

Scientific Papers

Natural History Museum The University of Kansas

29 March 2005

Number 36:1-18

New Neotropical Species of the Genus *Holotrochus* (Coleoptera: Staphylinidae: Osoriinae)

By

ULRICH IRMLER

Oecologie-Zentrum, Universität zu Kiel, Schauenburgerstrasse 112, D-24118 Kiel, Germany

CONTENTS

ABSTRACT.....	1
INTRODUCTION	2
ACKNOWLEDGMENTS.....	2
METHODS	2
TAXONOMY	2
LITERATURE CITED.....	18

ABSTRACT Examination of collections of *Holotrochus* beetles (Staphylinidae: Osoriinae,) from the Neotropics has revealed 17 new species. Nine are from South America and nine from Central America. The species are: *H. andersoni* (Costa Rica: Puntarenas), *H. arcuatus* (Costa Rica: Heredia), *H. ashei* (Peru: Madre de Dios), *H. bolivianus* (Bolivia: Cochabamba), *H. brooksi* (French Guyana: Cayenne), *H. chilensis* (Chile: Osorno and Chiloé), *H. chiriquensis* (Panama: Chiriquí, and Costa Rica: Puntarenas), *H. crassicornis* (Brazil: Minas Gerais), *H. curtispennis* (Ecuador: Azuay), *H. decumanus* (Honduras: Olancho, and Costa Rica: Puntarenas), *H. honduranus* (Honduras: Santa Barbara), *H. lescheni* (Peru: Madre de Dios, and Bolivia: Cochabamba), *H. loreti* (Peru: Loreto), *H. minax* (Venezuela: Aragua), *H. panamae* (Panama: Chiriquí), *H. rufomarginatus* (Guatemala), and *H. uncinatus* (Mexico: Oaxaca). Keys are provided for the identification of the *Holotrochus neotropicus* group and the *H. brasiliensis* group including maps of distribution for the species of these groups.

Key words: Rove beetles; Staphylinidae; Osoriinae; *Holotrochus*; Neotropics

Scientific Papers

Natural History Museum The University of Kansas

29 March 2005

Number 36:1-18

New Neotropical Species of the Genus *Holotrochus* (Coleoptera: Staphylinidae: Osoriinae)

By

ULRICH IRMLER

Oecologie-Zentrum, Universität zu Kiel, Schauenburgerstrasse 112, D-24118 Kiel, Germany

CONTENTS

ABSTRACT.....	1
INTRODUCTION	2
ACKNOWLEDGMENTS.....	2
METHODS	2
TAXONOMY	2
LITERATURE CITED.....	18

ABSTRACT Examination of collections of *Holotrochus* beetles (Staphylinidae: Osoriinae,) from the Neotropics has revealed 17 new species. Nine are from South America and nine from Central America. The species are: *H. andersoni* (Costa Rica: Puntarenas), *H. arcuatus* (Costa Rica: Heredia), *H. ashei* (Peru: Madre de Dios), *H. bolivianus* (Bolivia: Cochabamba), *H. brooksi* (French Guyana: Cayenne), *H. chilensis* (Chile: Osorno and Chiloe), *H. chiriquensis* (Panama: Chiriquí, and Costa Rica: Puntarenas), *H. crassicornis* (Brazil: Minas Gerais), *H. curtippennis* (Ecuador: Azuay), *H. decumanus* (Honduras: Olancho, and Costa Rica: Puntarenas), *H. honduranus* (Honduras: Santa Barbara), *H. lescheni* (Peru: Madre de Dios, and Bolivia: Cochabamba), *H. loreti* (Peru: Loreto), *H. minax* (Venezuela: Aragua), *H. panamae* (Panama: Chiriquí), *H. rufomarginatus* (Guatemala), and *H. uncinatus* (Mexico: Oaxaca). Keys are provided for the identification of the *Holotrochus neotropicus* group and the *H. brasiliensis* group including maps of distribution for the species of these groups.

Key words: Rove beetles; Staphylinidae; Osoriinae; *Holotrochus*; Neotropics

INTRODUCTION

In the intensive collections of Osoriinae from the Neotropics of the Natural History Museum and Biodiversity Research Center of the University of Kansas are a considerable number of species of *Holotrochus* from Central and South America. Within the collections of *Holotrochus*, I found 15 new species. A small collection of the British Museum Natural History with 30 specimens of *Holotrochus* contained another three new species and one being identical in both collections. The purpose of this paper is to provide descriptions and illustrations of these new species. These descriptions complement my earlier studies of *Holotrochus* (Irmeler, 1981, 1987, 2001). The following descriptions of the new species are arranged

alphabetically by species names. Keys for the identification of species and maps of distribution are provided for the *H. neotropicus* and *H. brasiliensis* species groups. For the species of the other groups no key is given, because they can hardly be distinguished without studying the aedeagus.

ACKNOWLEDGMENTS

I am thankful to the following institutions and curators who graciously provided material used in this study: Natural History Museum and Biodiversity Research Center of the University of Kansas, Lawrence, Kansas, Dr. J. S. Ashe (SEMC); British Museum Natural History, London, Dr. M. Brendell (BMNH).

METHODS

All measurements were made using an ocular micrometer. Total body length was determined by summing the individual lengths of the tagmata. Measurements of the tagmata were performed as follows: head length along the midline between front margin and neck; width between the eyes including eyes. Pronotal length along the midline;

width at the widest part. Elytral length from shoulder to posterior angle; width in the middle.

Abbreviations for collections containing the specimens used in this study are given in the acknowledgments. My own collection is abbreviated UIC

TAXONOMY

Holotrochus andersoni new species
(Fig. 12a–d)

Holotype.—Costa Rica: *Puntarenas*: Osa Peninsula, Fundación Neotropical, 10 km W. Rincon, 20 m elevation, 8°42'30" N, 83°32'30" W, male, 22 June 1997, collected by R. Anderson, from berlese forest litter, CR1A97 O26F (SEMC)

Diagnosis.—The species is related to the species of the *Holotrochus simplex*-group, which are characterized by the margined anterior edge of the pronotum and the laterally hairy abdomen. From the related species, *H. andersoni* can be distinguished by its small size. The species is smaller than *H. hanagarthi*. Punctuation of pronotum is also very similar, but slightly finer and sparser. Without analyzing the aedeagus no sure determination is possible. In *H. andersoni* the three spirals of endophallus are close, whereas the two spirals in *H. hanagarthi* are wider (Fig. 12c). *H. andersoni* is also similar to *H. newtoni* in pronotal and elytral punctuation and microsculpture, but *H. newtoni* is distinctly larger.

Description.—Length: 3.2 mm. Color: Piceous; posterior angles of pronotum, elytral suture and abdominal tergites red, partly light red; legs and antennae yellow. Head: 0.35 mm long, 0.5 mm wide; very finely and sparsely punctate, with distance between punctures on average 3 times wider than diameters of punctures; punctures on clypeus distinctly denser and larger, with distance between punctures on

average only as wide as diameters of punctures; surface moderately shiny, with transverse micro-reticulation, while surface of disc polished and shiny, without microsculpture. *Antennae*: Antennomere 2 globular, 3 conical, not larger than 2nd; Antennomeres 4 and 5 quadrate, the followings wider than long; 9th antennomere 3 times wider than long (Fig. 12b). *Pronotum*: 0.55 mm long, 0.7 mm wide; widest in the anterior third, scarcely and straightly narrowed to posterior edge (Fig. 12a), arcuately narrowed to anterior angles; laterally distinctly margined, anterior edge very finely margined except a moderately wide central part; punctuation much denser and punctures larger than on the head, with few scattered larger punctures; surface polished and shiny, without microsculpture; depressions at posterior angles very indistinct. *Elytra*: 0.6 mm long, 0.7 mm wide; with similar punctuation as on the pronotum, but punctures slightly larger; surface less shiny than on the pronotum, with coriaceous ground sculpture. *Abdomen*: With very fine punctuation; surface scarcely shiny, with dense netlike micro-reticulation, a wide midline with still sparser punctuation and without hairs; abdominal tergites laterally with short yellow hairs, hairs shorter than distances between punctures. *Aedeagus*: With short paramera and central lobe; endophallus with close spirals, wide at the base and small at the top (Fig. 12c).

Etymology.—The species name is dedicated to Dr. Richard Anderson, who collected an incredible high

number of Osoriinae during his studies of the Neotropical litter fauna.

Holotrochus arcuatus new species
(Fig. 2a–d)

Holotype.—COSTA RICA: *Heredia*: La Selva, 3.2 km SE Puerto Viejo, 100 m elevation, 10° 26' N, 84° 01' W, male, 17 February 1992, collected by W. Bell, from flight intercept trap (SEMC)

Paratype.—COSTA RICA: *Heredia*: La Selva, Biological Station, 3 km SE Puerto Viejo, male, 10 April 1989, collected by H.A. Hespeneheide (UIC)

Diagnosis.—*Holotrochus arcuatus* is related to the species of the *H. rufopygus* group. The species in this group are characterized by the large size (>5 mm) and the sparsely hairy abdomen. Within this species group the new species is like *H. plaumanni* by the micropunctures of the pronotum and the transverse microsculpture of the clypeus. A weak, scarcely visible reticulation on the pronotum exists; therefore, *H. arcuatus* can be confused with the species, which have also a pronotal microsculpture, e.g. *H. susannae*. Without analysis of the aedeagus no certain determination is possible (Fig. 2c). The aedeagus is characterized by a very broad and stout middle lobe and long paramera, which are elevated in the distal half and pointed to the middle lobe.

Description.—*Length*: 5.1 mm. *Color*: Black; femur and tibia of legs piceous; tarsi red. *Head*: 0.6 mm long, 0.85 mm wide; punctuation fine and sparse, with distance between the punctures twice as long as the diameter of punctures; clypeus with transversely reticulate dense microsculpture; disc polished, without microsculpture; short supraocular carina present with few short setae, labrum transverse, 3 times wider than long. *Antennae*: Thick, middle antennomeres as wide as one eye; 3rd antennomere twice as long as the short globular 2nd; Middle antennomeres quadrate; Antennomeres 8 to 10 1.3 times as wide as long (Fig. 2b). *Pronotum*: 0.9 mm long, 1.15 mm wide; widest shortly behind the anterior angles; straightly narrowed to posterior angles and arcuately narrowed to anterior angles (Fig. 2a); lateral margin distinct, while anterior margin is finer, central part of anterior edge and total posterior edge not margined; punctuation as dense and fine as on the head, punctuation of the midline in the anterior half scarcely sparser than on the lateral pronotum, in the posterior half smooth; shortly in front of posterior edge several larger punctures forming a flat, transverse depression; between the normal punctuation with sparse micro-punctuation; surface nearly polished, with a very weak microsculpture, which is scarcely visible; prosternum distinctly elevated between coxae. *Elytra*: 0.1 mm long, 0.12 mm wide; surface less shiny than the pronotum, with distinct coriaceous

ground sculpture; punctuation fine and sparse and among this punctuation irregularly scattered larger punctures. *Abdomen*: surface dull, with dense transversely reticulate microsculpture; only with very fine and sparse micro-punctuation; tergites dorsally without hairs, but laterally and ventrally distinctly hairy, hairs yellow; 6th abdominal sternite with a pear-shaped depression, the depression and the adjacent area without hairs, adjacent to the anterior part of the depression with short hairs, laterally to the depression a granulate area; 7th abdominal tergite deeply emarginate (Fig. 2d). *Aedeagus*: Paramera longer than the central lobe and a characteristically formed endophallus with a short basal part, a long arcuate middle part, and a short spiral part at the top (Fig. 2c).

