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The *Holotrochus syntheticus* group in the Neotropical Region – new species, key and geographical distribution

(Coleoptera: Staphylinidae: Osoriinae)

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Abstract

Three new species of the genus *Holotrochus* ERICHSON, 1839 (Coleoptera: Staphylinidae: Osoriinae) are described from Central and South America: *H. diversipennis*, *H. longicornis*, and *H. guyanus*. They all belong to the *Holotrochus syntheticus* group. Due to the sexual dimorphism in the elytral structure of *H. diversipennis*, the *Holotrochus syntheticus* group has to be redefined and combined with the *H. brasiliensis* group. *Holotrochus breviatus* nom.n. is proposed to replace the preoccupied *H. curtipennis* IRMLER, 2005 (nec COIFFAIT, 1979). A revised key to species of the *H. syntheticus* group is provided and the geographical distribution and potential phylogenetic relations are considered.

Key words: Coleoptera, Staphylinidae, Osoriinae, *Holotrochus*, Neotropical Region, new species, new name, key, phylogenetic relation, zoogeography.

Introduction

In the Neotropical genus *Holotrochus* ERICHSON, 1839 (Coleoptera: Staphylinidae: Osoriinae) several species groups were differentiated (IRMLER 1981). Some species which were newly discovered by scientists of the Natural History Museum of the University of Kansas, reflect a new relationship between three of them: *H. syntheticus* group, *H. brasiliensis* group, and *H. pubescens* group. As a consequence of some character states displayed by the new species, some changes at the species group level have become necessary (see below).

Material, acknowledgement & methods

The material studied was collected by members of the staff of the Natural History Museum of the University of Kansas during several field trips to South America. 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, USA (SEMK) and my own collection (UIC). In particular, I am obliged to the late Prof. James S. Ashe, whose untimely passing has left a big gap in the research of Neotropical staphylinids.

Width was measured at the widest part of the referring tagmata, length was measured along the mid-line.

Holotrochus guyanus sp.n.

TYPE MATERIAL: **Holotype** ♂: French Guyana: "Saül, Mt. Galbao summit, 740m elevation (3°37'18"N, 53°16'42"W), 5.-7. June 1997, leg. J. Ashe and R. Brooks, #FG1AB97 154, collected by flight intercept trap" (SEMK).

DESCRIPTION (Figs. 2, 6): Length: 5.2 mm. Colour: brown, legs and antennae yellow. Head: 0.60 mm long, 0.90 mm wide; eyes large, at least two times as long as temples; distinctly prominent; setiferous punctures dense and deep; distance between punctures on average half as wide as diameter of punctures; backwards pointing yellow setae longer than diameter of two punctures; surface without microsculpture, polished. Antennae with 2nd antennomere oval and 3rd conical; both antennomeres longer than wide and of equal length; the following three antennomeres more or less quadrate with increasing width; antennomeres 7–11 distinctly wider than preceding ones, but only slightly wider than long. Pronotum: 0.85 mm long, 1.20 mm wide, widest in anterior third; anterior angles obtusely rounded; posteriorly scarcely narrowed, nearly parallel; posterior angles rectangular; lateral margin continuing to anterior edge; only a small central part of anterior edge without margin; a deep depression at posterior angles present; setiferous punctures as deep and dense as on head; a moderately small midline without punctures; yellow setae pointing backwards as long as on head; surface without microsculpture; polished. Elytra: 1.2 mm long, 1.3 mm wide; both lateral margins visible in dorsal aspect and slightly granulate; shoulders marked by short teeth; densely and coriaceously punctate; yellow setae as on head and pronotum; surface without microsculpture, polished.

DIAGNOSIS: This interesting species combines characters of the *H. syntheticus* group and the *H. pubescens* group. The margin of the anterior edge is typical for the species of the *H. syntheticus* group, whereas the totally hairy body is present in the *H. pubescens* group. The species is placed here within the *H. syntheticus* group based on the margined anterior edge. The overall feature of the punctation is also similar to the other species of the *H. syntheticus* group and differs from that in the *H. pubescens* group where punctation is much denser and less deep although a slight similarity in punctation is given with *H. danoffburgi* IRMLER, 2001 of the *H. pubescens* group. Nevertheless, this species might represent a link between the two species groups.

