A NEW GENUS AND SPECIES OF FLEA BEETLE (COLEOPTERA: CHRYSMELIDAE: ALTICINAE) FROM THE RAINFOREST CANOPY IN COSTA RICA

DAVID G. FURTH

Department of Entomology, National Museum of Natural History, Smithsonian Institution, P. O. Box 37012, MRC 165, Washington, D. C. 20013-7012, U.S.A. (e-mail: furthd@si.edu)

Abstract.—Laselva, n. gen., and Laselva triplehorni, n. sp., are described and illustrated from the canopy of a lowland Atlantic rainforest in Costa Rica. The genus belongs to the “Sphaeronychini” of the Alticinae.

Key Words: La Selva, ALAS Project, morphology, rainforest canopy fogging, Sphaeronychini, Monoplatini

This new genus belongs to an unusual group of genera of the Alticinae often called the “Monoplatini or Sphaeronychini.” This group has traditionally been placed near the end of the Alticinae in checklists (e.g., Seeno and Wilcox 1982) and catalogs (e.g., Heikertinger and Csiki 1939–40, Riley et al. 2003) — a kind of “catalogue phylogeny” without any explanation as to the reason for such placement. The genera included in the “Monoplatini or Sphaeronychini” may be monophyletic, but no true study of this has been undertaken. Morphologically this group of Alticinae genera is characterized by a globosely swollen apical metatarsal segment, closed procoxal cavities, and striate elytra often with thick or very dense patterned or colored pubescence. However, there has never been an accurate or comprehensive treatment of the Alticinae at a tribal level, so the use of tribal names is not really a true reflection of their classification. As discussed in Furth and Suzuki (1998), Furth and Lee (2000), and elsewhere, I prefer not to follow the classification scheme in Reid (1995) that uses the tribal terminology of Alticini and Galerucini within the Galerucinae. See Discussion section below for more details about the use of the name “Monoplatini and Sphaeronychini.”

Species in the “Monoplatini/Sphaeronychini” are relatively uncommon in collections and especially rare as series of specimens (personal observation). I have long believed that this is because many or most live in the forest canopy. Furth et al. (2003) reported 247 species in 68 genera of Alticinae collected by various structured/quantitative sampling techniques from a single site (La Selva Biological Station, Costa Rica) over a 9-year period. This study showed that over such a long sampling period Malaise trapping was more efficient on a per-individual basis and canopy fogging was more efficient on a per-sample basis. This study also demonstrated that fogging multiple tree species captured species at a higher rate than fogging a single tree species when species accumulation curves were compared on a per-individ-
ual basis, but not when compared on a per-sample basis. In Furth et al. (2003), of the 247 species collected only 37 species showed a bias for being found by canopy fogging and only 23 of these species showed a strong bias (i.e., p<0.001) for the canopy, one of these was listed as “Monoplatini new genus” and is the subject of this paper.

**METHODS**

The study site is La Selva Biological Station (Heredia, Costa Rica, 84° 01’W, 10° 26’N). It consists of a lowland Atlantic tropical rainforest of about 1500 hectares with elevations from 50–150 m and a mean annual rainfall of 4 m. The habitat is a mosaic of lowland rainforest, second growth forest of various ages and abandoned pastures (McDade et al. 1993).

The Alticinae inventory of La Selva was conducted as part of Project ALAS (http://viceroy.eeb.uconn.edu/ALAS/ALAS.html). Project ALAS was a large collaborative effort to survey the arthropods of La Selva (Pentaclethra macroloba (Willd.) O. Ktze., Fabaceae), six individual trees of a species of intermediate abundance (Virola koschnyi Warb., Myristicaceae), and one individual each of trees from six additional families. Six areas dispersed across the available primary forest were chosen. In each area three trees were selected: a Pentaclethra, a Virola, and one of the six unique species. The three trees in a group were usually fogged on consecutive days, and the 6 groups were fogged at approximately two–month intervals over one calendar year. In October and November of 1994 a second sampling was done by fogging seven sets of three trees, all compressed into this two–month period instead of spread over a year. Again each group of three contained a Pentaclethra macroloba, a Virola koschnyi, and a distinct species in the “other” category. Another set of six samples was taken in late December 1999 and early January 2000. These were from diverse species in a variety of families, all from one area in primary forest. Finally, a set of six samples was taken in late December 1999 and early January 2000, all from one area in primary forest. Specimens were captured in funnels slung beneath tree crowns. Following fogging, a two-hour drop time was allowed. The fogging machine used a 3% solution of a natural pyrethrin insecticide with synergists, in a petroleum distillate carrier.

