Loc. VEN-16-2010, canyon; of the Rio Yuruen above; Uruyen village, Venezuela; Bolivar Province" "NP Canaima, N 5°42'26.0"; W62°28'13.7", alt. 658m; a.s.l. 16.i.2010; leg. T. Derka & M. Svitok (11 specimens CKB).

Diagnosis. *Neblinagena doylei* can be distinguished from *N. prima* by its range, which does not overlap with the range of the latter. Additionally, in *N. doylei* the pronotal longitudinal carinae are entire and the oblique furrow of the pronotum forms a 30° angle relative to the median longitudinal furrow (Fig. 57), whereas in *N. prima* the pronotal lateral carinae are obscured anteriorly and the oblique furrows form a 45° angle relative to the median longitudinal furrow (Fig. 61). *Neblinagena doylei* is also slightly larger than its congener.

Intraspecific variation. This species varies slightly in size (5.5–6.6 mm) and in coloration – from dark brown to black.

Distribution and habitat. *Neblinagena doylei* can be found throughout the eastern part of Venezuela, in and around the Gran Sabana, in Bolívar and Amazonas States (Fig. 5). Specimens have been collected on flat, waterslide-like rocks in the La Escalera region.

Associated species. This species is associated the Mount Roraima endemic species *Roraima carinata*. Other aquatic beetles collected at the same localities include: *Notionotus* spp., *Oocyclus* spp. (Hydrophilidae), and *Macrelmis* spp. (Elmidae: Elminae).

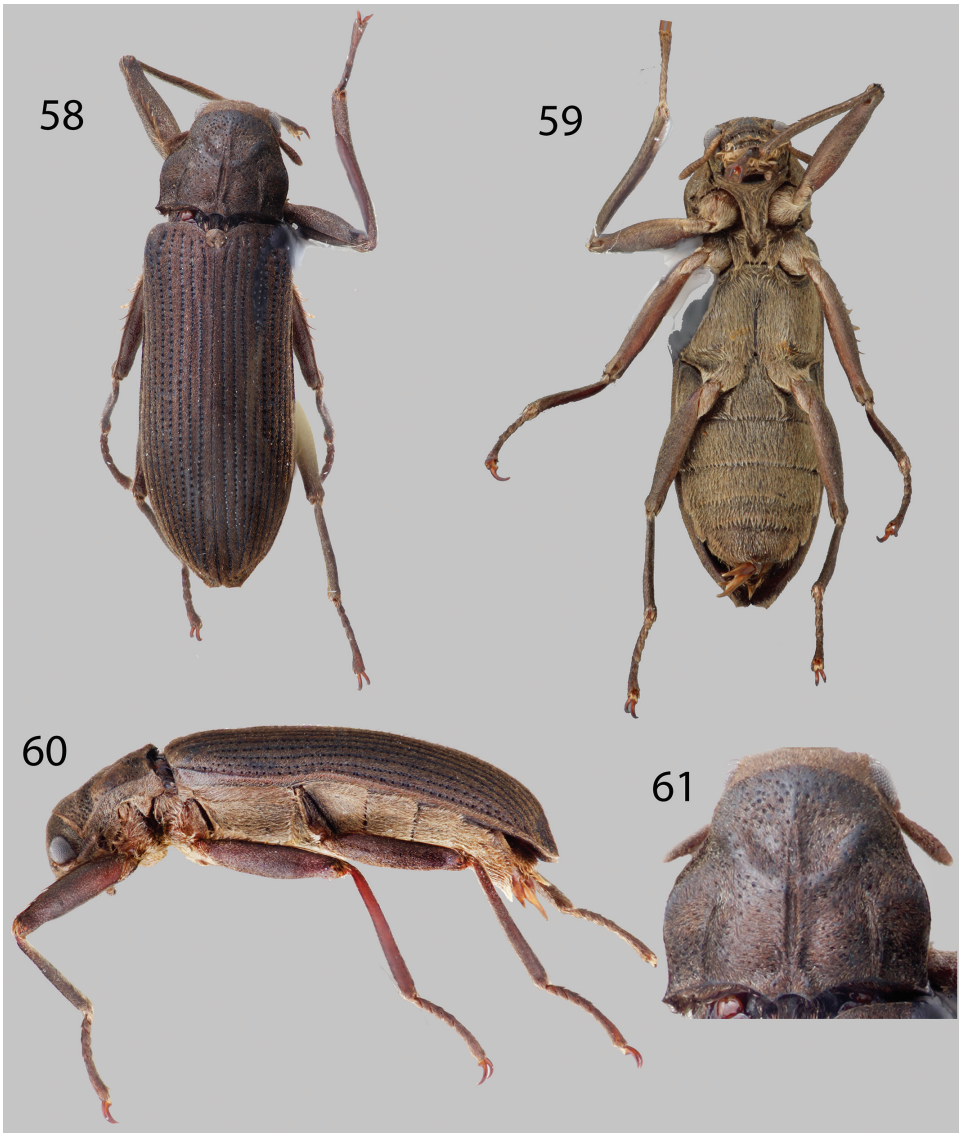
Neblinagena prima Spangler, 1985

http://species-id.net/wiki/Neblinagena_prima
Figs 5, 58, 59, 60, 61

For complete species description and genitalia illustrations see Spangler 1985.

Material examined. VENEZUELA: Amazonas State: "VENEZUELA, T.F.Amaz. [Amazonas State]; Cerro de la Neblina; Camp X, 1690m; 0°54'N, 60°2'W; 12 February 1985" "Small sunlit stream; on rock surface in; falls between boulders; W.E. Steiner; collector" (1 paratype USNM). "VENEZUELA, T.F.Amaz. [Amazonas State]; Cerro de la Neblina; Camp XI, 1450m; 0°52'N, 65°58'W; 25–28 February 1985" "From leaf packs in; small rapid stream; P.J. & P.M. Spangler; & R.A. Faitoute; Seine of rapids in; small mountain stream" (1 holotype USNM, 1 paratype USNM). "Venezuela T.F. [Amazonas State]; Amazonas 600m; 18–24-X-1987" "Talud Cerro; Aracamuni; 1°29'N; 65°38'W" "Ex. Terramar" (1 specimen MIZA).

Diagnosis. *Neblinagena prima* can be distinguished from *N. doylei* by its range, which does not overlap with the range of the latter. Additionally, the pronotal lateral



Figures 58–61. *Neblinagena prima*: **58** Dorsal habitus **59** Ventral habitus **60** Lateral habitus **61** Pronotum, dorsal view.

carinae of *N. prima* are obscured anteriorly and the oblique furrows form a 45° angle relative to the median longitudinal furrow (Fig. 61), whereas in *N. doylei* the pronotal longitudinal carinae are entire and the oblique furrow of the pronotum forms a 30° angle relative to the median longitudinal furrow (Fig. 57).

Intraspecific variation. This species varies slightly in size (6.0–6.3mm) and in coloration – from dark brown to black.

Habitat and distribution. This species appears to be endemic to Cerro de Neblina, and is restricted to the highlands, unlike its congener, *Neblinagena doylei*, which is widespread in lower areas (<1000m) of Bolivar State, Venezuela (Fig 5). *Neblinagena prima* was collected in leaf packs and between boulders in small mountain streams on Cerro de Neblina (Spangler 1985).

Associated species. This species is associated with the other, highly unusual, Cerro de Neblina endemic, *Hypsilara royi*, and was collected in the same habitats.

Phanoceroides Hinton, 1939

http://species-id.net/wiki/Phanoceroides
Figs 3, 62, 63, 64, 65

Diagnosis. *Phanoceroides* can be distinguished from all other genera of Larainae by the presence of a dense, silvery mat of setae on the ventral surface, or plastron (Fig. 63). They can be distinguished from members of the other elmid subfamily, Elminae, by the clubbed antennae, dense hairlike setae on the dorsum, and transverse procoxae (Fig. 63).

Distribution. This genus is known from Manaus, Amazonas State, in the Amazon river basin in Brazil and from Tobogan de la Selva, Amazonas State, in the Orinoco River drainage in Venezuela, and probably occur throughout the Southern Venezuela and Northern Brazil. There have also been literature reports of *Phanoceroides* spp. from as far west as Cordillera de Vilcabamba, Peru, but this record has not been confirmed by me (Acosta et al. 1998).

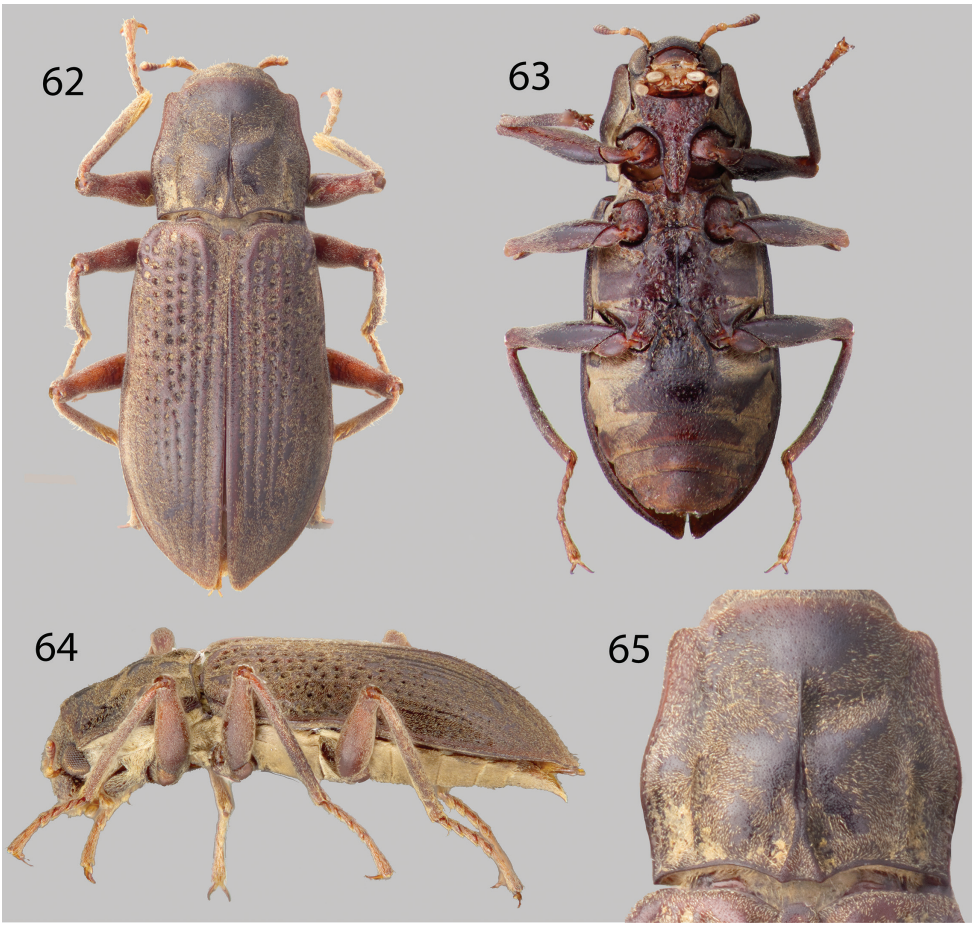
Habitat. *Phanoceroides* species have unique habitat requirements in the subfamily Larainae, in that they remain fully submerged and are found in the benthos of streams, as opposed to water-splashed surfaces in streams as others in Larainae (Hinton 1939).

Notes. The genus *Phanoceroides* is rather interesting among the Larainae, in that while it bears superficial resemblance to beetles in the subfamily Elminae, in their fully aquatic habits and in the presence of a dense, hairy plastron on the ventral surface, anatomically, they are most similar to the Larainae, and therefore they are included in this work. Whether this is a case of convergent evolution or the retention of plesiomophic characters is unknown and it deserves further study, and this species may provide insights into the evolution of laraine Elmidae.