Distribution: Fig. 7.

ETYMOLOGY: The specific name refers to the country, i.e. French Guyana, where the species was collected.

Holotrochus longicornis sp.n.

TYPE MATERIAL: **Holotype** ♂: Bolivia: "Santa Cruz, 3.7 km SSE Buena Vista, Hotel Flora y Fauna (17°29.95'S, 63°33.15'W), 400 – 440m elevation, 2.- 9. 11. 2002, leg. R. Leschen, secondary forest, collected by flight intercept trap, #BOL1L02-055" (SEMK). **Paratype** ♀: same data as holotype (SEMK).

DESCRIPTION (Figs. 1, 4): Length: 3.7 mm. Colour: brown, posterior edge of abdominal tergites reddish; legs and antennae light brown. Head: 0.40 mm long, 0.65 mm wide; eyes large and prominent, 1.5 times as long as temples; distinctly and variably densely punctate; on average distance between punctures as wide as diameter of punctures; four punctures on the disc setiferous forming a quadrate with anterior line in front of anterior edge of eyes and posterior line equal to posterior edge of eyes; a pair of setiferous punctures near the anterior edge of clypeus and two supraocular setiferous punctures; clypeus with dense transversely reticulate microsculpture; microsculpture on disc extremely weak and net-like reticulate; surface shiny. Antennae in total longer than head and pronotum combined, 2nd antennomere oval, 3rd conical; 3rd antennomere nearly twice as long as 2nd, antennomeres 4–6 longer than wide; subsequent ones more or less quadrate. Pronotum: 0.60 mm long, 0.85 mm wide; widest shortly behind anterior angles; scarcely and continuously narrowed to rectangular posterior angles; anterior angles obtusely rounded and lateral margin continuing to anterior edge; entire anterior edge margined; with a flat and indistinct depression at posterior angles; punctures much larger and

denser than on head; distance between punctures shorter than diameter of punctures; a small midline without punctures. Elytra: 0.85 mm long, 0.95 mm wide; lateral margin broad, both lateral margins visible in dorsal view; shoulder with a short lateral tooth; with coriaceous ground sculpture; punctures scarcely visible between coarse ground sculpture.

DIAGNOSIS: The species certainly belongs to the *H. syntheticus* group due to the pubescent abdomen and the margined anterior edge of the pronotum. Regarding the relatively large prominent eyes it resembles *H. leticiae* and *H. guyanus*, but also *H. syntheticus* and *H. laticollis*, although the eyes are less prominent. *Holotrochus longicornis* can be differentiated from all other species of the species group by the long antennae with the extremely long 3rd antennomere and the quadrate penultimate antennomeres. In all other species of the group the penultimate antennomeres are distinctly wider than long.

Distribution: Fig. 8.

ETYMOLOGY: The specific epithet derives from the Latin word "longus" meaning long and "cornu" meaning horn (antenna) and refers to the conspicuously long antennae that are distinctly longer than head and pronotum combined.

Holotrochus diversipennis sp.n.

TYPE MATERIAL: **Holotype** ♂: Mexico: "Chiapas, Mpio: Tenejapa, Ojo de Agua (16°49.06'N, 92°26.33'W), 1800 m elevation, 21. 7. 2003, leg R. Anderson, collected from mixed cloud/pine forest litter, #MEX1A03 114" (SEMK). **Paratypes** 3 ♂♂, 13 ♀♀: same data as holotype (SEMK, UIC); 3 ♀♀: Mexico: "Chiapas, Mpio: Angel Albino Corzo, Reserva El Trifúno, Pico El Trifúno (15°40.16'N, 92°48.70'W), 2300 m elevation, 16.-21.11.2001, leg. R. Anderson, collected from cloud forest litter, #MEX1A01 206" (SEMK, UIC).

