

Revision of the genus *Tropobracon* Cameron (Hymenoptera: Braconidae)

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Key words: Hymenoptera; Braconidae; Braconinae; *Tropobracon*; Afrotropical; Oriental; distribution; key; biology; Pyralidae; *Chilo*; *Maliarpha*; *Coniesta*, *Scirpophaga* (Pyralidae); *Sesamia* (Noctuidae); millet wheat; rice stem borer.

The genus *Tropobracon* Cameron, 1905 (Braconidae: Braconinae) is revised and its species are keyed. The type species is re-described and fully illustrated. Two new species are described: *T. comorensis* spec. nov. from the Comores and *T. infuscatus* spec. nov. from Hong-Kong. *Bracon dorsalis* Matsumura, 1910 and *Tropobracon luteus* var. *indica* Ramakrishna Ayyar, 1928 are synonymized with *T. luteus* Cameron, 1905.

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Introduction

This revision of the genus *Tropobracon* Cameron, 1905 (Braconidae: Braconinae) is part of a taxonomic survey of the natural enemies of 16 species of Lepidoptera (Noctuidae and Pyralidae), whose larvae are the major pests of the four main subsistence cereals (maize, millet, sorghum and rice) in many parts of Africa (Polaszek, 1992). A taxonomic survey of their parasites belonging to the Braconidae is necessary because of the lack of keys for these groups, a prerequisite for the use of these parasites for both classical and natural biological control. There is a shift from using broad-spectrum insecticides towards an integrated approach, especially for subsistence farming. The shift is necessary because of the high costs of chemical control, lack of adequate control using previous (chemical) methods, dangers to people and to the environment, residues in the crop and the development of resistance. The integrated approach relies on cultural methods, development of resistant varieties, encouragement and augmentation of natural enemies and (limited) use of chemicals (Polaszek, 1992).

The genus *Tropobracon* is a small genus, restricted to the Palaetropics; one formerly included species (*Bracon yokohamensis* Cameron, 1910, from Japan, China and Taiwan) has been placed in another genus (*Pseudoshirakia* van Achterberg, 1983) by van Achterberg (1983). As far as is known its members are parasites of larvae of Noctuidae (species of *Sesamia* Guenée, 1852) and Pyralidae (species of *Chilo* Zincken, 1817 (= *Proceras* Bojer, 1856), *Coniesta* Hampson, 1919, *Maliarpha* Ragonot, 1888, *Schoenobius* Duponchel, 1936, and *Scirpophaga* Treitschke, 1832 (= *Tryporyza* Common, 1960; *Schoenobius* auct. p. p.). The larvae of *Tropobracon* are boring in stems of Gramineae and are notorious pests in cereals; chemical control is problematic because of the concealed way of living.

For the identification of the subfamily Braconinae, see van Achterberg (1990), for the genus *Tropobracon*, see Quicke (1987) and for the terminology used in this paper, see van Achterberg (1988).

Descriptions

Tropobracon Cameron, 1905

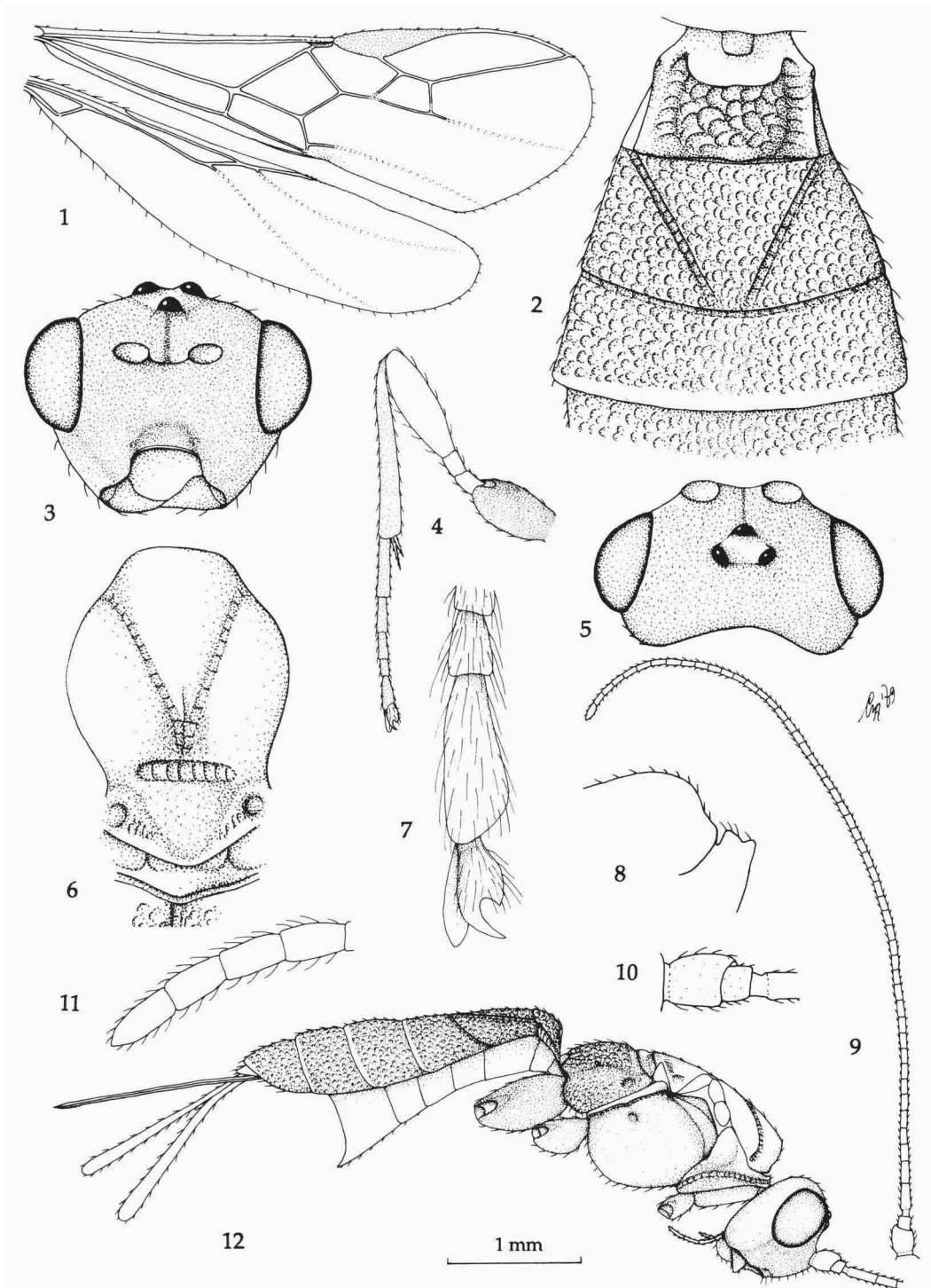
Tropobracon Cameron, 1905: 91; Shenefelt, 1978: 1730-1730; Quicke, 1987: 134. Type-species (by monotypy): *Tropobracon luteus* Cameron, 1905 [type lost?].

