

Three new endogean species of *Laparocerus* Schönherr, 1834 from the Canary Islands (Coleoptera, Curculionidae)

Antonio Machado*

La Laguna, Tenerife, Canary Islands, Spain

(Received 10 March 2007; final version received 25 January 2008)

Three new species of the weevil genus *Laparocerus* Schönherr (1834) adapted to the edaphic environment of the Canary Islands are described: *L. edaphicus* n. sp., *L. oromii* n. sp. and *L. lopezi* n. sp. They live in the humid laurel forests of Tenerife (Anaga Mountains), La Gomera (Garajonay National Park) and Gran Canaria (Valsendero), respectively. The small size and somewhat tubular body shape is a common character among them, as is the reduction of the eyes, which are totally absent in *L. oromii* n. sp. Despite these common adaptive traits, the three species seem not to be directly related. A key for the identification of all the known cryptozoic (edaphic and troglobitic) species of *Laparocerus* is provided.

Keywords: Curculionidae; Entiminae; *Laparocerus*; Canary Islands; new species

Introduction

Adults of species of the genus *Laparocerus* Schönherr, 1834 are commonly nocturnal leaf-eaters, and climb the vegetation for feeding. Very few dwell in the leaf litter (e.g. *Laparocerus distortus* (Woll. 1854)), but three large blind species (>10 mm) are known from lava tubes and the MSS (“mesocavernous shallow substratum”, Culver 2001) in the island of La Palma: *L. zarazagai* García et Oromí, 1997, *L. dacilae* García, 1998 and *L. machadoi* García et González, 2006. These three troglobitic species are closely related and belong to the group of *L. sculptus* (Brullé, 1839), which has copiously radiated within the island of La Palma (unpublished DNA data). Until now, no true edaphic species of *Laparocerus* have been described. The three new species proposed here are each from a different island – Tenerife, La Gomera and Gran Canaria – living in the soil of humid laurel forests. They have some common adaptive traits, but they are not directly related, having presumably derived from different surface-living *Laparocerus* species of their respective islands. DNA analysis would help to solve this question, but it has been achieved only for *L. oromii* n. sp. and the results will be presented in future contributions focussing on the DNA phylogeny of the whole group.

Materials and methods

This study is based on 26 specimens provided by different colleagues. They have been occasionally collected below stones or shifting forest leaf litter, but mainly with deep pitfall traps or by washing earth sampled in the rhizosphere of trees in rather humid places. Edaphic species are usually difficult to locate. In the case of *L. lopezi* n. sp.

*Email: antonio.machado@telefonica.net

only a single female has been found during the three years in which the traps were installed. Earth washing on the spot did not produce results either.

The abbreviations used for the various collections are the following:

AAC	Agustín Aguiar Clavijo, private collection. La Laguna, Spain.
AMC	Antonio Machado Carrillo, private collection. La Laguna, Spain.
CG	Christoph German, private collection. Hinterkapellen, Switzerland.
DEI	Deutsches Entomologisches Institut. Müncheberg, Germany.
POM	Pedro Oromí Masoliver, private collection. La Laguna, Spain.
NMW	Naturhistorisches Museum Wien. Vienna, Austria.
PS	Peter Stüben, private collection. Mönchengladbach, Germany.
RGB	Rafael García Becerra, private collection. S/C de la Palma, Spain.
TFMC	Museo de Ciencias Naturales. Santa Cruz de Tenerife, Spain.
ZMUH	Zoological Museum, University of Helsinki, Finland.
ZMUL	Zoological Museum, University of Lund, Sweden.

Holotypes are deposited in the Natural History Museum of Santa Cruz de Tenerife (TFMC). Dissections were made according to standard entomological techniques and drawings using a camera lucida attached to a microscope. Measurements were taken with a stereoscopic microscope provided with a micrometer. Sizes of specimens were measured without rostrum. Symbols L, W and H refer to length, width and height, respectively. Eye convexity is expressed here as the percentage of a theoretical complete ellipsoid or globe emerging from the profile of the head; thus 50% would mean a hemispheric protruding eye, 10% a fairly flat eye. Abdominal transverse convexity is obtained by dividing the maximum height of the abdomen by its maximum width (expressed as percentage).

The term prorostrum (Damoiseau 1967) refers to the anterior and dorsal portion of the rostrum delimited by the line where the apical declivity usually starts, just behind the level of insertion of the antennae; the metarostrum is the posterior portion.