DESCRIPTION (Figs. 3, 4): Length: male 3.8 mm, female 4.1 mm. Colour: brown, posterior edge of pronotum and of abdominal tergites reddish; antennae and legs yellow. Head: male 0.35 mm long (female 0.50 mm long), 0.65 mm wide; eyes of male large and prominent; 1.5 times as long as temples, eyes of female much smaller, only half as long as temples; punctation distinct, but moderately sparse; distance between punctures on average wider than diameter of punctures; a transverse row of four setiferous punctures in a line with posterior edge of eyes; without microsculpture; surface polished; antennae with 2nd antennomere oval and 3rd conical; 3rd antennomere not longer than 2nd; 4th antennomere slightly longer than wide; antennomeres 5–11 with increasing width, 5th quadrate and 10th distinctly wider than long. Pronotum: 0.6 mm long, 0.9 mm wide in males, 0.7 mm long, 1.0 mm wide in females; sides nearly parallel (inconspicuously narrowed posteriad in females) with widely and obtusely rounded anterior angles; lateral margin continuing to anterior edge, but a wide central part of anterior edge not margined; an indistinct depression at posterior margin present; punctation fine and sparse; distance between punctures at least twice as wide as diameter of punctures; without microsculpture; surface polished. Elytra: 0.90 mm long, 0.95 mm wide in males, 0.70 mm long, 1.05 mm wide in females; lateral margin distinctly marked and both margins visible in dorsal view; shoulders with a short tooth; sparse and fine punctation scarcely visible within coriaceous ground sculpture.

DIAGNOSIS: This interesting species is conspicuous by the sexual dimorphism that might be an evolutionary link between the *Holotrochus* species with normally developed wings and the *H. brasiliensis* group and *H. neotropicus* group with short elytra in both sexes. Additionally, the reduced eyes in females mediate between the *H. syntheticus* group with usually normally developed eyes and the *H. neotropicus* group, in which the eyes are usually strongly reduced. The male of *H. diversipennis* resembles *H. poundi* and *H. antennatus* due to the indistinct

depression at the posterior angles and the sparse punctation of the elytra, but the eyes are larger and more prominent in *H. diversipennis*.

DISTRIBUTION: Fig. 9.

ETYMOLOGY: The specific epithet combines the Latin words diversus ("different") and pennis ("pertaining to wings") and refers to the sexual dimorphism of the elytra.

***Holotrochus breviatus* nom.n.**

Holotrochus curtipennis IRMLER, 2005 (nec COIFFAIT, 1979)

Lee Herman informed me that the recently decribed *H. curtipennis* IRMLER, 2005 is preoccupied by *H. curtipennis* COIFFAIT, 1979. Therefore, it was necessary to rename the species.

New definition of the *Holotrochus syntheticus* group and key to species

Hitherto, the *pubescens* group, *brasiliensis* group and *syntheticus* group have been differentiated by the length of the elytra and the pubescence: *pubescens* group – entirely pubescent, *brasiliensis* group and *syntheticus* group – only abdomen pubescent. The two latter were defined by length of elytra being shorter than pronotum in the *brasiliensis* groups and distinctly longer than pronotum in the *syntheticus* group. In the three newly described species which certainly represent members of the actual *syntheticus* group, one species (*H. diversipennis*) is distinctly sexual dimorphic, with normally long elytra in males and shortened elytra in females, linking the *brasiliensis* group and the *syntheticus* group and a second one (*H. guyanus*) that is entirely pubescent links the *syntheticus* and the *pubescens* group.

The elytral structure of *H. diversipennis* shows, that the separation of the *H. syntheticus* group and the *H. brasiliensis* group cannot be maintained. Thus, the species of the former *H. brasiliensis* group (*H. brasiliensis*, *H. panamae*, *H. columbiensis*, *H. centralensis*, and *H. bolivianus*) have to be included in the *H. syntheticus* group that is newly defined by the following characters: at least abdomen densely covered by relatively long setae, eyes well developed, elytra shorter or slightly longer than pronotum, elytral margin broad and distinctly visible in dorsal aspect and shortly prominent at shoulders.