Rica, with the exception of those distributed to taxonomic specialists or collaborators, following INBio and Costa Rican regulations.

Canopy fogging sampling methods were described in Furth et al. (2003) and followed the general procedures of Erwin (1983), Adis et al. (1984), and Stork (1988). During the 1993–1994 sampling period, eighteen trees were selected for canopy fogging: six individual trees of the most common tree species at La Selva (Pentaclethra macroloba (Willd.) O. Ktze., Fabaceae), six individual trees of a species of intermediate abundance (Virola koschnyi Warb., Myristicaceae), and one individual each of trees from six additional families. Six areas dispersed across the available primary forest were chosen. In each area three trees were selected: a Pentaclethra, a Virola, and one of the six unique species. The three trees in a group were usually fogged on consecutive days, and the 6 groups were fogged at approximately two–month intervals over one calendar year. In October and November of 1994 a second sampling was done by fogging seven sets of three trees, all compressed into this two–month period instead of spread over a year. Again each group of three contained a Pentaclethra macroloba, a Virola koschnyi, and a distinct species in the “other” category. Another set of six samples was taken in late December 1999 and early January 2000. These were from diverse species in a variety of families, all from one area in primary forest. Finally, a set of six samples was taken in late December 1999 and early January 2000, all from one area in primary forest. Specimens were captured in funnels slung beneath tree crowns. Following fogging, a two-hour drop time was allowed. The fogging machine used a 3% solution of a natural pyrethrin insecticide with synergists, in a petroleum distillate carrier.
Specimens have three labels, one a general project locality label, a second with exact date, collecting code with the collecting method (FPM = fogging of Pentaclethra macroloba, FVK = fogging of Virola koschnyi, FOT = fogging of other species of trees), fogging event number, and funnel number, and the third is the project bar code. The holotype and some paratypes are deposited in the collection at the Instituto Nacional de Biodiversidad (INBio) in San José, Costa Rica. Other paratypes are deposited at the Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D. C. U.S.A. (USNM).

The numbers associated with the antennomeres are not actual measurements, they are relative numbers taken from the ocular scale in the Leitz MZ APO dissecting microscope used in this study to indicate the relative lengths of the antennomeres.

The photographs of the genitalia and metafemoral spring were taken with an Olympus BX50 compound microscope using Auto-Montage imaging software.

**RESULTS**

*Laselva Furth, new genus*

Type species: *Laselva triplehorni* Furth.

Description.—General shape oval. Body size small, less than 2 mm in length. Entire dorsum, including head, densely evenly pubescent (Fig. 1). Head broad, densely, coarsely punctate; due to heavy punctation without apparent frontal bossae or frontal furrows; eyes large, oval, interocular distance relatively narrow, especially on vertex; antennae short only reaching elytral humeri, stout with apical 4–5 antennomeres apparently more swollen than previous antennomeres; mandibles narrow, apically tapering, each with 3 teeth. Pronotum wide at least twice as wide as long, lateral margins subparallel, only slightly narrowing anteriorly, only slightly narrower than base of elytra; punctuation dense, coarse; seta in anterolateral, subapical pore approximately as long as pronotum. Elytra with strong humeri, prominent basal calli (*sensu* Scherer 1983; subbasal raised areas); striate with 10 rows (including scutellar row) of subcontiguous punctures; epipleuron strongly arched dorsally to receive metafemur. Metafemur very swollen and relatively large; pro and mesotarsi with minutely appendiculate claws; metatibia (Figs. 2, 3) extending significantly beyond tarsal insertion (a distance approximately equal to first tarsal segment length). Metafemoral apical segment distinctly swollen, subglobose (sometimes with minutely subrugose surface as in Figs. 2, 3); metatibial apex with stout spine. Procoxal cavities open. Metafemoral spring: *Psylliodes* Morpho-Group (Furth 1989; Furth and Suzuki 1994; Furth and Suzuki 1998) with extended arm of dorsal lobe very short (not extending much beyond apex of ventral lobe), apically depressed, basal edge of spring flat-sided at about a 70 degree angle to central axis of dorsal lobe, basal angle of ventral lobe narrow, pointed dorsally, with very distinct sclerotized recurved flange (Fig. 4), length = 0.28 mm.