Results

Laparocerus edaphicus n. sp. (Figures 1 and 2)

Measurements of holotype (♂)

Length. Total 4.35 mm, head 0.88 mm, rostrum 0.44 mm, scape 0.86 mm, funicle 0.78 mm, articles (1st/2nd/3rd/4th) 0.20/0.20/0.09/0.10 mm, club 0.36 mm, eyes 0.20, pronotum 1.00 mm, elytra 2.95 mm, tibiae (pro-/meso-/meta-) 0.98/0.88/1.08 mm.

Width. Head (at eye level) 0.56 mm, frons 0.36 mm, rostrum (with pterygia) 0.52 mm, rostrum (minimum dorsal/ventral) 0.28/0.46 mm, rostrum (base) 0.38 mm, scape 0.12 mm, club 0.18 mm, pronotum (anterior/maximum/posterior) 0.84/1.18/1.04 mm and elytra (maximum) 1.65 mm.

Height. Abdomen 1.20 mm.

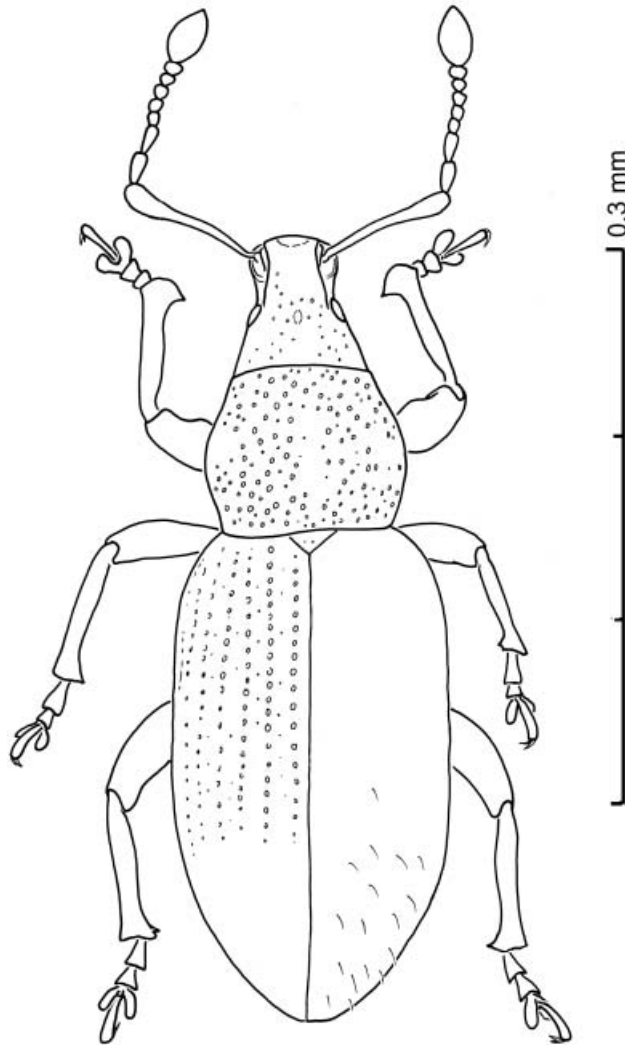


Figure 1. Male of *Laparocerus edaphicus* n. sp.

Description of male

A small fusiform *Laparocerus* (length without rostrum: 3.9–4.3 mm); colour piceous-brown with legs lighter and more reddish. Integument shiny, conspicuously punctured, devoid of scales cover, with inconspicuous flavescent pilosity. Antennae short, robust: scape shorter than length of pronotum, slightly sinuate, capitate at apical third; funicle shorter than scape, article 1–2 equal, 3–7 short, subglobular (5–7 slightly transverse); club very thick, longer than the three previous articles combined. Head cone-shaped, with broad pregenae; eyes small, flattened (convexity=10%), situated near border of frons, $0.55 \times$ as long as frons width (Figure 2E). Rostrum longer than broad, constricted before insertion of antennae, clearly narrower dorsally than ventrally, pregenae robust and conspicuous; pterygia

