

Systematics and cladistics of a new Naupactini genus (Coleoptera: Curculionidae: Entiminae) from the Andes of Colombia and Ecuador

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Received 19 July 2011; revised 28 March 2012; accepted for publication 4 April 2012

A new genus of broad-nosed weevils belonging to the tribe Naupactini (Coleoptera: Curculionidae) is described, based on six species from the Páramo–Puna subregion (Andean region) of South America. Three species are new and three have been transferred from the genus *Asymmathetes* (*Asymmathetes nigrans*, *Asymmathetes rugicollis*, and *Asymmathetes vulcanorum*). The new genus is recognized by the black, denuded, and shiny tegument, the well-developed pre-epistome, the elytral base curved backwards on middle, the reduction of the hindwings, and the widely separated procoxae, closer to the anterior than to the posterior margin of the prosternum. A cladistic analysis of the six species of the new genus plus five out-groups (*Amitrus*, *Amphideritus*, *Asymmathetes*, *Melanocyphus*, and *Trichocyphus*), using 49 morphological characters, resulted in a single cladogram.

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doi: 10.1111/j.1096-3642.2012.00833.x

ADDITIONAL KEYWORDS: *Asymmathetes*, ***Leschenius* gen. nov.**, new taxa, Páramo–Puna subregion, phylogeny, potato pest, weevils.

The tribe Naupactini (Curculionidae: Entiminae) consists of approximately 65 genera (Alonso-Zarazaga & Lyal, 1999) with over 500 species mainly distributed in Central and South America (Wibmer & O'Brien, 1986). At present, seven genera and 29 species of Naupactini are reported for the Páramo–Puna subregion of the Andean region (Cabrera & Willink, 1973; Morrone, 2001) or the Central–Northern area of the South American transition zone, *sensu* Morrone (2006). These genera are: *Amitrus* Schoenherr, 1840 (eight species); *Amphideritus* Schoenherr, 1840 (eight species); *Asymmathetes* Wibmer & O'Brien, 1986 (seven species); *Galapaganus* Lanteri, 1992 (15 species, but with only two found in this region);

Melanocyphus Jekel, 1875 (two species); *Trichocyphus* Heller, 1921 (one species); and *Obrieniolus* del Río, 2011 (one species). Their species diversity is poorly known, and there is scarce information on host plants and biological aspects, even though some species are harmful for potato culture (Munro, 1968; Peña, 2001).

The aims of the present contribution are: to describe a new genus of Naupactini, *Leschenius* del Río, from Colombia and Ecuador, based on three new species; to re-describe three species transferred from *Asymmathetes*; and to perform a cladistic analysis to test the monophyly of the genus and reconstruct the relationships among its species.

MATERIAL AND METHODS

We have examined specimens borrowed from the following entomological collections: CWOB, Charles

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W. O'Brien Collection, Tucson, Arizona, USA (Charles W. O'Brien); HAHC, Henry and Anne Howden Private Collection, Ottawa, Canada (Anne Howden); MLP, Museo de La Plata Collection, La Plata, BA, Argentina (Analía Lanteri); NZAC, New Zealand Arthropod Collection, Landcare Research, Auckland, New Zealand (Richard Leschen); PUCE, Pontificia Universidad Católica del Ecuador, Quito, Ecuador (Giovanni Onore).

The dissection of genitalia was performed according to standard entomological techniques. Measurements were taken with an ocular micrometer. Abbreviations used in the descriptions are as follows: A1, length of funicular article 1; A2, length of funicular article 2; LA, maximum length of antenna; LB, body length, measured from apex of rostrum to apex of elytra; LC, maximum length of club; LE, maximum length of elytra; LP, maximum length of pronotum; LR, length of rostrum from anterior margin of eye to apex; WC, maximum width of club; WE, maximum width of elytra; WP, maximum width of pronotum; WRa, width of rostrum across apex; WRb, width of rostrum at base. For line drawings we used a camera lucida adapted to a stereoscopic microscope Nikon MZ1000.

The terminology used for the sculpturation follows that of Harris (1979).

PHYLOGENETIC ANALYSIS

For the cladistic analysis, 49 morphological characters were selected (see Table 1): 36 from external morphology and 13 from the terminalia (nine of females and four of males). They were scored for 11 terminal taxa: the six species of *Leschenius* plus five out-group taxa. The out-groups chosen are representative species of five closely related genera from the Andes of South America (del Río & Lanteri, 2010): *Amitrus* Schoenherr, 1840; *Amphideritus* Schoenherr, 1840; *Asymmathetes* Wibmer & O'Brien, 1986; *Melanocyphus* Jekel, 1875; and *Trichocyphus* Heller, 1921. The relationship of these genera to *Leschenius* is suggested by characters of the rostrum, antennae, and elytra (del Río, 2009).

The data matrix (Table 2) of 11 taxa and 49 characters, treated as unordered, was analysed with the software 'Tree Analysis using New Technologies' (TNT; Goloboff, Farris & Nixon, 2008). To find the most parsimonious tree we applied the 'traditional' search approach based on 100 replicates, with tree bisection and reconnection (TBR) branch swapping, and holding ten trees for each replicate. The characters were mapped on the tree using ACCTRAN optimization with WINCLADA 1.00.08 (Nixon, 2002). Homoplasy of the tree was evaluated through the consistency and the retention indices (Kluge & Farris, 1969; Farris, 1989). Branch support was

estimated with TNT using jackknife (JK; Lanyon, 1985), with 100 replicates and Bremer support (B; Bremer, 1994). Values of JK are indicated below branches of the cladogram, with B listed above the branches. The most parsimonious tree was rooted with *Melanocyphus lugubris*.

SYSTEMATICS

LESCHENIUS GEN. NOV.

Type species: Leschenius manuely sp. nov. designated herein.

Etymology: The genus was named after the outstanding specialist in Coleoptera Richard Leschen, curator of the 'New Zealand Arthropod Collection', who kindly loaned us the material for this study.

Diagnosis

Leschenius is characterized by: length of about 5–12 mm; tegument visible, black to brown, shiny; vestiture scarce to absent, with short filiform suberect setae on elytra; sides of rostrum straight; epistome narrow; pre-epistome well developed; scape reaching hind margin of eye to slightly exceeding it; pronotum subcylindrical to slightly conical; scutellum denuded; elytra oval, short to slightly elongate, base curved backwards on middle; humeri rounded, slightly prominent; apical declivity slightly abrupt; apex projected backwards, usually divided or bifid; hindwings absent; procoxal cavities not confluent, closer to anterior margin than to posterior margin of prosternum; metatibial apex with apical comb of setae subequal to slightly longer than dorsal comb.

Description

Species medium to large in size (length of female, 5.3–12.3 mm; length of male, 7.8–10 mm; Figs 1–12).

Tegument visible, black to reddish brown, shiny. *Vestiture* lacking scales and with sparse setae, usually whitish, fine, short; setae semirecumbent on head (directed anteriorly and to median sulcus), pronotum (directed anteriorly and to middle), and venter, suberect on elytra and legs; setae on inner margin of tibiae usually wider and longer. *Rostrum* very short to short (LR/WRa: 0.95–1.03), sides slightly to moderately convergent towards apex (WRb/WRa: 1.31–1.55), dorsum flat to slightly depressed, usually foveolate–strigose; lateral carinae absent; lateral borders usually slightly thickened, elevated, and sharp (not thickened in *Leschenius vulcanorum* comb. nov.); median groove narrow, almost reaching hind margin of eyes to slightly exceeding them. Epistome subtriangular, narrow; pre-epistome well developed. Scrobes curved, deep, ending below eyes. Gular angle

Table 1. List of characters, character states, and coding

External morphology

0. Body size (length in dorsal view, from apex of rostrum to apex of elytra): small (less than 8 mm long) (0); medium sized (8–10 mm long) (1); large (over 10 mm long) (2).
1. Elytral vestiture: squamose (0); setose (1); scarce or absent (2).
2. Elytral setae: absent (0); short, suberect (1); long, erect (2).
3. Rostrum and frons: smooth (0); punctuate or foveolate (1); foveolate–strigose (2); coarsely strigose (3).
4. Pronotum: smooth (0); punctuate or foveolate (1); foveolate–granulose (2); tuberculate (3).
5. Relative length of rostrum: short ($LR \setminus WRa > 1$) (0); very short ($LR \setminus WRa \leq 1$) (1).
6. Sides of rostrum: slightly convergent towards apex ($WRb \setminus WRa < 1.4$) (0); moderately convergent towards apex ($WRb \setminus WRa > 1.4$) (1)
7. Rostral sulcus: reaching frons (0); exceeding posterior margin of eyes (1)
8. Size of epistome: narrow (0); moderately wide (1); very wide (2).
9. Epistome: depressed (0); elevated (1).
10. Pre-epistome: absent or reduced (0); well developed (1).
11. Eyes: strongly convex (0); moderately convex (1).
12. Length of antennal scape: short, not reaching hind margin of eyes (0); reaching hind margin of eye (1); slightly exceeding hind margin of eyes (2).
13. Ratio between length of funicular article 2 and 1 ($A2/A1$): $A2/A1 > 1.5$ (0); $1.1 < A2/A1 < 1.49$ (1); subequal (2).
14. Ratio between maximum width and length of pronotum (WP/LP): less than 1.3 (0); more than 1.3 (1).
15. Shape of pronotum: subcylindrical (0); slightly conical (1).
16. Sides of pronotum: almost straight to slightly curved (0); moderately curved (1); strongly curved (2).
17. Pronotal base: straight (0); curved backwards (1); 'V'-shaped (2); bisinuate (3).
18. Projection of lateral angles of pronotum of males: absent (0); present (1).
19. Ratio between maximum length and width of elytra (LE/WE): > 1.5 (0); < 1.5 (1).
20. Maximum width of elytra: about middle (0); at posterior third (1); at anterior third (2).
21. Elytral base: bisinuate (0); straight to slightly curved backwards at middle (1); strongly curved backwards at middle (2).
22. Humeral angles of males: not projected (0); anteriorly projected (1).
23. Elytral humeri: moderately prominent (0); slightly prominent to absent (1).
24. Apical projection of elytra: absent (0); present (1).
25. Elytral apex: entire (0); slightly divided (1); strongly divided or bifid (2).
26. Elytral intervals: slightly wider than striae ($1.5-2\times$) (0); about same width of striae or slightly slender (1).
27. Elytral intervals: flat to slightly convex (0); moderately convex (1); strongly convex (2).
28. Procoxae: contiguous to slightly separate (0); distinctly separate from each other (1).
29. Procoxae: almost contiguous with anterior margin of prosternum (0); about $2\times$ closer to anterior than to posterior margin (1); less than $2\times$ closer to anterior than to posterior margin of prosternum (2).
30. Row of denticles on inner margin of tibiae: present on three pairs of tibiae (0); present on pro- and mesotibiae (1); present only on protibiae (2); absent on three pairs of tibiae (3).
31. Corbel of metatibial apex: broad, squamose (0); narrow to moderately broad, squamose (1); narrow, setose, or denuded (2); absent (3).
32. Apical comb of metatibiae: longer than dorsal comb (0); about as long as dorsal comb (1); shorter than dorsal comb (2).
33. Ratio between length of ventrite 2 and ventrites 3 + 4 ($L2/L3+4$): subequal (0); $1.25-1.5$ (1); more than $1.5\times$ (2).
34. Posterior margin of of ventrite 5 in females: rounded (0); blunt (1); escavate (2); slightly pointed (3).
35. Posterior margin of ventrite 5 in males: rounded (0); bilobed (1); emarginate (2) blunt (3).