Remarks.—This new genus differs in form from all other “Monoplatini/Sphaeronychini” relative to the antennae, eye shape and size, metabiae, elytral punctuation and pubescence, and body shape and size. It most closely resembles *Distignoptera* Blake and *Hypolampsis* Clark, but has open procoxal cavities. With *Distignoptera* it shares antennal form of the apical 5 antennomeres short and swollen, dorsum with dense coarse punctuation and dense pubescence, and epipleura strongly arched dorsally to accommodate greatly swollen metafemora; however, *Distignoptera* has the dorsum with much denser pubescence...
and coarser, more rugose punctuation, elytra with more distinct basal calli, pronotum distinctly narrower at base than elytra and with protuberant medial area of disc, metatibia not extending far beyond metatarsal insertion, eyes small round, interocular distance at least twice that of the maximum eye width, and body size larger over 2.0 mm. It is less similar to *Hypolampsis* Clark, *Laselva* differing by oval body shape rather than elongate, evenly distributed dorsal pubescence rather than very dense patterned pubescence, coarse dorsal punctuation, especially on

Fig. 1. *Laselvia triplehorni*. Dorsal habitus.
Laselva has somewhat similar oval body shape, metafemoral shape, and unusual metatarsal insertion to Ulrica Scherer, but differs in many characters such as the stout thickened antennal form, prominent elytral humeri and basal calli, coarse dorsal punctation, and dorsal pubescence.

Etymology.—By an arbitrary combination of letters in the female gender, this genus is named for La Selva Biological Station (Heredia, Costa Rica) where it was discovered as part of the ALAS Project. La Selva means “the forest” in Spanish, and this genus is only known from the canopy of the forest.

Laselva triplehorni Furth, new species
(Figs. 1–10)

Description.—Body dark brown. Dorsum (head, pronotum, elytra) covered

vertex and frons, extended metatibial apex. Laselva has somewhat similar oval body shape, metafemoral shape, and unusual metatarsal insertion to Ulrica Scherer, but differs in many characters such as the stout thickened antennal form, prominent elytral humeri and basal calli, coarse dorsal punctation, and dorsal pubescence.

Etymology.—By an arbitrary combination of letters in the female gender, this genus is named for La Selva Biological Station (Heredia, Costa Rica) where it was discovered as part of the ALAS Project. La Selva means “the forest” in Spanish, and this genus is only known from the canopy of the forest.

Laselva triplehorni Furth, new species
(Figs. 1–10)

Description.—Body dark brown. Dorsum (head, pronotum, elytra) covered
Figs. 4–10. *Laselvia triplehorni*. 4, Metafemoral spring lateral view. 5, Male aedeagus ventral view. 6, Male aedeagus dorsal view. 7, Male aedeagus lateral view. 8, Female spermatheca. 9, Female vaginal palpi. 10, Female tignum.
with dense golden pubescence – one seta associated with each puncture. Venter and femora reddish brown, tibiae light brown/yellow. Male body length: 1.01–1.80 mm. Female body length: 1.58–1.98 mm. Male maximum body width: 0.75–1.01 mm. Female maximum body width: 0.80–1.08 mm (just behind humeri).

**Antenna** (Fig. 1): Short, stout, extending only a little beyond humeri. Antennomeres 1 and 2 very swollen, dark brown, 3 to 7 light brown or yellow, 3 narrow subequal in length to 2, 4 shortest, narrow, 5 somewhat thicker (in male only) than 4 only slightly shorter than 3, 6 somewhat thickened like 5 and subequal to 5, 7 swollen, subequal in length to 2, 8 swollen, dark brown, subequal to 7, 9 and 10 swollen, dark brown, subequal to 8, 11 swollen, dark brown, distinctly longer than other antennomeres. Relative antennomere lengths: Male: 8:5:5:3:4:5:6:6:6:8. Female: 6:6:5:3:3:2:5:4:5:7. Antennomere number 6 is distinctly the smallest in female, not so in male.

**Head**: Above dark brown, below usually lighter brown, above entirely covered with dense coarse punctures (subrugose) each with seta, thus pubescent; depression just above longitudinal frontal carina, carina not evident due to punctures that extend to lower frons, below lower frons with lateral frontal carina angled laterally inflated, smooth; maxillary palp basally swollen apically tapered; eye large, oval, ventrally tapered, interocular distance (dorsally) subequal to maximum eye width.

**Pronotum**: Dark brown, evenly pubescent, narrow, anterior and posterior margins straight and subparallel; densely punctured with coarse punctures often contiguous, giving a subrugose appearance; anterolaterally evidently protruding, but not truly angled/beveled, anterolateral pore subapical (just behind anterior margin) with a very long seta subequal to pronotal length (Fig. 1); posterolaterally rounded; often with a sublateral, anterolaterally oriented depression giving an elevated appearance to the central pronotal disc. Male width: 0.50–0.65 mm. Female width: 0.54–0.69 mm. Male length: 0.24–0.27 mm. Female length: 0.24–0.27 mm.

