

**Cladistic revision of the genus *Trotricus* BRULLÉ, 1846
(Hymenoptera Braconidae)
including descriptions of eleven new taxa and new records
for other African Braconids**

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Abstract

Eleven new species are described from Africa and included in the genus *Trotricus* : *T. bredoi* sp. n., *T. cryptus* sp. n., *T. dewittei* sp. n., *T. flaviscapus* sp. n., *T. louwpenrithi* sp. n., *T. oocularis* sp. n., *T. partitus* sp. n., *T. segetophilus* sp. n., *T. sharkeyi* sp. n., *T. spatulatus* sp. n., *T. tricortus* sp. n. With these discoveries the cladistic analysis of this genus with the genus *Protrotricus* VAN ACHTERBERG confirm the basal position of *Protrotricus* species. On another issue, new collection data increase our knowledge about the distribution of Braconidae. We also confirm that the genus *Rhoptrocentroides* MARSH, 1993 is a junior synonym for *Pseudorhoptrocentrus* GRANGER, 1949.

Keywords : Braconidae, *Archibracon*, *Cardiochiles*, *Chelonus*, *Pachychelonus*, *Physaraia*, *Protrotricus*, *Pseudorhoptrocentrus*, *Steblocera*, *Trotricus*, *Yelicones*, cladistic, key.

Résumé

Onze nouvelles espèces africaines sont décrites : *T. bredoi* sp. n., *T. cryptus* sp. n., *T. dewittei* sp. n., *T. flaviscapus* sp. n., *T. louwpenrithi* sp. n., *T. oocularis* sp. n., *T. partitus* sp. n., *T. segetophilus* sp. n., *T. sharkeyi* sp. n., *T. spatulatus* sp. n., *T. tricortus* sp. n. Fort de ces découvertes, l'analyse cladistique de ce genre et du genre *Protrotricus* VAN ACHTERBERG confirme la position de ce dernier genre à la base du clade formé par les espèces du genre *Trotricus*. D'autre part, de nouvelles captures de Braconides africains viennent compléter nos connaissances sur leurs distributions. Nous confirmons également que le genre *Rhoptrocentroides* MARSH, 1993 doit être considéré comme un synonyme récent du genre *Pseudorhoptrocentrus* GRANGER, 1949.

Introduction

As for many other parasitic hymenoptera, the scarce distribution data for several genera of Braconidae in Africa are one of the difficulties in understanding the biogeography and diversity in several areas. For this reason, we present here some new data obtained during the survey of the specimens of Braconids in several institutions. During this work, two specimens of an undescribed species of Agathidinae have been found. Their placement, in the monospecific genera *Trotricus* BRULLÉ, 1846 or *Protrotricus* VAN ACHTERBERG, 1988 is uncertain because they show a mixture of characters belonging to the two genera. As *Protrotricus* sp., they lack the bump on lateral mesoscutal lobes, their palpi are normal, the scutellum is normally convex but, as in *Trotricus* sp., they have an acute metapleural flange, their fore tarsal segments are swollen and they have the vein 3-M of fore wing curved near the wing apex. To confirm our opinions, we have examined several undescribed specimens housed in the collections of MRAC which have been previously sorted by SHARKEY in 1984. This examination revealed a high level of character combinations belonging to the two previous genera within several new species. Because of the lack of revisionary works after the original descriptions, a cladistic analysis has thus been realized to reveal affinities between the species in order to decide upon their generic position.

Both genera, *Trotricus* and *Protrotricus*, belong to the tribe Disophrini sensu SHARKEY (1992). This tribe is supported by two unequivocal autapomorphies : hind basitarsomere with a serrate ridge and ovipositor short and ventrally curved (SHARKEY, 1922). No biological data are available for *Trotricus* but *Protrotricus* has been reared from two species of Lasiocampidae (Lepidoptera) : *Pachymeta robusta* AURIVILLIUS and *Pachypasa howdenii* DEW (VAN ACHTERBERG, 1988a). But members of Agathidinae are known as koinobiont endoparasitoids of larval Lepidoptera. Most host larvae are leaf rollers or stem borers, though about 20% of the hosts are free-living foragers and usually crepuscular or nocturnal. Eggs usually are laid in first- or second instar-larvae and the adult parasitoid emerges after the final instar of the host has spun its cocoon (NICKELS *et al.*, 1950; DONDALE, 1954; ODEBIYI & OATMAN, 1972, 1977).

Systematic account

Material and methods

All specimens examined are housed in the following entomological collections : own collection (OC), Zoological Museum of Amsterdam (The Netherlands) (ZMA), National Museum of Namibia (Windhoek, Namibia) (NMNW), Muséum national d'Histoire naturelle (Paris, France) (MNHN), American Entomological Institute (Gainesville, Florida, USA) (AEIC) and the 'Musée Royal d'Afrique Centrale' (Tervuren, Belgium) (MRAC). All material of our collection should be deposited in Facultés Universitaires des Sciences Agronomiques (FUSAGx) within some years.

For identification of the Braconidae subfamilies, we refer to VAN ACHTERBERG (1990, 1993). The terminology used in this paper is according to VAN ACHTERBERG (1988b, 1994a). The Agathidinae subfamily is supported by three synapomorphies (SHARKEY, 1992) : the presence of specialized males tergal glands on metasomal segments 6 and 7, the presence of a wing fold between the parastigma and 1-SR vein, and the SRI of fore wing terminates on the fore margin well anterior to the wing apex resulting in a very narrow marginal cell. As with the other genera in the Disophrini tribe, *Trotricus* and *Protrotricus* genera are characterized by the presence of fore tarsal claws cleft, the ovipositor sheaths shorter than 0.5 times length of metasoma and the base of fore tarsal claws not pectinate. Four genera belonging to this tribe have been chosen, because they are available, to be used as outgroups in our analysis : *Coccygidium* SAUSSURE, 1892, *Dichelosus* SZÉPLIGETI, 1902, *Marjoriella* SHARKEY, 1983 and *Monophrys* VAN ACHTERBERG, 1988. More than 30 undetermined specimens, sharing with the genera *Trotricus* and *Protrotricus* the presence of angulate prepectal carina (a synapomorphy of these two genera), have been included in our studies.

The matrix was run in the Hennig86 software (FARRIS, 1988) with the <ie*>, <cc-> and <nelsen> options (search after all optimal trees, considering all characters as unordered and finding a strict consensus tree from the results). Polymorphic characters have been considered as unknown during the cladistic analysis.

Cladistic analysis

Characters states :

- (1). External carina of frons. 0 = joining, or nearly so, the stemmaticum; 1 = arriving far of the stemmaticum; 2 = absent.
- (2). Occipital flange. 0 = thin and not acute; 1 = large and acute.
- (3). Median carina of metanotum. 0 = absent or not included in the median areola of metanotum; 1 = present, at least partly included in the median areola of metanotum.
- (4). Middle lobe of mesoscutum. 0 = convex; 1 = truncate.
- (5). Depression on middle lobe of mesoscutum. 0 = absent; 1 = present.
- (6). Notauli, if present. 0 = smooth; 1 = crenulate.
- (7). Prepectal carina. 0 = not angulate; 1 = angulate.
- (8). Prepectal carina. 0 = not protruding ventrally (or only weakly); 1 = protruding ventrally.
- (9). Scutellum. 0 = flattened in lateral view; 1 = convex in lateral view.
- (10). Posterior elevation of scutellum, if present. 0 = with large fovea and a medio-longitudinal carina; 1 = as a transverse depression without carina (or as a transversal ruga only).
- (11). Medio-anterior carina of propodeum. 0 = obsolescent; 1 = present.
- (12). Rugae of propodeum. 0 = present; 1 = absent.
- (13). Rugae of propodeum, if present. 0 = present medially and enclosing a triangular or diamond shaped areola; 1 = small and present only poste-

- riorly.
- (14). Metapleural flange. 0 = present; 1 = absent.
 - (15). Ramulus of second submarginal cell. 0 = absent or short; 1 = long.
 - (16). Vein 3-M of fore wing. 0 = straight apically; 1 = curved to the posterior margin of wing.
 - (17). Fore tarsal segments. 0 = normal (length of all tarsi equal or longer than tibia); 1 = shortened and swollen (length of all tarsi shorter than tibia).
 - (18). Hind tarsal segments. 0 = normal; 1 = flattened ventro-dorsally and enlarged (sometimes weakly).
 - (19). Hind tarsus. 0 = with a normal pilosity; 1 = with numerous long and dense setae.
 - (20). Upper side of metasoma (T1). 0 = rufous-reddish dorsally; 1 = blackish or infuscated.
 - (21). Hind legs (excluding tarsi). 0 = reddish-rufous; 1 = blackish.
 - (22). Hind femur. 0 = long (its length more than 5 times its maximal width); 1 = short (its length less or equal to 5 times its maximal width).
 - (23). Hind tibia. 0 = long (its length more than 7 times its maximal width); 1 = short (its length less or equal to 7 times its maximal width).
 - (24). Precoxal sulcus. 0 = crenulate; 1 = absent or not crenulate.

Character 13 has been previously used (SHARKEY, 1992). For this character the polarisation has been kept, but we have added an intermediate state for it (state 1). Polarisation for the other characters is difficult because the phylogenetic position of Agathidinae within the Braconidae is problematic. For the purpose of this analysis, it was realized after examination of specimens of several non-cyclostome subfamilies of braconids. Moreover, uninformative or autapomorphic characters were not included during our analysis.

Results and discussion

As the first result, we obtain the following matrix.

This analysis results in only one tree with length of 53, $ci = 0.47$, $ri = 0.65$ (Fig. 54). From these results, the monophyly of all species of *Trotricus* BRULLÉ and *Protrotricus* VAN ACHTERBERG, is clearly supported by their truncate middle lobe of the mesoscutum and their angulate prepectal carina (characters 4 and 7). The median carina of metanotum (character 3) at least partly present in the areola seems to be considered as a character which has been conserved by the less derived species of *Trotricus* (*T. ovatus*, *T. dewittei*, *T. partitus*, *T. tricornutus* spp. n.) and in three species of the derived groups (*T. louwpenrithi*, *T. spatulatus* and *T. cryptus* spp. n.) where it could be considered as a secondary reversion. The genus *Protrotricus* VAN ACHTERBERG could be separated from all species of *Trotricus*, but *T. sharkeyi* sp. n., by the absence of metapleural flange (character 14). This character is nearly always present in all Braconidae and its absence in *T. sharkeyi* sp. n. could be considered as an apomorphy. Basal position of *Protrotricus nigripennis* in comparison of the *Trotricus* species confirm the remarks of VAN ACHTERBERG (1988a) about its plesiomorphy.

Table 1. Full matrix of characters (24) for the studied species. *Coccygidium* sp., *Dichelosus* sp., *Marjoriella ancha* and *Monophrys manifesta* was used as outgroups. P : character poly-morphic; ? : character unknown.

Taxa	Characters		
<i>Coccygidium</i> sp.	0010000001	1000000000	0001
<i>Dichelosus</i> sp.	00000?0001	01?00000000	0001
<i>Marjoriella ancha</i> SHARKEY	01001?000?	01?0100000	?110
<i>Monophrys manifesta</i> (KOKUJEV)	2000000001	1000000000	0010
<i>Protrotricus nigripennis</i> (VAN ACHTERBERG)	0011001011	0000011001	0110
<i>Trotricus bredoii</i> sp. n.	1101101?00	101001000?	0000
<i>T. cryptus</i> sp. n.	1011101100	0010011111	1000
<i>T. dewittei</i> sp. n.	0011101011	1000010000	0110
<i>T. flaviscapus</i> sp. n.	20010?1001	01P001100P	P000
<i>T. louwpenrithi</i> sp. n.	0011111000	0000010000	0110
<i>T. oocularis</i> sp. n.	1101101000	0010010000	0110
<i>T. ovatus</i> BRULLÉ	0011001011	0000011001	0110
<i>T. partitus</i> sp. n.	0011101010	000001000?	0110
<i>T. segetophilus</i> sp. n.	0001111000	1000010000	0110
<i>T. sharkeyi</i> sp. n.	0101101110	0011111111	1000
<i>T. spatulatus</i> sp. n.	1111101100	0010010111	1000
<i>T. tricortus</i> sp. n.	0001101010	0000011000	0110

Among the *Trotricus* species, one cluster is clearly supported by several apomorphies which included the following six species : *T. bredoii* sp. n., *T. cryptus* sp. n., *T. flaviscapus* sp. n., *T. oocularis* sp. n., *T. sharkeyi* sp. n. and *T. spatulatus* sp. n. All these species share a reduction of rugae on propodeum (small and present only posteriorly or completely absent as for *T. flaviscapus* sp. n.), and an external carina of frons arriving far of the stemmaticum (characters 13 and 1). Presence of a large and acute occipital flange should be also considered as a third synapomorphy for this group of species among the genus *Trotricus*, although it is found in *M. ancha* and several other genera of Agathidinae. Inside this cluster, three species (*T. spatulatus* sp. n., *T. sharkeyi* sp. n. and *T. cryptus* sp. n.) are united by three other synapomorphies : the prepectal carina protruding ventrally, the hind tarsal segments flattened ventro-dorsally and with numerous and long setae (characters 8, 18 and 19). Despite their divisions, *Trotricus ovatus*, *T. dewittei* sp. n., *T. tricortus* sp. n. and *T. partitus* sp. n. seems to form a group of species with the metasoma reddish and with large patches and stigma yellowish on fore wings. *T. segetophilus* sp. n. and *T. louwpenrithi* sp. n. could form a cluster united by the character 6 (state 1) (Fig 54). We could also observe that the resulting tree respect the observed distribution of the *Trotricus* species, mainly diversified in central Africa (D.R. of Congo).

In conclusion, cladistic analysis of all species with angulate prepectal carina reveal clear apomorphies that could support the existence of the two genera *Trotricus* and *Protrotricus*. Moreover, three groups of species could be distinguished in the genus *Trotricus*. The first group includes the more derived spe-

cies as *T. ocularis*, *T. bredoi*, *T. flaviscapus*, *T. sharkeyi*, *T. spatulatus* and *T. cryptus* spp. n. The second group include two species, *T. segetophilus* and *T. louwpenrithi* spp. n.. These two groups are clearly supported by several apomorphies described here above and could be considered as two distinct subgenera. The third group is composed by the remaining species of *Trotricus* but not clearly supported by some characters. Until the discovery of clear apomorphies for the last group, we prefer to postpone the erection of new subgenera.