Based on these characters, *H. breviatus* (recently described as *H. curtipennis* IRMLER, 2005 – see above) cannot be placed in the *H. syntheticus* group, because the abdomen is not pubescent. It must be regarded as a species incertae sedis. The *H. pubescens* group which is also characterised by densely pubescent abdomen and fore body can be differentiated from the *H. syntheticus* group by the narrow lateral margin of the elytra and the smoothly curved shoulders without prominent angle. Additionally, pubescence and punctation is still denser in the *H. pubescens* group than in the *H. syntheticus* group. Nevertheless, the entirely pubescent *H. guyanus* shows that both groups might be phylogenetically related.

1	Pronotum, elytra and abdomen entirely pubescent	*guyanus* sp.n.
-	Only abdomen pubescent	2
2	Penultimate antennomeres distinctly wider than long, antennae mostly forming an indistinct club with antennomeres apically increasing in width	3
-	Antennae slender, penultimate antennomeres longer than wide	*longicornis* sp.n.
3	Pronotum with deep lateral depressions at posterior angles	4

- Depressions at posterior angles of pronotum indistinct 6

4 Sides of pronotum smoothly curved from anterior to posterior edge ..... *syntheticus* SHARP, 1876

- Sides of pronotum straight or slightly emarginate in front of posterior angles 5

5 Pronotum with a pair of depressions on each side of the middle in front of the posterior edge, elytra with coarse punctation; larger, 3.8 mm long ..... *laticollis* BERNHAUER, 1908

- Pronotum without central depressions in front of the posterior edge, punctation of elytra finer; smaller, 3.2 mm long ..... *leticiae* IRMLER, 1987

6 Small species with short elytra in both sexes, pronotum with relatively deep punctation and sides emarginate in front of posterior angles ..... *panamae* IRMLER, 2005

- Larger species, at least 3.0 mm long, sides of pronotum parallel or smoothly curved from anterior to posterior angles and punctation finer and sparser 7

7 Sides of pronotum parallel, at posterior angles as wide as or wider than at anterior angles 8

- Sides of pronotum smoothly curved from anterior to posterior angles, largest width of pronotum in middle 10

8 Elytra in both sexes longer than pronotum; larger, 3.9–4.1 mm long……. ..... *poundi* BLACKWELDER, 1943

- Elytra in both sexes shorter than pronotum 9

9 Eyes very short, only 0.3 times as long as temples..... *bolivianus* IRMLER, 2005

- Eyes larger, only slightly shorter than temples..... *columbiensis* IRMLER, 1987

10 3rd antennomere distinctly longer than 2nd 11

- 3rd antennomere not longer than 2nd 12

11 Pronotum with indistinct glabrous midline, female with reduced eyes and elytra shorter than pronotum..... *diversipennis* sp.n.

- Pronotum densely punctate, without glabrous midline, elytra and eyes not sexually dimorphic ..... *antennatus* WENDELER, 1955