Phanoceroides sp. 1

Figs 3, 62, 63, 64, 65

Material examined. VENEZUELA: Amazonas State: "VENEZUELA, T.F. Amazonas; Puerto Ayacucho (40km S); El Tobogan, Caño Coromoto; 19 January 1989; leaf packs, upper riffles" "Collected by; P.J. Spangler; R.A. Faitoute & C.B. Barr" (22 specimens USNM).



Figures 62–65. *Phanoceroides* sp. 1: **62** Dorsal habitus **63** Ventral habitus **64** Lateral habitus **65** Pronotum, dorsal view.

Distribution and habitat. In Venezuela, this species has only been collected at a single locality, Caño Coromoto, at El Tobogan de la Selva (Fig. 3). They were found in leaf packs and in benthic stream samples between the cascades. Additionally, specimens are known to come to UV lights.

Associated species. No other species in Larainae has been collected with this *Phanoceroides* species, however, other aquatic beetles collected in the same habitat include: *Tyletelmis* spp., *Heterelmis* spp., *Gyrelmis* spp., *Neoelmis* spp., *Neolimnius* spp., *Pilielmis* spp. (Elmidae: Elminae), *Berosus* spp., *Chaetarthria* spp., *Phaenonotum* spp., *Derallus* spp., *Oocyclus* spp. (Hydrophilidae), *Laccodytes* spp. (Dytiscidae), Torridincollidae, *Lutrochus* spp. (Lutrochidae), Hydroscaphidae, and Meruidae.

Notes. This species will be described in a later publication.

***Phanocerus* Sharp, 1882**
http://species-id.net/wiki/Phanocerus
Figs 6, 7, 8, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76.

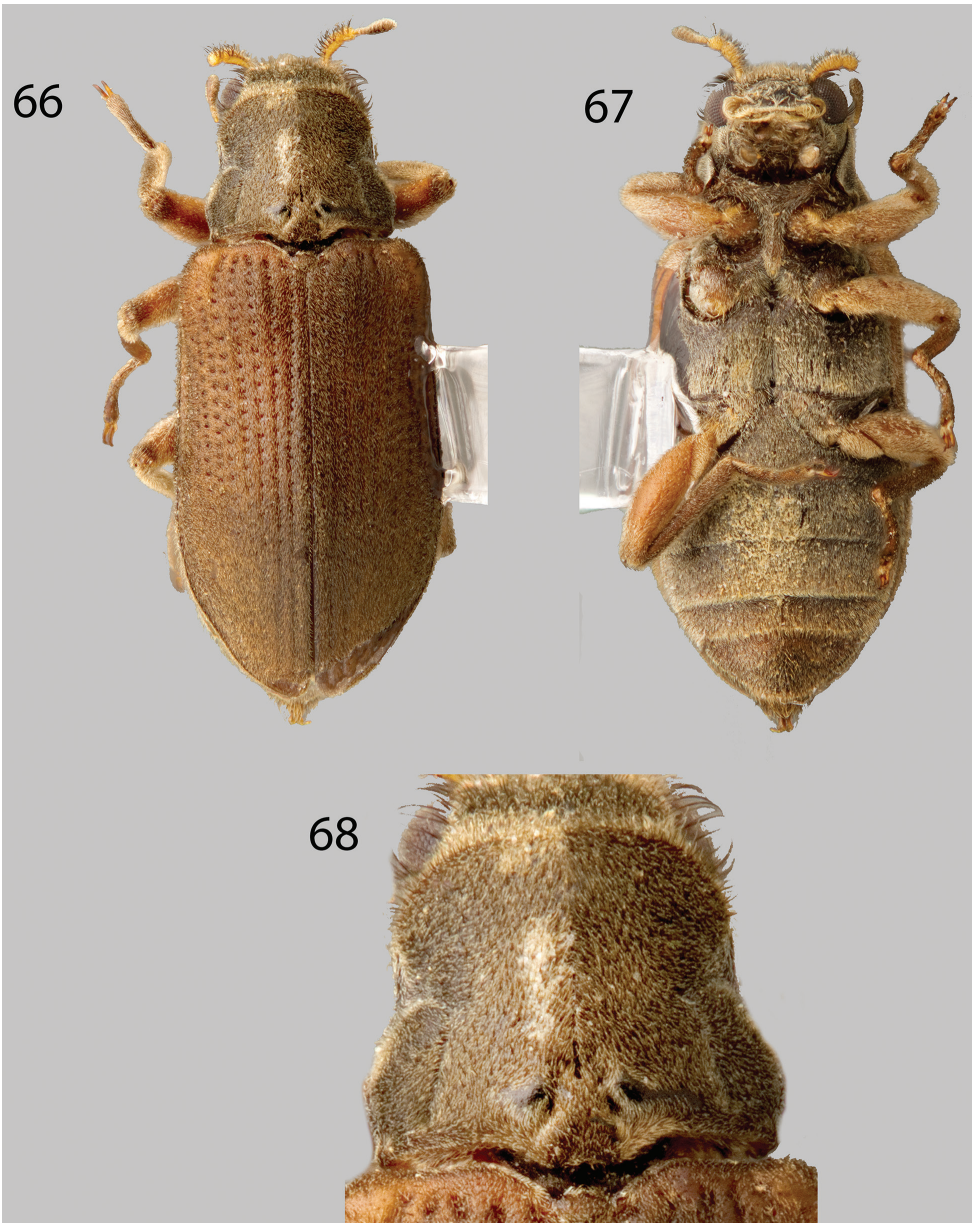
Diagnosis. This genus can be distinguished from all other genera of Larainae in Venezuela by its small size and pronotum which lacks a transverse groove (Fig. 68).

Distribution and habitat. *Phanocerus* spp. can be found throughout Central America and northern South America. They are fast fliers and congregate in leaf packs and on water-splashed detritus in streams, waterfalls, and rivers.

***Phanocerus clavicornis* Sharp, 1882**
http://species-id.net/wiki/Phanocerus_clavicornis
Figs 6, 66, 67, 68

For complete redescription and genitalia illustrations, see Spangler and Santiago-Fragoso 1992.

Material examined. VENEZUELA: Amazonas State: "Venezuela Exp[edition].; Territ. Amazonas; Upper Cunucunuma; Julian Apr. 28, 1950" "J. Maldonado; Capriles Coll." (2 specimens USNM). "Isla de las; Hormigas TFA; 22-VIII-51" "ExpFcoVen; Alto Orinoco" (2 specimens USNM). **Barinas State:** "VENEZUELA: Barinas State; 8°49.334'N, 70°11.993'W, 203 m; nr. Santa Barbara; 15.vii.2009; leg Short, Gustafson, Camacho; Garcia & Inciarte; along river; margins/snags; VZ09-0715-04A" (5 specimens SEMC). "VENEZUELA: Barinas State; 8°49.334'N, 70°11.993'W, 203 m; nr. Santa Barbara; 15.vii.2009; leg. W. Shepard; gross sample; VZ09-0715-04Z" (6 specimens SEMC). **Bolívar State:** "Venezuela; Bolívar; Rio Caura; Salto Para; Playon; 23-XI-1978" "B. Bechyne; lgt." (15 specimens MIZA). "Venezuela –BO[Bolívar State]; Kanarakuni; Alto Caura, 450 m" "10–13.9.1964; F.F. Yepez &; J. Bechyne lgt." (7 specimens MIZA). "Venezuela- Boli-; var [Bolívar State]. Guri rio; Caroni. 100m; 16-XI-1966" "J. & B. Bechyne; E. Osuna" (2 specimens MIZA). "Venezuela- Boli-; var [Bolívar State]. Guri rio; Caroni. 100m.; 11-IV-1968" "J. Salcedo; col." (1 specimen MIZA). "Venezuela- Boli-; var [Bolívar State]. Guri rio; Caroni. 100m.; 10-IV-1968" "J. Salcedo; col." (1 specimen MIZA). **Mérida State:** "VENEZUELA: Mérida State; 8°57.205'N, 71°17.620'W, 88 m; W. of Tucani; 21.vii.2009; Gross sample from river; leg. Shepard; VZ09-0721-04Z" (26 specimens SEMC). "VENEZUELA: Mérida State; 8°49.749'N, 71°25.579'W, 68m; ca. 4 km E. Santa Elena; 28.i.2012; leg. Short, Arias, & Gustafson; River Habitats; VZ12-0128-04A" (1 specimen SEMC). **Monagas State:** "VENEZUELA: Monagas State; 10°02.289'N, 63°46.623'W, 686m; 1.ii.2010, Rio Caripicual, btw.; San Antonio & Mundo Nuevo; leg. Short, Garcia, & Joly; in flow; /kicknetting; VZ10-0201-04B" (1 specimen SEMC). "VENEZUELA: Monagas State; 10°04.306'N, 63°33.561'W, 464 m; Rio Aragua, nr. Rio Chiquito; 1.ii.2010; leg. A. Short; in flow, kick netting; VZ10-0201-01B" (1 specimen SEMC).



Figures 66–68. *Phanocerus clavicornis*: **66** Dorsal habitus **67** Ventral habitus **68** Pronotum, dorsal view

"VENEZUELA: Sucre State [locality in Monagas State]; 10°00.840'N, 63°08.548'W, 38 m; Rio Azagua; 31.i.2010; leg. L. Joly; general river; collecting; VZ10-0131-03C" (1 specimen SEMC). **Táchira State:** "VENEZUELA: Táchira State; 7°35.038'N, 72°10.340'W, 472 m; El Tama National Park; 16.vii.2009; leg. Short, Sites, Garcia, Inciarte, Gustafson & Camacho; HG-vapor light; VZ09-0716-07A" (2 specimens

SEMC). **Zulia State:** "VENEZUELA: Zulia State; 10.86041°N, 72.32210°W, 95m; Quebrada Reincito; 30.xii.2008; leg. A. Short & M. Garcia; VZ08-1230-01A; in riffle area" (2 specimens SEMC).

Diagnosis. *Phanocerus clavicornis* can be separated from all other species of *Phanocerus* by the shape of the pronotum (Fig. 68). The pronotum is narrow in *P. clavicornis*, with narrow anterolateral angles, which are not explanate. Additionally, the setose patch at the base of the mesotibia is short (Fig. 66).

Intraspecific variation. This species varies a great deal in color and size, from 2.0–2.7 mm in size, and from dark brown to medium brown in color. Occasional specimens can have a reddish cast, but this is rare.

Distribution and habitat. The range of *P. clavicornis* is very large, and it is the most widely distributed laraine species in the Western Hemisphere. It occurs from Texas, in Southwestern United States, south to Amazonas State, Venezuela; it is also the most widely distributed in Venezuela, occurring throughout the country, excepting Los Llanos region in the central part of Venezuela (Fig. 6).That makes it the only species of laraine that crosses the Llanos and occurs on both the Guiana Shield and in the Northern Andes.