Shirakia Viereck, 1913: 643; Shenefelt, 1978: 1730; van Achterberg, 1983: 74. Type-species (by original designation): *Shirakia schoenobii* Viereck, 1913 [examined].

Diagnosis.— Head granulate, but sculpture superficial in *T. persimilis* and absent dorsally in *T. infuscatus*; scapus suboval, gradually narrowed basally, its apex slightly protruding dorsally (figs 10, 12), and its inner apical margin simple; apex of antenna normally setose, without spine (fig. 11); pedicellus cylindrical; frons flat or slightly convex; eyes glabrous; clypeus convex and its ventral margin thin, rather protruding outwards (fig. 3); malar suture absent, except for a obsolescent impression (fig. 12); labio-maxillary complex not protruding; labrum concave; mesoscutum smooth or granulate, largely glabrous, only near notauli with some setae; notauli complete; medio-longitudinal depression of mesoscutum absent (fig. 6) or present; pleural sulcus finely crenulate (fig. 12); mesosternal sulcus smooth, shallow; antescutal depression present (figs 8, 12); side of scutellum with round depression (fig. 6); metapleural flange absent, except for a thickened rim; metanotum protruding medio-posteriorly and its median carina absent (fig. 6); propodeum granulate, reticulate or anteriorly largely smooth and shiny; propodeal spiracle round, just behind middle of propodeum and without lateral tubercles above it (fig. 12); angle between veins 1-SR and C+SC+R of fore wing 30-40° (figs 1, 13); vein 1-SR short (figs 1, 13); vein 1-SR+M of fore wing straight; vein 3-SR of fore wing straight, about as long as vein 2-SR or shorter (figs 1, 13); vein cu-a of fore wing antefurcal (figs 1, 28), interstitial or slightly postfurcal (fig. 25); vein 1-M of fore wing straight and in line with vein 1-SR (fig. 1); vein CU1b of fore wing short, subvertical; vein m-cu of fore wing far antefurcal (fig. 1), parallel to 1-M; vein 1-R1 of fore wing somewhat longer than pterostigma, ending slightly basally of level of apex of vein 3-M (fig. 1); vein 3-CU1 of fore wing slender; vein r of fore wing strongly oblique, about as long as width of pterostigma (fig. 1) or much shorter (fig. 13), issued just before middle of pterostigma; second submarginal cell of fore wing slender, parallel-sided (fig. 1); vein 2-SC+R of hind wing elongate; vein 1r-m of hind wing short, straight or slightly curved (figs 1, 15); hind wing with one bristle antero-basally and with 3 hamuli on vein R1; tarsal claws with lobe (fig. 7), setose; tarsal segments normal, with medium-sized setae; fore tibia with one spur, about 0.4 times fore basitarsus, with some irregularly arranged small spines; first metasomal tergite movably joined to second tergite, flat basally, with curved area enclosed by dorsal carinae (fig. 2), in lateral view depressed basally (fig. 12), without median carina or differentiated medio-posterior area; second tergite with pair of converging narrow grooves (fig. 2), without medio-basal area; second and following tergites without antero-lateral grooves; second-sixth tergites with sharp lateral crease; ovipositor normal, with ventral teeth subapically, no nodus; hypopygium of female acute apically, not surpassing apex of metasoma (fig. 12); length of ovipositor sheath 0.3-0.4 times fore wing.

Distribution.— Afrotropical and Oriental.

