

New Species and Synonymies of the Genus *Nacaeus* Blackwelder, 1942 (Coleoptera: Staphylinidae: Osoriinae) from the Neotropical Region

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> Abstract

Four new species of the genus *Nacaeus* (Staphylinidae: Osoriinae) are described from Central and South America: *N. collinatus*, *N. colombinellus*, *N. honduranus* and *N. flavoelytratus*. Another species, *N. americanus*, is redescribed and transferred from the genus *Lispinodes* to *Nacaeus*. A rough overview to three species groups is given and the newly described species are compared in detail with similar species. *N. nevermanni* (Bernhauer, 1942) is synonymised to *N. spegazzini* (Bernhauer, 1933) and new records of the species are published.

> Key words

New species, Neotropics, Staphylinidae, Osoriinae.

1. Introduction

Within the Coleoptera family Staphylinidae the subfamily Osoriinae is characterised by the lack of abdominal lateral sclerites and seems to be most closely related to the subfamilies Piestinae and Oxytelinae (BEUTEL & MOLENDEN 1997). At present, 22 genera are placed in the tribe Thoracophorini in the Neotropical region including the genus *Nacaeus*. Species of this tribe are less depressed than in Eleusini and Leptochirini and a tibial emargination with a comb of setae is not present as found in the tribe Osoriini. Within Thoracophorini, the subtribe Lispinina is mainly characterised by the presence of five tarsomeres and a prosternal process separating the front coxae. Six genera are placed at present in the subtribe: *Nacaeus*, *Tannea*, *Lispinus*, *Neolosus*, *Liberiana*, and *Lispinuncus*. *Nacaeus* is most closely related to the genera *Tannea* and *Lispinus*. From *Tannea* it differs by the structure of the spermatheca and from *Lispinus* by the absence of abdominal strigae. A more detailed diagnosis of the three genera and arguments for the generic separation are given in IRMLER (2003). At present, no research on the phylogenetic relationship has been carried out. The habitat of most species of *Nacaeus* and related genera seems to be under rotten bark, which is expressed by the flattened body. However, species can also be found in the litter layer of lowland rain forests and cloud forests up to an elevation of 2500 m.

According to the revision of the Neotropical species of *Tannea* and *Nacaeus* (IRMLER 2003), 26 species of the genus *Nacaeus* have been described from Central and South America. Several of the Neotropical species show a pantropical distribution. Further 28 species are distributed in all tropical and subtropical regions of the old world and Australia, but a new revision of these species is lacking and the correct generic placement of single species is uncertain (HERMAN 2001).

Within the large collections of the Canadian National Collections and the Snow Entomological Collections, I found 4 new species from this region, which are described and compared with related species. For one species a new combination is proposed and a new synonymy established due to the high variability in one species.

2. Materials and methods

The material studied was collected by members of the staff of the Natural History Museum of the University of Kansas, Lawrence, Kansas, U.S.A. and of the Canadian National Collections, Ottawa, Canada during several field trips to South and Central America. Further material was provided by Michael Schülke, Berlin. The respective collections, where types are deposited, are abbreviated as follows:

Snow Entomological collections of the Natural History Museum of the University of Kansas, Lawrence, U.S.A (SEC); Canadian National Collections (CNC); Field Museum of Natural History, Chicago, U.S.A. (FMNH); my own collections (UIC) and collections of M. Schülke (CS).

The genitalia were dissected, placed in Euparal on a transparent plastic plate and finally analysed using a microscope. Illustrations were produced using a drawing tube. Width was measured at the widest part and length along the middle of the referring tagmata. Total length considers only length of tagmata without the abdominal intersegmental teguments. Photos of surfaces were made using the 'Makroskop-M420' of 'Wild' company, Heerbrugg, and a digital Nikon camera.

3. Descriptions of taxa

3.1. Diagnosis of *Nacaeus* species groups

The genus *Nacaeus* is currently represented by three species groups: (1) The typical group with eyes not prominent includes most of the species, and all species newly described in this publication are part of this species group. (2) The *Nacaeus sulciger*-group is characterised by slightly prominent eyes and long antennae in males. These characters are also found in the closely related genus *Tannea*. It contains the two species *N. sulciger* Irmeler, 2003 and *N. cordiger* Irmeler, 2003. (3) The *N. americanus*-group with short antennae and distinctly prominent eyes, with the species *N. americanus* and *N. depressus* (Fig. 8).

One species was described by BERNHAUER, 1909 as *Lispinodes americanus*, certainly due to the form of the head, which strongly differs from other *Nacaeus* species. But, this species is related to the genus *Nacaeus* by the presence of five tarsomeres and the extended prosternal process that is absent in the genus *Lispinodes*. It is suggested to form a species group within the genus *Nacaeus* actually represented by two species only.

3.2. *Nacaeus americanus* (Bernhauer, 1909), new combination

Lispinodes americanus Bernhauer, 1909: 226
Fig. 1a–c; Figs. 6-P1, E1; Fig. 8B

Description. *Length:* 2.1 mm. *Colour:* light brown, head and abdomen darker brown, legs and antennae yellow. *Head:* 0.30 mm long, 0.35 mm wide; without

punctuation, microsculpture distinct, isodiametrically reticulate, surface scarcely shiny, eyes large and prominent (Fig. 8 B), neck slightly wider than head between antennae, head at base of antennae with longitudinal prominence. *Antennae:* as long as head and pronotum combined, 2nd antennomere scarcely smaller than 1st, 3rd distinctly smaller and conical, 4th and 5th quadrate, the following antennomeres 6 and 7 wider than long, but scarcely wider than preceding ones, antennomeres 8 to 11 distinctly wider than preceding ones and much wider than long, forming an indistinct club. *Pronotum:* 0.30 mm long, 0.38 mm wide; sides widest near anterior edge, then slightly narrowed posteriorly, in posterior fourth distinctly narrowed and slightly emarginate, dorsally depressed with a small ridge along midline not reaching posterior margin, with indistinct depression at posterior angles, without punctuation and with microsculpture as on head (Fig. 6-P1). *Elytra:* 0.50 mm long, 0.45 mm wide; without punctuation and with distinct netlike microsculpture (Fig. 6-E1), slightly more shiny than head and pronotum. *Abdomen:* without distinct punctuation, but with deep and netlike microsculpture, surface dull. *Genitals:* The aedeagus shows the typical structure with a spiral endophallus and a relatively large transparent lobe at apex of paramera (Fig. 1c, 2d). The spermatheca shows the typical hook-like ductus as found in all other species of *Nacaeus* (Fig. 2e).

Remarks. The genus *Lispinodes* established by SHARP (1980) for Hawaiian species is placed in the subtribe Glyptomina due to the reduced number of tarsomeres (HERMAN 2001). Since in *N. americanus* five tarsomeres and a prosternal process are developed, it must be placed in the subtribe Lispinina. Regarding the lack of the distinct abdominal punctuation, *N. americanus* can be placed either in the genus *Tannea* or in the genus *Nacaeus* (see key of genera in IRMLER 2003). The species is conspicuous by the large prominent eyes that resemble the head structure in the genus *Tannea*. However, in contrast to the genus *Tannea* that is characterised by a short straight spermathecal ductus, *N. americanus* shows the typical hook-like ductus as in the genus *Nacaeus*. I am obliged to Dr. A.F. Newton who informed me that this species should be placed in the genus *Nacaeus*.