Descriptions of new species

Trotricus BRULLÉ, 1846

Type-species : *Trotricus ovatus* BRULLÉ, 1846. BRULLÉ, 1846 : 509; SHENEFELT, 1970 : 424-425; VAN ACHTERBERG, 1988a : 53.

Key to the species of *Trotricus* BRULLÉ

The known species may be separated as follow :

- 1(0) Median carina of metanotum absent or not included in the median areola of metanotum (Figs 44, 49, 51) 2
- Median carina of metanotum present, at least partly included in the median areola of metanotum (Figs 45, 46, 47, 50) 7

- 2(1) Fore tarsal segments normal 3
- Fore tarsal segments shortened and swollen 5

- 3(2) Notauli smooth; rugae of propodeum small and present only posteriorly (Fig. 47); external carina of frons arriving far of the stemmaticum (Figs 2, 15); pedicellus totally enclosed by the scapus; occipital flange large and acute (Figs 1, 14) 4
- Notauli crenulate; rugae of propodeum present medially and enclosing a diamond shaped areola (Fig. 53); external carina of frons joining, or nearly so, the stemmaticum (Fig. 18); pedicellus partly enclosed by the scapus; occipital flange thin and not acute (Fig. 17).
..... *T. segetophilus* sp. n.

- 4(3) Medio-anterior carina of propodeum obsolescent (Fig. 49); hind femur and hind tibia short *T. ocularis* sp. n.
- Medio-anterior carina of propodeum present (Fig. 48); hind femur long; hind tibia long *T. bredoi* sp. n.

- 5(2) Scutellum flattened in lateral view; depression on middle lobe of mesoscutum absent; posterior elevation of scutellum as a transverse depression without carina (Fig. 44); rugae of propodeum absent (Fig.

- 44); dorso-lateral carina of first tergite absent basally *T. flavigrapus* sp. n.
- Scutellum convex in lateral view; depression on middle lobe of mesoscutum present; posterior elevation of scutellum, if present with large fovea and a medio-longitudinal carina; rugae of propodeum present; dorso-lateral carina of first tergite present basally 6
- 6(5) Prepectal carina not protruding ventrally; rugae of propodeum present medially and enclosing a triangular or diamond shaped areola (Fig. 43); hind tarsal segments normal; hind tarsus with a normal pilosity; hind femur short *T. tricortus* sp. n.
- Prepectal carina protruding ventrally; rugae of propodeum small and present only posteriorly (Fig. 51); hind tarsal segments flattened ventro-dorsally and enlarged (Figs 22, 23); hind tarsus with numerous long and dense setae (Fig. 23); hind femur long *T. sharkeyi* sp. n.
- 7(1) Scutellum flattened in lateral view 8
- Scutellum convex in lateral view 10
- 8(7) Notauli smooth; rugae of propodeum small and present only posteriorly; prepectal carina protruding ventrally; hind tarsal segments flattened ventro-dorsally and weakly enlarged; hind tarsus with numerous long and dense setae 9
- Notauli crenulate; rugae of propodeum present medially and enclosing a triangular areola (Fig. 46); prepectal carina not protruding ventrally; hind tarsal segments normal; hind tarsus with a normal pilosity *T. louwpenrithi* sp. n.
- 9(8) Fore tarsal segments normal; occipital flange large and angulate (Fig. 24) *T. spatulatus* sp. n.
- Fore tarsal segments shortened and swollen; occipital flange thin and not acute (Fig. 33) *T. cryptus* sp. n.
- 10(7) Depression on middle lobe of mesoscutum absent; fore tarsal segments shortened and swollen; pedicellus totally enclosed by the scapus *T. ovatus* BRULLÉ
- Depression on middle lobe of mesoscutum present; fore tarsal segments normal; pedicellus partly enclosed by the scapus 11
- 11(10) Posterior elevation of scutellum with large fovea and a medio-longitudinal carina (Fig. 45); medio-anterior carina of propodeum obsolescent *T. partitus* sp. n.
- Posterior elevation of scutellum present as a transverse rugae (Fig. 52); medio-anterior carina of propodeum present as large bump *T. dewittei* sp. n.

Description of species

Trotricus bredoi sp. n. (Figs 1-3, 48)

Material examined : holotype, ? [abdomen missing] (MRAC) : " Coll. Mus; Congo, Uele : Dingila vii.1933 (H.J.Brédo) " *Trotricus* det. M. Sharkey " .

Etymology : in honour of the collector.

Holotype, ?, body length (head + mesosoma) 7.5 mm, fore wing 15 mm.

Head (Figs 1, 2). Head weakly emarginated, in dorsal view; medio-anterior carina of frons arriving far to the external carina; external carina of frons present arriving far the stemmaticum; occipital flange large and acute; palpi slender; profil of head, posteriorly, not constricted submedially; scapus without constriction medially; pedicellus totally enclosed by the scapus; antennal segments 47, length of 3rd segment 2.5 to the 4th segment, length of 3rd, 4th, penultimate and apical segments 4, 1.4, 3 and 4 times their width, respectively; length of maxillary palp 0.8 times height of head; length of eye in dorsal view 1.8 times temple; POL : OD : OOL = 9 : 7 : 22; face punctate; frons and vertex smooth, frons depressed; malar suture absent; length of malar space 2.8 to basal width of mandible; temples smooth and sparsely punctate.

Mesosoma. Length of mesosoma 1.6 times its height; mesopleuron smooth; mesoscutum and scutellum finely and sparsely punctulate; middle lobe of mesoscutum truncate and clearly individualized; depression on middle lobe of mesoscutum present but weak; notaui present and smooth, meeting at the middle of mesoscutum; scutellum flattened in lateral view; posterior elevation of scutellum present, with large fovea and a medio-longitudinal carina; median carina of metanotum present posteriorly; medio-anterior carina of propodeum present; rugae of propodeum small and present only posteriorly (Fig. 48); metapleural flange present.

Wings. Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; r : 3-SR : SR1 = 4 : 8 : 50; SR1 straight; 2-SR : 2-M : r-m = 7 : 10 : 10; cu-a straight and intersitial; 1-SR present.

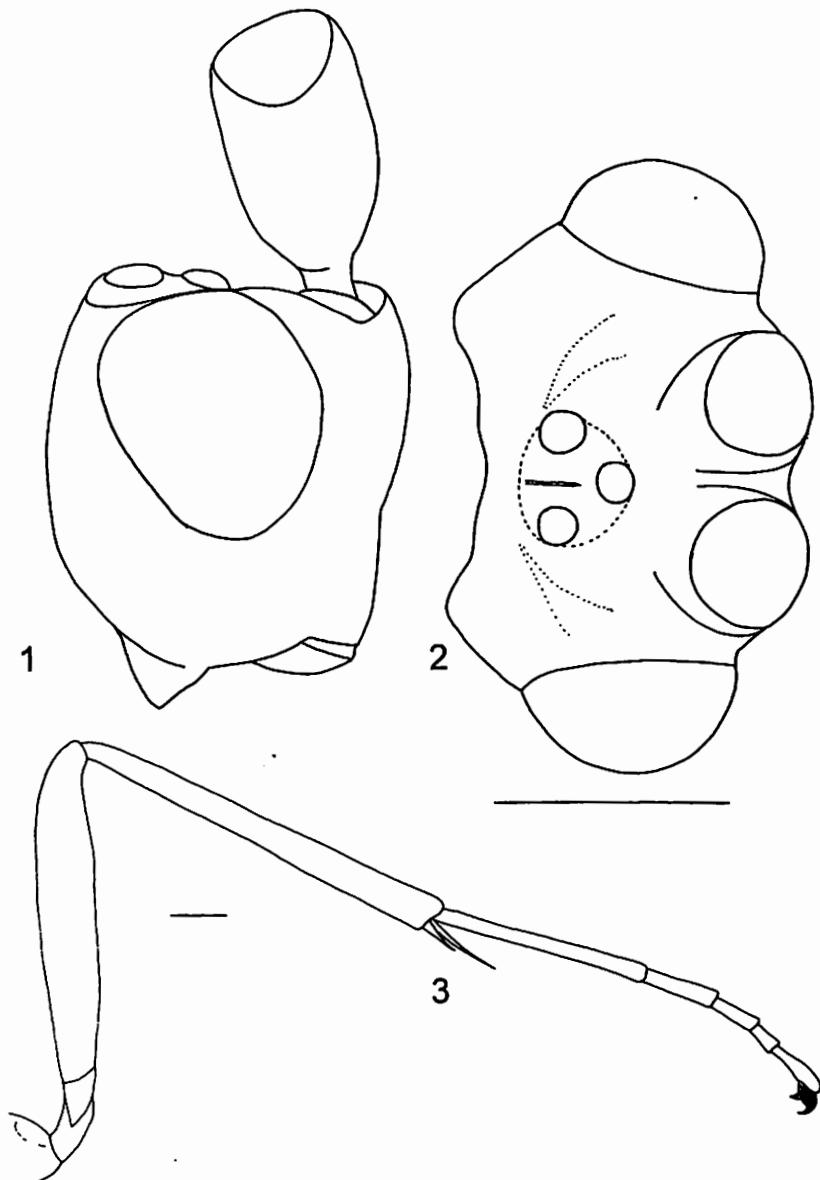
Metasoma. Missing.

Legs (Fig. 3). Length of femur, tibia and basitarsus of hind leg 5.8, 11.8 and 11 times their width, respectively; hind tibia with one spine apically; length of hind spurs 0.32 and 0.27 times hind basitarsus; fore tarsal segments normal; hind tarsal segments cylindrical with a normal pilosity.

Colour. Reddish-rufous. Head (excepted palpi), antenna, hind tarsus blackish; fore wing membrane dark-brown excepted for some small hyalines patches below the pterostigma; stigma dark-brown; hind wing dark-brown.

Distribution. D.R. of Congo.

Host. Unknown.



Figs 1-3. *Trotricus bredoi* sp. n., holotype. Head in lateral (1) and dorsal (2) views; hind leg in lateral view (3). Scale bar = 1 mm.

Trotricus cryptus sp. n. (Figs 33, 34, 47)

Material examined : holotype, ♀ (MRAC) : "Mus. Roy. Afr. Centr., Yagambi (Stan[leyville]), iv.1960 (J. Decelle)" "*Trotricus* det. M. Sharkey".

Paratype, ♀ (MRAC) : "Coll. Mus. Congo, Yangambi, 15.xii.1939 (P. Henrard)" "*Trotricus* det. M. Sharkey".

Etymology : because this species is very similar to *T. flaviscapus* sp. n.

Holotype, ♀, body length 13.2 mm, fore wing 15 mm.

Head (Figs 33, 34). Head weakly emarginated, in dorsal view; medio-anterior carina of frons arriving far to the external carina; external carina of frons arriving far of the stemmaticum; occipital flange thin and not acute; palpi slender; profil of head, posteriorly, not constricted submedially; pedicellus totally enclosed by the scapus; antennal segments 64, length of 3rd segment 1.3 to the 4th segment, length of 3rd, 4th, penultimate and apical segments 3, 2.3, 1 and 2 times their width, respectively; length of maxillary palp 0.3 times height of head; length of eye in dorsal view 2.5 times temple; POL : OD : OOL = 8 : 6 : 26 ; face punctate; frons and vertex depressed and smooth; malar suture absent; length of malar space 2.2 to basal width of mandible; temples smooth and sparsely punctate.

Mesosoma. Length of mesosoma 1.36 times its height; mesopleuron smooth but punctate below precoxal sulcus; mesoscutum and scutellum finely and sparsely punctulate; middle lobe of mesoscutum truncate and clearly individualized; depression on middle lobe of mesoscutum present; notaulari present and smooth meeting at the middle of mesoscutum; prepectal carina protruding ventrally; precoxal sulcus largely and coarsely foveolate; scutellum flattened in lateral view; posterior elevation of scutellum present, with large fovea and a medio-longitudinal carina; median carina of metanotum weakly present; medio-anterior carina of propodeum absent; rugae of propodeum small and present only posteriorly (Fig. 47); metapleural flange present.

Wings. Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; r : 3-SR : SR1 = 3 : 8 : 50; SR1 straight; 2-SR : 3-SR : r-m = 8 : 11 : 10; cu-a straight and intersitial; 1-SR present.

Metasoma. Length of first tergite 1.36 times its apical width; length of T2 1.8 length of T3; surface of tergites smooth; length of ovipositor sheath less than 0.01 times fore wing; dorsal carina of first tergites absent latero-basally.

Legs. Length of femur, tibia and basitarsus of hind leg 8, 12 and 10.5 times their width, respectively; hind tibia with 2 spines apically; length of hind spurs 0.38 and 0.3 times hind basitarsus; fore tarsal segments shortened and swollen; hind tarsal segments flattened ventro-dorsally and weakly enlarged; hind tarsus with numerous long and dense setae; hind telotarsus sub-rectangular.

Colour. Blackish. Head, palpi, scapus basally, propleuron, fore legs, the last 38 antennal segments yellowish; wing membrane dark-brown excepted for

some hyaline patches below the pterostigma; stigma dark-brown.

Male. Unknown.

Distribution. D.R. of Congo.

Host. Unknown.

Remarks. The paratype has the mesoscutum, the mesopleuron below precoxal sulcus and anteriorly reddish-rufous. Moreover, it lacks the presence of the median carina of metanotum, the notauli and the crenulae of precoxal sulcus are both less impressed. This species may be superficially confused with the *T. flaviscapus* sp. n. but it varies by the presence of notauli, the protruding middle lobe of mesoscutum and the blackish abdominal sternites.