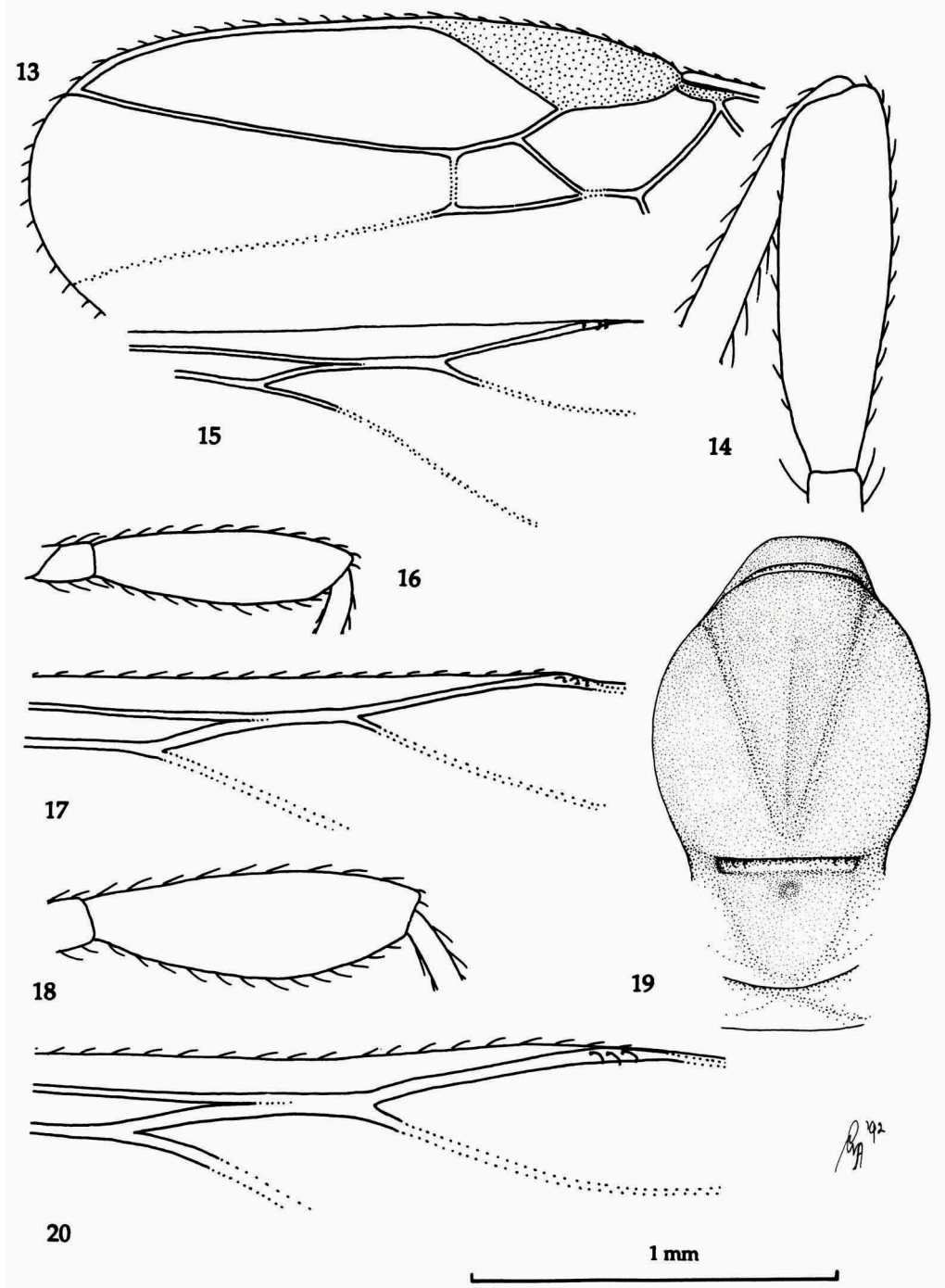
Biology.— Ectoparasites of larvae of stemborers in Gramineae belonging to the Pyralidae and Noctuidae (Lepidoptera).



Figs 1-12, *Tropobracon luteus* Cameron, ♀, holotype of *Shirakia schoenobii* Viereck. 1, wings; 2, first-third metasomal tergites, dorsal aspect; 3, head, frontal aspect; 4, hind leg; 5, head, dorsal aspect; 6, mesonotum and metanotum, dorsal aspect; 7, outer hind claw; 8, mesoscutum anteriorly and pronotum, lateral aspect; 9, antenna; 10, scapus and pedicellus, outer aspect; 11, apex of antenna; 12, habitus, lateral aspect. 1, 4, 9, 12: 1 × scale-line; 2, 3, 5, 6: 2.6 ×; 7, 11: 5 ×; 8, 10: 2.8 ×.

Key to species of the genus *Tropobracon* Cameron

1. Free part of vein 1r-m of hind wing about half as long as vein 1-SC+R and combined part of vein 1r-m (figs 15, 20); pterostigma yellowish; stemmaticum and second metasomal tergite brownish-yellow; hind tibia pale yellowish, without whitish subbasal ring; third-sixth tergites equally brownish-yellow or dark brown, exceptionally with pale median stripe; anterior half of propodeum mainly granulate, except medially and may be smooth anteriorly; vein cu-a of fore wing subinterstitial (fig. 32), exceptionally antefurcal; continental Africa, and Malagasy 2
- Free part of vein 1r-m of hind wing about as long as vein 1-SC+R (figs 1, 27, 31); pterostigma dark brown, infuscate or brown; stemmaticum and frequently a pair of patches on second metasomal tergite dark brown; subbasal ring of hind tibia whitish or yellowish-brown, or with narrow dark brown basal ring; third-sixth tergites with pale yellowish median stripe or triangular area medially; anterior half of propodeum usually reticulate, except antero-laterally, and granulate in *T. comorensis*; vein cu-a of fore wing more or less antefurcal (fig. 1), but just postfurcal in *T. comorensis* (fig. 25) or subinterstitial in *T. infuscatus* (fig. 28); Oriental, Comores 3
2. Mesoscutum distinctly granulate and rather dull; mesopleuron superficially granulate dorsally; scutellum with minute pit medio-anteriorly and granulate (fig. 19); middle lobe of mesoscutum with shallow median groove medially (fig. 19); vein r of fore wing somewhat shorter compared to vein 3-SR (fig. 32); hind femur more robust (fig. 18) *T. antennatus* (Granger)
- Mesoscutum smooth and strongly shiny; mesopleuron smooth; scutellum without pit medio-anteriorly (or obsolescent) and only sparsely punctate; median groove of middle lobe of mesoscutum absent or nearly so; vein r of fore wing somewhat longer compared to vein 3-SR (fig. 13); hind femur usually more slender (fig. 15, but in holotype comparatively robust (fig. 14)) *T. persimilis* (Szépligeti)
3. Vein 1-SC+R of hind wing about as wide as vein 1r-m (figs 24,31); scutellum without pit medio-anteriorly (fig. 6); anterior half of propodeum (reticulate)-rugulose (fig. 12) or smooth and shiny; lateral grooves of medial area of second metasomal tergite comparatively narrow, crenulate, and ending near apex of tergite (figs 2, 12, 21) or grooves absent posteriorly (fig. 30); vein cu-a of fore wing antefurcal (fig. 1) or subinterstitial (fig. 28); Oriental 4
- Vein 1-SC+R of hind wing distinctly narrower than vein 1r-m (fig. 27); scutellum with pit medio-anteriorly (cf. fig. 19); anterior half of propodeum granulate and mat; lateral grooves of medial area of second tergite wide, widely crenulate, and united in basal half of tergite (fig 22); vein cu-a of fore wing postfurcal (fig. 25); Comores *T. comorensis* spec. nov.
4. Hind tibia with narrow dark brown ring basally; pair of converging grooves shallow, in posterior half of second tergite absent (fig. 30); face largely dark brown; propodeum without distinct reticulate sculpture *T. infuscatus* spec. nov.
- Hind tibia yellowish basally, with pale subbasal ring; pair of converging grooves distinctly impressed and complete (fig. 21); face completely yellowish; propodeum (partly) distinctly reticulate *T. luteus* Cameron