Material. Syntypes: ARGENTINA: Buenos Aires, leg. Silvestri, 1♂ in FMNH examined; BRAZIL: without further data, leg. Bang-Haas, 1♀.

3.3. *Nacaeus collinatus*, new species Fig. 2a–e; Figs. 6-P2, E2

Description. *Length:* 2.9 mm. *Colour:* black, legs and abdominal tergites posteriorly red. *Head:* 0.4 mm

long, 0.45 mm wide; punctuation fine and sparse, distance between punctures wider than diameter of punctures, microsculpture on clypeus transverse or netlike reticulate, on the disc longitudinally reticulate; at base of antennae slightly prominent; at inner edge of prominence with a longitudinal depression. *Antennae*: thick, 2nd antennomere globular, 3rd conical, antennomeres 4 and 5 quadrate, the following ones wider than long, *Pronotum*: 0.40 mm long, 0.55 mm wide; sides widest in middle, continuously curved toward anterior angles, emarginate in front of the posterior angles, punctuation distinct, much denser and deeper than on head, distance between punctures as wide or wider than diameter of punctures, with indistinct smooth midline and a small ridge ending in front of posterior edge, microsculpture longitudinally reticulate, surface slightly shiny (Fig. 6-P2). *Elytra*: 0.7 mm long, 0.6 mm wide; punctuation sparser and finer than on pronotum, distance between punctures on average wider than diameter of punctures, microsculpture longitudinally undulate, surface shiny (Fig. 6-E2). *Genitalia*: The aedeagus has the typical structure of the genus *Nacaeus* and provides no significant characters for a specific differentiation as well as the female spermatheca that is built as in Fig. 2e.

Diagnosis. The species is similar to *N. collinus*, but larger and the elytra are longer than wide, whereas they are quadrate in *N. collinus*. It can be differentiated from another similar species, i.e. *N. colombinellus* n.sp., by the dark colour and larger size.

Etymology. The specific name refers to the similarity with *N. collinus* and derives from the Latin word *collis* meaning hill.

Material. Holotype: 1♂, COLOMBIA, Magdalena, San Lorenzo, 41 km S. Santa Marta, May 9, 1973, leg. Howden & Campbell (CNC). – Paratypes: 2♀, data as for holotype (CNC, UIC).

3.4. *Nacaeus colombinellus*, new species

Fig. 3a–e; Fig. 6-P3,E3

Description. *Length*: 2.5 mm; *Colour*: light reddish, head darker, brown; abdominal tergites piceous at base, reddish at posterior edge; legs and antennae yellow. *Head*: 0.3 mm long, 0.3 mm wide; clypeus without punctuation, on disc with distinct and dense punctuation, distance between punctures as wide as diameter of punctures, microsculpture roundly reticulate on clypeus, netlike or longitudinally reticulate on disc, surface shiny, on the clypeus on each side of middle with a flat depression, several setae along anterior and lateral margin. *Antennae*: 2nd antennomere oval, 3rd conical, slightly longer than wide, antennomeres 4–6 quadrate, following ones scarcely

wider than long, *Pronotum*: 0.4 mm long, 0.5 mm wide; slightly dorsoventrally depressed, widest in middle, sides narrowed to anterior angles and smoothly curved; slightly emarginate in front of posterior angles; depressions at posterior angles indistinct; punctuation coarser than on head, in particular on each side of smooth midline with slightly coriaceous punctures; microsculpture longitudinally reticulate, surface shiny (Fig. 6-P3). *Elytra*: 0.65 mm long, 0.5 mm wide; punctuation much finer and sparser than on pronotum, distance between punctures more than twice as wide as diameter of punctures; setiferous punctures on disc scarcely finer than normal punctures, setae at lateral margin short; microsculpture longitudinally reticulate, slightly deeper than on pronotum, but surface still shiny (Fig. 6-E3).

Diagnosis. The species resembles *N. collinus* and *N. collinatus* concerning the longitudinal microsculpture of pronotum and elytra. However, *N. collinus* and *N. collinatus* are black in colour, while *N. colombinellus* is light red with darker head, only. It is also similar to *N. nigrifrons* in colour, but differs in the longitudinally reticulate microsculpture of the elytra.

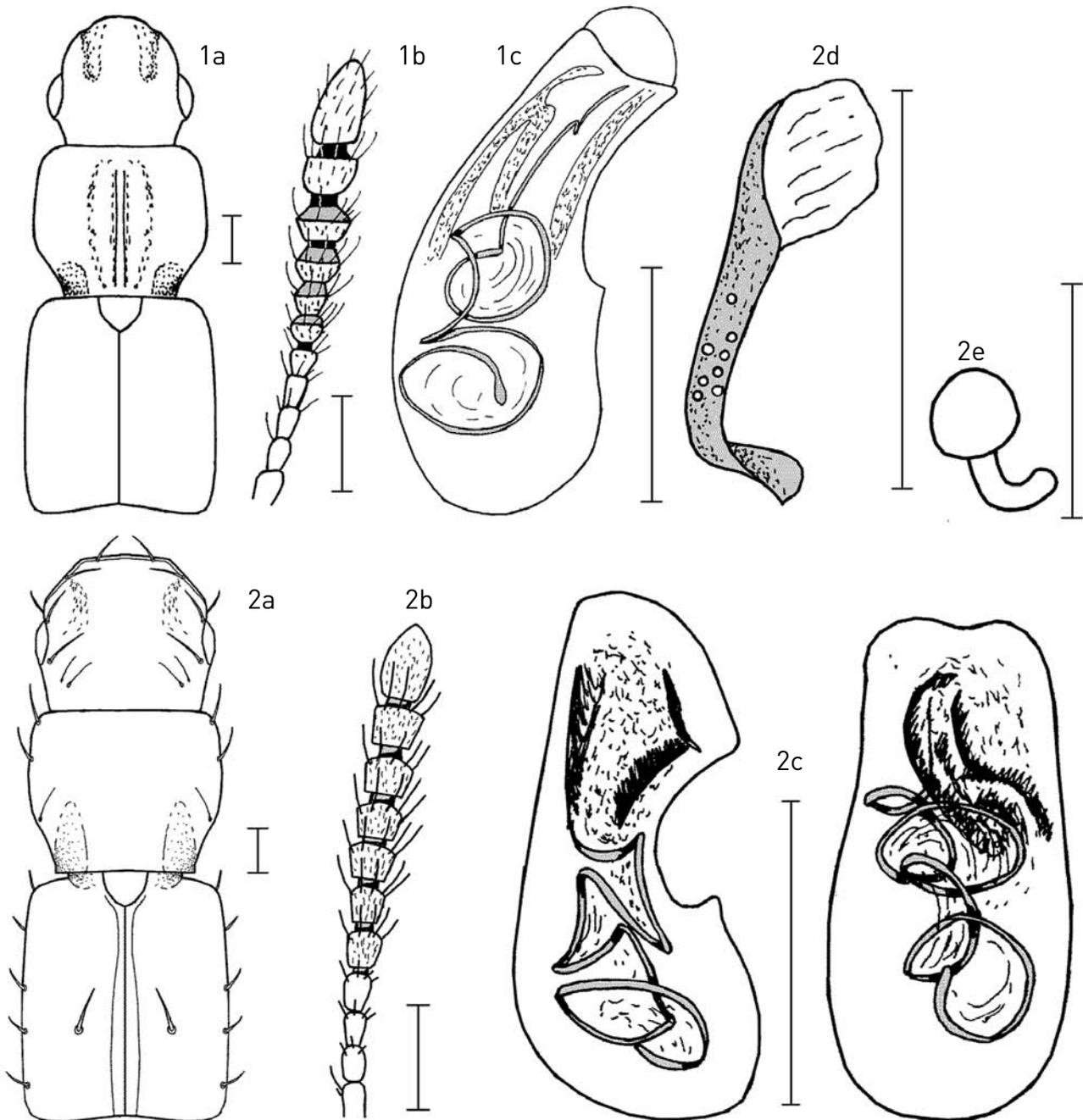
Etymology. The specific name is a diminutive of *Colombia*, the name of the country, where the species was found.