***Trotricus dewittei* sp. n. (Figs 4-7, 38, 52)**

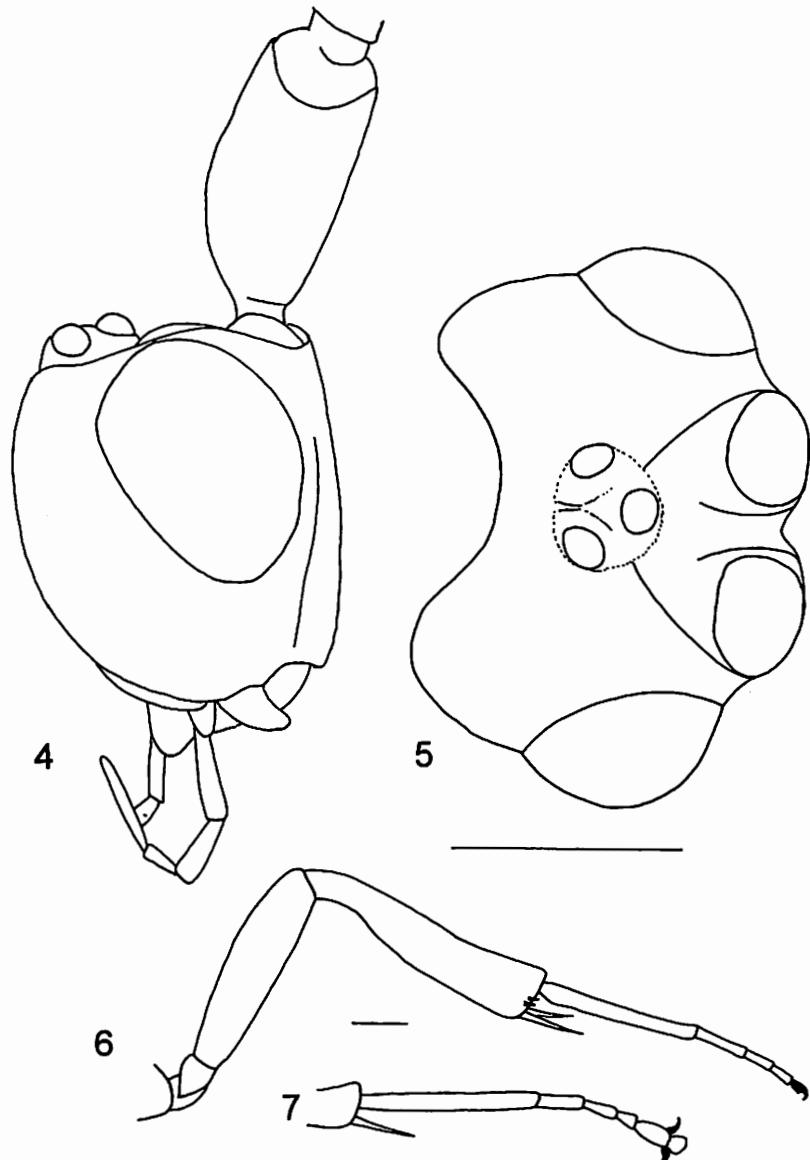
Material examined : holotype, ♂ (MRAC) : " Congo belge, P.[arc]N.[ational de la]G.[aramba], Kankunda, s'affl.r.dr.Lufira [on a tributary on the right bank of the Lufira river], 13-19.xi.1947 (1300m, Mis. G.F. de Witte, 972a)" " Coll. Mus. Tervuren " "*Trotricus* det. M. Sharkey".

Etymology : from the name of G.F. DE WITTE for his contribution to the knowledge of the entomological fauna in central Africa.

Holotype, ♂, body length 15 mm, fore wing 13.5 mm.

Head (Figs 4, 5). Head strongly emarginated, in dorsal view; medio-anterior carina of frons arriving far to the external carina; external carina of frons meeting, or nearly so, the stemmaticum; occipital flange thin and not acute; palpi slender; profil of head, posteriorly, not constricted submedially; scapus without constriction medially; pedicellus partly enclosed by the scapus; remaining antennal segments 51, length of 3rd segment 1.5 to the 4th segment, length of 3rd and 4th segments 1.8 and 2.8 times their width, respectively; length of maxillary palp 0.9 times height of head; length of eye in dorsal view 1.3 times temple; POL : OD : OOL = 8 : 6 : 16; face punctate; frons and vertex smooth, frons depressed between the external carina; malar suture absent; length of malar space 1.8 to basal width of mandible; temples smooth and sparsely punctate.

Mesosoma. Length of mesosoma 1.4 times its height; mesopleuron smooth; mesoscutum and scutellum finely and sparsely punctulate; middle lobe of mesoscutum truncate and clearly individualized; depression on middle lobe of mesoscutum present; notauli present and smooth, meeting at the 2/3 of mesoscutum; prepectal carina not protruding ventrally; scutellum convex in lateral view; posterior elevation of scutellum present as a transversal rugae (a medio longitudinal carina may be distinguished); median carina of metanotum present posteriorly; medio-anterior carina of propodeum present; rugae of propodeum present medially and enclosing a triangular areola (Fig. 52); metapleural flange present.



Figs 4-7. *Trotricus dewittei* sp. n., holotype. Head in lateral (4) and dorsal (5) views; hind leg in lateral view (6), detail of hind tarsus (7). Scale bar = 1 mm.

Wings (Fig. 38). Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; $r : 3\text{-}SR : SR1 = 4 : 8 : 42$; SR1 straight; $2\text{-}SR : 2\text{-}M : r\text{-}m = 8 : 11 : 9$; cu-a straight and intersitial;

1-SR present.

Metasoma. Length of first tergite 1.1 times its apical width; length of T2 equal to the length of T3; surface of tergites smooth; dorsal carina of first tergites present latero-basally.

Legs (Figs 6, 7). Length of femur, tibia and basitarsus of hind leg 3.6, 4.4 and 8.7 times their width, respectively; hind tibia with two spines apically; length of hind spurs 0.3 and 0.2 times hind basitarsus; fore tarsal segments not shortened; hind tarsal segments cylindrical with a normal pilosity (Fig. 7).

Colour. Rufous-reddish. Head (excepted temple ventrally, frons, face medially), antenna blackish; fore wing membrane dark-brown excepted for two large yellowish patches near the pterostigma and subbasally; pterostigma yellowish; hind wing dark-brown with a small yellow patch anteriorly (near the R1).

Female. Unknown.

Distribution. D.R. of Congo.

Host. Unknown.

Trotricus flavigiscapus sp. n. (Figs 8-10, 39, 40, 44)

Material examined : holotype, ♀ (MARC) : " Musée du Congo, Lulua : Kapanga, iii.1933 (F.G. Overlaet) " "*Trotricus* det. M. Sharkey".

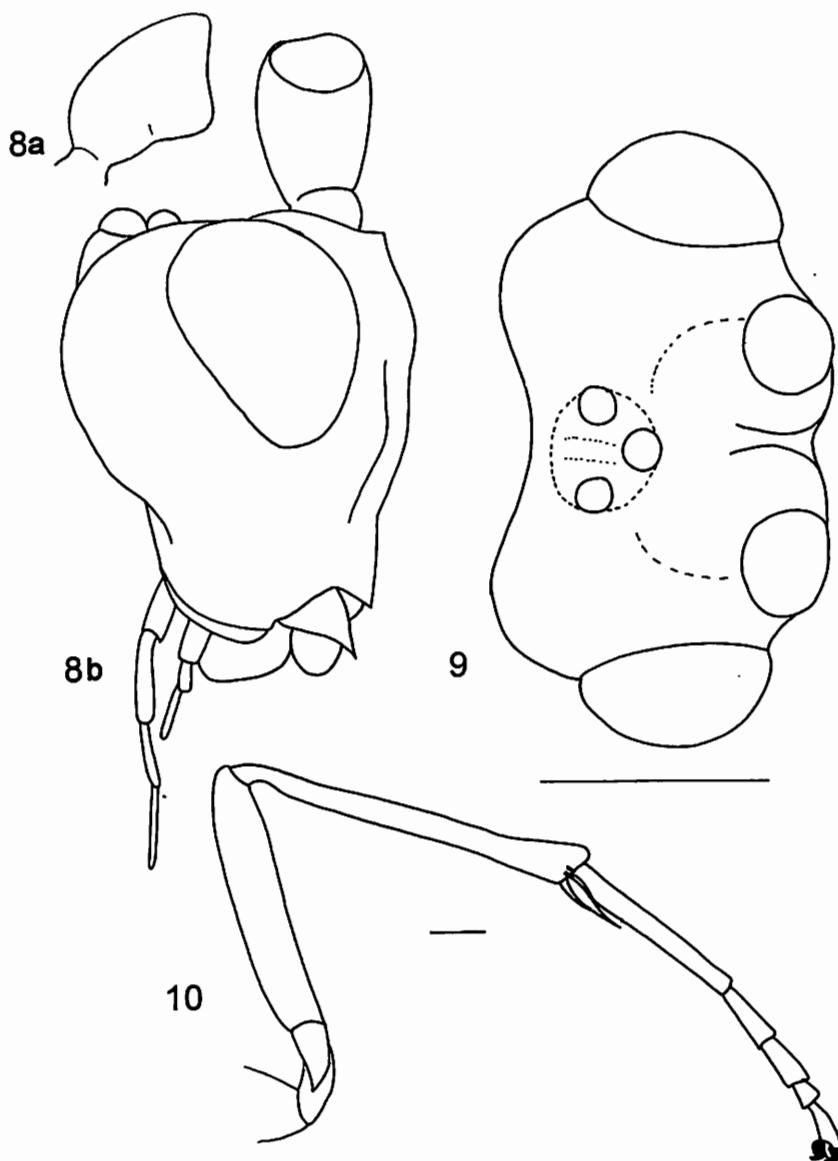
Paratypes, ♂ and ♀ (MRAC) : ♂, " Mioko, Fernando-Poo, 1700-2000m, 8.xii.[19]51 " " 8.xii.[19]51, DeKeyser, Lepesme et A. Villiers " " Coll. Mus. Tervuren " "*Trotricus* det. M. Sharkey"; ♀, " Coll. Mus. Congo, Kivu : Matalé, vii.1939 (Dr. Hautmann) " "*Macroagathis* sp., dét. De Saeger" "*Trotricus* det. M. Sharkey".

Etymology : from their yellow scapus.

Holotype, ♀, body length 15 mm, fore wing 15 mm.

Head (Figs 8a-b, 9). Head weakly emarginated, in dorsal view; medio-anterior carina of frons arriving far to the external carina; external carina of frons absent; occipital flange thin and not acute; palpi slender; profil of head, posteriorly, constricted submedially; scapus constricted medially (Fig. 8b) in lateral view; pedicellus totally enclosed by the scapus; remaining antennal segments 12, length of 3rd segment 1.1 to the 4th segment, length of 3rd and 4th segments 2.5 and 2 times their width, respectively; length of maxillary palp 0.8 times height of head; length of eye in dorsal view 2.4 times temple; POL : OD : OOL = 9 : 6 : 23; face punctulate; frons and vertex smooth, frons distinctly impressed between the stemmaticum and the antennal sockets; malar suture absent; length of malar space 2.1 to basal width of mandible; temples smooth and sparsely punctate.

Mesosoma. Length of mesosoma 1.43 times its height; mesopleuron smooth but punctate below precoxal sulcus; mesoscutum and scutellum smooth; middle lobe of mesoscutum weakly truncate, anteriorly, and in the same plane



Figs 8-10. *Trotricus flavigampus* sp. n., holotype. Head in lateral (8a) and dorsal (9) views; scapus in lateral view (8b); hind leg in lateral view (10). Scale bar = 1 mm.

than the other (all the mesoscutum weakly convex); depression on middle lobe of mesoscutum absent; notauli absent; prepectal carina not protruding ventrally; precoxal sulcus finely crenulate; scutellum flattened in lateral view; poste-

rior elevation of scutellum present as a transverse depression without carina; median carina of metanotum absent; medio-anterior carina of propodeum obsolescent; rugae of propodeum absent (Fig. 44); metapleural flange present.

Wings (Fig. 39). Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; $r : 3-SR : SR1 = 3 : 10 : 52$; SR1 straight; $2-SR : 2-M : r-m = 8 : 11 : 10$; cu-a straight and intersitial; 1-SR present.

Metasoma. Length of first tergite 1 times their apical width; surface of tergites smooth; length of ovipositor sheath less than 0.01 times fore wing; dorsal carina of first tergites absent latero-basally.

Legs. Length of femur, tibia and basitarsus of hind leg 5.2, 8.2 and 8 times their width, respectively; length of hind spurs 0.37 and 0.25 times hind basitarsus; fore tarsal segments shortened and swollen; hind tarsal segments cylindrical with a normal pilosity (Fig. 10).

Colour. Black. Head, scapus, pedicellus, pronotum, fore legs yellowish; metasomal sternites and some tergites rufous to yellowish; stigma, wings membranes dark-brown excepted for some small patches below the pterostigma; .

Male. Similar to the female but its metasoma is more dark than the female, the number of remaining antennal segments is 45.

Distribution. Equatorial Guinea, D.R. of Congo.

Host. Unknown.

Remarks. Although it has a rufous-reddish body and banded wings (Fig. 40), the paratype female is morphologically similar to the holotype. Thus we have considered it as a lighter form of the species. The constriction of scapus give it a similar shape to the scapus of some *Coccygidium* or *Dichelosus* species.

Trotricus louwpenrithi sp. n. (Figs 11-13, 41, 46)

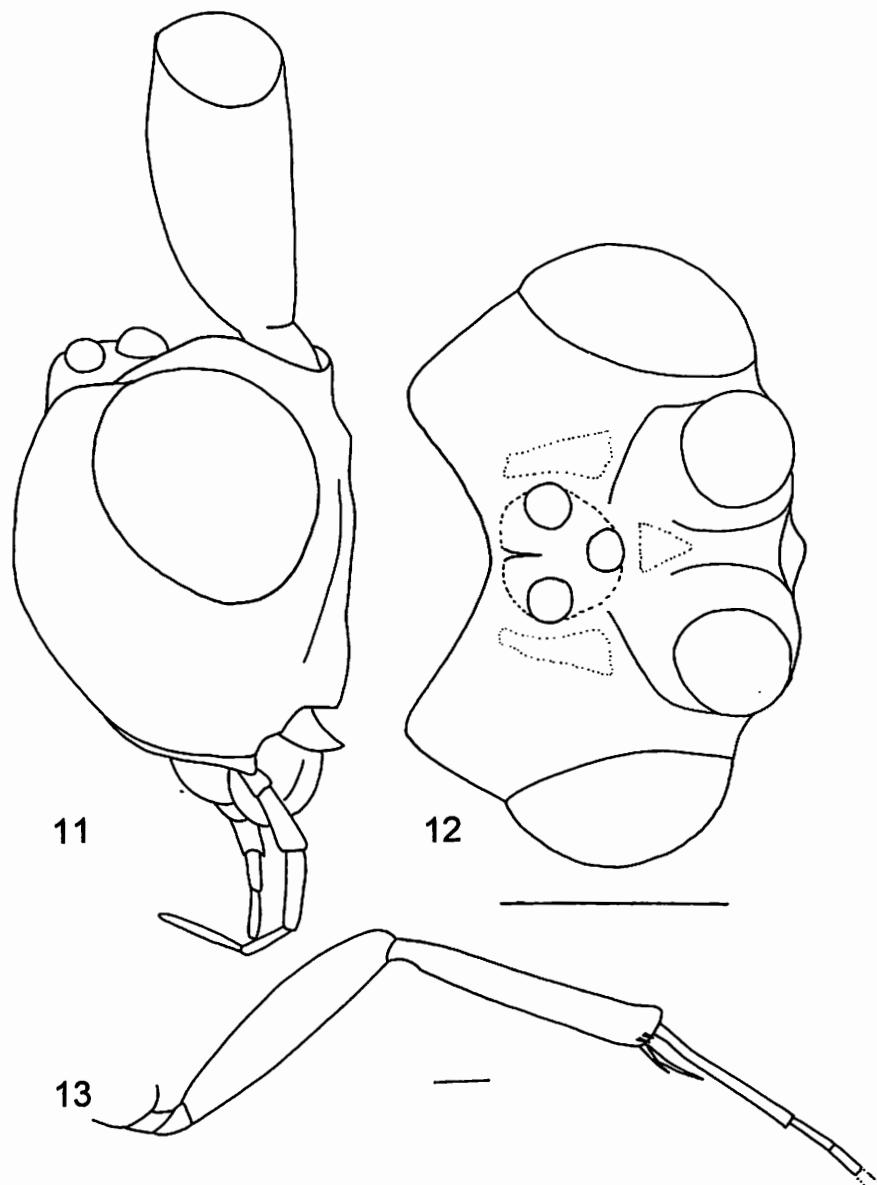
Material examined : holotype, ♀ (NMNW) : " [Namibia] Rundu, SE 1719 Dc, Okavango, xi.1969-i.1970 " " H 2633 ".

