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Description of two new species of *Notiobia* Perty from Southern Venezuela

(Insecta, Coleoptera, Carabidae, Harpalini)

Erik Arndt & David W. Wrase

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Two new species of *Notiobia* Perty are described from South America. *N. variabilis*, spec. nov. is one of the largest known species, most similar to *N. disparilis* Bates but has equally developed convex elytral intervals in both sexes. It is known from several localities in the Amazonian lowlands. *N. acuminata*, spec. nov., known only from the type locality, is one of the smallest species and is distinguished from the similar *N. flavicincta* (Erichson) and *N. umbrifera* Bates by its peculiar lanceolate aedeagus. Both species belong to the fruit fall communities in primary rain forests.

Prof. Dr. Erik Arndt, Hochschule Anhalt, Fachbereich LOEL, Strenzfelder Allee 28, D-06406 Bernburg, Germany, e-mail: earndt@loel.hs-anhalt.de

David W. Wrase, Dunckerstr. 78, D-10437 Berlin, Germany,
e-mail: david.wrase@t-online.de

Introduction

Species of the Neotropical subgenus *Notiobia* Perty of the harpaline genus *Notiobia* are part of the animal community associated with fruit fall in tropical forests. Therefore, local and time restricted fruit fall events in the forests cause complicated ecological adaptations of *Notiobia* (s. str.) species. All known species are adapted to specific tree genera (or families). The winged adults arrive in the trees when ripe fruits are available, at least in part before the fruit fall begins (Paarmann, pers. comm.). After fruit fall, females lay eggs in the ground of the fruit fall area. Larval *Notiobia* are spermatophagous and develop only on fruit fall of specific trees as shown by Arndt et al. (1996) and Paarmann et al. (in press). Mandibular configuration of larval *Notiobia* species is strongly associated with the particular seed. The larvae of *N. pseudolimbipennis* Arndt and *N. flavicincta* (Erichson) feed on *Ficus* (Moraceae). They have extremely elongated, straight and slender mandibles with 4-5 terebral teeth. Mandibles of a similar structure occur in the larva of *N. nebroioides* Perty, which feeds on seeds of Clusiaceae. Larvae which feed on seeds of Melastomataceae have a short mandible with fewer terebral teeth (Arndt et al. 1996).

At present 24 species of *Notiobia* (s. str.) are known. The Mexican species were revised by Noonan (1973). Arndt (1998) revised the species of Brazil including all known taxa from the Amazonian lowlands. During a research project in Southern Venezuela, two new species were discovered which are described here.

Material and methods

Beside the types of the described species, material of the following museum and private collections was examined:

CMP	Carnegie Museum of Natural History (Pittsburgh, U.S.A., R. Davidson).
INPA	Instituto Nacional de Pesquisas da Amazônia (Manaus, Brazil, C. R. V. Fonseca)
IRSNB	Institut Royal des Sciences naturelles de Belgique (Bruxelles, Belgium, K. Desender)
MPM	Milwaukee Public Museum (Milwaukee, U.S.A., G. Noonan)
NMNH	National Museum of Natural History (Washington, U.S.A., T. L. Erwin, M. G. Pogue)
ZSM	Zoologische Staatssammlung (München, Germany, M. Baehr)
cEA	Coll. E. Arndt (Leipzig, Germany)
cKI	Coll. S. Kirmse (Erfurt, Germany)
cWR	Coll. D.W. Wrase (Berlin, Germany)

The total body length was measured from the tip of the right mandible to the elytral apex at a magnification of $10\times$ using an ocular micrometer in a SM 20 stereobinocular microscope (Carl Zeiss Jena). Line drawings were prepared using an ocular grid (15×15 squares) attached to a SM 20 stereobinocular microscope. Dissections were made with standard techniques. Median lobes were preserved in Euparal on transparent labels and pinned together with the appropriate specimen.

Description of species

Notiobia (s. str.) *variabilis*, spec. nov.

Figs 1, 3, 4

Types. Holotype: ♂, Venezuela, Amazonas, Orinoco region, Rio Surumoni near La Esmeralda, 03.10N/65.40W, 12.03.1999, leg. S. Kirmse (ZSM). – Paratypes: 3♂♂, (27.02.1999, 01.02.1999, 12.03.1999), 4♀♀ (27.10.1997, 13.11.1997, 12.01.1999, 27.01.1999) from the same locality and collector (ZSM, cEA, cKI, cWR).