Material. Holotype: 1♂: COLOMBIA, Valle Pichinde, VII. 18, 1970, 1600 m, leg. J.M. Campbell (CNC). – Paratypes: 1♂, 4♀ with data like holotype (CNC, UIC).

3.5. *Nacaeus honduranus*, new species

Fig. 4a–d; Fig. 6-P4,E4

Description. *Length*: 2.1 mm. *Colour*: black, legs and antennae yellow. *Head*: 0.30 mm long, 0.40 mm wide; with two flat depressions between the base of antennae; in each depression a yellow seta; punctuation fine and sparse, scarcely visible within distinct isodiametrically reticulate microsculpture; with two supraocular setae, a neck seta on each side and a front seta inserting at front margin; eyes scarcely prominent. *Antennae*: with second antennomere oblong and third one conical; antennomeres 4 and 5 more or less quadrate, following ones slightly wider than long. *Pronotum*: 0.35 mm long, 0.45 mm wide; widest in anterior third, slightly arcuate in middle and distinctly narrowed toward posterior angles; emargination in front of posterior angles obsolete; on each side of smooth midline another obsolete depression in front of the posterior edge; with several long setae along lateral and front margin and one seta at outer edge of lateral posterior depression; surface with isodiametrically reticulate microsculpture and slightly shiny (Fig. 6-P4); on a small part between lateral and inner depression with

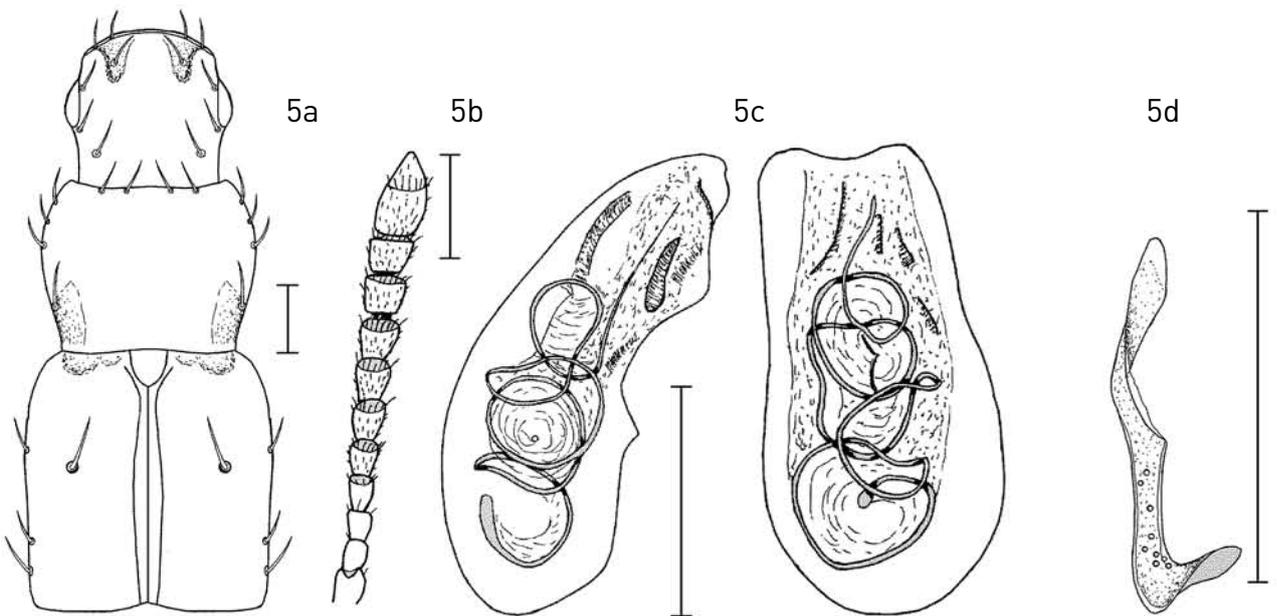
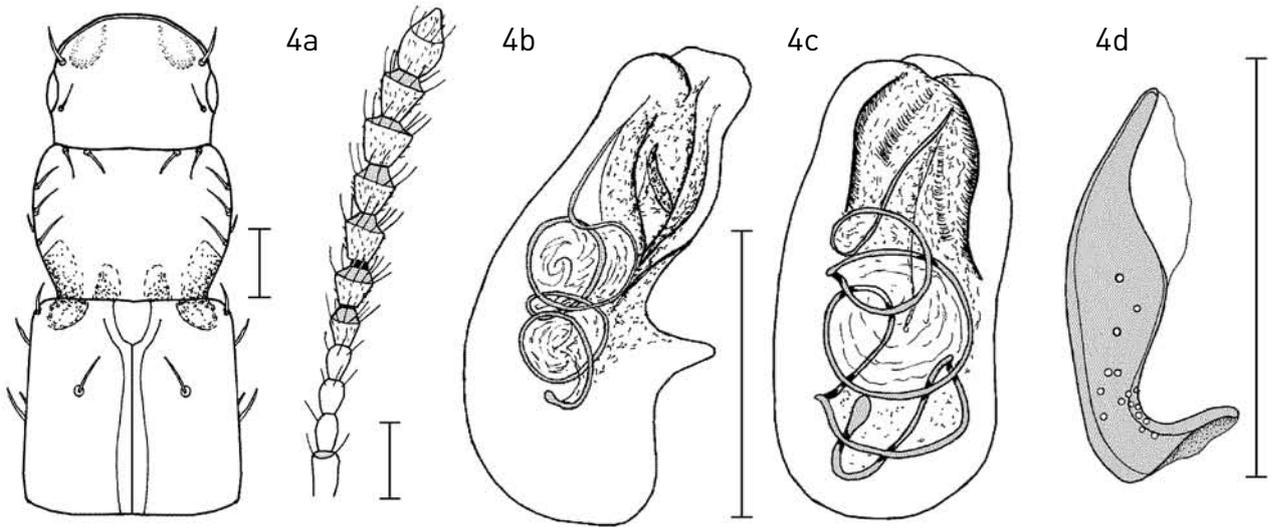
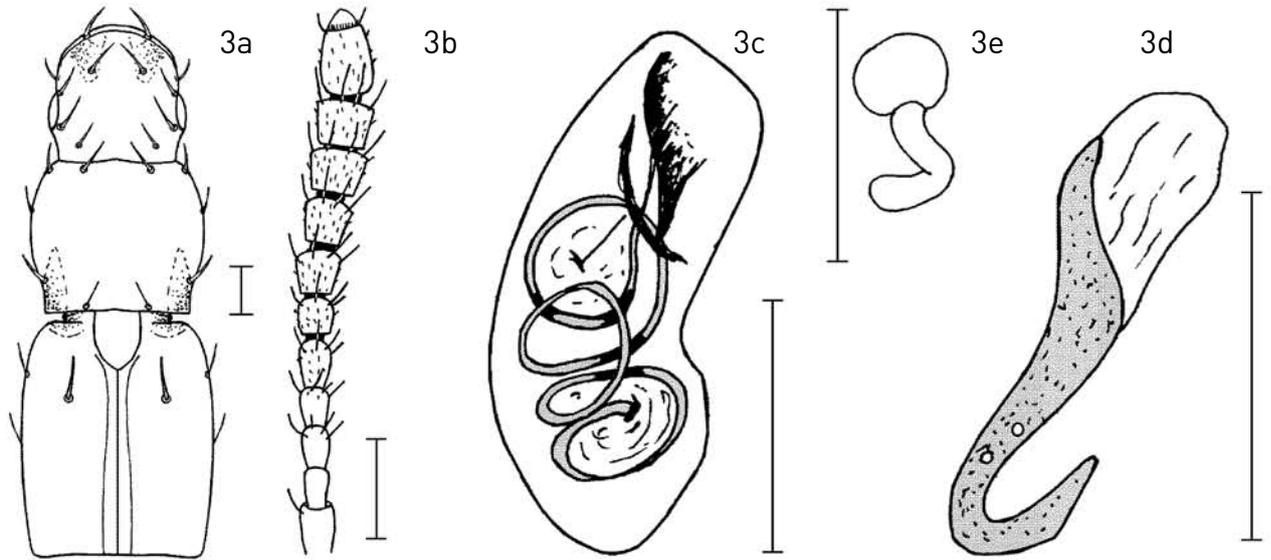


