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DE
ZOOLOGIE

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DE
ZOOLOGIE

ANNALES

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SOCIÉTÉ SUISSE DE ZOOLOGIE
ET DU
MUSÉUM D'HISTOIRE NATURELLE
DE LA VILLE DE GENÈVE



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TABLE DES MATIÈRES

TOME 106 – 1999

	Pages
Fascicule 1	
ROWELL, C. Hugh F. New and little known species of <i>Cloephoracris</i> (Orthoptera: Caelifera: Romaleidae) from Central America	3-20
BOURGAT, Robert, Salah BOUAMER & Sim-Dozou KULO. Nouvelles données sur les Trématodes d'Oiseaux d'Afrique Occidentale et description de <i>Brachylecithum</i> (<i>B.</i>) <i>togoensis</i> n. sp.	21-44
BESUCHET, Claude. Psélaphides paléarctiques. Notes taxonomiques et faunistiques (Coleoptera Staphylinidae Pselaphinae).	45-67
MAURIÈS, Jean-Paul & Jean-Jacques GEOFFROY. Les Diplopodes édaphiques et souterrains de l'Ile Maurice (Myriapoda, Diplopoda).	69-79
SALGADO COSTAS, José María. <i>Quaestus</i> (<i>Speogeus</i>) <i>littoralis</i> n. sp. (Coleoptera: Cholevidae, Leptodirinae). Considérations biogéographiques et évolutives sur la faune troglobie de la Sierra du Sueve (Asturies, Espagne).	81-90
ZAWADZKI, Cláudio Henrique, Erasmo RENESTO & Luís Maurício BINI. Genetic and morphometric analysis of three species of the genus <i>Hypostomus</i> Lacépède, 1803 (Osteichthyes: Loricariidae) from the Rio Iguacu basin (Brazil).	91-105
PACE, Roberto. Aleocharinae della Cina: Parte V (conclusionone) (Coleoptera, Staphylinidae).	107-164
DE CHAMBRIER, Alain & Claude VAUCHER. Proteocephalidae et Monticelliidae (Eucestoda: Proteocephalidea) parasites de poissons d'eau douce au Paraguay, avec descriptions d'un genre nouveau et de dix espèces nouvelles.	165-240
HLAVÁČ, Peter, Ján KODADA & Alexander KOVAL. A new cavernicolous species of <i>Seracamaurops</i> Winkler, 1925 (Coleoptera: Staphylinidae: Pselaphinae) from Caucasus.	241-247
LOURENÇO, Wilson R. & Dietmar HUBER. Additions to the scorpion faunas of Trinidad and Tobago.	249-267
Fascicule 2	
BOCAKOVA, Milada. Several new <i>Melaneros</i> from Sri Lanka and southern India (Coleoptera, Lycidae).	269-276
TOMASZEWSKA, K. Wioletta. A new genus and species of Epipocinae (Coleoptera: Endomychidae) from Pakistan.	277-284
STEBNICKA, Zdzisława Teresa. Neotropical Eupariini: New and little known genera and species (Coleoptera: Scarabaeoidea: Aphodiinae).	285-300
LOURENÇO, Wilson R. & Lionel MONOD. A new species of <i>Ananteris</i> Thorell from French Guyana (Scorpiones, Buthidae).	301-306
ROWELL, C. Hugh F. New species of <i>Lagarolampis</i> Descamps (Orthoptera, Caelifera, Acridoidea, Romaleidae, Bactrophorinae) from Central America.	307-324

	Pages
SARTORI, Michel & Jean-Marc ELOUARD. Biodiversité aquatique de Madagascar 30: le genre <i>Cheirogenesia</i> Demoulin, 1952 (Ephemeroptera, Palingeniidae).	325-337
ALMIRON, Adriana E. & Jorge R. CASCIOTTA. <i>Hyphessobrycon wajat</i> n. sp. from La Plata basin in Argentina (Characiformes: Characidae).	339-346
KOTTELAT, Maurice & Franck BRÉHIER. <i>Troglocyclocheilus khammuonanensis</i> , a new genus and species of cave fish from the Khammouan karst, Laos (Teleostei: Cyprinidae).	347-359
FRISCH, Johannes. A revision of the <i>Scopaeus debilis</i> species group, with description of a new species from Madagascar (Coleoptera, Staphylinidae, Paederinae).	361-383
BERNASCONI, Reno. <i>Paladillia bessoni</i> n. sp. (Gastropoda Prosobranchia Hydrobiidae) des eaux souterraines karstiques de la Haute Soule (Pyénées Atlantiques, France).	385-392
LOMBARDO, Francesco. Remarks on the genus <i>Metriomantis</i> Saussure & Zehntner and descriptions of two new species and a new genus: <i>Rehniella</i> gen. n. (Insecta Mantodea).	393-405
DURETTE-DESSET, Marie-Claude & Claude VAUCHER. <i>Molostromyglus mbopi</i> sp. n. (Nematoda, Trichostrongylina, Molineoidea), parasite de <i>Molossops</i> spp. (Chiroptera, Molossidae) au Paraguay.	407-418
SCHAWALLER, Wolfgang. Notes on Palearctic and Oriental Phrenapatini (Coleoptera: Tenebrionidae), with descriptions of four new species.	419-428
BALKENOHL, Michael. Revision of the genus <i>Trilophus</i> Andrewes from the Oriental region (Coleoptera, Carabidae).	429-537

Fascicule 3

FRISCH, Johannes. A revision of the <i>Scopaeus sulcicollis</i> species group, with description of a new species from North-East Anatolia (Coleoptera, Staphylinidae, Paederinae).	539-553
ADIS, Joachim, Ulf SCHELLER, José Wellington de MORAIS & José Maria G. RODRIGUES. Abundance, species composition and phenology of Pauropoda (Myriapoda) from a secondary upland forest in Central Amazonia.	555-570
MANCONI, Renata & Ruth DESQUEYROUX-FAÜNDEZ. Freshwater sponges (Porifera, Spongillidae) from the Lake of Geneva, Switzerland.	571-580
HANZELOVÁ, Vladimira, Tomáš SCHOLZ, Daniel GERDEAUX & Alain de CHAMBRIER. Endoparasitic helminths of fishes in three Alpine lakes in France and Switzerland.	581-590
LOURENÇO, Wilson R. Un nouveau genre et une nouvelle espèce de scorpion d'Égypte, appartenant à la famille des Buthidae Simon.	591-598
GARETTO, Roberta & Pier Mauro GIACHINO. Nuovi Anillina (Coleoptera, Carabidae: Bembidiini) del Kenya.	599-610
VAUCHER, Claude & Marie-Claude DURETTE-DESSET. <i>Histiostrongylus spineus</i> n. sp. (Nematoda: Trichostrongylina), parasite de <i>Phyllostomus discolor</i> (Chiroptera: Phyllostomidae) et nouvelles données sur les genres <i>Histiostrongylus</i> Molin, 1861 et <i>Parahistiostrongylus</i> Perez Viguera, 1941.	611-620
RUŽIČKA, Jan. A new apterous and microphthalmic species of <i>Anemadus</i> (Coleoptera: Leioididae: Cholevinae) from China.	621-626

	Pages
BENTOS-PEREIRA, Alba & C. Hugh F. ROWELL. The genus <i>Proscopia</i> Klug, 1820 (Orthoptera, Caelifera, Eumastacoidea, Proscopiidae) in Central America, with description of a new species.	627-641
HOESS, René & Adolf SCHOLL. <i>Glomeris undulata</i> Koch and <i>G. conspersa</i> Koch are conspecific. - Enzyme electrophoretic evidence and taxonomical consequences (Diplopoda: Glomeridae).	643-661
PACE, Roberto. Aleocharinae di Hong Kong (Coleoptera, Staphylinidae).	663-689
LÖBL, Ivan. A review of the Scaphidiinae (Coleoptera: Staphylinidae) of the People's Republic of China, I.	691-744

Fascicule 4

ZOOLOGIA ET BOTANICA '99, Zurich, 17-19 February 1999 (Joint meeting of the Swiss Society of Zoology and the Swiss Society of Botany).	745-787
BESUCHET, Claude. Psélaphides paléarctiques nouveaux ou méconnus (Coleoptera: Staphylinidae: Pselaphinae).	789-811
LEISTIKOW, Andreas. <i>Androdeloscia</i> gen. n., a new genus of South American terrestrial isopods with description of 13 new species (Crustacea: Oniscidea: "Philosciidae").	813-904
LIENHARD, Charles & N. Philip ASHMOLE. <i>Sphaeropsocopsis myrtleae</i> sp. n., a blind subterranean psocid from St Helena (Psocoptera: Sphaeropsocidae).	905-912
ANGELINI, Fernando. New species of <i>Agathidium</i> Panzer from China (Coleoptera, Leiodidae, Agathidiini).	913-927
LOURENÇO, Wilson R. Considérations taxonomiques sur le genre <i>Hadogenes</i> Kraepelin, 1894: création des Hadogeninae subfam. n. et description d'une espèce nouvelle de l'Angola (Scorpiones, Scorpionidae, Hadogeninae).	929-938
CASSOLA, Fabio. Studies on tiger beetles. XCVIII. A new <i>Cylindera</i> from Chubut, Argentina (Coleoptera: Cicindelidae).	939-943
SCHWENDINGER, Peter J. & Jochen MARTENS. A taxonomic revision of the family Oncopodidae II. The genus <i>Gnomulus</i> Thorell (Opiliones, Laniatores).	945-982
ZICSI, András & Csaba CSUZDI. Weitere Angaben zur Regenwurmfauna Frankreichs mit Beschreibung fünf neuer Arten (Oligochaeta: Lumbricidae).	983-1003
CARPANETO, Giuseppe M. & Roberto MIGNANI. A review of the Himalayan <i>Thorectes</i> (Coleoptera: Geotrupidae), with description of a new species from northern India.	1005-1012
HOESS, René & Adolf SCHOLL. The identity of <i>Glomeris quadrifasciata</i> C. L. Koch (Diplopoda: Glomeridae).	1013-1024
BELFIORE, Carlo & Michel SARTORI. Redescription of <i>Electrogena galileae</i> (De-moulin, 1973) (Ephemeroptera, Heptageniidae).	1025-1034

INDEX DES AUTEURS

par

ORDRE ALPHABÉTIQUE

	Pages
ADIS, Joachim, Ulf SCHELLER, José Wellington de MORAIS & José Maria G. RODRIGUES. Abundance, species composition and phenology of Pauropoda (Myriapoda) from a secondary upland forest in Central Amazonia.	555-570
ALMIRON, Adriana E. & Jorge R. CASCIOTTA. <i>Hyphessobrycon wajat</i> n. sp. from La Plata basin in Argentina (Characiformes: Characidae).	339-346
ANGELINI, Fernando. New species of <i>Agathidium</i> Panzer from China (Coleoptera, Leiodontidae, Agathidiini).	913-927
BALKENOHL, Michael. Revision of the genus <i>Trilophus</i> Andrewes from the Oriental region (Coleoptera, Carabidae).	429-537
BELFIORE, Carlo & Michel SARTORI. Redescription of <i>Electrogena galileae</i> (De-moulin, 1973) (Ephemeroptera, Heptageniidae).	1025-1034
BENTOS-PEREIRA, Alba & C. Hugh F. ROWELL. The genus <i>Proscopia</i> Klug, 1820 (Orthoptera, Caelifera, Eumastacoidea, Proscopiidae) in Central America, with description of a new species.	627-641
BERNASCONI, Reno. <i>Paladilhia bessonii</i> n. sp. (Gastropoda Prosobranchia Hydrobiidae) des eaux souterraines karstiques de la Haute Soule (Pyrénées Atlantiques, France).	385-392
BESUCHET, Claude. Psélaphides paléarctiques. Notes taxonomiques et faunistiques (Coleoptera Staphylinidae Pselaphinae).	45-67
BESUCHET, Claude. Psélaphides paléarctiques nouveaux ou méconnus (Coleoptera: Staphylinidae: Pselaphinae).	789-811
BOCAKOVA, Milada. Several new <i>Melaneros</i> from Sri Lanka and southern India (Coleoptera, Lycidae).	269-276
BOURGAT, Robert, Salah BOUAMER & Sim-Dozou KULO. Nouvelles données sur les Trématodes d'Oiseaux d'Afrique Occidentale et description de <i>Brachylecithum</i> (<i>B.</i>) <i>togoensis</i> n. sp.	21-44
CARPANETO, Giuseppe M. & Roberto MIGNANI. A review of the Himalayan <i>Thorectes</i> (Coleoptera: Geotrupidae), with description of a new species from northern India.	1005-1012
CASSOLA, Fabio. Studies on tiger beetles. XCVIII. A new <i>Cylindera</i> from Chubut, Argentina (Coleoptera: Cicindelidae).	939-943
DE CHAMBRIER, Alain & Claude VAUCHER. Proteocephalidae et Monticelliidae (Eucestoda: Proteocephalidea) parasites de poissons d'eau douce au Paraguay, avec descriptions d'un genre nouveau et de dix espèces nouvelles. . . .	165-240
DURETTE-DESSET, Marie-Claude & Claude VAUCHER. <i>Molostromylyus mbopi</i> sp. n. (Nematoda, Trichostrongylina, Molineoidea), parasite de <i>Molossops</i> spp. (Chiroptera, Molossidae) au Paraguay.	407-418

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HANZELOVÁ, Vladimira, Tomáš SCHOLZ, Daniel GERDEAUX & Alain de CHAMBRIER. Endoparasitic helminths of fishes in three Alpine lakes in France and Switzerland.	581-590
HLAVÁČ, Peter, Ján KODADA & Alexander KOVAL. A new cavernicolous species of <i>Seracamaurops</i> Winkler, 1925 (Coleoptera: Staphylinidae: Pselaphinae) from Caucasus.	241-247
HOESS, René & Adolf SCHOLL. <i>Glomeris undulata</i> Koch and <i>G. conspersa</i> Koch are conspecific. - Enzyme electrophoretic evidence and taxonomical consequences (Diplopoda: Glomeridae).	643-661
HOESS, René & Adolf SCHOLL. The identity of <i>Glomeris quadrifasciata</i> C. L. Koch (Diplopoda: Glomeridae).	1013-1024
KOTTELAT, Maurice & Franck BRÉHIER. <i>Troglocyclocheilus khammouanensis</i> , a new genus and species of cave fish from the Khammouan karst, Laos (Teleostei: Cyprinidae).	347-359
LEISTIKOW, Andreas. <i>Androdeloscia</i> gen. n., a new genus of South American terrestrial isopods with description of 13 new species (Crustacea: Oniscidea: "Philosciidae").	813-904
LIENHARD, Charles & N. Philip ASHMOLE. <i>Sphaeropsocopsis myrtleae</i> sp. n., a blind subterranean psocid from St Helena (Psocoptera: Sphaeropsocidae).	905-912
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LOURENÇO, Wilson R. & Dietmar HUBER. Additions to the scorpion faunas of Trinidad and Tobago.	249-267
LOURENÇO, Wilson R. & Lionel MONOD. A new species of <i>Ananteris</i> Thorell from French Guyana (Scorpiones, Buthidae).	301-306
LOURENÇO, Wilson R. Un nouveau genre et une nouvelle espèce de scorpion d'Égypte, appartenant à la famille des Buthidae Simon.	591-598
LOURENÇO, Wilson R. Considérations taxonomiques sur le genre <i>Hadogenes</i> Kraepelin, 1894: création des Hadogeninae subfam. n. et description d'une espèce nouvelle de l'Angola (Scorpiones, Scorpionidae, Hadogeninae).	929-938
MANCONI, Renata & Ruth DESQUEYROUX-FAÚNDEZ. Freshwater sponges (Porifera, Spongillidae) from the Lake of Geneva, Switzerland.	571-580
MAURIÈS, Jean-Paul & Jean-Jacques GEOFFROY. Les Diplopodes édaphiques et souterrains de l'Île Maurice (Myriapoda, Diplopoda).	69-79
PACE, Roberto. Aleocharinae della Cina: Parte V (conclusioni) (Coleoptera, Staphylinidae).	107-164

	Pages
PACE, Roberto. Aleocharinae di Hong Kong (Coleoptera, Staphylinidae).	663-689
ROWELL, C. Hugh F. New and little known species of <i>Cloephoracris</i> (Orthoptera: Caelifera: Romaleidae) from Central America	3-20
ROWELL, C. Hugh F. New species of <i>Lagarolampis</i> Descamps (Orthoptera, Caelifera, Acridoidea, Romaleidae, Bactrophorinae) from Central America. .	307-324
RUŽIČKA, Jan. A new apterous and microphthalmic species of <i>Anemadus</i> (Coleoptera: Leiodidae: Cholevinae) from China.	621-626
SALGADO COSTAS, José María. <i>Quaestus (Speogeus) littoralis</i> n. sp. (Coleoptera: Cholevidae, Leptodirinae). Considérations biogéographiques et évolutives sur la faune troglobie de la Sierra du Sueve (Asturies, Espagne).	81-90
SARTORI, Michel & Jean-Marc ELOUARD. Biodiversité aquatique de Madagascar 30: le genre <i>Cheirogenesia</i> Demoulin, 1952 (Ephemeroptera, Palingeniidae).	325-337
SCHAWALLER, Wolfgang. Notes on Palearctic and Oriental Phrenapatini (Coleoptera: Tenebrionidae), with descriptions of four new species.	419-428
SCHWENDINGER, Peter J. & Jochen MARTENS. A taxonomic revision of the family Oncopodidae II. The genus <i>Gnomulus</i> Thorell (Opiliones, Laniatores).	945-982
STEBNICKA, Zdzisława Teresa. Neotropical Eupariini: New and little known genera and species (Coleoptera: Scarabaeoidea: Aphodiinae).	285-300
TOMASZEWSKA, K. Wioletta. A new genus and species of Epipocinae (Coleoptera: Endomychidae) from Pakistan.	277-284
VAUCHER, Claude & Marie-Claude DURETTE-DESSET. <i>Histiostrongylus spineus</i> n. sp. (Nematoda: Trichostrongylina), parasite de <i>Phyllostomus discolor</i> (Chiroptera: Phyllostomidae) et nouvelles données sur les genres <i>Histiostrongylus</i> Molin, 1861 et <i>Parahistiostrongylus</i> Perez Viguera, 1941.	611-620
ZAWADZKI, Cláudio Henrique, Erasmo RENESTO & Luís Maurício BINI. Genetic and morphometric analysis of three species of the genus <i>Hypostomus</i> Lacépède, 1803 (Osteichthyes: Loricariidae) from the Rio Iguagu basin (Brazil). .	91-105
ZICSI, András & Csaba CSUZDI. Weitere Angaben zur Regenwurmfauna Frankreichs mit Beschreibung fünf neuer Arten (Oligochaeta: Lumbricidae).	983-1003
ZOOLOGIA ET BOTANICA '99, Zurich, 17-19 February 1999 (Joint meeting of the Swiss Society of Zoology and the Swiss Society of Botany).	745-787

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TOME 106 — FASCICULE 1

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Comité de lecture

Président: Ivan LÖBE — Muséum de Genève

Il est constitué en outre du président de la Société suisse de Zoologie, du directeur du Muséum de Genève et de représentants des Instituts de zoologie des universités suisses.

Les manuscrits sont soumis à des experts d'institutions suisses ou étrangères selon le sujet étudié.

La préférence sera donnée aux travaux concernant les domaines suivants: biogéographie, systématique, écologie, éthologie, morphologie et anatomie comparée, physiologie.

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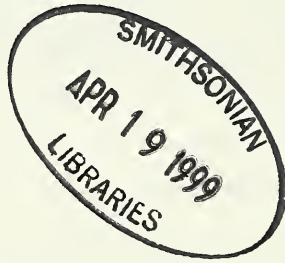
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New and little known species of *Cloephoracris* (Orthoptera: Caelifera: Romaleidae) from Central America.

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New and little known species of *Cloephoracris* (Orthoptera: Caelifera: Romaleidae) from Central America. - The new species *Cloephoracris caesia* and *C. disrupta* are described from Costa Rica, representing the most northerly known occurrence of the tribe Hysichiini (Romaleinae). The previously unknown female of *Cloephoracris festae* (Giglio-Tos) is described from Panama, together with observations on the live male.

Key-words: Orthoptera - Acridoidea - Romaleidae - Hysichiini - taxonomy.

INTRODUCTION

DESCAMPS (1979) erected the tribe Hysichiini of the Romaleinae for the genera *Hysichius* Stål, 1878 and five new genera, *Acrideumeras*, *Acridophaea*, *Cloephoracris*, *Porphoracris*, and *Pseudhysichius*. All are apterous insects of medium size, most of them ornamented with blunt spines and knobs, and inhabit neotropical wet forest. The tribe is predominantly South American, occurring in the Amazon basin and on both faces of the Northern Andes; only *Cloephoracris* is so far known to extend into Central America.

Hysichiini are rarely collected, and many species have been described only from single holotypes. AMÉDÉGNATO & POULAIN (1986) described the hitherto unknown males of two existing species and added two new ones; the same authors later (1994) erected a further genus (*Pareusychius*) for one of these latter species, provided a new key to the genera of Hysichiini, and discussed their relationships.

Cloephoracris is the only hisyichiine genus so far known to occur in Central America. The two known species, *nodulithorax* Descamps, 1979 (the type species of the genus) and *festae* (Giglio-Tos, 1897), come from Colombia and the extreme E. of Panama (Darién) respectively. They are known only from the male holotypes and one male paratype, and females of the genus are unknown. This article describes both sexes of a new species of the genus from Costa Rica, the male of a further new Costa Rican species and the previously unknown female of *C. festae*. The holotype male of *festae* is completely discoloured, and the original description is inadequate in this respect; the coloration of the living male is described below and it is figured for the first time. Some information on the biology of this species is provided.

Abbreviations of depositories: ANSP, Academy of Natural Sciences, Philadelphia, USA; INBio, Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica; MNHNP, Muséum National d'histoire naturelle, Paris, France; RC, the author's collection.

Cloephoracris Descamps

DESCAMPS 1979: 21

AMÉDÉGNATO & POULAIN 1994: 14,15.

The general features of the genus were given by DESCAMPS (1979). There are however 21 or 22 antennal segments, not 17, and his sentence "un groupe de granules sur le mésonotum proprement dit" is apparently an error; "méтанotum" was doubtless intended. Integument of head, nota and pleura pitted, coarsely on head and thorax, finely on abdomen; sterna smooth and polished. Dorsolateral areas of thorax and abdomen and the anterior (ventral) surface of hind tibia with numerous white hairs in the male (the female is only sparsely haired, apart from the ovipositor valves). The cingulum is of unusual shape, being shallow and shell-like, confined to the dorsal surface of the genital apparatus, and only weakly notched anteriorly; the long delicate rami extend far posteriorly, wrapping around the upwardly flexed ventral valves and meet in the midline, supporting a collar of membrane which forms a ring around the tips of the valves. This collar is bounded anteriolaterally by two arcs of sclerotized membrane which also belong to the ectophallus (see Figs 2C, E; 5C, E).

KEY TO SPECIES OF *Cloephoracris* (MALES ONLY):

- 1 Fastigium long (Fig. 8A, B) 2
- Fastigium short (Fig. 8C; DESCAMPS 1978, Fig. 4) 3
- 2 Fastigium deeply grooved distally (Fig. 8A). General colour dark green; head, grooves between meso- and metanota, knee and distal parts of hind femur dark blue (Panama) *festae* (Giglio-Tos 1897)
- Fastigium moderately grooved distally (Fig. 8B). General colour blue-grey, head brownish, hind knees and tibial spines black. Thoracic nodules very large (Costa Rica) *caesia* n. sp.
- 3 General colour olive green, head orange, thorax mottled brown. External and internal carinae of hind femur lined prominently in black, interrupted by clear nodules. Thoracic nodules small (Costa Rica) . . . *disrupta* n. sp.
- Head, thorax and hind knees chocolate brown, remainder of body and legs green (Colombia). Thoracic nodules of medium size (Colombia) *nodulithorax* Descamps, 1979

Cloephoracris festae (Giglio-Tos)

Hisychius festae Giglio-Tos, 1897: 3; KIRBY 1910: 391; BRUNER 1911: 68
DESCAMPS 1979: 22 (transferred to *Cloephoracris* n. g.)

The new material consists of a pair caught in copula in 1959, and a male and a last instar larval female collected by the author in 1997. Both males agree closely with the holotype (examined).

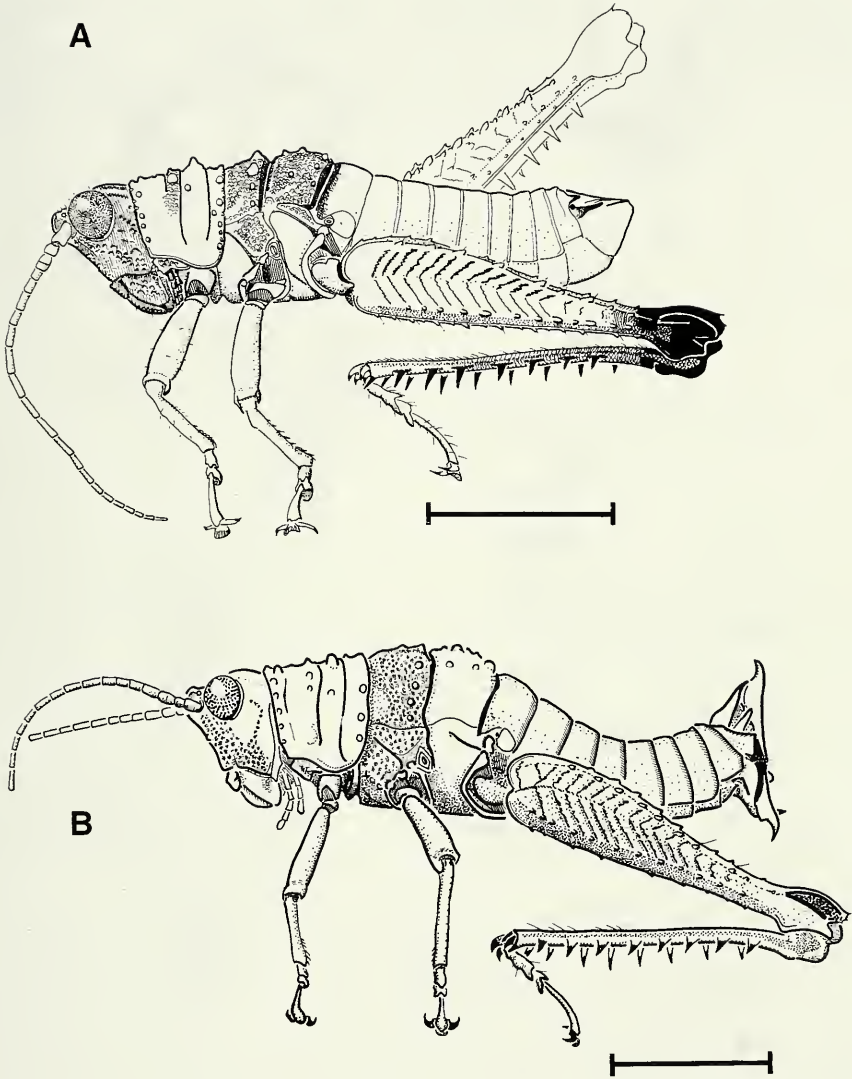


FIG. 1

Cloephoracris festae (G-T) A. Male, lateral view. B. Female, lateral view. Scale bars, 10 mm.

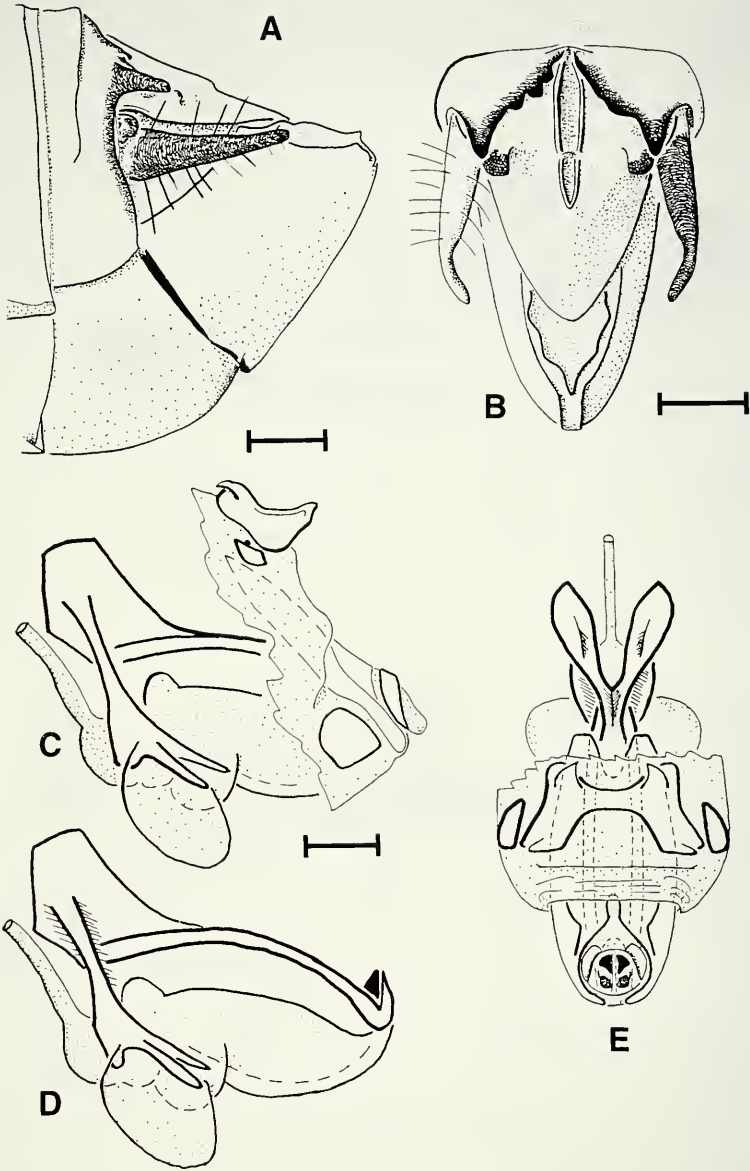


FIG. 2. *Cloephoracris festae* (G-T). A-B. Male external genitalia. A. Lateral view. B. Dorsal view. The asymmetry of the furcula is present in the original specimen. C-E, internal genitalia, scale bar common to all. C. Entire phallic complex, lateral view. D. Endophallus, lateral view. E. Entire phallic complex, dorsal view. Scale bars, 1 mm.

MALE (Fig. 1A). External and internal genitalia (Fig. 2) similar to those of *C. nodulithorax* (DESCAMPS 1979, Figs. 7-10). Supraanal plate decorated with two low lateral sclerotized bosses, wider than they are high or long (Fig. 2B). Tips of aedeagal valves not visible in side view above the surrounding collar of ectophallic membrane; ectophallic ventrolateral sclerites present (Fig. 2C).

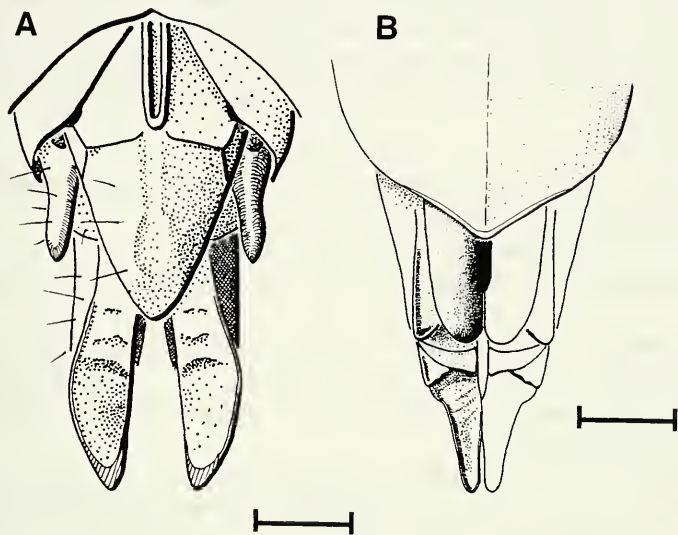


FIG. 3

Cloephoracris festae (G-T). Female genitalia. A. Dorsal view. B. Ventral view. Scale bars, 1 mm.

Coloration. The living male is strikingly coloured. General colour, dark green. Antennae dark purple basally, grading to salmon pink at tip. Head dark blue; eyes dark brown, palps green. The deep grooves between the nota of the meso- and metathorax, and between those of the metathorax and first abdominal segment, dark blue. Hind knees and distal part of femur, very dark blue, semilunar processes black. Dorsal articular membrane of the hind knee white (see below). Hind tibia proximally blueish-black, shading through purple to yellow and finally green distally. Tibial spines purplish black. Tibial spurs and claws of feet green basally, tipped black. Tarsi and pulvilli green. Cerci blackish green.

Pinned males appear to discolour progressively and become a uniform olive brown, other than the antennae. A rapidly appearing artifact is the black pigment in the basal segments of the antenna, noted by Giglio-Tos in the original description, which develops in freshly pinned specimens within a month. The holotype is now totally discoloured other than the semilunar processes.

FEMALE (Fig 1B). Similar in form to male, fusiform, widest and deepest in the meso/metathoracic region, equivalent to 23-25% of total length.

Antennae long, more ensiform than in male, finely pointed at tip, originally 22 flagellar segments (tips broken during transport). Fastigium and upper part of frontal ridge medially grooved. Lower part of frontal ridge flat, parallel sided; medial ocellus small and indistinct.

Anterior edge of pronotum bisinuate, posterior edge more or less straight. Ventral anterior angle of lateral lobe of pronotum sharply angular, ventral posterior angle smoothly rounded. Medial and lateral carinae absent. Dorsal midline crossed by three sulci, the anterior two very weak and indistinct. Prosternal process short, sharp, curved slightly anteriorly. Thorax ornamented with nodules, distributed as follows:

Pronotum:

- anterior edge: 4 pair of very small nodules;
- behind anterior edge but anterior to 1 sulcus, 2 pair larger nodules;
- sulci 1-2, 2 pairs of nodules plus one medially;
- sulci 2-3, 2 pair nodules, the medial pair being larger;
- posterior edge of pronotum, 4 pair of nodules, the two medial pairs being larger.

Mesonotum: a medial group of about 6 minute nodules, plus 5 pair larger nodules on posterior edge.

Metanotum: 1 pair large medial nodules and 1 pair small dorsolateral nodules, plus 2 pair on posterior edge.

Hind tibia with 8 external and 9 internal dorsal spines, apical spine included.

Cerci simple, tapering; supraanal plate long, triangular, pointed, divided transversely, grooved medially proximally, tectate (Fig. 3A). Ovipositor valves long and strong, smoothly hooked, not toothed, dorsal distal surface of superior valve concave (Fig. 3A), in side view similar to those of *C. caesia* (Fig. 6C). Subgenital plate with weak medial carina distally, posterior margins concave (Fig. 3B). The spermatheca of the unique adult female has not been dissected.

General colour a uniform medium brown, eyes very dark brown, antennae purple, terminal 7 antennal segments of flagellum pink. Semilunar processes of hind knees, hind tibial dorsal spines, undersides of tarsal segments, and claws black. Posterior margins of abdominal segments, outer margins of supraanal plate, blackish brown. Cerci brown basally, black distally. Articular membranes at neck and base of legs dark brown.

The final instar larval female (20 antennal flagellar segments) is closely similar, with the same coloration and distribution of major nodules. The general surface of the integument is however smoother than in the adult, and there is a weak medial dorsal carina running the full length of thorax and abdomen, corresponding to the line of splitting during ecdysis.

Dimensions: see Table 1.

TABLE 1. Dimensions of *Cleophoracris* species

Dimensions in millimetres:	<i>Cleophoracris festae</i>			<i>Cleophoracris caesia</i>			<i>Cleophoracris disrupia</i>			<i>Cleophoracris nodulithorax</i> #		
	Males:	97294	Holotype	Mean	863378	Holotype	Mean	Holotype	Holotype	Paratype		
Specimen	94075											
Hind femur (F)	22.02	21.85	19.64	21.17	22.13	19.11	20.40	20.40	20.70			
Rostrum-subgen. plete (L)	31.83	32.47	32.11	32.14	36.80	30.00	32.80	32.80	35.50			
Pronotum (midline) (P)	5.45	5.51	5.49	5.48	5.79	5.15	5.80	5.80	6.00			
Pronotum longest	5.68	5.63	5.6	5.64	5.96	5.28	5.28	5.28				
Interocular space (IO)	0.63	0.6	0.58	0.60	0.68	0.61	0.61	0.61				
Antennal pedicel (width) (PD)	0.78	0.89	0.73	0.80	0.83	0.62	0.62	0.62				
Antenna length (A)	22.21	23.5	none	22.86	21.80 §	none	none	none				
Hind tarsus 1st + 2nd segments	3.02	3.03	3.05	3.03	3.76	2.93	2.93	2.93				
Hind tarsus 3rd. segment	none	3.99	3.33	3.66	3.68	3.39	3.39	3.39				
Ratios												
F/P	4.04	3.97	3.58	3.86	3.82	3.71	3.71	3.71				
L/P	5.84	5.89	5.85	5.86	6.36	5.83	5.83	5.83				
IO/P	0.12	0.11	0.11	0.11	0.12	0.12	0.12	0.12				
IO/PD	0.81	0.67	0.79	0.76	0.82	0.98	0.98	0.98				
Tarsus 3/ 1+2		1.32	1.09	1.20	0.98	1.16	1.16	1.16				
Tarsus 1+2+3/F		0.32	0.32	0.32	0.34	0.33	0.33	0.33				
Tarsus 1+2+3/P		1.27	1.16	1.22	1.28	1.23	1.23	1.23				
A/P	4.08	4.26	4.17	4.17	3.77							
Females:												
Specimen	94076				339264	294397	Mean		(No female)			
Hind femur (F)	24.59				25.64	26.05	25.85					
Rostrum-ovipositor tip (L)	47.19				49.42	49.13	49.28					
Pronotum (midline)	6.71				7.20	7.30	7.25					
Pronotum longest (P)	6.97				7.50	7.52	7.51					
Interocular space (IO)	0.96				1.09	1.04	1.07					
Antennal pedicel (width) (PD)	0.83				0.87	0.85	0.86					
Antenna length (A)	20.80				20.19	19.89	20.04					
Hind tarsus 1st + 2nd segments	4.02				4.05	4.12	4.09					
Hind tarsus 3rd. segment	3.95				3.86	4.11	3.99					
Ratios												
F/P	3.66				3.56	3.57	3.56					
L/P	7.03				6.86	6.73	6.80					
IO/P	0.14				0.15	0.14	0.15					
IO/PD	1.16				1.25	1.22	1.24					
Tarsus 3/ 1+2	0.98				0.95	1.00	0.98					
Tarsus 1+2+3/F	0.32				0.31	0.32	0.31					
Tarsus 1+2+3/P	1.19				1.10	1.13	1.11					
A/P	3.10				2.80	2.72	2.76					

§ only 16 segments of antenna available; dimension calculated proportionately from female.

Dimensions from DESCAMPS (1979: 22)

MATERIAL EXAMINED:

PANAMA:

Darien Prov.: "Foreste, Rio Cianati (Darien)", no date (E. Festa). Holotype male. Specimen bears label "Hisyichius festae G.Tos Holotypus male C.S. Carbonell 1966" (red label) and "CSC 1355" (white label). The genitalia have been dissected, and bear the labels "Hisyichius festae G.T. Holotypus. Genitalia 1355" (red label) and "1355" (white label). (MRSNT).

Canal Zone: Piña area. 7.3.1959 (Hanson WJ). Male, in cop. (specimen no. 94075); female, in cop. (specimen no. 94076). (both ANSP (originally deposited in the Biology Museum of Utah State University at Logan). This locality is apparently Piña Camp (9°16'N, 80°00'W), near Fort Sherman, Provincia de Colón. Allotype female, here designated.

Panama Prov.: Cerro Campana, 950 m., trail through forest. 7.9.1997 (Rowell CHF, Windsor D). Male. (Specimen no. 97294) (RC).

Panama Prov.: Cerro Campana, 950 m., on *Pavonia rosea*. 13.9.1997 (Rowell CHF, Perez RA). Female larva, instar V. (Specimen no. 97429) (RC).

BIOLOGY. The specimens caught recently on Cerro Campana were on or near the low growing woody plant *Pavonia rosea* (Malvaceae). They ate voraciously of this plant in captivity but would accept nothing else offered to them, either plants from their original environment or others, and the female larva eventually died of starvation when this plant could not be supplied. The species shows every sign of being a specialist on this plant. It grows only in wet forest below about 1200 m, typically along paths or at the shaded edges of tree-fall clearings. There are other species of the genus in Panama and Costa Rica, including small trees; it is not known whether *Cloephoracris festae* accepts these, or whether other species of the genus have similar preferences. *Pavonia rosea* extends however from Mexico to Brazil (Croat 1978), exceeding the known distribution of *Chloephoracris*.

The dates of capture of the specimens are consistent with year-round breeding or with long-lived (approaching 12 months) adults. The records reported here extend the range of the species to central Panama, some 250 km NW of the type locality.

The shining white colour of the dorsal articular membrane of the hind knee contrasts strongly with the black surround. When the legs are flexed these membranes present two striking white spots when viewed from above or behind, and are probably used in intraspecific communication.

***Cloephoracris caesia* n. sp.**

Holotype male: COSTA RICA: Prov. Limón: Valle de la Estrella: Est. Miramar, Res. Biol. Hitoy-Cerere, 200 m., map reference LS N398100 E572800, Sept. 1992, (G. Carballo), specimen no. CRI000 863378 (INBio).

Allotype female: COSTA RICA: Prov. Limón: Valle de la Estrella: Res. Biol. Hitoy-Cerere, 200 m., map reference LN N184200 E643300, Sept. 1992, (G. Carballo), specimen no. CRI000 339264 (INBio).

Paratype: Same locality and collector as allotype, but Dec. 1990, one female, specimen no. CRI000 294397 (INBio).

Other specimens (not paratypes):

Prov. Puntarenas: Osa Peninsula, no other data, one female (INBio).

Prov. Puntarenas: Osa Peninsula, P.N. Corcovado: Llorona, map reference LS N282200 E498650 (L. Garling & C.H.F. Rowell), 10 March 1978. On palm leaf by stream. Larva, presumed to be this species. Specimen no. 78199 (RC).

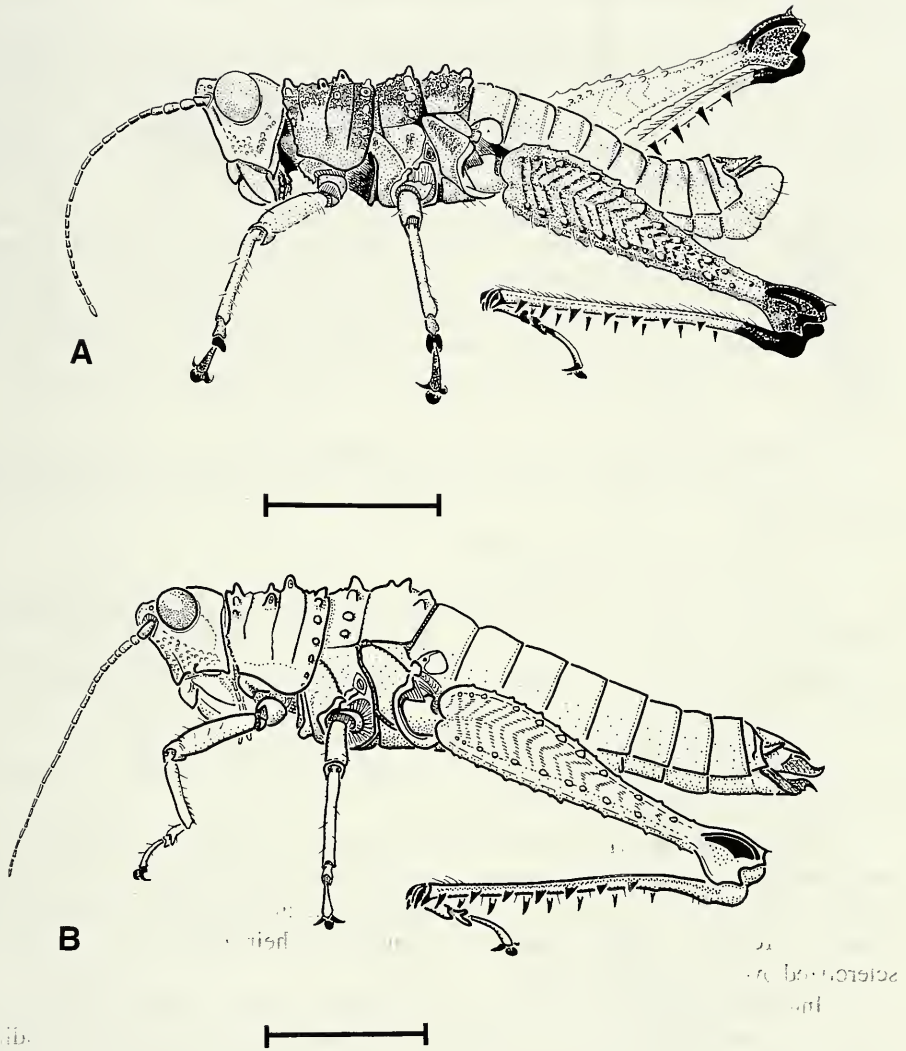


FIG. 4

Cloephoracris caesia n. sp. A. Male, lateral view. B. Female, lateral view. Scale bars, 10 mm.

Etymology: Latin *caesius*, blue gray, referring to the dominant coloration of the adult male.

MALE (Fig. 4A). Structurally more similar to *C. nodulithorax* than to *C. festae*.

Antennae subsensiform, 21-22 segments, finely tapered. Fastigium flat or slightly uptilted, surface pitted, grooved medially distally; groove continues on to frontal ridge. Sides of frontal ridge subparallel, first widening, then constricting ventrally, obsolete well before medial ocellus, which is clearly visible.

Anterior margin of prothorax convex (not bisinuate, v. *festae*), posterior margin straight. Anterior ventral angle of lateral lobe sharply angular, posterior ventral angle smoothly rounded. Prosternal process short, pointed, vertical (not inclined forwards, v. *festae*). Medial and lateral carinae absent. Midline traversed by 4 thin but distinct sulci, all but the second most anterior of which extend on to the lateral lobes. Thoracic nodules large and prominent (larger than in *festae*), distributed as follows:

Pronotum:

- anterior margin of pronotum: 6 or more pairs of very small, variable nodules;
- posterior to margin, anterior to 1st sulcus: 2 pair nodules, the medial pair much the larger.

- sulci 1-2: 1 small medial nodule

- sulci 2-3: 1 pair dorsolaterally

- sulci 3-4: 2 pair, the medial pair large and close together, the other small and dorsolateral.

- posterior edge: 4 pair nodules, the second from the midline much larger than the rest.

Mesonotum: 4 pair nodules on posterior edge.

Metanotum: 2 pair (individually variable in size) in medial area, 1 pair dorsolaterally; 2 pair on posterior edge.

External genitalia (Fig. 5A, B). Points of furcula somewhat blunter than in the other species. Supraanal plate triangular, rounded at tip, grooved medially in proximal part, proximolaterally with paired bosses, longer and higher than they are wide (v. *C. festae*). Cerci long, pointed, thinning abruptly in their distal third, incurved, sclerotized over most of their length.

Internal genitalia (Fig. 5 C-E) similar to those of other species of the genus. The tips of both the dorsal and ventral valves project well above the surrounding collar of ectophallic membrane and are clearly visible in side view, and the specimen examined shows no sign of ectophallic ventrolateral sclerites (both characters contrast with the state in *C. festae*).

Coloration. Antennae brown, without contrastingly coloured tips. Head pale brown, palps and margin of labrum blue-gray.

Thorax olive brown with blue-gray cast, nodules paler than ground colour. Abdomen yellowish, genital region suffused blackish. Subgenital plate blue-grey. Fore- and middle legs and tarsi, blue-grey. Hind femur blue-grey. Knee blue-black, with pale articular membrane (see *C. festae* above). Hind tibia and tarsus yellow,

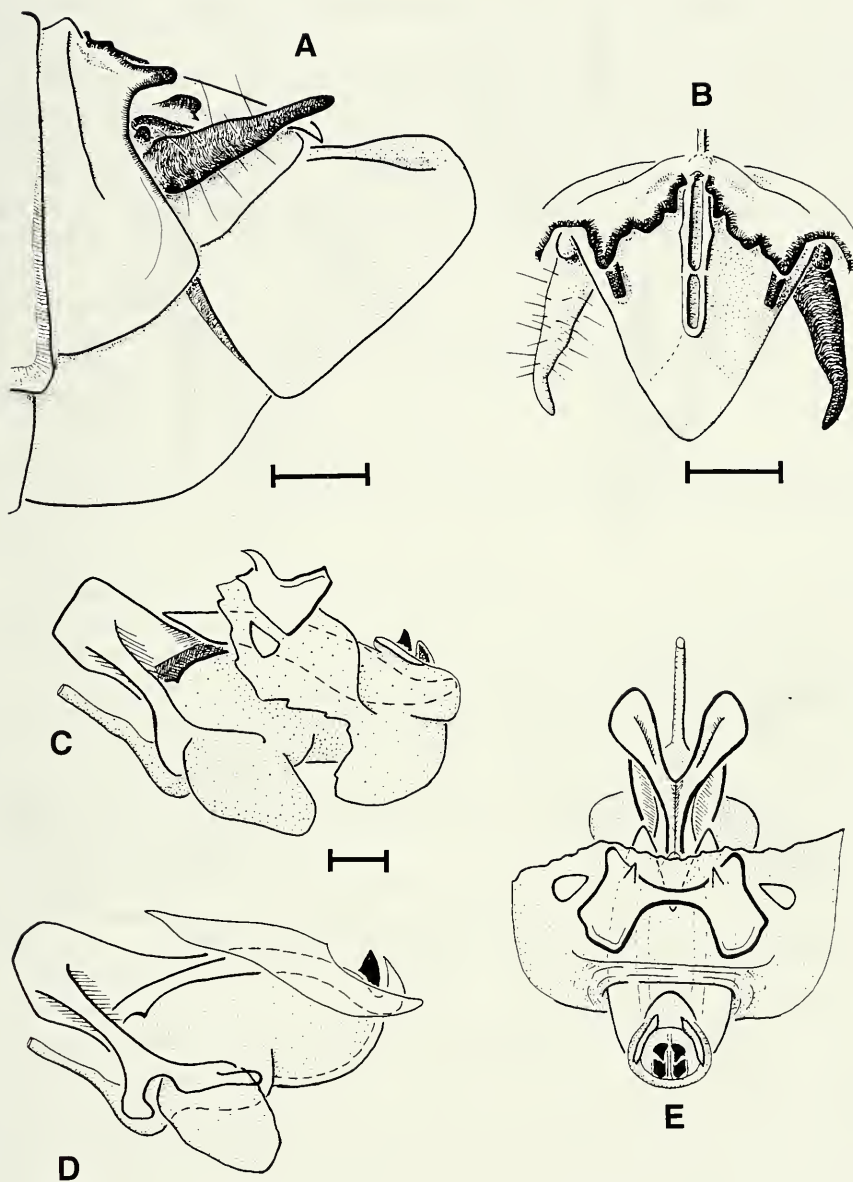


FIG. 5. *Cloephoracris caesia* n. sp. A-B. male external genitalia. A. Lateral view. B. Dorsal view. The asymmetry of the furcula is present in the original specimen. C-E. Internal genitalia, scale bar common to all. C. Entire phallic complex, lateral view. D. Endophallus, lateral view. E. Entire phallic complex, dorsal view. Scale bars, 1 mm.

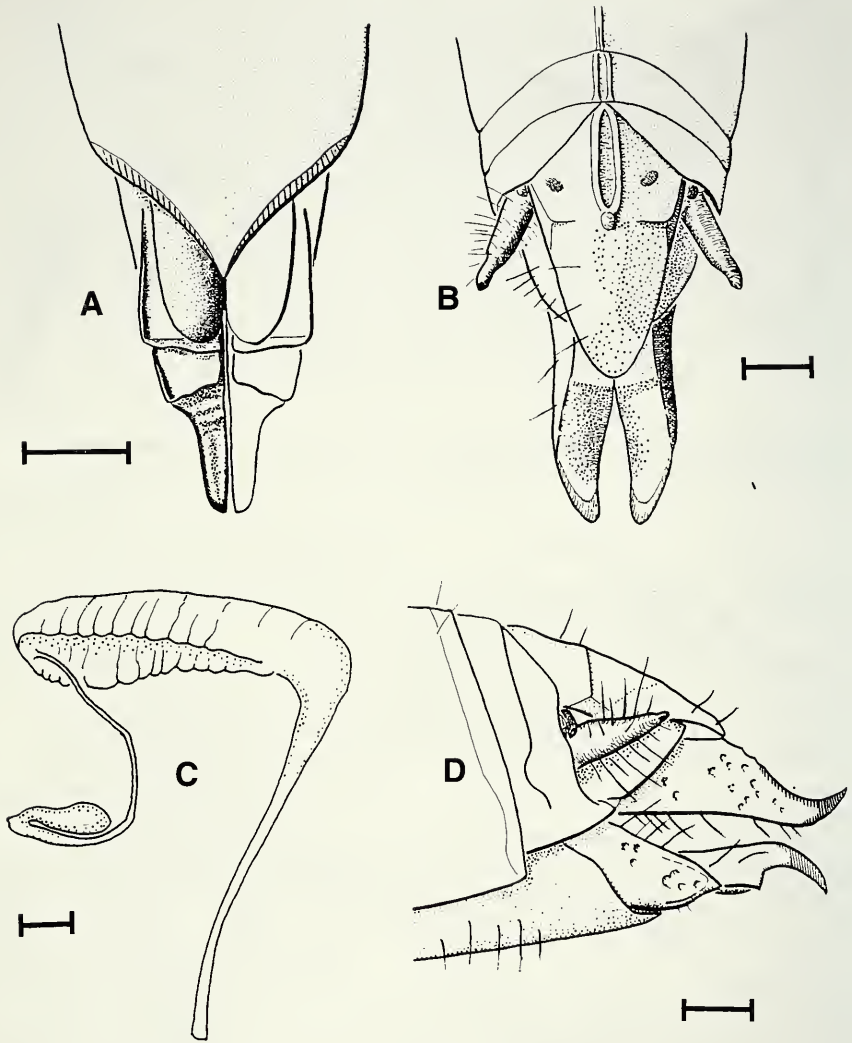


FIG. 6

Cloephoracris caesia n. sp. Female genitalia. A, B & D, external aspect. A. Dorsal view. B. Ventral view. D. Lateral view. C. Spermatheca of paratype female. Scale bars, 1 mm.

tibial spines black. The author has not seen the male alive, and the colours in life may be brighter than described here.

FEMALE (Fig. 3B). Antennae flattened dorsoventrally, tapering, but less ensiform than in *C. festae*. Fastigium medially grooved distally, frontal ridge less grooved than in male, or than in female of *C. festae*. Medial ocellus not visible.

Pronotal midline crossed by 3 weak sulci, corresponding to the three most posterior of the four sulci visible in the male. Nodules of thorax larger and more prominent than in *festae*, distributed somewhat differently from those of the male, as follows:

Pronotum:

- anterior margin of pronotum: 4 pair of small nodules.
- posterior to margin, anterior to 1st sulcus: 2 pair nodules, the medial pair much the larger.
- sulci 1-2: 1 pair plus one medial nodule
- sulci 2-3: 2 pair, the medial pair large and close together
- posterior edge: 5 pair nodules, the second from the midline much larger than the rest.

Mesonotum: 4 pair nodules on posterior edge.

Metanotum: 2 pair (individually variable in size) in medial area, 1 pair dorso-laterally; 2 pair on posterior edge.

Projections on carinae of hind femur larger and more pointed than in *C. festae*.

External genitalia (Fig. 6). Subgenital plate pointed, posterior margins angular rather than biconcave, with long terminal filament. Supranal plate and ovipositor valves similar to those of *C. festae*, but more elongate. Spermatheca (Fig. 6C) of remarkable size and shape, similar to that of *Hisychius nigrispinus* (Amédégnato & Poulain 1994, Fig. 27) and confirming the supposition of these authors that the two genera are closely related.

Coloration. General colour, reddish brown; eyes, antennae, thoracic nodules, darker than ground colour. Antennae yellowish at tip (not pink as in *C. festae*). Semilunar processes of hind knee, hind tibial spines, distal ends of cerci, tips of ovipositor valves, black.

Dimensions: see Table 1. Relative to *C. festae* the antennae may be slightly shorter proportionately. Otherwise the bodily proportions are very similar.

Larval stages. Only a single larval specimen of what is presumably this species (coming from the same locality as some of the adults) is known, probably of second or third instar. The larger knobs of the thoracic ornamentation are already visible, but the rest of the cuticle is smooth. **Coloration:** Pale brown, fore and middle legs somewhat lighter in colour. Hind femora with three dark bands. Hind tibia dark brown.

Cloephoracris disrupta n. sp.

Holotype male: COSTA RICA: Prov. S José: Pozo Azul de Perrís, 325-550 ft, on foliage of forest undergrowth (C.H. Lankester & J.A.G. Rehn), 23. Aug. 1927, one male (ANSP). This specimen is that referred to in footnote 12 of Amédégnato & Poulain 1994, p. 15. The locality is usually spelt Pirrís, it is at 98-167 m., map ref. LS N400200 E431200.

Etymology: Latin *disruptus*, interrupted, referring to the conspicuous broken black lines on the hind femoral carinae.

MALE (Fig. 7A). Structurally more similar to *C. festae* than to *C. nodulithorax*. Smaller than the other species of the genus (see Table 1, Dimensions).

Both antennal flagella missing. Fastigium shorter than in the other species, (Fig. 8 and DESCAMPS 1979, Fig. 4), weakly downwards tilted, surface pitted, grooved medially distally; groove continues onto frontal ridge. Sides of frontal ridge subparallel, first widening, then constricting ventrally, extending to medial ocellus. Frons heavily pitted.

Anterior margin of prothorax weakly bisinuate, as in *C. festae*, posterior margin straight. Anterior ventral angle of lateral lobe sharply angular, posterior ventral angle smoothly rounded. Prosternal process short, pointed, vertical. Anterior margin (presternum) of prosternum heavily pitted. Medial and lateral carinae absent. Midline traversed by only 3 thin sulci (vide *C. caesia*), of which the two most posterior extend on to the lateral lobes. The most anterior sulcus seen in *caesia* is present only on the lobes in *disrupta*, and is obsolete in the midline. Thoracic nodules very small (yet smaller than in *festae*); their distribution differing from that given above for *festae* as follows:

Pronotum:

- sulci 2-3: 1 pair dorsolaterally and one additional pair medially
- posterior edge: 5 pair nodules, subequal.

Mesonotum: 5 pair nodules on posterior edge.

Metanotum: 2 pair (individually variable in size) in medial area, none dorsolaterally; 2 pair on posterior edge.

External genitalia (Fig. 7B, C). Furcula, supraanal plate and cerci similar to those of *C. festae* but comparatively little sclerotized. Midline of furcula with a circular excavation, bordered anteriorly by a raised rim. Subgenital plate keeled in midline distally.

Internal genitalia have been previously dissected out but are missing from the specimen, presumed lost. The male genitalia of the genus are however very homogenous, and it is unlikely that those of *C. disrupta* deviate significantly from the norm.

Coloration. Antennae missing. Head orange, eyes dark brown. General colour orange-brown, flecked with green on thorax, hind femur (especially in pregenicular region), and on the fore and middle femora and tibiae. Hind femur brown proximally, blue green distally, the dorsal and ventral external and internal carinae marked with interrupted lines of black, the interruptions corresponding to the major tubercles. Hind knee dark brown dorsally, blue-green ventrally. Hind tibia blue-green proximally, purple over most of its length, and yellow distally; tibial spines purple, but tibial spurs yellow, tipped brown. Hind tarsi yellow-green, pulvillus grey, claws green tipped with brown. Fore and middle tarsi dark brown. The deep grooves posterior to the meso- and metathorax are blackish brown. Cerci purple, darker distally.

The males of hisychiines discolour rapidly. The original coloration was probably predominantly blueish green rather than brown.

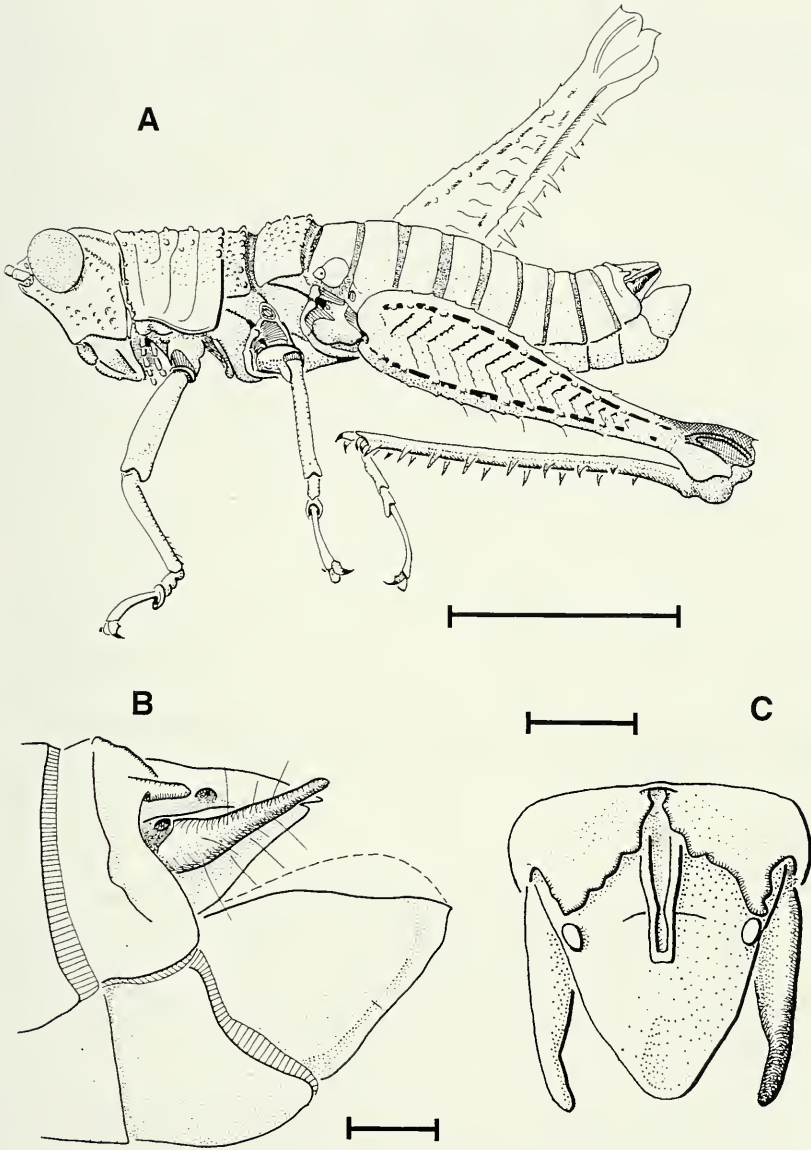


FIG. 7

Cloephoracris disrupta n. sp. A. Male, lateral view. Scale bar, 10 mm. B, C, scale bar common to both. Male external genitalia. B. Lateral view. C. Dorsal view. The asymmetry of the furcula is present in the original specimen. Scale bar, 1 mm.

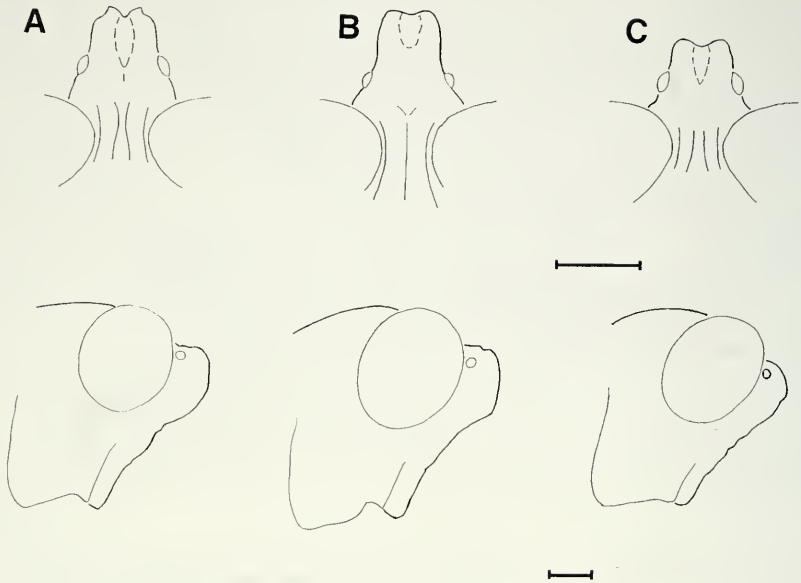


FIG. 8

Fastigium in dorsal view and head in profile of the males of A. *C. festae*, B. *C. caesia* and C. *C. disrupta*. Scale bars, 1 mm.

DISCUSSION

C. caesia & *C. disrupta* extend the known geographical range of the tribe Hisychiini considerably northwards. The rarity and cryptic character of the genus makes it quite possible that it extends still further, at least on the Caribbean coast of Central America, where ecological conditions (lowland rainforest) are favorable for it.

The known localities of *C. caesia* lie on the Pacific and Caribbean coasts of Costa Rica (Fig. 9), and are separated by the ecologically very different Talamanca mountain range. This suggests the possibility that the species extends into western Panama, where there is continuous forest cover between the two coasts. The sparse capture dates of this taxon are consistent with the hypothesis of larvae hatching with the onset of the rains in the early months of the year, and a single generation per year, as in many Costa Rican forest species. *C. disrupta* is currently recorded only from a single locality on the mid-Pacific coast of Costa Rica, and suitable habitat is not found on that coast much further north than this.

AMÉDÉGNATO (1997) reports that in Amazonia the hisychiines *Hisychius nigripinus* and *Pseudhisychius nigroornatus* are polyphagous on the foliage of canopy

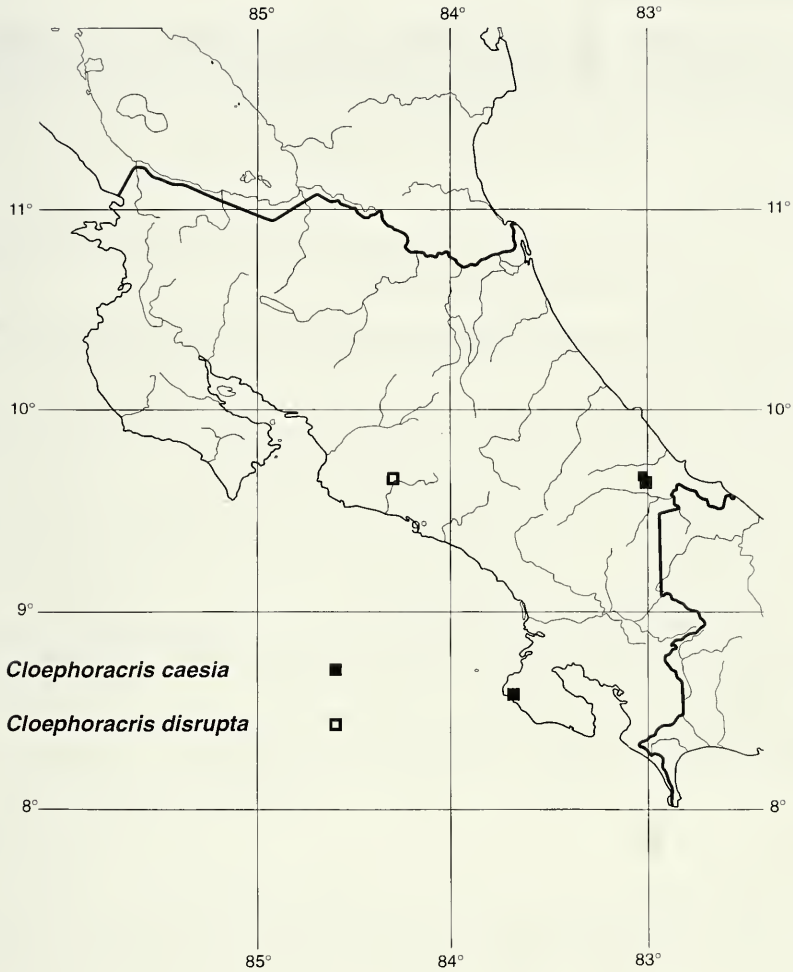


FIG. 9

Capture localities of *Cloephoracris* in Costa Rica.

trees and epiphytic lianas. In contrast, *Cloephoracris festae* appears likely to be a foodplant specialist and neither it nor *C. disrupta* can be exclusively arboreal. Nothing is yet known of the biology of the other species of the genus.

ACKNOWLEDGEMENTS

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Nouvelles données sur les Trématodes d'Oiseaux d'Afrique Occidentale et description de *Brachylecithum (B.) togoensis* n. sp.

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New data on the Trematodes of Birds from Western Africa. Description of *Brachylecithum (B.) togoensis* n. sp. - This study presents the description of a new Trematode parasite of *Numida* from Togo (West Africa): *Brachylecithum (B.) togoensis* n. sp. (DICROCOELIIDAE Odhner, 1910), and reports new geographic distribution record for: *Cyclocoelum vicarium* (Arnsdorff, 1908), *Haematotrephus lanceolatum* (Wedl, 1885), *Tracheophilus sisowi* Skrjabin, 1913, *Leucochloridium actitis* McIntosh, 1932, *Athesmia heterolecithodes* (Braun, 1899), *Zonorchis microrchis* (Travassos, 1916), *Stomylotrema pictum* (Creplin, 1837).

Gallinula angulata is recorded as a new host for *T. sisowi*, *Tringa hypoleucos* for *L. actitis*, *Crecopsis egregia* for *Z. microrchis*, *Tringa nebularia* for *S. pictum* and *Numida meleagris* for the genus *Brachylecithum*.

Key-words: Trematodes - Western Africa - Birds - *Cyclocoelum* - *Haematotrephus* - *Tracheophilus* - *Leucochloridium* - *Athesmia* - *Brachylecithum* - *Zonorchis* - *Stomylotrema*.

INTRODUCTION

Cette étude est consacrée à une série de 39 Trématodes livrés par la dissection d'Oiseaux appartenant à 6 espèces, provenant de la République du Togo (Afrique Occidentale), collectés dans les années 1976, 1980 et 1981.

Les parasites, fixés sur le terrain au Bouin alcoolique et ultérieurement colorés au carmin boracique de Grenacher, sont montés in toto et dessinés à la chambre claire.

Le *Brachylecithum* est reconnu comme espèce nouvelle, *Brachylecithum (B.) togoensis* n. sp. La détermination de 6 autres espèces, *Haematotrephus lanceolatum* (Wedl, 1858), *Tracheophilus sisowi* Skrjabin, 1913, *Leucochloridium actitis* McIntosh, 1932, *Athesmia heterolecithodes* (Braun, 1899), *Zonorchis microrchis* (Travassos, 1916) et *Stomylotrema pictum* (Creplin, 1837), ne pose pas de problème majeur. La principale difficulté rencontrée concerne l'affectation spécifique des *Cyclocoelum*, car les travaux antérieurs expriment des conceptions divergentes. Certains auteurs, comme JOYEUX & BAER (1927), BYCHOWSKAYA-PAVLOVSKAYA (1953), DUBOIS (1959),

FEIZULLAEV (1980), ne reconnaissent qu'un petit nombre d'espèces et proposent d'importants regroupements; d'autres, comme BASHKIROVA (1950) et YAMAGUTI (1971) admettent la validité de la plupart des espèces décrites. En l'absence de démonstration expérimentale formelle, nous suivons cette dernière démarche qui a le mérite de traduire la diversité de ce taxon et son potentiel évolutif.

CYCLOCOELIDAE

CYCLOCOELINAE

Cette sous-famille comprend de très nombreuses formes que les auteurs classent différemment suivant l'importance qu'ils accordent aux caractères discriminants. La difficulté est encore aggravée par l'existence d'intermédiaires entre les formes typiques de chaque taxon.

JOYEUX & BAER (1927) analysent «l'histoire de la famille des Cyclocoelidae». Ils suppriment les sous-familles admises par WITENBERG (1926), et classent l'ensemble des Cyclocoelidae en 3 genres (*Cyclocoelum* Brandes, 1892, *Spaniometra* Kossack, 1911 et *Typhlocoelum* Stossich, 1902); le genre *Haematotrephus* Stossich, 1902 devenant synonyme de *Cyclocoelum*.

DOLLFUS (1948) considère les 2 genres représentés dans notre étude (*Cyclocoelum* et *Haematotrephus*) comme suffisamment éloignés pour les classer dans 2 sous-familles distinctes (Cyclocoelinae Stossich, 1902 et Haematotrophinae Dollfus, 1948).

BASHKIROVA (1950) les situe dans la même sous-famille des Cyclocoelinae, mais dans 2 tribus différentes, celles des Cyclocoelea Witenberg, 1923 et Haematotrophea Witenberg, 1923.

DUBOIS (1959) considère *Haematotrephus* comme un sous-genre de *Cyclocoelum*.

BYCHOVSKAYA-PAVLOVSKAYA (1962) reconnaît 8 genres dans la sous-famille des Cyclocoelinae parmi lesquels *Cyclocoelum* et *Haematotrephus*.

YAMAGUTI (1971) admet 19 genres (et 2 sous genres) dans la sous-famille des Cyclocoelinae et parmi eux *Cyclocoelum* et *Haematotrephus*.

FEIZULLAEV (1980) subdivise à nouveau la sous-famille des Cyclocoelinae en 3 tribus: Cyclocoelini Feizullaev, 1980, Haematotrophini Feizullaev, 1980 et Hyptiasmini Feizullaev, 1980.

Cyclocoelum vicarium (Arnsdorff, 1908)

Figs 1, 2a, 2b

WITENBERG (1926) admet la validité de l'espèce *Cyclocoelum vicarium* (Arnsdorff, 1908).

JOYEUX ET BAER (1927) arguant de la plasticité habituelle des helminthes, des variations individuelles et des différences d'état physiologique des vers lors de leur fixation, réduisent le nombre des genres et des espèces et placent *C. vicarium* en synonymie avec *C. obscurum* (Leidy, 1887).

DOLLFUS (1948) accorde à *C. vicarium* dont il souligne les «amples variations individuelles» une place intermédiaire entre la sous-famille des Cyclocoelinae et celle des Haematotrophinae Dollfus, 1948.

BASHKIROVA (1950) reconnaît une vingtaine d'espèces de *Cyclocoelum*, parmi lesquelles *C. vicarium*; elle donne une clé de détermination fondée sur l'extension latérale des anses utérines, la position relative de l'ovaire et des testicules, l'importance des vitellogènes, la forme de la vessie excrétrice et la dimension relative du pharynx et de la ventouse buccale.

DUBOIS (1959) retient comme caractères discriminants entre les *Cyclocoelum* la situation du pore génital, le diamètre du pharynx, la position de l'intestin, et la topographie des vitellogènes. Il propose ensuite un vaste regroupement qui place *C. vicarium* en synonymie avec *C. ovopunctatum* Stossich, 1902.

BYCHOVSKAYA-PAVLOVSKAYA (1962) reconnaît seulement la validité de 6 espèces de *Cyclocoelum*, et considère *C. vicarium* comme synonyme de *C. mutabile* (Zeder, 1800).

YAMAGUTI (1971) dans la ligne de BASHKIROVA (1950), rétablit la plupart des espèces de *Cyclocoelum* et en particulier *C. vicarium*.

FEIZULLAEV (1980) n'admet que 2 espèces de *Cyclocoelum*: *C. mutabile* et *C. obscurum*, qu'il distingue par la largeur du ruban des vitellogènes et la position du pore génital par rapport au pharynx. Cet auteur considère *C. vicarium* comme synonyme de *C. obscurum*.

Synonymie: *Monostomum vicarium* Arnsdorff, 1908; *C. mehryi* Khan, 1935, et *C. ovopunctatum* selon Bashkirova (1950).

C. vicarium a été mis en synonymie avec *C. obscurum* par JOYEUX ET BAER (1927) et FEIZULLAEV (1980), avec *C. ovopunctatum* par DUBOIS (1959), avec *C. mutabile* par BYCHOVSKAYA-PAVLOVSKAYA (1962).

HÔTES et LOCALITÉS ANTÉRIEUREMENT MENTIONNÉS¹: *Erolia maritima*² au Labrador par ARNSDORFF (1908); *Numenius arquatus* et *Tringa alpina* en Europe par KOSSACK (1911); *Arquatella m. maritima* (cf. 2) au Labrador (Canada) et *Capella gallinago* en Inde par BASHKIROVA (1950).

HÔTE, LOCALITÉ, DATE DE LA RÉCOLTE ET OCCURRENCE: *Tringa nebularia*, capturé à Lomé (Togo) le 11 décembre 1981, hébergeait 3 *C. vicarium*.

HABITAT: Sac aérien (sans précision).

MATÉRIEL EXAMINÉ: 2 exemplaires montés in toto (n° 57, 58).

DIMENSIONS^{3, 4}: **L.** (mm) = 13,08 à 16,04 (moy. 14,56); **I.** (mm) = 2,04 à 3,16 (moy. 2,6); **Ph.** = 226 x 302 à 246 x 246 (moy. 236 x 274); **T. d.** (mm) = 11,94 x 239,26 à 14 x 293,26 (moy. 13,30 x 266,27); **T. a.** = 615 x 634 à 624 x 757 (moy. 619 x 695); **T. p.** = 596 x 738 à 690 x 889 (moy. 643 x 813); **P.** = 180 x 388; **Ov.** = 322 x 416 à 416 x 430 (moy. 369 x 423); **Oo.** = 255 x 284 à ? x 397 (moy. 255 x 340); **V.** (mm) = 123 x 12 à 170 x 15,12 (moy. 146,64 x 13,66); **F.** = 28 x 38 à 61 x 95 (moy. 52 x 71); **Oe.** = 61 x 135 à 85 x 142 (moy. 69 x 122).

CAS DU *Cyclocoelum* n° 56: Le même oiseau hôte hébergeait un 3^e *Cyclocoelum*, n° 56 (fig. 2b), qui ressemble aux précédents par sa forme générale. Cependant cet individu

¹ Les mentions induites par des mises en synonymies, ne sont pas prises en compte dans ce paragraphe.

² Cette espèce est actuellement placée dans le genre *Calidris* (J.-F. VOISIN comm. pers.).

³ **Abréviations:** les abréviations suivantes sont utilisées dans l'ensemble du travail. **Ac.** = acétabulum; **F.** = follicules vitellins; **L.** Longueur; **I.** = largeur; moy. = moyenne; **Oe.** = œuf; **Oes** = œsophage; **Oo.** = ootype; **Ov** = ovaire; **P.** = poche du cirre; **Ph.** = pharynx; **R. s.** = réceptacle séminal; **T. a.** = testicule antérieur; **T. d.** = tube digestif; **Tes.** = testicule; **T. p.** = testicule postérieur; **V.** = vitellogènes; **V. o.** = Ventouse orale; **V. s.** = vésicule séminale.

⁴ Les dimensions sont notées en micromètres, sauf indication particulière.

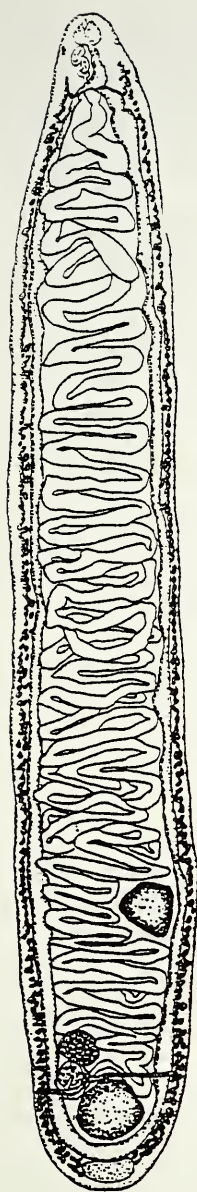
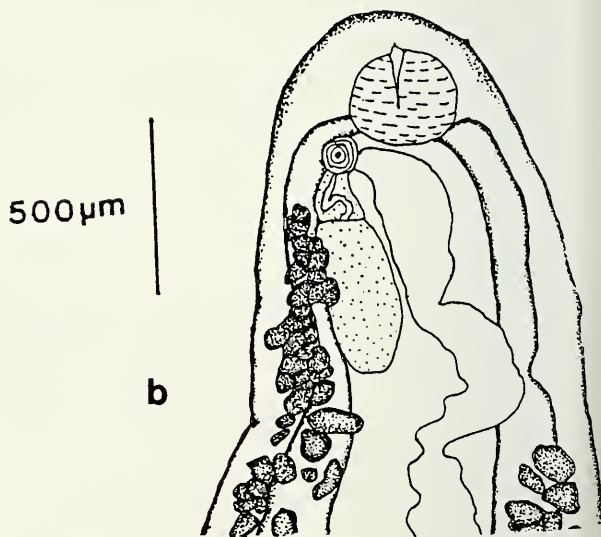
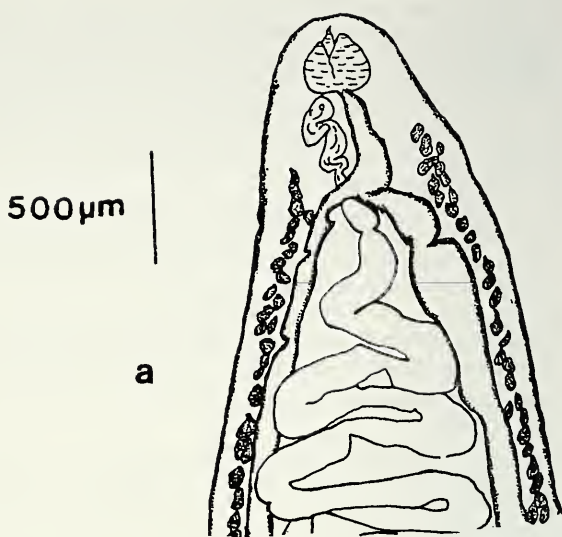


FIG. 1
Cyclocoelum vicarium (Arnsdorff, 1908), n° 58, face dorsale.



FIGS 2a-2b

2a. *Cyclocoelum vicarium* (Arnsdorff, 1908), n° 58, région antérieure, face ventrale.

2b. *Cyclocoelum vicarium* (Arnsdorff, 1908), n° 56, région antérieure, face dorsale. L'absence d'oesophage et le volume de la poche du cirre marquent la différence de ce spécimen avec le *C. vicarium* n° 58.

ne montre pas d'oesophage et sa poche du cirre est particulièrement développée (662 x 208 au lieu de 388 x 180), ce qui est exceptionnel dans le genre *Cyclocoelum* et peut résulter d'un artefact de préparation. Cependant ni la silhouette ni la configuration de l'écaillure n'indiquent de déformation; on ne peut exclure qu'il s'agisse simplement d'un *C. vicarium* atypique ou de la manifestation du polymorphisme intraspécifique.

DISCUSSION: Si on suivait la conception de FEIZULLAEV (1980) nos *Cyclocoelum*, dont le pore génital est postérieur au pharynx et les vitellogènes limités entre le bord extérieur des caecums et la marge du ver, seraient attribués à l'espèce *C. obscurum* (Leidy, 1887).

FEIZULLAEV (1980) rassemble dans la même espèce des vers dont le pore génital est opisthopharyngien, mésopharyngien et péranspharyngien⁵. Or selon DOLLFUS (1948), et DUBOIS (1959), ces nuances doivent être prises en compte pour l'identification des espèces.

La position de l'ovaire qui, chez nos *Cyclocoelum*, est accolé au testicule postérieur, ne correspond pas à la diagnose de *C. obscurum* chez qui il est équidistant des 2 testicules selon BASHKIROVA (1950). Cet auteur précise en outre que les vitellogènes de *C. obscurum* atteignent le pharynx, alors que chez nos *Cyclocoelum* ils dépassent de peu la bifurcation caecale.

Bien que la conception de FEIZULLAEV (1980) facilite l'affectation spécifique des espèces du genre *Cyclocoelum*, les regroupements proposés occultent le polymorphisme et, par voie de conséquence, le potentiel évolutif de ce genre. C'est pourquoi, tout autant que des démonstrations expérimentales ne viennent pas en contradiction, nous attribuons nos vers à une espèce distincte de *C. obscurum*.

Les exemplaires étudiés ici se rapprochent par certains caractères biométriques et par la disposition des gonades de *C. ovopunctatum* Stossich, 1902 trouvé chez *Tringa glareola* (L.) à Nyekonakpoe (Togo) par BOURGAT *et al.* (1984), mais ils en diffèrent par la position du pore génital (chez *C. ovopunctatum*, le pore génital est au niveau du 1/4 antérieur du pharynx, dans notre matériel il se situe plus en arrière, à 14 µm de l'extrémité postérieure du pharynx), par la taille des testicules, inférieure chez *C. ovopunctatum* (360 et 500 µm), par le rapport testicules/ovaire (1,2 et 1,6 chez *C. ovopunctatum*, 1,55 et 1,83 dans notre matériel), et par l'importance des vitellogènes qui dépassent la bifurcation caecale alors que chez *C. ovopunctatum* ils s'arrêtent à son niveau. Tous ces arguments nous permettent de ne pas attribuer notre *Cyclocoelum* à cette espèce.

⁵ DOLLFUS (1948, pp. 134, 135, 136) a utilisé les termes: «prosthépharyngien» = au niveau du bord antérieur du pharynx, ou plus en avant; «mésopharyngien» = au niveau du milieu du pharynx, ou presque; «opisthopharyngien» = au niveau du bord postérieur du pharynx, ou tout près du bord postérieur; «péranspharyngien» = nettement au-delà du pharynx, au niveau de la bifurcation intestinale. Selon DUBOIS (1959) les positions méso- et opistho- sont indistinctes. De plus, lorsque le pharynx est petit, et selon le degré d'extension de la région céphalique, le pore génital peut se déplacer par rapport à cet organe et apparaît tantôt opistho- ou mésopharyngien, tantôt prosthépharyngien (cas de *Haematotrephus brasilianum* Stossich, 1902).

La position de l'ovaire, contigu au testicule postérieur, l'étendue des vitellogènes, la position opisthopharyngienne du pore génital, les dimensions des œufs (grands), ainsi que du pharynx, l'identifient à l'espèce *C. vicarium* (Arnsdorff, 1908).

Cette découverte de *C. vicarium* au Togo est la première de cette espèce sur le continent africain.

Haematotrephus lanceolatum (Wedl, 1858)

Fig. 3

Synonymie: Le statut taxonomique de *Haematotrephus lanceolatum* (Wedl, 1858) a été plusieurs fois modifié.

Kossack (1911)⁶ lui donne comme synonymes, *Monostomum lanceolatum* Wedl, 1858, *M. mutabile* Diesing, 1858, *M. mutabile* Monticelli, 1892, *M. arcuatum* Brandes, 1892 et *Haematotrephus lanceolatum*, Stossich, 1902.

JOYEUX ET BAER (1927) considèrent *Cyclocoelum lanceolatum*⁷ comme *nomen nudum* car le type est perdu.

DOLLFUS (1948) répartit le genre *Haematotrephus* en 2 sous-genres *Haematotrephus* et *Uvitellina*, reconnaissant l'espèce *H. lanceolatum* (cf. 6) comme espèce type du sous-genre *Haematotrephus*.

DUBOIS (1959) réunit les espèces de Cyclocoelinae dont «l'ovaire est antérieur ou latéral par rapport aux testicules, ou encore situé entre eux» dans le genre *Cyclocoelum* qu'il subdivise en 3 sous-genres, *Cyclocoelum*, *Hyptiasmus* et *Haematotrephus*. Cet auteur considère, *Haematotrephus similis* Stossich, 1902, *H. consimilis* Nicoll, 1914, *H. adelphus* Johnston, 1916, *H. lobivanelli* Gupta, 1958, ainsi que plusieurs espèces du genre *Uvitellina* Witenberg, 1923, *U. pseudocotylea* Witenberg, 1923, *U. magniembria* Witenberg, 1923, *U. dollfusi* Tseng, 1930, *U. kerii* Yamaguti, 1933, *U. tageri* Yamaguti 1933, *U. macroisophaga* Hanun et Wilson, 1934, et l'espèce *Cyclocoelum titiri* Chatterji, 1958, comme synonymes de *Cyclocoelum* (*Haematotrephus*) *lanceolatum*.

BYCHOVSKAYA-PAVLOVSKAYA (1962) confirme les synonymies de *H. similis* Stossich, 1902 et *H. consimilis* Nicoll, 1914 avec *H. lanceolatum*.

DUBOIS (1965) identifie les *H. lanceolatum* cités par MACKO (1960) et MACKO ET FEIGE (1960) à *Cyclocoelum* (*Haematotrephus*) *kossacki* (Witenberg, 1923).

YAMAGUTI (1971) reconnaît *Haematotrephus* comme genre à part entière, dont il réhabilite toutes les espèces sauf *C. titiri* qu'il transfère dans le genre *Wardianum* Witenberg, 1923.

FEIZULLAEV (1980) range le genre *Haematotrephus* dans la tribu des Haematotrephini; l'espèce *H. lanceolatum* (cf. 6) reçoit comme synonyme *H. similis* Stossich, 1902. Cet auteur met *H. lanceolatum* sensu MACKO (1960) et MACKO ET FEIGE (1960) en synonymie avec *H. tringae* (Brandes, 1982)⁸. FEIZULLAEV (1980) met les espèces *Haematotrephus consimilis*⁹, *H. lobivanelli* (cf. 9), *Cyclocoelum titiri* (cf. 9) et *H. lanceolatum* sensu STOSSICH, 1902 et STUNKARD, 1966 en synonymie avec *Uvitellina adelphus* (Johnston, 1916) tribu des Hyptiasmini. Il place de même *Uvitellina kerii* Yamaguti, 1933 (cf. 9) et *U. tageri* Yamaguti, 1933 (cf. 9) en synonymie avec *U. vanelli* (Rudolph, 1819).

HÔTES et LOCALITÉS ANTÉRIEUREMENT MENTIONNÉS (cf. 1): WEDL (1858), chez *Himantopus h. himantopus* en Suisse; STOSSICH (1902), chez *H. h. himantopus* en Italie; BYCHOVSKAYA-PAVLOVSKAYA (1953 et 1962) chez *Erolia temminckii* (cf. 2) en Sibérie Occidentale, *Vanellus vanellus* et *Xenus cinereus* en URSS; BAER (1959), chez *H. h. himantopus* (L.) en République Démocratique du Congo; STUNKARD (1966), chez *Recurvirostra americana*, au Sud-Ouest des

⁶ Cet auteur écrit *H. lanceolatus*.

⁷ Ces auteurs placent le genre *Haematotrephus* en synonymie avec *Cyclocoelum*.

⁸ Cf. Supra la proposition de DUBOIS (1965).

⁹ DUBOIS (1959) plaçait cette espèce en synonymie avec *H. lanceolatum*.

USA; UKOLI (1968), chez *Himantopus h. himantopus* au Ghana; YAMAGUTI (1971), chez *Himantopus candidus*, en Italie, chez *H. melanopterus*, *H. rubropterus*, *Phylomachus pugnax* en Europe, chez *Terekia cinerea* et *Calidris temminckii* en Sibérie Orientale, chez *Capella stenura* et *Charadrius dubius* au Nord-Vietnam, chez *Lobivanellus indicus* aux Indes et chez *H. himantopus*, et *Hemiparva crassirostris*, en République Démocratique du Congo; FEIZULLAEV (1980), chez *Himantopus himantopus*, *Vanellus vanellus*, *Xenus cinereus*, *Tringa erythropus*, *T. totanus*, *T. nebularia*, *Calidris temminckii*, *Phylomachus pygnus*, *Charadrius hiaticus*, *Hemiparva crassirostris*, *Himantopus atropterus*, *H. rubropterus*, en Europe, en URSS et en Afrique (Égypte et Congo).

HÔTE, LOCALITÉ, DATE DE LA RÉCOLTE ET OCCURRENCE: *Himantopus himantopus*, capturé à Lomé-Aflao (Togo) le 1 février 1981, qui hébergeait 1 *Haematotrephus* ainsi que 7 *Athesmia*.

HABITAT: Sac aérien (sans précision).

MATÉRIEL EXAMINÉ: 1 exemplaire monté in toto (n° 54).

DIMENSIONS: **L.** (mm) = 15,5; **l.** (mm) = 2,36; **V. o.** = 260 x 341; **Ph.** = 377 x 415; **Oes.** = 132; **T. d.** (mm) = 14,45 x 345,75; **T. a.** = 662 x 388; **T. p.** = 747 x 568; **P.** = 411 x 274; **Ov.** = 350 x 331; **Oo.** = 388 x 236; **Oe.** = 52 x 132 à 85 x 189 (moy. 64 x 150).

DISCUSSION: Contrairement à DUBOIS (1959), YAMAGUTI (1971), admet que la position prétesticulaire de l'ovaire ainsi que la situation relative des testicules non séparés par l'utérus sont des caractères suffisants pour justifier la pleine validité du genre *Haematotrephus*. Cette argumentation, appuyée sur l'emplacement des organes est satisfaisante, nous la suivons.

La situation non contiguë des testicules, l'extension latérale des boucles utérines qui dépassent les caecums digestifs, se replient nettement vers l'arrière, et enveloppent les gonades, la situation opisthopharyngienne du pore génital et la structure des œufs dont la coque est mince, sont autant de caractères qui justifient l'attribution de notre spécimen à l'espèce *H. lanceolatum* (Wedl, 1858). Il se distingue de *H. tringae* Stossich, 1902 autre *Haematotrephus* d'Afrique occidentale, par des champs inter-caecaux étroits, des vitellogènes à follicules petits à très petits et la présence de miracidiums libres dans l'utérus.

Cette découverte au Togo d'*Haematotrephus lanceolatum* chez *Himantopus himantopus*, alors qu'il était connu chez le même hôte au Ghana, confirme la présence de ce parasite sur la côte du Bénin.

TYPHLOCOELINAE

Tracheophilus sisowi Skrjabin, 1913

Fig. 4

WITENBERG (1926) admet la validité de la sous-famille des Typhlocoelinae Harrah, 1922 avec 3 genres *Tracheophilus* Skrjabin, 1913, *Typhlocoelum* Stossich, 1902 et *Typhlultimum* Witenberg, 1926.

JOYEUX ET BAER (1927) ne subdivisent pas les Cyclocoelidae en sous-familles. Ils mettent le genre *Tracheophilus* en synonymie avec *Typhlocoelum*.

DOLLFUS (1948) élève la sous-famille des Typhlocoelinae au rang de famille, avec 2 genres *Typhlophilus* Lal, 1936 et *Typhlocoelum* divisé en 2 sous-genres, *Typhlocoelum* et *Tracheophilus*, tout en admettant que la suppression de ce sous-genre se justifierait.

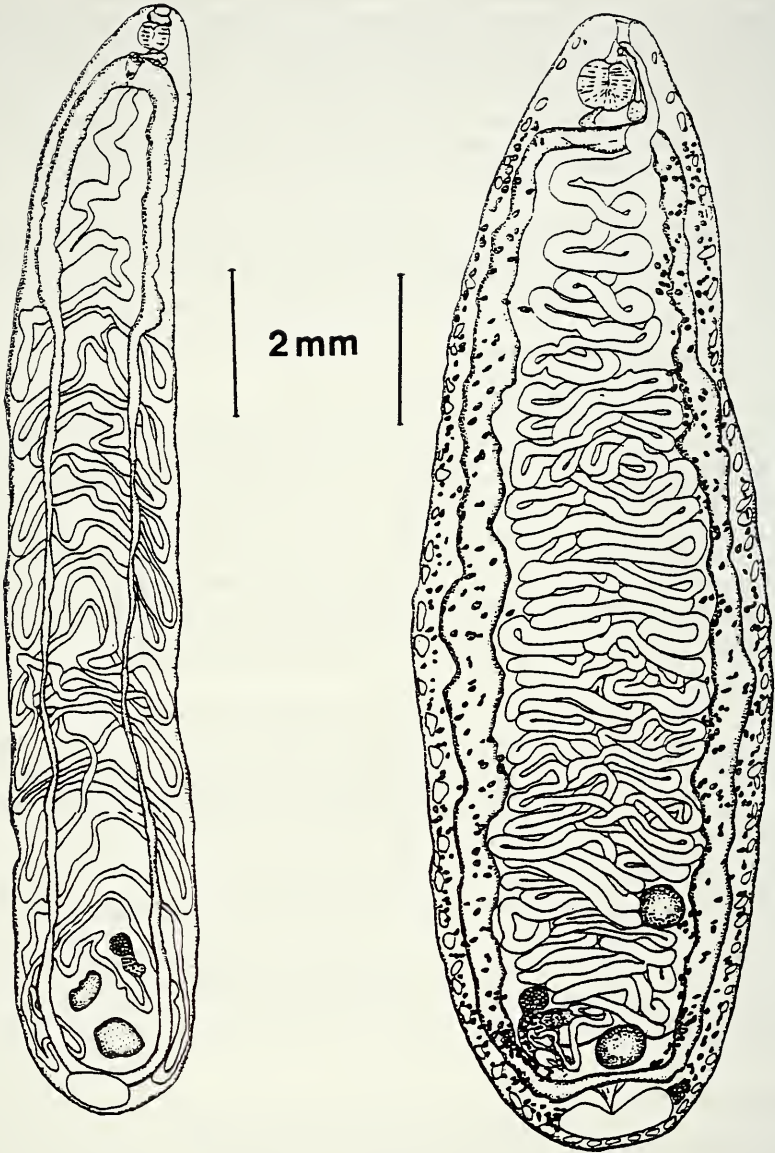


FIG. 3

Haematotrephus lanceolatum (Wedl, 1858), n° 54, face ventrale. Les vitellogènes sont discrets; sur notre préparation ils sont très peu visibles.

FIG. 4

Tracheophilus sisowi Skrjabin, 1913, n° 61, face dorsale.

BASHKIROVA (1950) ramène les Typhlocoelinae au rang de sous-famille avec 2 genres, *Tracheophilus* et *Typhlocoelum*.

DUBOIS (1959) à son tour, considère le genre *Tracheophilus* comme synonyme de *Typhlocoelum* et réhabilite le genre *Neivaia* Travassos, 1929 pour l'espèce *N. cymbium* (DIESING, 1850).

BYCHOVSKAYA-PAVLOVSKAYA (1962) admet la validité de la sous-famille des Typhlocoelinae avec 2 genres monospécifiques *Tracheophilus* et *Typhlocoelum*.

JAIN (1966) reconnaît le genre *Tracheophilus* qui se caractérise par la forme arrondie, et non pas lobée, des testicules et leur séparation par l'utérus.

YAMAGUTI (1971) confirme la subdivision des Typhlocoelinae en 2 genres, *Tracheophilus* et *Typhlocoelum*, et renvoie *Neivaia* en synonymie avec *Cyclocoelum*.

FEIZULLAEV (1980) en accord avec JOYEUX ET BAER (1927), DOLLFUS (1948) et DUBOIS (1959) considère *Tracheophilus* comme synonyme de *Typhlocoelum*. Ces auteurs motivent leur proposition en considérant que la lobation des testicules n'est pas un critère suffisamment constant pour séparer les genres *Tracheophilus* et *Typhlocoelum*.

Cependant SCOTT et al. (1981) démontrent expérimentalement, par des infestations croisées de canards appartenant aux genres *Anas* et *Aythya* à l'aide de métacercaires provenant de *Typhlocoelum* à testicules soit ronds soit lobés, que la forme des testicules se maintient quel que soit le genre de canard infesté. Il est donc légitime d'utiliser la lobation des testicules, caractère génétiquement fixé, dans la diagnose du genre *Tracheophilus* et de le valider.

Synonymie: L'espèce *Tracheophilus sisowi* Skrjabin, 1913 a été mise en synonymie avec *Typhlocoelum cymbium* (Diesing, 1850) par JOYEUX ET BAER (1927), et DOLLFUS (1948); DUBOIS (1959) et FEIZULLAEV (1980) l'ont mise en synonymie avec *Typhlocoelum sisowi*; BYCHOVSKAYA-PAVLOVSKAYA (1953 et 1962) la considère comme synonyme de *Tracheophilus cymbium* (Diesing, 1850).

HÔTES ET LOCALITÉS ANTÉRIEUREMENT MENTIONNÉS (cf. 1): *T. sisowi* est signalé chez *Anas platyrhynchos*¹⁰ en URSS et en France par SKRJABIN (1913), en URSS par IVANITZKAJA (1920), WITENBERG (1926), SZIDAT (1928) et RIJKOV (1956); en Europe, au Turkestan, et à Taiwan par MORISHITA (1929); en Hollande par BAUDET (1929); aux USA par GOWER (1938) et DUBOIS (1951); au Mexique par CABALLERO (1939); à Formose par YAMAGUTI et MITUNAGA (1943). Cette espèce est aussi signalée chez *Anas acuta* aux USA par MANTER et WILLIAMS (1928) et en Inde par JAIN (1966), chez *Netta rufina* en Suisse par DUBOIS (1959) et dans les genres *Aythya*, *Nyroca*, *Dafila*, *Netta* et *Anser* en Sibérie, au Tonkin et aux USA par YAMAGUTI (1971).

HÔTE, LOCALITÉ, DATE DE LA RÉCOLTE ET OCCURRENCE: *Gallinula angulata*, capturé au Togo le 13 décembre 1980, hébergeait 7 *Tracheophilus*.

HABITAT: Sac aérien (sans autre précision).

MATÉRIEL EXAMINÉ: 7 exemplaires montés in toto (55 et 59 à 64).

DIMENSIONS: **L.** (mm) = 11,47 à 19,67 (moy. 15,05); **l.** (mm) = 2,49 à 5,09 (moy. 4,21); **V. o.** = 236 à 369 (moy. 312); **Oe.** = 226 à 415 (moy. 332); **Ph.** = 492 x 586 à 653 x 804 (moy. 623 x 698); **R. s.** = 1892 x 378 à 359 x 946 (moy. 242 x 505); **T. a.** = 454 x 567 à 577 x 785 (moy. 577 x 697); **T. p.** = 321 x 605 à 681 x 861 (moy. 553 x 719); **P.** = 94 x 1078 à 199 x 1069 (moy. 197 x 1159); **Ov.** = 312 x 350 à 426 x 473 (moy. 367 x 417); **Oo.** = 246 x 530 (moy. 246 x 530); **V.** = 227 x 9696 à 943 x 1456 (moy. 773 x 11761); **F.** = 56 x 94 à 88 x 158 (moy. 78 x 123); **Oe.** = 56 x 94 à 57 x 114 (moy. 59 x 106).

¹⁰ *Anas boschas* est synonyme de *A. platyrhynchos* (J.-F. Voisin, comm. pers.).

DISCUSSION: Le genre *Tracheophilus* comprend 3 espèces, *T. hepaticus* (Sugimoto, 1919), *T. cymbium* (Diesing, 1850) et *T. sisowi*. Le *Tracheophilus* du Togo se différencie de *T. hepaticus* par la forme ovale des œufs et la moindre importance des vitellogènes qui ne se rejoignent pas postérieurement; ce caractère le distingue aussi de *T. cymbium*. Bien que ses vitellogènes soient moins étendus antérieurement, il s'identifie à *T. sisowi*, en particulier par la configuration de la poche du cirre et l'extension postérieure des vitellogènes.

Cette mention de *T. sisowi* est la première pour l'espèce, le genre et la sous-famille des Typhlocoelinae, en Afrique. *Gallinula angulata* est un hôte nouveau, *T. sisowi* étant auparavant surtout connu de canards.

LEUCOCHLORIDIIDAE

LEUCOCHLORIDIINAE

Leucochloridium actitis McIntosh, 1932

Fig. 5

Le genre *Leucochloridium* a fait l'objet d'une étude globale, par MCINTOSH (1932) qui reconnaît 11 espèces aux USA. Depuis cette date BYCHOVSKAYA-PAVLOVSKAYA (1951) a réduit le nombre d'espèces à 3, alors que BAKKE (1980) répartit à nouveau le genre en 3 sous-genres et donne 5 espèces pour le sous-genre *Leucochloridium*.

Dans l'état actuel des connaissances, la multiplicité des espèces apparaît comme une façon utile de représenter la situation de ce genre dans le monde.

Synonymie: *L. actitis* est mis en synonymie avec *L. cyanocittae* McIntosh, 1932 par KAGAN (1952), et avec *L. insigne* (Looss, 1899) par PAVLOV (1962).

BYCHOVSKAYA-PAVLOVSKAYA (1962) réhabilite l'espèce *L. actitis* et considère les *Distoma macrostomum* Rudolphi, 1803 de ZELLER (1874) et d'HECKERT (1889) comme ses synonymes. Cet auteur place aussi le *L. insigne* (Looss, 1899) de WITENBERG (1925) - mais pas *L. insignis* (Looss, 1899) - ainsi que *L. pricei* McIntosh, 1932, *L. varia* McIntosh, 1932, *L. melospizae* McIntosh, 1932, *L. sime* (Yamaguti, 1935), en synonymie avec *L. actitis*.

HÔTES ET LOCALITÉS ANTÉRIEUREMENT MENTIONNÉS (cf. 1): MCINTOSH (1932), signale *L. actitis* chez *Actitis macularia* au Michigan (Amérique du nord); KAGAN (1952), chez *Gallus domesticus*, *Passer domesticus*, *Agelaius phoeniceus* en Louisiane. BYCHOVSKAYA-PAVLOVSKAYA (1962), indique de nombreux hôtes de *L. actitis*: *Plegadis falcinellus*, *Anas acuta*, *Fulica atra*, *Pluvialis apricarius*, *Charadrius dubius*, *Vanellus vanellus*, *Tringa ochropus*, *T. glareola*, *T. totanus*, *T. stagnatilis*, *T. nebularia*, *Actitis hypoleucos*, *Numenius arquata*, *N. minutus*, *Limosa lapponica*, *L. limosa*, *Erolia subminuta*, *E. temminckii*, *Capella stenura*, *Philomachus pugnax*, *Phalaropus lobatus*, *Chlidonias leucoptera*, *Picoides tridactylus*, *Oriolus oriolus*, *Periparus ater*, *Parus atricapillus*, *Anthus trivialis*, *Turdus musicus*, *Sturnus vulgaris*, en URSS. YAMAGUTI (1971), indique la présence de *L. actitis* dans les genres *Fulica*, *Charadrius*, *Vanellus*, *Tringa*, *Philomachus*, *Hydrochelidon*, *Anas*, *Calidris*, en Sibérie et en Europe; CHERNOBAI (1974), chez *Corvus frugilegus* en URSS; SHALDYBIN *et al.* (1977), chez *Turdus pilaris*, *T. ruficollis*, en URSS.

HÔTE, LOCALITÉ ET DATE DE LA RÉCOLTE: *Tringa hypoleucos*, Lomé (Togo) le 5 décembre 1981.

HABITAT: Cloaque.

MATÉRIEL EXAMINÉ: 4 exemplaires montés in toto (n° 41 à 44).

DIMENSIONS: **L.** (mm) = 2,3 à 2,7 (moy. 2,5); **l.** (mm) = 1,25 à 1,3 (moy. 1,3); **V. o.** = 652 x 717 à 679 x 716 (moy. 666 x 739); **Ph.** = 161 x 208 à 186 x 208 (moy. 176 x

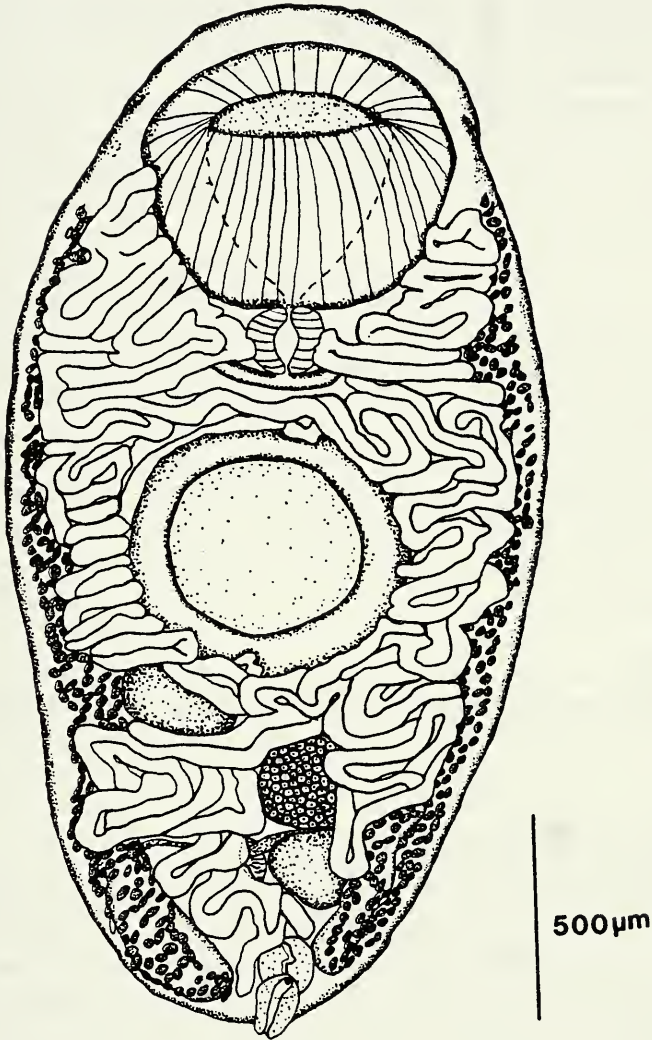


FIG. 5

Leucochloridium actitis McIntosh, 1932, n° 41, face dorsale.

201); **Ac.** = 652 x 671 à 667 x 690 (moy. 683 x 692); **R. s.** = ? x 70 à 75 x 85; **T. a.** = 131 x 244 à 227 x 264 (moy. 183 x 238); **T. p.** = 161 x 187 à 217 x 236 (moy. 182 x 212); **P.** = 128 x 203 à 170 x 260 (moy. 152 x 236); **Ov.** = 170 x 283 à 210 x 300 (moy. 219 x 240); **V.** = 94 x 2113 à 312 x 1886 (moy. 217 x 1936); **Oe.** = 19 à 26 (moy. 23).

DISCUSSION: Le *Leucochloridium togolais* diffère du *L. ghanensis* Fischthal et Thomas, 1971, décrit au Ghana pays voisin, par la position du testicule antérieur nettement

déporté sur la gauche et séparé de l'ovaire par plusieurs boucles utérines, les vitello-gènes plus étendus aussi bien antérieurement que postérieurement, les œufs non operculés, les boucles utérines beaucoup plus avancées, jusqu'à la moitié de la ventouse buccale et la cuticule lisse.

Ce *Leucochloridium* présente des similitudes avec *L. cyanocittae*, *L. actitis* (deux espèces Américaines) et *L. insigne* Looss, 1899 (espèce Asiatique). Il s'identifie à *L. actitis* par les dimensions du pharynx, plus petit que l'ovaire, et la disposition des testicules séparés par plusieurs boucles utérines, critères considérés comme discriminants par MCINTOSH (1932).

BAKKE (1976) démontre, en se basant sur la structure des sporocystes, que des populations néarctiques et paléarctiques peuvent être conspécifiques, et que la localisation géographique ne peut être retenue comme indication taxonomique. C'est pourquoi, bien que nos *Leucochloridium* soient d'origine africaine nous les attribuons, en ne prenant en compte que des critères morphologiques, à l'espèce *L. actitis* surtout connue d'Amérique et d'URSS.

La découverte de *L. actitis* au Togo est la première de cette espèce dans le continent Africain et dans la zone intertropicale d'où elle était jusqu'ici ignorée. *Tringa hypoleucos* est un hôte nouveau pour *L. actitis*.

DICROCOELIIDAE

DICROCOELIINAE

Les Dicrocoeliinae sont représentés ici par 3 tribus: Athesmiini, Brachylecithini, Eurytrematini.

ATHESMIINI

***Athesmia heterolecithodes* (Braun, 1899)**

Fig. 6

Le genre *Athesmia* LOOSS, 1899 a été créé pour l'espèce *A. (Distomum) heterolecithodes* (Braun, 1899). SKRJABIN et EVRANOVA (1952) donnent une clé pour 6 espèces, dans lesquelles ils n'incluent pas *A. reelfooti* Denton (in PETRI, 1942) qui est cependant mentionné. FREITAS (1961) confère un statut monospécifique au genre *Athesmia* en considérant toutes les espèces du genre synonymes d'*A. heterolecithodes*. Yamaguti (1971) réhabilite l'ensemble des espèces, *A. foxi* Goldberger et Crane, 1911 et *A. parkeri* Pérez Vigueras, 1942, étant parasites de Mammifères.

Synonymie: *Distomum heterolecithodes* Braun, 1899, selon LOOSS, 1899 cité par MCINTOSH (1937). *A. atilae* Travassos, 1917, *A. pricei* McIntosh, 1937, *A. rudecta* (Braun, 1901), *A. butensis* Petri, 1942, *A. wehri* McIntosh, 1937, *A. jolliei* Schell, 1957, *A. foxi* et *A. parkeri* sont mis en synonymie avec *A. heterolecithodes* par FREITAS (1961) de même que *A. reelfooti* par DENTON et BYRD (1951) et *A. jolliei* par LUMSDEN et ZISCHKE (1963).