Paratype, ♀ (NMNW) : " [Namibia] Wildhein Ost 384, SE 2619 Bc, Keetmanshoop, 17-25.iv.1977 (S. Louw, M-L Penrith) " " H34454 ".

Etymology : from the names of the two collectors of the paratype.

Holotype, ♀, body length 14.4 mm, fore wing 15 mm.

Head (Figs 11, 12). Head strongly emarginated, in dorsal view; medio-anterior carina of frons meeting far to the external carina; external carina of frons meeting, or nearly so, the stemmaticum; occipital flange thin and not acute; palpi slender; profil of head, posteriorly, not constricted submedially; scapus without constriction medially; pedicellus partly enclosed by the scapus; remaining antennal segments (right antenna missing), length of 3rd segment 1.4 to the 4th segment, length of 3rd and 4th segments 2.7 and 1.8 times their width,



Figs 11-13. *Trotricus louwpenrithi* sp. n., holotype. Head in lateral (11) and dorsal (12) views; hind leg in lateral view (13). Scale bar = 1 mm.

respectively; length of maxillary palp 0.8 times height of head; length of eye in dorsal view 2.3 times temple; $POL : OD : OOL = 8 : 7 : 19$; face punctate;

frons and vertex smooth; malar suture absent; length of malar space 2.7 to basal width of mandible.

Mesosoma. Length of mesosoma 1.6 times its height; mesopleuron smooth but punctate below precoxal sulcus; mesoscutum and scutellum smooth; middle lobe of mesoscutum truncate and clearly individualized; depression on middle lobe of mesoscutum present; notauli present and crenulate; prepectal carina not protruding ventrally; scutellum flattened in lateral view; posterior elevation of scutellum present, with large fovea and a medio-longitudinal carina; median carina of metanotum present; medio-anterior carina of propodeum obsolescent; rugae of propodeum present medially and enclosing a triangular or diamond shaped areola (Fig. 46); metapleural flange present.

Wings (Fig. 41). Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; $r : 3\text{-SR} : \text{SR1} = 2 : 6 : 38$; SR1 straight; 2-SR : 2-M : r-m = 6 : 10 : 8; cu-a straight and intersital; 1-SR present.

Metasoma. Length of first tergite equal its apical width; surface of tergites smooth; length of ovipositor sheath less than 0.01 times fore wing; dorsal carina of first tergites present latero-basally.

Legs. Length of femur, tibia and basitarsus of hind leg 4.5, 7.1 and 9 times their width, respectively; hind tibia with 2 spines; length of hind spurs 0.4 and 0.25 times hind basitarsus; fore tarsal segments normal; hind tarsal segments normal (Fig. 13); hind tarsus with a normal pilosity.

Colour. Rufous-reddish. Vertex, temple largely, face laterally blackish; wing membrane dark-brown excepted for some yellow hyaline patches below the pterostigma; stigma yellowish; hind wing dark-brown with a small hyaline patch near the R₁ vein.

Male. Unknown.

Variations. The size of body of the second female is 10.5 mm and the wings of 11.4 mm.

Distribution. Namibia.

Host. unknown.

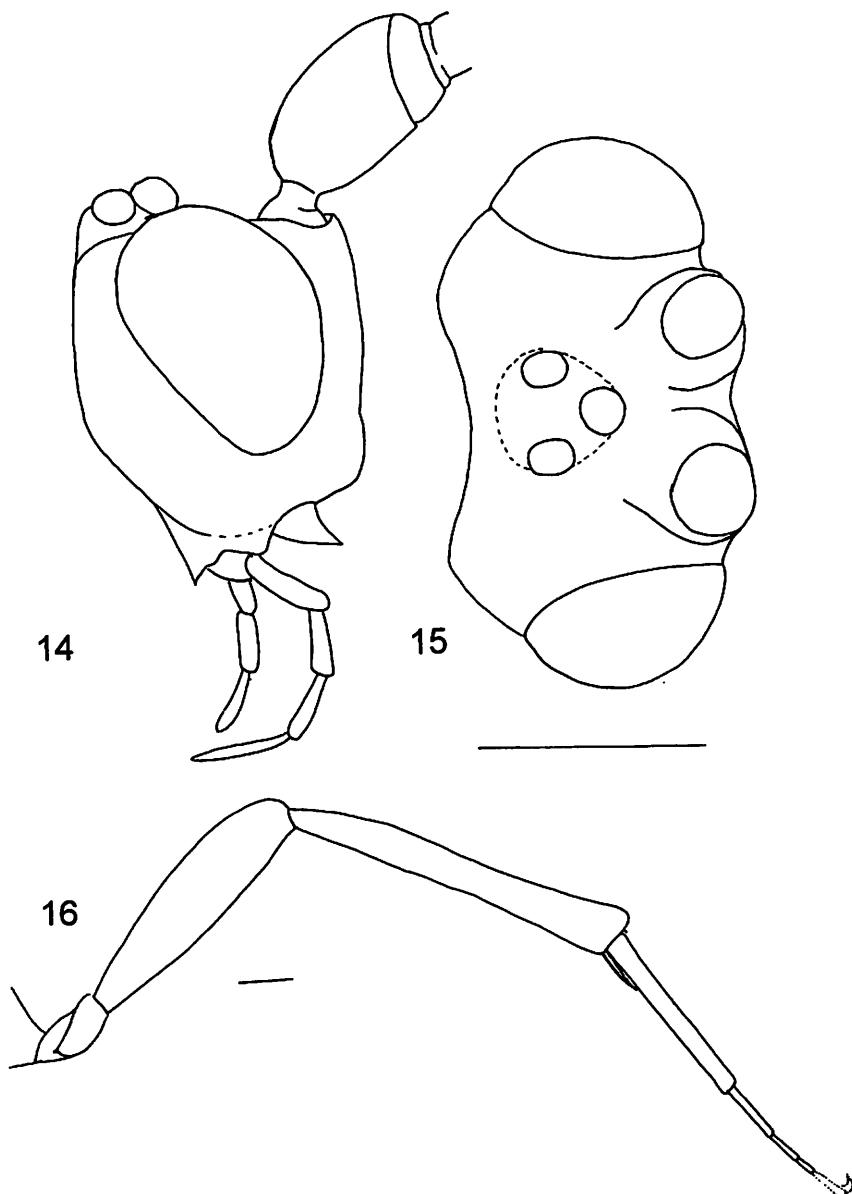
Trotricus ocularis sp. n. (Figs 14-16, 35, 49)

Material examined: holotype, ♂ (MRAC) : " Coll. Mus; Congo; Lubumbashi (Elisabethville); iv.1951 (Ch. Seydel leg.) " "*Trotricus* det. M. Sharkey".

Etymology: from the eye-like oval patch on fore wing.

Holotype, ♂, body length 12.9 mm, fore wing 12.3 mm.

Head (Figs 14, 15). Head weakly emarginated, in dorsal view; medio-anterior carina of frons arriving far to the external carina; external carina of frons arriving far of the stemmaticum; occipital flange large and acute; palpi slen-



Figs 14-16. *Trotricus ocularis* sp. n., holotype. Head in lateral (14) and dorsal (15) views; hind leg in lateral view (16). Scale bar = 1 mm.

der; profil of head, posteriorly, not constricted submedially; scapus without constriction medially; pedicellus totally enclosed by the scapus. Remaining

antennal segments 18 (left antenna broken), length of 3rd segment 1.5 to the 4th segment, length of 3rd and 4th segments 3 and 2 times their width, respectively; length of eye in dorsal view 2.5 times temple; POL : OD : OOL = 9 : 6 : 15; face punctulate; frons and vertex smooth; malar suture absent; length of malar space subequal to basal width of mandible; temples smooth and sparsely punctate.

Mesosoma. Length of mesosoma 1.3 times its height; mesopleuron smooth; mesoscutum and scutellum finely and sparsely punctulate; middle lobe of mesoscutum truncate; depression on middle lobe of mesoscutum present; notauli present and smooth; prepectal carina not protruding ventrally; scutellum flattened in lateral view; posterior elevation of scutellum present, with large fovea and a medio-longitudinal carina; median carina of metanotum absent; medio-anterior carina of propodeum obsolescent; rugae of propodeum small and present only posteriorly (Fig. 49); metapleural flange present (rather small).

Wings (Fig. 35). Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; r : 3-SR : SR1 = 2 : 4 : 31 ; SR1 straight; 2-SR : 2-M : r-m = 4 : 6 : 7; cu-a straight and intersitial; 1-SR short but present.

Metasoma. Length of first tergite 0.9 times its apical width, its dorsal carina present latero-basally; length of T2 equal to the length of T3; surface of tergites smooth.

Legs. Length of femur, tibia and basitarsus of hind leg 4.5, 7.5 and 6.4 times their width, respectively; hind tibia with 2 spines apically; length of hind spurs 0.3 and 0.2 times hind basitarsus (Fig. 16); hind tarsus with a normal pilosity.

Colour. Rufous-reddish. Antenna (and scapus) blackish; hind tibia, hind tarsi infuscate; fore wings membrane dark-brown excepted for some small hyaline patches below the pterostigma and a large ovale patch subapically which is hyaline; pterostigma dark-brown; hind wings dark-brown.

Female. Unknown.

Distribution. D.R. of Congo (Congo Belge).

Host. Unknown.

Trotricus partitus sp. n. (Figs 30, 32, 42, 45)

Material examined : holotype, ? [abdomen missing] (MRAC) : " Coll. Mus. Congo, Kapanga, 6.ix.1933 (F.G. Overlaet) " "*Trotricus* det. M. Sharkey".

Etymology : because only a part of the body exists.

Holotype, ?, body length (head + mesosoma) 5.4 mm, fore wing 11.4 mm.

Head (Fig. 30). Head weakly emarginated, in dorsal view; medio-anterior carina of frons meeting, or nearly so, the external carina; external carina of frons meeting, or nearly so, the stemmaticum; occipital flange thin and not

acute; palpi slender; profil of head, posteriorly, not constricted submedially; scapus without constriction medially; pedicellus partly enclosed by the scapus; remaining antennal segments 30, length of 3rd segment 2.5 to the 4th segment, length of 3rd and 4th segments 2.75 and 1.5 times their width, respectively; length of maxillary palp 2.5 times height of head; length of eye in dorsal view 2.3 times temple; POL : OD : OOL = 8 : 6 : 17; face punctate; frons and vertex smooth; malar suture absent; length of malar space 2 to basal width of mandible.

Mesosoma. Length of mesosoma 1.5 times its height; mesopleuron smooth; mesoscutum and scutellum smooth with sparse punctures; middle lobe of mesoscutum truncate and clearly individualized; depression on middle lobe of mesoscutum present; notauli present and smooth (at most only weakly crenulate anteriorly); prepectal carina not protruding ventrally; scutellum convex in lateral view; posterior elevation of scutellum present, with fovea and a medio-longitudinal carina; median carina of metanotum present; medio-anterior carina of propodeum obsolescent; rugae of propodeum present medially and enclosing a triangular or diamond shaped areola (Fig. 45); metapleural flange present but small.

Wings (Fig. 42). Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; r : 3-SR : SR1 = 3 : 5 : 31 ; SR1 straight; 2-SR : 2-M : r-m = 4 : 7 : 7 ; cu-a straight and intersitial; 1-SR present.

Metasoma. Missing.

Legs. Length of femur, tibia and basitarsus of hind leg 3.3, 6.1 and 7 times their width, respectively; hind tiba with 2 spines apically; length of hind spurs 0.4 and 0.2 times hind basitarsus; fore tarsal segments normal; hind tarsal segments not flattened (Fig. 32), with a normal pilosity.

Colour. Rufous-reddish. Vertex, temple largely, face laterally, scapus and remaining antennal segments blackish; wing membrane dark-brown excepted for a transversal patch below the parastigma and a large one in the basal cell which are yellowish; stigma yellowish; hind wing with a transversal yellow patch near the anterior margin.

Male. Unknown.

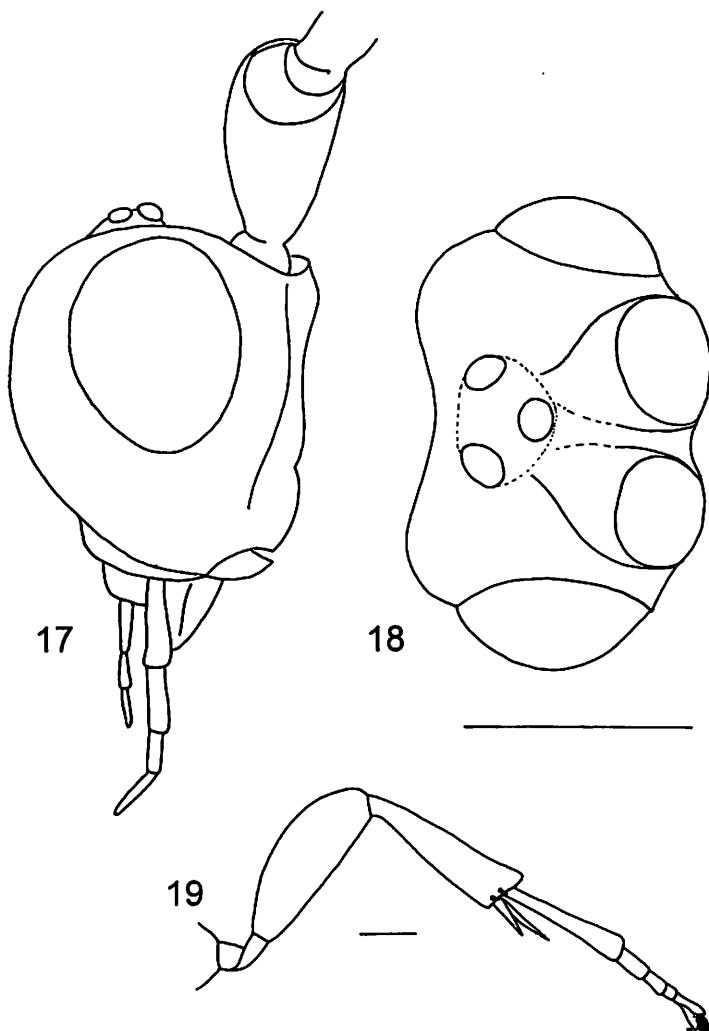
Distribution. D.R. of Congo.