Figs 13-14, 16-17, *Tropobracon persimilis* (Szépligeti), ♀, holotype, but 16-17 of ♀, Zambia, Lusaka; 15, 18-20, *T. antennatus* (Granger), 15 of ♀, holotype of *T. triangularis* (Szépligeti), 18 of ♀ Togo, N of Sokodé, 19 of ♀, Senegal, Rd Toll, 20 of ♀, Senegal, Kandialang. 13, anterior part of fore wing; 14, 16, 18, hind femur; 15, 17, 20, detail of veins 1r-m and 1-SC+R of hind wing; 19, mesoscutum, dorsal aspect. 13, 16, 18, 19: 1 × scale-line; 14, 17, 20: 1.5 ×; 15: 1.2 ×.

***Tropobracon antennatus* (Granger, 1949)**
(figs 15, 18-20, 23, 32)

Habrobracon triangularis Szépligeti, 1911: 405; Shenefelt, 1978: 1590.

Bracon antennatus Granger, 1949: 61 (replacement name for *Bracon triangularis* (Szépligeti, 1911) nec Nees, 1834); Shenefelt, 1978: 1590.

Tropobracon antennatus; Etienne, 1987: 51.

Mesobracon spec. Ingram, 1958: 381; Saraiva, 1963: 367 (misidentification).

Habrobracon near *triangularis* Szépligeti: Risbec, 1950: 323.

Shirakia spec.; Badawy, 1967: 235; Jordan, 1966: 17.

Material.— Holotype of *T. triangularis*, ♀ (ZMB), "Ost-Afrika, [Kenya], Mombassa, Hildebrandt S.", "Type", "*Habrobracon triangularis*"; additional specimens from: Cameroon (BMNH, MNHN: Garoua, ex *Chilo zacconius* (as "*Proceras africana*"), Ivory Coast (CIRAD: Bouaké, on rice; MNHN: Adiopodoumé/Tay, ex *Maliarpha separatella*; LUW: Mankono), Malagasy (MNHN: Bekily; BMNH: Lac Alaotra, ex *Maliarpha separatella*), Malawi (BMNH: Kasungu, Mtunthama), Mali (CIRAD: Kogoni, ex *Chilo zacconius*; MNHN: Segou), Mozambique (MNHN: Nova Choupanga, near Chemba), Niger (MNHN: Kayo, ex *Chilo zacconius*; LUW: Niamey, ex *Coniesta ignefusalis*), Nigeria (BMNH, RMNH: Ibadan), Senegal (RMNH: Richard Toll; BMNH: Ziguinchor, ex *Chilo* on rice; ISRA: Djibelor/ Ziguinchor, ex *Chilo* on rice; CIRAD: Djibelor/Kagnout/Kandialang/Koloban, ex *Chilo zacconius* / *Maliarpha separatella* on rice; MNHN: Bambey/Djibelor/Kandialang, ex *Chilo zacconius* / *Maliarpha separatella*), Sierra Leone (BMNH: Rokupr, ex ?*Scirpophaga* (as "*Schoenobius*") on rice; Njala), South Africa (BMNH: Port St. John; Zululand, Gingindlovu), Sudan (BMNH: Shambat, ex stem borer [*Sesamia cretica*]; Wad Medani, ex wheat stem borer), Togo (LUW: Sokodé), Uganda (BMNH: Serere, ex *Sesamia* labelled ?*Mesobracon*).

Morphologically, *Tropobracon antennatus* is largely similar to *T. luteus*. It differs by the sculpture of the mesoscutum and propodeum, and by its colour, of which the yellowish colour of the pterostigma is the most easy to use.

Note.— The holotype of *T. triangularis* has length of fore wing 4.5 mm, and of body 5.1 mm; length of ovipositor sheath 0.40 times fore wing; length of vein SR1 of fore wing 4.5 times 3-SR; length of vein 2-SR of fore wing 1.8 times vein r-m (fig. 13); body completely yellowish, except outer stripe of scapus and pedicellus, telotarsi (except yellowish basal third) and flagellum dark brown; stemmaticum yellowish; mesoscutum completely (coriaceous-)granulate; second metasomal suture comparatively wide medially, wider than laterally (but in other specimens narrow medially); vein 1r-m of hind wing partly close to vein 1-SC+R; hind femur granulate; median length of second metasomal tergite 0.6 times its basal width of tergite (in other species 0.7 times); anterior half of propodeum mainly granulate, its posterior half densely finely reticulate; vein cu-a of fore wing interstitial; hind tibia without whitish ring subbasally.

The male has second metasomal tergite much more slender than female, and consequently the triangular area is more slender. Also the grooves are often much wider.

Distribution.— Afrotropical: continental Africa, Malagasy.

Biology.— Parasite of stem boring Lepidoptera: Noctuidae: *Sesamia cretica* Lederer, 1857, *Sesamia* spec. Pyralidae: *Chilo zacconius* Bleszynski, 1970 (= *Proceras africana* auct.), *Coniesta ignefusalis* (Hampson, 1919), *Maliarpha separatella* Ragonot, 1888 and ?*Scirpophaga* spec.