HÔTES ET LOCALITÉS ANTÉRIEUREMENT MENTIONNÉS (cf. 1): BRAUN (1899), chez *Porphyrio porphyrio* aux USA et à Madagascar et chez *Gallinula chloropus* aux USA; JACOBY (1899), chez *Gallinula chloropus* à l'Est de la Russie; ODHNER (1911), chez *Himantopus candidus* et *Para africana* en Egypte; DENTON et BYRD (1951), chez *Gallinula chloropus cachinnans* aux USA; GINETSINSKAYA (1952) cité par NASIR *et al.* (1969), chez *Fulica atra* en URSS; SKRJABIN et EVRANOVA (1952), chez *Porphyrio porphyrio* et *Gallinula chloropus* aux USA; MYERS *et al.* (1960), chez *Ptolostomus afer* au Soudan; LUMSDEN et ZISCHKE (1963), chez *Gallinula chloropus*

et chez *Rallus elegans* en Louisiane; FAUST (1966), chez *Gallicix cinerea* en Chine; BYRD *et al.* (1967), chez *Meleagris gallopavo silvestris*, *Bonasa umbellus umbellus*, *Rallus longirostris* aux USA et chez *Nothura maculosa* et *N. darwini* en Argentine; NASIR *et al.* (1969), chez *Cerdocyon thous* (L.) au Vénézuéla; YAMAGUTI (1971), chez *Cerdocyon thous* (L.) au Vénézuéla, ainsi que chez les Oiseaux des rivages (*Himantopus himantopus*, *Phyllopezus africanus*, *Ortygonax*, *Jacana*, *Guira*, *Mauroornis phoenicurus javanicus*) en Europe, Egypte, Madagascar, USA, Brésil et Malaisie; MARTINEZ et BINDA (1992), chez *Myocastor coypus* en Argentine.

HÔTE, LOCALITÉ ET DATE DE LA RÉCOLTE: *Himantopus himantopus*, capturé à Lomé-Aflao (Togo) le 2 janvier 1981.

HABITAT: Canaux biliaires.

MATÉRIEL EXAMINÉ: 7 exemplaires montés in toto (n° 45 à 51).

DIMENSIONS: **L.** (mm) = 5,4 à 7,3 (moy. 6,5); **l.** (mm) = 0,52 à 0,7 (moy. 5,3); **V. o.** = 264 x 281 à 309 x 360 (moy. 294 x 309); **Ph.** = 64 x 71 à 73 x 97 (moy. 71 x 81); **Oes.** = 189 à 340 (moy. 282); **Ac.** = 208 x 236 à 266 x 270 (moy. 244 x 256); **R. s.** = 53 x 69 à 75 x 146 (moy. 76 x 108); **T. a.** = 101 x 283 à 193 x 330 (moy. 155 x 282); **T. p.** = 169 x 225 à 187 x 402 (moy. 199 x 306); **P.** = 75 x 284 à 94 x 284 (moy. 89 x 269); **Ov.** = 187 x 225 à 195 x 284 (moy. 213 x 218); **V.** = 112 x 2658 à 104 x 3405 (moy. 153 x 2592); **F.** = 14 x 52 à 19 x 88 (moy. 20 x 72); **Oe.** = 20 x 33 à 20 x 36 (moy. 22 x 33); Distance de l'extrémité du caecum droit à l'extrémité postérieure du corps = 338 à 813 (moy. 608); Distance de l'extrémité du caecum gauche à l'extrémité postérieure du corps = 709 à 1513 (moy. 962).

DISCUSSION: La forme et la disposition relative des glandes génitales, ainsi que l'extension des vitellogènes écarte les *Athesmia* étudiés ici de la plupart des autres espèces du genre. Il reste à les comparer à *A. wheri*, *A. pricei*, et *A. heterolecithodes*.

Nos *Athesmia* se rapprochent de *A. wehri* par la forme lobée des testicules mais ils en diffèrent par la taille, la forme du corps (*A. wehri* est allongé, lancéolé, largeur maximale au niveau du milieu du corps), les dimensions des deux ventouses et du pharynx, l'emplacement de l'acétabulum, le rapport testicule/ovaire, la taille du testicule postérieur qui occupe tout l'espace intercaecal chez *A. wehri*, les dimensions du réceptacle séminal ainsi que celles de la poche du cirre.

Les *Athesmia* du Togo rappellent *A. pricei*, par la forme générale, les dimensions du corps, celles des ventouses, du pharynx, du réceptacle séminal, de la poche du cirre et des œufs; les similitudes concernent aussi l'emplacement de l'acétabulum, le trajet de l'utérus et les rapports testicules/ovaire. Mais ils en diffèrent fondamentalement par la forme lobée des testicules et de l'ovaire qui, chez *A. pricei*, sont régulièrement ovales.

Les *Athesmia* du Togo présentent avec *A. heterolecithodes*¹¹ quelques divergences mineures en particulier au niveau de l'extension des vitellogènes et du diamètre de l'ovaire, mais ils présentent des similitudes majeures comme la lobation des

¹¹ Nous prenons comme élément de comparaison, la description donnée par DENTON et BYRD, 1951 (hôte: *Gallinula chloropus cachinnans* Bangs).

testicules et de l'ovaire, l'allure générale et certains rapports biométriques (rapport ventouse): pour cela nous les identifions à l'espèce *A. heterolecithodes* (Braun, 1899).

Les œufs d'*A. heterolecithodes* du Togo ne sont pas operculés, ce caractère les différencie des spécimens décrits par FREITAS (1961) et par MARTINEZ et BINDA (1922) et provenant de mammifères.

Avec cette découverte au Togo, l'aire de répartition d'*A. heterolecithodes* s'étend à l'Afrique intertropicale occidentale.

BRACHYLECITHINI

Brachylecithum (Brachylecithum) togoensis n. sp.

Fig. 7

HÔTE, LOCALITÉ ET DATE DE LA RÉCOLTE: *Numida meleagris*, capturé à Dapaon (Nord Togo) le 19 avril 1976.

HABITAT: Canaux biliaires.

MATÉRIEL EXAMINÉ: 4 exemplaires montés in toto (n° 37 à 40).

DESCRIPTION: Corps mince, de forme allongée, cuticule lisse; ventouse buccale et acétabulum présents, ce dernier situé dans le premier 1/3 du corps; on remarque l'absence, chez tous ces individus, de processus ou expansions bilatérales sur l'acétabulum, "auricules" selon DOLLFUS (1957), caractère typique chez plusieurs espèces de ce genre.

APPAREIL DIGESTIF: La bouche s'ouvre dans la ventouse buccale, subterminale; pharynx subsphérique, tenu, le prépharynx est presque inexistant. L'oesophage, bien développé, se continue par 2 caecums digestifs, de diamètre variable, à paroi fine, transparente et grêle; ils cheminent parallèlement aux côtés du corps mais n'atteignent pas l'extrémité postérieure; ils sont dorsaux à l'utérus et largement masqués par les vitellogènes.

APPAREIL GÉNITAL MÂLE: Les testicules sont médians, de forme arrondie, disposés en tandem juste après la poche du cirre dans le premier tiers de l'animal, séparés par plusieurs boucles utérines. La poche du cirre, piriforme, est entièrement contenue dans l'espace limité par l'acétabulum et les deux branches digestives, en position prétesticulaire, elle s'étend selon l'axe longitudinal du corps. La vésicule séminale est interne, très contournée, le pore génital péranspharyngien (cf. 5).

APPAREIL GÉNITAL FEMELLE: L'ovaire, de forme légèrement ovale est en position médiane, situé postérieurement au testicule postérieur dont il est séparé par l'utérus. Les dimensions de l'ovaire se rapprochent de celles des testicules.

L'utérus très long, circonvolutionné, est rempli d'œufs. Les boucles utérines occupent la totalité de l'espace postacétabulaire et intracaecal laissé libre par les organes génitaux et digestifs. Certaines boucles utérines peuvent déborder sur l'espace extracaecal. L'utérus n'entoure pas entièrement les testicules et l'ovaire; il est ventral aux caecums.

Les follicules vitellogènes sont gros, irréguliers, disposés en arrière de l'ovaire en 2 champs longitudinaux dorsaux à l'utérus; ils sont extra et intracaecaux; on en dénombre 17 à gauche, 2 médians et 14 à droite. Les œufs, de petite taille, ne sont pas operculés.



FIG. 6
Athesmia heterolecithodes (Braun,
 1899), n° 51, face dorsale.

FIG. 7
Brachylecithum togoensis n. sp.,
 n° 38, face dorsale.

DIMENSIONS: **L.** (mm) = 4,716; **I.** (mm) = 0,4; **V. o.** = 178 x 170 à 227 x 227 (moy. 200 x 203); **Ph.** = 45 x 76 à 57 x 85 (moy. 51 x 74); **Oes.** = 217 à 307 (Moy. 254); **Ac.** = 180 x 180 à 217 x 222 (moy. 195 x 197); **T. a.** = 189 x 189 à 189 x 198 (moy. 189 x 194); **T. p.** = 132 x 141 à 198 x 208 (moy. 170 x 176); **P.** = 64 x 205 à 85 x 213 (Moy. 72 x 197); **Ov.** = 141 x 144 à 179 x 208 (moy. 160 x 176); **V.** = 104 x 463 à 170 x 595 (moy. 137 x 529); **F.** = 38 x 109 à 41 x 108 (moy. 39 x 108); **Oe.** = 14 x 28 à 16 x 29 (moy. 15 x 29).

DISCUSSION: L'étendue des vitellogènes limités à la zone postovarienne, la brièveté des caecums, qui n'atteignent pas la région postérieure, sont des caractères qui, en accord avec SKRJABIN et EVRANOVA (1952), SKRJABIN (1970), YAMAGUTI (1971), SITKO (1994), MACKO, MACKOVA et HANZELOVA (1996) rattachent ces *Dicrocoeliidae* au genre *Brachylecithum* Shtrom, 1940.

La séparation de l'ovaire et des testicules par l'utérus les attribue au sous-genre *Brachylecithum* (*Brachylecithum*) Yamaguti, 1971.

Ces *Brachylecithum* du Togo se différencient des autres espèces du genre par plusieurs caractères morphologiques, biométriques, le nombre des follicules vitellins et la taille des œufs.

La forme et les dimensions du corps, les dimensions de la ventouse buccale et du pharynx, la distance de la ventouse orale à l'acétabulum sont proches de celles de *B. microtesticulatum* Timon-David, 1955, mais les *Brachylecithum* du Togo diffèrent de cette espèce par la taille de l'acétabulum, le rapport ventousaire, le rapport ventouse orale/pharynx, les dimensions de l'oesophage, la position relative des testicules, les dimensions de la poche du cirre, les dimensions des œufs, et la portion d'utérus séparant l'ovaire du testicule postérieur; chez *B. microtesticulatum* 2 à 4 anses s'immiscent entre ces 2 gonades sans les contourner (KOSTADINOVA, 1996), alors que chez nos spécimens l'utérus passe une seule fois et contourne le testicule postérieur.

Nos vers se rapprochent du *B. filum*¹² (Dujardin, 1945) par la forme et la trajectoire de l'utérus, mais en diffèrent par la taille, les rapports, **Vo/Ac** (0,8 chez *B. filum*, 1 chez notre matériel), **Vo/Ph** (2,6 à 3,5 chez *B. filum*, 2,8 à 3,9 chez nos vers) les rapports étendue des vitellogènes/longueur du corps (0,18 chez *B. filum*, 0,11 du côté droit, 0,13 du côté gauche de notre animal), écartement des deux ventouses longueur du corps (0,09 chez *B. filum*, 0,11 chez nos vers), ainsi que par la taille des œufs qui, chez ce ver, varie de 49 x 26 à 37 x 58 µm, ce qui est clairement supérieur aux dimensions des œufs du *Brachylecithum* togolais.

En conclusion, le *Brachylecithum* parasite de *Numida meleagris* au Togo s'écarte de chacune des espèces connues par au moins un caractère significatif, ce qui permet de le reconnaître comme espèce nouvelle que nous proposons de nommer *Brachylecithum* (*B.*) *togoensis*. Il est l'un des rares représentants du genre découverts en Afrique après *B. alfortense* (Railliet, 1900) au Maroc par DOLLFUS (1954) et *B. megacotyle* (Baer, 1959), en République Démocratique du Congo. La Pintade est un hôte nouveau pour le genre *Brachylecithum*.

¹² Nous prenons comme élément de comparaison, la description la plus détaillée, celle donnée par SHTROM et SONDAK (1935), d'exemplaires parasites de *Passer* sp. provenant d'Azerbaïdjan.

EURYTREMATINI

Zonorchis microrchis (Travassos, 1916)

Fig. 8

Dans la famille des Dicrocoeliidae le genre *Zonorchis* voisin du genre *Lyperosomum* Looss, 1899, a été créé par TRAVASSOS (1944). Aujourd'hui il comporte une trentaine d'espèces parasites d'Oiseaux et de Mammifères.

Synonymie: *Platynosomum microrchis* Travassos, 1916 selon TRAVASSOS (1944).

HÔTES ET LOCALITÉS ANTÉRIEUREMENT MENTIONNÉS: TRAVASSOS (1944), chez *Laterallus melanophaius*, *L. viridis viridis*, *Aramidés cajanea*, *A. mangle* au Brésil.

HÔTE, LOCALITÉ, DATE DE LA RÉCOLTE ET OCCURRENCE: *Crecopsis egregia*, capturé à Kové (Togo), hébergeait 11 *Zonorchis*.

HABITAT: Intestin.

MATÉRIEL EXAMINÉ: 11 exemplaires montés in toto (n° 26 à 36).

DIMENSIONS: **L.** (mm) = 3,773 à 5,584 (moy. 4,719); **l.** (mm) = 0,820 à 1,307 (moy. 980,12); **V. o.** = 284 x 331 à 340 x 397 (moy. 326 x 368); **Ph.** = 112 x 120 à 142 x 170 (moy. 119 x 137); **Oes.** = 123 x 189 à 114 x 255 (moy. 118 x 175); **Ac.** = 520 x 662 à 690 x 738 (moy. 615 x 663); **R. s.** = 57 x 66 à 113 x 142 (moy. 81 x 105); **Tes. gauche** = 198 x 217 à 340 x 455 (moy. 242 x 309); **Tes. droit** = 189 x 350 à 321 x 406 (moy. 237 x 298); **P.** = 75 x 189 à 94 x 283 (moy. 94 x 254); **Ov.** = 142 x 189 à 208 x 236 (moy. 258 x 350); **V.** = 71 x 2452 à 208 x 1886 (moy. 123 x 1800); **F.** = 35 x 65 à 47 x 94 (moy. 44 x 44); **Oe.** = 19 x 26 à 21 x 33 (moy. 20 x 29).

DISCUSSION: Parmi les espèces les plus proches du *Zonorchis* du Togo on trouve:

Z. dollfusi Richard, 1962 (chez *Coracina cinerea cinerea* de Madagascar), qui en diffère cependant, par la taille des ventouses, le rapport ventousaire (0,33-0,2 chez *Z. dollfusi*), les dimensions des testicules, de l'ovaire et des œufs.

Z. clathratum (Deslongschamps, 1824) diffèrent par un œsophage pratiquement absent, des vitellogènes commençant au niveau de la partie postérieure de l'ovaire et beaucoup plus étendus, le rapport ventousaire, et les dimensions des œufs.

Nos vers s'identifient à *Z. microrchis* (Travassos, 1916), par l'ensemble de leurs caractères et surtout par: le rapport ventousaire voisin de 0,55, la longueur voisine de 4,8 mm, la position des caecums et leur légère dissymétrie, ainsi que par la disposition générale des vitellogènes.

Avec cette découverte au Togo, l'aire de répartition de *Zonorchis microrchis* n'est plus limitée à l'Amérique du Sud, mais s'étend à l'Afrique de l'Ouest. *Crecopsis egregia* est un nouvel hôte, dont la niche écologique est analogue à celle des Oiseaux hôtes brésiliens (*Laterallus* et *Aramidés*): habitats marécageux et forêt humides, régimes alimentaires composés de petites proies, mollusques, reptiles, insectes, vers...

STOMYLOTREMATIDAE

Stomylotrema pictum (Créplin, 1837)

Figs 9a et 9b

Le genre *Stomylotrema* Looss, 1900 apparaît rarement dans la littérature, YAMAGUTI (1971) recense 15 espèces; depuis cette date, 2 espèces ont été décrites en Inde, *S. srivastavi*

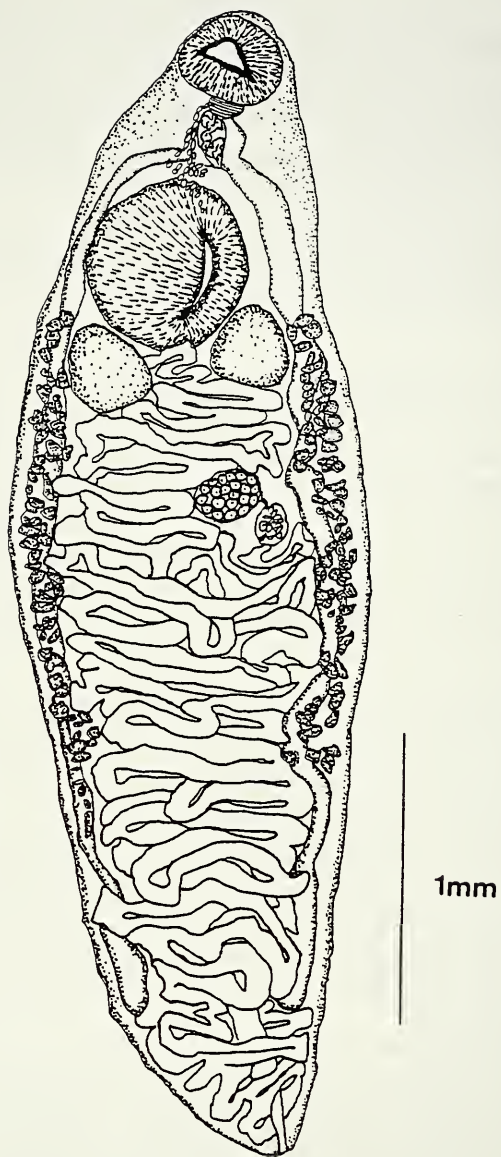


FIG. 8

Zonorchis microrchis (Travassos, 1916), n° 36, face dorsale.

Agrawal, 1976, en Inde, dans l'intestin de *Bubulcus ibis* et *S. multivitellaria* Singh et Prasad, 1979, chez un poisson.

Synonymie: *Distomum pictum* Creplin, 1837 selon BRAUN (1901).

HÔTES ET LOCALITÉS ANTÉRIEUREMENT MENTIONNÉS (cf. 1): BRAUN (1901), chez *Ciconia alba* Creplin (1837) en Europe; Braun (1902), chez *Ciconia ciconia* en Europe, selon RICHARD (1963); RICHARD (1963), chez *Tyto alba affinis* et *Corvus scapularis* à Madagascar.

HÔTE, LOCALITÉ, DATE DE LA RÉCOLTE, ET OCCURRENCE: L'hôte *Tringa nebularia*, capturé à Lomé (Togo), 12 décembre 1989, hébergeait aussi les *Cyclocoelum* étudiés plus haut et 2 *Stomylotrema*.

HABITAT: Cloaque.

MATÉRIEL EXAMINÉ: 2 exemplaires montés in toto (n° 52, 53)

DIMENSIONS du spécimen n° 52 (fig. 9a): **L.** (mm) = 2,73; **l.** (mm) = 1,546; **V. o.** = 832 x 899; **Ph.** = 236 x 258; **Ac.** = 908 x 932; **Tes. droit** = 269 x 274; **Tes. gauche** = 236 x 284; **P.** = 132 x 733; **V. s.** = 47 x 75; **Ov** = 283 x 331; **Oo.** = 95 x 151; **F.** = 75 x 135 à 94 x 189 (moy. 96 x 138); **Oe.** = 20 x 22 à 22 x 34 (moy. 22 x 29).

MORPHOANATOMIE: Ce *Stomylotrema* répond à la description de RICHARD (1963), il en diffère seulement par un léger écart dans le nombre des vitellogènes, 9 à droite au lieu de 7, et 10 à gauche au lieu de 9.

DISCUSSION: Le *Stomylotrema* du Togo s'accorde au type de CRÉPLIN (1837), redécrit par RICHARD (1963), par les dimensions du corps, des organes génitaux et des œufs ainsi que par la trajectoire de l'utérus. Bien que le nombre, la disposition et la forme des vitellogènes en diffèrent très légèrement, nous l'attribuons à *S. pictum* (Créplin, 1837).

CAS DU SPÉCIMEN n° 53 (fig. 9b):

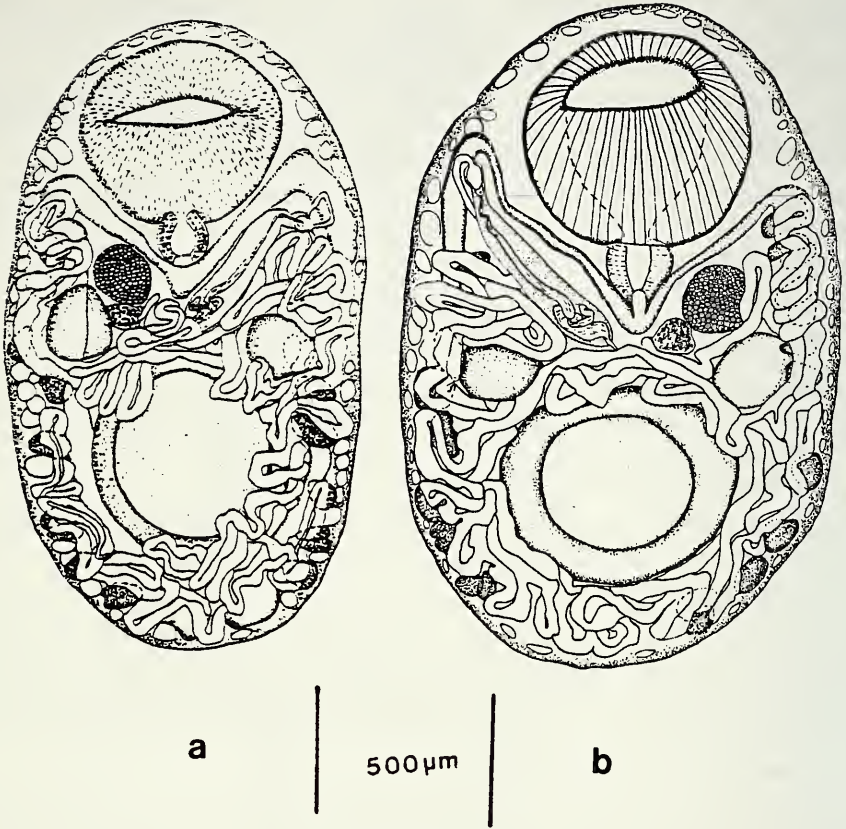
DIMENSIONS: **L.** = 2,6 (mm); **l.** = 1,745 (mm); **V. o.** = 837 x 899; **Ph.** = 236 x 265; **Ac.** = 842 x 998; **Tes. droit** = 265 x 340; **Tes. gauche** = 236 x 340; **P.** = 142 x 870; **V. s.** = 26 x 80; **Ov.** = 255 x 284; **Oo.** = 146 x 151; **F.** = 66 x 113 à 94 x 217 (moy. 85 x 168); **Oe.** = 15 x 33 à 18 x 30 (moy. 17 x 32).

On peut noter que les dimensions des testicules, de l'ovaire, de l'ootype et celles des œufs marquent une petite différence avec celles du n° 52.

MORPHOANATOMIE: Elle correspond à celle du ver n° 52 sauf que les follicules vitellins sont de 8 à droite et 12 à gauche au lieu de 9 à droite et 10 à gauche, et qu'une boucle de l'utérus sépare l'ovaire et le testicule gauche ce qui n'est pas le cas du ver n° 52.

DISCUSSION: Malgré une légère différence dans le nombre des vitellogènes et dans le parcours de l'utérus, nous rattachons les 2 *Stomylotrema* du Togo à la même espèce *S. pictum* (Creplin, 1837), car ils proviennent tous les 2 du même organe du même hôte. Leur écart morphologique met en évidence le polymorphisme de ce genre d'helminthes et donc la "fragilité" de certains arguments taxonomiques.

Tringa nebularia est un hôte nouveau pour *S. pictum*; la présence de *S. pictum* était connue à Madagascar (RICHARD 1963) mais cette découverte est la première de l'espèce sur le continent Africain proprement dit.



FIGS 9a, 9b

9a. *Stomylotrema pictum* (Creplin, 1837), n° 52, face dorsale. - 9b. *Stomylotrema pictum* (Creplin, 1837), n° 53, face ventrale. La séparation de l'ovaire et du testicule gauche par l'utérus, et le nombre plus élevé des follicules vitellins, marquent une différence avec l'individu n° 52.

CONCLUSION

Cette étude améliore la connaissance des Trématodes d'Oiseaux de la Côte du Bénin auxquels, dans les 3 dernières décennies, peu de contributions avaient été consacrées: UKOLI (1968), FISCHTHAL et THOMAS (1971), BOURGAT *et al.* (1984).

Une nouvelle espèce est décrite: *Brachylecithum* (*B.*) *togoensis* n. sp., parasite de la Pintade, *Numida meleagris*. Il est le premier représentant du genre en Afrique intertropicale.

La détermination des *Cyclocoelum* demande confirmation; cette difficulté rejoint celle rencontrée par les auteurs antérieurs sur le choix des caractères morphoanatomiques discriminants et du niveau taxonomique à attribuer aux différents ensembles phénotypiques.

En ce qui concerne les hôtes, *Crecopsis egregia* est un hôte nouveau pour *Zonorchis microrchis*, *Gallinula angulata* pour *Tracheophilus sisowi*, *Tringa hypoleucos* pour *Leucochloridium actitis*, *Numida meleagris* pour l'ensemble du genre *Brachylecithum* et *Tringa nebularia* pour *Stomylotrema pictum*.

Au plan biogéographique, les aires de 5 espèces sont étendues pour la première fois au continent africain: celle de *Cyclocoelum vicarium*, deuxième *Cyclocoelum* du Togo après *C. ovopunctatum*, celles de *T. sisowi*, de *Z. microrchis*, et de *S. pictum* précédemment connu de Madagascar mais pas du continent africain et celle de *L. actitis*, qui rejoint *L. ghanensis* sur la côte du Bénin.

L'aire d'*A. heterolecithodes* jusqu'ici limitée à l'Égypte et Madagascar, est étendue à l'Afrique intertropicale occidentale.

Haematotrephus lanceolatum, déjà recensé au Ghana par UKOLI (1968) et retrouvé au Togo n'apparaît plus comme un élément exceptionnel de la faune Ouest Africaine.

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Psélaphides paléarctiques. Notes taxonomiques et faunistiques (Coleoptera Staphylinidae Pselaphinae)

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Palaeartic pselaphids. Taxonomic and faunistic notes (Coleoptera Staphylinidae Pselaphinae). - New synonymies for genera (7) and species (55 in 24 genera), designation of lectotypes (26 in 13 genera), replacement names (3), revalidation of a new genus, species (17 in 5 genera) and sub-species (4 for 1 species), transfers of 2 genera and species (43) and new distributional records (5) are provided. *Trissemus clavatus* (Motschulsky) and *Tychobythinus clermonti* (Jeannel) are redescribed. The Palaeartic species of the genera *Pselaphus* Herbst, *Dicentrius* Reitter, *Pselaphogenius* Reitter and *Afropselaphus* Jeannel are listed and a key to distinguish the genera *Dicentrius* Reitter, *Pselaphogenius* Reitter and *Afropselaphus* Jeannel is provided.

Key-words: Coleoptera - Staphylinidae - Pselaphinae - taxonomy - Palaeartic.

INTRODUCTION

La rédaction du prochain "The Catalogue of the order Coleoptera of the Palaeartic region" me donne l'occasion de publier les notes diverses qui se sont accumulées dans mes dossiers au cours des dix dernières années : nouveaux synonymes, noms de remplacement pour les homonymes, réhabilitations de taxa tombés en synonymie et espèces nouvelles pour la région paléarctique.

Chez les Psélaphides, les espèces sont généralement bien définies par tout un ensemble de caractères. Les différences interspécifiques sont particulièrement grandes avec l'édéage. Les sous-espèces que j'ai décrites ou reconnues ne diffèrent de l'espèce nominale que par des caractères plus atténués, mais toujours stables, que ce soit pour la morphologie extérieure ou l'édéage. Ces différences, même petites, sont indépendantes des variations individuelles ou du polymorphisme qui existe chez certains Psélaphides. En fait mes "sous-espèces" des années 1960-1980 sont de bonnes espèces d'après les critères actuels de la systématique.

CASTELLINI (1997) a fait tomber en synonymie 37 sous-espèces, avec des arguments que j'ai peine à comprendre. Il démontre par de nombreuses figures que l'édéage est identique d'une sous-espèce à l'autre; c'est vrai et je l'ai moi-même écrit pour *Brachygluta globulicollis* par exemple; mais Castellini néglige d'autres caractères.

tères, notamment les caractères sexuels secondaires, "una variabilita riconducibile al polimorfismo" et la répartition des taxa. Je dois réfuter les décisions prises par mon collègue pour les espèces que j'ai jadis soigneusement étudiées.

J'ai pu voir presque tous les "types" signalés dans ce travail. Seuls les "types" non localisés ou accompagnés d'un point d'interrogation (?) ont échappé à mes recherches.

EUPLECTINI

Euplectus decipiens var. *caspicus* Raffray (1910: 210. Holotype ♂: Mus. Paris. Loc. typ.: Iran, Haramat au bord de la mer Caspienne). Il s'agit d'une bonne espèce du groupe de l'*E. bescidicus* Reitter.

Euplectus crassus var. *scillarum* Normand (1904: 211. Syntype ♂: Coll. Normand, Tunis. Loc. typ.: Tunisie, El Feidja). Pour JEANNEL (1956: 45), cette forme n'est qu'un synonyme de l'*Euplectus afer* Reitter. C'est en réalité une bonne espèce du groupe de l'*E. bescidicus* Reitter.

Euplectus mouzaïensis Jeannel (1956: 49. Syntype ♂: Mus. Paris. Loc. typ.: Algérie, Massif des Mouzaïa) n'est qu'un synonyme de l'*E. curvipes* Peyerimhoff, 1906 (**syn. nov.**).

Euplectus pulcher Motschulsky (1851: 499. Syntype ♂: Mus. Berlin. Loc. typ.: Indes Orientales) n'est pas seulement "très voisin de l'*Eu. nanus*" comme indiqué dans la description originale, mais identique à celui-ci. *E. pulcher* Motschulsky tombe ainsi dans la synonymie de l'*E. nanus* (Reichenbach, 1816) (**syn. nov.**). Reste à savoir si l'exemplaire en question provient vraiment des Indes Orientales...

Euplectus bonvouloiri Reitter, 1881. CASTELLINI (1997: 107) a fait tomber dans la synonymie de *bonvouloiri* les sous-espèces *narentinus* Reitter, 1881, *felschei* Reitter, 1887, *siculus* Raffray, 1910 et *rosae* Raffray, 1910. Il est vrai que ces *Euplectus* sont étroitement apparentés, que les édéages sont très semblables et que ces sous-espèces peuvent coexister dans certaines régions. Mais il y a de bons caractères distinctifs, mis en évidence par RAFFRAY (1910: 179). L'étude de l'édéage aurait dû contribuer à une meilleure interprétation de ces caractères de la morphologie extérieure; c'est le contraire qui en est résulté avec JEANNEL (1950: 117). Je me suis intéressé à ce problème depuis longtemps, avec l'étude de plusieurs centaines d'exemplaires et 130 préparations microscopiques de l'édéage.

Les *Euplectus bonvouloiri* s.str. et *bonvouloiri siculus* sont localisés respectivement en Corse et en Sicile; *E. bonvouloiri felschei* est seul en Sardaigne, mais il se trouve aussi en Corse. *E. bonvouloiri narentinus* est assez largement répandu en Europe: France, Suisse, Allemagne, Tchéquie, Slovaquie, Autriche, Italie, Croatie, Serbie et Bosnie-Herzégovine. *E. bonvouloiri rosae* est également largement répandu en Europe: Grande-Bretagne, Suède, Danemark, France, Suisse, Allemagne, Slovaquie, Hongrie, Italie, île d'Elbe et Corse.

Euplectus bonvouloiri rosae n'est pas rare en Suisse dans la région du lac Léman, où il se trouve seul; tous les exemplaires sont rigoureusement identiques, tant par les caractères de la tête que ceux de l'édéage (21 préparations microscopiques de l'édéage pour 15 provenances); celui-ci est bien caractérisé (BESUCHET, 1974b: 323 fig. 12b) par la partie apicale à bords parallèles et par la grande dent hyaline en haut à droite du dessin. Il y a ici et là au Tessin les *Euplectus bonvouloiri narentinus* et *b. rosae*; il existe au Monte Generoso une population intermédiaire avec la tête peu ponctuée de *rosae* et un édéage (3 préparations microscopiques) proche de celui de *narentinus* (BESUCHET 1974b: 323, fig. 12a), sans dent hyaline. La situation est plus complexe en Corse où les sous-espèces *bonvouloiri*, *felschei* et *rosae* semblent cohabiter; il y a en plus des exemplaires bien caractérisés, des individus atypiques quant à la forme de la tête (étroite comme *bonvouloiri* s.str. mais avec le front de *felschei* par exemple) ou la structure de l'édéage (partie apicale élargie dès la capsule basale mais avec la grande dent hyaline de *rosae* et de *felschei*).

Il y a donc chez l'*Euplectus bonvouloiri* des formes intermédiaires lorsqu'il y a coexistence de *narentinus*, *rosae*, *felschei* et *bonvouloiri* s.str. Il n'y a en conséquence pas d'isolement reproductif, ce qui est par définition le cas des sous-espèces. Il faut donc maintenir chez l'*Euplectus bonvouloiri* Reitter, 1881 les cinq sous-espèces *bonvouloiri* s.str., *narentinus* Reitter, 1881, *felschei* Reitter, 1887, *siculus* Raffray, 1910 et *rosae* Raffray, 1910 (**stat. nov.**).

Euplectus (Archeuplectus) remyi Jeannel (1961b: 428. Holotype ♂: Mus. Paris. Loc. typ.: Sri-Lanka, Naturawela). Ce Psélaphide appartient au genre *Leptoplectus* Casey (**comb. nov.**). Je connais l'espèce *remyi* du Sri-Lanka, de l'Inde, du Népal (7♂ 5♀ de Lampokhari et 1♂ 1♀ de Chauki), du Japon (1♂ de Kobé dans un compost de jardin), du Sénégal (3♂ 5♀ de Nianing dans le bois pourri d'un baobab) et aussi en Suisse, dans les environs de Lugano (composts de Bioggio en 1990, 1995 et 1996, environ 60 ex.). Ce *Leptoplectus remyi* (Jeannel) semble désormais acclimaté dans la région de Lugano.

Euplectus nubigena caucasicus Roubal (1910: 141. Syntype ♂: Mus. Bratislava. Loc. typ.: Russie, région de Krasnodar, Krasnaja Poljana). REITTER (1913: 131) a fait tomber ce *Plectophloeus caucasicus* dans la synonymie de *P. pharax* Reitter, décrit lui aussi du Caucase, en 1908. Toute une polémique s'est alors engagée entre Roubal et Reitter, chacun gardant son point de vue! *P. caucasicus* (Roubal) est réellement un synonyme de *P. pharax* Reitter.

Trimium merkli Reitter (1894: 113. Syntype ♂: Mus. Paris. Loc. typ. Turquie, Forêt de Belgrade près d'Istanbul) tombe dans la synonymie de *T. caucasicum* Kolenati, 1846, décrit de Géorgie (**syn. nov.**). L'espèce est largement répandue en Turquie.

Amauronyx italicus Pace (1975: 128. Holotype ♂: Mus. Verona. Loc. typ.: Italie centrale, Molise, Isernia) n'est qu'un synonyme de l'*A. maerkeli* (Aubé, 1844) (**syn. nov.**).

Celui-ci est assez largement répandu en Europe moyenne. Plusieurs des caractères distinctifs donnés ou figurés par Pace sont faux. Par exemple les trochanters II du ♂ ne sont pas inermes mais armés d'une petite dent triangulaire, exactement comme chez *A. maerkeli*. Les paramères de l'édéage ne sont pas courts et symétriques, mais relativement longs et inégaux, chacun avec quatre soies, tout à fait comme chez *A. maerkeli*. L'holotype ♂ et le paratype ♀ de l'*A. italicus* ne diffèrent des *A. maerkeli* de l'Europe moyenne que par leur taille un peu plus grande: largeur maximum des élytres: 0,82 à 0,83 mm contre 0,70 à 0,79 mm; longueur de l'édéage: 0,41 mm contre 0,33 à 0,37 mm.

Trichonyx talyschensis Reitter, 1881 appartient en fait au genre *Amauronyx* Reitter (**comb. nov.**).

BATRISINI

Paramaurops (Protamaurops) vitolistensis Karaman (1954c: 79. Holotype ♀: Univ. Skopje. Loc. typ.: Macédoine, Marijovo) et *Protamaurops peristeri* Karaman (1961: 159, 161, 168. Holotype ♂: Univ. Skopje. Loc. typ.: Macédoine, Mt. Perister) tombent dans la synonymie de *Protamaurops winneguthi* (Szekessy, 1943) (**syn. nov.**) = *P. similis* Karaman, 1961, tous décrits de la Macédoine.

Il y a chez ce *Protamaurops*, comme chez d'autres espèces du genre, un développement plus ou moins grand des yeux: 5 à 6 ommatidies pour l'holotype ♀ de *vitolistensis*, 8 à 9 pour l'holotype ♂ de *similis*, 12 pour l'holotype ♂ de *peristeri* et 15 à 20 pour *winneguthi* (d'après la description originale).

BRACHYGLUTINI

Le genre *Barbiera* Jeannel (1952: 88, fig. 27, 28, 29. Espèce-type: *Barbiera frontalis* Jeannel, 1952, de Saïgon) tombe dans la synonymie de *Prosthecarthron* Raffray (1914: 2. Espèce-type: *Prosthecarthron sauteri* Raffray, 1914, de Taiwan) (**syn. nov.**). Ce genre appartient à la tribu des *Brachyglutini* et non pas à celle des *Tanypleurini* (NEWTON & CHANDLER, 1989: 42). Information communiquée par M. S. Kurbatov, août 1998.

Briara palpalis Löbl (1974: 97. Holotype ♀: Mus. Cracovie. Loc. typ. Corée du Nord, Baudo) a été transféré par LÖBL (1977: 236), après la découverte du mâle, dans le genre *Barbiera* Jeannel. Mais ce *Barbiera palpalis* (Löbl) n'est qu'un synonyme de *Prosthecarthron sauteri* Raffray, 1914 (**syn. nov.**). Information communiquée par M. S. Kurbatov, août 1998.

Rybaxis bulgarica Karaman (1972: 38. Syntype ♂ ici désigné comme lectotype: Mus. Paris. Loc. typ.: Bulgarie, Cap Maslen) n'est qu'un synonyme de *Rybaxis gigas* (Baudi) (**syn. nov.**).

Bryaxis albana Motschulsky (1845: 18. Syntype ♂ ici désigné comme lectotype: Mus. St. Pétersbourg. Loc. typ.: Caucase, Daghestan) n'est qu'un synonyme de *Rybaxis longicornis* (Leach, 1817) (**syn. nov.**).

Brachygluta schueppelii (Aubé, 1844) doit céder la priorité à *Bryaxis foveola* Motschulsky (1840: 195. Syntype ♂ ici désigné comme lectotype: Mus. Moscou. Loc. typ.: Italie, Trieste). L'auteur russe (1851: 493). avait déjà établi cette synonymie ... complètement tombée dans l'oubli. *Bryaxis langei* Reitter (1884: 68. Syntype ♀ ici désigné comme lectotype: Mus. Paris. Loc. typ.: Israël, Haïfa) tombe aussi dans cette synonymie. Donc *Brachygluta foveola* (Motschulsky) = *B. schueppelii* (Aubé) = *B. langei* (Reitter) (**syn. nov.**).

Les *Brachygluta* décrits comme *Briaxis* [sic] *spinicoxis* Motschulsky (1835: 317. Syntype ♂ ici désigné comme lectotype: Mus. Munich. Loc. typ.: Géorgie, Tiflis) et *Bryaxis brunniventris* Motschulsky (1851: 493. Syntype ♂ ici désigné comme lectotype: Mus. Moscou. Loc. typ.: Géorgie) sont rigoureusement identiques (**syn. nov.**).

Ce *Brachygluta* présente deux sous-espèces: *spinicoxis spinicoxis* (Motschulsky) = *brunniventris* (Motschulsky) = *syriaca* (Baudi) = *persica* (Saulcy) qui se trouve en Israël, au Liban, en Turquie orientale, en Géorgie, en Arménie, dans le Caucase, en Azerbaïdjan et en Iran; *spinicoxis fuchsi* (Krauss) en Turquie occidentale, en Bulgarie, en Grèce avec les îles des Cyclades et Rhodes, en Albanie, au Monténégro et en Dalmatie.

Le *Brachygluta* décrit comme *Bryaxis foveiventris* Raffray (1882: 33. Holotype ♂: Mus. Paris. Loc. typ. Ethiopie, Bogos) a la priorité sur les *Brachygluta excavativentris* Pic, 1939 et *aegyptiaca* Jeannel, 1956 que j'avais déjà mis en synonymie (**syn. nov.**). Information communiquée par le Dr G. Sabella, mars 1998.

Brachygluta globulicollis (Mulsant & Rey, 1861) est une espèce halophile, souvent fréquente dans les marais à salicornes du littoral atlantique et méditerranéen. J'ai pu distinguer (BESUCHET 1969: 405; fig. 13 à 18) cinq sous-espèces qui diffèrent nettement par les caractères sexuels abdominaux des mâles (il n'y a pas de formes intermédiaires) et parfois des femelles (*aubei*); les édéages sont par contre identiques; la répartition est discontinue. CASTELLINI (1997: 109) a malgré tout fait tomber toutes ces sous-espèces dans la synonymie de *B. globulicollis*. Je persiste à penser que ce sont des taxa différents, même de bonnes espèces: *Brachygluta globulicollis* (Mulsant & Rey, 1861) du littoral méditerranéen du sud-est de la France, de Sardaigne et des oasis tunisiennes de Fernana et de Gabès; *B. aubei* (Tournier, 1867), largement répandu du littoral atlantique de la France et de l'Espagne au littoral méditerranéen de l'Espagne et de l'Afrique du Nord, avec les îles Baléares, la Sardaigne, la Sicile, Malte et Pantelleria; *B. uhagoni* (Saulcy, 1876) du centre de l'Espagne: Aranjuez; *B. pici* Raffray, 1904 de deux oasis du sud de la Tunisie et *B. exsculpta* Besuchet, 1969 de l'oasis de Biskra en Algérie (**stat. nov.**).

Bryaxis simplex (Waterhouse, 1862) décrit comme *Bryaxis*, est homonyme primaire de *Bryaxis simplex* Motschulsky, 1851. Nom de remplacement: *Bryaxis waterhousei* Rye, in REITTER 1881b: 467. CASTELLINI (1997: 109) a aussi mis en synonymie les cinq sous-espèces que j'ai pu distinguer chez ce *Brachygluta*

(BESUCHET 1963: 36). Là encore je dois les réhabiliter comme bonnes espèces, pour les mêmes raisons que précédemment: *Brachygluta waterhousei* (Rye, 1881) du littoral de la Manche et de l'Atlantique, à savoir de la Grande-Bretagne au Portugal; *B. tetuanica* (Reitter, 1884) de Gibraltar et du nord du Maroc; *B. hipponensis* (Saulcy, 1876) largement répandu dans toute l'Afrique du Nord, mais aussi connu de Malte, de Pantelleria, de Sardaigne et du sud de la Grèce; *B. hispana* Besuchet, 1963 du centre et du sud de l'Espagne; enfin *B. exigua* Besuchet, 1963 du nord de l'Espagne et du sud de la France, particulièrement du littoral méditerranéen (**stat. nov.**).

Brachygluta haemata (Reichenbach, 1816) est largement répandu en Europe dans les marécages, les prairies humides et les forêts alluviales. J'ai pu distinguer (BESUCHET 1963: 28) cinq sous-espèces, bien définies par les caractères sexuels abdominaux des mâles. Deux d'entre elles sont localisées dans le sud-est de l'Europe; les trois autres cohabitent en Europe centrale, sans qu'il y ait de formes intermédiaires. Plusieurs collègues m'ont reproché de ne pas en avoir fait des espèces. Par contre CASTELLINI (1997: 109) les a toutes mises en synonymie... Ce sont effectivement de bonnes espèces en raison de leur isolement reproductif: *Brachygluta nodosa* (Motschulsky, 1835) du Caucase et de l'extrême nord de la Turquie; *B. balcanica* (Saulcy, 1878) de Bulgarie et de Turquie; *B. haemata* (Reichenbach, 1816), *B. sinuata* (Aubé, 1833) et *B. simplicior* Raffray, 1904 de l'Europe centrale au sens large (**stat. nov.**).

On peut penser que les populations primitives de *Brachygluta haemata* ont été complètement séparées lors des dernières glaciations et qu'elles ont évolué différemment, pour donner à l'est *B. haemata* (aussi connu de Sibérie: Novosibirsk, Akademgorodok 1 ♂ 1 ♀, W. Schawaller), à l'ouest *B. sinuata* et au sud des Alpes *B. simplicior*. Ces populations se sont progressivement retrouvées après le retrait des glaces, mais elles avaient déjà perdu la faculté de se croiser.

Reichenbachia guineensis Jeannel, 1953. Je connais cette espèce de Guinée et du Yémen du Nord. Les exemplaires du Yémen sont rigoureusement identiques aux deux cotypes mâles de Guinée du Muséum de Paris.

Trissemus (Trissemellus) nigeriensis Jeannel (1958b: 247. Syntype ♂: Mus. Paris. Loc. typ.: Niger, Zinder) n'est qu'un synonyme de *Trissemus tetuanicus* Jeannel, 1956 (**syn. nov.**). Je connais cette espèce du Maroc, d'Égypte et du Niger.

Les types des *Reichenbachia ceconii* Reitter (1905: 208. Holotype ♀: Mus. Budapest. Loc. typ.: Chypre) et *nunganasti* Reitter (1905: 208. Holotype ♂: Mus. Budapest. Loc. typ.: Grèce, Eubée, Karystos) correspondent respectivement à la femelle et au mâle de *Trissemus clavatus* (Peyron, 1858) (**syn. nov.**).

Mais *Bryaxis clavata* Peyron (1858: 415. Syntype ♂ ici désigné comme lectotype: Mus. Genève. Loc. typ.: Turquie, Tarsous) est homonyme primaire de *Bryaxis clavata* Motschulsky, 1851. Je choisis *Trissemus munganasti* (Reitter, 1905) comme nom de remplacement pour *Bryaxis clavata* Peyron, 1858 (**nom. nov.**).

Bryaxis clavata Motschulsky (1851: 491. Syntype ♂ ici désigné comme lectotype: Mus. Moscou. Loc. typ.: Inde, Calcutta) est une bonne espèce du genre *Trissemus* Jeannel (**comb. nov.**).

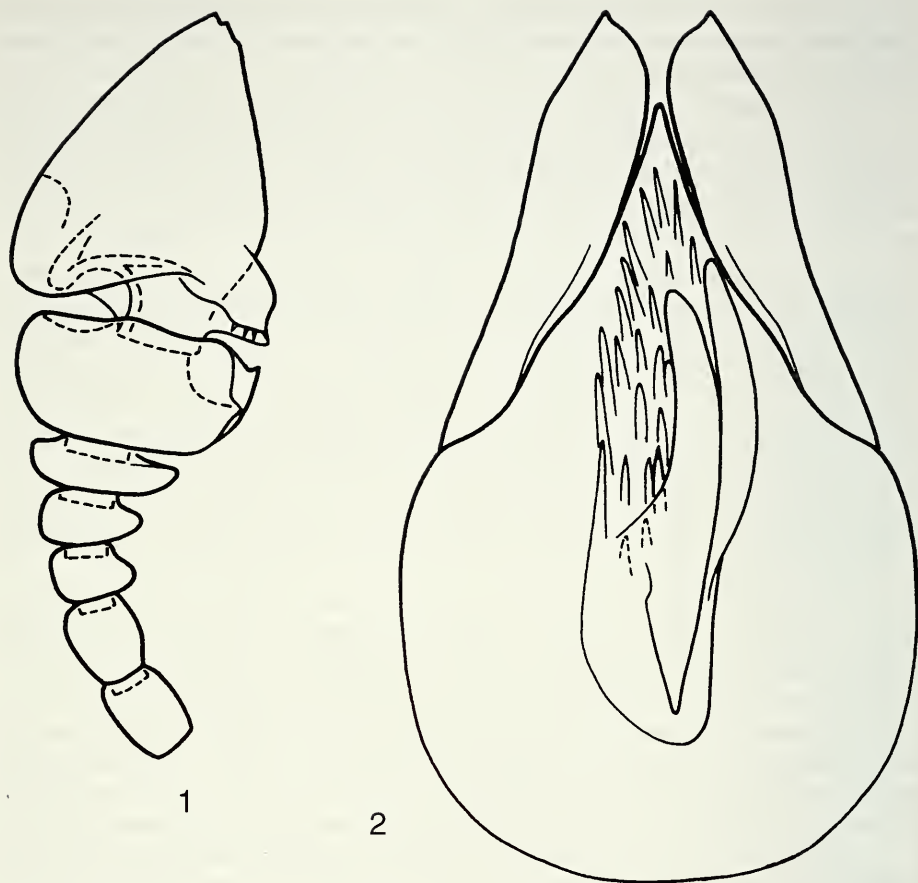
Description du lectotype ♂. Long. 1,5 mm. Coloration entièrement d'un brun rougeâtre clair. Face dorsale de la tête avec trois fossettes bien marquées, égales. Yeux gros, saillants, nettement plus longs que les tempes; celles-ci courtes, atténuées et arrondies. Antennes (long. 0,65 mm) avec le scape nettement plus long que large, le pédicelle pas tout à fait deux fois plus long que large; article 3 nettement plus long que large, 4, 5 et 6 un peu plus longs que larges. Pronotum petit (0,31/0,36 mm), globuleux, à peine plus large que la tête; fossette basale médiane bien marquée, un peu plus petite seulement que les fossettes latérales. Tête et pronotum non ponctués. Elytres réunis (0,52/0,67 mm) un peu élargis d'avant en arrière, finement ponctués; trois petites fossettes basales égales sur chaque élytre; strie suturale entière; strie dorsale interrompue juste un peu avant le bord postérieur. Premier tergite apparent (0,28/0,65 mm) subparallèle, les carénules (long. 0,11 mm; écartement à la base 0,24 mm) légèrement divergentes; surface de ce tergite assez convexe transversalement, finement ponctuée. Tibias III (long. 0,45 mm; largeur à l'apex 0,06 mm) nettement courbés au tiers apical.

Caractères sexuels du mâle. Massue antennaire (0,28/0,16 mm) grande et aplatie, triarticulée (fig. 1); article 9 relativement petit, lenticulaire; 10 avec une dépression transverse profonde sur la face ventrale, proche du côté interne de l'article; des soies nombreuses assez longues occupent cette dépression; dernier article orné dans la région basale de la face ventrale d'une dépression assez profonde, glabre, plus ou moins partagée par un tubercule arrondi situé sur la base de l'article; celui-ci prolongé par une lame saillante sur l'angle basal externe. Articles 7 et 8 un peu élargis sur le bord interne. Tibias II prolongés sur le bord interne par un petit éperon. Trochanters simples.

Édage (fig. 2). Long. 0,30 mm. Paramères de longueur moyenne, terminés en pointe obtuse. Armature du sac interne bien distincte, formée de deux grandes dents et de petites épines nombreuses peu chitinisées.

Ce *Trissemus clavatus* (Motschulsky) a été trouvé au Japon, dans plusieurs localités de l'île Okinawa, à la lumière (B. Melin) (27 exemplaires des deux sexes au Muséum de Genève). Les mâles sont identiques au lectotype de Calcutta. Les femelles diffèrent par la massue antennaire (0,24-0,25/0,11 mm) de structure normale, triarticulée, progressivement élargie dès l'article 9; celui-ci un peu plus large que l'article 8, transverse; 10 transverse, 11 un peu plus long que les trois articles précédents réunis; article 7 un peu plus large que long, 8 transverse.

Trissemus antilope (Raffray, 1909) de Kyoto ressemble beaucoup extérieurement à *T. clavatus* (Motschulsky), en particulier par les antennes du mâle. Mais l'édage est bien différent; long. 0,40 mm; paramères longs, très grêles dans la partie apicale, avec l'extrémité recourbée en avant sur 0,06 mm. Armature du sac interne indistincte. Il manque toute cette partie apicale de l'édage au dessin donné par JEANNEL (1958a: 103 fig. 133).



FIGS 1-2

Trissemus clavatus (Motschulsky) de Calcutta. 1. Extrémité de l'antenne du ♂, face dorsale. 2. Édéage, face dorsale.

Reichenbachia talyschensis Reitter (1884c: 68. Syntypes ♀: Mus. Paris? Loc. typ.: Russie, Azerbaïdjan, Lenkoran), d'après la description, ne peut pas être un synonyme de *Trissemus melinus* (Solsky, 1869). C'est à mon avis un synonyme de *Trissemus montanus* (Saulcy, 1874) (**syn. nov.**), déjà connu de la région de Lenkoran.

BYTHININI

Chiasmatobythus remyi Jeannel (1956: 69. Holotype ♀: Mus. Paris. Loc. typ.: Maroc, Moyen-Atlas, Beni-Mellal). Le type unique de ce Psélaphide n'est à mon avis qu'un petit exemplaire de *Tychobythinus algericus* (Raffray, 1871) (**syn. nov.**), espèce assez largement répandue du Maroc au nord de la Tunisie.

Globobythus ganglbaueri Karaman (1954a: 182. Holotype ♂: Mus. Sarajevo. Loc. typ.: Grèce, Missolonghi) et *Bythinus (Tychobythinus) abnormipes* Reitter (1910: 158. Holotype ♂: Mus. Budapest. Loc. typ.: Grèce, Zante, Kalamaki) appartiennent à une seule et même espèce: *Tychobythinus abnormipes* (Reitter) (**syn. nov.**).

Le pronotum, très convexe, est plus ou moins large: 0,35 mm chez un mâle de Hagios Wlassis en Morée, 0,36-0,37 chez les femelles de Zante, 0,38-0,40 chez les mâles de Zante, 0,39 chez un mâle d'Avythos dans l'île de Céphalonie.

Bythinus (Linderia) bulatii Reitter (1917: 7. Syntype ♂ ici désigné comme lectotype: Coll. Frey in Mus. Bâle. Loc. typ.: Croatie, Spalato) tombe dans la synonymie de *Tychobythinus glabratus* (Rye, 1870) (**syn. nov.**).

Prionobythus clermonti Jeannel (1950: 189. Holotype ♀: Mus. Paris. Loc. typ.: France, Ariège, grotte de Lombrive). Cette espèce appartient réellement au genre *Tychobythinus* Ganglbauer, comme je l'ai déjà signalé (BESUCHET 1974a: 44). La grotte de Lombrive est très fréquentée par les biospéologues; mais ce Psélaphide n'a jamais été retrouvé, et pour cause... J. A. Clermont était un marchand d'insectes dont les provenances n'étaient pas toujours correctes. C'est ainsi que Jeannel a été induit en erreur. Car *Tychobythinus clermonti* (Jeannel) est une espèce du Caucase: Russie, région de Krasnodar, Krasnaja Poljana, IV. 1973, 1 ♂ 1 ♀ (R. Rous) (Mus. Genève).

Les antennes du mâle sont très différentes de celles de la femelle; articles 4, 5, 6 et 7 très transverses, l'article 7 un peu plus large; articles 8, 9 et 10 progressivement plus longs, concaves sur le bord interne, formant ainsi ensemble un arc de cercle; article 10 élargi de la base au sommet, l'angle apical interne saillant, le bord interne finement rebordé. Yeux bien développés. Pattes longues et grêles, semblables à celles de la femelle.

Bythinopsis balearica Jeannel (1961a: 289. Syntype ♂ ici désigné comme lectotype: Mus. Paris. Loc. typ.: Espagne, îles Baléares, Minorque, Fornells) appartient au genre *Decatocerus* Saulcy (**comb. nov.**). Il est synonyme plus ancien de *Decatocerus bicornis rotundatus* Besuchet (1961: 95. Syntype ♂: Coll. Franz, Vienne. Loc. typ.: Espagne, îles Baléares, Minorque, Playa Tirant Nou). Il s'agit exactement de la même espèce, qui doit être nommée *Decatocerus balearicus* (Jeannel) (**syn. nov.**), compte tenu d'une priorité de dix mois.

Bythinus novaki Karaman (1948: 11, 17. Syntype ♂: Mus. Francfort/Main. Loc. typ.: Croatie, Lic) n'est qu'un synonyme de *B. heterocerus* Müller, 1904 (**syn. nov.**).

Bolbobythus serbicus Karaman (1952: 101, 112. Syntype ♂: Mus. Francfort/Main. Loc. typ.: Serbie, Belgrade) n'est qu'un synonyme de *Bythinus balkanicus* Reitter, 1885 (**syn. nov.**).

La provenance citée par Karaman "in der Umgebung von Beograd 1. VI. 1894" est en réalité la Forêt de Belgrade (Belgrader Wald) près d'Istanbul, Turquie, localité où E. Merkl a fait de belles découvertes.

Bolbobythus acutangulus pancici Karaman (1948: 9, 15. Syntype ♂: Univ. Skopje. Loc. typ.: Macédoine, Mt Vodno près de Skopje) et *Bythinus leonhardinus*

Reitter (1913: 137, 163. Syntype ♂: Mus. Budapest. Loc. typ.: Bulgarie, Iskeranow) appartiennent à une seule et même espèce: *Bythinus leonhardinus* Reitter (**syn. nov.**).

Bythinus albinae Reitter (1913: 138, 164. Syntype ♂: Mus. Budapest. Loc. typ.: Bosnie-Herzégovine, Jablanica) tombe dans la synonymie de *Bythinus acutangulus acutangulus* Reitter, 1878 (**syn. nov.**).

Bythinus moreanus Reitter (1913: 139, 164. Syntype ♂: Mus. Budapest. Loc. typ.: Grèce, Morée, Hagios Wlassos) appartient à l'espèce *acutangulus* Reitter, plus précisément à la sous-espèce *atticus* Reitter, 1885 (**syn. nov.**).

L'édéage du type de *B. moreanus* présente cependant, dans l'armature du sac interne, une épine apicale interne un peu plus longue que celle dessinée par KARAMAN (1948: 10 fig. 7) pour *B. acutangulus atticus*. Notons encore que REITTER (1913: 162-164) a oublié *atticus* dans sa table d'identification des *Bolbobythus*.

Glyphobythus incisus Laneyrie (1960: 137. Holotype ♂ homéomorphe: Coll. Laneyrie. Loc. typ.: France, Alpes-Maritimes, Les Ferres) n'est qu'un synonyme de *G. maritimus* (Reitter, 1884) (**syn. nov.**).

Bythinus pedestris Motschulsky (1845: 44. Syntype ♂ oedimère ici désigné comme lectotype: Mus. St. Pétersbourg. Loc. typ.: Géorgie) et *Bythinus clavipes* Motschulsky (1851: 498. Syntype ♂ oedimère: Mus.? Loc. typ.: Géorgie) appartiennent à une seule et même espèce: *Bryaxis pedestris* (Motschulsky) (**syn. nov.**).

Bythinus longipalpis Motschulsky (1835: 318. Syntype ♂ ici désigné comme lectotype: Mus. Dresde. Loc. typ.: Russie, Ekaterinograd) n'est pas un synonyme de *Bryaxis crassicornis* (Motschulsky, 1835); il a au contraire la priorité sur *Bryaxis corpulentus* (Motschulsky, 1845). Donc *Bryaxis longipalpis* (Motschulsky) = *B. corpulentus* (Motschulsky) (**syn. nov.**).

Arcopagus variicornis Karaman (1954: 49. Syntype ♂ ici désigné comme lectotype: DEI Eberswalde. Loc. typ.: Grèce, Thessalie, Pelion) et *Bryaxis sculptifrons* var. *roumaniae* Raffray (1904: 263. Syntype ♂ ici désigné comme lectotype: Mus. Paris. Loc. typ.: Roumanie) appartiennent à une seule et même espèce: *Bryaxis roumaniae* (Raffray) (**syn. nov.**).

L'édéage est rigoureusement identique chez les mâles de Grèce (Thessalie: Pelion; Chalcidique: Taxiarchis et Arma Evros; Macédoine: Katovermion; Thrace: Bos-Dagh près de Drama), de Bulgarie (Iskeranvo, Küleftse) et de Roumanie (Comana Vlaska). Chez tous ces mâles, le scape porte sur le bord interne, près de l'apex, un petit tubercule très aplati; sauf les mâles de Pelion chez lesquels ce tubercule est minuscule.

KARAMAN (1957: 200, 207) a donné un bon dessin de l'édéage (fig. 40) d'un *Bythinites lamerei* de Radoskok, Bosnie, mais aucune description de la morphologie extérieure. Elle attribue cette espèce à Apfelbeck (p. 185, 186) ou à Holdhaus (p. 207). C'était en fait un nom resté *in litteris*; mais la description de Karaman est valable. Ce *Bryaxis lamerei* (Karaman, 1957) n'est qu'un synonyme de *B. rambouseki* (Matcha, 1916) (**syn. nov.**).

Bythinius portalegreensis Schaufuss (1882: 398. Holotype ♀: Mus. Paris. Loc. typ.: Portugal, Portalegre) et *Bythinius occidentalis* Machulka (1938: 47. Holotype ♂ homéomorphe: Mus. Prague. Loc. typ.: Portugal, Portalegre) appartiennent à une seule et même espèce: *Bryaxis portalegreensis* (Schaufuss) (**syn. nov.**).

Bythinius anguliceps Reitter (1885: 369. Syntype ♂ homéomorphe: Mus. Paris. Loc. typ.: Portugal, Serra de Monchique) n'est qu'un synonyme de *Bryaxis lusitanicus* (Saulcy, 1870) (**syn. nov.**).

Chez cette espèce, les tempes peuvent être tout à fait arrondies, plus ou moins anguleuses ou encore très nettement prolongées par une dent saillante, particulièrement chez les mâles homéomorphes. Il y a aussi une variation bien marquée du pédicelle antennaire, plus ou moins largement caréné sur son bord interne. Mais il n'y a pas de variations de l'édéage, si ce ne sont celles causées par l'oedimérie.

Bythinius tenenbauni Machulka (1938: 43. Syntype ♂ oedimère: Mus. Prague. Loc. typ.: Ukraine, Wotzkow) et *Bythinius chaudoirii* Chaudoir (1845: 43. Syntype ♂ oedimère ici désigné comme lectotype: Mus. Moscou. Loc. typ.: Ukraine, Bérégow près de Kiev) appartiennent à une seule et même espèce: *Bryaxis chaudoirii* (Chaudoir) (**syn. nov.**). Information communiquée par M. S. Kurbatov, avril 1992.

TYCHINI

Tychus myops Kiesenwetter (1858: 46. Holotype: Mus. Munich? Loc. typ.: Grèce, Zante), *rufus* var. *morio* Reitter (1881a: 183. Syntype ♂: Mus. Paris. Loc. typ.: Croatie, Dalmatie, Cattaro), *nodicornis* Reitter (1884b: 109. Holotype ♂: Mus. Paris. Loc. typ.: Grèce, Corfou) et *rufus* var. *puncticollis* Reitter (1887: 505. Syntype ♂: Mus. Budapest. Loc. typ.: Roumanie, Herkulesfürdő) ne diffèrent de *Tychus rufus* Motschulsky (1851: 495. Syntype ♂ ici désigné comme lectotype: Mus. Moscou. Loc. typ.: Italie, Trieste) que par de simples variations individuelles; les édésages sont rigoureusement semblables. Je tenais à confirmer cette synonymie.

Tychus ganglbaueri Apfelbeck (1897: 506. Holotype ♂: Mus. Sarajevo. Loc. typ.: Bosnie-Herzégovine, Mostar) et *T. caudatus ganglbaueri* [sic] Karaman (1955: 123, 124 fig. 24) sont synonymes de *Tychus caudatus* Reitter (1884a: 76. Syntype ♂ ici désigné comme lectotype: Mus. Paris. Loc. typ.: Grèce, Zante) (**syn. nov.**).

Je connais cette espèce de Bosnie-Herzégovine (Mostar) et de Grèce (Corfou, Zante et Nauplia).

Tychus longicornis Besuchet (1958b: 914. Holotype ♂: Mus. Genève. Loc. typ.: Turquie, Port Baklar) n'est qu'un synonyme de *Tychus balcanicus* Reitter (1901: 187. Syntype ♂ ici désigné comme lectotype: Mus. Paris. Loc. typ.: Bulgarie, Kara-Balkan) (**syn. nov.**).

L'exemplaire décrit par Reitter ne provient pas de la Turquie; il a été trouvé dans les limites territoriales de la Bulgarie actuelle car il porte, en plus du nom de la chaîne montagneuse Kara-Balkan, une petite étiquette "Nord-Turkei gegen Philipp-opel", c'est-à-dire vers l'actuel Plovdiv.

Genre *Pselaphotychus* Khnzorian (1957: 159, 160 fig. 5. Espèce-type: *Pselaphotychus onobrychidis* Khnzorian, 1957, de l'Arménie). L'espèce-type, dont j'ai pu étudier le seul exemplaire connu, une femelle de 1,4 mm, appartient à mon avis au genre *Tychus* Leach, et plus précisément au groupe de *T. brevipennis* Sahlberg, 1908. Le genre monospécifique *Pselaphotychus* Khnzorian tombe ainsi dans la synonymie de *Tychus* Leach (**syn. nov.**).

Il y a dans ce groupe de *Tychus brevipennis* plusieurs espèces nouvelles de Crimée, de Turquie (vilayets: Erzurum, Malatya, Mersin, Adana et Antakya), du Liban et d'Israël. Ces espèces n'ont pas de caractères sexuels sur le lobe frontal ni sur les antennes. Les yeux sont petits, plus particulièrement chez les femelles. L'édéage est de même structure générale que celui de *T. brevipennis* Sahlberg (cf. BESUCHET 1960: 23, 28 fig. 11).

Les *Tychus mendax* Kiesenwetter (1858: 47. Syntypes: Mus. Munich? Loc. typ.: Grèce), *castaneus* Aubé var. *tenuicornis* Baudi (1869: 407. Holotype ♀: Mus. Turin. Loc. typ.: Chypre) et *mendax zantei* Karaman (1955: 133, 134. Syntype ♂ ici désigné comme lectotype: DEI Eberswalde. Loc. typ.: Grèce, Zante) appartiennent à une seule et même espèce du genre *Paratychus* Besuchet: *mendax* (Kiesenwetter) (**comb. nov.** et **syn. nov.**).

Les *Tychus bryaxoides* Guillebeau (1893: 293. Syntype ♂: Mus. Paris. Loc. typ.: Algérie, Margueritte dans le massif de Miliana), *bryaxioides* [sic] var. *raffrayi* Peyerimhoff (1904: 170, 173. Syntype ♂: Mus. Paris. Loc. typ.: Algérie, Mouzaïa) et *Tychomorphus bryaxioides* [sic] *chobauti* Jeannel (1956: 146. Syntype ♂: Mus. Paris. Loc. typ.: Algérie, Bou-Bérak) sont synonymes (**syn. nov.**) dans le genre *Tychomorphus* Jeannel.

Ce *Tychomorphus bryaxoides* (Guillebeau) est bien caractérisé par la grande lame latérale de l'édéage, partiellement ou complètement cassée dans les préparations et figures de JEANNEL (1956: 147 fig. 150 et 151).

Tychus auverti Croissandeau (1892: 152, 157. Syntype ♂ ici désigné comme lectotype: Mus. Paris. Loc. typ.: Algérie ?) n'est pas un synonyme de *Tychomorphus bryaxoides* (Guillebeau) mais une bonne espèce proche de celui-ci.

Tychomorphus pici forme *cloueti* Jeannel (1956: 144, fig. 147 et 148. Holotype ♂: Mus. Paris. Loc. typ.: Algérie, Medjez-Amar) serait bien caractérisé par l'inversion de l'édéage par rapport aux vrais *Tychomorphus pici* (Croissandeau). Mais l'auteur a tout simplement mal interprété ses préparations! La synonymie est évidente (**syn. nov.**).

Tychomorphus remyi Jeannel (1956: 139, 146. Holotype ♀: Mus. Paris. Loc. typ.: Maroc, Haut-Atlas, Ijoukak) n'est qu'un synonyme de *Tychomorphus dentifrons* (Reitter, 1881) (**syn. nov.**).

L'article 3 des antennes, aussi grand ou même plus grand que le pédicelle, chez les mâles comme chez les femelles, permet facilement de reconnaître cette espèce. Le *Tychomorphus remyi* ♂ que j'ai décrit (BESUCHET 1962: 365) appartient à une espèce différente et nouvelle, pour laquelle je propose le nom *mussardi* (**nom. nov.**) (holotype ♂: Mus. Genève. Loc. typ.: Maroc, Haut-Atlas, Tizi-n-Aït-Imguer).

CTENISTINI

Sognorus peyerinhoffi Raffray (1903: 186. Syntypes ♀: Mus. Paris. Loc. typ.: Palestine, Bou Seira, Bosra d'Edam) tombe dans la synonymie de *Ctenistes palpalis* Reichenbach, 1816 (**comb. nov.** et **syn. nov.**). Les deux types de la collection Peyerimhoff sont vraiment deux femelles de *C. palpalis* !

Ctenistes pilicollis Motschulsky (1851: 481. Syntype ♀ ici désigné comme lectotype: Mus. Moscou. Loc. typ.: Egypte) est identique à *Centrophthalmosis tenenbaumi* Roubal, 1928, qui devient ainsi un synonyme de *Centrophthalmus pilicollis* (Motschulsky) (**comb. nov.** et **syn. nov.**).

Ctenistes elegans Motschulsky (1851: 482. Syntype ♂ ici désigné comme lectotype: Mus. Moscou. Loc. typ.: Egypte) est identique à *Desimia arabica* Raffray, 1887, qui devient ainsi un synonyme de *Desimia elegans* (Motschulsky) (**comb. nov.** et **syn. nov.**).

Sognorus subtilipalpis Reitter (1910: 159. Holotype ♂: Mus. Budapest. Loc. typ.: Ouzbékistan) appartient au genre *Desimia* Reitter, 1882 (**comb. nov.**). Et *Desimia longicornis* Besuchet (1958a: 337, fig. 5. Holotype ♂: Mus. Genève. Loc. typ.: Turkménistan, Tedjen) est synonyme de *Desimia subtilipalpis* (Reitter) (**syn. nov.**).

TYRINI

Le genre *Metaxis* Motschulsky (1851: 490. Espèce-type: *Metaxis corpulentus* Motschulsky, 1851, des Indes Orientales) est classé parmi les *Brachyglutini* dans le catalogue de NEWTON & CHANDLER (1989: 43). Or *Metaxis corpulentus* Motschulsky (1851: 490. Holotype ♀: Mus. Moscou. Loc. typ.: Indes Orientales) et *Metaxis lativentris* Motschulsky (1851: 490. Holotype ♀: Mus. Moscou. Loc. typ.: Indes Orientales) sont des *Tyrini* du genre *Tyrus* Aubé! *Metaxis* Motschulsky, 1851 n'est qu'un synonyme de *Tyrus* Aubé, 1833 (**syn. nov.**).

Novissimus helferi Blattny (1925: 217. Holotype ♂: Mus. Prague. Loc. typ.: Indes Orientales) est synonyme de *Tyrus corpulentus* (Motschulsky, 1851) (**syn. nov.**).

PSELAPHINI

Callithorax Motschulsky, 1851, préoccupé, a été remplacé par *Callithoracoides* Strand, 1928. Mais l'espèce-type, *Callithorax subtilis* Motschulsky (1851: 483. Holotype ♀: Mus. Moscou. Loc. Typ.: Inde, Bengale) appartient indubitablement au genre *Mentraphus* Sharp, 1883 (**comb. nov.**). Donc *Callithorax* Motschulsky, 1851 et *Callithoracoides* Strand, 1928 tombent dans la synonymie de *Mentraphus* Sharp, 1883 (**syn. nov.**).

Pselaphus skopljensis Karaman (1940: 118, fig. 3 c, d. Syntype ♂: Univ. Skopje. Loc. typ.: Macédoine, Skopje) est synonyme de *Pselaphus caucasicus* Motschulsky (1851: 483. Syntype ♂ ici désigné comme lectotype: Mus. Moscou. Loc. typ.: Anatolie) (**syn. nov.**).

Ce *Pselaphus caucasicus* Motschulsky est assez largement répandu de la Macédoine à la Turquie.

Les *Pselaphini* du groupe genre *Pselophoxys* Raffray (1890: 137. Espèce-type: *Pselaphus delicatulus* Raffray, 1882, de l'Ethiopie), *Pselaphoptrus* Reitter (1891: 139. Espèce-type: *Pselaphoptrus kubischteki* Reitter, 1891, de l'Ouzbékistan), *Faradayus* Reitter (1909: 217. Espèce-type: *Pselaphus banghaasi* Reitter, 1893, de l'Ouzbékistan), *Pselaphidius* Jeannel (1951: 7, 9. Espèce-type: *Pselaphus filipalpis* Reitter, 1882, du Ghana) et *Pselaphus* subgen. *Pselaphinus* Jeannel (1951: 10. Espèce-type: *Pselaphus reitterianus* Jeannel, 1951, du Ghana) tombent tous dans la synonymie de *Pselaphus* Herbst, 1792 (**syn. nov.**). *Pselaphinus* Jeannel était déjà un synonyme de *Pselaphus* Herbst et *Faradayus* Reitter un synonyme de *Pselaphoptrus* Reitter (NEWTON & CHANDLER 1989: 63). Mais je tenais à le confirmer.

Toutes les espèces du genre *Pselaphus* présentent un ensemble de caractères très constants. Face ventrale de la tête avec une saillie gulaire arrondie plus large que longue, immédiatement suivie en arrière, jusqu'à la constriction collaire, d'une aire tomenteuse atteignant presque le bord inférieur des yeux. Pronotum sans fossettes basales et sans sillon transversal, lisse et brillant. Elytres sans fossettes basales et sans carène humérale; strie suturale et strie dorsale entières; pubescence alignée sur trois ou quatre rangées sur chaque élytre. Premier tergite apparent très grand, la base décline, occupée par une aire tomenteuse. Des aires tomenteuses sur le prosternum, le mésosternum et la base de la face ventrale de l'abdomen. Edéage toujours de même structure générale: une grande capsule basale plus ou moins faiblement prolongée en arrière, des paramères grêles relativement longs et le sac interne avec une armature complexe, bien chitinisée.

Ces espèces montrent une très grande variation dans la conformation du dernier article des palpes maxillaires. Celui-ci est presque toujours très allongé, avec une partie basale longue et fine (pédoncule) et une partie apicale renflée (massue). La pubescence de la massue est soit formée de petites épines nombreuses entremêlées de soies fines (type "*Pselaphus*"), soit seulement de soies fines nombreuses ("*Pselaphinus*"), soit encore de quelques soies fines; mais il y a dans ce cas un sillon longitudinal bien marqué sur la face externe de la massue ("*Pselaphidius*"). La longueur du pédoncule varie beaucoup; il est parfois complètement atrophié, la massue restant cependant bien renflée ("*Pselaphoxys*"); ou très court, avec une massue peu renflée, subcylindrique ("*Pselaphoptrus*"); ou encore bien marqué mais nettement plus court que la massue, celle-ci peu renflée, avec des soies éparses et un sillon fin plus ou moins distinct ("*Faradayus*"). Deux espèces de l'Asie centrale, *banghaasi* Reitter et *brevipalpus* Jeannel, présentent cette dernière conformation palpaire; la première a été classée dans le genre *Faradayus*, la seconde dans le genre *Pselaphidius*... Chez *Pselaphus elegans* Motschulsky, 1851, des Indes Orientales, le dernier article des palpes maxillaires est longuement pédonculé, avec une massue bien renflée dont la moitié apicale porte de petites épines assez nombreuses et un sillon longitudinal bien marqué (type "*Pselaphus*" + "*Pselaphidius*" !). J'ai aussi vu un exemplaire de *Pselaphus heisei* Herbst, espèce-type du genre *Pselaphus* Herbst, dont le dernier article des palpes maxillaires est réduit à une massue épineuse, non pédonculée (type "*Pselaphoxys*").

Ainsi défini, le genre *Pselaphus* Herbst compte environ 80 espèces réparties en Amérique du Nord et en Amérique Centrale, dans presque toute la région paléarctique (sauf les îles Canaries et l'Afrique du Nord), dans toute la région orientale et dans presque toute la région afrotropicale.

ESPÈCES PALÉARCTIQUES DU GENRE *Pselaphus* Herbst

<i>acuminatus</i> Motschulsky; comb. nov. = <i>hirtus</i> Reitter (de <i>Pselaphidius</i>)	
<i>arabicus</i> (Jeannel); comb. nov.	(de <i>Pselaphoxys</i>)
<i>banghaasi</i> (Reitter); comb. nov.	(de <i>Pselaphoptrus</i> = <i>Faradayus</i>)
<i>belovi</i> Kurbatov	
<i>brevipalpus</i> (Jeannel); comb. nov.	(de <i>Pselaphidius</i>)
<i>caspicus</i> Reitter	
<i>caucasicus</i> Motschulsky = <i>skopljensis</i> Karaman	
<i>chineus</i> (Li & Chen); comb. nov.	(de <i>Dicentrius</i>)
<i>heisei</i> Herbst = <i>brevipalpis</i> Schrank = <i>herbsti</i> Reichenbach = <i>eyrigaster</i> Beck	
<i>kubischteki</i> (Reitter); comb. nov.	(de <i>Pselaphoptrus</i>)
<i>lewisi</i> Sharp	
<i>lomnickii</i> (Reitter); comb. nov.	(de <i>Pselaphoptrus</i>)
<i>minyops</i> Wollaston	
<i>mysiis</i> Besuchet	
<i>parvus</i> Karaman; stat. nov.	
<i>salonitanus</i> Karaman	
<i>striatus</i> Löbl	
<i>turkestanicus</i> Karaman	

Pselaphoxys elegans Raffray (1908: 13. Holotype ♂: Mus. Paris. Loc. typ.: Zaïre: Kinshasa) appartient au genre *Pselaphus* Herbst (**comb. nov.**). Il devient ainsi un homonyme secondaire de *Pselaphus elegans* Motschulsky (1851: 483. Syntype ♂ ici désigné comme lectotype: Mus. Moscou. Loc. typ.: Indes Orientales). Je propose de remplacer *P. elegans* (Raffray) par *P. raffrayanus* (**nom. nov.**).

Pselaphus provincialis Doderò (1919: 249. Holotype ♀: Mus. Gênes. Loc. typ.: France, Var, Fréjus) n'est qu'un synonyme de *Pselaphostomus argutus* (Reitter, 1881) (**syn. nov.**) de Sardaigne.

L'unique exemplaire de *P. provincialis* aurait été trouvé à Fréjus par Doderò lui-même, le 27. XII. 1912. L'espèce n'a jamais été reprise en France, malgré les recherches très actives de MM. M. Curti, P. Hervé et J. Ochs. Il y a manifestement une erreur de provenance, car *P. provincialis* = *argutus* appartient à un groupe d'espèces localisées exclusivement en Corse et en Sardaigne.

Pselaphopsis (s. str.) *revelierei minor* Jeannel (1950: 392, 393. Holotype ♂: Mus. Paris. Loc. typ.: Corse). Les deux mâles séparés sous ce nom ne sont que de petits exemplaires (1,50 à 1,55 mm; édéage, long. 0,27 mm) de *Pselaphostomus revelierei* (Reitter, 1881) (**syn. nov.**).

Pselaphopsis (s. str.) *revelierei frontalis* Jeannel (1950: 392, 393. Holotype ♀: Mus. Paris. Loc. typ.: Corse, Bastia). Le type unique de cette sous-espèce n'appartient pas au genre *Pselaphostomus* Reitter (= *Pselaphopsis* s. str. de Jeannel) mais au genre *Pselaphogenius* Reitter (**comb. nov.**); il est proche de *P. conosternum* (Holdhaus), dont trois sous-espèces ont été décrites: *conosternum* s. str. de l'île d'Elbe, *c. argentarius* (Holdhaus) du Monte Argentario en Toscane et de l'île Giglio, *c. gardinii* Castellini de l'île de Giannutri. Les exemplaires de Corse (Bastia, 1 ♀, Mus. Paris et Corse, sans autre précision, 1 ♀, Mus. Genève) diffèrent par le pygidium totalement arrondi chez les femelles. CASTELLINI (1997: 110) a mis en synonymie toutes les sous-espèces précitées. Ce sont au contraire des espèces allopatriques, étroitement apparentées, dont trois présentent des caractères distinctifs sur l'édéage: *Pselaphogenius conosternum* (Holdhaus, 1905), *P. argentarius* (Holdhaus, 1910) et *P. gardinii* Castellini, 1983; ils forment un groupe auquel il faut encore ajouter *P. frontalis* (Jeannel, 1950) (**stat. nov.**).

Pselaphostomus (*Pselaphogenius*) *normandi* Reitter (1910: 156. Holotype ♂: Mus. Budapest. Loc. typ.: Algérie, St. Charles) n'est pas un synonyme de *Pselaphogenius algerinus* [sic] (Raffray, 1896) (JEANNEL 1956: 163) mais une bonne espèce du genre *Afropselaphus* Jeannel (**comb. nov.**).

Dicentrius Reitter (1882: 192, 208. Espèce-type: *Pselaphus merklia* Reitter, 1880, de Bulgarie), *Pselaphogenius* Reitter (1910: 155. Espèce-type: *Pselaphus quadricostatus* Reitter, 1884, des Alpes Pennines) et *Afropselaphus* Jeannel (1950: 385. Espèce-type: *Pselaphus algiricus* Raffray, 1908, de l'Algérie) sont de bons genres. La synonymie *Dicentrius* = *Pselaphogenius* (BESUCHET 1968: 295) n'est pas justifiée. Je donne ici un tableau d'identification et la liste des espèces paléarctiques pour ces trois genres, afin de clarifier une situation bien embrouillée.

- *Pselaphini* aptères, microptalmes. Dernier article des palpes maxillaires constamment très long. Elytres toujours ornés d'une carène dorsale, parfois très petite; elle sépare les deux fossettes basales internes (réunies dans une même dépression) des deux fossettes basales externes (réunies aussi dans une même dépression); carène humérale plus ou moins développée, parfois complètement atrophiée, pouvant ainsi causer l'atrophie complète de la fossette basale externe 2
- 2 Massue du dernier article des palpes maxillaires atténuée à l'apex en une longue pointe; aucun sillon longitudinal sur la massue elle-même. Pubescence de la face dorsale du corps assez fournie, uniformément répartie sur les élytres. Saillie gulaire arrondie non prolongée en pointe en arrière. Édéage avec une longue lame ventrale *Dicentrius* Reitter (Bosnie-Herzégovine, Albanie, Macédoine, Bulgarie)
- Massue du dernier article des palpes maxillaires sans longue pointe, presque toujours ornée d'un sillon longitudinal sur sa face dorsale externe. Pubescence de la face dorsale du corps plus clairsemée, toujours alignée sur deux ou trois rangées sur chaque élytre 3

- 3 Saillie gulaire arrondie, jamais prolongée en pointe en arrière. Édéage de structure complexe, avec une lame ventrale généralement bien développée. Massue du dernier article des palpes maxillaires plus ou moins renflée, lisse, parfois non sillonnée *Pselaphogenius* Reitter (Sud de l'Europe, Turquie, Japon, Corée, Chine)
- Saillie gulaire nettement prolongée en arrière par une pointe toujours un peu séparée de la face ventrale de la tête. Édéage de structure simple, sans lame ventrale. Massue du dernier article des palpes maxillaires plus ou moins grande, sa surface lisse, ou granuleuse ou même épineuse; sillon longitudinal toujours présent, parfois très fin *Afropselaphus* Jeannel (Iles Canaries, Afrique du Nord, Dalmatie, Grèce, Turquie, Liban, Israël, Caucase, Ouzbékistan).

ESPÈCE PALÉARCTIQUE DU GENRE *Dicentrius* Reitter
merklii Reitter

ESPÈCES PALÉARCTIQUES DU GENRE *Pselaphogenius* Reitter

- argentarius* (Holdhaus)
aspromontanus (Reitter)
bulgaricus Löbl
calabrus (Reitter) = *calaber* [sic] (Holdhaus)
carusoi Sabella
conosternum (Holdhaus)
cornurus (Nomura); **comb. nov.** (de *Dicentrius*)
cottianus (Dodero)
crassiusculus Löbl
debilis (Sharp)
dentipenis Sawada
fiorii (Raffray) = *reitteri* (Fiori)
frontalis (Jeannel); **comb. nov.** (de *Pselaphopsis*)
gardinii Castellini
gotoinsularis (Nomura); **comb. nov.** (de *Dicentrius*)
grajus (Dodero)
lanceolatus Sawada
laticeps Besuchet
latinus Besuchet
lepontinus Besuchet
longipalpis (Kiesenwetter)
lucanicus Besuchet
magniocularatus Sawada
mehadiensis (Frivaldszky); **comb. nov.** (de *Pselaphostomus*)
neapolitanus Besuchet
orientalis Besuchet

<i>paganettii</i> (Dodero)	
<i>paradoxus</i> Sawada	
<i>peloritanus</i> (Holdhaus)	
<i>quadricostatus</i> (Reitter)	
<i>shibatai</i> Sawada	
<i>spinifer</i> Sawada	
<i>spinifer tuberculipenis</i> Sawada	
<i>spinifer uncinatus</i> Sawada	
<i>treskanus</i> (Karaman); comb. nov.	(de <i>Pselaphostomus</i>)
<i>tridentatus</i> Sawada	
<i>tridentatus vicinus</i> Sawada	
<i>tubipenis</i> Sawada	
<i>uncifer</i> Tanokuchi	
<i>yoshidae</i> Sawada	
<i>yosii</i> Sawada	
<i>yosii hamatus</i> Sawada	
<i>yosii securiger</i> Sawada	

Quelques *Pselaphogenius* ont été décrits en dehors de la région paléarctique; il faudrait vérifier leur appartenance générique.

ESPÈCES PALÉARCTIQUES DU GENRE *Afropselaphus* Jeannel

<i>algiricus</i> (Raffray); comb. nov. = <i>algerinus</i> [sic] (Jeannel)	(de <i>Pselaphogenius</i>)
<i>breiti</i> (Besuchet); comb. nov.	(de <i>Pselaphogenius</i>)
<i>canariensis</i> Besuchet	
<i>caucasicus</i> (Reitter); comb. nov.	(de <i>Pselaphogenius</i>)
<i>caviventris</i> (Reitter); comb. nov.	(de <i>Pselaphogenius</i>)
<i>chobauti</i> (Normand); comb. nov.	(de <i>Pselaphogenius</i>)
<i>circassicus</i> (Besuchet); comb. nov.	(de <i>Pselaphogenius</i>)
<i>clavigeroides</i> (Reitter); comb. nov.	(de <i>Pselaphogenius</i>)
<i>dalmatinus</i> (Roubal); comb. nov.	(de <i>Pselaphus</i>)
<i>fernandezi</i> Besuchet	
<i>guanche</i> Besuchet	
<i>jeani</i> (Normand); comb. nov.	(de <i>Pselaphogenius</i>)
<i>maroccanus</i> (Besuchet); comb. nov.	(de <i>Pselaphogenius</i>)
<i>melichari</i> (Reitter); comb. nov.	(de <i>Pselaphogenius</i>)
<i>mirei</i> (Jeannel); comb. nov.	(de <i>Pselaphogenius</i>)
<i>normandi</i> (Reitter); comb. nov.	(de <i>Pselaphogenius</i>)
<i>palpiger</i> (Wollaston)	
<i>pentagonus</i> (Saulcy); comb. nov.	(de <i>Pselaphogenius</i>)
<i>raffrayi</i> (Peyerimhoff); comb. nov.	(de <i>Pselaphogenius</i>)
<i>spinipalpis</i> Besuchet	
<i>tergitalis</i> (Reitter); comb. nov.	(de <i>Pselaphogenius</i>)
<i>tuniseus</i> (Normand); comb. nov.	(de <i>Pselaphogenius</i>)
<i>zacynthius</i> (Besuchet); comb. nov.	(de <i>Pselaphogenius</i>)

CLAVIGERINI

Claviger (s. str.) *devillei* Jeannel (1950: 63, 67. Syntype ♂ ici désigné comme lectotype: Mus. Paris. Loc. typ.: France, Var, La Londe) n'est qu'un synonyme de *Claviger testaceus testaceus* Preysslner, 1790 (**syn. nov.**).

Les *Claviger pyrenaicus* Raffray (1887: 19. Holotype ♂ ici désigné comme lectotype: Mus. Paris. Loc. typ.: France, Basses-Pyrénées, Saint-Jean-de-Luz) et *duvali vasconicus* Jeannel (1950: 68. Holotype ♀: Mus. Paris. Loc. typ.: France, Basses-Pyrénées, Lanhay) ne sont que des synonymes de *Claviger piochardi brucki* Saulcy, 1874 (**syn. nov.**).

Cette sous-espèce occupe les Pyrénées toutes entières (des Pyrénées-Orientales aux Basses-Pyrénées et à la Navarre), les Landes et la partie orientale des Monts Cantabriques (province de Santander).

Claviger (s. str.) *antoinei* Jeannel (1956: 200, 202. Paratypes ♂ et ♀: Mus. Genève. Loc. typ.: Maroc, Moyen-Atlas, Forêt de Ksiba) tombe dans la synonymie de *Claviger barbarus* Bedel, 1884 (**syn. nov.**).

Commatocerus (*Articerus*) *subnitidius* Pic (1903: 145. Syntype ♂: Mus. Paris. Loc. typ.: Grèce, Crète) appartient au genre *Articerodes* Raffray (**comb. nov.**), dans lequel il n'est qu'un synonyme d'*A. syriacus* (Saulcy, 1865) (**syn. nov.**).

Corynotopsis scotti Jeannel, 1951 a été décrit de Dire-Daoua en Ethiopie. Il a aussi été trouvé en Arabie Saoudite: Fayfa, 1240 m, 1 ♀ le 23.IX.1981 (Büttiker).

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Les Diplopodes édaphiques et souterrains de l'île Maurice (Myriapoda, Diplopoda)

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Cavernicolous and soil Millipedes from Mauritius (Diplopoda). — Three caves located in low altitude and anthropic zone were visited by Pierre Strinati in November 1994. Six species were gathered, among them 4 are widespread species, and only 2 are new from this island. The checklist of the diplopods from Mauritius includes now 28 species: among them, 14 are possible endemics and 10 are widespread species. Several synonymies are reminded or newly established. *Leptogoniulus naresi* (Pocock, 1893) = *Trigoniulus lawrencei* Verhoeff, 1939 (syn. nov.); *Trigoniulus corallinus* (Eydoux & Souleyet, 1841) = *T. goesi* Porat, 1876 & auct. = *T. lumbricinus* (Gerstaecker, 1873 & auct. (syn. nov.); *Paraspirobolus dictyonotus* (Latzel, 1895) = *Seychellobolus dictyonotus mauritianus* Verhoeff, 1939 (syn. nov.). Otherwise, the species *Mauritacantha lawrencei* is suggested for future designation as type-species of the so-called genus *Mauritacantha*, after revision.

Key-words: Diplopoda - cave fauna - soil - Mauritius - nomenclature - biodiversity.

I. INTRODUCTION

Nos connaissances sur la faune diplopodologique de l'île Maurice (anciennement Ile de France) sont restées, pendant plusieurs décennies, limitées à six espèces : *Iulus corallinus* Eydoux & Souleyet, 1841, *Iulus (Glyphiulus) granulatus* Gervais, 1847, *Sphaerotherium insulanum* Karsch, 1881, *Rubanostreptus macilentus* (Saussure & Zehntner, 1902), *Spirobolus biconicus* Karsch, 1881 et *Prionopeltis xanthotrichus* Attems, 1898. Le premier et d'ailleurs unique travail relativement important effectué sur les Diplopodes de cette île porta sur les collectes de notre regretté collègue R.V.

Lawrence, qui y séjourna pendant tout le mois de Janvier 1935, et qui confia ses récoltes à K.W. Verhoeff. Ce dernier, manifestement enthousiasmé par la découverte de petits polydesmides aux caractères originaux, sur lesquels il basa plusieurs genres nouveaux et sous-familles nouvelles de Cryptodesmidae, ainsi que par le nombre relativement important (selon lui) de formes endémiques de ce matériel (pas moins de 9 genres nouveaux et 14 espèces ou sous-espèces nouvelles!) rédigea deux notes qui parurent presque simultanément, en 1939 (Verhoeff 1939a, b).

Basé sur ces travaux originaux et complété par les données récemment acquises, c'est une mise à jour actualisée et une nouvelle approche de la richesse et de la biodiversité spécifiques des diplopodes de l'île Maurice que propose le présent travail.

II. RÉSULTATS OBTENUS D'APRÈS LES RÉCOLTES DE P. STRINATI

Pour la première fois, des cavités de l'île Maurice ont été prospectées ; il s'agit de trois grottes, qui ont été visitées en novembre 1994 :

- Trois Cavernes, près de Cascavelle, alt. 130 m., du 6 au 8 novembre 1994.
- Caverne de Camp Thorel, alt. 350 m., le 7 novembre 1994.
- Caverne Petite Rivière, près de Chabel, alt. 110 m., du 6 au 8 novembre 1994.

Les matériaux récoltés par Pierre Strinati sont déposés au Museum d'histoire naturelle de Genève (MHNG), à l'exception d'un des deux mâles de *Peronorchus parvicollis*, qui est déposé dans la collection des Myriapodes du Muséum National d'Histoire Naturelle de Paris (MNHN : JC 295).¹

Les trois cavités visitées sont situées à de basses altitudes, dans des tubes de lave, assez proches de la zone urbaine de Port-Louis et s'ouvrant toutes dans des zones de culture de canne à sucre. Elles semblent éloignées, tant géographiquement qu'écologiquement, des sites dans lesquels Lawrence récolta certains des présumés endémiques décrits par Verhoeff.

Six espèces de Diplopodes (dont une non identifiée) y ont été récoltées:

POLYDESMIDA

PARADOXOSOMATIDAE

Oxidus gracilis (C.L. Koch, 1847)

Loc. : Caverne de Camp Thorel, 7 novembre 1994, 1 mâle, 1 femelle juv., coll. Pierre Strinati.

Caverne Petite Rivière, près de Chabel, 6-8 novembre 1994, 4 femelles, 5 juv., coll. Pierre Strinati.

Cette espèce, déjà signalée de l'île Maurice, est quasiment ubiquiste. Souvent classée dans le genre *Orthomorpha*, elle a été certainement largement dispersée par l'homme, non seulement dans de nombreuses îles et territoires des zones tropicales et néotropicales, mais aussi en de nombreuses localités paléarctiques à caractère synanthropique.

¹ Le mâle retourné à Genève a malheureusement perdu ses gonopodes suite à un accident survenu au cours du transfert du matériel P. Strinati de Paris à Genève.

Chondromorpha xanthotricha (Attems, 1898)

Loc. : Caverne Petite Rivière, près de Chabel, 6-8 novembre 1994, 1 mâle, coll. Pierre Strinati.

Depuis JEEKEL (1963) les diplopodologistes distinguent artificiellement, bien qu'ils soient quasiment identiques par leurs caractères gonopodiaux, *C. xanthotricha* et *C. kelaarti* (Humbert 1865), essentiellement par leur taille et leur ornementation tégumentaire. *C. kelaarti*, inféodé à Ceylan et au sud de l'Inde, est plus robuste et plus orné que *C. xanthotricha*, qui, décrit en 1898 sur des échantillons de l'île Maurice (une femelle) et surtout de Ceylan (mâles et femelles), a été depuis retrouvé, probablement dispersé par l'homme, sur diverses îles et autres lieux des océans Indien, Pacifique et Atlantique. *C. xanthotricha* constitue très probablement une forme diasporique de *C. kelaarti*, et les deux formes sont sujettes à des variations de leurs caractères morphologiques externes qui se sont traduites dans le passé par la création de plusieurs taxons de rang sub-spécifiques (CARL 1932, VERHOEFF 1936, ATTEMS 1937) et même d'une espèce, *granosa*, par Attems, 1913! Ces faits constituent, à nos yeux, non une démonstration, mais de bons éléments venant appuyer une argumentation en faveur de la conspécificité des deux taxons.

JEEKEL (1963) donne *C. xanthotricha* de l'île Maurice, Ceylan, Philippines, Luzon, Nouvelle-Calédonie, Îles Fidji, Samoa, et... Jamaïque; depuis, elle a été signalée des Séchelles (MAURIÈS 1980, GOLOVATCH & KORSOS 1992), de Bali (JEEKEL 1983), de Guadeloupe (MAURIÈS 1981) de Porto-Rico (SANTIAGO-BLAY & VELEZ 1985), à nouveau de Jamaïque, sous le nom de *kelaarti* (LOOMIS 1975) et, sans autre précision, d'Afrique continentale (JEEKEL 1983).

Desmoxytes planata (Pocock, 1895)

Loc. : Caverne de Camp Thorel, 7 novembre 1994, 1 mâle, coll. Pierre Strinati.

Révisée récemment (voir GOLOVATCH & ENGHOFF 1994), cette espèce, qui est nouvelle pour l'île Maurice, a également des dispositions à la dispersion par l'homme puisque elle a été citée des Îles Andamans, des Séchelles, de Ceylan et de Java, avant d'être retrouvée sur le continent, d'où elle est probablement originaire, en Thaïlande et en Chine.

PYRGOIDESMIDAE

Gen.sp. (?)

Loc. : Caverne Petite Rivière, près de Chabel, 6-8 novembre 1994, 1 femelle juv. à 18 anneaux.

TRICHOPOLYDESMIDAE

Peronorchus parvicollis Attems, 1907 (Figs 1-5)

Loc. : Trois Cavernes, près de Cascavelle, 6-8 novembre 1994, 2 mâles, 1 mâle juv., 1 femelle juv., coll. Pierre Strinati.

Il suffit de comparer les figures XIV, XV, 32 et 33 d'ATTEMS (1907) à nos figures 1-5 pour se rendre compte de la conspécificité du matériel de Java et du nôtre.

On notera également la concordance des caractères donnés ci-après :

- 19 anneaux chez les mâles (29 paires d'appendices), la jeune femelle a 18 anneaux (et 27 paires de pattes).

- les mâles mesurent respectivement 5, 3 et 4,8mm de long sur 0,56 et 0,60mm de large.

- antennes identiques à celle figurée par ATTEMS (1907, fig. 31), avec un fort renflement des antennomères 7 et 8.

- Ozopores sur les anneaux 5, 7, 9,10,12,13 et 15 à 18.

- Dos parcouru transversalement par 3 rangs de soies bacilliformes ou un peu claviformes à raison de: un rang antérieur de 4+4 soies (soie marginale non comprise), un deuxième rang de 5+5 soies (soie marginale non comprise) situé dans la moitié postérieure du métazonite et un 3ème rang, submarginal, de 4+4 soies (la ou les deux soies angulaire(s) non comprises). Les carènes sont peu développées et, sur les anneaux non-porifères elles portent chacune 3 soies marginales (une un peu en arrière de l'angle arrondi antérieur, une sur l'angle postérieur, la moyenne étant plus proche de la postérieure que de l'antérieure) séparées par de faibles échancrures sur les anneaux non-porifères; aux anneaux porifères, les ozopores sont petits, peu visibles, mais repérables au fait que l'angle postérieur des carènes porte deux soies au lieu d'une seule (Fig. 1).

Ces caractères externes sont ceux que l'on rencontre communément aussi bien chez les Trichopolydesmidae que chez les Fuhrmannodesmidae. Quant aux gonopodes, comme le montrent les figures 2 à 5, ils se rattachent plutôt aux Trichopolydesmidae, notamment en raison du relativement faible développement du coxite par rapport au télopodite, ce qui n'apparaît pas nettement sur les figures d'Attems. A noter la présence de deux très grandes soies, une coxale, l'autre préfémorale, et, au télopodite, une rainure séminale classique qui se termine dans une partie en vasque dans laquelle prend naissance un court appendice solénomérial (s).

SPIROBOLIDA

TRIGONIULIDAE

Leptogoniulus naresi (Pocock, 1893)

Loc. : Caverne Petite Rivière, près de Chabel, du 6 au 8 novembre 1994, 1 mâle, coll. Pierre Strinati.

Déjà citée de l'île Maurice par VERHOEFF (1939b) sous le nom de *Trigoniulus lawrencei* n.sp., cette espèce est connue, sous diverses dénominations, dont la plus fréquente a été *Spirostrophus naresi*, de plusieurs localités tropicales et néotropicales, dont plusieurs îles:

Madagascar: *Spiroبولus coquereli* et *Spiroبولus naresi*, (SAUSSURE & ZEHNTNER 1902); *Spirostrophus naresi* (ATTEMS 1910).

Séchelles: *Spiroboldus naresi* (POCOCK 1893), *Broelemann* 1896, ATTEMS 1901, SAUSSURE & ZEHNTNER 1902; *Glosselus naresi* (COOK 1911); *Spirostrophus naresi* (MAURIES 1980); *Leptogoniulus naresi* (GOLOVATCH & KORSOS 1992).

Marquises: *Litobolus hanevavus*, (CHAMBERLIN 1947, LOOMIS & HOFFMAN 1948).

Micronésie: *Trigoniulus naresi* (ATTEMS 1914); *Trucobolus townesi* (CHAMBERLIN 1947, HOFFMAN 1980).

Archipel Bismarck: *Trigoniulus naresi* (ATTEMS 1914).

Costa-Rica: *Glosselus musarum* (Cook 1911); *Spirostrophus naresi* (LOOMIS & HOFFMAN 1948).

Jamaïque: *Cairibolus antonianus* (CHAMBERLIN 1918, VELEZ 1967); *Spirostrophus naresi* (LOOMIS 1938, 1948).

Porto-Rico: *Cairibolus leiosuturus* (CHAMBERLIN 1918, VELEZ 1967); *Spirostrophus naresi* (VELEZ 1967).

Iles Swan: *Trigoniulus remotus* (CHAMBERLIN 1918) = *Spirostrophus remotus* (CHAMBERLIN 1922, LOOMIS 1938, LOOMIS & HOFFMAN 1948).

Dominica: *Spirostrophus naresi* (LOOMIS 1934, HOFFMAN 1960).

Guadeloupe: *Trigoniulus naresi* (BROELEMANN 1900); *Spirostrophus naresi* (CHAMBERLIN 1918, LOOMIS 1934, SAHLI 1980, MAURIÈS 1981).

Martinique: *Spirostrophus naresi* (LOOMIS 1934).

Sainte-Lucie: *Spirostrophus naresi* (LOOMIS 1934).

Guyane française: *Trigoniulus acolastus* (SILVESTRI 1897, BROELEMANN 1900).

Brésil: *Spirostrophus naresi* (BROELEMANN 1929, SCHUBART 1947).

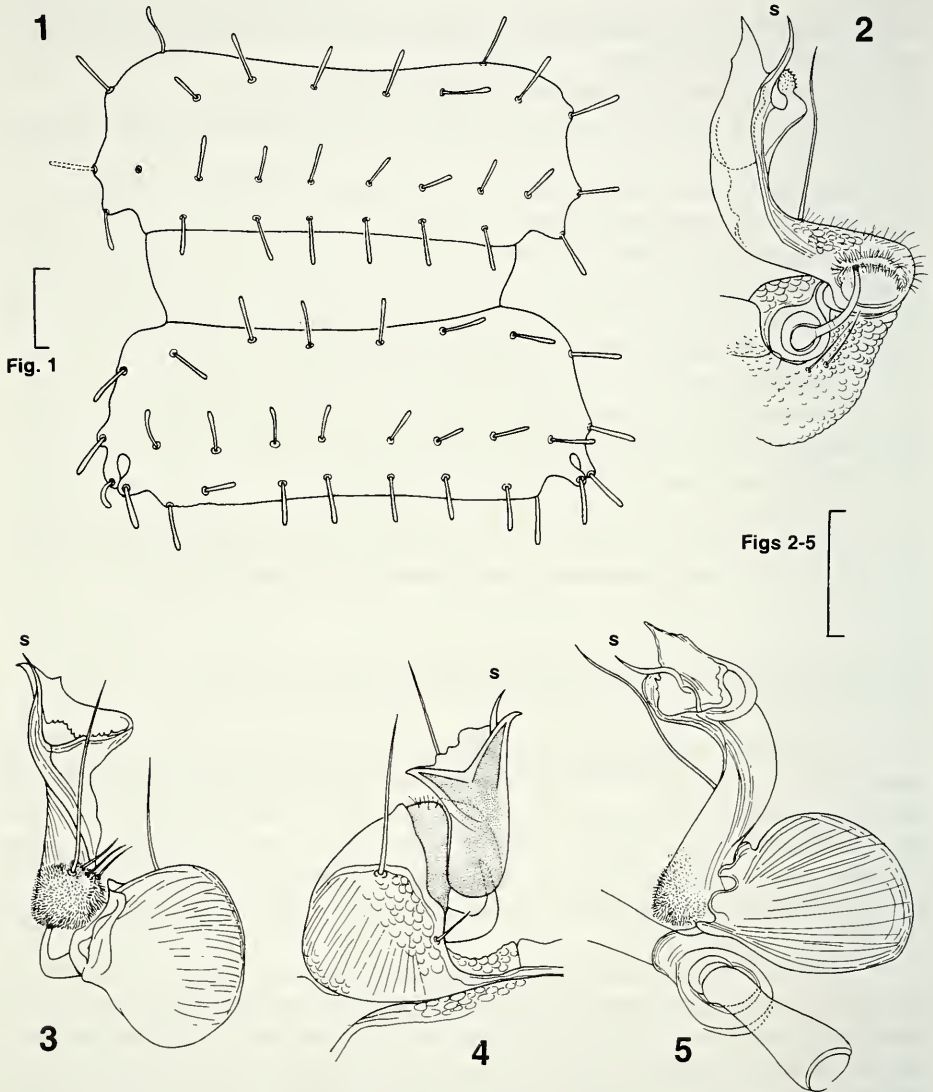
III. LES DIPLOPODES DE L'ILE MAURICE : UNE MISE A JOUR

La liste des DiplopoDES de l'île Maurice, que nous donnons ci-après, est donc basée essentiellement sur celle établie par VERHOEFF (1939b); elle est ici complétée et mise en conformité avec nos conceptions taxinomiques et nomenclaturales actuelles. Elle comprend 28 espèces, dont un nombre d'endémiques potentiels et probables bien inférieur, tant au niveau générique que spécifique, à celui donné par Verhoeff, du fait de plusieurs synonymies évidentes et déjà reconnues (HOFFMAN 1980, 1981; JEEKEL 1972).

Les taxons de Polydesmidea de rang générique et spécifique, dont l'intérêt est certain et la validité probable bien que nécessitant une révision, sont conservés tels quels et répartis entre Trichopolydesmoidea et Stylodesmoidea, les coupes subfamiliales créées par VERHOEFF (1939a, b) nous paraissant, pour les unes, abusives (ainsi, les Eneilissominae, qui sont créés sur une seule femelle!), et pour les autres, devoir être examinées avec attention dans le cadre d'une révision des Polydesmoidea.

Les espèces à grande propagation (par l'homme) sont marquées d'un *, les endémiques probables de deux ** (Tableau I).

Le genre *Mauritacantha* Verhoeff, 1939, pour lequel son auteur a décrit 5 espèces, n'a pas d'existence aux yeux de la nomenclature zoologique (voir JEEKEL 1971, HOFFMAN 1980 et Code International de Nomenclature Zoologique, ICZN, art.



FIGS 1-5

Peronorchus parvicollis Attems, 1907: 1, 8^e et 9^e anneaux, vue dorsale; 2, gonopode gauche, en vue médiale; 3, le même, en vue caudale; 4, le même, en vue orale-distale; 5, le même, en vue latérale externe. (échelles: 0,1 mm)

13b) ; c'est pourquoi nous suggérons ici, en vue d'une future et correcte validation, que soit désignée *M. lawrencei* comme espèce-type du futur genre, cette démarche ne préjudgeant en rien de la valeur formelle de ces taxons, pour lesquels une révision est tout à fait nécessaire.

TABLEAU I

Liste actualisée des diplopoDES de l'île Maurice. Les espèces à large répartition (liée aux activités humaines) sont marquées d'un *, les endémiques probables sont marquées de deux **.

POLYXENIDA

- ***Mauritixenus gracilicornis* Verhoeff, 1939
Alloproctoides simulans Marquet & Condé, 1950 (Condé & Jacquemin, 1962)

GLOMERIDA

SPHAEROTHERIIDEA

Sphaerotheriidae

- ***Sphaerotherium insulanum* Karsch, 1881

POLYZONIIDA

Siphonotidae

- **Rhinotus africanus* Cook, 1896
 = *Paraburenia insulana* Verhoeff, 1939 (Hoffman, 1980)

POLYDESMIDA

POLYDESMIDEA

Trichopolydesmidae ?

- ***Mauritacantha lawrencei* Verhoeff, 1939
 ***Mauritacantha fimbriata* Verhoeff, 1939
 ***Mauritacantha montana* Verhoeff, 1939
 ***Mauritacantha similis* Verhoeff, 1939
 ***Mauritiosoma gibbosum* Verhoeff, 1939
Peronorchus parvicollis Attems, 1907

Stylodesmidae

- ***Lemuriocryptus montanus* Verhoeff, 1939
 ***Cryptocephalius niger* Verhoeff, 1939
 ***Cryptomauritius lawrencei* Verhoeff, 1939
 ***Eneilissomus setiger* Verhoeff, 1939

PARADOXOSOMATIDEA

- **Anoplodesmus saussurei* (Humbert, 1865)
 = *Anoplodesmus saussurei mauritianus* Verhoeff, 1939 (Jeekel, 1972)
 **Chondromorpha xanthotricha* (Attems, 1898)
 **Desmoxytes planata* (Pocock, 1895)
 **Oxidus gracilis* (C.L. Koch., 1847)

SPIROBOLIDA

Trigoniulidae

- **Leptogoniulus naresi* (Pocock, 1893)
 = *Trigoniulus lawrencei* Verhoeff, 1939 (**syn. nov.**)
 **Trigoniulus corallinus* (Eydoux & Souleyet, 1841):

Iulus corallinus, dont les types (un mâle et une femelle), déposés au M.N.H.N. de Paris, ont été revus récemment par notre collègue Richard L. Hoffman (qui a désigné un lectotype) a manifestement pour synonymes:

- = *T. goesi* Porat, 1876 et auct. (**syn.nov.**)
 = *T. lumbricinus* (Gerstaecker, 1873) et auct. (**syn.nov.**)

Spirobolellidae

- **Paraspirobolus dictyonotus* (Latzel, 1895)
- = *Seychellobolus dictyonotus mauritanus* Verh., 1939 (syn. nov.)
- ***Spirobolellus fissus* (Verhoeff, 1939)
- = *Mauritobolus fissus* Verhoeff, 1939
- ***Spirobolellus claviger* (Verhoeff, 1939)
- = *Poratobolus claviger* Verhoeff, 1939

Pseudospirobolellidae

- **Pseudospirobolellus avernus* Butler, 1876
- = *Pseudospirobolellus broelemanni* Verhoeff, 1939 (Hoffman, 1981)

incerte sedis

- Spirobolus biconicus* Karsch, 1881

SPIROSTREPTIDA

Spirostreptidae

- Rubanostreptus macilentus* (Saussure & Zehntner, 1902)

JULIDA

Glyphiulidae

- ***Hypocambala cornuta* (Verhoeff, 1939)
- = *Agastrophus cornutus* Verhoeff, 1939
- **Glyphiulus granulatus* Gervais, 1847

IV. CONCLUSION

L'intérêt présenté par ce matériel, collecté exclusivement en milieu souterrain, tient essentiellement en 4 points :

a) Contrairement à notre attente, le matériel récolté par Pierre Strinati ne comprend aucun des Polydesmida endémiques, aux caractères si particuliers, décrits par Verhoeff; tout porte à croire que les cavités prospectées ont été colonisées relativement récemment par des espèces à large dispersion se différenciant de la faune endémique ancienne installée dans les sols. Cela peut tenir, d'une part, au caractère relativement «récent» des niches proposées par les cavités souterraines formées par les tunnels de lave, d'autre part, à la proximité de zones où les activités humaines sont intenses (proximité de la zone sub-urbaine de Port-Louis et des cultures de canne à sucre).

b) En effet, sur les 5 espèces identifiables récoltées, 4 sont des espèces réputées être dispersées par l'homme en diverses îles des océans Pacifique, Indien ou Atlantique; leur présence dans les stations étudiées tient très probablement au caractère fortement anthropique de l'environnement externe où s'ouvrent ces cavités (cultures de canne à sucre), qui a été aisément colonisé par ces espèces diasporiques. L'exemple le plus fréquent est, encore une fois ici, représenté par *Oxidus gracilis*, classiquement abondant près des agglomérations, cultures, habitations, serres...

c) 2 de ces 5 espèces sont citées pour la première fois de l'île Maurice: *Desmoxytes planata* et *Peronorchus parvicollis*.

d) La dernière d'entre elles n'était encore connue, depuis 1907, que de sa localité-type, Buitenzorg, dans l'île de Java (ATTEMS 1907).

L'étude de cette collection de Diplopodes de P. Strinati nous a ainsi donné l'occasion de faire une intéressante mise au point sur la richesse et la biodiversité de ce groupe dans l'île Maurice. Nul doute que les récoltes futures effectuées par d'autres chercheurs viendront enrichir cette connaissance, encore bien fragmentaire à nos yeux, et qu'il conviendra de relier plus précisément aux faunes réparties dans les aires biogéographiques voisines.

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Quaestus (Speogeus) littoralis n. sp.

(Coleoptera: Cholevidae, Leptodirinae).

Considérations biogéographiques et évolutives sur la faune troglobie de la Sierra du Sueve (Asturies, Espagne).*

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***Quaestus (Speogeus) littoralis* n. sp. (Coleoptera: Cholevidae, Leptodirinae). Biogeographical and evolutionary considerations on the cave-dwelling fauna in Sierra del Sueve (Asturias, Spain).** - *Quaestus (Speogeus) littoralis* n. sp. from Sierra del Sueve is described. The main distinguishing characters of the new species are the shape of the mesosternal carina and the aedeagus. The affinity with close species and the position within the subgenus *Speogeus* are discussed. Finally, the possible colonization of the karstic area of Sierra del Sueve and the evolutionary process of the four Leptodirinae species found in the western Cantabric region are analysed.