Host. Unknown.

Trotricus segetophilus sp. n. (Figs 17-19, 53)

Material examined : holotype, ♀ (MRAC) : " Rutshuru, 17-20.vi.1934 (G.F. de Witte, Parc Nat. Albert) " " Coll. Mus. Tervuren " "*Trotricus* det. M. Sharkey".

Paratype, ♂ (MRAC) : " Parasite de *Euxoa segetum* L. " " Elisabethville, i.1951 (Ch. Seydel) " " Coll. Mus. Congo, Ch. Seydel, H.6550 " " Parasite de L 8248 " " H 6550 " "*Trotricus* det. M. Sharkey".



Figs 17-19. *Trotricus segetophylus* sp. n., holotype. Head in lateral (17) and dorsal (18) views; hind leg in lateral view (19). Scale bar = 1 mm.

Etymology : from the name of the host.

Holotype, ♀, body length 12.6 mm, fore wing 10.8 mm.

Head (Figs 17, 18). Head weakly emarginated, in dorsal view; medio-anterior carina of frons arriving far to the external carina; external carina of frons joining, or nearly so, the stemmaticum; occipital flange thin and not acute; palpi slender; profil of head, posteriorly, not constricted submedially; scapus

without median constriction; pedicellus partly enclosed by the scapus; remaining antennal segments 9, length of 3rd segment 1.9 to the 4th segment, length of 3rd and 4th segments 2.75 and 1.5 times their width, respectively; length of maxillary palp 0.8 times height of head; length of eye in dorsal view 2.1 times temple; POL : OD : OOL = 9 : 6 : 15; face, frons and vertex punctulate; malar suture absent; length of malar space 2.3 to basal width of mandible; temples smooth and sparsely punctate.

Mesosoma. Length of mesosoma 1.5 times its height; mesopleuron smooth; mesoscutum and scutellum finely and sparsely punctulate; middle lobe of mesoscutum truncate; depression on middle lobe of mesoscutum present; notauli present and crenulate, metting to the $\frac{2}{3}$ of mesoscutum; prepectal carina not protruding ventrally; scutellum flattened in lateral view; posterior elevation of scutellum present, with fovea and a medio-longitudinal carina; median carina of metanotum present posteriorly; medio-anterior carina of propodeum present; rugae of propodeum present medially and enclosing a triangular or diamond shaped areola (Fig. 53); metapleural flange present.

Wings. Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; r : 3-SR : SR1 = 2 : 4 : 33; SR1 straight; 2-SR : 2-M : r-m = 4 : 6 : 7; cu-a straight and intersitial; 1-SR present.

Metasoma. Length of first tergite 0.8 times their apical width; surface of tergites smooth; length of ovipositor sheath less than 0.01 times fore wing; dorsal carina of first tergites present latero-basally.

Legs (Fig. 19). Length of femur, tibia and basitarsus of hind leg 2.8, 3.75 and 5.3 times their width, respectively; hind tibia with 2 spines apically; length of hind spurs 0.4 and 0.3 times hind basitarsus; fore tarsal segments normal; hind tarsal segments cylindrical with a normal pilosity.

Colour. Rufous-reddish. Head (excepted temples ventrally, face medially), antenna blackish; fore wing membrane dark-brown excepted for some small hyalines patches below the pterostigma; stigma dark-brown; hind wing dark-brown with a small yellow patch anteriorly.

Male. 1.2 larger than the female, 49 antennal segments with the penultimate and ultimate antennal segments 2 and 2.5 times their width, respectively, last 6 flagellomeres yellowish.

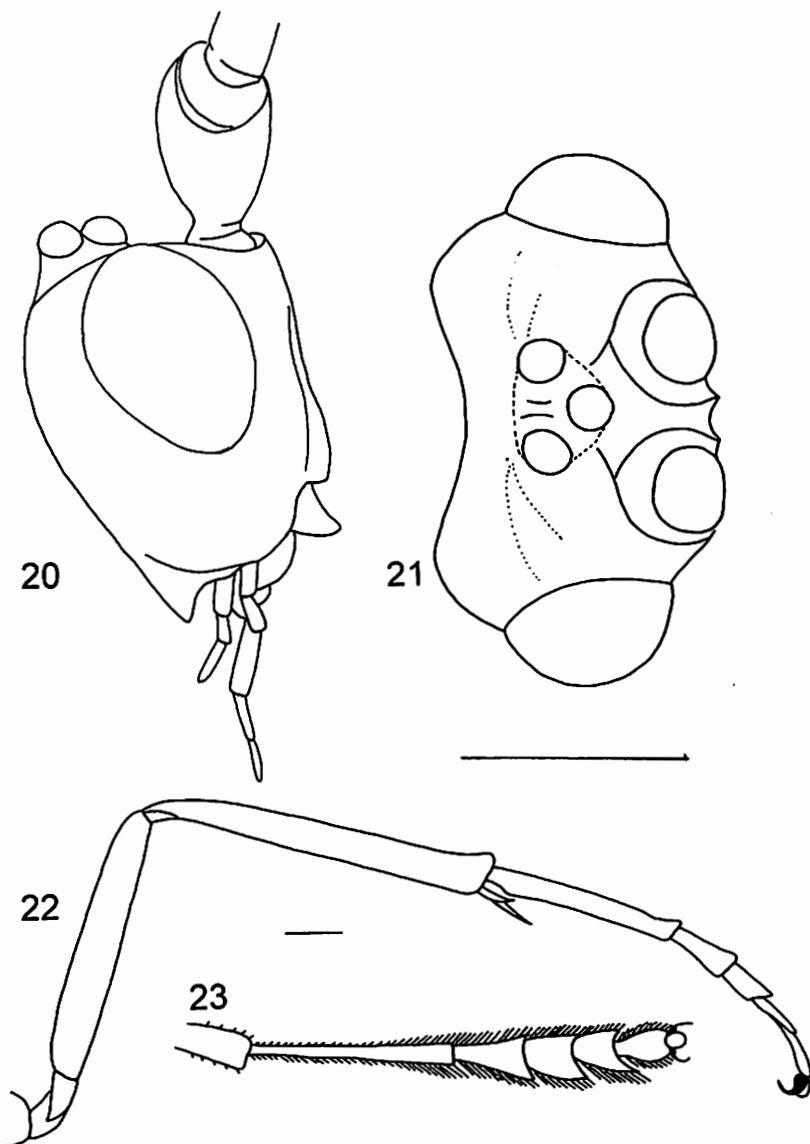
Distribution. D.R. of Congo.

Host. Reared from *?Agrotis segetum* (DENIS & SCHIFFERMÜLLER) (Lepidoptera : Noctuidae, Noctuinae).

Trotricus sharkeyi sp. n. (Figs 20-23, 37, 51)

Material examined : holotype, ♀ (MRAC) : "Musée du Congo, Eala, 23.iii.1936 (J. Ghesquière)" "*Trotricus* det. M. Sharkey".

Paratypes, 10♀♀ and 4♂♂ (MRAC) : ♂, "Musée du Congo, Eala, 23.iii.1936 (J. Ghes-



Figs 20-23. *Trotricus sharkeyi* sp. n., holotype. Head in lateral (20) and dorsal (21) views; hind leg in lateral view (22) and hind tarsi in dorsal view (23). Scale bar = 1 mm.

quière) " "*Trotricus* det. M. Sharkey"; ♂, "Musée du Congo, Uélé : Bambesa, 10.x.1933 (J. Leroy) " "*Trotricus* det. M. Sharkey"; ♀, "Musée du Congo, Uélé : Bambesa, 20.x.1933 (J. Leroy) " "*Trotricus* det. M. Sharkey"; 2♀ ♀, "Musée du Congo, Eala, 23.iii.1936 (J. Ghesquière) (2290) " "*Trotricus* det. M. Sharkey"; ♀, "Musée du Congo,

Eala, 1.iv.1936 (J. Ghesquière) (2290) " "*Trotricus* det. M. Sharkey"; 3♀♀ and ♂, "Musée du Congo, Eala, 23.iii.1936 (J. Ghesquière) (2290) " "*Trotricus* det. M. Sharkey"; ♀, "Musée du Congo, Bumba, xii.1939-i.1940 (H. De Saeger)" "*Trotricus* det. M. Sharkey"; ♀ and ♂, "Musée du Congo, Eala, iii.1936 (J. Ghesquière) (2290) " "*Trotricus* det. M. Sharkey".

Etymology: in honour of Dr. M. J. SHARKEY, for his work on the taxonomy of Braconidae and especially the Agathidinae.

Holotype, ♀, body length 13.5 mm, fore wing 15 mm.

Head (Figs 20, 21). Head weakly emarginated, in dorsal view; medio-anterior carina of frons meeting, or nearly so, the external carina; external carina of frons meeting, or nearly so, the stemmaticum; occipital flange large and acute; palpi slender; profil of head, posteriorly, not constricted submedially; scapus without median constriction; pedicellus partly enclosed by the scapus; antennal segments 62, length of 3rd segment 1.1 to the 4th segment, length of 3rd, 4th, penultimate and apical segments 2.2, 2, 1.5 and 3 times their width, respectively; length of maxillary palp 0.8 times height of head; length of eye in dorsal view 2.3 times temple; POL : OD : OOL = 8 : 7 : 16; face punctulate; frons and vertex smooth, vertex flat; malar suture absent; length of malar space 1.3 to basal width of mandible; temples smooth and sparsely punctate.

Mesosoma. Length of mesosoma 1.5 times its height; mesopleuron smooth; mesoscutum and scutellum smooth; middle lobe of mesoscutum truncate; depression on middle lobe of mesoscutum present (weak); notauli present and smooth; prepectal carina protruding ventrally; precoxal sulcus largely foveolate; scutellum convex in lateral view; posterior elevation of scutellum present, with large fovea and a medio-longitudinal carina; median carina of metanotum present (only posteriorly); medio-anterior carina of propodeum absent (Fig. 51); rugae of propodeum small and present only posteriorly; metapleural flange absent.

Wings (Fig. 37). Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus present and long; r : 3-SR : SR1 = 3 : 7 : 46; SR1 straight; 2-SR : 2-M : r-m = 8 : 9 : 11; cu-a straight and intersitial; 1-SR present.

Metasoma. Length of first tergite 0.75 times its apical width; length of T2 1.2 times length of T3; surface of tergites smooth; length of ovipositor sheath less than 0.01 times fore wing; dorsal carina of first tergite present latero-basally.

Legs. Length of femur, tibia and basitarsus of hind leg 6.6, 7.5 and 8.25 times their width, respectively; hind tibia with 3 spines apically; fore tarsal segments shortened and swollen; length of hind spurs 0.27 and 0.18 times hind basitarsus; outer margins of hind telotarsus convex in dorsal view; hind tarsal segments flattened ventro-dorsally and enlarged (Figs 22, 23); apex of hind basitarsus and the border of following tarsi with numerous long and dense setae.

Colour. Reddish and black. Head (excepted palpi which are yellowish), antenna, metasoma, hind tarsus (excepted apex of basitarsus and the second) blackish; propodeum anteriorly, $\frac{1}{2}$ apical of mid tibia weakly and hind leg dark-brown; apex of hind basitarsus, second hind tarsus and the setae in the corresponding area whitish; fore wing membrane dark-brown except for some small hyaline patches below the pterostigma; pterostigma dark-brown; hind wing dark-brown.

Male. Similar to the female.

Variations. 59-62 antennal segments.

Distribution. D.R. of Congo.

Host. Unknown.

***Trotricus spatulatus* sp. n. (Figs 24-27, 36, 50)**

Material examined : holotype, ♀ (MRAC) : "Musée du Congo, Eala, v.1935 (J. Ghesquière)" "Trotricus det. M. Sharkey".

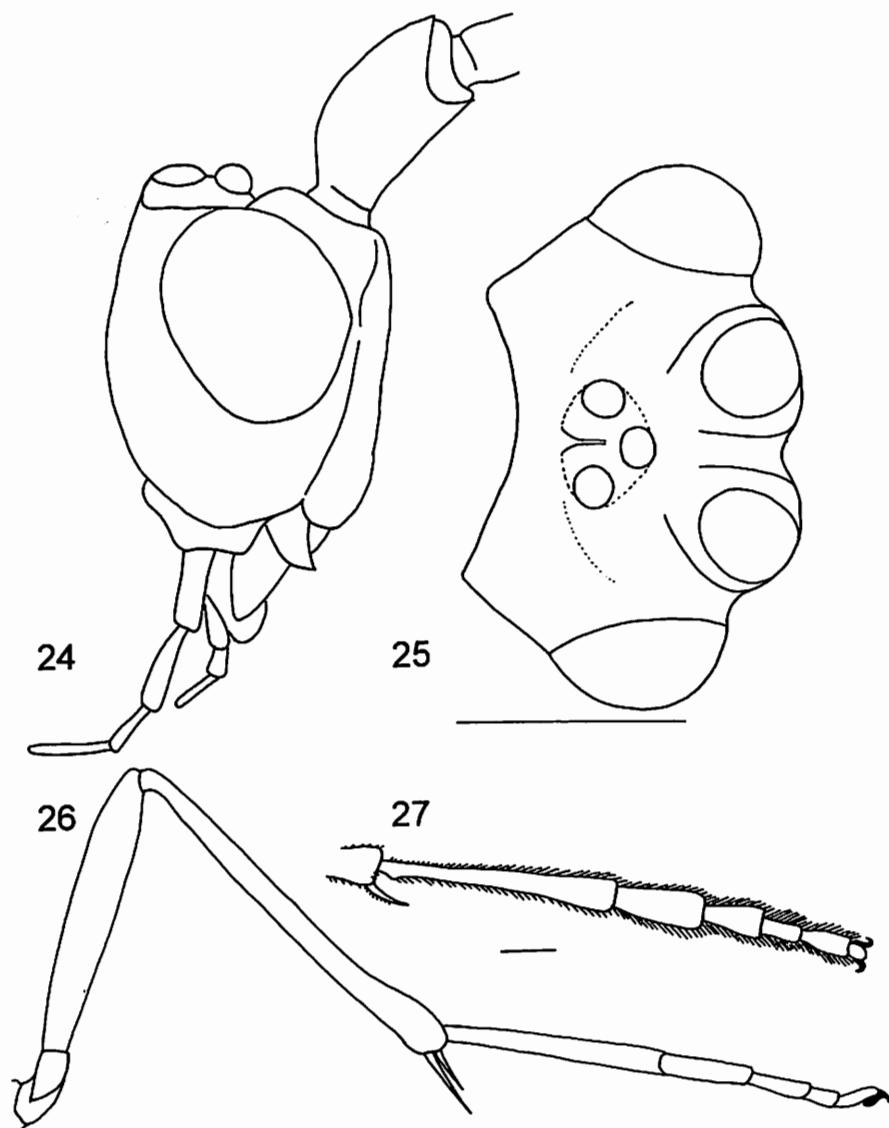
Paratypes, ♀ and 2♂♂ (MRAC) : ♀, "Musée du Congo, Likele s/ Somela, vi.1936 (J. Ghesquière)" "ex chenille vivant sur *Palisota*" "Trotricus det. M. Sharkey"; ♂, "Musée du Congo, Bambesa 15.ix.1933 (H.J. Brédo)" "Trotricus det. M. Sharkey"; ♂, "Musée du Congo, Uélé : Bambesa, 20.x.1933 (J. Leroy)" "Trotricus det. M. Sharkey".