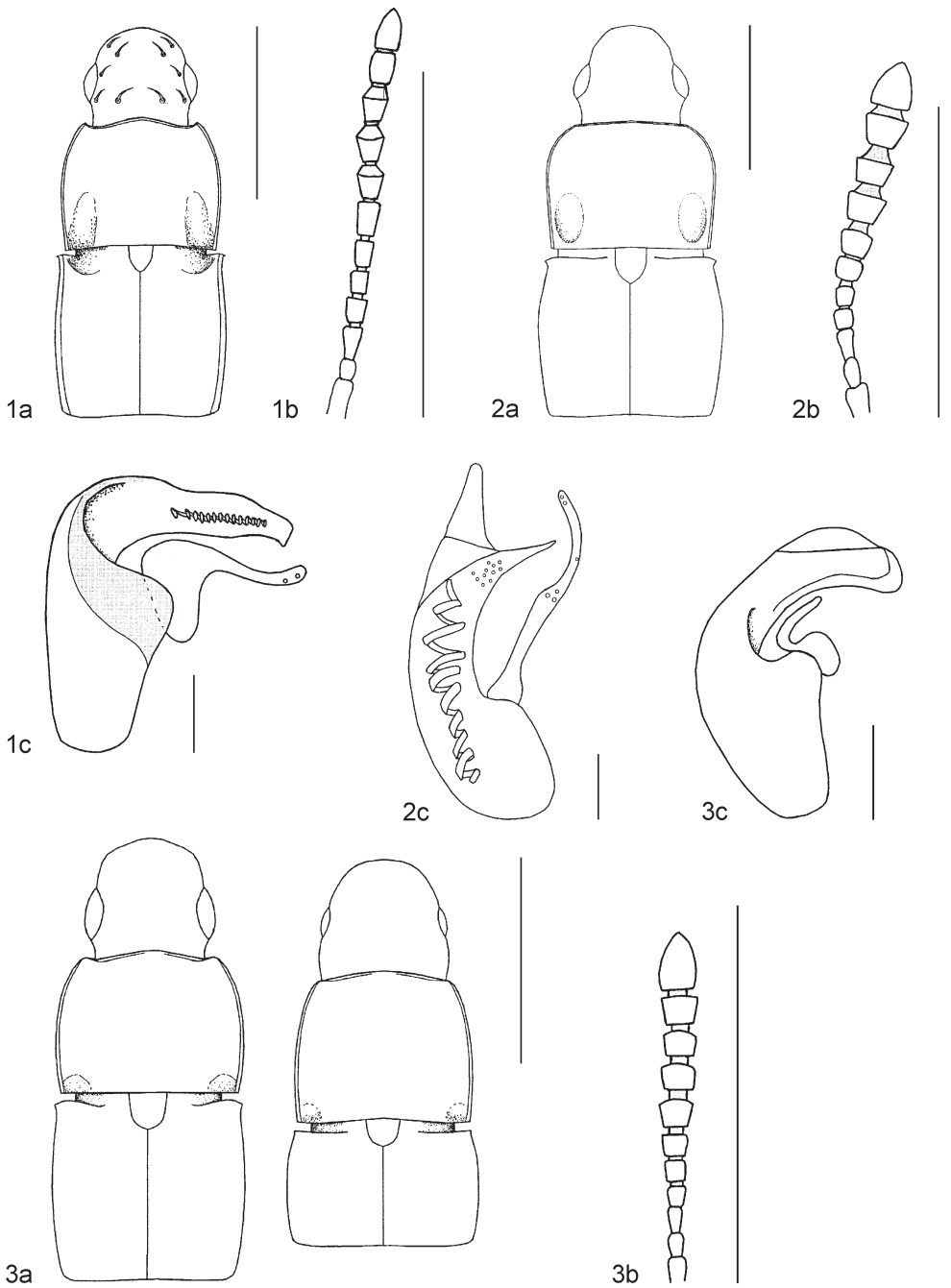
12 Surface of pronotum polished and with moderately dense and deep punctation..... ..... *centralensis* IRMLER, 1987

- Surface of pronotum with weak net-like reticulation and punctation much finer and sparser, scarcely visible ..... *brasiliensis* BERNHAUER & SCHUBERT, 1911