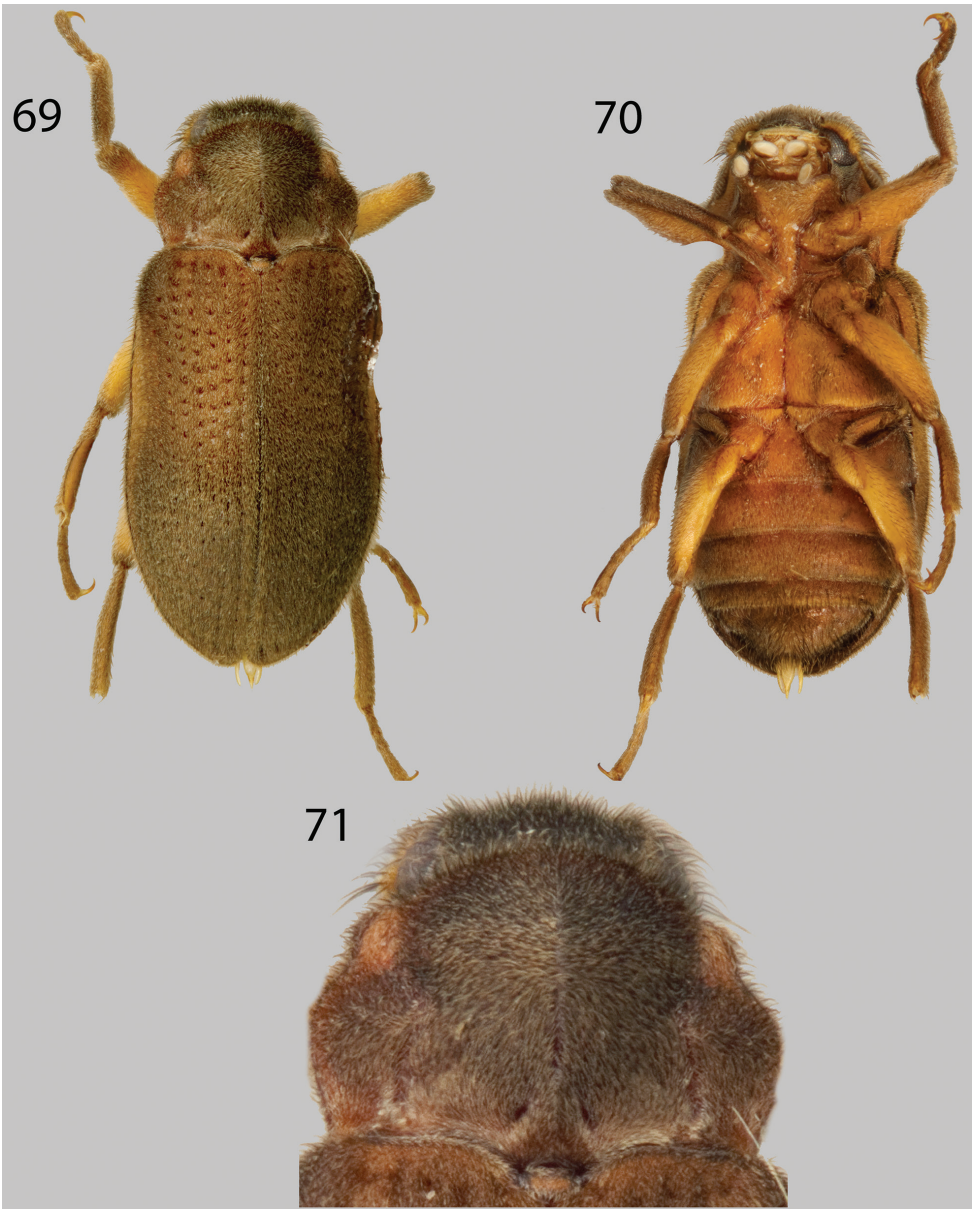
The habitat of *P. clavicornis* is similar to that of any other species of *Phanocerus*, it can be found in small to medium sized streams and rivers, in the leaf packs and on partially submerged detritus and woody debris.

Associated species. Numerous species of aquatic Coleoptera have been collected with this common laraine elmid, however, they will not be listed here, since they are so widespread.

***Phanocerus congener* Grouvelle, 1898**
http://species-id.net/wiki/Phanocerus_congener
Figs 7, 69, 70, 71

For complete redescription and genitalia illustrations, see Spangler and Santiago-Fragoso 1992.

Material examined. VENEZUELA: Aragua State: "Venezuela: Aragua; near coast; 1 II 06 226 m; Rio Grande del Mérida ; 10°27'N 67°36'W" "A.E.Z. Short & P.J. Torres legs." "Phanocerus congener; W.D. Shepard" (6 specimens SEMC). "VENEZUELA: Aragua State; 10.37319°N, 67.74250°, 295m; Henri Pittier N.P.: Rio La Trilla; 4.i.2009; leg. A. Short; VZ09-0104-01B; kick netting" (12 specimens SEMC). "VENEZUELA: Aragua State; 10.39376°N, 67.79597°W, 130m; Henri Pittier N.P.: Rio Cumboto; 4.i.2009; leg. Short; leaf packs; & kick netting; VZ09-0104-02A" (35 specimens SEMC). "VENEZUELA: Aragua State; 10.48189°N, 67.60880'W, 152m; Rio Choroni; ca. 4km S. coast; 6.i.2009; leg. A. Short; VZ09-0106-03A: leaf packs" (34 specimens SEMC). "VENEZUELA: Aragua State: 10.37068°N, 67.59683°W, 1039m; H. Pittier N.P.: road to Choroni; 6.i.2009; Short, Miller, Camacho; Garcia; VZ09-0106-02X; stream" (1 specimen SEMC). "VENEZUELA: Aragua State; 10.48189°N,



Figures 69–71. *Phanocerus congener*: **69** Dorsal habitus **70** Ventral habitus **71** Pronotum, dorsal view.

67.60880°W, 152m; Rio Choroni; ca. 4 km S. coast; 6.i.2009; Short, Miller, Camacho; Garcia; VZ09-0106-03X" (1 specimen SEMC). "VENEZUELA: Aragua State; 10.39376°N, 67.79597°W, 130m; Henri Pittier N.P.: Rio Cumboto; 4.i.2009; leg. K.B. Miller; VZ09-0104-02A; river backwaters" (1 specimen SEMC). "VENEZUE-

LA: Aragua; Par. Nac. Henri Pittier; Rancho Grande –Ocamure; 790 m, 20JUN1987, M.A. Ivie; leaf packs in waterfall" (4 specimens MAIC). **Barinas State:** "VENEZUELA: Barinas State; 8°49.334'N, 70°11.993'W, 203m; nr. Santa Barbara; 15.vii.2009; leg. W. Shepard; gross sample; VZ09-0715-04Z" (2 specimens SEMC). "VENEZUELA: Barinas State; 8°18.033'N, 70°45.201'W, 216m; River nr. Bum Bum; 15.vii.2009; leg. Short et al.; river margins; VZ09-0715-02A" (2 specimens SEMC). **Falcón State:** "VENEZUELA: Falcón State; 11°10.667'N, 69°33.695'W, 593 m; Cataratas del Hueque; 9.vii.2009; leg. Shepard; mud puddles/pools; gross sample; VZ09-0709-01Z" (1 specimen SEMC). "VENEZUELA: Falcón State; 11°10.667'N, 69°33.695'W, 593 m; Cataratas del Hueque; 9.vii.2009; Short & Gustafson; leafpacks/roots; at river margin; VZ09-0709-01Z" (4 specimens SEMC). **Trujillo State:** "VENEZUELA: Trujillo State; 9°11.840'N, 70°47.545'W, 1131m; ca. 2.5 km E. Monte Carmelo; 22.vii.2009; leg. W. Shepard; rocky stream after flooding; VZ09-0722-04Z; gross sample" (2 specimens SEMC). **Zulia State:** "VENEZUELA: Zulia; P.N. Perija: Tukuko; Rio Manantial; 16.VII.2008; A.E.Z. Short, leg." "Phanocerus congener W.D. Shepard" (7 specimens SEMC). "VENEZUELA: Zulia State; 9°50.490'N, 72°49.310'W; Perija N.P. Tukuko: Rio Mantantial; 29.i.2009; Short, Garcia, Camacho; VZ09-0129-01A: gravel margin" (5 specimens SEMC). "VENEZUELA: Zulia, El; Tucuco (51 km S.O. de; Machiques). Trampa Ma-; laise. 01/03-II-1982" "Colectores; E. Inciarte; E. Rubio" (1 specimen MALUZ). "VENEZUELA: Zulia, El; Tucuco (51 km S.O. de; Machiques). 13.14-VIII-1982" "E. Rubio; colector" (1 specimen MALUZ). "Venezuela Zulia; Dtto. Maracaibo; San Jose de los; Altos 35 km N.; O. de Laberinto; 1400m. 16-vi-1989" "Colector; J. Camacho" (12 Specimens MALUZ). "VENEZUELA, Zulia, Mcpio. Rosario de; Perija, Rio Seco, 525; msnm. 16–18/II/1996" "Colectores; M. Garcia; D. Ascanio" (1 specimen MALUZ). "VENEZUELA: Zulia State; 9°50.513'N, 72°48.334'W, 252m; Perija N.P. Tukuko: Rio Tukuko; 29.i.2009; leg. Short, Garcia &; Camacho; VZ09-0129-02X" (1 specimen SEMC).

Diagnosis. *Phanocerus congener* can be separated from all other species of *Phanocerus* by the following combination of characters: pronotum wide, 1.4x as wide as long, with wide anterolateral angles which are explanate (Fig. 71). Additionally, the setose patch at the base of the mesotibia of the male is long (Fig. 69).

Intraspecific variation. Slight variations in size (2.1–2.5 mm) and color (light to dark brown) are common in *Phanocerus congener*.

Distribution and habitat. This species has previously only been known from the Lesser Antilles, but is actually widespread in Venezuela, found throughout Western Venezuela in the Mérida Andes and the coastal ranges (Fig. 7). The habitat of *P. congener* is similar to that of other *Phanocerus* species, in partially submerged leaf packs and woody debris.

Associated species. *Hexanchorus falconensis* sp. n. was collected at Cataratas del Hueque along with *Phanocerus congener,* in addition to *Heterelmis* spp., and *Microcylloepus* spp., *Lutrochus acuminatus* (Lutrochidae) (Maier and Short 2013), and larvae of Psephenidae.

***Phanocerus rufus* sp. n.**
http://zoobank.org/94558BCC-E8D0-433C-927A-86D6545FABE6
http://species-id.net/wiki/Phanocerus_rufus
Figs 8, 72, 73, 74, 75, 76

Type material. Holotype Male. "VENEZUELA: Aragua State; 10.35669°N, 67.60645°W; Henri Pittier N.P.: Rio Castaño; Regesiva del Diablo; 6.i.2009; Short, Miller, Camacho, Garcia; VZ09-0106-01X" Holotype deposited in MIZA. **Paratypes (20):** Same data as holotype (9 Specimens SEMC). "VENEZUELA: Aragua State; 10.35669°N, 67.60645°W; Henri Pittier N.P.: Rio Castaño; Regesiva del Diablo; 6.i.2009; leg. A.E.Z. Short; VZ09-0106-01C; stream leaf packs" (9 specimens SEMC). "VENEZUELA: Aragua State; 10.35669°N, 67.60645°W; Henri Pittier N.P.: Rio Castaño; Regesiva del Diablo; 6.i.2009; A.E.Z. Short; VZ09-0106-01A; log in stream" (2 specimens SEMC). Paratypes will be deposited in: 2 in MIZA, 2 in MALUZ, 2 in USNM, 14 in SEMC.

Diagnosis. *Phanocerus rufus* can be distinguished from all other species of *Phanocerus* by the combination of its large size (2.7–3.5 mm), reddish coloration (Fig. 72), distinctive pronotal shape, that is 1.6x as wide as long (Fig. 75), and the presence of a short setose patch at base of mesotibia (Fig. 74).

Description. Holotype male. Body elongate, sub-parallel, moderately convex (Fig. 72). Total length 2.7 mm, greatest width 1.2 mm. Cuticle light reddish-brown, maxillary palpus, basal antennomeres, and legs testaceous (Fig. 73). Dorsal surface with dense, erect golden setae and denser golden, recumbent setae. Surface microreticulate, with dense, fine punctures.

Head moderately coarsely, densely punctate; punctures separated by their diameter; cuticle microreticulate. Clypeus with anterior margin rounded. Fronto-clypeal suture deep and curved. Labrum with anterior margin entire and gently rounded, narrower than clypeus; angle on each side obtuse, covered with setae approximately twice as long as setae on head. Eyes protruding only slightly laterally; separated by a distance about 3x the eye-width; bordered by short dark brown curved setae ("eyelashes") that arise near dorsal and ventral sides of eyes and extend toward middle of eye, setae not as prominent as in other genera. Antenna 11 segmented, densely pubescent, slightly clubbed; basal two antennomeres with dense, medium-brown, brushy setae, thicker in width than proceeding antennomeres, with dense recumbent setae and dense brushy light brown setae. Antennal club of six antennomeres, compact, wide, quite thickened towards apex. Antennae very short, just barely reaching transverse groove of pronotum. Apical five antennomeres reddish-brown, with dense recumbent setae. Apical antennomere rounded.