Female terminalia

36. Plate of sternite VIII of female: subrhomboidal, elongate (basal half longer than apical half) (0); subrhomboidal, not elongate (basal and apical half subequal) (1).
37. Apodeme of sternite VIII: less than $2.7\times$ longer than plate (0); more than $2.7\times$ longer than plate (1).
38. Ovipositor: about as long as to longer than ventrites 1–5 (0); two-thirds to three-quarters the length of ventrites 1–5 (1); about half or less the length of ventrites 1–5 (2).
39. Rows of setae along sides of baculi (ovipositor): absent (0); present (1).
40. Length of spermathecal duct: as long as half of ovipositor (= medium-sized) (0); shorter than half of ovipositor (= short) (1).
41. Spermathecal body: subcylindrical, long (0); subcylindrical, short (1); subglobose (2); globose (3).
42. Nodus of spermatheca: conical, very short (0); truncate conical, short (1); tubular (2).
43. Ramus of spermatheca: indistinct to slightly developed (0); well developed (1).
44. Cornu of spermatheca: short (0); medium length to long (1); very long (2).

Male genitalia

45. Ratio between length of aedeagal apodemes and length of median lobe (LAp/Lml): median lobe slightly shorter than its apodemes (two-thirds to three-quarters) (0); about twice shorter than its apodemes (1).
46. Angle between longitudinal axis of median lobe and its apodemes: almost flat (0); obtuse to about 90° (1).
47. Apex of median lobe: acute (0); slightly pointed (1); rounded, with a pointed projection at apex (2); evenly rounded (3).
48. Endophallic armature: absent, no distinct sclerotized pieces (0); present, with sclerotized pieces (1).

Table 2. Data matrix of *Leschenius* plus five out-groups

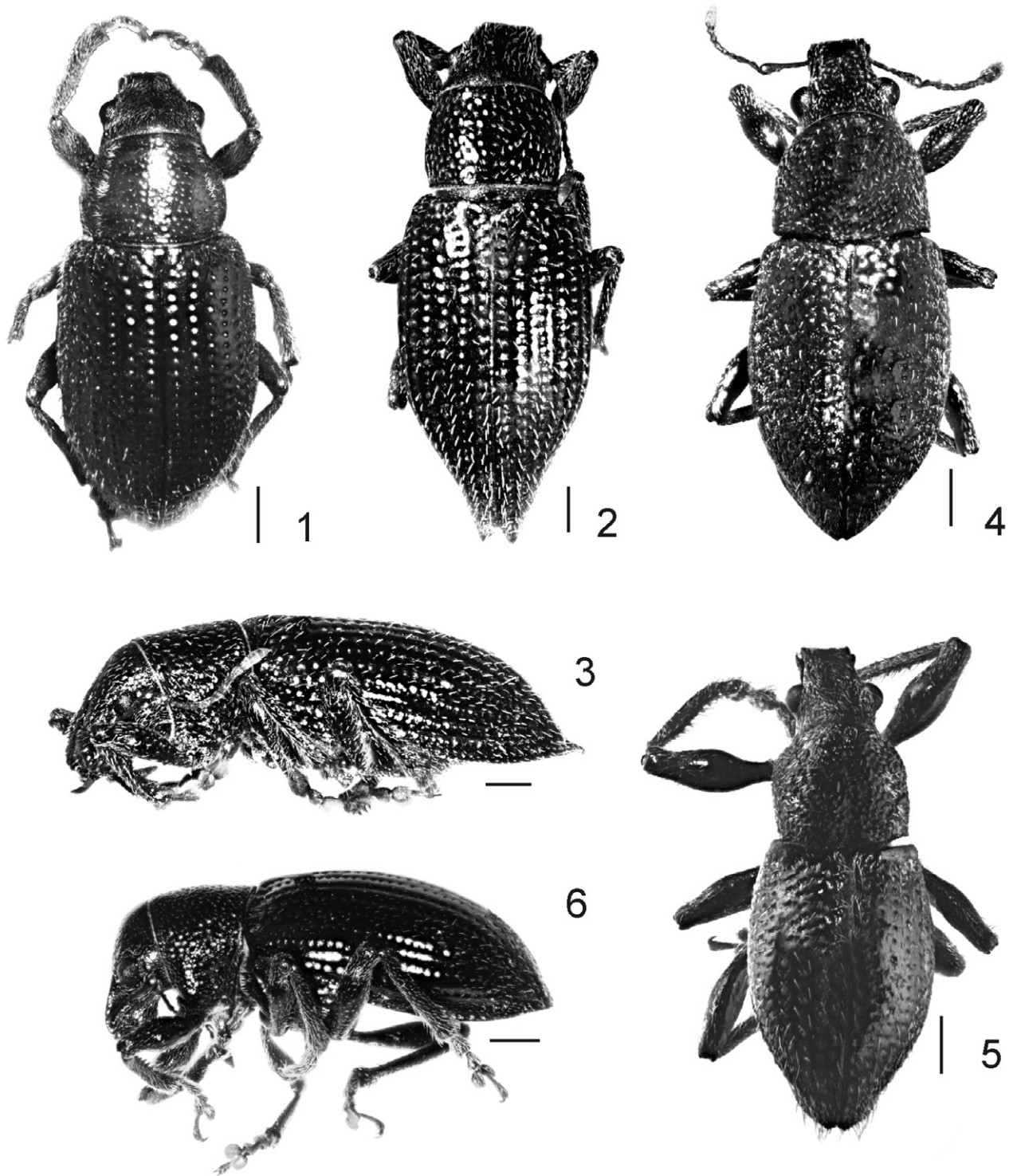
	1										2										3																		
	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8
<i>Trichocephalus formosus</i>	2	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Melanocyphus lugubris</i>	2	2	0	1	1	0	0	1	3	1	0	1	0	1	2	0	1	2	0	2	3	3	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
<i>Amitrus nitens</i>	2	2	0	1	[1 3]	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	2	1	1	1	1	1	1	1	0	1	0
<i>Amphideritus vilis</i>	1	1	2	3	2	0	1	0	2	1	0	1	1	0	0	0	0	0	0	0	1	2	0	2	0	3	0	1	1	0	1	1	1	1	1	1	0	1	0
<i>Asymathetes pascoei</i>	0	0	1	2	1	1	1	0	0	1	2	0	1	1	0	0	0	0	0	0	1	2	1	2	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0
<i>Leschenius rugicollis</i> comb. nov.	1	2	1	3	2	1	0	1	0	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1	0
<i>Leschenius nigrans</i> comb. nov.	2	2	1	2	1	1	1	0	1	1	2	1	1	1	1	1	1	1	1	0	2	0	1	0	0	1	3	1	0	1	0	1	0	1	0	1	0	1	1
<i>Leschenius vulcanorum</i> comb. nov.	0	2	1	2	1	1	1	0	0	1	1	2	1	1	1	1	1	1	1	0	1	2	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1	1
<i>Leschenius manueli</i> sp. nov.	1	2	1	3	2	1	0	1	1	1	2	1	1	1	1	1	1	1	1	0	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Leschenius bifurcatus</i> sp. nov.	2	2	1	1	1	1	0	1	1	1	2	2	0	0	0	0	0	0	0	0	1	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Leschenius silviae</i> sp. nov.	1	2	1	2	1	1	0	1	1	1	2	0	1	1	1	1	1	1	1	0	1	2	0	1	1	1	1	1	0	1	0	2	0	1	1	1	1	1	1

about 130°. Eyes suboval, medium-sized to large, and usually moderately convex [strongly convex in *Leschenius rugicollis* (Voss, 1954) comb. nov. and *L. manueli* sp. nov.]. Preocular depressions absent. Frons wide (about 3× the height of eye), usually slightly convex (flat in *L. vulcanorum* comb. nov.), usually foveolate or strigose. Vertex moderately convex, usually foveolate or punctuate, with imbricate microsculpture. Postocular constriction slight to absent. *Antennae* short to medium in length (LB/LA, 1.90–2.94; Figs 13, 15, 17, 19, 21, 23), with long, coarse, decumbent ocher setae, and with long, fine, verticillate setae; scape robust to moderately robust, straight, reaching posterior margin of eyes to slightly exceeding it. Funicular article 2× longer than article 1 (1.1–1.6×); funicular articles 3–7 usually slightly longer than wide; club oval to fusiform (LC/WC, 2.15–2.95), acuminate.

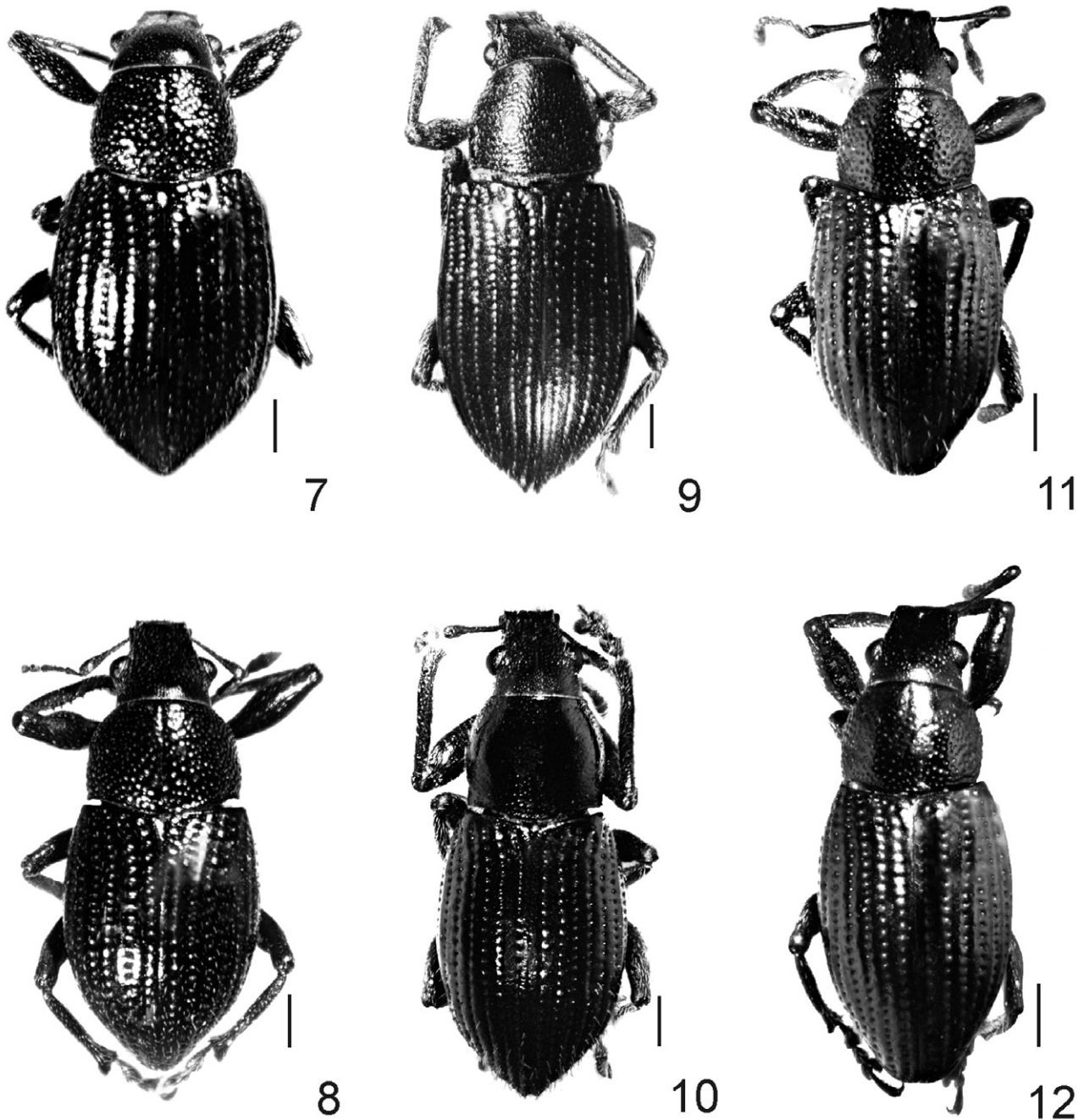
Pronotum (Figs 1–12) slightly conical to sub-cylindrical, slightly to moderately wider than long (WR/LR, 1.14–1.36); flanks usually moderately curved (slightly curved in *L. rugicollis* comb. nov. and *Leschenius bifurcatus* sp. nov.); disc slightly convex, usually foveolate to foveolate–granulose; median groove usually absent [distinct in *L. manueli* sp. nov. and shallow in *Leschenius nigrans* (Olfiff, 1891) comb. nov.]; anterior margin straight to slightly curved anteriorly; base usually posteriorly ‘V’-shaped (straight in *L. bifurcatus* sp. nov. and *Leschenius silviae* sp. nov.), wider than anterior margin (sub-equal in *L. silviae* sp. nov.). *Scutellum* subtriangular, denuded, usually large (small in *L. nigrans* comb. nov. and *L. silviae* sp. nov.).