Figs. 1–5. 1: *Nacaeus americanus*, 2: *N. collinatus*, 3: *N. columbinellus*, 4: *N. honduranus*, 5: *N. flavoelytratus* (a: front body, b: antenna, c: aedeagus, right in lateral view, left in dorsal view, d: paramera, e: spermatheca; scale bar: 0.1 mm).

longitudinally reticulate microsculpture; punctures fine and sparse, on average distance between punctures wider than diameter of punctures; punctures more distinct than on head. *Elytra*: 0.50 mm long, 0.48 mm wide; with very fine and sparse punctuation; punctuation distinctly sparser than on pronotum; surface with netlike reticulate microsculpture, meshes of microsculpture oblong (Fig. 6-E4); surface slightly shiny; along lateral margin with several setae and one seta in centre. *Genitals*: Spermatheca like in Fig. 2e or 3e; aedeagus with a long spiral endophallus and relatively broad paramera (Fig. 4d); apical transparent

lobe small and scarcely wider than basal part of paramera.

Diagnosis. The species is very similar to *N. sculpturatus* due to the colour and microsculpture of the surface. It is on average smaller. *Nacaeus sculpturatus* is 2.4–2.7 mm, *N. honduranus* 2.1–2.4 mm long. The elytra of *N. sculpturatus* are more or less quadrate, whereas the elytra of *N. honduranus* are slightly longer than wide (Fig. 9). Concerning the longitudinal shape of elytra, *N. honduranus* also resembles *N. opacus* that has the elytra longer than wide, too. But the microsculpture of the elytra is more distinct in *N. opacus* and thus less