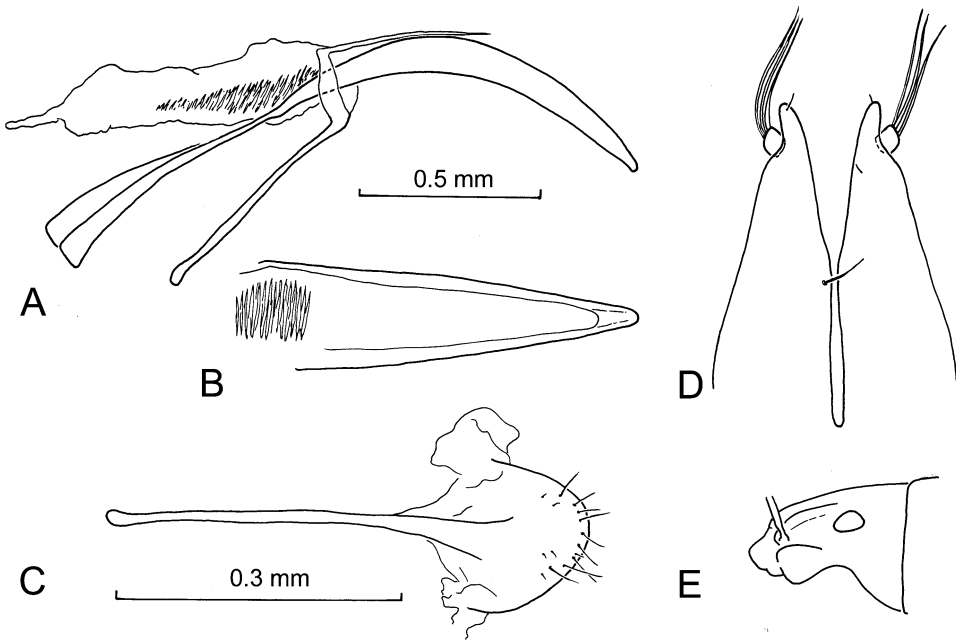


Figure 2. *Laparocerus edaphicus* n. sp. (A) Aedeagus, (B) apex of aedeagus, (C) female sternite VIII, (D) hemisternites of ovipositor, (E) head in lateral view.

salient; pronotum convergent apicad, without punctures (base of antennae completely exposed); epistomal keel complete; metarostrum slightly V-canalicate; frontal fovea rhombiform and short; dorsal integument isodiametrically micro-reticulate, with separate irregular punctures (excluded vertex, almost smooth) beset with small hairy scales. Pronotum slightly transverse ($L/W=0.84$), $0.34 \times$ length of elytra, sides moderately curved, widest at middle, narrower anteriorly, not rimmed at base; integument shiny with very conspicuous large foveiform punctures and some micro-punctures, distributed separately and irregularly, more dense on flanks; large punctures beset with a thin hairy scale (if not abraded); median line vague, a smooth area devoid of punctures laterally on disc. Scutellum small, broad-triangular, punctured. Elytra oblong-elongate ($L/W=1.8$) subparallel or smoothly curved; disc moderately flattened; base almost as broad as base of pronotum (no humeral callus); striae heavily marked by large foveiform punctures (as big as on pronotum), shallower in apical third; intervals subconvex, with some conspicuous foveiform smaller punctures beset of emergent short flavescent setae pointing backwards (longer and more noticeable in apical third); integument smooth, shiny, at disc with shallow separate transversal irregular marks, at base somewhat corrugated. Ventral parts: mesosternal declivity less pronounced; inter-mesocoxal process, broad and short, less elevated; integument sub-nitid with shallow large separate punctures (including coxae); pilosity dispersed and short. Last ventrite slightly truncated. Abdominal convexity 72%. Legs robust; protibiae straight, externally keeled, slightly scooped internally, fan-like at apex (hardly expanded externally and much internally), with very strong mucro. Meso- and metatibiae with strong but shorter mucro; pilosity longer and more dense on apical outer half. Genitalia (Figures 2A–

B). Aedeagus uniformly and smoothly curved, progressively narrowing apicad, tip straight. Internal sac short, with a median large field of teeth.

Description of female

Length without rostrum: 3.7–4.6 mm. Same as male, but slightly broader and elytra laterally more curved; shoulders slightly marked. Transverse marks on elytral integument more noticeable. Preapical internal sinuosity of protibiae less developed; pro- and mesomucro short, acute (metatibiae unarmed). Last ventrite round-ended. Styli of ovipositor very short, not reaching tip of valves (Figure 2D). Sternite VIII (Figure 2C).

Etymology

The name of the species, derived from the Greek “*edaphos*”=the soil or ground, is a Latinized adjective and refers to the soil living habits of the insect.