Etymology : from the weakly spatulated hind tarsus.

Holotype, ♀, body length 15 mm, fore wing 15 mm.

Head (Figs 24, 25). Head weakly emarginated, in dorsal view; medio-anterior carina of frons arriving far to the external carina; external carina of frons arriving far of the stemmaticum; frons strongly depressed; occipital flange large and acute; palpi slender; profil of head, posteriorly, not constricted submedially; scapus without median constriction; pedicellus totally enclosed by the scapus; antennal segments 60, length of 3rd segment 1.1 to the 4th segment, length of 3rd, 4th, penultimate and apical segments 2.6, 2.3, 1.5 and 3.3 times their width, respectively; length of maxillary palp 0.7 times height of head; length of eye in dorsal view 2.1 times temple; POL : OD : OOL = 8 : 7 : 19 ; face, frons and vertex punctulate to punctate; malar suture absent; length of malar space 3.1 to basal width of mandible; temples smooth and sparsely punctate.

Mesosoma. Length of mesosoma 1.44 times its height; mesopleuron smooth; mesoscutum and scutellum finely and sparsely punctulate; middle lobe of mesoscutum truncate and differentiated from the other; depression on middle lobe of mesoscutum weakly present; notaui indistincts and smooth; prepectal carina protruding ventrally (crenula absent ventrally); scutellum flattened in lateral view; posterior elevation of scutellum present, with large fovea and a medio-longitudinal carina; median carina of metanotum present (posteriorly until the middle of areola); medio-anterior carina of propodeum obsolescent; rugae of propodeum small and present only posteriorly (Fig. 50); meta-pleural flange present.



Figs 24-27. *Trotricus spatulatus* sp. n., holotype. Head in lateral (24) and dorsal (25) views; hind leg in lateral view (26) and tarsi in dorsal view (27). Scale bar = 1 mm.

Wings (Fig. 36). Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; $r : 3\text{-}SR : SR1 = 5 : 8 : 51$; SR1 straight; $2\text{-}SR : 2\text{-}M : r\text{-}m = 7 : 9 : 9$; cu-a straight and intersitial; 1-SR present.

Metasoma. Length of first tergite equal to its apical width, its dorsal carina present latero-basally; surface of tergites smooth; length of ovipositor sheath less than 0.01 times fore wing.

Legs. Length of femur, tibia and basitarsus of hind leg 8.15, 10 and 9.6 times their width, respectively; hind tibia with 2 spines apically; length of hind spurs 0.3 and 0.2 times hind basitarsus; hind telotarsus rectangularly shaped in dorsal view; hind tarsi flattened ventro-dorsally and enlarged (Figs 26, 27), with numerous long and dense setae.

Colour. Reddish and black. Head (excepted palpi), antenna, propodeum, metapleuron, metasoma, mid and hind legs (excepted hind tarsus 4 and telotarsus) blackish; hind tarsus 4, hind telotarsus, setae on the last three tarsi whitish; fore wing membrane dark-brown excepted for some small hyaline patches below the pterostigma; pterostigma dark-brown; hind wing dark-brown.

Male. Similar to the female.

Variations. Number of antennal segments varies between 58-60, the depression on middle lobe of mesoscutum is absent for two specimens.

Distribution. D.R. of Congo.

Host. Unknown.

Trotricus tricortus sp. n. (Figs 28, 29, 31, 43)

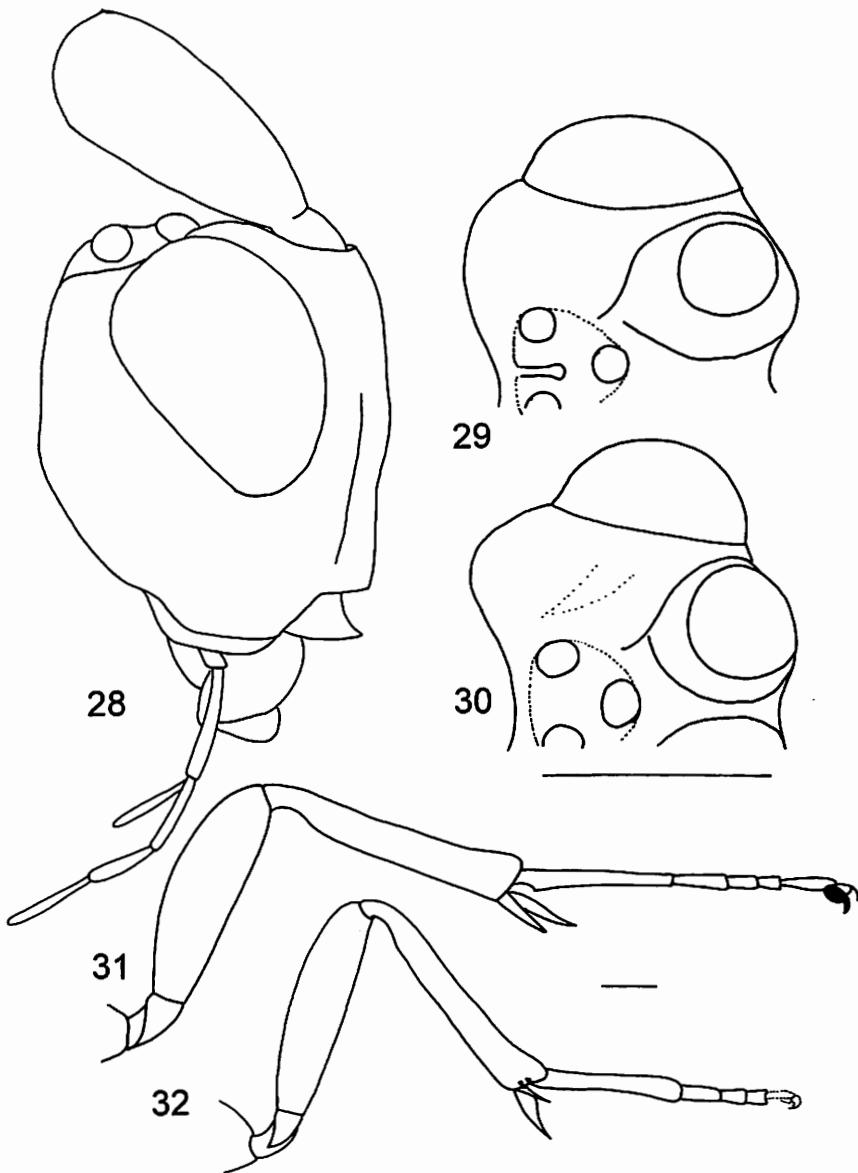
Material examined : holotype, ♀ (MRAC) : " Musée du Congo, Lusembo, 9.i.1950 " " Ichneumonide parasite de chenille indéterminée, Lusembo 9.i.1950 " " *Trotricus* det. M. Sharkey ".

Paratypes, ♀ and ♂ (MRAC) : ♂, " Congo belge, P.[arc] N.[ational de l'] U.[pemba], 17-31.xii.1948 (585 m, Mis. G.F. de Witte, 2126a)" " *Trotricus* det. M. Sharkey "; ♀, " Coll. Mus. Tervuren, Rég. Thysville (Bas-Congo), 1959-1963 (R. Michaux, don A. Allaer) " " *Trotricus* det. M. Sharkey ".

Etymology : anagram of the name *Trotricus*.

Holotype, ♀, body length 15 mm, fore wing 14.4 mm.

Head (Figs 28, 29). Head weakly emarginated, in dorsal view; medio-anterior carina of frons meeting, or nearly so, the external carina; external carina of frons meeting, or nearly so, the stemmaticum; occipital flange thin and not acute; palpi slender; profil of head, posteriorly, not constricted submedially; scapus without median constriction; pedicellus totally enclosed by the scapus; remaining antennal segments 45, length of 3rd segment 2 to the 4th segment, length of 3rd and 4th segments 2 and 1 times their width, respectively; length of maxillary palp 0.9 times height of head; length of eye in dorsal view 3.8 times temple; POL : OD : OOL = 8 : 6 : 16; face punctate; frons and vertex smooth; malar suture absent; length of malar space 1.8 to basal width of mandible; temples smooth and sparsely punctate.



Figs 28-32. *Trotricus tricortus* sp. n., holotype (28-29, 31); *Trotricus partitus* sp. n., holotype (30, 32). Head in lateral (28) and dorsal (29, 30) views; hind leg in lateral view (31, 32). Scale bar = 1 mm.

Mesosoma. Length of mesosoma 1.6 times its height; mesopleuron smooth; mesoscutum and scutellum finely and sparsely punctulate; middle lobe of mesoscutum weakly protruding and truncate; depression on middle lobe of me-

soscutum present; notauli present and smooth; prepectal carina not protruding ventrally; scutellum convex in lateral view; posterior elevation of scutellum present, with large fovea and a weak medio-longitudinal carina; median carina of metanotum absent; medio-anterior carina of propodeum obsolescent; rugae of propodeum present medially and enclosing a triangular shaped areola (Fig. 43); metapleural flange present.

Wings. Vein 3-M of fore wing curved to the posterior margin of wing; second submarginal cell quadrate, ramulus absent; $r : 3\text{-SR} : \text{SR1} = 3 : 8 : 45$; SR1 straight; 2-SR : 2-M : r-m = 8 : 9 : 10; cu-a straight and intersitital; 1-SR present.

Metasoma. Length of first tergite 0.9 times their apical width; surface of tergites smooth; length of ovipositor sheath less than 0.01 times fore wing; dorsal carina of first tergites present latero-basally.

Legs (Fig. 31). Length of femur, tibia and basitarsus of hind leg 3.6, 5.65 and 6.5 times their width, respectively; length of hind spurs 0.3 and 0.2 times hind basitarsus; fore tarsal segments shortened and swollen; hind tarsal segments cylindrical with a normal pilosity.

Colour. Rufous-reddish. Head (excepted face medially and temple ventrally), antenna blackish; hind tarsus infuscated apically; fore wing membrane dark-brown excepted for a medio-transversal patch which is yellowish; stigma yellowish; hind wing dark-brown.

Male. Similar to the female.

Distribution. D.R. of Congo.

Host. Reared from an unidentified cartepillar.

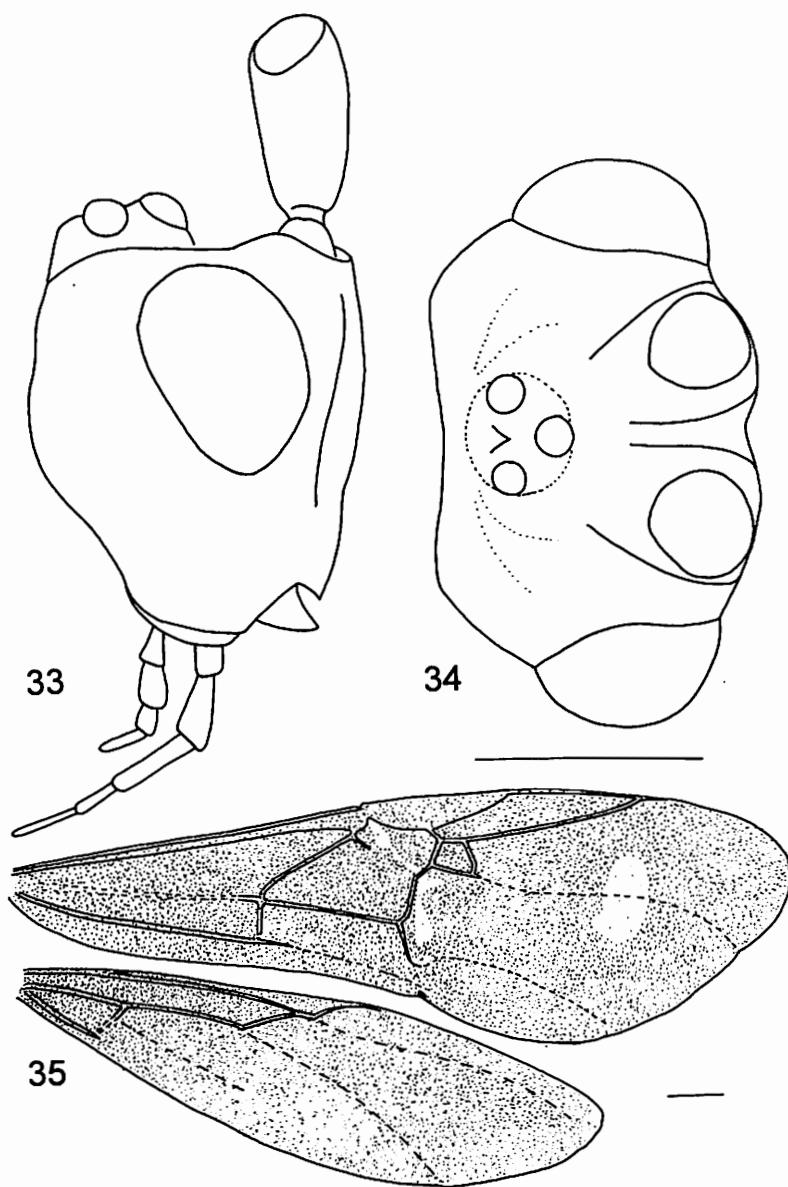
Addenda : new data

Among the examined material, few species may be identified without any doubts using the existing keys. The data given below must be considered only as a the first step before a revision of the corresponding genera or subfamilies. The identifications were realized using the keys of QUICKE (1989) for *Archibracon* species, of DONALDSON (1989) for *Physaraia* species, of DE SAEGER (1948) for *Cardiochiles*, *Steblocera* and *Chelonus* (as *Neochelonella*) species, of GRANGER (1949), FISCHER (1982) and MARSH (1993) for *Pseudorhoptroncentrus* or *Rhoptroncentroides* species, of PAPP (1965) for the *Aridelus* species, of ZETTEL (1990) for *Pachychelonus* species and of VAN ACHTERBERG (1991) and QUICKE & CHISHTI (1997) for *Yelicones* species, respectively. New records are indicated by a dash.