Pronotum overall smooth, 1.6x as wide as long; widest at basal third; anterior width roughly two thirds the posterior width; anterior margin strongly convex over base of head; base tri-sinuate (Fig. 74). Pronotum with a sublateral groove, which joins deep anterolateral fovea near the anterior margin; anterolateral margins explanate; base with two small foveae anterior to scutellum; lateral margins strongly sinuate, nearly

at right angles at basal third, strongly gibbous (Fig. 74); surface similarly punctate to head. Hypomeron oblique. Scutellum flat, broader than long; posterior angle square. Prosternum long in front of procoxae. Anterior margin reflexed ventrally. Prosternal process narrowly triangular, broad at base and tapering to apex; disc with strong median carina, lateral margins reflexed; apex strongly acuminate (Fig. 73). Mesoventrite short, depressed, with a deep, narrow, U-shaped depression for reception of apex of prosternal process (Fig. 73). Metaventrite with disc inflated on posterior three-fourths, finely punctate behind mesocoxae; with deep, impressed longitudinal groove on midline of disc, groove deepest and broadest on posterior third of disc (Fig. 73); with short, dense pubescence; cuticular surface of metaventrite finely microreticulate.

Elytra more than 3.4x as long as pronotum; lateral margins slightly sinuate; humeri and base adjacent to scutellum slightly gibbous; lateral margins smooth; apex smoothly rounded. Each elytron with 10 coarse striae formed by a row of large, coarse punctures separated by more than three times their diameter; striae slightly impressed becoming narrower and more shallow towards the apex; strial punctures coarse basally, becoming progressively finer towards apex; striae 3 and 4 not converging sub-apically; intervals flat (Fig. 72). Elytral surface with dense, golden recumbent pubescence and dense, erect hair-like setae.

Legs thin and short. Pro-, meso- and metatibiae lacking fringe of tomentum. Protibia glabrous ventrally, tomentose dorsally. Mesotibia with short basal setose patch and short apical setose patch (Fig. 75). Metatibia tomentose. Apical tarsomere of all legs entirely pubescent.

Abdomen with five ventrites, all ventrites pubescent, covered with fine, golden setae (Fig. 73). First ventrite lacking longitudinal carina behind metacoxae; cuticle densely covered with short, recumbent setae. Ventrite 4 lacking V-shaped carina. Last ventrite subtruncate, medially with patch of dense, long, dark brown setae. Aedeagus slightly curved, with parameres nearly as long as aedeagus (Fig. 76). Internal sac quite visible in slide mount, densely lined with spicules (Fig. 76).

Female. Externally similar to male except slightly larger in size, protibiae slightly less curved than those of male. Metaventral disc not as deeply and less concave. Apical abdominal ventrite with less dense setae than male.

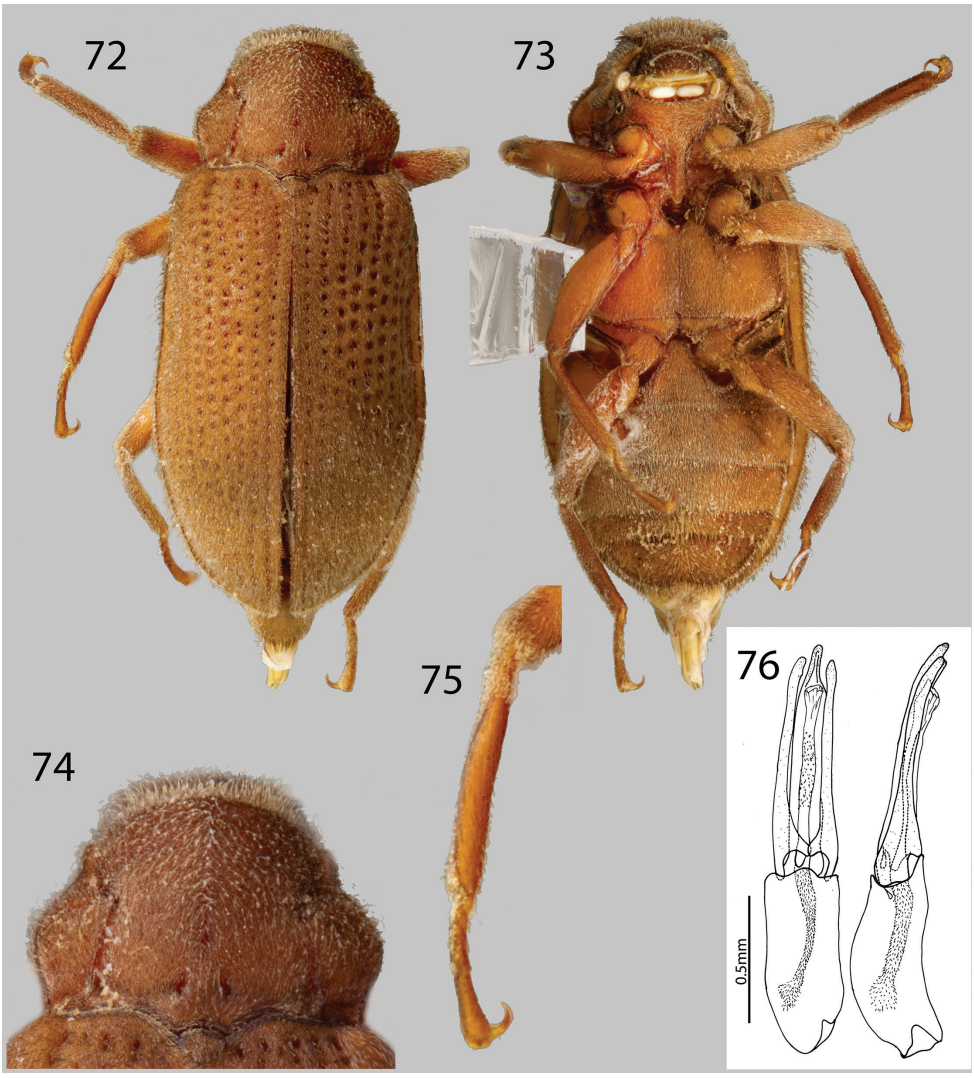
Intraspecific variation. This species varies slightly in color, from dark reddish-brown to medium reddish-brown, length (2.7–3.5 mm), and degree of setation.

Distribution and habitat. This species has only been collected at the type locality at Rio Castaño, a small river in cloud forest on the interior slopes of Henri Pittier National Park, in Aragua State, Venezuela (Fig. 8). They were collected on logs in the stream and in leaf packs.

Etymology. This species is named *Phanocerus rufus*, in reference to the slightly reddish cast of the cuticle.

Associated species. *Phanocerus rufus* was found in crevices on submerged logs along with the lutrochid, *Lutrochus acuminatus* (Maier and Short 2013).

Other material examined (Not Assigned to species – all female, likely new species).



Figures 72–76. *Phanocerus rufus* sp. n.: **72** Dorsal habitus **73** Ventral habitus **74** Pronotum, dorsal view **75** Mesotibia, male **76** Aedeagus, dorsal and lateral views.

Population 1: VENEZUELA: Monagas State: "VENEZUELA: Monagas State; 10°10.322'N, 63°33.315'W; 1110m; Gauchero Cave National Park; 20.vii.2010; leg. Short, Tellez, Arias; along stream; VZ10-0720-02A" (2 specimens SEMC).

Population 2: Trujillo State: "VENEZUELA: Trujillo State; 9°11.935'N, 70°45.233'W, 1601m; ca. 6 km E Monte Carmelo; 22.vii.2009; leg. W. Shepard; VZ09-0722-03Z" (4 specimens SEMC).

Population 3: Aragua State: "VENEZUELA: Aragua; 19 km. N. Maracay; 2 July 1986; R.S. Miller colr" (1 specimen MAIC).

Population 4: Barinas State: "VENEZUELA: Barinas; nr. Alta Mira; 5 July 1986; R.S. Miller colr.; Riparian woodland" (1 specimen MAIC).

***Pharceonus* Spangler & Santiago-Fragoso, 1992**
http://species-id.net/wiki/Pharceonus
Figs 5,8, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87.

Diagnosis. The genus *Pharceonus* can be distinguished from all other genera of Laraine Elmidae that occur in South America by its small size and distinctive pronotum. All *Pharceonus* species are small (3.1–4.3 mm), but generally larger than the similar genus *Phanocerus*, in various shades of medium to dark brown, with a pronotum that has a distinctive transverse bisinuate impression at the apical third and a transverse, bisinuate impression subbasally (Fig. 83). These two impressions form two gibbosities on the basal two thirds of the pronotum (Fig. 83).

Distribution. *Pharceonus* species occur throughout southern Central America and northern South America, from Costa Rica south to Peru (pers. obs.).

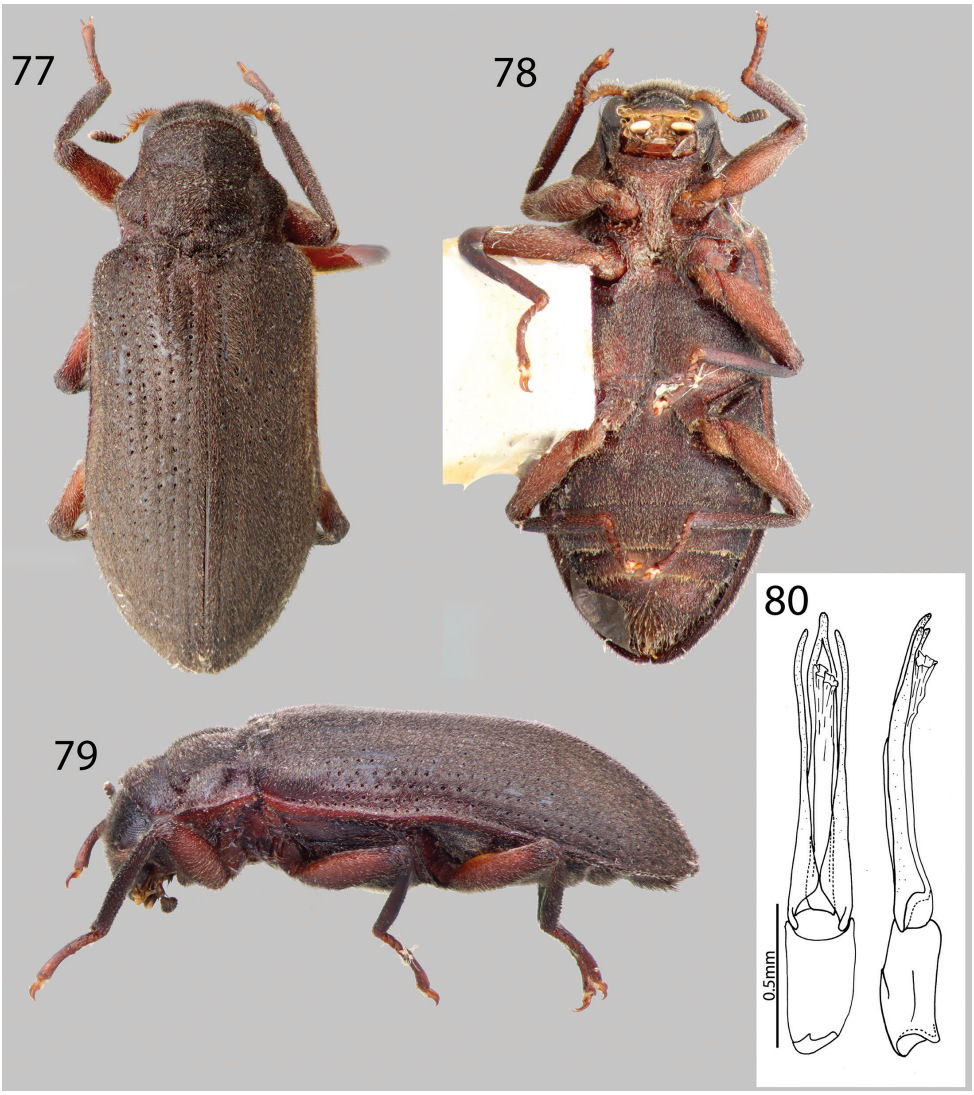
Habitat. Members of this genus can be found on roots and woody debris in small to medium forested streams and seeps, as well as in the benthos, among gravel and sometimes on on rocky substrate (Spangler and Santiago-Fragoso 1992).