Etymology.—The species name is derived from the Latin *arcuatus* meaning arched and refers to the arched paramera of the aedeagus.

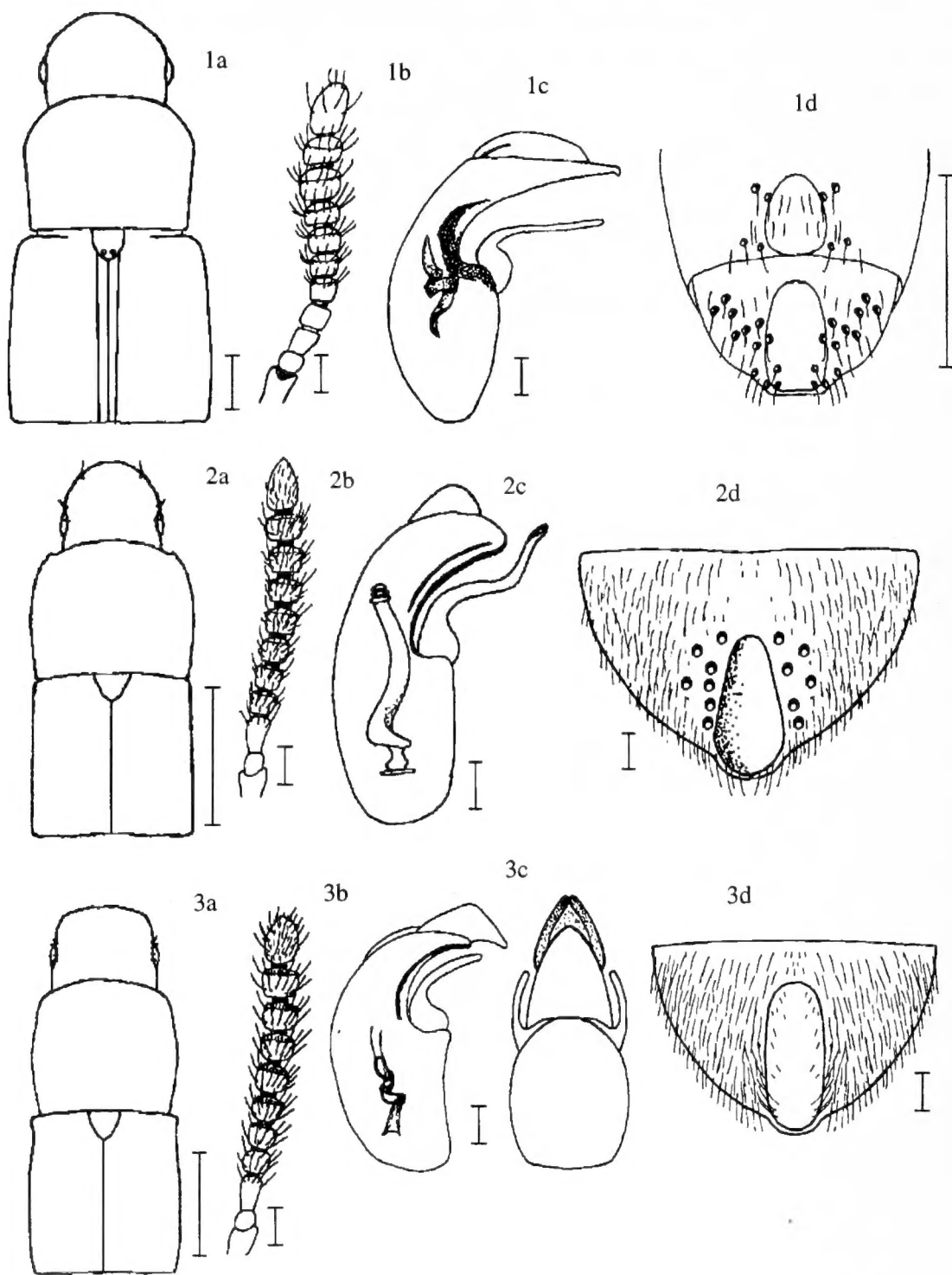
Holotrochus ashei new species
(Fig. 8a–c)

Holotype.—PERU: *Madre de Dios*: 15 km NE Puerto Maldonado, 200 m elevation, 12° 35' S, 65° 05' W, male, 25 June 1989, collected by J. Ashe and R. Leschen, #338, from palm flowers (SEMC)

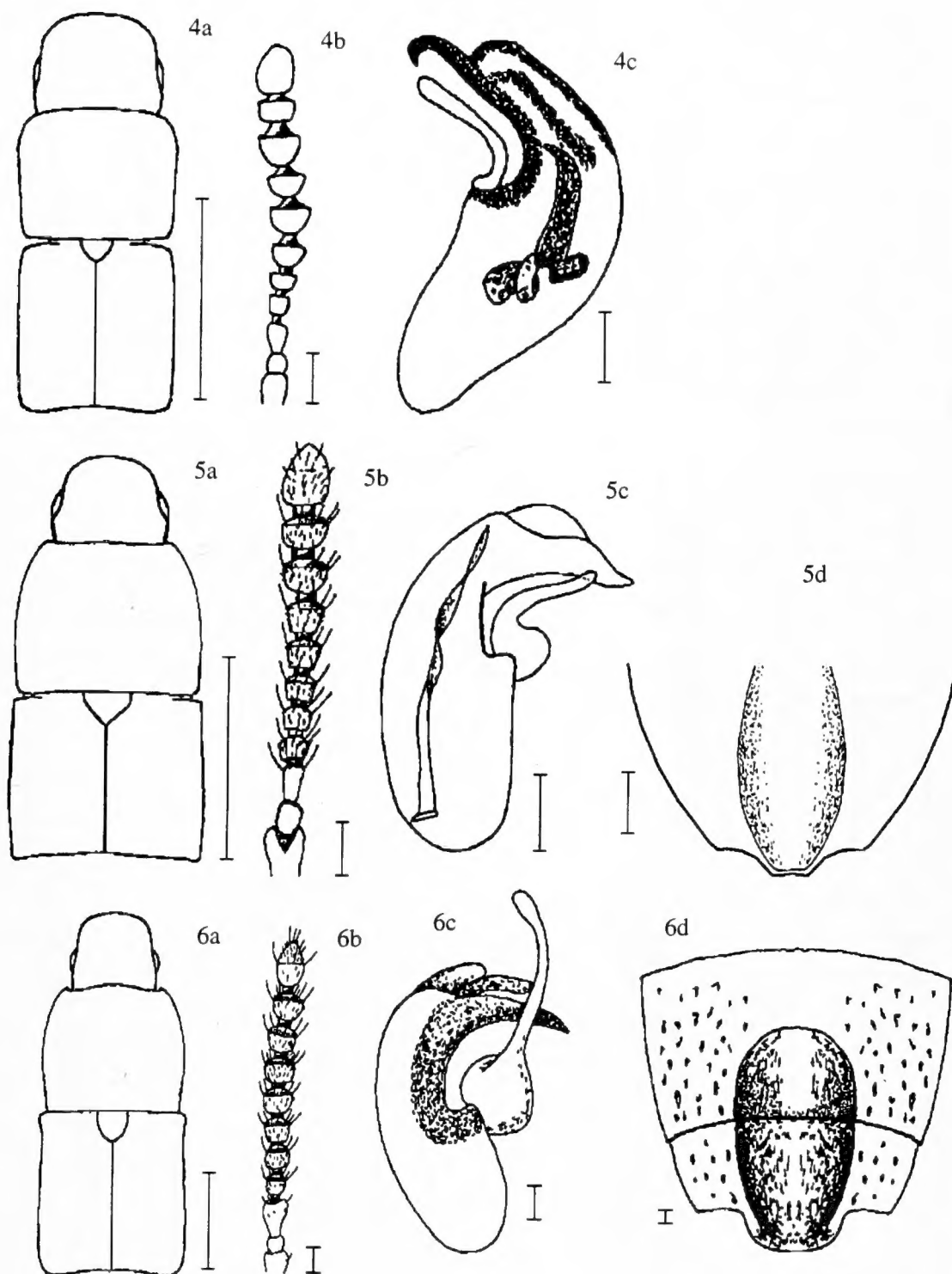
Paratype.—PERU: *Madre de Dios* 1 female with same data as holotype (SEMC)

Diagnosis.—The species belongs to the *Holotrochus minor* group by its small size, the anteriorly margined pronotum and the hairless abdomen. Within the *H. minor* group, *H. ashei* is most similar to *H. hyleae* Irmeler, 1987, by the short 3rd antennomere and the scarcely shiny abdomen. It can be distinguished by the club-form antennae from the related species of that group (Fig. 8b).