Diagnostic remarks

Laparocerus edaphicus n. sp. is easy to recognize by its small size, fusiform-shape with conspicuous pregenae, small flattened eyes, very shiny piceous and heavily punctured (all over) integument devoid of scale cover, scarce pilosity and anterior tibiae with outer apical angle not obtusely rounded and a very robust mucro in its inner side. The short raised apex of the median lobe of the aedeagus is also very characteristic. For differences with the other known edaphic species of *Laparocerus* see the key at the end of the current paper.

Material examined

Holotype. Tenerife: Anaga, Bco. de Ijuana, 1 ♂ 8-11-1986 leg. R. García (TFMC, reg. CO-15537).

Paratypes. Tenerife: Same locality (UTM 28R 038563 315973) 1 ♂ 3-2-2008 1 ♂ 25-3-2007 leg. A. Machado (AMC); Punta de Anaga, 1 ex 12-6-1960 leg. J.M. Fernández (TFMC); Montes de Anaga, 1 ♀ 25-3-1973 J. Bonnet leg. (RGB); Bco. Ijuana, 1 ♀ 29-9-1986 leg. A. Aguiar (AAC), same locality without date, 1 ♂ 1 ♀ leg. H. Franz (NMW). Anaga, Anambro, 2 ♂ 1 ♀ 4-2-1977 leg. T. Palm (2 ZMUL, 1 AMC); Anaga, NE Chinobre 860 m, 2 ♀ 12-1995/1-1996 leg. L. Zerche (DEI, AMC), idem. 1 ♂ leg. A. Puchner (DEI); Anaga, E Chinobre 700-800 m 1 ♀ inmat. 24-11-1996 leg. Schülke & Günberg (DEI).

Non-paratypes. Tenerife: Vueltas de Taganana, 1 ♀ 21-1-1996 leg. A. Aguiar (AAC).

Distribution and ecology

Laparocerus edaphicus n. sp. is endemic to the island of Tenerife, having being found only in the old northeastern region of Anaga. It lives underground (ca. 30–50 cm) in the damp laurel forests that cover the mountain ridge (700–800 m), but can also be sieved from the leaf litter (under ferns) and occurs occasionally under stones. It presumably feeds on roots or decaying leaves.

Laparocerus oromii n.sp.
(Figures 3 and 4)

Measurements of holotype (♂)

Length. Total 3.10 mm, head 0.70 mm, rostrum 0.36 mm, scape 0.59 mm, funicle 0.64 mm, articles (1st/2nd/3rd/4th) 0.16/0.12/0.07/0.07 mm, club 0.31 mm, eyes 0.13, pronotum 0.74 mm, elytra 2.10 mm, tibiae (pro-/meso-/meta-) 0.58/0.74/0.66 mm.

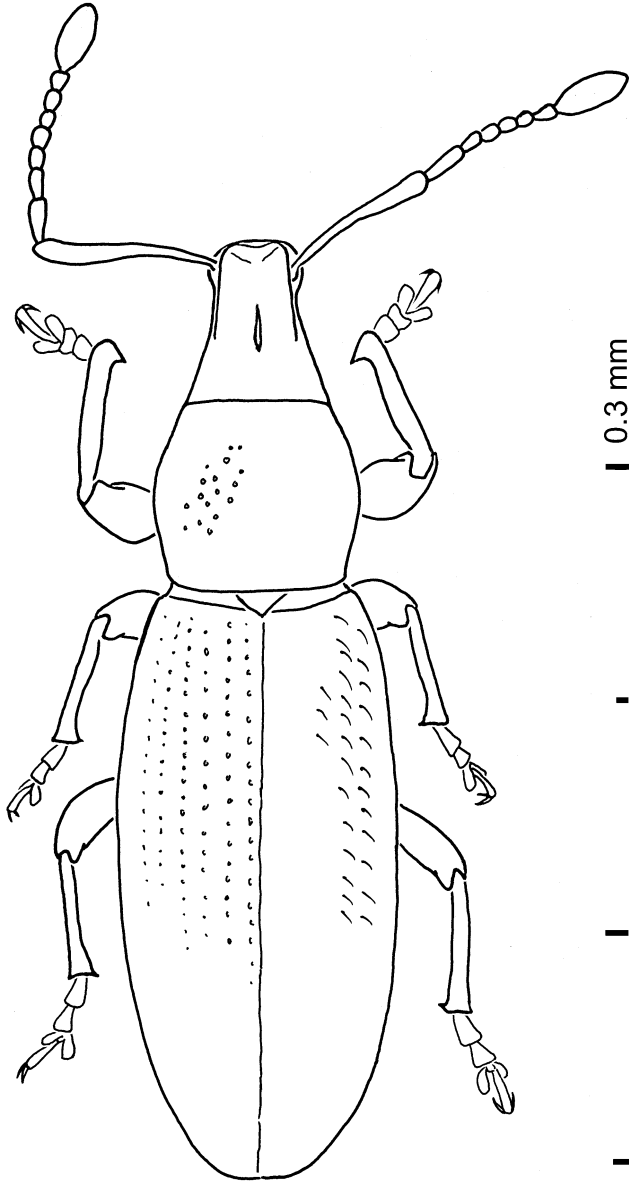


Figure 3. Male of *Laparocerus oromii* n. sp.