Key-words: Coleoptera - Leptodirinae - taxonomy - caves - colonization and evolution - Sierra del Sueve - Spain.

INTRODUCTION

Une des zones karstiques les plus intéressantes pour l'étude de la faune troglobie de la Péninsule Ibérique se trouve dans la Sierra du Sueve et ses chaînons (43° 24' - 43° 29' N; 5° 20' - 5° 4' W). Une étude exhaustive a été réalisée pendant les 20 dernières années dans cette zone dans plus de 30 cavités de cette zone, ce qui a permis la réalisation de nombreux travaux très intéressants, aussi bien faunistiques que biogéographiques, SALGADO (1978, 1980, 1984, 1985, 1986, 1989, 1991, 1993 et 1995), GIACHINO & SALGADO (1989) et OUTERELO *et al.* (sous presse).

L'étude seule des familles de Carabidae, Cholevidae et Staphylinidae a permis de cataloguer 84 espèces cavernicoles, nombre vraiment extraordinaire, surtout si l'on tient compte de la surface réduite de ce karst, soit environ 200 km². Parmi les données apportées, on remarque comme espèces troglobies propres à cette zone: *Quaestus (Quaestus) espanoli* (Salgado, 1978), *Q. (Q.) pseudoccidentalis* (Salgado, 1980), *Q. (Q.) variabilis* (Salgado, 1991), *Q. (Q.) suevensis* (Salgado, 1991), *Notidocharis calabrezi* Giachino & Salgado, 1989, et surtout, *Breuilites eloyi* Salgado, 1980. Il faudrait ajouter à toutes ces espèces *Quaestus (Speogeus) littoralis* n. sp.

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Quaestus (Speogeus) littoralis n. sp.

Série type: Holotype ♂ et allotype ♀, Grotte du Barredo (43° 28' N - 5° 7' 51'' W), 4-VI-1994, La Torre (Asturies, Espagne), leg. J. M. Salgado (Muséum d'histoire naturelle de Genève). Paratypes: 43 ♂♂ et 45 ♀♀, même localité, date et collectionneur (Coll. Muséum d'histoire naturelle de Genève; Coll. Muséum d'Histoire Naturelle de Paris; Coll. Muséum de Zoologie de Barcelone; Coll. Muséum de Sciences Naturelles de Vitorie; Coll. Fresneda; Coll. Giachino; Coll. Salgado).

DIAGNOSE: Taille comprise entre 2,60 et 2,90 mm, définie par la carène mésosternale courte et la forme de l'édéage par la structure singulière de la zone apicale des paramères.

MALE (holotype): Longueur totale: 2,80 mm. Forme elliptique, allongée, légèrement rétrécie en arrière et anophtalme. Corps modérément convexe, recouvert par une pubescence dorée, fine et allongée (fig. 1). Couleur testacée uniforme. Téguments brillants, sans striolation transverse. Longues antennes qui dépassent la moitié de la longueur du corps (rapport longueur antennes/longueur corps = 0,57). Tous les articles sont plus longs que larges, subcylindriques, l'article IV légèrement plus court que III, V et VI qui sont presque égaux; IX et X égaux; XI, le plus long, deux fois et demi la longueur de X (Tableau I).

TABLEAU I

Quaestus littoralis n. sp. (holotype): longueur (L) et largeur (A) maximales des articles des antennes. (Mesures en 1 mm).

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
L	0,14	0,16	0,12	0,112	0,12	0,12	0,144	0,08	0,1	0,1	0,25
A	0,05	0,05	0,04	0,04	0,04	0,04	0,06	0,05	0,06	0,06	0,07

Pronotum très transverse (rapport largeur maximale/longueur maximale: 1,8), avec la plus grande largeur vers le quart basal; côtés régulièrement arrondis, non sinueux devant les angles postérieurs qui prolongent sans interruption la courbe des élytres.

Elytres légèrement convexes, allongés (rapport longueur max./largeur max.: 1,53); strie suturale absente, on observe uniquement un rudiment de strie formé par 8-10 points peu marqués et situés dans la zone antérieure de l'élytre.

Carène mésosternale courte, qui n'atteint pas le métasternum, modérément élevée avec le bord ventral légèrement convexe, le sommet arrondi et l'angle obtus (fig. 2).

Pattes robustes, modérément allongées, protarses pentamères, très dilatés, avec le premier tarsomère clairement plus large que la largeur maximale du protibia (rapport largeur protarse/largeur protibia = 1,8). Le premier tarsomère est cordé, aussi large que long (fig. 3). Métafémurs non dentés dans la marge postérieure.

Édéage long (0,78 mm), arqué (fig. 4); le lobe médian, en vue ventrale, présente la largeur maximale vers la moitié, avec l'extrémité peu pointue et un peu courbée (fig. 5); les paramères dépassent le sommet du lobe médian, sans massue différenciée mais avec la zone apicale courbée, pourvue de 3 soies très petites, de taille égale, dont 2

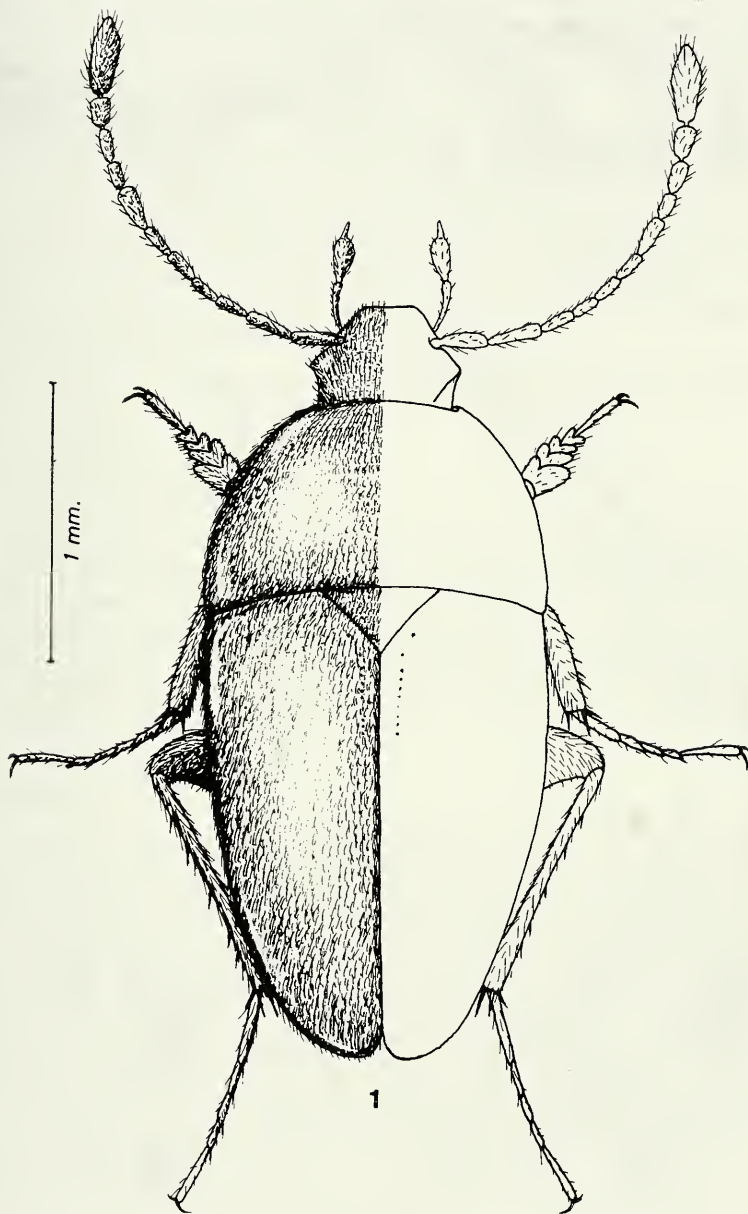
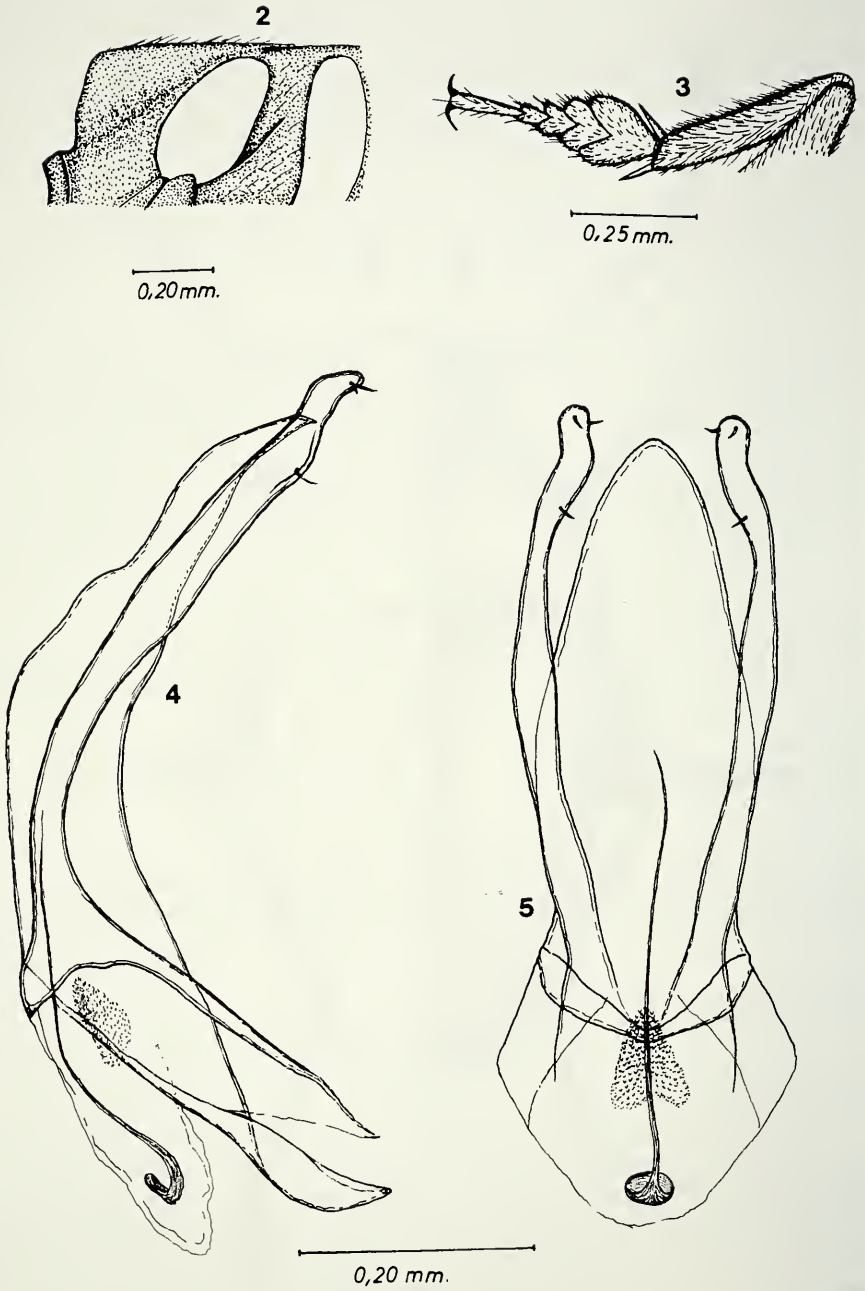


FIG. 1

Quaestus (Speogeus) littoralis n. sp. (holotype), habitus.



FIGS 2-5

Quaeustus (Speogeus) littoralis n. sp. (holotype): (2) carène mésosternale; (3) protarse; (4) édéage, vue latérale; (5) édéage, vue ventrale.

apicales, rapprochées, et 1 interne, très éloignée. Sac interne pourvu de structures simples, vers la zone basale moyenne où l'on remarque un groupe d'épines très réduites disposées en forme de cœur, et un long stylet qui présente la plaque basale arrondie.

LA FEMELLE (allotype) présente une morphologie similaire à celle du mâle. Tarses antérieurs tetramères et étroites; articles de la massue des antennes plus courts que ceux du mâle et un peu plus larges, surtout le XI. La spermathèque (0,15 mm) se caractérise par la présence d'un conduit court et large, plus membraneux que les lobes qu'il unit. Le lobe distal est arrondi et beaucoup plus petit que le proximal qui est oval; le conduit spermatique, un peu plus dilaté dans la zone d'union avec le lobe proximal, est environ 6 fois plus long que la longueur de la spermathèque (fig. 6). Le spiculum ventral (Perreau, 1989) du 8^o urosternite est très court et étroit.

Etymology: Le nom spécifique de cette nouvelle espèce fait allusion à la proximité de la grotte au littoral.

ECOLOGIE ET DISTRIBUTION

C'est une espèce fréquente dans toute la grotte que l'on peut capturer en petits groupes dans les excréments de chauve-souris ou bien de façon dispersée sous des débris de végétaux. La grotte du Barredo a une longueur de 250 m environ, son parcours est étroit et sa surface plane dans sa première partie et en pente raide au fond. L'humidité relative est très élevée, supérieure à 97% et la température est de 11° C. La grotte est enclavée dans un petit massif calcaire au nord-est de la Sierra du Sueve, à 1 km de la côte.

DISCUSSION

La nouvelle espèce est morphologiquement proche de *Quaestus espanoli* (Salgado, 1978), *Q. suevensis* (Salgado, 1991) et *Q. variabilis* (Salgado, 1991) qui appartiennent au "groupe *occidentalis*" (SALGADO 1984, 1991) et sont présents dans la zone karstique orientale de la Sierra du Sueve (SALGADO 1995). Les différences sont très significatives et s'observent tout d'abord au niveau de la carène mésosternale, qui est pour *Quaestus littoralis* n. sp. du "Groupe 1" (Salgado, 1996), la raison par laquelle on l'inclut dans le sous-genre *Speogeus* Salgado, 1985, alors que les trois autres espèces font partie du "Groupe 2C" (SALGADO 1996). L'autre différence est la forme des paramères, plus robustes, avec une massue plus allongée et les soies de la massue plus courtes. La structure de la massue des paramères permet de différencier la nouvelle espèce des autres *Quaestus*.

CONSIDÉRATIONS BIOGÉOGRAPHIQUES ET ÉVOLUTIVES DE LA FAUNE TROGLOBIE DE LA SIERRA DU SUEVE

Le climat a été un facteur déterminant en ce qui concerne la survie et la distribution des espèces hypogées dans l'Europe tempérée, vu que les glaciations de la fin du

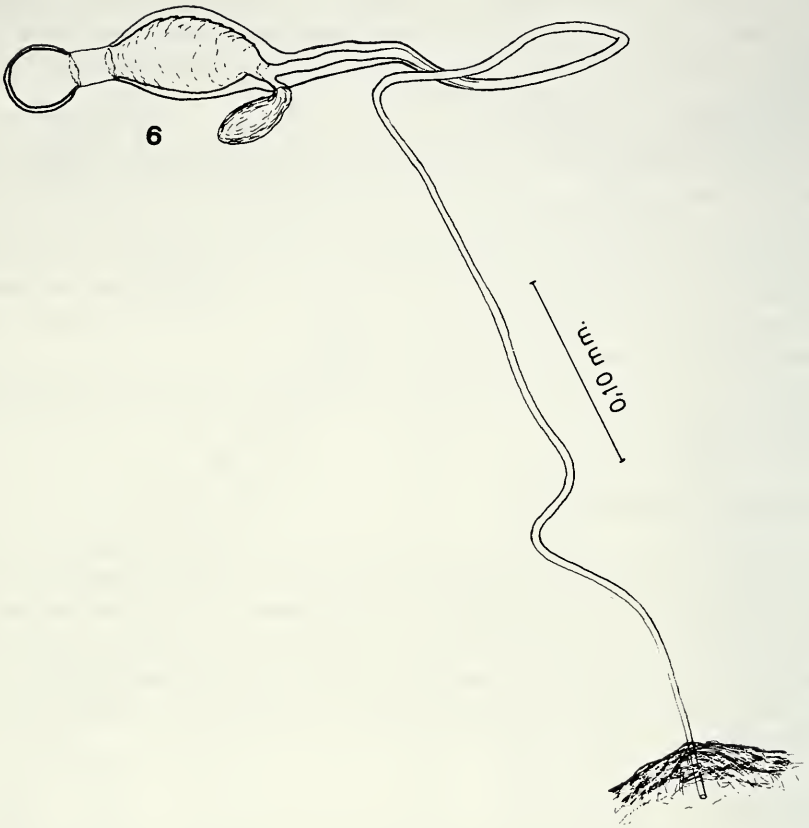


FIG. 6

Quaeustus (Speogeus) littoralis n. sp. (paratype): (6) spermathèque.

Tertiaire (Pliocène) et du Quaternaire ont directement affecté la faune épigée. Selon CRIADO (1984), quatre périodes glaciaires avec leurs interglaciaires respectifs se sont produites pendant l'ère Quaternaire, c'est pourquoi la conquête du milieu hypogé a dû se réaliser à de nombreuses reprises tout au long du Plio-Pleistocène. De cette manière, l'occupation des grottes par les troglobies correspond à une série de vagues migratoires d'âges différents.

Le processus de colonisation du milieu troglobie s'est réalisé d'une façon active (JEANNEL 1943; GINET & JUBERTHIE 1988) par la conquête préalable, pendant les épisodes froids des aires refuge (VANDEL 1965; BELLÉS 1987) comme ce fut le cas dans les vallées profondes qui conservent une végétation forestière, pour ensuite s'adapter progressivement et évoluer en divers biotopes tels que mousse, humus, endogé, réseau de fissures, etc., qui ont agi comme des milieux de transition jusqu'à ce que la faune atteigne la grotte.

Au cours de ces processus de dispersion, les populations d'une espèce déterminée purent occuper un vaste karst, mais une fois atteint le milieu profond, les structures géologiques ont agi comme un facteur d'isolement entre les populations, pouvant ainsi donner lieu à de multiples fractionnements et conditionner, par conséquent, la distribution et l'évolution de la faune. Parmi les facteurs d'isolement qui forment des barrières souterraines, on peut remarquer les chevauchements, les dislocations, les roches compactes ou les terrains imperméables qui vont tous empêcher un flux de gènes entre les populations et qui conduiront à un processus de différenciation des espèces (REVEILLET 1980; BELLÉS 1980; SALGADO 1995). Ce fractionnement dans différentes zones dû à la formation de barrières souterraines va répondre à un modèle de spéciation allopatrique, ce qui est sans doute le cas dans la Sierra du Sueve.

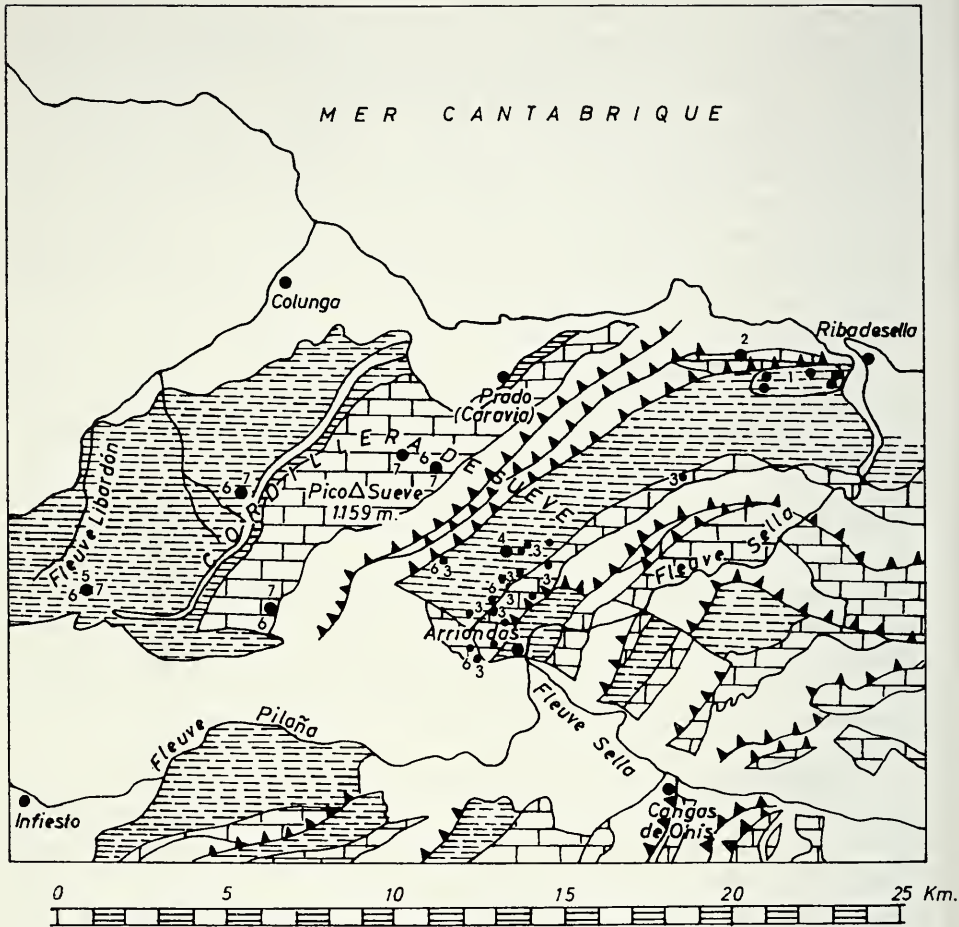
Comme on peut l'observer (fig. 7), il existe dans la Sierra du Sueve un ample chevauchement qui isole clairement les populations occidentales, avec *Quaestus pseudoccidentalis* et *Breuilites eloyi*, des orientales, avec *Quaestus espanoli*, *Q. variabilis*, *Q. suevensis* et *Q. littoralis*. Ces quatre dernières espèces, qui appartiennent au même genre et présentent des caractéristiques morphologiques très semblables, occupent apparemment une même zone karstique; c'est pourquoi on pourrait se demander quelle est la raison de leur isolement et comment elles ont pu évoluer.

Quaestus variabilis et *Q. espanoli*, avec une aire de distribution bien définie, se trouvent dans plusieurs cavités, mais il existe pourtant une interconnexion entre les populations de chacune de ces espèces à travers le réseau de crevasses profondes du karst, ce qui faciliterait le flux génétique (SALGADO 1995; TIZADO *et al.* 1997). La séparation, et spéciation ultérieure, entre *Q. variabilis* et *Q. espanoli* peut être due à l'existence d'une zone imperméable (fig. 7).

Quaestus littoralis, qui vit seulement dans une cavité, est isolée de *Q. espanoli* par un petit chevauchement, suffisant pour maintenir l'indépendance entre les deux espèces. Par contre, la grotte dans laquelle se trouve *Q. suevensis* étant enclavée dans l'aire de *Q. variabilis*, la seule raison possible de leur isolement serait les roches compactes qui entourent la grotte. Cette affirmation est confirmée par le fait qu'on n'observe aucun cas de coexistence, même dans les cavités les plus proches.

Il faut souligner que ces quatre espèces n'ont jamais pu être capturées dans le Milieu Souterrain Superficiel (MSS) (JUBERTHIE *et al.* 1981) ce qui indique qu'il s'agit d'espèces évoluées, et viendrait confirmer ce qu'ont signalé OROMI & MARTIN (1992), soit que les espèces les plus troglomorphyques sont seulement connues du souterrain profond. De plus, des exemplaires de *Quaestus* sp. du "groupe *Q. jeannei*" (SALGADO 1982) ont été capturés dans ce karst, aussi bien à l'entrée de certaines grottes que dans le MSS, ce qui manifeste clairement que c'est une espèce moins évoluée et que sa conquête du milieu hypogé date de périodes glaciaires récentes.

Il est très important de signaler que les populations fondatrices qui se sont installées dans un karst comptaient dans la plupart des cas un petit nombre d'effectifs (GALAN 1993). C'est sans doute le processus de colonisation qu'ont suivi les quatre espèces qui se trouvent dans la zone karstique orientale de la Sierra du Sueve, car à partir d'un petit nombre d'exemplaires et d'un même ancêtre épigé, qui s'est dispersé dans ce karst pendant la même période glaciaire, les espèces ont évolué de manière



LÉGENDE

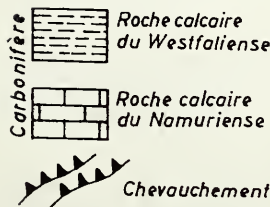


FIG. 7

Carte de distribution de: 1, *Quaestus (Quaestus) espanoli*; 2, *Q. (Speogeus) littoralis*; 3, *Q. (Q.) variabilis*; 4, *Q. (Q.) suevensis*; 5, *Q. (Q.) pseudoccidentalis*; 6, *Quaestus* sp.; 7, *Breuilites eloyi*.

différente. Cette évolution, réalisée dans le même milieu, avec les mêmes voies de pré-adaptation, et les mêmes caractéristiques physiques, chimiques et biologiques, est l'une des principales raisons pour lesquelles les caractéristiques morphologiques des quatre espèces sont très proches. Les différences sont dues seulement à l'isolement et au réseau intégré des processus (HÜPPOP 1985), comme une série d'étapes propres à chacune des populations, venant marquer la

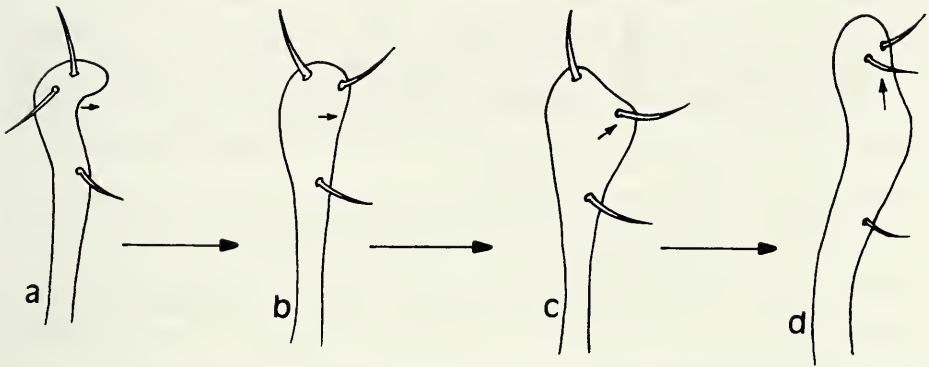


FIG. 8

Evolution des paramères de: a, *Quaestus (Quaestus) suevensis*; b, *Q. (Q.) variabilis*; c, *Q. (Q.) espanoli*; d, *Q. (Speogeus) littoralis*. **Note.** - La petite flèche marque le sens de la croissance de la massue des paramères.

forme différente de la massue des paramères de l'édéage et la longueur de la carène mésosternale, qui est courte chez *Q. littoralis*. Une hypothèse évolutive possible peut être analysée en observant une série d'étapes graduelles dans la forme de la massue des paramères, ce qui permet de penser qu'une croissance allométrique s'est produite dans cette structure (fig. 8), à partir de la forme échancrée de *Q. suevensis*, jusqu'à la massue plus allongée et plus développée de *Q. littoralis*.

En conclusion, la faune troglobie du karst asturien apporte une grande diversité de types de formes relictés (JEANNEL 1965; LINCOLN *et al.* 1982) d'âges différents. Le territoire possède des caractéristiques de forte humidité propices à une colonisation lente du milieu hypogé par diverses vagues de Coléoptères, en particulier les familles de Carabidae et Cholevidae, qui ont activement conquis les grottes.

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Genetic and morphometric analysis of three species of the genus *Hypostomus* Lacépède, 1803 (Osteichthyes: Loricariidae) from the Rio Iguacu basin (Brazil)¹

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Genetic and morphometric analysis of three species of the genus *Hypostomus* Lacépède, 1803 (Osteichthyes: Loricariidae) from the rio Iguacu basin (Brazil). - Three species of *Hypostomus* from the Rio Iguacu basin, *H. aff. commersonii*, *H. derbyi* and *H. myersi*, were examined by multivariate analysis, PCA and size-free discriminant canonical analysis, by the external characters truss network method and starch gel isoenzyme electrophoresis in heart, liver and muscle tissues. Twenty-six gene loci of 14 isoenzyme systems (AAT, ACP, ADH, GDH, G3PDH, G6PDH, GPI, IDHP, LDH, MDH, ME, PGM, PER and SOD) were scored for the first time for these species. The percentage of polymorphic loci (P0.99) varied from 11.54% for *H. derbyi* and *H. myersi* to 19.23% in *H. aff. commersonii*. Expected mean heterozygosity (H_e) varied from 0.011 in *H. derbyi* to 0.044 in *H. aff. commersonii*. Nei's genetic distance (D) between *H. aff. commersonii* and *H. derbyi* was 0.142, between *H. aff. commersonii* and *H. myersi* 0.621, and between *H. derbyi* and *H. myersi* 0.776. We discuss hypotheses for the maintenance of the low mean heterozygosity observed, and for the presence of these species in this drainage basin.

Key-words: Loricariidae – *Hypostomus* – Rio Iguacu – enzyme electrophoresis – size-free canonical discriminant analysis - morphometry

INTRODUCTION

Because of the large number of species in the genus *Hypostomus* Lacépède and the great intraspecific variation in morphology and pigmentation pattern in the species of this genus, systematists have encountered much difficulty in correctly identifying many of these species. Moreover, summary and incomplete descriptions, in conjunction with limited knowledge of the distribution patterns of the South American ichthyofauna, have resulted in proliferation of identification errors in the literature (REIS *et al.* 1990a).

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The drainage basin of the Rio Iguaçú is characterized by a high degree of endemism (about 75% of its ichthyofauna), by a low number of fish species and the absence of many fish families very common in the Paraná basin (JULIO JR *et al.* 1997). The Iguaçú basin became separated from the Rio Paraná about 22 million years ago by the formation of Iguaçú Falls, which are about 70 meters high (SEVERI & CORDEIRO 1994). Its isolation makes the basin an excellent natural laboratory for studies of the *Hypostomus* species, which requires studies at the regional level because of its complexity (REIS *et al.* 1990a).

The differences and similarities between groups of organisms must be quantified in terms of morphological, physiological, ecological and/or molecular characters. With the development of the enzyme electrophoresis technique on a porous support medium by HUNTER & MARKERT (1957), it became possible to obtain information about the structural enzymes of living organisms. Additionally, the subsequent development of calculations of allelic frequencies and indices of distance and similarity to evaluate the genotypic variation between intra- or interspecific populations, made possible the use of enzyme electrophoresis in systematic studies.

AVISE (1974) mentions among other advantages of enzyme electrophoresis, the possibility of acquiring adequate data for the description of a species for systematic purposes, even for a sample with a relatively small number of individuals, and that phylogenetically proximate species can be arranged according to the percentages of alleles or distinct genotypes. However, THORPE & SOLÉ-CAVA (1994) maintain that isoenzyme electrophoresis should not be used as a substitute for morphological analyses, but as complementary to these. For this purpose, isoenzyme electrophoresis, combined with techniques of multivariate morphometry, has for a long time been cited and used in evolutionary and systematic biology (SHAKLEE & TAMARU 1981; O'MAOILEIDIGH *et al.* 1988; HEDGECOCK *et al.* 1989; ROBY *et al.* 1991; LOPEZ-LEMUS 1991; THORPE & SOLÉ-CAVA 1994). Nevertheless, such combined techniques have not yet been used to investigate the taxonomic status or phylogenetic relationships of most groups of neotropical fishes. Therefore it is necessary to test and refine these techniques, in order that they can assist in clarifying relationships between groups of fishes where traditional systematics has encountered great difficulties in obtaining precise results.

Accordingly, the present work aimed to investigate the genetic relationships of *H. aff. commersonii* Valenciennes, 1840, *H. derbyi* (Haseman, 1911), and *H. myersi* (Gosline, 1947), to analyze the morphological variation between these species by means of morphometric techniques and to address questions about the presence of the species in the Rio Iguaçú basin.

MATERIALS AND METHODS

Morphometric analyses. For the morphometric analyses, 22 specimens of *H. aff. commersonii*, 24 of *H. derbyi*, and 26 of *H. myersi* were collected from the Rio Iguaçú basin (Fig. 1), from March 1993 through February 1996. The specimens were fixed in 10% formalin and they are alcohol preserved in the synoptic collection of Nupélia

(Limnology, Ichthyology and Aquaculture Research Center) of the State University of Maringá voucher specimens are also deposited in the collections of the Muséum d'histoire naturelle, Geneva (Switzerland). A list of specimens was arranged in the text as follow: locality, town, collecting date, number of specimens (if there are more than one) between parenthesis and the standard length in centimeters (the smallest and biggest if there are more than one in the lot).

LIST OF SPECIMENS STUDIED: BRAZIL, PARANA.

H. aff. commersonii. Morphometric analyses. Downstream Segredo dam, Pinhão, 04.ii.1994, 21.5; 04.ii.1995, 18.6; 02.ii.1995, 23.0; Upstream Segredo dam, Pinhão, 06.i.1995, 18.4; 03.viii.1995, (2) 23.7-25.2; Rio São Pedro, Pinhão, 12.i.1994, 26.5; Rio Iratim, Palmas, 09.viii.1993, 21.5; 08.x.1995, (2) 24.1-30.3; 09.x.1995, (2) 27.4-28.0; 07.xi.1994, 26.1; 07.ii.1995, 15.8; 05.xi.1995, (2) 31.0-32.7; Rio Verde, Pinhão, 30.0; Downstream Areia dam, Bituruna, 10.ii.1994, 22.5; Upstream Areia dam, Bituruna, 07.viii.1993, (3) 16.5-22.5; 27.v.1994, 17.5. Electrophoretic analysis. Downstream Segredo dam, Pinhão, 03.xi.1995, 18.0; 02.ii.1996, 23.0; Rio Iratim, Palmas, 04.xi.1995, (2) 19.9-32.5; 06.xi.1995, 31.0.

H. derbyi. Morphometric analyses. Downstream Segredo dam, Pinhão, 03.viii.1994, 12.0; Upstream Segredo dam, Pinhão, 03.ii.1995, (2) 20.8-23.0; 04.ii.1995, (2) 18.5-24.2; 05.ii.1995, 19.1; Rio Iratim, Palmas, 09.vii.1993, (2) 22.5-26.5; 07.xi.1993, (2) 25.0-27.0; 07.xi.1995, (2) 27.7-29.4; Rio Butiá, Palmas, 04.xi.1994, 24.7; Rio Covó, Mangueirinha, 04.ii.1994, 16.5; 04.iii.1994, 19.4; 04.xi.1994, (2) 21.5-22.1; Downstream Areia dam, Bituruna, 13.xi.1994, (2) 21.0-23.5; 09.viii.1995, 20.7; Upstream Areia dam, Bituruna, 10.viii.1993, (4) 16.0-22.5. Electrophoretic analysis. Downstream Segredo dam, Pinhão, 03.xi.1995, (8) 14.2-18.3; Upstream Segredo Dam, Pinhão, 02.xi.1995, (3) 17.1-22.9; Rio Iratim, Palmas, 08.xi.1995, 21.6; Downstream Areia dam, 06.xi.1995, (2) 17.3-19.4.

H. myersi. Morphometric analyses. Upstream Segredo Dam, Pinhão, 23.iii.1993, 17.4; 05.ii.1995, (5) 9.0-14.5; Rio Iratim, Palmas, 06.xi.1993, 11.4; 09.ii.1995, (2) 12.7-14.9; 05.viii.1995, (2) 12.4-12.5; Rio Butiá, Palmas, 19.v.1993, (2) 8.5-11.2; Downstream Areia dam, Bituruna, 12.i.1995, (2) 13.2-17.4; 08.viii.1995, (4) 14.6-15.8; 09.xi.1995, (7) 10.1-17.8. Electrophoretic analysis. Downstream Segredo dam, Pinhão, 02.xi.1995, (4) 10.1-14.3; Rio Iratim, Palmas, 05.xi.1995, (6) 12.5-13.8; Downstream Areia dam, 08.xi.1995, (5) 11.4-14.3.

Using ten landmarks, a group of 21 measurements (interlandmark distances) were made, based on the truss network method (Fig. 2), and used in the studies of multivariate morphometry. This method consists of a series of measurements calculated between anatomical points (landmarks), considered homologous for the groups under study, which form a regular pattern of continuous cells along the body (STRAUSS & BOOKSTEIN 1982). The measurements were taken with a caliper to a precision of 0.05 mm.

The multivariate morphometry techniques used were principal components analysis (PCA) and size-free canonical discriminant analysis (SF-CDA), according to the procedure of REIS *et al.* (1990b). This technique basically consists of removing the effect of within-group ontogenetic variation, regressing each character separately on the within-group first principal component (PC1) which is a multivariate estimate of size. PC1 is obtained from an analysis performed on a covariance matrix of the measurements centered by the mean group and then applying canonical discriminant analysis to the residuals obtained from the regressions (STRAUSS 1985). These analyses were performed using the software Statistica for Windows®, version 5.1, 1996.

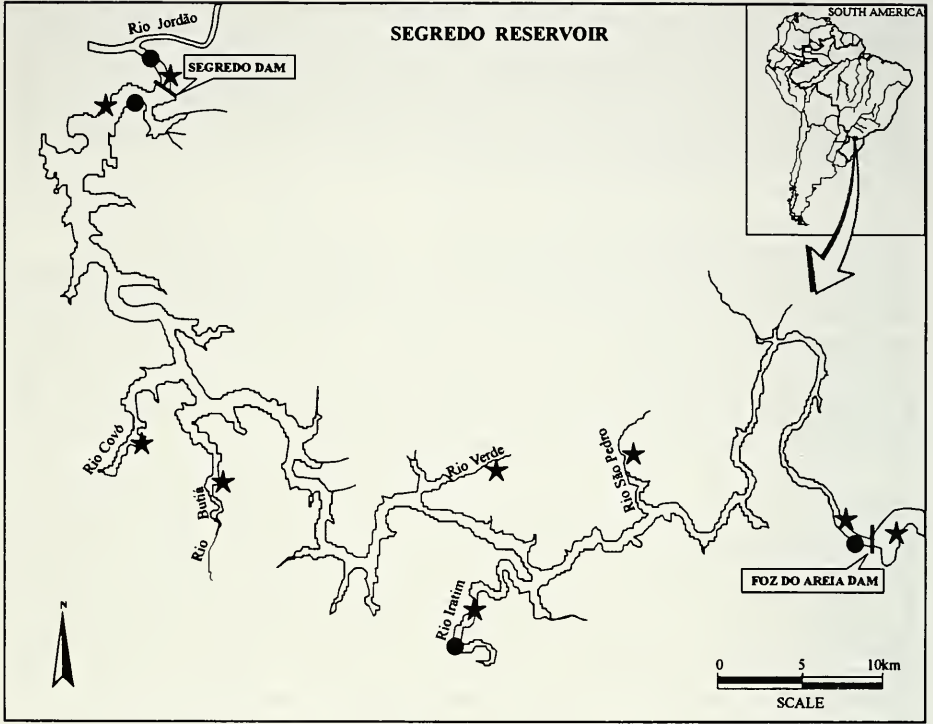


FIG. 1

The sampling sites in the Rio Iguazu basin. The symbols ★ and ● means the locations of the specimens collected for the morphometric and electrophoretic analyses respectively.

Electrophoretic analyses. The specimens used for the enzymatic electrophoresis were collected in the Rio Iguazu using simple gill nets. The collections were carried out from November 1995 through February 1996, in conjunction with the same project mentioned previously. In total, 5 specimens of *H. aff. commersonii*, 14 of *H. derbyi*, and 15 of *H. myersi* were analyzed. The liver, muscle and heart were removed from live fish and frozen in liquid nitrogen. For analysis, the tissues were homogenized by macerating with plastic pestles in 1.5 ml Eppendorf tubes with 0.02 M Tris/HCl buffer, pH 7.5 in 1:1 proportion. In macerating the liver it was necessary to add carbon tetrachlorate in a 1:2 concentration (tissue: tetrachlorate), because of the large quantity of fat present in this material (PASTEUR *et al.* 1988). The homogenized samples were centrifuged at 5500 rpm for 30 minutes at 5° C. The supernatant fractions were submitted to horizontal electrophoresis in 13% starch gel (Penetrose-30®) at 5° C for six hours. The enzyme systems and buffers used are shown in Table 1.

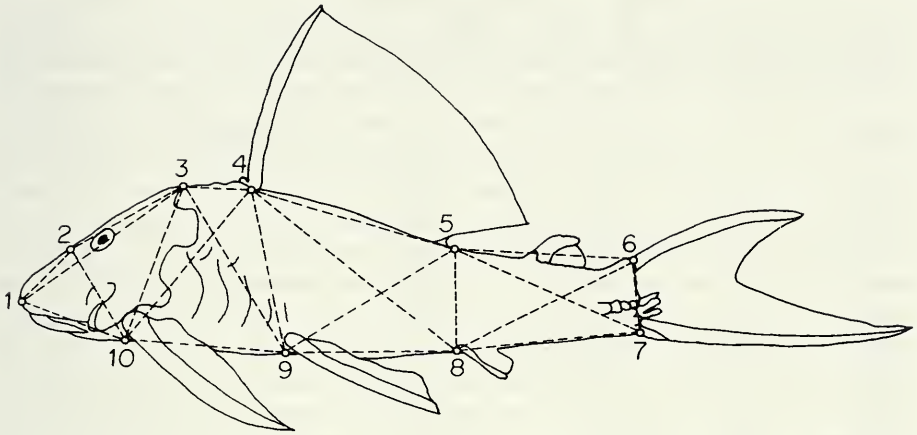


FIG. 2

Illustration of the 21 measurements used in the morphometric analyses. The locations of the 10 landmarks for the truss network data are shown as open circles, and the measurements of morphometric distances between the circles as dotted lines. The landmarks refer to the (1) anterior end of the snout; (2) median line of nasal pores; (3) posterior occipital margin; (4) anterior origin of dorsal fin; (5) posterior origin of dorsal fin; (6) origin of base of upper spine of caudal fin; (7) origin of base of lower spine of caudal fin; (8) anterior origin of anal fin; (9) anterior origin of pelvic fin; (10) end of operculum.

TABLE I

Enzyme systems, tissues and buffers used to investigate the *Hypostomus* species. * H, heart; L, liver; M, muscle. I - Tris-citrate buffer (pH 7.0) (Shaw & Prasad 1970). II - Tris-borate-EDTA buffer (pH 8.7) (BOYER *et al.* 1963).

Enzyme	E. C. Number	Structure	Tissue*	Buffer
Acid phosphatase	ACP 3.1.3.2	Monomeric	L	I
Alcohol dehydrogenase	ADH 1.1.1.1	Dimeric	L	I and II
Aspartate aminotransferase	AAT 2.6.1.1	Dimeric	H, L and M	II
Glucose dehydrogenase	GDH 1.1.1.47	Monomeric	L	II
Glucose-6-phosphate dehydrogenase	G6PDH 1.1.1.49	Tetrameric	L	II
Glucose-6-phosphate isomerase	GPI 5.3.1.9	Dimeric	H, L and M	I
Glycerol-3-phosphate dehydrogenase	G3PDH 1.1.1.8	Dimeric	L and M	I
Isocitrate dehydrogenase	IDHP 1.1.1.42	Dimeric	H, L and M	I
Lactate dehydrogenase	LDH 1.1.1.27	Tetrameric	H and M	I
Malate dehydrogenase	MDH 1.1.1.37	Dimeric	H, L and M	I
Malic enzyme	MEP 1.1.1.40	Monomeric	H, L and M	I
Peroxidase	PER 1.11.1.6	Tetrameric	H and L	I and II
Phosphoglucomutase	PGM 5.4.2.2	Monomeric	H, L and M	I
Superoxide dismutase	SOD 1.15.1.1	Tetrameric	L	II

In order to visualize the specific isoenzymes, we followed the modified procedures of AEBERSOLD *et al.* (1987), except for AAT for which we used the procedure of WHITMORE (1990). The enzyme quaternary structure, according to RICHARDSON *et al.* (1986), WHITMORE (1990) and WARD *et al.* (1992) was taken as the basis for genetic interpretation of the electrophoretic results. The nomenclature utilized is that proposed by SHAKLEE *et al.* (1990). The data were analyzed using the software Biosys 1® (SWOFFORD & SELANDER 1981). Genetic variability was estimated by calculating polymorphism, with 95% and 99% criteria, and genetic distances and heterozygosities were calculated according to NEI (1978). Proportional deviations [$D = (H_o - H_e)/(H_e)$] calculated for the obtained and expected values of the heterozygotic genotypes for all loci. The relative time of divergence was calculated from Sarich (1977) where each Albumin Immunological Distance (AID) was equivalent to 35 units of Nei's genetic distance (AID = 35D) and was calibrated according to CARLSON *et al.* (1978) formulae $t = 0.54y$, where t is the divergence time and y is the immunological distance. We can have then $t = 0.54 \times (35D) \rightarrow t = 18.9 D$. Thus, each unit of Nei's distance was equivalent to 18.9 millions of years.

RESULTS

Multivariate morphometric analyses

A preliminary principal components analysis discriminated the species in three nearly distinct groups. No sexual dimorphism was evident, and therefore this source of variation was not considered. The first principal component explained 85% of the total variation, and was considered as an axis of size, as indicated by the positive and approximately equal coefficients of the variables (Table 2).

When the data were treated by size-free discriminant canonical analysis, projection of individual scores along the canonical variables (CV) 1 and 2 for the three species studied (Fig. 3) showed that *H. myersi* was discriminated from *H. aff. commersonii* and *H. derbyi* along CV-1, while *H. aff. commersonii* and *H. derbyi* were discriminated from each other along CV-2.

The correlation vectors between the original characters and the canonical variables 1 and 2 are shown in Table 2. These coefficients demonstrated that *H. myersi* differed from the other species principally in measurements (6-7), (8-9), (1-10), (5-9) and (5-7). Measurements (4-5), (7-8), (9-10), (3-9) and (6-8) most influenced the separation of *H. derbyi* from *H. aff. commersonii*.

Electrophoretic analysis

We detected 48 alleles distributed in 26 isoenzyme loci. The frequencies of alleles for the loci studied are shown in Table 3.

A summary of the statistical analyses of genetic variation is presented in Table 4. The proportion of polymorphic loci was low in all species ($P_{0.95} = 12\%$ on average). *Hypostomus aff. commersonii* showed the highest variation, notably in relation to *H. derbyi* ($P_{0.95} = 20\%$ vs. 4%). The mean number of alleles per locus (AN) was higher in *H. aff. commersonii* than in *H. myersi* and *H. derbyi*. The mean H_e for the three species was 0.024.

TABLE 2

Variables, measurements (interlandmark distances), structural coefficients of the principal components analysis (PC) and size-free canonical discriminant analysis (CV) for the three species of *Hypostomus* from the Rio Iguaçú basin.

Variables	Measurements	PC-1	PC-2	CV-1	CV-2
1	1-2	0.849	-0.516	0.456	0.182
2	2-3	0.903	0.247	-0.434	0.323
3	3-4	0.920	0.129	0.144	0.148
4	4-5	0.986	0.024	0.509	-0.704
5	5-6	0.975	0.022	-0.745	0.586
6	6-7	0.985	0.008	0.620	-0.345
7	7-8	0.980	0.027	-0.159	0.684
8	8-9	0.988	-0.008	0.592	0.238
9	9-10	0.970	0.026	-0.350	-0.725
10	1-10	0.990	0.029	0.521	0.632
11	1-3	0.992	-0.005	0.407	0.593
12	2-10	0.976	-0.107	0.264	0.264
13	3-10	0.994	0.005	0.251	0.018
14	4-10	0.990	0.034	0.182	-0.202
15	3-9	0.978	0.029	-0.157	-0.784
16	4-9	0.974	-0.004	-0.312	-0.655
17	5-9	0.989	0.021	0.860	-0.264
18	4-8	0.992	0.001	-0.506	-0.625
19	5-8	0.963	0.059	0.245	-0.233
20	6-8	0.984	0.042	-0.391	0.705
21	5-7	0.982	0.028	0.660	0.626

The three species showed a tendency in favor of homozygotes, for most of the genes analyzed. Proportional deviations (D), varied from 0.000 in *H. derbyi* to -0.529 in *H. myersi*. However, the different number of individuals sampled among the groups must be taken into account. Except *MDH-1* ($P = 0.007$) all loci are in the Hardy-Weinberg equilibrium.

The three species of *Hypostomus* analyzed showed clear genetic differences. The loci *AAT-2* and *3*, *ACP-1*, *GDH-1*, *G6PDH-1* and *2*, *IDHP-1* and *2*, *MDH-3*, *ME-1* and *GPI-1* are diagnostic for *H. myersi*, and *GPI-2* is diagnostic for *H. derbyi*. The calculations for Nei's genetic distance (Nei 1978) between species also showed substantial separation (Table 5).

DISCUSSION

Morphometric analysis

The 21 variables examined by principal components analysis showed a clear tendency for separation among the three species studied. Nevertheless, some superposition of the species was observed. This superposition is due more to a limitation of the technique itself in the presence of ontogenetic variations, than to sample similarity, since in PCA the size may be confounded with the form of the organisms. Generally, the first principal component shows the coefficients of structure having the same sign

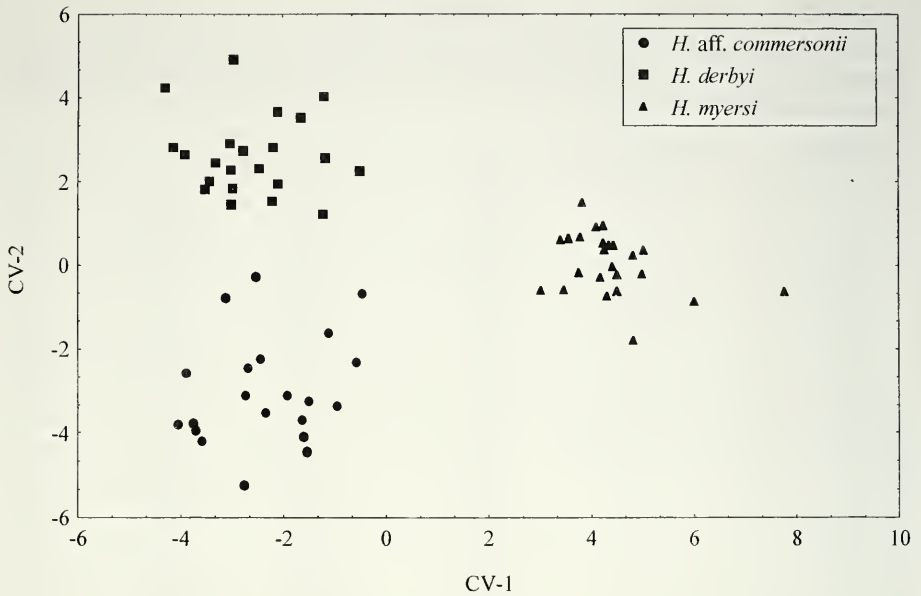


FIG. 3

Graphic representation of the scores of the first (CV-1) and second (CV-2) canonical variables from the three *Hypostomus* species analyzed.

TABLE 3

Allele frequencies for the 26 loci of *Hypostomus* of the Rio Iguçu basin. N indicates number of individuals analyzed.

Locus	Allele	<i>H. aff. commersonii</i>	<i>H. derbyi</i>	<i>H. myersi</i>
<i>AAT-1</i> *	A	1,000	1,000	1,000
<i>AAT-2</i> *	A	1,000	1,000	—
	B	—	—	1,000
<i>AAT-3</i> *	A	1,000	1,000	—
	B	—	—	1,000
<i>ACP-1</i> *	A	1,000	1,000	—
	B	—	—	1,000
<i>ADH-1</i> *	A	0,100	1,000	—
	B	0,900	—	1,000
<i>GDH-1</i> *	A	—	—	0,033
	B	—	—	0,967
	C	—	0,036	—
	D	1,000	0,964	—
<i>GPI-1</i> *	A	—	—	1,000
	B	1,000	1,000	—
<i>GPI-2</i> *	A	1,000	—	1,000
	B	—	0,929	—
	C	—	0,071	—

<i>G3PDH-1*</i>	A	1,000	1,000	1,000
<i>G3PDH-2*</i>	A	1,000	1,000	1,000
<i>G6PDH-1*</i>	A	—	—	1,000
	B	1,000	1,000	—
<i>G6PDH-2*</i>	A	—	—	1,000
	B	1,000	1,000	—
<i>IDHP-1*</i>	A	—	—	1,000
	B	1,000	0,964	—
	C	—	0,036	—
<i>IDHP-2*</i>	A	—	—	1,000
	B	1,000	1,000	—
<i>LDH-1*</i>	A	0,100	1,000	—
	B	0,900	—	1,000
<i>LDH-2*</i>	A	1,000	1,000	1,000
<i>MDH-1*</i>	A	0,800	1,000	0,933
	B	0,200	—	0,067
<i>MDH-2*</i>	A	0,900	1,000	1,000
	B	0,100	—	—
<i>MDH-3*</i>	A	1,000	1,000	—
	B	—	—	1,000
<i>ME-1*</i>	A	1,000	1,000	—
	B	—	—	1,000
<i>ME-2*</i>	A	1,000	1,000	1,000
<i>PGM-1*</i>	A	0,900	—	—
	B	0,100	1,000	0,867
	C	—	—	0,133
<i>PER-1*</i>	A	1,000	1,000	1,000
<i>PER-2*</i>	A	1,000	1,000	1,000
<i>SOD-1*</i>	A	1,000	1,000	1,000
<i>SOD-2*</i>	A	1,000	1,000	1,000
N		5	14	15

TABLE 4

Statistical analyses of the genetic variation examined for the three species of *Hypostomus*. L, number of loci studied; N, number of individuals examined; AN, mean number of alleles per locus; P0.99 and P0.95, percentages of polymorphic loci using the relaxed and stringent criteria respectively; H_o and H_e , mean observed and expected heterozygosity per locus (non-tendentious estimate of Nei, 1978); D, proportional deviation. Numbers in parentheses refer to respective standard errors.

Variable	<i>H. aff. commersonii</i>	<i>H. derbyi</i>	<i>H. myersi</i>
L	26	26	26
N	5	14	15
AN	1.20 (0.10)	1.10 (0.10)	1.10 (0.10)
P0.99	19.23	11.54	11.54
P0.95	19.23	3.85	7.69
H_o	0.031 (0.014)	0.011 (0.007)	0.008 (0.006)
H_e	0.44 (0.019)	0.011 (0.006)	0.017 (0.010)
D	-0.295	0.000	-0.529

TABLE 5

Nei's coefficients of genetic similarity (upper diagonal) and genetic distance (lower diagonal) (NEI 1978) between the species studied. Values in parentheses refer to relative time of divergence of the species, in millions of years (Carlson *et al.* 1978).

Species	<i>H. aff. commersonii</i>	<i>H. derbyi</i>	<i>H. myersi</i>
<i>H. aff. commersonii</i>	—	0.867	0.538
<i>H. derbyi</i>	0.142 (2,684)	—	0.460
<i>H. myersi</i>	0.621 (11,737)	0.776 (14,666)	—

and similar magnitude, and is therefore interpreted as a variable of general size (NEFF & MARCUS 1980). The remaining principal components possess positive and negative coefficients, and are usually interpreted as containing information relative to form (REIS *et al.* 1987). Because the independence of principal components is a consequence of the mathematical deduction of the method, the relationship of the principal components to size and shape may be arbitrary and therefore without biological meaning (MORRISON 1976; NEFF & MARCUS 1980). For the species studied, the position along the second principal component of the smaller individuals was much different from that of larger individuals, thus indicating a strong tendency toward allometric increments.

According to GOULD (1971, 1975), allometry is an almost universal phenomenon, in ontogenetic development as much as in interspecific scaling of bodily differences among species. BOOKSTEIN *et al.* (1985) commented that discrimination among species must be inherently robust against tendentious samples, in which differences in size frequency are an inevitable aspect.

In order to resolve this problem, several authors have refined the techniques of multivariate morphometry so that the separation of the groups does not suffer the effect of size of the organisms, but any separation results from differences in shape between the groups studied (HUMPHRIES *et al.* 1981; SOMERS 1986; REIS *et al.* 1990b).

Size-free discriminant canonical analysis (REIS *et al.* 1990b) was shown to be efficient when applied to the three species analyzed, clearly demonstrating the separation of the groups obtained primarily by PCA. In Fig. 3 the individual scores in the reduced space of the CV-1 and CV-2 resulted in total separation of the species, demonstrating that when the size effect is eliminated, *H. aff. commersonii*, *H. derbyi* and *H. myersi* can be completely distinguished by their shape. The most morphologically divergent *H. myersi*, was discriminated by the others principally by some measures related to length of the body, that are smaller (6-7) length of the caudal peduncle, (8-9) toracic length and (1-10) length of the head. And *H. aff. commersonii* was discriminated by the others principally by having a grater fin dorsal length (4-5).

Genetic variability

From the values of heterozygosities presented in WARD *et al.* (1992) we calculated a mean heterozygosity using the same 14 enzyme systems assayed in this work.

We found a value of 0.051, which is higher than the values exhibited by the three *Hypostomus* species. However, those authors obtained this value from several previous works on both marine and freshwater fishes. GYLLENSTEN (1985), comparing marine, anadromous and freshwater fishes, found a lower mean heterozygosity for freshwater and anadromous fishes ($H = 0.041$) than for marine fishes ($H = 0.063$). Compared to the mean for freshwater fishes, the heterozygosity values estimated for the three species of *Hypostomus* are still low. In spite of the small number of specimens examined, a good sum of loci, as the 26 scored here, make possible a reliable estimate of the population genetic variability, useful in interspecific comparisons and phylogenetic inferences (SARICH 1977; NEI 1978; GORMAN & RENZI 1979). Several models have been developed to explain the variation in heterozygosity between different groups of organisms (SELANDER 1976; NEVO 1978; SMITH & FUJIO 1982; NEI & GRAUR 1984 and DA SILVA *et al.* 1992). Among these, DA SILVA *et al.* (1992) declared that most variation in protein heterozygosity between different taxa is attributable to the species-protein interaction, where neither the function nor the structure of the enzyme would help to explain such interaction. Because of this, it becomes difficult to compare mean heterozygosities for different species in distinct habitats. According to those authors, it would be necessary to compare species with regard to a single protein, or to compare proteins among individuals of one species.

A possible explanation for the low heterozygosity encountered may be the sedentary mode of life of these species, which contributes to high endogamy. Corroborating this hypothesis are the low values for D (Table 4). According to Nei (1977), high values of heterozygosity and polymorphism are expected in species that occupy a broad niche, in heterogeneous environments, and which have a large population size, lessening the possibility for interbreeding. Considering that these species appear to have evolved in a relatively stable environment, with low gene flow between populations and an apparent high rate of endogamy, natural selection apparently favored low genetic variability as the best strategy to exploit the environment. However, in order to test this hypothesis, further studies on each species would be necessary, analyzing a higher number of individuals in different localities throughout their geographic ranges.

Genetic distance and time of divergence

Nei's coefficients of genetic distance and identity (NEI 1978) indicate that the two most morphologically similar species, *H. aff. commersonii* and *H. derbyi*, are also the less genetically divergent (Table 5), while *H. myersi* is shown to be more distant from both of them. Although the value of genetic identity (I) of *H. aff. commersonii* and *H. derbyi* (0.867) is at the upper limit of the interval for congeneric species of THORPE (1982), where I varies from about 0.35 to 0.85, the locus *GPI-2* was shown to be fixed for different alleles in the two species, showing that they are really genetically different sympatric species. The identity values of *H. myersi* with these two species agree with Thorpe's values for congeneric species.

From genetic and morphological patterns, some hypotheses can be suggested regarding the origin of the species studied. We can return about the separation of the Rio Iguaçú basin from the rest of the Rio Paraná basin, from which, according to

HASEMAN (1911) and SAMPAIO (1988), the ichthyofauna of the Iguaçu basin appears to have originated. Geomorphological data are still incomplete, but SEVERI & CORDEIRO (1994) estimated the formation of Iguaçu Falls at about 22 million years ago, and SAMPAIO (1988) affirmed that the isolation of the ichthyofauna of the Iguaçu basin from the rest of the Paraná basin happened in the Oligocene (about 38 million years ago).

Considering the values for genetic distance as a relative measure of time of divergence of the taxa involved (Table 5), the species *H. aff. commersonii* and *H. derbyi* have initiated speciation approximately 2.7 million years ago, in the Rio Iguaçu basin, long after the formation of Iguaçu Falls.

Despite many authors as HILLIS (1987) do not agree with SARICH (1977) and CARLSON *et al.* (1978)'s calculations of relative time of divergence based on proteins, we found this approach suitable to elaborate an evolutionary hypothesis, since the estimated time for the separation of the two basins was dated long before the estimated time of divergence between the species of *Hypostomus*. Thus, an ancestral "*derbyi-commersonii*" population in the Rio Paraná drainage was isolated by a vicariance event (the Iguaçu Falls uplift), and later, within the Iguaçu basin, this population underwent speciation, originating *H. derbyi* and *H. aff. commersonii*. The hypothesis of the formation of these two species within the Rio Iguaçu basin is strengthened by the statement of SAMPAIO (1988) that the formation of the ichthyofauna of the Rio Iguaçu basin, after its isolation, was not subject to influences from neighboring basins.

There is morphological evidence that, within the genus *Hypostomus*, a "*commersonii*" lineage was broadly distributed through South American hydrographic basins (excluding the Amazonian basin) before these became separated and the present hydrographic configuration was formed. Valenciennes, in CUVIER & VALENCIENNES (1840) described *H. commersonii* based on specimens from Rio de la Plata basin, Montevideo, Uruguay and from Rio São Francisco basin. Later, the type-locality was restricted to the Rio de la Plata (WEBER 1986). GOSLINE (1947) included in the "*commersonii*" group, the species *H. derbyi*, endemic to the Rio Iguaçu (HASEMAN 1911); *H. affinis*, restricted to the Paraíba do Sul basin (MAZZONI *et al.* 1994); and *H. punctatus*, occurring in coastal rivers of the State of Rio de Janeiro (MAZZONI *et al.* 1994). WEBER (1985) compared *H. dlouhyi*, apparently endemic to the Rio Acary, Paraná basin, and *H. cordovae*, cited by RINGUELET *et al.* (1967) for Argentina and Paraguay to the "*commersonii*" group. Also, EIGEMANN & KENNEDY (1903) *apud* WEBER (1986) noticed in the original description the close relationship of *H. commersonii* to *H. boulengeri*, *H. plecostomus* and *H. scabriceps*.

According to data in literature, the species of a "*commersonii*" group are relatively morphologically conservative even inhabiting different hydrographic basins. However, in spite of its close phenotypic similarity to *H. commersonii* (sensu Valenciennes), *H. aff. commersonii* from the Iguaçu basin, has the dorsal fin always reaching the adiposa fin when laying it down (even in the smaller specimens) and this is not seen in *H. commersonii*. Thus, *H. aff. commersonii* may have followed an evolutionary path independent from the Rio Paraná populations, to the point of meriting closer investigation of its taxonomic status. Ideally, a revision of the "*commersonii*" group should be done and its genetics data compared.

Although *H. myersi* have been considered endemic to the Iguçu basin (GOSLINE 1947) and the calculations for the estimated time of divergence also suggest that *H. myersi* originated within the Iguçu basin after its isolation. The high number of diagnostic loci separating *H. myersi* from the other two species may lead to an underestimate of genetic distance and time of divergence, since these diagnostic loci may contain more than one change event (mutations), which are not detected by the isoenzyme electrophoresis technique. Besides, the high degree of morphological differentiation observed to the other two species and the cited close relationship to *H. paulinus* from the Rio Paraná basin by GOSLINE (1947) leads to doubts as to whether *H. myersi* originated from a "*derbyi-commersonii*" lineage after isolation of the Rio Iguçu basin.

Extending electrophoretic studies to other species of the genus *Hypostomus* in the Rio Paraná basin may lead to improved clarification of their phylogenetic relationships. In addition, these data can be compared to data from other groups of fishes, in an attempt to establish a broad and reliable biogeographic hypothesis for the area under study.

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Aleocharinae della Cina: Parte V (conclusione) (Coleoptera, Staphylinidae)

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Aleocharinae from China: Part V (conclusion). (Coleoptera, Staphylinidae). - In this paper further 66 species are described as new to science. These new species belong to following tribes: Oxypodini (54 species), Hoplandriini (6) and Aleocharini (6). Five genera are described as new, assigned to following tribes: Oxypodini (*Platysmarthrusa* n. gen., *Ischyradelia* n. gen. and *Beijingusa* n. gen.), Hoplandriini (*Alloplandria* n. gen.) and Aleocharini (*Ystrixoxygymna* n. gen.).

Key-words: Coleoptera - Staphylinidae - Aleocharinae - Taxonomy - China.

INTRODUZIONE

Con il presente lavoro si conclude la pubblicazione della descrizione delle specie della sottofamiglia Aleocharinae raccolte in Cina dal Dr Ales Smetana del "Centre for Land and Biological Resources Research" di Ottawa e del collega studioso di Staphylinidae Guillaume de Rougemont di Londra.

Le specie note o nuove per la Cina sono elencate nella prima parte di questa stessa serie (PACE 1998a).

La nuove specie appartengono alle tribù Oxypodini, Hoplandriini e Aleocharini. Gli holotipi delle nuove specie sono depositati nel Museo di Storia naturale di Ginevra (MHNG).

OXYPODINI

Platysmarthrusa gen. n.

Figg. 1-6

DIAGNOSI. Genere tassonomicamente vicino al genere *Tacata* Blackwelder, 1952 ("olim" *Atacta* Cameron, 1939), in base alla forma dell'edeago e della spermateca, come dell'habitus. Ne è distinto per la ligula più stretta alla base che all'estremità. In *Tacata*, al contrario, la ligula è più larga alla base e strettissima all'estremità. Inoltre il nuovo genere non presenta lunghe setole isolate ai lati del corpo come in *Tacata*.

DESCRIZIONE. Capo più stretto del pronoto; antenne di 11 antenomeri; tempie marginate; palpi labiali di 3 articoli (fig. 5); ligula divisa in due lunghi lembi divergenti con 3 setole all'apice di ciascuno; palpi mascellari di 4 articoli (fig. 6), con il terzo dilatato; mento con margine anteriore lievemente arcuato all'indietro; processo mesosternale acuto, insinuato tra le mesocoxe che sono tra loro contigue; formula tarsale 5-5-5; primo tarsomero posteriore molto lungo.

TYPUS GENERIS: *Platysmarthrusa chinensis* sp. n.

ETIMOLOGIA. Il nome del nuovo genere significa "Coei che ha un articolo dilatato". Questo articolo dilatato è il terzo dei palpi mascellari. Il genere grammaticale è femminile.

***Platysmarthrusa chinensis* sp. n.**

Figg. 1-6

Holotypus ♂, China, Beijing, Songshan, 15.V.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 4,2 mm. Avancorpo opaco, addome lucido. Corpo bruno-rossiccio con capo e pronoto nero-bruni, elitre con lati esterni e area periscutellare bruni, addome bruno con margine posteriore dei tre uriti liberi basali giallo-rossicci; antenne rossicce; zampe rossicce con tarsi giallo-rossicci. Il capo e il pronoto sono coperti di punteggiatura ombelicata contigua che dà un aspetto rugoso alla superficie. La punteggiatura delle elitre è distinta, posta su un fondo non reticolato come quello dell'addome. Edeago figg. 2-3, spermateca fig. 4, parti boccali figg. 5-6.

***Ischyradelia* gen. n.**

Figg. 7-12

DIAGNOSI. Genere affine al precedente *Platysmarthrusa* gen. n. sopra descritto, per l'habitus, l'edeago e la spermateca, ma la ligula non è divisa in due lunghi lembi e con tre setole apicali su ciascuno, ma è bilobata all'estremità, con una robusta setola esterna a ciascun lato. Inoltre il secondo articolo dei palpi mascellari e il primo dei labiali sono nettamente più larghi nel nuovo genere che in *Platysmarthrusa*.

DESCRIZIONE. Habitus simile a quello di *Platysmarthrusa* gen. n.; palpi labiali di 3 articoli (fig. 11), con il primo corto e largo; palpi mascellari (fig. 12) di 4 articoli con il secondo ben dilatato e il terzo molto largo; mento simile a quello del genere precedente; processo mesosternale acuto; mesocoxe tra loro contigue; formula tarsale 5-5-5; primo tarsomero posteriore lungo.

TYPUS GENERIS: *Ischyradelia tianmuensis* sp. n.

ETIMOLOGIA. Il nome del nuovo genere significa "Robusta e sconosciuta". Il genere grammaticale è femminile.

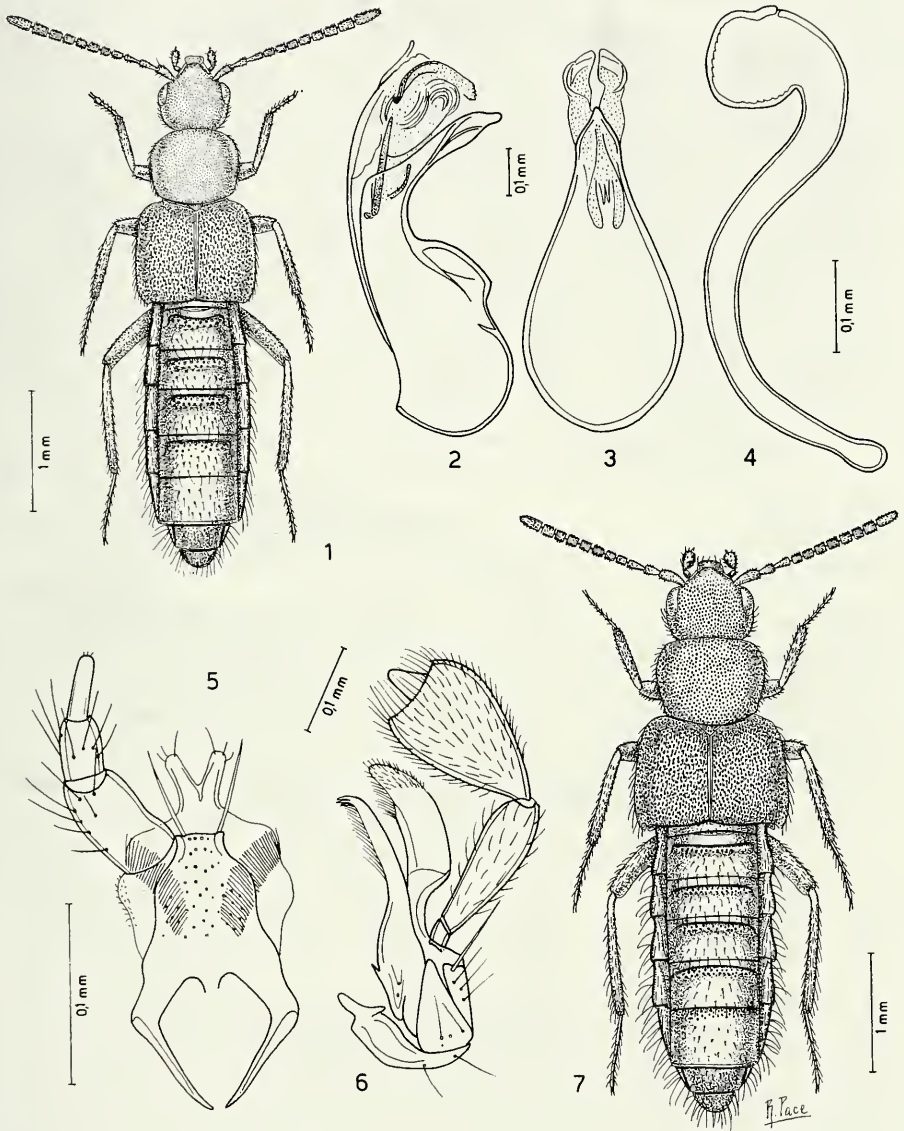
***Ischyradelia tianmuensis* sp. n.**

Figg. 7-12

Holotypus ♂, China, Zhejiang Prov., Lin'an County, ca. 1000 m, W Tianmu Shan N.R., 18.V.1996, J. Cooter leg. (MHNG).

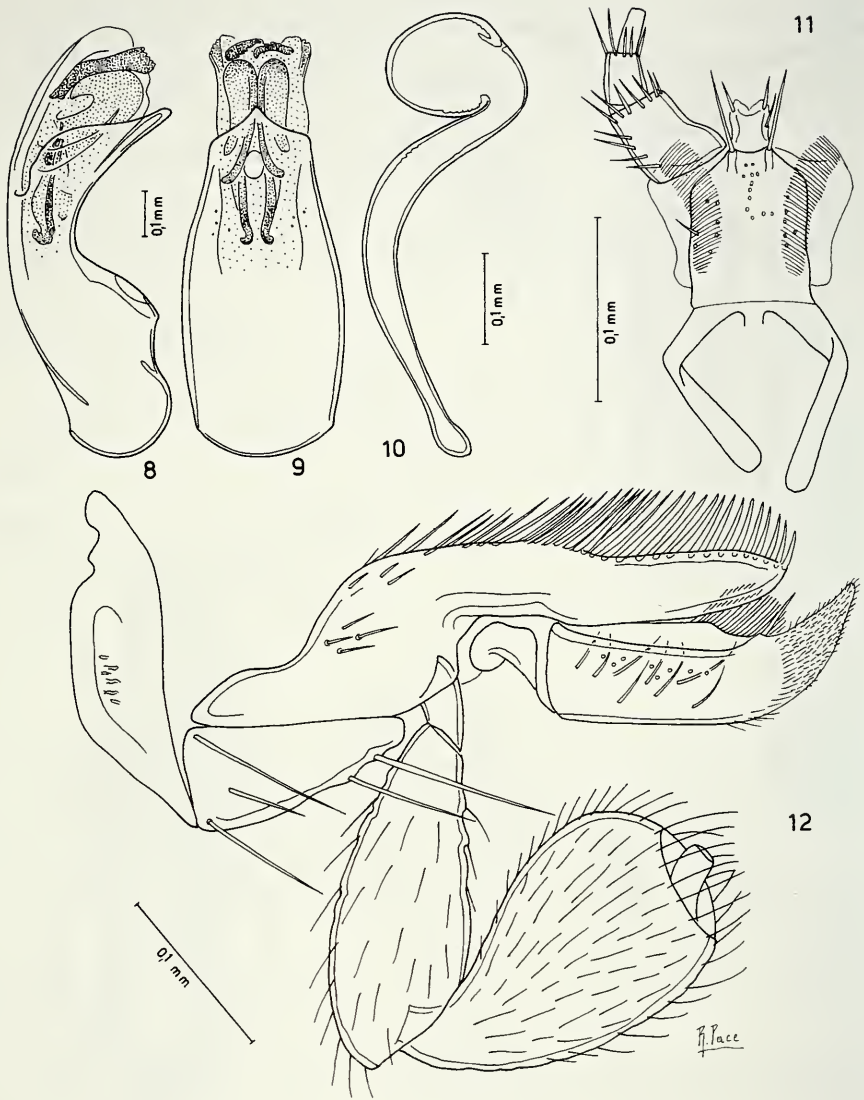
Paratypi: 2 ♀♀, stessa provenienza.

DESCRIZIONE. Lunghezza 4,7 mm. Avancorpo debolmente lucido, addome lucido. Corpo nero con elitre brune; antenne e zampe rossicce. La superficie dell'avancorpo è coperta di punteggiatura profonda e contigua. Lungo il margine posteriore delle



FIGG. 1-7

Habitus, edeago in visione laterale e ventrale, spermateca, labio con palpo labiale e maxilla con palpo mascellare. 1-6: *Platysmarthrusa chinensis* gen. n., sp. n.; 7: *Ischyradelia tianmuensis* gen. n., sp. n.



FIGG. 8-12

Edeago in visione laterale e ventrale, spermateca, labio con palpo labiale e maxilla con palpo mascellare. 8-12: *Ischyradelia tianmuensis* gen. n., sp. n.

elitre la punteggiatura è svanita su un fondo non reticolato, come quello degli uroterghi. Edeago figg. 8-9, spermateca fig. 10, parti boccali figg. 11-12.

Beijingusa gen. n.

Figg. 13-18

DIAGNOSI. Poiché ha il collo stretto, il nuovo genere è da avvicinare tassonomicamente al genere *Blepharhymenus* Solier, 1849. Per la presenza della ligula intera, di lunghissime mandibole e di pronoto solcato sulla linea mediana e con solchi basali il nuovo genere ne è nettamente distinto.

DESCRIZIONE. Collo stretto; tempie non marginate; mandibole molto lunghe e appuntite (fig. 16); palpi labiali di 3 articoli (fig. 15); ligula intera, a lati paralleli e a punta acuta; palpi mascellari (fig. 18) di 4 articoli; mento con margine anteriore arcuato all'indietro (fig. 17); processo mesosternale acuto, insinuato tra le mesocoxe che sono tra loro contigue; formula tarsale 5-5-5; primo tarsomero posteriore un po' allungato.

TYPUS GENERIS: *Beijingusa rougemonti* sp. n.

ETIMOLOGIA. Il nuovo genere prende nome dalla città di Beijing (Pekino) e significa "Celei che è di Beijing". Il genere grammaticale è femminile.

Beijingusa rougemonti sp. n.

Figg. 13-18

Holotypus ♀, China, Beijing, Xiaolongmen, 1100-1500 m, 1.VII.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 2,3 mm. Corpo lucido e bruno-rossiccio con margini laterale e posteriore del pronoto e addome giallo-rossicci; antenne giallo-rossicce; zampe gialle. Sulla superficie corporea non si osserva reticolazione. Il capo presenta una fossetta frontale mediana allungata e tubercoletti fini sparsi sulla sua superficie. La punteggiatura del pronoto è svanita e quella delle elitre è profonda e netta alla base e gradualmente svanita e superficiale posteriormente fino a una fascia marginale posteriore senza punteggiatura. Gli uroterghi sono coperti di tubercoletti salienti. Spermateca fig. 14.

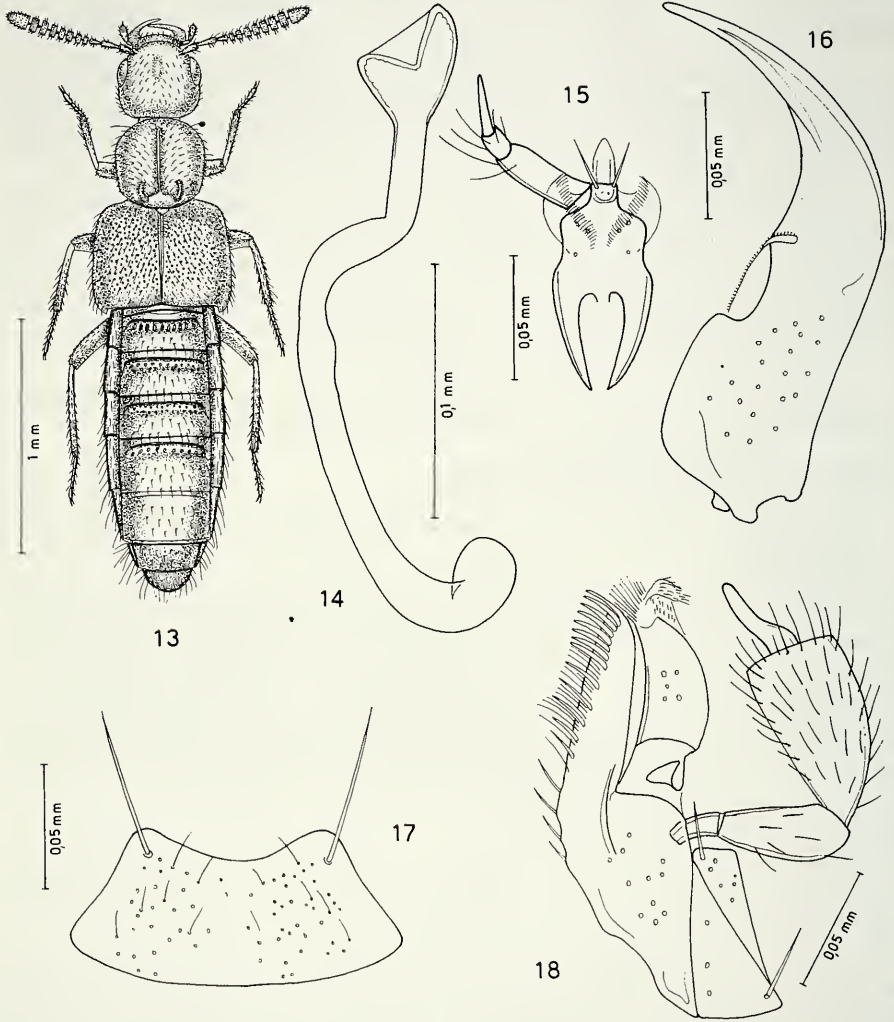
Ocalea chinensis sp. n.

Figg. 19-21

Holotypus ♂, China, Sichuan, Gongga Shan, above camp 3, 3050 m, 22.VII.1994, A. Smetana leg. (MHNG).

DESCRIZIONE. Lunghezza 5,6 mm. Corpo lucido e nero; antenne nere con i tre antennumeri basali rossicci; zampe rossicce. La reticolazione della superficie del capo e delle elitre è distinta, quella del pronoto è svanita e quella dell'addome è assente. La punteggiatura del capo è molto svanita, quella del pronoto è ombelicata e molto superficiale e quella delle elitre è distinta. Distinti tubercoletti coprono gli uroterghi. La punteggiatura del fondo dei solchi trasversi basali degli uroterghi è molto svanita. Edeago figg. 20-21.

COMPARAZIONI. La nuova specie ha habitus simile a quello di *O. himalayica* Cameron, 1939, dell'India, ma il pronoto e le elitre sono meno trasversi e l'edeago della nuova specie ha dimensioni maggiori, è meno arcuato al lato ventrale e ha apice, in visione ventrale, strettissimo a forma di appendice e non cortissimo a forma di ogiva come in *himalayica*.



FIGG. 13-18

Habitus, spermatheca, labio con palpo labiale, mandibole, mento e maxilla con palpo mascellare.
13-18: *Beijingusa rougemonti* gen. n., sp. n.

Blepharhymenus divisus sp. n.

Figg. 22-25

Holotypus ♂, China, Yunnan, Ruili, ca. 700 m, 3.II.1993, de Rougemont leg. (MHNG).
Paratypi: 5 es., stessa provenienza.

DESCRIZIONE. Lunghezza 4,1 mm. Corpo lucidissimo e nero-bruno con capo bruno; antenne rossicce con i due antenomeri basali giallo-rossicci; zampe brune con tarsi rossicci e base dei femori medi e posteriori gialla. Sulla superficie corporea non vi è traccia di reticolazione. La punteggiatura del capo è ombelicata e netta sul disco, svanita sulla regione occipitale e assente sulla fascia mediana, quella del pronoto è profonda e assente a ciascun lato e quella delle elitre è distinta. La superficie dello stretto collo è rugosa. Il solco mediano del pronoto è profondo. Tuberoletti distinti sono sparsi sulla superficie degli uroterghi. Edeago figg. 23-24, spermateca fig. 25.

COMPARAZIONI. La nuova specie è facilmente distinguibile anche esternamente da *B. nepalensis* Pace, 1992, del Nepal, per la presenza di un solco mediano del pronoto, assente in *nepalensis*. Il bulbo distale della spermateca della nuova specie è più largo e la parte prossimale è avvolta in un minore numero di spire.

Blepharhymenus zhejiangensis sp. n.

Figg. 26-28

Holotypus ♂, China, Zhejiang, Tianmushan, 29.IV.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 3,7 mm. Corpo lucido e bruno-rossiccio con base delle elitre e i tre uroterghi basali gialli e con gli uriti liberi 4° e 5° neri; antenne giallo-rossicce; zampe gialle con metà distale dei femori medi e posteriori oscurati di bruno. Sul corpo non esiste reticolazione. La punteggiatura del capo e delle elitre è quasi indistinta, quella del pronoto è distinta e gradualmente più profonda all'indietro. Il pronoto è senza solco mediano, ha una fossetta mediana posteriore ed è privo di punteggiatura lungo il margine posteriore. Edeago figg. 27-28.

COMPARAZIONI. La nuova specie differisce da *B. nepalensis* Pace, 1992, del Nepal, per il pronoto meno lungo e robustamente punteggiato solo sulla metà posteriore (robustamente punteggiato su tutta la superficie del pronoto in *nepalensis*), per la punteggiatura indistinta delle elitre (metà basale delle elitre fortemente punteggiata in *nepalensis*) e per la taglia minore (4,2 mm in *nepalensis*). Non è noto il maschio di *nepalensis*.

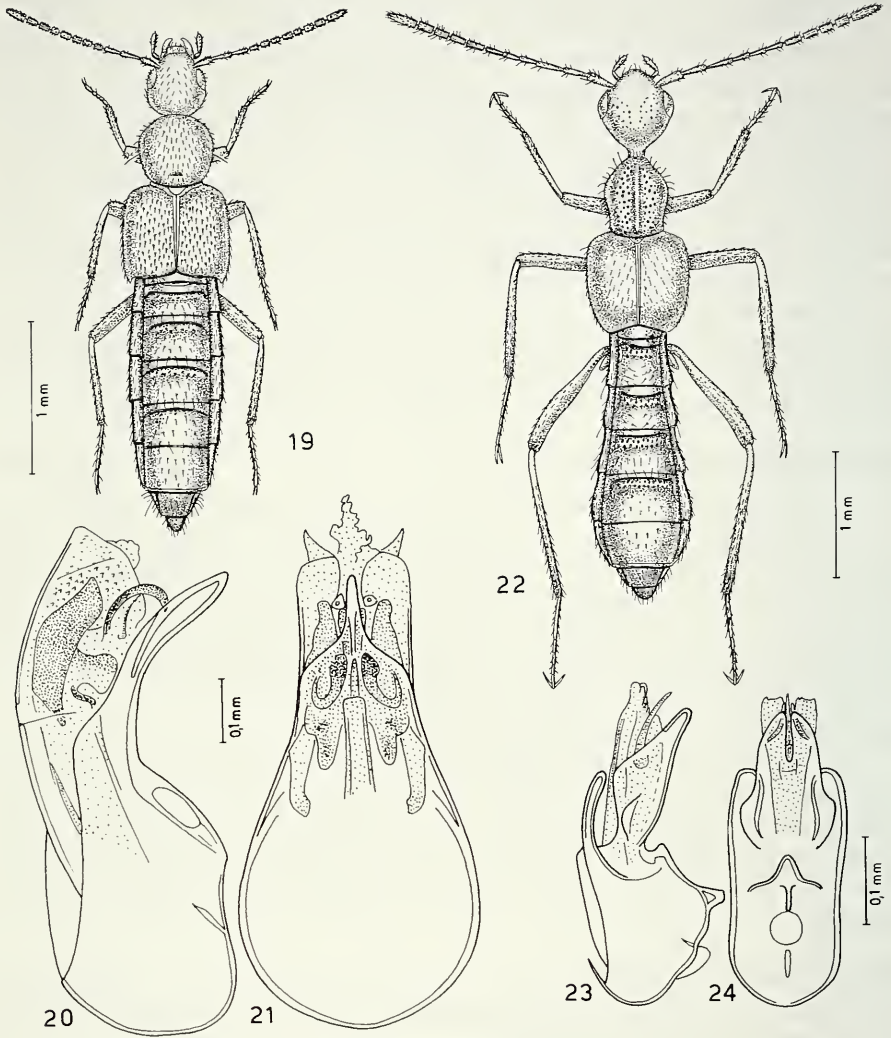
Blepharhymenus rougemonti sp. n.

Figg. 29-32

Holotypus ♂, China, Zhejiang, Tianmushan, 29.IV.1993, de Rougemont leg. (MHNG).
Paratypi: 5 ♀ ♀, stessa provenienza.

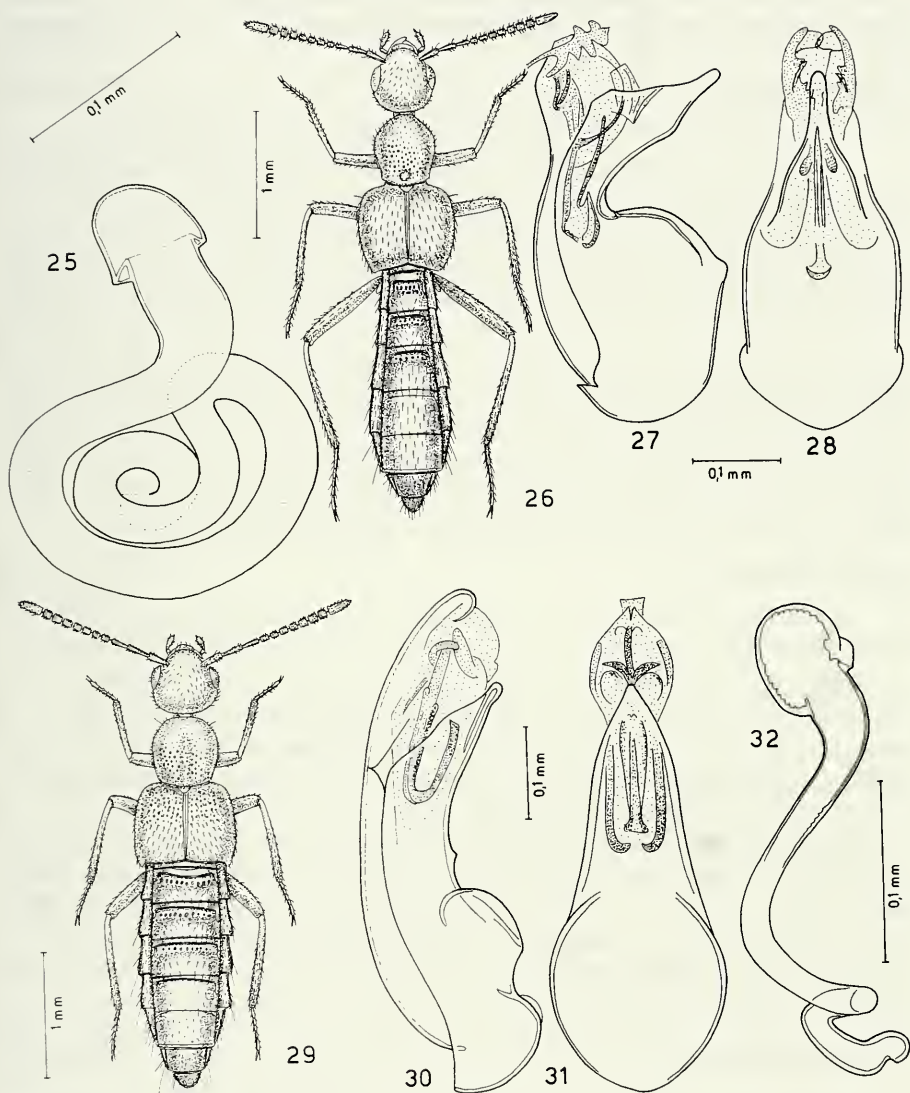
DESCRIZIONE. Lunghezza 3,4 mm. Corpo lucido e bruno con uriti liberi 3°, 4° e base del 5° nero-bruni; antenne rossicce con l'undicesimo antennumero giallo-rossiccio; zampe rossicce. La reticolazione non è presente sulla superficie del corpo. La punteggiatura del capo è molto svanita e fine, quella del pronoto è estremamente svanita sulla metà anteriore e profonda su quella posteriore, quella delle elitre è netta nell'area perimerale, sul resto della superficie delle elitre è assente. Tuberoletti fini sono sparsi sugli uroterghi. Edeago figg. 30-31, spermateca fig. 32.

COMPARAZIONI. La nuova specie è simile a *B. zhejiangensis* sp. n. sopra descritta, ma il corpo è meno slanciato, il pronoto ha un debole e largo solco mediano (solco



FIGG. 19-24

Habitus ed edeago in visione laterale e ventrale. 19-21: *Ocalea chinensis* sp. n.; 22-24: *Blepharhymenus divisus* sp. n.



FIGG. 25-32

Spermateca, habitus ed edeago in visione laterale e ventrale. 25: *Blepharhymenus divisus* sp. n.;
 26-28: *Blepharhymenus zhejiangensis* sp. n.; 29-32: *Blepharhymenus rougemonti* sp. n.

mediano assente, ma con una fossetta mediana posteriore in *zhejiangensis*) e la metà basale delle elitre è nettamente punteggiata (punteggiatura indistinta in *zhejiangensis*).

Calodera hebeiensis sp. n.

Figg. 33-34

Holotypus ♀, China, Hebei, Chengde, 3.X.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 2,7 mm. Corpo debolmente opaco e nero; antenne brune; zampe anteriori giallo-brune, le medie e le posteriori sono bruno-rossicce. La reticolazione del capo è distinta, quella del pronoto e delle elitre è netta e quella dell'addome è indistinta. I tubercoletti che coprono la superficie del capo e dell'addome sono fini e fitti, quelli del pronoto e delle elitre sono confusi nella reticolazione. Spermateca fig. 34.

COMPARAZIONI. La nuova specie è simile a *C. protensa* Mannerheim, 1830, a diffusione paleartica occidentale. Ma è da essa distinta per le antenne interamente brune (e non con i tre antenomeri basali rossicci come in *protensa*) per il quarto antenonomero lungo quanto largo (e non distintamente trasverso come in *protensa*), per l'assenza di un superficiale solco mediano del pronoto e per le zampe anteriori giallo-brune e non brune con ginocchia e tarsi gialli come le zampe medie e posteriori.

Apimela chinensis sp. n.

Figg. 35-36

Holotypus ♀, China, Sichuan, Gongga Shan, above camp 3, 3050 m, 22.VII.1994, A. Smetana leg. (MHNG).

DESCRIZIONE. Lunghezza 2,8 mm. Corpo lucido e bruno; antenne brune con i tre antenomeri basali bruno-rossicci; zampe rossicce. La reticolazione sul capo e sul pronoto è assente, quella sulle elitre è distinta e quella sull'addome è estremamente svanita. La punteggiatura del capo e del pronoto è fitta e distinta, quella delle elitre è confusa nella reticolazione. Spermateca fig. 36.

COMPARAZIONI. La nuova specie è distinta da *A. lineola* (Kraatz, 1859), ampiamente diffusa in oriente, per la taglia corporea maggiore, per l'undicesimo antenonomero lungo quanto i tre antenomeri immediatamente precedenti compresi insieme (undicesimo antenonomero lungo quanto i due antenomeri immediatamente precedenti considerati insieme in *lineola*) e per la spermateca molto più sviluppata, con parte distale molto più lunga e più larga.

Apimela rufigaster sp. n.

Figg. 37-39

Holotypus ♂, Hong Kong, Tai Po, VII.1996, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 1,8 mm. Corpo lucido con capo ed elitre bruni, pronoto bruno-rossiccio e addome rossiccio; antenne brune con i tre antenomeri basali rossicci; zampe gialle. L'avancorpo è privo di reticolazione, l'addome è superficialmente reticolato. La punteggiatura del capo e del pronoto è fine, fitta e distinta. I tubercoletti della superficie delle elitre sono confusi tanto sono fitti e contigui tra loro. Tubercoletti superficiali sono sparsi sulla superficie degli uroterghi. Edeago figg. 38-39.

COMPARAZIONI. Per avere gli occhi lunghi quanto le tempie, il pronoto poco trasverso e l'addome interamente rossiccio, la nuova specie è chiaramente distinta da

A. lineola (Kraatz, 1859), che ha occhi più corti delle tempie, pronoto ben trasverso e addome rossiccio con una fascia posteriore bruna.

***Smetanaetha smetanai* sp. n.**

Figg. 40-43

Holotypus ♂, China, Sichuan, Gongga Shan, above camp 2, 2800 m, 25.VII.1994, A. Smetana leg. (MHNG).

Paratypi: 8 es., stessa provenienza, ma anche in data 21.VII.1994.

DESCRIZIONE. Lunghezza 3,4 mm. Corpo debolmente lucido e bruno; antenne brune con i tre antennomeri basali giallo-rossicci; zampe rossicce. Il capo e il pronoto non hanno reticolazione che sulle elitre è svanita. I tubercoli della superficie del capo e del pronoto sono molto salienti, quelli delle elitre sono distinti. L'addome è coperto di pubescenza fitta e sericea. Edeago figg. 41-42, spermateca fig. 43.

COMPARAZIONI. La nuova specie è distinta da *S. tubercolicollis* Pace, 1992, del Nepal, essenzialmente per la spermateca di minori dimensioni, nonostante la taglia corporea sia maggiore (2,8 mm in *tubercolicollis*). Il bulbo distale della spermateca è di un terzo minore e la parte prossimale della stessa spermateca, escluso il bulbo distale, è stretta e nettamente più lunga dell'asse maggiore del bulbo distale (parte prossimale nettamente più corta dell'asse maggiore del bulbo distale, in *tubercolicollis*). Inoltre l'apice dell'edeago, in visione ventrale, è ad ogiva, mentre in *tubercolicollis* è ad arco schiacciato.

***Smetanaetha chinensis* sp. n.**

Figg. 44-47

Holotypus ♂, China, Zhejiang, Tianmushan, 29.IV.1993, de Rougemont leg. (MHNG).

Paratypus: 1 ♀, stessa provenienza.

DESCRIZIONE. Lunghezza 3,4 mm. Corpo debolmente lucido e bruno con addome rossiccio avente la fascia longitudinale mediana dei tre uroterghi basali e gli uriti liberi 4° e 5° bruni; antenne brune; zampe giallo-rossicce. Il capo e il pronoto non hanno reticolazione che sulle elitre è distinta. L'avancorpo è coperto di tubercoli fitti e salienti. L'addome è coperto di pubescenza fitta e sericea. Edeago figg. 45-46, spermateca fig. 47.

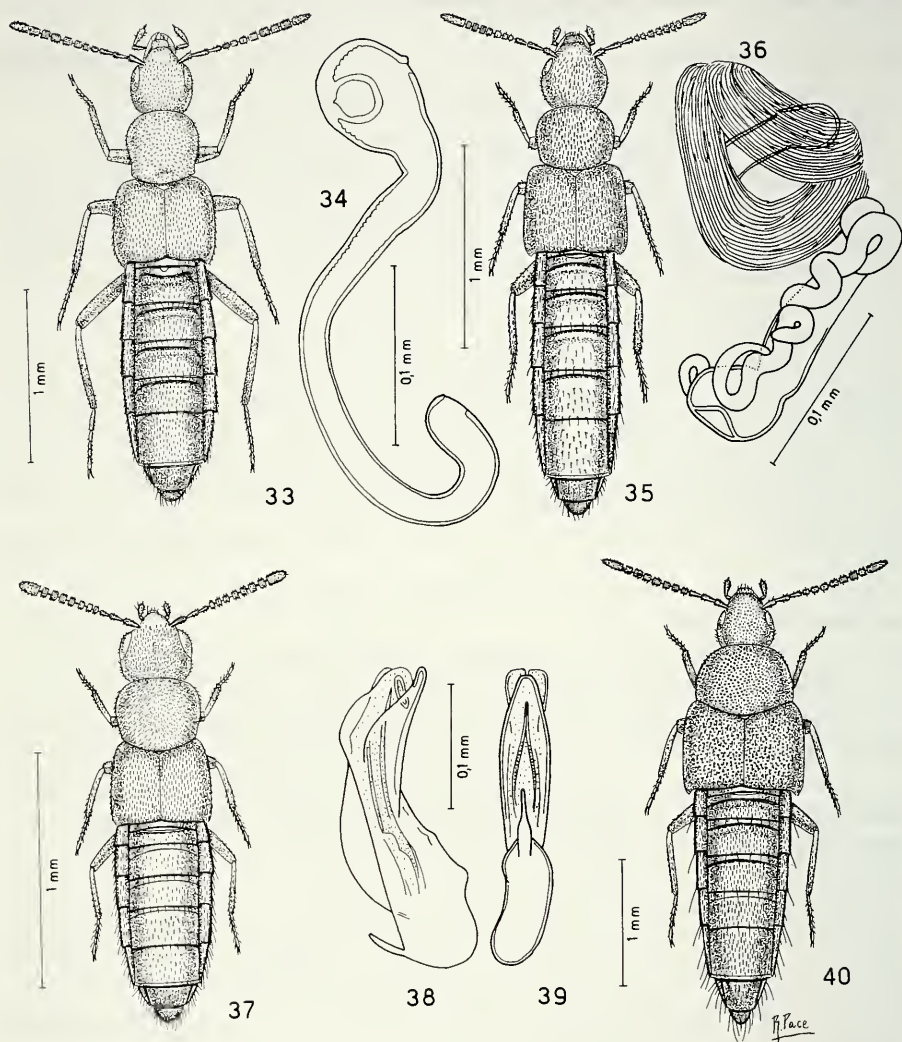
COMPARAZIONI. Il particolare colore dell'addome e la taglia dell'edeago maggiore di un terzo sono i caratteri più evidenti che distinguono la nuova specie da quelle note. L'armatura genitale interna dell'edeago della nuova specie è robusta e molto sviluppata: ciò non si riscontra affatto nelle altre due specie note *S. tubercolicollis* Pace, 1992 e *S. smetanai* sp. n.

***Stichoglossa pekinensis* sp. n.**

Figg. 48-50

Holotypus ♂, China, Beijing, B.N.U., Malaise trap, 10.VI-10.VII.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 2,9 mm. Corpo lucido e nero-bruno con elitre brunorossicce e addome nero avente il margine posteriore del primo urotergo libero brunorossiccio; antenne brune con i due antennomeri basali e la base del terzo giallo-rossicci; zampe rossicce. La reticolazione del capo è molto svanita, quella del pronoto, delle elitre e dei quattro uroterghi basali e la metà basale del quinto senza reticolazione, la



FIGG. 33-40

Habitus, spermateca ed edeago in visione laterale e ventrale. 33-34: *Calodera hebeiensis* sp. n.; 35-36: *Apimela chinensis* sp. n.; 37-39: *Apimela rufigaster* sp. n.; 40: *Smetanaetha smetanai* sp. n.

reticolazione della metà distale del quinto urotergo libero è distinta e quella presso il margine posteriore è netta. La punteggiatura del capo è distinta. Il pronoto mostra d'essere coperto di tubercoletti distinti ai suoi lati esterni, mentre mostra tubercoletti svaniti sulla fascia longitudinale mediana. Le elitre presentano la stria suturale all'indietro deviata lievemente verso l'esterno e tubercoletti distinti, come quelli dell'addome. Edeago figg. 49-50.

COMPARAZIONI. La nuova specie è ben distinta da *S. lateralis* Cameron, 1939, dell'India, per gli antenomeri 4° e 5° lunghi quanto larghi e non più lunghi che larghi come in *lateralis*, per l'assenza di un'impressione trasversa mediana posteriore del pronoto e per il sesto urotergo libero del maschio con un solo tubercolo mediano e non coperto di granuli allungati come in *lateralis*.

Ocyusa beijingensis sp. n.

Figg. 51-54

Holotypus ♂, China, Beijing, Xishan, IX.1992, de Rougemont leg. (MHNG).

Paratypi: 4 ♀♀, China, Beijing, Panshan, 8.V.1993, de Rougemont leg.; 4 ♀♀, China, Beijing, Xiaolongmen, 1100-1500 m, 1.VII.1993, de Rougemont leg.

DESCRIZIONE. Lunghezza 2,8 mm. Avancorpo debolmente opaco, addome lucido. Corpo nero pece con addome nero; antenne nero-pece con i due antenomeri basali gialli; zampe gialle. La reticolazione del capo è nettissima, quella del pronoto e delle elitre è confusa per formare una rugosità della superficie. I tubercoletti della superficie del capo sono poco distinti, quelli del pronoto e delle elitre sono indistinti. La pubescenza dell'addome è fitta e sericea. Edeago figg. 52-53, spermateca fig. 54.

COMPARAZIONI. La nuova specie è simile a *O. himalayica* Cameron, 1939, dell'India, ma ha il pronoto quasi lungo quanto largo e privo di impressione mediana posteriore (e non nettamente trasverso e con una piccola impressione mediana posteriore come in *himalayica*). Inoltre la lunghezza dell'undicesimo antenonomero della nuova specie raggiunge quasi la lunghezza dei tre precedenti antenomeri compresi insieme (undicesimo antenonomero lungo quanto i due precedenti compresi insieme in *himalayica*).

Ocyusa cooteri sp. n.

Figg. 55-56

Holotypus ♀, China, Zhejiang Prov., Lin'an County, ca. 1000 m, W Tianmu Shan N.R., 18.V.1996, J. Cooter leg. (MHNG).

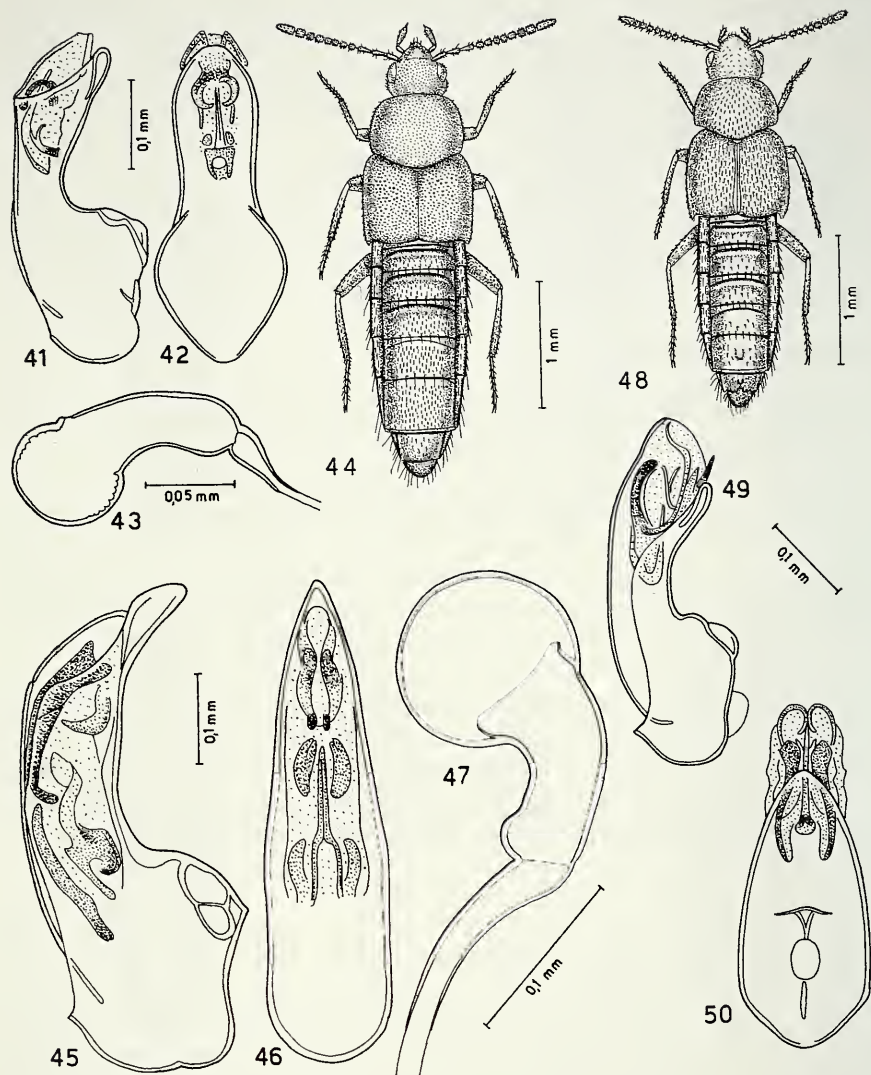
DESCRIZIONE. Lunghezza 2.0 mm. Corpo lucido e giallo-rossiccio comprese le antenne e le zampe. La reticolazione del pronoto è netta, quella delle elitre è svanita. I tubercoletti che coprono la superficie del capo sono fitti e superficiali, quelli del pronoto e delle elitre sono distinti e quelli dell'addome sono salienti. Spermateca fig. 56.

COMPARAZIONI. La nuova specie è ben distinta da *O. himalayica* Cameron, 1939, dell'India, per il quarto antenonomero molto trasverso e per l'undicesimo più lungo dei tre precedenti compresi insieme e non come in *himalayica* che ha il quarto antenonomero lungo quanto largo e l'undicesimo lungo quanto i due precedenti compresi insieme.

Trichoglossina smetanai sp. n.

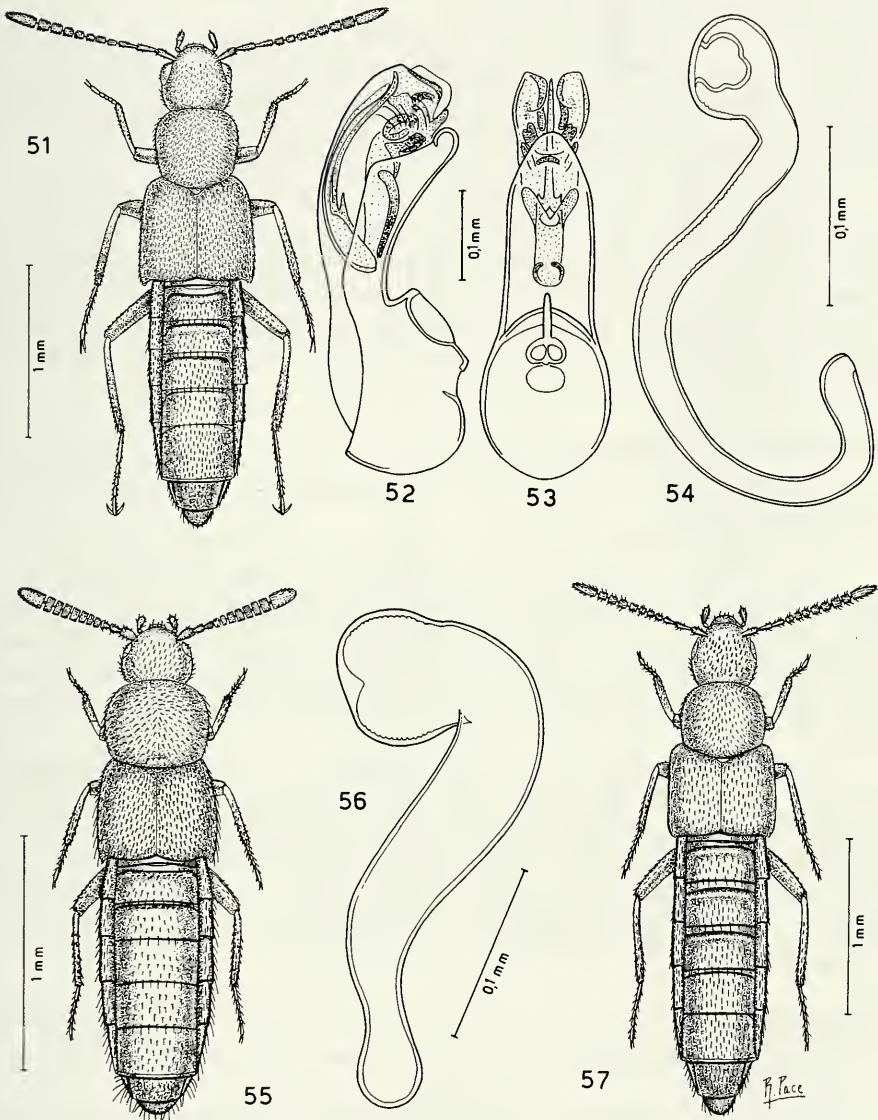
Figg. 57-60

Holotypus ♂, China, Sichuan, Langmusi, 3500-3600 m, 13.VII.1994, A. Smetana leg. (MHNG).



FIGG. 41-50

Edeago in visione laterale e ventrale, spermateca e habitus. 41-43: *Smetanaetha smetanai* sp. n.; 44-47: *Smetanaetha chinensis* sp. n.; 48-50: *Stichoglossa pekinensis* sp. n.



FIGG. 51-57

Habitus, edeago in visione laterale e ventrale e spermateca. 51-54: *Ocyusa beijingensis* sp. n.; 55-56: *Ocyusa cooteri* sp. n.; 57: *Trichoglossina smetanai* sp. n.

Paratypi: 7 es.. stessa provenienza; 1 ♂, China, Gansu, M. ts 25 Km E Xiahe, 2805-2925 m, 3.VIII.1994, A. Smetana leg.

DESCRIZIONE. Lunghezza 2,9 mm. Corpo debolmente lucido e bruno con pronoto giallo-bruno; antenne brune con i due antennomeri basali gialli; zampe giallo-rossicce. Il capo è privo di reticolazione che sul resto del corpo è svanita. I tubercoli della superficie del capo sono salienti, quelli del pronoto e delle elitre sono svaniti e quelli del pronoto sono distinti. Edeago figg. 58-59, spermateca fig. 60.

COMPARAZIONI. La nuova specie, in base alla forma della spermateca e dell'edeago, è affine a *T. nepalicola* Pace, 1984a, del Nepal, ma ha corpo meno robusto ed elitre meno ridotte rispetto al pronoto. L'introflessione apicale del bulbo distale della spermateca della nuova specie è larga e appuntita e stretta e con estremità distale arrotondata in *nepalicola*. L'edeago della nuova specie è sinuato al lato preapicale ventrale (in visione laterale) e più profondamente arcuato al lato ventrale (edeago non sinuato in *nepalicola*).

Trichoglossina parasmetenai sp. n.

Figg. 61-64

Holotypus ♂, China, Xinlong Shan, ca. 70 Km S Lanzhou, 2225-2380 m, 7.VIII.1994, A. Smetana leg. (MHNG).

Paratypi: 5 ♀♀, stessa provenienza.

DESCRIZIONE. Lunghezza 2,9 mm. Corpo lucido e bruno con capo, pronoto ed estremità addominale giallo-bruni; antenne gialle sfumate di bruno verso l'estremità distale; zampe giallo-brune. La reticolazione del capo è assente, quella del pronoto e dell'addome è estremamente svanita e quella delle elitre è superficiale. L'intera superficie corporea è coperta di tubercoli salienti. Edeago figg. 62-63, spermateca fig. 64.

COMPARAZIONI. La nuova specie per il pronoto molto più stretto in avanti che all'indietro e per le elitre particolarmente lunghe, si distingue esternamente da *T. nepalicola* Pace, 1984a, del Nepal, e da *T. smetanai* sp. n. sopra descritta, che hanno il pronoto rispettivamente più stretto all'indietro e appena più stretto in avanti che all'indietro. L'edeago ampiamente sinuato al lato ventrale e il ridotto bulbo distale della spermateca, con larga introflessione apicale, distinguono ulteriormente la nuova specie dalle due citate.