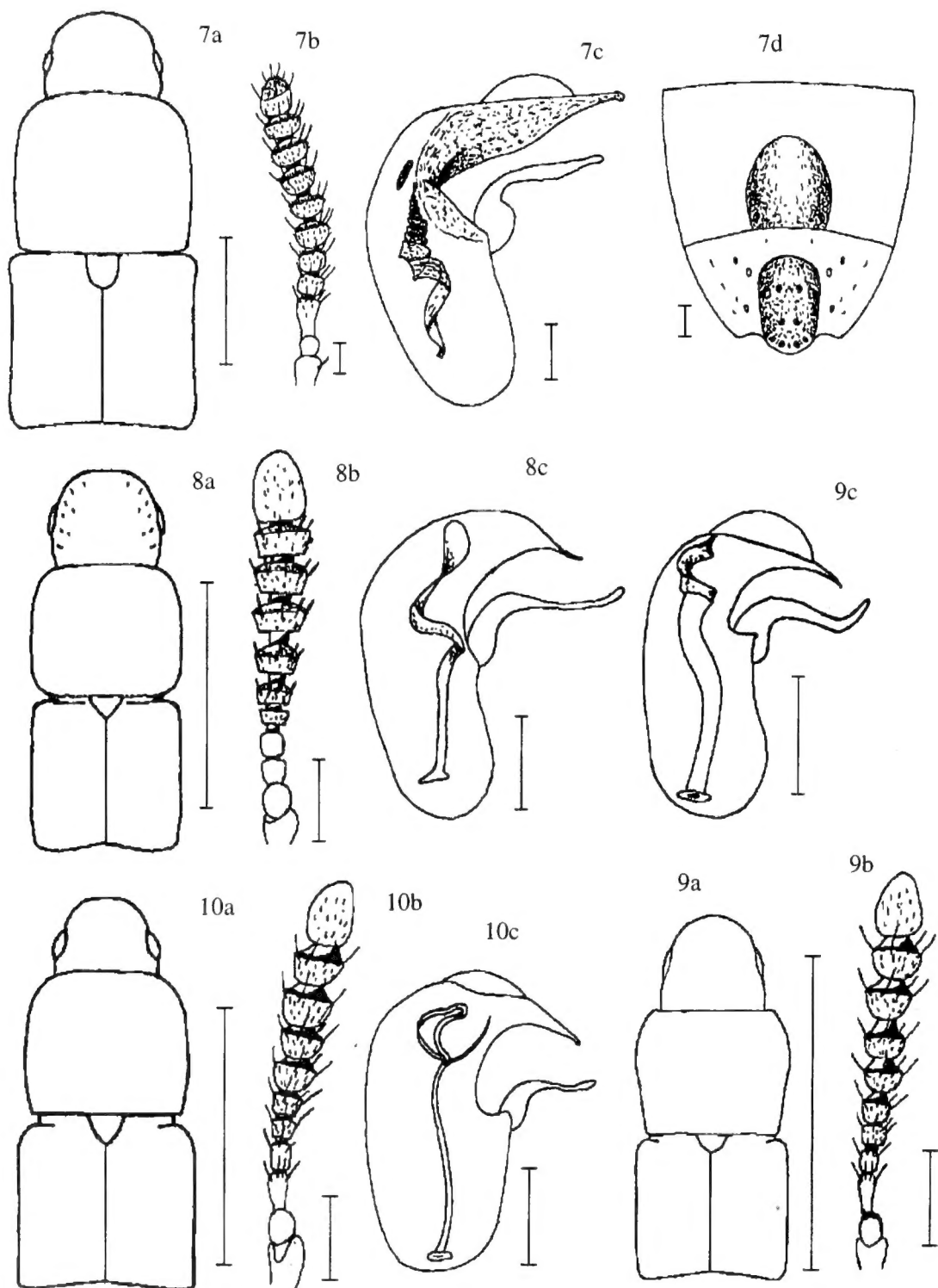
Description.—*Length*: 2.6 mm. *Color*: Piceous; legs and antennae yellow; posterior edge of pronotum and abdominal tergites red. *Head*: 0.3 mm long, 0.4 mm wide; with distinct punctuation and a fine micropunctuation between the larger punctures, distance between punctures as wide or slightly wider than diameter of punctures; surface of clypeus dull, with dense and distinct transversely reticulate microsculpture; surface of disc polished, without microsculpture; eyes as long as temples and a supraocular carina with few short setae; temples with longitudinally reticulate microsculpture. *Antennae*: Short and stout, 2nd antennomere globular, 3rd conical as long as 2nd, 4th quadrate, the following wider than long; Antennomeres 7th–10th forming an indistinct club, 8th–10th 3 times wider than long (Fig. 8b). *Pronotum*: 0.45 mm long, 0.55 mm wide; widest near the middle, arcuately narrowed to anterior and posterior angles, slightly more narrowed to posterior angles than to anterior angles (Fig. 8a); lateral margin distinct, while anterior edge finely margined;



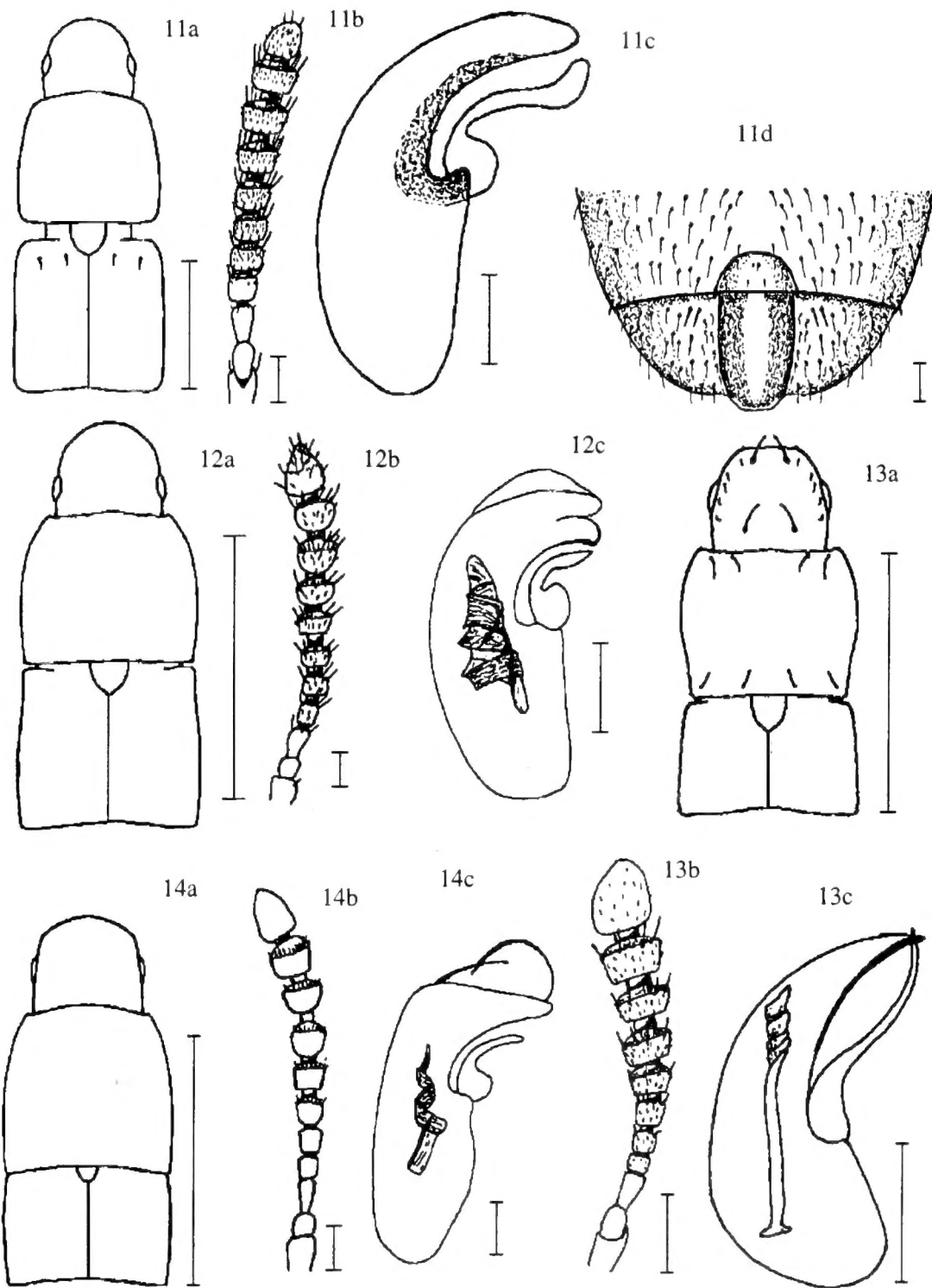
Figs. 1-3. 1. *Holotrochus crassicornis*, 2. *H. arcuatus*, 3. *H. decumanus* (a: front body, b: antenna, c: aedeagus in lateral view [left] and ventral view [right], d: last abdominal sternite of male; scale bars for a = 1 mm, for b-d = 0.1 mm).



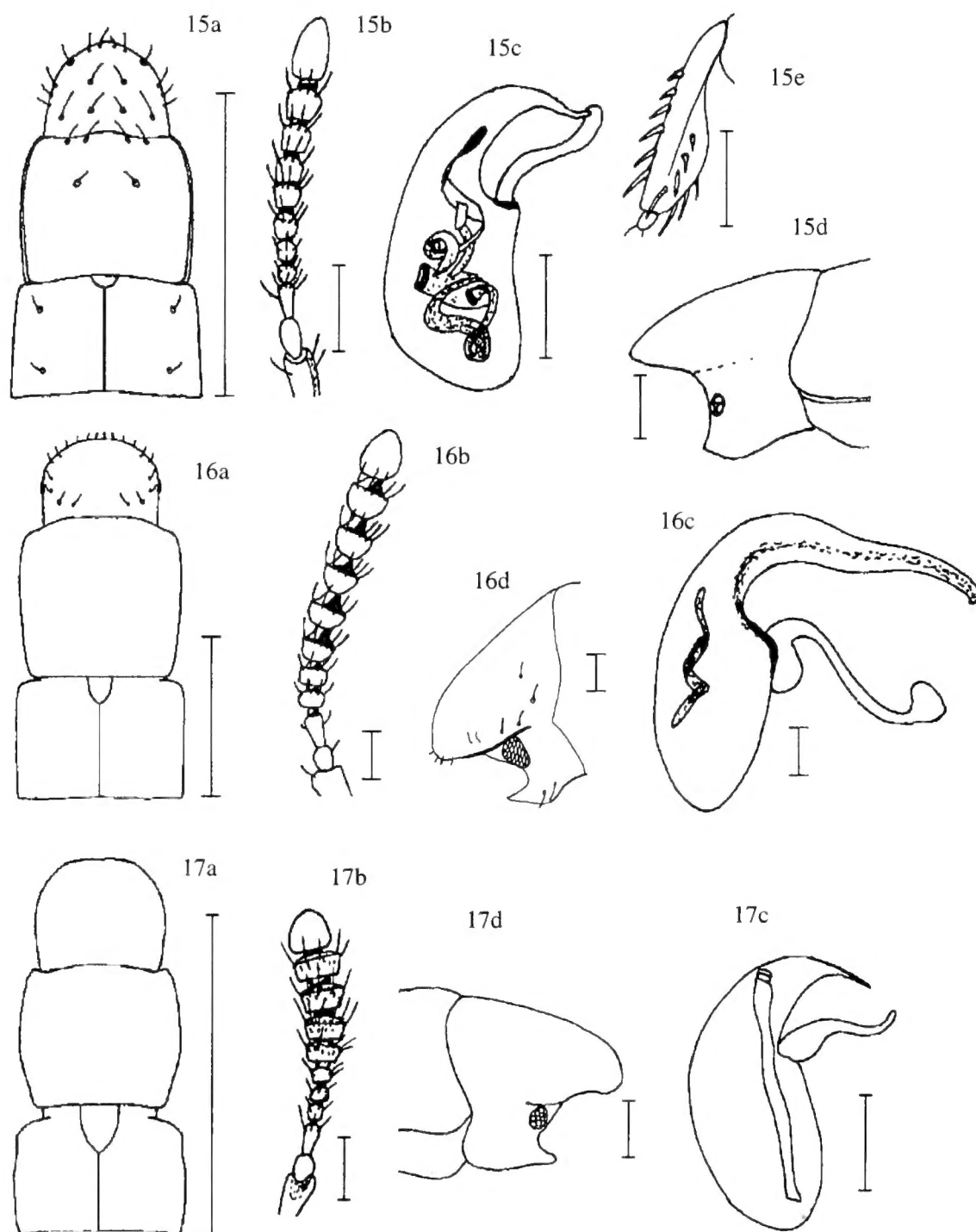
Figs. 4–6. 4. *Holotrochus uncinatus*, 5. *H. honduranus*, 6. *Holotrochus minax* (a: front body, b: antenna, c: aedeagus in lateral view, d: last abdominal sternite of male; scale bars for a = 1 mm, for b–d = 0.1 mm).