Other material studied: Brazil, state Amazonas, Lago Janauari near Manaus, 03.20S/60.17W (4 specimens, INPA and cEA); state Rio Grande do Sul, Santo Augusto (1 specimen, CMP); “Chapada” (2 specimens, CMP); Bolivia, dept. Santa Cruz, Rio Ichilo, Buenavista (6 specimens IRSNB, 1 specimen CMP), Santa Cruz (1 specimen MPM); dept. Cochabamba, Rio Chapara, 400 m (ZSM), dept. del Sara (1 specimen CMP); Peru, prov. Madre de Dios, Rio Manu, Pakitza (101 specimens, NMNH); prov. Loreto, Rio Amazonas, Caño Yanamona, 100 m (56 specimens, NMNH), Rio Napo, Rio Sucusari 100 m (26 specimens, NMNH), Rio Samiria (3 specimens, NMNH).

Description

Body length. 11.4–14.0 mm (Holotype 12.6 mm).

Color. Dull, black, or dorsum with slight green metallic lustre.

Head. Labrum straight anteriorly; frons with foveae punctiform; clypeus broadly emarginate; eyes large and protruding. Mentum with prominent median tooth, mentum and submentum completely separated by a transverse suture; paraglossa slightly longer than ligula. Microsculpture of isodiametric meshes, micropunctures present.

Thorax. Pronotum with sides arcuate anteriorly, and straight in the most posterior part; posterior angles rectangular, base lobed; lateral depression deep, not widened posteriorly; lateral bead complete, basal and anterior beads only distinct at the sides, absent in the middle. A setigerous puncture in the middle of lateral groove. Median line present. Microsculpture of very fine transverse meshes and micropunctures.

Legs. Dorsa of tarsi with single small hairs except the posterior tarsi of females which are glabrous. Hairs on anterior and median tarsi of males more numerous than those on posterior tarsi, hairs on anterior tarsi of females more numerous than those of middle tarsi. Anterior and median tarsi of males strongly expanded laterally.

Elytra. Scutellar striae moderately long, posteriorly turning to stria I, with a basal setigerous puncture; all intervals equally and comparably convex, subapical sinuation moderate in both sexes; sutural angles acute. Elytral intervals with micropunctures, all intervals equally microsculptured with smooth to finely granulate isodiametric mesh (in the sense of Arndt 1998); interval III with a setigerous puncture in apical third; interval VII complete, with a small setigerous puncture near apex or not complete, ending before apex, then setigerous puncture in striae between intervals VIII and VI;



Fig. 1. Habitus of *Notiobia variabilis*, spec. nov. (paratype).

Fig. 2. Habitus of *Notiobia acuminata*, spec. nov. (paratype).

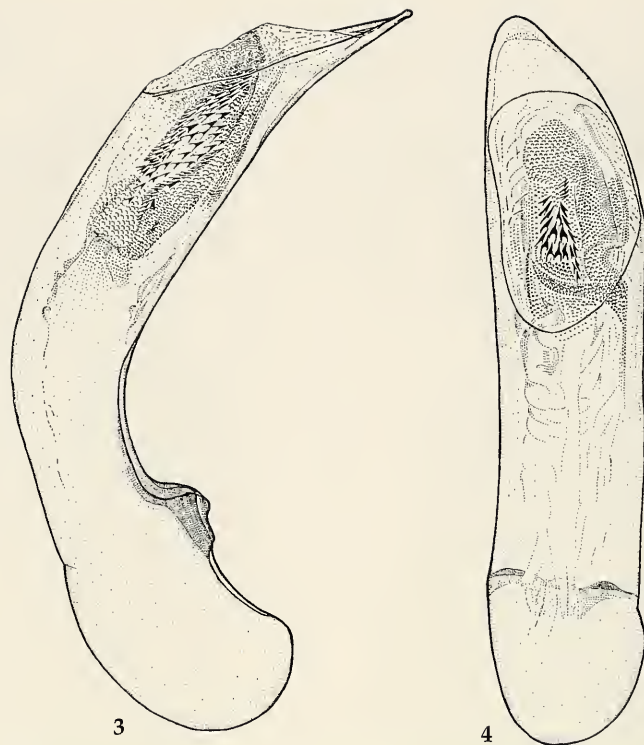
proximal puncture present. Hind wings fully developed in all examined specimens.