Tropobracon comorensis spec. nov.
(figs 22, 25-27)

Material.— Holotype, ♂ (MNHN), "Gr[an]de Comore, Inané, 25.i.1982, D. Bordat, 2386", "Ex *Chilo partellus* [de] riz".

Holotype, ♂, length of body 4.5 mm, of fore wing 3.6 mm.

Head.— Antenna incomplete, with 13 remaining segments, length of third antennal segment 1.4 times fourth segment, third and fourth segments 3.6 and 2.6 times their width, respectively; length of maxillary palp 0.9 times height of head; face and frons finely granulate; vertex and temples superficially granulate, rather shiny; length of eye 2.4 times temple in dorsal view; temple roundly narrowed posteriorly; OOL:diameter of ocellus:POL = 10:5:5; length of malar space 0.7 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.7 times its height; episternal scrobe linear, shallow; notauli smooth; mesoscutum smooth, also medio-posteriorly, without a short groove; scutellar sulcus deep, but narrower than of *T. luteus*, and finely crenulate; scutellum with distinct pit medio-anteriorly (cf. fig. 19); mesopleuron largely smooth; metapleuron microsculptured, without long whitish setae except anteriorly; propodeum finely granulate, its posterior half rugose, but laterally rugulose, and with shallow median groove.

Wings (left wings missing).— Fore wing: r:3-SR:SR1 = 6:9:43; cu-a slightly postfurcal (fig. 25); 2-SR:3-SR:r-m = 9:9:7. Hind wing: 1r-m straight, largely free from 1-SC+R, and somewhat longer than 2-SC+R (fig. 27); 1-SC+R distinctly narrower than 1r-m (fig. 27).

Legs.— Hind coxa superficially granulate; length of femur, tibia and basitarsus of hind leg 3.6, 10.9 and 6.6 times their width, respectively; length of spurs of hind tibia 0.2 and 0.3 times hind basitarsus.

Metasoma.— Length of first tergite 1.2 times its apical width, its surface distinctly rugose, no distinct dorsal carinae, its lateral areas rather wide and crenulate; first tergite strongly convex medially; pair of grooves of second tergite wide, rather shallow, coarsely crenulate and meeting each other about halfway length of tergite, not reaching second metasomal suture, and resulting in a comparatively small triangular area (fig. 22); second and third tergites distinctly and rather finely rugose; fourth and fifth tergites distinctly coriaceous and partly rugulose.

Colour.— Yellowish-brown (including stemmaticum and telotarsi); palpi and tegulae pale yellowish; whole hind tibia yellowish-brown, without (sub)basal ring; eighth and following antennal segments rather dark brown; wing membrane subhyaline; pterostigma and veins brown, but middle of pterostigma paler than its lateral parts.

Distribution.— Afrotropical: Comores. The narrow vein 1-SC+R of hind wing (fig. 27), pit of scutellum, and the slightly postfurcal vein cu-a of fore wing (fig. 25) indicate that it belongs to the Afrotropical group of species, despite it has a shorter vein 2-SC+R, a comparatively slender hind femur and dark pterostigma. Therefore it is likely that the parental stock came from Malagasy or the African continent.

Biology.— Parasite of *Chilo partellus* Swinhoe, 1885 (Lepidoptera: Pyralidae).

Note.— Very similar to *T. luteus*, but differs by the sculpture of the propodeum and the sculpture of the second metasomal tergite.

Tropobracon infuscatus spec. nov.

(figs 28-31)

Material.— Holotype, ♀ (BMNH), "Hong-Kong, 16.xi.[19]61", "ex paddy stem borer", "CIBC-15", "2", "CIE. Coll. N. 18024", "*Shirakia* sp. nr *schoenobii*, R.D. Eady det. 1962".

Holotype, ♀, length of body 2.3 mm, of fore wing 2.4 mm.

Head.— Antenna incomplete, with 34 remaining segments, length of third antennal segment 1.3 times fourth segment, third and fourth segments 3.5 and 2.8 times their width, respectively; length of maxillary palp 0.6 times height of head; face granulate; frons partly superficially granulate and shiny; vertex and temples smooth, shiny; length of eye 2.2 times temple in dorsal view; temple roundly narrowed posteriorly; OOL:diameter of ocellus:POL = 11:3:5; length of malar space 1.3 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.5 times its height; episternal scrobe round, distinct; mesoscutum and mesopleuron smooth; middle lobe of mesoscutum without a shallow groove medially; notauli smooth; scutellar sulcus deep, but narrower than in fig. 6 of *T. luteus* (but in latter species variable), and finely crenulate; scutellum without pit medio-anteriorly metapleuron microsculptured, with long whitish setae; propodeum granulate, but smooth anteriorly, shiny and with shallow median depression.

Wings.— Fore wing: r:3-SR:SR1 = 5:18:68; cu-a subinterstitial (fig. 28); 2-SR:3-SR:r-m = 10:9:6. Hind wing: 1r-m slightly curved, free from 1-SC+R, and about as long as 2-SC+R (fig. 31); 1-SC+R distally nearly as wide as 1r-m (fig. 31).

Legs.— With long setae; hind coxa granulate; length of femur, tibia and basitarsus of hind leg 3.2, 9.4 and 6.0 times their width, respectively; length of spurs of hind tibia both 0.45 times hind basitarsus.