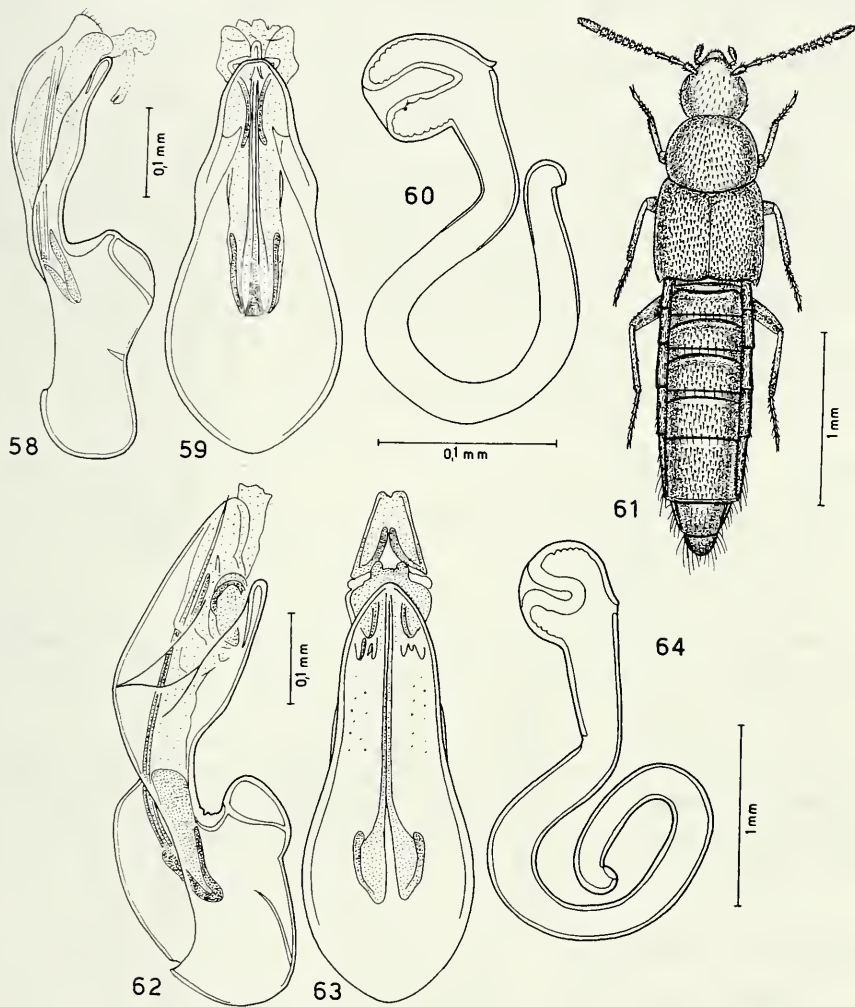
Trichoglossina laetula sp. n.

Figg. 65-66

Holotypus ♀, China, Sichuan, Gongga Shan, above camp 2, 2800 m, 25.VII.1994, A. Smetana leg. (MHNG).

DESCRIZIONE. Lunghezza 4,2 mm. Corpo lucido e bruno con capo, pronoto ed estremità addominale bruno-rossicci; antenne rossicce sfumate di bruno verso l'apice; zampe rossicce. La reticolazione del capo è distinta, quella del pronoto e dell'addome è assente e quella delle elitre è svanita. L'intera superficie corporea è coperta di tubercoli salienti e fitti. Spermateca fig. 66.

COMPARAZIONI. La spermateca della nuova specie è simile a quella di *T. franzi* (Pace, 1984a), del Nepal, ma il bulbo distale di quella della nuova specie è grande il doppio e la scultura reticolare interna della stessa spermateca è molto estesa nella nuova



FIGG. 58-64

Edeago in visione laterale e ventrale, spermateca e habitus. 58-60: *Trichoglossina smetanai* sp. n.; 61-64: *Trichoglossina parasetanai* sp. n.

specie e ridotta in *franzi*. Le elitre della nuova specie sono più strette e più ridotte rispetto quelle di *franzi*.

Trichoglossina sichuanensis sp. n.

Figg. 67-68

Holotypus ♀, China, Sichuan, Gongga Shan, above camp 2, 2800 m, 25.VII.1994, A. Setana leg. (MHNG).

DESCRIZIONE. Lunghezza 4,2 mm. Corpo lucidissimo e bruno con capo e metà basale degli uroterghi liberi 3°, 4° e 5° nero-bruni e con metà distale degli stessi uroterghi e l'apice addominale rossicci; antenne bruno-rossicce con i tre antennumeri basali e l'undicesimo giallo-rossicci; zampe rossicce. Sulla superficie del corpo non vi è presenza di reticolazione, ma vi sono fitti tubercoletti salienti. Spermatea fig. 68.

COMPARAZIONI. Il pronoto è molto stretto in avanti e il grandissimo bulbo distale della spermatea, privo di profonda introflessione apicale, sono caratteri che da soli permettono di distinguere la nuova specie da quelle note.

Oxypoda (s. str.) **contraria** sp. n.

Figg. 69-72

Holotypus ♂, China, Gansu, Xilong Shan, ca. 70 Km S Lanzhou, 2225-2380 m, 7.VIII.1994, A. Smetana leg. (MHNG).

Paratypi: 8 es., stessa provenienza.

DESCRIZIONE. Lunghezza 2,7 mm. Corpo debolmente lucido e nero pece; antenne nere con antennumero basale bruno; zampe rossicce. L'avancorpo è coperto di reticolazione svanita e di tubercoletti fitti e superficiali. L'addome mostra una pubescenza fitta e sericea. Edeago figg. 70-71, spermatea fig. 72.

COMPARAZIONI. La nuova specie è distinta da *O. himalayica* Cameron, 1939, dell'India, per il pronoto meno trasverso, per l'edeago meno ricurvo al lato ventrale e per la parte prossimale della spermatea molto lunga, con estremità ricurva in direzione contraria, con una larga introflessione apicale del bulbo distale della stessa spermatea (introflessione stretta in *himalayica*).

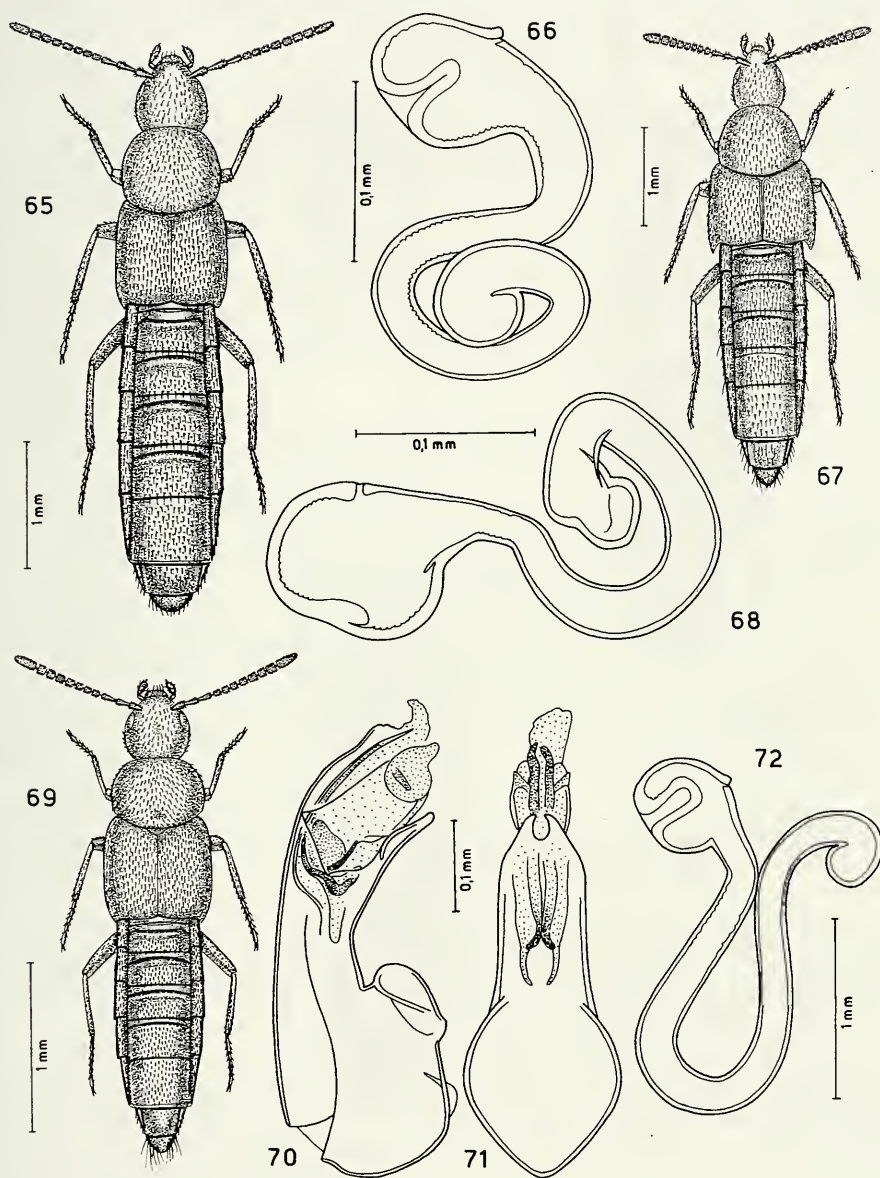
Oxypoda (s. str.) **regina** sp. n.

Figg. 79-81

Holotypus ♂, China, Gansu, Dalijia Shan, 46 Km w Linxia, 2980 m, 10.VII.1994, A. smetana leg. (MHNG).

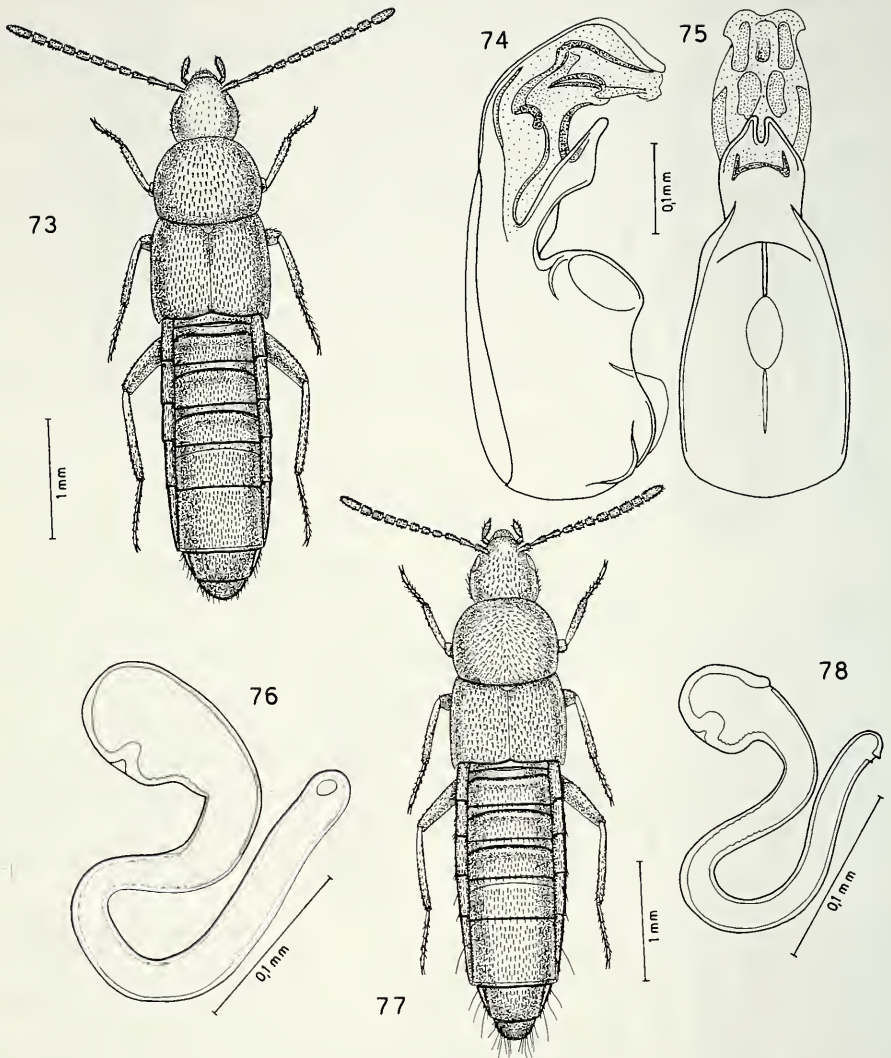
DESCRIZIONE. Lunghezza 4,0 mm. Corpo lucido e bruno; antenne bruno-rossicce con i cinque antennumeri basali rossicci; zampe rossicce. La reticolazione della superficie del capo è assente, quella del pronoto è molto svanita e quella delle elitre è distinta. L'addome è coperto di pubescenza fitta e sericea. Svaniti sono i tubercoletti che coprono la superficie del corpo. Edeago figg. 80-81.

COMPARAZIONI. L'ampia curvatura ventrale dell'edeago della nuova specie e l'apice dello stesso organo non diviso, distinguono la nuova specie da *O. himalayica* Cameron, 1939, dell'India. Esternamente la nuova specie si distingue da essa per avere il pronoto chiaramente meno trasverso ed elitre meno larghe.



FIGG. 65-72

Habitus, spermateca ed edeago in visione laterale e ventrale. 65-66: *Trichoglossina laetula* sp. n.; 67-68: *Trichoglossina sichuanensis* sp. n.; 69-72: *Oxypoda* (s. str.) *contraria* sp. n.



FIGG. 73-78

Habitus, edeago in visione laterale e ventrale e spermataca. 73-78: *Oxypoda* (s. str.) *morosa* Cameron.

Oxypoda (s. str.) **deprehendens** sp. n. Figg. 82-84

Holotypus ♂, China, Sichuan, Gongga Shan, above camp 2, 2800 m, 26.VII.1994, A. Smetana leg. (MHNG).

Paratypos: 1 ♂, stessa provenienza.

DESCRIZIONE. Lunghezza 2,8 mm. Corpo debolmente lucido e bruno; antenne brune con l'antennomero basale giallo-bruno; zampe rossicce. La reticolazione del capo e delle elitre è svanita, quella delle elitre è distinta. Tubercoli superficiali coprono la superficie del corpo. Edeago figg. 82-83.

COMPARAZIONI. Il robusto edeago, con armatura genitale interna complessa e ben sviluppata, e con apice largamente arrotondato, sono caratteri che permettono di distinguere la nuova specie da *O. himalayica* Cameron, 1939, che ha armatura genitale dell'edeago esile e apice dello stesso organo ogivale e diviso.

Oxypoda (s. str.) **precaria** sp. n. Figg. 85-86

Holotypus ♀, China, Beijing, Panshan, 8.V.1993, de Rougemont leg. (MHNG).

Paratypos: 1 ♀, stessa provenienza.

DESCRIZIONE. Lunghezza 3,7 mm. Corpo lucido e bruno con capo bruno scuro e addome nero avente il margine posteriore dei due uroterghi basali rossiccio; antenne brune con l'antennomero basale rossiccio e il secondo bruno-rossiccio; zampe rossicce. La reticolazione del capo e del pronoto è superficiale, quella delle elitre è distinta. I tubercoli della superficie del corpo sono poco distinti. Spermateca fig. 86.

COMPARAZIONI. La nuova specie è distinta da *O. himalayica* Cameron, 1939, per la parte prossimale della spermateca poco prolungata e non ricurva all'estremità e per l'introflessione apicale del bulbo distale della stessa spermateca, larga e profonda (stretta in *himalayica*).

Oxypoda (s. str.) **yonghaensis** sp. n. Figg. 87-88

Holotypus ♀, China, Yonghai, ca. 20 Km SW Yuzhou, 2700-2800 m, 9.VIII.1994, A. Smetana leg. (MHNG).

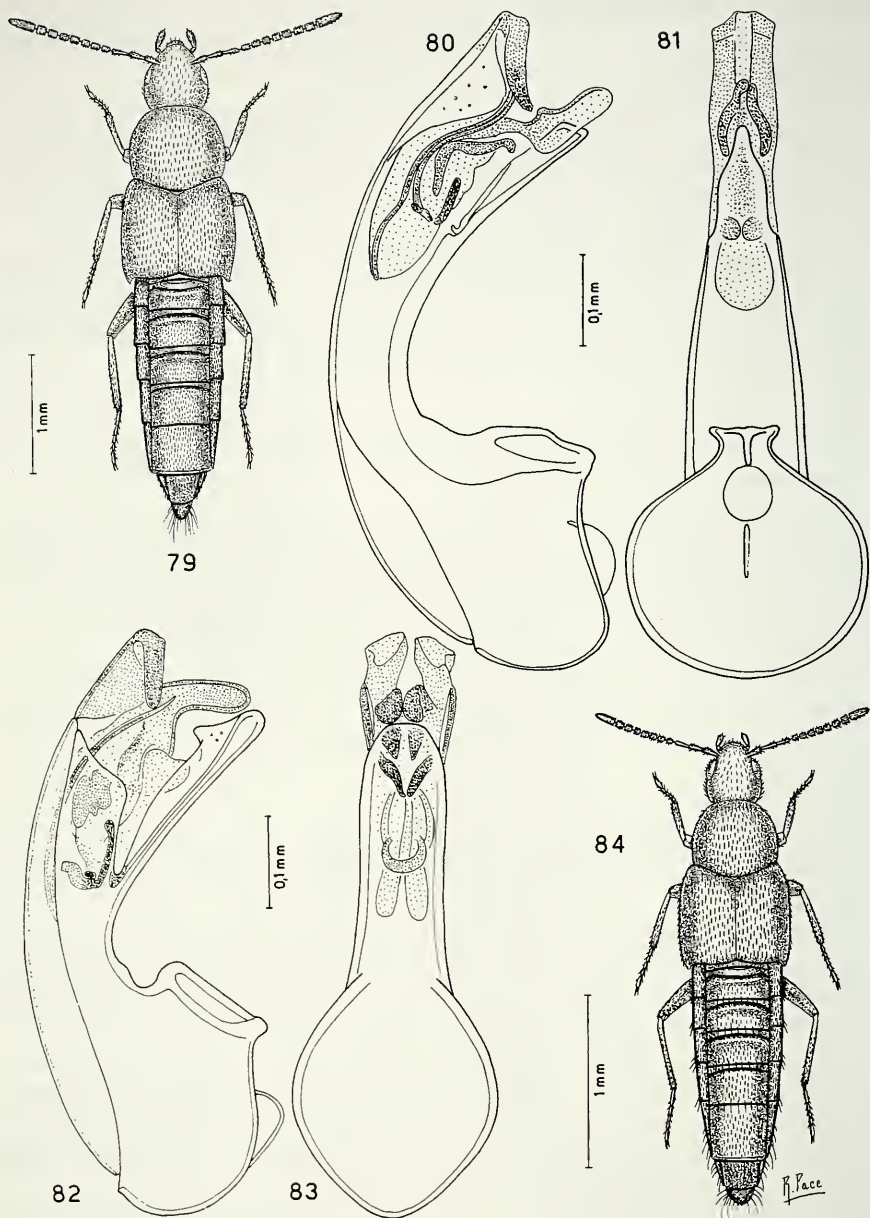
DESCRIZIONE. Lunghezza 4,7 mm. Corpo lucido e nero-bruno; antenne brune con i tre antenomeri basali rossicci; zampe anteriori e medie giallo-brune con femori bruni, posteriori brune con tarsi giallo-bruni. Sul corpo la reticolazione è assente. Tubercoli superficiali coprono la superficie del corpo. Spermateca fig. 88.

COMPARAZIONI. La larga introflessione apicale del bulbo distale della spermateca e la corta parte prossimale dello stesso organo sono caratteri sufficienti a distinguere la nuova specie da *O. himalayica* Cameron, 1939, che ha strettissima introflessione apicale del bulbo distale della spermateca e parte prossimale dello stesso organo molto lunga e descrivente una mezza spirale.

Oxypoda (s. str.) **xiahaensis** sp. n. Figg. 89-90

Holotypus ♀, China, Gansu, M. ts 25 Km E Xiahe, 3000 m, 5.VIII.1994, A. Smetana leg. (MHNG).

DESCRIZIONE. Lunghezza 4,1 mm. Corpo lucido e bruno, antenne compresse; zampe giallo-brune. La reticolazione dell'avancorpo è svanita. I tubercoli della



FIGG. 79-84

Habitus ed edeago in visione laterale e ventrale. 79-81: *Oxyptoda* (s. str.) *regina* sp. n.; 82-84: *Oxyptoda* (s. str.) *deprehendens* sp. n.

superficie del capo sono poco distinti, quelli del pronoto e delle elitre sono salienti. Spermateca fig. 90.

COMPARAZIONI. E' essenzialmente grazie alla forma della spermateca che è possibile distinguere la nuova specie da *O. himalayica* Cameron, 1939. Infatti quella della nuova specie ha bulbo distale non distintamente ellittico come in *himalayica* e con introflessione apicale larga, e non strettissima come in *himalayica*. Inoltre la parte restante della spermateca della nuova specie è sottile, con microscultura interna su area limitata, mentre in *himalayica* essa non esiste.

Oxypoda (Podoxya) hsingicola sp. n.

Figg. 91-94

Holotypus ♂, China, Gansu, Pass btw Hezuo & Amqog, 3300 m, 12.VII.1994, A. Smetana leg. (MHNG).

DESCRIZIONE. Lunghezza 2,6 mm. Corpo lucido e bruno pece con estremità addominale bruno-rossiccia; antenne brune con antennumero basale giallo-rossiccio e il successivo bruno-rossiccio; zampe gialle con femori rossicci. Sulla superficie del corpo non esiste reticolazione, tranne che sul pronoto dove è estremamente svanita. Tubercoli distinti e fitti coprono la superficie del corpo. Edeago figg. 92-93, spermateca fig. 94.

COMPARAZIONI. In base all'habitus e alla forma della spermateca, la nuova specie sembra affine a *O. subsericea* Cameron, 1939, dell'India e del Nepal. Se ne distingue per l'introflessione del bulbo distale della spermateca appena distinto e non profondo e larghissimo come in *subsericea*, e per l'edeago più sviluppato con corta "crista apicalis", con bozza nel fondo della curvatura ventrale (assente in *subsericea*) e per l'apice dell'edeago stesso, in visione ventrale, a punta ogivale e non acuta come in *subsericea*.

ETIMOLOGIA. Il nome della specie nuova significa "Abitatrice dei passi montani" e deriva dal sostantivo cinese "hsing" che significa passo montano.

Oxypoda (Podoxya) subhsingicola sp. n.

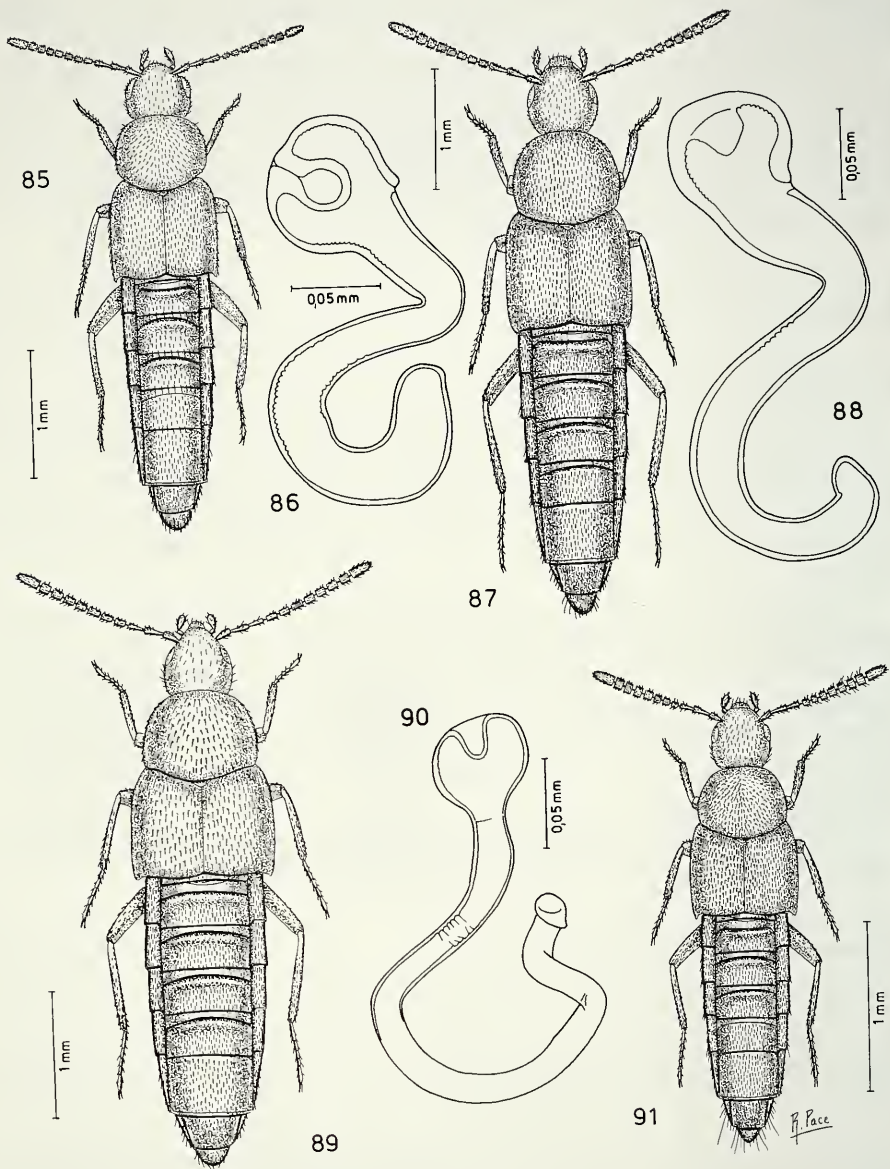
Figg. 95-98

Holotypus ♂, China, Sichuan, Langmusi, 3500-3600 m, 13.VII.1994, A. Smetana leg. (MHNG).

Paratypi: 2 ♂♂ e 4 ♀♀, stessa provenienza; 37 es., China, Gansu, M. ts 25 Km E Xiahe, 2805-2925 m et 3000 m, 3-5.VIII.1994, A. Smetana leg.; 1 ♀, China, Gansu, Pass btw Hezuo & Amqog, 3300 m, 12.VII.1994, A. Smetana leg.

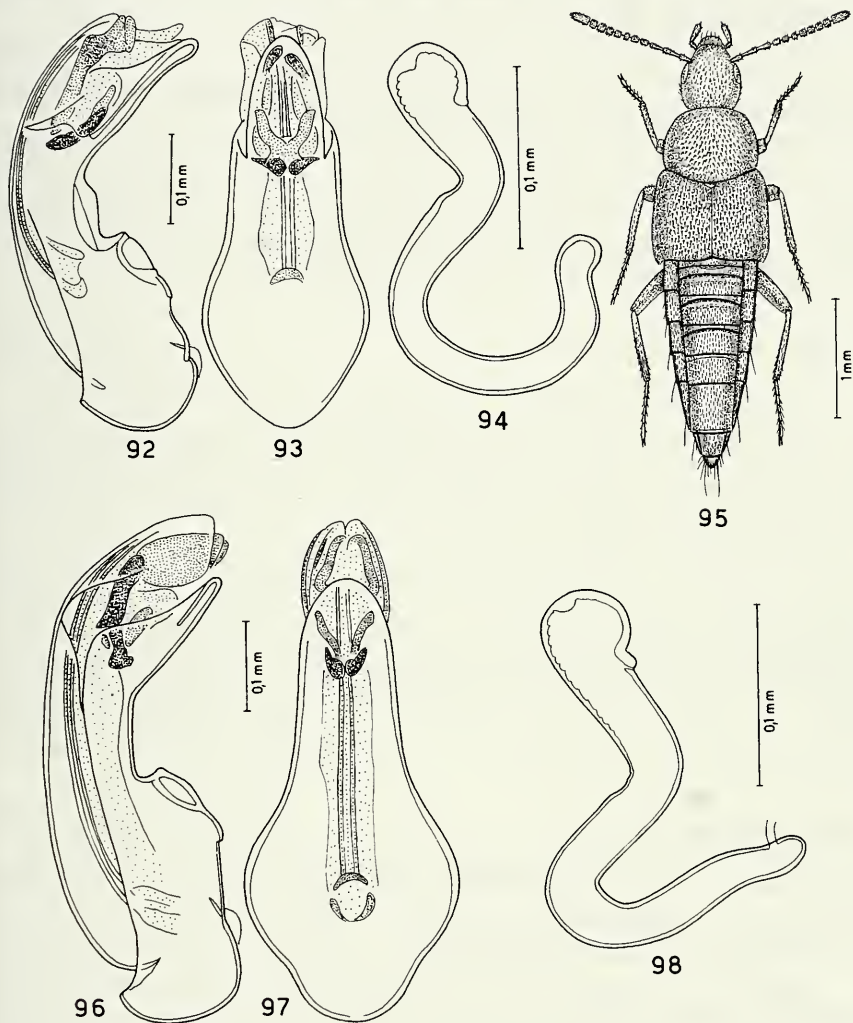
DESCRIZIONE. Lunghezza 3,3 mm. Corpo lucido e bruno pece; antenne brune con i tre antennumeri basali bruno-rossicci; zampe rossicce. La reticolazione del capo è svanita, quella del pronoto e delle elitre è distinta. Tubercoli distinti coprono la superficie del corpo. Edeago figg. 96-97, spermateca fig. 98.

COMPARAZIONI. La nuova specie per i caratteri della spermateca e dell'edeago, sembra affine a *O. hsingicola* sp. n. sopra descritta, ma l'addome è fortemente ristretto all'indietro, l'edeago ha un'armatura genitale interna molto dilatata distalmente e la spermateca ha parte prossimale visibilmente più corta.



FIGG. 85-91

Habitus e spermateca. 85-86: *Oxypoda* (s. str.) *precaria* sp. n.; 87-88: *Oxypoda* (s. str.) *yonghaensis* sp. n.; 89-90: *Oxypoda* (s. str.) *xiahensis* sp. n.; 91: *Oxypoda* (*Podoxya*) *hsingicola* sp. n.



FIGG. 92-98

Edeago in visione laterale e ventrale, spermateca e habitus. 92-94: *Oxypoda (Podoxya) hsingicola* sp. n.; 95-98: *Oxypoda (Podoxya) subhsingicola* sp. n.

Oxypoda (Podoxya) neohsingicola sp. n.

Figg. 124-125

Holotypus ♀, China, Sichuan, Gongga Shan, above camp 3, 3300-3350 m, 23.VII.1994, A. Smetana leg. (MHNG).

DESCRIZIONE. Lunghezza 4,1 mm. Corpo lucido e bruno; antenne brune con i due antenomeri basali bruno-rossicci; zampe gialle. La reticolazione e i tubercoletti della superficie corporea sono distinti. Spermateca fig. 125.

COMPARAZIONI. La forma della spermateca induce a ipotizzare che la nuova specie è affine alle due precedentemente descritte: *O. hsingicola* sp. n. e *O. subhsingicola* sp. n. Il bulbo distale della spermateca della nuova specie è molto più sviluppato che nelle due specie citate e l'introflessione apicale dello stesso bulbo distale è sì breve come nelle due specie a confronto, ma molto largo alla base.

Oxypoda (Podoxya) subneglecta sp. n.

Figg. 99-101

Holotypus ♂, China, Zhejiang, Hangzhou, 27.IV.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 3,8 mm. Corpo debolmente lucido e bruno scuro con elitre bruno-rossicce e con margine posteriore dei tre uroterghi basali rossiccio; antenne nere con antennumero basale bruno; zampe rossicce. L'intero corpo è coperto da fitta pubescenza sericea. Edeago figg. 100-101.

COMPARAZIONI. A giudicare dalla forma dell'edeago, la nuova specie sembra presentare affinità tassonomiche con *O. smetanaiana* Pace, 1992, del Nepal, ma il quarto antennumero della nuova specie è trasverso (lungo quanto largo in *smetanaiana*) e l'edeago è più largamente e meno profondamente ricurvo al lato ventrale (profondamente e strettamente arcuato in *smetanaiana*). Inoltre la robusta e corta spina dell'armatura genitale interna dell'edeago di *smetanaiana* è assente nell'edeago della nuova specie, sostituita da una lunga lamina.

Oxypoda (Podoxya) shang sp. n.

Figg. 102-105

Holotypus ♂, China, Beijing, Xiaolongmen, 1100-1500 m, 1.X.1993, de Rougemont leg. (MHNG).

Paratipi: 1 ♀, stessa provenienza; 2 ♂♂ e 3 ♀♀, Beijing, Dong Ling Shan, 1900 m, leaf litter *Quercus* & *Alnus*, 1.VII.1993, de Rougemont leg.

DESCRIZIONE. Lunghezza 2,1 mm. Corpo debolmente lucido e bruno scuro con estremità addominale giallo-bruna; antenne brune con antennumero basale giallo; zampe rossicce. Il capo è privo di reticolazione che sul pronoto e sulle elitre è svanita. Tubercoletti superficiali coprono la superficie del corpo. Edeago figg. 103-104, spermateca fig. 105.

COMPARAZIONI. La forma della spermateca della nuova specie permette forse di riscontrare affinità tassonomiche con *O. subsericea* Cameron, 1939, dell'India, ma l'introflessione apicale del bulbo distale della stessa spermateca è più profonda e più stretta nella nuova specie e la parte prossimale dello stesso organo descrive una spira completa, mentre in *subsericea* ne descrive una incompleta. Inoltre la spermateca della nuova specie ha taglia nettamente minore. L'edeago della nuova specie presenta

maggiori differenze rispetto quello di *subsericea*: è meno sviluppato e meno largo, in visione ventrale, ed è privo di robusta armatura genitale interna.

ETIMOLOGIA. La nuova specie prende nome dalla dinastia Shang, la prima della Cina.

Oxypoda (Demosoma) salamannai sp. n.

Figg. 106-109

Holotypus ♂, China, Sichuan, Langmui, 3500-3600 m, 13.VII.1994, A. Smetana leg. (MHNG).

Paratypi: 1 ♂ e 1 ♀, China, Gansu, M. ts 25 Km E Xiahe, 2865-2925 m, 3. VIII.1994, A. Smetana leg.

DESCRIZIONE. Lunghezza 2,7 mm. Corpo lucido e bruno con pronoto, margine posteriore dei tre uroterghi basali e estremità addominale rossicci; antenne giallo-brune con i tre antennomeri basali giallo-rossicci; zampe giallo-rossicce. La reticolazione del capo è assente, quella del pronoto e delle elitre è svanita. Tuberoletti superficiali coprono la superficie del corpo. Spermateca fig. 107, edeago fig. 108-109.

COMPARAZIONI. Per la forma dell'edeago, la nuova specie mostrerebbe affinità con *O. exoleta* Erichson, 1839, a diffusione paleartica occidentale, ma le elitre della nuova specie sono più corte del pronoto (elitre poco più lunghe del pronoto in *exoleta*) e il pronoto è meno trasverso. L'armatura genitale interna dell'edeago della nuova specie ha due lamine di cui una ampiamente ricurva, mentre è tozza e larghissima in *exoleta*. Inoltre la parte prossimale della spermateca della nuova specie è corta (lunga e avvolta a spirale in *exoleta*).

ETIMOLOGIA. La nuova specie è dedicata al Prof. Giovanni Salamanna dell'Università di Genova che per tanti anni è stato direttore delle pubblicazioni della Società Entomologica Italiana.

Oxypoda (Demosoma) gansuicola sp. n.

Figg. 110-112

Holotypus ♂, China, Gansu, Xinlong Sham, ca. 70 Km S Lanzhou, 2225-2380 m, 7.VIII.1994, A. Smetana leg. (MHNG).

DESCRIZIONE. Lunghezza 2,9 mm. Corpo lucido e bruno con pronoto, margine posteriore degli uroterghi ed estremità addominale bruno-rossicci; antenne bruno-rossicce con i tre antennomeri basali giallo-rossicci; zampe giallo rossicce. Sul capo tuberoletti superficiali e sul pronoto e sulle elitre distinti stanno su una superficie non reticolata. Edeago figg. 111-112.

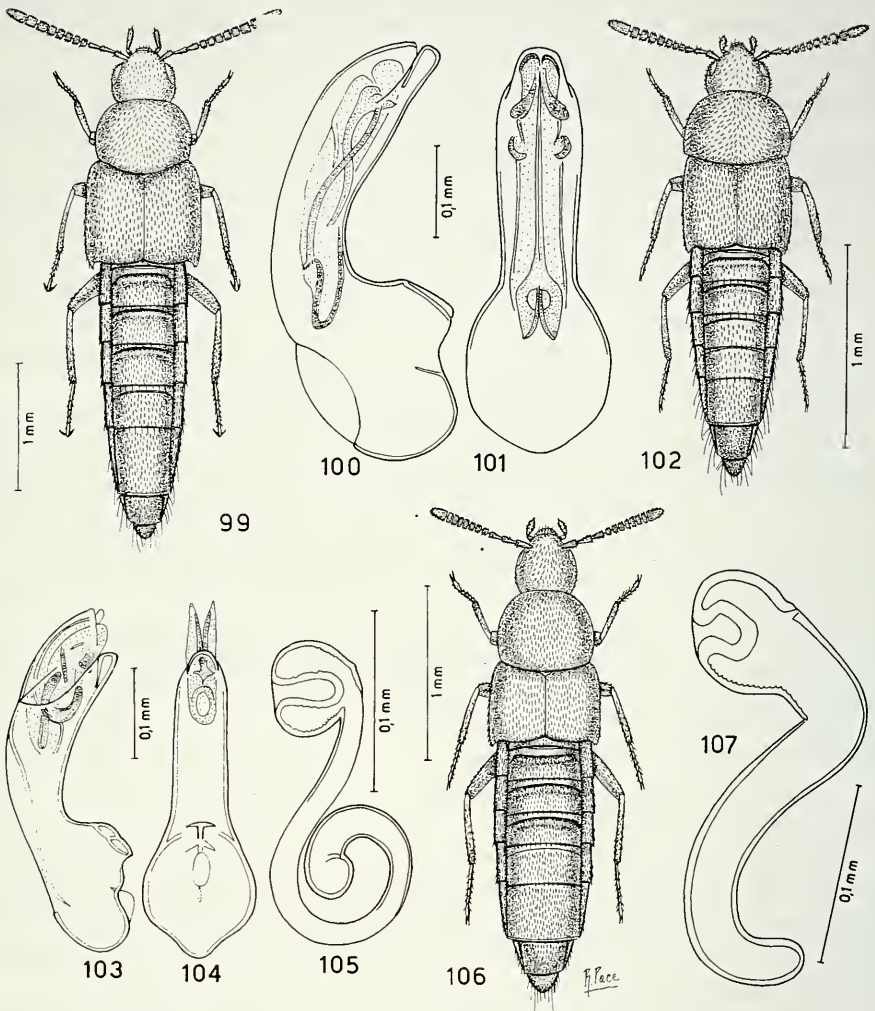
COMPARAZIONI. L'edeago della nuova specie mostrerebbe affinità con quello di *O. song* Pace, 1993, pure della Cina, ma è snello e stretto in visione ventrale, l'armatura genitale interna è meno robusta e la sua "crista apicalis" è corta (edeago robusto e largo, con lunga "crista apicalis" in *song*). Inoltre la nuova specie ha pronoto poco trasverso ed elitre lunghe quanto il pronoto (pronoto molto trasverso ed elitre più lunghe del pronoto in *song*).

Oxypoda (Demosoma) gansuensis sp. n.

Figg. 113-115

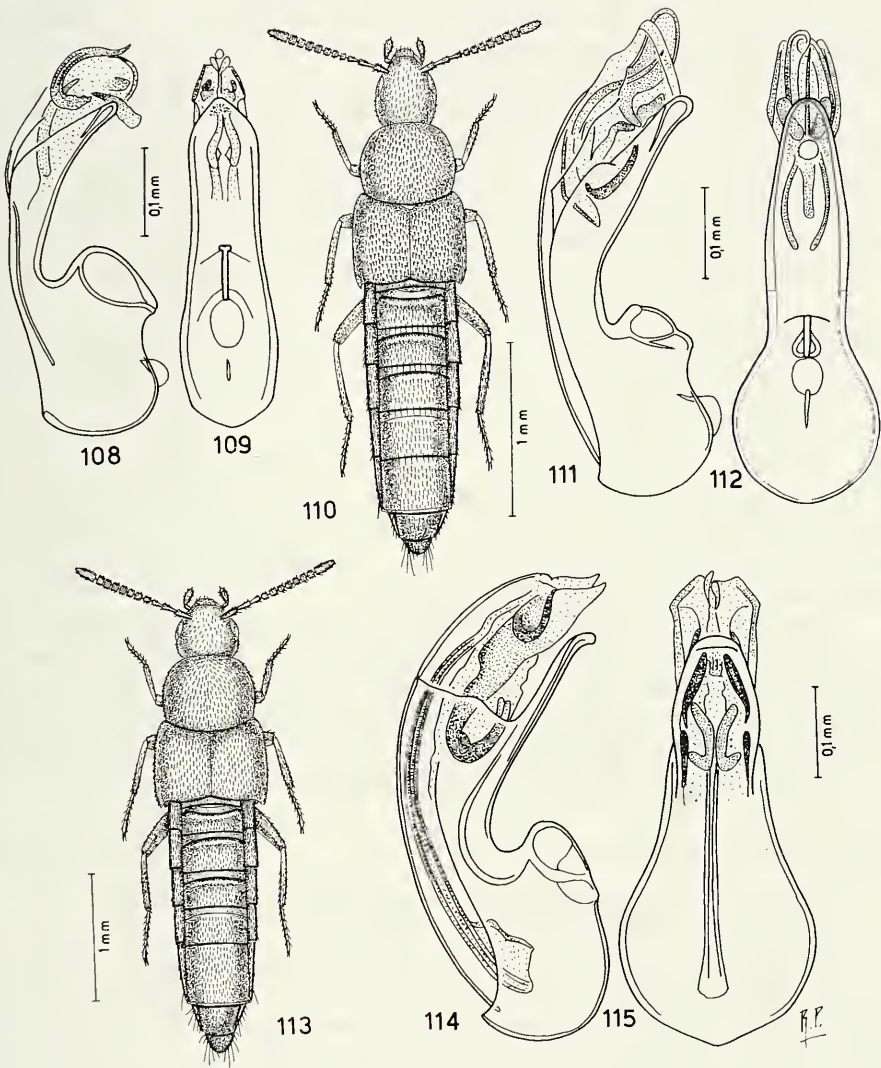
Holotypus ♂, China, Gansu, Dalijia Shan, 46 Km W Linxia, 2980 m, 10.VII.1994, A. Smetana leg. (MHNG).

Paratypus: 1 ♂, stessa provenienza.



FIGG. 99-107

Habitus, edeago in visione laterale e ventrale e spermateca. 99-101: *Oxypoda (Podoxya) subneglecta* sp. n.; 102-105: *Oxypoda (Podoxya) shang* sp. n.; 106-107: *Oxypoda (Demosoma) salamannai* sp. n.



FIGG. 108-115

Edeago in visione laterale e ventrale e habitus. 108-109: *Oxypoda (Demosoma) salamannai* sp. n.; 110-112: *Oxypoda (Demosoma) gansuicola* sp. n.; 113-115: *Oxypoda (Demosoma) gansuensis* sp. n.

DESCRIZIONE. Lunghezza 3,6 mm. Corpo debolmente lucido e bruno pece; antenne brune con i due antennumeri basali bruni; zampe giallo-brune. La reticolazione del capo e delle elitre è estremamente svanita, quella del pronoto è superficiale. La punteggiatura dal capo è distinta. I tubercoletti della superficie del pronoto sono svaniti, quelli delle elitre sono distinti. Edeago figg. 114-115.

COMPARAZIONI. La nuova specie in base alla forma dell'edeago, può essere avvicinata tassonomicamente a *O. smetanaiana* Pace, 1992, del Nepal. L'edeago di entrambe le specie ha una lunga armatura genitale interna, ma quella della nuova specie è molto più lunga e l'edeago stesso è profondamente infossato al livello della "crista apicalis" (non infossato in *smetanaiana*). Inoltre le elitre della nuova specie sono lunghe quanto il pronoto, mentre in *smetanaiana* sono più lunghe del pronoto.

Oxypoda (Demosoma) linearis sp. n.

Figg. 116-119

Holotypus ♂, China, Gansu, Yonghai, ca. 20 Km SW Yuzhong, 2700-2800 m, 9.VIII. 1994, A. Smetana leg. (MHNG).

Paratypi: 7 es., stessa provenienza.

DESCRIZIONE. Lunghezza 3,4 mm. Corpo lucido e bruno scuro; antenne brune con i due antennumeri basali bruno-rossicci; zampe rossicce. La reticolazione del capo è molto svanita, quella sul resto del corpo è assente. La punteggiatura del capo è fitta e svanita. I tubercoletti della superficie del pronoto sono distinti, quelli delle elitre sono svaniti. Edeago figg. 117-118, spermateca fig. 119.

COMPARAZIONI. La struttura dell'armatura genitale interna dell'edeago della nuova specie è simile a quella di *O. smetanaiana* Pace, 1992, del Nepal. Ma l'edeago è meno sviluppato, strettamente e poco profondamente arcuato al lato ventrale. Inoltre nella nuova specie gli antennumeri 5° a 10° sono nettamente trasversi e le elitre sono poco più lunghe del pronoto, mentre in *smetanaiana* gli antennumeri 5° a 10° sono poco trasversi e le elitre sono molto più lunghe del pronoto.

Oxypoda (Demosoma) cristae sp. n.

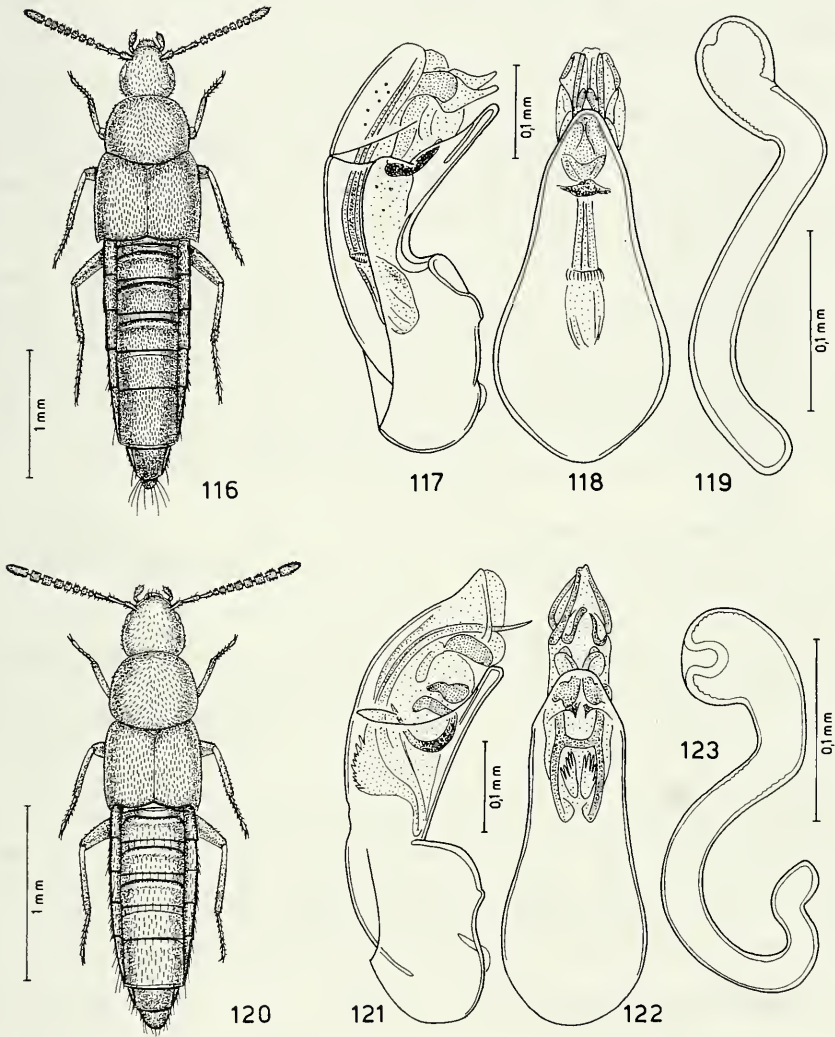
Figg. 120-123

Holotypus ♂, China, Beijing, Panshan, 8.V.1993, de Rougemont leg. (MHNG).

Paratypi: 19 es., China, Hebei Prov., Yong Nian, 6.X.1995, Shuqiang Li leg.

DESCRIZIONE. Lunghezza 2,5 mm. Corpo debolmente lucido e bruno-rossiccio con pronoto giallo-rossiccio e con uriti liberi 3° e 4° nero-bruni; antenne brune con antennumero basale giallo e i due successivi rossicci; zampe gialle. La reticolazione del capo è estremamente svanita, quella del pronoto e delle elitre è superficiale. I tubercoletti della superficie del capo sono fini e svaniti, quelli del pronoto e delle elitre sono fini e salienti. Edeago figg. 121-122, spermateca fig. 123.

COMPARAZIONI. La nuova specie ha edeago senza profondo incavo ventrale. Per questo carattere e per la presenza di una lamina crestata dell'armatura genitale interna è specie ben distinta da *O. smetanaiana* Pace, 1992, del Nepal. Inoltre le elitre della nuova specie sono poco più larghe del pronoto e gli antennumeri 4°, 5° e 6° sono trasversi (elitre molto più larghe del pronoto e antennumeri 4°, 5° e 6° lunghi quanto larghi in *smetanaiana*).



FIGG. 116-123

Habitus, edeago in visione laterale e ventrale e spermateca. 116-119: *Oxypoda (Demosoma) linearis* sp. n.; 120-123: *Oxypoda (Demosoma) cristae* sp. n.

Oxypoda (Demosoma) nudiceps sp. n.

Figg. 126-127

Holotypus ♀, China, Sichuan, Gongga Shan, above camp 3, 2800 m, 26.VII.1994, A. Smetana leg. (MHNG).

Paratypus: 1 ♀, stessa provenienza.

DESCRIZIONE. Lunghezza 4,0 mm. Corpo lucido e bruno con pronoto giallo-bruno e con margine posteriore degli uroterghi ed estremità addominale rossicci; antenne giallo-brune con i tre antenomeri basali gialli; zampe rossicce. La reticolazione del capo è assente, quella del pronoto e delle elitre è svanita. La punteggiatura del capo è rada e distinta. Tubercoli salienti stanno sulla superficie del pronoto e delle elitre. Spermatea fig. 127.

COMPARAZIONI. La spermatea della nuova specie ha alcuni elementi di somiglianza con la spermatea di *O. subsericea* Cameron, 1939, dell'India, ma la parte prossimale di quella della nuova specie è bruscamente interrotta e non prolungata a descrivere una spirale quasi completa come in *subsericea*. Inoltre nella nuova specie il capo ha punteggiatura rada ed è più lungo che largo, il pronoto è poco trasverso e le elitre sono molto lunghe, mentre in *subsericea* la punteggiatura del capo è fitta, il capo e il pronoto sono trasversi e le elitre sono poco più lunghe del pronoto.

Oxypoda (Demosoma) bisinuata sp. n.

Figg. 128-131

Holotypus ♂, China, Xinlongshan, ca. 70 Km S Lanzhou, 2225-2380 m, 7.VIII.1994, A. Smetana leg. (MHNG).

Paratipi: 8 es., stessa provenienza.

DESCRIZIONE. Lunghezza 2,8 mm. Corpo lucido e bruno con pronoto rossiccio; antenne brune con i tre antenomeri basali gialli; zampe gialle. La superficie del corpo è coperta di reticolazione svanita e di tubercoli fitti e distinti. Edeago figg. 129-130, spermatea fig. 131.

COMPARAZIONI. La nuova specie è ben distinta da *O. subsericea* Cameron, 1939, per i lati dell'edeago sinuati e per la debole armatura genitale interna dell'edeago stesso (robustissima in *subsericea*). Inoltre nella nuova specie gli antenomeri 4° e 5° sono nettamente trasversi, il pronoto è poco più largo che lungo e le elitre sono appena più lunghe del pronoto, mentre in *subsericea* gli antenomeri 4° e 5° sono lunghi quanto larghi, il pronoto è molto trasverso e le elitre sono distintamente più lunghe del pronoto.

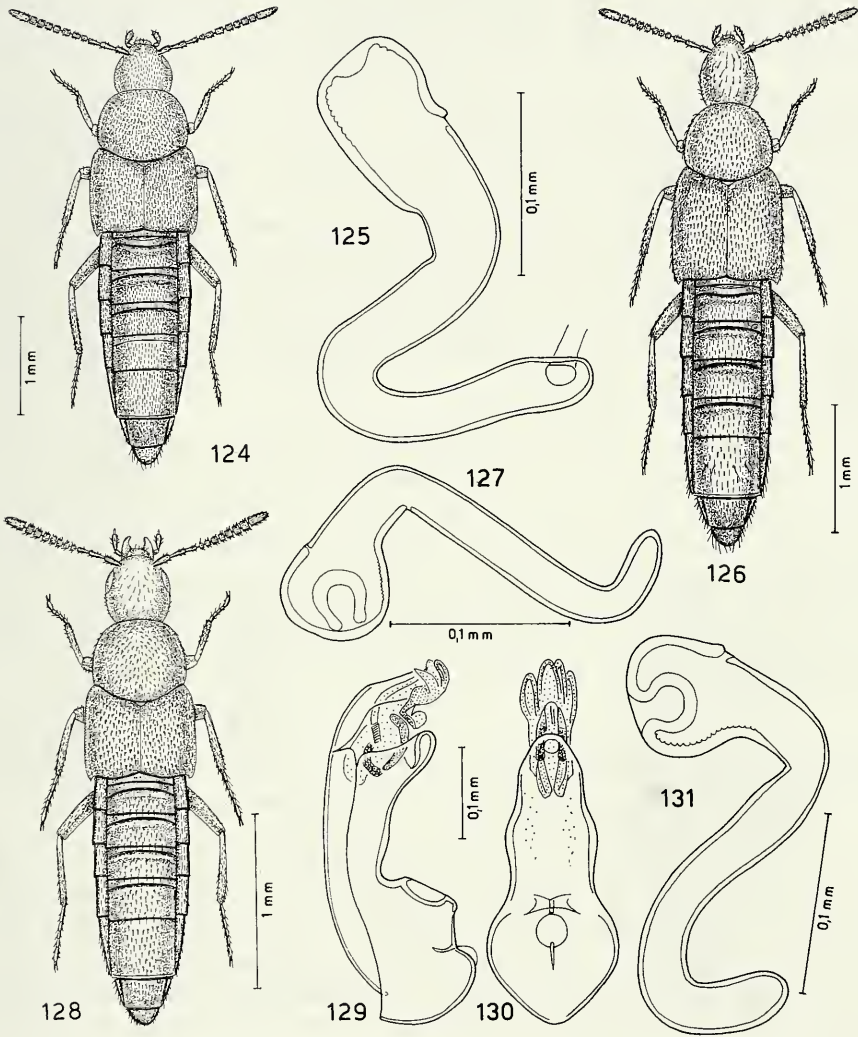
Oxypoda (Demosoma) insinuata sp. n.

Figg. 132-133

Holotypus ♀, China, Xinlong Shan, ca. 70 Km S Lanzhou, 2225-2380 m, 7.VIII.1994, A. Smetana leg. (MHNG).

DESCRIZIONE. Lunghezza 2,7 mm. Corpo lucido e bruno con pronoto giallo-bruno e con il margine posteriore degli uroterghi liberi 2° a 5° bruno-rossicci; antenne brune con i due antenomeri basali bruno-rossicci; zampe gialle. La reticolazione del capo è assente, quella del pronoto e delle elitre è svanita. I tubercoli della superficie del capo sono appena distinti, quelli del pronoto e delle elitre sono distinti. La pubescenza dell'addome non è molto fitta. Spermatea fig. 133.

COMPARAZIONI. La nuova specie ha antenne corte e la parte prossimale della spermatea descrivente un'ampia spirale. Per questi caratteri sembra essere tassono-



FIGG. 124-131

Habitus, spermateca ed eedeago in visione laterale e ventrale. 124-125: *Oxypoda (Podoxya) neohsingicola* sp. n.; 126-127: *Oxypoda (Demosoma) nudiceps* sp. n.; 128-131: *Oxypoda (Demosoma) bisinuata* sp. n.

micamente vicina a *O. nigrita* Cameron, 1939, dell'India, ma ha pronoto poco trasverso ed elitre più corte di esso, mentre in *nigrita* il pronoto è nettamente trasverso e le elitre sono molto più lunghe di esso. Inoltre l'introflessione apicale del bulbo distale della spermateca della nuova specie è corta, conica in *nigrita*.

Oxypoda (Demosoma) beijingensis sp. n.

Figg. 134-137

Holotypus ♂, China, Beijing, Xiaolongmen, 1100-1500 m, 1.X.1993, de Rougemont leg. (MHNG).

Paratypi: 1 ♂ e 1 ♀, stessa provenienza; 3 ♂♂, China, Shanxi, Wutaishan, 4-5.VI.1993, de Rougemont leg.; 1 ♀, China, Yunnan, Dali, 9.II.1993, de Rougemont leg.

DESCRIZIONE. Lunghezza 2,6 mm. Corpo debolmente lucido e nero pece; antenne nere con antennumero basale giallo-rossiccio; zampe rossicce. La reticolazione del capo è assente quella del pronoto e delle elitre è estremamente svanita. I tuberoletti della superficie del capo sono superficiali, quelli del pronoto e delle elitre sono distinti. Edeago figg. 135-136, spermateca fig. 137.

COMPARAZIONI. La nuova specie appartiene al gruppo di specie a cui fa capo *O. rubra* Cameron, 1939, dell'India e del Nepal. Ciò in base alla forma dell'edeago. La nuova specie è distinta da *rubra* e specie affini per l'armatura genitale interna dell'edeago più sviluppata e più robusta, con il pezzo dorsale molto più lungo. L'apice dell'edeago stesso, in visione ventrale, ha una forma caratteristica, come da fig. 136 (apice dell'edeago in visione ventrale arrotondato e bisinuato nelle specie del gruppo di *O. rubra*). Inoltre le elitre della nuova specie sono nettamente più lunghe del pronoto (elitre lunghe quanto il pronoto in *rubra*).

Oxypoda (Demosoma) saanxicola sp. n.

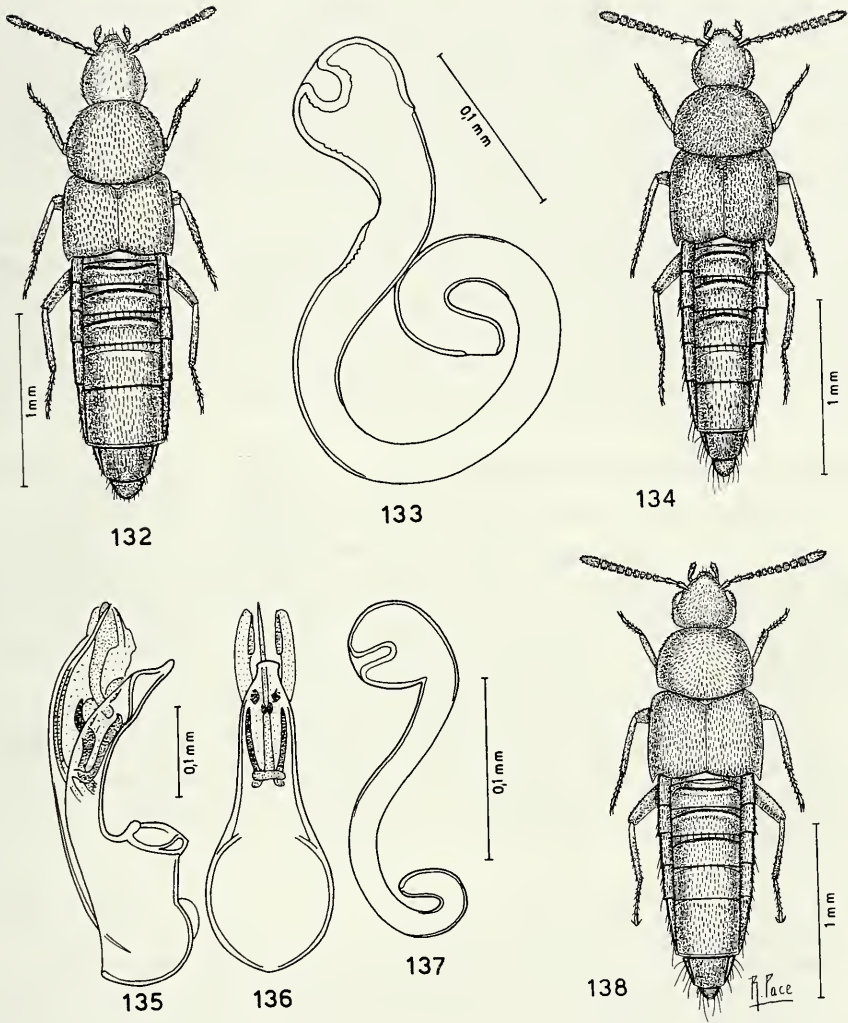
Figg. 142-145

Holotypus ♂, China, Shaanxi, Xian, 16.X.1993, de Rougemont leg. (MHNG).

Paratypus: 1 ♀, stessa provenienza.

DESCRIZIONE. Lunghezza 2,7 mm. Corpo debolmente lucido e bruno-rossiccio con capo nero pece e con addome nero-bruno avente il margine posteriore degli uroterghi e l'estremità addominale rossicci; antenne bruno-rossicce con i tre antennumeri basali giallo-rossicci; zampe bruno-rossicce. La reticolazione del capo e del pronoto è svanita, quella delle elitre è distinta. La punteggiatura del capo è fitta e superficiale. I tuberoletti della superficie del pronoto e delle elitre sono fini e superficiali. Edeago figg. 143-144, spermateca fig. 145.

COMPARAZIONI. L'edeago della nuova specie mostra delle probabili affinità morfologiche con l'edeago di *O. kashmirica* Cameron, 1939, dell'India. Infatti in visione ventrale l'edeago di entrambe le specie è fortemente ristretto a metà. Poiché l'edeago della nuova specie non ha una carena ventrale, ma solo una debole gibbosità e ha l'armatura genitale interna composta di una robusta spina e di altri robusti pezzi copulatori, la nuova specie è ben distinta da *kashmirica*. Inoltre la nuova specie presenta il pronoto più trasverso ed elitre più accorciate, mentre *O. kashmirica* ha il pronoto poco trasverso ed elitre bene sviluppate.



FIGG. 132-138

Habitus, spermatheca ed eedeago in visione laterale e ventrale. 132-133: *Oxypoda (Demosoma) insinuata* sp. n.; 134-137: *Oxypoda (Demosoma) beijingensis* sp. n.; 138: *Oxypoda (Demosoma) guanxiensis* Pace.

Oxypoda (Demosoma) mutella sp. n.

Figg. 146-147

Holotypus ♀, China, Shanxi, Nanwutai, 17.IX.1995, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 2,8 mm. Corpo poco lucido e bruno-rossiccio con capo nero, elitre brune aventi margine posteriore e una macchia trasversa periscutellare rossicci e con addome rossiccio scuro con i tre uriti basali e l'estremità addominale rossicci; antenne brune con i due antennomeri basali giallo-rossicci; zampe gialle. Il corpo è privo di evidente reticolazione ed è coperto di tuberoletti superficiali sul pronoto e distinti sulle elitre. Spermatea fig. 146.

COMPARAZIONI. La spermatea della nuova specie è simile a quella di *O. subsericea* Cameron, 1939, dell'India, ma l'introflessione apicale del bulbo distale della spermatea della nuova specie è poco profonda e poco larga (molto profonda e molto larga in *subsericea*). Inoltre il pronoto della nuova specie è meno trasverso di quello di *subsericea* e le elitre della nuova specie sono brune con una fascia in diagonale rossiccia, mentre le elitre di *subsericea* sono bruno-rossicce appena oscurate alla base.

Oxypoda (Demosoma) kunmingicola sp. n.

Figg. 148-149

Holotypus ♀, China, Yunnan, Kunming, 1.II.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 2,2 mm. Corpo debolmente lucido e nero-bruno con margine laterale e posteriore del pronoto bruno-rossicci e con margine posteriore degli uroterghi e l'estremità addominale rossicci; antenne brune con i due antennomeri basali gialli macchiati di bruno; zampe giallo-rossicce. La superficie corporea è coperta di tuberoletti distinti posti su un fondo non reticolato. Spermatea fig. 149.

COMPARAZIONI. La spermatea della nuova specie ha forma simile a quella di *O. coiffaiti* Pace, 1984b, del Nepal, ma la sua parte prossimale non è sensibilmente molto stretta come quella di *coiffaiti*. Inoltre il pronoto della nuova specie è molto trasverso (poco trasverso in *coiffaiti*) e le elitre sono molto più lunghe del pronoto (lunghe quanto il pronoto in *coiffaiti*).

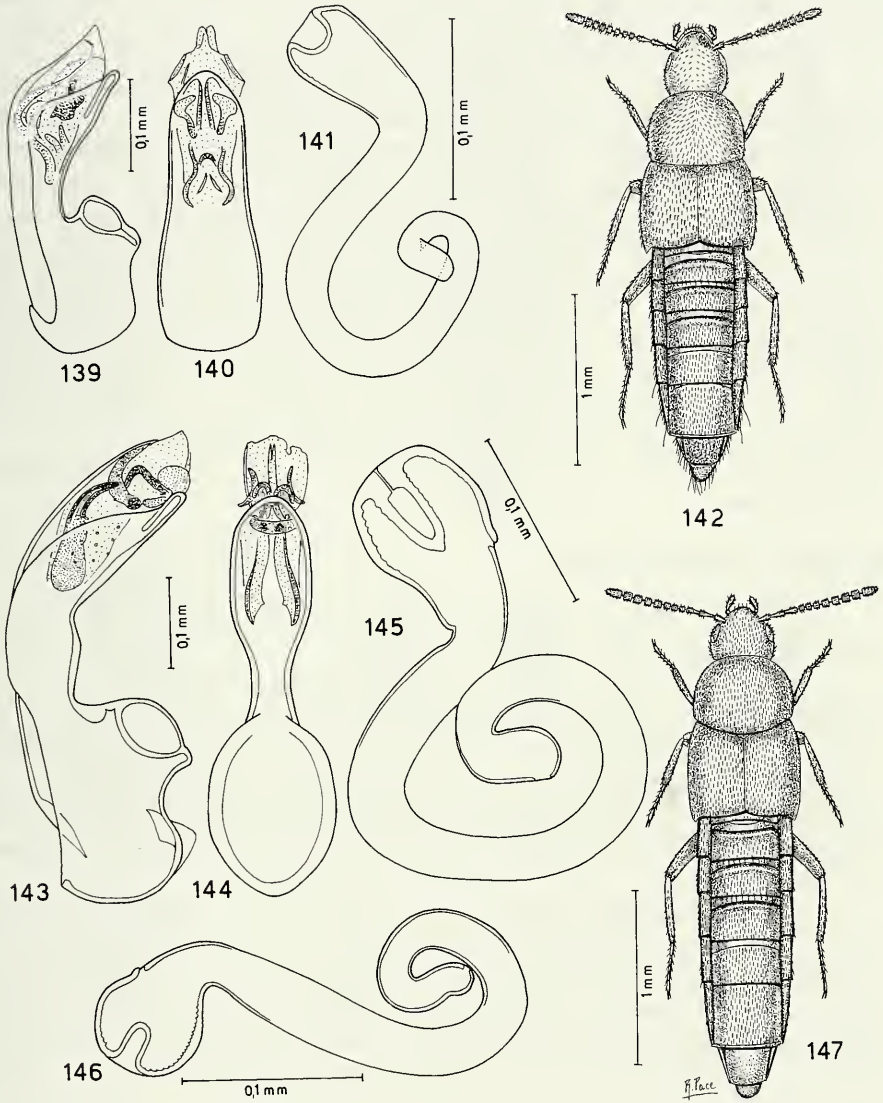
Oxypoda (Demosoma) falcifera sp. n.

Figg. 150-152

Holotypus ♂, China, Zhejiang, Hangzhou, 27.IV.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 2,8 mm. Corpo lucido. Capo bruno scuro, pronoto bruno, elitre giallo-brune con metà posteriore bruna, tranne il margine laterale esterno e quello posteriore, addome bruno con lati e margine posteriore dei tre uriti basali rossicci; antenne brune con l'antennomero basale giallo-rossiccio; zampe gialle. La superficie del corpo è coperta di tuberoletti fitti e superficiali su un fondo non reticolato. Edeago figg. 151-152.

COMPARAZIONI. Una specie che presenta una robusta e lunga armatura genitale interna dell'edeago come quella della nuova specie è *O. subsericea* Cameron, 1939, dell'India. Ma quella di quest'ultima specie è molto più larga e più corta di quella della nuova specie. Inoltre l'edeago di *subsericea* non è infossato al livello della "crista apicalis" quanto quello della nuova specie.



FIGG. 139-147

139-141: *Oxypoda (Demosoma) guanxiensis* Pace; 142-145: *Oxypoda (Demosoma) saanxicola* sp. n.; 146-147: *Oxypoda (Demosoma) mutella* sp. n.

Oxypoda (Demosoma) jiensis sp. n.

Figg. 153-156

Holotypus ♂, China, Beijing, Xiaolongmen, 1100-1500 m, 1.VII.1993, de Rougemont leg. (MHNG).

Paratypus: 1 ♀, China, Zhejiang, Tianmushan, 29.IV.1993, de Rougemont leg.

DESCRIZIONE. Lunghezza 2,3 mm. Corpo lucido e bruno con pronoto, margine posteriore degli uroterghi ed estremità addominale giallo-rossicci e con elitre giallo-brune; antenne bruno-rossicce con i due antennomeri basali giallo-rossicci; zampe rossicce. Il capo è privo di reticolazione e ha tubercoletti molto superficiali. I tubercoletti della superficie del pronoto e delle elitre sono distinti, posti su un fondo a reticolazione estremamente svanita. Edeago figg. 154-155, spermateca fig. 156.

COMPARAZIONI. La nuova specie, in base alla forma dell'edeago e della spermateca, sembra affine a *O. kashmirica* Cameron, 1939, dell'India. Infatti l'edeago della nuova specie ha una bozza ventrale che in *kashmirica* diventa una saliente carena e la spermateca della nuova specie ha introflessione apicale del bulbo distale profonda, mentre in *kashmirica* è poco sviluppata. Le elitre della nuova specie sono lunghe quanto il pronoto, mentre quelle di *kashmirica* sono nettamente più lunghe.

ETIMOLOGIA. La nuova specie prende nome da Ji, antico nome di Pekino nell'ottavo secolo a.C.

Oxypoda (Demosoma) festiva sp. n.

Figg. 157-160

Holotypus ♂, China, Beijing, Panshan, 8.V.1993, de Rougemont leg. (MHNG).

Paratypus: 1 ♀, stessa provenienza; 1 ♀, China, Shaanxi, Nanwutai, 17.IX.1995, de Rougemont leg.

DESCRIZIONE. Lunghezza 3,7 mm. Corpo debolmente lucido. Capo bruno, pronoto giallo-rossiccio, elitre giallo-brune con lati esterni e area periscutellare bruni, addome bruno con margine posteriore dei tre uroterghi basali rossicci; antenne e zampe giallo-rossicce. La reticolazione del capo è molto svanita, quella del pronoto è superficiale e quella delle elitre è distinta. I tubercoletti della superficie del capo e delle elitre sono poco salienti, quelli del pronoto sono indistinti. Edeago figg. 158-159, spermateca fig. 160.

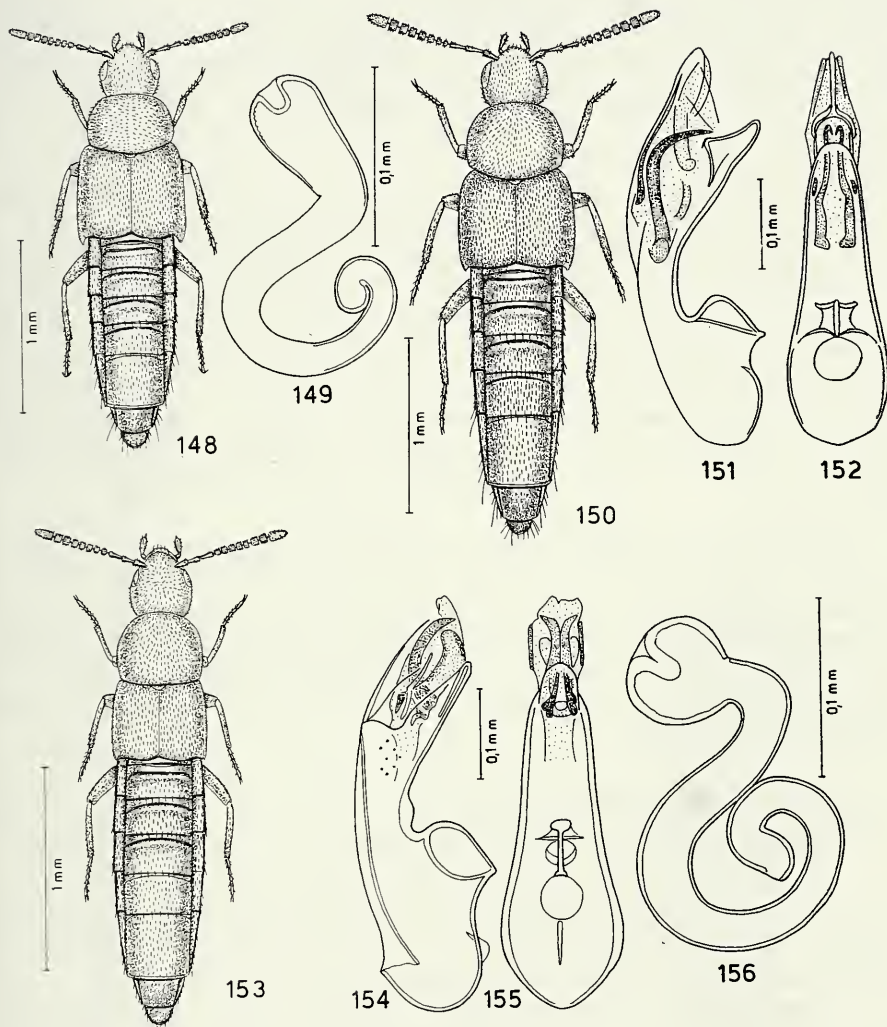
COMPARAZIONI. La nuova specie sembra affine a *O. sui* Pace, 1993, pure della Cina. Se ne distingue per l'edeago meno profondamente arcuato al lato ventrale, con incavatura posta al livello della "crista apicalis" stretta e poco profonda (larga e profonda in *sui*). La spermateca ha minore sviluppo di quello di *sui* e ha introflessione apicale del bulbo distale molto più pronunciata. Inoltre le elitre della nuova specie sono più lunghe del pronoto, mentre quelle di *sui* sono lunghe quanto il pronoto.

Oxypoda (Demosoma) cooteri sp. n.

Figg. 161-162

Holotypus ♀, China, Jiangsu Prov., Nanjin, Zijinshan, 8.V.1996, J. Cooter leg. (MHNG).

DESCRIZIONE. Lunghezza 3,9 mm. Corpo debolmente lucido. Capo bruno, pronoto giallo-rossiccio, elitre rossicce con area periscutellare bruna, addome bruno con margine posteriore degli uroterghi ed apice addominale rossicci; antenne brune con i due antennomeri basali giallo-rossicci; zampe gialle. I tubercoletti della superficie del corpo sono fitti e poco salienti, posti su un fondo non reticolato. Spermateca fig. 162.



FIGG. 148-156

Habitus, spermateca ed edeago in visione laterale e ventrale. 148-149: *Oxypoda (Demosoma) kunningicola* sp. n.; 150-152: *Oxypoda (Demosoma) falcifera* sp. n.; 153-156: *Oxypoda (Demosoma) jiensis* sp. n.

COMPARAZIONI. La nuova specie è affine a *O. festiva* sp. n. sopra descritta. Esternamente se ne distingue per le antenne brune con i due antennomeri basali giallo-rossicci (antenne giallo-rossicce in *festiva*) e per il pronoto più trasverso (rapporto larghezza/lunghezza pari a 1,26) di quello di *festiva* (rapporto pari a 1,22). La spermateca ha maggiore sviluppo, con introflessione apicale del bulbo distale meno profonda.

Oxypoda (Demosoma) pekinensis sp. n.

Figg. 163-165 e 226

Holotypus ♂, China, Beijing, Panshan, 8.V.1993, de Rougemont leg. (MHNG).

Paratypi: 1 ♀, China, Beijing, Xiaolongmen, 1100-1500 m, 1.X.1993, de Rougemont leg.; 1 ♂ e 2 ♀, China, Hebei Chengde, 3.X.1994, de Rougemont leg.

DESCRIZIONE. Lunghezza 4,0 mm. Corpo lucido e bruno con capo e addome nero-bruni con margine posteriore dei due uroterghi basali giallo-bruni, il terzo e l'estremità addominale bruno-rossicci; antenne bruno-rossicce con i due antennomeri basali giallo-rossicci; zampe gialle. La reticolazione del capo è assente, quella del pronoto è estremamente svanita e quella delle elitre è superficiale. I tubercoletti che coprono la superficie del corpo sono fittissimi e svaniti. Edeago figg. 164-165, spermateca fig. 226.

COMPARAZIONI. La nuova specie è affine alle due precedenti specie descritte: *O. festiva* sp. n. e *O. cooteri* sp. n., come a *O. sui* Pace, 1993, pure della Cina. Si distingue da quest'ultima per l'edeago meno profondamente arcuato al lato ventrale per l'armatura genitale interna più robusta, per la parte prossimale della spermateca molto più prolungata, fino a descrivere oltre una spira (spira incompleta in *sui*) e per il pronoto più esteso, largo quasi quanto le elitre (pronoto nettamente più stretto delle elitre nelle tre specie citate).

Oxypoda (Demosoma) seminudiventris sp. n.

Figg. 166-167

Holotypus ♀, China, Jiangsu Prov., Nanjing, Zijinshan, 8.V.1996, J. Cooter leg. (MHNG).

DESCRIZIONE. Lunghezza 3,2 mm. Corpo lucido e giallo-rossiccio con capo e uriti liberi 3°, 4° e base del 5° bruni; antenne e zampe giallo-rossicce. I tubercoletti della superficie dell'avancorpo sono distinti, posti su un fondo non reticolato, quelli dell'addome sono poco fitti e salienti. Spermateca fig. 167.

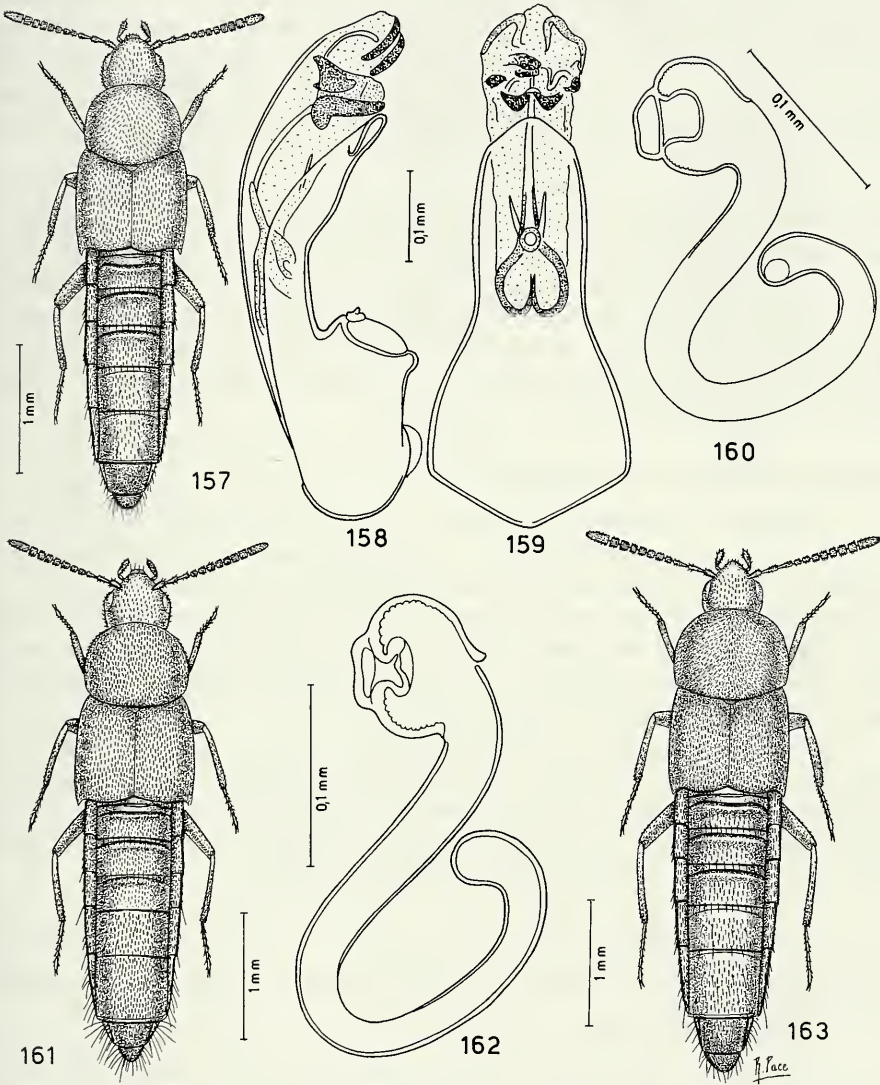
COMPARAZIONI. In base alla forma della spermateca, la nuova specie può essere tassonomicamente vicina a *O. nagaidana* Pace, 1992, del Nepal. Se ne distingue per avere il bulbo distale non asimmetrico e la parte mediana dello stesso organo priva di finissima microscultura reticolare interna (presente al contrario in *nagaidana*). Inoltre gli occhi sono meno ridotti nella nuova specie e il pronoto è nettamente più stretto delle elitre (pronoto appena più stretto delle elitre in *nagaidana*).

Oxypoda (Demosoma) maculiventris sp. n.

Figg. 168-169

Holotypus ♀, China, Yunnan, Xishuangbanna, Mengdien, 26.I.1993, de Rougemont leg. (MHNG).

Paratypus: 1 ♀, stessa provenienza.



FIGG. 157-163

Habitus, edeago in visione laterale e ventrale e spermateca. 157-160: *Oxypoda (Demosophia) festiva* sp. n.; 161-162: *Oxypoda (Demosophia) cooteri* sp. n.; 163: *Oxypoda (Demosophia) pekinensis* sp. n.

DESCRIZIONE. Lunghezza 2,7 mm. Corpo debolmente lucido. Capo bruno, pronoto ed elitre giallo-bruni, addome giallo-rossiccio con il terzo urite libero giallo-bruno e il quarto e la metà basale del quinto e una macchia mediana basale sui due uriti basali, bruni; antenne brune con i due antennomeri basali giallo-rossicci; zampe giallo-rossicce. La reticolazione del capo e del pronoto è svanita, quella delle elitre è distinta. La punteggiatura del capo è distinta. I tubercoletti che coprono la superficie del pronoto e delle elitre sono fitti e salienti. Spermateca fig. 168.

COMPARAZIONI. La nuova specie appare simile a *O. shuteae* Pace, 1984a, dell'India, se si confrontano le spermateche. La nuova specie ha la parte prossimale di quest'organo meno prolungata e con scultura reticolare interna (assente in *shuteae*). Inoltre l'undicesimo antennomero della nuova specie è visibilmente più lungo di quello di *shuteae*, gli occhi sono più lunghi delle tempie (occhi molto più corti delle tempie in *shuteae*), il pronoto è più trasverso e più stretto delle elitre (pronoto poco più stretto delle elitre in *shuteae*) e per la presenza di una macchia mediana basale sui due uriti basali (macchia assente in *shuteae*).

Oxypoda (Demosoma) pulchricolor sp. n.

Figg. 170-171

Holotypus ♀, China, Zhejiang, Tianmushan, 29.IV.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 2,0 mm. Corpo lucido. Capo nero pece, pronoto giallo-rossiccio, elitre giallo-brune con base bruna, addome giallo-rossiccio con uriti liberi 3°, 4° e base del 5° nero-bruni; antenne brune con i due antennomeri basali gialli; zampe gialle. La reticolazione del capo è assente, quella del pronoto e delle elitre molto svanita. I tubercoletti della superficie del capo e delle elitre sono molto superficiali, quelli del pronoto sono distinti. Spermateca fig. 170.

COMPARAZIONI. La nuova specie è distinta da *O. proxima* Cameron, 1939, dell'India, per il bulbo distale della spermateca meno asimmetrico, con inflessione apicale a punta acuta e non a punta largamente arrotondata come in *proxima*. Inoltre la parte prossimale della stessa spermateca è meno sviluppata e l'addome della nuova specie è meno ristretto all'indietro rispetto quello di *proxima*.

Oxypoda (Bessopora) gonggaensis sp. n.

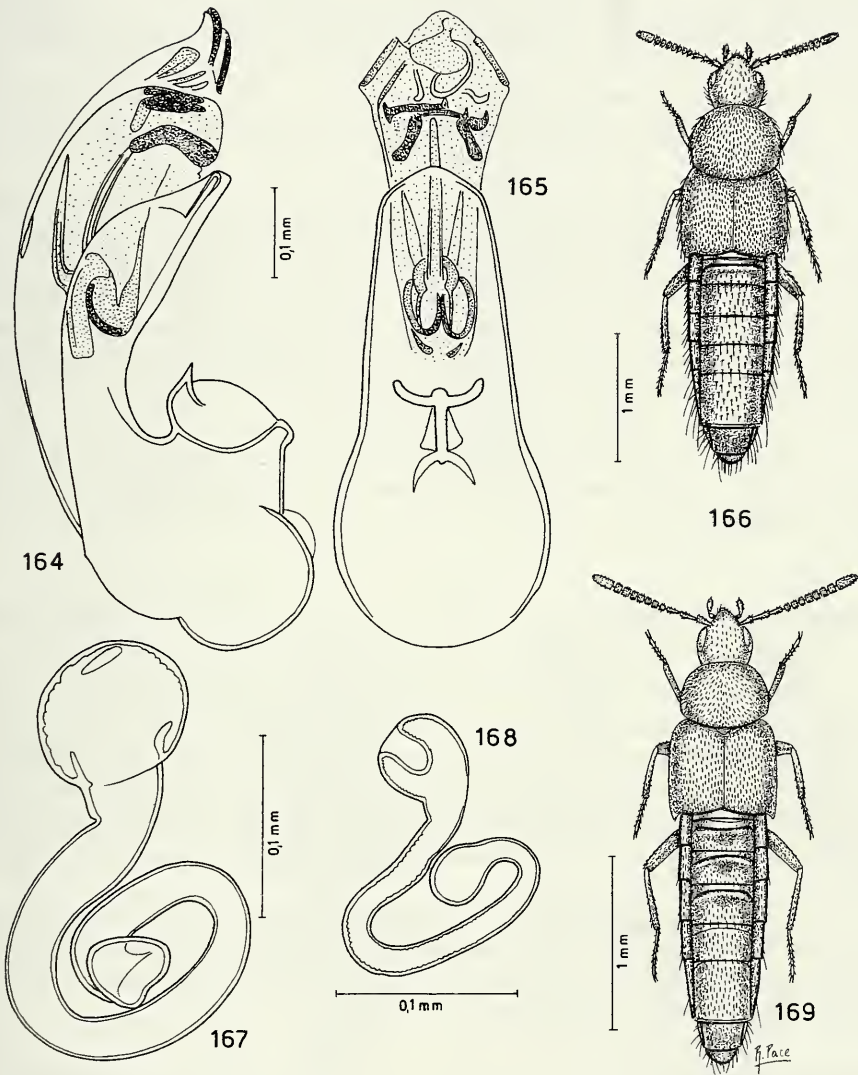
Figg. 172-174

Holotypus ♂, China, Sichuan, Gongga Shan, above camp 2, 2850 m, 26.VII.1994, A. Smetana leg. (MHNG).

Paratypi: 1 ♂ e 1 ♀, stessa provenienza.

DESCRIZIONE. Lunghezza 2,7 mm. Corpo lucido e bruno con margini del pronoto ed estremità addominale rossicci; antenne brune con i tre antennomeri basali e l'undicesimo giallo-rossicci. La reticolazione del capo e del pronoto è molto svanita, quella delle elitre è distinta. I tubercoletti della superficie del capo e del pronoto sono salienti, quelli delle elitre sono svaniti. Edeago figg. 173-174.

COMPARAZIONI. In base alla forma dell'edeago, la nuova specie è affine a *O. elata* Pace, 1992, del Nepal. Infatti entrambe le specie presentano una bozza nel fondo dell'incavatura ventrale dell'edeago. Ma quella di *elata* è più saliente e più stretta, mentre quella della nuova specie è larghissima e poco saliente. Inoltre l'apice



FIGG. 164-169

Edeago in visione laterale e ventrale, habitus e spermateca. 164-165: *Oxypoda (Demosoma) pekinensis* sp. n.; 166-167: *Oxypoda (Demosoma) seminudiventris* sp. n.; 168-169: *Oxypoda (Demosoma) maculiventris* sp. n.

dell'edeago, in visione ventrale, è assai largo nella nuova specie e stretto in *elata* e le elitre della nuova specie sono nettamente più corte del pronoto che è poco trasverso, mentre in *elata* le elitre sono molto più lunghe del pronoto che è fortemente trasverso.

Oxypoda (Bessopora) uncinata sp. n.

Figg. 175-177

Holotypus ♂, China, Beijing, Xiaolongmen, 1100-1500 m, 1.VII.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 2,6 mm. Corpo lucido e bruno con pronoto bruno-rossiccio e con margine posteriore dei tre uriti basali e del quinto libero rossicci; antenne brune con i due antenomeri basali giallo-rossicci; zampe gialle. La reticolazione del capo e del pronoto è estremamente svanita, quella delle elitre è distinta. I tubercoletti della superficie del capo sono poco fitti e sono superficiali, quelli del pronoto sono estremamente svaniti e quelli delle elitre sono poco salienti. I quattro uroterghi basali mostrano una reticolazione poligonale irregolare distinta, il quinto libero ha reticolazione trasversa evidente. Edeago figg. 176-177.

COMPARAZIONI. L'edeago della nuova specie ha qualche affinità morfologica con quello di *O. franziana* Pace, 1984a, del Nepal. Se ne distingue per il caratteristico robusto dente preapicale ventrale dell'edeago (due dentini preapicali ventrali in *franziana*).

Ischyrocolpura chinensis sp. n.

Figg. 178-179

Holotypus ♀, China, Jiangsu Prov., Nanjing, Zijinshan. 8.V.1996, J. Cooter leg. (MHNG).

DESCRIZIONE. Lunghezza 3,6 mm. Corpo lucido e giallo-rossiccio; antenne rossicce con i due antenomeri basali e l'undicesimo giallo-rossicci; zampe giallo-rossicce. non è presente una reticolazione sulla superficie del corpo. La punteggiatura del capo è svanita, quella del pronoto è molto superficiale e quella delle elitre è distinta. Solo i due uroterghi basali presentano punteggiatura distinta, i restanti uroterghi sono appiattiti e quasi privi di punteggiatura (solo qualche punto isolato). Spermatea fig. 179.

COMPARAZIONI. La nuova specie esternamente è molto simile a *I. philippinensis* Pace, 1990, delle Filippine. Se ne distingue con evidenza per la forma della spermatea che nella parte prossimale è nettamente più lunga, tanto che descrive un arco, non presente nella spermatea di *philippina*.

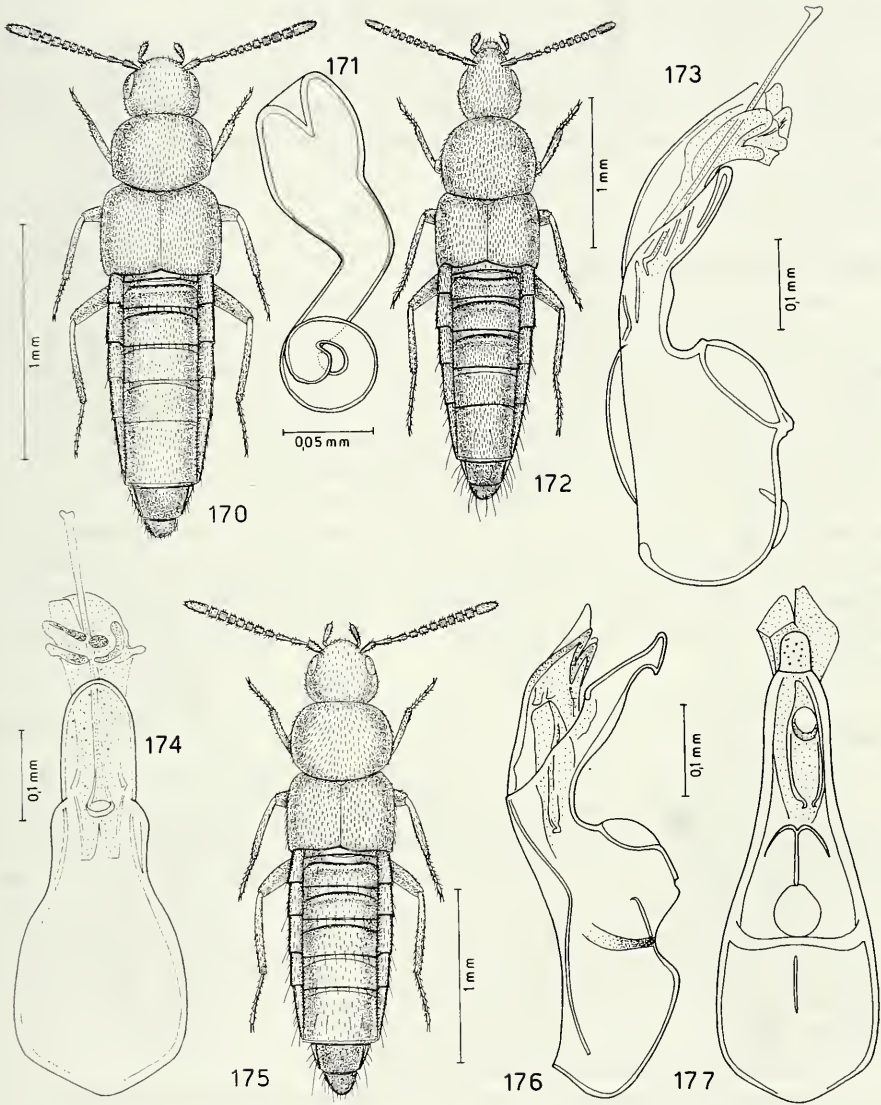
Homoeusa chinensis sp. n.

Figg. 180-181

Holotypus ♀, China, Beijing, Xiaolongmen, 1100-1500 m, 1.VII.1993, de Rougemont leg. (MHNG).

Paratypus: 1 ♀, stessa provenienza.

DESCRIZIONE. Lunghezza 3,5 mm. Corpo lucido e bruno; antenne bruno-rossicce con i due antenomeri basali e l'undicesimo rossicci; zampe rossicce. La reticolazione del capo è estremamente svanita, quella del pronoto superficiale e quella delle elitre è distinta. La superficie dell'avancorpo è coperta di tubercoletti finissimi e poco salienti. La reticolazione dei due uroterghi basali è svanita, quella del terzo è estremamente



FIGG. 170-177

Habitus, spermateca ed edeago in visione laterale e ventrale. 170-171: *Oxyopoda (Demosoma) pulchricolor* sp. n.; 172-174: *Oxyopoda (Bessopora) gonggaensis* sp. n.; 175-177: *Oxyopoda (Bessopora) uncinata* sp. n.

superficiale e quella sui restanti uroterghi è assente. Il quinto urotergo libero è coperto di tubercoletti allungati molto salienti. Spermateca fig. 181.

COMPARAZIONI. La nuova specie è distinta da *H. acuminata* (Maerkel, 1842), della regione paleartica occidentale, per il pronoto meno trasverso e il diverso colore del corpo. Da *H. prolongata* Sawada, 1970, del Giappone, è distinta per la parte prossimale della spermateca non prolungata a formare un occhiello.

HOPLANDRIINI

Tinotus rougemontianus sp. n.

Figg. 182-183

Holotypus ♀, China, Yunnan, Ruili, ca. 700 m, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 2,8 mm. Corpo lucidissimo. Capo nero, pronoto nero bruno, elitre perdute, addome bruno con margine posteriore dei tre uroterghi basali bruno-rossiccio; antenne nero-brune; zampe bruno-rossicce. La reticolazione del capo è assente, quella del pronoto è svanita come quella degli uroterghi liberi 4° e 5°. I tubercoletti della superficie del corpo sono svaniti. Spermateca fig. 183.

COMPARAZIONI. La nuova specie è distinta da *T. kashmiricus* Cameron, 1939, dell'India, per il differente colore dell'addome che nella nuova specie è bruno con il margine posteriore dei tre uroterghi basali bruno-rossiccio, mentre in *kashmiricus* l'addome è interamente nero. E' pure differente la punteggiatura sui due ultimi uroterghi: più rada che sui tre basali in *kashmiricus*, con punteggiatura non più rada nella nuova specie.

Alloplandria gen. n.

Figg. 184-191

DIAGNOSI. Il nuovo genere si colloca in posizione intermedia tra i generi *Hoplandria* Kraatz, 1857, a diffusione neotropicale e *Pseudoplandria* Fenyés, 1921, a diffusione orientale. Del primo possiede la formula tarsale 4-5-5 (controllo effettuato su più esemplari: non è un caso teratologico), del secondo ha il tipo di edeago, A sé stanti sono la forma della spermateca e la carena mesosternale.

DESCRIZIONE. Palpi labiali di 4 articoli (fig. 190); ligula molto lunga, divisa all'estremità, con una setola a ciascun lato; palpi mascellari di 5 articoli (fig. 191); tempie marginate; processo mesosternale acuto e carenato; mesocoxe contigue; formula tarsale 4-5-5.

TYPUS GENERIS: *Alloplandria problematica* sp. n.

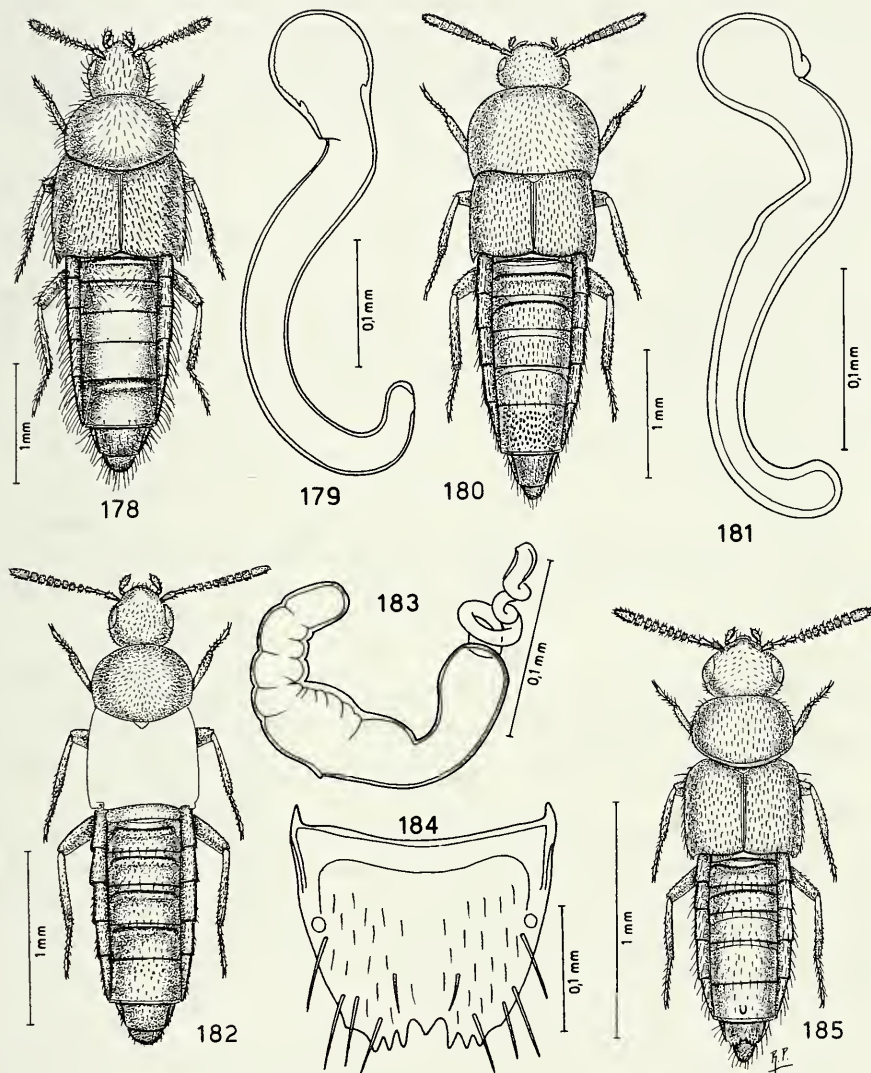
ETIMOLOGIA. Il nome del nuovo genere significa "Hoplandria differente". Il genere grammaticale è femminile.

Alloplandria problematica sp. n.

Figg. 184-191

Holotypus ♂, Hong Kong, Kadoorie Agricultural Research Centre, flight interception trap, 19-31.V.1996, de Rougemont leg. (MHNG).

Paratypi: 18 es., stessa provenienza, ma anche in data VI.1996; 8 es., Hong Kong, Tai Po, vegetable refuse, VII.1996, de Rougemont leg.; 3 ♂♂, Hong Kong, N.T., IX.1996, sifted litter, de Rougemont leg.



FIGG. 178-185

Habitus, spermateca e sesto urotergo libero del maschio. 178-179: *Ischyrocolpura chinensis* sp. n.; 180-181: *Homoeusa chinensis* sp. n.; 182-183: *Tinotus rougemontianus* sp. n.; 184-185: *Alloplandria problematica* gen. n., sp. n.

DESCRIZIONE. Lunghezza 1,8 mm. Corpo lucido e rossiccio con capo bruno-rossiccio, elitre brune aventi base giallo-rossiccia; antenne brune con i tre antennumeri basali rossicci; zampe giallo-rossicce. Sul corpo non vi è traccia di reticolazione e i tubercoli sono fini e svaniti sul pronoto e distinti sulle elitre. La punteggiatura del capo è svanita e rada. Sesto urotergo libero del maschio fig. 184, edeago figg. 186-187, spermateca fig. 188.

Pseudoplandria fellowesi sp. n.

Figg. 192-196

Holotypus ♂, Hong Kong, Tai Po Kau, pit-fall trap, VIII.1992, J. Fellowes leg. (MHNG).

Paratypi: 7 es., stessa provenienza.

DESCRIZIONE. Lunghezza 1,9 mm. Corpo lucido e giallo con capo giallo-rossiccio, con elitre giallo-brune e con la base degli uriti liberi 4° e 5° giallo-rossicci; antenne giallo-rossicce con i due antennumeri basali gialli; zampe gialle. Non vi è presenza di reticolazione sul corpo. La punteggiatura del capo è poco distinta. I tubercoli che coprono il resto della superficie del corpo sono superficiali. Edeago figg. 193-194, spermateca fig. 195, sesto urotergo libero del maschio fig. 196.

COMPARAZIONI. La nuova specie, in base all'habitus e alla forma della spermateca è comparabile con *P. piceorufa* Cameron, 1941, delle Filippine. Se ne distingue per la spermateca di dimensione assai ridotta rispetto la spermateca di *piceorufa* e per la parte prossimale della stessa spermateca della nuova specie, corta, mentre è molto lunga in *piceorufa*.

Pseudoplandria anjiensis sp. n.

Figg. 197-198

Holotypus ♀, China, Zhejiang Prov., Anji County, ca. 500 m, Long Wang Shan N.R., 12.V.1996, J. Cooter leg. (MHNG).

Paratypi: 2 ♀♀, Zhejiang Prov., Lin'an County, W Tianmu Shan N.R., 16.22.V.1996, J. Cooter leg.

DESCRIZIONE. Lunghezza 3,6 mm. Corpo lucido e giallo-rossiccio con capo ed elitre bruni; antenne rossicce con i due antennumeri basali e l'undicesimo giallo-rossicci; zampe giallo-rossicce. La reticolazione del capo e del pronoto è molto svanita, quella delle elitre e dell'addome è assente. La punteggiatura del capo e del pronoto è superficiale. Le elitre sono coperte dei tubercoli distinti come quelli della superficie degli uroterghi.

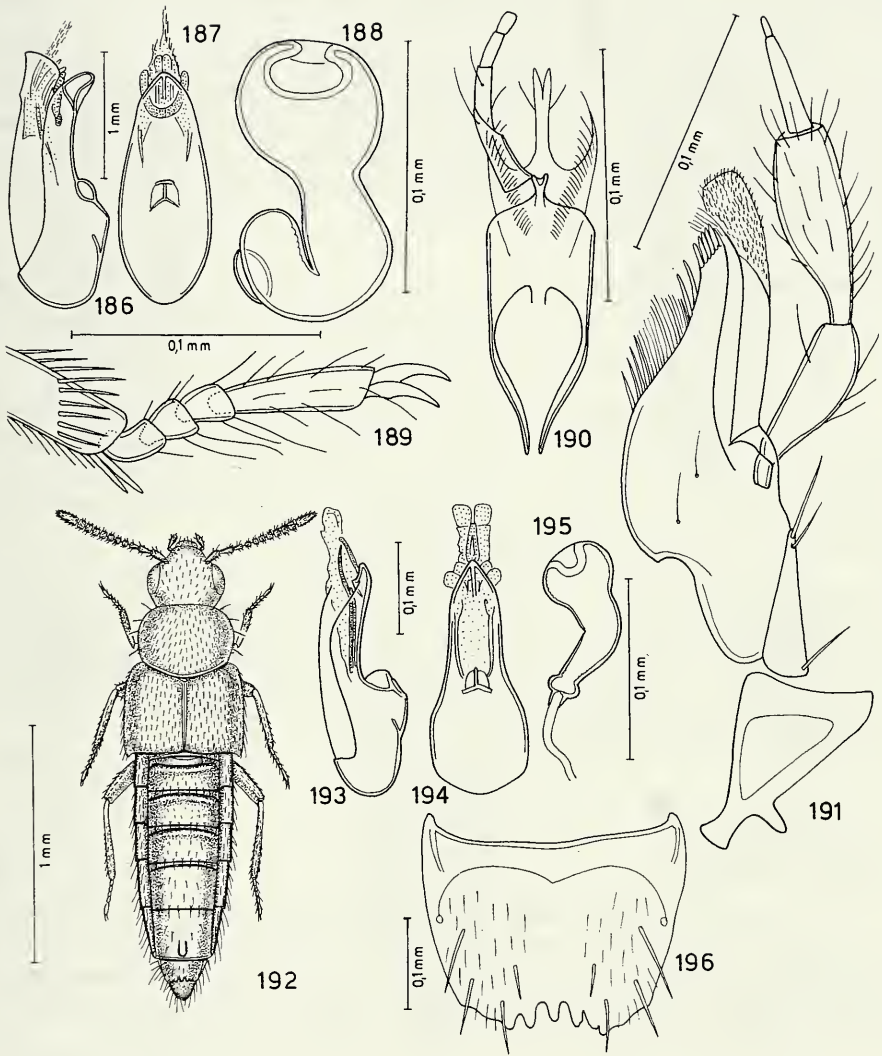
COMPARAZIONI. La spermateca della nuova specie ha forma simile a quella di *P. championi* Cameron, 1939, dell'India, ma è di maggiore grandezza perché la parte mediana è più prolungata e l'introflessione apicale del bulbo distale della stessa spermateca è più profonda e meno larga di quella di *championi*.

Pseudoplandria rougemonti sp. n.

Figg. 199-201

Holotypus ♂, Hong Kong N.T., IV.1996, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 3,2 mm. Corpo lucido e rossiccio con elitre brune aventi omeri rossicci; antenne brune con i tre antennumeri basali e l'undicesimo giallo-rossicci; zampe giallo-rossicce. La reticolazione del corpo è assente. La punteggiatura



FIGG. 186-196

Edeago in visione laterale e ventrale, spermateca, labio con palpo labiale, maxilla con palpo mascellare, tarsi anteriori, habitus e sesto urotergo libero del maschio. 186-191: *Alloplandria problematica* gen. n., sp. n.; 192-196: *Pseudoplandria fellowesi* sp. n.

del capo e del pronoto è indistinta. Tubercoli salienti coprono la superficie delle elitre. Il secondo e il quinto degli uroterghi liberi hanno ciascuno una carena mediana, nel maschio. Edeago figg. 200-201.

COMPARAZIONI. L'edeago della nuova specie ha due pliche preapicali ventrali. Le stesse si riscontrano in *P. minima* Cameron, 1941, delle Filippine, ma questa specie ha edeago meno sviluppato e apice (in visione ventrale) a punta largamente arrotondata. Inoltre l'undicesimo antennomero della nuova specie è molto più lungo di quello delle antenne di *minima* e gli occhi sono molto più lunghi delle tempie nella nuova specie e più corti delle tempie in *minima*.

Pseudoplandria neglecta sp. n.

Figg. 202-204

Holotypus ♂, China, Yunnan, Xishuangbanna, Mengdian, 26.I.1993, de Rougemont leg. (MHNG).

Paratypi: 1 ♂, Hong Kong, Tai Po, III.1996, de Rougemont leg.

DESCRIZIONE. Lunghezza 2,8 mm. Corpo lucidissimo e bruno con margine posteriore dei due uroterghi basali rossiccio; antenne brune con metà basale degli antennomeri basali 2° e 3° gialla-rossicia; zampe brune. Assente è la reticolazione sul corpo. La punteggiatura del capo e del pronoto è molto svanita. Tubercoli poco salienti coprono la superficie delle elitre. Edeago figg. 203-204.

COMPARAZIONI. La nuova specie ha edeago simile e quello di *P. ruficollis* Cameron, 1928, del Borneo, ma le sue dimensioni sono minori, è più arcuato al lato ventrale e ha il bulbo basale meno dilatato, sicché la "crista apicalis" è lontana dal fondo dell'incavo ventrale dell'edeago stesso ("crista apicalis" vicinissima all'incavo ventrale in *ruficollis*). Inoltre i penultimi antennomeri della nuova specie sono nettamente trasversi, mentre in *ruficollis* lo sono appena.

ALEOCHARINI

Ystrixoxygymna gen. n.

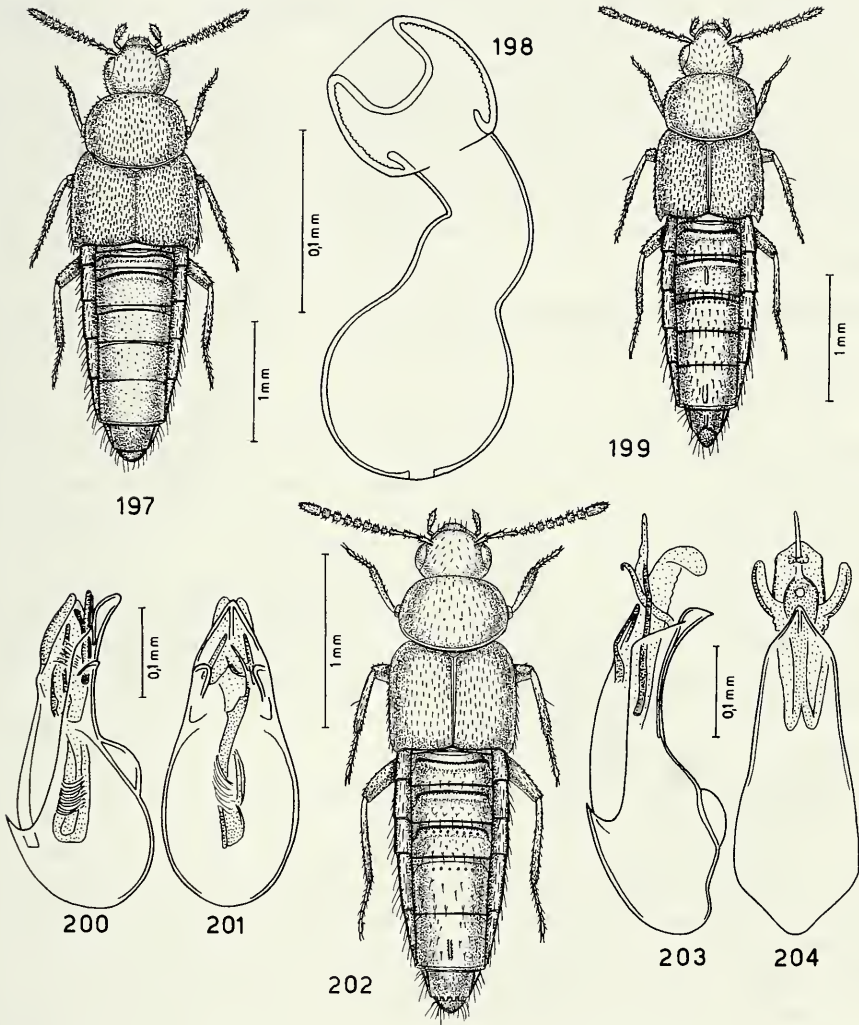
Figg. 205-212

DIAGNOSI. Per i caratteri delle parti boccali, il nuovo genere può essere tassonomicamente vicino al genere *Tetrasticta* Kraatz, 1857, dello Sri Lanka, ma il corpo è privo di pubescenza e ha lunghe e robuste setole isolate e l'addome è fortemente ristretto all'indietro, al contrario di quanto si riscontra nel genere *Tetrasticta* che ha addome non fortemente ristretto all'indietro e corpo coperto di pubescenza, sebbene rada.