Figs. 7-10. 7. *Holotrochus brooksi*, 8. *H. ashei*, 9. *H. lescheni*, 10. *H. loretoi* (a: front body, b: antenna, c: aedeagus in lateral view; scale bars for a = 1 mm, for b-d = 0.1 mm).



Figs. 11–14. 11. *Holoatrochus rufomarginatus*, 12. *H. andersoni*, 13. *H. panamae*, 14. *H. bolivianus* (a: front body, b: antenna, c: aedeagus in lateral view; scale bars for a = 1 mm, for b–c = 0.1 mm).



Figs. 15-17. 15. *Holotrochus chilensis*, Fig. 16. *H. curtipennis*, Fig. 17. *H. chiriquiensis* (a: front body, b: antenna, c: aedeagus in lateral view, d: head in lateral view, e: middle tibia; scale bars for a = 1 mm, for b-e = 0.1 mm).

punctuation as dense and deep as on the head, without smooth midline, surface shiny, with sparse longitudinal microsculpture between the punctures; posterior angles without depression. *Elytra*: 0.55 mm long, 0.6 mm wide; surface less shiny than pronotum, with irregular coriaceous ground sculpture; the fine and sparse punctuation scarcely visible. *Abdomen*: Surface shiny, with weak netlike microsculpture; punctures very fine and sparse, much finer and sparser than on the pronotum; without hairs dorsally and ventrally, 7th tergite obtuse at top. *Aedeagus*: With very long paramera that are longer than the acute central lobe; endophallus with a long straight basal part and widely diverged spirals at the top (Fig. 8c).

Etymology.—The species is dedicated to Prof. James S. Ashe, who collected it together with Dr. Richard Leschen.

Holotrochus bolivianus new species
(Fig. 14a–c)

Holotype.—BOLIVIA: *Cochabamba*: Cochabamba, 82 km E. Yungas (Cochabamba–Villa Tunari), 2100 m elevation, 17°11'50" S, 65°53'42" W, male, 6 February 1999, collected by R. Anderson, BOL 1A 99 026, from lower forest litter (SEMC).

Paratypes.—BOLIVIA: *Cochabamba*: 28 specimens with same data as holotype (SEMC, UIC); *Cochabamba*: 117 km E. Yungas, Lagunitas, 1000 m elevation, 17°12'13" S, 65°40'57" W, 2 specimens, 1 February 1998, collected by R. Anderson (SEMC); *Cochabamba*: 80 km E. Yungas, Villa Tunari road, near Río Vinto, 65°51'27" W, 17°12'13" S, from mixed alder litter, 8 specimens, 3 February 1998, collected by R. Anderson (SEMC, UIC).

Diagnosis.—This species belongs to the *Holotrochus brasiliensis* group by the short elytra and the hairy abdomen. It seems to be most closely related to *H. centralensis* by the structure of the aedeagus and can be distinguished by the denser punctuation and the weak isodiametrically reticulate microsculpture of the pronotum. Furthermore, the sides of the pronotum of *H. centralensis* are slightly narrowed to the posterior edge, whereas they are parallel in *H. bolivianus* (Fig. 14a). Compared to *H. columbiensis* and *H. panamae*, the pronotum is longer, nearly quadrate in *H. bolivianus*, whereas it is 1.3–1.4 times wider than long in *H. panamae* and *H. columbiensis*. The punctuation in *H. panamae* is deeper and in *H. centralensis* weaker and sparser than in *H. bolivianus*.

Description.—*Length*: 3.6 mm. *Color*: Piceous; posterior edge of pronotum and posterior edge of abdominal tergites reddish; antennae and legs yellow. *Head*: 0.35 mm long, 0.55 mm wide; weakly and sparsely punctate, punctuation denser on clypeus than on disc, on the disc distance between punctures at least four times wider

than diameter of punctures; surface nearly polished, with distinct roundly reticulate microsculpture on clypeus and a much weaker, scarcely visible microsculpture on the disc; eyes short; temples four times longer than eyes, with dense micro-reticulation. *Antennae*: 3rd antennomere scarcely longer than 2nd; Antennomere 4 to 6 quadrate; Antennomeres 7 to 10 slightly wider than long (Fig. 14b). *Pronotum*: 0.7 mm long, 0.85 mm wide; sides from anterior third to posterior angles nearly parallel, smallest at anterior edge; punctuation denser than on the head, distance between punctures only two times wider than diameter of punctures, with sparse micro-punctuation; surface nearly polished, with weak roundly reticulate microsculpture; depressions at posterior angles flat and short. *Elytra*: 0.45 mm long, 0.85 mm wide; coriaceous punctate and with coriaceous ground sculpture, surface dull. *Abdomen*: With fine and sparse punctuation and distinct, netlike reticulate microsculpture; sternites and tergites totally covered by short yellow hairs. *Aedeagus*: With short paramera that are much shorter than the central lobe; endophallus with a short straight basal part continuing into two spirals (Fig. 14c).

Etymology.—The species name refers to the country of Bolivia.

Remarks.—Remarks on the geographical distribution (Fig. 18) and a key to the species of the *Holotrochus brasiliensis* group are provided after the description of *H. panamae*.

Holotrochus brooksi new species
(Fig. 7a–c)

Holotype.—FRENCH GUYANA: *Cayenne*: 39.4 km SSE Roura, 270 m elevation, 4°32'43" N, 52°8'26" W, male, 10 June 1997, collected by J. S. Ashe and R. Brooks, FG1AB97 174, from tree fall litter (SEMC).

Diagnosis.—The species belongs to the *Holotrochus rufopygus* group, which is characterized by the large size of at least 5 mm length and the sparsely hairy lateral abdomen. The microsculpture of the pronotum is found also in *H. susannae* and *H. decumanus* (see description) in the same species group. *Holotrochus brooksi* is distinctly larger than *H. susannae*, but of the same size as *H. decumanus*. Pronotal punctuation is also similar in both species, but pronotal microsculpture is distinctly denser in *H. decumanus* than in *H. brooksi*. Abdomen is more densely hairy in *H. decumanus*, in particular the last abdominal sternites. The structure of the abdominal depressions is similar, but the depression of the 6th abdominal sternite is much deeper in *H. decumanus* than in *H. brooksi* (Fig 7d and 3d).

Description.—*Length*: 6.1 mm. *Color*: Black; antennae and legs piceous. *Head*: 0.8 mm long, 1.05 wide; finely and sparsely punctate, distance between punctures nearly

3 times wider than diameters of punctures, four larger punctures on a line between the posterior edge of eyes; surface shiny, with very weak, transversely or netlike reticulate microsculpture; clypeus with denser and more distinct microsculpture than on the disc, therefore surface less shiny. *Antennae*: With short globular 2nd antennomere; antennomere 3 at least twice as long as 2nd; the following two ones more or less quadrate; antennomeres 6–10 distinctly wider than long (Fig. 7b). *Pronotum*: 1.3 mm long, 1.5 mm wide; as finely and sparsely punctate as the head; surface less shiny than head, with a more distinct, but still weak, netlike microsculpture; widest in the anterior half, smoothly narrowed to the anterior angles and scarcely but straightly narrowed to posterior angles (Fig. 7a); depressions at posterior angles indistinct, with denser and larger punctures than on the disc. *Elytra*: 1.4 mm long, 1.6 mm wide; punctures distinctly denser and larger than on the pronotum, with three still larger and more impressed punctures adjacent to the suture in an arched longitudinal line; surface as shiny as pronotum, but with more or less coriaceous ground sculpture. *Abdomen*: With distinct punctuation, punctures larger than on pronotum, but slightly finer than on elytra, distance between punctures as wide or slightly wider than diameters of punctures; surface as shiny as on pronotum, with netlike or transversely reticulate microsculpture, tergites centrally hairless, laterally with very few and very short yellow hairs; 5th and 6th abdominal sternites with dense and coarse punctures, 6th abdominal sternite nearly coriaceously punctate; 5th abdominal sternite with smooth, hemispherical depression; 6th abdominal sternite with smooth, flat depression with scattered granulation in the outer part and adjacent parts of the sternite, surface of depression more or less dull, with dense, round micro-reticulation (Fig. 7d). *Aedeagus*: With long and straight central lobe; paramera also straight, but shorter than central lobe; endophallus with a wide basal spiral and numerous distal ones (Fig. 7c).

Etymology.—The species is dedicated to Richard Brooks, who collected this species together with Prof. Ashe on his excursion to French Guyana.

Holotrochus chilensis new species
(Fig. 15a–c)

Holotype.—CHILE: Osorno: 48.5 km W. Osorno, 40°37' S, 73°45' W, 75 m elevation, 28 November 1994, one male, collected by R. Leschen and C. Carlton, #181, from sifting leaf litter (SEMC)

Paratypes.—CHILE: Osorno: 4 males, 1 female, with same data as holotype (SEMC, UIC); 58.5 km W Osorno, 40°33' S, 72°44' W, 1 male, 12 November 1994, collected by R. Leschen and C. Carlton, #180, from sifting leaf litter (SEMC); Osorno: 14.5 km W, Puauchó, 40°37' S, 73°45' W,

1 female, 12 November 1994, collected by R. Leschen and C. Carlton, #181, from sifting leaf litter (SEMC); Chiloe: 33 km SW Chonchi, Lago Tepuhuaco, 25 m elevation, 42°49' S, 73°55' W, 1 female, 26 November 1994, collected by R. Leschen and C. Carlton, #160, from sifting leaf litter (SEMC); Chiloe: Chepu, 42° S, 150 ft, mixed forest, 13 females, 9 males, presented by Royal Society B.M. 1974-654, collected by Fr. Kuschel, 2 October 1958 (3 individuals), 9 October 1958 (5), 10 October 1958, (1), 14 October 1958 (1), HC18 T143, 120 ft. (2), HC16 (1), HC8, T73 (1), HC14 T106 (2), HC15 T120 (7) (BMNH).

Diagnosis.—The species belongs to the *Holotrochus neotropicus* group. The species in this group are characterized by small eyes and short elytra. *Holotrochus chilensis* is distinctly different from the other two species of the group by the extremely small eyes and short elytra (Fig. 15a) and the very sparse and fine punctuation of head and pronotum.

Description.—Length: 2.8 mm. Color: Reddish; base of abdominal tergites darker piceous; antennae and legs yellow; scutellum black. Head: 0.30 mm long, 0.45 mm wide; with very sparse and fine punctuation, several larger punctures with setae along the apical and lateral edge and on the disc; surface shiny, with ground sculpture very fine, transversely reticulate on the forehead and netlike reticulate on posterior head; temples with distinct netlike reticulation; eyes very small with only one or two ommatidia, which are not visible in dorsal view (Fig. 15d). *Antennae*: 2nd antennomere oblong, scarcely shorter than the 3rd conical antennomere; the following antennomeres globular and quadrate; Antennomere 8 to 10 slightly wider than long (Fig. 15b). *Pronotum*: 0.5 mm long, 0.6 mm wide; widest shortly behind the anterior angles (Fig. 15a); with small lateral margin, whereas anterior and posterior edge are not margined; punctuation as sparse and fine as on the head; along anterior edge with few larger punctures, in which setae are inserted and in the apical third of the disc with two larger punctures with setae; surface shiny, with ground sculpture very fine, netlike reticulate. *Elytra*: 0.35 mm long, 0.6 mm wide; sides parallel (Fig. 15a), punctuation still sparser and finer than on the pronotum, surface shiny, with fine, coriaceous ground sculpture. *Abdomen*: Surface shiny, with wide netlike reticulation on tergites. *Legs*: Front and middle tibiae wider than hind tibiae, with few spines at outer edge; in particular middle tibia distinctly wide at posterior third, with about 6 spines at outer edge; hind tibia with a comb of setae at posterior half of inner edge (Fig. 15e). *Aedeagus*: With acute central lobe and long arcuate paramera that are scarcely longer than the central lobe; endophallus with labyrinthine spirals (Fig. 15c).