**Elytron**: Dark brown, evenly pubescent, gradually tapered apically; striate with coarse punctures, each with a seta, setae also inserted on interstrial ridges; sparsely placed longer, dark, erect setae inserted on interstrial ridges; epipleura extending entire length of elytra ending subapically, laterally flattened and smooth throughout length; 10 striae, including scutellar striae (extending over half elytral length), strial punctures very deep, coarse, almost contiguous, giving the appearance of ridges/carinae between striae, each puncture with golden, posteriorly recumbent seta, giving the appearance of rather dense golden pubescence throughout elytra; base of each elytron centrally raised as distinct bossae (see Scherer 1983); humerus strong, prominent. Male length: 1.01–1.35 mm. Female length: 1.20–1.50 mm. Male maximum width: 0.36–0.50 mm. Female maximum width: 0.39–0.54 mm.

**Legs**: All tibiae lighter brown/yellow; metafemora darker brown, densely pubescent, very swollen/inflated, dorsoventral width approximately equal to width of elytron; male first foretarsal segment not evidently swollen; metatibia apically with medial dorsal margin excavated just beyond insertion of tarsus, with serrations especially apically, outer dorsal margin with strong serrations from apex extending basally past tarsal insertion almost to midtibia with fewer teeth basally (not indicated in figures) (Figs. 2, 3). Apical metatarsal segment globosey swollen, but not as spherical as in *Disignoptera, Hypolampsis,* and
most "Sphaeronychini/Monoplatini" (Figs. 1–3).

*Venter:* Dark brown; prosternal process flat, hour-glass shaped; male with a dark longitudinal mark along midline of apical abdominal sternite.

*Genitalia:* Male Aedeagus: Ventrally smooth surfaced, parallel-sided gradually tapering to narrowly pointed apex (Fig. 5); dorsal view (Fig. 6); lateral view gradually curved (Fig. 7). Length 5.055 mm. Female: Spermatheca: (Fig. 8), length 5.00.20 mm, including ductus coil. Vaginal palpi: (Fig. 9), basally joined, length 5.00.34 mm. Tignum: (Fig. 10), length 5.00.55 mm.


Females (INBio, USNM): Costa Rica: Heredia, Est. Biol. La Selva 50–150 m. 10°26’N 84°01’W, Jan. 1993, INBio-OET; 14 Enero 1993, Virola koschnyi, FVK/01/32; bar code no. INBIOCRI002257585. ibid., FOT/46/11; INBIOCRI002257585. ibid., FOT/46/03; INBIOCRI002257599. ibid., FOT/46/20; INBIOCRI002257599. ibid., FOT/46/26; INBIOCRI0022726018.
ETYMOLGY.—This species is named for Dr. Charles A. Triplehorn (Prof. Emeritus, The Ohio State University, Columbus, Ohio) who was the author’s M.Sc. advisor as well as an inspiration and a colleague for many years since.

DISCUSSION

Specimens described above were taken by canopy fogging from 11 species of trees (numbers of specimens in parentheses): Pentaclethra macroloba (Fabaceae) (33), Virola koschnyi (Myristicaceae) (28), Sacoglottis trichogyna Cuatrec. (Humiriaceae) (2), Vitex cooperi Standl. (Lamiaceae) (4), Minquartia guianensis Aubl. (Olacaceae) (1), Pouruma minor Boenist (Cecropiaceae) (2), Eugenia sp. (Myrtaceae) (8), Carapa guianensis Aubl. (Meliaceae) (1), Tapirira guianensis Aubl. (Anacardiaceae) (1), Inga leiocalycina Benth. (Fabaceae) (2), Sclerobium costaricense N. Zamora & Poveda (Fabaceae) (1). Although the larger numbers are associated with P. macroloba and V. koschnyi these are also the most common trees and there is no clear dominant tree species. Therefore, it is assumed that none of these tree species is necessarily the true food plant of Laselva triplehorni. Certainly its food plant is a canopy plant species, but further closer investigation is necessary, possibly using more careful host plant association sampling methods like those in Novotny and Basset (2000) in order to reliably determine the food plant. The plant association results for L. triplehorni typify the results in Furth et al. (2003) that rather surprisingly there was relatively little tree species effect from fogging. The ALAS fogging program was structured to investigate the effect of tree species on fogging efficiency. The expectation was that if there were some degree of host specificity among arthropods, then fogging multiple species of trees would produce more species than fogging single species of trees. There are all degrees of host specificity in Alticinae, although in the author’s experience, more often species are at least oligophagous—feeding on several genera/species of the same plant family. It may be that in rainforests the complexity of individual tree crowns masks any tree species
effect. Fairly large-scale canopy fogging as carried out here captures arthropods from a column of fogged vegetation. Although that column contains primarily the crown of the focal tree, it also contains the edges of adjacent crowns, lianas in the focal tree, and countless species of epiphytes.