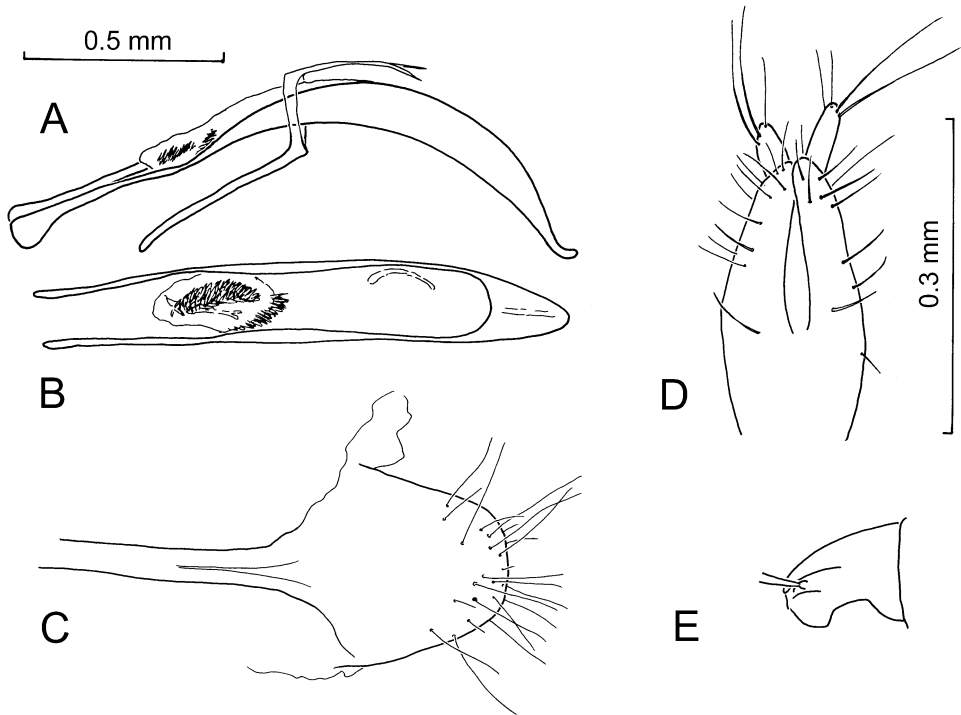


Figure 4. *Laparocerus oromii* n. sp. (A) Aedeagus, (B) apex of aedeagus, (C) female sternite VIII, (D) hemisternites of ovipositor, (E) head in lateral view.

Width. Head (at eye level) 0.44 mm, frons 0.34 mm, rostrum (with pterygia) 0.38 mm, rostrum (minimum dorsal/ventral) 0.26/0.33 mm, rostrum (base) 0.32 mm, scape 0.09 mm, club 0.13 mm, pronotum (anterior/maximum/posterior) 0.58/0.76/0.66 mm and elytra (maximum) 1.10 mm.

Height. Abdomen 0.72 mm.

Description of male

A very small *Laparocerus* (length without rostrum: 2.9–3.2 mm), of oblong-elongate shape. Integument uniformly reddish-brown, brilliant, devoid of scale cover and with dispersed short flavescent pilosity all over. Antennae: scape robust, slightly sinuate at base, a little longer than pronotum, capitate at apex (1/3 of length); funicle longer than scape, first article longer than second, third and fourth short, subglobular; club oval, thick, longer than the three previous articles combined. Head cone-shaped, without eyes (with only a vestigial scar). Rostrum short, subparallel convergent apicad (minimum dorsal width before the insertion of the antennae); prorostrum and epistomal keel badly defined; pterygia large and salient; frontal furrow broad and shallow, extending along whole metarostrium; surface with large separate punctures and small suberect hairy scales, except vertex (almost smooth, shiny). Pronotum almost as long as broad ($L/W=0.95$), $0.33 \times$ length of elytra, sides moderately