Elytra (Figs 1–12) oval, short to slightly elongate (LE/WE, 1.37–1.65), with maximum width usually at middle (at anterior third in *L. nigrans* comb. nov. and *L. silviae* sp. nov.), slightly to moderately convex; base curved backwards on middle; humeri rounded, slightly developed; striae well defined, with medium-sized to large punctures, closer to each other along the same striae; striae 9–10 usually closer on posterior two-thirds (except in *L. manueli* sp. nov. and *L. bifurcatus* sp. nov.); intervals flat to slightly convex, usually as wide as striae (slightly wider in *L. manueli* sp. nov. and *L. nigrans* comb. nov.); apical declivity slightly abrupt; apex usually projected (except *L. vulcanorum* comb. nov.) and acute (slightly pointed in *L. silviae* sp. nov.). Hindwings absent.

Legs. Procoxae widely separated, more than three times closer to anterior than to posterior margin of prosternum, almost reaching anterior margin; protibia with row of between seven and ten acute denticles on inner margin and well-developed mucro, mesotibia with or without denticles, and metatibia without denticles; metatibial apex usually



Figures 1–6. Habitus photographs of *Leschenius*: 1, *Leschenius vulcanorum* comb. nov., female, dorsal view; 2, *Leschenius bifurcatus* sp. nov., female, dorsal view; 3, *Leschenius bifurcatus* sp. nov., female, lateral view; 4, *Leschenius rugicollis* comb. nov., female, dorsal view; 5, *Leschenius rugicollis* comb. nov., male, dorsal view. 6, *Leschenius manueli* sp. nov., female, lateral view. Scale bars: 1 mm.



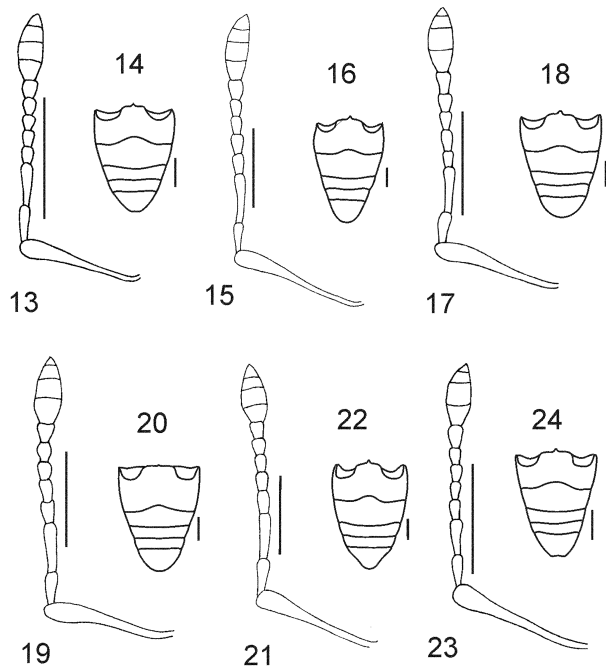
Figures 7–12. Habitus photographs of *Leschenius*, dorsal views: 7, *Leschenius manueli* sp. nov., female; 8, *Leschenius manueli* sp. nov., male; 9, *Leschenius nigrans* comb. nov., female; 10, *Leschenius nigrans* comb. nov., male; 11, *Leschenius silviae* sp. nov., female; 12, *Leschenius silviae* sp. nov., male. Scale bars: 1 mm.

with well-developed corbel, covered with setae-like scales (absent in *L. bifurcatus* sp. nov.); apical comb subequal to slightly longer than dorsal comb.

Abdomen (Figs 14, 16, 18, 20, 22, 24). Intercostal portion of ventrite 1 broader than metacoxal cavities (1.15–1.70×); ventrite 2 longer than ventrites 3 and 4 combined (1.26–1.5×); posterior margin of ventrite 5

usually slightly pointed; tergites I–VII membranose to moderately sclerotized.

Female terminalia. Sternite VIII (Figs 25, 27, 29, 31, 33, 35) with plate subrhomboidal, having apical tuft of long setae and shorter setae on each side; usually with 'V'-shaped sclerotization and lateral arms reaching half of plate (with the exception of



Figures 13–24. Antennae and abdominal ventrites: 13, 14, *Leschenius vulcanorum* comb. nov.; 15, 16, *Leschenius bifurcatus* sp. nov.; 17, 18, *Leschenius rugicollis* comb. nov.; 19, 20, *Leschenius manueli* sp. nov. 21, 22, *Leschenius nigrans* comb. nov.; 23, 24, *Leschenius silviae* sp. nov. Scale bars: 1 mm.

L. vulcanorum comb. nov.); apodeme two to three times longer than plate. Ovipositor (Fig. 26, 28, 30, 32, 34, 36) slightly curved in lateral view, shorter than ventrites 1–5 (0.63–0.84 \times); with or without setae on sides of baculi; ventral baculi subparallel or slightly divergent towards base; distal coxites slightly sclerotized; styli well developed, directed backwards or sideways. Spermathecal body (Figs 37–42) usually subcylindrical (subglobose in *L. silviae* sp. nov.; Fig. 42); nodulus usually truncate-conical, short (tubular in *L. silviae* sp. nov.); ramus usually indistinct (present in *L. manueli* sp. nov. and *L. bifurcatus* sp. nov.); cornu medium to very long; spermathecal duct (Figs 37–42) one- to two-thirds as long as ovipositor, usually membranous (sclerotized in *L. bifurcatus* sp. nov.).

Male genitalia (Figs 43–50). Median lobe with slightly pointed to rounded apex, slightly curved in lateral view; median lobe plus apodemes shorter to slightly longer than abdomen (0.72–1.07 \times), without setae, apodemes shorter than remaining part of median lobe (0.45–0.75); endophallus with or without sclerotized armature.

Sexual dimorphism: Male similar to slightly smaller than female; rostrum usually slightly longer, pronotum with posterolateral angles projected and directed

backwards; elytra with thickened base, projected forwards, humeri less prominent, ventrite 5 with different shape (blunt, bilobed, or emarginate).

Distribution: The genus *Leschenius* is distributed in Ecuador and northern Colombia, approximately 1800–5000 m a.s.l. This area corresponds to the North Andean Páramo province of the South American transition zone.

Biology: Parthenogenetic reproduction may occur in some species of *Leschenius*, as no males are known in populations of *L. bifurcatus* and *L. vulcanorum* comb. nov., as well as in other related genera from the high Andes and open vegetation areas (Lanteri & Normark, 1995; Rodriguero *et al.*, 2010). This kind of reproduction was confirmed in *L. vulcanorum* comb. nov., through a rearing experiment of virgin females held under laboratory conditions. This experiment was undertaken in our lab during November of 2009 using larvae and female specimens brought from Colombia by Jorge Eduardo C. Gomez, confirming the observations made by Garza for the same species misidentified in the paper as the Sibaté biotype of *Naupactus* sp. (Garza, 2007).

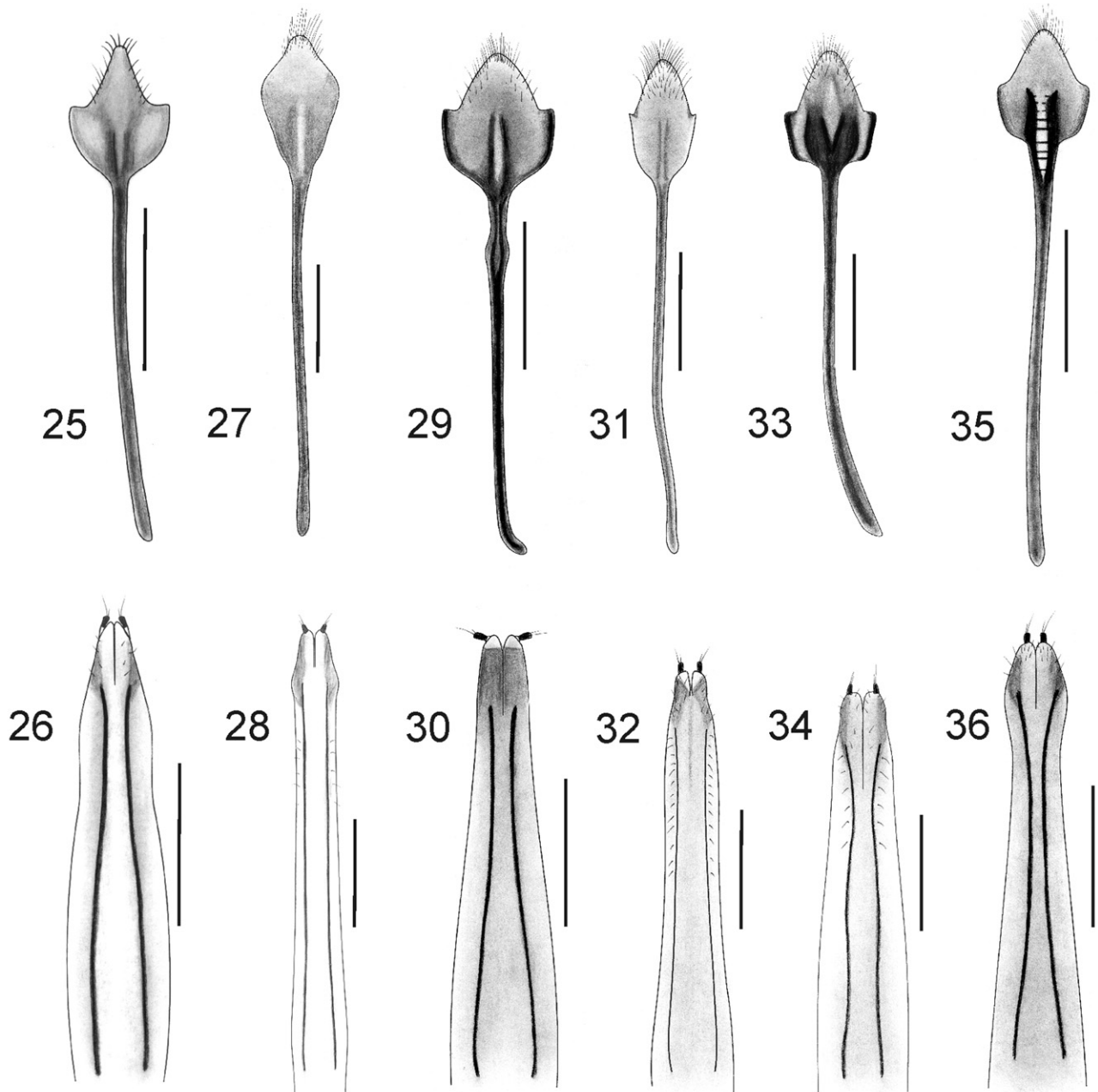
Host plants and habitat: Host plants are unknown for most species of *Leschenius*, usually found under rocks, soil, grass, or in cracks. *Leschenius vulcanorum* comb. nov. occurs in Andean meadows, associated with cabbage such as *Brassica oleracea* (Brassicaceae). In addition, this species is considered a pest in *Solanum tuberosum* (potato; Solanaceae) in Colombia, where it is known as ‘Potato shooter’ (Canchala, 1992; Peña, 2001). The first report of this pest dates from 1983 and corresponds to south-western Colombia, Nariño province (Canchala, 1992).