Only one species is currently known in the genus.

Considerable confusion with the use of the names “Monoplatini” and “Sphaeronychini”, including by myself, calls for some clarification. Clark (1860) published the first somewhat comprehensive treatment of this group – “Monoplatini” and he referred to Dejean (1836–1837, p. 407) as the original description for the type genus Monoplatus. Scherer (1962, 1983) considered the valid genus to be Monoplatus Clark (1860) with the type species M. nigripes Clark. Clark (1860) described 42 genera and 245 species; however, as indicated by Scherer (1962, 1983) there is considerable ambiguity and confusion in this group, beginning with the use of maxillary palpi by Clark (1860). Scherer (1962, 1983) discussed the problems of this group and stated that in the Coleopterorum Catalogus (Heikertinger and Csiki 1939–1940) further confusion occurred because some genera were incorrectly combined. Scherer (1962, 1983) included keys to 35 Neotropical genera of this group, plus 3 not included in his keys, and synonymized several genera, including Sphaeronychus Dejean, in litteris and Metriotes Clark, 1869, as junior under Monoplatus. Scherer (1962 only) included a checklist of the genera and species of the “Monoplatini” with many new combinations and some new synonyms. Seeno and Wilcox (1982) included a list of 45 genera of this group (reflecting the additional genera described by Jan Bechyné) in 3 groupings, but indicated that the use of the type genus Monoplatus Clark, 1860, had been preceded by the use of Sphaeronychus Dejean, 1837. This was also stated in Monró and Bechyné (1956). The detailed explanation for the above is as follows: In the second edition of Dejean’s Catalogue des Coléoptères (1833–1836), on page 383 both Sphaeronychus Dejean [misspelled as Sphraeronychus] (with three species: excelsus Dejean, cinctipennis Dejean, and melanurus Olivier) and Monoplatus Chevrolat (with two species: rubicundus Dejean and dimidiatus Dejean) were listed, the same was repeated on page 407 of Dejean’s third edition, 1837. S. excelsus Dejean, S. cinctipennis Dejean are apparently nomina nuda, but S. melanurus Olivier was originally described as Altica by Olivier (1808). Both M. rubicundus Dejean and M. dimidiatus Dejean are also apparently nomina nuda; therefore, Sphaeronychus melanurus (Olivier) is the type species and Monoplatus is a synonym of Sphaeronychus as stated in Monró and Bechyné (1956). The explanation of the correct year of publication is as follows: According to Barber and Bridwell (1940) pages 361–443 of Dejean’s second edition were published in 1837 (see also White 1970). However, as Madge (1988) and Pope (1992) pointed out the second edition of Dejean was actually published in 1836 and the genera attributed to Chevrolat in Dejean’s second edition were described by Chevrolat and should be quoted as Chevrolat in Dejean and this was recently corroborated by Bousquet (2004). However, in this case Sphaeronychus was not listed by Dejean as a Chevrolat name; therefore, I now prefer to use Sphaeronychus Dejean 1836 as the type genus of this still dubious tribal group name “Sphaeronychini” as was indicated in Seeno and Wilcox (1982).

ACKNOWLEDGMENTS

The habitus and metatibial illustrations were done by Mr. Young Sohn (Smithsonian Institution). The specimens are from the ALAS Project supported by National Science Foundation grants.
BSR-9025024, DEB-9401069, DEB-9706976, and DEB-0072702. Auto-Mon-
tage photos were taken by L. Rodriguez (Systematic Entomology Lab, USDA, Washington, D. C.).

LITERATURE CITED


CORRECTIONS

   In couplet 4 (p. 773) the following changes should be made:
   Left column, line 9: change Fig. 12 to Fig. 20.
   Left column, line 20: change Fig. 10 to Fig. 21.
   Left column, line 23: change Fig. 10 to Fig. 21.
   Left column, line 25: change Fig. 8 to “as in Fig. 14.”

CORRECTION TO: Furth, David G.—A new genus and species of flea beetle (Coleoptera: Chrysomelidae: Alticinae) from the rainforest canopy of Costa Rica. Proceedings of the Entomological Society of Washington 109(1):90–101. The correct epithet for this new genus and species is Laselva triplehorni as cited throughout the text; however, the figure captions (Figs. 1, 2–3, 4–10) on pages 93, 94, 95, respectively, are incorrectly cited as Laselvia. Laselva is the correct spelling.