DESCRIZIONE. Corpo nudo, con isolate lunghissime setole; antenne fusiformi di 11 antennomeri; tempie finemente marginate; palpi labiali di 4 articoli (figg. 208); ligula divisa in due lembi; paraglosse sporgenti in avanti; mento stretto (figg. 212); palpi mascellari di 5 articoli (figg. 211); processo mesosternale tronco; mesocoxe largamente separate tra loro; formula tarsale 5-5-5; primo tarsomero posteriore di poco più lungo del seguente.

TYPUS GENERIS: *Ystrixoxygymna fusicornis* sp. n.

ETIMOLOGIA. Il nome del nuovo genere significa "Istrice acuta e nuda". Genere grammaticale femminile.



FIGG. 197-204

Habitus, spermateca ed edeago in visione laterale e ventrale. 197-198: *Pseudoplandria anjiensis* sp. n.; 199-201: *Pseudoplandria rougemonti* sp. n.; 202-204: *Pseudoplandria neglecta* sp. n.

Ystrixoxygymna fusicornis sp. n.

Figg. 205-212

Holotypus ♂, Hong Kong N.T., Tai Po, VII.1996, de Rougemont leg. (MHNG).

Paratypus: 1 ♀, Hong Kong, Kadoorie Farm, flight interception trap, 3.XI.1996, de Rougemont leg.

DESCRIZIONE. Lunghezza 1,9 mm. Corpo lucido e giallo-bruno con lati del pronoto gialli (perché traslucidi) e con zona mediana bruna degli uroterghi liberi 3°, 4° e 5°; antenne giallo-brune con antennomeri basali 2° e 3° e apice dell'undicesimo gialli; zampe gialle. Il corpo è senza punteggiatura e senza reticolazione. Il pronoto è ampiamente concavo a ciascun lato. Le elitre sono prive di stria suturale. Gli uroterghi sono sollevati al margine posteriore. Le robuste setole sono nere. Edeago figg. 206-207, spermateca fig. 210.

Aleochara (Polychara) beijingensis sp. n.

Figg. 213-215

Holotypus ♂, China, Beijing, Xiaolongmen, 1100-1500 m, 1.VII.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 7,0 mm. Corpo lucidissimo e nero con elitre fasciate dagli omeri al margine posteriore di rossiccio; antenne nere; zampe nere con tarsi bruni. La punteggiatura del capo è fine e distinta, quella del pronoto è doppia composta da punti grandi e netti e da punti finissimi e svaniti. I tubercoli che coprono la superficie delle elitre e dell'addome sono salienti. Edeago figg. 214-215.

COMPARAZIONI. La nuova specie è distinta da *A. asiatica* Kraatz, 1859, dello Sri Lanka, per l'edeago appena arcuato al lato ventrale (distintamente arcuato in *asiatica*) e molto più stretto in visione ventrale. La fascia obliqua rossiccia sulle nere elitre della nuova specie è il carattere esterno più evidente che la distingue da *asiatica* che ha elitre interamente nere.

Aleochara (s. str.) globus sp. n.

Figg. 216-217

Holotypus ♀, China, Zhejiang Prov., Lin'an County, 350 m, W Tianmu Shan N.R., 16-22.V.1996, J. Cooter leg. (MHNG).

DESCRIZIONE. Lunghezza 4,5 mm. Corpo lucido e bruno con elitre giallo-brune e addome rossiccio avente gli uriti liberi 3°, 4° e la metà basale del 5° nero-bruni; antenne nere con i tre antennomeri basali giallo-rossicci; zampe giallo-rossicce. La punteggiatura del capo è ombelicata e distinta, quella del pronoto è molto svanita, quella delle elitre è distinta e quella dell'addome è netta. Spermateca fig. 217.

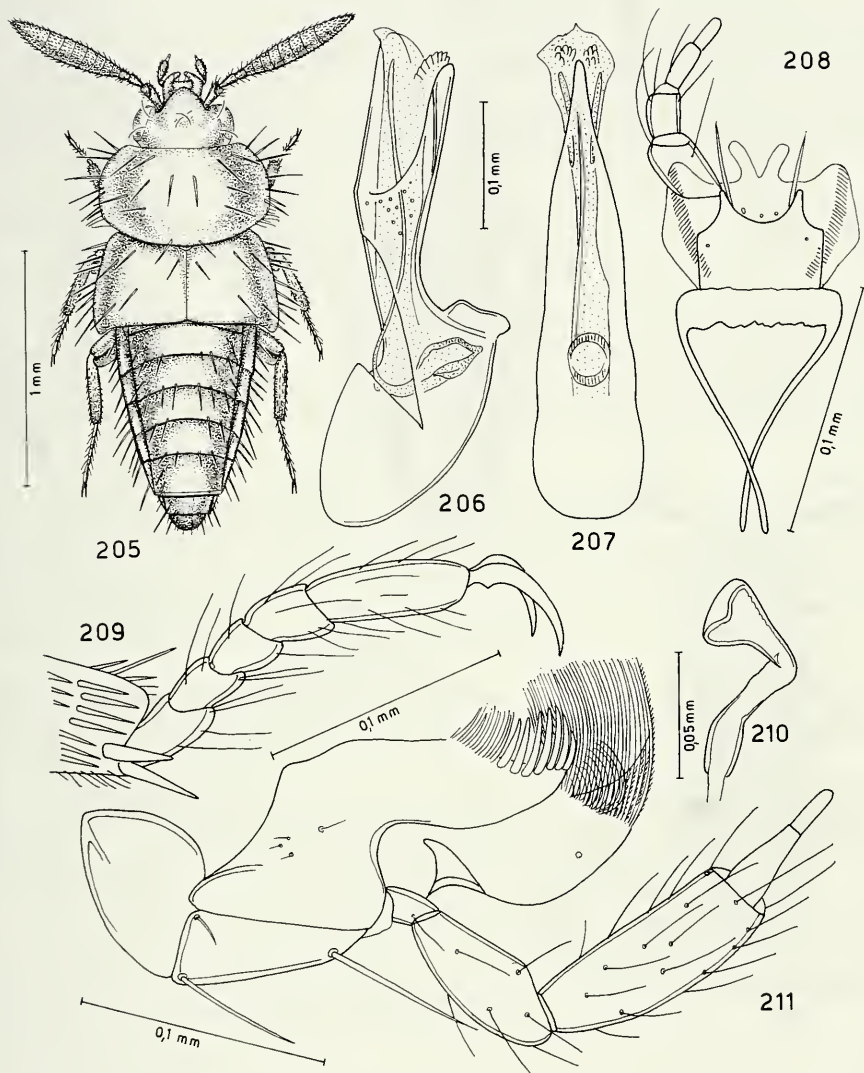
COMPARAZIONI. La nuova specie è distinta da *A. nigra* Kraatz, 1859, dello Sri Lanka, per avere il bulbo distale della spermateca sferico con introflessione apicale globulare (in *nigra* il bulbo distale è allungato con introflessione apicale conica).

Aleochara (Euryodma) sichuanensis sp. n.

Figg. 218-220

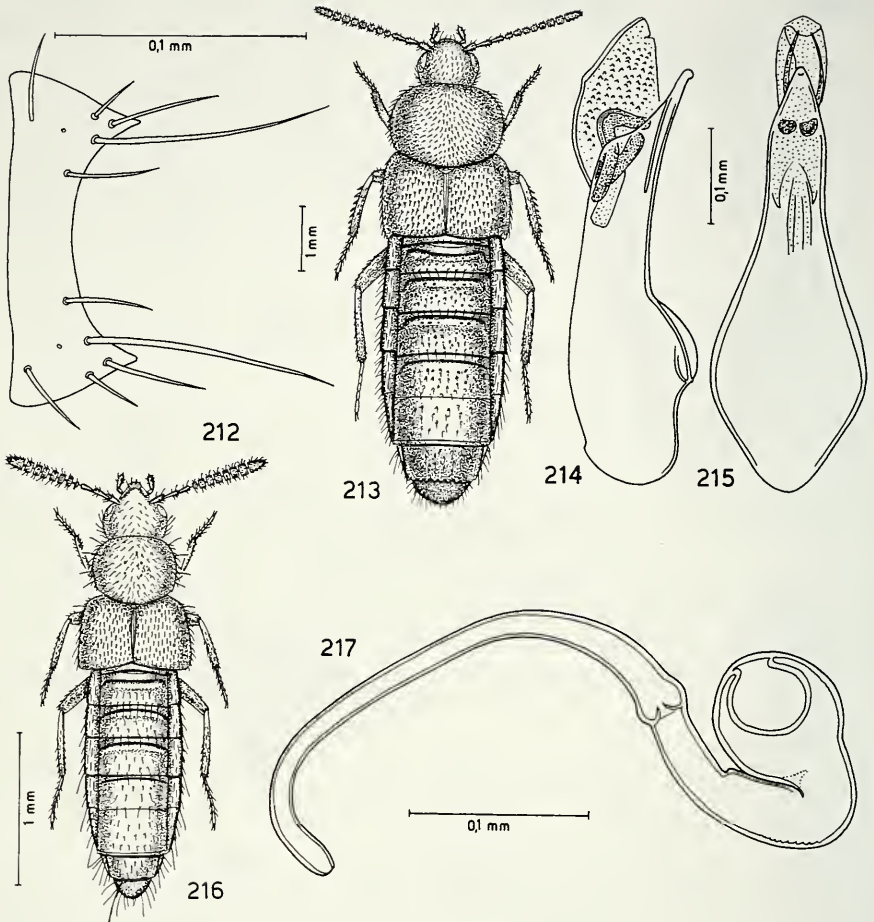
Holotypus ♂, China, Sichuan, Gongga Shan, above camp 2, 2800 m, 26.VII.1994, A. Smetana leg. (MHNG).

DESCRIZIONE. Lunghezza 5,9 mm. Avancorpo debolmente lucido, addome lucido. Corpo nero pece con addome nero avente il margine posteriore dei tre uroterghi basali e l'estremità addominale bruno-rossicci; antenne nere con i due antennomeri basali bruno-rossicci; zampe di un rossiccio scuro. L'avancorpo è coperto di retico-



FIGG. 205-211

Habitus, edeago in visione laterale e ventrale, labio con palpo labiale, tarsi anteriori, spermateca e maxilla con palpo mascellare. 205-211: *Ystrixoxygymna fusicornis* gen. n., sp. n.



FIGG. 212-217

Mento, habitus, edeago in visione laterale e ventrale e spermateca. 212: *Ystrixoxygymna fusicornis* gen. n., sp. n.; 213-215: *Aleochara (Polychara) beijingensis* sp. n.; 216-217: *Aleochara (s. str.) globus* sp. n.

lazione netta, l'addome ne è privo. La punteggiatura del capo è svanita. I tubercoletti della superficie del pronoto e delle elitre sono fini e netti. Edeago figg. 219-220.

COMPARAZIONI. La nuova specie è distinta da *A. croceipennis* Motschulsky, 1858, dello Sri Lanka, per il pronoto poco trasverso e per gli antennomeri 6° a 10° poco trasversi (in *croceipennis* pronoto molto trasverso e antennomeri 6° a 10° pure molto trasversi). L'edeago della nuova specie è più sviluppato ed è molto largo in visione ventrale, mentre quello di *croceipennis*, in visione ventrale, è molto stretto.

Aleochara (*Euryodma*) *cooteri* sp. n.

Figg. 221-223

Holotypus ♂, China, Zhejiang Prov., Lin'an County, 350 m, W Tianmu Shan N.R., 16-22.V.1996, J. Cooter leg. (MHNG).

DESCRIZIONE. Lunghezza 4,8 mm. Corpo lucido e bruno con capo e base degli uroterghi neri; antenne nere con i due antennomeri basali rossicci; zampe rossicce. Solo sul capo è presente una distinta reticolazione, sul resto del corpo non vi è traccia di reticolazione. L'intero corpo è coperto di punteggiatura netta e profonda. Edeago figg. 222-223.

COMPARAZIONI. La nuova specie per la forma dell'edeago sembra simile ad *A. croceipennis* Motschulsky, 1858, ma la sinuosità ventrale dell'edeago è meno accentuata nella nuova specie, inoltre l'edeago stesso, in visione ventrale, è molto più largo nella nuova specie che in *croceipennis*. Esternamente il capo, il pronoto e le elitre della nuova specie sono robustamente punteggiati, mentre in *croceipennis* la superficie di queste parti del corpo è coperta di tubercoli superficiali.

Aleochara (*Euryodma*) *beijingorum* sp. n.

Figg. 224-225

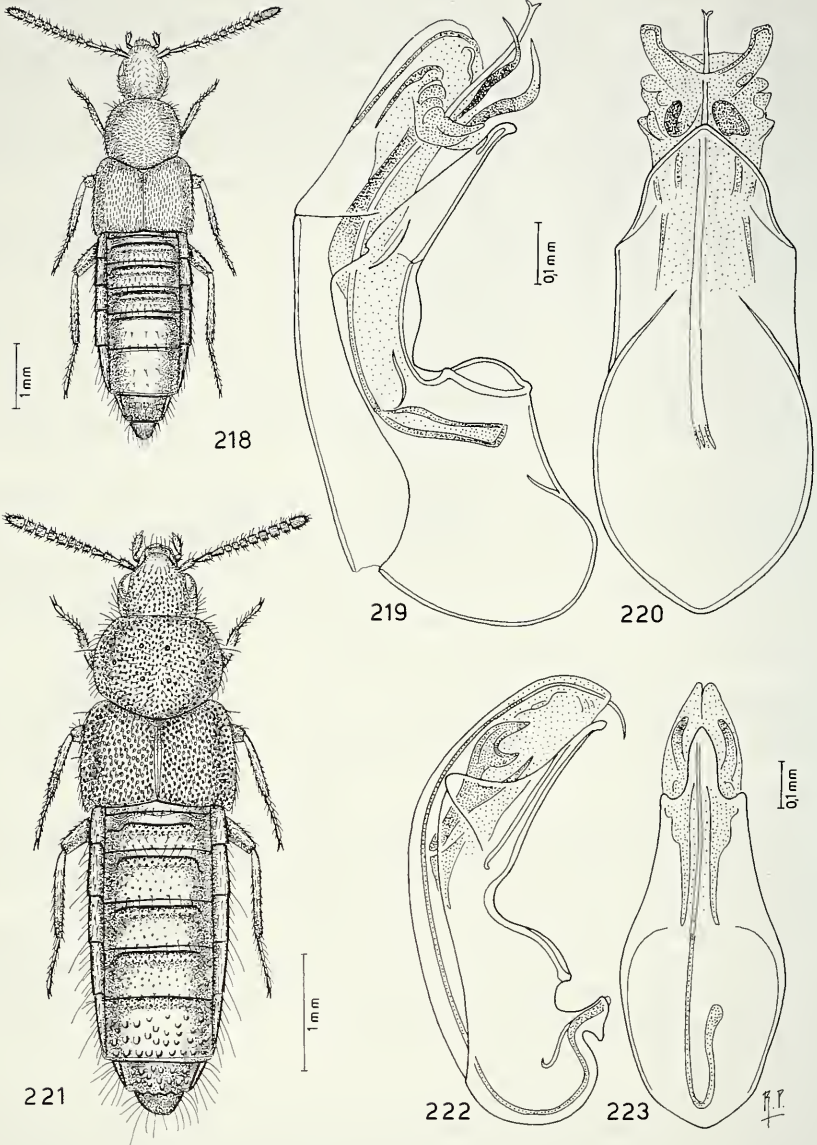
Holotypus ♂, China, Beijing, Xiaolongmen, 1100-1500 m, 1.X.1993, de Rougemont leg. (MHNG).

DESCRIZIONE. Lunghezza 3,7 mm. Corpo lucidissimo e nero con una macchia giallo-bruna sulla metà posteriore di ciascuna elitra; antenne nere; zampe bruno-rossicce. La punteggiatura del capo è distinta e assente sulla fascia mediana, quella del pronoto è netta. Tubercoletti salienti coprono la superficie delle elitre. Spermateca fig. 225.

COMPARAZIONI. La nuova specie è distinta da *A. croceipennis* Motschulsky, 1858, dello Sri Lanka, per la presenza di una macchia giallo-bruna sulle elitre nere, assente in *croceipennis*, per le elitre meno trasverse e per l'assenza di punteggiatura allungata sugli uroterghi liberi terzo, quarto e quinto.

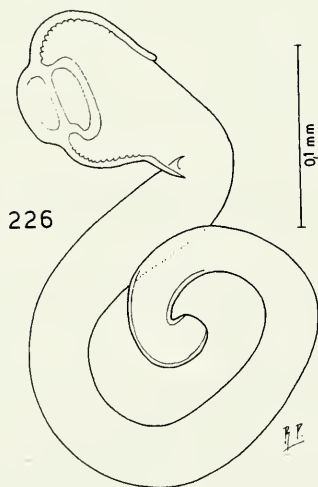
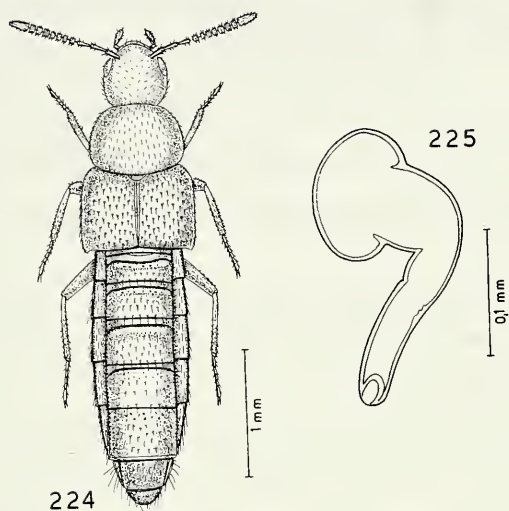
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Rivolgo i miei più sentiti ringraziamenti a coloro che mi hanno affidato in studio le Aleocharinae della Cina oggetto del presente lavoro e frutto di recenti raccolte: il collega Guillaume de Rougemont di Londra, il Dr. Ales Smetana di Ottawa, Jonathan Cooter di Hereford (Gran Bretagna), Garry Ades, Graham Reels (Hong Kong) e il Dr. Shuqiang Li di Stuttgart. Per il prestito di tipi e di materiale di confronto ringrazio sentitamente il Dr. A.F. Newton del "Field Museum of Natural History" di Chicago, il Dr. P.M. Hammond del "Natural History Museum" di Londra e il Dr. L. Zerche del D.E.I. di Eberswalde.



FIGG. 218-223

Habitus ed edeago in visione laterale e ventrale. 218-220: *Aleochara (Euryodma) sichuanensis* sp. n.; 221-223: *Aleochara (Euryodma) cooteri* sp. n.



FIGG. 224-226

Habitus e spermateca. 224-225: *Aleochara (Euryodma) beijungensis* sp. n.; 226: *Oxypoda (Demosoma) pekinensis* sp. n.

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Proteocephalidae et Monticelliidae (Eucestoda: Proteocephalidea) parasites de poissons d'eau douce au Paraguay, avec descriptions d'un genre nouveau et de dix espèces nouvelles

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Proteocephalidae and Monticelliidae (Eucestoda: Proteocephalidea) parasites of freshwater fishes in Paraguay, with descriptions of a new genus and ten new species. - The present study treats 59 Proteocephalidean species, mostly based on recently collected material, distributed in 17 genera. Twenty one type species are revised. One new genus and 10 new species are described: *Proteocephalus mahnerti* n. sp. parasite of *Hoplerythrinus unitaeniatus*; *P. hobergi* n. sp. of *Oxydoras kneri*; *P. vladimirae* n. sp. of *Pinirampus pirinampu*; *P. pilarensis* n. sp. of *Paraloricaria* sp.; *Monticellia dlouhyi* n. sp. *Acestrorhynchus altus*; *M. ventrei* n. sp. of *Pinirampus pirinampu*; *Ageneiella brevifilis* n. gen., n. sp. of *Ageneiosus brevifilis*; *Endorchis aucheniapteri* n. sp. of *Aucheniapterus osteomystax*; *Nupelia tomasi* n. sp. of *Trachelyopterus* sp.; *Mariauxiella piscatorum* n. sp. of *Hemisorubim platyrhynchus*.

The following species are revised, many compared with the respective type material: *Proteocephalus rhamdiae* Spector & Garzon, 1988; *P. serrasalmus* Rego & Pavanelli, 1990; *Choanoscolex abscisus* (Riggenbach, 1896); *Goezeella siluri* Fuhrmann, 1916; *Goezeella paranensis* Pavanelli & Rego, 1989; *Jauella glandicephala* Rego & Pavanelli, 1985; *Monticellia belavistensis* Pavanelli *et al.*, 1994; *Monticellia coryphicephala* (Monticelli, 1891); *Monticellia magna* (Rego, dos Santos & Silva, 1974); *Paramonticellia itaipuensis* Pavanelli & Rego, 1991; *Spatulifer maringaensis* Pavanelli & Rego, 1989; *Spatulifer* cf. *maringaensis* Pavanelli & Rego, 1989; *Monticellia spinulifera* Woodland, 1935; *Gibsoniella mandube* (Woodland, 1935) Rego, 1984 (Syn. *Anthobothrium mandube*); *Harriscolex kaparari* Rego, 1987; *Nomimoscolex chubbi* (Pavanelli & Takemoto, 1995); *N. lopezi* Rego, 1989; *N. microacetabula* Gil de Pertierra, 1995; *Travassiella avitellina* Rego & Pavanelli, 1987; *Nupelia portoriquensis* Pavanelli & Rego, 1991; *Pelidocotyle rugosa* Diesing, 1850.

Following taxonomical actions are introduced: *Spasskyellina* Freze, 1965 syn. nov. of *Monticellia*; *Monticellia mandi* (Pavanelli & Takemoto, 1996) comb. nov. for *Spasskyellina mandi* Pavanelli & Takemoto, 1996; *Gibso-*

niela meursaulti nom. nov. for *Endorchis mandube* Woodland, 1935; *Gozeella nupeliensis* Pavanelli & Rego, 1991 syn. nov. of *Paramonticellia itaipuensis* Pavanelli & Rego, 1991. *Monticellia loyolai* Rego & Pavanelli 1992 syn. nov. of *Monticellia magna* (Rego, dos Santos & Silva, 1974). A lectotype is designated for *Nomimoscolex admonticellia* (Woodland, 1934). The genus *Travassilla* Rego & Pavanelli, 1987 is transferred to Zygobothriinae.

Biloculate suckers are observed in *Othinosclex lenha* Woodland, 1933, originally described without suckers. Mean prevalence is relatively high within the Monticelliidae (48%) and within the Proteocephalidae (30%). Most studied Proteocephalidea exhibit oioxene type of specificity.

Keys-words: Eucestoda - Proteocephalidae - Monticelliidae - Freshwater fishes - Taxonomy - Paraguay

INTRODUCTION

Les cestodes Proteocephalidea représentent un important groupe de plathelminthes chez les poissons d'eau douce néotropicaux, principalement chez les siluriformes. Leur classification est surtout fondée sur les travaux de WOODLAND (1933a, b, c; 1934a, b, c; 1935a, b, c), de FREZE (1965), de BROOKS (1978a, b), de BROOKS & DEARDORFF (1980), de BROOKS & RASMUSSEN (1984) et de REGO (entre 1984 et 1994). Ces différents auteurs ont tous reconnu la présence de deux familles dans l'ordre des Proteocephalidea, les Proteocephalidae et les Monticelliidae, différenciées par la disposition médullaire ou corticale des follicules vitellins. Récemment, REGO (1995) a proposé une nouvelle classification, se fondant sur la présence ou l'absence de metascolex, supprimant les Monticelliidae et ne considérant plus qu'une seule famille, les Proteocephalidae. Ce groupe a été suffisamment étudié pour susciter des tentatives de reconstructions phylogénétiques (BROOKS 1978a, b; 1995; BROOKS *et al.*, 1991; BROOKS & McLENNAN 1993; REGO *et al.* 1998).

Le but du présent travail est d'améliorer la connaissance de la faune de cestodes Proteocephalidea du bassin du Parana à travers les récoltes que le Muséum de Genève a effectuées à partir de 1979 et couvrant la plupart des départements paraguayens. Nous avons examiné 1016 poissons pour en récolter les parasites intestinaux. De ces récoltes, quelques travaux concernant les cestodes Proteocephalidea ont déjà été publiés (DE CHAMBRIER & VAUCHER 1994, 1997; DE CHAMBRIER & REGO 1995; DE CHAMBRIER *et al.* 1996; REGO *et al.*, 1998).

Cet article présente un inventaire des espèces de cestodes Proteocephalidea collectés lors de ces missions, la description de nouveaux taxa et une discussion des statuts spécifiques incluant la révision des types.

MATÉRIEL ET MÉTHODES

Les hôtes sont disséqués et examinés pour leurs parasites immédiatement après la mort. Le tractus digestif, fendu dans toute sa longueur, est fixé dans une solution de formaldéhyde à 4% bouillante. Après le tri au laboratoire, les helminthes sont

conservés dans l'éthanol à 75%. Les cestodes ont été colorés au carmin chlorhydrique de Mayer, différenciés à l'éthanol acide, déshydratés, éclaircis dans l'eugénol et montés au baume du Canada. Les coupes sériées transversales ou frontales de 12-15 μm d'épaisseur ont été colorées à l'Hématoxyline de Weigert/éosine et montées au baume du Canada. Les oeufs dessinés ont été montés extemporanément dans l'eau distillée. Tous les parasites ainsi qu'une partie des hôtes provenant des récoltes sont déposés au Muséum d'histoire naturelle de Genève.

Sauf indications contraires, les dimensions sont données en micromètres (μm).

A = abondance, I = intensité, MT = matériel-type, n = nombre de mesures, d'observations ou d'hôtes examinés, P = prévalence, x = moyenne; OV = rapport de la largeur de l'ovaire sur la largeur du proglottis; PC = rapport longueur de la poche du cirre sur la largeur du proglottis; PG = situation du pore génital en % de la longueur du proglottis; Amaz = numéros de terrain originaux de Woodland; BMNH = The Natural History Museum, IOC = Instituto Oswaldo Cruz. Les numéros d'enregistrement dans la collection du Muséum d'histoire naturelle de Genève sont suivis du sigle INVE.

Nous reportons la localisation du parasite dans l'intestin seulement si celle-ci a été précisément observée. La prévalence, l'abondance et l'intensité sont définies selon MARGOLIS *et al.* (1982).

Les localités de récoltes au Paraguay ne sont pas précédées de la mention du pays.

RÉSULTATS

PROTEOCEPHALIDAE La Rue, 1911

Proteocephalinae La Rue, 1911

Proteocephalus Weinland

Proteocephalus Weinland, 1858: 53; espèce-type: *Taenia fillicollis* Rudolphi, 1802: 114-115

Ichthyotaenia Lönnberg, 1894: 802; espèce-type: *Taenia fillicollis* Rudolphi, 1802: 114-115

Ophiotaenia La Rue, 1911: 480; espèce-type: *Ophiotaenia perpicua* La Rue, 1911: 480

Proteocephalus regoi de Chambrier, Scholz & Vaucher

Proteocephalus regoi de Chambrier, Scholz & Vaucher, 1996: 133

Hôte: *Hoplias malabaricus* (Bloch, 1794) (Erythrinidae).

MATÉRIEL EXAMINÉ: Dép. Neembucu, Route San Juan Batista-San Juan Neembucu, km 55, 19671 INVE, 20410 INVE, 16.10.1989. Dép. Paraguari, 3 km nord de Carapegua, 19672 INVE, 09.10.1982.

P = 6%; n = 52; I = 1 exemplaire; A = 0,06.

Proteocephalus renaudi de Chambrier & Vaucher

Proteocephalus renaudi de Chambrier & Vaucher, 1994: 176.

Hôte: *Platydoras costatus* (Linnaeus, 1766) (Doradidae).

MATÉRIEL EXAMINÉ: Dép. Central, Villeta, Rio Paraguay, 18236 INVE, 14.11.1987. Dép. Neembucu, Rio Parana, General Diaz Neembucu, 17881-17900 INVE, 18.10.1989 et 07.11.1991.

P = 60%; n = 20; I = 3-51 exemplaires; A = 7.1.

Proteocephalus rhamdiae Holcman-Spector & Mane-Garzon

Proteocephalus rhamdiae Holcman-Spector & Mane-Garzon, 1988: 151.

Hôte: *Rhamdia quelen* (Quoy & Gaimard, 1824) (Pimelodidae); milieu de l'intestin.

MATÉRIEL EXAMINÉ: Dép. Guaira, Arroyo Yhaca-mi, à 2km nord de Numi, 22357 INVE, 27.03.1985. Dép. Caaguazu, Rio Güyraugua à 3km est de Lir Juna M. Frutos, 22358 INVE, 13.04.1985. Dép. Concepcion, Estancia Santa Sofia, 22359 INVE, 29.10.1987. Dép. San Pedro, Arroyo Tapiracuayi, 8 km nord-ouest de San Estanislao, 23712 INVE, 25.10.1989. Dép. Neembucu, 18 km à l'est de San Lorenzo Neembucu, lagunes du Rio Parana, 22360 INVE, 16.10.1989.

P = 23 %; n = 22; I = 1-5 exemplaires ; A = 0,45.

REMARQUES: Ce matériel est caractérisé par des testicules médullaires, par un ovaire médullaire avec quelques lobes dans le cortex dorsal, par un tronc utérin cortical ventral avec développement des diverticules dans la médulla, ainsi que par des follicules vitellins médullaires, paramusculaires, corticaux. De plus, il présente les caractères suivants: un scolex très petit, un diamètre de 170-185 (MT = 151-154), des ventouses uniloculées, une musculature longitudinale interne bien développée, 107-140 (MT = 109-137) testicules en un champ dorsal, PC= 24-30% (MT = 29-42%), PG = 32-40% (MT = 25-37%), un vagin postérieur (MT = antérieur) à la poche du cirre, avec un sphincter musculaire proximal, un ovaire représentant les 73-79% de la largeur de l'anneau et un utérus avec 27-34 (MT = 17 - 26) diverticules utérins.

Dans la description originale de *P. rhamdiae*, les auteurs signalent un vagin situé antérieurement par rapport à la poche du cirre alors qu'ils figurent un vagin situé postérieurement (HOLCMAN-SPECTOR & MANE-GARZON 1988, figures 2c, d).

La présence dans le scolex de nombreuses cellules au cytoplasme finement granuleux n'a pas été signalée dans le travail original. Ces cellules sont comparables à celle rencontrées chez *Nomimoscolex chubbi* (Pavanelli & Takemoto, 1995) et qui sont figurées dans le présent travail (Figs 66-67, 69) (PAVANELLI & TAKEMOTO 1995).

Proteocephalus serrasalmus Rego & Pavanelli

Proteocephalus serrasalmus Rego & Pavanelli, 1990: 93

Hôte: *Serrasalmus spilopleura* Kner, 1860 (Characidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Rio Parana, 1 exemplaire mature (pas de proglottis grande en préparation totale) holotype IOC 32505; paratype IOC 32506 (1 exemplaire immature), 32507a-c (coupes sériées).

2) Dép. San Pedro, Laguna Blanca, près de Lima, 21972 INVE, 29.10.1985.

P = 12,5%; n = 8 ; I = 1 exemplaire; A = 0,12.

REMARQUES: Notre matériel, constitué d'un exemplaire mature, ressemble à *Proteocephalus serrasalmus* par le diamètre et la forme du scolex, par la disposition et le nombre des testicules (61-73, MT = 79-107), ceux-ci ne dépassant pas les canaux

excréteurs, par la musculature longitudinale interne en faisceaux parallèles peu développés, par le rapport PC (21-33%, MT = 16-21%), par un pore génital antérieur situé entre les 21-38 % (MT = 30-40%) de la longueur du proglottis, par le rapport OV (50-52%, MT = 45-50%) et par une position corticale du tronc utérin. Le matériel-type, comme nos spécimens, possèdent un organe apical et un vagin pourvu d'un petit sphincter annulaire subproximal, caractères qui n'ont pas été signalés dans la description originale.

Il est à noter que HAMANN (1996) n'a trouvé aucun cestode chez 237 *Serrasalmus spilopleura* provenant de Corrientes, Argentine.

Proteocephalus soniae de Chambrier & Vaucher

Proteocephalus soniae de Chambrier & Vaucher, 1994: 174.

Hôte: *Platydoras costatus* (Linnaeus, 1766) (Doradidae); moitié antérieure de l'intestin.

MATÉRIEL EXAMINÉ: Dép. Cordillera, Rio Piribebuy à 5 km au nord de Emboscada Nueva, 22323 INVE, 07.04.1985; Dép. Neembucu, Rio Parana, General Diaz Neembucu, 17874-17880 INVE, 18.10.1989 et 07.11.1991.

P = 30%; n = 20; I = 1-3 exemplaires; A = 0,55.

Proteocephalus mahnerti n. sp.

Figs 1-6

Hôte: *Hoplerythrinus unitaeniatus* (Spix, in Spix & Agassiz, 1825) (Erythrinidae).

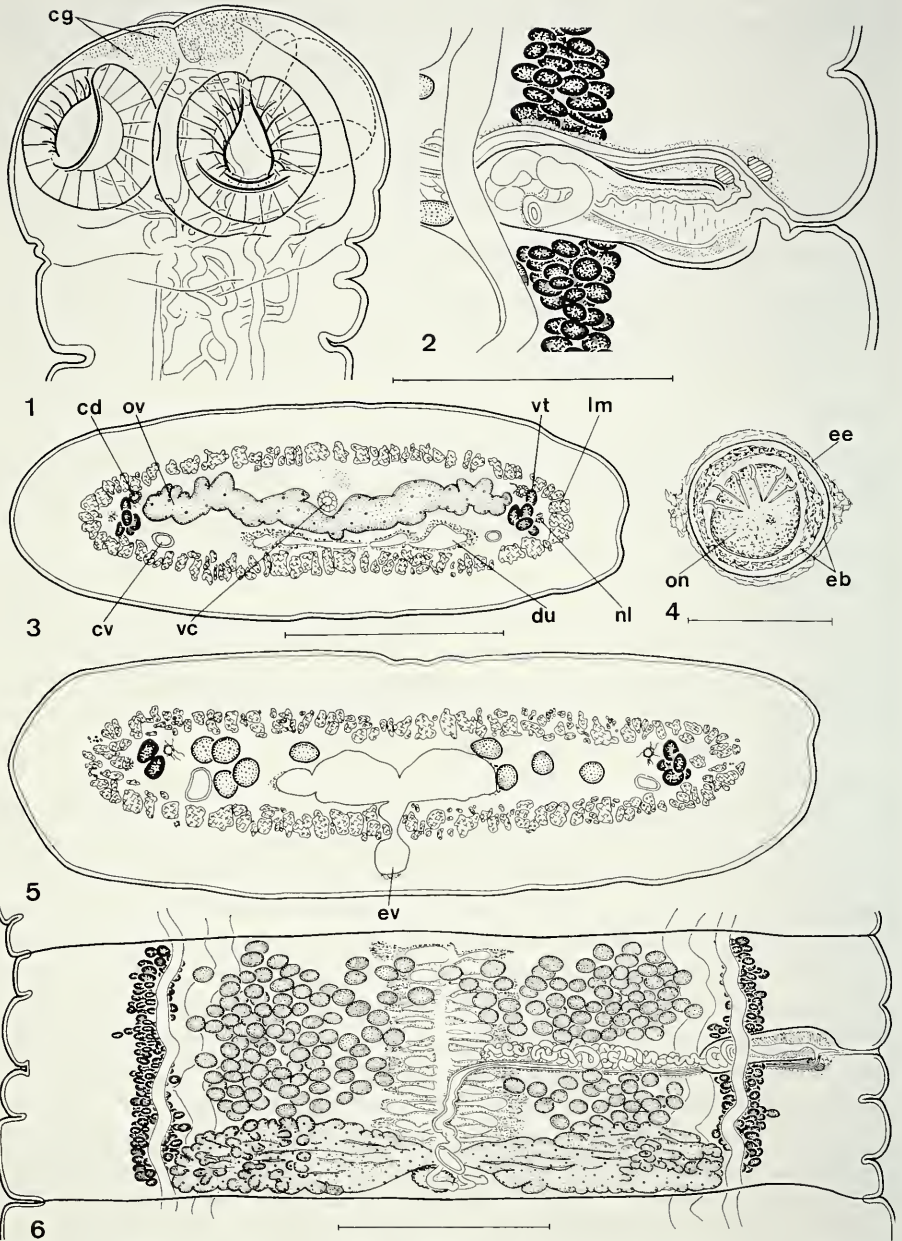
MATÉRIEL EXAMINÉ: Dép. Concepcion, Estancia Santa Sofia, holotype 22346 INVE, paratype 24631 INVE, 29.10.1987; paratypes 22345, 24630 INVE, 27.10.1987.

P = 10,5%; n = 19; I = 2-5 exemplaires; A = 0,37.

DESCRIPTION:

Strobiles acraspédotes longs de 95-100 mm, avec de nombreux plis tégumentaires transversaux. Environ 90 proglottis jusqu'au premier mature, environ 96 avant l'arrivée des oeufs dans l'utérus (= stade prégravidé) et environ 155 au total. Scolex légèrement plus large que le cou, de 340-400 de diamètre. Scolex avec de nombreuses cellules allongées au cytoplasme granuleux sous l'apex. Dans un cas, scolex immature présentant à l'apex une structure que l'on peut interpréter comme un organe apical peu différencié (Fig. 1), non observable dans les autres scolex. Ventouses uniloculées de 130-180 de diamètre, pourvues d'une encoche discrète à leur marge antérieure (Fig. 1). Zone de croissance longue de 3-5 mm. Musculature longitudinale interne développée en faisceaux très anastomosés, presque réticulés. Canaux osmorégulateurs ventraux de 60-80 de diamètre, chevauchant la poche du cirre au niveau de sa partie distale ou au niveau du canal déférent (Fig. 2). Canaux osmorégulateurs dorsaux de 15-25 de diamètre, situés au niveau des follicules vitellins, chevauchant la poche du cirre entre sa partie médiane et sa partie distale.

Testicules médullaires, au nombre de 174-202, en deux champs légèrement convergents antérieurement, avec une densité plus forte latéralement, disposés en une ou deux couches (Fig. 6). Testicules n'atteignant qu'exceptionnellement les follicules vitellins, dépassant parfois le canal osmorégulateur ventral, jamais le canal osmorégulateur



FIGS 1-6. *Proteocephalus mahnerti* n. sp., 1-2, holotype 22346 INVE: 1, scolex, vue ventrale; 2, vagin et poche du cirre, vue dorsale; 3-5, paratype 24631 INVE: 3, coupe transversale au niveau de l'ovaire; 4, oeuf; 5, coupe dans la partie antérieure d'un proglottis prégravide; 6, holotype 22346 INVE, proglottis mature, vue dorsale. Echelles: 1, 2 = 250 μ m; 4 = 20 μ m; 3, 5, 6 = 500 μ m.

Abréviations: ap, appendice; ag, atrium génital; cd, canal osmorégulateur dorsal; ci, cils vaginaux; cg, cellules à cytoplasme granuleux; cm, musculature circulaire distale des ventouses; cs, canal secondaire; cv, canal osmoregulateur ventral; du, diverticules utérins; eb, embryophore; ed, ébauche des diverticules utérins (apex); ee, enveloppe externe; eu, expansions dorsales de l'utérus; ev, expansion ventrale de l'utérus; gm, glandes de Mehlis; lm, musculature longitudinale interne; ms, musculature secondaire diffuse; nl, nerf latéral longitudinal; pt, portion proximale épaissie du vagin; od, oviducte; on, oncosphère; ov, ovaire; sv, sphincter vaginal; te, testicule; tu, tronc utérin; ud, utéroducte, ut, utérus; vc, canal vaginal; vd, vitelloductes; vt, vitellogènes.

lateur dorsal. Poche du cirre très allongée, à paroi mince, PC = 13-16% (Fig. 2). Cirre représentant environ les 50-60% de la longueur de la poche du cirre. Canal éjaculateur contourné. Pores génitaux irrégulièrement alternes, PG = 37-45%. Atrium génital présent. Vagin postérieur (52%) ou antérieur (48%) à la poche du cirre, avec un petit sphincter musculaire proximal (Fig. 2). Glande de Mehlis de 100-130 de diamètre. Ovaire médullaire bilobé, folliculé, représentant les 61-67% de la largeur de l'anneau (Figs 3, 6).

Follicules vitellins occupant la presque totalité de la longueur du proglottis, ininterrompus dans les anneaux matures au niveau de la poche du cirre (Fig. 6).

Utérus déjà visible dans les anneaux immatures sous la forme d'un amas tubulaire, médullaire, de cellules chromophiles. Tronc utérin, avec lumière dans les derniers anneaux immatures, émettant des diverticules digités composés de cellules fortement chromophiles occupant à ce stade environ 9-12% de la largeur du proglottis. Lumière présente dans les diverticules utérins des proglottis matures avant l'arrivée des oeufs (Fig. 6). A ce stade, paroi externe distale des diverticules utérins entourée de cellules chromophiles. Utérus prégravide occupant les 20% de la largeur du proglottis, gravide jusqu'à 75 %. il y a 9-14 diverticules utérins superposés de chaque côté. Tronc utérin avec 7-12 expansions ventrales, médianes, débouchant à la surface des proglottis gravides (Fig. 5).

Oncosphères (mesurées dans l'eau distillée) de 13-15 de diamètre, pourvues de 6 crochets longs de 4,5-6; embryophores arrondis, 16-19 de diamètre (Fig. 4).

REMARQUES: *Hoplerythrinus unitaeniatus* est signalé pour la première fois comme hôte d'un cestode Proteocephalidae. Vingt quatre espèces de *Proteocephalus* parasites de poissons d'eau douce de la région néotropicale sont connues (DIESING 1850; RIGGENBACH 1895; WOODLAND 1933c, 1934c, 1935c; VIGUERAS 1936; SZIDAT & NANI 1951; LYNDALE 1959, FREZE 1965; REGO 1984b; REGO *et al.* 1974; HOLCMAN-SPECTOR & MANE-GARZON 1988; PONCE DE LEON *et al.*, 1995; GARCIA-PRIETO *et al.*, 1996; DE CHAMBRIER *et al.* 1996; DE CHAMBRIER & VAUCHER 1984, 1994, 1997; REGO & PAVANELLI 1990, 1991; DE CHAMBRIER & REGO 1994). Seuls deux espèces présentent un nombre similaire de testicules: *P. renaudi* de Chambrier & Vaucher, 1994 et *P. soniae* de Chambrier & Vaucher, 1994. Ces deux espèces diffèrent de notre matériel par la forme et la structure du vagin ainsi que par le nombre de diverticules utérins. De plus, *P. renaudi* est distinct par la forme du scolex, par le rapport PC, par la présence des testicules en un champ ainsi que par la forme des oeufs. *P. soniae* est encore caractérisé par un organe apical bien différencié ainsi que par le diamètre du scolex.

Le parasite de *Hoplerythrinus unitaeniatus* est nommé en l'honneur de Volker Mahnert, du Muséum d'histoire naturelle de Genève, Suisse.

Proteocephalus hobergi n. sp.

Figs 7-13, 96

Hôte: *Oxydoras kneri* Bleeker, 1862 (Doradidae); quart antérieur de l'intestin.

MATÉRIEL EXAMINÉ: Dép. Neembucu, 5 km nord ouest de Pilar, holotype 22119 INVE, 4 paratypes 24632-24635 INVE, 19.10.1982, autre matériel 24644 INVE; Rio Parana, General Diaz Neembucu, 1 paratype 22361 INVE, 07.11.1991. Dép. Central, Rio Paraguay, San Antonio, 4 paratypes 21880, 24637-24639 INVE, autre matériel 24636, 24640-24643, 06.11.1995.

P = 30 %; n = 10; I = 1- plus de 100 exemplaires; A = plus de 10.

DESCRIPTION:

Strobiles acraspédotes longs de 11-21mm. Zone de croissance longue de 1300-1500. Environ 39 proglottis jusqu'au premier mature, environ 40 avant l'arrivée des oeufs dans l'utérus (= stade prégravide) et environ 48 au total. Scolex plus large que le cou, de 400-475 de diamètre. Scolex avec de nombreuses cellules allongées au cytoplasme granuleux sous l'apex. Ventouses uniloculées dont la cavité est peu ou pas marquée, en forme de citrons, de 160-230 de diamètre (Figs 7, 96). Ventouses séparées par des sillons, plus profonds latéralement que dorsalement et ventralement (Figs 7, 96).

Musculature longitudinale interne constituée de nombreuses fibres anastomosées en une couche dense (Figs 10-11).

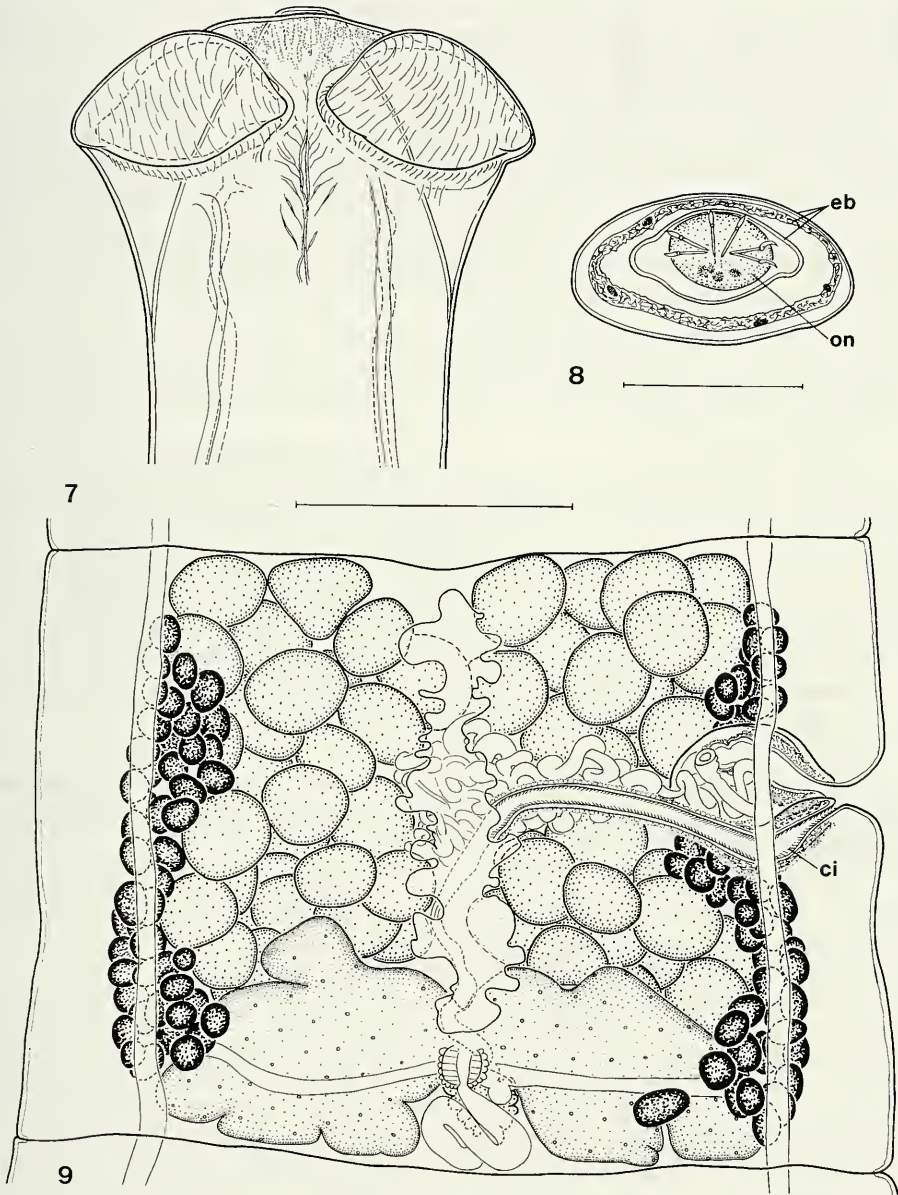
Canaux osmorégulateurs ventraux de 15-30 de diamètre, chevauchant les follicules vitellins et la poche du cirre au niveau de sa partie médiane (Fig. 9). Canaux osmorégulateurs dorsaux de 8-10 de diamètre, chevauchant les follicules vitellins ou situés à l'extérieur de ceux-ci. Présence de canaux secondaires débouchant sous la surface du tégument (Fig. 10).

Testicules ronds à ovoïdes de 50-95 de diamètre, au nombre de 60-87 ($x = 75$, $n = 10$) disposés en un champ, en deux, parfois trois couches (Fig. 9), atteignant les follicules vitellins, localisés entre les canaux osmorégulateurs. Poche du cirre ovoïde à piriforme, à paroi terminale plus épaisse, longue de 105-220, PC = 18-29% (Fig. 9). Canal éjaculateur très contourné. Pores génitaux irrégulièrement alternes, PG = 32-44%. Atrium génital présent. Vagin antérieur (71%) ou postérieur (29%, $n = 86$) à la poche du cirre, avec un manchon vaginal proximal épaissi. Partie intérieure du canal vaginal couverte de cils bien visibles (Fig. 9). Glande de Mehlis de 60-75 de diamètre, représentant les 9-11% de la largeur du proglottis.

Ovaire bilobé, massif, dégénéralant très précocement, presque immédiatement après l'arrivée des oeufs dans l'utérus, occupant les 63-75% de la largeur de l'anneau mature et 43-61% de l'anneau prégravide.

Follicules vitellins s'étendant sur 69-87% de la longueur du proglottis, ininterrompus au niveau de la poche du cirre (Fig. 9), n'atteignant pas la marge antérieure du proglottis et atteignant rarement la marge postérieure.

Utérus déjà visible dans les anneaux immatures sous la forme d'un amas médullaire, tubulaire, de cellules chromophiles. Tronc utérin avec lumière dans les



FIGS 7-9. *Proteocephalus hobergi* n. sp. 7, paratype 21880 INVE, scolex; 8-9, paratype 24633 INVE: 8, oeuf; 9, proglottis mature, vue ventrale. Echelles: 7, 9 = 250 μ m. 8 = 50 μ m.

premiers anneaux matures. Arrivée des oeufs simultanément au développement des diverticules utérins, au nombre de 9-15 de chaque côté (Fig. 12), occupant jusqu'à 90% de la largeur du proglottis gravide (Fig. 13).

Oeufs augmentant progressivement de taille dans l'utérus, jusqu'à atteindre environ quatre fois leur diamètre initial. Oncosphères (mesurées dans l'eau distillée) de 30-32 x 22-24 de diamètre, pourvues de 6 crochets longs de 13-15; embryophore divisé en trois enveloppes distinctes: première enveloppe d'aspect chitineuse en forme de citron et n'adhérant pas à l'oncosphère, de 48-62 x 26-27 de diamètre; deuxième enveloppe irrégulière, contenant des noyaux, de 72-82 x 35-40 de diamètre; troisième enveloppe ovoïde d'aspect chitineux de 80-93 x 40-44 de diamètre (Fig. 8).

REMARQUES: *P. hobergi* n. sp. se différencie nettement des espèces connues chez les poissons d'eau douce néotropicaux par 4 caractères: la forme du scolex, la forme des ventouses, et, pour les espèces dont les oeufs sont connus, par la structure et la taille de ceux-ci.

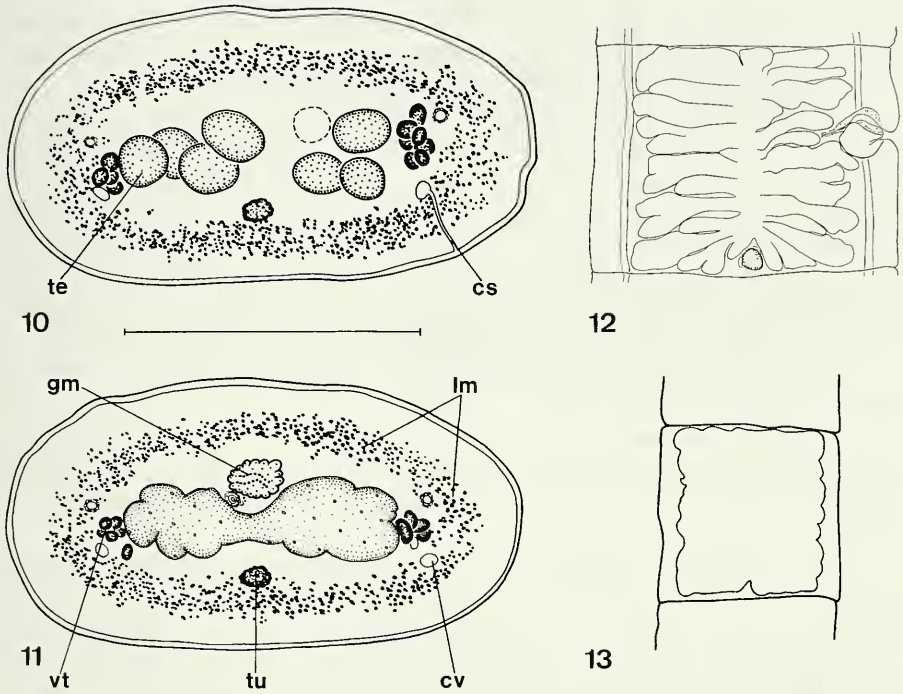
Parmi les espèces de *Proteocephalus* dont les oeufs ne sont pas connus, six présentent un nombre similaire de testicules à notre matériel: *P. gaspari* de Chambrier & Vaucher, 1984, parasite de *Lepisosteus tropicus*; *P. serrasalmus* Rego & Pav., 1990, parasite de *Serrasalmus spilopleura*; *P. bagri* Holcman-Spector & Mane-Garzon, 1988, parasite de *Rhamdia sapo*; *P. chamelensis* Pérez-Ponce de Leon, Brooks & Berman, 1995, parasite de *Gobiomorus maculatus*; *P. pimelodi* (Gil de Pertierra, 1995), parasite de *Pimelodus maculatus*; *P. hemioliopteri* de Chambrier & Vaucher, 1997, parasite de *Phractocephalus hemioliopterus* (WOODLAND 1935c; FREZE 1965; GIL DE PERTIERRA 1995; HOLCMAN-SPECTOR & MANE-GARZON 1988).

P. chamelensis, *P. gaspari*, *P. serrasalmus*, *P. bagri* et *P. pimelodi* se distinguent de *P. hobergi* par la forme des ventouses et par la position du vagin par rapport à la poche du cirre; *P. hemioliopteri* par le rapport PC et par la musculature longitudinal interne.

Proteocephalus hobergi n. sp. ne peut pas être identique à *Proteocephalus kuyukuyu* décrit par WOODLAND (1935c) chez le même hôte*, sur la base d'individus immatures, en raison de la forme du scolex et du strobile.

Chez *Proteocephalus hobergi* n. sp., l'ovaire dégénère très précocement, presque immédiatement après l'arrivée des oeufs dans l'utérus, ce qui représente, à notre connaissance, une situation inhabituelle chez les Proteocephalidea. Les oeufs triplent, voire quadruplent de longueur entre le moment de leur apparition dans l'utérus et les derniers proglottis gravides; les oncosphères mûres atteignent une taille nettement plus grande que ceux rencontrés chez les autres Proteocephalinae, respectivement 30-32 µm contre 10-20 µm (FREZE 1965, p. 42); de plus, les oeufs possèdent trois enveloppes dont la disposition ne se retrouve pas chez les autres *Proteocephalus* néotropicaux (Fig. 8).

* *Pseudodoras niger* (= *Oxydoras kneri*), ("Kuyukuyu"), BMNH 7r.1961.4.5.71-89, de Codajaz, département Amazonas, Brésil.



Figs 10-13. *Proteocephalus hobergi* n. sp. 10-11, holotype 22119 INVE, coupes transversales d'un proglottis mature: 10, coupe dans la partie antérieure; 11, coupe au niveau de l'ovaire; 12, paratype 24633 INVE, croquis d'un des premiers proglottis gravides montrant la forme des diverticules utérins; 13, paratype 24634 INVE, croquis d'un proglottis gravide terminal. Echelles: 10, 11 = 250 µm.

La nouvelle espèce est dédiée à Eric Hoberg, du département de l'Agriculture, Beltsville, USA.

***Proteocephalus vladimirae* n. sp.**

Figs 14-18

Hôte: *Pinirampus pinirampu* (Spix, 1829) (Pimelodidae).

MATÉRIEL EXAMINÉ: Dép. Central, Rio Paraguay, San Antonio, holotype 22909 INVE, paratype 24479 INVE, 27.11.1993.

P = 17 %; n = 6; I = 2 exemplaires; A = 0,33.

DESCRIPTION:

Strobiles acraspédotes longs de 43-55 mm. Petit scolex légèrement plus large que le cou, de 190 de diamètre et long de 225. Ventouses peu profondes, saillantes, allongées postérieurement, longues de 125-145 et larges de 85-90 (Fig. 14). Zone de croissance très longue. Musculature longitudinale interne puissante, composés de

faisceaux anastomosés (Figs 15-16). Système osmorégulateur ventral et dorsal chevauchant la poche du cirre dans sa partie médiane terminale. Canaux ventraux reliés entre eux postérieurement dans chaque anneau (Fig. 17). Présence de canaux secondaires postérieurs à l'ovaire débouchant sous la surface du tégument.

Testicules en un champ dorsal, au nombre de 67-81, en une couche interrompue au niveau de la poche du cirre, atteignant les follicules vitellins, dépassant parfois les canaux osmorégulateurs latéralement (Fig. 18). Poche du cirre volumineuse, ovoïde, à paroi épaisse, occupant les 29-34% de la largeur du proglottis (Fig. 18). Cirre occupant jusqu'à 80% de la longueur de la poche du cirre. Pore génital antérieur, PG = 30-41%. Vagin toujours antérieur à la poche du cirre, avec de nombreuses cellules chromophiles entourant sa portion distale; présence d'un sphincter musculaire sub-proximal peu développé, parfois difficilement observable (Fig. 18).

Ovaire bilobé, massif, folliculé, dont la largeur représente les 71-77% de la largeur du proglottis (Figs 16, 18).

Follicules vitellins latéraux occupant la presque totalité de la longueur du proglottis, interrompus au niveau de la poche du cirre (Fig. 18); en coupes transversales, disposition paramusculaire avec de nombreux follicules médullaires ou corticaux.

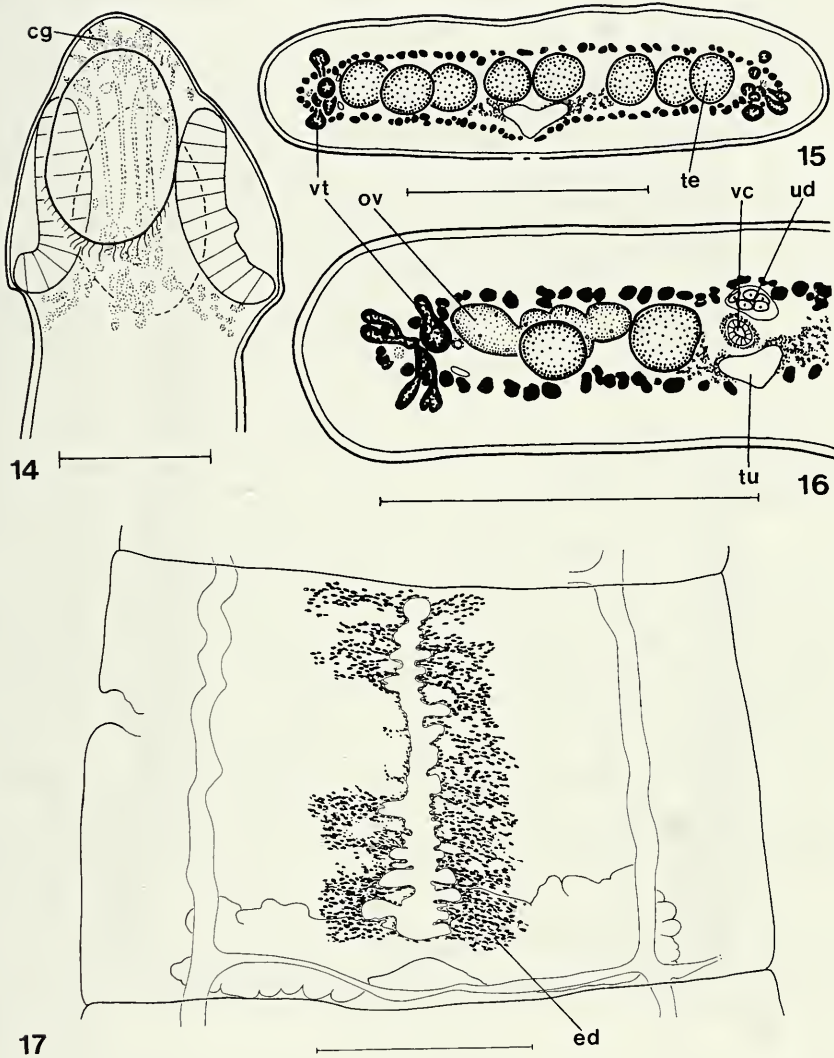
Utérus préformé, visible dans les anneaux immatures sous la forme d'un amas tubulaire de cellules chromophiles se développant latéralement à partir du tronc utérin. Cellules s'organisant en digitations ramifiées dans les premiers anneaux matures, occupant jusqu'à 30% de la largeur du proglottis (Fig. 17). Apparition d'une lumière dans le tronc utérin dans les premiers anneaux matures et dans les diverticules simultanément à l'arrivée des oeufs. A maturité, 9-16 diverticules utérins peu ramifiés, de chaque côté, occupant jusqu'à 60 % de la largeur du proglottis. Ouverture utérine longitudinale médiane dans les proglottis gravides.

Présence de quelques oeufs avec crochets dans les derniers proglottis gravides. Oncosphères (mesurées en préparation totale) de 12-13 de diamètre, pourvues de 6 crochets; embryophore de 20-24 de diamètre.

REMARQUES: *Pinirampus pirinampu* est signalé pour la première fois comme hôte d'un *Proteocephalus*.

Dix espèces de *Proteocephalus*, parasites de poissons d'eau douce d'Amérique latine, possèdent un nombre similaire de testicules: *P. gasparyi* de Chambrier & Vaucher, 1984 parasite de *Lepisosteus tropicus*; *P. hobergi* n. sp. de *Oxydoras kneri*; *P. piramutab* (Woodland, 1933), de *Brachyplatystoma vaillantii*; *P. sophiae* de Chambrier & Rego, 1995 de *Paulicea luetkeni*; *P. serratalmus* Rego & Pav., 1990 de *Serratalmus spilopleura*; *P. bagri* Spector & Garzon, 1988 de *Rhamdia sapo*; *P. chameleensis* Pérez-Ponce de Leon, Brooks & Berman, 1995 de *Gobiomorus maculatus*; *P. pimelodi* (Gil de Perterra, 1995) de *Pimelodus maculatus*; *P. pirarara* (Woodland, 1935) et *P. hemioliopleri* de Chambrier & Vaucher, 1997 de *Phractocephalus hemioliopleri*.

P. vladimirae n. sp. diffère de *P. serratalmus*, *P. sophiae*, *P. pimelodi*, *P. pirarara* et *P. hemioliopleri* par la position constamment postérieure du vagin par rapport



Figs 14-17. *Proteocephalus vladimirae* n. sp. 14, holotype 22909 INVE, scolex; 15-16, paratype 24479 INVE, coupes transversales d'un proglottis prégravid: 15, coupe dans la partie postérieure; 16, coupe au niveau de l'ovaire. 17, holotype 22909 INVE, croquis d'un proglottis mature, vue ventrale, montrant le développement de l'utérus. Echelles: 14 = 100 μ m, 15-17 = 250 μ m.

à la poche du cirre, alors qu'elle est toujours antérieure pour les 5 espèces comparées. *P. piramutab* et *P. gaspari* se distingue par la présence de 2 champs testiculaires ainsi que par le diamètre du scolex, *P. hobergi* n. sp. par le diamètre du scolex et par le

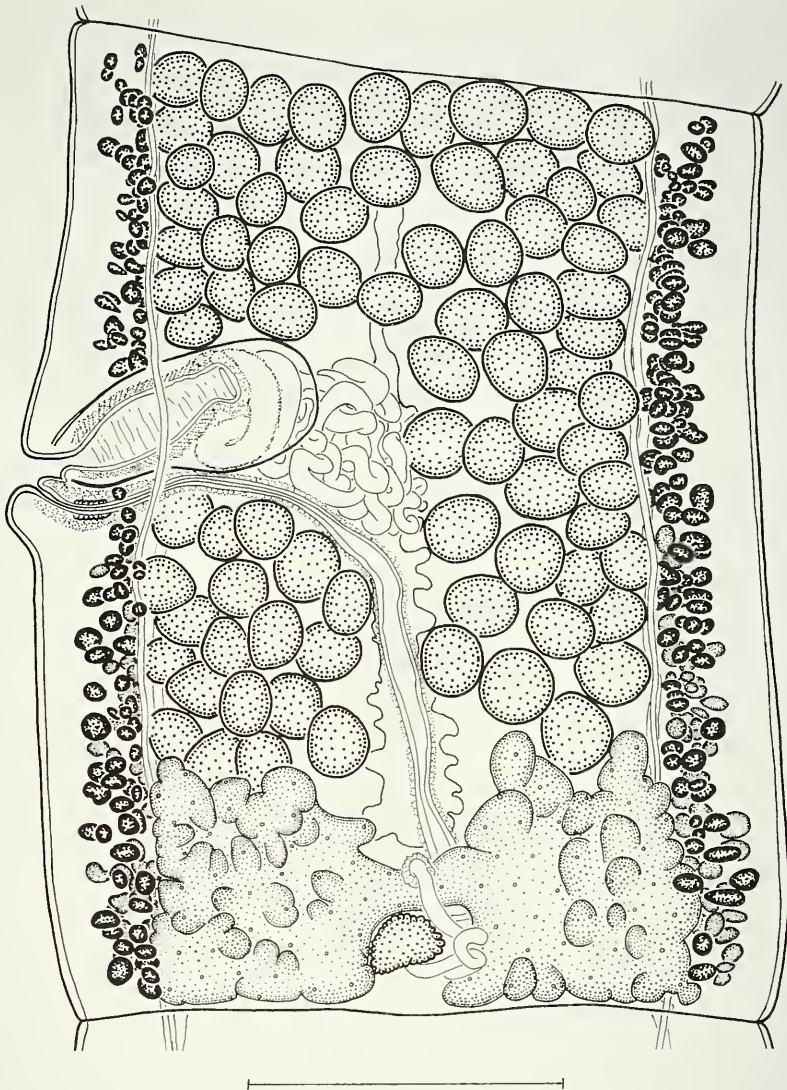


FIG. 18. *Proteocephalus vladimirae* n. sp. holotype 22909 INVE, proglottis mature, vue dorsale, détail de l'ébauche des diverticules utérins non figurée. Echelle = 250 μ m.

rapport PC, *P. chamelensis* par le diamètre du scolex, par le nombre de diverticules utérins, et par la position du pore génital. *P. bagri* par le nombre de diverticules utérins et par le rapport PC.

L'espèce nouvelle est dédiée à Vladimira Hanzelová, Institut d'Helminthologie de Kosice, Slovaquie.

Proteocephalus pilarensis n. sp.

Figs 19-24

Hôte: *Paraloricaria* sp. (Loricariidae).

MATÉRIEL EXAMINÉ: Dép. Neembucu, 5 km nord ouest de Pilar, holotype 22010 INVE, paratype 24629 INVE, 19.10.1982.

P = 100 %; n = 1; I = 2 exemplaires; A = 0,5.

DESCRIPTION:

Strobila acraspède de grande taille, long de 485 mm. Zone de croissance très longue. Scolex ne se délimitant pas du corps, d'un diamètre de 410, sans organe apical. Quatre ventouses, 130-140 de diamètre, dirigées dorso-ventralement deux par deux, situées en arrière d'un apex bombé (Fig. 19). Présence de plusieurs proglottis tératologiques (double poche du cirre, ovaire déformé, etc.) qui ne sont pas pris en compte dans la description. Musculature longitudinale interne peu développée, en faisceaux parallèles peu anastomosés.

Canaux osmorégulateurs internes par rapport aux follicules vitellins dans les anneaux immatures et matures (Figs 21-22, 24), chevauchant parfois les follicules vitellins dans les anneaux gravides. Canaux osmorégulateurs ventraux de 8-35 de diamètre avec parfois des anastomoses, dorsaux de 8-24 de diamètre.

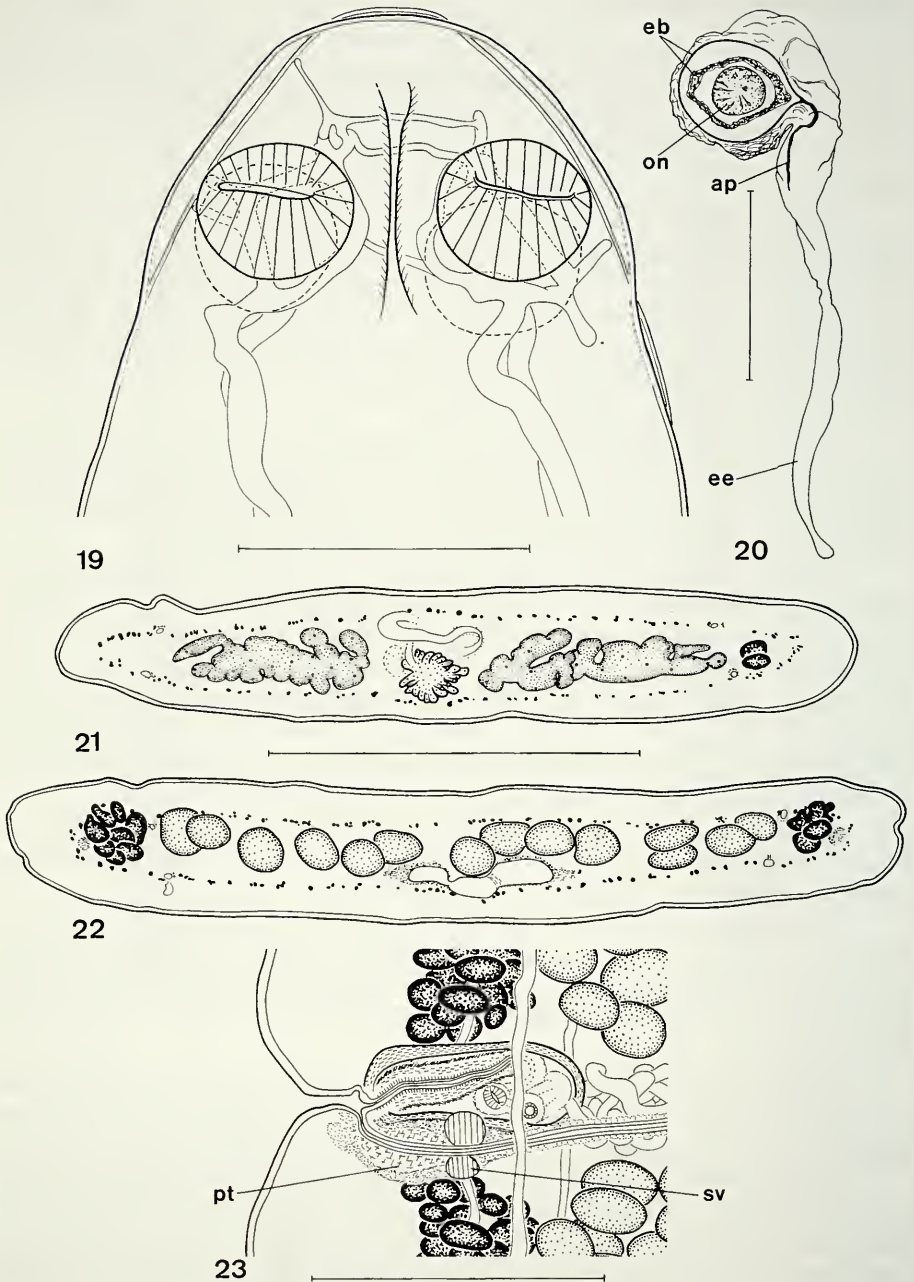
Testicules médullaires arrondis à ovales, de 32-60 x 36-80 de diamètre, au nombre de 167-219 (\bar{x} = 201, n = 6), disposés en un champ dont la disposition paraît moins constante que chez *Proteocephalus* en général (Fig. 24). Testicules latéraux nettement plus denses que ceux disposés le long de l'axe longitudinal où ils présentent une tendance à converger postérieurement. Testicules préporaux et postporaux pas nettement séparés par le vas deferens, dépassant parfois les canaux osmorégulateurs ventraux et dorsaux, atteignant les follicules vitellins, en une ou deux couches (Figs 22, 24). Dégénérescence des testicules dans les anneaux gravides terminaux.

Poche du cirre ovoïde à allongée, à paroi d'apparence musculaire épaisse, longue de 160-220 et large de 75-85, PC = 11-16%. Atrium génital peu profond. Pore génital très antérieur, PG = 17-22%.

Vagin postérieur (51%) ou antérieur (49%), avec une zone proximale épaissie longue de 100-135 comprenant une portion sub-proximale épaissie pourvue de nombreuses cellules musculaires et d'un puissant sphincter musculaire postérieur (Fig. 23). Ovaire bilobé, lobulé, représentant les 65-67% de la largeur du proglottis (Figs 21, 24).

Follicules vitellins médullaires en une bande latérale compacte de chaque côté, occupant la presque totalité de la longueur du proglottis, ininterrompus dorsalement au niveau de la poche du cirre, avec dorsalement quelques follicules paramusculaires.

Utérus médullaire préformé, visible dans des proglottis immatures, tubulaire, situé ventralement. Le long du tronc utérin des derniers anneaux immatures, formation de nombreuses petites excroissances latérales composées d'un amas diffus et allongé de petites cellules chromophiles, ébauches des diverticules utérins (Fig. 24). Diverticules au nombre de 12-18 paires se formant à la base de ces excroissances, et s'étendant perpendiculairement à partir du tronc utérin.



FIGS 19-23. *Proteocephalus pilarensis* n. sp. holotype, 22010 INVE: 19, scolex; 20, oeuf; 21-22, coupe transversale d'un proglottis prégravid; 21, coupe au niveau de l'ovaire; 22, coupe dans la partie antérieure; 23, vagin et poche du cirre, vue ventrale. Echelles: 19, 23 = 250 μ m; 20 = 50 μ m; 21-22 = 500 μ m.

Oncosphères de 13-16 de diamètre, pourvues de 6 crochets longs d'environ 5.5-6.5. Embryophore légèrement piriforme, 24-25 de diamètre et long de 29-34, avec un appendice. Embryophore non adhérente à l'oncosphère. Enveloppe externe hyaline, peu épaisse, asymétrique, longue de 70-210, conférant à l'oeuf un aspect de têtard; la portion allongée inclut l'appendice polaire et mesure jusqu'à 180 (Fig. 20).

REMARQUES: Les Loricariidae sont signalés pour la première fois comme hôte d'un *Proteocephalus*. Seules quatre espèces de *Proteocephalus* parasites de poissons d'eau douce d'Amérique latine possèdent un nombre similaire de testicules: *P. renaudi* de Chambrier & Vaucher, 1994 et *P. soniae* de Chambrier & Vaucher, 1994, parasite de *Platydoras costatus*, *P. brooksi* Garcia-Prieto, Rodriguez & Pérez-Ponce de Leon, 1996 de *Rhamdia guatemalensis* et *P. mahnerti* n. sp. de *Hoplerythrinus unitaeniatus*.

Proteocephalus pilarensis n. sp. diffère de *P. renaudi*, de *P. brooksi* et de *P. soniae* par la position du pore génital, par la structure proximale du vagin et par le nombre de diverticules utérins. Des caractères supplémentaires de distinction concernent pour *P. soniae*, le champ testiculaire et la position des canaux osmorégulateurs ventraux et dorsaux, pour *P. renaudi*, la position des follicules vitellins en coupe transversale.

De *P. mahnerti* n. sp., *P. pilarensis* n. sp. se distingue par la forme du scolex et des ventouses, par la position du pore génital, par la structure proximale du vagin et par la forme des oeufs.

L'espèce nouvelle est nommée en référence à la localité type.

Proteocephalus sp.

Hôte: *Platydoras costatus* (Linnaeus, 1766) (Doradidae).

MATÉRIEL EXAMINÉ: Dép. Cordillera, Rio Piribebuy à 5 km au nord de Emboscada Nueva, 22322 INVE, 07.04.1985. Dép. Neembucu, Rio Parana, General Diaz Neembucu, 19701 INVE, 18.10.1989.

P = 10%; n = 20 ; I = 1 exemplaire; A = 0,2.

REMARQUES: Il s'agit du troisième taxon signalé chez *P. costatus* par DE CHAMBRIER & VAUCHER (1994).

PROTEOCEPHALIDAE sp.

Hôte: *Leporinus* aff. *friderici* (Anostomidae).

MATÉRIEL EXAMINÉ: Dép. Neembucu, 5 km nord ouest de Pilar, 22324 INVE, 19.10.1982.

P = 4%; n = 23; I = 1 exemplaire; A = 0,04.

REMARQUES: Nous disposons d'un individu gravide sans scolex. A notre connaissance, il s'agit de la première citation d'un Proteocephalidae chez *Leporinus*.

MONTICELLIIDAE La Rue, 1911

Monticelliinae La Rue, 1911

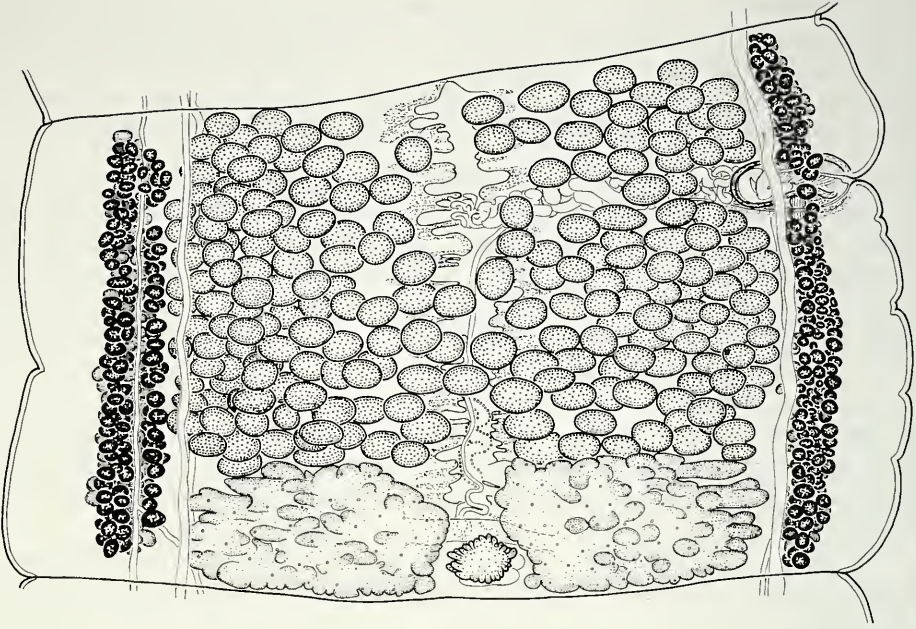


FIG. 24. *Proteocephalus pilarensis* n. sp., holotype, 22010 INVE, proglottis mature, vue dorsale. Echelle = 500 μ m.

Choanoscolex La Rue

Choanoscolex La Rue, 1911: 474; espèce-type: *Ichthyotaenia abscura* Riggenbach, 1895: 611

Choanoscolex abscurus (Riggenbach, 1895)

Fig. 97

Ichthyotaenia abscura Riggenbach, 1895: 611; RIGGENBACH 1896: 193.

Choanoscolex abscura; LA RUE 1911: 479.

Choanoscolex abscurus; LA RUE 1914: 188.

Choanoscolex abscurus; BROOKS & RASMUSSEN 1984: 752; REGO & PAVANELLI 1990: 99; REGO 1990: 997.

Spatulifer abscurus; BROOKS 1995: 365.

Hôte: *Pseudoplatystoma coruscans* (Agassiz, 1829) (Pimelodidae) "Surubi"*.

MATÉRIEL EXAMINÉ: 1) Rio Paraguay, matériel-type, 1 lame, No 43/45 (coll. Institut de Zoologie, Neuchâtel), février 1894. 2) Dép. Itapua: Rio Parana, Candelaria, 22334 INVE, 23.11.1986; Campichuelo, 19861-19862 INVE, 12.05.1987 et 17906 INVE, 02.06.1987; Puerto Lopez, 23865 INVE, 09.08.1987; Arroyo Yabebury, en face de Cambyreta, 17907 INVE, 14.08.1987. Dép. Central: Rio Paraguay, San Antonio, 17904-17905 INVE, 14.10.1989.

P = 83 %; n = 12; I = de 2 à plus de 100 exemplaires; A = non calculée

* "Surubi" est le nom vernaculaire de *Pseudoplatystoma coruscans* sur le Rio Paraguay et pourrait représenter l'hôte type de *Choanoscolex abscurus* (Riggenbach, 1896).

REMARQUES: Nos spécimens présentent les mêmes caractères que le matériel type réexaminé: un scolex conique avec des ventouses peu profondes, saillantes, allongées antéro-postérieurement, avec la partie postérieure parfois en forme de cupule et qui occupent presque toute la longueur du scolex (Fig. 97); une zone de prolifération avec des plis transversaux et longitudinaux; un nombre similaire de testicules. 185-209 (MT = 178-180); un pore génital antérieur représentant les 20-32% (MT = 20-33%) de la longueur du proglottis; une poche du cirre allongée, piriforme, occupant les 35-41% (MT = 36-40%) de la largeur du proglottis et un vagin postérieur ou antérieur à la poche du cirre.

Choanoscolex sp.

Hôte: *Pseudoplatystoma fasciatum* (Linnaeus, 1766) (Pimelodidae).

MATÉRIEL EXAMINÉ: Dép. Itapua, Rio Parana, Puerto Lopez, INVE 22332, 23.11.1986.

P = 33 %; n = 3; I = 3 exemplaires immatures; A = 0,33.

REMARQUES: Le scolex et les ventouses présentent les mêmes caractères que ceux observés chez *Choanoscolex abscisus*. Les spécimens étant immatures, nous ne pouvons toutefois affirmer qu'il s'agit de la même espèce.

BROOKS & RASMUSSEN (1984) signalent *C. abscisus* chez *Pseudoplatystoma fasciatum* au Venezuela.

Goezeella Fuhrmann

Goezeella Fuhrmann, 1916: 386; espèce-type: *Goezeella siluri* Fuhrmann, 1916: 386.

Goezeella siluri Fuhrmann

Goezeella siluri Fuhrmann, 1916: 386; BROOKS & DEARDORFF 1980: 15.

Monticellia siluri; WOODLAND 1925: 385; REGO, DOS SANTOS & SILVA 1974: 195; REGO 1975: 573.

Spatulifer siluri; BROOKS 1995: 365.

Hôte: *Cetopsis coecutiens* (Lichtenstein, 1829) (Cetopsidae).

MATÉRIEL EXAMINÉ: Brésil, "Amazonas", syntypes: 2 préparations totales, 11 préparations de coupes sériées, coll. Institut de Zoologie Neuchâtel.

REMARQUES: En revisant le matériel-type de FUHRMANN (1916), nous avons observé: un scolex avec métascolex et des ventouses biloculées; environ 380 testicules en un champ; la position toujours antérieure du vagin par rapport à la poche du cirre (n = 34); une position très antérieure du pore génital (5-16%); la présence d'un sphincter vaginal proximal; un ovaire très folliculé; un utérus avec diverticules digités, fins, ramifiés à paroi épaisse; des follicules vitellins ventraux très étendus, un utérus ne traversant pas la musculature longitudinale interne.

Plusieurs auteurs ont cité *Goezeella siluri* ou redécrit le matériel-type: WOODLAND (1933c), REGO *et al.* (1974) et REGO (1975) chez *Cetopsis coecutiens* (hôte-type); BROOKS & DEARDORFF (1980) chez *Ageneiosus caucanus*; BROOKS & RASMUSSEN (1984) chez *Pseudocetopsis othonops*.

En comparant ces redescriptions avec le matériel-type, nous constatons que l'espèce décrite chez *Ageneiosus caucanus* par BROOKS & DEARDORFF (1980) ne semble pas appartenir à *G. siluri*. Elle diffère par la disposition ventro-latérale des follicules vitellins, la position du sphincter vaginal, la taille du cirre par rapport à la poche du cirre ainsi que par la présence d'utérus préformé dans les proglottis matures. De même, *G. siluri*, parasite de *Pseudocetopsis othonops* décrit par BROOKS & RASMUSSEN (1984) diffère du matériel-type par la position soit antérieure soit postérieure du vagin.

Goezeella paranensis Pavanelli & Rego

Fig. 34

Goezeella paranensis Pavanelli & Rego, 1989: 385.

Spatulifer paranensis; Brooks 1995: 365.

Hôte: *Hemisorubim platyrhynchos* (Valenciennes, 1840) (Pimelodidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Etat du Parana, Rio Parana, Itaipu et Porto Rico, holotype IOC 32490, paratypes IOC 32491a, b. 2) Dép. Itapua, Rio Parana, Puerto Lopez, 19517 INVE, 25.11.1986. Dép. Cordillera, Rio Piribebuy à 5 km au nord de Emboscada Nueva, 19516 INVE, 06-07.04.1985. Dép. Central, Rio Paraguay, San Antonio, 19514, 19518 INVE, 28.10.1989; 19519, 23866 INVE, 27.11.1993; 22925 INVE, 02.11.1995.

P = 69%; n = 13; I = 1-38 exemplaires; A = 4,6.

REMARQUES: Dans le matériel paraguayen, la disposition des organes, la position du pore génital, la position du vagin par rapport à la poche du cirre concordent avec la description originale de PAVANELLI & REGO (1989). Pourtant, le nombre des testicules selon la description originale (100-130) ne correspond pas à nos observations sur le matériel paraguayen (131-177) ou sur le matériel-type révisé (139-150). De même, le nombre de diverticules utérins selon la description (7-11) ne correspond pas à nos comptages sur le matériel paraguayen (17-22) ou sur le matériel-type (environ 14-16).

Cette espèce, qui ne possède pas de métascolex (Fig. 34) contrairement à l'espèce-type du genre *Goezeella siluri*, est maintenue dans le genre où elle était initialement placée.

Ageneiella n. gen.

Proteocephalidea, Monticelliidae, Monticelliinae. Strobile acraspédote avec de nombreux plis tégumentaires. Scolex massif sans métascolex muni de quatre ventouses bilobées. Musculature longitudinale interne bien développée. Pores génitaux irrégulièrement alternes. Follicules vitellins latéraux, corticaux, disposés en forme de croissant en coupes transversales. Testicules corticaux dorsaux, en un champ continu et en une ou plusieurs couches. Vagin antérieur à la poche du cirre. Ovaire cortical bilobé, lobulé dorsalement, avec une portion médiane médullaire. Utérus cortical, ventral, dont les diverticules produisent de nombreuses expansions traversant la médulla, aboutissant dans le cortex dorsal. Parasites de poissons siluriformes néotropicaux. Espèce-type: *Ageneiella brevifilis* n. sp.

Le nom du genre est dérivé de *Ageneiosus*.

Ageneiella brevifilis n. sp. Figs 25-33, 98

Hôte: *Ageneiosus brevifilis* Valenciennes, 1840 (Ageneiosidae); tiers antérieur de l'intestin.

MATÉRIEL EXAMINÉ: Dép. San Pedro, Rio Jejui-Guazu près du pont sur la route de Lima, holotype 22513 INVE, 7 paratypes 22512, 22514-22519 INVE, 09.10.1985. Dép. Central, Rio Paraguay, San Antonio, 2 paratypes 22521, 24645 INVE, autre matériel 24646 INVE 28.10.1989; Dép. Central, Rio Paraguay, San Antonio, 3 paratypes 21841, 22522-22523 INVE, autre matériel 22524-22525, 23844 INVE, 04-06.11.1995.

P = 40%; n = 20; l = 1-27 exemplaires; A = 2,7.

DESCRIPTION:

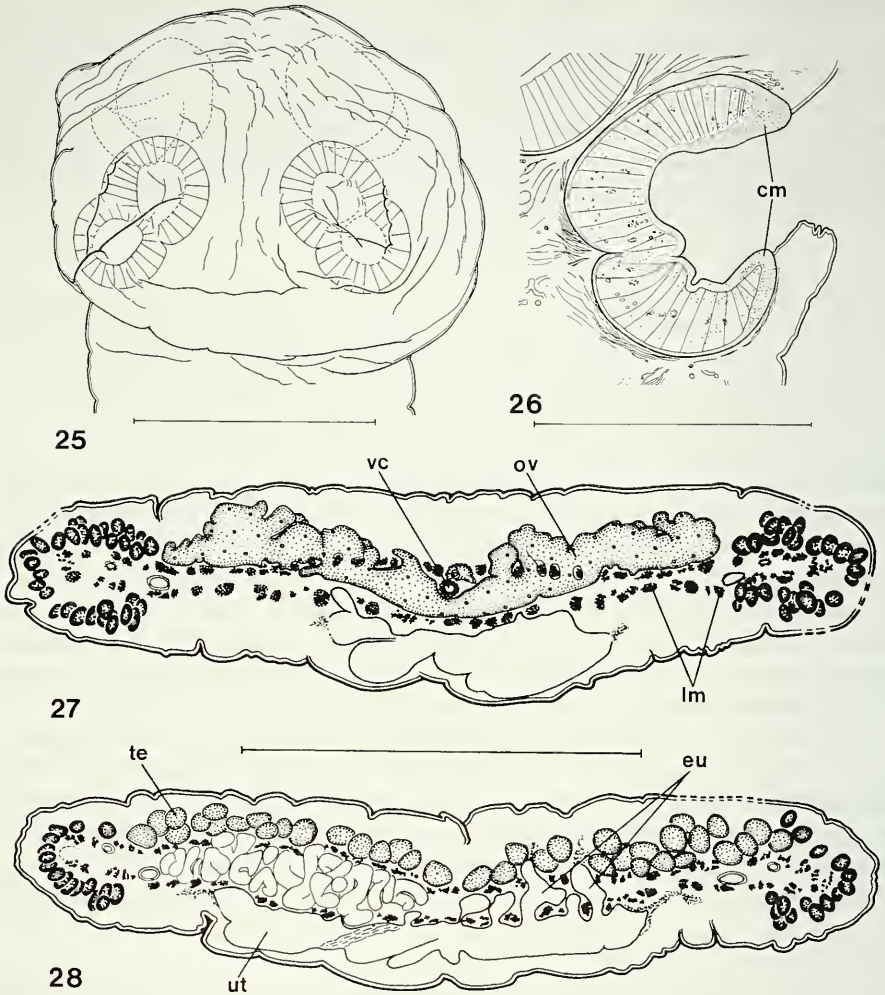
Strobiles acraspédotes massifs, longs de 22-49 mm, inhabituellement larges (jusqu'à 5,1 mm), avec de nombreux plis tégumentaires transversaux. Zone de croissance longue de 1170-1300. Proglottis immatures, matures et prégravides plus larges que longs, gravides parfois plus longs que larges.

Scolex massif, élargi à sa base (Figs 25, 98), de 1355-1915 (n = 13) de diamètre, pourvu de ventouses allongées, bilobées, longues de 510-630, avec une musculature circulaire distale bien développée à la marge externe supérieure des ventouses (Fig. 26). Lobe antérieur de la ventouse légèrement plus grand que le lobe postérieur (Fig. 25). Musculature longitudinale interne bien développée, composée de larges faisceaux parallèles, peu anastomosés (Figs 27-28). Canaux osmorégulateurs chevauchant la poche du cirre au niveau de son tiers postérieur. Canaux osmorégulateurs ventraux, sans anastomoses observables, de 20-50 de diamètre, canaux osmorégulateurs dorsaux de 15-25 de diamètre.

Testicules corticaux, au nombre de 244-286, en un champ dorsal compact, en une ou plusieurs couches, atteignant les follicules vitellins, dépassant les canaux osmorégulateurs (Fig. 29). Poche du cirre très allongée à paroi épaisse, tubulaire dans sa partie antérieure, piriforme dans sa partie postérieure, PC = 10-19% (n = 15). Cirre très court, occupant jusqu'à 30% de la longueur de la poche du cirre (Fig. 30). Pores génitaux alternants irrégulièrement, PG = 15-25%. Vagin toujours antérieur à la poche du cirre, élargi dorso-ventralement dans sa partie proximale, avec un sphincter musculaire proximal discret (Fig. 30).

Ovaire cortical bilobé, folliculé dorsalement, avec une portion médiane médullaire (Figs 27, 29). Ovaire représentant les 58-69% de la largeur du proglottis. Follicules vitellins latéraux, corticaux, formant un croissant en coupes transversales (Figs 27-28), occupant la presque totalité de la longueur du proglottis, plus nombreux et plus largement répandus ventralement en direction de l'ovaire (Fig. 29) dans la partie postérieure de l'anneau.

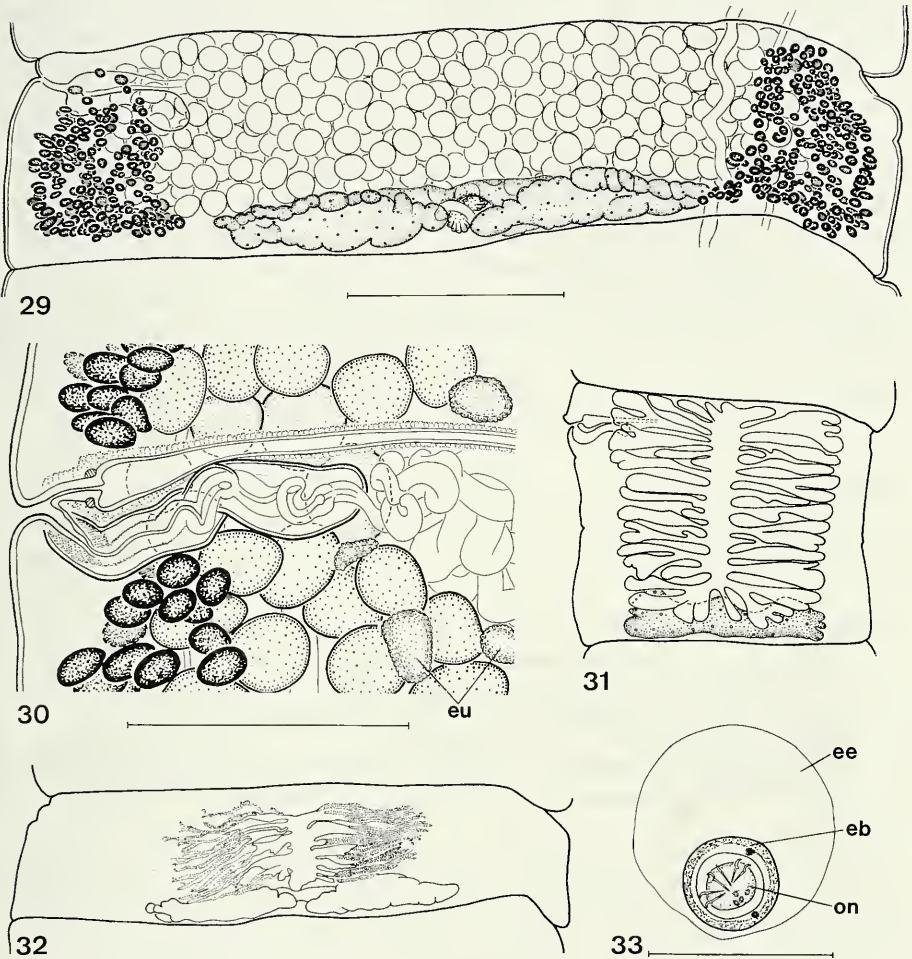
Utérus cortical, ventral, dont les diverticules ventraux produisent des expansions traversant la médulla, aboutissant dans le cortex dorsal (Fig. 28). A l'état immature, diverticules utérins latéraux allongés, occupant jusqu'à 52% de la largeur du proglottis. A partir des proglottis matures (Fig. 32), apparition d'une lumière dans les 9-14 diverticules utérins et les expansions dorsales. Dans les proglottis prégravides, expansions dorsales traversant la médulla et atteignant le cortex dorsal (Fig. 28), envahissant progressivement une partie de la médulla et du cortex dorsal dans les



FIGS 25-28. *Ageniella brevifilis* n. gen., n. sp. 25, paratype 22517 INVE, scolex. 26, paratype 22517 INVE, ventouse, coupe sagittale montrant la musculature circulaire distale. 27-28, paratype 22516 INVE, coupes transversales d'un proglottis prégravid; 27, coupe au niveau de l'ovaire; 28, coupe dans la partie postérieure. Echelles: 25, 27-28 = 1000 μ m; 26 = 500 μ m.

proglottis gravides. Utérus occupant jusqu'à 66% de la largeur des proglottis matures, jusqu'à 89% de la largeur du proglottis gravide (Fig. 31).

Oncosphères (mesurées dans l'eau distillée) arrondies, de 12-14 de diamètre, pourvues de 6 crochets longs d'environ 7-8. Embryophore de 24-29 de diamètre. Enveloppe externe ronde, hyaline, d'environ 50-65 de diamètre (Fig. 33).



FIGS 29-33. *Ageneiella brevifilis* n. gen., n. sp. 29, holotype 22513 INVE, proglottis mature, vue ventrale; 30, paratype, 22521 INVE Vagin et poche du cirre, vue dorsale; 31, paratype 22523 INVE, croquis montrant la forme de l'utérus dans un proglottis grévde; 32, holotype 22513, croquis montrant la forme de l'utérus dans un proglottis mature; 33, 24646 INVE, oeuf. Echelles: 29 = 500 μ m; 30 = 250 μ m; 33 = 50 μ m.

REMARQUES: Nous plaçons *Ageneiella brevifilis* dans les Monticelliinae en raison de la position corticale (follicules vitellins, testicules) et principalement corticale (ovaire et utérus) du système génital. La présence d'une partie de l'ovaire dans la médulla est cependant caractéristique des Othinoscolecinae. L'examen des genres-type des deux sous-familles, respectivement *Monticellia* et *Othinoscolex*, nous a démontré que le premier possède un ovaire entièrement cortical et le second entièrement médullaire.

Les Monticelliinae comprennent actuellement 5 genres: *Choanoscolex* La Rue 1911; *Goezeella* Fuhrmann, 1916; *Monticellia* La Rue, 1911; *Paramonticellia* Pavanelli & Rego, 1991; *Spatulifer* Woodland, 1934. (LA RUE 1911; FUHRMANN 1916; WOODLAND 1933c, 1934a; PAVANELLI & REGO 1991; DE CHAMBRIER & REGO 1995). Seul, le genre *Goezeella* possède des ventouses biloculées. Dans la systématique actuelle, il n'existe pas de genre réunissant des espèces possédant l'une des ventouses uniloculées et l'autre des ventouses biloculées. *Ageneiella* n. gen. se distingue de *Goezeella* par: l'absence de métascolex, par la position dorso-ventrale des follicules vitellins, par la localisation médullo-corticale de l'ovaire, par le développement cortico-médullaire de l'utérus qui atteint le cortex dorsal, ainsi que par la musculature longitudinale interne en faisceaux compact. La formation et le développement de l'utérus ressemblent à ceux décrits chez *Mariauxiella pimelodi* de Chambrier & Rego, 1995: les diverticules corticaux ventraux produisent des expansions traversant la médulla et atteignant le cortex dorsal (DE CHAMBRIER & REGO 1995, figs 9-14).

L'espèce nouvelle est nommée en référence au nom spécifique de l'hôte.

Monticellia La Rue

Monticellia La Rue, 1911: 474; espèce-type: *Tetracotylus coryphicephala* Monticelli, 1891: 161.

Tetracotylus Monticelli, 1891: 161.

Monticellia coryphicephala (Monticelli)

Fig. 36

Tetracotylus coryphicephala Monticelli, 1891: 161.

Ichthyotaenia coryphicephala; Lönnberg 1894: 803.

Ichthyotaenia coryphicephala; La Rue 1914: 268.

Monticellia coryphicephala; Rego 1975: 570.

Monticellia coryphicephala; Rego & Pavanelli 1990: 99.

Hôte: *Salminus maxillosus* Valenciennes (in Cuvier & Valenciennes, 1850) (Characidae).

MATÉRIEL EXAMINÉ: Dép. Itapua, Rio Parana, Campichuelo, 17982 INVE, 29.06.1986; 17983 INVE, 13.12.1986; 17987 INVE, 23.08.1987. Dép. Boqueron, Rio Pilcomayo, Puerto P. Pena, 17986 INVE, 08.10.1986. Dép. Central, Rio Paraguay, Bahia de Asuncion, 17985 INVE, 09.09.1990. Dép. Neembucu, Rio Parana, General Diaz Neembucu, 17984 INVE, 18.10.1989.

P = 33 %; n = 18; I = 1-5 exemplaires; A = 0,83.

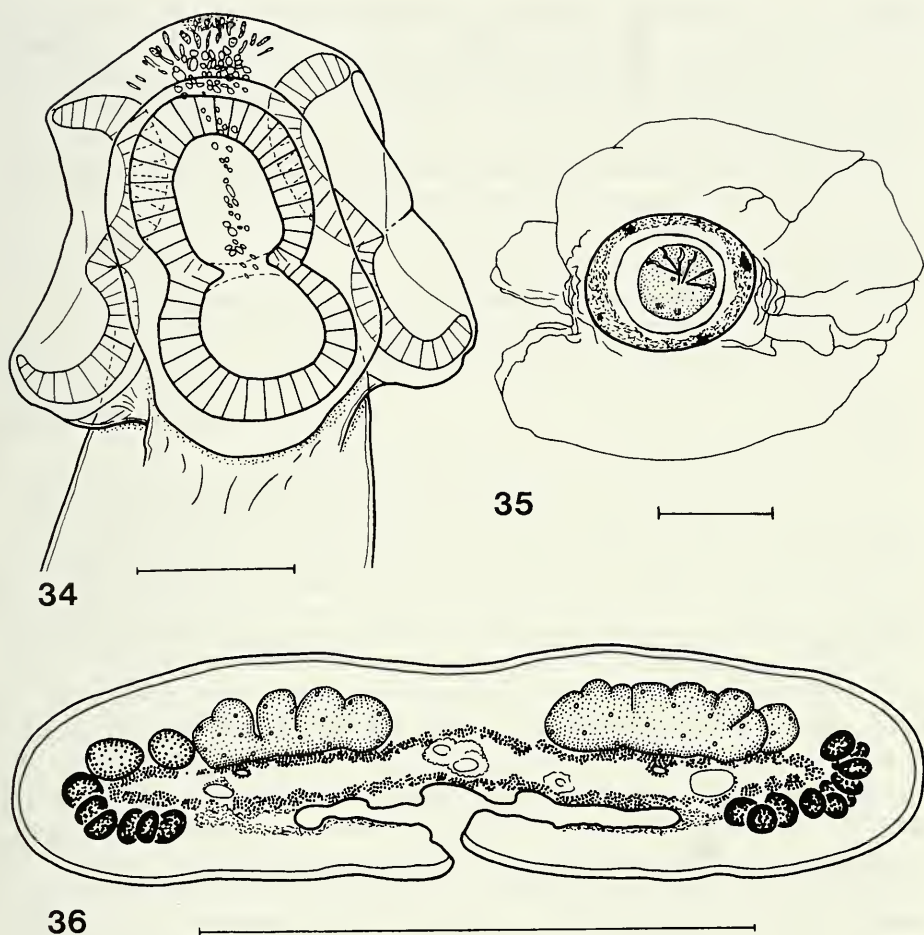
REMARQUES: LA RUE (1914) a redécrit cette espèce sur la base du matériel-type de MONTICELLI (1891). Nos observations correspondent à la description originale ainsi qu'à la redescription. La disposition des organes ainsi que leur position par rapport à la musculature longitudinale interne sont identiques (Fig. 36). REGO & PAVANELLI (1990) ont retrouvé cette espèce chez *Salminus maxillosus* au Rio Parana et chez *S. brevidens* à Pirapora, Minas Gerais au Brésil et l'ont redécrite.

Monticellia belavistensis Pavanelli, Machado, Takemoto & Dos Santos

Monticellia belavistensis Pavanelli, Machado, Takemoto & Dos Santos, 1994: 589.

Hôte: *Pterodoras granulosus*¹⁾ (Valenciennes, 1821) (Doradidae)

¹⁾ L'intérieur de l'intestin de l'hôte ainsi que le ver sont couverts de spicules d'éponges. Nous ne savons pas dans quelle mesure ces spongiaires sont consommés par le poisson.



FIGS 34-36. 34, *Goezeella paranensis* Pavanelli & Rego, 1989, scolex, 19514 INVE; 35, *Jauella glandicephala* Rego & Pavanelli, 1985, oeuf, 19297 INVE; 36, *Monticellia coryphicephala* (Monticelli, 1891), coupe transversale au niveau de l'ovaire, 17984 INVE. Echelles: 34 = 200 µm. 35 = 20 µm; 36 = 500 µm.

MATÉRIEL EXAMINÉ: 1) Brésil, Etat du Parana, Rio Parana, Itaipu et Porto Rico, holotype IOC 33.122 a, paratypes IOC 33.122 b-e. 2) Dép. Canendiyu, Salto del Guaira, 22353 INVE, 19.03.1989.

P = 4.7 %; n = 21; I = 1 exemplaire sans scolex; A = 0,047.

REMARQUES: L'exemplaire présente les mêmes caractères que ceux cités dans la description originale de *M. belavistensis* en ce qui concerne le champ testiculaire, la structure et la disposition de la musculature longitudinale interne, la position du pore génital (20-24%, selon description originale = environ 25%), le rapport PC (16-21%, selon dessins originaux = 15-17%), le rapport OV (72-80%, selon description ori-

ginale = 78-81% selon dessins originaux), la position antérieure du vagin par rapport à la poche du cirre et le nombre de diverticules utérins (15-27, selon description originale = 13-22). Il diffère cependant par un nombre plus important de testicules (296-342, selon description originale = 136-200). Pourtant, dans l'holotype, nous dénombrons 294-298 testicules.

La prévalence observée pour cette espèce par PAVANELLI *et al.* (1994) est nettement plus élevée que pour notre matériel.

Monticellia magna (Rego, dos Santos & Silva)

Nomimoscolex magna Rego, dos Santos & Silva, 1974: 202, in parte.

Monticellia loyolai Pavanelli & Machado dos Santos 1992: 46; syn. nov.

Monticellia magna; de Chambrier & Vaucher 1997: 225.

Hôtes: 1) *Pimelodns clarias* (Bloch, 1782) (*P. clarias* est considéré comme synonyme de *P. blochii* par Mees (1974, p. 134)). 2) *Pimelodns macnlatus* Lacépède, 1803; 3) *Pimelodus* cf. *blochii* Valenciennes, 1840 (Pimelodidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Porto Esperanza, Mato Grosso, syntypes IOC 31.049 a-c, 4 spécimens en 3 préparations; IOC 33.137 (= 4.476), 22.04.1925, IOC 33.138 (= 4.478), 15.04.1925, IOC 33.139 (= 4.480), 28.03.1925, matériel en alcool; le No 4.478 coloré et monté à Genève est un *Proteocephalus* (DE CHAMBRIER & VAUCHER 1997). 2) Brésil, Etat du Parana, Rio Parana, holotype de *Monticellia loyolai* Pavanelli & Machado dos Santos, 1992, IOC 32.715, paratypes IOC 32716a-d, IOC 32.717 a-d. 3) Dép. Concepcion, Rio Paraguay, km 638, 19513 INVE 09.10.1988. Dép. Neembucu, Rio Parana, General Diaz Neembucu, 19512 INVE, 04.11.1991.

P = 100%; n = 2; I = 3-11 exemplaires; A = non calculée.

REMARQUES: Le matériel récolté présente les mêmes caractères que le matériel-type de *Monticellia magna* (Rego, dos Santos & Silva, 1974) (voir DE CHAMBRIER & VAUCHER 1997, p. 225) que nous avons revu: nombre similaire de testicules, 96-127 (MT = 107-139) en deux champs convergents antérieurement et postérieurement, diamètre du scolex, 540-725 (MT = 485-790) et des ventouses, 185-265, (MT = 210-285) similaires, PC similaire, 21-28% (MT = 19-27%), position du pore génital semblable, 19-37% (MT = 19-27%), rapport OV, 64-78% (MT = 70-75%), position paramusculaire des follicules vitellins, position presque toujours antérieure du vagin par rapport à la poche du cirre, 98% des observations (MT = 97%). Il ne diffère que par le nombre de diverticules utérins, 18-36 (MT = 11-18).

De plus, nous avons remarqué dans cette espèce: la présence dans le scolex d'une importante concentration de cellules de forme arrondie ou oblongue au cytoplasme finement granuleux situées sous l'apex; la présence d'un sphincter vaginal proximal asymétrique; la présence d'un cirre court (environ 30% de la longueur de la poche du cirre); une formation particulière de l'utérus, avec des diverticules utérins ramifiés.

Monticellia loyolai Rego & Pavanelli 1992 présente les mêmes caractères que *M. magna* et ne diffère que par le rapport PC de 29-34% (MT = 19-27%).

Monticellia cf. **magna** (Rego, dos Santos & Silva, 1974)

Hôte: *Pimelodns* cf. *macnlatus* Lacépède, 1803 (Pimelodidae).

Matériel examiné: Dép. Neembucu, Rio Parana, General Diaz Neembucu, 19515 INVE, 18.10.1989.

P = non calculée; n = 1; I = 3-4 exemplaires juvéniles; A = non calculée.

REMARQUES: Ces spécimens se rapprochent de *Monticellia magna* (Rego, dos Santos & Silva, 1974) par les caractères suivants: le diamètre du scolex (605 μ) et des ventouses (185-265 μ), la disposition des testicules, la position du pore génital (26-30%), la position presque toujours antérieure du vagin par rapport à la poche du cirre, un sphincter vaginal proximal asymétrique, plus large du côté opposé à la poche du cirre.

Ils diffèrent de *M. magna* par le nombre plus faible de testicules (64-73), par le rapport PC (35-36%), par le rapport OV (56-64%). Ces différences pourraient être dues à l'état juvénile du matériel concerné.

Monticellia spinulifera Woodland

Fig. 99

Monticellia spinulifera Woodland, 1935a: 857.

Spasskyellina spinulifera; Freze 1965: 469; Rego 1990: 998.

Monticellia spinulifer; Brooks 1995: 364 [orthographe incorrecte].

Hôtes: 1 & 2) *Pseudoplatystoma fasciatum* (Linnaeus, 1766); 3) *Pseudoplatystoma coruscans* (Agassiz, 1829) (Pimelodidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Etat d'Amazonas, Rio Amazonas, 15 miles en amont de Parintins, syntypes BMNH 1964.12.15.236-239, automne 1931. 2) Dép. Itapua, Rio Parana, Puerto Lopez, 22331 INVE, 23.11.1986, P = 33%; n = 3; I = 2 exemplaires adultes, A = 0,66. 3) Dép. Itapua, Rio Parana, Puerto Lopez, 23864 INVE, 12.05.1987, 22329 INVE, 09.08.1987. Dép. Central, Rio Paraguay, San Antonio, 21861 INVE, 02.11.1995.

P = 21%; n = 14; I = 1-4 exemplaires, A = 0,36.

REMARQUES: Le matériel récolté est caractérisé par un nombre similaire de testicules (33-66, MT = 49-57), par un diamètre similaire des scolex (350-545, MT = 500) et des ventouses (190-375, MT = 175-210), par la présence de microtriches spiniformes sur les ventouses (Fig. 99), par la position du vagin par rapport à la poche du cirre ainsi que par la présence d'un puissant sphincter vaginal subproximal. REGO (1990) a retrouvé cette espèce chez *P. coruscans* provenant du Rio Cuiaba, Mato Grosso, Brésil.

FREZE (1965) a décrit le genre *Spasskyellina* pour y placer *S. lenha* (Woodland, 1935) et *S. spinulifera* (Woodland, 1933). PAVANELLI & TAKEMOTO (1996) y ont ajouté *S. mandi*. FREZE (1965) a fondé ce genre sur deux caractères: la présence d'épines sur les ventouses; la déhiscence précoce de l'utérus qui reste petit. Chez *S. lenha*, récemment collecté aux environs de la localité-type, l'utérus ne présente pas de déhiscence précoce et contient des oeufs embryonnés. De plus, les "épines" représentent des microtriches spiniformes comme l'ont démontré THOMPSON *et al.* (1980). Ces microtriches sont du même type que ceux rencontrés chez *Nonimoscolex piraeba* (voir DE CHAMBRIER & VAUCHER, 1997).

Spasskyellina est donc synonyme de *Monticellia*. L'espèce *Spasskyellina mandi* Pavanelli & Takemoto, 1996 devient *Monticellia mandi* (Pavanelli & Takemoto, 1996) comb. nov.

Monticellia dlouhyi n. sp.

Figs 37-41

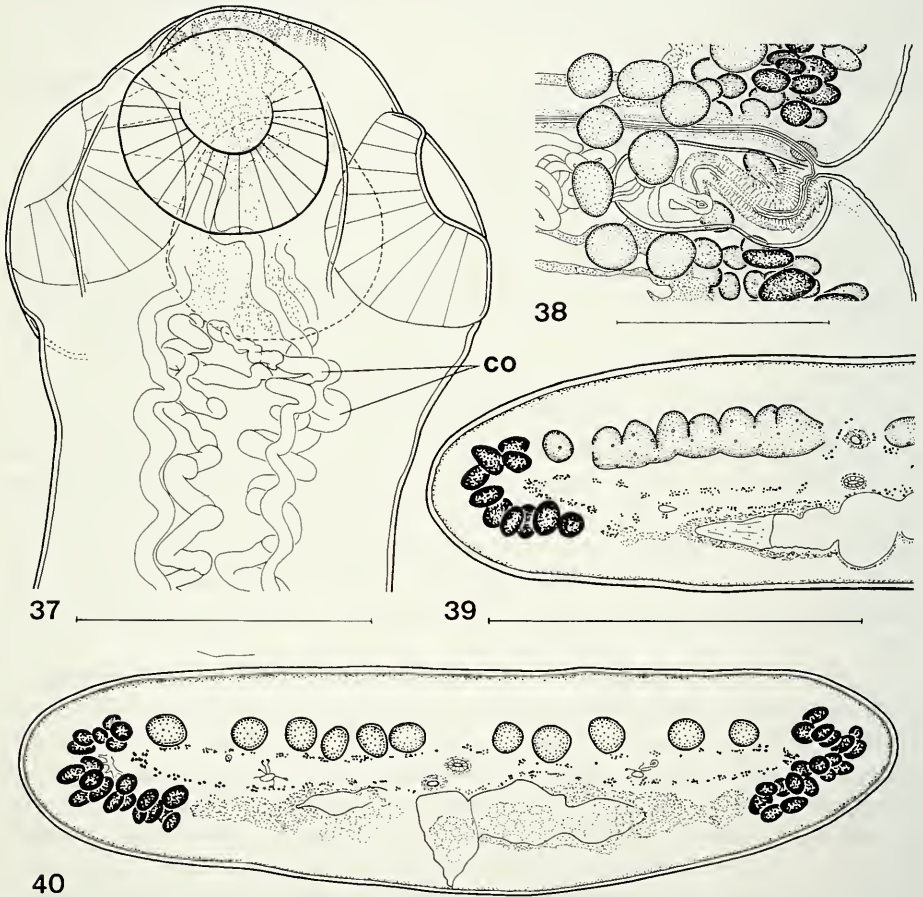
Hôte: *Acestrorhynchus altus* (Characidae).