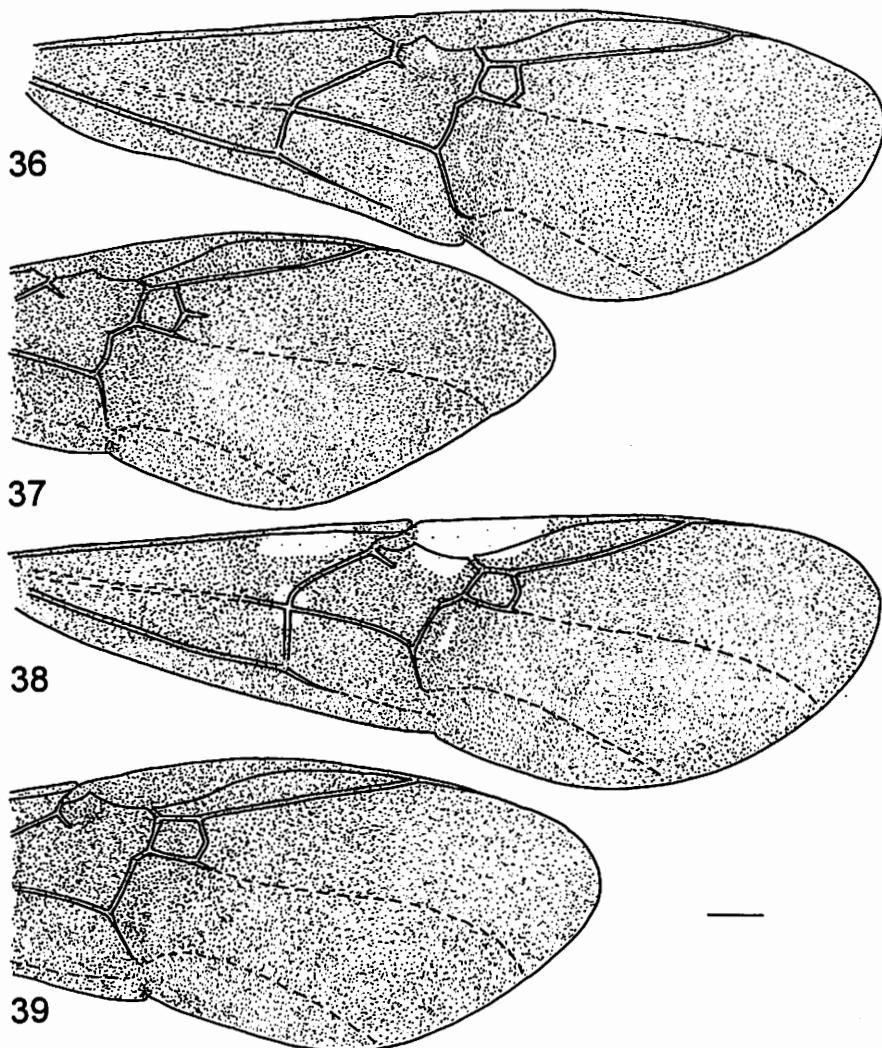
Braconinae

Archibracon ?curticornis QUICKE, 1989 : Centrafrican Republic (ZMA) : ♀, Bangui, 28.ii.1994 (G.G.M. Schulten).

Known from Centrafrican Republic* and D.R. of Congo (Luhua).



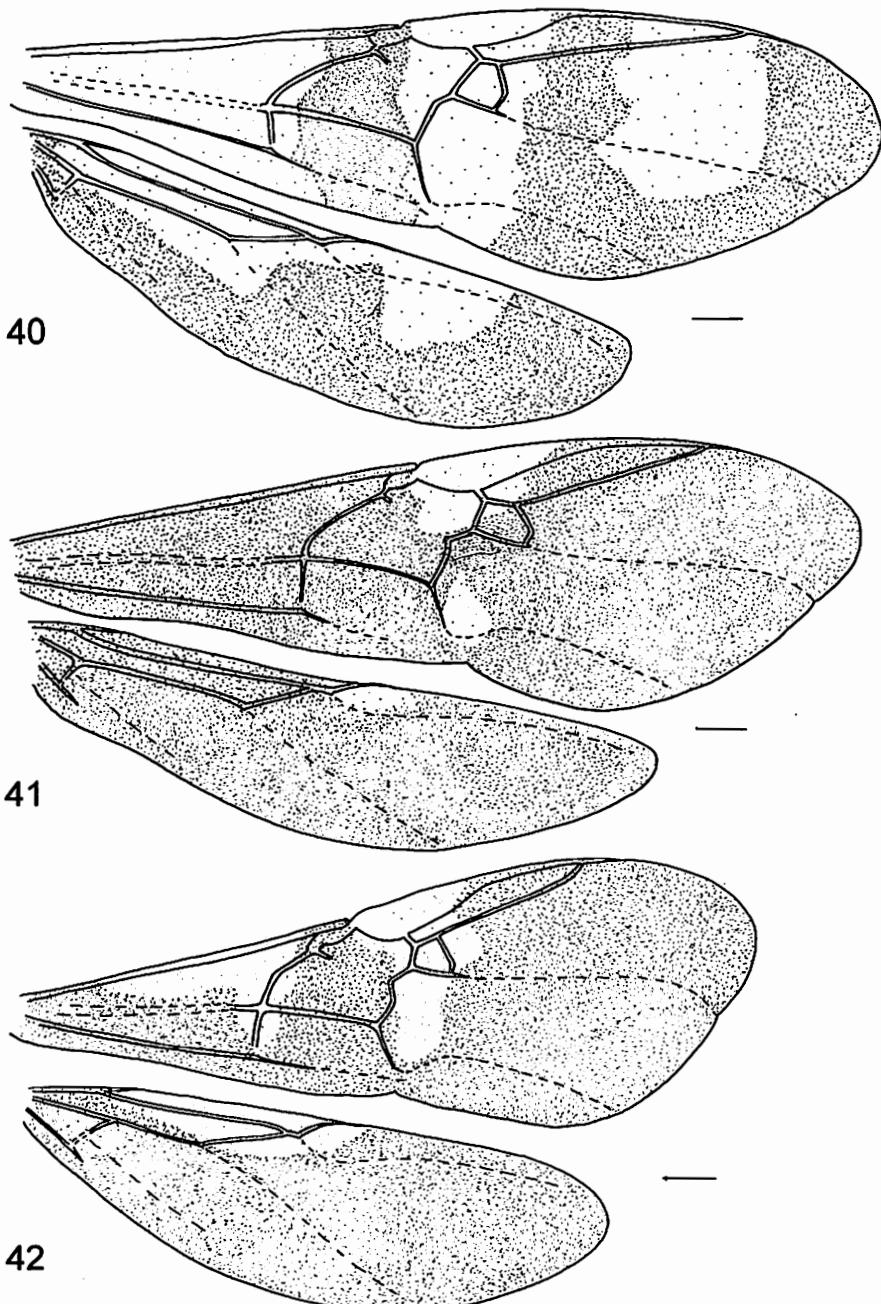
Figs 33-35. *Trotricus cryptus* sp. n., holotype (33-34); *Trotricus ocularis* sp. n., holotype (35). Head in lateral (33) and dorsal (34) views; wings (35). Scale bar = 1 mm.



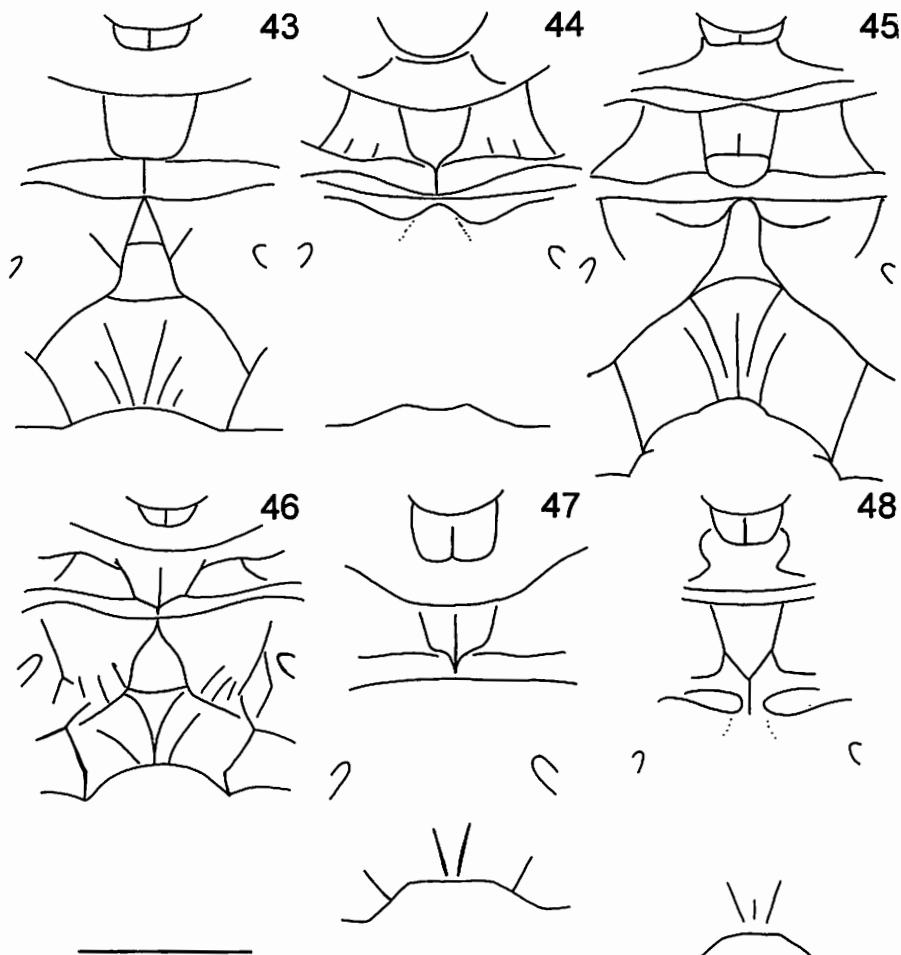
Figs 36-39. *Trotricus spatulatus* sp. n., holotype (36); *Trotricus sharkeyi* sp. n., holotype (37); *Trotricus dewittei* sp. n., holotype (38); *Trotricus flaviscapus* sp. n., holotype (39). Wings. Scale bar = 1 mm.

Archibracon delimiter (SZÉPLIGETI, 1905) : Gabon (FUSAGx) : ♂, W. N. Foulebeng, 19.i.1987 (A. Pauly rec.).
Known from Gabon* and D.R. of Congo (Lulua).

Archibracon luteoflagellaris QUICKE, 1989 : Togo (ZMA) : ♀, Region des Plateaux, Mt Agou, 5.ii.1995 (800-900 m, G.G.M. Schulten).
Known from D.R. of Congo (Bambesa) and Togo*.



Figs 40-42. *Trotricus flavigampus* sp. n., holotype (40); *Trotricus louwpenriethi* sp. n. (41); *Trotricus partitus* sp. n., holotype (42). Wings. Scale bar = 1 mm.

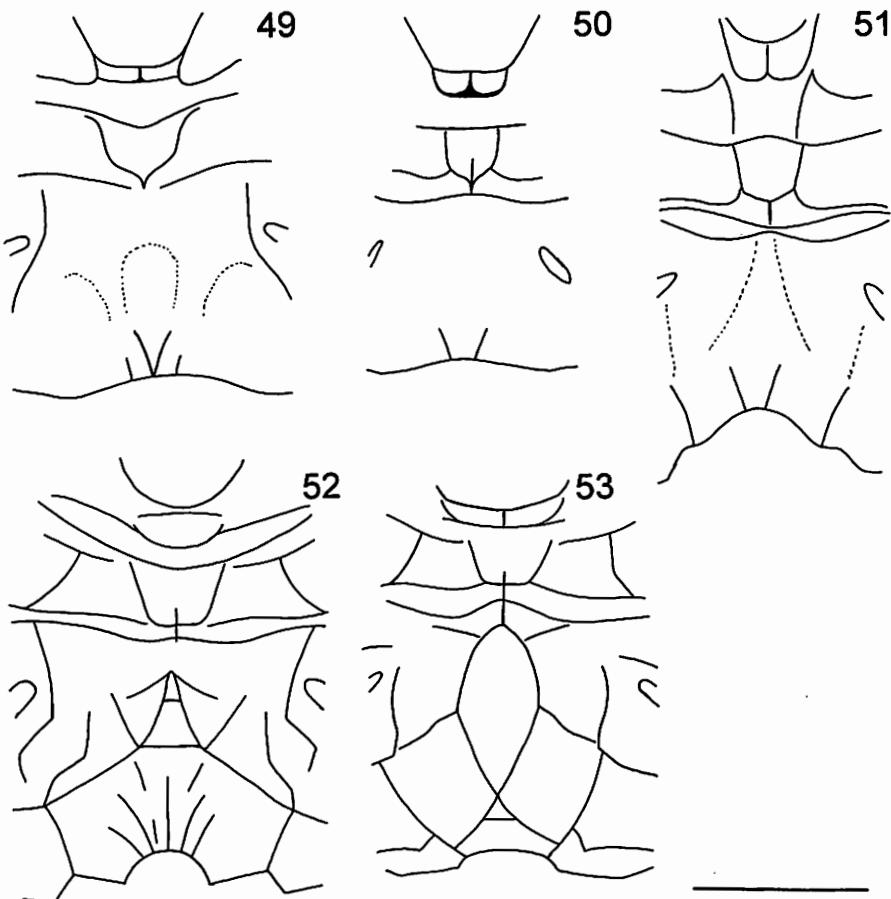


Figs 43-45. *Trotricus tricortus* sp. n., holotype (43); *Trotricus flaviscapus* sp. n., holotype (44); *Trotricus partitus* sp. n., holotype (45). Posterior part of mesosoma. Scale bar = 1 mm.
 Figs 46-48. *Trotricus louwpenrithi* sp. n., holotype (46); *Trotricus cryptus* sp. n., holotype (47); *Trotricus bredoi* sp. n., holotype (48). Posterior part of mesosoma. Scale bar = 1 mm.