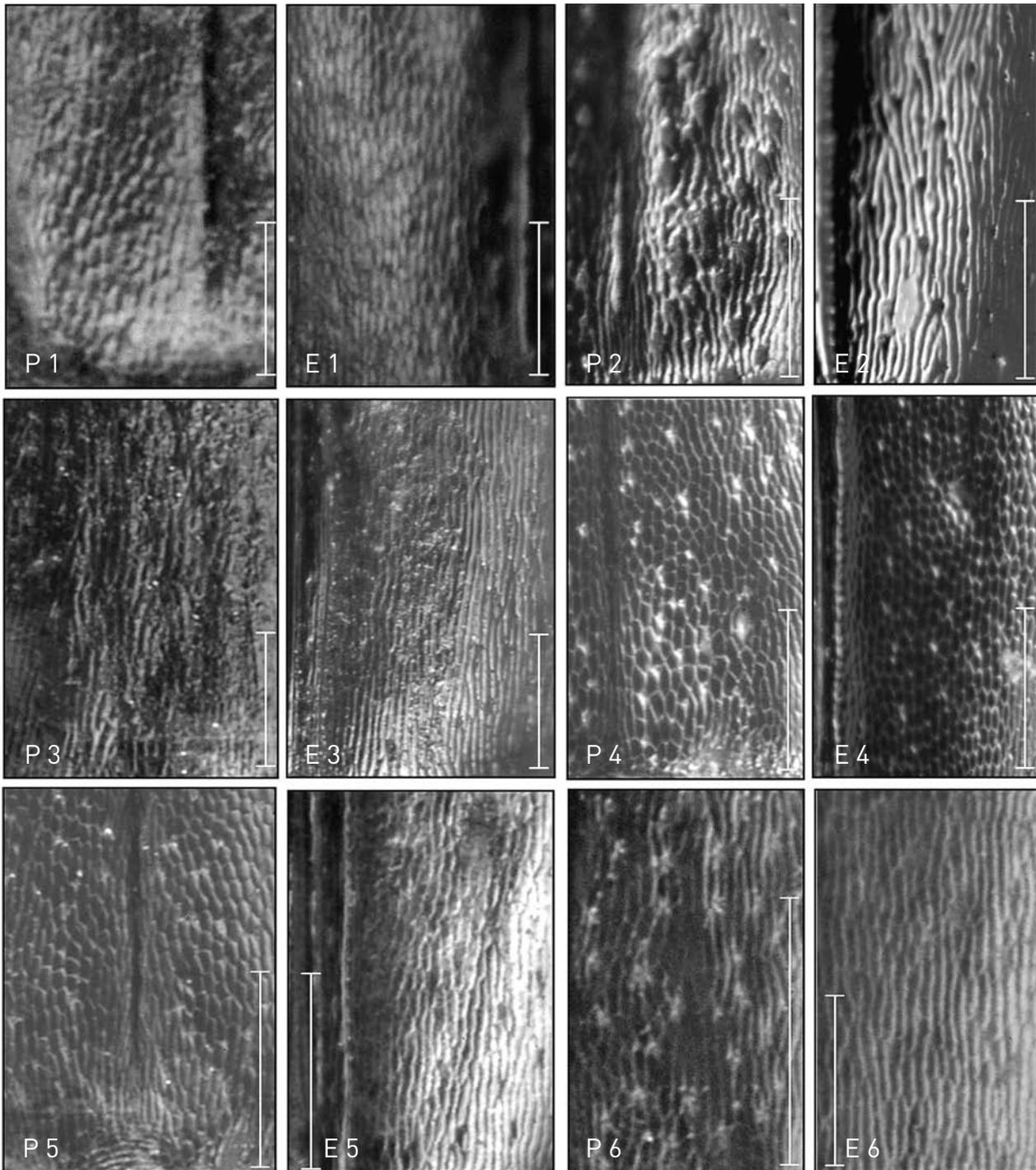


Fig. 6. Surface of pronotum (P) and elytra (E) of **1:** *N. americanus*, **2:** *N. collinatus*, **3:** *N. columbinellus*, **4:** *N. honduranus*, **5:** *N. flavoelytratus*, **6:** *N. bicolor* (scale bar: 0.1 mm).

shiny than in *N. honduranus*. Moreover, *N. opacus* is distinctly larger (Fig. 9). The three species can be easily distinguished by the elytral proportions (average length : width): *N. honduranus*: 0.57 : 0.54, *N. opacus*: 0.77 : 0.69, *N. sculpturatus*: 0.68 : 0.68. In addition, the paramera of *N. honduranus* are distinctly different from *N. sculpturatus* and *N. opacus* in the shape of the transparent lateral lobe. The following key is provided to differentiate the five species of the *N. sculpturatus*-

group that is characterised by the black colour and the distinct netlike or isodiametrically reticulate microsculpture of pronotum and elytra. In addition to the elytral form and the pronotal microsculpture, the shape of the lateral lobe at the apex of paramera provides a useful character for differentiation of the species.

Etymology. The name of the species refers to the name of the country, Honduras, where the holotype was found.

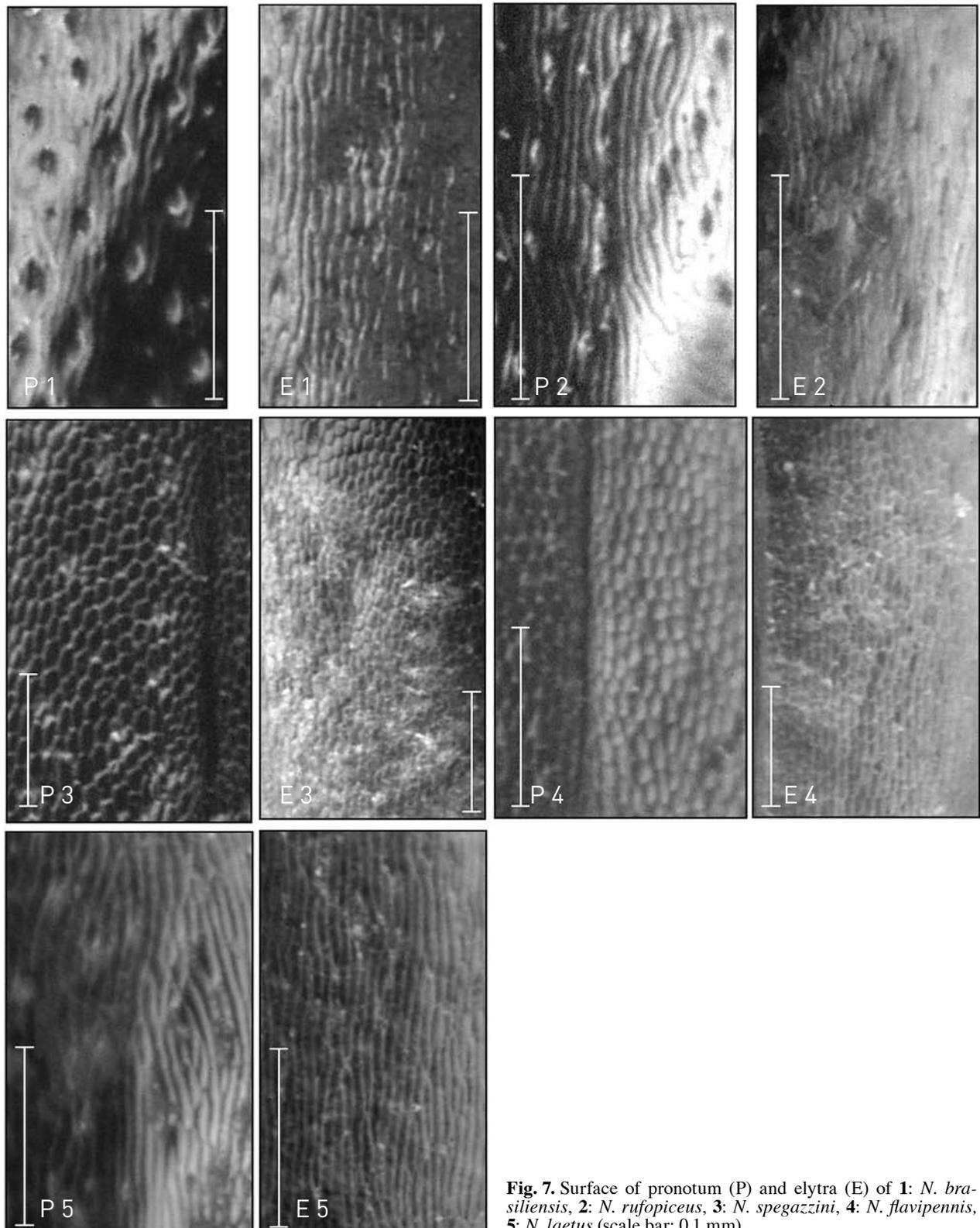


Fig. 7. Surface of pronotum (P) and elytra (E) of **1:** *N. brasiliensis*, **2:** *N. rufopiceus*, **3:** *N. spegazzini*, **4:** *N. flavipennis*, **5:** *N. laetus* (scale bar: 0.1 mm).