***Pharceonus ariasi* sp. n.**
http://zoobank.org/C8211343-31E1-4EBC-AD20-E503849B458E
http://species-id.net/wiki/Pharceonus_ariasi
Figs 8, 77, 78, 79, 80

Type material. Holotype Male. "Venezuela: Mérida State; 8°52.423'N, 70°37.611'W, 1616m; Cascada Velo de la Novia; 24.i.2012; leg. Short, Arias, & Gustafson; logs and kicknetting; VZ12-0124-01B" Holotype deposited in MIZA. **Paratypes (18):** "VENEZUELA: Mérida State; 8°52.423'N, 71°37.611'W, 1616 m; Cascada Velo de la Novia; 19.vii.2009; leg. W. Shepard; gross sample; VZ09-0719-01Z" (4 specimens SEMC). "VENEZUELA: Mérida State; 8°51.933'N, 70°37.131'W, 1682m; ca. 12 km SE of Santo Domingo; leg. Short, Arias, & Gustafson; 22.i.2012; log and stick jams; in river; VZ12-0122-03B" (8 specimens SEMC). "VENEZUELA: Mérida State; 8°51.933'N, 71°37.131'W, 1682m; ca. 12 km SE Santo Domingo; 19.vii.2009; leg. W. Shepard; gross sample; VZ09-0719-02Z" (6 specimens SEMC). Paratypes will be deposited in: 2 in MIZA, 2 in MALUZ, 2 in USNM, 12 in SEMC.

Diagnosis. This species can be distinguished from all other species of *Pharceonus* by its large size (3.5–4.1mm), dark brown color (Fig. 77), narrow genitalia (aedeagus + phallobase) (6x as long as wide) (Fig. 80), and pronotum with only a shallow bisinuate transverse impression across apical third (Fig. 77).

Description. Holotype male. Body elongate, sub-parallel, moderately convex. Total length 3.3 mm, greatest width 1.3 mm. Cuticle dark brown, base of maxillary palpus, six basal antennomeres, femora, and tarsi testaceous (Fig. 78). Dorsal surface with dense, erect brownish hair-like setae and denser and finer, golden, recumbent setae (Fig. 77). Surface microreticulate, with dense fine punctures.



Figures 77–80. *Pharceonus ariasi* sp. n.: **77** Dorsal habitus **78** Ventral habitus **79** Lateral habitus **80** Aedeagus, dorsal and lateral views.

Head moderately coarsely, densely punctate; punctures separated by their diameter; cuticle microreticulate. Clypeus with anterior margin truncate. Fronto-clypeal suture deep and slightly curved. Labrum with anterior margin entire and straight; angle on each side rounded, covered with golden setae approximately twice as long as setae on head. Eyes protruding only slightly laterally; separated by a distance about three times the eye-width; bordered by long dark brown curved setae ("eyelashes") that arise near dorsal and ventral sides of eyes and extend toward middle of eye, setae not as prominent as in other genera. Antenna 11 segmented, pubescent, slightly clubbed;

basal two antennomeres with long, brown, hair-like setae, thicker in width than proceeding antennomeres, with dense recumbent setae and dense brushy light brown setae (Fig. 77). Antennal club of six antennomeres, compact, thickened towards apex. Antennae short, reaching transverse groove of pronotum. Apical five antennomeres dark brownish black, with dense recumbent setae. Apical antennomere rounded.

Pronotum heavily sculptured, wider than long (1.1 mm and 1.0 mm, respectively); widest at basal third; anterior width two thirds the posterior width; anterior margin strongly convex over base of head; base tri-sinuate (Fig. 77). Pronotum with a shallow sublateral depression on each side extending from a deep anterolateral fovea near the anterior margin towards the base, where it is joined to sub-basal, transverse and bisinuate shallow depression; a short medial longitudinal and superficial groove joins the sub-basal and transverse depression with a strong tranverse and bisinuate depression at apical third; surface similarly punctate to head (Fig. 77). Pronotal base with strong median gibbosity anterior to scutellum. Hypomeron oblique (Fig. 79). Scutellum flat, broader than long, elevated posteriorly; posterior angle obtuse. Prosternum long in front of procoxae; with tuft of long, golden setae apicomedially. Anterior margin reflexed ventrally. Prosternal process scutiform, broad at base and tapering to apex; disc slightly impressed, lateral margins reflexed; middle convex; apex acuminate (Fig. 78). Mesoventrite short, depressed, with a deep, narrow, V-shaped depression for reception of apex of prosternal process. Metaventrite with disc inflated on posterior three-fourths, finely punctate behind mesocoxae; with deep, impressed longitudinal groove on midline of disc, groove deepest and broadest on posterior third of disc; with short, dense pubescence; cuticular surface of metaventrite finely microreticulate (Fig. 78).

Elytra more than three times as long as pronotum; lateral margins slightly sinuate; humeri and base adjacent to scutellum strongly gibbous; lateral margins smooth; apex rounded (Fig. 79). Each elytron with 10 coarse striae formed by a row of deep punctures well separated by more than three times their diameter; striae slightly impressed becoming narrower and more shallow towards the apex; strial punctures coarse basally, becoming progressively finer towards apex; striae 3 and 4 converging sub-apically; intervals flat (Fig. 77). Elytral surface with dense, golden pubescence.

Legs thin and short. Pro-, meso- and metatibiae with very short fringe of tomentum extending from about mid-tibia to nearly the tip. Surface of legs entirely pubescent, including mesotibiae. Mesotibia with small glabrous patch basally. Apical tarsomere of all legs with glabrous patch dorsally.

Abdomen with five ventrites. First ventrite distinctly carinate adjacent to metacoxae; carinae extending longitudinally behind metacoxae for almost entire length of first ventrite; cuticle densely covered with short, recumbent setae (Fig. 78). Ventrite IV with median V-shaped carina; carina covered with thicker setae than rest of ventrite. Last ventrite subtruncate, covered with dense, long, dark brown setae. Genitalia (aedeagus + phallobase wide, 6x as long as wide, slightly curved (Fig. 80).

Female. Externally similar to male except slightly larger in size, elytral gibbosities more producted, and elytral sutural stria slightly inflated in apical third. Protibiae slightly less curved than those of male. Metaventral disc not as deeply and less concave.

Abdominal ventrite IV lacking V-shaped carina. Apical abdominal ventrite with less dense setae than male.

Intraspecific variation. This species varies slightly in color, from dark brown to medium brown, length (3.5–4.1 mm), and degree of setation.

Etymology. The specific epithet "*ariasi*" is a patronym in honor of Mr. Quintin Arias, who helped to collect many of the specimens of this species.

Distribution and habitat. This species is limited to the type locality at Cascada Velo de la Novia and from a nearby stream 12 km southeast of Santo Domingo, in Mérida State, Venezuela (Fig. 8). The specimens were found clinging to waterlogged woody debris in the river.

Associated species. No other laraine species were collected with *P. ariasi*.

***Pharceonus grandis* sp. n.**
http://zoobank.org/1394A6F1-8545-41DF-9CA5-AD5B8E8A6FAF
http://species-id.net/wiki/Pharceonus_grandis
Figs 5, 81, 82, 83, 84

Type material. Holotype Male. "Venezuela: Mérida State; 8°38.006'N, 71°09.782'W, 2037m; Monte Zerpa area; 20.vii.2009; leg. W. Shepard; stream margin; VZ09-0720-01Z" Holotype deposited in MIZA. **Paratypes (20): VENEZUELA: Mérida State:** Same data as Holotype (14 specimens SEMC). "Venezuela: Mérida State; 8°38.006'N, 71°09.782'W, 2037m; Monte Zerpa area; 20.vii.2009; leg. Short, Sites, Gustafson, &; Camacho; stream margin/pools; VZ09-0720-01A/L-1098" (1 specimen SEMC). "VENEZUELA: Mérida State; 8°35.355'N, 71°13.926' W 1646m; N. of Ejido, Rt. 4 river x-ing; 10.vii.2009; leg. Shepard; gross sample; VZ09-0720-02Z" (4 specimens SEMC). "VENEZUELA: Mérida State; 8°48.725'N, 70°47.057'W, 3012m; ca. 6 km E. Laguna Mucubaji; by Hotel Los Frailes; 19.vii.2009; W. Shepard; VZ09-0719-03Z; gross sample" (1 specimen SEMC). Paratypes will be deposited in: 2 in MIZA, 2 in MALUZ, 2 in USNM, 14 in SEMC.

Diagnosis. This species can be distinguished from all other species of *Pharceonus* by its large size (3.5–4.3 mm), slightly reddish color (Fig. 81), wide genitalia (aedeagus + phallobase) (3.7x as long as wide) (Fig. 84), and pronotum with a deep and strongly bisinuate transverse impression across apical third (Fig. 83).

Description. Holotype male. Body elongate, sub-parallel, moderately convex. Total length 3.7 mm, greatest width 1.6 mm. Cuticle dark reddish-brown, base of maxillary palpus, six basal antennomeres, femora, and tarsi lighter reddish-brown (Fig. 82). Dorsal surface with dense, erect brownish hair-like setae and denser and finer, golden, recumbent setae. Surface microreticulate, with dense fine punctures.

Head moderately coarsely, densely punctate; punctures separated by their diameter; cuticle microreticulate. Clypeus with anterior margin rounded. Fronto-clypeal suture deep and curved. Labrum with anterior margin entire and gently rounded; angle on each side obtuse, covered with setae approximately twice as long as setae