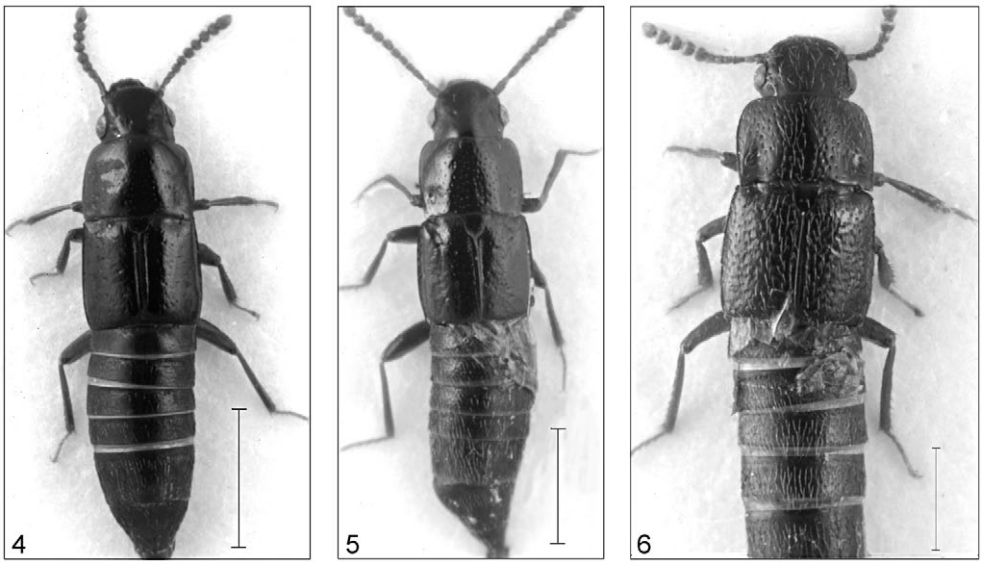
Geographical distribution and considerations on potential phylogenetic relations

Within the *Holotrochus syntheticus* group three major assemblages of closer affinity may exist.

1) The *H. syntheticus* subgroup with the species *H. syntheticus*, *H. laticollis*, *H. leticiae* and *H. guyanus*. The species of this subgroup are characterised by large prominent eyes and deep depressions at posterior angles (Fig. 6). With the exception of *H. leticiae*, the endophallus is formed like a long and close spiral and the paramers are relatively long exceeding the central lobe. In *H. leticiae* the aedeagus resembles those of the *H. poundi* group. Thus, *H. leticiae* may represent a phylogenetic transition between the *H. syntheticus* subgroup and those of the *H. poundi* subgroup. The species are distributed in the Amazonian and adjacent rainforest area from southern Brazil to Venezuela and Guyana. Hitherto, *H. syntheticus* is known from the northern parts of this area, *H. laticollis* occurs in the western and southern parts from the coastal rain forest in southern Brazil to the eastern slopes of the Andean range in Colombia. *Holotrochus leticiae* occurs in the central parts, while *H. guyanus* is known only from Guyana.



Figs. 1–3: 1) *Holotrochus longicornis*, 2) *H. guyanus*, 3) *H. diversipennis* (3a: left – male, right – female); a: fore body, b: antenna, c: aedeagus; scale bar: 1 mm (a, b), 0.1 mm (c).



Figs. 4–6: Dorsal aspect of 4) *Holotrochus diversipennis*, 5) *H. longicornis*, and 6) *H. guyanus* showing the hair cover and surface of pronotum and elytra (scale bar: 1 mm).