MATÉRIEL EXAMINÉ: Dép. Neembucu, 18 km à l'est de San Lorenzo, lagunes du Rio Parana, holotype 21973 INVE, 17.10.1989.

P = 6,25 %; n = 16; I = 1 exemplaire; A = 0,0625.

DESCRIPTION:

Strobile à maturation lente, long de 67 mm. Zone de croissance longue de plus de 5 mm. Environ 114 proglottis jusqu'à l'apparition d'une lumière dans le tronc utérin; 122 proglottis jusqu'au premier mature; 123 proglottis jusqu'à l'apparition



FIGS 37-40. *Monticellia dlouhyi* n. sp., holotype 21973 INVE; 37, scolex, vue ventrale, 38, vagin et poche du cirre, vue dorsale; 39, coupe au niveau de l'ovaire; 40, coupe dans la partie postérieure. Echelles: 37, 38 = 250 μ m; 39, 40 = 500 μ m.

d'une lumière dans les diverticules utérins; 125 proglottis jusqu'à l'arrivée des oeufs dans l'utérus; 135 proglottis jusqu'à l'apparition d'ouvertures utérines ventrales, environ 150 proglottis au total.

Scolex légèrement plus large que le cou, de 415 de diamètre. Ventouses uniloculées, de 175-190 de diamètre. Présence sous l'apex de cellules allongées au cytoplasme finement granuleux (Fig. 37). Musculature longitudinale interne développée en faisceaux parallèles peu anastomosés (Figs 39-40). Position inhabituelle des canaux osmorégulateurs ventraux et dorsaux, situés entre les 25-37% de la marge latérale du proglottis (Figs 39-41). Canaux osmorégulateurs ventraux parfois anastomosés de 20-40 de diamètre et dorsaux de 5-10 de diamètre.

Testicules corticaux, au nombre de 163-187 (n = 4), en un champ dorsal, ininterrompu du côté poral, dépassant les canaux osmorégulateurs dorsaux et ventraux et atteignant les follicules vitellins (Fig. 41). Poche du cirre ovoïde à paroi épaisse, PC = 16-21%. Cirre représentant environ 60% de la longueur de la poche du cirre (Fig. 38). Atrium génital présent. Pore génital antérieur, PG = 16-26%. Vagin toujours antérieur à la poche du cirre, avec une portion distale élargie et avec un sphincter vaginal proximal discret (Fig. 38). Ovaire cortical bilobé, fortement lobulé, dont la largeur représente les 71-74% de la largeur du proglottis (Fig. 41).

Follicules vitellins corticaux latéraux, plus étendu ventralement en direction de la partie médiane du proglottis, ininterrompus ventralement au niveau de la poche du cirre, s'étendant sur 95-98% de la longueur du proglottis.

Utérus cortical préformé, occupant dans les derniers anneaux immatures 65% de la largeur du proglottis. A ce stade, apparition d'une lumière dans le tronc utérin. La paroi externe distale des diverticules utérins est composée d'un grand nombre de cellules chromophiles. Utérus gravidé représentant les 71% de la largeur du proglottis. Utérus avec, de chaque côté, 17-23 diverticules utérins digités, ramifiés. Évacuation des oeufs par 3-5 petites ouvertures ventrales longitudinales irrégulières avant les derniers proglottis qui contiennent encore quelques oeufs. Oncosphères (mesurées dans une préparation totale) d'environ 12 de diamètre, pourvus de 6 crochets; embryophores arrondis, collapsés, de 14-24 de diamètre; enveloppe externe hyaline collapsée.

REMARQUES: Nous avons à comparer le matériel étudié avec les autres *Monticellia*: *M. amazonica* DE CHAMBRIER & VAUCHER, 1997, parasite de *Calophysus macropterus*; *M. belavistensis* PAVANELLI, MACHADO DOS SANTOS, TAKEMOTO & DOS SANTOS, 1994, de *Pterodoras granulatus*; *M. coryphicephala* (MONTICELLI, 1891), de *Salminus maxillosus*; *M. lenha* WOODLAND, 1933, de *Platyostomatichthys sturio*; *M. magna* (REGO, SANTOS & SILVA, 1974), de *Pimelodus clarias*; *M. mandi* (PAVANELLI & TAKEMOTO), 1996, de *Pimelodus ornatus*; *M. spinulifera* WOODLAND, 1935, de *Pseudoplatystoma fasciatum*; *M. ventrei* n. sp., de *Pinirampus pinirampu* (DE CHAMBRIER & VAUCHER 1997; REGO & PAVANELLI 1992a; PAVANELLI *et al.* 1994; PAVANELLI & TAKEMOTO 1996; REGO *et al.* 1974; WOODLAND 1933a, 1935a).

M. dlouhyi n. sp. diffère de *M. lenha*, *M. mandi*, *M. spinulifera* par l'absence de microtriches spiniformes sur le scolex. Il se différencie de *M. magna* par le nombre de testicules (107-139) et de *M. belavistensis* par la distribution des follicules vitellins

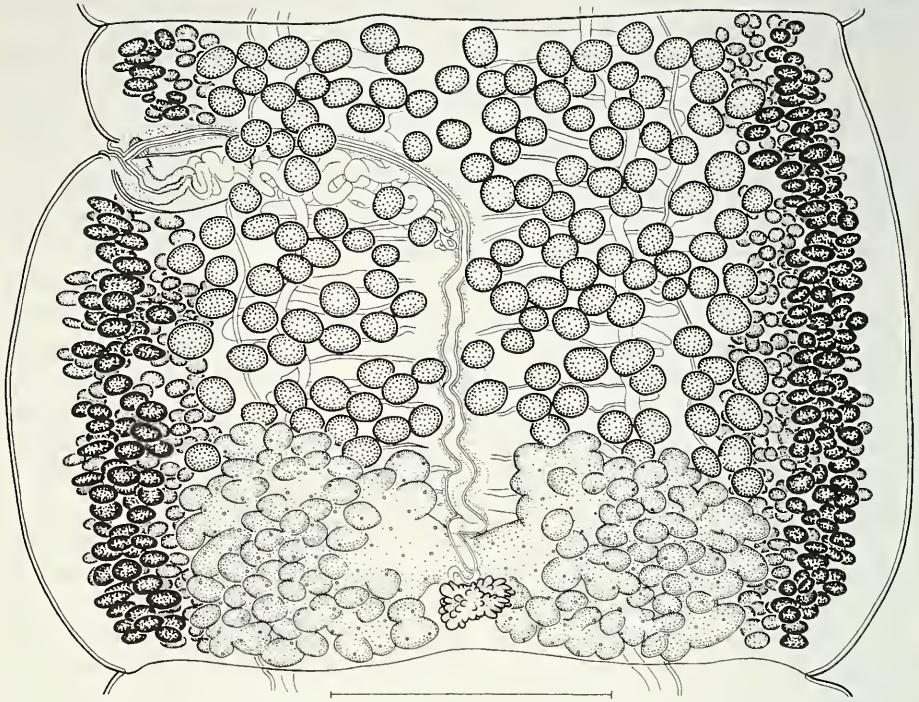


FIG. 41. *Monticellia dlouhyi* n. sp., holotype 21973 INVE. Proglottis gravide, vue dorsale. Echelle = 500 μ m.

en coupe transversale ainsi que par le diamètre du scolex (490-1220). D'après nos observations, il diffère aussi de *M. amazonica* par le rapport PC (38-45%), par la position du pore génital (26-34%), par la position postérieure du vagin par rapport à la poche du cirre ainsi que par la musculature longitudinale interne, qui est très discrète chez *M. amazonica*.

De *M. coryphicephala*, le matériel décrit se différencie par un nombre plus faible de testicules (163-187 contre 200-238) et par une musculature longitudinale interne plus faible.

Monticellia ventrei n. sp. est à comparer avec *M. dlouhyi* n. sp. Ceux-ci se distinguent par un nombre plus faible de testicules (222-325), par la position du pore génital (25-39%), par le rapport PC (26-31%) et par le nombre de diverticules utérins de chaque côté (28-39).

Monticellia diesingii (Monticelli, 1891), *M. macrocotylea* (Monticelli, 1892), *M. megacephala* Woodland, 1934 sont considérées comme species inquirendae (Rego & Pavanelli 1992).

A notre connaissance, *Acestrorhynchus altus* est signalé ici pour la première fois comme hôte d'un cestode Monticelliidae.

La nouvelle espèce nommée en l'honneur de Carlo Dlouhy, Université nationale d'Asuncion, Paraguay.

Monticellia ventrei n. sp.

Figs 42-47

Myzophorus admonticellia Woodland 1934 [partim]: 145

Hôtes: 1) *Pinirampus* sp. ("Peracachinga do grandje"); 2) *Pinirampus piri-nampu* (Spix, 1829) (Pimelodidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Etat d'Amazonas, Rio Amazonas, 10 miles en aval de Itacoatiara, syntypes BMNH 1965.2.23.119-138, "Amaz 35" & "Amaz 77", de *Myzophorus admonticellia* Woodland, 1934 (= *Nominoscolex admonticellia*), automne 1931. 2) Dép. Central, Rio Paraguay, Bahia de Asuncion, holotype 22912 INVE, 4 paratypes 24652-24654, 24656; autre matériel 22913, 24655, 24657 INVE, 03.10.1990.

P = 33 %; n = 6; I = plus de 40 exemplaires; A = environ 12.

DESCRIPTION:

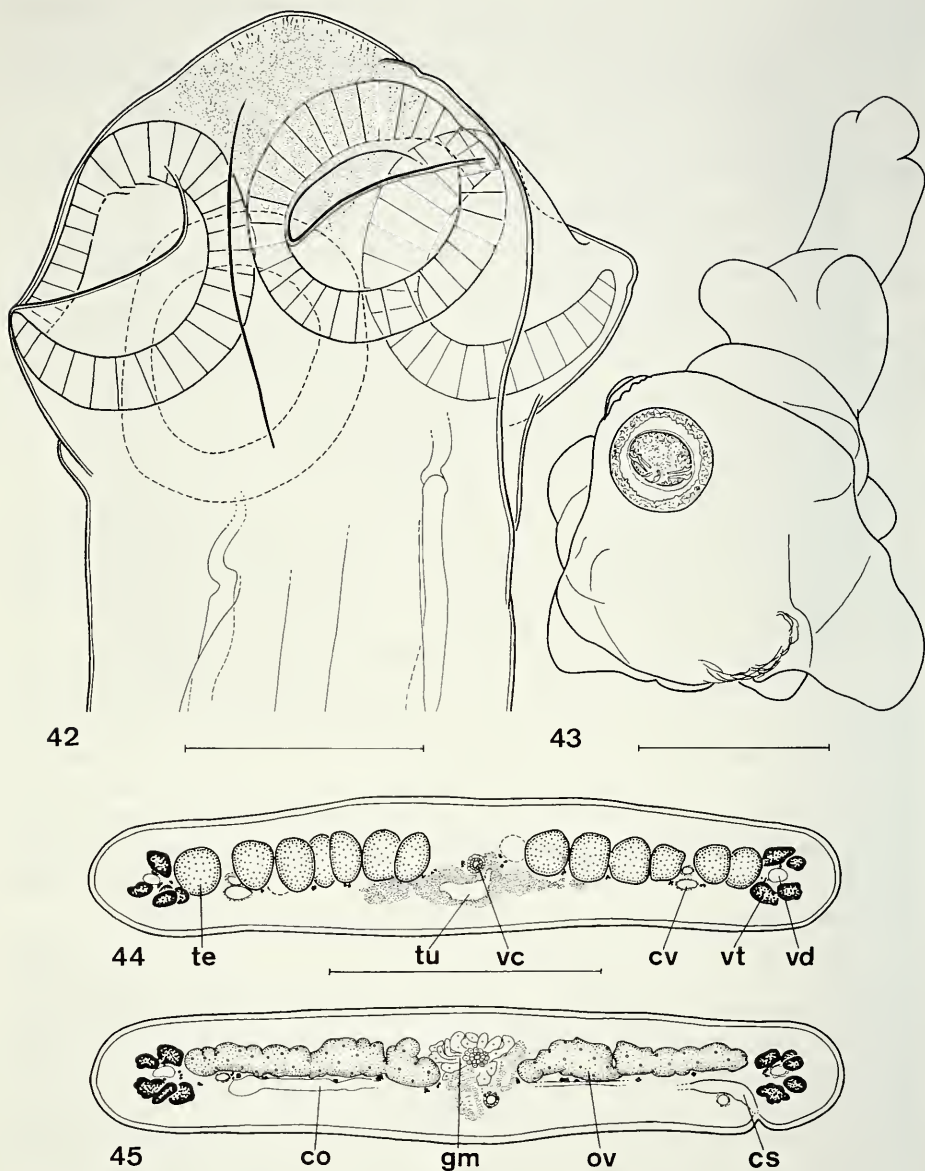
Strobile acraspédote long de 73-124 mm. Zone de croissance longue d'environ 500-650. Environ 72 proglottis jusqu'au premier mature; 78 jusqu'à l'arrivée des oeufs dans l'utérus: plus de 100 proglottis au total. Proglottis matures et gravides plus longs que larges.

Scolex plus large que le cou, de 530-660 de diamètre. Ventouses ovales uniloculées, de 230-315 de diamètre (Fig. 42). Sous l'apex, très nombreuses cellules allongées au cytoplasme finement granuleux. Musculature longitudinale interne très discrète, constituée d'environ 8-10 faisceaux en une seule couche, sans médulla observable (Figs. 44-45). Canaux osmorégulateurs ventraux et dorsaux divisant les champs testiculaires, situés entre les 13-21% de la marge latérale du proglottis. Canaux osmorégulateurs ventraux, reliés postérieurement, de 25-30 de diamètre et canaux osmorégulateurs dorsaux de 10-15 de diamètre (Fig. 46). Canaux ventraux débouchant postérieurement, au niveau de l'ovaire, sous la surface du tégument (Figs 45-46).

Testicules corticaux, au nombre de 222-325 (x = 279, n = 5) en deux champs dorsaux convergents antérieurement, interrompus du côté poral, dépassant les canaux osmorégulateurs dorsaux et ventraux et atteignant les follicules vitellins. Poche du cirre piriforme à paroi épaisse, souvent déformée par la pression du canal déférent, rapport PC = 26-31%. Cirre à paroi épaisse, plus long que la poche du cirre. Atrium génital présent. Pore génital antérieur, PG = 25-39%. Vagin toujours antérieur à la poche du cirre, avec un sphincter vaginal proximal musculaire développé. Ovaire cortical bilobé, fortement lobulé, dont la largeur représente les 77-82 % de la largeur du proglottis.

Follicules vitellins corticaux latéraux, représentant environ 96-98% de la longueur du proglottis. Follicules vitellins interrompus ventralement au niveau de la poche du cirre, avec dorsalement quelques rares follicules. Quelques follicules vitellins postérieurs situés ventralement à l'ovaire (Fig. 46).

Utérus cortical préformé, occupant dans les derniers anneaux immatures environ 10% de la largeur du proglottis. Apparition d'une lumière dans le tronc utérin



FIGS 42-45. *Monticellia ventrei* n. sp. 42, paratype 24654 INVE, scolex, vue ventrale; 43, 24655 INVE, oeuf; 44-45, paratype 24654 INVE, coupes transversales d'un proglottis mature, 44, coupe au niveau de l'ovaire. 45, coupe dans la partie postérieure. Echelles: 42, 44-45 = 250 μ m; 43 = 50 μ m.

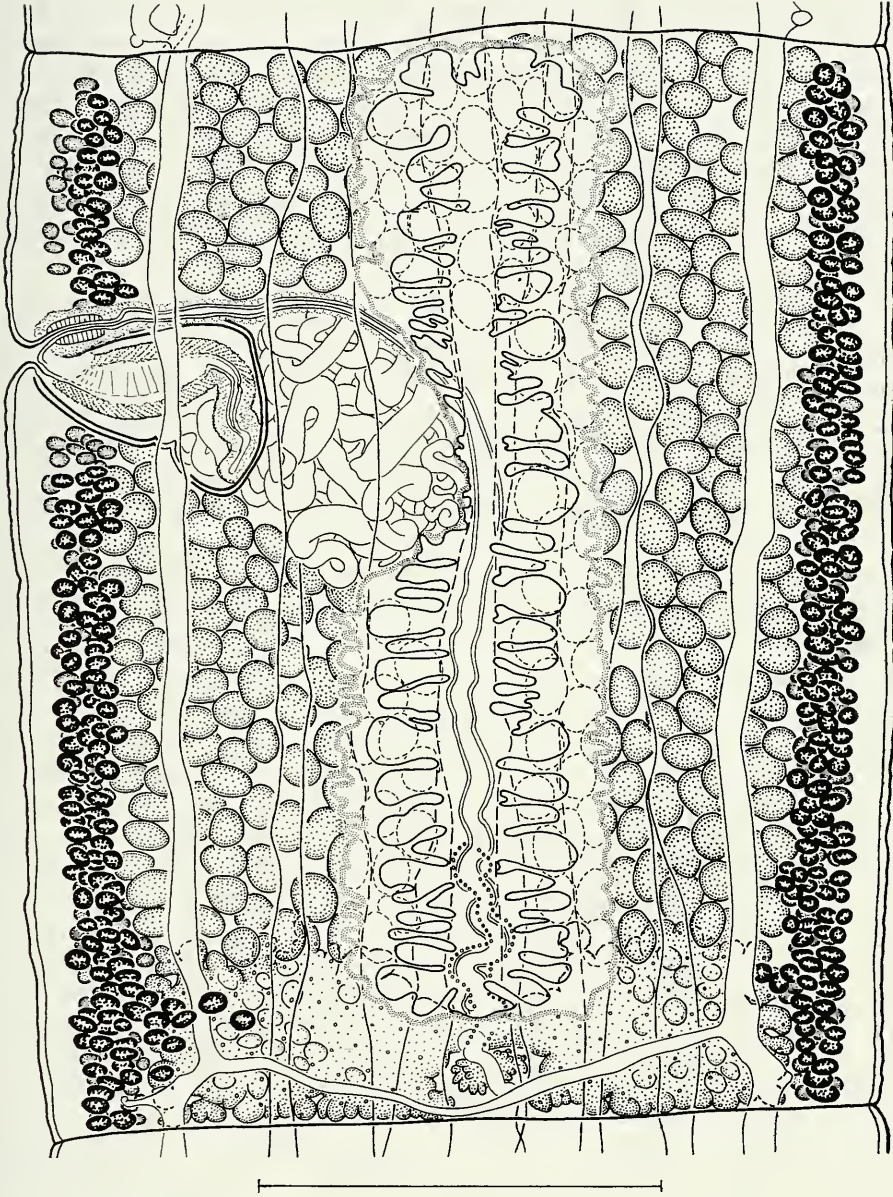


FIG. 46. *Monticellia ventrei* n. sp., holotype 22912 INVE, proglottis mature, vue ventrale. Echelle = 500 μ m.

dans les premiers anneaux matures, avec de chaque côté, une concentration de cellules chromophiles, occupant 15-20% de la largeur du proglottis. Lumière de diverticules utérins présente avant l'arrivée des oeufs. Paroi externe distale des diverticules utérins entourée de cellules chromophiles. Utérus gravide représentant plus de 70% de la largeur du proglottis avec, de chaque côté, 28-39 diverticules utérins parfois ramifiés. Évacuation des oeufs par une ouverture ventrale longitudinale sur toute la longueur de l'utérus. Oncosphères (mesurées dans l'eau distillée) de 13-14 de diamètre, pourvus de 6 crochets longs de 6-7; embryophores arrondis, 24-28 de diamètre; enveloppe externe hyaline de forme irrégulière pourvue d'excroissances ovoïdes à digitées, jusqu'à 180 de diamètre (Fig. 43).

REMARQUES: *M. ventrei* n. sp. diffère de *M. lenha*, *M. mandi*, *M. spinulifera* par l'absence de microtriches spiniformes sur le scolex, de *M. magna* et de *M. amazonica* par le nombre de testicules et de *M. belavistensis* par le rapport PC (15-17%), par une musculature longitudinale interne plus faible, par la position des canaux osmorégulateurs, par la distribution des follicules vitellins en coupe transversale. Il se différencie de *M. coryphicephala* par une musculature longitudinale interne plus faible, par le nombre de diverticules utérins ainsi que par la taille du cirre par rapport à la poche du cirre.

Dans le matériel original, fragmenté, de *Myzophorus admonticellia* (= *Nomimoscolex admonticellia*) de WOODLAND (1934a), libellé "Amaz 77", deux espèces distinctes sont présentes.

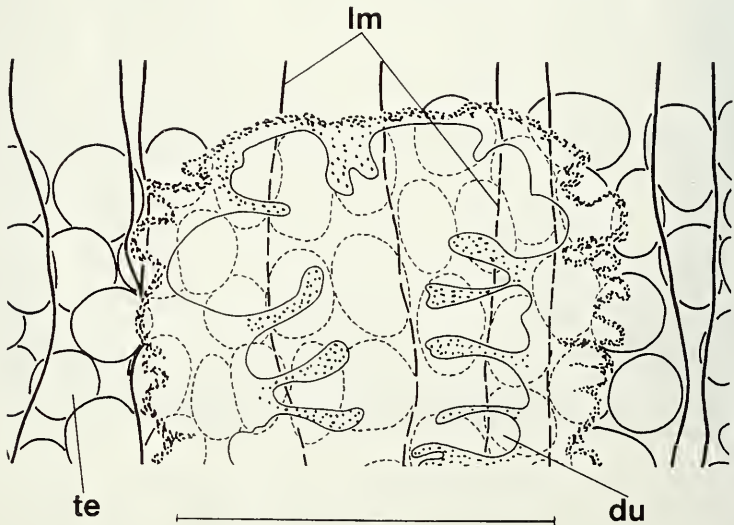


FIG. 47. *Monticellia ventrei* n. sp., holotype 22912 INVE. proglottis mature, vue ventrale, détail montrant la position de la musculature longitudinale interne. Échelle = 250 μ m.

1. La première, *Nomimoscolex admonticellia*, est caractérisée par une musculature longitudinale interne très développée et par une musculature longitudinale secondaire (Figs 12-13, WOODLAND 1934a et figs 49-50, présent travail), par des proglottis légèrement craspédote, par un scolex d'un diamètre de 295, par 323-372 testicules en un champ dans les proglottis matures (Figs 48-51), par un rapport PC de 34-39%, par des pores génitaux débouchant entre les 29-36% de la longueur du proglottis, par un vagin toujours antérieur à la poche du cirre, par un tronc utérin cortical développant des diverticules médullaires (Fig. 49), par 22-33 diverticules utérins de chaque côté ainsi que par un ovaire médullaire présentant des lobes dorsaux traversant la musculature longitudinale interne.

Nous désignons comme lectotype de *Nomimoscolex admonticellia*, les lames "cotype Amaz 77", No A1-A4 ainsi que celles de coupes sériées notées "Amaz 77".

2. La deuxième espèce est caractérisée par: une musculature longitudinale interne à peine visible, un strobile acraspédote, 240 testicules en deux champs convergents antérieurement dans les proglottis matures, des pores génitaux débouchant entre les 28-35% de la longueur du proglottis, un rapport PC de 25-32%, un vagin antérieur à la poche du cirre, avec un sphincter musculaire proximal, un ovaire folliculé représentant 73-82% de la largeur de l'anneau. Ce taxon est identique à *Monticellia ventrei* n. sp. décrit ci-dessus.

3. A notre avis, la redescription par REGO & PAVANELLI (1992b) de *Nomimoscolex admonticellia*, parasite de la même espèce-hôte, correspond au moins en partie à *Monticellia ventrei* n. sp. en raison des caractères suivants: un strobile acraspédote, un scolex d'un diamètre de 500-580 avec une concentration de cellules à l'apex, 300-400 testicules (selon figure 3 = 267 testicules), une musculature longitudinale très discrète, un pore génital s'ouvrant à 44% (selon figures 3-4 = 36-38%) de la longueur du proglottis, une poche du cirre représentant les 33% (selon figures 3-4 = 34-35%) de la largeur du proglottis, un vagin antérieur avec un sphincter vaginal, un ovaire représentant (selon figures 3-4) les 74-80% de la largeur du proglottis, un utérus avec 50-60 diverticules utérins (selon figure 4 = 31-39).

Quatre espèces avaient déjà été décrites chez *Pirirampus pirinampu*: *Nomimoscolex admonticellia* (Woodland, 1934); *Rudolphiella piranabu* (Woodland, 1934); *Rudolphiella myoides* (Woodland, 1934); *Proteocephalus vladimirae* n. sp. *Monticellia ventrei* n. sp. est la cinquième espèce et le quatrième genre de Proteocephalidea connus chez cet hôte.

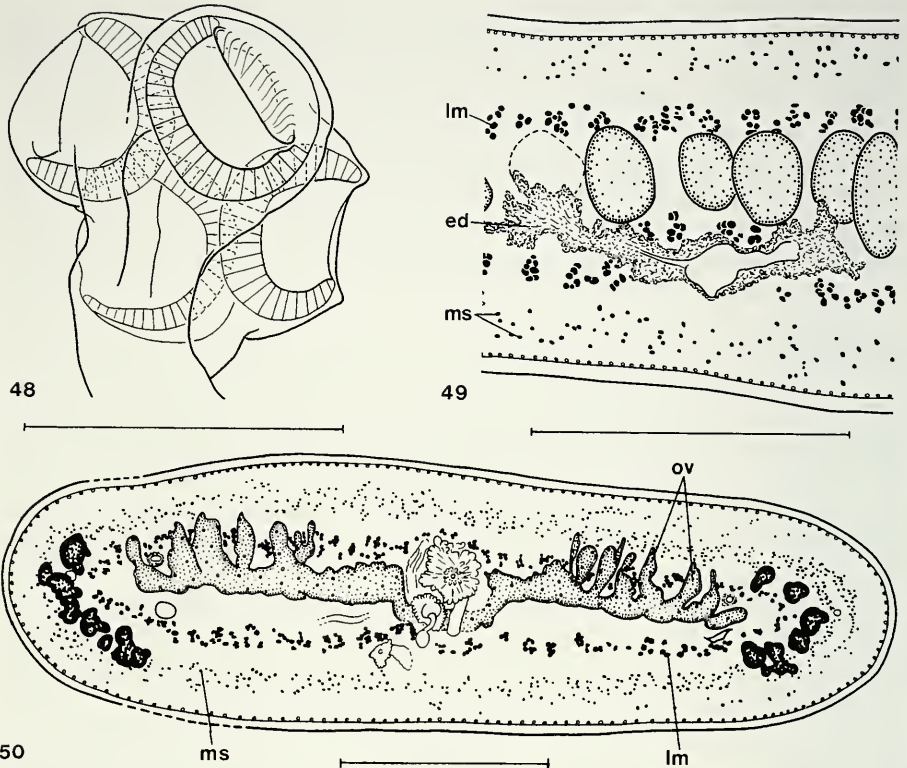
Monticellia ventrei n. sp. est nommé en l'honneur de Manuel Marino Ventre, de l'Université nationale d'Asuncion, Paraguay.

Monticellia sp.

Hôte: *Pirirampus pirinampu* (Spix, 1829) (Pimelodidae)

MATÉRIEL EXAMINÉ: Dép. Central, Rio Paraguay, San Antonio, 22908 INVE, 27.11.1993.

P = 17 %; n = 6; I = 3 exemplaires; A = 0,5.



FIGS 48-50. *Nomimoscolex admonticellia* Woodland, 1934, lectotype, BMNH 1965.2.23.119-138; 48, scolex, 49, détail d'une coupe transversale montrant le tronc utérin cortical et les diverticules médullaires, 50, coupe transversale au niveau de l'ovaire, remarquez les lobes de l'ovaire s'insérant à travers la musculature longitudinale interne et la musculature longitudinale secondaire. Echelles: 48-50 = 250 μ m.

REMARQUES: Ces spécimens, distincts apparemment de *Monticellia ventrei* n. sp., sont caractérisés par 101-109 testicules en un champ, par un rapport PC d'environ 33%, par un vagin toujours antérieur à la poche du cirre, avec un sphincter vaginal proximal bien développé. Les caractères anatomiques n'ont pu être observés que sur un proglottis mature, par conséquent, nous renonçons à une identification spécifique.

Monticellia sp.

Hôte: *Brycon orbynianus* Valenciennes, 1849 (Characidae).

MATÉRIEL EXAMINÉ: Dép. Concepcion, Arroyo Alegre, 21992 INVE, 07.10.1989.

P = 100 %; n = 1; I = 2 exemplaires immatures; A = 0,5.

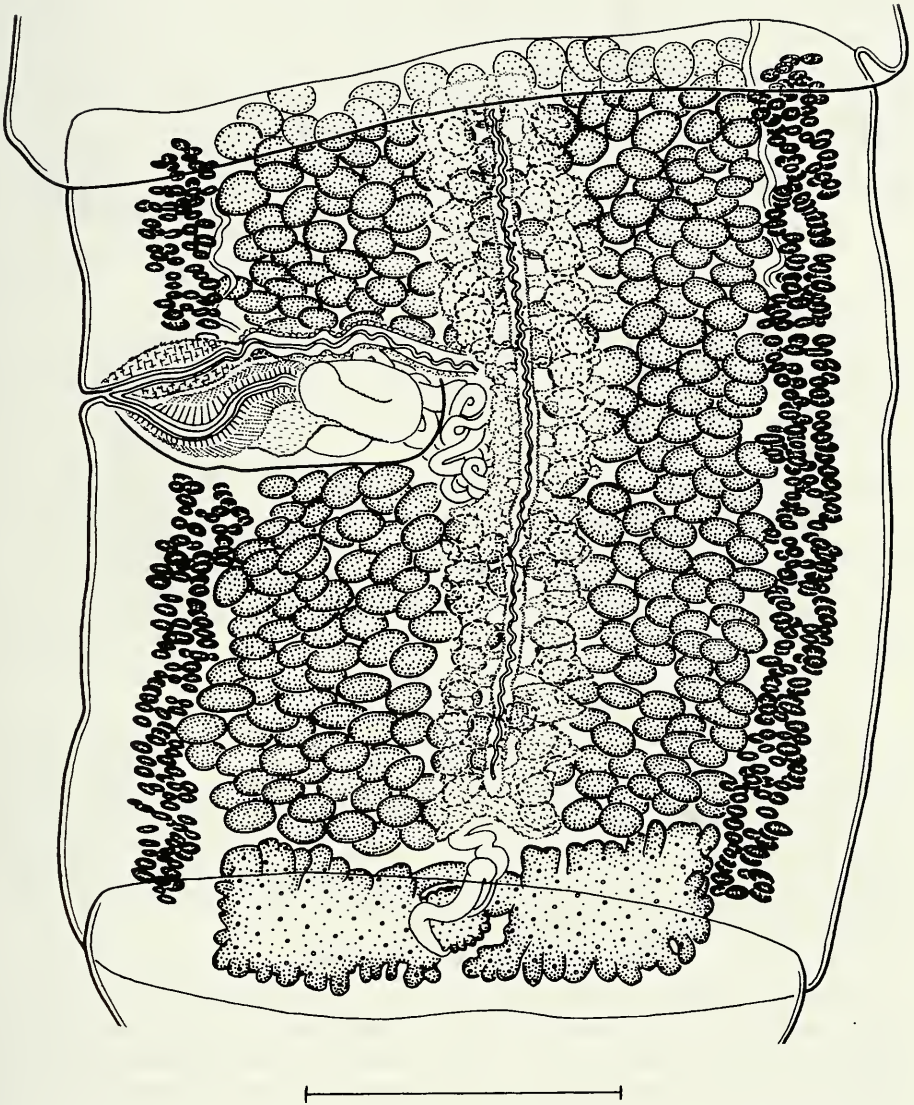


FIG. 51. *Nomimoscolex admonticellia* Woodland, 1934, lectotype, BMNH 1965. 2.23.119-138; proglottis mature, vue ventrale. Echelle = 250 μ m.

REMARQUES: Ce matériel immature, long de 160 mm, est caractérisé par une position corticale de tous les organes génitaux ainsi que par un scolex sans metascolex, ni plis de tissus à la base des ventouses. Nous le plaçons donc dans le genre *Monticellia* La Rue, 1914, mais l'identification spécifique n'est pas possible. A notre connaissance, *Brycon orbynianus* est signalé ici pour la première fois comme hôte d'un cestode Proteocephalidea.

Monticellia sp.

Hôte: *Pseudoplatystoma fasciatum* (Linnaeus, 1766) (Pimelodidae)

MATÉRIEL EXAMINÉ: Dép. Central. Rio Paraguay, San Antonio. 23838 INVE, 06.11.1995.

P = 33%; n = 3.

REMARQUES: Cette espèce est caractérisée par une position corticale de tous les organes génitaux ainsi que par un scolex sans metascolex, ni plis de tissus à la base des ventouses.

Paramonticellia Pavanelli & Rego

Paramonticellia Pavanelli & Rego, 1991: 10; espèce-type: *Paramonticellia itaipuensis* Pavanelli & Rego, 1991: 11.

Paramonticellia: BROOKS 1995: 364.

Paramonticellia itaipuensis Pavanelli & Rego

Figs 52-54, 102

Paramonticellia itaipuensis Pavanelli & Rego, 1991: 11.

Goezeella nupeliensis Pavanelli & Rego, 1991: 11; syn. nov.

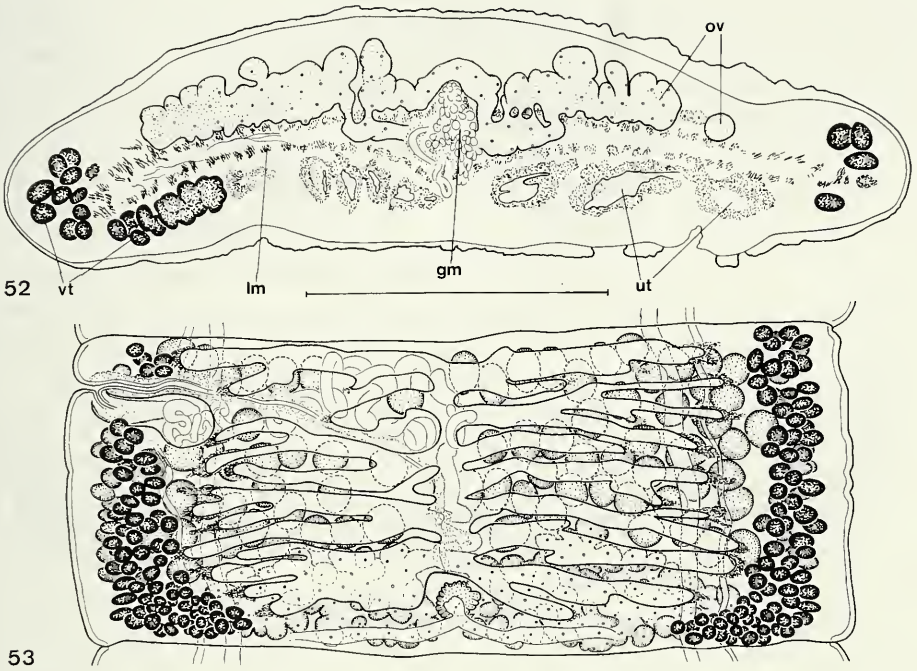
Hôte: *Sorubim lima* (Schneider, 1801) (Pimelodidae); tiers antérieur de l'intestin.

MATÉRIEL EXAMINÉ: 1) Brésil, Etat du Parana, Rio Parana, Itaipu et Porto Rico, holotype IOC 32.560a, paratypes IOC 32.560b-c. IOC 32.561a-b. 2) Brésil, Etat du Parana, Rio Parana, Itaipu et Porto Rico, holotype (de *Goezeella nupeliensis* Pavanelli & Rego, 1991), IOC 32.562a, paratypes IOC 32.562b-c. IOC 32.563a. 3) Dép. Itapua, Rio Parana, Campichuelo, 17909 INVE, 28.02.1987. Dép. Central. Rio Paraguay, San Antonio, 17908 INVE, 28.10.1989; 19354 INVE, 27.11.1993; 21855 INVE, 04.11.1995.

P = 25 %; n = 24; I = 1-15 exemplaires; A = 1,25.

REMARQUES: PAVANELLI & REGO (1991, fig. 11, p. 10 et description p. 11) signalent des portions de l'ovaire émettant des hernies dans la médulla, que nous n'avons pas observées ni dans le matériel-type, ni dans le matériel récent. Par contre, une portion de l'ovaire correspondant à l'isthme ovarien se prolonge un peu dans la médulla avant de pénétrer dans le cortex dorsal (Fig. 52).

De plus, le matériel est caractérisé par un nombre similaire de testicules (55-100, MT = 76-90), par un scolex globuleux de forme comparable (Fig. 102) à celui de *Mariauxiella piscatorum* n. sp. (Fig. 105), par la présence de musculature circulaire développée dans les ventouses; par une disposition confluyente des follicules vitellins postérieurs, chevauchant la partie distale des lobes ovariens; par un développement de l'utérus particulier, avec des diverticules utérins digités et ramifiés, par la présence d'oeufs embryonnés dans l'utérus (Figs 53-54).

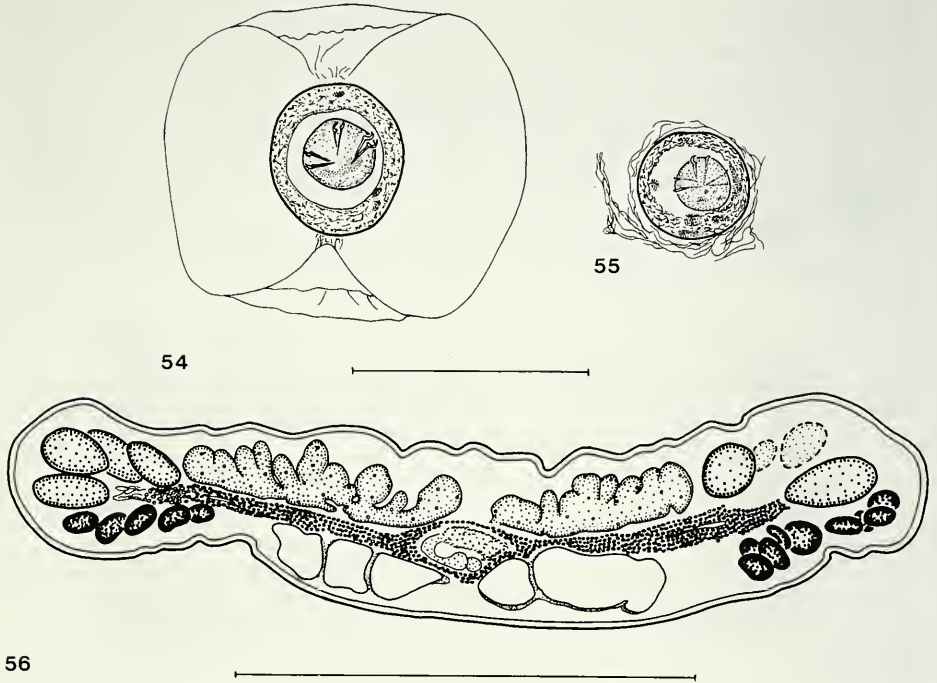


FIGS 52-53. *Paramonticellia itaipuensis* Pavanelli & Rego, 1991, paratype IOC 32.561b, 52, coupe transversale au niveau de l'ovaire; 53, Proglottis prégravid, vue ventrale, 17908 INVE. Echelle = 500 µm.

Dans le même hôte, PAVANELLI & REGO (1991) décrivent *Goezeella nupeliensis*. Nous avons revu le matériel-type et constaté que celui-ci est partiellement macéré. La forme et le diamètre des scolex et des ventouses sont semblables chez les types de *G. nupeliensis* et *P. itaipuensis* (ventouses uniloculées chez *G. nupeliensis* et non biloculées comme le décrivent PAVANELLI & REGO 1991, p. 11 et figure 13); les ventouses possèdent une musculature circulaire en forme de fer à cheval semblable; la taille et la forme du strobile et des proglottis ainsi que la forme de l'ovaire sont identiques. De plus, le nombre de testicules, la position antérieure du vagin par rapport à la poche du cirre, la position du pore génital sont similaires. Nous plaçons *G. nupeliensis* en synonymie de *P. itaipuensis*.

Spatulifer Woodland

Spatulifer Woodland, 1934a: 148; espèce-type: *Spatulifer surubim* Woodland, 1933b: 185, nec *Peltidocotyle rigosa* Diesing, 1850.
Spatulifer; BROOKS 1995: 364.



FIGS 54-56. 54, *Paramonticellia itaipuensis* Pavanelli & Rego, 1991, oeuf, 19354 INVE; 55-56, *Spatulifer maringaensis* Pavanelli & Rego, 1989, 55, oeuf, 17902 INVE, 56, coupe transversale au niveau de l'ovaire, 17902 INVE. Echelles: 54-55 = 50 μ m; 56 = 500 μ m.

Spatulifer maringaensis Pavanelli & Rego

Figs 55-56

Spatulifer maringaensis Pavanelli & Rego, 1989: 383.

Spatulifer maringaensis; BROOKS 1995: 365.

Hôte: *Hemisorubim platyrhynchos* (Valenciennes, 1840) (Pimelodidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Etat du Parana, Rio Parana, Itaipu et Porto Rico, syntypes IOC 32.487, 32.488a-c, 32.489 a-b. 2) Dép. Cordillera, Rio Piribebuy à 5 km au nord de Emboscada Nueva, 17903, 19526 INVE, 06-07.04.1985. Dép. Central, Rio Paraguay, San Antonio, 17902 INVE, 28.10.1989. Dép. Canendiyu, Salto del Guaira, 22902 INVE, 05.10.1989.

P = 38%; n = 13; I = 1-11 exemplaires; A = 1,38.

REMARQUES: La description sommaire de PAVANELLI & REGO (1989) correspond peu à nos observations. Au contraire, l'examen du matériel-type nous a conduit à cette identification, en raison des caractères suivants: diamètre des scolex 1035-1290 (MT = 1550), des ventouses 200-265 (MT = 265-310), nombre de testicules 119-176 (MT = 108-120), nombre de diverticules utérins, 16-23, (MT = 13-23), position

entièrement corticale de l'utérus (Fig. 56). En plus, nous observons dans notre matériel, un sphincter musculaire vaginal sub-proximal, annulaire, présent aussi dans le matériel-type, des pores génitaux irrégulièrement alternes débouchant entre les 17 et 30% (MT = 20-28%) de la longueur du proglottis, une poche du cirre représentant les 14-28% (MT = 20-26%) de la longueur du proglottis, des oncosphères (mesurées dans l'eau distillée) d'environ 12-13 de diamètre, pourvues de 6 crochets longs de 5-6,5; des embryophores arrondis, 21-26 de diamètre avec enveloppes externes hyalines collapsées (Fig. 55).

Spatulifer cf. maringaensis Pavanelli & Rego, 1989.

Hôte: *Sorubim lima* (Schneider, 1801) (Pimelodidae); deuxième tiers de l'intestin.

MATÉRIEL EXAMINÉ: Dép. Itapua, Rio Parana, Puerto Lopez, 17994 INVE, 07.02.1987; Ouro Verde, 17992 INVE, 16.02.1987; Campichuelo, 19536 INVE 23.08.1987. Dép. Neembucu Rio Parana, General Diaz Neembucu, 17991 INVE, 18.10.1989; Dép. Central, Rio Paraguay, San Antonio, 17989-90 INVE, 14.10.1989; 17988 INVE, 28.10.1989; 19527-35, 23843 INVE, 27.11.1993; 21857, 21859-60, 23843 INVE, 02-04.11.1995.

P = 100%; n = 24; I = 5 - plus de 245 exemplaires; A = non calculée

REMARQUES: Ces spécimens se rapprochent de *S. maringaensis*. La disposition des organes est similaire, le nombre des testicules (110-150), le rapport PC (21-24%), la position du pore génital (17-27%), le rapport OV (67i-71%) ainsi que le nombre de diverticules utérins (16-24) sont comparables. Par contre, le diamètre du scolex (660-855µ) est nettement inférieur.

Endorchiinae Woodland, 1934

WOODLAND (1934b) a établi la sous-famille des Endorchiinae pour le genre *Endorchis*. YAMAGUTI (1959) a révisé cette sous-famille et y ajoute le genre *Myzophorus*. Ces deux genres ont été mis en synonymie avec *Nomimoscolex* (REGO 1991; REGO & PAVANELLI 1992b). *Myzophorus* a été revalidé par REGO (1994) puis remis en synonymie avec *Nomimoscolex* (Rego 1995). Le genre *Endorchis* a été revalidé par de CHAMBRIER & VAUCHER (1997).

Endorchis Woodland

Endorchis WOODLAND 1934: 268; espèce-type: *Endorchis piraeba* Woodland, 1934b: 268.

Endorchis; DE CHAMBRIER & VAUCHER 1997: 229.

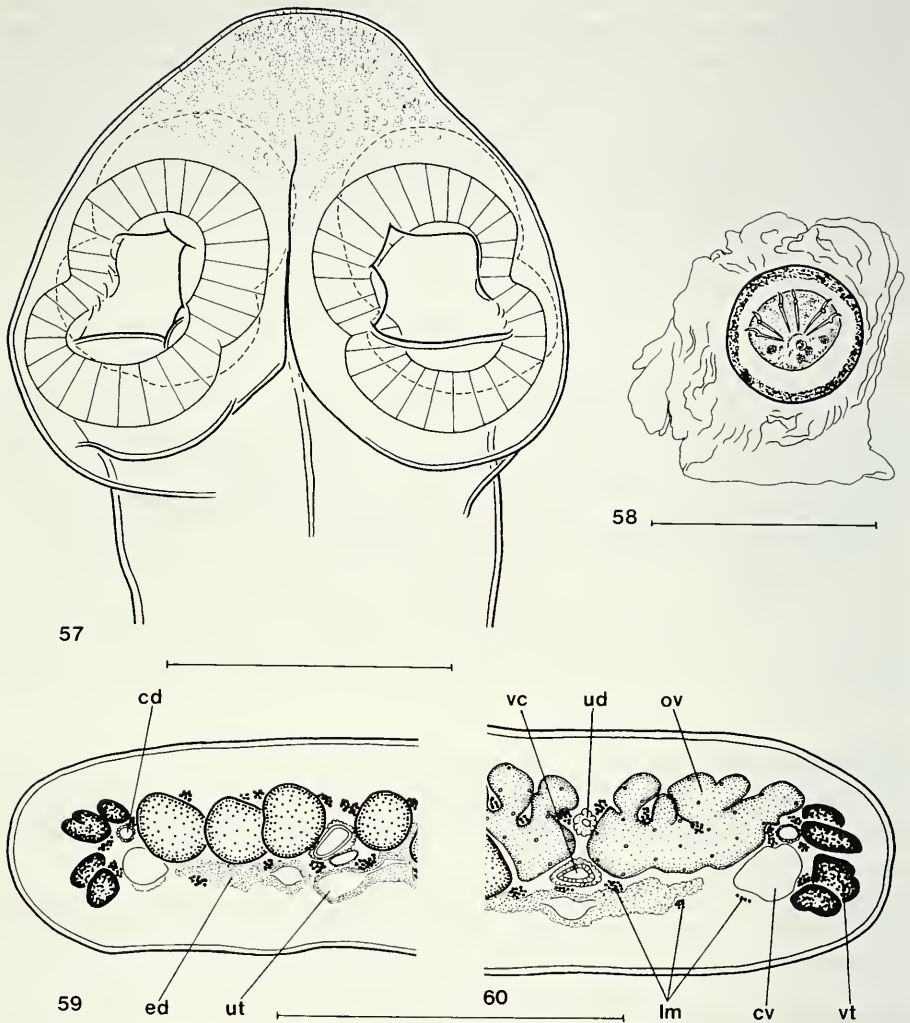
Endorchis auchenipteri n. sp.

Figs 57-61

Hôte: *Auchenipterus osteomystax* (Ribeiro) (Auchenipteridae).

MATÉRIEL EXAMINÉ: Dép. Neembucu, Rio Parana, General Diaz Neembucu, holotype 21976 INVE et 3 paratypes 21978, 24659-24660, autre matériel 21974, 21975, 21977, 24658 INVE, 18-19.10.1989. Dép. Presidente Hayes, Rio Salado, route Trans Chaco au pont sur le Rio Salado, 1 paratype 21980 INVE, autre matériel 21979 INVE, 08.10.1991.

P = 63%; n = 11; I = 1-9 exemplaires; A = 1,45.



FIGS 57-60. *Endorchis auchenipteri* n. sp., 57, holotype, 21976 INVE, scolex; 58, paratype 21980 INVE. oeuf; 59, paratype 21978 INVE. coupe transversale dans la partie postérieure d'un proglottis mature; 60, paratype 21978 INVE. coupe transversale au niveau de l'ovaire. Echelles: 57, 59-60 = 250 μ m; 58 = 50 μ m.

DESCRIPTION:

Strobiles acraspédotes, à maturation rapide, longs de 25-40mm. Zone de croissance longue de 250-300. Environ 40 proglottis jusqu'au premier mature, environ 44 proglottis avant l'arrivée des oeufs dans l'utérus (= stade prégravide) et environ 66 au total. Proglottis matures et gravides plus longs que larges.

Scolex de forme conique avec un apex bombé, plus large que le cou, de 495-530 de diamètre (Fig. 57). Ventouses allongées, biloculées, longues de 220-265. Amas important de cellules au cytoplasme granuleux sous l'apex (Fig. 57). Musculature longitudinale interne composée seulement de quelques faisceaux de fibres sans anastomoses observables (Figs 59-60). Canaux osmorégulateurs ventraux d'un diamètre irrégulier de 40-70, sans anastomoses observables, reliés entre eux postérieurement. Canaux ventraux pourvus d'un diverticule débouchant postérieurement de chaque côté au niveau de l'ovaire, sous la surface du tégument ventral (Fig. 61). Canaux osmorégulateurs dorsaux de 8-20 de diamètre.

Testicules médullaires en un champ dorsal, au nombre de 49-79 ($x = 59$, $n = 29$, $CV = 12.7$), atteignant les follicules vitellins, ne dépassant pas les canaux excréteurs (Fig. 61). Poche du cirre, allongée, piriforme, à paroi terminale épaissie, $PC = 26-34\%$ ($n = 15$). Canal éjaculateur contourné. Atrium génital présent. Pore génital antérieur représentant les 15-27% ($n = 17$) de la longueur du proglottis. Vagin toujours antérieur, avec un sphincter musculaire sub-proximal très discret (Fig. 61). Glande de Mehlis exceptionnellement développée, de 155-250 de diamètre, représentant les 24-32% de la largeur du proglottis (Fig. 61).

Ovaire médullaire bilobé, folliculé, occupant jusqu'à 40% de la longueur du proglottis (Fig. 61), avec de larges expansions dans le cortex dorsal (Fig. 60). Rapport $OV = 64-75\%$ ($n = 16$).

Follicules vitellins latéraux corticaux, ininterrompus dorsalement au niveau de la poche du cirre, occupant les 92-99% de la longueur du proglottis, avec leur portion postérieure légèrement plus étendue ventralement en direction de l'ovaire (Fig. 61).

Utérus préformé, visible dans les anneaux immatures, occupant environ 35% de la largeur du proglottis dans les derniers anneaux immatures. Apparition d'une lumière dans le tronc utérin dans les premiers anneaux matures. Tronc utérin cortical développant des diverticules utérins médullaires (Figs 59-60). Paroi externe distale des diverticules utérins entourée d'un grand nombre de cellules chromophiles. A maturité, utérus avec 21-27 diverticules utérins de chaque côté, en une ou deux couches, occupant la presque totalité de la largeur du proglottis. Evacuation des oeufs par une ou plusieurs ouvertures longitudinales ventrales. Oncosphères irrégulièrement arrondies de 18-21 de diamètre, pourvues de 6 crochets longs de 9.5-10.5, embryophores arrondis de 29-32 (Fig. 58), enveloppe externe hyaline de plus de 80 lorsqu'elle est turgescente.

REMARQUES: *E. auchenipteri* n. sp. diffère de la seule autre espèce du genre, *Endorchis piraebea* Woodland, 1934 (DE CHAMBRIER & VAUCHER 1997; préparations BMNH 1964.12.15.65-70) par les caractères suivants: le nombre de testicules (100-150), la taille de la glande de Mehlis (env. 8-10% de la largeur du proglottis) et de l'ovaire (environ 15% de la longueur du proglottis), la position du pore génital, la forme du sphincter vaginal, la musculature longitudinale interne, ainsi que la disposition des follicules vitellins (deux bandes dorso-latérales et deux bandes ventro-latérales).

La glande de Mehlis est particulièrement développée chez *Endorchis auchenipteri* n. sp. Le rapport diamètre de la glande de Mehlis sur la largeur du proglottis est

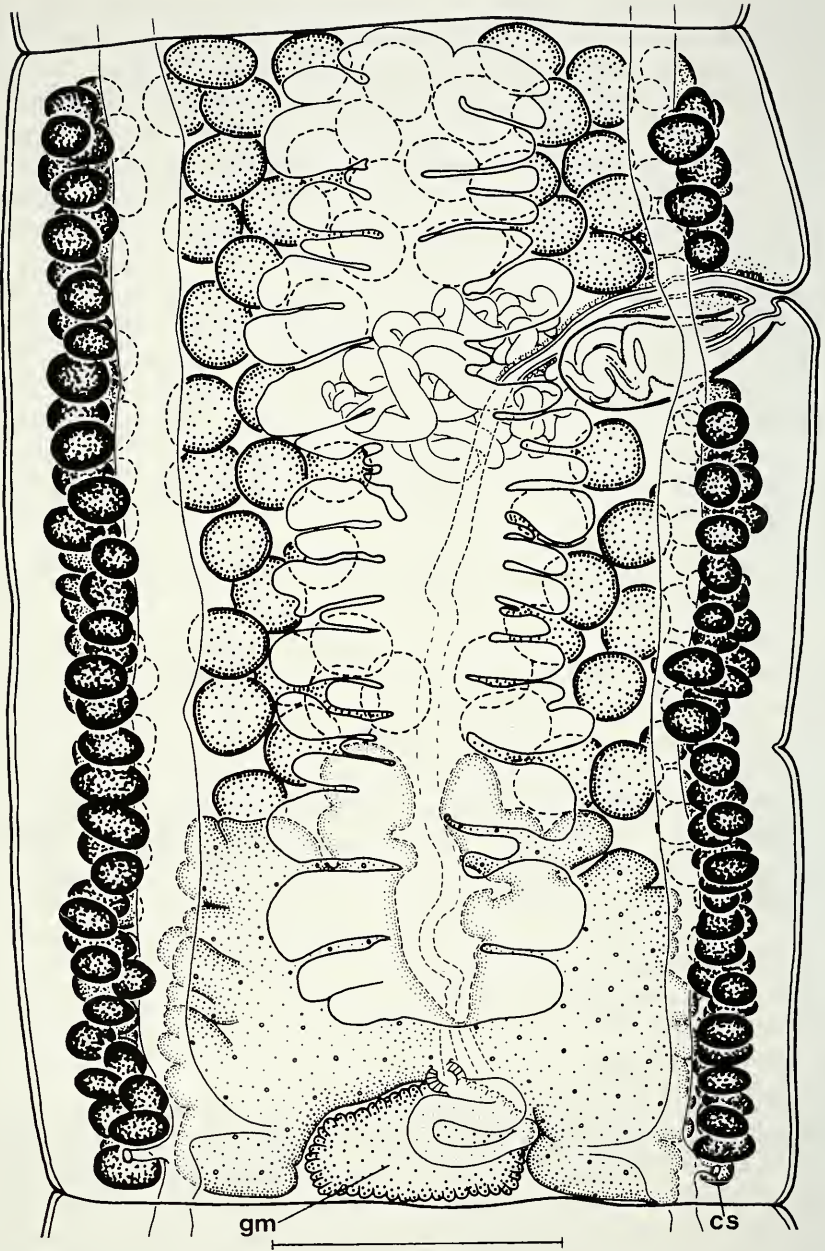


FIG. 61. *Endorchis auchenipteri* n. sp., paratype 24659 INVE, proglottis prégravide, vue ventrale. Echelle = 250 μ m.

environ 3 fois plus élevé que chez *Endorchis piraeeba*, respectivement 24-32% et 8-10%. Chez les Proteocephalidea, en général la dimension de la glande de Mehlis n'excède pas 10% de la largeur du proglottis.

Auchenipterus osteonystax est signalé ici pour la première fois comme hôte d'un cestode Proteocephalidea.

Le nom de cette espèce nouvelle est dérivé du nom de genre de l'hôte.

Endorchis sp.

Hôte: *Trachelyopterus striatulus* (Steindachner, 1876) (Pimelodidae)

MATÉRIEL EXAMINÉ: Dép. Concepcion, Laguna Negra, Estancia Laguna Negra, 21981 INVE, 18.10.1985.

P = 50%; n = 2; I = 1 exemplaire; A = 0,5.

REMARQUE: Cet unique exemplaire présente des proglottis tératologiques et ne semble appartenir à *Endorchis auchenipteri* n. sp. Il ne paraît pas identifiable.

Endorchis sp.

Hôte: *Pimelodus* cf. *maculatus* Lacépède, 1803 (Pimelodidae).

MATÉRIEL EXAMINÉ: Dép. Concepcion, Estancia Laguna Negra, 22356 INVE, 16.10.1985.

P = 5.5%; n = 18; I = 5 exemplaires; A = 0,28.

REMARQUES: Ces spécimens, distincts apparemment de *Endorchis auchenipteri* n. sp., sont caractérisés par 76-96 testicules en un champ, par un rapport PC de 23-26%, par un rapport PG de 26-34%, par un vagin toujours antérieur à la poche du cirre, avec un sphincter vaginal proximal. Le matériel étant très fragmenté, nous renonçons à une étude plus détaillée.

Zygobothriinae Woodland, 1933

Gibsoniela Rego

Gibsoniela Rego, 1984: 89; espèce-type: *Anthobothrium mandube* Woodland, 1935b: 208.

REGO (1984a) a décrit le genre *Gibsoniela* (Monticelliidae: Zygobothriinae) pour classer *Anthobothrium mandube* Woodland, 1935 qui possède des ventouses trilocolées.

REGO (1992) considère *Endorchis mandube* comme synonyme de *G. mandube*. Une révision du matériel-type de *Gibsoniela mandube* (Woodland, 1935) et de *Endorchis mandube* Woodland, 1935, ainsi que de matériel récemment récolté nous a convaincu qu'il s'agit de deux espèces distinctes.

Endorchis mandube, possédant des ventouses trilocolées, est à transférer dans le genre *Gibsoniela*, où il tombe en homonymie secondaire avec *G. mandube* (Woodland, 1935) Rego, 1984. Nous le désignons sous le nom de *Gibsoniela meursaulti* nom. nov.

Gibsoniela mandube (Woodland)

Fig. 101

Anthobothrium maudube Woodland, 1935b: 208.*Gibsoniela mandube* (Woodland, 1935) REGO 1984: 89.*Endorchis mandube*; DE CHAMBRIER 1990: 95; REGO 1991: 231.*Gibsoniela maudube*; REGO 1992: 418.*Nominoscolex maudube*; BROOKS 1995: 361.

- 1) Hôte: *Pseudogeneiosus brevifilis* (= *Ageneiosus brevifilis*) (Ageneiosidae),
 2) Hôte: *Ageneiosus brevifilis* Valenciennes, 1840.

MATÉRIEL EXAMINÉ: 1) Brésil, Etat d'Amazonas, marché de Manaus, "Amaz 36", syntypes (BMNH 1965.2.23.18-23), automne 1931. 2) Itacoatiara, Etat Amazonas, Brésil, INVE 19853, 15.09.1992.

REMARQUES: Nous avons revu le matériel-type de Woodland ainsi que du matériel récemment récolté en Amazonie. Ce taxon diffère de *Gibsoniela meursaulti* nom. nov. par la taille du scolex (respectivement 230-280, MT = 205 contre 1230-1435, MT = 750) (Fig. 101), par la disposition du champ testiculaire (respectivement 1 champ contre 2 champs convergents antérieurement), par la disposition des follicules vitellins en coupes transversales (de Chambrier 1990, Fig. 5a) et par la position du pore génital (respectivement 34-46%, MT = 30-41% contre 20-34%, MT = 18-31%), contrairement à l'affirmation de Rego (1984a, 1985).

Gibsoniela meursaulti nom. nov.

Fig. 100

Nom de remplacement pour *Endorchis maudube* Woodland, 1935, non *Gibsoniela maudube* (Woodland, 1935) Rego, 1984 [= *Anthobothrium mandube*]

Hôte: *Ageneiosus brevifilis* Valenciennes, 1840 (Ageneiosidae); moitié postérieure de l'intestin

MATÉRIEL EXAMINÉ: 1) Brésil, Etat d'Amazonas, marché de Manaus, syntypes: "Amaz 5", BMNH 1965.12.15.63-64, automne 1931. 2) Dép. San Pedro, Rio Jejuí-Guazu près du pont sur la route de Lima, 19854 INVE, 09.10.1985; Dép. Central, Rio Paraguay, San Antonio, 19855-19856 INVE, 29.11.1993; 21833-21840, 21842-21843, 21863, 21917-21918, 21932, 22923, 22926 INVE, 02-06.11.1995.

P = 70%, n = 20; I = 2-62 exemplaires; A = 9,25.

REMARQUES: *Endorchis maudube* Woodland, 1935 possède des ventouses triloculées et il est caractérisé par des testicules médullaires dorsaux, un ovaire médullaire émettant dorsalement des lobules dans le cortex, des follicules vitellins latéraux paramusculaires (DE CHAMBRIER 1990, Fig. 5d), un tronc utérin cortical avec développement des diverticules médullaires. Nous le transférons dans le genre *Gibsoniela*.

Ce matériel est caractérisé par un scolex de 1230-1435 (MT = 750) (Fig. 100) de diamètre avec présence d'un réseau très dense appartenant au système osmorégulateur (ainsi qu'un amas de cellules au cytoplasme granuleux prolongé antérieurement par plusieurs faisceaux de fibres allongées aboutissant juste sous le tégument de l'apex); 78-120 testicules ($x = 95$, $n = 6$, MT = environ 150 selon Woodland); un pore génital antérieur représentant les 20-34% (MT = 18-31%) de la longueur du proglottis; une poche du cirre représentant les 21-34% de la largeur du proglottis. Un vagin antérieur avec manchon cellulaire et sphincter musculaire distal. Un ovaire

folliculé représentant les 65-75% de la largeur du proglottis; un utérus avec 8-14 diverticules utérins; une présence de crochets dans les embryons.

Le nom *meursaulti* nom. nov. se réfère à l'extraordinaire vin blanc de Meursault (Bourgogne).

Harriscolex Rego

Harriscolex Rego, 1987: 207; espèce-type: *Nomimoscolex kaparari* Woodland, 1935b: 217.

Nomimoscolex Woodland 1934b: 272, partim.

La forme très particulière du scolex et des ventouses a incité REGO (1987) à isoler *Nomimoscolex kaparari* Woodland, 1935 dans un genre à part. Les ventouses possèdent une excroissance pointue sur les deux côtés de chaque marge antérieure ainsi qu'une forme allongée en cupule (Fig. 62) qui ressemble à celle des ventouses de *Choanoscolex abscisus* (Riggenbach, 1896).

Harriscolex cf. kaparari (Woodland)

Figs 62-65

Nomimoscolex kaparari Woodland, 1935b: 217.

Harriscolex kaparari; Rego 1987: 207; Rego 1990: 999.

Hôtes: 1) *Pseudoplatystoma tigrinum* (Valenciennes, 1840); 2) *Pseudoplatystoma coruscans* (Agassiz, 1829) (Pimelodidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Rio Amazonas, entre Manaus et Santarem, syntypes (BMNH 1964.12.15.132-137), automne 1931. 2) Dép. Itapua, Campichuelo, 19508, 22328 INVE, 12.05.1987; 19509 INVE, 27.05.1987; Arroyo Yabebyry, en face de Cambyreta, 22917 INVE, 14.08.1987.

P = 33 %; n = 12; I = 2 à plus de 35 exemplaires; A = non calculée

REMARQUES: Nos spécimens sont similaires au matériel-type de *Harriscolex kaparari* (Woodland, 1935) que nous avons revu et au matériel étudié par Rego (WOODLAND 1935b; REGO 1990) par: la forme particulière des ventouses (Fig. 62), le nombre de testicules (92-115, $x = 103$ dans notre matériel, MT = 68-102, $x = 86$) (Fig. 65), la disposition dorso-ventrale des follicules vitellins (Fig. 64), une position antérieure du vagin par rapport à la poche du cirre, un tronc utérin cortical et des diverticules médullaires (Fig. 63) et le rapport OV (65-80%, MT = 68-74%).

Par contre, nos exemplaires diffèrent surtout par le diamètre du scolex (725-790, MT = 285-335) ainsi que par le nombre de diverticules utérins de chaque côté (16-21, MT = 8-10). Les caractères suivants présentent des variations: position du pore génital (39-49%, MT = 27-38%), rapport PC (36-42%, MT = 29-37%).

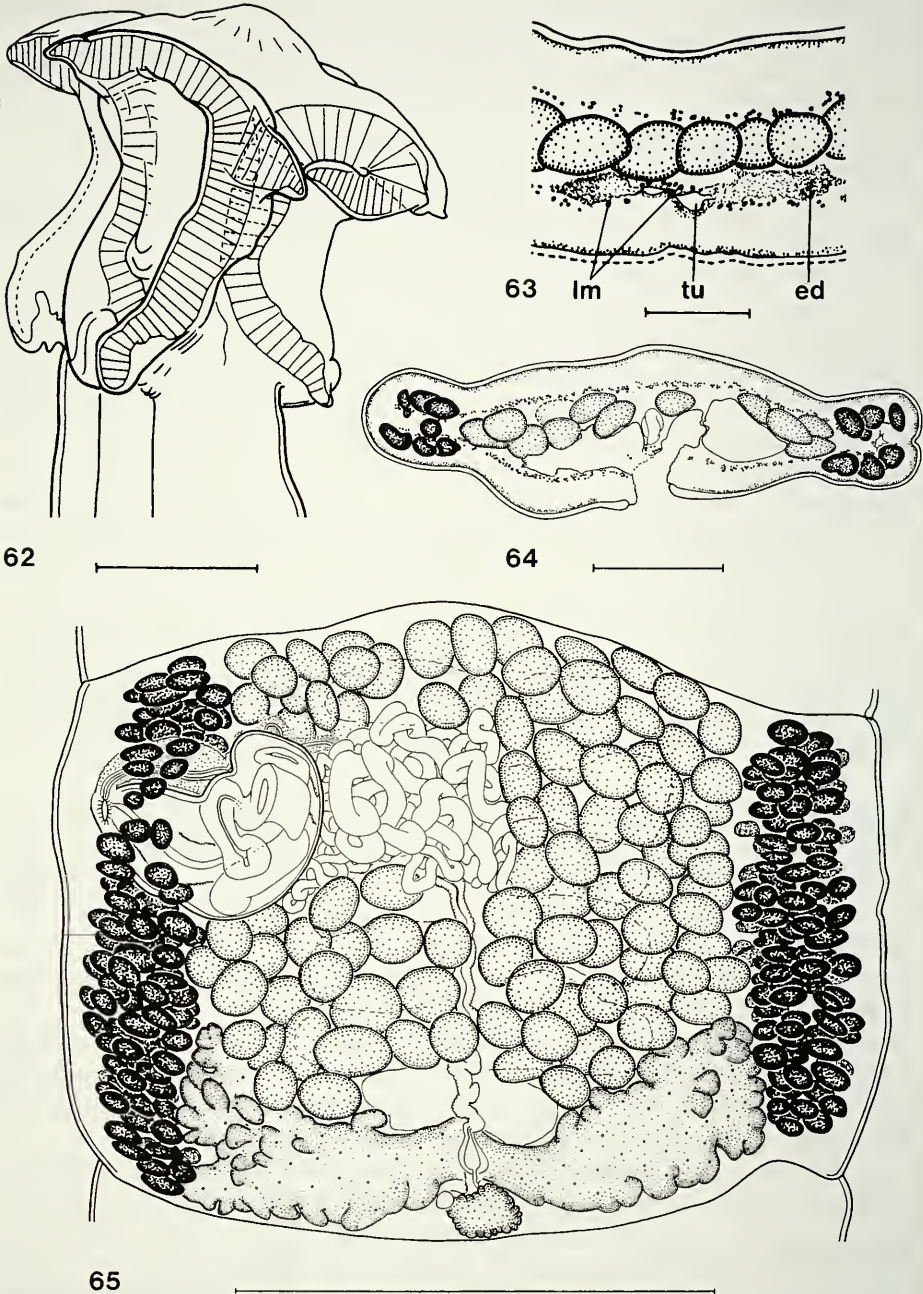
Un exemplaire aberrant, 19508 INVE, diffère par une position principalement postérieure (88%, n = 27) du vagin par rapport à la poche du cirre.

Nomimoscolex Woodland

Nomimoscolex Woodland, 1934b: 272; espèce-type: *Nomimoscolex piraeba* Woodland, 1934b: 272.

Nomimoscolex; DE CHAMBRIER & VAUCHER 1997: 224.

Paramonticellia Pavanelli & Rego, 1991, partim, BROOKS 1995: 364.



FIGS 62-65. *Harriscolex kaparari* (Woodland, 1935), syntype BMNH 1964. 12.15.132-137; 62, scolex; 63, détail d'une coupe transversale montrant le tronc utérin cortical et les diverticules médullaires; 64, coupe transversale dans la partie antérieure d'un proglottis gravide; 65, proglottis gravide, vue dorsale. Echelles: 62, 63 = 100 µm; 64 = 250 µm; 65 = 500 µm.

Toutes les espèces de ce genre ont été récemment revues et la diagnose du genre a été modifiée (DE CHAMBRIER & VAUCHER 1997).

Nomimoscolex chubbi (Pavanelli & Takemoto)

Figs 66-72

Proteocephalus chubbi Pavanelli & Takemoto, 1995: 595.

Nomimoscolex chubbi; DE CHAMBRIER & VAUCHER 1997: 226.

Hôte: *Gymnotus carapo* Linnaeus, 1758 (Gymnotidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Etat du Parana, Rio Parana, Porto Rico, holotype IOC 33.188, paratypes IOC 33.189a-b. 2) Dép. Neembucu, 18 km Sud est de San Lorenzo Neembucu, 20351 INVE et 20352 INVE, 17.10.1989; Dép. Concepcion, Estancia Santa Sofia, 20353 INVE, 27.10.1987; Dép. Misiones, Panchito Lopez, 20354 INVE, 22.10.1982.

3P = 57%; n = 7; I = 1-2 exemplaires; A = 1.

REMARQUES: L'examen du type ainsi que la description originale de ce matériel confirme la présence de follicules vitellins principalement corticaux (fig. 11, p. 596), plaçant ce taxon dans les Zygobothriinae (Monticelliidae).

La présence dans le scolex de cellules au cytoplasme finement granuleux avait déjà été signalée (DE CHAMBRIER & VAUCHER 1997, pp. 226-227). Ces cellules sont particulièrement remarquables chez cette espèce (Figs 66-67, 69). Dans le scolex, au niveau des ventouses, on observe un amas de cellules de forme arrondie ou oblongue au cytoplasme finement granuleux, s'amincissant en direction de l'apex (Fig. 66). Sous l'apex (Fig. 67) ainsi qu'antérieurement aux ventouses (Fig. 69), de nombreuses cellules de structure similaire, mais très allongée en direction de la surface du tégument sont présentes.

De plus, un sphincter vaginal est présent (Fig. 71). L'utérus possède un tronç utérin cortical et des diverticules médullaires (Figs 68, 69). L'oeuf a une embryophore non adhérente à l'oncosphère (Fig. 72)

Nomimoscolex lopesi Rego

Figs 73-75

Nomimoscolex lopesi Rego, 1989: 455.

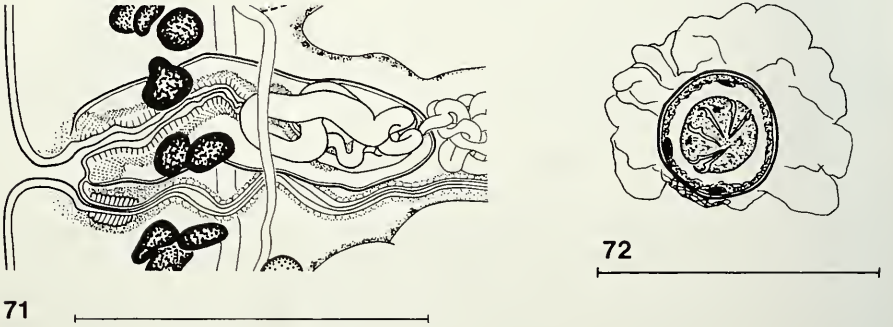
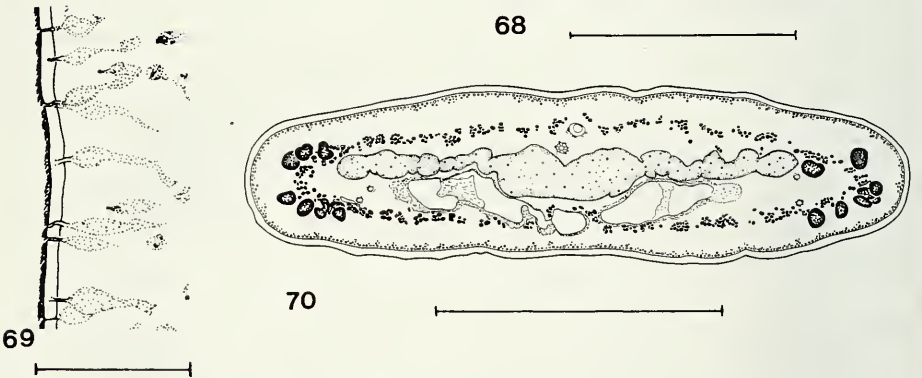
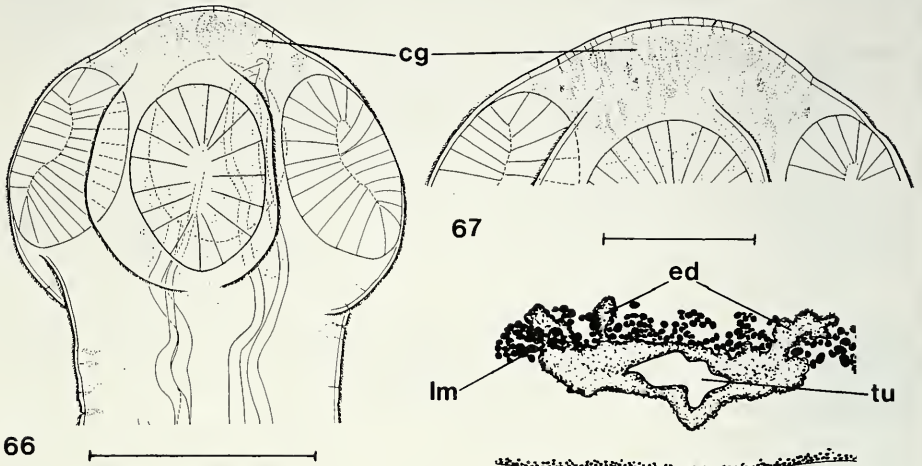
Paramonticellia lopesi; BROOKS 1995: 364.

Hôte: *Pseudoplatystoma fasciatum* (Linnaeus, 1766) (Pimelodidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Mato Grosso, Rio Miranda et Rio Cuiaba, holotype IOC 32.553a, paratypes IOC 32.553b-c, IOC 32.553d. 2) Dép. Central, Rio Paraguay, San Antonio, 21963 INVE, 06.11.1995.

P = 33%; n = 3; I = 1 exemplaire; A = 0,33.

REMARQUES: Ce matériel est caractérisé par 240-268 (x = 254, MT = 221-318, n = 7, x = 256) testicules disposés en un champ dorsal régulier, divisé longitudinalement par les canaux osmorégulateurs (Fig. 75), un pore génital situé antérieurement (21-34%, MT = 22-30%), 19-28 (MT = 18-27) diverticules utérins de chaque côté et par une position antérieure du vagin par rapport à la poche du cirre (Fig. 74). Les spécimens sont semblables à l'holotype (No IOC 32553a, Figs 74-75) que nous avons révisé. De plus, un sphincter vaginal proximal est présent, l'utérus est entièrement médullaire (Fig. 73) et l'utérodute est très long.



Nomimoscolex matogrossensis Rego & Pavanelli

Nomimoscolex matogrossensis Rego & Pavanelli, 1990: 96.

Nomimoscolex matogrossensis; DE CHAMBRIER, SCHOLZ & VAUCHER 1996: 136.

Hôte: *Hoplias malabaricus* (Bloch, 1794) (Erythrinidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Mato Grosso, Salobra, holotype IOC 32.512, paratype IOC 32.513, IOC 32.514a-c. 2) Dép. Concepcion, Estancia Santa Sofia, 17912 INVE, 29.10.1987; Dép. San Pedro, Arroyo Tapiracuayi, 8 km nord-ouest de San Estanislao, 17913 INVE, 24.10.1989.

P = 3.8%; n = 52; I = 1-3 exemplaires A = 0,08.

Nomimoscolex cf. microacetabula Gil de Pertierra

Hôtes: 1) *Pimelodus maculatus* Lacépède, 1803; 2) *Pimelodus albicans* Valenciennes, 1840; 3) *Pimelodus ornatus* Kner, 1857 (Pimelodidae).

MATÉRIEL EXAMINÉ: 1) Argentine, Rio de la Plata, puerto de Buenos Aires, holotype No 372/1. 2) Argentine, Rio de la Plata, puerto de Buenos Aires, paratype No 372/2. 3) Dép. Caazapa, Rio Pirapo, à 3km à l'est de Yegros, 22362 INVE, 29.03.1985. Dép. Central, Rio Paraguay, San Antonio, 22363 INVE, 28.10.1989.

P = 100%; n = 2; I = 5-27 exemplaires; A = 16.

REMARQUES: ces spécimens se rapprochent de *N. microacetabula* Gil de Pertierra, 1995 par la forme et la structure du scolex (présence de cellules glandulaires dans la région apicale et post-acetabulaire), par le diamètre du scolex (200-210, MT = 200-240), par le nombre et la disposition des faisceaux de la musculature longitudinale interne, par la position antérieure du vagin par rapport à la poche du cirre. Il présente de faibles différences en ce qui concerne le nombre de testicules (26-43, MT = 40-65), la position du pore génital (46-54%, MT = 34-45%) et le rapport PC (38-46%, MT = 26-36%). Dans le matériel-type, le tronc utérin est cortical (voir GIL DE PERTIERRA 1995, fig. 5, p. 21), comme dans notre matériel.

Nomimoscolex sp.

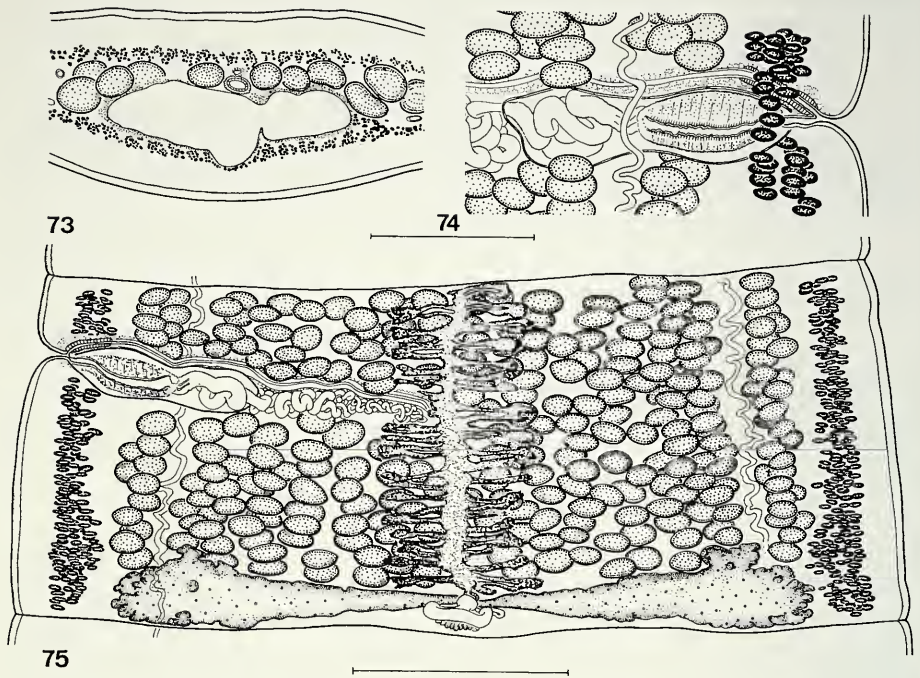
Hôte: *Luciopimelodus pati* (Valenciennes, 1840) (Pimelodidae)

MATÉRIEL EXAMINÉ: Dép. Central, Rio Paraguay, San Antonio, 22326 INVE, 22327 INVE 28.10.1989.

P = 40%; n = 5.

REMARQUES: Il s'agit de 4 spécimens fragmentés non identifiables.

FIGS 66-72. *Nomimoscolex chubbi* (Pavanelli & Takemoto, 1995). 66, 20351 INVE, scolex; 67, 20351 INVE, détail de la partie apicale du scolex; 68, 20351 INVE, coupe transversale d'un proglottis mature montrant le tronc utérin cortical développant l'ébauche des diverticules médullaires; 69, 20351 INVE détail de la partie latérale de la zone de croissance montrant les cellules au cytoplasme granuleux débouchant à la surface du tégument; 70, 20351 INVE, coupe transversale au niveau de l'ovaire; 71, 20353 INVE, vagin et poche du cirre, vue dorsale; 72, 20353 INVE oeuf. Echelles: 66 = 200 µm; 67,68 = 100 µm; 69,72 = 50 µm; 70 = 500 µm; 71 = 250 µm.



FIGS 73-75. *Nomimoscolex lopesi* Rego, 1989. 73, 21963 INVE, coupe transversale de la partie postérieure d'un proglottis prégravid; 74-75, holotype, IOC 32553a; 74, vagin et poche du cirre, vue dorsale; 75, proglottis mature, vue ventrale. Echelles: 73-74 = 250 μ m; 75 = 500 μ m.

Travassiella Rego & Pavanelli

Travassiella Rego & Pavanelli, 1987: 358; espèce-type: *Travassiella avitellina* Rego & Pavanelli, 1987: 358.

Travassiella; REGO 1994: 261.

REGO & PAVANELLI (1987) et REGO (1994) placent ce genre dans les Proteocephalinae en raison de la position médullaire des testicules, de l'ovaire et de l'utérus. Ils considèrent que la principale caractéristique générique de ce taxon est l'absence de follicules vitellins. Ces derniers sont pourtant présents dans tout le matériel examiné. En effet, il y a des follicules vitellins latéraux corticaux diffus, peu chromophiles, de forme allongée. Ils sont disposés en forme de croissant en coupes transversales, dont les extrémités dorsales et ventrales chevauchent les testicules et les lobes de l'ovaire.

En raison de la position corticale des follicules vitellins et de la position médullaire des autres organes génitaux, nous transférons le genre *Travassiella* dans la sous-famille des Zygobothriinae.

TravassIELla avitellina Rego & Pavanelli

TravassIELla avitellina Rego & Pavanelli, 1987: 358.

Hôte: *Paulicea luetkeni* (Steindachner, 1876) (Pimelodidae); tiers postérieur de l'intestin.

MATÉRIEL EXAMINÉ: 1) Brésil, Mato Grosso, Rio Parana, Itaipu, Salobra, et Etat de Sao Paulo, Pirasununga, holotype IOC 32.259, autre matériel 32.260 a-b. 2) Dép. Central, Rio Paraguay, San Antonio, 19315 INVE, 27.11.1993.

P = 100 %; n = 1; I = plus de 18 exemplaires; A = 0,18.

REMARQUES: Notre matériel présente un nombre inférieur de testicules (49-77, $x = 61$, $n = 25$) à celui mentionné dans la description originale (environ 100). Pourtant, dans le matériel-type (IOC 13.425), nous avons dénombré 59-96 ($x = 77$, $n = 9$) testicules. Sur la figure originale (Fig. 3), REGO & PAVANELLI (1987) illustrent 47 testicules.

En plus des observations de REGO & PAVANELLI (1987), nous remarquons la présence d'un puissant sphincter vaginal proximal, de 4-6 faisceaux de muscles peu développés dorsalement et ventralement ainsi que d'une musculature basale bien développée.

Nupeliinae Pavanelli & Rego, 1991

Chez *Nupelia portoricensis* Pavanelli & Rego, 1991, nous observons un tronc utérin cortical, développant des diverticules principalement corticaux, aboutissant parfois dans la médulla (Fig. 77). Ce caractère n'a pas été observé en détail par REGO & PAVANELLI (1991), ce qui a une répercussion dans la diagnose de la sous-famille.

Nupelia Pavanelli & Rego

Nupelia Pavanelli & Rego, 1991: 8; espèce-type: *Nupelia portoricensis* Pavanelli & Rego, 1991: 8.

Nupelia portoricensis Pavanelli & Rego

Figs 76-78, 103

Nupelia portoricensis Pavanelli & Rego, 1991: 8.

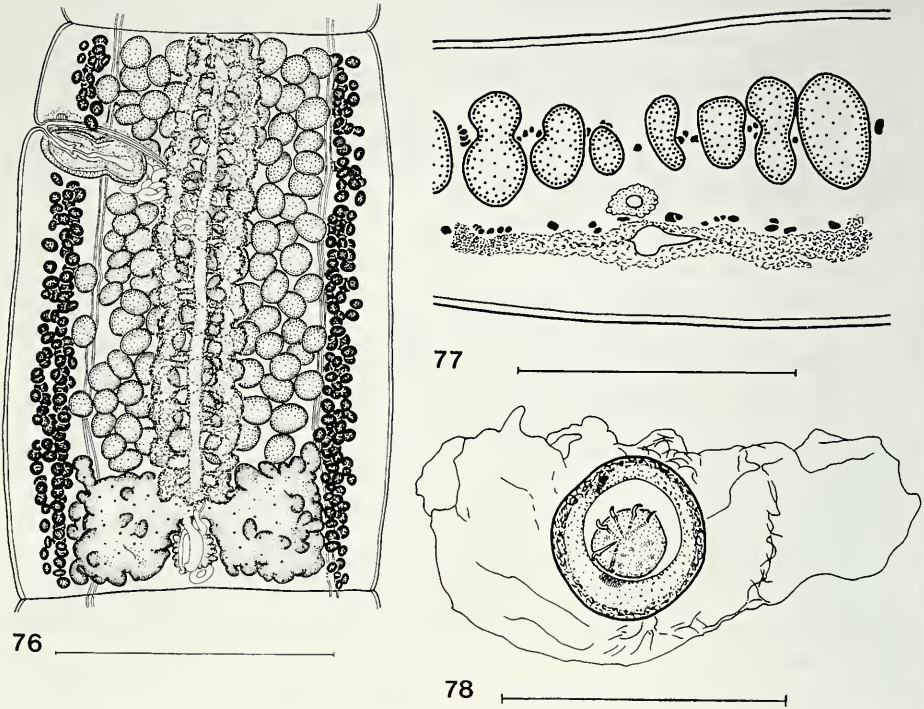
Nomimoscolex portoricensis; BROOKS 1995: 365.

Hôte: *Sorubim lima* (Schneider, 1801) (Pimelodidae); tiers postérieur de l'intestin.

MATÉRIEL EXAMINÉ: 1) Brésil, Etat du Parana, Rio Parana, Itaipu et Porto Rico, paratype IOC No 32558 c (préparation totale) et 32559a-b (coupes transversales). 2) Dép. Central, Rio Paraguay, San Antonio: 17911 INVE, 28.10.1989; 17910, 19355 INVE, 14.10.1989; 17911 INVE, 28.10.1989; 19379-19380 INVE, 27.11.1993; 21856, 21987 INVE, 04.11.1995.

P = 25%; n = 24; I = 2-10 exemplaires; A = 1,9.

REMARQUES: Nous avons comparé les spécimens du Paraguay avec le matériel-type de PAVANELLI & REGO (1991). Nos exemplaires sont caractérisés par un diamètre du scolex 155-265 (MT = 230) et des ventouses 120-160 (MT = 100-130), par 122-185 ($n = 149$, $x = 12$, MT = 120-136) testicules en un champ (Fig. 76), par des pores génitaux débouchant entre les 14 et 20% (MT = 17-18%) de la longueur du proglottis, par un rapport PC 16-22% (MT = 24-26%), par un vagin toujours antérieur à la poche du cirre et par un utérus avec 22-34 (MT = 30-35) diverticules de chaque côté.



FIGS 76-78. *Nupelia portoricensis* Pavanelli & Rego, 1991. 76, paratype, IOC 32.558c, proglottis mature, vue ventrale; 77, paratype, IOC 32.559a, coupe transversale dans la partie postérieure. 78. oeuf, 17910 INVE. Echelles: 76 = 500 μ m; 77 = 250 μ m; 78 = 50 μ m.

En plus de la description originale, nous observons: des ventouses dont la marge externe est saillante (Fig. 103), un cirre très particulier; la présence d'un sphincter vaginal (Fig. 76); un utérus principalement cortical (Fig. 77); des oncosphères arrondies, d'un diamètre de 11-13, pourvues de 6 crochets longs d'environ 6-7 avec embryophore de 27-29 de diamètre et enveloppe intermédiaire d'un diamètre de 16-20; enveloppe externe hyaline avec un diamètre d'environ 130 (Fig. 78).

La formation des diverticules utérins débute par une paroi très épaisse composée de cellules fortement chromophiles dans leur face externe, dans les anneaux matures et prégravides. Dans les anneaux gravides, la face interne des diverticules s'est épaissie notablement.

***Nupelia tomasi* n. sp.**

Figs 79-84

Hôtes: 1) *Trachelyopterus galeatus* (Linnaeus, 1766) (= *Parauchenipterus galeatus*, voir BERTOLETTI *et al.* 1992); 2) *Trachelyopterus* cf. *striatulus* (Steindachner, 1876) (= *Parauchenipterus* cf. *striatulus*) (Auchenipteridae).

MATÉRIEL EXAMINÉ: 1) Dép. Misiones, Arroyo Yabebyry, holotype 21971 INVE, 2 paratypes 24661-24662, autre matériel 24663-24664, 24715 INVE, 04.11.1993.

P = 5.2%; n = 19; I = 5 exemplaires; A = 0,26.

2) Dép. Neembucu, 18 km à l'est de San Lorenzo Neembucu, lagunes du Rio Parana, 1 paratype 21970 INVE, 17.10.1989.

P = 50%; n = 2; I = 3 exemplaires; A = 1,5.

DESCRIPTION:

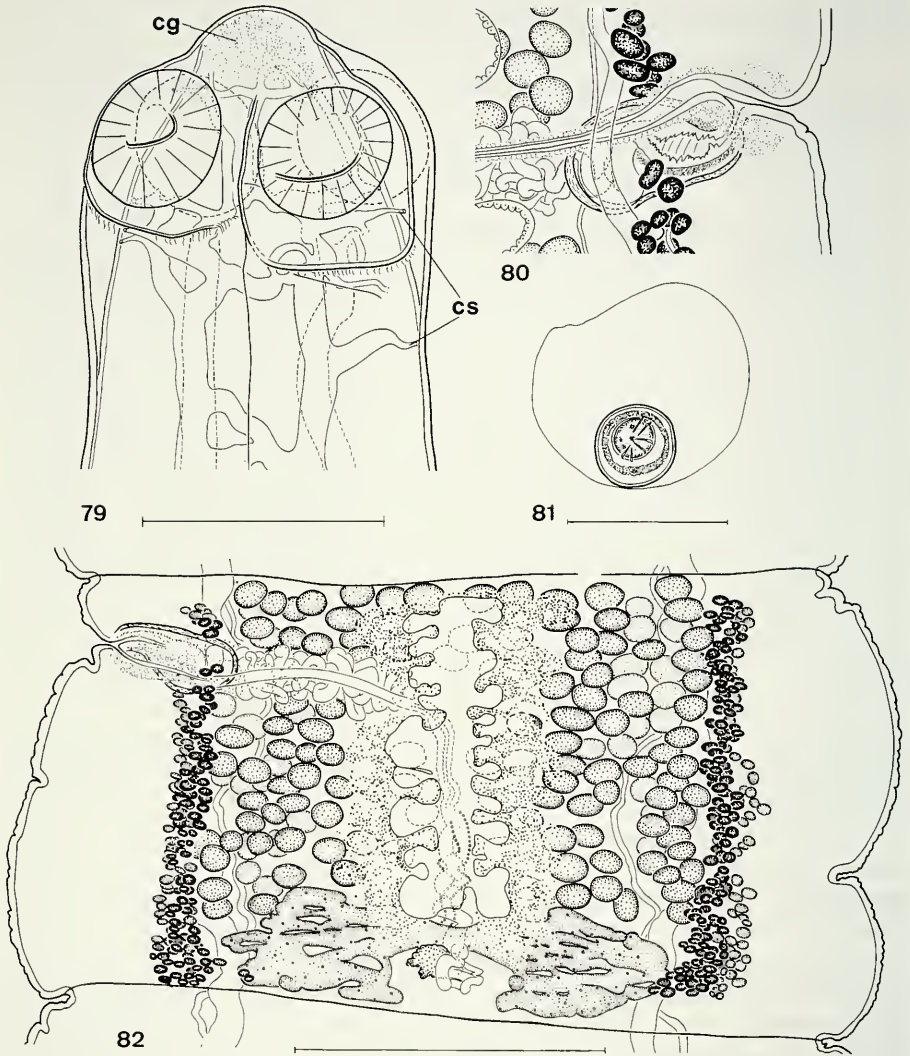
Strobiles acraspédotes à maturation lente, longs de 42-72 mm. Zones de croissance longue de 2,5 - 4 mm. Environ 128 proglottis jusqu'au premier mature, environ 145 avant l'arrivée des oeufs dans l'utérus (= stade prégravidé) et environ 180 au total. Scolex de 375-540 de diamètre, avec protubérance apicale et présence de nombreuses cellules au cytoplasme granuleux sous l'apex et autour des ventouses (Fig. 79). Ventouses uniloculées ovales de 145-165 de diamètre. Musculature longitudinale interne puissante, peu anastomosée, composée de faisceaux isolés, avec latéralement 3-6 gros faisceaux entourant le nerf longitudinal (Fig. 83-84). Canaux osmorégulateurs ventraux d'un diamètre irrégulier de 10-70, reliés entre eux postérieurement; dorsaux de 3-15 de diamètre. Canaux osmorégulateurs chevauchant la poche du cirre au niveau de sa partie distale ou au niveau du canal déférent (Fig. 80). Dans le scolex et en arrière des ventouses, canaux secondaires débouchant sous la surface du tégument (Fig. 79).

Testicules en majorité médullaires, au nombre de 144-180 (n = 6), quelques-uns paramusculaires ou corticaux, en un champ, dépassant latéralement les canaux osmorégulateurs, atteignant les follicules vitellins, ininterrompus au niveau de la poche du cirre et du canal déférent (Fig. 82). Poche du cirre à paroi épaisse, rapport PC = 12-18% (Fig. 80). Cirre représentant au moins 50% de la longueur de la poche du cirre. Pores génitaux irrégulièrement alternes, PG = 17-33%. Vagin postérieur (56%) ou antérieur (44%) à la poche du cirre, chevauchant ventralement celle-ci.

Ovaire bilobé médullaire, avec des expansions dans le cortex dorsal (Fig. 84), rapport OV = 51-59%. Follicules vitellins corticaux, dorsaux et ventraux, avec parfois quelques follicules paramusculaires, ininterrompus au niveau de la poche du cirre (Figs 82-84).

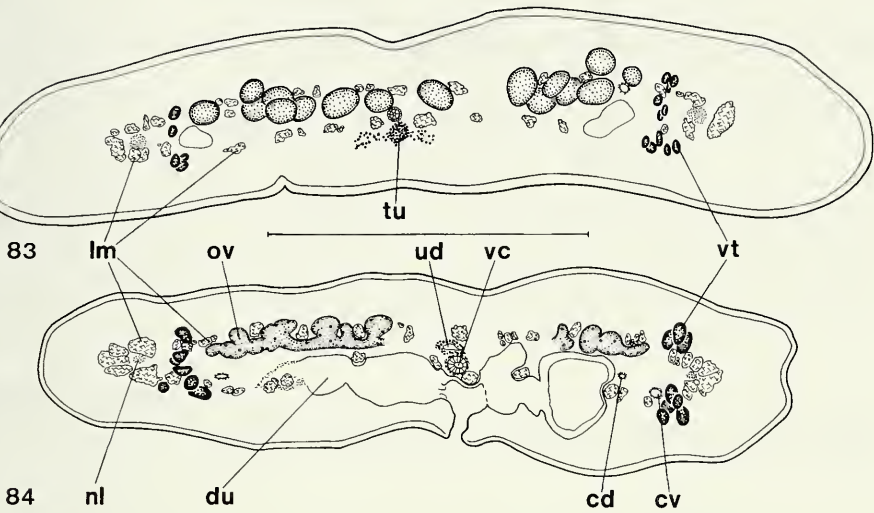
Utérus préformé, cortical, ventral. Développement caractérisé par une concentration de cellules chromophiles situées ventralement, de chaque côté du tronc utérin. Apparition d'une lumière dans le tronc utérin des derniers anneaux immatures et dans les diverticules utérins au stade des premiers anneaux matures (Fig. 82). Paroi externe distale des diverticules utérins entourée de cellules chromophiles dans les anneaux prégravidés et gravidés. Paroi interne des diverticules utérins couverte de grosses cellules au cytoplasme translucide dans les anneaux gravidés terminaux. Utérus avec 12-16 diverticules peu ramifiés de chaque côté, pourvues d'expansions dorsales pénétrant la médulla, occupant plus de 60% du proglottis gravidé. Évacuation des oeufs par une ou plusieurs ouvertures ventrales longitudinales.

Oncosphères (mesurées dans l'eau distillée) d'environ 13-14,5 de diamètre, pourvues de 6 crochets longs de 6-7; membrane oncosphérique observable; embryophores arrondis, 23-25 de diamètre, dédoublés, la couche externe plus grande que celle contenant des noyaux et n'adhérant pas à l'oncosphère (Fig. 81).



FIGS 79-82. *Nupelia tomasi* n. sp., 79-80, 82, holotype 21971 INVE; 79, scolex, vue ventrale; 80, vagin et poche du cirre, vue ventrale; 81, paratype 21970 INVE, oeuf; 82, proglottis mature, vue ventrale. Echelles: 79, 80 = 250 μ m; 81 = 50 μ m; 82 = 500 μ m.

REMARQUES: La comparaison de notre matériel avec la seule autre espèce du genre, *Nupelia portoricensis* Pavanelli & Rego, 1991, démontre que *N. tomasi* diffère par le rapport PC, la position du pore génital, la position du vagin par rapport à la poche du cirre, le rapport de la largeur de l'ovaire/largeur du proglottis, la position des follicules vitellins et le diamètre du scolex.



Figs 83-84. *Nupelia tomasi* n. sp. 83, 84, holotype 21971 INVE; 83 coupe transversale dans la partie antérieure d'un proglottis mature; 84, coupe d'un proglottis gravide au niveau de l'ovaire. Echelle = 500 µm.

Cette espèce est dédiée à Tomáš Scholz de l'Institut de Parasitologie de Česká Budejovice, République Tchèque.

Othinoscolecinae Woodland, 1933

Peltidocotylineae Woodland, 1934

Le scolex de *Othinoscolex* Woodland, 1933 (Fig. 85) possède des ventouses biloculées semblables à celles rencontrées chez *Peltidocotyle*, comme nous l'avons constaté en révisant le matériel-type et le matériel récemment récolté. En conséquence, il n'existe aucun Monticelliidae dépourvus de ventouses.

L'hôte de *Othinoscolex lenha* Woodland 1933 selon WOODLAND (1933a) est *Platystomatychtys sturio* (Kner, 1857). A tort, Woodland rapporte que ce poisson s'appelle "Peixe Lenha". Ce nom vernaculaire est donné localement à *Sorubimichthys planiceps*; la description de l'hôte par Woodland correspond bien à cette dernière espèce. Nos propres récoltes de *Othinoscolex lenha* (Fig. 104) proviennent toutes de *Sorubimichthys planiceps*.

Peltidocotyle Diesing

Peltidocotyle Diesing, 1850: 560; espèce-type: *Peltidocotyle rugosa* Diesing, 1850: 560.



FIG. 85. *Othinoscolex lenha* Woodland, 1933, syntype BMNH 1964.12.15.87-93, coupe frontale du scolex montrant des ventouses bilobées. Echelle = 1000 μ m.

***Peltidocotyle rugosa* Diesing**

Peltidocotyle rugosa Diesing, 1850: 560.

Peltidocotyle rugosa; SOUTHWELL 1925: 361; WOODLAND 1933b: 185; FUHRMANN 1934: 552; REGO 1989: 458; Rego 1990: 1000.

Spatulifer rugosa; BROOKS 1995: 365.

Hôtes: 1) *Pseudoplatystoma coruscans* (Agassiz, 1829); 2) *P. fasciatum* (Linnaeus, 1766) (Pimelodidae).

MATÉRIEL EXAMINÉ: 1) Brésil, Mato Grosso, 3.12.1826, matériel-type, 2 préparations totales, 8 préparations de coupes sériées, 35/33-42 (coll. Institut de Zoologie, Neuchâtel). 2) Dép. Central, Rio Paraguay, San Antonio, 22374 INVE, 06.11.1995.

P = 33%; n = 3; I = 1 exemplaire; A = 0,33.

REMARQUES: Le matériel étudié est caractérisé par une position corticale des testicules, de l'utérus et des follicules vitellins et par une position médullaire de l'ovaire ainsi que par un scolex avec métascolex et ventouses bilobées. Très contracté, il présente les caractères suivants: env. 227-231 (MT = 150 selon FUHRMANN (1934) et 166-201 selon nos observations) testicules corticaux en un champ dorsal, un pore génital très antérieur, un rapport PC 15-16% (MT = 17-22 %), un vagin toujours antérieur à la poche du cirre avec un puissant sphincter proximal, un ovaire folliculé représentant les 56-59% de la largeur du proglottis, des follicules vitellins dorsaux-ventraux et un utérus avec 4-7 (MT = 5-8) diverticules de chaque côté.

Peltidocotyle rugosa a été décrit sur du matériel récolté par Natterer le 3 décembre 1826 dans le Mato Grosso brésilien chez "Silurus pintado (= *Platystoma tigrinum*)" (Southwell 1925, p. 351). *Pseudoplatystoma tigrinum* est un poisson amazonien. Dans le Mato Grosso brésilien, "pintado" est le nom vernaculaire de *Pseudoplatystoma coruscans* (G. Pavanelli & C. Dlouhy, communications personnelles). Il est donc probable que l'hôte type de *Peltidocotyle rugosa* soit *Pseudoplatystoma coruscans*.

Peltidocotyle sp.

Hôte: *Paulicea luetkeni* (Steindachner, 1875) (Pimelodidae); quart postérieur de l'intestin.

MATÉRIEL EXAMINÉ: Dép. Central, Rio Paraguay, San Antonio, 22903 INVE. 27.11.1993.

P = 100%; n = 1.

REMARQUES: L'anatomie de cet unique exemplaire contracté ressemble à celle de *P. rugosa* décrite chez le même hôte par REGO & PAVANELLI (1987). Il diffère légèrement de *P. rugosa* par un nombre de testicules plus faible (122-147) et par le rapport PC (24-26%). L'état du matériel ne nous permet pas de confirmer avec certitude le statut spécifique. Il est infesté par 9 nématodes et un cysticercoïde enkystés.

Jauella Rego & Pavanelli

Jauella Rego & Pavanelli, 1985: 650; espèce-type: *Jauella glandicephala* Rego & Pavanelli, 1985: 650.

La structure du métascolex chez *Jauella glandicephala* a déjà été discutée dans de précédents travaux (voir DE CHAMBRIER & PAULINO 1997; Rego 1995).

Jauella glandicephala Rego & Pavanelli

Fig. 35

Jauella glandicephala Rego & Pavanelli, 1985: 650.

Spatulifer glandicephalus; BROOKS 1995: 365.

Hôte: *Paulicea luetkeni* (Steindachner, 1877) (Pimelodidae); quart antérieur de l'intestin.

MATÉRIEL EXAMINÉ: 1) Brésil, Mato Grosso: types IOC 32.179, 32.180, 32.181 a-d. 2) Dép. Central, San Antonio, 4 exemplaires INVE 19297, 27.11.1993.

P = 100%; n = 1; I = 4 exemplaires; A = 0,25.

REMARQUES: Le matériel récolté est caractérisé par un nombre inférieur de testicules (145-164, n = 2) par rapport au matériel-type révisé (200-227, n = 3). REGO & PAVANELLI (1985, 1987) ont estimé leur nombre à 500 au moins. L'utérus médullaire émet des hernies ventrales et dorsales. De plus, nous observons un sphincter vaginal proximal suivi d'un manchon allongé fusiforme de cellules fortement chromophiles entourant le vagin ainsi que des oeufs mûrs munis de crochets dans l'utérus. Oncospères d'un diamètre de 14-15, avec 6 crochets longs de 6-6,5, embryophores ovoïdes d'un diamètre de 22-25 à 26-30, enveloppe externe arrondie d'un diamètre d'environ 80 (Fig. 35).

Mariauxiella de Chambrier & Rego

Mariauxiella de Chambrier & Rego, 1995: 58; espèce-type: *Mariauxiella pimelodi* de Chambrier & Rego, 1995: 58.

Mariauxiella pimelodi de Chambrier & Rego

Mariauxiella pimelodi de Chambrier & Rego, 1995: 58.

Hôtes: *Pimelodus ornatus* Kner, 1857 et *Pimelodus* sp. (Pimelodidae).

MATÉRIEL EXAMINÉ: Dép. Caazapa, Rio Pirapo, à 3km à l'est de Yegros, 18288 INVE, 29.03.1985; Dép. Central, Rio Paraguay, San Antonio, 18290 INVE, 28.10.1989.

P = 100%; n = 2; I = 1 exemplaire; A = 1.

Mariauxiella piscatorum n. sp.

Figs 86-93, 105

Hôte: *Hemisorubim platyrhynchos* (Valenciennes, 1840) (Pimelodidae).

MATÉRIEL EXAMINÉ: Dép. Central, Rio Paraguay, San Antonio, holotype 19523 INVE, 2 paratypes 19524, 24665 INVE, autre matériel: 24666 INVE, 28.10.1989; 22924, 23872 INVE, 04-06.11.1995. Dép. Cordillera, Rio Piribebuy à 5 km au nord de Emboscada Nueva, 19525, 22904 INVE, 06-07.04.1985.

P = 46 %; n = 13; I = 1-5 exemplaires; A = 1.

DESCRIPTION:

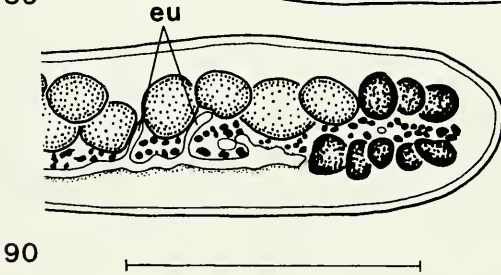
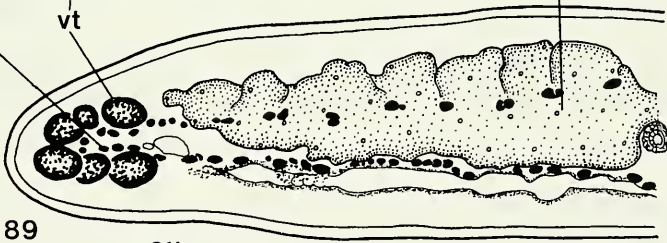
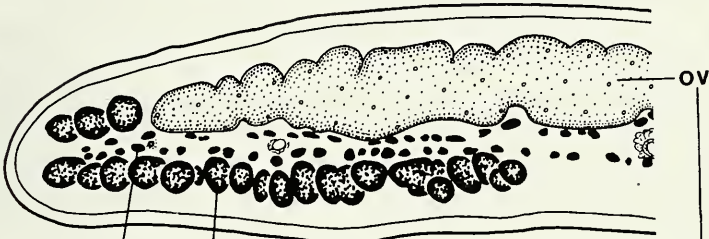
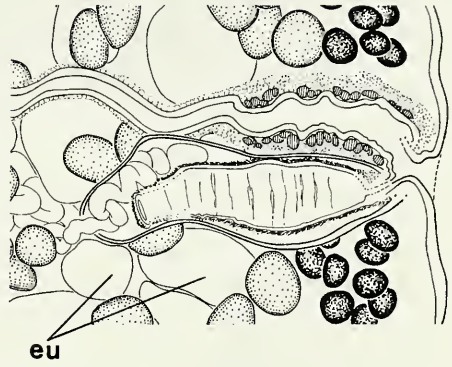
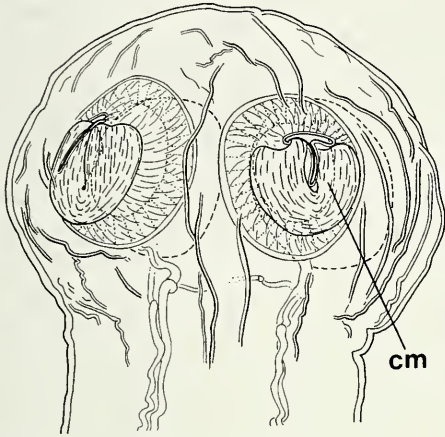
Strobiles acraspédotes, de forme à tendance pyramidale, longs de 8,5 mm à 17,5 mm. Zone de croissance longue d'environ 500. Environ 55 proglottis jusqu'au premier mature; 68 proglottis jusqu'à l'arrivée des oeufs dans l'utérus; plus de 85 proglottis au total. Proglottis matures et gravides plus larges que longs.

Scolex globuleux, plus large que le cou, sans organe apical, de 1035-1145 de diamètre (Fig. 86, 105). Ventouses ovoïdes, uniloculées, dont la cavité est presque entièrement incluse dans le scolex, de 335-525 de diamètre, pourvue, dans sa partie externe supérieure, d'une musculature circulaire très puissante en forme de fer à cheval, fermant l'orifice de la ventouse en forme de T (Fig. 86). Musculature longitudinale interne développée, constituée de puissants faisceaux de fibres peu anastomosés (Figs 88-90). Canaux osmorégulateurs ventraux de 20-35 de diamètre et canaux osmorégulateurs dorsaux de 10-15 de diamètre.

Testicules corticaux, au nombre de 124-164 ($x = 147$, $n = 8$), en un champ dorsal compact, atteignant les follicules vitellins dorsaux et chevauchant les follicules vitellins ventraux (Figs 90, 92-93). Poche du cirre allongée, piriforme, à paroi mince, longue de 260-370, PC = 15-21% ($x = 18\%$, $n = 21$). Cirre occupant plus de 60% de la longueur de la poche du cirre. Pores génitaux irrégulièrement alternes, PG = 21-37%. Vagin toujours antérieur à la poche du cirre ($n = 75$), avec un sphincter musculaire bien développé, occupant plus de la moitié de la longueur de la poche du cirre (Fig. 87). Glande de Mehlis de 100-120 de diamètre, représentant les 5-6% de la largeur de l'anneau.

Ovaire bilobé avec portion médullaire antérieure (Fig. 88) et nombreuses expansions corticales dorso-postérieures (Fig. 89). Largeur de l'ovaire représentant les 70-77% ($x = 75\%$) de la largeur du proglottis.

Figs 86-90. *Mariauxiella piscatorum* n. sp., 86-87, holotype 19523 INVE, 86, scolex, vue ventrale, 87, vagin et poche du cirre, vue ventrale; 88-90, paratype 24665 INVE, 88, coupe d'un proglottis prégravide au niveau postérieur de l'ovaire montrant sa position corticale et la topographie des vitellogènes, 89, coupe d'un proglottis prégravide au niveau antérieur de l'ovaire montrant sa position médullo-corticale, 90, coupe transversale dans la partie antérieure d'un proglottis prégravide montrant l'utérus s'infiltrant dorsalement à travers la médulla et atteignant le cortex dorsal. Echelles: 86 = 500 μ m; 87-90 = 250 μ m .



Follicules vitellins corticaux, latéraux, ininterrompus au niveau de la poche du cirre, occupant la totalité de la longueur du proglottis, formant un croissant en coupe transversale. Portion postérieure des follicules ventraux très étendues en direction de la glande de Mehlis, accolée à la marge postérieure du proglottis, chevauchant ventralement l'ovaire, occupant jusqu'à 80% de la largeur du proglottis (Figs 88, 92). Follicules vitellins ventraux légèrement plus étendus en direction de la partie médiane de l'anneau.