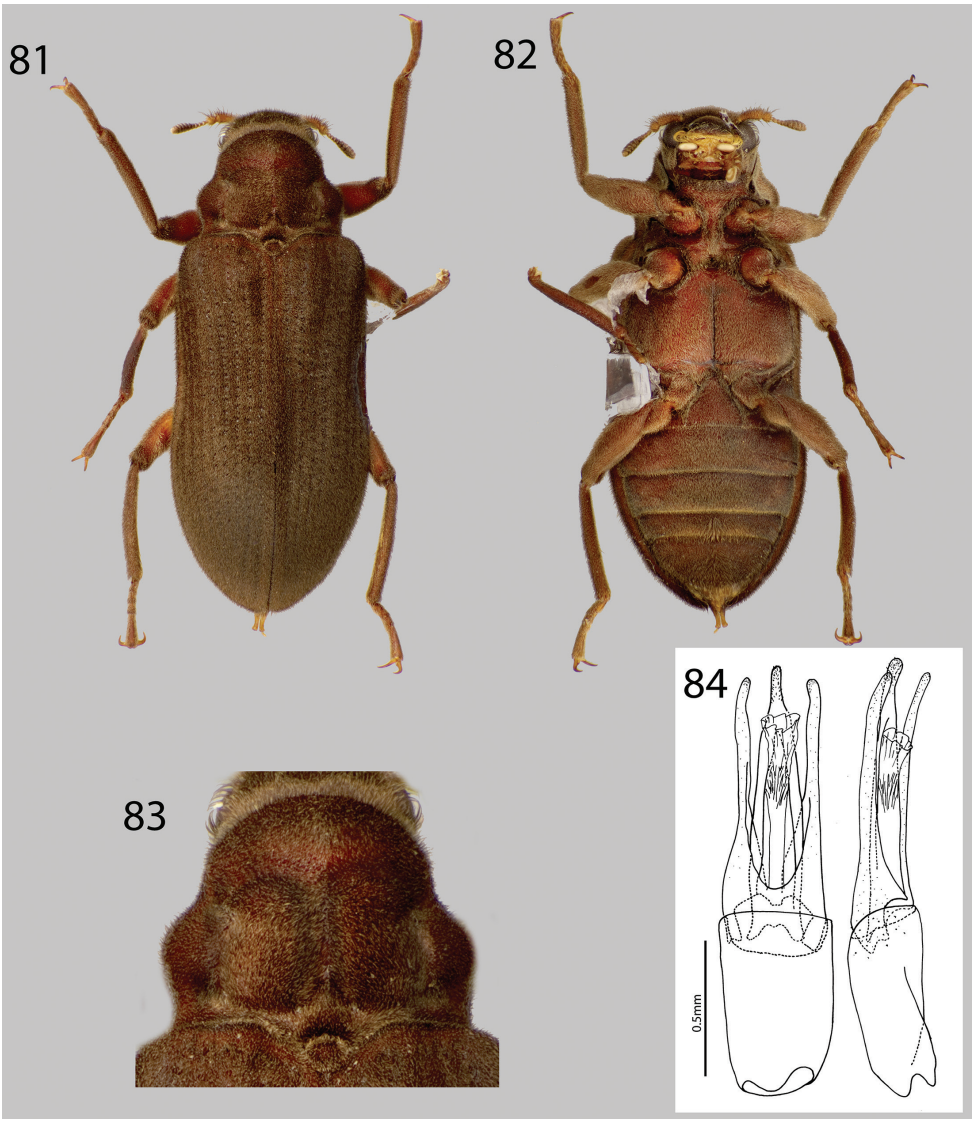
on head. Eyes protruding only slightly laterally; separated by a distance about 3.5x the eye-width; bordered by long dark brown curved setae ("eyelashes") that arise near dorsal and ventral sides of eyes and extend toward middle of eye, setae not as prominent as in other genera. Antenna eleven segmented, pubescent, slightly clubbed; basal two antennomeres with long, brown, hair-like setae, thicker in width than proceeding antennomeres, with dense recumbent setae and dense brushy light brown setae. Antennal club of six antennomeres, compact, thickened towards apex (Fig. 81). Antennae short, reaching transverse groove of pronotum (Fig. 81). Apical five antennomeres dark brownish black, with dense recumbent setae. Apical antennomere rounded.

Pronotum heavily sculptured, as wide as long (0.9 mm and 0.9 mm, respectively); widest at basal third; anterior width two thirds the posterior width; anterior margin strongly convex over base of head; base tri-sinuate (Fig. 83). Pronotum with a sublateral depression on each side extending from a deep anterolateral fovea near the anterior margin towards the base, where it is joined to sub-basal, transverse and bisinuate depression; a short medial longitudinal and superficial groove joins the sub-basal and transverse depression with a strong tranverse and bisinuate depression at apical third; surface similarly punctate to head. Pronotal base with strong median gibbosity anterior to scutellum (Fig. 83). Hypomeron oblique. Scutellum slightly convex, broader than long, elevated posteriorly; posterior angle square. Prosternum long in front of procoxae; with tuft of long, golden setae apicomedially. Anterior margin reflexed ventrally. Prosternal process narrowly triangular, broad at base and tapering to apex; disc slightly impressed, lateral margins reflexed; middle convex; apex acuminate (Fig. 82). Mesoventrite short, depressed, with a deep, narrow, V-shaped depression for reception of apex of prosternal process. Metaventrite with disc inflated on posterior three-fourths, finely punctate behind mesocoxae; with deep, impressed longitudinal groove on midline of disc, groove deepest and broadest on posterior third of disc; with short, dense pubescence; cuticular surface of metaventrite finely microreticulate (Fig. 82).

Elytra more than three times as long as pronotum; lateral margins slightly sinuate; humeri and base adjacent to scutellum strongly gibbous; lateral margins smooth; apex rounded. Each elytron with ten coarse striae formed by a row of large punctures well separated by more than three times their diameter; striae slightly impressed becoming narrower and more shallow towards the apex; strial punctures coarse basally, becoming progressively finer towards apex; striae 3 and 4 converging sub-apically; intervals flat (Fig. 81). Elytral surface with dense, golden pubescence.

Legs thin and short (Fig. 81). Pro-, meso- and metatibiae with very short fringe of tomentum extending from about mid-tibia to nearly the tip. Surface of legs entirely pubescent, including mesotibiae. Mesotibia with small glabrous patch basally. Apical tarsomere of all legs with glabrous patch dorsally.

Abdomen with five ventrites. First ventrite distinctly carinate adjacent to metacoxae; carinae extending longitudinally behind metacoxae for almost entire length of first ventrite; cuticle densely covered with short, recumbent setae (Fig. 82). Ventrite IV with median V-shaped carina; carina covered with thicker setae than rest of



Figures 81–84. *Pharceonus grandis* sp. n.: **81** Dorsal habitus **82** Ventral habitus **83** Pronotum, dorsal view **84** Aedeagus, dorsal and lateral views.

ventrite (Fig. 82). Last ventrite subtruncate, covered with dense, long, dark brown setae. Genitalia (aedeagus + phallobase wide, 3.7× as long as wide, gently curved (Fig. 84).

Female. Externally similar to male except slightly larger in size, elytral gibbosities more producted, and elytral sutural stria slightly inflated in apical third (Fig. 81). Protibiae slightly less curved than those of male. Metaventral disc not as deeply and

less concave. Abdominal ventrite 4 lacking median V-shaped carina. Apical abdominal ventrite with less dense setae than male.

Intraspecific variation. This species varies slightly in color, from dark reddish-brown to medium reddish-brown, length (3.5–4.2 mm), and degree of setation.

Distribution and habitat. *Pharceonus grandis* has been collected only in the Mérida Andes in Venezuela (Fig. 5), at stream margins and in bulk benthic samples.

Etymology. *Pharceonus grandis* is named after the Latin "grandis", meaning large, referring to its large size.

Associated species. No other laraine species were collected with *Pharceonus grandis*. The following aquatic beetle taxa were collected at the same localities as *P. grandis*: *Andogyrus* spp. (Gyrinidae), *Andonectes* spp. (Dytiscidae), *Enochrus* spp. (Hydrophilidae), *Hydraena* spp. (Hydraenidae).

Pharceonus volcanus Spangler & Santiago-Fragoso, 1992

http://species-id.net/wiki/Pharceonus_volcanus
Figs 5, 85, 86, 87

See Spangler and Santiago-Fragoso 1992 for complete species description and genitalia illustrations.

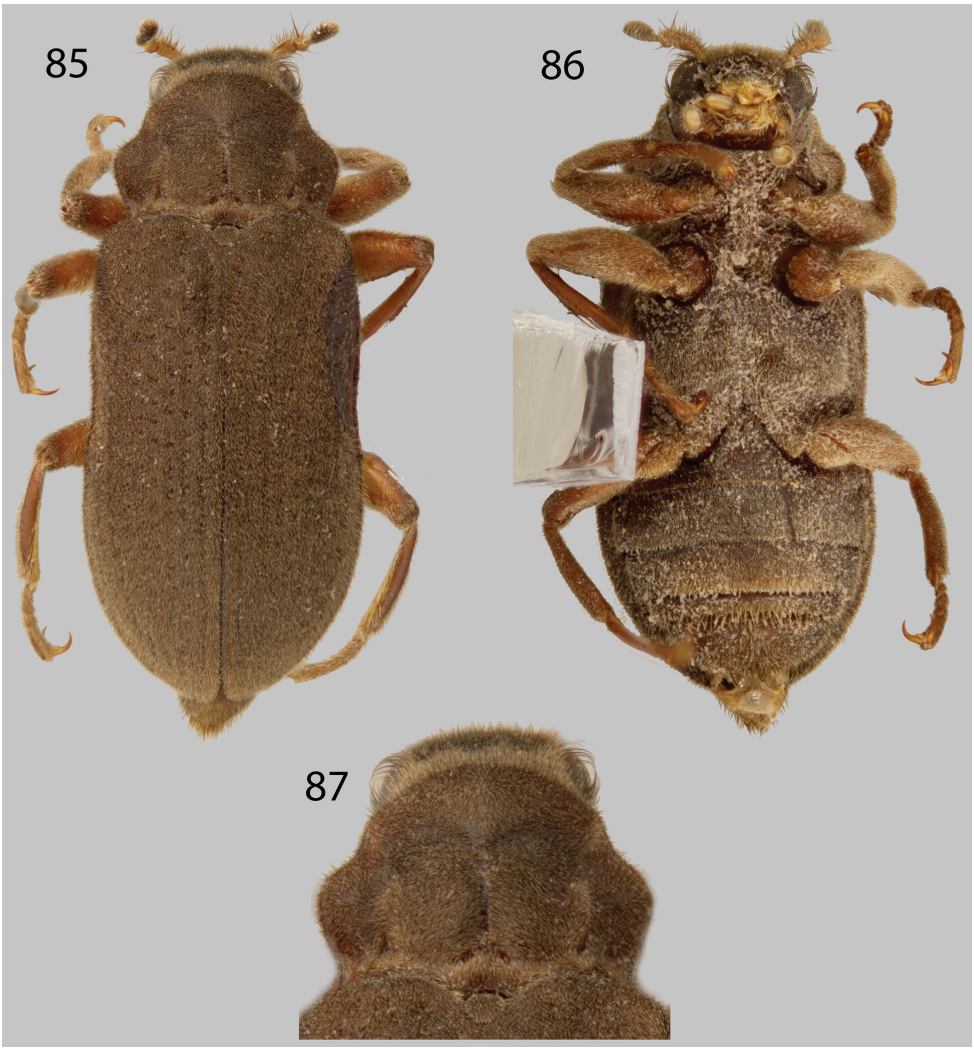
Material examined. PANAMA: Chiriqui: "PANAMA, Chiriqui; Volcan (26km W); 1380 m, small brook; at culvert, 3 June1983" "Collectors; P.J. Spangler; R.A. Faitoute; W.E. Steiner" (1 Holotype USNM). **VENEZUELA: Zulia State:** "VENEZUELA: Zulia; SW of Machiques; 31 XII 05; 435m; 10°03'N, 72°43'W; trib[utary] of Rio Negro" "A.E.Z. Short; P.J. Torres; collectors" (5 specimens SEMC). "VENEZUELA: Zulia State; 10°03.058'N, 72°42.974'W; 435m; Perija National Park; Toromo; 31.xii.2005; leg. A.E.Z. Short; Small stream & seep; AS-06-001" (3 specimens SEMC).

Diagnosis. This species can be distinguished from all other species of *Pharceonus* by its small size (3.1–3.5 mm), dark brown color, genitalia (aedeagus + phallobase) of medium width (4.3× as long as wide), and pronotum with only a shallow transverse impression across apical third (Fig. 87).

Intraspecific variation. This species varies slightly in color, from dark brown to medium brown, and size, from 3.1–3.5 mm.

Distribution and habitat. This species is found on roots in small to medium forested streams, and on roots in seeps in the Sierra de Perija in Venezuela (Fig. 5). This appears to be the southern extent of its range. Outside of Venezuela, this species is known from as far north as Costa Rica. Specimens have been collected in leaf packs and in the benthos in shallow streams.

Associated species. This species was collected at the same sites as following taxa: *Oocyclus* spp., *Anacaena* spp., *Enochrus* spp., *Notionotus* spp., and *Chasmogenus* spp. (Hydrophilidae), and Hydraenidae.



Figures 85–87. *Pharceonus volcanus*: **85** Dorsal habitus **86** Ventral habitus **87** Pronotum, dorsal view.