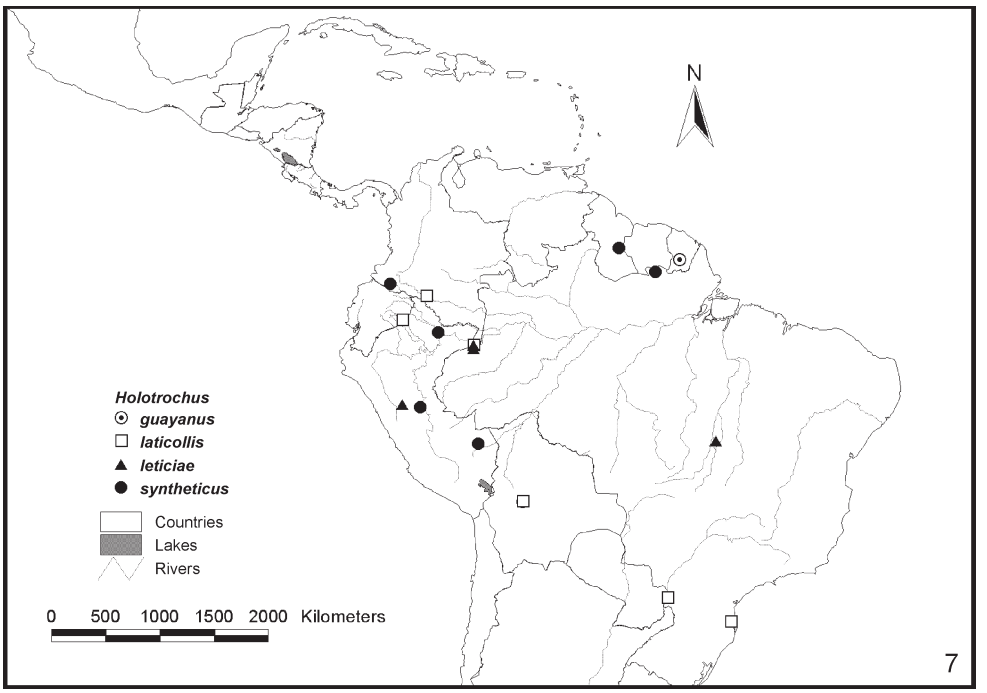


Fig. 7: Geographical distribution of the species of the *Holotrochus syntheticus* group.