Abdomen. Sternum VI of females evenly rounded apically, with two pairs of setae; sternum VI of males with one pair of ambulatory setae. Aedeagus with median lobe moderately long with rounded apex (Figs. 3, 4).

Distribution. Amazonian lowlands in Brazil, South Venezuela, East Peru, Central and East Bolivia.

Etymology. The name was proposed by H. W. Bates for this species.

Discussion. *Notiobia variabilis*, spec. nov. is a widespread species and present in several museum collections. Bates already labeled this species with the name *N. variabilis* (IRSNB) but did not describe it. *N. variabilis* is most similar to *N. disparilis* Bates, but has equally developed convex elytral intervals in both sexes, whereas *N. disparilis* has equally convex intervals in males but flat intervals 1, 3, 5, and 7 as well as convex intervals 2, 4, and 6 in females. *N. variabilis* was found to develop on fruit falls of *Goupia glabra* (Celastraceae).



Figs 3, 4. Aedeagus of *Notiobia variabilis*, spec. nov. **3.** Lateral aspect (holotype). **4.** Dorsal aspect (paratype).

Notiobia (s. str.) acuminata, spec. nov.

Figs 2, 5, 6

Types. Holotype: ♂, Venezuela, Amazonas, Orinoco region, Rio Surumoni near La Esmeralda, 03.10N/65.40W, 17.12.1998, leg. S. Kirmse (ZSM). – Paratypes: 28♂♂, 7♀♀ from the same locality and collector (1♂, 1♀ 17.09.1997, 1♀ 22.09.1997, 11♂♂ 15.12.1998, 5♂♂ 17.12.1998, 1♂ 19.12.1998, 1♂ 1.1.1999, 1♂ 12.1.1999, 1♂ 17.1.1999, 1♂ 21.1.1999, 2♂♂ 23.1.1999, 1♂ 25.1.1999, 1♂, 2♀♀ 27.1.1999, 1♀ 30.1.1999, 2♀♀ 14.02.1999, 1♂ 24.02.1999, 1♂ 28.12.1999) (ZSM, cEA, cKI, cWR).

Description

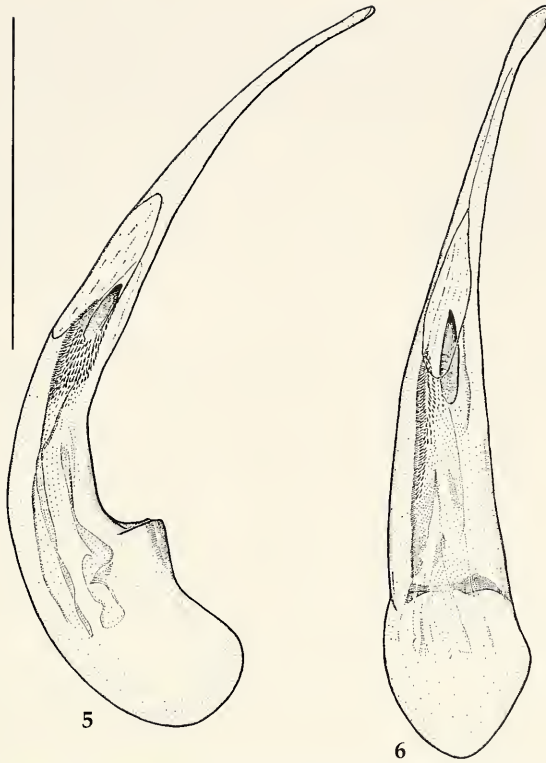
Body length. 8.9-9.9 mm (HT 9.9 mm).

Color. Dorsum with labrum yellow to red brown, remaining parts of head, pronotum, and elytra greenish to cupreous with metallic lustre; ventral part of body generally brown; legs and palpi yellowish; antennae yellowish to piceous.

Head. Labrum straight anteriorly; clypeus broadly emarginate; frons with foveae punctiform, bearing a distinct clypeo-ocular prolongation to eyes; eyes large and protruding. Mentum with prominent median tooth, mentum and submentum completely separated by a transverse suture; paraglossa slightly longer than ligula. Microsculpture of fine isodiametric meshes, micropunctures present.