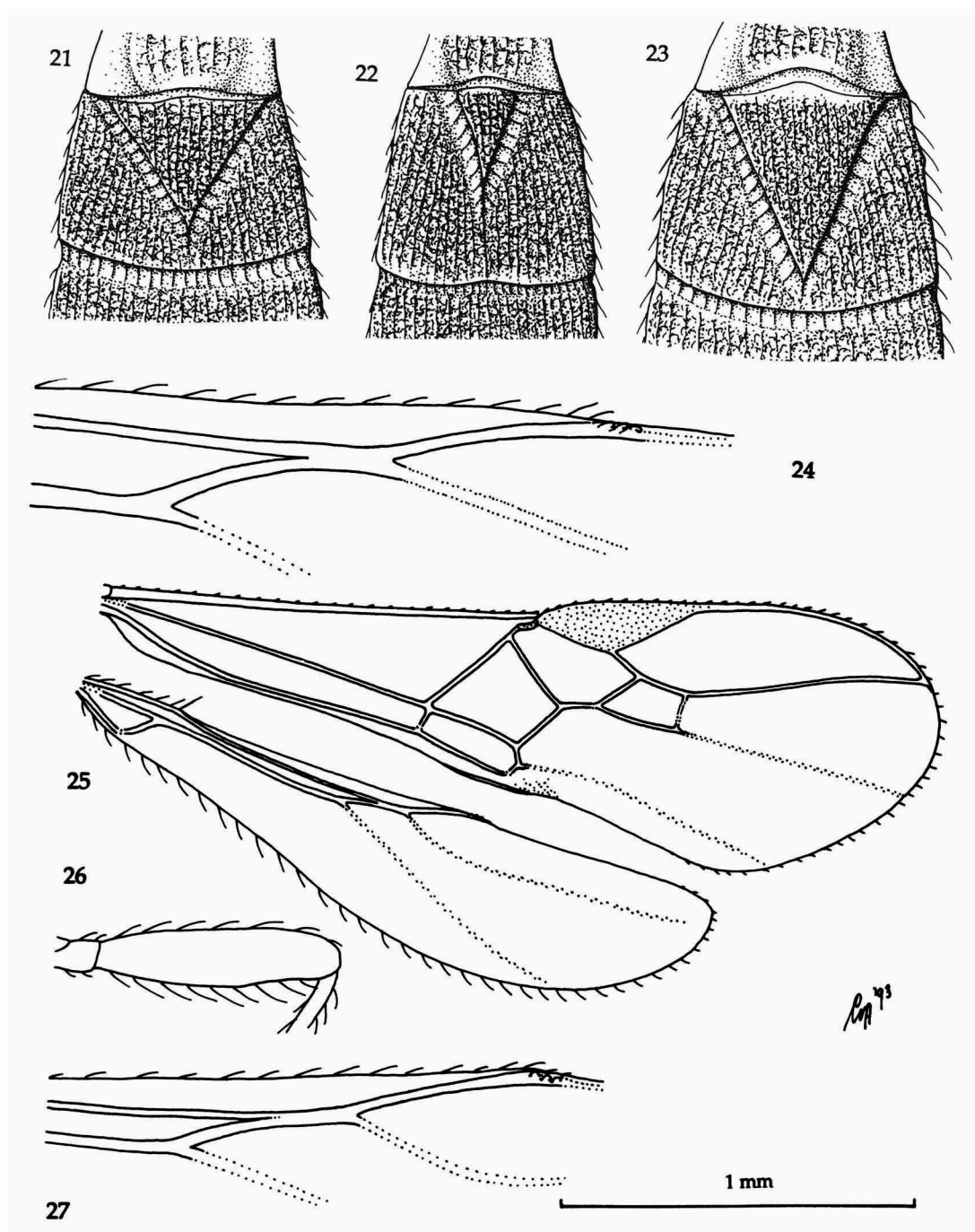
Metasoma.— Length of first tergite 0.8 times its apical width, its surface superficially and sparsely rugose behind weak dorsal carinae, its lateral areas wide and smooth, and spiracle distinctly protruding; pair of grooves of second tergite obsolescent, only basally distinctly impressed, smooth, and not meeting or reaching second metasomal suture, and without a distinct triangular area (fig. 30); second tergite superficially rugose, shiny; third-sixth tergites rather coarsely granulate, but smooth posteriorly, shiny; length of ovipositor sheath 0.38 times fore wing.

Colour.— Brown; face largely, antenna, palpi, frons, vertex, mesosoma (except scutellum, metanotum, pronotum largely, propodeum, and tegulae), a narrow basal ring of hind tibia, apical two-fifths of ovipositor sheath dark brown or blackish; propodeum, metasoma, legs (except femora) rather infuscate; pterostigma and veins brown; wing membrane slightly infuscate.

Distribution.— Oriental: Hong-Kong.

Biology.— Parasite of a stemborer in rice, probably a smaller host than that of *T. luteus*.

Note.— Differs by its colour, the sculpture of the second tergite and the small size of the female from all other known species.



Figs 21, 24, *Tropobracon luteus* Cameron, σ , India, Madras, but 24 of ♀ , Indonesia, Medan; 22, 25-27, *T. comorensis* spec. nov., σ , holotype; 23, *T. antennatus* (Granger), σ , Nigeria, Ibadan. 21-23, second metasomal tergite, dorsal aspect; 24, 27, detail of veins 1r-m and 1-SC+R of hind wing; 25, wings; 26, hind femur. 21-23, 26: 1 \times scale-line; 24, 27: 1.5 \times ; 25: 0.7 \times .

***Tropobracon luteus* Cameron, 1905**
(figs 1-12, 21, 24)

Tropobracon luteus Cameron, 1905: 91; Shenefelt, 1978: 1730.

Shirakia schoenobii Viereck, 1913: 643; Shenefelt, 1978: 1730-1731. Synonymized by Delfinado, 1959: 349.

Bracon dorsalis Matsumura, 1910: 49, 84 (nec Brullé, 1846); Shenefelt, 1978: 1730. **Syn. nov.**

Tropobracon luteus var. *indica* Ramakrishna Ayyar, 1928: 39; Shenefelt, 1978: 1730. **Syn. nov.**

Material.— 2 ♀♀ (BMNH), "E Pakistan, Dacca, swept on rice, C.I.B.C, C.I.E. A862, No. 169"; 2 ♀♀ (RMNH), "Qionghai in Guandong, P.R.C., 1966.v.4, He Junnua, "Host: *Tryporyza incertulas* (Walker), No. 66.016.19"; 1 ♂ (RMNH), "Bangladesh, Mushinganj, yellow pan trap, xii.1980, leg. A.L. Khan"; 1 ♂ (BMNH), "Ex *Schoenobius incertulas* on paddy", "India, Madras, Tituvarut, vii.1962", "*Shirakia schoenobii* Vier., det. Eady, 1962"; 5 ♀♀ +27 ♂♂ (RMNH), "India: Kerala, 10.xii.1988, P.K. Sumodan, RMNH'91"; 2 ♀♀ (BMNH), "[Indonesia], Medan, S.O.K., L. Fulmek".