Etymology.—The species name refers to the country of Chile.

Remarks.—Remarks on the geographical distribution (Fig. 18) and a key to the species of the *Holotrochus neotropicus* group are provided after the description of *H. chiriquiensis*.

Holotrochus chiriquiensis new species
(Fig. 17a–d)

Holotype.—Panama: Chiriquí: 27.7 km W Volcán, Hartmann's Finca, 1450 m elevation, 8°51'48" N, 82°44'36" W, 14 June 1995, male, collected by R. Anderson, PAN2A95 24A, from berlese forest litter (SEMC).

Paratypes.—Panama: Chiriquí: 1 male and 2 females with same data as holotype (SEMC, UIC); Costa Rica: Puntarenas: San Vito Estación Biológica Las Alturas, 2 km NE Alturas, 1720 m elevation, 8°58'26" N, 82°50'4" W, 3 specimens, 21 June 1998, collected by R. Anderson, CR1A98 106, from berlese leaf litter (SEMC, UIC); Puntarenas: Las Cruces, Biological Station, San Vito, 4 km S, 1110 m elevation, 8°47'3" N, 82°57'36" W, 3 specimens, 18 June 1998, collected by R. Anderson, CR1A98 103, from Berlese leaf litter (SEMC, UIC).

Diagnosis.—Within the *Holotrochus neotropicus* group, this species most closely resembles *H. neotropicus* in the number of ommatidia and the punctuation of head and pronotum. Punctuation of elytra less dense than in *H. neotropicus*. *Holotrochus chiriquiensis* can be easily distinguished from *H. neotropicus* by the structure of the pronotum, which is slightly emarginate in front of posterior angles (Fig. 17a), whereas posterior angles are arcuate in *H. neotropicus*.

Description.—Length: 2.3 mm. Color: Red; antennae and legs yellow. Head: 0.3 mm long, 0.45 mm wide; punctuation of head distinct, distance between punctures varying between as wide to twice as wide as diameter of punctures; surface polished, without microsculpture; eyes small with 12 ommatidia, which are not visible in dorsal view; supraocular carina very small (Fig. 17d); temples more than twice as long as eyes, with longitudinally reticulate microsculpture. Antennae: 2nd antennomere globular, 3rd conical scarcely longer than 2nd, 4th – 6th quadrate; Last 5 antennomeres forming an indistinct club; 9th and 10th antennomere 3 times wider than long (Fig. 17b). Pronotum: 0.45 mm long, 0.55 mm wide; widest behind the middle, straightly narrowed to anterior edge, slightly emarginate posteriorly, near posterior edge nearly parallel (Fig. 17a); punctuation with large punctures and between these with fine micro-punctures, distance between the large punctures shorter than the diameter of punctures; without smooth midline; lateral margin distinct, anterior margin finer, with central part of anterior edge not margined; depressions at posterior angles very indistinct. Elytra: 0.4 mm long,

0.55 mm wide; smaller at shoulders than at posterior edge; with coriaceous ground sculpture; punctuation as on the pronotum, but partly coriaceous and forming irregular rows of punctures; sides distinctly margined with denticulate shoulders. Abdomen: Punctuation as deep, but much sparser than on the pronotum; surface polished, with only very sparse microsculpture, at most part without microsculpture. Aedeagus: With acute central lobe and long paramera that are longer than the central lobe; endophallus with a very long straight basal part and a short part with short and close spirals (Fig. 17c).

Etymology.—The name refers to the province of Chiriquí in Panama, where the holotype was found.

Remarks.—Three species of the *Holotrochus neotropicus* group are distributed along the Andean–Central American mountain ranges, with *H. chiriquiensis* the northernmost species and *H. chilensis* the southernmost species (Fig. 18). *Holotrochus chilensis* is the southernmost species of the genus in South America. The *Holotrochus brasiliensis* group has a similar distribution; one species in the *H. neotropicus* group, e.g., *H. sigridae*, occurs in the mountains in southern Brazil. The species can be differentiated in the following key. The overall characters of the group are small eyes, which are covered by a supraocular carina and cannot be seen in dorsal view, hairless abdomen, and the four recorded species are of small size.

KEY TO THE SPECIES OF THE *HOLOTROCHUS NEOTROPICUS* GROUP

1. Eyes very small, with only one or two ommatidia (Fig. 15d), pronotum with weak isodiametrically reticulate microsculpture, antennae long, antennomeres longer than wide or quadrate (Fig. 15b).....
..... *H. chilensis* new species
- Eyes slightly larger, with more than two ommatidia, pronotum polished, shiny, antennae shorter, at least antennomeres 8 to 10 distinctly wider than long, forming an indistinct club 2
2. Eyes with 50 ommatidia, abdomen dull and nearly without punctures
..... *H. sigridae* Irmer, 1981
- Eyes smaller, with less than 20 ommatidia, abdomen shiny 3
3. Sides of pronotum evenly arched, not emarginate in front of posterior angles, endophallus of aedeagus with short straight basal part.....
..... *H. neotropicus* Irmler, 1981
- Sides of pronotum slightly emarginate in front of posterior angles (Fig. 17a), endophallus of aedeagus with long straight basal part (Fig. 17c).....
..... *H. chiriquiensis* new species.

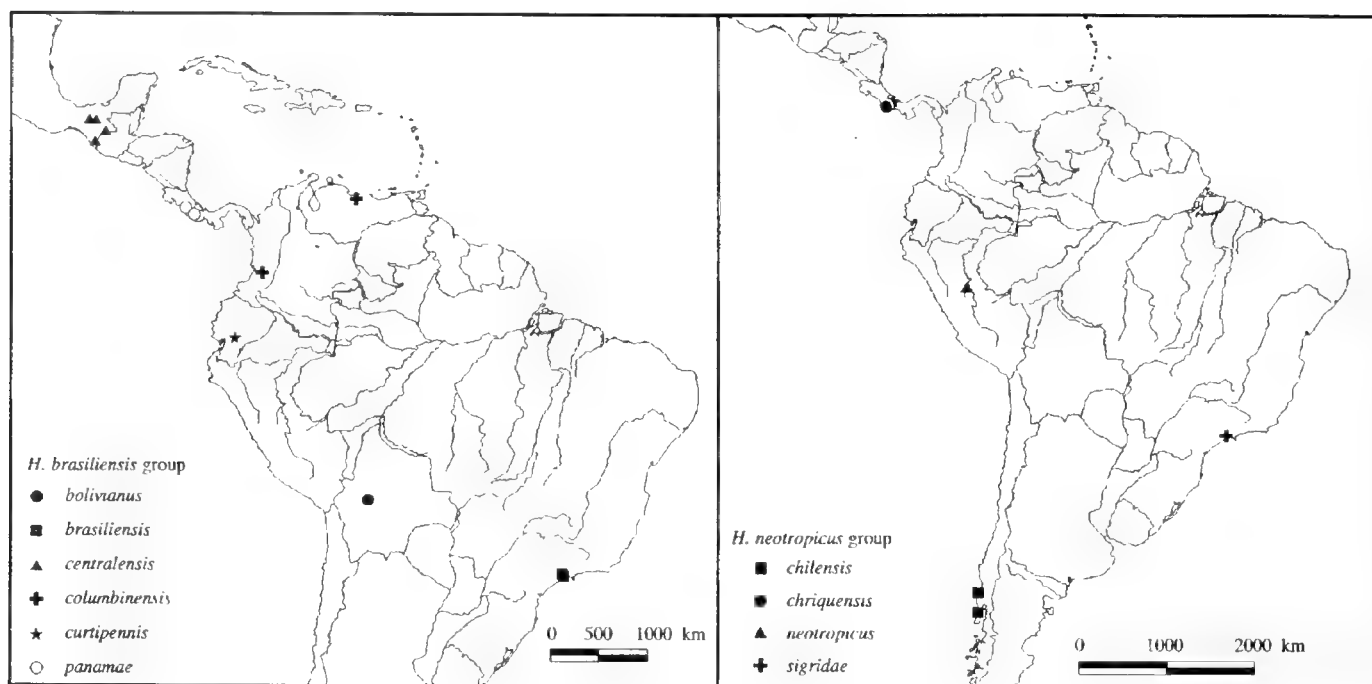


Fig. 18. Distributions of the *Holotrochus brasiliensis* and *Holotrochus neotropicus* group.

Holotrochus crassicornis new species
(Fig. 1a–d)

Holotype.—BRAZIL: Minas Gerais: São Paulo, June 1914, male, collected by J. Mraz, B.M. 1955-147 (ex. Col. Cameron) (BMNH).

Diagnosis.—*Holotrochus crassicornis* belongs to the *Holotrochus durus* group because of the hairless abdomen and the anteriorly margined pronotum. It seems to be most closely related to *H. convexus*. The depression of the 6th abdominal sternite has a longitudinal feature (Fig. 1d), the paramera of the aedeagus are nearly as long as the middle lobe in *H. crassicornis* (Fig. 1c), whereas the depression is round and the paramera are distinctly shorter than middle lobe in *H. convexus*.

Description.—*Length:* 6.7 mm. *Color:* Black; posterior edge of pronotum reddish; antennae and legs brown. *Head:* 0.65 mm long, 1.1 mm wide; finely and sparsely punctuate, distance between punctures twice as wide as diameter of punctures; surface dull, with microsculpture on the clypeus transversely reticulate and on the disc isodiametrically reticulate. *Antennae:* 2nd antennomere globular, 3rd triangular, nearly twice as long as 2nd, 4th and 5th antennomere more or less quadrate, the followings wider than long; Antennomeres 8 to 10 twice as wide as long, with long yellow setae, which are as long as the length of one antennomere or longer (Fig. 1b). *Pronotum:* 1.2 mm long, 1.5 mm wide; sides widest in the anterior third, arcuately narrowed to the front angles, straightly narrowed to the posterior angles (Fig. 1 a); sides deeply

margined, whereas anterior edge is finely margined in the outer part; punctuation as dense and deep as on the head; surface dull, with microsculpture densely and isodiametrically reticulate; depressions at posterior angles indistinct. *Elytra:* 1.6 mm long, 1.6 mm wide; weakly punctuate, but punctuation slightly deeper and denser than on the pronotum; surface more shiny than the pronotum, with ground sculpture coriaceous; scutellum with one deep puncture on each side of the middle. *Abdomen:* With punctuation and microsculpture as on the pronotum, but microsculpture less deep and therefore more shiny; 5th abdominal sternite with round depression at posterior edge, with four grains at each side of the depression and several scattered yellow hairs; 6th abdominal sternite with a longitudinal depression, laterally with several grains and scattered yellow hairs, depression only laterally and posteriorly with few grains, posterior edge of sternite obtusely prominent (Fig. 1d); 7th abdominal tergite shortly bifurcate. *Aedeagus:* With long central lobe and long paramera that are slightly shorter than central lobe; top of central lobe with a short hook-like structure; the short endophallus with diverged spirals (Fig. 1c).