Utérus cortical préformé, avec des diverticules utérins latéraux très minces et très allongés (Fig. 91), pourvus d'expansions dorsales pénétrant la médulla déjà dans les derniers proglottis immatures (Fig. 90), occupant à ce stade jusqu'à 60% de la largeur du proglottis. Diverticules utérins et expansions dorsales avec lumières dans les proglottis matures. Expansions dorsales traversant la médulla et atteignant le cortex dorsal dans les proglottis prégravides, envahissant progressivement la totalité de la médulla et la plus grande partie du cortex dorsal. Utérus occupant jusqu'à 88% de la largeur des proglottis prégravides, avec, de chaque côté, 6-11 diverticules utérins très allongés, digités, ramifiés. Oncosphères (mesurées en préparation totale) de 20-22 de diamètre avec crochets longs de 8-9. Embryophores de 26-28 de diamètre.

REMARQUES: La formation et le développement particuliers de l'utérus sont comparables à ceux décrits chez *Mariauxiella pimelodi* (de Chambrier & Rego, 1995, figures 9-14). La comparaison des taxa révèle que le nouveau matériel se distingue par des proglottis matures et gravides plus larges que longs, par la position en partie postérieure à l'ovaire des follicules vitellins (occupant jusqu'à 80% de la largeur du proglottis), par des ventouses uniloculées, pourvue d'une musculature circulaire en forme de fer à cheval fermant l'orifice de la ventouse (Fig. 86), par la présence d'un manchon vaginal musculaire représentant plus de la moitié de la longueur de la poche du cirre ainsi que par la position du pore génital.

Le nom de cette espèce, du latin *piscator*, pêcheur, est donné en hommage aux pêcheurs paraguayens qui nous ont procuré beaucoup de matériel.

Rudolphiellinae Woodland, 1933

Rudolphiella Fuhrmann

Rudolphiella Fuhrmann, 1916: 393; espèce-type *Corallobothrium lobosum* Riggenbach, 1895: 612.

Amphilaphorchis Woodland, 1934a: 141; espèce-type *Amphilaphorchis piranabu* Woodland, 1934a: 141.

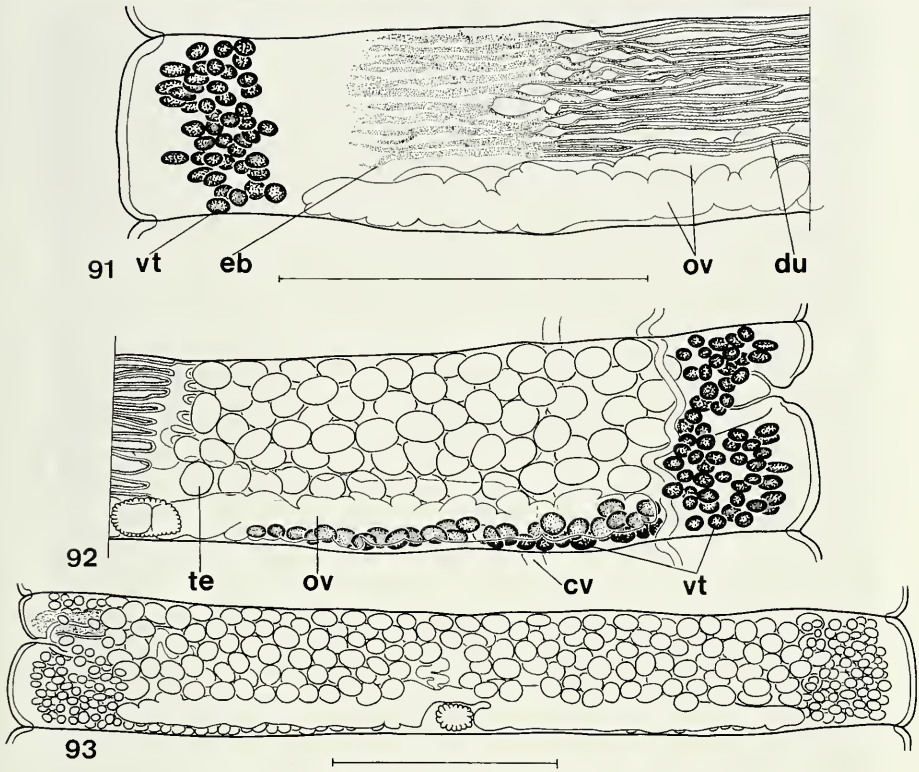
Rudolphiella: WOODLAND 1935b: 222.

Chez toutes les espèces du genre *Rudolphiella*, nous avons remarqué la présence de cellules allongées, au cytoplasme granuleux, situées juste sous l'apex et disposées en forme de croix.

Rudolphiella cf. **lobosa** (Riggenbach, 1895)

Figs 94-95

Hôtes: 1) *Luciopimelodus pati* (Valenciennes, 1840); 2) *Megalonema platanum* (Günther, 1880) (Pimelodidae).



FIGS 91-93. *Mariauxiella piscatorum* n. sp., holotype 19523 INVE, proglottis mature, vue dorsale: 91, seuls l'utérus, l'ovaire et les follicules vitellins sont représentés; 92, seuls, les testicules, l'ovaire et les follicules vitellins ventraux sont représentés; 93, croquis d'un proglottis mature, vue dorsale. Echelles = 500 μ m.

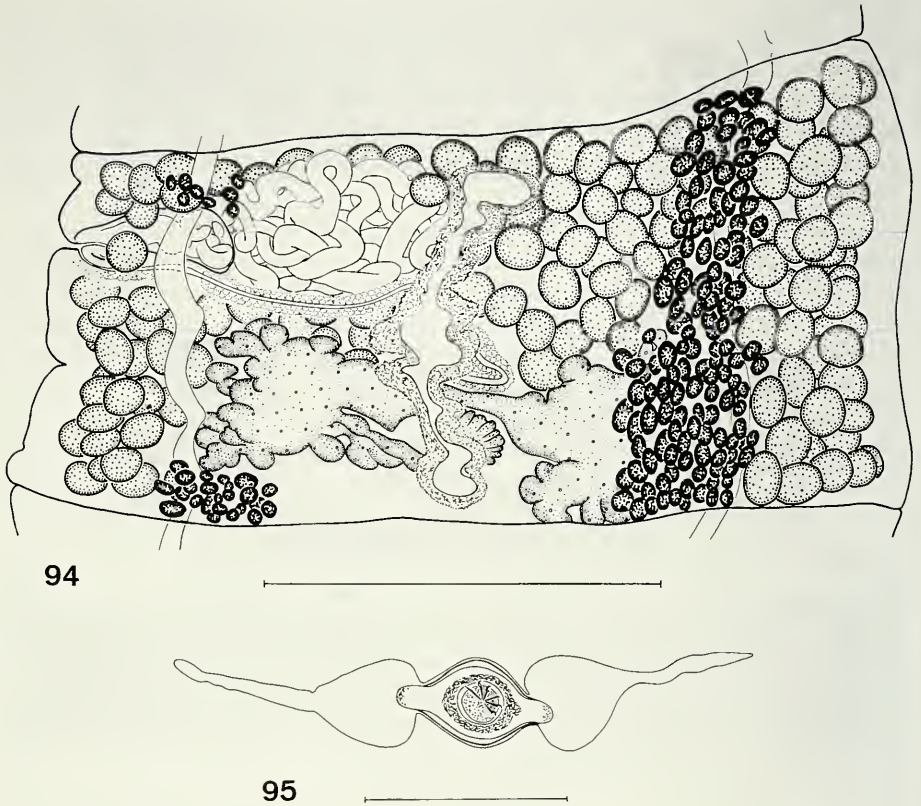
MATÉRIEL EXAMINÉ: 1) Paraguay, Rio Paraguay, syntypes, No 43/43-44 (coll. Institut de Zoologie, Neuchâtel). 2) Dép. Itapua, Rio Parana, Campichuelo 3 spécimens INVE 22352, 12.12.1986.

P = 25%; n = 4; I = 3 exemplaires + scolex immatures; A = 0,75.

REMARQUES: Les trois exemplaires se rapprochent de *R. lobosa* (Riggenbach, 1895) par la disposition des organes (Fig. 94), par le diamètre du métascolex (925-1700, MT = 1350), par le nombre de testicules (180-183, MT = 194-219), par la forme des oeufs (Fig. 95), par le rapport PC (20-27%, MT = 16-22%) ainsi que par la position du vagin. A notre connaissance, *Megalonema platanum* est signalé ici pour la première fois comme hôte d'un cestode Proteocephalidea.

Rudolphiella sp.

Hôte: *Luciopermelodus pati* (Valenciennes, 1840) (Pimelodidae).



FIGS 94-95. *Rudolphiella lobosa* (Riggenbach, 1896). 94, 22352 INVE, proglottis mature, vue ventrale; les follicules vitellins gauches ne sont pas entièrement représentés; 95, 22352 INVE, oeuf. Echelles: 94 = 500 μ m; 95 = 50 μ m.

MATÉRIEL EXAMINÉ: Dép. Itapua, Rio Parana, Campichuelo, 4 spécimens, INVE 17914, 25.09.1986.

P = 25 %; n = 4; I = 4 exemplaires (1 adulte et 3 immatures); A = 1.

REMARQUES: Ces spécimens du Parana ressemblent au matériel-type de *Rudolphiella lobosa* (Riggenbach, 1896) que nous avons revu. Ils diffèrent légèrement par le nombre de diverticules utérins (4-10) ainsi que par le nombre de testicules (240-265).

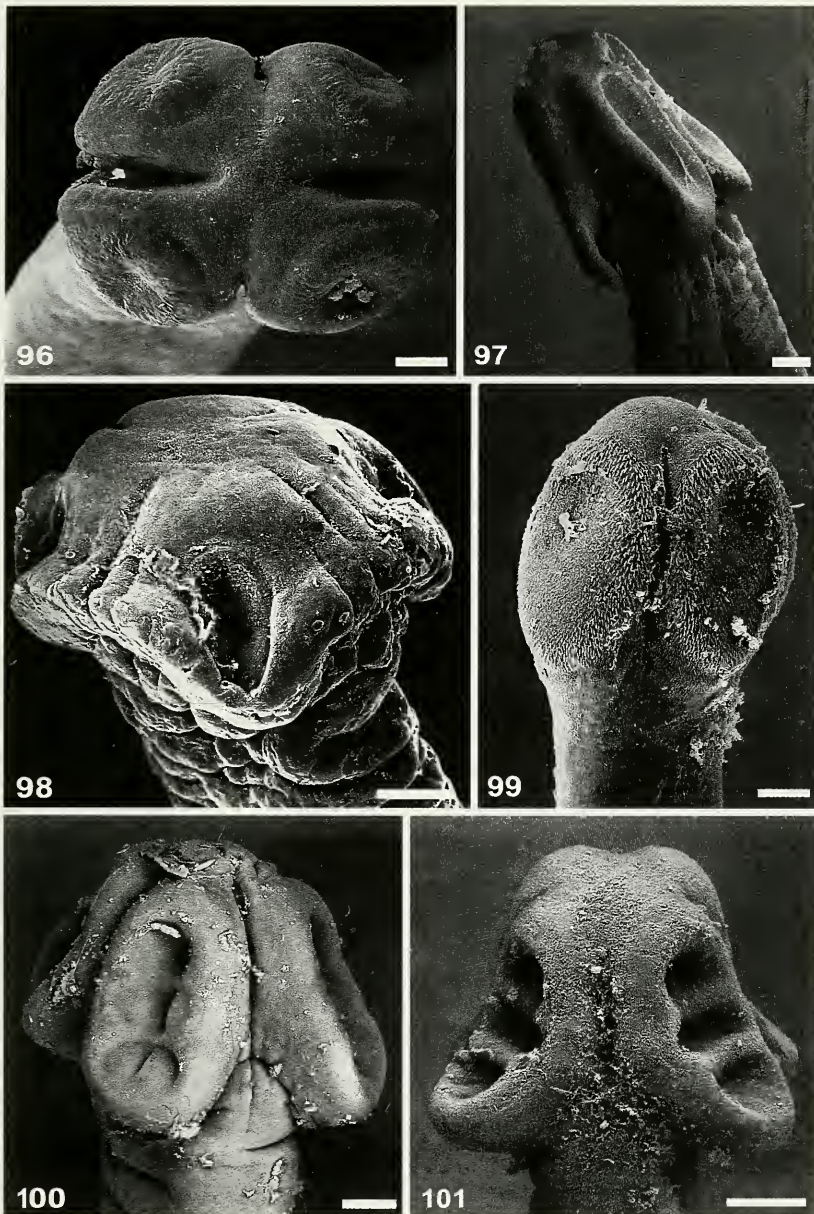
Rudolphiella sp.

Hôte: *Pinirampus pirinampu* (Spix, 1829) (Pimelodidae).

MATÉRIEL EXAMINÉ: Dép. Central, Bahia de Asuncion, 19863 INVE, 03.10.1990.

P = 17%; n = 6; I = 1 exemplaire prégravide; A = 0,17.

REMARQUES: WOODLAND (1934a) différencie *R. piranabu* et *R. myoides*, parasites de *P. pirinampu*, par la forme des oeufs, par la musculature longitudinale interne mais



Figs 96-101, scolex: 96, *Proteocephalus hobergi* n. sp., 22119 INVE; 97, *Choanoscolex abcisus* (Riggenbach, 1896), 19861 INVE; 98, *Ageneiella brevifilis* n. gen., n. sp., 22445 INVE; 99, *Monticellia spinulifera* Woodland, 1935; 100, *Gibsoniela meursaultii* nomen nov., 19856 INVE; 101, *Gibsoniela mandube* (Woodland, 1935), remarquez la différence de taille entre les deux scolex de *Gibsoniela*. Echelles: 96, 97, 99, 101 = 50 µm; 98 = 200 µm; 100 = 100 µm.

aussi par la présence ou l'absence de testicules au niveau de l'ovaire et par la position du vagin par rapport à la poche du cirre.

Le matériel prégravidé en notre possession présente des testicules au niveau de l'ovaire, ce qui correspondrait à la situation rencontrée chez *R. piranabu* mais le vagin a une position à la fois antérieure et postérieure par rapport à la poche du cirre.

INDÉTERMINÉS

PROTEOCEPHALIDEA sp.

Hôte: *Crenicichla* gr. *lepidota* (Cichlidae).

MATÉRIEL EXAMINÉ: Laguna Blanca, près de Lima, Dép. San Pedro, 29.10.1985, 23867 INVE.

P = 5,5%; n = 18; I = 1 exemplaire.

REMARQUES: Exemplaire immature. Scolex sans métascolex, ventouses uniloculées, pas d'organe apical. Testicules en un champ central.

A notre connaissance, le genre *Crenicichla* est signalé ici pour la première fois comme hôte d'un cestode Proteocephalidea.

PROTEOCEPHALIDEA sp.

Hôte: *Hypostomus* sp. (*ternetzi*?) (Loricariidae)

MATÉRIEL EXAMINÉ: Dép. Central, Rio Paraguay, Villeta, 23868-23869 INVE, 14.11.1987.

REMARQUES: Individus immatures. Scolex avec organe apical musculaire, ventouses bilobées. Présence de cellules au cytoplasme granuleux en arrière des ventouses. Sur 47 *Hypostomus* ssp., seuls 2 individus (4,2%) étaient parasités par des Proteocephalidea. A notre connaissance, des cestodes Proteocephalidea n'ont pas encore été rencontrés chez *Hypostomus*.

PROTEOCEPHALIDEA sp.

Hôte: *Megalonema platanum* (Günther, 1880) (Pimelodidae).

MATÉRIEL EXAMINÉ: Dép. Itapua, Rio Parana, Campichuelo, 12.12.1986.

P = 25%; n = 4; I = 4 exemplaires immatures.

REMARQUES: Strobila immatures. Scolex sans métascolex, sans organe apical observable, légèrement plus large que le cou. Ventouses uniloculées dirigées légèrement antérieurement. Indéterminables.

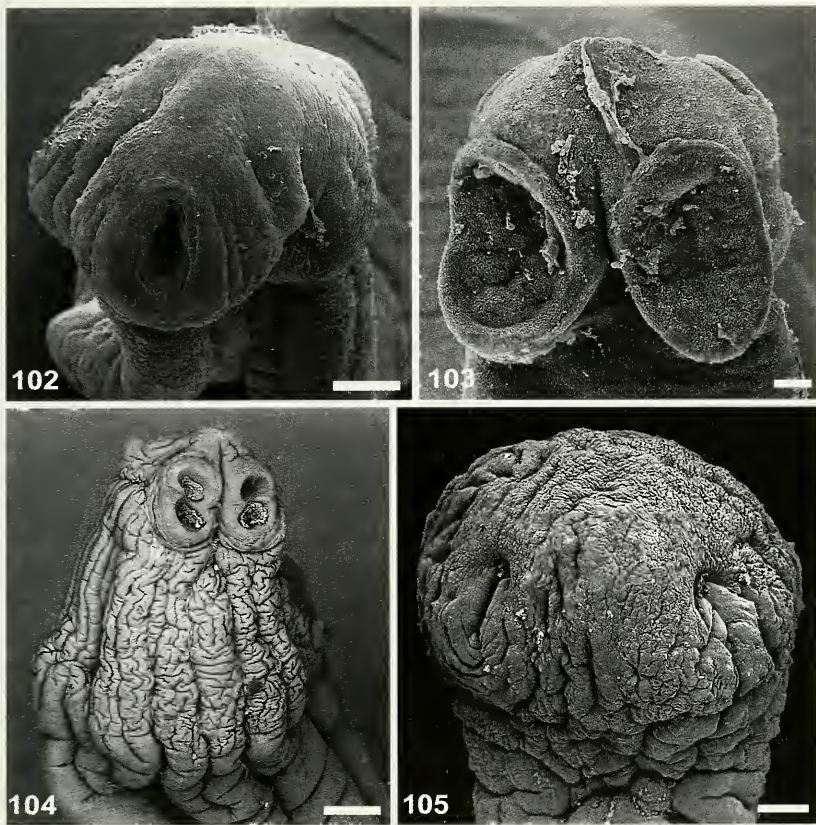
PROTEOCEPHALIDEA sp.

Hôte: *Pimelodus maculatus* Lacépède, 1803 (Pimelodidae).

MATÉRIEL EXAMINÉ: Dép. Concepcion, Laguna Negra, Estancia Laguna Negra, 23870 INVE, 16.10.1985.

P = 4,5%; n = 22; I = 3 exemplaires immatures.

REMARQUES: Scolex avec ventouses unilobées. Ressemble au scolex de *Monticellia magna* (Rego, dos Santos & Silva, 1974). Immatures, indéterminables.



Figs 102-105, scolex: 102. *Paramonticellia itaipuensis* Pavanelli & Rego, 1991, 17908 INVE; 103. *Nupelia portoricensis* Pavanelli & Rego, 1991, scolex, 17911 INVE. 104. *Othinoscolex lenha* Woodland, 1933, scolex, 19537 INVE. 105. *Mariauxiella piscatorum* n. sp. scolex, 19518 INVE. Echelles: 102, 105 = 100 μ m; 103 = 20 μ m; 104 = 200 μ m.

DISCUSSION

A. PRÉVALENCE

Nous avons examiné 1016 poissons d'eau douce appartenant à 82 genres et à 147 espèces; 160 (15,7%) étaient parasités par des Cestodes Proteocephalidea. Aucun représentant adulte d'autres ordres de Cestodes n'a été rencontré. En outre, 485 poissons (47,7%) hébergeaient des Nématodes, 255 (25%) des trématodes et 146 (14,3%) des acanthocéphales; 274 poissons (26,9%) n'abritaient pas d'helminthes.

La prévalence observée au Paraguay est d'environ 30% en moyenne pour les Proteocephalidae et 48% pour les Monticellidae. Certaines espèces présentent une prévalence très faible (*Nomimoscolex matogrossensis*, 3,8%, n = 52) et d'autres atteignant 100% (*Spatulifer* cf. *maringaensis*, n = 24) (Tableau I).

TABLEAU I: Prévalences observées dans le présent travail (Paraguay)

Parasite	Hôte	Classification hôte	P	n
<i>P. regoi</i>	<i>Hoplias malabaricus</i>	Erythrinidae-nS	6	52
<i>P. renaudi</i>	<i>Platydoras costatus</i>	Doradidae-S	60	20
<i>P. rhamdiae</i>	<i>Rhamdia sapo</i>	Pimelodidae-S	23	22
<i>P. serrasalmus</i>	<i>Serrasalmus spilopleura</i>	Characidae-nS	12,5	8
<i>P. soniae</i>	<i>Platydoras costatus</i>	Doradidae-S	30	20
<i>P. mahnerti</i> n. sp.	<i>Hoplerythrinus unitaeniatus</i>	Erythrinidae-nS	10,5	19
<i>P. hobergi</i> n. sp.	<i>Oxydoras kneri</i>	Doradidae-S	30	10
<i>P. vladimirae</i> n. sp.	<i>Pinirampus pirinampu</i>	Pimelodidae-S	17	6
<i>P. pilarensis</i> n. sp.	<i>Paraloricaria</i> sp.	Loricariidae-S	100	1
<i>Proteocephalus</i> sp.	<i>Platydoras costatus</i>	Doradidae-S	10	20
<i>Proteocephalidea</i> sp.	<i>Leporinus aff. fridericii</i>	Anostomatidae-nS	4	23
<i>Choanoscolex abscisus</i>	<i>Pseudoplatystoma coruscans</i>	Pimelodidae-S	83	12
<i>Choanoscolex</i> sp.	<i>Pseudoplatystoma fasciatum</i>	Pimelodidae-S	33	3
<i>Goezeella paranensis</i>	<i>Hemisorubim platyrhynchos</i>	Pimelodidae-S	69	13
<i>Ageneiella brevifilis</i> n. gen. n. sp.	<i>Ageneiosus brevifilis</i>	Ageneiosidae-S	40	20
<i>Jauella glandicephala</i>	<i>Paulicea luetkeni</i>	Pimelodidae-S	100	1
<i>Monticellia belavistensis</i>	<i>Pterodoras granulosus</i>	Doradidae-S	4,7	21
<i>M. coryphicephala</i>	<i>Sabninus maxillosus</i>	Characidae-nS	33	18
<i>M. magna</i>	<i>Pimelodus cf. blochii</i>	Pimelodidae-S	100	2
<i>M. cf. magna</i>	<i>Pimelodus cf. maculatus</i>	Pimelodidae-S	---	2
<i>M. spinulifera</i>	<i>Pseudoplatystoma fasciatum</i>	Pimelodidae-S	33	3
<i>M. dlouhyi</i> n. sp.	<i>Acestrorhynchus altus</i>	Characidae-nS	6,25	16
<i>M. ventrei</i> n. sp.	<i>Pinirampus pirinampu</i>	Pimelodidae-S	33	6
<i>Monticellia</i> sp.	<i>Brycon orbynianus</i>	Characidae-nS	100	1
<i>Monticellia</i> sp.	<i>Pinirampus pirinampu</i>	Pimelodidae-S	17	6
<i>Monticellia</i> sp.	<i>Pseudoplatystoma fasciatum</i>	Pimelodidae-S	33	3
<i>Paramonticellia itaipuensis</i>	<i>Sorubim lima</i>	Pimelodidae-S	25	24
<i>Spatulifer maringaensis</i>	<i>Hemisorubim platyrhynchos</i>	Pimelodidae-S	38	13
<i>S. cf. maringaensis</i>	<i>Sorubim lima</i>	Pimelodidae-S	100	24
<i>Endorchis auchenipteri</i> n. sp.	<i>Auchenipterus osteomystax</i>	Auchenipteridae-S	63	11
<i>Endorchis</i> sp.	<i>Parauchenipterus striatulus</i>	Auchenipteridae-S	50	2
<i>Endorchis</i> sp.	<i>Pimelodus cf. maculatus</i>	Pimelodidae-S	5,5	18
<i>Gibsoniella meursaulti</i> n. nov.	<i>Ageneiosus brevifilis</i>	Ageneiosidae-S	70	20
<i>Harrisocox</i> cf. <i>kaparari</i>	<i>Pseudoplatystoma coruscans</i>	Pimelodidae-S	33	12
<i>Nomimoscolex chubbi</i>	<i>Gymnotus carapo</i>	Gymnotidae-nS	57	7
<i>N. lopesi</i>	<i>Pseudoplatystoma fasciatum</i>	Pimelodidae-S	33	3
<i>N. natogrossensis</i>	<i>Hoplias malabaricus</i>	Erythrinidae-nS	3,8	52
<i>N. cf. microacetabula</i>	<i>Pimelodus ornatus</i>	Pimelodidae-S	100	2
<i>Nomimoscolex</i> sp.	<i>Luciopimelodus pati</i>	Pimelodidae-S	40	5
<i>Travassielia avitellina</i>	<i>Paulicea luetkeni</i>	Pimelodidae-S	100	1
<i>Nupelia portoriquensis</i>	<i>Sorubim lima</i>	Pimelodidae-S	25	24
<i>N. tomasi</i> n. sp.	<i>Parauchenipterus galeatus</i>	Auchenipteridae-S	5,2	19
	<i>P. cf. striatulus</i>	Auchenipteridae-S	50	2
<i>Peltidocotyle</i> cf. <i>rugosa</i>	<i>Pseudoplatystoma fasciatum</i>	Pimelodidae-S	33	3
<i>Peltidocotyle</i> sp.	<i>Paulicea luetkeni</i>	Pimelodidae-S	100	1
<i>Mariauxiella pimelodi</i>	<i>Pimelodus</i> sp. & <i>P. ornatus</i>	Pimelodidae-S	100	2
<i>Mariauxiella piscatorum</i> n. sp.	<i>Hemisorubim platyrhynchos</i>	Pimelodidae-S	46	13
<i>Rudolphiella</i> cf. <i>lobosa</i>	<i>Megalonema platanum</i>	Pimelodidae-S	25	4
<i>Rudolphiella</i> sp.	<i>Luciopimelodus pati</i>	Pimelodidae-S	25	4
<i>Rudolphiella</i> sp.	<i>Pinirampus pirinampu</i>	Pimelodidae-S	17	6

INDETERMINÉS:

Proteocephalidea sp.	<i>Crenicichla lepidota</i>	Cichlidae-nS	5,5	18
Proteocephalidea sp.	<i>Hypostomus</i> sp.	Loricariidae-S	4,2	47
Proteocephalidea sp.	<i>Megalonema platanum</i>	Pimelodidae-S	25	4
Proteocephalidea sp.	<i>Pimelodus</i> cf. <i>maculatus</i>	Pimelodidae-S	4,5	22

P = prévalences en %; n = nombre d'hôtes; S = Siluriformes; nS = non-Siluriformes

Par rapport aux résultats de PAVANELLI & MACHADO DOS SANTOS (1991) (Tableau II), nous constatons une prévalence moyenne plus élevée pour l'ensemble des stations étudiées au Paraguay et dans le Rio Parana que dans le lac de barrage d'Itaipu. Les prévalences obtenues par PAVANELLI & MACHADO DOS SANTOS (1991) (Tableau II) sont comparables à celles du présent travail pour *Choanoscolex abscisus* et *Spatulifer maringaensis*. Par contre, elles diffèrent pour 4 espèces du lac de barrage d'Itaipu soit pour *H. kaparari*, *N. portoricensis*, *G. paranensis* et *S. cf. maringaensis* et pour 3 espèces du Rio Parana, soit pour *M. coryphicephala*, *P. itaipuensis* et *N. portoricensis* (Tableau II).

La différence de prévalence entre *Spatulifer maringaensis*, parasite de *Hemisorubim platyrhynchos* et *Spatulifer* cf. *maringaensis*, parasite de *Sorubim lima* se retrouve dans l'étude de PAVANELLI & MACHADO DOS SANTOS (1991) (Tableau II). Rappelons que certains caractères suggèrent qu'il pourrait s'agir de deux espèces différentes.

Nous notons une prévalence et une intensité élevée pour *Choanoscolex abscisus*. PAVANELLI & MACHADO DOS SANTOS (1991) ont retrouvé ce parasite chez *P. coruscans* et chez *Paulicea luetkeni*. Chez *P. coruscans*, ces auteurs observent aussi des prévalences élevées, 77.9% (Lac de barrage d'Itaipu) et 75.4% (Rio Parana). Ces données sont comparables à nos résultats obtenus au Paraguay (83%) (Tableau II). Par contre, chez *P. luetkeni*, Pavanelli & Machado Dos Santos signalent une prévalence très faible (0.5%, 1/207), suggérant une infestation accidentelle.

B. DIVERSITÉ

Dans la région étudiée, les siluriformes représentent 85% des hôtes parasités par des Proteocephalidea. Cette proportion est pratiquement identique à celle rencontrée dans l'ensemble des 92 Proteocephalidea néotropicaux parasites de poissons d'eau douce, soit 84,8%! Les Pimelodidae sont les hôtes les plus fréquemment parasités par ces cestodes en région néotropicale (67%) comme au Paraguay (62%) (Tableau III).

Les hôtes siluriformes abritent 30 genres de Proteocephalidea alors que les non-siluriformes n'en n'hébergent que 4. Les siluriformes *Paulicea luetkeni*, *Pseudoplatystoma fasciatum* et *P. coruscans* sont parasitées par plusieurs espèces, jusqu'à 7, classée dans 6 ou 7 genres différents (DE CHAMBRIER & REGO 1994; REGO & PAVANELLI 1992a). De plus, les 10 hôtes abritant chacun 4 espèces ou plus de Proteocephalidea appartiennent tous au Pimelodidae.

TABLEAU II: Prévalences comparées (présent travail, Lac d'Itaipu, Rio Parana)

Parasite	Hôte	Classification-hôte	P1	n	P2	n	P3	n
<i>Protocephalus serrasalvus</i>	<i>Serrasalmus spilopleura</i>	Characidae-nS	12,5	8			5,7	194
<i>Choanoscolex abscisus</i>	<i>Pseudoplatystoma corniscans</i>	Pimelodidae-S	83	12	77,9	68	75,4	114
<i>Gozeella parauensis</i>	<i>Hemisorubim platyrhynchos</i>	Pimelodidae-S	0,69	13	22,9	35	36,7	79
<i>Janella glandicephala</i>	<i>Paulicea luetkeni</i>	Pimelodidae-S	(100)	1	60,2	191	18,8	16
<i>Monticellia coryphicephala</i>	<i>Salminus maxillosus</i>	Characidae-nS	33	18	33	15	6	67
<i>M. spinulifera</i>	<i>Pseudoplatystoma fasciatum</i>	Pimelodidae-S	(33)	3	47	68	56	114
<i>Paramonticellia itaipuensis</i>	<i>Sorubim lima</i>	Pimelodidae-S	25	24	25	24	61,1	18
<i>Spatulifer maringensis</i>	<i>Hemisorubim platyrhynchos</i>	Pimelodidae-S	38	13	28,6	35	36,7	79
<i>S. cf. maringensis</i>	<i>Sorubim lima</i>	Pimelodidae-S	100	24	70,8	24	94,4	18
<i>Harriscolex cf. kaparari</i>	<i>Pseudoplatystoma corniscans</i>	Pimelodidae-S	33	12	19,1	68	28,1	114
<i>Travassella avitellina</i>	<i>Paulicea luetkeni</i>	Pimelodidae-S	(100)	1	61,8	191	56,2	16
<i>Nippelia portoriquensis</i>	<i>Sorubim lima</i>	Pimelodidae-S	25	24	4,2	24	44,4	18
<i>Pelidocotyle</i> sp.	<i>Paulicea luetkeni</i>	Pimelodidae-S	(100)	1	37,2	191	68,8	16

TABLEAU III: Répartition des espèces de Proteocephalidea dans les différentes familles-hôtes de la région néotropicale

Hôtes Siluriformes			Hôtes Non-Siluriformes		
	nb. sp. Proteocephalidea			nb. sp. Proteocephalidea	
	Présent travail	Total	Présent travail	Total	
<i>Pimelodidae</i>	33	61	<i>Atherinidae</i>	---	1
<i>Auchenipteridae</i>	3	4	<i>Characidae</i>	4	4
<i>Ageneiosidae</i>	3	4	<i>Cichlidae</i>	---	4
<i>Doradidae</i>	5	5	<i>Cynodontidae</i>	---	1
<i>Cetopsidae</i>	---	2	<i>Erythrinidae</i>	3	3
<i>Ariidae</i>	---	1	<i>Gymnotidae</i>	1	1
<i>Loricariidae</i>	1	1			
Total	45	78		8	14

Quelques genres de poissons n'ont livré aucun cestode Proteocephalidea. Il s'agit des Siluriformes *Ancistrus* (n= 24), *Cochliodon* (n= 21) et *Hoplosternum* (n= 29), ainsi que des non-Siluriformes *Bryconops* (n= 20), *Curimata* (n= 31), *Hemiodus* (n= 18), *Plagioscion* (n= 16), *Prochilodus* (n= 22), *Schizodon* (n= 19), *Triporthesus* (n= 17).

C. SPÉCIFICITÉ

Sur les 53 espèces rencontrées au Paraguay, la grande majorité (98%) présente une spécificité du type oioxène (selon EUZET & COMBES 1980).

Une espèce, *Nupelia tomasi*, présente une spécificité du type sténoxène et parasite deux espèces d'hôtes d'un même genre (voir Tableau I).

PAVANELLI & MACHADO DOS SANTOS (1991, p. 169) observent aussi une spécificité du type oioxène pour la majorité des espèces rencontrées. Ils citent un petit nombre d'exceptions.

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A new cavernicolous species of *Seracamaurops* WINKLER, 1925 (Coleoptera: Staphylinidae: Pselaphinae) from Caucasus

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A new cavernicolous species of *Seracamaurops* WINKLER, 1925 (Coleoptera: Staphylinidae: Pselaphinae) from Caucasus. - *Seracamaurops komarovi* sp.n., a cavernicolous species of Amauropini from the Nazarovskaja cave system in the Alek karst mountains chain, western Caucasus is described and illustrated.

Key-words: Coleoptera - Staphylinidae - Pselaphinae - Amauropini - cave fauna - Caucasus.

INTRODUCTION

JEANNEL (1948) erected the tribe Amauropini, spelled incorrectly Amauropsini to accommodate a group of Batrisinae which are usually anophtalmous and have in common a large first exposed abdominal tergite, long appendages and convex elytra without foveae. Members of Amauropini are known from the northern and eastern part of the Mediterranean basin, from France to Greece, Anatolia and Lebanon, and in eastern United States. The group includes currently 117 species in 12 genera, one of which, with 33 species, is Nearctic (NEWTON & CHANDLER 1989, Löbl pers. comm.).

The genus *Seracamaurops* Winkler, 1925 has been studied by BESUCHET (1986). Currently it includes seven species: *S. fodori* (Székessy, 1943); *S. frieseni* (Winkler, 1925); *S. fritschi* Besuchet, 1986; *S. grabowskii* (Müller, 1926); *S. grandis* (Winkler, 1925); *S. novaki* Svirčev, 1936 and *S. weiratheri* (Reitter, 1913). They are characterised by the absence of eyes (ocular spines are also absent or minute), slender legs and relatively long antennae. All are strict cave dwelling, and known only from Montenegro, Bosnia and Herzegovina (BESUCHET 1986).

A new species of *Seracamaurops* was recently discovered in the western Caucasus and is described below.

ACRONYMS

KSAU - Kuban State Agrarian University collection, Krasnodar, Russia; ZIN - Zoologiceskij Institut, St. Petersburg, Russia; MHNG - Muséum d'histoire naturelle, Genève; CPH - P. Hlaváč collection, Ružomberok, Slovakia; CAK - A. Koval collection, St. Petersburg, Russia.

***Seracamaurops komarovi* sp. n.**

Figs 1-24

MATERIAL EXAMINED. Holotype ♀: "W Caucasus, Sochi, Alek Mt. R., Baribana Cave, 22.viii.1996, leg. A.G.Koval", ZIN; Paratypes 1♂, 6 ♀♀: "W Caucasus, Sochi, Alek Mt. R., Baribana Cave, Traps, 22.viii.1996 - 19.viii.1997, leg. A.G.Koval, CPH, CAK, ZIN; 1 ♀ in toto: "W Caucasus, Sochi, Alek Mt. R., Baribana Cave, Traps, 7.v. - 22.viii.1996, leg. A.G.Koval", CPH; 1 ♀: "Russia, W Caucasus, Sochi, Alek Mt. range, Baribana cave, traps, 4.vi.1995-7.v.1996, leg. A.G.Koval", MHNG; 1 ♀: "W Caucasus, Sochi, Alek Mt. Range, Baribana cave, 2.v.96, Zamotajlov & Mirosnikov", KSAU; 1 ♀: "Russia, W Caucasus, Sochi, Alek Mt. range, Baribana cave, traps, 7.v.-22.viii.1996, leg. A.G.Koval", CAK. Other material examined: 1♂, 2♀♀: the same locality as type material, incomplete and damaged, not included in type series, CPH.

DESCRIPTION. Body length 3.80 - 4.20 mm, combined width of elytra 1.03 - 1.13 mm, colour uniform dark reddish-brown, pubescence relatively dense.

Head (figs 1, 2) elongate, 1.6 times as long as wide, strongly flattened dorsoventrally; surface finely punctured, punctures more closely spaced laterally and anteriorly, much smaller than intervals, setigerous; dorsal setae about half as long as scapus, semi-erect; lateral and ventrolateral setae erect and as long or longer than scapus. Labrum short, anterior margin emarginate, anterolateral angles produced, surface finely punctured near anterior margin, punctures with short prone setae and with a few long setae on anterolateral portion; anterior margin of frontoclypeus roof-like in dorsal view, raised and continuous with ventrolateral carina which extends to fine ocular spine (see in lateral view). Median carina of vertex low, reaching nearly middle of cranium anteriorly, and about basal fourth posteriorly; neck with fine low carina on posterior half; foveae of vertex deep, lying in admedian longitudinal impressions on each side of vertexal carina; supraantennal prominence strong and large, extending nearly to middle of cranium posteriad, mesally separated by a distance about equal to a maximum width of one protuberance; tempora long, sub-parallel then arcuately convergent posteriad, with long erect setae. Venter punctured more strongly than dorsum, especially in anterolateral halves; gular suture carinate along anterior half (fig. 2); tentorial pits deep, lying in round depression slightly posteriad middle; cardo (figs 4, 5) with elliptical porous area. Maxillary palpi (figs 6, 7) long and thin; first segment minuscule; second long, 2.7 times as long as third segment, both expanded distad; fourth segment longest, about 5 times as long as wide, widest near middle; palpal spine short and slender, about 0.13 times as long as terminal segment. Antenna distinctly longer than the combined median length of head and pronotum, all segments distinctly longer than wide; scape 1.7 times as long and 1.5 times as wide as pedicell (fig. 3), latest subcylindrical; segments 3 and 4 slightly longer than pedicell; segment 5 about as long as scape; segments 7 and 9 1.2 times as long as segments 6, 7 and 10; apical segment about 1.6 times as long as scape.

Thorax. Pronotum (figs 8, 9) moderately longer than wide, widest near middle, slightly wider than head; lateral margin arcuate; surface finely punctuate, punctures much smaller than intervals, setigerous, setae shorter than those on vertex, semi-erect; median sulcus rather shallow, not sharply delimited, widest at basal third, reaching middle, on each side with small spine-like denticle near basal fourth; base with two pairs of small, admesal foveae; sublateral foveae at basal third deep. Scutellum (fig. 11) shield-shaped, anterior margin sinuate; surface smooth on anterior third with scale-like sculpture on posterior 0.6. Elytra (fig. 10) moderately convex dorsally, slightly longer than wide, finely and regularly punctured, setae as long as on pronotum; posterior margin truncate, posterolateral angle arcuate. Mesosternum (fig. 13) about twice as wide as mesoepisternum, on anterior half with large, round, deep depression, the bottom rather densely punctuate, setose; lateral mesosternal foveae deep; posterior two thirds shiny. Metasternum about as long as mesosternum, punctured as pronotum, interstices shiny; prebasal median impression rounded, moderately deep. Legs (figs 14-17) long and slender. Profemora widest slightly distad of middle, about as long as elytra; surface finely punctured, punctures bearing prone setae; anteroventral portion with row of short, regularly spaced vertical ribs, these bordered by short, erect ventral setae. Mesotrochanters with ventrodiscal tooth in males. Mesofemora moderately longer than profemur, moderately expanded, dorsal outline arcuate in females and males, ventral arcuate in females, rather straight and with strong tooth at proximal third in males. Metafemora longest, widened from proximal third, widest near two thirds of femur length. Tibiae subequal in length with femora, densely setose and moderately thickened on distal half, protibiae moderately curved, meso- and metatibiae rather straight.

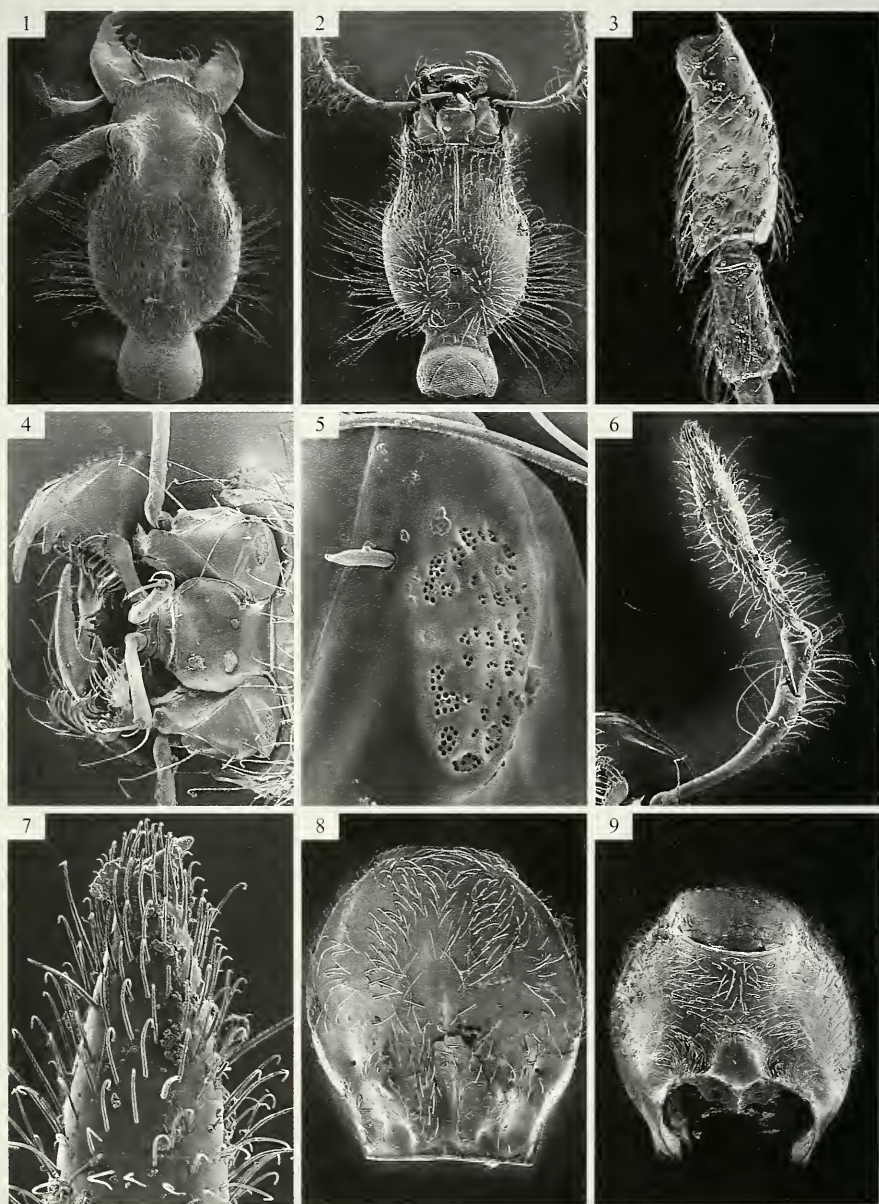
Abdomen (figs 10, 12, 18-22) very finely, evenly punctured and pubescent, except for rather strongly punctured terminal segment. First exposed tergite slightly shorter than combined length of three following segments; with fine sublateral carina extending nearly to middle; lateral margin produced into strong lamina on anterior half; surface impressed near sublateral carinae, with flat nearly triangular basal tubercles on lateral third. Aedeagus (figs 23-24) elongate, about three times as long as wide across basal bulb, asymmetrical.

MALE SEXUAL CHARACTERS. Mesotrochanters with a ventrodiscal tooth, mesofemora with strong ventral tooth at proximal third.

ETYMOLOGY. Patronymic, dedicated to Mr. J.N. Komarov, Sochi, Russia for his kind assistance during many expeditions of third author in Caucasus.

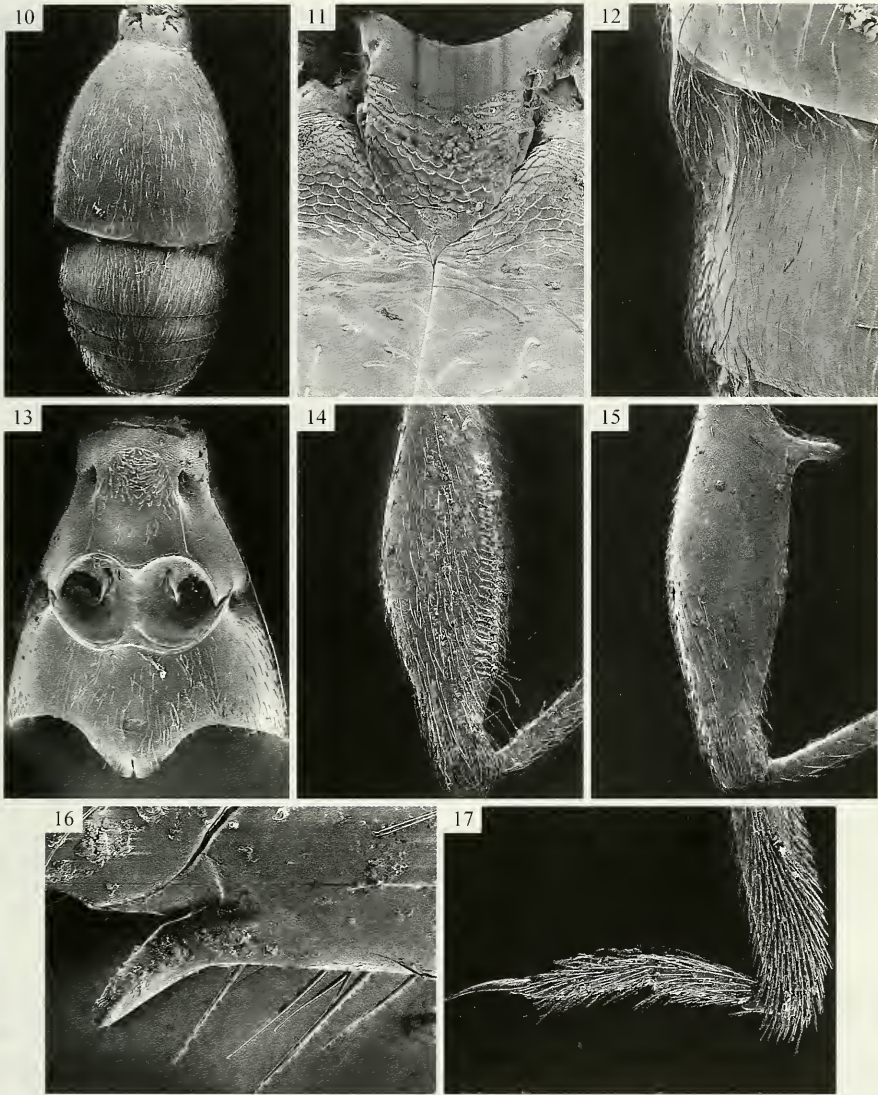
HABITAT. Baribana cave (Russia, western Caucasus, Alek karst mountains chain, upper part of river Zapadnaja Malaja Chosta) in the Nazarovskaja cave system - length 110 m, deep 20 m, surface 700 m², volume 8800 m³. All specimens have been found in the end of cave (110 m from entrance, temperature 8° C) at the same humid place together with many Collembola.

DIAGNOSIS. *Seracamaurops komarovi* can be distinguished from other members of *Seracamaurops* by the following combination of characters: (1) presence of median pronotal sulcus reaching the middle of pronotum which is flanked by pair of spines; (2) fourth segment of maxillary palpi very long, about 5 times as long as wide:



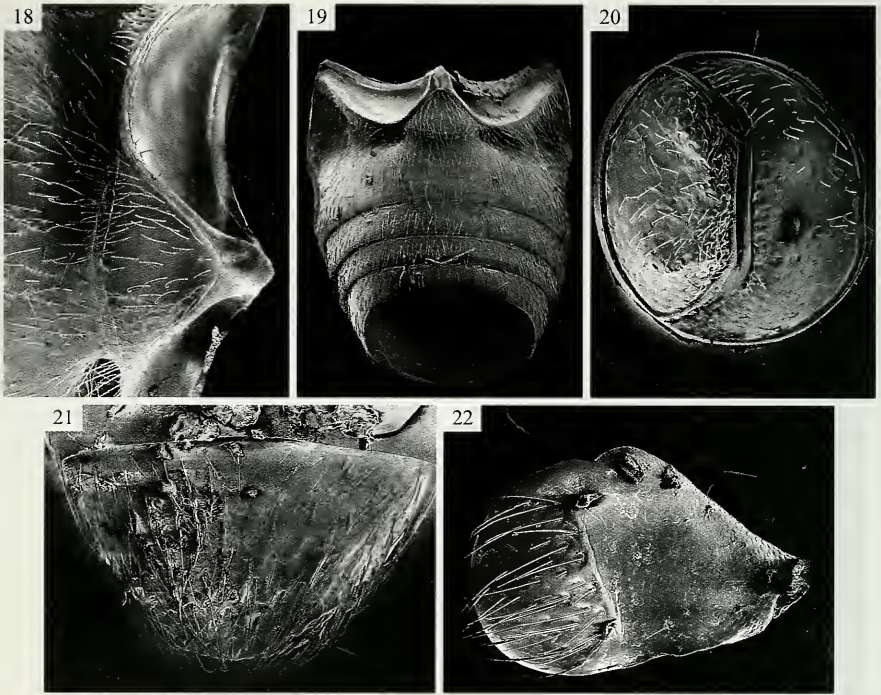
FIGS 1-9

Seracamaurops komarovi sp.n., female; (1) head, dorsal view; (2) head, ventral view; (3) antenna, scape and pedicel, lateral view; (4) mouth parts, ventral view; (5) sensory area of cardo, ventral view; (6) maxillary palpus, ventral view; (7) terminal segment of maxillary palpus, dorsal view; (8) pronotum, dorsal view; (9) pronotum, ventral view.



FIGS 10-17

Seracamauops komarovi sp.n.; (10) elytra and abdomen, dorsal view; (11) scutellum, dorsal view; (12) lateral portion of first tergite, dorsal view; (13) meso- and metathorax, ventral view; (14) profemur in female, anterior face; (15) mesofemur in male, posterior face; (16) mesotrochanter in male, posterior view; (17) mesotarsus in female, posterior view.



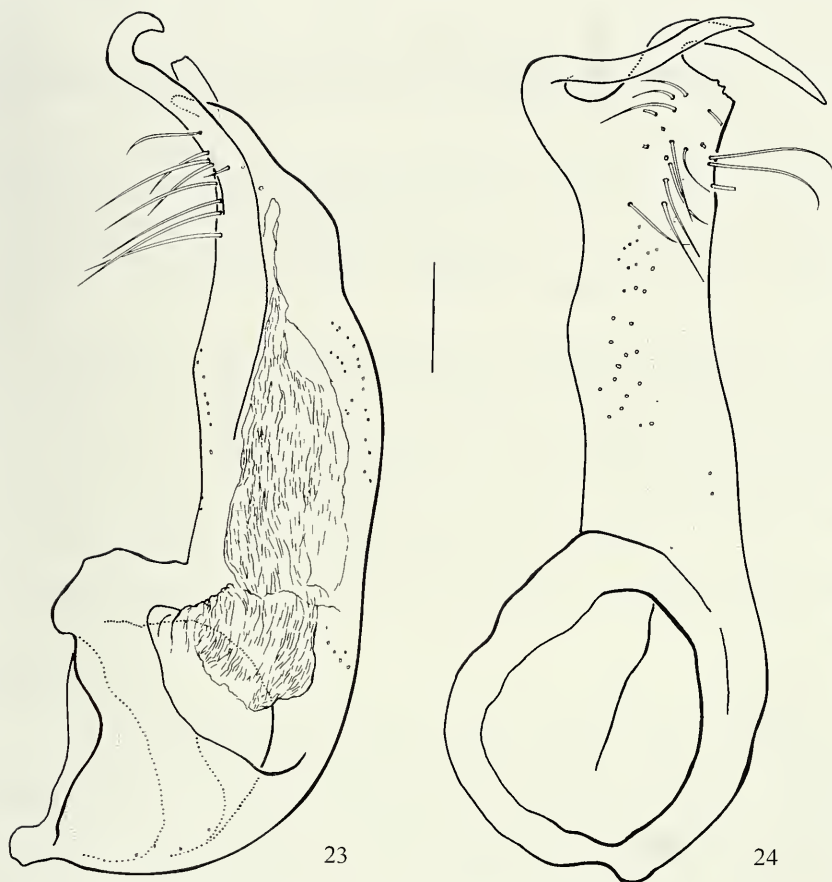
FIGS 18-22

Seracamaurops komarovi sp.n.; (18) medial part of first ventrite in female, ventral view; (19) abdomen in female, terminal segments removed, ventral view; (20) terminal, exposed segments in female, posterior view; (21) terminal ventrite in male, ventral view; (22) Ventrite VII (morphological sternite IX).

(3) lateral margin of first exposed tergite produced into strong lamina at anterior half; (4) sublateral carina reaching the middle of first exposed tergite; (5) basomedian and basolateral foveae of first exposed tergite absent; (6) presence of mesotibial tooth in males; (7) presence of small tooth on mesotrochanter in males.

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FIGS 23-24

Seracamauops komarovi sp.n., male; (23) aedeagus of holotype, medio-apical projection missing, lateral view; (24) aedeagus of paratype, short latero-apical projection missing, ventral view. Scale = 0.1 mm.

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Additions to the scorpion faunas of Trinidad and Tobago¹

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Additions to the scorpion faunas of Trinidad and Tobago. - In this paper are presented the results of a study of scorpion material collected during the spring of 1997 in Trinidad and Tobago. The collection is composed of 2 families, 4 genera and 7 species. One new species, *Microtityus starri* n. sp. (Buthidae) is described from Little Tobago. It is suggested that *Tityus trinitatis* Pocock may be a polymorphic species. Some comments on the other species are also included.

Key-words: Scorpion - Neotropics - Trinidad & Tobago - New species - *Microtityus starri*.

INTRODUCTION

Early contributions to knowledge of the scorpion fauna of Trinidad and Tobago consisted mainly of isolated descriptions of species from these two islands or citations of species previously described from nearby countries such as Venezuela and the Guianas (KARSCH 1879; POCOCK 1893a, b, 1897). The first publication presenting a synthesis of the species known to be represented in Trinidad and Tobago was the monographic work by MELLO-LEITÃO (1945). This work, however, focuses on the entire South American fauna and does not give any details concerning the scorpions of Trinidad and Tobago.

The first publication dedicated entirely to the scorpions of Trinidad and Tobago was by KJELLESVIG-WAERING (1966). In this, the author not only presented a synopsis of the scorpion faunas of the two islands, but also gave a considered discussion of the biogeographic affinities between the faunas of Trinidad and Tobago and those of the mainland, in particular of Venezuela. In addition, he described an unusual new buthid genus, *Microtityus*, with a new species, *Microtityus rickyi* and a new species of the chactid genus *Broteochactas*, *B. laui*.

In a more recent publication, FRANCKE & BOOS (1986) gave specific account of the chactid scorpions of Trinidad and Tobago. These authors described a new species

¹ Etude subventionnée par le Département municipal des affaires culturelles de la Ville de Genève.

in the genus *Chactas*, *C. raymondhansi*. This was the first record of this genus in the Islands. In addition, they resurrected the species *Broteochactas nitidus* Pocock, previously thought to be a synonym of *Broteochactas gollmeri* (Karsch), a species only present in Venezuela.

Field work carried out by the junior author in Trinidad & Tobago during the spring of 1997 resulted in the collection of more than 200 scorpions belonging to the genera *Ananteris*, *Microtityus* and *Tityus* (Buthidae) and *Broteochactas* (Chactidae). The *Ananteris* and *Tityus* species were confirmed as being *A. cussinii* Borelli, *T. melanostictus* Pocock, *T. trinitatis* Pocock and *T. discrepans* (Karsch), while the *Broteochactas* was *B. nitidus* Pocock. The specimens of *Microtityus* collected in Trinidad corresponded well with *M. rickyi* Kjellesvig-Waering, but those taken in Little Tobago proved to be a new species. The scorpion fauna of Trinidad et Tobago comprises therefore 2 families, 5 genera and 8 species.

This new species is described in the present paper, and comments are made on the other species.

All specimens are deposited in the collections of the Muséum d'histoire naturelle, Geneva. All but a few have been collected by Dietmar Huber.

SPECIES STUDIED

FAMILY BUTHIDAE

***Ananteris cussinii* Borelli, 1910**

Figs 1 to 9

This species, originally described from Cagua in Venezuela is the only member of the genus *Ananteris* present in Trinidad. It has already been clearly described in the revision of the genus by Lourenço (1982), but seems to be rare in Trinidad. Rarity is also apparent in all other species of this genus.

Material examined: Trinidad, Lady Chancellor Hill-P.O.S., 18/III/1997, 1 male; 6/IV/1997, 2 males; 7/IV/1997, 1 male. St. Benedict- Tunapuna, Mt. Tabor trail, 2/IV/1997, 1 female; 4/IV/1997, 2 males and 1 female.

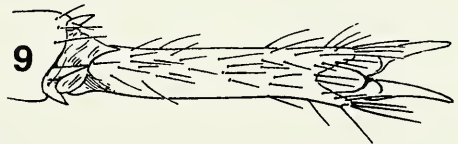
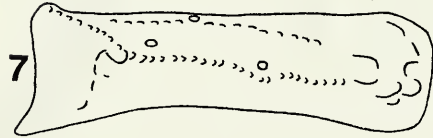
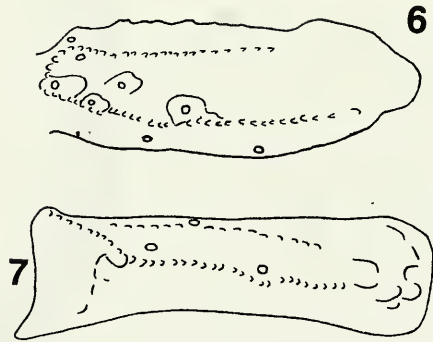
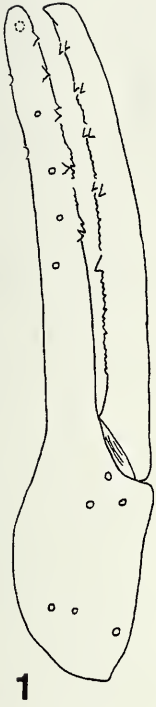
***Microtityus rickyi* Kjellesvig-Waering, 1966**

Fig. 10

The genus *Microtityus* was originally described from Trinidad, with *Microtityus rickyi* Kjellesvig-Waering, 1966 as type species. The type locality indicated was «Crow's Nest» at the south flank of Punta Delgada, on the south of Teteron Bay.

Since the first description of both genus and species in 1966, many other species have been discovered and described from the Caribbean islands and South America. At present 14 species are known from Cuba, Dominican Republic, US Virgin Islands, Brazil, Trinidad and Venezuela, as well as an Oligocene amber fossil from Dominican Republic. *Microtityus rickyi* seems to be common in Trinidad. It has not been reported from Tobago.

FIGS 1 to 9. *Ananteris cussinii*, female. 1 to 7. Trichobothrial pattern. 1 to 3. Chela, external, ventral and internal aspects. 4 and 5. Tibia, dorsal and external aspects. 6 and 7. Femur, dorsal and external aspects. 8. Disposition of the granulation of pedipalp-chela finger. 9. Tarsi, ventral aspect.



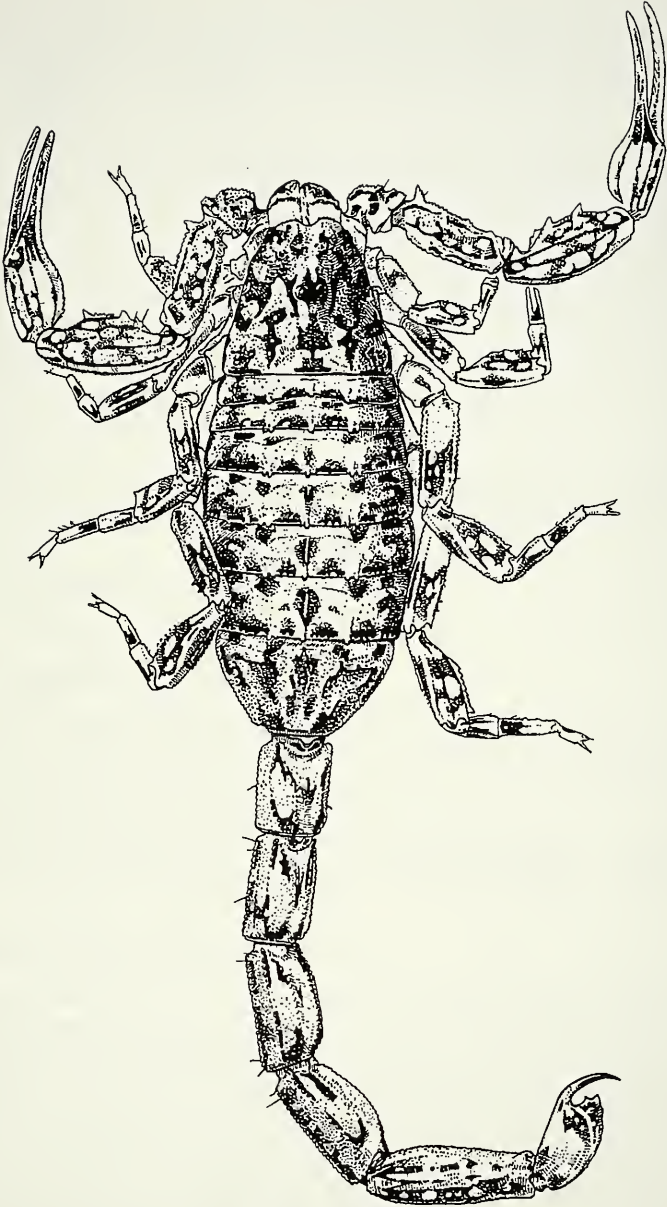


FIG. 10

Microtityus rickyi, female paratype, dorsal view (from Vachon 1977).

Material examined: Trinidad, Chacachacare Island- Lepra House, 5/IV/1997 (lg. R. Martinez), 2 males, 3 females, 1 juv.; Chacachacare Is., south of Lepra House, 5/IV/1997; Lady Chancellor Hill-P.O.S., 16/III/1997, 1 male and 2 females; 18/III/1997, 2 males and 2 females. St. Benedict- Tunapuna, Mt. Tabor trail, 2/IV/1997, 14 males and 13 females, same locality, 4/IV/1997, 2 males and 1 female.

Microtityus starri n. sp.

Figs 11 to 22

Holotype male, allotype female, and 9 male and 16 female paratypes: Trinidad and Tobago, Little Tobago, south west part, 23-27/III/1997.

Holotype, allotype and 7 male and 14 female paratypes, deposited at the Natural History Museum, Geneva. 1 male and 1 female paratypes also deposited at the Muséum national d'Histoire naturelle, Paris and in the Zoologisches Museum of the University of Hamburg.

Etymology: Named in honour of Dr Christopher K. Starr, Dept. of Zoology, University of the West Indies, Trinidad & Tobago.

DIAGNOSIS:

The new species *Microtityus starri* can be distinguished from *Microtityus rickyi*, its closest relative, by: (i) the presence of darker pigmentation generally, (ii) a smaller number of pectinal teeth (see Table I), (iii) three large smooth plates on sternite V. In *M. rickyi* these are small. (iv) trichobothrial pattern orthobothriotaxic with the d_2 present in the femur. In *M. rickyi* this pattern is neobothriotaxic with d_2 absent (Vachon 1977 Lourenço & Eickstedt 1983).

The insular geographical distribution of the new species confirms it as representing an isolated population, since scorpion populations generally present very predictable geographical ranges of distribution (Lourenço, 1996).

DESCRIPTION OF THE HOLOTYPE AND ALLOTYPE (measurements in Table II)

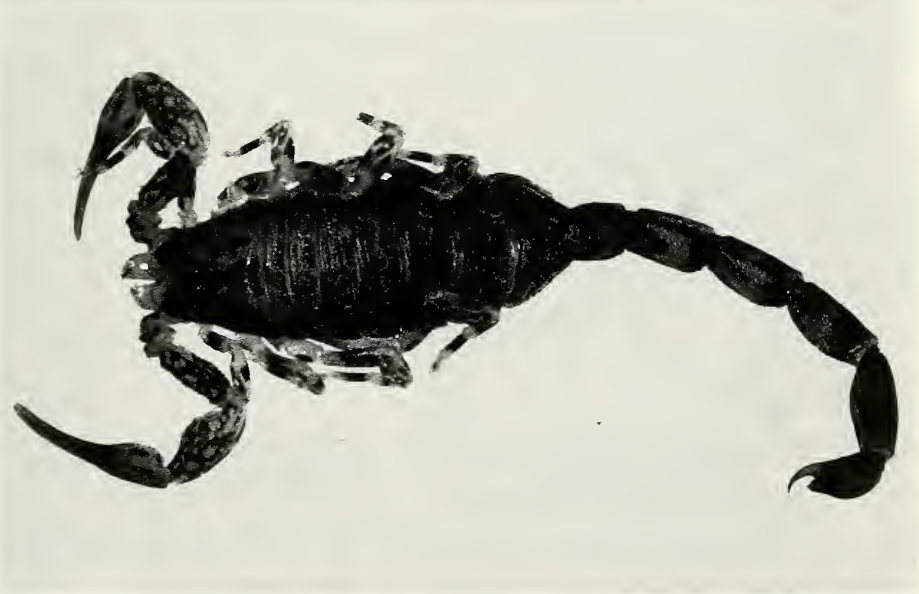
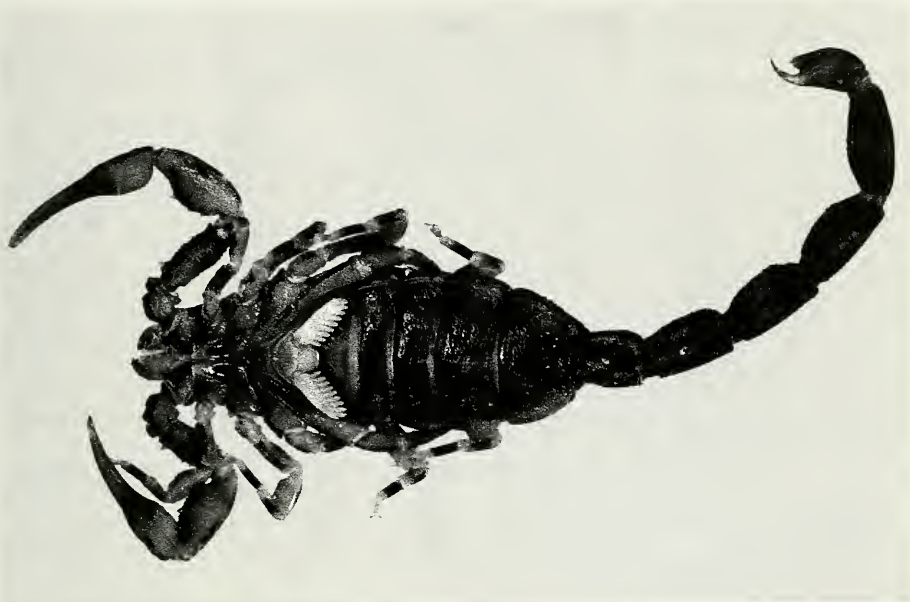
Coloration. Basically yellowish, symmetrically marbled with dark brown producing an overall spotted appearance. Prosoma: carapace yellowish and heavily spotted excepted on the anterior margin; eyes surrounded with black pigment. Mesosoma: yellowish with variegated brown spots over all the tergites and more densely marked on the last two. Metasoma: segments I to III yellowish, with variegated brown spots. Segments IV and V reddish-yellow with brown spots; segment V very dark on posterior end, and ventrally. Vesicle yellowish with dark brown spots on the ventral and lateral faces; base of the aculeus yellowish and its extremity reddish. Venter light yellow with darker spots on coxapophysis and sternites VI and VII. Sternite V with three smooth expanded white zones. Chelicerae yellowish without any variegated brown spots; base of fingers reddish-yellow; fingers yellowish. Pedipalps: yellowish with several spots on the femur and tibia; chelae slightly less densely spotted; fingers reddish-brown. Legs yellowish with dark brown variegated spots.

Morphology. Carapace moderate to strongly granular; anterior margin with a moderate to strong concavity. Anterior median superciliary and posterior median keels moderate to strong. All furrows feeble. Median ocular tubercle distinctly anterior to the centre; median eyes separated by one and a half ocular diameters. Three pairs of lateral



FIGS 11 and 12

Microtityus starri. Male holotype, dorsal and ventral views (photos Cl. Ratton).



FIGS 13 and 14
Female allotype, dorsal and ventral views (photos Cl. Ratton).

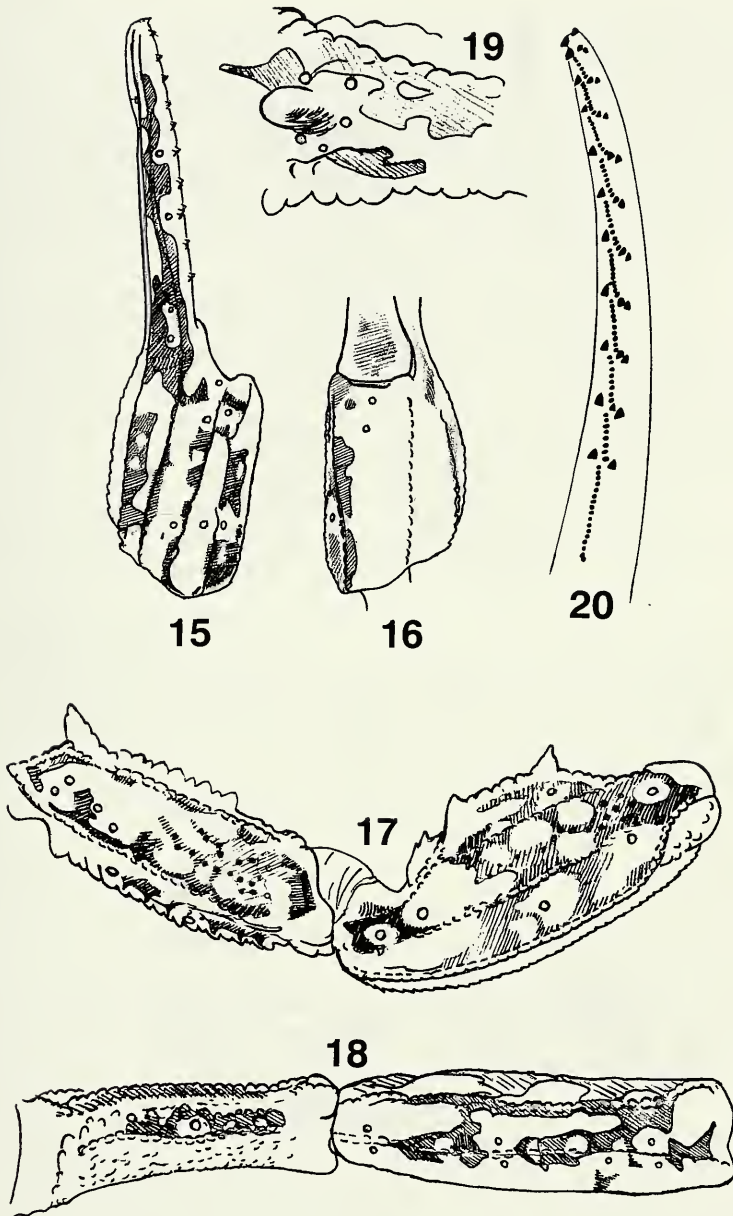
TABLE I
Pectinial tooth variability in *Microtityus rickyi* and *Microtityus starri*.

Trinidad: <i>M. rickyi</i>			Little Tobago: <i>M. starri</i>	
No Teeth	Males	Females	Males	Females
7	0	0	0	7
8	0	12	1	19
9	0	30	13	4
10	19	6	6	0
11	24	0	0	0
12	5	0	0	0

TABLE II
Morphometric values (in mm) of the male holotype and female allotype of *Microtityus starri*

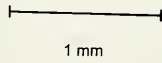
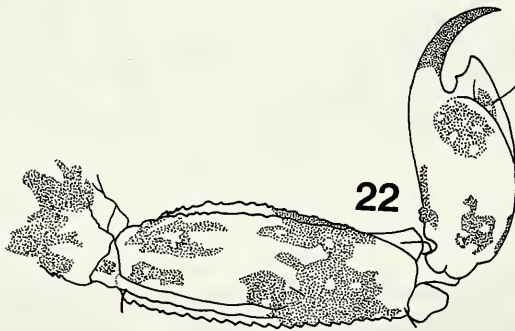
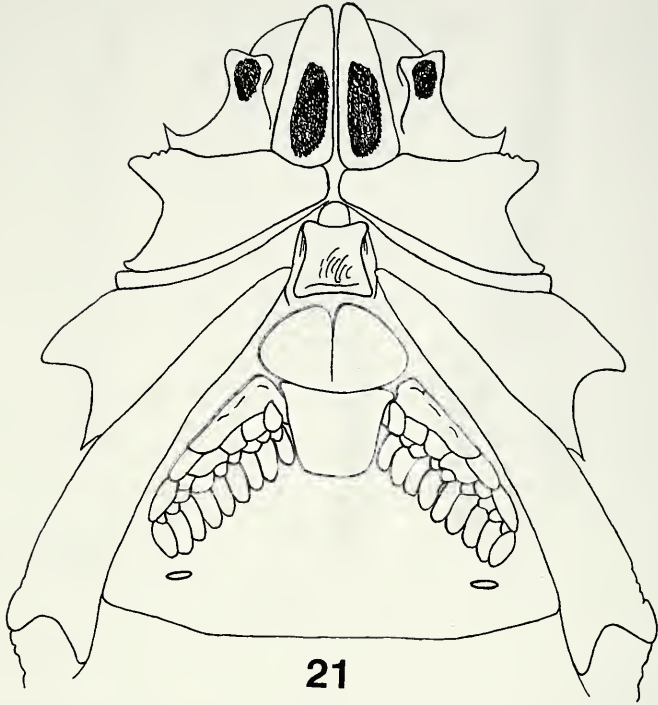
	Male holotype	Female allotype
Carapace:		
– length	1,7	2,4
– anterior	1,2	1,4
– posterior width	2,1	2,8
Metasomal segment I:		
– length	1,1	1,3
– width	0,9	1,2
Metasomal segment V:		
– length	1,8	2,3
– width	0,7	0,9
– depth	0,8	1,0
Vesicle:		
– width	0,7	0,9
– depth	0,6	0,8
Pedipalp:		
– Femur length	1,3	1,7
– Femur width	0,4	0,7
– Tibia length	1,6	2,1
– Tibia width	0,6	0,9
– Chelae length	2,4	3,2
– Chelae width	0,6	0,8
– Chelae depth	0,4	0,8
Movable finger:		
– length	1,5	2,1

eyes. Sternum subquadrangular to quadrangular. Mesosoma: tergites moderate to strongly granular. Median keel and two accessory keels present in all tergites, which are therefore tricarinate. Tergite VII pentacarinate. Venter: genital operculum divided longitudinally. Pectines: pectinal tooth count 10-10; basal middle lamellae of the pectines not dilated. Sternites I to V almost smooth with very short stigmata. Sternite V with three smooth expanded zones; sternites VI and VII moderately granular with four keels. Metasoma: segments I and II with 10 keels, crenulate; segments III and IV



FIGS 15 to 20

Microtityus starri, female allotype. 15 to 19. Trichobothrial pattern. 15 and 16. Chela, external and ventral aspects. 17 and 18. Tibia and femur, dorsal and external aspects. 19. Femur, detail of internal aspect. 20. Disposition of the granulation of pedipalp-chela finger.



with 8 keels. Segment V with 5 keels. Intercarinal spaces moderately granular. Telson with vestigial keels and a short and moderately curved aculeus; subaculear tooth very strong and rhomboid. Cheliceral dentition characteristic of the family Buthidae (Vachon, 1963). Pedipalps: femur pentacarinata; tibia with 7 keels and chelae with 8-9 keels, crenulate; internal face of tibia with 6 strong spinoid granules; all faces moderately granular. Movable fingers with 11/11 oblique rows of granules; no accessory granules present. Trichobothriotaxy; orthobothriotaxy A- α (Vachon 1973, 1975). Legs: tarsus with very numerous median fine setae ventrally.

Tityus discrepans (Karsch, 1879)

Fig. 36

This species, described by Karsch from Caracas, Venezuela, remains poorly known. Some indications of the characters and status of the species are given by POCOCK (1897), MELLO-LEITÃO (1945), KJELLESVIG-WAERING (1966) and more recently by LOURENÇO (1981). *Tityus discrepans* is rapidly recognised among the *Tityus* spp. of Trinidad and Tobago by the presence of a single keel on the ventral surface of metasomal segments II to V.

Material examined: Trinidad, Lady Chancellor Hill-P.O.S., 16/III/1997, 1 male. Mt. St. Benedict- Tunapuna, Mt. Tabor trail, 4/IV/1997, 2 males.

Tityus melanostictus Pocock, 1893b

Fig. 23

This species was described from Trinidad where it seems to be fairly common. *Tityus melanostictus* is also present in the northern part of Venezuela. A full redescription has already been published by LOURENÇO & EICKESTEDT (1987).

Material examined: Trinidad, Lady Chancellor Hill-P.O.S., 16/III/1997, 1 male and 2 females; 18/III/1997, 1 male. Chacachacare Island-south of Lepra House, 5/IV/1997, 13 males and 8 females; 5/IV/1997 (I. R. Martinez), 4 males and 2 females.

Tityus trinitatis Pocock, 1897

Figs 24 to 35

This species was described from Trinidad and is endemic to the islands of Trinidad & Tobago, where it presents some polymorphic variability in its overall size and in several other characters such as pigmentation and the number of teeth in the pectines (see Table III). After its description this species was redescribed in more detail by Mello-Leitão (1945) and Lourenço (1984). *Tityus trinitatis* is, without question, the most common species in Trinidad and Tobago and the only one responsible for serious incidents of scorpion poisoning of humans.

Material examined: Trinidad, Chacachacare Island- south of Lepra House, 5/IV/1997, 2 males and 10 females; 5/IV/1997 (I. R. Martinez), 3 males and 2 females. Lady Chancellor Hill-P.O.S., 16/III/1997, 5 males and 1 female; 18/III/1997, 12 males and 2 females; 6/IV/1997, 1 male and 3 females; 7/IV/1997, 3 males and 1 female. Mt. St. Benedict-Tunapuna, Mt. Tabor Trail, 2/IV/1997, 1 male and 1 juv.; 4/IV/1997, 1 male. Tobago, Speyside- Trail to top of Pigeon Peak, 22/III/1997, 1 male and 2 females). Little Tobago, south-west part, 23/III/1997, 1 male; 27/III/1997, 13 males and 15 females.

FIGS 21 and 22. *Microtityus starri*, female allotype. 21. Ventral aspect of prosoma and mesosoma showing the pectines, genital operculum, sternum and dark spots on coxapophysis. 22. Metasomal segment V and telson, lateral view.

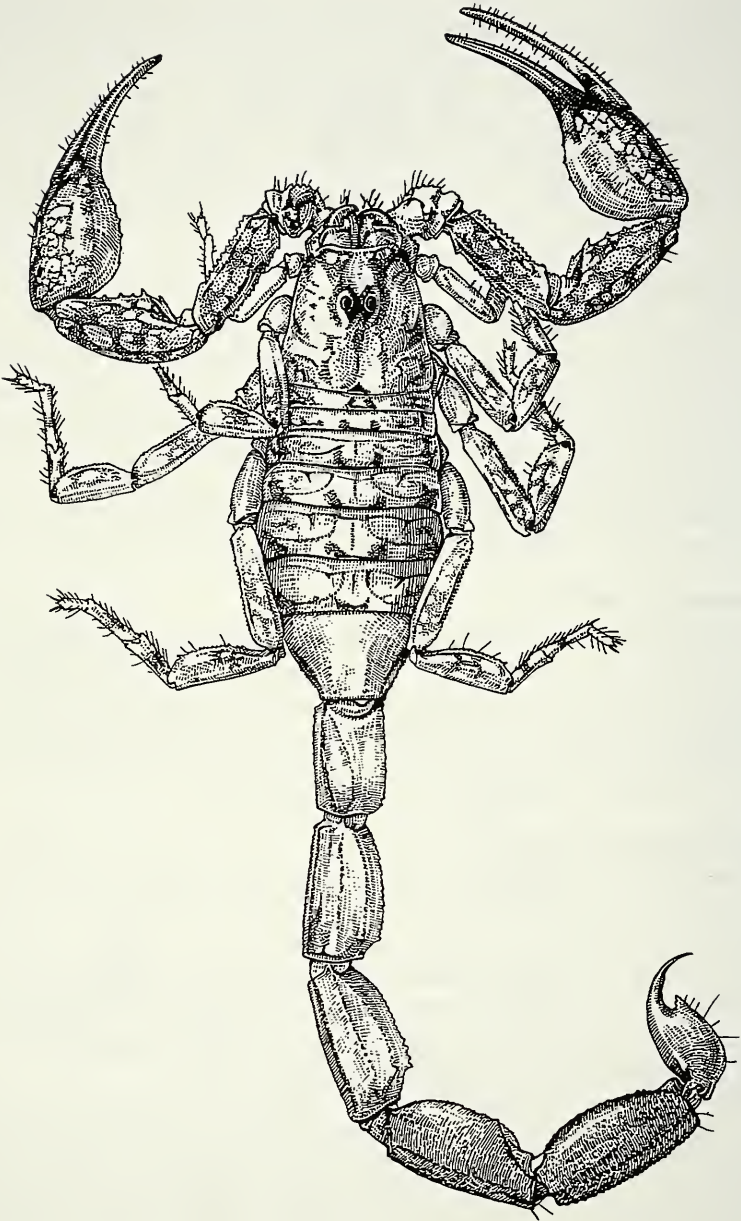
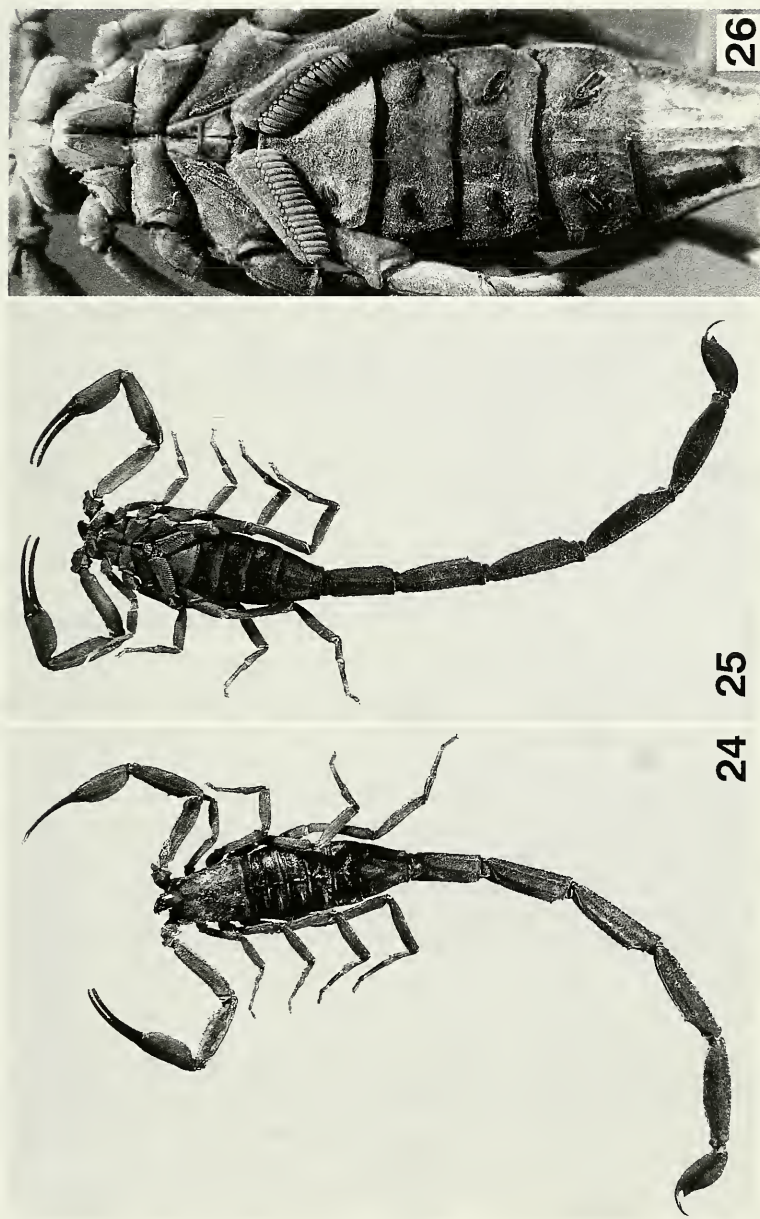
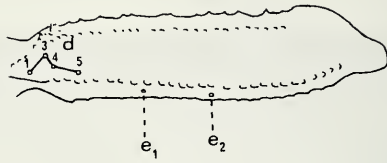
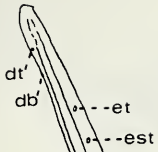


FIG. 23

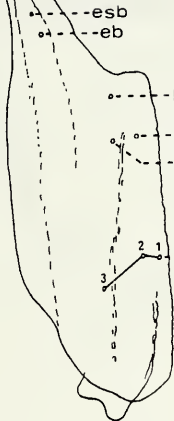
Tityus melanostictus, male, dorsal view (from Lourenço, 1984).



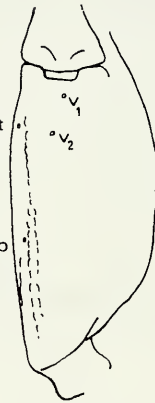
FIGS 24 TO 26. *Tityus trinitatis*, male lectotype. 24 and 25. Dorsal and ventral aspects. 26. Ventral aspect of prosoxa and mesosoma showing coxapophysis, sternum, genital operculum, pectines and sternites.



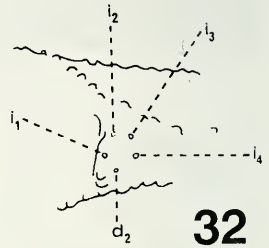
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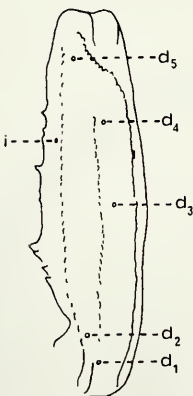
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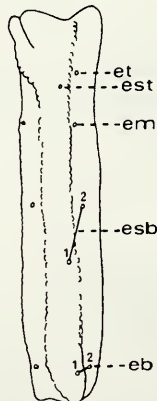
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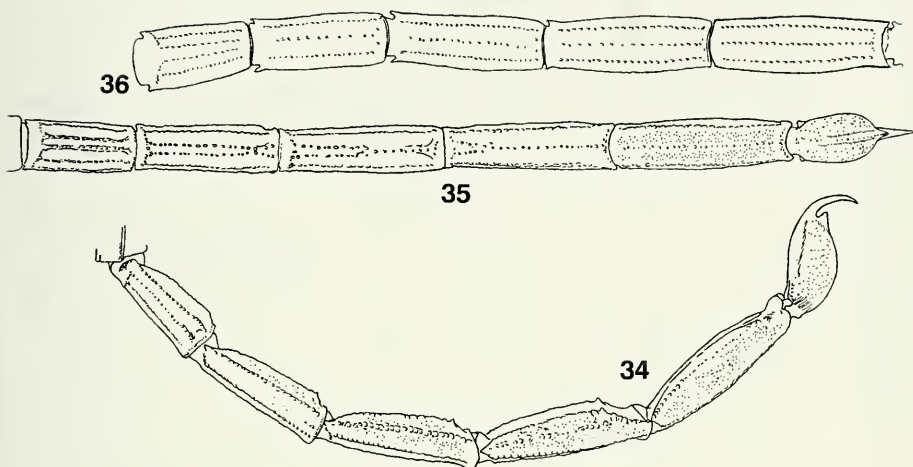
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FIGS 34 and 35. *Tityus trinitatis*, male lectotype. Metasoma and telson, lateral and ventral views. FIG. 36. *Tityus discrepans*, male Metasoma, ventral view.

FAMILY CHACTIDAE

***Broteochactas nitidus* Pocock, 1893a**

This species was described from Trinidad as the type species of the genus *Broteochactas*. Subsequently it was regarded as a synonym of *Broteochactas gollmeri* (Karsch), described from Venezuela. In their contribution to the Chactidae of Trinidad and Tobago, FRANCKE & BOOS (1986) resurrected *B. nitidus* and demonstrated that this species was endemic to Trinidad and Tobago. The chactid species present in the two islands all clearly redescribed and illustrated by FRANCKE & BOOS (1986).

Material examined: Trinidad, Maracas Bay, 16/III/1997, 1 female. Maracas Waterfall 18/III/1997, 1 male and 1 female. Mt. St. Benedict-Tunapuna, Mt. Tabor Trail, 11/III/1997, 3 males and 6 females; 4/IV/1997, 1 male. Tobago, Main Ridge Forest, 26/III/1997, 1 male and 3 females. Speyside-Trail to top of Pigeon Peak, 22/III/1997, 2 females. Speyside- Top of Pigeon Peak, 22/III/1997, 1 male.

ACKNOWLEDGEMENTS

I am most grateful to Prof. John L. Cloudsley-Thompson of London, for reviewing the manuscript and to Mr. M. Gaillard, Laboratoire de Zoologie Arthropodes, for preparing several of the drawings.

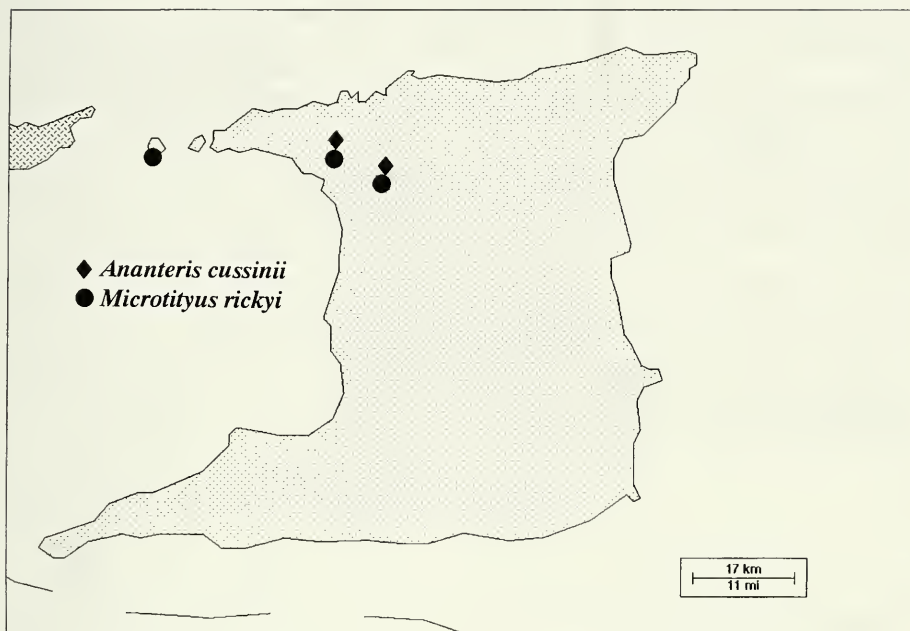
FIGS 27 to 33. *Tityus trinitatis*, male lectotype. 27 to 32. Trichobothrial pattern. 27 and 28. Chela, external and ventral aspects. 29 and 30. Tibia dorsal and external aspects. 31 and 32. Femur, dorsal aspect and detail of internal aspect. 33. Disposition of the granulation of pedipalp-chela finger.

TABLE III. Pectinial tooth variability in 3 species of Trinidad and Tobago

	<i>Tityus melanostictus</i>		<i>Tityus trinitatis</i>		<i>Broteochactas nitidus</i>			
	Male	Female	Male-Tri.	Female-Tri.	Male-Tob.	Female-Tob.	Male	Female
5 & 5							1	0
7 & 5							0	1
7 & 7							1	12
7 & 8							1	0
8 & 8							4	0
15-16	0	2						
16-15	0	1						
16-16	1	2						
17-15	0	1						
16-17	2	1	1	0				
16-18			1	0				
17-16	3	2						
17-17	4	0	0	1	0	1		
17-18	4	1	2	0				
18-17	2	0			0	1		
18-18	3	0	9	3				
18-19			5	0				
19-18	1	1	6	1				
17-19			0	1				
19-19			1	1	1	1		
19-20			1	2	0	2		
20-19			0	2				
20-20			2	1	3	5		
20-21			0	1	3	2		
21-20			2	1	1	2		
20-22					0	1		
21-21			1	1	5	1		
21-22					1	0		
22-20					0	1		
22-21			1	1				
22-22			1	0				
23-22					1	0		

FIG. 37. Localities of collection of *Ananteris cussinii* and *Microtityus rickyi* in Trinidad.

FIG. 38. Localities of collection of *Tityus discrepans*, *Tityus melanostictus* and *Tityus trinitatis* in Trinidad.



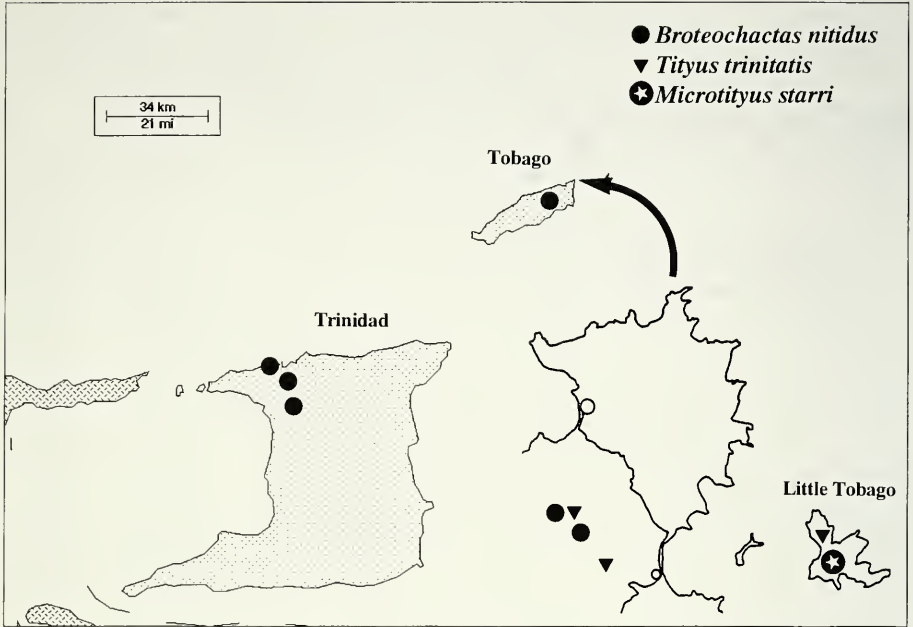


FIG. 39. Localities of collection of *Broteochoactas nitidus* in Trinidad & Tobago and *Tityus trinitatis* and *Microtityus starri* in Tobago and Little Tobago.

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REVUE SUISSE DE ZOOLOGIE

Tome 106 — Fascicule 1

	Pages
ROWELL, C. Hugh F. New and little known species of <i>Cloephoracris</i> (Orthoptera: Caelifera: Romaleidae) from Central America	3-20
BOURGAT, Robert, Salah BOUAMER & Sim-Dozou KULO. Nouvelles données sur les Trématodes d'Oiseaux d'Afrique Occidentale et description de <i>Brachylecithum</i> (<i>B.</i>) <i>togoensis</i> n. sp.	21-44
BESUCHET, Claude. Psélaphides paléarctiques. Notes taxonomiques et faunistiques (Coleoptera Staphylinidae Pselaphinae).	45-67
MAURIÈS, Jean-Paul & Jean-Jacques GEOFFROY. Les Diplopodes édaphiques et souterrains de l'Île Maurice (Myriapoda, Diplopoda).	69-79
SALGADO COSTAS, José María. <i>Quaestus</i> (<i>Speogeus</i>) <i>littoralis</i> n. sp. (Coleoptera: Cholevidae, Leptodirinae). Considérations biogéographiques et évolutives sur la faune troglobie de la Sierra du Sueve (Asturies, Espagne).	81-90
ZAWADZKI, Cláudio Henrique, Erasmo RENESTO & Luís Maurício BINI. Genetic and morphometric analysis of three species of the genus <i>Hypostomus</i> Lacépède, 1803 (Osteichthyes: Loricariidae) from the Rio Iguazu basin (Brazil).	91-105
PACE, Roberto. Aleocharinae della Cina: Parte V (conclusionone) (Coleoptera, Staphylinidae).	107-164
DE CHAMBRIER, Alain & Claude VAUCHER. Proteocephalidae et Monticelliidae (Eucestoda: Proteocephalidea) parasites de poissons d'eau douce au Paraguay, avec descriptions d'un genre nouveau et de dix espèces nouvelles.	165-240
HLAVÁČ, Peter, Ján KODADA & Alexander KOVAL. A new cavernicolous species of <i>Seracamaurops</i> Winkler, 1925 (Coleoptera: Staphylinidae: Pselaphinae) from Caucasus.	241-247
LOURENÇO, Wilson R. & Dietmar HUBER. Additions to the scorpion faunas of Trinidad and Tobago.	249-267

REVUE SUISSE DE ZOOLOGIE

Volume 106 — Number 1

	Pages
ROWELL, C. Hugh F. New and little known species of <i>Cloephoracris</i> (Orthoptera: Caelifera: Romaleidae) from Central America.	3
BOURGAT, Robert, Salah BOUAMER & Sim-Dozou KULO. New data on the Trematodes of Birds from Western Africa. Description of <i>Brachylecithum</i> (<i>B.</i>) <i>togoensis</i> n. sp.	21
BESUCHET, Claude. Palaearctic pselaphids. Taxonomic and faunistic notes (Coleoptera Staphylinidae Pselaphinae).	45
MAURIÈS, Jean-Paul & Jean-Jacques GEOFFROY. Cavernicolous and soil Millipedes from Mauritius (Diplopoda).	69
SALGADO COSTAS, José María. <i>Quaestus</i> (<i>Speogeus</i>) <i>littoralis</i> n. sp. (Coleoptera: Cholevidae, Leptodirinae). Biogeographical and evolutionary considerations on the cave-dwelling fauna in Sierra del Sueve (Asturias, Spain).	81
ZAWADZKI, Cláudio Henrique, Erasmo RENESTO & Luís Maurício BINI. Genetic and morphometric analysis of three species of the genus <i>Hypostomus</i> Lacépède, 1803 (Osteichthyes: Loricariidae) from the Rio Iguçu basin (Brazil).	91
PACE, Roberto. Aleocharinae from China: Parte V (conclusion) (Coleoptera, Staphylinidae).	107
DE CHAMBRIER, Alain & Claude VAUCHER. Proteocephalidae and Monticelliidae (Eucestoda: Proteocephalidea) parasites of freshwater fishes in Paraguay, with descriptions of a new genus and ten new species . . .	165
HLAVÁČ, Peter, Ján KODADA & Alexander KOVAL. A new cavernicolous species of <i>Seracamaurops</i> Winkler, 1925 (Coleoptera: Staphylinidae: Pselaphinae) from Caucasus.	241
LOURENÇO, Wilson R. & Dietmar HUBER. Additions to the scorpion faunas of Trinidad and Tobago.	249

Indexed in CURRENT CONTENTS, SCIENCE CITATION INDEX

PUBLICATIONS DU MUSÉUM D'HISTOIRE NATURELLE DE GENÈVE

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Fasc. 1.	SARCODINÉS par E. PENARD	Fr. 12.—
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ANNALES

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et du
MUSÉUM D'HISTOIRE NATURELLE
de la Ville de Genève

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Directeur du Muséum d'histoire naturelle de Genève

FRANÇOIS BAUD
Conservateur au Muséum d'histoire naturelle de Genève

CHARLES LIENHARD
Chargé de recherche au Muséum d'histoire naturelle de Genève

Comité de lecture

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Several new *Melaneros* from Sri Lanka and southern India (Coleoptera, Lycidae)

S

Milada BOCAKOVA

Regional Museum Olomouc, nám. Republiky 5, 771 73 Olomouc, Czech Republic

Several new *Melaneros* from Sri Lanka and southern India (Coleoptera, Lycidae). - Following eight species are described: *Melaneros inermis* sp. n., *M. oculus* sp. n., *M. kejvali* sp. n., *M. cardamomensis* sp. n., *M. pacholatkoï* sp. n., *M. uzeli* sp. n., *M. bicoloratus* sp. n. and *M. parvus* sp. n. Male copulatory organs of all species and other important diagnostic features are figured.

Key-words: Taxonomy - Coleoptera - Lycidae - *Melaneros* - Sri Lanka - southern India

INTRODUCTION

The genus *Melaneros* is one of the largest genera of the family Lycidae. It comprises over 400 species distributed mostly in tropical regions, North America and eastern Asia, 21 of which are known from Sri Lanka. Although *Melaneros* of Ceylon has lately been revised (BOCAK & BOCAKOVA 1990), examination of some additional material yielded other new species. Relatively low vagility of these small animals living in the lowest stratum of tropical forest causes that the distribution range of most species is often strongly limited. Therefore, new material from different localities usually yields additional new species.

The genus *Melaneros* comprises small to medium-sized species provided with pronotum without carinae, irregular reticulate cells on the elytra and with male genitalia without lateral lobes. Unfortunately, identification of females is often impossible, because species of this genus show extensive variability in body coloration and other external characters. Moreover, the female genitalia are only weakly diversified. Therefore, this paper is based on the study of copulatory organs of males only.

ABBREVIATIONS:

- MHNG – Muséum d'histoire naturelle, Genève
NMPC – National Museum, Praha, Czech Republic
LMBC – author's collection

DESCRIPTIONS

Melaneros inermis sp. n.

Figs 1, 11, 23

Holotype: ♂ (LMBC), Sri Lanka, Idalgashinna, 25 km SW of Badulla, alt. 1400 m, 29. IV. – 1. V. 1994, Z. Kejval leg.

Etymology: *Inermis* (Lat.) – not armed, refers to the aedeagus without thorns.

DESCRIPTION

Body dark brown to black, only pronotum (except disc portion) and basal elytral half yellow. Head with large eyes, eye diameter 1.07 times longer than interocular distance (Fig. 23). Antennae slender (Fig. 11), reaching over elytral half, segment 4 is 1.3 times longer than 3. Pronotum transverse, lateral margins emarginate, posterior angles projected obliquely backwards (Fig. 23). Scutellum black, subquadrate. Elytra 3 times longer than humeral width, weakly widened posteriorly. Male genitalia simple, dorsoventrally arcuate, without thorns (Fig. 1).

Body length: 4.4 mm, humeral width: 1.2 mm.

COMMENTS: Semicircularly arcuate aedeagus is a synapomorphy on the basis of which *M. inermis* seems to be related to *M. arcuatus* (Bocák et Bocáková, 1990). It differs from this species in much smaller body size, in having only half of the elytra yellow and in the morphology of the aedeagus lacking a dorsoproximal thorn.

Melaneros oculus sp. n.

Figs 2, 12, 24

Holotype: ♂ (LMBC), Sri Lanka: Idalgashinna, 25 km SW of Badulla, alt. 1400 m, 29. IV. – 1. V. 1994, Z. Kejval leg.

Etymology: *Oculus* (Lat.) – big-eyed, refers to the large eyes of male.

DESCRIPTION

Body dark brown to black, only pronotum and elytra yellow. Head with large eyes, eye diameter 1.4 times longer than interocular distance (Fig. 24). Antennae slender (Fig. 12), reaching apical third of elytra, segment 4 is 1.2 times longer than 3. Pronotum trapezoidal, anterior margin strongly produced forwards, posterior angles projected obliquely backwards (Fig. 24). Scutellum black, square-shaped. Elytra 3.5 times longer than humeral width, nearly parallel-sided. Male genitalia simple, weakly dorsoventrally arcuate, provided with a dorsal thorn (Fig. 2). Body length: 5.43 mm, humeral width: 1.31 mm.

COMMENTS: *M. oculus* seems to be related to *M. aliquantulus* (BOCAK & BOCAKOVA 1990) on the basis of the slightly dorsoventrally arcuate aedeagus. On the contrary to *M. aliquantulus*, male genitalia of *M. oculus* are provided with a bilobed apical portion and with a thorn basally. Males of *M. oculus* have much larger eyes than those of *M. aliquantulus*.

Melaneros kejvali sp. n.

Figs 3, 4, 13, 25

Holotype: ♂ (LMBC), Sri Lanka: Idalgashinna, 25 km SW of Badulla, alt. 1400 m, 29. IV. – 1. V. 1994, Z. Kejval leg.

Etymology: named in honour of the collector.

DESCRIPTION

Body dark brown to black, only margins of pronotum, basal third of elytra and basal 2/3 of suture as well as basal 2/3 of lateral elytral margins yellow. Head with large eyes, eye diameter as long as interocular distance (Fig. 25). Antennae slender (Fig. 13), reaching elytral midlength, segment 3 much shorter than 4. Pronotum strongly transverse, posterior angles acute, projected obliquely backwards (Fig. 23). Scutellum black, square-shaped, weakly emarginate apically. Elytra 3 times longer than humeral width, almost parallel-sided. Male genitalia provided with a ventroapical opening in distal half and with two dorsoapical, medially divergent belts (Figs 3, 4). Body length: 4.7 mm, humeral width: 1.2 mm.

COMMENTS: The aedeagus provided with dorsoapical sutures as well as with a ventroapical opening seem to provide synapomorphies supporting the close relationships of *M. kejvali* sp. n. and *M. bicoloratus* sp. n. *M. kejvali* differs from the other species in having not flabellate male antennae, pronotal margins yellow and large ventroapical opening of aedeagus.

Melaneros cardamomensis sp. n.

Figs 7, 8, 14, 26

Holotype: ♂ (LMBC), S India: Kerala, Cardamom hills, 77°05'E 9°25'N, ca 50 km NW of Pathanamthitta, near Pambaiyar riv., alt. 300 m, 6. – 9. V. 1994, Z. Kejval leg. ; paratype, same data, 1 ♂ (LMBC).

Etymology: Named in reference to the type locality.

DESCRIPTION

Body dark brown to black, only pronotum, scutellum and almost whole elytra (except apical spots) yellow. Head with large, not very prominent eyes, eye diameter 1.5 times longer than interocular distance (Fig. 26). Antennae serrate (Fig. 14), reaching elytral midlength, segment 3 shorter but wider than 4. Pronotum strongly transverse, lateral margins nearly straight, posterior angles projected obliquely backwards (Fig. 26). Scutellum slightly trapezoidal with lateral margins divergent forwards. Elytra 2.7 times longer than humeral width, weakly widened posteriorly. Male genitalia ventrally arcuate in median portion, provided with a ventroapical opening (Fig. 7, 8). Body length: 4.8 mm, humeral width: 1.6 mm.

COMMENTS: It differs from all other known *Melaneros* species in the shape of aedeagus.

Melaneros pacholatko sp. n.

Figs 5, 6, 16, 27

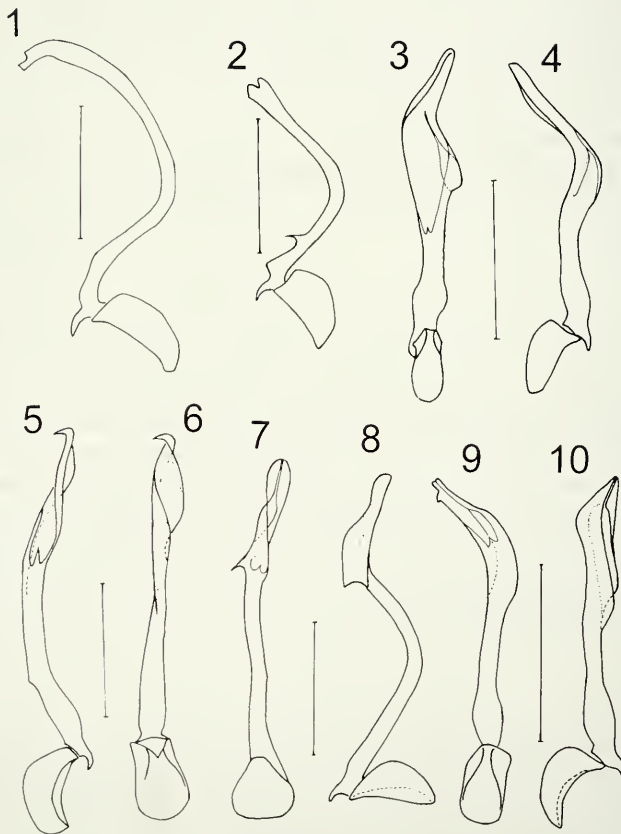
Holotype: ♂ (LMBC), S India, Tamil Nadu, 11.22N 76.56E, 15 km SE Kotagiri, Kunchappanai, 17.-22. V. 1997, Dembicky & P. Pacholátko leg.; paratypes: 1 ♀, the same data; (LMBC), 2 ♂, Tamil Nadu, 11.25N 76.52E, 6 km S of Kotagiri, Elk falls, 1650 m, 12. – 16. V. 1997, Dembicky & P. Pacholátko leg. (MHNG, LMBC).

Etymology: Named in honour of the collector, Mr. P. Pacholátko (Czech Republic).

DESCRIPTION

Body black, only basal half to 4/5 of elytra yellow. Head with slightly prominent eyes, eye diameter as long as interocular distance (Fig. 27). Antennae slender, reaching elytral midlength (Fig. 16). Segment 4 is 1.3 times longer than 3. Pronotum transverse, trapezoidal, anterior margin produced forwards (Fig. 27). Scutellum black, lateral margins divergent forwards, weakly emarginate apically. Elytra 2.8 times longer than humeral width, lateral margins weakly widened posteriorly. Male genitalia slender, slightly arched ventrally, provided with apical opening (Figs 5, 6). Body length: 4.4 – 4.8 mm, humeral width: 1.6–1.7 mm.

COMMENTS: On the basis of the shape of male genitalia this species seems to be related to *M. pseudopicianus* Bocáková, 1997. It differs from it in having pronotum and scutellum black and in the shape of apex of the aedeagus.



FIGS 1-10

Male genitalia of: 1: *Melaneros inermis* sp. n., 2: *M. oculus* sp. n., 3-4: *M. kejvali* sp. n., 5-6: *M. pacholatkoii* sp. n., 7-8: *M. cardanomensis* sp. n., 9-10: *M. bicoloratus* sp. n. Scale = 0.5 mm.

Melaneros uzeli sp. n.

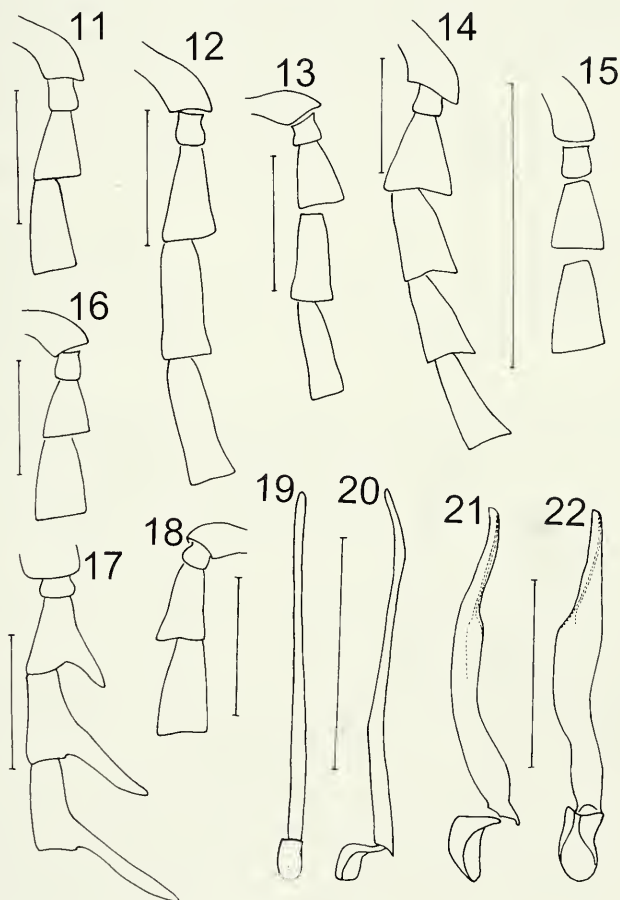
Figs 18, 21, 22, 29

Holotype: ♂ (NMPC), Sri Lanka: »Ceylon, Kandy, III. 1910, Dr Uzel leg.«

Etymology: Named in honour of the collector.