Redescribed from holotype of *T. schoenobii*, length of body 4.5 mm, of fore wing 4.2 mm.

Head.— Antennal segment 52, length of third antennal segment 1.7 times fourth segment, third, fourth and penultimate segments 3.2, 1.9 and 2.0 times their width, respectively (figs 9, 11); length of maxillary palp 0.6 times height of head; vertex and frons granulate; length of eye 2.8 times temple in dorsal view (fig. 5); temple roundly narrowed posteriorly (fig. 5); OOL:diameter of ocellus:POL = 11:3:6; face granulate; clypeus flat; length of malar space 1.5 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.6 times its height; episternal scrobe round, distinct (fig. 12); mesoscutum smooth, only medio-posteriorly granulate and with a short carina (fig. 6), medio-anteriorly with a short groove; scutellar sulcus wide, deep and with 7 longitudinal carinae (fig. 6); scutellum without pit medio-anteriorly; metapleuron finely rugose, with long whitish setae; propodeum without median carina, coarsely and densely reticulate-rugose, but with a narrow part smooth.

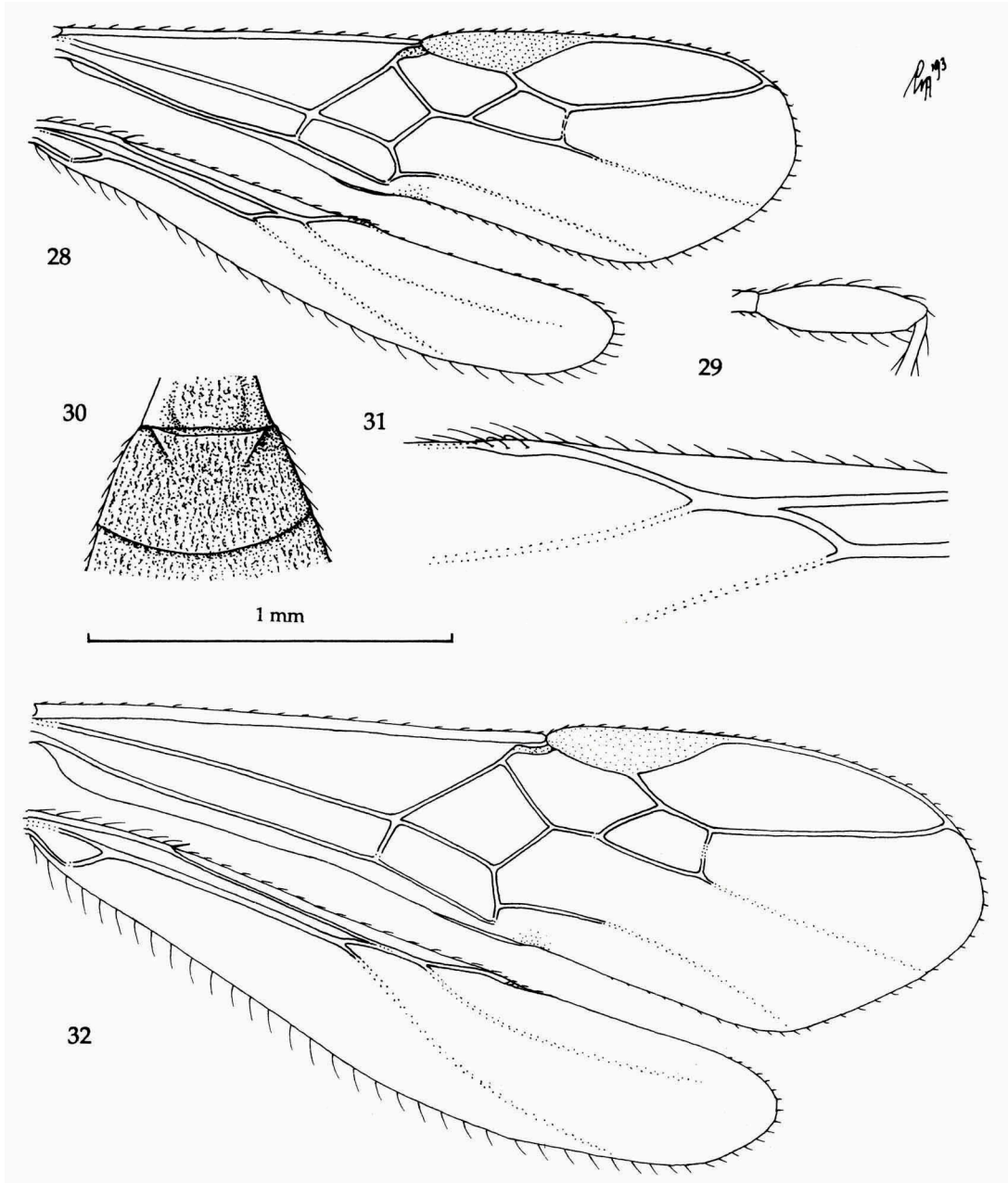
Wings.— Fore wing: r:3-SR:SR1 = 11:16:70; cu-a just antefurcal (fig. 1); 2-SR:3-SR:r-m = 18:16:15. Hind wing: 1r-m straight, completely free from 1-SC+R, and somewhat longer than 2-SC+R (fig. 1); 1-SC+R about as wide as 1r-m (fig. 24).

Legs.— Hind coxa granulate; length of femur, tibia and basitarsus of hind leg 3.1, 9.2 and 5.0 times their width, respectively; length of spurs of hind tibia 0.4 and 0.5 times hind basitarsus.