Thorax. Pronotum with sides arcuate anteriorly, and straight in the most posterior part; posterior angles variable, from slightly concave lateral margin with rectangular angle to straight lateral margin with obtuse angle; base lobed; lateral depression flat, not widened posteriorly; lateral bead complete, basal and anterior beads only distinct at the sides, absent in the middle. A setigerous puncture near widest point of pronotum in anterior half. Median line present. Microsculpture of very fine transverse meshes and micropunctures.

Legs. Dorsa of anterior tarsi with scattered small hairs, dorsa of middle and posterior tarsi glabrous. Anterior and median tarsi of males strongly expanded laterally.



Figs 5, 6. Aedeagus of *Notiobia acuminata*, spec. nov. 5. Lateral aspect (holotype). 6. Dorsal aspect (paratype). Scale bar 1.5 mm (Figs. 3-6).

Elytra. Scutellar striae long, extended to a fourth of elytral length, posteriorly more or less turning to stria I, with a basal setigerous puncture; inner intervals flat, becoming more convex towards the lateral margin; subapical sinuation moderate in both sexes; sutural angles acute. Inner elytral intervals of males green, shining, with fine transverse meshes and micropunctures, whereas lateral two (anterior part of elytra) to four intervals (posterior part) are more or less pale, covered with granulate microsculpture; pale and granulate region of lateral intervals strongly enlarged in females, covering in some specimens the whole elytra except the medio-subapical part. Interval III with a setigerous puncture in apical third; interval VII with a small setigerous puncture near apex and with proximal puncture. Hind wings fully developed in all examined specimens.

Abdomen. Sternum VI of females evenly rounded apically, with two pairs of setae; sternum VI of males with one pair of ambulatory setae. Aedeagus with median lobe extremely elongate (Figs. 5, 6).

Distribution. Known only from the type locality (Venezuela, state Amazonas).

Etymology. The name refers to the acuminate and elongate median lobe of aedeagus.

Discussion. *N. acuminata*, spec. nov. was found on fruit falls of *Miconia* species (Melastomataceae). The species resembles *N. flavicincta* (Erichson) and *N. umbrifera* Bates in habitus and colour. But it is distinguished from both species by its peculiar aedeagus, from *N. umbrifera* also by its extended granulate and pale region of lateral elytral intervals.

Key to the adults of *Notiobia* (s. str.) species from Amazonian lowland

1. Elytral intervals different in males and females. Males with intervals of elytra convex, dorsum of males bicolored in most specimens, head and pronotum golden green-cupreous, elytra black with purple tinge; median lobe of aedeagus with short but wide apex. Females with convex intervals 2, 4 and 6, but flat intervals 1, 3, 5, and 7; dorsum of females uniformly dark colored *N. disparilis* Bates
 - Elytral intervals of the same shape in males and females, dorsum not bicolored 2.
2. Elytral intervals metallic green, with uniform microsculpture and not granulate; microsculpture of intervals reticulate or lacking; lateral parts of elytra not yellowish; subapical sinuation of elytra never prominent 9.
 - Postero-lateral intervals of elytra with a region of distinct granulate microsculpture and/or light yellowish, remaining median part of elytra shining, with reticulate microsculpture, not granulate, OR species with elytra black with convex intervals and uniform granulate microsculpture; subapical sinuation of elytra prominent or not 3.
3. Subapical sinuation of elytra prominent; dorsum green, bronze or blue-green, lateral intervals in part pale yellow-testaceous 4.
 - Subapical sinuation of elytra not prominent; dorsum of variable color 5.
4. Sternum VI of females produced into a ventrally projected spine; median lobe of male aedeagus with short but wide apex; elytra distinctly bicolored, with lateral intervals granulate, pale yellow-testaceous and inner intervals green-cupreous; in females granulated area in the anterior part enlarged, covering the full anterior part of elytra *N. viridula* (Dejean)
 - Sternum VI of females rounded apically; median lobe of male aedeagus with longer and more narrow apex; elytra not distinctly bicolored in most specimens; granulate area of elytra anteriorly not expanded to the middle part, dorsal surface more shining, green, cupreous or black with greenish, bluish or purple lustre *N. pseudolimbipennis* Arndt
5. Body length 11-15 mm; elytral intervals uniformly colored, black or cupreous 6.
 - Body length 7-10 mm; lateral intervals of elytra, in some females whole elytra except a preapical macula, granulate and pale yellow-testaceous, inner intervals green or cupreous 7.
6. Body length 11-13 mm; elytra cupreous, rarely black with blue or cupreous lustre, inner intervals flat and shining, lateral intervals more convex and slightly granulate; median lobe of aedeagus acuminate. Anterior tarsi of males peculiarly narrow *N. nebrionides* Perty
 - Body length 13-15 mm; elytra black, dull or with cupreous or bluish lustre, all intervals convex, more or less distinctly uniformly granulate; aedeagus rounded. Anterior tarsi of males wide *N. variabilis*, spec. nov.
7. Median lobe of aedeagus slender, with rounded apex, apex not elongate. Pale region of lateral intervals strongly enlarged in females; anterior tarsi of males very wide *N. flavicincta* (Erichson)
 - Median lobe of aedeagus elongate, lanceolate or spatula-shaped, not rounded. Pale region of lateral intervals extended or not 8.
8. Median lobe of aedeagus very slender, apex elongate (Figs. 5, 6); pale region of lateral intervals enlarged in some females; 8.9-9.9 mm; anterior tarsi of males wider *N. acuminata*, spec. nov.
 - Apex of median lobe of aedeagus elongated, spatula-shaped (laterally depressed); pale region of lateral intervals in both sexes narrow, sometimes indistinct; body length usually 7-8 mm; anterior tarsi of males narrower *N. umbrifera* Bates
9. Elytra very smooth and shining, microsculpture even in the outer intervals indistinct, intervals not completely flattened; posterior angles of pronotum not blunt, fairly sharp, subdentate. Median lobe of aedeagus always rounded apically 10.