curved, widest at middle, not rimmed at base; integument smooth, shiny, with separate foveiform punctures, each beset with a suberect hairy scale; usually a long median impunctate line (slightly cariniform). Scutellum small, acute, smooth with two tiny piliferous punctures. Elytra elongated with rounded apex (L/W=1.9), in profile evenly flattened (like pronotum) and apical declivity short; shoulders obsolete, sides weakly but evenly curved, maximum width at middle. Striae marked by big round punctures, obliterated apicad; intervals flat, shiny, with some irregular wrinkles and rows of emergent short flavescent setae pointing backwards. Ventral parts: mesosternal declivity not pronounced; inter-mesocoxal process poorly developed (often granule-ended); with a wide median fovea at posterior margin of metasternum. Metasternum and first ventrite depressed, with strong transverse wrinkles. Ventrites shiny, with very shallow large separate punctures, pilosity shorter and more disperse. Last ventrite truncated, briefly scoped at middle. Abdominal convexity 65%. Legs short, (tibiae shorter than length of pronotum), protibiae straight, slightly excavated apicad, briefly curved inwards at apex; outer apical angle blunt, inner angle acute, expanded, with a very strong and large mucro. Meso- and metatibiae with strong but shorter mucro. First tarsomere short, transversal. Genitalia (Figures 4A–B). Aedeagus weakly curved, broad apical plate with apex curved upwards. Parameres strongly broadened at end, very short (1/4 of median lobe). Internal sac short, with two median fields of teeth and a y-shaped piece (visible dorsally).

Description of female

Length 2.8–3.5 mm. Same as male, but more elongate (Elytra/pronotum L ratio=3.0× instead of 2.8) and elytra broader, less parallel. Preapical internal sinuosity of protibiae less marked; promucro shorter, meso- and metamucro reduced to a tiny triangular blade. Last ventrite round-ended. Sternite VIII (Figure 4C). Styli of valves long (Figure 4D).

Etymology

The species is dedicated to its discoverer, Dr Pedro Oromí, a good friend and professor of Entomology at the University of La Laguna.

Diagnostic remarks

This is the most morphologically endogean adapted *Laparocerus* and the only known without eyes. Its very small size, linear form, unpigmented integument (ferruginous colour) and extended pilosity are also very characteristic. Although the species has the pro-tibiae externally round at the apex, it is related to the *sculptus-excavatus* group (unpublished DNA data), which has some representatives in the island where it lives.

Material examined

Holotype. La Gomera: El Cedro – Los Acebiños, 940 m (N28°08'20" W17°13'40") 1 ♂ 30-12-2004 leg. P. Stüben (TFMC, reg. CO- 15538).

Paratypes. Same locality and collector, 10 exx (6 PS, 4 AMC); same locality 30-12-2004, leg. Ch. Germann, 7 exx (4 CG, 2 AMC, 1 POM). El Cedro: Reventón Oscuro, 1 ♀ 20-9-2002 leg. P. Oromí (POM), 1 ex 6-9-2003 leg. P. Oromí (AMC, in alcohol).

Distribution and ecology

Laparocerus oromii n. sp. is endemic to the island of La Gomera. It has been collected with traps in the mesocavernous shallow substratum (MSS) and by washing earth with small roots beneath an *Apollonias* tree in Los Acebiños cloud forest, near a small stream. In the latter case several individuals were collected, as well as many dead specimens and remnants. It seems to be a very hygrophilous insect.

***Laparocerus lopezi* n. sp.**
(Figure 5)

Measurements of holotype (♀)

Length. Total 5.8 mm, head 1.10 mm, rostrum 0.50 mm, scape 1.18 mm, funicle 1.18 mm, articles (1st/2nd/3rd/4th) 0.30/0.26/0.12/0.12 mm, club 0.52 mm, eyes 0.28, pronotum 1.24 mm, elytra 4.05 mm, tibiae (pro-/meso-/meta-) 1.26/1.04/1.40 mm.

Width. Head (at eye level) 0.84 mm, frons 0.52 mm, rostrum (with pterygia) 0.64 mm, rostrum (minimum dorsal/ventral) 0.41/0.62 mm, rostrum (base) 0.58 mm, scape 0.11 mm, club 0.14 mm, pronotum (anterior/maximum/posterior) 1.06/1.56/1.40 mm and elytra (maximum) 2.20 mm.

Height. Abdomen 1.70 mm.