Relationships with other genera

A close relationship between *Leschenius* and the genus *Asymmathetes* is suggested by the presence of filiform, short, and suberect elytral setae, rostrum wider than long, narrow epistome, well-developed pre-epistome, rounded and slightly prominent shoulders, widely separated procoxae, subcylindrical spermathecae with very long cornu, and slightly curved median lobe of aedeagus in lateral view.

Species included

Three species previously assigned to *Asymmathetes* are herein transferred to the new genus *Leschenius*: *L. nigrans* comb. nov., *L. rugicollis* comb. nov., and *L. vulcanorum* comb. nov. These species and the three new ones described herein: *L. bifurcatus* sp. nov., *L. manueli* sp. nov., and *L. silviae* sp. nov., all show

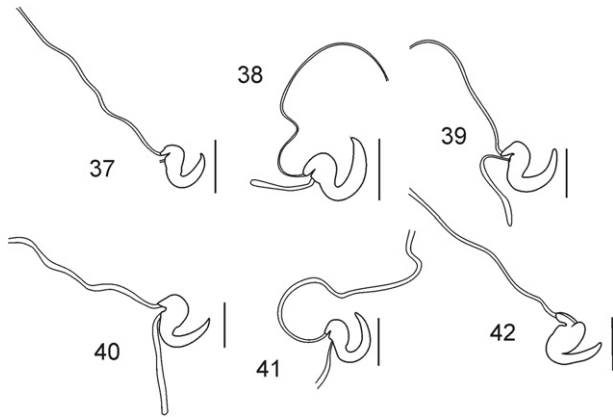


Figures 25–36. Female terminalia. Sternites VIII and ovipositors: 25, 26, *Leschenius vulcanorum* comb. nov.; 27, 28, *Leschenius bifurcatus* sp. nov.; 29, 30 *Leschenius rugicollis* comb. nov.; 31, 32, *Leschenius manueli* sp. nov.; 33, 34 *Leschenius nigrans* comb. nov.; 35, 36 *Leschenius silviae* sp. nov. Scale bars: 1 mm.

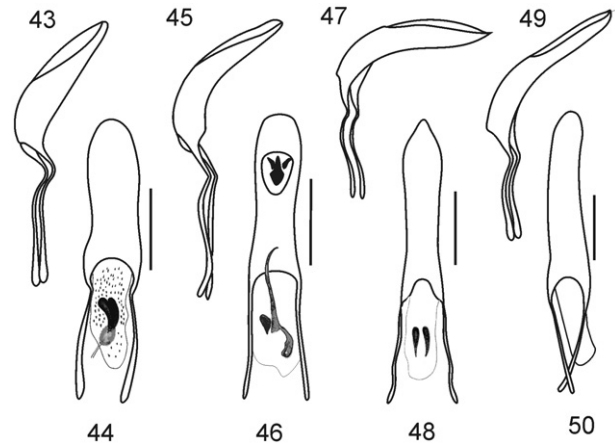
widely separated procoxae. The six species also share other synapomorphies, such as the elytral base moderately curved posteriad (see the results of the cladistic analysis).

Asymmathetes aequatorialis (Kirsch, 1889), a species that we were not able to study because of a lack of material, may also belong to *Leschenius*, as it shares the same combination of generic characters

and similar geographical distribution (it is endemic to Ecuador). Within the genus, it is probably closer to *L. silviae* sp. nov., because of the presence of a small scutellum, a similar sculpture on head and pronotum, and similar proportions in the antennae. It differs from *L. silviae* sp. nov. mainly by its smaller body size, the pilosity of the pronotum, and the shape of the elytral apex, which is more acute.



Figures 37–42. Spermathecae: 37, *Leschenius vulcanorum* comb. nov.; 38, *Leschenius bifurcatus* sp. nov.; 39, *Leschenius rugicollis* comb. nov.; 40, *Leschenius manueli* sp. nov.; 41, *Leschenius nigrans* comb. nov.; 42, *Leschenius silviae* sp. nov. Scale bars: 0.5 mm.



Figures 43–50. Male genitalia: 43, 45, 47, 49, aedeagus, lateral view; 44, 46, 48, 50, aedeagus, ventral view. 41, 42 *Leschenius rugicollis* comb. nov.; 43, 44, *Leschenius manueli* sp. nov.; 45, 46, *Leschenius nigrans* comb. nov.; 47, 48, *Leschenius silviae* sp. nov. Scale bars: 1 mm.

KEY TO SPECIES OF *LESCHENIUS*

1. Rostrum strongly conical; rostral sulcus reaching posterior margin of eyes; elytral apex not projected.....*Leschenius vulcanorum* comb. nov. (Fig. 1)
- 1'. Rostrum slightly conical; rostral sulcus exceeding posterior margin of eyes; elytral apex projected.....2
2. Elytral apex distinctly bifid.....*Leschenius bifurcatus* sp. nov. (Figs 2–3)
- 2'. Elytral apex entire to divided.....3
3. Eyes strongly convex; pronotum foveolate–granulose; scutellum large; maximum width of elytra at middle; apical and dorsal combs of metatibiae subequal; posterior margin of ventrite 5 of males emarginate or bilobate.....4
- 3'. Eyes moderately convex; pronotum punctuate or foveolate; scutellum medium-sized; maximum width of elytra at anterior third; apical comb of metatibiae longer than dorsal comb; posterior margin of ventrite 5 of males blunt.....5
4. Pronotum of males slightly wider than long, with slightly bisinuate base; estriae 9 and 10 closer on posterior two-thirds; ovipositor without setae on sides of baculi; apex of median lobe slightly pointed.....*Leschenius rugicollis* comb. nov. (Figs 4–5)
- 4'. Pronotum of males strongly wider than long, with strongly bisinuate base; estriae 9 and 10 not closer on posterior two-thirds; ovipositor with conspicuous setae on sides of baculi; apex of median lobe rounded.....*Leschenius manueli* sp. nov. (Figs 6–8)
5. Elytral apex acute, divided; elytral intervals flat, slightly wider than striae; corbel broad; posterior margin of ventrite 5 of females slightly pointed; spermatheca with conical nodulus*Leschenius nigrans* comb. nov. (Figs 9–10)
- 5'. Elytral apex slightly pointed, entire; intervals slightly convex, as wide as striae; corbel narrow; posterior margin of ventrite 5 of females emarginated; spermatheca with tubular nodulus, constricted near spermathecal-body.....*Leschenius silviae* sp. nov. (Figs 11–12)

***LESCHENIUS VULCANORUM* (KIRSCH, 1889)
COMB. NOV. (FIGS 1, 13–14, 25–26, 37, 51)**

Canephorus vulcanorum Kirsch 1889: 17.

Canephorulana vulcanorum: Strand 1943: 96.

Amitrus vulcanorum: Kuschel 1955: 277.

Asymmathetes vulcanorum: Kuschel in Wibmer & O'Brien 1986: 53.

Amphideritus brevis Oliff 1891: 68.

Macrostylus brevis: Dalla Torre, Emden & Emden 1936: 14.

Amitrus brevis: Kuschel 1955: 277 (syn. of *vulcanorum* Kuschel 1955: 277).

Asymmathetes brevis: Kuschel in Wibmer & O'Brien 1986: 53.

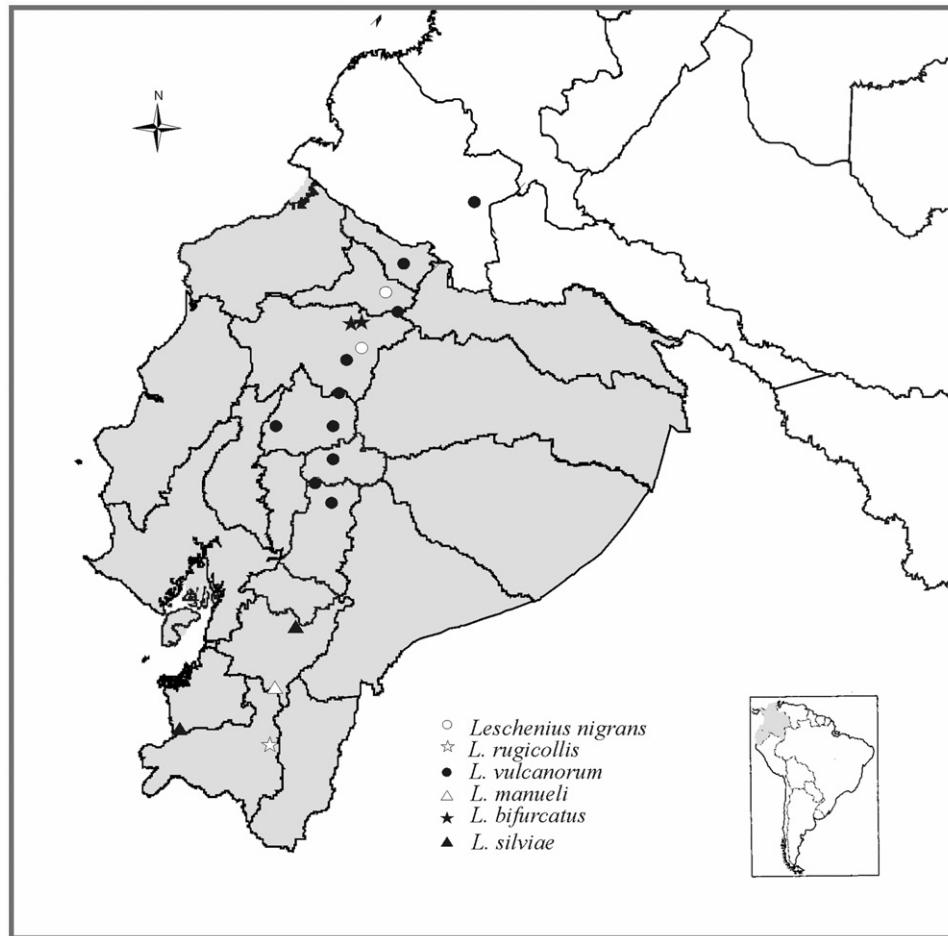


Figure 51. Distribution map of the six species of *Leschenius*. Ecuador and southern Colombia are shown in detail. Species references are given on the map.