- All intervals of elytra with equal and distinct microsculpture, elytra dull, intervals very flat, separated from each other only by a faint row of punctures; posterior angles of pronotum blunt. Median lobe of aedeagus more or less acuminate. Length 9-10.5 mm. (Note: Larger specimens of 11-13 mm length with shining inner intervals, dull, slightly granulate outer intervals, and narrow anterior male tarsi, see *N. nebrionides* Perty) *N. aulica* (Dejean)
- 10. Body length 13-15 mm; median lobe of aedeagus wide and stout; apical part of everted internal sac with irregularly distributed, isolated large spines *N. maxima* Arndt
- Body length 10-12 mm; median lobe of aedeagus comparatively slender; everted internal sac dorso-basally with a field of 5-25 large spines *N. glabrata* Arndt

Discussion

The number of known species of *Notiobia* (s. str.) increased to 26 (or 27 respectively, if one follows van Emden 1953 and includes *Anisotarsus concinnus* Erichson in *Notiobia* s. str.). That of known species from Brazil increased from 11 to 12 with the record of *N. variabilis* in the Amazonian lowlands. *Notiobia viridula* (Dejean), *N. disparilis* Bates and *N. glabrata* Arndt were collected with the newly described species by S. Kirmse at the study site near La Esmeralda in southern Venezuela. All three species are recorded for the first time in Venezuela.

The newly described species confirm the spermatophagy of larvae and adaptation to fruits of a single tree family in this subgenus of ground beetles.

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Zusammenfassung

Zwei Arten der Laufkäfergattung *Notiobia* Perty werden aus Süd-Amerika beschrieben. Die über weite Teile des Amazonas-Tieflands verbreitete *N. variabilis*, spec. nov. ist groß, matt, schwarz oder mit leicht metallischem Glanz und hat konvexe, granuliert Flügeldeckenzwischenräume. Von der ähnlichen Art *N. disparilis* Bates unterscheidet sie sich durch gleichmäßig ausgebildete Flügeldeckenzwischenräume bei den Weibchen. *N. acuminata*, spec. nov. gehört zu den kleinsten beschriebenen Arten, mit glänzender grüner bis kupferfarbener Oberseite mit Ausnahme der helleren, matt granulierten äußeren Flügeldeckenzwischenräume. Diese Art ist bisher nur vom locus typicus aus Süd-Venezuela bekannt und unterscheidet sich von den beiden ähnlichen *N. flavicincta* Erichson und *N. umbrifera* Bates durch ihren sehr langen, lanzettförmigen Aedeagus-Fortsatz. Beide neuen Arten wurden auf Fruchtlflächen in Primärwäldern gefunden.

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Autor(en)/Author(s): Arndt Erik, Wrase David W.

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