Material. Holotype 1♂, HONDURAS: Santa Barbara, La Fe, Finca la Roca, 5.3 km S Pena Blanca, 14°57'N 88°02'W, 740 m elevation, 21 June 1994, leg. Brooks and Ashe, # 176, collected under bark (SEC). – Paratypes: MEXICO: Yucatan Hwy 190; 4 specimens, 12.v.1969, leg. Bright, collected in a *Pinus michoacana* forest litter (CNC, UIC); San Luis

Potosi, 29.1 km N Tamazunchale, 1 specimen, 10.vii.1990, leg. J.S. Ashe, collected under bark (SEC) and 3 specimens, 11.vii.1990, leg. J.S. Ashe, 19.4 km S, Hwy 85, at Hidalgo border, collected under bark (SEC, UIC); GUATEMALA: Finca el Zapote, Escuintla, Zool. Expedition (1948), 1 specimen, 13.vii.1948, leg. R.D. Mitchell (FMNH);

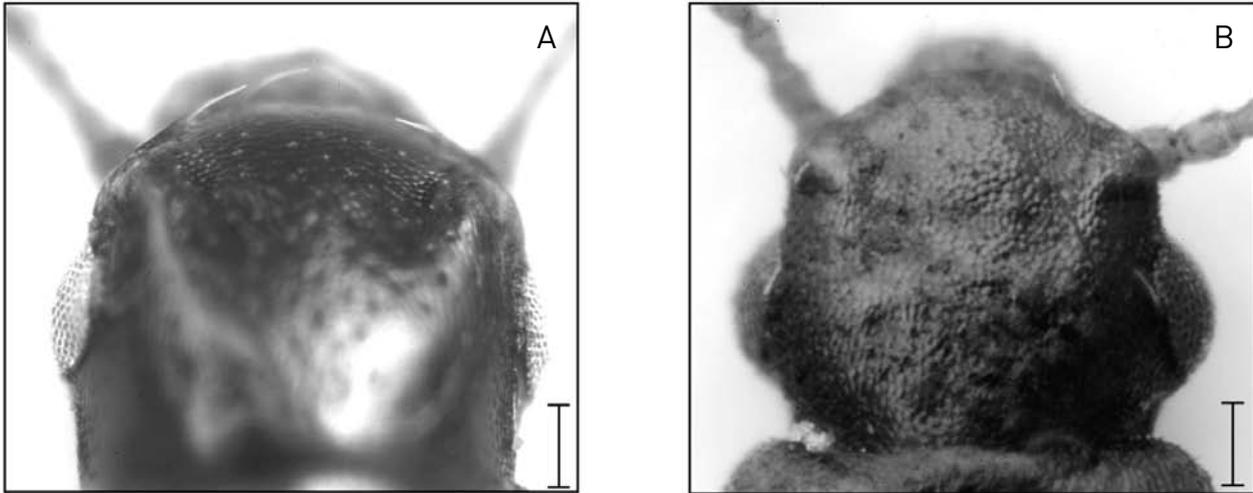


Fig. 8. Heads of **A:** *Nacaeus honduranus* and **B:** *N. americanus* (scale bar: 0.1 mm).

HONDURAS: 2 females with same data as for the holotype (SEC); Mt. Santa Barbara, 1800 m elevation, 11.5 km S & 5.6 km N, Pena Blanca (14°57'N 88°05'W), 1 male, 20 June 1990, leg. Brooks and Ashe, collected under bark (SEC); COSTA RICA: Pital, 5 km SW, at Sawmill, 1 specimen, 9.1.2005, leg. M. Schülke, collected under bark (CS); CUBA: Pinar del Rio, 1 specimen, 3.4.1934, leg. A. Bierig (CNC).

- 4** Larger, 3.2–3.6 mm long.
..... *N. opacus* (Fauvel, 1865)
- 4'** Smaller, 2.1–2.4 mm long.
..... *N. honduranus* n.sp.

3.6. Key to the species similar to *N. sculpturatus*

Within the ‘typical’ species group of the genus *Nacaeus* the following species form a group of similar species regarding the black colour and the distinct netlike microsculpture of the elytra. In particular the species *N. sculpturatus*, *N. opacus* and *N. honduranus* are very similar and an analysis of paramera should support the identification. The following key completes the key to Neotropical *Nacaeus* species established by IRMLER (2003), where additional illustrations of the paramera can be found.

- 1** Large species of 4.2 mm length.
..... *N. funebris* (Bernhauer, 1921)
- 1'** Smaller species, not longer than 3.6 mm.
..... **2**
- 2** Elytra quadrate, with distinct, but not deep microsculpture on elytra.
..... *N. sculpturatus* (Sharp, 1887)
- 2'** Elytra longer than wide, length : width at least equal to 1.06 : 1.
..... **3**
- 3** Elytra with scaly microsculpture, surface distinctly matt (fig. 52C in IRMLER 2003).
..... *N. dejectus* (Sharp, 1887)
- 3'** Elytra with weaker microsculpture, surface slightly shiny (Fig. 6-4).
..... **4**

3.7. *Nacaeus flavoelytratus*, new species
Fig. 5a–d; Fig. 6-P5,E5

Description. *Length:* 2.2 mm. *Colour:* Head black; pronotum and abdomen dark brown; elytra yellow with a small spot at base darker; legs and antennae yellow. *Head:* 0.28 mm long, 0.38 mm wide; with two flat depressions between base of antennae; in each depression a short yellow seta; punctuation sparse and fine; on average distance between punctures twice as wide as diameter of punctures; microsculpture distinct, isodiametrically reticulate; surface moderately shiny; with two supraocular setae, a neck seta, and a seta at front margin on each side of middle. *Antennae:* Second antennomere oblong, 3rd conical, antennomeres 4 to 5 slightly longer than wide, 6th and 7th quadrate; following ones slightly wider than long. *Pronotum:* 0.35 mm long, 0.43 mm wide; widest shortly behind front angles, slightly narrowed toward obsolete emargination in front of the posterior angles; an obsolete depression at posterior angles; with a smooth midline; several long setae along front and lateral margin; punctures distinctly deeper than on head; a space adjacent to midline with denser punctuation; on average distance between punctures only slightly wider than diameter of punctures; microsculpture with netlike reticulation like on head (Fig. 6-P5) microsculpture on lateral parts more or less longitudinally reticulate; surface moderately shiny. *Elytra:* 0.50 mm long, 0.45 mm wide; with very sparse and fine punctuation; punctures scarcely visible within the more or less longitudinally

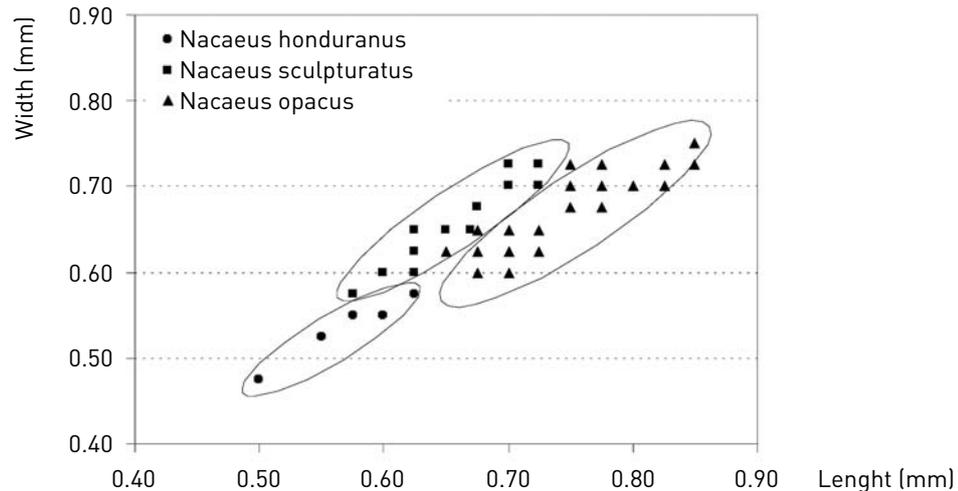


Fig. 9. Relation between length and width of elytra in the closely related species *N. honduranus*, *N. sculpturatus* and *N. opacus*.

reticulate microsculpture (Fig. 6-E5); surface still more shiny than surface of pronotum; distance between punctures at least five to six times wider than diameter of punctures; a large setiferous puncture in the margin and several setae along the lateral margin. *Genitals*: Spermatheca without specific character like in Figs. 2e and 3e; aedeagus with a long spiral endophallus; paramera slender forming a slight torsion in its apical part and with a very small transparent lobe that is smaller than apical emargination (Fig. 5d).