Amphideritus pigmaeus Oliff 1891: 68.

Macrostylus pigmaeus: Dalla Torre, Emden & Emden 1936: 14.

Amitrus pigmaeus: Kuschel 1955: 277 (syn. of *vulcanorum* Kuschel 1955: 277).

Asymmathetes pigmaeus: Kuschel in Wibmer & O'Brien 1986: 53.

Redescription: Female (Fig. 1). Species medium-sized (LB, 5.3–8.7 mm). *Tegument* visible, dark brown to reddish brown, shiny. *Vestiture* composed of disperse, pale ocher setae; sides of pronotum and margins of elytra (intervals 9–10) with moderately dense and wide, creamy setae, forming a stripe; these setae also present on distal third of femora. *Rostrum* very short (Fig. 1) (LR/WRa, 0.95), sides moderately convergent towards apex (WRb/WRa, 1.41–1.55), dorsum flat, foveolate–strigose with longitudinal wide striae; median groove wide, deep, reaching posterior margin of eyes. Epistome slightly depressed and punctuate. Eyes medium-sized

and moderately convex. Frons foveolate–strigose, with longitudinal, wide, conspicuous striae. Vertex sparsely punctuate. *Antennae* (Fig. 13) of medium length (LB/LA, 1.9); scape exceeding posterior margin of eyes. Funicular article 2 about 1.21× as long as article 1, both elongated; funicular articles 3–5, 2× longer than wide, and funicular articles 6–7 as long as wide; club slightly fusiform (LC/WC, 2.42).

Pronotum (Fig. 1) slightly conical, moderately wider than long (WP/LP, 1.36); flanks moderately curved; disc foveolate–punctulate; median groove absent; anterior margin slightly curved anteriorly, slightly thickened; base slightly posteriorly V-shaped. *Scutellum* large, slightly elevated.

Elytra (Fig. 1) short (LE/WE, 1.38–1.49), with maximum width postmedian, slightly convex; base slightly curved backwards on middle; striae with medium-size punctures; striae 9–10 closer on posterior two-thirds; intervals slightly convex to flat, about as long as striae; apex acute, entire, not projected.

Legs. Procoxae almost at anterior margin of prosternum; protibiae with row of six or seven acute small denticles (on distal two-thirds of tibiae) and medium sized mucro; meso and metatibiae without denticles and with small mucro; metatibial apex with moderately broad corbel covered with disperse small cream scales; apical and dorsal combs subequal.

Abdomen (Fig. 14). Intercoxal portion of ventrite 1 broader than metacoxal cavities (1.15×); ventrite 2 longer than ventrites 3 and 4 combined (1.26–1.37×); posterior margin of ventrite 5 escavated; tergites I–VII membranose.

Terminalia. Sternite VIII (Fig. 25) with plate sub-rhomboidal, elongate tapering into an acute apex, with tuft of medium-sized and coarse setae, and shorter setae on apical third; V-shaped sclerotization with lateral arms reaching two-thirds of plate, and lateral borders sclerotized; apodeme 2.2–2.6× longer than plate. Ovipositor (Fig. 26) slightly shorter than ventrites 1–5 (0.78–0.84×); without setae on sides of baculi; ventral baculi subparallel; styli wide, directed backwards. Spermathecal body (Fig. 37) sub-cylindrical, long; nodulus conical, short; ramus indistinct; cornu long; spermathecal duct (Fig. 37) short, as long as half of ovipositor (~1.6 mm), membranous, moderately wide.

Male: Unknown.

Variation

Specimens from Chimborazo have denser vestiture of setae on dorsum, shorter antennae, with funicular articles 1 and 2 less elongate, and articles 3–7 moniliform, the base of the pronotum is wider and the elytra are shorter than in the remaining specimens.

Comparative notes and diagnosis

This species is sister to the remaining species of the genus (cladogram Fig. 52). It is easily distinguished from other congeners by possessing a shorter and less conical rostrum, with sides not thickened and elevated, longer antennae, elytral apex not projected, and corbels of metatibiae moderately broad and squamose.

Type material

The type material of *Canephorus vulcanorum* Kirsch, 1889, *Amphideritus brevis* Oliff, 1891, and *Amphideritus pigmaeus* Oliff, 1891, was not available for examination. However, we studied specimens from Kuschel's collection, identified by the specialist G. Kuschel by comparison with types that justify the synonymy given by the author in 1955.

Material examined

No data, *Amphid. brevis* Olliff (1♀ NZAC). COLOMBIA. Nariño: Pasto, 1–XII–1958, A. Unigarro, en coles

(1♀ NZAC). ECUADOR. *Carchi*: El Angel, 1–I–1931 (5♀ NZAC). *Chimborazo*: NW Chimborazo, 4000 m, 1–XI–1977, Luis Peña col. (1♀ HAHC), 10–11–XI–1977 (1♀ MLPC, 1♀ HAHC); Riobamba, 3–VII–1905, F. Ohaus G. col., unter Steinen (1♀ NZAC). *Cotopaxi*: Cotopaxi, 4300–5000 m., III–1965, N. y J. Leleup col., preire alpine (1♀ NZAC); 13 km S. Latacunga, along PanAm, 2600 m, 3–X–1977, G. Noonan & Moffett col., under clumps soil and grass, rock debris in field with green short grass (4♀ CWOB); 45 km W. Latacunda, 1–V–1978, O'Brien & Marshall col., under stones (4♀ CWOB). *Pichincha*: N. du Cayambe, Andes contrefort, 3600 m, IV–1965, N. y J. Leleup, prairies alpin, sous pierres (5♀ NZAC); Conocoto, 2000 m, III–1965, N. y J. Leleup, sous pierres (1♀ NZAC). *Tungurahua*: Ambato, 31–III–1931, brevis Olliff comp. c. typo Kuschel 1954 (6♀ NZAC), 2600 m, II–1956, Foerster leg. (1♀ NZAC).

Distribution: Colombia (Nariño) and Ecuador (Carchi, Chimborazo, Cotopaxi, Pichincha y Tungurahua), between 2600 and 5000 m a.s.l.

Biology: The life cycle of *L. vulcanorum* comb. nov. was studied in laboratory conditions by Garza. The species was misidentified in the article as *Naupactus* sp. (2007). She reported that it lasted 319 days from egg until initiation of adult oviposition. The larvae damage tubers, roots, and underground stems of potato grown at higher altitudes. They live freely in the soil, boring the roots and externally biting the potato tubers. The females start oviposition 35 days after emergence. The eggs are laid in clusters of 18–60, they are oval, with smooth chorion, arranged in two layers, and covered with a crystalline substance that sticks them to each other and to the substrate. During their development the eggs change from white or crystalline to yellow.

Males are unknown for *L. vulcanorum* comb. nov., and according to the laboratory breeding experiments, virgin females are able to oviposit: in this case, the species would be parthenogenetic.

Host plants and habitat

Leschenius vulcanorum comb. nov. was found under soil, grass, or in cracks in the prairies of the Andes, and in association with the cabbage *Brassica oleracea* (Brassicaceae) and with the potato *Solanum tuberosum* (Solanaceae). It is considered a pest of potato in Colombia, and is known as 'Potato shooter' (Canchala, 1992; Peña, 2001). Major damage was reported in south-western Colombia, in Nariño province.

Remarks

Leschenius vulcanorum comb. nov. shares some characters with species of other genera related to *Leschenius*.

For this reason it was previously assigned to *Amitrus* (= *Canephorus* = *Canephorulana*), *Amphideritus*, *Macrostylus*, and *Asymmathetes*. Because of its general appearance, mainly with regards to body shape and vestiture, it resembles *Amphideritus chilensis* (Kuschel, 1949), but is easily distinguished by its short conical rostrum, with sides slightly curved, narrow and depressed epistome, pre-epistome well developed, and by procoxae widely separated.

***LESCHENIUS BIFURCATUS* SP. NOV.**

(FIGS 2–3, 15–16, 27–28, 38, 51)

Type material: Holotype. Female, 11.5 mm long, 'ECUADOR, PICHINCHA, POMASQUI, RUNCUCHO, 2400 m, 6–XII–1993, K. Volbracht' (PUCE). Genitalia dissected and placed in a vial with glycerine.

Paratype. 1♀ same data as holotype (PUCE); 1♀ 'Ecuador, Puerto de Guayllabamba, 1800 m, 16–I–1931, púrres' (NZAC).

Etymology: named in reference to the distinctly bifurcated elytral apex.

Description: Female. Species large (LB, 11.5–12.3 mm) (Figs 2–3). *Tegument* visible, black, and shiny (teneral reddish brown). *Vestiture* composed of scattered setae, whitish on head, pronotum, legs, and venter, and ocher on elytra; setae wider than in remaining species of the genus. *Rostrum* short (Fig. 2) (LR/WRa, 1), sides slightly convergent toward apex (WRb/WRa, 1.31–1.39), dorsum slightly depressed, densely foveolate; median groove widened at apex, slightly exceeding posterior margin of eyes. Epistome slightly elevated. Eyes medium-sized and moderately convex. Frons densely foveolate. Vertex densely punctuate. *Antennae* (Fig. 15) (LB/LA, 2.5–2.6); scape (narrower than the other species) slightly exceeding posterior margin of eyes. Funicular article 2 about 1.5× as long as article 1; funicular articles 3–7 about 2× longer than wide; club fusiform (LC/WC, 2.82–2.94).

Pronotum (Fig. 2) subcylindrical, slightly to moderately wider than long (WP/LP, 1.17–1.30); flanks slightly curved; disc densely foveolate; median groove absent; anterior margin and base straight. *Scutellum* large and convex.

Elytra (Figs 2–3) slightly elongated (LE/WE, 1.59–1.65), with maximum width at middle, moderately convex; base thickened, slightly curved backwards on middle; striae with large oval punctures, striae 9–10 not closer on posterior two-thirds; intervals slightly convex (6–9° more elevated), as wide as striae to slightly narrower than striae; apex acute, bifid, and projected.

Legs. Procoxae less separated than in the other species, 3× closer to anterior margin than to posterior margin of prosternum; protibiae with row of nine or ten acute, medium-sized denticles and large mucro; mesotibiae without denticles and mucro, and metatibiae crenulate without mucro; metatibial apex without corbel; apical and dorsal comb subequal.

Abdomen (Fig. 16). Intercoxal portion of ventrite 1 broader than metacoxal cavities (1.5×); ventrite 2 longer than ventrites 3 and 4 combined (1.35×); posterior margin of ventrite 5 rounded; tergites I–VII slightly sclerotized.

Terminalia. Sternite VIII (Fig. 27) with plate sub-rhomboidal, elongate, with acute apex, having apical tuft of long setae and shorter setae on sides of apical third; basal two-thirds more sclerotized and central line membranose; apodeme about 2× longer than plate. Ovipositor (Fig. 28) shorter than ventrites 1–5 (0.80×); with fine disperse setae on external side of baculi; ventral baculi subparallel; styli moderately wide, short, directed backwards. Spermathecal body (Fig. 38) subcylindrical, short; nodulus conical, short; ramus developed; cornu very long; spermathecal duct (Fig. 38) short, about one-third of the ovipositor (~1.4 mm) moderately sclerotized, wide.