Physaraia nigricephala DONALDSON, 1989 : South Africa (ZMA) : Natal : ♀, Hluhluwe Game Reserve, 27-28.ii.1967 (D. Gillissen & L. Blommen); ♀, Pietermaritzburg, 5-6.ii.1967 (L.H.M. Blommers).
 Known from Malawi, D.R. of Congo and South Africa.

Cardiochilinae

Cardiochiles angustifrons BRUES, 1924 : Namibia (NMNW) : ♀, Grootfon-



Figs 49-50. *Trotricus ocularis* sp. n., holotype (49); *Trotricus spatulatus* sp. n., holotype (50); *Trotricus sharkeyi* sp. n., holotype (51). Posterior part of mesosoma. Scale bar = 1 mm.

Figs 52-53. *Trotricus dewittei* sp. n., holotype (52); *Trotricus segetophylus* sp. n., holotype (53). Posterior part of mesosoma. Scale bar = 1 mm.

tein Distr., Dakota 424, SE 1917 Ac., 13-23.xii.1993 (M. Pusch, Malaise trap).

Known from Namibia*, South Africa (Natal) and Madagascar.

C. tegularis BRUES, 1924 : Namibia (NMNW) : ♂, Buffalo Base, West Caprivi Park, 18°08'S-21°41'E, 3-5.iv.1990 (E. Marais leg.); 3♂♂ & 4♀♀, Waterberg Plateau Park, Onjoka SE 2017 Ad., iv.1992 (S.V. Green, Malaise trap).

In comparison with the original description, some variations have been ob-

served : stigma dark brown totally to only apically; wings may be infuscate apically or totally (extreme base excepted); tegula yellowish totally or only apically, T6-T7 sometimes with faint dark patches. Known from Kenya, Namibia* and Natal.

C. testaceus KRIECHBAUMER, 1894 : Namibia (NMNW) : ♀, Buffalo Base, West Caprivi Park, 18°08'S-21°41'E, 3-6.iv.1990 (E. Marais leg.); 2♂♂ & ♀, Waterberg Plateau Park, Onjoka SE 2017 Ad., iv.1992 (S.V. Green, Malaise trap); ♀, Hartmann's Valley, Kaokoland at : 17°23'S-12°15'E, 24.iv.1995 (E. Marais leg.).

Known from Cameroun, Guinea, Kenya, Madagascar, Namibia*, D.R. of Congo, Somalia and Tunisia.

Cheloninae

Chelonus (Microchelonus) curvifaculatus CAMERON, 1906 : Namibia (NMNW) : 2♂♂ & ♀, Dassifontein 87, Keetmanshoop Distr., SE 2718 Ba, 26.iii.1988 (E. Marais); ♂, 10 Km NW Rosh Pinah, Lüderite Distr., 27°54'S-16°42'E, 13.viii.1990 (C. Roberts, E. Marais). Botswana (NMNW) : ♂, Third Bridge, 19°14'S-23°21'E, 10.iii.1993 (E. Marais).

Known from Botswana*, Congo, Madagascar, Mauritius, Namibia*, Somalia, S. Africa, Zimbabwe, Sudan, Tanzania and Uganda.

Pachychelonus flavifasciatus ZETTEL, 1990 : D.R. of Congo (MRAC) : ♀, P.[arc] N.[ational de la] G.[aramba], PFSK 22/8, 10.iv.1952 (Miss. H. De Saeger, H. De Saeger, 3608); ♂, P.[arc] N.[ational de la] G.[aramba], II/tc/6, 11.x.1951 (Miss. H. De Saeger, H. De Saeger, 2576).

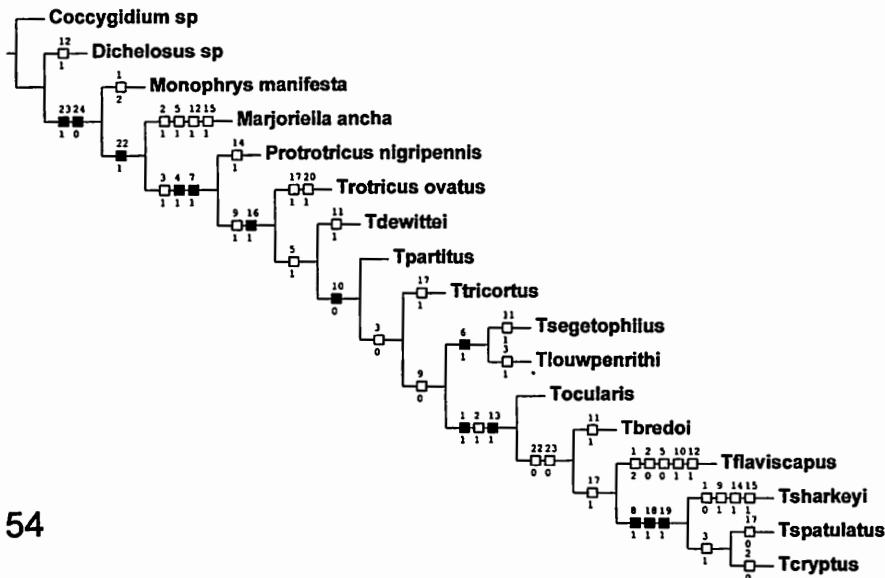
From the work of ZETTEL (1990), this is the second report of the species in Africa. Known from Nigeria, D.R. of Congo*. These two specimens fit well with the original description except, for the male specimen, the presence of two lateral white spots on second tergite. The length of ovipositor sheath (not indicated in the original description) is equal to the length of 1-SR+M vein of fore wing.

Doryctinae

Pseudorhopstrocentrus brunneus GRANGER, 1949 : Réunion Island (MHNP) : ♀, Saint-Philippe, Forêt du Brûlé de Mare longue, 13.ii.1955 (Institut Scientifique Madagascar); Sierra Leone (AEIC) : ♀, Freetown, v.1970 (K33, D.F. Owen); Nigeria (AEIC) : ♀, Umuahia, CRIN, EC state, 10.iv.1975 (J.T. Medler coll.).

Known from Madagascar, Mauritius Island, Nigeria*, Réunion Island* and Sierra Leone*.

Specimens from Sierra Leone and Nigeria are darker than the type-specimen. With the examination of the type specimen of *P. brunneus* and specimens of *Rhopstrocentroides* MARSH, 1993, we confirm here the synonymy,



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Fig. 54. Tree (length = 53; ci = 47; ri = 65) resulting from the analysis of the full matrix.

proposed by BELOKOBYL'SKII (1995), between the two genera. *Pseudorhoptroncrus brunneus* and *P. annulipes* (FISCHER, 1982) have an Afrotropical distribution and are originally described from the Madagascar area. The third species is Neotropical (Brazil). Among these three species, *P. brunneus* and *P. platyfemur* are very close and may be conspecifics. Only careful examination of more specimens should be necessary to delimit the range of variations of sculptures in the two species and to confirm their specific status.

The three known species could be separated as follows :

1. Propodeum without carina; vein SR of hind wing present basally (Afrotropical) *P. annulipes* (CAMERON, 1908)
- Propodeum with carina and an apical areola; vein SR of hind wing fully absent 2
2. Scape longer ventrally than dorsally (antenna directed anteriorly); margin of eyes coarsely crenulate (Afrotropical) *P. brunneus* GRANGER, 1949
- Scape with nearly the same length ventrally and dorsally (antenna directed anteriorly); margin of eyes weakly crenulate (Neotropical) *P. platyfemur* (MARSH, 1993)

Euphorinae

Aridelus cameroni (SZÉPLIGETI, 1914) : Cameroon (FUSAGX) : ♀, Ada-

maoua, 20 km W Tibiati, 6°30'N-12°26'E, 24.vii.1987 (A. Pauly rec.).
Known from Cameroon*, Tanzania and Uganda.

Steblocera serrata GRANGER, 1949 : Gabon (FUSAGx) : ♀, H. OG., Bakoumba, 30.i.1986 (A. Pauly rec.).

Known from Gabon* and Madagascar. This specimen fit well with the original description, but has only the mesonotum and the dorsal tergites 1-3 dark-brown. The remainder of the body is yellowish.

Rogadinae

Yelicones vojnitsi PAPP, 1992 : Namibia (NMNW) : 2♂♂, Okosongomingo 148, Otjiwarongo SE 2017 Ca, 14-18.xi.1972; 2♂♂, Kaokoland, Otjinungwa SE 1712 Ab, 19-22.viii.1973; ♂, Ovwambo, Oskikango, 17°23'S-15°53'E, 22.v.1974 (H19879); ♀, Klein Dobe, Bushmanland, 19°26'S-20°30'E, 19-21.ii.1992 (E. Marais & M. Pusch, light trap); ♀, Epukiro River, 1 km NE Gemsboklaagte, SWA : Hereroland East, 21°23'S-20°27'E, 24.xi.1988 (E. Marais); ♂, Owambo, Okamwaela, 17°25'S-16°03'E, 20.i.1993; ♂, idem but : '21.i.1993'.

Known from Tanzania, Oman, Egypt, Niger, Senegal, Kenya, Namibia, South Africa.

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Bibliography

- ACHTERBERG C. VAN, 1988a. - Three new genera of the subfamily Agathidinae (Hymenoptera : Braconidae). *Zoologische Mededelingen Leiden* 62 : 43-58.
ACHTERBERG C. VAN, 1988b. - Revision of the subfamily Blacinae Foerster (Hymenoptera : Braconidae). *Zoologische Verhandelingen Leiden* 249 : 1-324.
ACHTERBERG C. VAN, 1990. - Illustrated key to the subfamilies of the Holarctic Braconidae (Hymenoptera, Ichneumonoidea). *Zoologische Mededelingen Leiden* 64 : 1-20.
ACHTERBERG C. VAN, 1991. - Revision of the genera of the Afrotropical and W. Palaearctic Rogadinae Foerster (Hymenoptera, Ichneumonoidea). *Zoologische Verhandelingen Leiden* 273 : 1-102.
ACHTERBERG C. VAN, 1993. - Illustrated key to the subfamilies of the Braconidae (Hymenoptera, Ichneumonoidea). *Zoologische Verhandelingen Leiden* 283 : 1-189.
ACHTERBERG C. VAN, 1994. - New morphological terms. *Ichnews* 14 : 5.

- BELOKOBYL'SKII S.A., 1995. - Main evolutionary transformations of the morphological structures in the subfamilies Doryctinae and Exothecinae (Hymenoptera, Braconidae). *Entomologicheskoe Obozrenie* 74 : 153-176 (In Russian).
- BRULLÉ A., 1846. - Hyménoptères. In : A.L.M. Lepeletier de St. Fargeau, *Histoire Naturelle des insectes* 4 : 1-689.
- DE SAEGER , 1948. - Exploration du Parc national Albert, Mission G.F. de Witte 53 : 1-360.
- DONALDSON J.S., 1989. - Revision of the Braconid genus *Physaraia* Shenefelt (Hymenoptera : Ichneumonoidea). *Systematic Entomology* 14 : 15-39.
- DONDALE C.D., 1954. - Biology of *Agathis laticinctus* (Cresson) (Hymenoptera : Braconidae) a parasite of the eye-spotted bud moth, in Nova Scotia. *Canadian Entomologist*, 86 : 40-44.
- FARRIS J.S., 1988. - Hennig86 reference : documentation for version 1.5. Port Jefferson Station, New York.
- FISCHER M., 1982. - Untersuchungen an Typenmaterial van *Doryctinae* aus dem Britischen Museum in London (Hymenoptera, Braconidae). *Polskie Pismo Entomologiczne* 52 : 231-273.
- GRANGER C., 1949. - Braconides de Madagascar. *Mémoires de l'Institut scientifique de Madagascar (A)*, 2 : 1-428.
- MARSH P.M., 1993. - Descriptions of new Western Hemisphere genera of the subfamily Doryctinae (Hymenoptera : Braconidae). *Contributions of the American Entomological Institute* 28(1) : 1-58.
- NICKELS C.B., PIERCE W.C. & PINKNEY C.C., 1950. - Parasites of the pecan nut case-bearer in Texas. *Technical Bulletin of the Texas Department of Agriculture*, N° 1011, 21 pp.
- ODEBIYI J.A. & OATMAN E.R., 1972. - Biology of *Agathis gibbosa* (Hymenoptera : Braconidae), a primary parasite of the potato tuberworm. *Annals of the Entomological Society of America*, 65 : 1104-1114.
- ODEBIYI J.A. & OATMAN E.R., 1977. - Biology of *Agathis unicolor* (Schrottky) and *Agathis gibbosa* (Say) (Hymenoptera : Braconidae), primary parasites of the potato tuberworm. *Hilgardia*, 45 : 123-151.
- PAPP J., 1965. - A monograph of the genus *Aridelus* Marsh (Hymenoptera, Braconidae : Euphorinae). *Acta Zoologica Hungarici* 11 : 181-201.
- PAPP J., 1992. - New Braconids wasps (Hymenoptera : Braconidae) in the Hungarian Natural History Museum, 3. *Annales Historico-Naturales Musei Nationalis Hungarici* 84 : 129-160.
- QUICKE D.L.J., 1989. - Parasitic braconine wasps of the genus *Archibracon* (Hymenoptera : Braconidae). *Journal of Natural History* 23 : 29-70.
- QUICKE D.L.J. & CHISHTI M.J.K., 1997. - A revision of the *Yelicones* species (Hymenoptera : Braconidae : Rogadinae) from Africa and the Arabian Peninsula, with descriptions of four new species. *African Entomology* 5 : 77-91.
- SHARKEY M.J., 1992. - Cladistic and tribal classification of the Agathidinae (Hymenoptera : Braconidae). *Journal of Natural History* 26 : 425-447.
- ZETTEL V.H., 1990. - Eine Revision der Gattungen der Cheloninae (Hymenoptera, Braconidae) mit Beschreibungen neuer Gattungen und Arten. *Ann. Naturhist. Mus. Wien* 91(B) : 147-196.