Description of holotype (♀)

A smallish *Laparocerus* (length: 5.8 mm), of oblong boat-shape, dorsally quite straight in profile. Integument of chestnut-colour, lighter at elytra shiny, devoid of scales, with some pilosity on elytra. Antennae short; scape not longer than pronotum, almost straight, capitate at apical third; funicle as long as scape, articles 1–2 subequal, 5–7 subglobular; club oval, thick, longer than the three previous articles combined. Head cone-shaped, dorsally straight; eyes small, oval, fairly flattened (convexity=13%), separate from rim of frons; rostrum as long as broad, moderately convergent apicad (minimum dorsal width before the insertion of the antennae); prorostrum not delimited, epistomal keel complete; pterygia slightly salient; metarostrum laterally not keeled; frontal furrow linear, incised, extending only backwards into vertex; surface densely punctured, with some suberect hairy scales. Pronotum slightly transversal (L/W=0.79), 0.30 × length of elytra, sides moderately curved, widest at middle, broader at basal than anterior margin, both slightly concave, not rimmed; disc flattened, with an imprecise shallow small depression on each sides, median line badly defined; surface densely and coarsely punctured, with some disperse larger and deeper punctures (fewer on disc), small

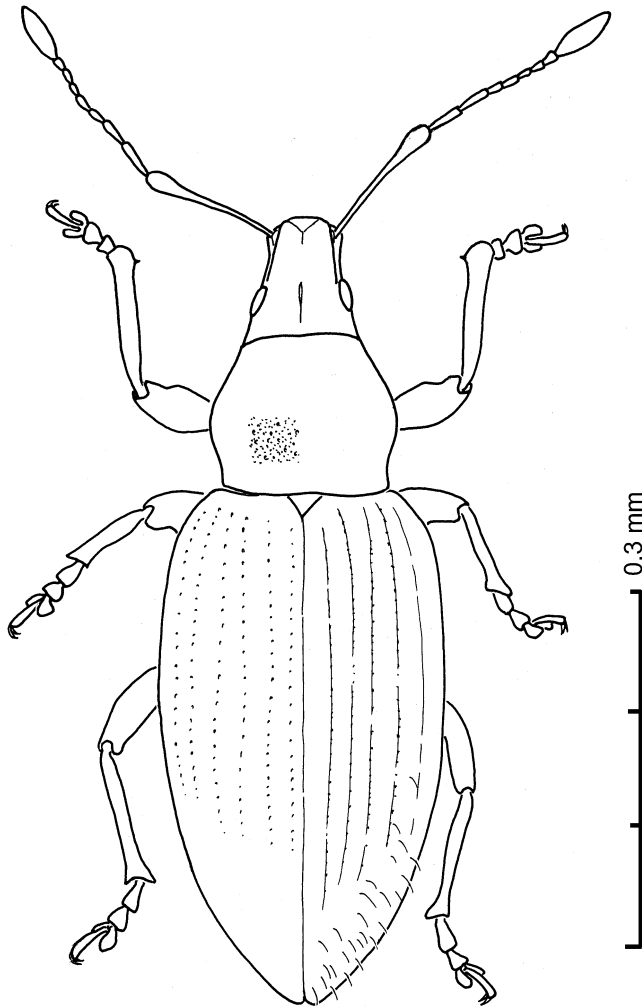


Figure 5. Female of *Laparocerus lopezi* n. sp.

decumbent scales on the flanks (few on disc). Scutellum small, acutely pointed, punctured. Elytra sub-parallel progressively acuminate in apical half, maximum width towards first half, dorsally flattened, apical declivity short (suture slightly keeled); base slightly sinuate, shoulders less marked (7th interval briefly incrassate). Striae incised, with longitudinal moderate punctures, evanescent in second half; intervals subconvex (8th visible from above in first third). Integument shiny with few short decumbent scales (mainly in the flanks), with long and conspicuous hairy-scales in apical third. Ventral parts: inter-mesocoxal process elongated, hardly elevated; integument alutaceous, shallowly punctured, with sparse cover of decumbent scales. Last ventrite apically rounded. Abdominal convexity 77%. Legs: protibiae straight, externally keeled, at apex briefly fan-like expanded, with a small mucro; meso and metatibia broadened at apex, quite hairy in apical half, the latter, without mucro. Tarsomeres narrow.

Etymology

The species is dedicated to my colleague Heriberto López, who discovered the species during an edaphic survey campaign in Gran Canaria.