Male: Unknown.

Comparative notes and diagnosis

The new species *L. bifurcatus* sp. nov. is the sister species of *L. manueli* sp. nov., with which it shares the characteristics of the elevated epistome, the funicular 1 and 2 subequal, the presence of conspicuous rows of setae on sides of baculi, spermathecal duct short, ramus developed, and the endophallic armature with sclerotized pieces. It is easily differentiated by the elytral apex distinctly bifid.

Distribution: It is found in Ecuador (Pichincha), between 1800 and 2800 m a.s.l.

Biology: Males are unknown, suggesting that the species would be parthenogenetic.

Habitat: It was found under stones.

Remarks

The presence of a bifid elytral apex is a rare trait in the tribe Naupactini. It is present in some species of *Ericydeus* Pascoe, 1880 (Lanteri, 1995), and also occurs in genera of other tribes such as *Compsus* (Tribe Eustylini). These species show a very abrupt elytral declivity (hunchback elytra), and live in areas of tropical forest of South America. To the contrary, the elytra of *L. bifurcatus* sp. nov. are somewhat depressed, with a slightly abrupt elytral declivity, and

the environment in which it occurs is completely different.

LESCHENIUS RUGICOLLIS (VOSS, 1954) **COMB. NOV.**
(FIGS 4–5, 17–18, 29–30, 39, 43–44, 51)

Asymmathetes rugicollis Voss, 1954: 210.

Redescription: Female. Species medium-sized (LB, 9.3 mm) (Fig. 4). *Tegument* visible, reddish brown, shiny. *Vestiture* composed of scattered setae, whitish on head, legs, and venter, ocher on pronotum and elytra; setae on sides of pronotum, and margins and posterior third of elytra denser than on anterior two-thirds of disc; elytra with suberect setae and minute, decumbent, seta-like scales. *Rostrum* short (Fig. 4) (LR/WRa, 1), sides slightly convergent towards apex (WRb/WRa, 1.38), dorsum flat, strigose with longitudinal wide striae; median groove narrow, slightly exceeding posterior margin of eyes. Epistome slightly depressed. Eyes large and strongly convex. Frons strigose with longitudinal wide striae. Vertex foveolate–strigose with oblique striae. *Antennae* (Fig. 17) (LB/LA, 2.44) with scarce pilosity; scape reaching posterior margin of eyes. Funicular article 2 about 1.33× as long as article 1; funicular article 3, 2× longer than wide and funicles 4–7 slightly longer than wide; club slightly fusiform (LC/WC, 2.44).

Pronotum (Fig. 4) slightly conical, slightly wider than long (WP/LP, 1.21); flanks slightly curved; disc densely foveolate on centre and granulose on sides, or completely densely granulose; median groove shallow or absent; anterior margin slightly curved anteriorly, slightly thickened; base posteriorly V-shaped. *Scutellum* large.

Elytra (Fig. 4) short (LE/WE, 1.37), with maximum width at middle, moderately convex; base strongly curved backwards on middle; striae with large oval punctures, striae 9–10 closer on posterior two-thirds; intervals rugose–granulose, slightly convex to flat, as wide as striae to slightly narrower; apex acute, slightly divided, and projected.

Legs. Procoxae almost reaching anterior margin of prosternum; protibiae with row of between seven and nine acute small denticles and large hook-like mucro; mesotibiae with small denticles and small mucro, and metatibiae without denticles and mucro; metatibial apex with broad corbel covered with setae; apical and dorsal comb subequal.

Abdomen (Fig. 18). Intercoxal portion of ventrite 1 broader than metacoxal cavities (1.5×); ventrite 2 longer than ventrites 3 and 4 combined (1.31×); posterior margin of ventrite 5 slightly pointed; tergites I–VII slightly sclerotized.

Terminalia. Sternite VIII (Fig. 29) with plate subrhomboidal, not elongate, having apical tuft of long

setae and shorter setae in apical margin; V-shaped sclerotization with wide lateral arms reaching half of plate, and median line membranose; apodeme about 2× longer than plate. Ovipositor (Fig. 30) shorter than ventrites 1–5 (0.72×); without setae on sides of baculi; ventral baculi slightly divergent towards base; styli thin, directed laterally. Spermathecal body (Fig. 39) subcylindrical, long; nodulus conical, short; ramus indistinct; cornu very long; spermathecal duct (Fig. 39) medium-sized, as long as half ovipositor (~1.5 mm) membranous and wide.

Male (Fig. 5). Smaller (8.3–8.7 mm) and more slender than female; rostrum slightly longer and less conical (L/W, 1.07–1.15; Wb/Wa, 1.23–1.32); antenna longer (LB/LA, 2.29–2.30), club slightly more elongate (L/W, 2.44–2.61); postocular constriction slight; pronotum (W/L, 1.09–1.22; LE/LP, 2–2.18) with base slightly bisinuate and posterolateral angles slightly projected backwards; scutellum smaller; elytra more slender (L/W, 1.52), with thickened base, curved, and angles projected anteriorly, shoulders reduced; mesotibiae without denticles; metatibiae with medium-sized mucro; and posterior margin of ventrite 5 bilobed.

Genitalia (Figs 43–44). Median lobe with rounded apex, in the same line with its apodemes; median lobe plus apodemes shorter than abdomen (0.88×); apodemes shorter than remaining part of median lobe (0.70); endophallus with two wing-shaped sclerites.

Comparative notes and diagnosis

Leschenius rugicollis comb. nov. is most closely related to the pair *L. bifurcatus* sp. nov.–*L. manuei* sp. nov. (see cladogram; Figure 52), based on similar head sculpture, frons (strigose), and pronotum (foveolate–granulose), eyes strongly convex, spermathecal body subcylindrical and short, and apex of the median lobe evenly rounded.

Leschenius rugicollis comb. nov. resembles *L. manuei* sp. nov., based on the large scutellum, maximum elytral width at middle, elytral apex slightly divided, and metatibiae with subequal apical and dorsal combs and narrow corbel, and with a small mucro in males. It differs from *L. manuei* sp. nov. by the pronotum of males wider than long, with slightly bisinuate base, male elytral base curved back in a V, striae 9 and 10 approximate on posterior two-thirds, and the ovipositor without setae on sides of baculi.

Type material

The type material of *Asymmathetes rugicollis* Voss, 1954 was deposited at the Museum of Hamburg, in the author's collection, which was destroyed during World War II (Weidner, 1979), years before the publication of Voss's paper.

We studied specimens from the Kuschel collection, held at the NZAC (included in the list of material

examined), identified by the specialist G. Kuschel. The characters of the specimens match those of the original description, except for the slightly smaller size of the type specimens (6.5–7 mm).

For the reasons expressed above, and with the reported destruction of the type series, we decided to designate a neotype, following the conditions established in the International Code of Zoological Nomenclature (ICZN), Article 75.3. *Neotype*. Female, 9.3 mm long, 'Loja, Abbé Gaujon col., *Asymmathetes rugicollis* Voss Det. G. Kuschel 1985' (NZAC).

Other material examined

ECUADOR. *Loja*: Loja, Abbé Gaujon col., *Asymmathetes rugicollis* Voss Det. G. Kuschel 1985 (2♀♀ 2♂♂ NZAC).

Distribution: Ecuador (Loja), about 2100 m a.s.l.

LESCHENIUS MANUELI SP. NOV.

(FIGS 6–8, 19–20, 31–32, 40, 45–46, 51)

Type material: *Holotype*. Female, 9.1 mm long, 'ECUADOR, AZUAY, VIA CUENCA LOJA, 5 km DE ONA, 13–I–1997, A. Paucar' (PUCE). Genitalia dissected and placed in a vial with glycerine.

Allotype. Male, 9 mm long, same data as holotype (PUCE).

Paratypes. 1♀ 1♂ same data as holotype (PUCE).

Etymology: this species is dedicated to Juan Manuel del Río, father of the first author.

Description: *Female*. Species medium-sized (LB, 8.8–9.1 mm) (Figs 6–7). *Tegument* visible, black, shiny, antennae reddish brown. *Vestiture* composed of scattered setae, whitish to cream; setae slightly more dense on sides of pronotum, and margins and posterior third of elytra. *Rostrum* short (Figs 6–7) (LR/WRa, 1.03), sides slightly convergent towards apex (WRb/WRa, 1.36), dorsum slightly depressed, foveolate-strigose, with longitudinal deep striae; median groove narrow, slightly exceeding posterior margin of eyes. Epistome slightly elevated. Eyes medium-sized and strongly convex. Frons foveolate-strigose. Vertex densely punctuate. *Antennae* (Fig. 19) (LB/LA, 2.25); scape reaching posterior margin of eyes. Funicular article 2 about 1.6× as long as article 1; funicular articles 3–4 slightly longer than wide, and funicles 5–7 moniliforms; club slightly fusiform (LC/WC, 2.38).

Pronotum (Figs 6–7) slightly conical, moderately wider than long (WP/LP, 1.32); flanks moderately curved; disc densely foveolate at centre, and densely granulose on sides; median groove distinct; anterior margin slightly curved anteriorly, slightly thickened; base posteriorly 'V'-shaped. *Scutellum* large.

Elytra (Figs 6–7) short (LE/WE, 1.37–1.39), with maximum width at middle, moderately convex; base more strongly posteriorly curved than in other species; striae with medium-size oval punctures, striae 9–10 not closer on posterior two-thirds; intervals slightly convex, slightly wider than striae; apex acute, entire, and projected.

Legs. Procoxae reaching anterior margin of prosternum; protibiae with row of nine or ten very acute, medium-sized denticles and large mucro; mesotibiae crenulate with minute mucro and metatibiae without denticles and mucro; metatibial apex with very narrow and denuded corbel; apical and dorsal comb subequal.

Abdomen (Fig. 20). Intercostal portion of ventrite 1 broader than metacoxal cavities (1.7×); ventrite 2 longer than ventrites 3 and 4 combined (1.5×); apex of ventrite 5 slightly pointed; tergites I–VII slightly sclerotized.

Terminalia. Sternite VIII (Fig. 31) with plate sub-rhomboidal, not elongate, having apical tuft of long setae and shorter setae in apical margin; 'V'-shaped sclerotization, with lateral arms reaching half of plate; apodeme about 3× longer than plate. Ovipositor (Fig. 32) shorter than ventrites 1–5 (0.80×); with fine scattered setae on external side of baculi; ventral baculi subparallel; styli moderately wide, directed backwards. Spermathecal body (Fig. 40) subcylindrical, short; nodulus conical, short; ramus developed; cornu medium-sized; spermathecal duct (Fig. 40) short, slightly shorter than half ovipositor (~1.5 mm), membranous and wide.

Male (Fig. 8). Same size as female (9 mm). Rostrum slightly longer (L/W, 1.16) than in females and more distinctly conical (Wb/Wa, 1.45); eyes strongly convex; pronotum slightly wider than long (W/L, 1.35), longer (LE/LP, 2.30), more strongly curved on sides, with base strongly bisinuate and posterolateral angles projected backwards; scutellum smaller; elytra slightly slender and shorter (L/W, 1.34), with parallel sides, thickened base projected anteriorly, punctures of striae larger; estriae 9 and 10 slightly approximate on posterior two-thirds; and posterior margin of ventrite 5 emarginate.