Etymology.—The specific epithet is a combination meaning thick antennae and derived from the Latin words *crassus* (= thick) and *cornu* (=antenna).

Holotrochus curtippensis new species
(Fig. 16a–c)

Holotype.—ECUADOR: Azuay: 25 km NE Cuenca, Cajas Rec. Area, 3700 m elevation, male, 7 January 1992, collected

by C. Carlton and R. Leschen, from *Polylepis* fungi, berlese, # 126 (SEMC).

Paratypes.—ECUADOR: *Azuay*: 3 females with same data as for the holotype (SEMC, UIC); Pr. 15 km NNE Cuenca, Mazan forest, 3200 m elevation, 1 female, 16 April 1990, collected by C. Carlton and R. Ardarve, 7-010001-1, from berlesate *Podocarpus* litter (SEMC).

Diagnosis.—By the short elytra and the number of omatidia (Fig. 16a and 16d), the species is related to the species of the *Holotrochus brasiliensis* group. However, the abdomen is hairless. It resembles *H. columbiensis* in size, but differs in the hairless abdomen and in the distinct microsculpture of the pronotum.

Description.—*Length*: 4.5 mm. *Color*: Red; anterior and posterior edge of pronotum; elytra and posterior edge of abdominal tergites light red; legs and antennae yellow. *Head*: 0.6 mm long, 0.75 mm wide; very finely and sparsely punctuate, distance between punctures much wider than diameter of punctures; surface sparsely shiny, microsculpture distinct with roundly or isodiametrically netlike reticulation; eyes very small (Fig. 16d), laterally scarcely prominent and therefore nearly invisible in dorsal view. *Antennae*: 2nd antennomere oblong, slightly longer than wide, 3rd antennomere conical, longer than wide; following antennomeres transverse, twice as wide as long; Antennomeres at apical edge with long setae (Fig. 16b). *Pronotum*: 0.9 mm long, 1.1 mm wide; widest near the anterior edge, straightly and scarcely narrowed to the posterior angles, nearly parallel (Fig. 16a); anterior edge margined; punctuation as sparse and weak as on head, distance between punctures at least three times as wide as diameter of punctures; surface scarcely shiny, with distinct isodiametrically netlike microsculpture. *Elytra*: 0.7 mm long, 1.1 mm wide; punctuation deeper than on pronotum, but still sparse and fine, scarcely visible in the coriaceous ground sculpture on the disc, surface uneven with a moderately wide stripe along the lateral edge smooth and shiny, within this stripe a row of five fine punctures. *Abdomen*: With similar punctuation and microsculpture as on pronotum, hairless, but with few short setae. *Aedeagus*: With undulate very long posterior part of central lobe that ends into a hook-like structure; paramera also long ending in a short plate-like structure; endophallus thin with long diverging spirals (Fig. 16c).

Etymology.—The specific name derived from the Latin words *curtus* meaning short and *penna* meaning wing and refers to the short elytra of the species.

Remarks.—Remarks on the geographical distribution (Fig. 18) and a key to the species of the *Holotrochus brasiliensis* group are provided after the description of *H. panamae*.

Holotrochus decumanus new species
(Fig. 3a–d)

Holotype.—HONDURAS: *Olancho*: Olan de La Muralla, 14 km N. La Unión, 15°06' N, 86°42' W, 1450 m elevation, male, 25 June 1994, collected by J. Ashe and R. Brooks, # 204, under bark (SEMC).

Paratypes.—COSTA RICA: *Puntarenas*, Peñas Blancas Valley, 850 m elevation, 1 female, 18 May 1989, collected by J. Ashe, R. Brooks, R. Leschen, from litter along stream (SEMC); PANAMA: *Bocas de Toro*: 2 km W of Fortuna, Hwy. continental divide, 1000m elevation, 2 males, 1 female, 20 June 1995, collected by A. Gillogly (SEMC, UIC); *Chiriquí*: La Reserva Fortuna, 3 km W. Fortuna, Hwy. on continental divide trail, 08°46' N, 82°12' W, 1 female, 8 August 1995, collected by A. Gillogly (SEMC).

Diagnosis.—The species belongs to the *Holotrochus rufopygus* group because of the hairy sternites of the abdomen. Within this group, *H. decumanus* is conspicuous by its large size, the distinct microsculpture of the pronotum, and the very fine and sparse punctuation. The species can be confused with species of the *H. durus* group by the large size, but at least the last abdominal sternites are hairy in *H. decumanus*, whereas the species of the *H. durus* group are totally hairless. Within the *H. rufopygus* group *H. rufopygus* is only slightly shorter than *H. decumanus*, but its pronotum is without microsculpture and with coarser punctuation.

Description.—*Length*: 6.5 mm. *Color*: Legs red; antennae piceous. *Head*: 0.8 mm long, 1.0 mm wide; punctuation fine and sparse, distance between punctures twice as long as diameter of punctures; surface scarcely shiny, with distinct roundly reticulate microsculpture, which is denser on the clypeus than on the disc; with few short setae in a short supraocular carina. *Antennae*: Very short and stout, scarcely longer than head; 2nd antennomere globular, half as long as 3rd; following 3 antennomeres scarcely wider than long; Antennomeres 7 to 10 distinctly wider than long, each with two rows of long setae and a chaplet of short hairs (Fig. 3b). *Pronotum*: 1.25 mm long, 1.4 mm wide; widest shortly behind the anterior angles, arcuately narrowed to the anterior angles and only scarcely narrowed to posterior angles, nearly parallel (Fig. 3a); slightly emarginate in the middle and at that part an indistinct depression; punctuation fine and sparse, still finer and sparser than on head, scarcely visible in the distinct roundly reticulate microsculpture; surface nearly dull; at posterior angles an indistinct depression with few larger punctures. *Elytra*: 1.5 mm long, 1.55 mm wide; punctuation very fine and sparse, scarcely visible within the coriaceous ground sculpture; surface at shoulders and a wide part parallel to the lateral margin polished, without punctuation and

microsculpture. *Abdomen*: surface shiny, with roundly reticulate microsculpture; punctuation fine and sparse, but more distinct than on the pronotum; tergites hairless, laterally and ventrally with short yellow hairs; 5th and 6th sternite with long yellow hairs; 6th sternite with an oblong, deep, and smooth depression, which has laterally very few short hairs (Fig. 3d); 5th sternite posteriorly with an indistinct round depression, which is also less hairy than the lateral part of the sternite. *Aedeagus*: With an evenly arcuate central lobe; in ventral view the prominent inner parts forming a roof-like feature; endophallus short with two long spirals (Fig. 3c).

Etymology.—The specific name derived from the Latin word *decumanus*, which means very large.

Holotrochus honduranus new species
(Fig. 5a–c)

Holotype.—HONDURAS: *Santa Barbara*: La Fe, Finca la Roca, 5.3 km S. Peña Blanca, 14°57' N, 88°02' W, 740 m elevation, male, 19 June 1994, collected by R. Anderson, 126B, from montane evergreen litter (SEMC).

Paratypes.—HONDURAS: *Santa Barbara*: 4 males, 8 females with same data as the holotype (SEMC, UIC).

Diagnosis.—*Holotrochus honduranus* is related to the species in the *H. simplex* group, which are characterized by the anteriorly margined pronotum, the laterally hairy abdomen and mostly by a size smaller than 5 mm. Within the *H. simplex* group, the species resembles *H. newtoni*. Without analysis of the aedeagus, it can be scarcely distinguished from the related species, *H. newtoni*, *H. latinotus*, and *H. vianai*. The endophallus in *H. honduranus* is long and slender and without spines (Fig. 5c). In *H. vianai* and *H. latinotus*, the endophallus is short with wide spirals, whereas in *H. newtoni* spines are additionally present.

Description.—*Length*: 4.1 mm. *Color*: Piceous; posterior edge of pronotum and abdominal tergites red; legs and antennae red. *Head*: 0.5 mm long, 0.75 mm wide; surface polished, without a trace of ground sculpture; distinctly, but very sparsely punctate, clypeus with denser punctuation than disc, two large punctures on a line between posterior edge of eyes; eyes slightly shorter than temples. *Antennae*: 2nd antennomere globular, 3rd conical, longer than 2nd; Antennomeres 4 to 6 quadrate, the following slightly wider than long (Fig. 5b). *Pronotum*: 0.8 mm long, 1.0 mm wide; surface as polished as surface of head and with similar punctuation, distance between punctures much wider than diameters of punctures, on the disc an deeply impressed puncture on each side of the midline; sides parallel in the posterior 2/3rd, narrowed to the anterior edge (Fig. 5a); lateral and anterior margin distinct, but anterior margin finer; posterior angles with obsolete depression, marked by a denser punctuation; depressions also with a trace

of netlike ground sculpture; posterior angles obtuse. *Elytra*: 0.9 mm long, 1.0 mm wide; surface less shiny than pronotum, with coriaceous ground sculpture; punctuation sparse and scarcely visible between the ground sculpture. *Abdomen*: laterally hairy, hairs short, scarcely longer than distance between the insertions; a wide midline without hairs; surface slightly shiny, with netlike ground sculpture; last abdominal sternite prominent with a longitudinal depression and an obtuse top posteriorly, which is as wide as the prominence. *Aedeagus*: With short paramera that are distinctly shorter than the central lobe; endophallus with a long and straight basal part and a contorted distal part (Fig. 5c).

Etymology.—The specific names refers to the country of Honduras, where the species was found by Dr. Richard Anderson.

Holotrochus lescheni new species
(Fig. 9a–c)

Holotype.—PERU: *Madre de Dios*: 15 km N Puerto Maldonado, Reserva Cuzco Amazonico, 200 m elevation, 12°35' S, 65°05' W, Plot #Z1 trail 26, male, 26 June 1989, collected by R. Leschen, #280, from flight intercept trap (SEMC).

Paratypes.—PERU: *Madre de Dios*: 1 male and 6 females, with same data as for the holotype, but 20 June 1989, 25 June 1989, 7 July 1989, 16 July 1989, 19 July 1989, collected by Ashe and Leschen; 28 June 1989, collected by D'Silva and Leschen; 7 July 1989, collected by Ashe and Leschen, from liana fruit fall (SEMC, UIC); BOLIVIA: *Cochabamba*: Cochabamba, 67.5 km NE Estación Biológico Valle del Sajita, Universidade de San Simón, 300 m elevation, 17°6'33" S, 64°47'52" W, 3 males, 9–13 February 1999, collected by F. Genier, BOL 1G99 068, from flight intercept trap (SEMC, UIC).