Diagnosis. The species resembles *N. flavipennis*, *N. bicolor*, and *N. spegazzini* in the yellow colour of the elytra. It can be distinguished from *N. flavipennis* and *N. spegazzini* by the longitudinally reticulate microsculpture of the elytra, which is also found in *N. bicolor*. Compared to *N. bicolor*, the microsculpture is less distinct and thus the surface more shiny. Additionally, *N. flavoelytratus* is smaller than *N. spegazzini* and the dark space at the base of elytra is smaller, too. The size of *N. flavoelytratus* ranges between 2.1 and 2.2 mm, whereas in *N. spegazzini* it is between 2.5 and 2.7 mm. *Nacaeus flavoelytratus* is unique in the shape of the paramera and can be easily differentiated from the mentioned similar species by this structure. A differentiation of the Neotropical species with red or yellow elytra and dark head and pronotum is provided in the following key that particularly considers the microsculpture of pronotum and elytra and the paramera. Additionally to the microsculpture, the preparation of the paramera is necessary to differentiate the species, in particular, the analysis of the lateral lobe.

Etymology. The specific name derives from the Latin word *flavus* meaning yellow and *elytra* for front wings of beetles and refers to the colour of the elytra.

Material. Holotype 1♂: PERU, Tambopata Prov., Dept. Madre de Dios, 15 km NE Puerto Maldonado, Reserva

Amazonico, 12°33'S 69°03'W, 200 m elevation, Plot Z1E7, 9 July 1989, leg. J.S.Ashe and R.A. Leschen, #449, collected under bark (SEC). – Paratypes: 1♂, 1♀ with same data as for the holotype (SEC, UIC).

3.8. *Nacaeus spegazzini* (Bernhauer, 1933)

Lispinus spegazzini Bernhauer, 1933: 326

Lispinus nevermanni Bernhauer, 1942: 3, **new synonymy**

Specimens of *Nacaeus spegazzini* originating from different regions of the South American continent showed a high variation in the colour of the elytra. The type specimen, described by BERNHAUER (1933) has light red elytra. In recent collections by Z.H. Falin including 38 specimens from Paraguay, specimens with dark red, nearly black elytra with the same punctuation and microsculpture of pronotum and elytra as in *N. spegazzini* have been found. Additionally, no differences could be detected in the structure of the aedeagus and in the paramera between these specimens and the typical *N. spegazzini* with light red elytra. In the same collections, specimens with yellow elytra as in *N. nevermanni* have been found, too. As *N. nevermanni* differs from *N. spegazzini* only in the yellow colour of the elytra, I came to the result that *N. nevermanni* is a form of *N. spegazzini*. The form with the dark elytra is presently known only from the collections from Paraguay. However, the yellow elytral and the red elytral form are known from South and Central America. Thus, *N. spegazzini* obviously develops a high variation in elytral coloration from dark, light red to yellow elytra with a dark basal spot. It seems that these forms are not geographically separated, but may occur in one population as in the

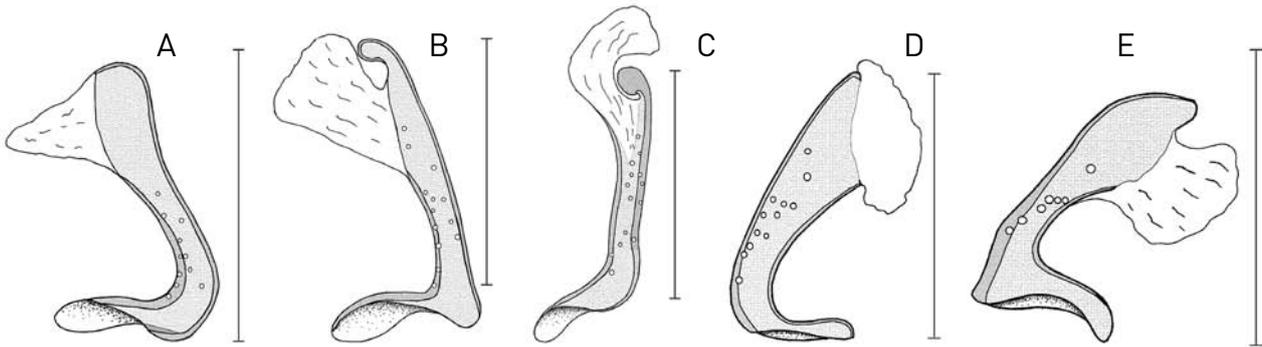


Fig. 10. Right paramera (A–C) respectively left paramera (D, E) of the *Nacaeus* species with red or yellow elytra and dark head and pronotum. **A:** *N. bicolor*, **B:** *N. spegazzini*, **C:** *N. rufopiceus*, **D:** *N. flavipennis*, **E:** *N. laetus* (scale bar: 0.1 mm).

material from Paraguay, collected on December 4 and 5, 2000, under bark by Z.H. Falin (SEC).

Material. ARGENTINA: 6 specimens, La Plata, 1914, leg. Spegazzini (FMNH); BRAZIL: 31 specimens, Nova Teutonia, 01.10.1972, leg. F. Plaumann (CNC); 1 specimen, Guarapuava, 01.11.1959, leg. M. Schneider (CNC); PARAGUAY: 21 specimens, Caazapa, 04.12.2000, 7 specimens, 05.12.2000, leg. Z.H. Falin (SEC); 10 specimens; Itapua, 20.11.2000, leg. Z.H. Falin (SEC); PERU: 9 specimens, Pucallpa, 25.06.1986, leg. A.A. Zakharov (ZC); ECUADOR: 1 specimen, Puyo, 19.07.1971, leg. B. Malkin (FMNH); VENEZUELA: 1 specimen, Bolivar, 30.07.1987, leg. M.A. Ivie (SEC); PANAMA: 1 specimen, Boquete, 12.3.1959, leg. H.S. Dybas (FMNH); 2 specimens, El Hato del Volcan, 14.06.1995, leg. J.S. Ashe (SEC); COSTA RICA: 3 specimens, Volcan Irazu, 22.04.1928, leg. Nevermann (FMNH); 1 specimen, Volcan Irazu, 22.04.1928, leg. A. Bierig (FMNH); 1 specimen, Carpintero, 25.06.1939, leg. A. Bierig (FMNH); 1 specimen, Vara Blanca, 02.1936, leg. A. Bierig (FMNH); 1 specimen, Monteverde, 22.05.1989, leg. R. Leschen (SEC); 14 specimens, Monteverde Reserve, 09.05.1989, 05.05.1989, leg. J.S. Ashe (SEC).