Potamophilops Grouvelle, 1896

http://species-id.net/wiki/Potamophilops
Figs 1, 88, 89, 90, 91, 92

Diagnosis. The genus *Potamophilops* can be distinguished from all other New World laraine genera by its large size (>5.8 mm), the absence of an accessory elytral stria (Fig. 88), and the presence of a deep, transverse impression on the anterior third of the pronotum (Fig. 91).

Distribution. *Potamophilops* has been recorded from as far south as northern Argentina, Mato Grosso and São Paulo States, Brazil (Spangler and Santiago-Fragoso 1987;

Vanin and Costa 2011), and Paraguay (USNM, pers. obs.) (*P. cinereus*), and from as far north as Taquaruçú, Tocantins state, Brazil (*P. bragaorum* Fernandes & Hamada, 2012). Here I report the first records of *Potamophilops* from Venezuela (Fig. 1).

Habitat. Fernandes and Hamada report *Potamophilops bragaorum* from a small mountainous stream in the Cerrado of Brazil. They were collected in cascades, on submerged logs, and on riparian vegetation, similar to *Disersus* spp. and *Pseudodisersus* spp. (Fernandes and Hamada 2012).

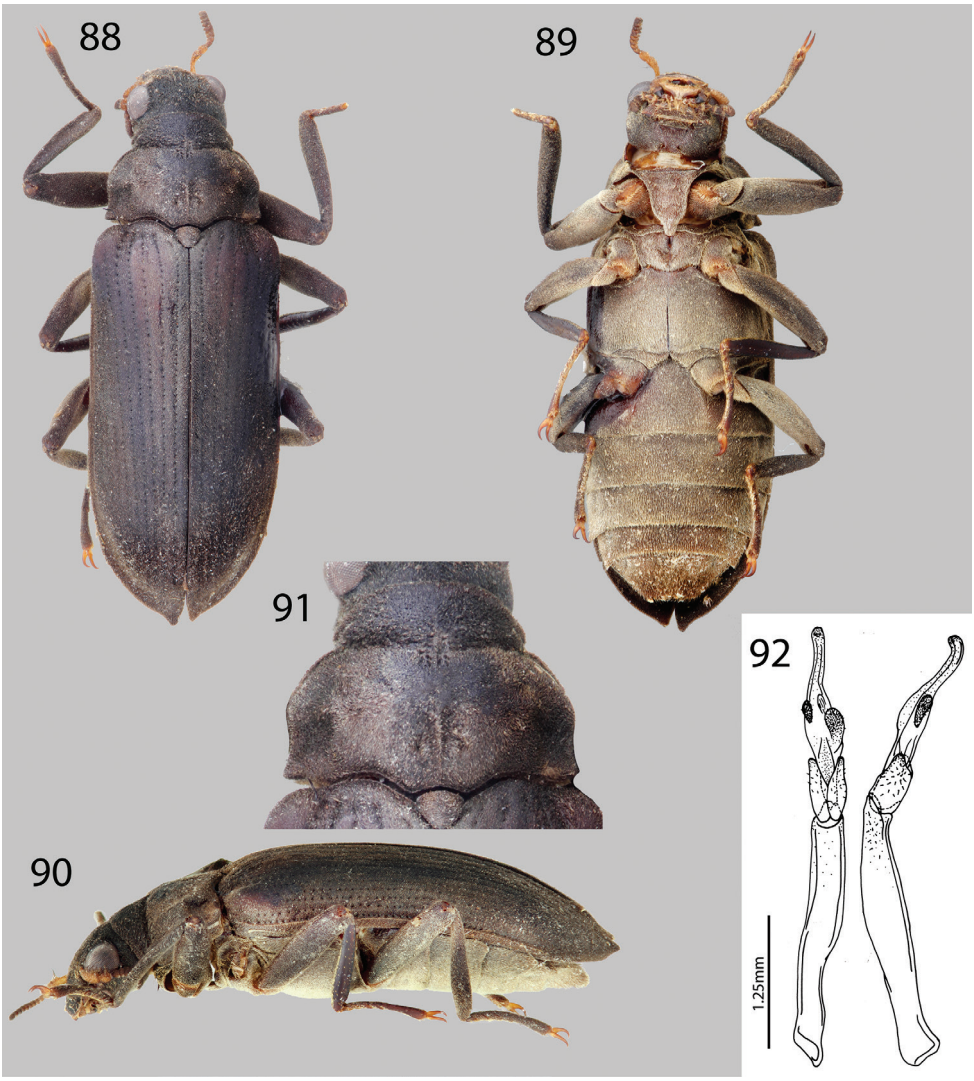
***Potamophilops bostrychophallus* sp. n.**
http://zoobank.org/B8F60D69-9871-4C87-9790-495791444BFE
http://species-id.net/wiki/Potamophilops_bostrychophallus
Figs 1, 88, 89, 90, 91, 92

Type material. Holotype Male. "Venezuela, Bo-; livar, Kanara-; kuni 450m; 4-II-1967" "F. Fernandez Y; A.D. Asco". Holotype deposited in MIZA. **Paratypes (37): VENEZUELA: Bolívar State:** "Venezuela, Bolívar; El Bochincho Res.; Forestal Imataca; 200m, 6–13-XII-74" "Expedicion Instituto; Zoologia Agricola; Fac. Agronomia; U.C.V." (7 specimens MIZA). "El Playon; Rio Caura; Venezuela, Boli-; var [Bolívar State]. 140m; 23-XI-1978" "B. Bechyne leg." (1 specimen MIZA). "El Playon; Rio Caura; Venezuela, Boli-; var [Bolívar State]. 100m; 8–10-XI-1978" "E. Osuna; J. Clavijo leg." (1 specimen MIZA). "Venezuela, Bo-; livar, Kanara-; kuni 450m; 3-II-1967" "F. Fernandez Y; A.D. Asco" (1 specimen MIZA). "VENEZUELA Bolívar; cr. San Rafael de Pendare; 06°06'27"N – 67°05'34"W; 17-vi-2000 M. Gaiani; P.; Freytag; Q. Arias" (1 specimen MIZA). "Venezuela- Boli-; var." "El Bochinche; Res. Forestal; Imataca 200m; 16–18-V-85" "Exp. Instituto; Zool. Agricola" (1 Specimen MIZA). "Venezuela – Bolívar; Rio Caura; Salto Para; Via Playon; 23-X-78" "B. Bechyne; leg." (2 specimens MIZA). "VENEZUELA, Bolivar; Rio Caura, El Playon env.; 06°19´33,2´´ N, 064°31´37,3´´ W, 27.11.2011; Čiamporová-Zaťovičová & Čiampor Jr lgt." (23 specimens FCC). Paratypes will be deposited in: 1 in MALUZ, 2 in USNM, 2 in SEMC, 9 in MIZA, 23 FCC.

Diagnosis. This species can be distinguished from all other species of *Potamophilops* by the following combination of characters: its small size (<6.8 mm TL); the presence of distinct but subtle postmetacoxal carinae (Fig. 89); and the distinctive aedeagus, with a curled apex (Fig. 92).

Description. Elongate, subparallel, moderately convex dorsally (Fig. 88). Length, 6.1 mm; width, 2.2 mm. Black dorsally; antennomeres I and II testaceous; antennomeres II–XI black. Ventral surface black except maxillary palpomeres I and II, labial palpi, labium, maxillae, coxae, trochanters, bases of femora, tarsal claws, and a small area behind each metacoxa on first abdominal ventrite light brown; mesotibiae medium reddish-brown (Fig. 89).

Head finely, densely punctate; punctures separated by distance equal to about half their diameter. Eyes large, hemispherical. Clypeus shallowly arcuately emarginate ante-



Figures 88–92. *Potamophilops bostrychophallus* sp. n.: **88** Dorsal habitus **89** Ventral habitus **90** Lateral habitus **91** Pronotum, dorsal view **92** Aedeagus, dorsal and lateral views.

riorly. Labrum, especially on anterior half, densely punctate; anterior margin shallowly and broadly emarginate, and densely fringed with long, fine, golden, hair-like setae; anterolateral angles rounded and greatly expanded laterally.

Pronotum widest at base; length, 1.5 mm; width, 1.7 mm; sides arcuate; anterolateral angles obtuse, with distinct constriction posterolaterally of each angle resulting from deep transverse impression across apical third of pronotum (Fig. 91); apex arcuate; base strongly bisinuate; with a shallow fovea on each side of midline a short distance in front of scutellum; posterolateral angles obtuse; with a deep, broad de-

pression adjacent to each angle, angled reflexed dorsally; surface with deep transverse impression across apical third; midline convex behind transverse impression (Fig. 91); discal area finely densely punctate, punctures separated by a distance equal to or less than their diameter.

Prosternum very short in front of procoxae. Prosternal process wide, elongate, apex with median process extending posteriorly further than sides (Fig. 89). Mesoventrite with moderately deep U-shaped depression for reception of apex of prosternal process. Metaventrite convex on each side of midline, depressed, with a glabrous line posteromedially between metacoxae (Fig. 89); surface microreticulate and punctate; punctures on convex surface fine and dense, separated by a distance equal to or less than their diameter; punctures sparser laterally.

Legs long and slender. Procoxae and metacoxae moderately widely separated; mesocoxae slightly more widely separated (Fig. 89). Mesotibiae entirely glabrous, except a very narrow strip on medial (lower) surface, with sparse coarse punctures (Fig. 90). Metatibia covered with dense pubescence. Tarsal claws long and stout.

Elytron with 10 rows of fine, nearly confluent punctures, punctures separated by a distance less than their diameter; intervals finely densely punctate, punctures separated by distance about equal to their diameter and obscured by dense pubescence; humeral area strongly tumid; sides of elytra distinctly margined and almost parallel; apex slightly dehiscent, evenly arcuate laterally and terminating in a pointed, upturned apex (Fig. 88).

Metaventrite and first abdominal ventrite broadly and moderately impressed. First abdominal ventrite with distinct, but poorly defined carinae between metacoxae (less so than in other genera) (Fig. 89); carinae and exceeding hind margin of metacoxal cavities. Apicomedial margin of last ventrite moderately emarginate. Aedeagus distinct, with strongly curled apex; parameres with sparse setae (Fig. 92).

Female. Similar to male except last abdominal ventrite is subtruncate and the elytral apices are slightly more produced and elongate than in the male.

Intraspecific variation. This species varies slightly in color from dark brown to black and size, (6.0 mm–6.8 mm).

Etymology. This species is named "*bostrychophallus*" meaning "curly phallus", which refers to the curled apex of the aedeagus (Fig. 92).