Diagnosis.—*Holotrochus lescheni* is related to the species of the *H. minor* group, which is characterized by the small size, the hairless abdomen and the anteriorly margined pronotum. Within the *H. minor* group, *H. lescheni* resembles the species with prolonged 3rd antennomere (Fig. 9b). It can be distinguished from *H. ingae* and *H. minor* by the less dense punctuation of the pronotum. In both species the distance between pronotal punctures is as wide or shorter than the diameter of punctures. It mostly resembles *Holotrochus pumilus* from the same region, but *H. pumilus* is distinctly larger and the 3rd antennomere is still longer than in *H. lescheni*.

Description.—*Length*: 2.1 mm. *Color*: Dark red; posterior edge of pronotum, elytral suture, and posterior edge of abdominal tergites light red; legs and antennae yellow. *Head*: 0.25 mm long, 0.45 mm wide; surface polished, without a trace of ground sculpture, punctuation

distinct and sparse, distance between punctures twice or three times as wide as diameter of punctures; eyes slightly prominent, with few short supraocular hairs. *Antennae*: 2nd antennomere globular, 3rd conical, nearly twice as long as 2nd; Antennomeres 4 – 6 quadrate, the following wider than long (Fig. 9b). *Pronotum*: 0.45 mm long, 0.55 mm wide; surface polished, with punctuation and ground sculpture as on the head; widest in the apical third, straightly narrowed to the posterior angles and shortly narrowed to the anterior angles (Fig. 9a); lateral margin distinct and anterior margin fine, a large central part not margined; without depression at the posterior angles. *Elytra*: 0.5 mm long, 0.55 mm wide; surface less shiny than pronotum, but partly with coriaceous ground sculpture; punctuation also partly coriaceous. *Abdomen*: Surface scarcely shiny, with netlike ground sculpture and sparse and fine punctuation. *Aedeagus*: With acute central lobe and long paramera that are distinctly longer than central lobe; endophallus thick and with the typical feature of the *H. minor*-group; a long undulate basal part and a spirally distal part (Fig. 9c).

Etymology.—The species is dedicated to Dr. Richard Leschen, who collected this species on one of his numerous excursions together with Dr. James S. Ashe.

Holotrochus loretoi new species
(Fig. 10a–c)

Holotype.—PERU: Loreto: 1.5 km Teniente Lopez, 2°35.66' S, 76°06.92' W, male, 21 July 1993, 210–240 m elevation, collected by R. Leschen, #170, from palm fruit berlese.

Diagnosis.—Within the *Holotrochus minor* group the species is related to *H. trinitatis* because of the relatively short 3rd antennomere, which is as long as 2nd (Fig. 10b). The punctuation of head and pronotum is also very similar and without analysis of the aedeagus it can be hardly distinguished from *H. trinitatis*. The endophallus of the aedeagus is very different from *H. trinitatis*. In *H. loretoi* it is very thin with a long straightly basal part and a torsion at the top (Fig. 10c). Endophallus in *H. trinitatis* is broader and with spirals in the middle part.

Description.—Length: 2.7 mm. Color: Piceous; posterior margin of pronotum and of abdominal tergites red; legs and antennae yellow. Head: 0.35 mm long, 0.45 mm wide; with fine and sparse punctuation, between the sparse large punctures with sparse micro-punctures; clypeus with weak, irregularly transverse ground sculpture; surface of disc polished, without ground sculpture; eyes slightly prominent, as long as temples. *Antennae*: 2nd antennomere oblong, 3rd conical, small, at the apex as wide as 2nd and as long as 2nd; Antennomeres 4 and 5 quadrate, the following wider than long; Antennomeres 7–10 twice as wide as long (Fig. 9b). *Pronotum*: 0.55 mm long, 0.65 mm

wide; with same punctuation as head, on the disc a central spot without punctures, but no smooth midline present; surface polished, without ground sculpture; widest near the middle, smoothly arcuately narrowed to anterior and posterior angles, posterior angles obtuse and without depression (Fig. 9a). *Elytra*: 0.6 mm long, 0.7 mm wide; surface slightly shiny, with coriaceous ground sculpture and fine and sparse punctuation, punctures scarcely visible in the coarse ground sculpture. *Abdomen*: surface scarcely shiny, with netlike ground sculpture and very fine micro-punctuation. *Aedeagus*: Central lobe acute and paramera nearly as long as central lobe; endophallus thin and long with a contorted distal part (Fig. 10c).

Etymology.—The specific name refers to the Peruvian Departamento Loreto, where the species was found by Dr. Richard Leschen.

Holotrochus minax new species
(Fig. 6a–c)

Holotype.—VENEZUELA: Aragua: Rancho Grande Biological Station, 1450 m elevation, 10°21'38" N, 67°40'38" W, male, 14 May–20 June 1998, collected by J. S. Ashe, R. Brooks, and R. Hanley, from flight intercept trap, VEN1ABH98 185 (SEMC).

Paratype.—VENEZUELA: Aragua: Rancho Grande Biological Station, 1200–1300 m elevation, 10°21'0" N, 67°41'0" W, female, 12 May 1998, collected by J. S. Ashe, R. Brooks, and R. Hanley, under bark, VEN1ABH98 005 (UIC).

Diagnosis.—The species is related to the species of the *Holotrochus durus* group, which is characterized by the large size, anteriorly margined pronotum, and the hairless abdomen. It is similar to *H. campbelli* and *H. convexus* in size. *Holotrochus minax* can be distinguished from *H. campbelli* by the more distinct pronotal microsculpture, which is similar to the pronotal microsculpture of *H. convexus*. Punctuation, however, is similar to *H. campbelli*, whereas pronotum is not punctuate in *H. convexus*. The males can be easily distinguished by their characteristic depressions of 6th abdominal sternite, which is spherical in *H. convexus*, X-shaped in *H. campbelli*, and oblong in *H. minax* (Fig. 6d).

Description.—Length: 6.3 mm. Colour: Black; anterior and posterior edge of pronotum dark red; legs and antennae piceous. Head: 0.6 mm long, 0.9 mm wide; with distinct and moderately dense punctuation, distance between punctures as wide as diameters of punctures or shortly wider; surface shiny, with dense and distinctly netlike microsculpture. *Antennae*: Antennomere 2 globular, 3 conical, more than twice as long as 2nd; Antennomeres 4 to 6 quadrate; following antennomeres slightly wider than long; 8th antennomere 1.5 times wider than long

(Fig. 6a). *Pronotum*: 1.05 mm long, 1.35 mm wide; widest in the anterior half, distinctly arcuately narrowed to the anterior angles, straightly narrowed to posterior angles (Fig. 6a); lateral margin distinct, anterior margin much finer, with a small central part not margined; punctuation similar as on head, with posterior half of the midline more sparsely punctate and with a transverse row of larger punctures along the posterior edge; surface dull, with dense and distinct, nearly isodiametrically netlike microsculpture; depressions at posterior angles distinct, without denser punctuation and microsculpture than on disc. *Elytra*: 1.5 mm long, 1.5 mm wide; surface dull, with similar punctuation and microsculpture as on pronotum; surface of shoulders and of a wide stripe along lateral margin smooth and more or less shiny, with a row of seven large punctures at the inner edge of the stripe. *Abdomen*: With much finer and sparser punctuation as on pronotum, distance between punctures at least 3 to 4 times wider than diameters of punctures; surface dull, with similar microsculpture as on pronotum; last abdominal sternite also with very sparse punctuation, but with few larger punctures near the central depressions; depression of 5th abdominal sternite hemispherical, in the apical part with a densely hairy spot on each side of the midline; hairs very short and stout; 6th abdominal sternite with an oblong, deep depression (Fig. 6d); surface dull, with extremely fine and dense microsculpture; sides of depression distinctly delimited in the basal part, flatter in the apical part. *Aedeagus*: With distinctly arcuate central lobe and extremely long paramera; basis of paramera conspicuously thick compared to the width of the central lobe; distal part of paramera compared to the basal part thin (Fig. 6c).

Etymology.—The specific name is derived from the Latin word *minax* meaning prominent or outstanding and refers to the extraordinary structure of the paramera.

Holotrochus panamae new species
(Fig. 13a–c)

Holotype.—PANAMA: Chiriquí: 6.0 km NE Boquete, 1620 m elevation, 8°48'0" N, 82°26'0" W, male, 14 June 1996, collected by R. Anderson, PAN2A96 96-130D, from oak forest litter (SEMC).

Paratypes.—PANAMA: Chiriquí: 6 males and 10 females with data as for the holotype (SEMC, UIC); La Fortuna, 1200 m elevation, Continental Divide Trail, 8°46'0" N, 82°12'0" W, 2 females, 9 June 1995, collected by R. Anderson, from berlese forest litter (SEMC); COSTA RICA: San José: 117 km Pan-American Highway, 18 km N. San Isidro el General, 1800 m elevation, 9°28'0" N, 83°42'20" W, 24 specimens, 15 February 1998, collected by R. Anderson, CR2A98 001, from cloud forest litter (SEMC, UIC); 4 specimens, 20 June 1997, collected by R. Anderson, CR1A97 0210, from Berlese forest

litter (SEMC, UIC); 2 specimens, 25 Jun 1997, collected by R. Anderson, CR1A97 035E (SEMC); 113 km Pan-American Hwy, 23 km N. San Isidro el General, 2000 m elevation, 8°28'0" N, 83°42'0" W, 20 June 1997, 2 specimens, CR1A97 021A, from Berlese forest litter (SEMC); Puntarenas: San Vito, Estación Biológico Las Alturas, 2 km NE Alturas, 1720 m elevation, 8°58'26" N, 82°50'4" W, 1 specimen, 21 June 1998, collected by R. Anderson, CR1A98 106, from Berlese leaf litter (SEMC); Las Cruces, Biological Station, San Vito, 4 km S, 110 m elevation, 8°47'3" N, 82°57'36" W, 1 specimen, 18 June 1998, collected by R. Anderson, CR1A98 103, from Berlese leaf litter (SEMC).

Diagnosis.—The species belongs to the *Holotrochus brasiliensis* group because of the short elytra and the hairy abdomen. It is much smaller than the other three species of the group, *H. brasiliensis*, *H. columbiensis* and *H. centralensis*. It can be also easily distinguished from these three species by the structure of the pronotum, which is slightly emarginate in front of posterior angles (Fig. 13a), whereas it is continuously arched in the other species.

Description.—*Length*: 2.4 mm. *Color*: Red; antennae and legs yellow. *Head*: 0.3 mm long, 0.45 mm wide; surface polished, with very weak ground sculpture; punctuation also weak and sparse, with few scattered hairs between eyes and neck; eyes very short, but visible in dorsal view; temples twice as long as eyes. *Antennae*: 2nd antennomere globular, 3rd conical, scarcely longer than 2nd; Antennomeres 4–6 as wide as the proceedings, but shorter, more or less quadrate; Following antennomeres much wider forming an indistinct club; Antennomeres 8 and 9 three times wider than long (Fig. 13b). *Pronotum*: 0.5 mm long, 0.65 mm wide; wider than head, widest in the middle part, arcuately narrowed to anterior angles and weakly emarginate in front of posterior angles (Fig. 13a); surface polished, with ground sculpture very weak; punctuation distinct, but also feeble and sparse; along the anterior edge two hairs on each side of the midline, and few hairs along the lateral margin; lateral margin distinct, anterior margin weak. *Elytra*: 0.3 mm long, 0.65 mm wide; surface less polished than surface of pronotum, with sparse punctuation and indistinctly coriaceous ground sculpture; lateral margin with three hairs. *Abdomen*: totally hairy, hairs short and yellow, not covering the ground, scarcely longer than distance between punctures. *Aedeagus*: With evenly arcuate central lobe and thin paramera that are as long as the central lobe; endophallus with long straight basal part and a spirally distal part that is 1/3 as long as the straight basal part (Fig. 13c).