Metasoma.— Length of first tergite 0.9 times its apical width, its surface behind united dorsal carinae coarsely reticulate-rugose, its lateral areas wide and partly smooth (fig. 2); first tergite strongly convex medio-posteriorly; grooves of second tergite narrow and reaching second metasomal suture (fig. 2, of male: fig. 21), resulting in a large triangular area; second-sixth tergites densely, and rather coarsely, reticulate-rugose; length of ovipositor sheath 0.35 times fore wing.

Colour.— Yellowish-brown; stemmaticum, middle of frons, antenna (but scapus ventrally, and annellus paler), propleuron, mesopleuron dorsally, mesosternum dorsally, mesosternum partly, pterostigma, wing veins, first-fifth metasomal tergites (except medially and laterally), and legs (except fore tibia, and all femora) dark brown; wing membrane slightly infuscate; middle and hind tibia narrowly whitish subbasally; second-sixth tergites with slender pale yellowish triangle.

Variation.— Antennal segments of ♀ 42(1), 46 (1), 49(1), 52(2), 54(1), 55(1), and 56(1), of ♂ 38(1), 40(2), 41(2), 42(1), 44(3), 45(2), 46(2), 47(1), 48(3), 49(3), 50(1), 52 (1),



Figs 28-31, *Tropobracon infuscatus* spec. nov., ♀, holotype; 32, *T. antennatus* (Granger), ♀, Senegal, Rd Toll. 28, 32, wings; 29, hind femur; 30, second metasomal tergite, dorsal aspect; 31, detail of veins 1r-m and 1-SC+R of hind wing. 28-30: 1 × scale-line; 31: 2.3 ×; 32: 0.7 ×.

and 56(1); length of fore wing 2.0-3.6 mm (σ) or (2.7-)-3.4-4.2 mm (♀); melanistic specimens may have also the head dorsally, the mesoscutum, the propodeum, the hind tibia (except basally) and tarsus dark brown, pale specimens may be largely yellowish-brown, with most of the antenna, and sometimes with a pair of patches of the second tergite dark brown, and the triangular area of the second tergite between grooves whitish; scutellum usually without pit antero-medially, but exceptionally with obsolescent minute pit and anterior margin of scutellum may have a (shallow) notch medially; sculpture of propodeum rather variable, but always partly reticulate; sculpture of second-sixth tergites distinct, including pair of grooves of second tergite; vein 1r-m of hind wing straight or slightly curved (fig. 24).

Distribution.— Oriental: Pakistan to Indonesia (Sumatera) and Taiwan and S China.

Biology.— Parasite of *Scirpophaga* and *Chilo* spp. (Lepidoptera: Pyralidae). The cocoon is whitish, thin and rather transparent.

Note.— The "type" under *Tropobracon luteus* in BMNH, a female, bears the following labels: "Type", "B.M. Type Hym. 3.c.665", "*Tropobracon luteus* Cam., Type Ceylon", "Peradeniya, Ceylon 2.1902", "Pundalu-oya, Ceylon, 3-03", "P. Cameron Coll. 1914-110", "This is certainly not genotype of *Tropobracon* which is a Braconine genus, G.E.J. N[ixon], ix.1938". I agree with Dr Nixon's statement, that the specimen is not (the type of) *T. luteus*. The specimen does not fit the original description, except for its colour and it belongs to a *Macrocentrus* spec. with nearly straight ventral margin of clypeus and vein SR of hind wing straight. The real type may be lost or displaced.

The females have usually the propleuron, mesopleuron and mesosternum partly, and whole hind tarsus, dark brown ("var. *schoenobii* (Viereck)") and the males usually have these parts yellowish-brown ("var. *luteus* Cameron"), but melanistic males occur and are not uncommon. Females are usually distinctly larger than males and have consequently more antennal segments than most males.

***Tropobracon persimilis* (Szépligeti, 1913)** (figs 13-14, 16-17)

Habrobracon persimilis Szépligeti, 1913: 599; Shenefelt, 1978: 1609.

Tropobracon persimilis; Quicke, 1991: 174.

Material.— Holotype, ♀ (TMA), "Africa or., Katona [= Tanzania]", "Mosaki, 1905.vii.", "Holotypus *Habrobracon persimilis* Szépli., 1913, ♀ , Papp'69", "23. *Habrobracon persimilis* n. sp.", "Hym. Typ. No. 1570, Mus. Budapest", "*Tropobracon persimilis*, Braconinae, det. D. Quicke, 1989"; 3 ♀ (BMNH, RMNH), "Malawi: Kasungu, Mtunthama, vi.1982 (1 ♀), vii.1982 (1 ♀) or ix.1982 (1 ♀), J. Feehan; 1 ♀ (BMNH), "Zambia: Lusaka, 28.vii-10.viii.[19]80, R.A. Beaver".

Very similar to *T. antennatus*, but differs by smooth and strongly shiny mesoscutum, the granulate scutellum with a medio-anterior pit and median groove of mesoscutum distinct. Antennal segments of ♀ 49 (2), 52 (1) or 53 (1).

Note.— The metasoma of the holotype is missing. The type is very similar to *T. antennatus*, it differs mainly by the sculpture of the mesosoma, but slight differences concern the wing venation and the shape of the legs.

Distribution.— Afrotropical: so far only specimens have been examined from East Africa.

Biology.— Unknown.

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Abbreviations: BMNH = The Natural History Museum, London; CIRAD = Centre de Coopération Internationale en Recherche Agronomique pour le Développement, Montpellier, France; ISRA = Institut Sénégalais pour la Recherche Agronomique, Dibelor, Ziguinchor, Senegal; LUW = Landbouwniversiteit, Wageningen; MNHN = Muséum National d'Histoire Naturelle, Paris; RMNH = Nationaal Natuurhistorisch Museum, Leiden; TMA = Természettudományi Múzeum Allattára; ZMB = Zoologisches Museum, Berlin.

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