Diagnostic remarks

From the three species here described, *L. lopezi* n. sp. is the least morphologically adapted to the edaphic environment. Perhaps it inhabits the underground environment (MSS) as well, or preferentially; further material is needed to answer this question. It can be recognized by its navicular shape, small flattened eyes, frontal furrow extending largely on to the vertex, pronotum with shallow dense punctures (double puncturation), elytra (slightly unpigmented) with alutaceous, somewhat microrugose integuments, and emerging setae on their apical third. The rostrum is dorsally narrowed, being narrowest before the level of the insertion of the antennae, while in *Laparocerus* the normal case is to be narrowest just after or at the level of the insertion of the antennae. This trait is shared with *L. oromii* n. sp. Nonetheless, both species seem not to be directly related (differently shaped tibiae) and such a trait may well reflect an adaptive convergence to underground life (more mobility for the antennae?).

Material examined

Holotype. Gran Canaria: Barranco Oscuro (Valsendero), 1 ♀ 4-1-2005, leg. H. López. (TFMC, reg. CO-15539).

Distribution and ecology

Only one specimen from *Laparocerus lopezi* n. sp. is known. It was collected with an underground pitfall trap placed in the MSS in the remnants of laurel forest of Barranco Oscuro. This type of cloud forest once covered the entire north face of the island of Gran Canaria, but is at present, almost extinct.

Key to the cryptozoic species of *Laparocerus* in the Canary Islands

- 1 Eyes absent or reduced, with diameter not longer than first article of funicle and their convexity less than 15%. Endogean or hypogean species 2
- Eyes normally developed, with diameter longer than first article of funicule or convexity over 15%. Species from the surface. . . *Laparocerus* spp. (not keyed)

- 2 Eyes with at least 40 ommatidia 3
- Eyes absent or with less than 40 ommatidia 4

- 3 Frontal fovea rhombiform, short, not prolonged backwards into vertex. Pronotum and elytra with large foveiform punctures on shiny integument. Tenerife *L. edaphicus* n. sp.
- Frontal fovea lineal, extending backwards into vertex. Pronotum and elytra with shallow punctures on subnitid microrugose integuments. Gran Canaria. *L. lopezi* n. sp.

Downloaded By: [Machado, Antonio] At: 20:30 10 July 2008

- 4 Length <5 mm. Elytra with uniform sparse erect pilosity. La Gomera.
 *L. oromii* n. sp.
- Length >5 mm. Elytra without erect pilosity. Species from La Palma. . . 5

- 5 Pronotum with small disperse punctures on shiny integument, devoid of
 scales. La Palma *L. machadoi* García et González, 2006
- Pronotum with many more or less coalescent large deep punctures, beset
 with emerging hairy-scales (at least on flanks) 6

- 6 Elytra laterally keeled, 7th interval conspicuously reflexed all over.
 *L. zarazagai* García et Oromí, 1997
- Elytra laterally not keeled, 7th interval normally developed, convex.
 *L. dacilae* García, 1998

Acknowledgements

The author wishes to express his appreciation to Agustín Aguiar, Christoph Germann, Heriberto López, Lutz Behne, Pedro Oromí and Peter Stüben for kindly providing specimens for the present study. Michael Morris kindly revised the English style of the manuscript.

Notes

- 1. Sensu Peck (1990).

References

Culver D. 2001. Subterranean ecosystems. In: Levin SA, editor. Encyclopedia of biodiversity, Vol. 5. San Diego (CA): Academic Press. p. 527–540.

García R. 1998. *Laparocerus dacilae* n. sp. del subsuelo de La Palma, islas Canarias (Col., Curculionidae, Mylacini). *Vulcania*. 2:45–52.

García R, González AJ. 2006. Descripción de un nuevo coleóptero hipogeo de la isla de La Palma (islas Canarias): *Laparocerus machadoi* n.sp. (Coleoptera: Curculionidae, Entiminae). *Boletín Sociedad Entomológica Aragonesa*. 39:171–173.

García R, Oromí P. 1997. *Laparocerus zarazagai* n. sp., un nuevo coleóptero microftalmo de Canarias (Curculionidae, Mylacini). *Vieraea*. 25:153–158.

Damoiseau R. 1967. Monographie des Coléoptères Brentidae du Continent Africain. *Annales du Musée Royal de l’Afrique Centrale, Série in-8, Sciences Zoologiques*. 1:1–507.

Peck S. 1990. Eyeless arthropods of the Galapagos Islands, Ecuador: composition and origin of the cryptozoic fauna of a young, tropical, oceanic archipelago. *Biotropica*. 22:366–381.