3.9. Key to *Nacaeus* species with light red or yellow elytra

The species included in the following key are similar due to the presence of light red or yellow coloured elytra; it completes the key in IRMLER (2003). Note that *N. spegazzini* with dark elytra is not included in the key. To differentiate the species it is necessary to analyse the paramera of the aedeagus. The specific structure of the paramera can be also used to determine the dark form of *N. spegazzini*.

- 1 Pronotum with longitudinally reticulate microsculpture (Figs. 6-6, 7-1, 7-2, 7-5). 2
- 1' Pronotum with isodiametrically reticulate microsculpture (Figs. 6-5, 7-3, 7-4). 5

- 2 Punctuation of elytra very fine and sparse, nearly invisible, microsculpture deep with dense longitudinal reticulation (Fig. 6-6), paramera as in Fig. 10A. *N. bicolor* (Sharp, 1887)
- 2' Punctures of elytra larger and deeper, distinctly visible, microsculpture weaker with wider longitudinal reticulation (Figs. 7-1, 7-2). 3
- 3 Larger species, 3.1 mm long, elytra light red, punctures of pronotum larger and microsculpture of elytra deeper (Fig. 7-1). *N. brasiliensis* Irmeler, 2003
- 3' Smaller species, 2.5 mm long, elytra yellow, punctures of pronotum smaller and microsculpture of elytra weaker (Fig. 7-2). 4
- 4 Microsculpture of elytra weaker, surface shiny (Fig. 7-2), colour of pronotum lighter, paramera as in Fig. 10C. *N. rufopiceus* Irmeler, 2003
- 4' Microsculpture on elytra more distinct, thus surface more or less matt (Fig. 7-5), colour of pronotum brown, paramera as in Fig. 10E. *N. laetus* (Sharp, 1876)
- 5 Larger species, 2.6–3.0 mm long, with dark red to yellow elytra with black spot at base, microsculpture of pronotum and elytra with netlike microsculpture (Fig. 7-3), paramera as in Fig. 10B. *N. spegazzini* (Bernhauer, 1933)
- 5' Smaller species, 2.1–2.4 mm long, elytra at least partly yellow, mostly with a dark triangular spot at scutellum. 6
- 6 Elytra with longitudinally reticulate microsculpture (Fig. 6-5), pronotum with scaly microsculpture, paramera as in Fig. 5d. *N. flavoelytratus* n.sp.
- 6' Elytra and pronotum with round reticulate microsculpture (Fig. 7-4), paramera as in Fig. 10D. *N. flavipennis* (Fauvel, 1865)

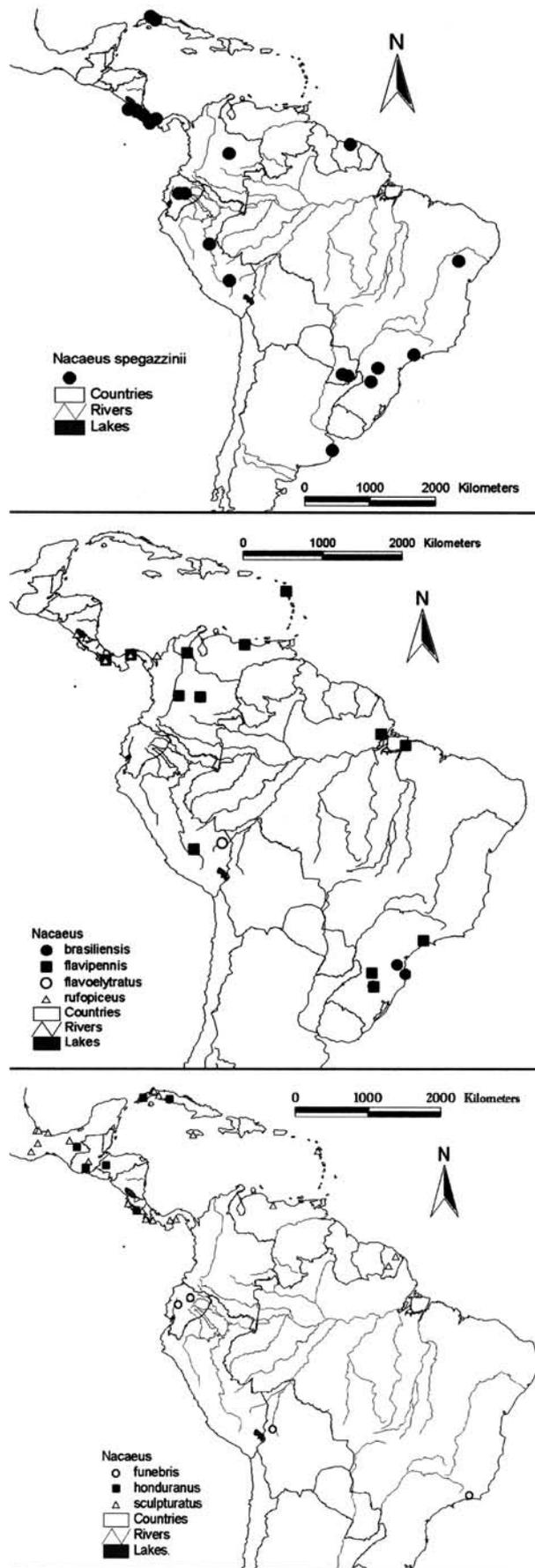


Fig. 11. Distribution of representative species of the genus *Nacaeus* placed to the *sculpturatus*-group and to the species with red or yellow elytra.

4. Discussion and remarks on the geographical distribution

Although extensive collections have been studied in the last three years, only 4 new species of *Nacaeus* have been found and two species have to be stated as conspecific. Considering the relatively poor knowledge on the Neotropical fauna, this number seems to be small and might be referred to the wide distribution of several *Nacaeus* species. Some species are even pantropically distributed, which might be a consequence of their under-bark habitat that enhanced the wide distribution by log transports. For instance, *N. impressicollis* is found in Central and South America, on several West Indian islands, i.e. Cuba, Guadeloupe and Puerto Rico, and additionally on the Atlantic islands and in the Indopacific region (IRMLER 2003). The example of *N. spegazzini* shows that based on large collections, the geographical distribution and the intraspecific variability of some species is wider than supposed in the past. *Nacaeus spegazzini* and *N. flavipennis* seem to be distributed from Central America along the Andean range to the South and to the eastern Venezuelan and Guyana's region (Fig. 11). The obvious lack of occurrence in the Amazon basin is striking, although intensive collections have been made there. Within the species group with light red or yellow elytra *N. bicolor* is still more widely distributed, additionally including the rainforest area of southern Mexico and Central Brazil, whereas the other species show a more limited distribution. *Nacaeus rufopiceus* is known only from southern Nicaragua to northern Panama. A similar distribution as in *N. spegazzini* is found in *N. opacus*. Concerning the distribution of species similar to *N. sculpturatus*, *N. opacus* shows the widest geographical range. *N. sculpturatus* seems to occur in Central America and northern South America only, the new species *N. honduranus* is still more restricted from western Cuba along southern Mexico and Guatemala to Costa Rica, and *N. funebris* was found from South Brazil to the eastern slope of the Andean mountains up to Ecuador.

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