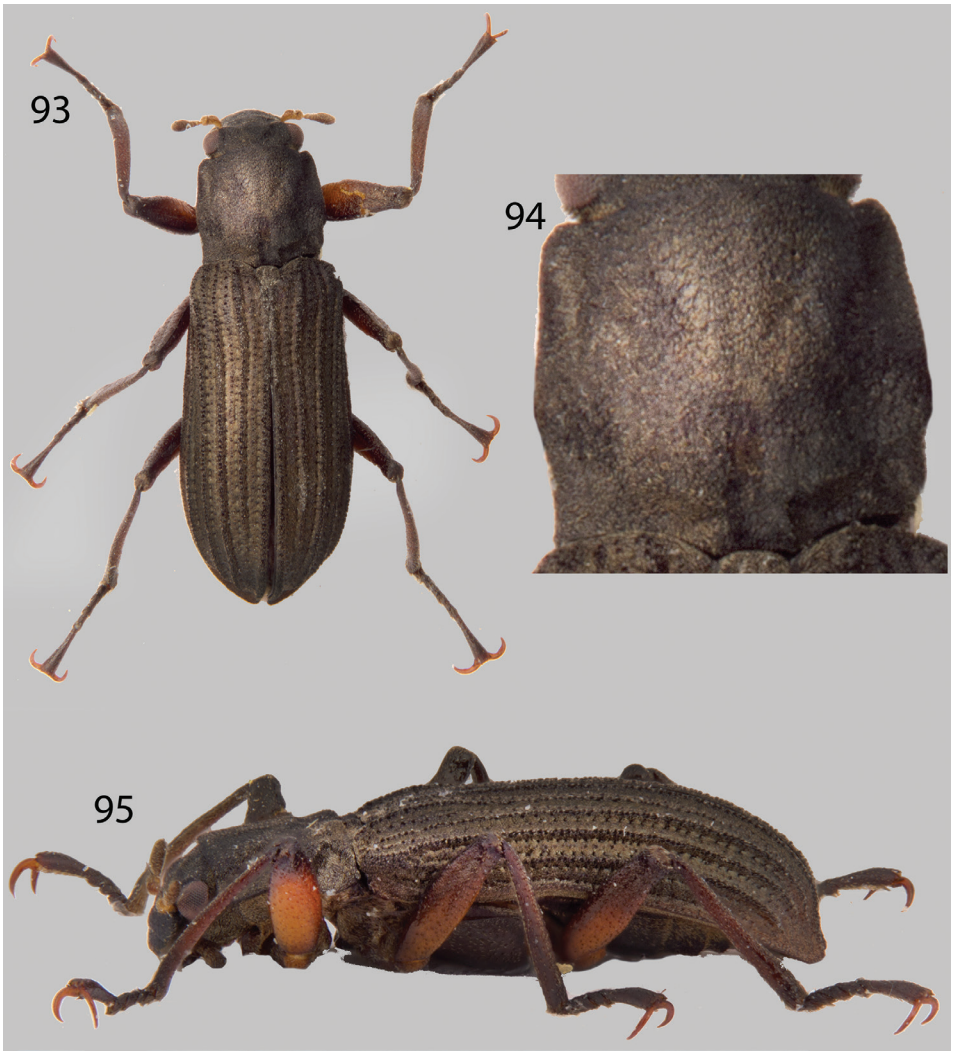
Distribution and habitat. This species has been found in rivers at lower elevations (<500m) throughout the Guiana Shield region in Venezuela, and presumably occurs in northern Brazil and Western Guyana as well (Fig. 1).

Associated species. This species has been found in association with *Lutrochus cauraensis* (Lutrochidae) at Kanarakuni, Venezuela (Maier and Short 2013).

Roraima **Kodada & Jäch, 1999**

http://species-id.net/wiki/Roraima
Figs 2, 93, 94, 95

Diagnosis. *Roraima* is a monotypic genus. See species diagnosis.



Figures 93–95. *Roraima carinata*: **93** Dorsal habitus **94** Pronotum, dorsal view **95** Lateral habitus.

Distribution. *Roraima* is known only from the type locality on Mount Roraima in Bolívar State, Venezuela (Fig. 2).

Habitat. See species account for habitat information.

***Roraima carinata* Kodada & Jäch, 1999**
http://species-id.net/wiki/Roraima_carinata
Figs 2, 93, 94, 95

For complete species description and genitalia illustrations see Kodada and Jäch 1999.

Material examined. "SE-Venezuela, Bolívar state, Mt. Roraima; the stream below the waterfall on the south-west face of the Mt. Roraima; which crosses a tourist pathway to Mt. Roraima plateau; ca. 2000 m a.s.l, 3. Feb. 1999" (1 Holotype, NMW).

Diagnosis. This species can be distinguished from all other laraine Elmidae in South America by its large size and distinctive appearance. *Roraima carinata* is the only laraine species larger than 5.0 mm that possesses strongly carinate elytra (Fig. 93) and strongly clubbed antennae. Additionally, the shape of the pronotum is distinct among the Larainae (Fig. 94). The only other species that has carinate elytra is *Hexanchorus leleupi* Delève, and that species is smaller than 5.0 mm and has filiform antennae.

Intraspecific variation. *Roraima carinata* varies in length from 5.1–5.2 mm and slightly in color.

Distribution and habitat. This species is known only from the high elevation type locality. Kodada and Jäch (1999) reported that the aquatic samples which included this species came from a small (ca. 1 m wide) shaded stream with a gravel substrate crossing the tourist path on the southwestern slope of Mount Roraima, in Bolívar State, Venezuela (Fig. 2).

Associated species. The unusual species *Neblinagena doyeli* was found near the *Roraima carinata* collection site, but at a lower elevation.

Key to the Species of Adult Larainae of Venezuela (Modified from Brown 1981)

1	Body size smaller, length 2.5 to 5.1 mm	**2**
1'	Body size larger, length 5.2 to 10.1 mm	**16**
2 (1)	Ventral surface covered with a thick, silvery mat of setae (Fig. 63); elytra with deep and nearly convergent punctures; antennae clubbed (Fig. 62)	***Phanoceroides* sp. 1**
2'	Ventral surface setose (Fig. 19), but never with a thick silvery mat of setae; elytra with fine punctures; antennae variable	**3**
3 (2')	Pronotum with a deep transverse groove across apical third; body length longer (2.8–5.1 mm) (Fig. 83)	**8**
3'	Pronotum without a transverse groove, or with a shallow, wide, V-shaped groove across apical third; body length shorter (less than 4.5 mm) (Fig. 74)	**4**
4 (3')	Pronotum with a shallow, wide, V-shaped groove across apical third (Fig. 53); southern Venezuela ***Hypsilara*** Maier & Spangler, 2011	**5**
4'	Pronotum without a transverse groove (Fig. 71). Texas (USA), south to Peru; Greater Antilles; ***Phanocerus*** Sharp, 1882	**6**
5 (4)	Elytral apices produced; body size small (TL 3.9–4.2 mm); phallobase ca. 0.6× as long as median lobe; parameres short, ca. 0.67× as long as median lobe	***Hypsilara breweri* Čiampor et al., 2013**
5'	Elytral apices rounded; body size large (TL 4.2–4.5 mm); phallobase ca. 0.45× as long as median lobe; parameres long, ca. 0.85x as long as median lobe	***Hypsilara royi* Maier & Spangler, 2011**

6 (4') Pronotum with narrow anterolateral angles, angles not explanate (Fig. 68) ... . ***Phanocerus clavicornis*** **Sharp, 1882**

6' Pronotum with wide anterolateral angles, angles are explanate (Fig. 71) **7**

7 (6') Body size large, length 3.0–3.5 mm; reddish in color; pronotum 1.6x as wide as long (Fig. 74); mesotibia of male with short setose patch basally (Fig. 75) .. .. ***Phanocerus rufus*** **sp. n.**

7' Body size smaller, length 2.1–2.5 mm; brown in color, pronotum 1.4× as wide as long (Fig. 71); mesotibia of the male with long setose patch basally (Fig. 69)..... ***Phanocerus congener*** **Grouvelle, 1898**

8 (3) Pronotum with a median groove and without small prescutellar foveae; anterolateral angles of pronotum rounded (Fig. 83); Costa Rica, south to Venezuela; ***Pharceonus*** Spangler & Santiago-Fragoso, 1992..... **9**

8' Pronotum without a median groove and with two small prescutellar foveae; anterolateral angles of pronotum declivous (Fig. 27); Mexico, south to Peru and West Indies; ***Hexanchorus*** Sharp, 1882..... **11**

9 (8) Body size small, length less than 3.5 mm; color dark brown (Fig. 85); pronotum with weak bisinuate anterior transverse groove (Fig. 87); male genitalia (aedeagus + phallobase) of medium width (4.3× as long as wide) .... ***Pharceonus volcanus*** **Spangler & Santiago-Fragoso, 1992**

9' Body size large, length greater than 3.5 mm; color dark brown to reddish-brown (Fig. 81); pronotum with strong or weak bisinuate anterior transverse groove (Fig. 83); male genitalia variable..... **10**

10 (9') Color dark brown; male genitalia (aedeagus + phallobase) narrow (6x as long as wide) (Fig. 80); pronotum with only a shallow bisinuate transverse impression across apical third (Fig. 77) ..... ***Pharceonus ariasi*** **sp. n.**

10' Color reddish-brown; male genitalia (aedeagus + phallobase) wide (3.7× as long as wide) (Fig. 84); pronotum with a deep and strongly bisinuate transverse impression across apical third (Fig. 83)..... ***Pharceonus grandis*** **sp. n.**

11 (8') Dorsal habitus with iridescent setae, making the dorsum appear to have a green-gold sheen (Fig. 48) **12**

11' Dorsal habitus lacking iridescent setae (Fig. 37); dorsum setose, but setae lacking iridescent sheen..... **13**

12 (11) Pronotum with postero-median depression (Fig. 27); mesotibia with short basal pubescent patch, parameres of aedeagus wide .... ***Hexanchorus dentitibialis*** **sp. n.**

12' Pronotum without distinct postero-median depression (Fig. 48); metatibia with long basal pubescent patch..... ..... ***Hexanchorus mcdiarmidi*** **Spangler & Staines, 2003**

13 (11') Posterior margin of penultimate abdominal ventrite of female with median projection (Fig. 40); aedeagus with parameres long, ca. 0.75–0.80× as long as median lobe (Figure 42) **14**

13' Posterior margin of penultimate abdominal ventrite of female straight, lacking median projection (Fig. 35); aedeagus with parameres short, ca. 0.55–0.65× as long as median lobe (Figure 36) **15**

14 (13) Elytra appearing swollen posteriorly in lateral view (Fig. 45); antennae distinctly filiform (Fig. 44); postero-median impression of pronotum strongly impressed..... ***Hexanchorus inflatus*** **sp. n.**

14' Elytra not appearing swollen in lateral view (Fig. 39); antennae serrate or weakly clubbed; postero-median impression of pronotum absent or weakly impressed (Fig. 41) ..... ***Hexanchorus homaeotarsoides*** **sp. n.**

15 (13') Scutellum convex in lateral aspect; elytral apices of female extended to a long point apically (moderately so in both sexes) (Fig. 28); aedeagus with "can-opener" notch at apex (Fig. 31)..... ***Hexanchorus falconensis*** **sp. n.**

15' Scutellum flat in lateral aspect; elytral apices of female not extended to a long point apically (Fig. 35); aedeagus with simple apex (Fig. 36) .... ***Hexanchorus flintorum*** **sp. n.**

16 (1') Elytron with distinct longitudinal carinae (Fig. 93). Southern Venezuela .... ***Roraima carinata*** **Kodada & Jäch, 1999**

16' Elytron without distinct longitudinal carinae (Fig. 13) **17**

17 (16') Pronotum with a distinct transverse groove across apical third..... **20**

17' Pronotum without a transverse groove across apical third (Fig. 21). Costa Rica, south to Peru; *Disersus* Sharp, 1882 ..... **18**

18 (17') Protibiae of male with dense patch of long, curly setae (Fig. 17) .... ***Disersus dasycolus*** **Spangler & Santiago-Fragoso, 1992**

18' Protibiae of male with short, flat setae, similar to setation on entire body (Fig. 10)..... **19**

19 (18') Metatibiae of male nearly entirely glabrous, sometimes with a small patch of setae basally (Fig. 12)..... ..... ***Disersus chibcha*** **Spangler & Santiago-Fragoso, 1987**

19' Metatibiae of male almost entirely pubescent, with a small glabrous patch apically (Fig. 22)..... ***Disersus inca*** **Spangler & Santiago-Fragoso, 1992**

20 (17) Pronotum with a lateral longitudinal carina or arcuate-sinuate groove on basal third; Pronotum with two short, converging, prescutellar carinae, each with a deep pit laterally (Fig 57); *Neblinagena* Spangler, 1985 ..... **21**

20' Pronotum without a carina or arcuate-sinuate groove on basal third (Fig. 91)..... ***Potamophilops bostrychophallus*** **sp. n.**

21 (20) Pronotum with two prescutellar mammiform tubercles at base and one similar tubercle near each posterolateral angle, thus appearing bidentate (Fig. 61). Venezuela..... ***Neblinagena prima*** **Spangler, 1985**

21' Pronotum with two short, converging, prescutellar carinae, each with a deep pit laterally (Fig. 57). Venezuela .... ***Neblinagena doyeli*** **Kodada & Jäch, 1999**

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