Genitalia (Figs 45–46). Median lobe with truncate rounded apex, almost in the same line (not forming angle) with its apodemes; median lobe plus apodemes slightly shorter than abdomen (0.93×); apodemes shorter than remaining part of median lobe (0.75); endophallus with spines and a central long baculum with two lateral sclerites in the proximal area.

Comparative notes and diagnosis

Leschenius manueli sp. nov. is the sister species of *L. bifurcatus* sp. nov. (see comparative notes and diagnosis section of *L. bifurcatus* sp. nov.).

Leschenius manueli sp. nov. resembles *L. rugicollis* comb. nov. in the sculpture of pronotum (foveolate–granulose), the large scutellum, the elytra with maximum width at distal half, and by the metatibiae with combs subequal, corbel narrow, and with mucro small and only present in males. It differs from *L. rugicollis* comb. nov. by the less convex eyes, the much wider than long pronotum of the males, with strongly bisinuate base, by striae 9 and 10 not approximate on posterior two-thirds, by the ovipositor with conspicuous setae on sides of baculi, and by the apex of the median lobe rounded.

Distribution: *Leschenius manueli* sp. nov. is endemic to Ecuador (Azuary), where it occurs at about 2500 m a.s.l.

Remarks: The female paratype shows one of the elytra more developed and longer than the other. This exemplar would be teratological.

LESCHENIUS NIGRANS (OLIFF, 1891) COMB. NOV.

(FIGS 9–10, 21–22, 33–34, 41, 47–48, 51)

Naupactus nigrans Olfiff 1891: 66.

Asymmathetes nigrans: Kuschel in Wibmer & O'Brien 1986: 53.

Redescription: Female. Species large (LB, 11.5 mm) (Fig. 9). *Tegument* visible, reddish-brown, shiny. *Vestiture* with very sparse setae on head and pronotum; whitish on head, pronotum, legs, and venter, pale ocher on elytra; setae on elytra only visible on posterior third. *Rostrum* short (Fig. 9) (LR/WRa, 1), sides slightly convergent towards apex (WRb/WRa, 1.33), dorsum slightly depressed, foveolate–strigose, with longitudinal wide striae; median groove narrow, deep, slightly exceeding posterior margin of eyes. Epistome slightly depressed. Eyes large, moderately convex. Frons foveolate–punctulate. Vertex densely foveolate. *Antennae* (Fig. 21) (LB/LA, 2.94); scape reaching posterior margin of eyes. Funicular article 2 about 1.15× as long as article 1, funicular articles 3–5, 2× longer than wide, and funicular articles 6–7 slightly longer than wide; club oval (LC/WC: 2.15).

Pronotum (Fig. 9) slightly conical and slightly wider than long (WP/LP, 1.14); flanks moderately curved; disc densely punctate; median groove absent; anterior margin slightly curved anteriorly, slightly thickened; base posteriorly 'V'-shaped. *Scutellum* small.

Elytra (Fig. 9) short (LE/WE, 1.5), with maximum width at anterior third, slightly convex; base slightly curved backwards on middle; striae with medium-sized punctures; striae 9–10 closer on posterior two-thirds; intervals slightly convex to flat and slightly wider than striae; apex acute, divided, and projected.

Legs. Procoxae almost reaching anterior margin of prosternum; protibiae with row of between eight and ten acute medium-sized denticles and large hook-like mucro; meso- and metatibiae without denticles and mucro; metatibial apex with broad corbel covered with small setiform scales; apical comb slightly longer than dorsal comb (1.25×).

Abdomen (Fig. 22). Intercostal portion of ventrite 1 broader than metacostal cavities (1.28×); ventrite 2 longer than ventrites 3 and 4 combined (1.39×); posterior margin of ventrite 5 slightly pointed; tergites I–VII moderately sclerotized.

Terminalia. Sternite VIII (Fig. 33) subrhomboidal, not elongate, with apical tuft of long setae and shorter setae on apical third, and 'V'-shaped sclerotization, with wide lateral arms reaching half of plate; apodeme 2.42× longer than plate. Ovipositor (Fig. 34) shorter than ventrites 1–5 (0.63×), with setae on sides of baculi; ventral baculi subparallel; styli thin, directed backwards. Spermathecal body (Fig. 41) subcylindrical, elongate; nodulus conical, short; ramus indistinct; cornu very long; spermathecal duct (Fig. 41) medium-sized, as long as two-thirds of ovipositor (~2.2 mm), membranous, and moderately wide.

Male (Fig. 10). Smaller than female (10 mm); rostrum (L/W, 1.07; Wb/Wa, 1.30); antenna longer (LB/LA, 2.46), club slightly more elongate (L/W, 2.48); pronotum (W/L, 1.11) more strongly curved on sides, with base slightly bisinuate and posterolateral angles projected and directed backwards; elytra more slender and elongate (L/W, 1.52), with thickened 'V'-shaped base; humeral angles slightly projected anteriorly, shoulders absent; metatibiae with small mucro; posterior margin of ventrite 5 blunt.

Genitalia (Figs 47–48). Median lobe with slightly pointed apex, forming an angle of about 90° with its apodemes; median lobe plus apodemes shorter than abdomen (0.72×); apodemes shorter than remaining part of median lobe (0.55); endophallus with two wing-shaped sclerites.

Comparative notes and diagnosis

Leschenius nigrans comb. nov. and *L. silviae* sp. nov. are sister species, sharing a similar sculpture of the rostrum (foveolate–strigose), the frons (foveolate), and the pronotum (densely foveolate); funicular article 2 longer than 1; medium-sized scutellum; apical comb of metatibiae longer than the dorsal comb; posterior margin of ventrite 5 of males blunt; median lobe about twice shorter than its apodemes; and angle between the longitudinal axis of median lobe and its apodemes obtuse. It differs from *L. silviae* sp. nov. by its larger body size; oval club; longer than wide pronotum; divided and acute elytral apex; elytral intervals flat, slightly wider than striae; smaller denticles of

the protibiae; broader corbel of metatibiae; ventrite 5 of females with slightly pointed apex; and spermatheca with truncated-conical nodulus.

Type material

It was not possible to study the type material of *Naupactus nigrans*; however, we have examined specimens from Kuschel's collection currently held in the NZAC, identified by the specialist G. Kuschel by comparison with the type material.

Material examined

ECUADOR. No loc. Baron (1♀ NZAC). *Imbabura*: Ibarra, 30–XII–1930 (1♂ NZAC). *Pichincha*: Puenbo, 2480 m, 20–XI–1931, *nigrans* Olliff comp. c. type Kuschel 1954 (1♂ NZAC).

Distribution: Ecuador (Imbabura and Pichincha), about 2500 m a.s.l.

LESCHENIUS SILVIAE SP. NOV.

(FIGS 11–12, 23–24, 35–36, 42, 49–50, 51)

Type material: *Holotype*. Female, 7.9 mm long, 'Cuenca Jesta' (NZAC). Genitalia dissected and placed in a vial with glycerine.

Allotype. Male, 7.8 mm, 'Cañas' (NZAC). Genitalia dissected and placed in a vial with glycerine.

Paratypes. 2 ♂♂, same data as allotype (NZAC).

Etymology: this species is dedicated to Silvia E. Antonelli, mother of the first author.

Description: *Female*. Species medium-sized (LB, 7.9 mm) (Fig. 11). *Tegument* visible, reddish brown, shiny. *Vestiture* with very sparse setae on head and pronotum; whitish on head, legs, and venter, pale ocher on pronotum and elytra; setae on elytra, only visible on posterior third. *Rostrum* very short (Fig. 11) (LR/WRA, 0.96), sides slightly convergent towards apex (WRb/WRA, 1.37), dorsum flat, foveolate-strigose, with longitudinal wide striae; median groove narrow, deep, exceeding posterior margin of eyes. Epistome strongly depressed. Eyes large and moderately convex. Frons and vertex densely foveolate. *Antennae* (Fig. 23) (LB/LA, 2.47) with scarce setae; scape exceeding posterior margin of eyes. Funicular article 2 about 1.1× as long as article 1; funicular articles 3–7 slightly longer than wide; club slightly fusiform (LC/WC, 2.36).

Pronotum (Fig. 11) subcylindrical, moderately wider than long (WP/LP, 1.35); flanks moderately curved; disc densely foveolate; median groove absent; anterior margin straight, slightly thickened; base posteriorly 'V'-shaped. *Scutellum* small.

Elytra (Fig. 11) short (LE/WE, 1.37), with maximum width at anterior third, moderately convex;

base strongly curved backwards on middle; striae with large, oval punctures; striae 9–10 closer on posterior two-thirds; intervals slightly convex, as wide as striae; apex slightly pointed, entire and projected.

Legs. Procoxae almost reaching anterior margin of prosternum; protibiae with row of between eight and ten acute small denticles, and large hook-like mucro; mesotibiae with small denticles and mucro, and metatibiae without denticles and with small mucro; metatibial apex with narrow corbel covered with small scarce setiform scales, apical comb slightly longer than dorsal comb (1.3×).

Abdomen (Fig. 24). Intercostal portion of ventrite 1 broader than metacoxal cavities (1.5×); ventrite 2 longer than ventrites 3 and 4 combined (1.34×); posterior margin of ventrite 5 emarginate; tergites I–VII membranose.

Terminalia. Sternite VIII (Fig. 35) with plate subrhomboidal, not elongate, thickened at base, with apical tuft of long setae; 'V'-shaped sclerotization with lateral arms reaching middle of plate; apodeme 2.6× longer than plate. Ovipositor (Fig. 36) shorter than ventrites 1–5 (0.81×); without setae on sides of baculi; ventral baculi slightly divergent towards base; styli thick, directed backwards. Spermathecal body (Fig. 42) subglobose; nodulus tubular, with a constriction near body; ramus indistinct; cornu very long; spermathecal duct (Fig. 42) medium-sized, as long as half of ovipositor (~1.6 mm), membranous, and moderately wide.

Male (Fig. 12). Same size as female (7.8–8.4 mm); rostrum slightly longer and less conical (L/W, 1.07–1.08; Wb/Wa, 1.23–1.36); antennae longer (LB/LA, 2.21–2.29), club more elongate (L/W, 2.47–2.67); pronotum wider than long (W/L, 1.25–1.28; LE/LP, 2.5–2.61), with base moderately bisinuate, and posterolateral angles projected and directed backwards; elytra more elongate (L/W, 1.39–1.52), with thickened base, 'V'-shaped backwards, shoulders reduced, with humeral angles slightly projected anteriorly and elytral apex less acute; protibiae with small denticles, mesotibia without denticles, and metatibiae with larger mucro than in females; posterior margin of ventrite 5 blunt.

Genitalia (Figs 49–50). Median lobe with slightly pointed apex, forming an obtuse angle with its apodemes; median lobe plus apodemes slightly longer than abdomen (1.07×); apodemes much shorter than median lobe (0.45); endophallus without sclerotized armature.

Comparative notes and diagnosis

The new species *L. silviae* sp. nov. resembles *L. nigrans* comb. nov., being sister species. They share the foveolate-strigose rostrum; the medium-sized scutellum, with apical comb of metatibiae longer than dorsal comb; the posterior margin of ventrite 5 of

male blunt; the median lobe about twice shorter than its apodemes; and the angle between the longitudinal axis of median lobe and its apodemes obtuse. It differs from *L. nigrans* comb. nov. by the smaller size, the more elongate club, the much wider than long pronotum, with larger punctures and straight base, the elytral apex slightly pointed and entire; intervals slightly convex, as wide as striae; protibiae with smaller denticles, and corbel of metatibiae narrow; posterior margin of ventrite 5 emarginate in females, and spermatheca with tubular nodulus a constriction near spermathecal body.