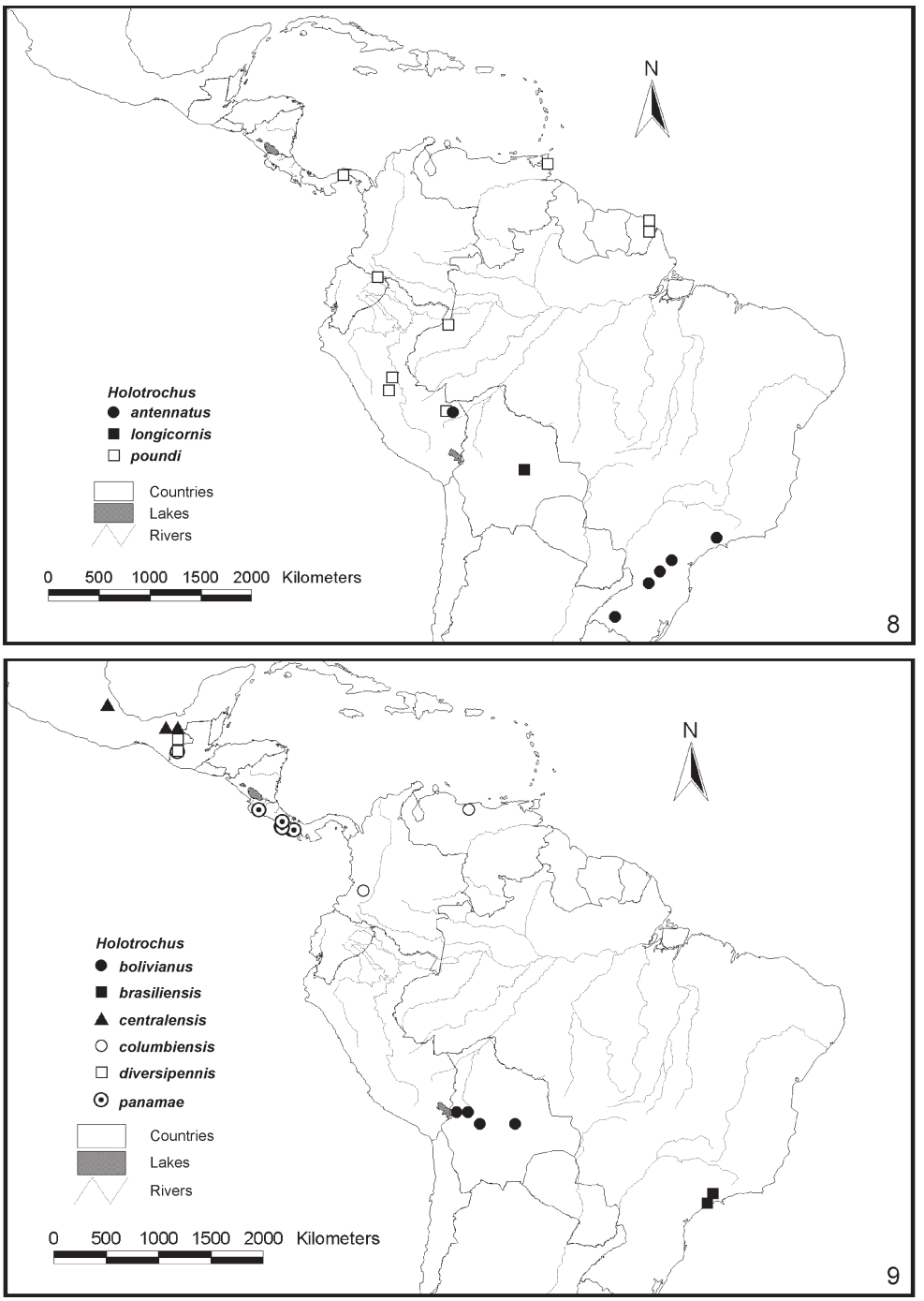


Fig. 8–9: Geographical distribution of the species of the *Holotrochus syntheticus* group.

2) The *H. poundi* subgroup consists of *H. poundi*, *H. antennatus* and *H. longicornis*. These species are characterised by less prominent eyes and indistinctly developed pronotal depressions (Fig. 5). The endophallus is short or with a wide spiral. The paramers are shorter and do not exceed the central lobe. The subgroup seems to inhabit only the marginal zones of the Amazonian lowland rainforest with highest elevations at approximately 800 m. *Holotrochus poundi* is found in the northern, *H. antennatus* in the southern area, and *H. longicornis* between these two areas.

3) The *H. brasiliensis* subgroup includes the species with reduced elytra, at least in females. The pronotum is similarly structured as in the *H. poundi* subgroup with indistinct posterior depressions on the pronotum and less prominent eyes (Fig. 4). Endophallus and the paramers are similarly short. The species occur from southern Mexico to southern Brazil along the mountain range of Central America and the Andean range in South America up to the coastal mountain range in Brazil. The species are well separated along the geographical gradient and evidently do not overlap in their distribution. They mainly live in cloud forests between 1500 and 2800 m, but rarely occur in lower elevations down to 400 m.

It seems that the species of the *H. brasiliensis* subgroup are more closely related to the species of *H. poundi* subgroup than to those of the *H. syntheticus* subgroup and seem to represent the ecological group of the upper elevations of the cloud forests. It is possible that the short elytra developed as an adaptation to higher mountainous regions where wind might have played a role in periods with a more open vegetation cover and a more cryptic life-style might have been an evolutionary advantage. Considering the morphology of other *Holotrochus* groups, the species of the *H. poundi* subgroup provide the most unspecific type, as the pronotal structure in the *H. syntheticus* subgroup is unique in the genus *Holotrochus*. Although reduced elytra are also found in other *Holotrochus* groups and related genera, e.g. *Mimotrochus*, the short elytra are certainly a progressive character, too.

Zusammenfassung

Drei neue Arten der Gattung *Holotrochus* ERICHSON, 1839 (Coleoptera: Staphylinidae: Osoriinae) werden aus Zentral- und Südamerika beschrieben: *H. diversipennis*, *H. longicornis*, und *H. guyanus*. Sie alle gehören zur *Holotrochus syntheticus*-Gruppe. Auf Grund des Sexualdimorphismus in der Elytrenstruktur des *H. diversipennis*, ist es notwendig die *Holotrochus syntheticus*-Gruppe neu zu definieren und mit der *H. brasiliensis*-Gruppe zu kombinieren. *Holotrochus breviatus* nom.n. wird für den präokkupierten *H. curtipennis* IRMLER, 2005 (nec COIFFAIT, 1979) vorgeschlagen. Ein revidierter Bestimmungsschlüssel zu den Arten der *H. syntheticus*-Gruppe wird präsentiert und die geografische Verbreitung sowie potentielle Verwandschaftsbeziehungen erörtert.

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