Etymology.—The specific name refers to the country of Panama

Remarks.—The species of the *Holotrochus brasiliensis*

group are distributed along the Andean mountain range from southern Mexico to southern Bolivia, and one species, *H. brasiliensis* Bernhauer and Schubert, 1910, occurs in the mountains of southern Brazil. Whereas *H. centralensis* and *H. panamae* seem to occur in relatively small areas, *H. columbinensis* inhabits a large area from southern Columbia to central Venezuela. *Holotrochus centralensis* and *H. columbiensis* occur between 1000 and 2000 m elevation; *H. panamae* also occurs in lowland rainforest. The species of the *H. brasiliensis* group can be differentiated in the following key. The group is characterized by short elytra, which are distinctly shorter than the pronotum. The abdomen is either hairy or hairless.

KEY TO THE SPECIES OF THE *HOLOTROCHUS BRASILIENSIS* GROUP

1. Large species of 4.5 mm length (Fig. 16a), abdomen hairless, pronotum with isodiametrically reticulate microsculpture, surface more or less dull
.....*H. curtipennis* new species
Smaller than 4.0 mm, abdomen hairy, pronotum polished or with extremely weak microsculpture, surface shiny 2
2. Pronotum with distinct punctuation, distance between punctures on average as wide as diameter of punctures or only slightly wider 3
Pronotum with extremely fine and sparse punctuation, distance between punctures on average at least three times wider than diameter of punctures 4
3. Pronotum widest shortly behind the middle, sides slightly emarginate in front of posterior angles (Fig. 13a), lateral margin anteriorly not covered by anterior angles*H. panamae* new species
Pronotum widest in the anterior third, sides parallel in the posterior half (Fig. 14 a), in dorsal aspect, lateral margin of the anterior third covered by anterior angles *H. bolivianus* new species
4. Sides of pronotum evenly arched, widest in anterior third, piceous
.....*H. brasiliensis* Bernhauer and Schubert, 1910
Sides of pronotum parallel, slightly emarginate in the middle, yellow*H. columbiensis* Irmeler, 1987

Holotrochus rufomarginatus new species
(Fig. 11a–d)

Holotype.—GUATEMALA: without further definition of the location, collected by Conradt, coll. Cameron (BMNH)

Diagnosis.—The species belongs to the *Holotrochus simplex* group, which is characterized by the laterally hairy abdomen and the size between 3.0 and 5.2 mm. Within this group *H. rufomarginatus* mostly resembles to *H.*

latinotus in overall appearance. In particular, the form of the pronotum is very similar (Fig. 11a). The punctuation is slightly denser in *H. rufomarginatus* than in *H. latinotus*. The surfaces of the abdominal tergites in *H. latinotus* are distinctly netlike reticulate, whereas they are nearly polished in *H. rufomarginatus*, with exception of the anterior half of the first abdominal tergite. Furthermore, the aedeagus of *H. latinotus* (see Irmeler 1987: Plate 3, Fig. 2c) can be easily distinguished from *H. rufomarginatus* (Fig. 11c) by the distinctly prominent inner parts at the top of the central lobe.

Description.—*Length:* 4.6 mm. *Color:* black, pronotum with wide reddish posterior margin, elytra indistinctly dark red, posterior margin of elytra slightly lighter red, posterior margin of abdominal tergites widely red, legs yellow, antennae piceous. *Head:* 0.5 mm long, 0.8 mm wide; clypeus with transverse micro-reticulation, disc polished, surface shiny, without microsculpture; punctuation distinct, but fine and sparse, distance between punctures on average wider than diameter of punctures; a row of four supraocular setae, beginning in front of the eyes and ending shortly behind the eyes, two further setae on the disc a transverse line between the posterior edge of eyes. *Antennae:* as long as head and half of the pronotum, 2nd antennomere globular, 3rd triangular, distinctly longer than 2nd, 4th quadrate, the following antennomeres wider than long, 2.5 times wide than long (Fig. 11b). *Pronotum:* 0.9 mm long, 1.1 mm wide; widest in the posterior half, nearly parallel, slightly and arcuately narrowed to anterior angles (Fig. 11a), laterally and anteriorly distinctly margined, except a small pat in the middle of the anterior edge, posterior margin not margined; posterior angles arcuate; a row of short setae along the lateral and anterior margin; punctuation fine and sparse, slightly sparser than on head, distance between punctures on average wider than diameter, between the normal punctures a fine and sparse micropunctuation; without microsculpture, surface shiny; without depression at the posterior angles. *Elytra:* 1.15 mm long, 1.2 mm wide; with indistinct coriaceous ground sculpture, punctures deeper and denser than on the pronotum, a row of short setae along the lateral and posterior margin, two further short setae in a transverse row between scutellum and shoulder. *Abdomen:* in the middle of the tergites very sparse punctuate, more sparsely punctuate than pronotum; first tergite with dense netlike microsculpture in the anterior half, posterior half without microsculpture, surface shiny; the following tergites with much weaker transversely reticulate microsculpture in the posterior half; all tergites laterally and sternites with dense punctuation and yellow hairs; 5th sternite posteriorly with semicircular smooth depression, the deep depression on the 6th sternite longitudinal and posteriorly obtusely

prominent (Fig. 11d), surface smooth with transversely reticulate microsculpture, dull. *Aedeagus*: With evenly arcuate central lobe and moderately long paramera that are as long as the central lobe (Fig. 11c).

Etymology.—The specific name refers to the red posterior edge of the pronotum. It is derived from the Latin word *rufus* meaning red and *marginatus* meaning margined.

Holotrochus uncinatus new species
(Fig. 4a–d)

Holotype.—MEXICO: *Oaxaca*: 14.9 km N Sola de Vega, male, 20 July 1992, 1820 m elevation, collected by J. S. Ashe, #105, from sapflow and woodchips (SEMC)

Paratype.—MEXICO: *Oaxaca*: 5 males and 10 females, with same the data as the holotype (SEMC, UIC).

Diagnosis.—The species belongs to the *Holotrochus simplex* group because of the margined anterior edge of the pronotum and the laterally hairy abdomen. It most closely resembles *H. hangarhi* in the small size and can scarcely be differentiated from the related species without analysis of the aedeagus. The aedeagus is conspicuous by the long straight middle lobe ending in a hook (Fig. 4c).

Description.—*Length*: 3.5 mm. *Color*: Black; posterior edge of pronotum reddish; elytra piceous; antennae and legs light red or yellow. *Head*: 0.40 mm long, 0.6 mm wide;

punctuation distinct, distance between punctures as wide or wider than the diameter of punctures; surface polished and shiny, without microsculpture, but with very sparse micropunctulation. *Antennae*: Short and stout, shorter than head and pronotum; 2nd antennomere globular, 3rd scarcely longer than 2nd; following antennomeres transverse, two times wider than long (Fig. 4b). *Pronotum*: 0.6 mm long, 0.75 mm wide; punctuation as dense as on head, but coarser; surface polished and shiny, without smooth midline and microsculpture, but with sparse micropunctulation; widest near anterior angles, straightly and scarcely narrowed to posterior angles (Fig. 4a); anterior edge margined except a moderately small central part. *Elytra*: 0.75 mm long, 0.8 mm wide; coarsely, but not coriaceously punctate; surface moderately dull, with coriaceous ground sculpture; surface at shoulders shiny. *Abdomen*: laterally with short yellow hairs, punctuation as coarse and dense as on elytra, surface shiny, with weak, netlike microsculpture. *Aedeagus*: With long central lobe ending into a distinct hook-like structure that is strongly sclerotized; paramera slightly shorter than central lobe; the short endophallus with a loose spiral (Fig. 4c).

Etymology.—The specific name is derived from the Latin word *uncinatus*, which means “formed like a hook” and refers to the conspicuous hook-like structure at the apex of the aedeagus.

LITERATURE CITED

- Irmeler, U. 1981. Descriptions of new neotropical *Holotrochus* and a key to the species of the genus (Coleoptera: Staphylinidae). *The Coleopterists Bulletin* 35:379–397.
- Irmeler, U. 1987. New neotropical species of the genus *Holotrochus* and the new genus *Mimotrochus*. *Entomologische Arbeiten des Museums Frey* 35/36:81–109.
- Irmeler, U. 2001. New neotropical species of the genera *Clavilispinus*, *Aneucamptus*, *Thoracophorus*, and *Holotrochus* (Coleoptera: Staphylinidae, Osoriinae). *Amazoniana* 16:349–361.



PUBLICATIONS OF THE NATURAL HISTORY MUSEUM, THE UNIVERSITY OF KANSAS

The University of Kansas Publications, Museum of Natural History, beginning with Volume 1 in 1946, was discontinued with Volume 20 in 1971. Shorter research papers formerly published in the above series were published as The University of Kansas Natural History Museum Occasional Papers until Number 180 in December 1996. The Miscellaneous Publications of The University of Kansas Natural History Museum began with Number 1 in 1946 and ended with Number 68 in February 1996. Monographs of The University of Kansas Natural History Museum were initiated in 1970 and discontinued with Number 8 in 1992. The University of Kansas Science Bulletin, beginning with Volume 1 in 1902, was discontinued with Volume 55 in 1996. The foregoing publication series are now combined in a new series entitled Scientific Papers, Natural History Museum, The University of Kansas, begun with Number 1 in 1997. Special Publications began in 1976 and continue as an outlet for longer contributions and are available by purchase only. All manuscripts are subject to critical review by intra- and extramural specialists; final acceptance is at the discretion of the editor.

The publication is printed on acid-free paper. Publications are composed using Microsoft Word® and Adobe PageMaker® on a Macintosh computer and are printed by The University of Kansas Printing Services.

Institutional libraries interested in exchanging publications may obtain the Scientific Papers, Natural History Museum, The University of Kansas, by addressing the Exchange Librarian, The University of Kansas Libraries, Lawrence, Kansas 66045-2800, USA. Available back issues of The University of Kansas Science Bulletin may be purchased from the Library Sales Section, Retrieval Services Department, The University of Kansas Libraries, Lawrence, Kansas 66045-2800, USA. Available issues of former publication series, Scientific Papers, and Special Publications of the Natural History Museum can be purchased from the Office of Publications, Natural History Museum, The University of Kansas, Lawrence, Kansas 66045-2454, USA. Purchasing information can be obtained by calling (785) 864-4450, fax (785) 864-5335, or e-mail (kunhm@ukans.edu). VISA and MasterCard accepted; include expiration date.

SERIES EDITOR: William E. Duellman

PRINTED BY
THE UNIVERSITY OF KANSAS PRINTING SERVICES
LAWRENCE, KANSAS