Distribution: It is endemic to Ecuador (Azuay), and is distributed between 2450 and 3100 m a.s.l.

CLADISTIC ANALYSIS: RESULTS AND DISCUSSION

The parsimony analysis resulted in a single most parsimonious cladogram of 144 steps in length, with a consistency index (CI) of 0.58 and a retention index (RI) of 0.52 (Fig. 52).

The sister genus of *Leschenius* is *Asymmathetes* (B, 5; JK, 78). These genera share several synapomorphies, mainly the rostrum very short (character 5.1), the epistome narrow (character 8.0), and the procoxae separate from each other (character 28.1). The absence of elytral vestiture (character 1.2) is a

feature common to other genera distributed in the high Andes (del Río & Lanteri, 2007): it is shared by the clade made up of *Leschenius*, *Asymmathetes*, and *Amitrus*, and apparently has evolved independently in *Melanocyphus*.

The monophyly of the new genus is well supported (B, 4; JK, 77) by several synapomorphies, mainly: the pre-epistome well developed (character 10.1); the pronotum slightly conical (character 15.1); the pronotal base 'V'-shaped (character 17.2); the elytral humeri slightly prominent to absent (character 23.1); and the procoxae almost contiguous with anterior margin of prosternum (character 29.0).

Leschenius vulcanorum comb. nov. is the sister taxon of the remaining species, that forms a clade (B, 3; JK, 53) justified by several synapomorphies, such as the sides of rostrum slightly convergent towards apex (character 6.0), the rostral sulcus exceeding the posterior margin of eyes (character 7.1), the elytral base strongly curved backwards at middle (21.2), and the elytral apex projected (character 24.1). This clade is divided into two groups, one including *L. nigrans* comb. nov. and *L. silviae* sp. nov. (B, 1; JK, 48), and the other, with *L. rugicollis* comb. nov., *L. manueli* sp. nov., and *L. bifurcatus* sp. nov. The first group is characterized by six apomorphies: funicular article 2 more than 1.5× longer than article 1 (character 13.0); maximum width of elytra at anterior third (character 20.2); apical comb of metatibiae

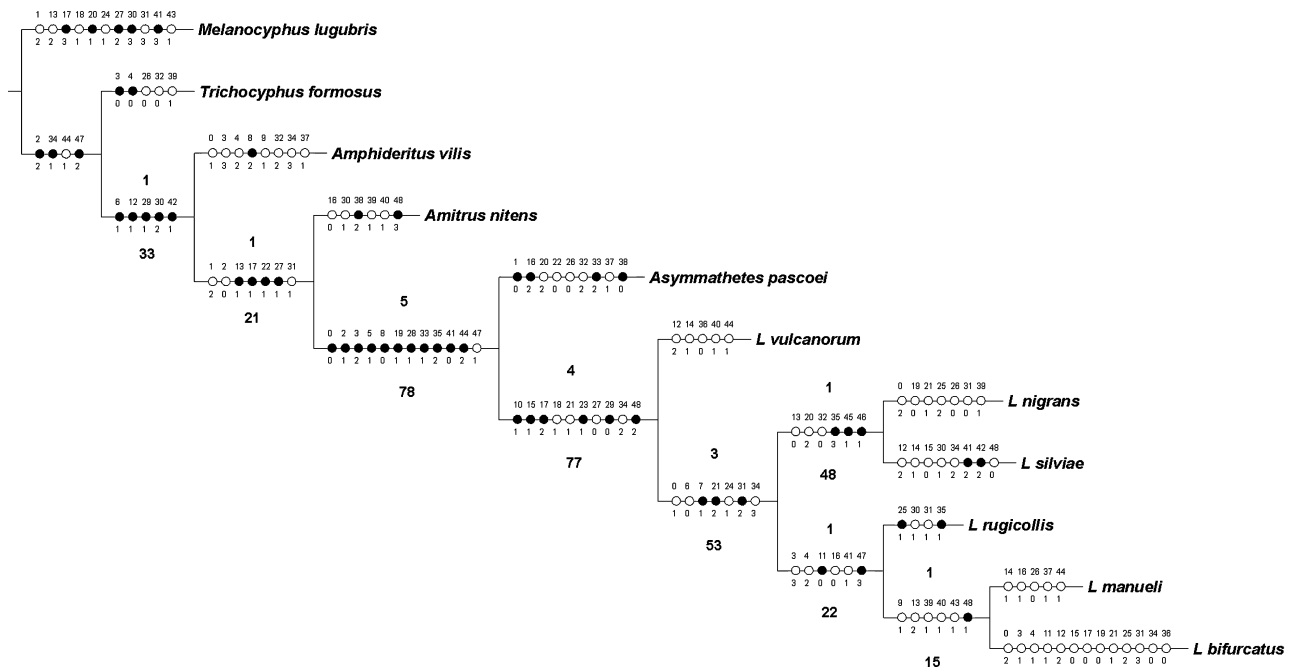


Figure 52. Most parsimonious cladogram of the six species of *Leschenius* plus five out-groups: ○, homoplasious characters; ●, apomorphies. Bremer support values are listed above the branches and jackknife values are listed below the branches. Length: 144 steps; consistency index, CI = 0.58; retention index, RI = 0.52.

longer than dorsal comb (character 32.0); posterior margin of ventrite 5 blunt in males (character 35.3); median lobe of aedeagus about twice shorter than its apodemes (character 45.1); and angle between longitudinal axis of median lobe and its apodemes obtuse to about 90° (character 46.1). The second group is mainly supported by the eyes strongly convex (character 11.0), the spermathecal body subcylindrical, short (character 41.1), and the apex of the median lobe evenly rounded (character 47.3). Within this clade *L. manuli* sp. nov. and *L. bifurcatus* sp. nov. are sister species supported by several synapomorphies such as the epistome elevated (character 9.1), the funicular articles 2 and 1 subequal (character 13.2), the presence of rows of setae along sides of baculi (ovipositor) (character 39.1), the spermathecal duct as long as half the ovipositor length (character 40.1), the ramus of spermatheca well developed (character 43.1), and the endophallic armature with a long central sclerotized piece (character 48.1). The presence of setae along the sides of baculi, as shown by the derived species of *Leschenius*, is not unique in the tribe Naupactini, occurring in other genera, particularly in *Naupactus* Dejean, 1821 and *Teratopactus* Heller, 1921 (Lanteri & del Río, 2008).

ACKNOWLEDGEMENTS

We thank all the curators who loaned us the specimens for study and the 'Consejo Nacional de Investigaciones Científicas y Técnicas' (CONICET), Argentina, for continuous support.

REFERENCES

- Alonso-Zarazaga MA, Lyal CHC. 1999.** *A world catalogue of families and genera of Curculionoidea (Insecta: Coleoptera)*. Barcelona: Entomopraxis.
- Bremer K. 1994.** Branch support and tree stability. *Cladistics* **10**: 295–304.
- Cabrera AL, Willink A. 1973.** *Biogeografía de América Latina*, Monografía 13. Washington DC: Serie de Biología, OEA, 122.
- Canchala MB. 1992.** Estudios biológicos de *Naupactus* sp. Coleoptera: Curculionidae. Nueva plaga en Nariño. Thesis, Universidad de Nariño, Facultad de Ciencias Agrícolas, Pasto, Colombia.
- Farris JS. 1989.** The retention index and the rescaled consistency index. *Cladistics* **5**: 417–419.
- Garza PJP. 2007.** The Colombian Potato Whitefringed Weevil. Life History of the 'Tiroteador de la Papa' (*Naupactus* sp.; Curculionidae). *Curculio* **55**: 12–13.
- Goloboff PA, Farris JS, Nixon KC. 2008.** TNT, a free program for phylogenetic analysis. *Cladistics* **24**: 774–786.
- Harris RA. 1979.** A glossary of surface sculpturing. *Occasional Papers in Entomology* **28**: 1–32.
- Kluge AG, Farris J. 1969.** Quantitative phyletics and the evolution of anurans. *Systematic Zoology* **18**: 1–32.
- Lanteri AA. 1995.** Systematic revision of *Ericydeus* Pascoe (Coleoptera: Curculionidae). *Entomologica Scandinavica* **26**: 393–424.
- Lanteri AA, Normark BB. 1995.** Parthenogenesis in the tribe Naupactini (Coleoptera: Curculionidae). *Annals of the Entomological Society of America* **88**: 722–731.
- Lanteri AA, del Río MG. 2008.** Caracteres genitales de la hembra en la clasificación y filogenia de la tribu Naupactini (Coleoptera: Curculionidae). In: Llorente Bousquets J, Lanteri AA, eds. *Contribuciones taxonómicas en órdenes de insectos hiperdiversos*. Mexico: UNAM- RIBES-CYTED, 159–176.
- Lanyon SM. 1985.** Detecting internal inconsistencies in distance data. *Systematic Zoology* **34**: 397–403.
- Morrone JJ. 2001.** *Biogeografía de América Latina y el Caribe. Manuales & Tesis*. Volumen 3. Zaragoza, España: Sociedad Entomológica Aragonesa (SEA). Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo (CYTED). Sociedad Entomológica Aragonesa (SEA).
- Morrone JJ. 2006.** Biogeographic areas and transition zones of Latin America and the Caribbean Islands based on pan-biogeographic and cladistic analyses of the entomofauna. *Annual Review Entomology* **51**: 467–494.
- Munro JA. 1968.** Insects affecting potatoes in Bolivia. *Journal of Economic Entomology* **61**: 882.
- Nixon KC. 2002.** *Winclada ver. 1.00.08*. Ithaca, NY: Cornell University. Published by the author.
- Peña L. 2001.** Gusanos blancos de la papa, biología y manejo. *Innovación Y Cambio Tecnológico* **2**: 29–33.
- del Río MG. 2009.** Estudio taxonómico y cladístico de los géneros de la tribu Naupactini (Coleoptera: Curculionidae) distribuidos en la subregión Páramo-Puneña o Zona de Transición Sudamericana. PhD thesis, Universidad Nacional de La Plata, Argentina.
- del Río MG, Lanteri AA. 2007.** Taxonomic revision of *Melanocyphus* Jekel (Coleoptera: Curculionidae). Studies on Neotropical Fauna and *Environment* **42**: 127–132.
- del Río MG, Lanteri AA.** Filogenia preliminar de los géneros de la tribu Naupactini (Coleoptera: Curculionidae). IX Reunión Argentina de Cladística y Biogeografía, La Plata 15-17 de noviembre de 2010, abstract: 32.
- Rodriguero MS, Confalonieri V, Guedes J, Lanteri AA. 2010.** Wolbachia infection in the tribe Naupactini: association between thelytokous parthenogenesis and infection status. *Insect Molecular Biology* **19**: 599–705.
- Weidner H. 1979.** Die entomologischen sammlungen des zoologischen institut und zoologischen museums der universität Hambur. *Mitteilungen Aus Dem Hamburgischen Zoologischen Museum Und Institut* **76**: 395–468.
- Wibmer GJ, O'Brien CW. 1986.** Annotated checklist of the weevils (Curculionidae sensu lato) of South America (Coleoptera: Curculionoidea). *Memoirs of the American Entomological Institute* **39**: 1–563.