DESCRIPTION

Body dark brown to black, only pronotum and anterior 3/5 of elytra yellow. Head with large eyes, eye diameter 1.7 times longer than interocular distance (Fig. 29). Antennae reaching to elytral midlength, segment 4 is 1.3 times longer than 3 (Fig. 18). Pronotum transverse, lateral margins emarginate, posterior angles projected obliquely

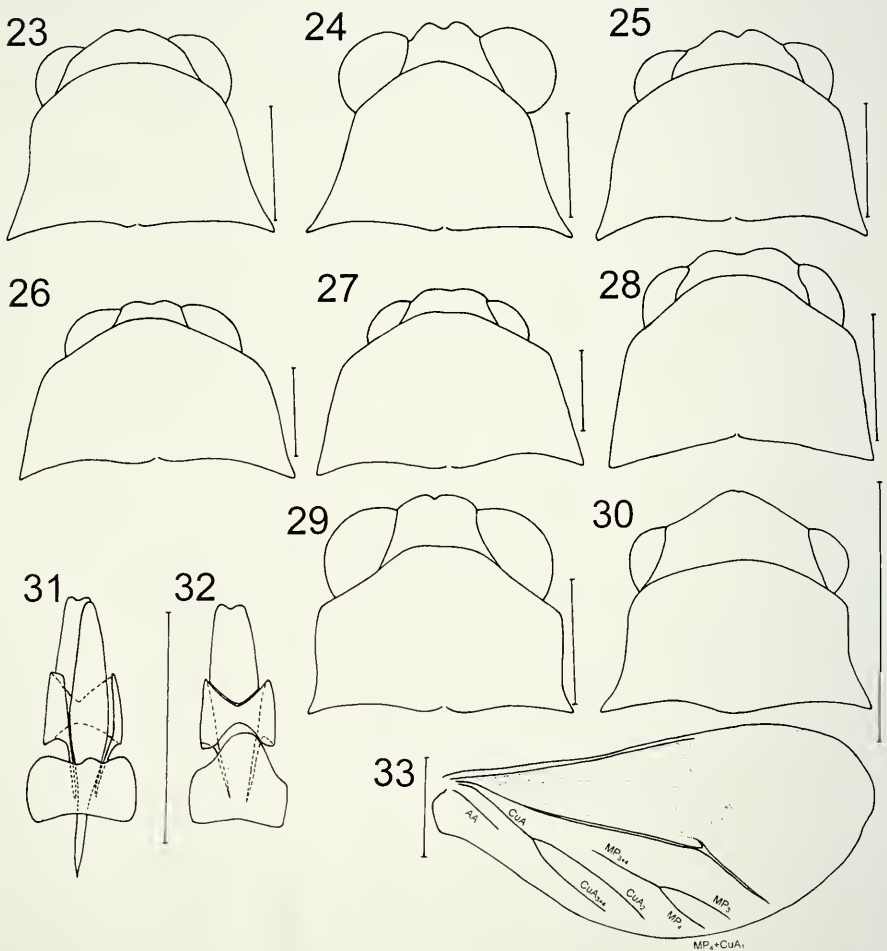


Figs 11-22

Basal antennal segments of: 11: *Melaneros inermis* sp. n., 12: *M. oculus* sp. n., 13: *M. kejvali* sp. n., 14: *M. cardamomensis* sp. n., 15: *M. parvus* sp. n., 16: *M. pacholatkoi* sp. n., 17: *M. bicoloratus* sp. n., 18: *M. uzeli* sp. n.; Figs 19-22: Male genitalia of: 19-20: *M. parvus* sp. n., 21-22: *M. uzeli* sp. n. Scale = 0.5 mm.

backwards (Fig. 29). Scutellum black, subquadrate, apically emarginate. Elytra 3.3 times longer than humeral width, nearly parallel-sided. Male genitalia simple (Fig. 21, 22), with two medially divergent dorsoapical sutures. Body length: 4 mm, humeral width: 1.1 mm.

COMMENTS: *M. uzeli* sp. n. is considered to be a member of the *samuelsoni* group (BOCAKOVA, 1997). It seems to be closely related to *M. simplex* Bocáková, 1997 from which it differs in the ventrally arched aedeagus.



Figs 23-30

Head and pronotum of: 23: *Melaneros inermis* sp. n., 24: *M. oculus* sp. n., 25: *M. kejvali* sp. n., 26: *M. cardamomensis* sp. n., 27: *M. pacholatkoii* sp. n., 28: *M. bicoloratus* sp. n., 29: *M. uzeli* sp. n., 30: *M. parvus* sp. n.; Figs 31, 32: Terminal abdominal segments of *M. parvus* sp. n.; Fig. 33: Wing venation of *M. parvus* sp. n. Scale = 0.5 mm.

Melaneros bicoloratus sp. n.

Figs 9, 10, 17, 28

Holotype: ♂ (MHNG) Sri Lanka: »Thuvaites, Ceylon, 1872»; paratypes: Sri Lanka: »Thuvaites, Ceylon», without other data, 2 ♂ (MHNG, LMBC).

Etymology: Named according to the body coloration.

DESCRIPTION

Body dark brown to black, only anterior half of elytra yellow. Head with small eyes, interocular distance 1.18 times as long as eye diameter (Fig. 28). Antennae shortly flabellate (Fig. 17), lamellae of middle segments as long as segment body. Antennae reaching apical third of elytra. Pronotum with lateral margins straight, divergent backwards, anterior margin produced forwards (Fig. 28). Scutellum black, subquadrate. Elytra 3 times longer than humeral width, nearly parallel-sided. Male genitalia simple, laterally projected in distal portion, provided with a distal opening (Figs 9, 10). Body length: 4.1 mm, humeral width: 1.1 mm.

COMMENTS: Species related to *M. kejvali* sp. n. but differs in having flabellate antennae, entirely black pronotum and different shape of the aedeagus.

Melaneros parvus sp. n.

Figs 15, 19, 20, 30-33

Holotype: ♂ (MHNG), India: Madras, Anaimalai H., 18 km N Valparai, 1250 m, 18. XI. 1972, C. Besuchet, I. Löbl, R. Mussard leg.

Etymology: Named according to its very small body size.

DESCRIPTION

Extremely small species, body dark brown, only apical segment of antennae yellow. Head only slightly hidden by pronotum, provided with very small eyes, interocular distance twice longer than eye diameter in lateral view (Fig. 30). Antennae very long, reaching apical fifth of elytra, simple, segment 3 slightly shorter than 4 (Fig. 15). Terminal segment of maxillary palpi strongly pointed apically. Pronotum transverse, lateral margins strongly emarginate, posterior angles projected obliquely backwards (Fig. 30). Scutellum apically emarginate. Elytra covered with long erect pubescence, 3 times longer than humeral width, elytra slightly divergent in apical half of the suture. Each elytron only with 4 primary costae and one secondary costa (between primary costa 4 and lateral margin), primary costa 1 missing in distal portion, therefore each elytron narrowed apically. Reticulate cells irregular. Wing venation with many reductions (Fig. 33). Proximal attachment of the hind branch of media posterior (MP₃₊₄) to MP₁₊₂ missing, CuA₁ also missing, anal anterior vein (AA) reduced distally and meets no of CuA branches. Anal field strongly reduced and anal posterior nerve (AP₃₊₄) missing. Terminal tergum and sternum apically emarginate (Figs 31, 32). Male genitalia stick-formed, distal portion curved ventrally (Fig. 20). Body length: 2.15 mm, humeral width: 0.55 mm.

COMMENTS: It differs from all other known *Melaneros* in its minute body size, in the shape of head, in elytra provided with only primary costae and only one secondary costa, in reduced reticulate cells, in the reductions of the wing venation and in the shape of aedeagus.

ACKNOWLEDGEMENTS

I am very indebted to Dr. I. Löbl (Muséum d'histoire naturelle, Genève) and to Dr. J. Jelínek (National Museum, Praha) for loans of material in their charge. This work was supported by a grant No. 97P01OMG79 from Ministry of Culture of the Czech Republic.

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A new genus and species of Epipocinae (Coleoptera: Endomychidae) from Pakistan

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A new genus and species of Epipocinae (Coleoptera: Endomychidae) from Pakistan. - *Danascelis elongata* gen. and sp. n. (Coleoptera: Endomychidae, Epipocinae) from Pakistan, is described and illustrated. Notes on Epipocinae are provided.

Key-words: entomology - taxonomy - new genus - new species - Pakistan - Coleoptera - Cucujoidea - Endomychidae.

INTRODUCTION

Epipocinae (=Stenotarsinae) (STROHECKER 1953, LAWRENCE & NEWTON 1995) received very little attention from the taxonomists, since Strohecker's world review and catalogue.

This group of endomychid beetles, like some others of the currently recognized subfamilies of Endomychidae, have been based solely upon overall appearance or combination of characters, and is almost certainly polyphyletic (ŠLIPÍŇSKI & PAKALUK 1992). The main distinguishing characters used to define this subfamily are brown colour, setose body and broadly bordered lateral margins of pronotum. But there are many exceptions even from this superficial definition. Relationships between currently recognized genera of Epipocinae need more complete and detailed studies, and phylogenetic classification of this diverse group is desperately needed.

In spite of these problems with the current classification of endomychid subfamilies, a new genus is proposed to be included within an expanded Epipocinae, based mainly upon the shape of the male antennal club. This character (9 antennomere greatly enlarged) suggests close relationships with Oriental genus *Tragoscelis* and widely distributed genus *Danae*, which have been classified within subfamily Epipocinae. A new genus is easily separated from the species of genera *Danae* and *Tragoscelis* by following characters: decidedly smaller body, double, oval, deep cavities on sides of pronotal basal sulcus (each cavity with small, oval pit), tarsus distinctly 4-segmented (1 and 2 tarsomeres very weakly flattened), and 3 antennomere not elongate; moreover, *Danascelis* differs from *Danae* by absence of broadly bordered lateral margins of pronotum, and from *Tragoscelis* it differs by having anterior angles of pronotum very weakly produced and rounded.

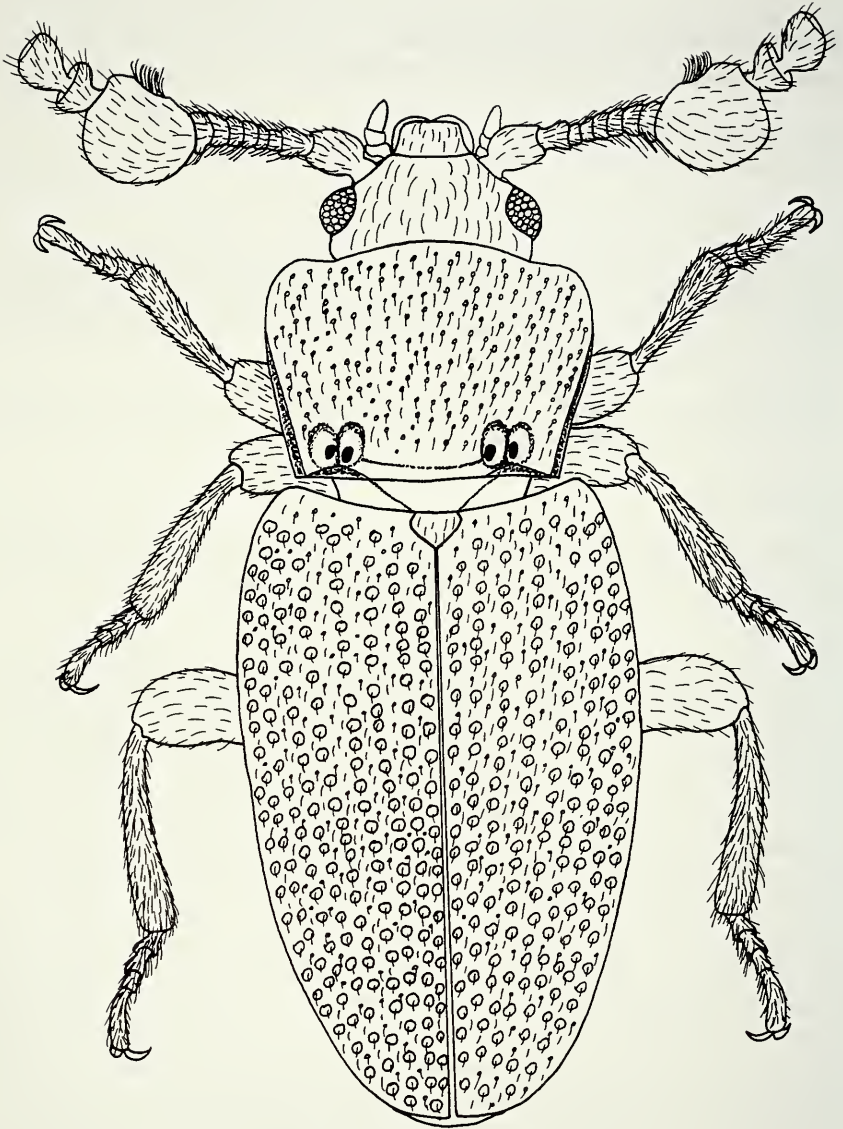


FIG. 1

Habitus of *Danascelis elongata* sp. nov.

Danascelis gen. n.

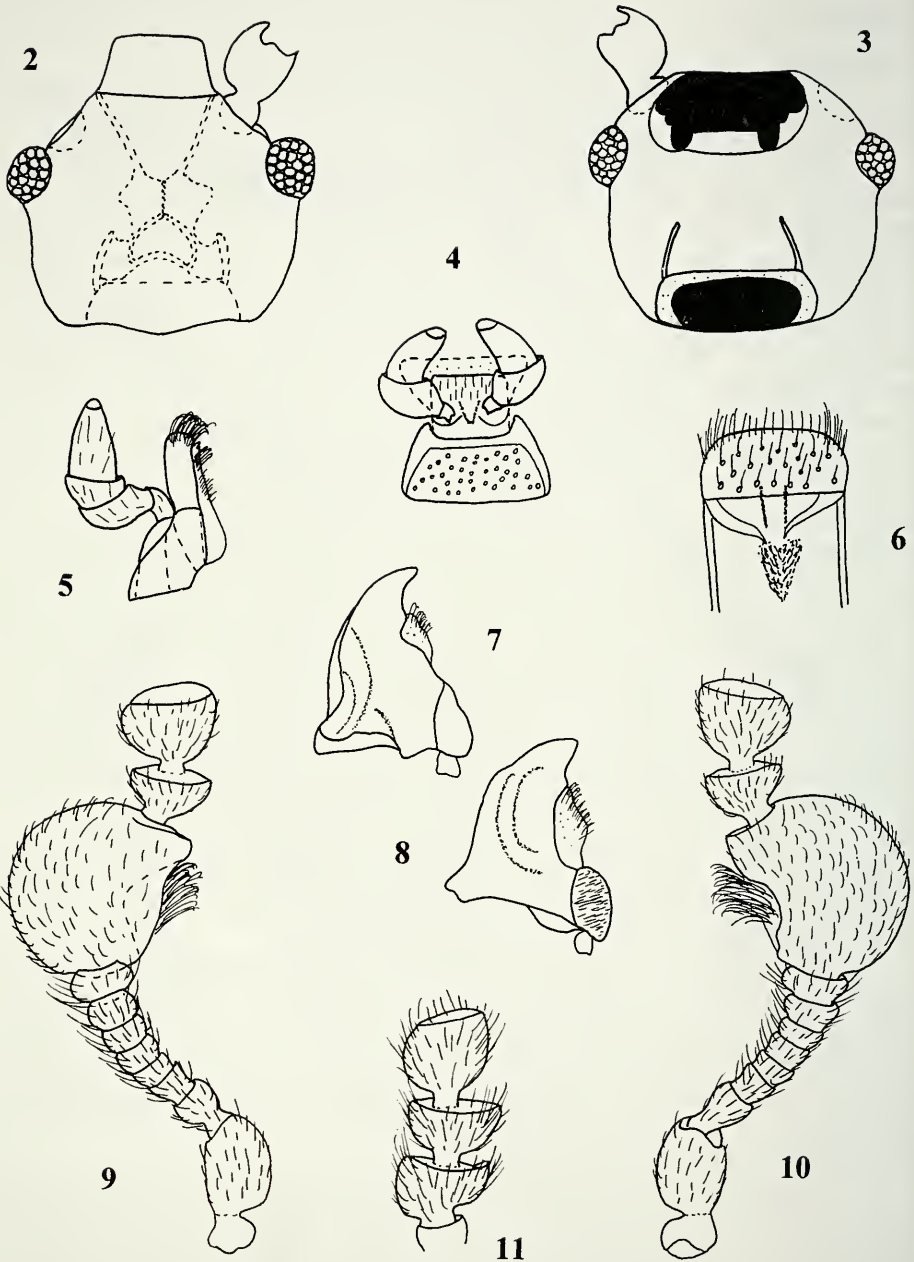
DESCRIPTION

Body elongate (Fig. 1), moderately convex; shiny, covered with fine, short pubescence; distinctly and densely punctured.

Head (Figs 2, 3) prognathous, partially retracted in prothorax, as long as wide; moderately densely and coarsely punctured; gula, genal area and occiput with fine microsculpture. Gular sutures moderately long, weakly convergent anteriorly, widely separated. Eyes placed on sides of head, small, oval, weakly prominent, coarsely faceted. Frontoclypeal suture distinct, straight. Antennal grooves absent; antennal sockets partially visible from above. Antenna reaches posterior pronotal margin, 11-segmented (Figs 9, 10), scape stout, longer than 3 following antennomeres together, pedicel subquadrate, antennomeres 3-8 short, transverse; last three form distinct, densely setose club. In male, first antennomere of the club greatly enlarged, weakly concave, bearing brush of long setae on its inner edge. In female, first and the second antennomeres of the club subequal in size (Fig. 11). Clypeus weakly transverse, flat. Labrum (Fig. 6) transverse, sclerotized, punctured, setose; tormae elongate, with mesal arms recurved posteriorly; labral rods slender, short, parallel. Mandible (Figs 7, 8) short and broad, with single apical tooth; mola moderately large, strongly sclerotized, with fine, transverse ridges; prostheca membranous, covered with short setae on its inner edge; submola very small. Maxilla (Fig. 5) with 4-segmented palp; apical palpomere elongate, tapering, rounded apically. Galea elongate, blunt and covered densely with long setae at apex; about twice as broad as lacinia. Lacinia as long as galea, weakly narrowing towards its apex; with visible digitus, several subapical spines and short setae on its inner edge. Labium (Fig. 4) with 3-segmented palp; terminal palpomere elongate, cylindrical, rounded apically. Mentum trapezoidal, densely punctured. Prementum weakly transverse, sclerotized; ligula submembranous, expanded apically. Submentum small, transverse. Tentorium (Fig. 2) with anterior arms broadly fused medially, and widely divergent anteriorly; posterior tentorial bridge weakly curved anteriorly, without median process.

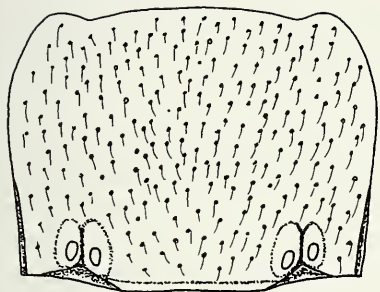
Pronotum (Fig. 12) transverse, very narrowly bordered laterally; basal sulcus rather distinct, with double, oval, deep cavities on its sides; each cavity with small, oval pit. Anterior angles weakly produced, rounded; posterior angles right. Pronotal disc weakly convex. Prosternum with two round, precoxal pits; intercoxal process (Fig. 13) narrow, flat, rounded apically; distinctly separates procoxae, extends posteriorly beyond them. Procoxa circular in outline (Fig. 19), its cavity externally open, internally closed. Trochantin concealed.

Mesosternum (Fig. 14) heavily sclerotized, with two, oval pits on sides, near anterior margin; with longitudinal ridge and concavities on its sides; intercoxal process narrow, less than half as broad as coxal diameter. Mesocoxa circular in outline, its cavity outwardly open; trochantin exposed. Meso-metasternal junction with internal knobs. Elytron (Fig. 17) elongate, convex, with rows of dark, coarse punctures; interspaces irregularly, finely punctured; epipleuron very narrow, incomplete apically. Scutellum small, transverse, weakly acute at apex.



FIGS 2-11

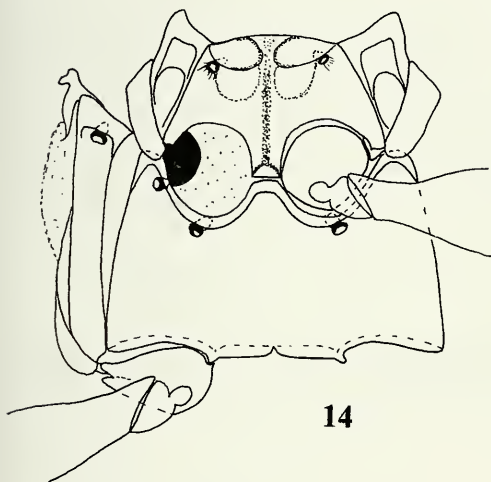
Danascelis elongata. 2, head, dorsal outline; 3, head, ventral outline; 4, labium, ventral; 5, maxilla, ventral; 6, labrum, ventral; 7, mandible, dorsal; 8, mandible, ventral; 9, male antenna, dorsal; 10, male antenna, ventral; 11, female antennal club.



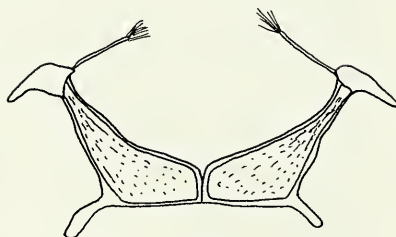
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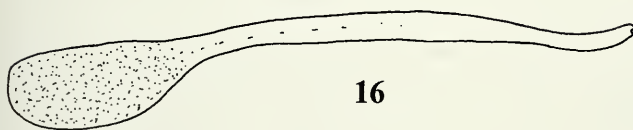
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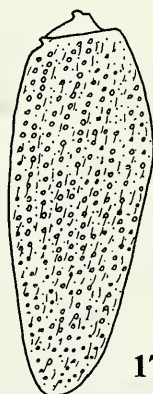
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15



16



17

FIGS 12-17

Danascelis elongata. 12, prothorax, dorsal; 13, prothorax, ventral; 14, pterothorax, ventral; 15, metendosternite, dorsal; 16, hind wing; 17, right elytron, dorsal.

Metasternum (Fig. 14) transverse, about 2 x as wide as long, weakly convex; with two pairs of postcoxal pits; medial line absent. Metacoxa transverse, broadly separated. Metapleuron with one, oval pit in its apical part. Metendosternite (Fig. 15) with short stalk and widely separated anterior arms and tendons.

Wing (Fig. 16) strongly reduced.

Leg with trochanterofemoral attachment oblique (Figs 14, 19); femur swollen, excavate mesally to receive tibia; tibia subcylindrical, about half as broad as femur; without apical spurs. Tarsal formula 4-4-4 in both sexes; tarsomeres 1 and 2 weakly flattened (Fig. 23), subequal in size; tarsomere 3 slightly shorter than 1 or 2, apical tarsomere longer than remaining together. Claws simple. Empodium small, bisetose.

Abdomen (Fig. 18) with five freely articulated ventrites; ventrite 1 longer than three following together, with two, oval, postcoxal pits; ventrites 2-4 subequal in length. Ventrites 2-5 with internal, anterolateral apodemes. 9 abdominal segment of male weakly sclerotized (Figs 21, 22). Aedeagus (Fig. 20) with median lobe rather stout, comparatively short, sclerotized, curved, resting on its side when retracted, with membranous gonopore at apex; tegmen very small, strongly reduced, ring-shaped; tegminal plate submembranous; tegminal strut short, membranous. Female genitalia (Fig. 24) with ovipositor short, weakly sclerotized; coxities moderately large, separated, elongate, densely setose at apex; styli reduced, very small, placed apically. Spermatheca small, oval, membranous; sperm duct short, slender; accessory gland very small, oval, membranous.

Type species. *Danascelis elongata* sp. n.

Etymology. The generic name is an arbitrary combination of letters referring to the genera Danae and Tragoscelis, which seem to be close related with a new genus; the gender is feminine.

***Danascelis elongata* sp. n.**

DESCRIPTION. Length 2.55-2.80 mm. Body 1.95-2.30 x longer than wide; pronotum 0.60-0.80 x as long as wide; elytra 1.19-1.28 x wider than pronotum, 2.80-3.00 x longer than pronotum.

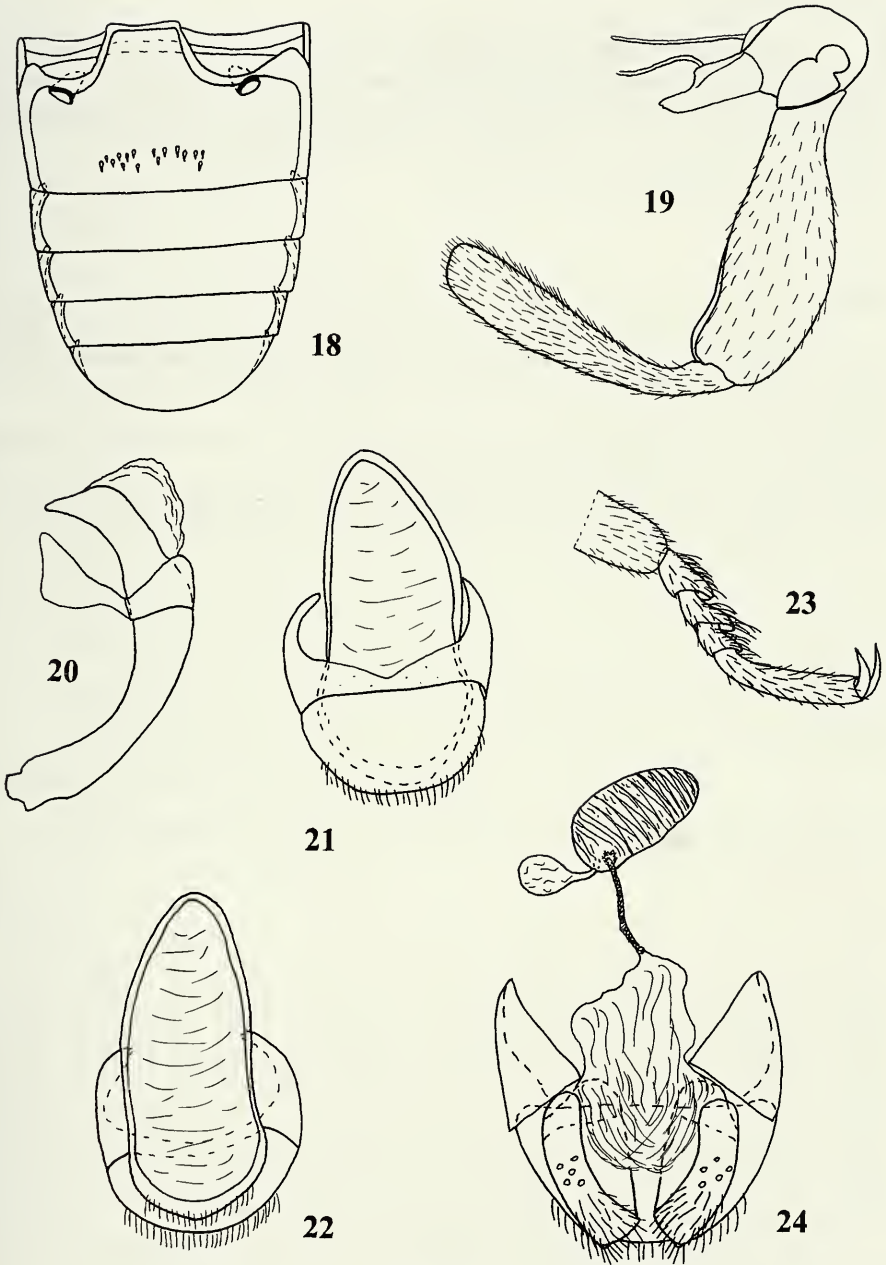
Colour light brown or brown with dorsal surface of head and edges of pronotum, and scutellum darker; eyes black. Vestiture of fine, short, pale yellow hairs. Pronotum widest at anterior third; edges smooth. Pronotal punctures fine, sparse and irregular. Elytra widest in about apical third, rounded at apex. Aedeagus as in Fig. 20.

Types. Holotype (male): PAKISTAN: Swat s/Utrot; 13.V.1983, 2500-2600 m, BESUCHET - LÖBL (MNHG).

Paratypes: PAKISTAN: Dir Lawarai Pass, 2700 m; 21.V.1983, BESUCHET - LÖBL (1 female, MNHG); same data (1 male, MZPW, completely dissected on slide).

One paratype is kept in the collection of the Museum and Institute of Zoology, Warszawa (MZPW).

Etymology. The name *elongata* is from the Latin referring to the elongate body.



FIGS 18-24

Danascelis elongata. 18, abdomen, ventral; 19, right fore leg (without tarsus); 20, aedeagus, ventral; 21, ninth abdominal segment of male, dorsal; 22, ninth abdominal segment of male, ventral; 23, apex of mid tibia and tarsus; 24, female genitalia, ventral.

ACKNOWLEDGMENTS

I am indebted to Adam Šlipiński, who brought this curious and very interesting species of beetles to my attention, after his visit to Museum in Geneva. A. Šlipiński is also acknowledged for his kind comments on an earlier version of this manuscript. I thank Dr. Ivan Löbl (MNHG - Muséum d'histoire naturelle de Genève) for the loan of specimens used in this study.

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Neotropical Eupariini: New and little known genera and species (Coleoptera: Scarabaeoidea: Aphodiinae)

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Neotropical Eupariini: New and little known genera and species (Coleoptera: Scarabaeoidea: Aphodiinae).

- Three monotypical genera: *Arupaia* gen. n., *Flechtmannia* gen. n. and *Selviria* gen. n. are described; diagnoses for *Iarupea* Mart. and *Lomanoxoides* Stebn. are given and keys to species are provided. *Lomanoxoides selviriaensis* sp. n. and *Selviria matogrossoensis* sp. n. from Brazil are described and illustrated. Six species are transferred from *Ataenius* Har. and *Euparia* St.-Farg. & Serv.: *Arupaia friedenreichi* (Har.) comb. n., *Flechtmannia laticollis* (Petr.) comb. n., *Iarupea attenuata* (Har.) comb. n., *I. serratipennis* (Petr.) comb. n., *Lomanoxoides nigrolineatus* (Hint.) comb. n., *L. tesari* (Balth.) comb. n. and *L. thoracalis* (Petr.) comb. n. The following new synonymies are proposed: *Arupaia friedenreichi* (Har.) (= *Iarupea guimaraesi* Mart. syn. n.), *Lomanoxoides tesari* (Balth) (= *Ataenius hrubantovai* Chal. syn. n.) and *Myrmecaphodius proseni* Mart. (= *M. fornicatus* Petr. syn. n.). Comments and notes on relationships are included.

Key-words: Coleoptera - Scarabaeoidea - Aphodiinae - Eupariini- Neotropical Region - Taxonomy.

INTRODUCTION

Previous classifications of most of the euparine species have been based on two principal genera: *Euparia* and *Ataenius*. The genus *Euparia* is exclusively of New World distribution, since the Asian-Papuan-Australian species belong to the other taxonomic units (STEBNICKA & HOWDEN 1996, STEBNICKA 1998). In 1984, CHALUMEAU & HOWDEN presented a complete description of the genus *Euparia* wherein they listed three valid species. In addition, they proposed a number of genera to comprise several New World species removed from the genus *Euparia*. Among these genera, the names *Lomanoxoides* and *Iarupoides* were given as nomina nuda. Since that time, no additional classificatory schemes have been proposed for these genera and their allies.

The present contribution is intended to form the framework upon which subsequent generic revisions and keys will be based. Six genera discussed and established

here come from an area with enormous and little understood diversity of species and need to be made available for inclusion of diverse new species described in the future. Twelve species listed in the present study are very rare in collections, probably due to their inquiline habits and most probably all of them are associated with various species of ants.

MATERIALS AND METHODS

In addition to the new taxa discussed herein, I examined a large Neotropical material of the following euparine genera: *Ataenius*, *Batesiana*, *Bruchaphodius*, *Lomanoxia*, *Martineziella* and *Phalangochaeta* (Stebnicka, a revision in preparation).

The material studied belongs mostly to the Museum d'histoire naturelle in Geneva (MHNG) where the holotypes of new species are deposited and to the following institutions and private collections: CFC - Carlos Flechtmann Collection, Brazil; CMN - Canadian Museum of Nature, Ottawa; FSCA - Florida State Collection of Arthropods, Gainesville; HNHM - Hungarian Natural History Museum, Budapest; ISEA - Institute of Systematics and Evolution of Animals, Kraków; MNHN - Museum national d'Histoire naturelle, Paris; NMNH - National Museum of Natural History, Washington; NMP - National Museum, Prague; NRS - Naturhistoriska Rijksmuseet, Stockholm; TM - Transvaal Museum, Pretoria; WWC - William Warner Collection, Arizona.

DESCRIPTIONS

Flechtmannia gen.n.

Euparia St.-Fargeau & Serville, 1828: 357 (partim).

Type species: *Euparia laticollis* Petrovitz.

DIAGNOSIS. Body robust. Head moderate in size, strongly gibbose at middle. Eye large, partially visible from above. Antenna 9-segmented, club circular, 3-segmented. Mouthparts adapted to soft saprophagy (Stebnicka 1985). Pronotum transverse, 1/3 as long as wide; anterior angles prominent in front, widely rounded and slightly reflexed, sides strongly converging to base. Scutellum narrowly triangular. Elytra elevated at middle, arduous toward sides and apex; humeri finely denticulate; elytral interval 9 strongly raised, forming lateral fold, interval 10 and epipleura abruptly inflexed. Metathoracic wings functional. Prosternum with small, triangular process. Mesosternum declivous toward metasternum; mesocoxae slightly separated, mesocoxal cavities elongate; metasternum elevated, relatively short. Abdominal sternites fused. Profemur narrow; meso- and metafemora slightly narrower than profemora. posterior femoral lines complete; meso- and metatibiae as long as femora, expanded apically, apical spurs thin; tarsi short, tarsal segments robust, claws very fine, hornlike.

DIFFERENTIATING DIAGNOSIS. The new genus shares some character states with *Lomanoxia* Martinez including an inflexed elytron, but it significantly differs from that genus by the features of the pronotum, mesosternum and abdomen and by its elongate mesocoxal cavities. In *Lomanoxia*, the mesocoxal cavities are similar to those characterizing the Colydiidae-beetles (Cucujoidea) and are unique within Aphodiinae.

ETYMOLOGY. The genus is named in honour of Carlos F. Flechtmann, University of Brasilia, whose field work revealed several new and little known species of Eupariini.

Flechtmannia laticollis (Petrovitz) comb. n.

Figs 1, 2

Euparia laticollis Petrovitz, 1973: 181-183.

?*Euparia laticollis*; CHALUMEAU & HOWDEN 1984: 87; DELLACASA 1988: 284 (catalogue).

MATERIAL EXAMINED. Holotype male, labelled: 'Brasilien, Mato Grosso, Corumba', '*Euparia laticollis* Petrovitz' (MHNG).

Other specimens (3): Brazil, Mato Grosso do Sul state, Tres Lagoas, Horto Rio Verde, 26.x.1993, black light trap, *Eucalyptus grandis* stand, C. Flechtmann (ISEA); Mato Grosso, Caceres, 24.xii.1955; Sao Paulo state, Itu, Faz. Pau d'Alho, 8.x.1960, coll. Martinez (CMN).

DESCRIPTION

Length 5.0-6.0 mm, greatest width 2.1-2.3 mm. Body (Fig. 2) elongate oval, plump, glabrous; colour carbon black, shining, legs reddish brown. Clypeus distinctly emarginate, anterior face thickened and slightly reflexed, sides arcuate toward prominent, deflexed gena; surface of head everywhere very finely to finely punctate, punctures separated by 2-3 diameters. Pronotum moderately convex medially, tumid along anterior margin, posterior angles barely angulate; sides and base margined, side margin with few very short, stubby setae; anterior median surface of pronotum very finely to finely punctate, posterior basal area and sides with coarse, deep punctures slightly irregularly spaced, separated by 1 diameter or less. Elytra widest at middle, finely margined at base, slightly lobed and explanate apically, edge of apex thickened; humeral umbone weakly indicated; striae narrow and shallow with fine punctures; intervals flat in anterior 2/3, obtusely convex in apical 1/3 and not united at apex; interval 9 strongly costate, ended before apex and here united with interval 7; interval 10 flat, invisible from directly above, epipleura narrow from base to apex; surface of intervals moderately shining with minute scattered punctures. Metathoracic wings functional. Mesosternum finely scabrous in anterior half, shining and punctate between mesocoxae, intercoxal carina lacking; metasternum finely punctate, midline impressed, lateral metasternal triangle wide and deep, slightly scabrous inside; abdominal sternites glabrous, finely fluted along sutures and indistinctly punctate. Surface of profemur shining, closely punctate, meso- and metafemora with fine scattered punctures; apex of meso- and metatibiae fringed with short setae, lacking accessory spine; basal segment of metatarsus subequal in length to upper tibial spur and subequal to following three tarsal segments combined.

Male. Terminal spur of protibia hooked inwardly at the tip; genitalia as in Fig. 1.

Female. Meso- and metatibiae and tarsal segments less robust than in male.

Selviria gen.n.

Type species: *Selviria matogrossoensis* sp.n.

DIAGNOSIS. Body slender. Head large, gibbose medially. Eye small, invisible from above. Antenna 9-segmented, club elongate oval, 3-segmented. Mouthparts

adapted to soft saprophagy. Pronotum transverse, sides widely arcuate and deplanate, side margin upturned. Scutellum parallel-sided, rounded at apex. Elytra convex at middle, widest at posterior third, humeral denticles small; elytral edge in posterior 2/3 narrowly deplanate and upturned. Prosternum with wide triangular process. Mesosternum declivous in posterior half, mesocoxae slightly separated; metasternum convex; abdominal sternites fused. Profemur 2 times as wide as mesofemur; meso- and metafemora long, narrow, flattened dorsoventrally, posterior femoral lines lacking; first tooth and terminal spur of protibia long; meso- and metatibiae unusually long and thin, slightly sinuate; tarsal segments relatively thick, the same thickness as tibia at knee; claws very fine, hornlike.

DIFFERENTIATING DIAGNOSIS. The new genus is most closely related to *Martineziella* Chalumeau, but differs noticeably in the form of the pronotum, elytra and legs. It can be easily distinguished from *Martineziella* and other euparine genera by its unusually long and thin tibiae and by its upturned margin of the elytra.

ETYMOLOGY. The name refers to the locality of the type species.

Selviria matogrossoensis sp. n.

Figs 3, 4

Holotype, male: Brazil, Mato Grosso do Sul state, Selviria, UNESP's farm, 10.xi.1994, black light trap, pasture, Code C-604, C. Flechtmann (MHNG).

Paratype, female: Mato Grosso do Sul, Tres Lagoas, Horto Rio Verde, 1.x.1993, black light trap, *Eucalyptus grandis* stand, Code C-1274, C. Flechtmann (ISEA).

DESCRIPTION

Length 4.8-5.0 mm, greatest width 1.9-2.0 mm. Body (Fig. 3) elongate, glabrous, shining; colour light castaneous, anterior of clypeus and sides of pronotum transparent. Clypeal margin upturned, rounded on each side of moderate median emargination and sinuate toward rounded, protruding gena; surface of head shining impunctate or with very few minute punctures on vertex. Pronotum moderately convex on disc, sides and base lacking marginal line, lateral edge fringed with very short, yellow, hair-like setae; pronotal surface shallowly punctate, anterior median area and sides finely punctate, disc with intermixed larger and closer punctures separated by 1 diameter, becoming closest along base. Elytra microreticulate, shining, humeral umbone moderate; striae fine, shallow with fine, slightly transverse punctures, stria 10 from base to apex with row of coarse, close punctures; discal intervals flat, moderately convex apically, surface punctures inconspicuous. Metathoracic wings functional. Mesosternum finely scabrous; space between mesocoxae smaller than width of mesofemur, lacking carina; metasternal plate convex, midline impressed, surface minutely punctate, lateral triangle shallow; abdominal sternites minutely fluted along sutures, surface glabrous impunctate. Profemur with perimarginal groove; surface of all femora with few fine scattered punctures; meso- and metatibiae hairless, apical fringe of 8-9 short setae, apical spurs slender, accessory spine absent; basal segment of metatarsus subequal in length to upper tibial spur and to following three tarsal segments combined.

Male. Terminal spur of protibia hooked inwardly at the tip; genitalia as in Fig. 4.

Female. Punctures of pronotum somewhat closer than in male.

Arupaia gen.n.

Euparia St.-Fargeau & Serville, 1828: 357 (partim).

Iarupea Martinez, 1953: 75-77 (partim).

Type species: *Euparia friedenreichi* Harold.

DIAGNOSIS. Body elongate, glabrous. Head large, deflexed, strongly gibbose at middle, gena remarkably produced. Eye moderate in size, invisible from above. Antenna 9-segmented, club ovoid, 3-segmented. Mouthparts adapted to soft saprophagy. Pronotum transverse, 1/3 as long as wide, disc convex, sides widely explanate, slightly arcuate, side margin fringed with short hair-like setae; anterior and posterior angles widely rounded, base strongly lobed at middle, deeply excavate on each side to receive humeral lobes of elytra; basal margin grooved, wide, punctate or longitudinally strigose. Scutellum parallel-sided, rounded apically. Elytra at base narrower than pronotum, widest in apical third; base finely margined and swollen; humeri produced forwards, ended by large denticles directed downward at the tip; striae finely impressed; intervals slightly convex; epipleura oblique, gradually narrowed to apex. Metathoracic wings functional. Prosternum with wide triangular process. Mesosternum declivous toward metasternum; mesocoxae moderately separated, space between mesocoxae smaller than width of mesofemur, with fine carina. Metasternum convex. Abdominal sternites fused. Profemora wide, flattened posteriorly; meso- and metafemora long, slightly fusciform; protibia with three lateral teeth unequal in size; meso- and metatibiae longer than femora, thin, feebly sinuate and widened apically; apical spurs and tarsal segments slender; claws fine, hornlike.

DIFFERENTIATING DIAGNOSIS. The genus is most close to *Euparia* sharing some similar character states. It differs from *Euparia* by its glabrous body, by the form and sculpture of the pronotum furnished with wide basal margin and by its longer and thinner tibiae. After comparing the representatives of all related genera with those of *Euparia friedenreichi*, I consider the latter sufficiently distinct to warrant a separate genus.

ETYMOLOGY. The generic name is a combination of the reverse of the name *Euparia*.

Arupaia friedenreichi (Harold) comb. n.

Fig. 10

Euparia friedenreichi Harold, 1870: 23, 27.- SCHMIDT 1922: 397; PETROVITZ 1973: 186.

?*Euparia friedenreichi*: Chalumeau & Howden, 1984: 87; DELLACASA 1988: 131 (catalogue).

Iarupea guimaraesi Martinez, 1955: 68.- DELLACASA 1988: 285 (catalogue) **syn.n.**

Euparia friedenreichi: type not examined (MNHN?), type locality: Brazil, Santa Catarina.

MATERIAL EXAMINED. *Iarupea guimaraesi*: paratypes (2) male and female, labelled: 'Brazil, Sao Paulo, Osasco, x. 1955, coll. Martinez' (CMN).

Other specimens (22): Brazil, Nuova Teutonia, Santa Catarina, xii. 1971, i-iii-xii. 1972, i. 1975, F. Plaumann (CMN, ISEA, MHNG); Sao Paulo state, x. 1956, Piracicaba, 2.iii.1966, black light trap, coll. Martinez (CMN), Campinas, v-vi. 1965, G. Illy (ISEA).

DESCRIPTION

Length 5.5-6.0 mm, greatest width 1.9-2.0 mm. Body glabrous, moderately shining; colour dark castaneous to black. Clypeal margin finely inflexed medially, rounded on each side of shallow median emargination, sides arcuate and distinctly emarginate before gena; lateral margin from gena to frons deeply grooved to meet pronotal edge when head is in repose; clypeal surface longitudinally wrinkled over median gibbosity and outward to elongate, impunctate tumosity just above marginal groove; frontal area with fine round punctures becoming larger and less close on vertex. Pronotum transverse, 1/3 as long as wide, disc moderately convex; surface punctures oval in shape, separated by 1 diameter or less, frequently confluent; basal pronotal margin scabrous and finely strigose. Elytra nearly parallel-sided or slightly widened at apical third, humeral umbone distinctly enlarged laterally; elytral striae fine to moderate with fine to moderate punctures slightly crenating inner margins of smooth intervals; interval 5 at base ended by strong tubercle (Fig. 10). Mesosternum scabrous in anterior half, finely punctate between mesocoxae with fine carina on punctate area; metasternal midline impressed, disc impunctate, lateral metasternal triangle shallow. Abdominal sternites finely fluted along sutures, surface glabrous impunctate; pygidium scabrous. All femora punctate, punctures fine to moderate, more or less close, evenly spaced; protibia with three lateral teeth unequal in size, terminal tooth longest, third usually very small; meso- and metatibiae equal in length, about twice as long as tarsi, outer side with row of granules bearing short setae; basal segment of metatarsus subequal to upper tibial spur and longer than following three tarsal segments combined. In male, terminal spur of protibia bent inward at the tip.

REMARKS. I have been unable to study the type of *Arupaia friedenreichi* but I have seen a number of photographs of it through the courtesy of Dr Henry Howden. Also, the specimens examined were collected at the type locality. With these in hand I feel that there is little doubt of the above synonymy.

Iarupea Martinez

Iarupea Martinez, 1953: 75-77.- DELLACASA 1988: 271 (catalogue).

Euparia St.-Fargeau & Serville, 1828: 357 (partim).

Iarupoides Chalumeau & Howden, 1984: 87 (nomen nudum); DELLACASA 1988: 139 (catalogue). **syn. n.**

Type species: *Iarupea lopeteguii*, by monotypy.

DIAGNOSIS. Body elongate, glabrous, usually covered with argillaceous coating. Head moderate in size, strongly gibbose at middle; gena prominent. Eye invisible from above. Antenna 9-segmented, club ovoid, 3-segmented. Mouthparts adapted to soft saprophagy. Pronotum strongly convex on disc, diverging posteriorly; anterior angles rounded and slightly explanate, sides narrowly explanate and bisinuate to small, acute posterior angles; side margin fringed with short, hair-like setae; base bisinuate, grooved, strongly lobed at middle, basal margin wide, longitudinally strigose. Scutellum triangular, impressed. Elytra at base narrower than pronotum, widest in apical third; humeri produced forwards, ended by large denticles; base margined and swollen; elytral striae with transverse punctures strongly crenating intervals; intervals microreticulate,

punctate or swollen; epipleura oblique, gradually narrowed toward apex. Metathoracic wings functional. Prosternum with wide, triangular process; mesosternum declivous toward metasternum; mesocoxae slightly separated, space between mesocoxae equal to width of mesofemur, with fine carina; metasternum rather long, convex. Abdominal sternites fused. Profemur wide, posterior margin widely flattened; Meso- and meta-femora long, parallel-sided; meso- and metatibiae longer than femora, thin, slightly enlarged apically; apical spurs and tarsal segments slender; claws fine, hornlike.

DIFFERENTIATING DIAGNOSIS. The genus is most closely related to *Myrmecaphodius*. It differs from *Myrmecaphodius* by the form of its pronotum and the elytra with humeral lobes.

REMARKS. MARTINEZ (1953) established the genus *Iarupea* to accomodate a distinctive species *I. lopeteguii* from Argentina. The genus was unique in having a combination of the characters given above. CHALUMEAU (1984) placed *Euparia attenuata* in a new genus named *Iarupoides* (nomen nudum), although *E. attenuata* bears the essential features characterizing the genus *Iarupea*. A third highly distinctive species, *Euparia serratipennis* is here also transferred to *Iarupea*. I believe, based upon examination of all available specimens of the species listed below that they are congeneric. The differences between *Iarupea lopeteguii* and *Euparia attenuata* at the generic level are not as substantial as the similarities between them, such as form of the head, pronotum, elytra, legs and the male genitalia.

The species of *Iarupea* are known or suspected to occur in ant nests, however, the exact nature of their association with ants is not clear.

KEY TO IARUPEA SPECIES

- 1 Pronotum strongly rugose with round, close punctures or longitudinal wrinkles; elytral intervals swollen or transversely crenate 2
- Pronotum with round or elongate, not rugose punctures separated by 1 diameter or less; elytral intervals crenate by striae punctures to about 1/3 of their width, lateral area rather smooth with few scattered punctures *I. attenuata*
- 2 Pronotal punctures round, rugose, nearly contiguous, pronotal base on each side with distinct tubercle; elytral intervals crenate by striae punctures to about 1/2 of their width, lateral area distinctly punctate through *I. lopeteguii*
- Pronotal punctures strongly longitudinally confluent, forming irregular wrinkles, basal tubercles weakly indicated or lacking; elytral intervals swollen, distinctly transversely crenate and punctate *I. serratipennis*

Iarupea attenuata (Harold) comb. n.

Fig. 11

Euparia attenuata Harold, 1870: 23,28.- SCHMIDT 1922: 397.

Iarupoides attenuatus: CHALUMEAU & HOWDEN 1984: 87; DELLACASA 1988: 93 (catalogue).

MATERIAL EXAMINED. Lectotype designated by CARTWRIGHT 1973 (MNHN). Other specimens (12). Brazil, Minas Gerais state, Cordisburgo, Faz. Pontinha, vii. 1974, F. de Mello (ISEA); Para state, Jacareacanga, x. 1959, coll. Martinez (CMN, MHNG).

DIFFERENTIATING DIAGNOSIS. *Iarupea attenuata* is closely allied to *I. lopeteguii* and to *I. serratipennis*, but it is quite distinct from both species in having the pronotal punctures less dense, forming shallow pits. The male genitalia are similar to those of *I. lopeteguii*.

***Iarupea lopeteguii* Martinez**

Fig. 5

Iarupea lopeteguii Martinez, 1953: 77-80, fig. 9.- DELLACASA 1988: 271 (catalogue).

MATERIAL EXAMINED. Holotype and paratypes (4) labelled: 'Argentina, Prov. Formosa, Puerto Irigoyen, Rio Pilcomayo, xii. 1950, J.B. Daguerre, coll. Martinez'; 'Prov. Salta, Dep. General San Martin, Aguaray, xi. 1950, coll. Martinez' (CMN).

Other specimens (17). ARGENTINA: Prov. Salta, NS Telavera, xi.1957; Dep. General Ballivian, 1927, leg. Harrington; Dep. Gen. San Martin, Politos, xi. 1950; Dep. Las Lajitas, xii.1984, coll. Martinez (CMN, MHNG); Dep. Tartagal, 12-19.xii.1990, black light, M. Archangelsky (WWC). BOLIVIA: Santa Cruz, Paiz Cordillera, Cabezas, ii. 1971, coll. Martinez (CMN); Villa Montes at Rio Pilcomayo, 1-29.xi.1930, leg. Eisentraut (ZMHB). PARAGUAY: Dep. Boqueron, Gran Chaco, xi. 1956, coll. Martinez (CMN).

DIFFERENTIATING DIAGNOSIS. *Iarupea lopeteguii* is most closely related to *I. serratipennis*, but it differs from that species in the sculpture of the pronotum.

REMARKS. According to MARTINEZ (1953), several specimens of *I. lopeteguii* were collected in the nests of leaf-cutting ants *Atta vollenweideri* (Myrmicinae).

***Iarupea serratipennis* (Petrovitz) comb. n.**

Fig. 6

Euparia serratipennis Petrovitz, 1973: 185-186.

?*Euparia serratipennis*: CHALUMEAU & HOWDEN, 1984: 88; DELLACASA 1988: 284 (catalogue).

MATERIAL EXAMINED. Holotype male, labelled: 'Brasilien, Minas Gerais, 1897, ex. coll. Fruehstorfer', *Euparia serratipennis* Petrovitz' (MHNG).

Other specimens (24). ARGENTINA: Misiones, Iguazu, xii.1957, coll. Martinez (CMN). BOLIVIA: Guayaramerin (Beni), 23.xi.1966, Hungarian Soil Exp. (HNHM, MHNG). BRAZIL: Nuova Teutonia, Santa Catarina, xii.1972, F. Plaumann (CMN); Amazonas (ISEA); Rondonia, 62 km SW Ariquemes, near Faz. Rancho Grande, 25.ix.1992, V. Schmitz (FSCA); Maranhao state, Pedrinhas, 26.vi.1984, C. Flechtmann (ISEA); Mato Grosso state, Xingu, xi. 1963; Esp. Santo, Linhares, xi.1962, coll. Martinez (CMN). PARAGUAY: Puerto P. Stroessner (= Ciudad del Este) 5-6.i.1966, (MHNG, ISEA); Villarica, 25 km E Independencia, 25.15S, 56.35W, 21.i.1991, Endrödy-Younga (ISEA, TM).

DIFFERENTIATING DIAGNOSIS. *Iarupea serratipennis* is most closely related to *I. lopeteguii*, from which it differs by the characters given in the key. The male genitalia are similar to those in *I. lopeteguii*, epipharynx as in Fig. 6.

REMARKS. Even though *I. serratipennis* is represented by the greatest number of specimens, its host relationships have not been established. However, because of its similarity to the other species of the genus, I expect it to be associated with leaf-cutting ants.

***Myrmecaphodius* Martinez**

Myrmecaphodius Martinez, 1952: 85-87.- DELLACASA 1988: 271 (catalogue).

Euparia St.-Fargeau & Serville, 1828: 357 (partim).

Type species *Myrmecaphodius proseni*, by monotypy.

DIFFERENTIATING DIAGNOSIS. Until now only a single Neotropical species *M. proseni* represents the genus which is closely related to *Martineziella* Chalumeau (1986). It differs from *Martineziella* by the shape and sculpture of its pronotum. In many respects it is also quite close to *Iarupea* even though the latter has more of the appearance of *Euparia* and *Arupaia*.

Myrmecaphodius proseni Martinez

Myrmecaphodius proseni Martinez, 1952: 87-92, figs 8-17, 50.- CHALUMEAU 1983: 148, fig. 8; DELLACASA 1988: 285 (catalogue).

Euparia fornicata Petrovitz, 1973: 187-188.

Myrmecaphodius fornicatus: DELLACASA 1988: 284 (catalogue). **syn.n.**

MATERIAL EXAMINED. *Myrmecaphodius proseni*: holotype male and paratypes (4) labelled: 'Argentina, Buenos Aires, Partido de Puan, Estacion Felipe Sola, 16-18.iv.1952, coll. Martinez' (CMN).

Euparia fornicata: holotype female, labelled: 'Villa Ballester, Buenos Aires, Arg.', *Euparia fornicata* Petrovitz' (MHNG).

One paratype of *M. proseni* (CMN) belongs to *Martineziella dutertrei* (Chalumeau 1983).

REMARKS. Comparison of the two holotypes showed them to be the same species, *M. proseni*. Several specimens of *M. proseni* have been collected by MARTINEZ (1952) in the nest of fire ants *Solenopsis saevissima* (Myrmicinae).

Lomanoxoides Stebnicka

Lomanoxoides Chalumeau & Howden, 1984: 87 (nomen nudum).- DELLACASA 1988: 341 (catalogue).

Euparia ST.- FARGEAU & SERVILLE 1828: 357 (partim).

Ataenius Harold, 1867: 82 (partim).

Phalangochaeta Martinez, 1952: 92-94 (partim).

Type species *Euparia bitubericolis*, designated by CHALUMEAU *et al.* (1984).

DESCRIPTION

Body oval, robust, strongly convex. Head deflexed, as wide as pronotum, clypeal margin usually inflexed at middle, ended by triangular process. Eye invisible from above. Antenna 9-segmented, club ovoid 3-segmented. Mouthparts adapted to soft saprophagy. Pronotum strongly convex, side margin fringed with short setae; pronotal surface with tumosity or/and fovea on sides, or/and tubercles and fossa at middle of base. Scutellum triangular. Elytra strongly convex, arcuate toward apex, humeral denticles small, acute, base margined; striae impressed punctate; intervals tectiform or strongly convex with median row of minute, close punctures or granules, surface frequently setigerous. Prosternum with triangular process; mesosternum slightly deplinate, space between mesocoxae smaller than width of mesofemur; mesometasternal carina elevated, long; metasternum convex, relatively short, lateral metasternal triangle large, deep. Abdominal sternites fluted along sutures. Profemora wide; meso- and metafemora fusiform, slightly narrower than profemora, postfemoral lines distinct; meso- and metatibiae as long as femora, slightly expanded apically, outer edge spini-

form; apical spurs thin; tarsi shorter than tibiae, tarsal segments cylindrical; claws very fine, horn-like. Phallobase of male genitalia long, parameres relatively short, rounded apically.

DIFFERENTIATING DIAGNOSIS. The genus is most similar to *Phalangochaeta* in its general facies and in some shared character states. In *Phalangochaeta*, however, the head is larger and strongly gibbose, the margins and surface of the pronotum are very different and the meso- and metatarsi are setaceous, tapering or thickened, usually significantly shorter than tibia. *Lomanoxoides* includes presently five species, but in fact all of them are rarely collected and there must be several species which remain to be discovered.

KEY TO SPECIES OF LOMANOXOIDES

- 1 Length 3.8-4.0 mm; colour castaneous; disc of pronotum in posterior half with transverse fold broken by short, shallow fossa; elytral intervals convex with median row of tooth-like granules bearing semierect seta *L. thoracalis*
- Length 4.8-5.5 mm; colour reddish black or black; disc of pronotum in posterior half lacking fold; elytral intervals convex to tectiform, setigerous or glabrous 2
- 2 Colour black; disc of pronotum above scutellum more or less deeply fossulate, surface punctures unequal in size, unevenly spaced; elytral intervals tectiform 3
- Colour reddish black; disc of pronotum not fossulate, surface punctures fine, equal in size, uniformly spaced; elytral intervals moderately to strongly convex 4
- 3 Pronotal fossa deep, oval; elytral striae strongly impressed, strial punctures deep, intervals apically and elytral margin from base to apex with upright, clavate setae *L. selviriaensis* sp. n.
- Pronotal fossa shallow, round; elytral striae finely impressed, strial punctures shallow, intervals glabrous, elytral margin apically with few clavate setae *L. bitubericollis*
- 4 Elytral intervals unicolored, strongly convex with median row of fine punctures bearing minute seta, apex of intervals 5,7,9 with few erect, clavate setae *L. tesari*
- Elytral intervals medially darkened, moderately convex with scattered, fine punctures and distinct erect setae on apical declivity *L. nigrolineatus*

Lomanoxoides thoracalis (Petrovitz) comb. n.

Fig. 7

Ataenius thoracalis Petrovitz, 1964: 284-285.- DELLACASA 1988: 282 (catalogue).

MATERIAL EXAMINED. Holotype (sex not determined) labelled: 'Brasilien, Manaos', '*Ataenius thoracalis* Petr.' (MHNG).

Other specimens (6). ARGENTINA: Prov. Salta, Tonona, coll. Martinez (CMN, ISEA). BOLIVIA: Santa Cruz, 500 m, x.1955 (MHNG); Guayaramerin (Beni), 23.xi.1966, Soil. Zool. Exp. (HNHM). BRAZIL: MS Campo Grande, 10.xi.1994, W. Koller (ISEA).

DIFFERENTIATING DIAGNOSIS. *Lomanoxoides thoracalis* might be considered a slightly atypical member of the genus, but the features of the head and under surface, the distinctive pronotal and genitalic characters seem to justify its placement. The odd pronotal characters coupled with those of elytra should easily distinguish *L. thoracalis* from any other species.

Nothing is known of its habits.

Lomanoxoides tesari (Balthasar) comb. nov.

Figs 8, 12

Euparia tesari Balthasar, 1963: 285-286.

Ataenius fastigatus Petrovitz, 1973: 168.- CHALUMEAU 1992: 198 (as synonym of *E. tesari*).

Phalangochaeta tesari: DELLACASA 1988: 285 (catalogue: unjustified placement).

Ataenius hrubantovai Chalumeau, 1992: 198-200 (nom. n. for preoccupied name in *Ataenius*).- DELLACASA 1996: 170 (catalogue). **syn. n.**

MATERIAL EXAMINED. *Euparia tesari*: holotype female (examined in 1973, coll. Balthasar) labelled: 'Paraguay, Asuncion' (NMP?).

Ataenius fastigatus: holotype (sex not determined) labelled: 'S.P. Brasilien, Sa. de Paranapiacaba', '*Ataenius fastigatus* Petrovitz' (MHNG).

Other specimens (6). ARGENTINA: Prov. Misiones, ix.1956, coll. Martinez (CMN). BRAZIL: Mato Grosso do Sul state, Selviria, 18.iv.1993, pasture, cattle dropping, C. Flechtmann (ISEA); Minas Gerais state, Ipatinga, ix. 1993, E. Grossi (ISEA); Rondonia, 62 km SW Ariquemes, Faz. Rancho Grande, 8.xi.1994, C.W. & L.B. O'Brien (WWC).

DIFFERENTIATING DIAGNOSIS. The species was incorrectly classified by CHALUMEAU (1992) in the genus *Ataenius*. The supposedly diagnostic character of the length of the basal segment of mesotarsus does not be consistent and occurs in many other species in various genera. *Lomanoxoides tesari* is most closely allied to *L. nigrolineatus* (see remarks under that species).

REMARKS. While uncommon in the collections, the species appears to range widely in South America. The specimens have been recorded coming to light and collected in the nest of *Atta sexdens* (Myrmicinae).

Lomanoxoides nigrolineatus (Hinton) comb. n.

Ataenius nigrolineatus Hinton, 1938: 116-117, figs 9-12.- DELLACASA 1988: 278 (catalogue).

Ataenius (*Paraplesiataenius*) *nigrolineatus*: CHALUMEAU 1992: 199.

Type not examined (NMNH), type locality: Panama, Barro Colorado Island.

MATERIAL EXAMINED. Specimens (3). Panama, Las Cumbres, 20.v.1974, H. Wolda (ISEA, MHNG, WWC).

DIFFERENTIATING DIAGNOSIS. Although the type was not available for the present study, the identity of *Lomanoxoides nigrolineatus* is easily established by the description and range. The species is hitherto known only from Panama. It may be easily distinguished from its close relative *L. tesari*, by having a wider pronotum with deeper lateral fovea as well as by less convex and medially darkened elytral intervals with irregular punctures not arranged in rows. The remaining characters of the external morphology and the shape of the male genitalia are similar to those of *L. tesari* (Figs 8, 12). Both species are close to the following species of the genus but differ in a smaller

size, lighter colour of the body and in the sculpture of the pronotum. Nothing is known of the habits of *L. nigrolineatus*.

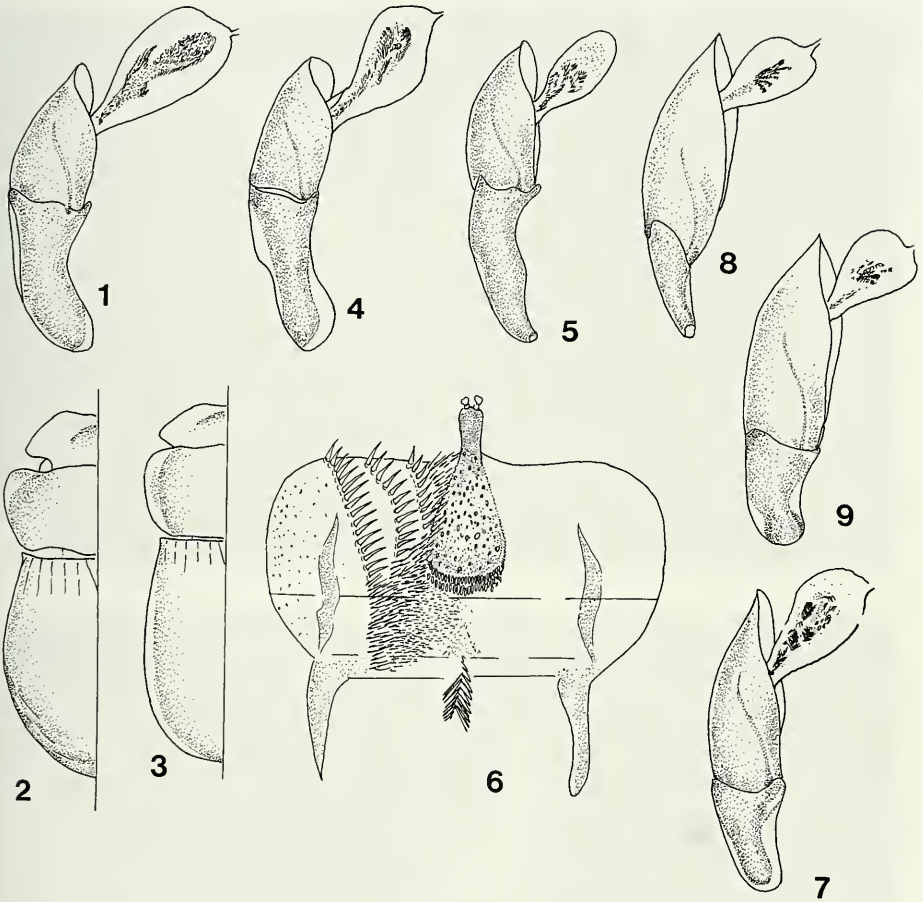
***Lomanoxoides selviriaensis* sp. n. Fig. 9**

Holotype male: Brazil, Mato Grosso do Sul, Selviria, UNESP's farm, 28.xi.1993, pasture C-377, black light trap, C. Flechtmann (MHNG). Paratypes (2), same locality as holotype, 11.iv.1995, pasture C-141, ex Guzera cattle dropping, S.R. Rodrigues (ISEA, MHNG).

DESCRIPTION

Length 5.0-5.5 mm, greatest width 2.1-2.2 mm. Body elongate oval, convex, shining; colour black, legs and under surface brownish black. Head as wide as pronotum, convex at middle, clypeal margin widely rounded on each side of shallow median emargination, sides arcuate to obtusely rounded, slightly protruding gena; clypeal surface with weak carina just above median emargination, minutely granular anteriorly, median convexity with shallow, minute punctures gradually increasing in size and depth toward vertex and here separated by 1 diameter or less. Pronotum about 2.5 times as long as wide; anterior angles rounded, sides slightly arcuate toward obtuse posterior angles, edge finely crenate, fringed with short, club-shaped setae; basal marginal line very fine lacking setae; pronotal surface swollen with large tumosity laterally and wide fossa above scutellum; sculpture uneven, punctures mixed fine, moderate and large, the latter unequally spaced, concentrated in posterior third of pronotum between median fossa and lateral tumosity and blending into scabrous area along lateral margin. Scutellum shining impunctate. Elytra widest at middle, sides and apical declivity with upright, not close, clavate setae; humeral denticles small; striae deep, strial punctures crenating outer slopes of intervals, crenations distinctly visible in glancing light; intervals tectiform, median carina acutely elevated, median punctures very minute. Mesosternum scabrous, rugose, mesometasternal carina long; metasternum convex, midline finely impressed, punctures fine; lateral metasternal triangle deep, scabrous inside; abdominal sternites 3-5 coarsely fluted in anterior half, surface glabrous, minutely to finely punctate; pygidium scabrous in apical 2/3, edge fringed with stout setae. Profemur with deep perimarginal groove and scabrous surface; punctures of meso- and metafemora fine, bearing minute yellow seta, postfemoral lines strong, complete; terminal spur of protibia slender, acutely pointed; meso- and metatibiae as long as femora with row of setae, apex spiniform externally, accessory spine lacking; basal segment of metatarsus longer than upper tibial spur and subequal to following three tarsal segments combined. External sexual differences slight; in male, penultimate abdominal sternite shorter than in female; male genitalia as in Fig. 9.

DIFFERENTIATING DIAGNOSIS. The species is very closely related to *L. bituberi-collis*, but it can be separated from that species by its coarser sculpture of the pronotum and the more acutely elevated elytral intervals with upright setae. Although its host ant is unknown, probably differs in this respect also.



FIGS 1-9

Male genitalia in lateral view, outlines of body, epipharynx. 1-2. *Flechtmannia laticollis* (Petrovitz); 1. male genitalia, 2. body outline. 3-4. *Selviria matogrossoensis* sp. n. holotype; 4. male genitalia. 3. body outline. 5. *Iarupea lopeteguii* Martinez; male genitalia. 6. *I. serratipennis* (Petrovitz); epipharynx. 7-9. male genitalia; 7. *Lomanoxoides thoracalis* (Petrovitz). 8. *L. tesari* (Balthasar). 9. *L. selviriaensis* sp. n.

Lomanoxoides bitubericollis (Schmidt)

Fig. 13

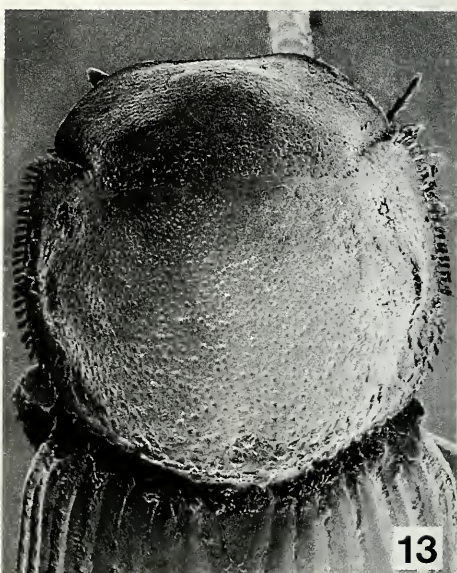
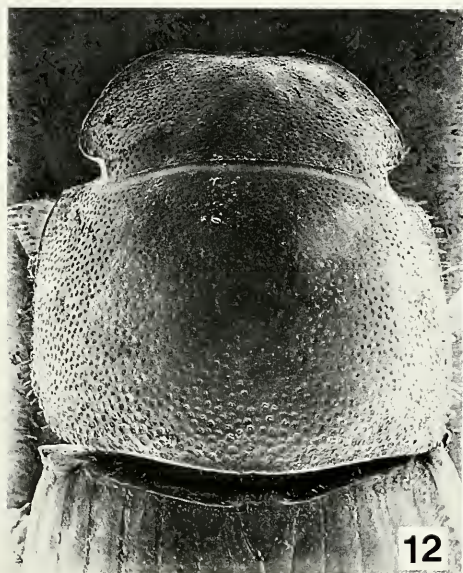
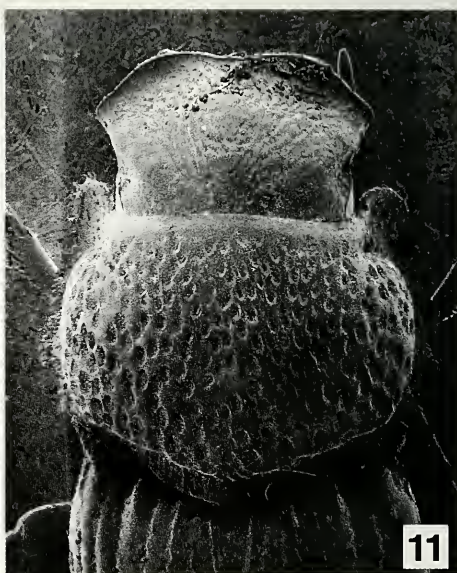
Euparia bitubericollis Schmidt, 1909: 44.- 1922: 396.

Lomanoxoides bitubericollis: CHALUMEAU & HOWDEN 1984: 87; DELLACASA 1988: 99 (catalogue).

MATERIAL EXAMINED. Holotype (sex undetermined) labelled: 'Argentinien' (NRS).

Other specimens (14). Argentina, Prov. Buenos Aires, Rosas, 1968; San Isidro, 4.i.1948, xii. 1963; Buenos Aires, vi.1945, J. Daguerra; Prov. Formosa, Pilaga, ii. 1949; Prov. Cordoba, Alta Gracia, ii.1980; Prov. Chaco, Resistencia, xi.1962, coll. Martinez (CMN, ISEA).

DIFFERENTIATING DIAGNOSIS. *Lomanoxoides bitubericollis* is hitherto known to occur only in Argentina. It is very similar in the general appearance and in the shape of the male genitalia to allopatric *L. selviriaensis*. (See remarks under the latter species).



FIGS 10-11

Habitus. 10. *Arupaia friedenreichi* (Harold). 11. *Iarupea attenuata* (Harold).

FIGS 12-13

Habitus. 12. *Lomanoxoides tesari* (Balthasar). 13. *L. bituberculis* (Schmidt).

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A new species of *Ananteris* Thorell from French Guyana (Scorpiones, Buthidae)

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A new species of *Ananteris* Thorell from French Guyana (Scorpiones, Buthidae). - A new species of *Ananteris* (Scorpiones, Buthidae) is described from rain forest in the region of Saint Eugène, French Guyana. This is the third species of *Ananteris* known from that country. The total number of species in the genus is now raised to 22.

Key-words: Scorpion - New species - *Ananteris* - Buthidae - French Guyane

INTRODUCTION

When the genus *Ananteris* was revised (LOURENÇO 1982), the species *Ananteris pydanieli* Lourenço was described from Manaus in Brazil. This species was later also cited from the south of French Guyana. Further studies (LOURENÇO 1988, 1993) clearly demonstrated that *A. pydanieli* is endemic to the region of Manaus, and that its citation to French Guyana was due to a misidentification.

Since the genus was last revised, the number of species described has increased continuously, with the description of 10 new species. At present it contains 21 known species (see LOURENÇO 1993, 1994, 1997, 1999-in press). In most cases, however, the species have remained rare.

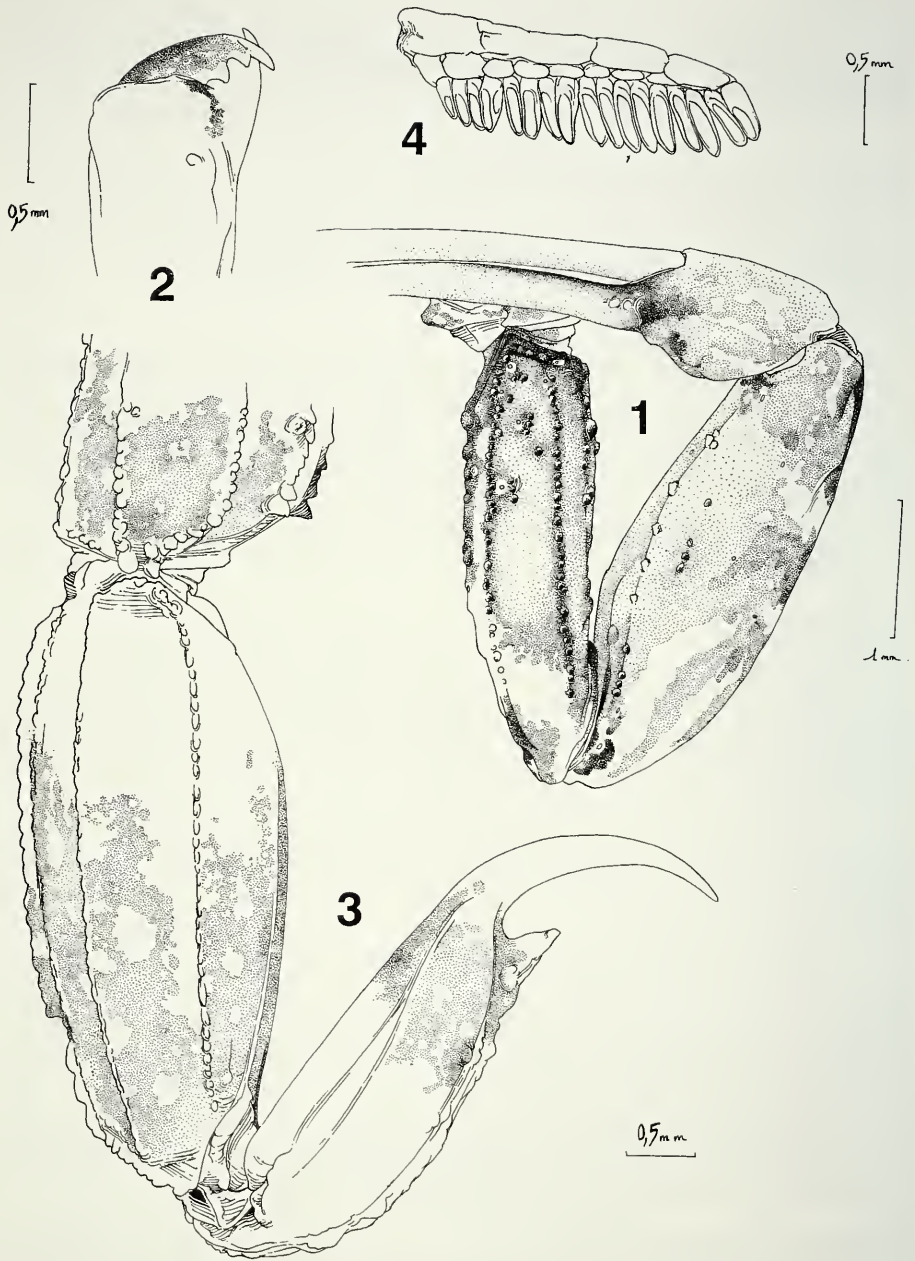
The genus *Ananteris* is distributed from the north of Argentina through Paraguay, Brazil, the Guyanas, Ecuador, Colombia, Panama and Costa Rica. One species is also known from Guinea in Africa. Most American species inhabit forest formations, however, the most widespread species, *Ananteris balzani* Thorell, type species of the genus is a typical savanicolous element.

The present investigation of a single specimen of *Ananteris* collected in the rain forest of Saint Eugène in French Guyana shows it to be a new species closely related to *A. pydanieli*. The new species is described herewith.

***Ananteris guyanensis* new species**

Figs 1 to 4

Holotype female: French Guyana, Saint Eugène, rain forest (in rotten log), 15/IV/1998 (leg. R. Boistel). Deposited in the Muséum d'histoire naturelle, Genève.



FIGS 1-4

Ananteris guyanensis, female holotype. 1. Pedipalp with the pattern of pigmentation. 2. Chelicera. 3. Metasomal segment V and telson, lateral aspect. 4. Pecten.

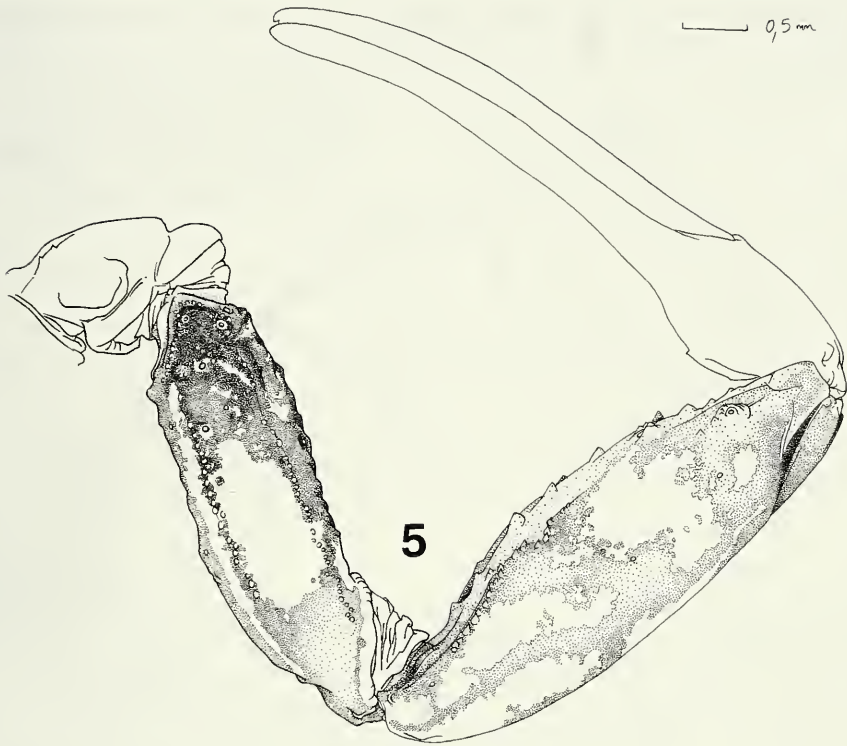


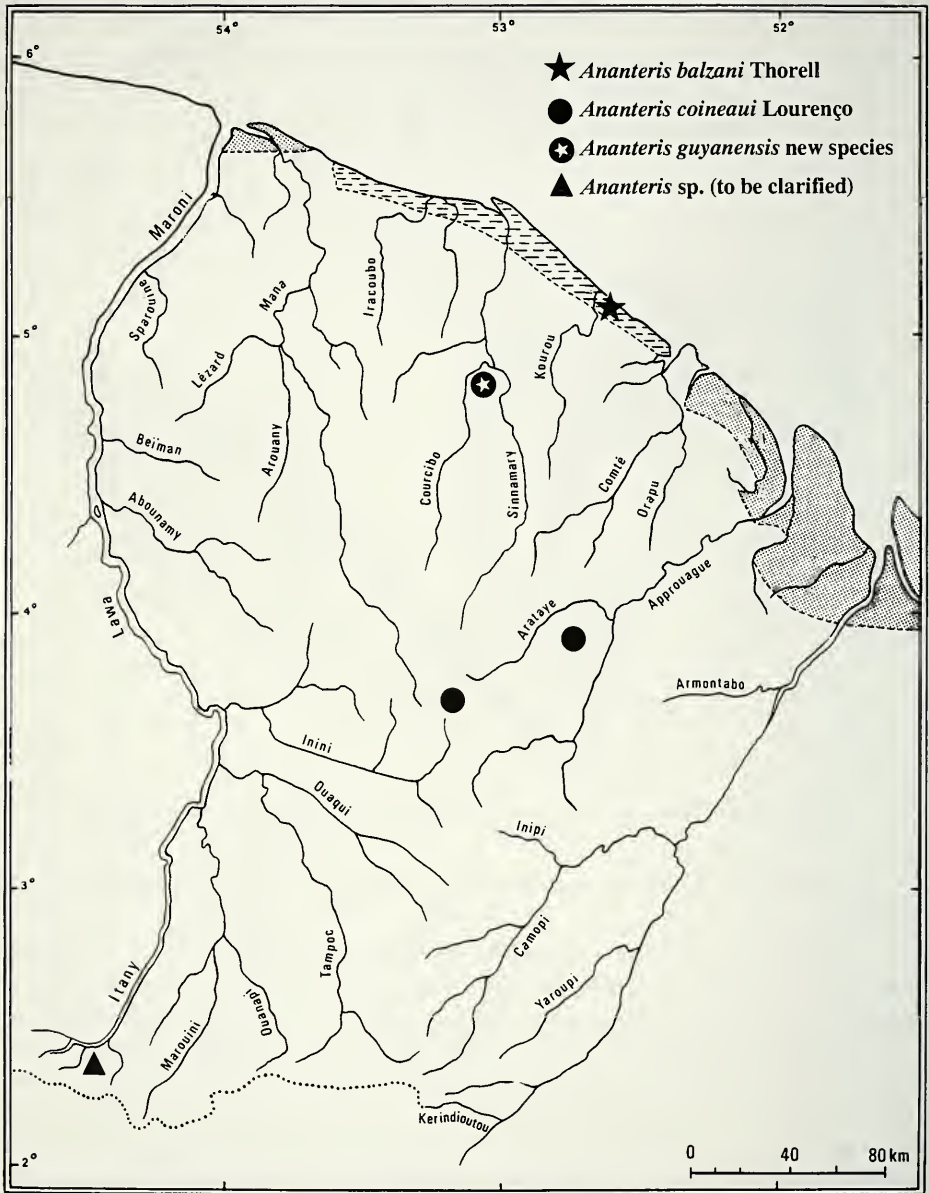
FIG. 5

Ananteris pydanieli, female paratype. Pedipalp with the pattern of pigmentation.

Etymology: Patronym refers to the country in which the scorpion was collected.

Coloration. Basically brownish-yellow, symmetrically marbled with dark reddish brown, producing an overall spotted appearance. Prosoma: carapace yellowish and heavily spotted; eyes surrounded with black pigment. Mesosoma: yellowish-brown with confluent brown stripes and two longitudinal yellowish stripes. Metasoma: segments I to V yellowish, with numerous brown spots; segments IV and V reddish, darker than the others. Vesicle reddish-yellow without spots, but with some darker areas over the keels. Venter yellowish with spots only on sternite VII. Chelicerae yellowish without variegated spots over their entire surface, and with only a dark thin zone at the base of the fingers; fingers reddish. Pedipalps: dark brown with spots on the femur and tibia; chelae yellowish; fingers brownish. Legs brownish with fuscous spots.

Morphology. Carapace feebly to moderately granular; anterior margin with a slight median concavity. Anterior median superciliary and posterior median keels very feeble. All furrows moderate to feeble. Median ocular tubercle distinctly anterior to the center; median eyes separated by less than one ocular diameter. Three pairs of lateral



FIGS 6

Map showing the known distribution of *Ananteris* species in French Guyana.

eyes. Sternum subtriangular to pentagonal. Mesosoma: tergites moderately granular. Median keel moderate to strong in all tergites. Tergite VII pentacarinata. Venter: genital operculum divided longitudinally. Pectines: pectinal tooth count 17-16; basal middle lamellae of the pectines not dilated; absence of fulcrum. Sternites almost smooth with moderate elongate stigmata; VII with four vestigial keels. Metasoma: segments I to III with 10 keels, crenulate. Segment IV with 8 keels, crenulate. Intercarinal spaces moderately granular. Segment V with 5 keels. Telson moderately granular with one ventral keel and with a fairly short and moderately curved aculeus; subaculear tooth strong and spinoid. Cheliceral dentition characteristic of the family Buthidae (Vachon, 1963); fixed finger with two basal teeth; ventral aspect of both finger and manus with dense, long setae. Pedipalps: femur pentacarinata; tibia and chelae with a few keels but moderately crenulate; internal face of tibia with only vestigial spinoid granules; all faces moderately to feebly granular. Movable fingers with 7 oblique rows of granules; only one accessory granule present at the base of each row. Trichobothriotaxy; orthobothriotaxy A- β (Vachon, 1973, 1975). Legs: tarsus with very numerous fine median setae ventrally. Tibial spurs strongly developed on legs III and IV. Measurements in Table I.

DISCUSSION

The new species is closely related to *Ananteris pydanieli* Lourenço, since both species share in common the absence of any variegated spots over the entire surface of the chelicerae: the new species presents only a dark thin zone at the base of the fingers, this dark zone being absent from *A. pydanieli*. A variegated pattern of cheliceral pigmentation is present in all other known species of the genus, and can present an important interspecific variability (Lourenço 1982). The two species under discussion can also readily be identified by their different patterns of pigmentation on the pedipalps (Figs 2 and 5). These different patterns of pigmentation are of great taxonomic importance in the classification of *Ananteris* species (Lourenço 1982).

Moreover, the type localities of both species are markedly different, and all species of *Ananteris* (except for *Ananteris balzani* Thorell), present extremely limited geographic distributions (Lourenço 1982, 1993).

TABLE I

Morphometric values (in mm) of the female holotype of *Ananteris guyanensis*

Carapace:	
- length	3,3
- anterior width	2,2
- posterior width	3,1
Metasomal segment I:	
- length	1,5
- width	2,0
Metasomal segment V:	
- length	4,2
- width	2,3
- depth	2,1

Vesicle:	
- width	1,5
- depth	1,2
Pedipalp:	
- Femur length	2,9
- Femur width	1,0
- Tibia length	3,8
- Tibia width	1,2
- Chelae length	4,8
- Chelae width	0,6
- Chelae depth	0,6
Movable finger:	
- length	3,6

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New species of *Lagarolampis* Descamps (Orthoptera, Caelifera, Acridoidea, Romaleidae, Bactrophorinae) from Central America.

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The new species *Lagarolampis maculata* and *L. cararensis* are described from Costa Rica, and *L. gamboensis* from Central Panama. *L. maculata* represents the most northerly known occurrence of this genus, previously recorded only from Colombia, Ecuador and the Amazon basin.

Key-words: Orthoptera - Acridoidea - Romaleidae - Ophthalmolampini - taxonomy - Neotropics.

INTRODUCTION

The Bactrophorinae are a distinctive group of Neotropical grasshoppers, almost entirely confined to forest environments. AMÉDÉGNATO (1974) gave them subfamily rank (originally under the name Trybliophorinae, but the original type genus *Trybliophorus* later transpired to be a romaleine) and grouped them with the Romaleinae as the family Romaleidae. This allotment of the Bactrophorinae is made primarily on the basis of their ♂ genitalia, which AMÉDÉGNATO (1977) interprets as being an early version of the form characteristic of the rest of the Romaleidae; in this work and elsewhere (e.g. AMÉDÉGNATO & DESCAMPS 1983) she also considers them the most archaic of all the Cryptosacci. (Molecular systematic studies (Flook and Rowell, *unpubl. obs.*) confirm that the Bactrophorinae are an early lineage within the Acridoidea, but do not provide any evidence that they are in the same clade as the Romaleinae. However, the ribosomal sequences used to date do not clearly resolve the branching order of clades within the Acridoidea, so the hypothesis of a near relationship to the Romaleinae cannot be considered disproven).

Bactrophorines are of small to medium size, usually brachypterous or micropterous, with powerful jumping hind legs, large globular protruding eyes, long antennae and a long second tarsal joint in the back foot. The feet and the lower surfaces of the abdomen are richly provided with sensory hairs. Many are brightly coloured, and they probably rely on visual intraspecific communication. They have no stridulatory apparatus and often no tympanum. Most of them are arboreal and rather rarely captured; at ground level they are most often found after wind storms or tree felling, or in the case of ♀ after oviposition. Little is known so far of their food plant preferences (but see AMÉDÉGNATO 1997), and virtually nothing of their sexual behaviour. Currently some 40 genera are described, with more in preparation.

AMÉDÉGNATO (1977) divided the subfamily into three tribes, the Bactrophorini, Taeniophorini and Ophthalmolampini, and the last of these into 4 subtribes. This division was accepted by DESCAMPS (1978, 1983) in his reviews of the latter two tribes. The taxa treated in the present article all belong to the subtribe Lagarolampae of the Ophthalmolampini, in to which DESCAMPS (1983) placed 8 genera. The members of this subtribe are micropterous and atympanate, and the valves of the ovipositor are of the usual acridoid form, suggesting that the eggs are laid in the ground, as indeed is known to be the case in the genus *Zoumolampis* (pers. obs.). In the other subtribes the valves are more or less modified and rod-like, suggesting epiphytic oviposition.

No member of the Lagarolampae has been recorded previously north of Colombia, other than *Zoumolampis bradleyi* and an undescribed species which probably also belongs to that genus, but of which only the ♀ is known to date. In this paper I describe two new species of *Lagarolampis* from Costa Rica and a third one from Panama. Additionally, drawings and measurements are given for *L. amazonica*, the type of the genus, which has not previously been figured.

KEY TO SPECIES OF *Lagarolampis*:

- 1 Pronotum green 2
- Pronotum black or dark brown, marked with white bands or a variable number of white spots 3
- 2 Pronotum with a medial purple stripe and purple ventral margins and two or more pairs of white spots. Elytron purple, with white dorsal and ventral border, in ♀ extending almost to posterior edge of metanotum, in ♂ shorter (Panama) *L. gamboensis* sp. n.
- Pronotum monochrome (♂) or marked with white spots (♀). Head black with yellow markings, antennae orange ringed with brown. (Colombia) *L. versicolor* Descamps, 1978
- 3 Antennae mainly black or dark brown 4
- Antennae mainly red 5
- 4 Meso- and metathoracic terga and pleura black or dark brown with white spots. Hind tibiae green proximally, black or dark blue distally. Smaller than *cordobae* (F ♀ <10.5 mm) (Amazonian Colombia, Peru, Ecuador, Brazil) *L. amazonica* Descamps, 1978
- Meso- and metathoracic terga and pleura green. Hind tibiae green, darker distally. Larger than *amazonica* (F ♀ >11.0 mm; ♂ unknown) (Colombia) *L. cordobae* Descamps, 1978
5. Pronotum, meso- and metanota, and all thoracic epimera and episterna black or dark brown, marked with discrete white spots. Elytron blackish brown with white dorsal and ventral border, extending only halfway across metanotum, similar in both sexes. ♂ antennae with black tip (Costa Rica) *L. maculata* sp. n.
- Meso- and metanota and all thoracic epimera and episterna green, neither black nor ornamented with white spots. Pronotum black; white

spots on lateral lobe confluent, forming a continuous band. Elytron green, in ♂ minute and barely visible, in ♀ extending to posterior edge of metanotum. ♂ antenna with white tip (Costa Rica). . . . *L. cararensis* sp. n.

Lagarolampis Descamps

DESCAMPS 1978: 386

DESCAMPS 1983: 18, 22, 25

Lagarolampis was created by DESCAMPS (1978) to contain 3 new species from Colombia (*L. amazonica*, the type of the genus, *L. versicolor* and *L. cordobae*); *L. amazonica* has subsequently been reported from Peru and Brazil (Descamps 1983) and from Ecuador (K. Riede, *pers. comm.*; C. Amédégnato, *pers. comm.*) as well. These three species are very similar. They differ principally in coloration, especially in the extent of the dark pigment on the thorax and anterior abdomen and the number and placement of pale spots on the head and thorax. These characters however appear variable within the species (DESCAMPS 1978, 1983) and even between the left and right sides of the same individual (see below). There are also small differences in size. The ♂ internal genitalia are very similar in all species examined to date. The adult ♂ of *L. cordobae* is unknown; a late instar ♂ larva in the Paris collection has the same coloration as the ♀ adult (C. Amédégnato, *pers. comm.*).

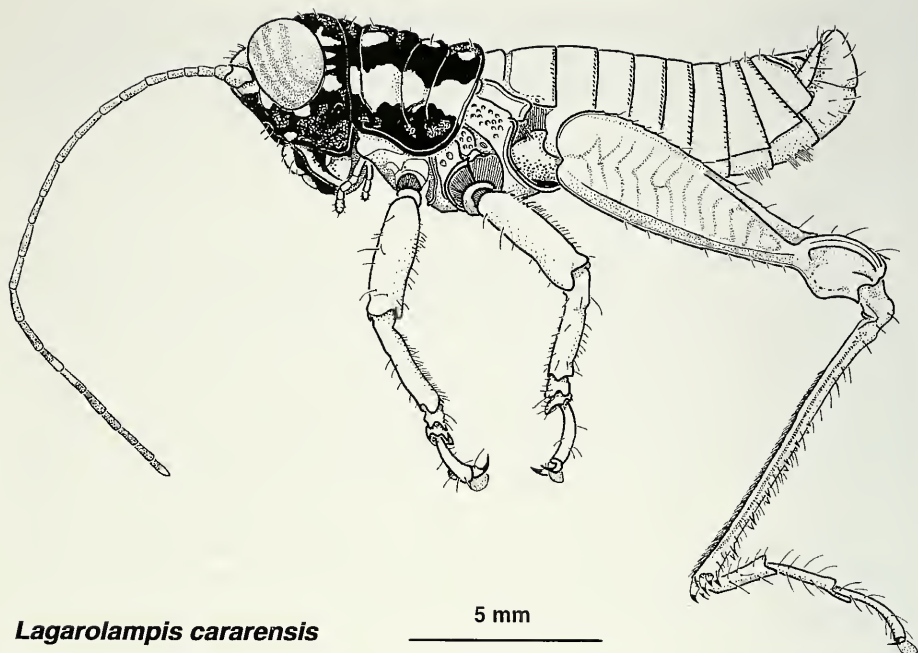
COMMENTS ON DEFINITION OF THE GENUS *Lagarolampis*

In light of the new material and of a ♂ of *L. amazonica* from Ecuador (kindly loaned by Dr. K. Riede) the original definition of the genus must be amended slightly. The dorsal carina of the hind femur is not perfectly smooth, but minutely toothed, with a hair arising at the base of each tooth. The elytra can extend as far as the boundary between the metathoracic and first abdominal tergites. The dorsal outer edge of the upper ovipositor valve can be more serrated (see e.g. Fig. 6) than suggested by the original description ("jamais dentées ... bords saillants et plus ou moins ondulés").

Lagarolampis cararensis sp. n.

MATERIAL EXAMINED: Holotype ♂, allotype ♀. COSTA RICA: Prov. Puntarenas: Reserva Biológica Carara: Estación Quebrada Bonita. 50 m. Lambert North N195200 E469400. In copulation on underside of leaf of sapling in moderately shady understorey, primary lowland forest, Aug 2, 1991 (Rowell CHF & Elsner N). Specimen no.s RC 91250, 91251. (Academy of Natural Sciences, Philadelphia).

♂ *holotype* (Fig. 1). Head and pronotum black, spotted with yellowish white as detailed below. Antennae salmon red, each segmental joint preceded by a narrow pale ring; a single broad white band on flagellar segments 15 and 16, then distally suffused with dark pigment, the final (21st) segment white (antennae black with light rings in the South American species (DESCAMPS 1978) and uniformly brown in the Roraima race of *L. amazonica* (DESCAMPS 1983)). Hind knees red, tarsal spines black. Remainder of body clear emerald green.

***Lagarolampis cararensis***

5 mm

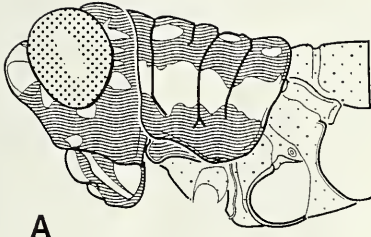
FIG. 1

Lagarolampis cararensis ♂ holotype, habitus.

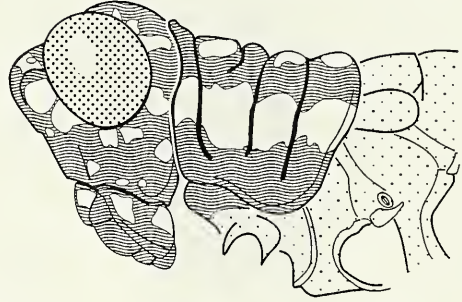
Distribution of white spots as in Fig. 2A & 3A, as follows. Head: fastigium and area surrounding base of antenna pale, 6-8 small spots around rim of eye, one at lower external angle of the gena, 2 on ventral margin of gena, one pair on the clypeus, 2 on each mandible. Vertex with irregular and rather assymmetric yellow markings. Palps pale. Thorax: 3 pairs of discrete white spots on disc of pronotum, situated behind the 1st, 3rd and 4th sulci respectively, plus 4 pairs on the lateral lobe of the pronotum, confluent, forming a continuous but unevenly wide stripe.

Micropterous, elytra barely visible at edge of pronotum. Hind femur with 7 external and 7 internal spines. Cerci, sclerotisations of posterior margin of 10th abdominal tergite and supraanal and subgenital plates (Fig. 4A & B) practically identical to those of *L. versicolor* (DESCAMPS 1978: Fig. 16-18). Dimensions as in Table 1.

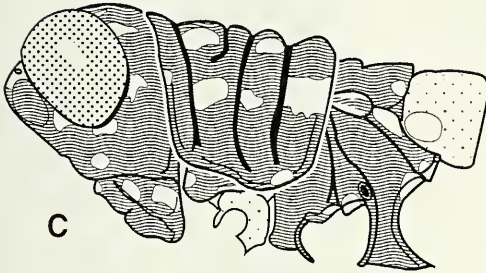
Internal genitalia (Fig. 5F-J) of type typical for genus. Epiphallus a simple, strap-like bridge with rudimentary ancorae, lateral plates triangular and relatively large; lophi terminally sclerotised, with a minute, outwardly and anteriorly directed hook at tip. Ventrolateral sclerites large, wrapping around posterior ventral part of ectophallus, indistinctly sclerotised. Cingulum simple and small, weakly sclerotized, cingular apodemes absent. Endophallus strongly sclerotised, with large, laterally compressed apodemes.

Lagarolampis cararensis

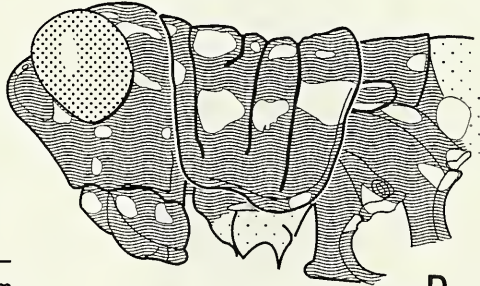
A



B

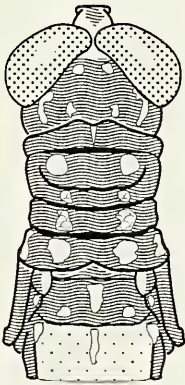


C

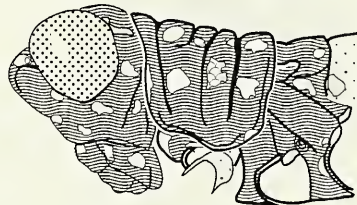
Lagarolampis maculata

D

F



1 mm

Lagarolampis amazonica (male)

E

FIG. 2

Colour patterning of black-and-white species. A & B, *L. cararensis*, ♂ and ♀; C & D, *L. maculata*, ♂ and ♀; E & F, *L. amazonica*, ♂ only. Key: Wavy lines, black: no pattern, white; heavy stippling, light gray; light stippling, green.

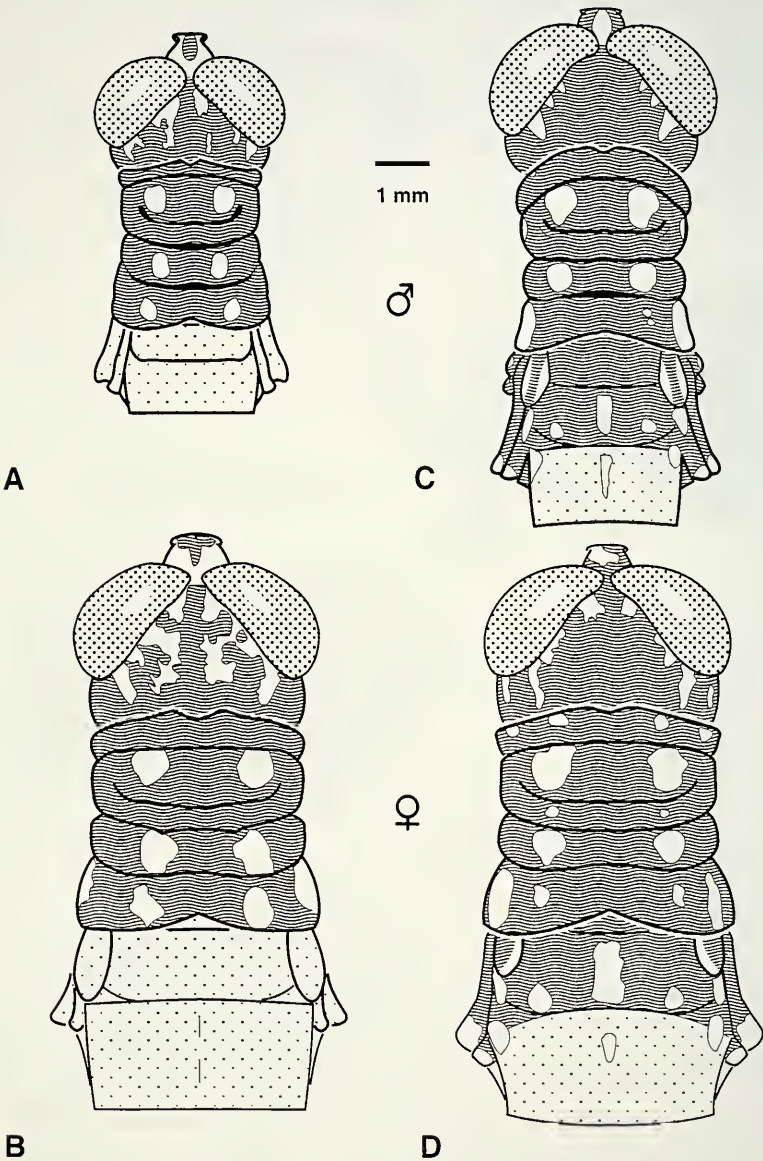
*Lagarolampis cararensis**Lagarolampis maculata*

FIG. 3

Colour patterning of black-and-white species, dorsal view. A & B, *L. cararensis*, ♂ and ♀. C & D, *L. maculata*, ♂ and ♀. Conventions as in Fig. 6.

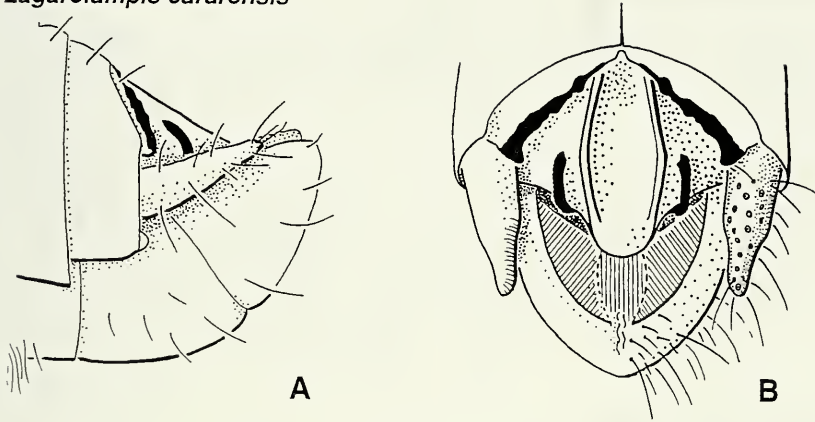
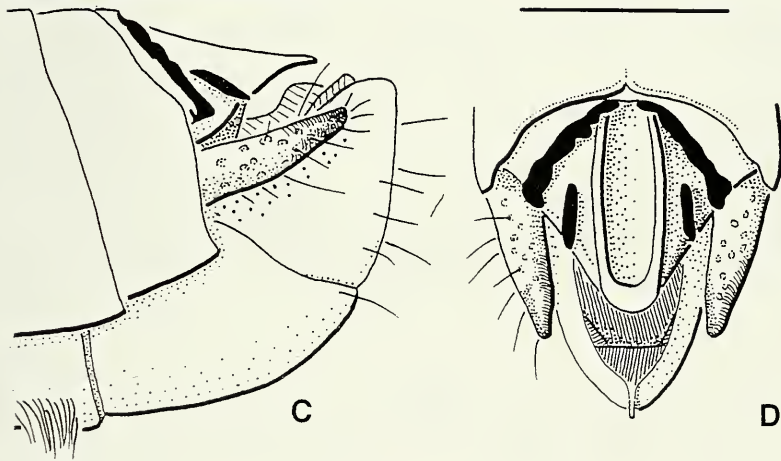
Lagarolampis cararensis*Lagarolampis gamboensis*

FIG. 4

Tip of abdomen of ♂ *L. cararensis*: A, lateral view; B, dorsal view. *L. gamboensis*: C, lateral view; D, dorsal view. Scale, 1 mm.

♀ *allotype*. Coloration as ♂, except for an additional pair of small pale spots at anterior dorsolateral edge of pronotum (Figs. 2B, 3B). The antennae lack the dark distal portion of the ♂ but have more numerous white bands.

Micropterous, but elytra much larger than in ♂ (or than in ♀ of other species of the genus), extending to posterior border of metathoracic tergite. Elytron green, not bordered in lighter colour as in the ♀ of *L. maculata*.

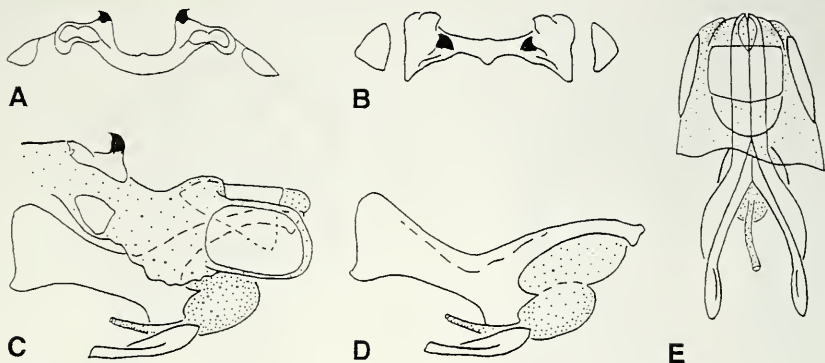
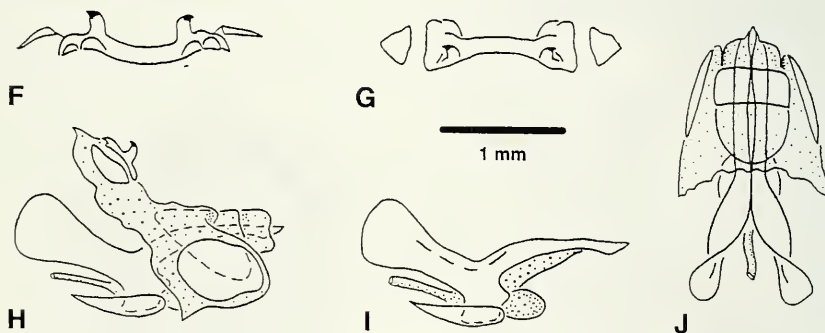
Lagarolampis amazonica*Lagarolampis cararensis*

Fig. 5

♂ internal genitalia. A-E, *L. amazonica*. F-J, *L. cararensis*. Scale, 1 mm.

Ovipositor valves (Fig. 6A-C) as described for genus (DECAMPS 1978: 386) and closely similar to those figured for *L. versicolor* (DESCAMPS 1978: Fig. 18-19). Posterior extremity of subgenital plate developed into a long triangular "egg-guide" lying medially between the ovipositor valves.

COMMENT

The differences in coloration alone would probably not warrant distinguishing *L. cararensis* from the rest of the genus. The considerably larger elytra of the ♀ however indicate specific rank; the sexual dimorphism in this character is quite striking in this species. The dorsal ovipositor valves are also shorter and less toothed than those of the other species here described (see Fig. 6).

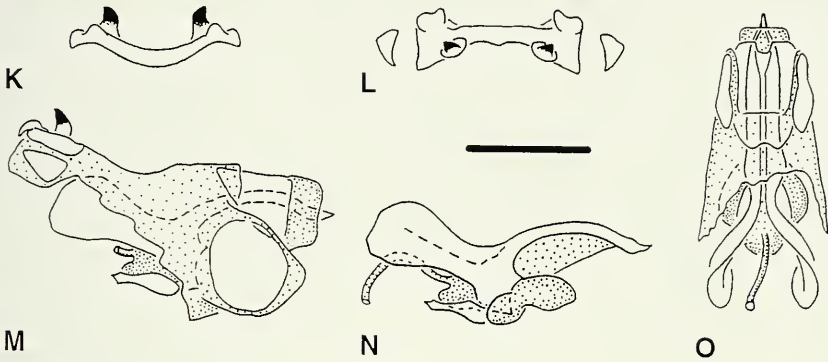
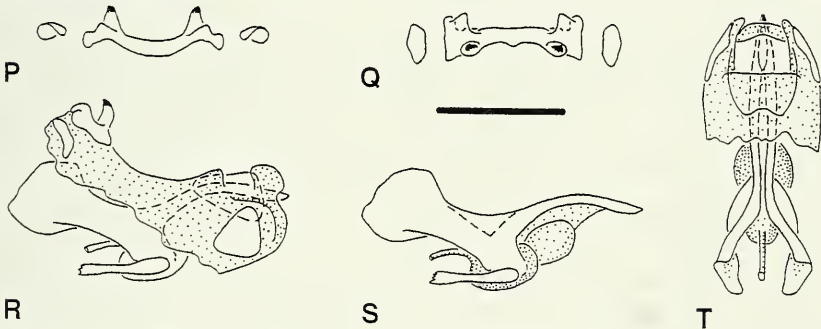
Lagarolampis maculata*Lagarolampis gamboensis*

FIG. 5

contd. K-O, *L. maculata*. P-T, *L. gamboensis*. Scales, 1 mm.

***Lagarolampis maculata* n. sp.**

MATERIAL EXAMINED: Holotype ♂. COSTA RICA: Guanacaste Prov.: R. Naranjo, 3 km SE thereof, Hacienda Montezuma, 500 m. Lambert North N293000 E417000, 14 Nov 1991 (Parker FD), originally deposited at Biology Museum, Utah State University at Logan, USA. Specimen number RC 96039 (Academy of Natural Sciences, Philadelphia). Allotype ♀. Same data as holotype, but 25 Nov 1991 and specimen number RC 94038. Paratype ♀. Limón Prov.: Margarita, 9.4 km beyond Bribri on rd. to Sixaola, trail up Fila Margarita, on sapling, 80-205 m. Lambert South N395500 E598500, 4 Jul 1980 (Rowell CHF), specimen number RC 80183 (Academy of Natural Sciences, Philadelphia). Paratype ♀. Limón Prov.: 7 km N. of Suretka, 230 m; Lambert South N395450 E583780, 21 Sep 1983 (Rowell CHF), specimen no. RC 83450 (Academy of Natural Sciences, Philadelphia). Paratype ♂. Limón Prov.: Cerro Uatsi, above Bribri, 600 m. Lambert South N396900 E579600, 23. Aug 1997 (Rowell CHF & Singh I), specimen no. RC 97187 (Academy of Natural Sciences, Philadelphia).

♂ *holotype*. Head, pronotum and all of thorax black, spotted with whitish yellow as detailed below. Antennae red, with rings of blackish pigment on flagellar segments 7-9, 12-14, and 17-21. The distal (21st) segment has no white tip (cf. *L. cararensis* above). Palps green. Hind knees red, tarsal spines black. Abdomen and legs green.

Distribution of white spots as in Fig. 2C & 3C, as follows. Head: similar to *L. cararensis*. Thorax: 2-3 pairs of white spots on disc of pronotum, situated behind the 1st, 3rd and 4th sulci respectively; in the holotype (but not the paratype) the most posterior pair is small on the right side and absent on the left side. In the paratype there is a fourth pair of spots on the anterior margin of the pronotum, absent in the type. Four pairs of discrete white spots on the lateral lobe of the pronotum, not forming a continuous stripe as in *cararensis*, plus a single white spot on the posterior ventral margin. Metanotum with one central and two pairs of lateral white spots. White marks at ventral margin of pro-, meso- and metathoracic epimera and episterna. A single medial white spot on the first abdominal tergite, and a pair of spots at the anterior lateral margins, just above the metathoracic epimera.

Micropterous, elytra extending halfway across the metanotum in the type, even shorter in the paratype. Elytra brown, with whitish dorsal and ventral margins. Genitalia, both external and internal (Fig. 5K-O), similar to other species of the genus. In the holotype the epiphallus cannot be seen, the rest of the internal genitalia are well defined. The drawings of the epiphallus are made from the paratype ♂. Dimensions as in Table 1. The ♂ of *L. maculata* is almost as large as the ♀. In the other species of the genus sexual dimorphism is much more pronounced.

♀ allotype. Differs from ♂ as follows:

- i. Antennae red, darkening to blackish distally, with 4 diffuse white rings, these not coinciding with segmental boundaries.
- ii. An additional white spot close to the posterior edge of the gena; on disc of pronotum, an additional small spot anterior to the 1st sulcus, and another between sulcus 2 & 3, making a row of 5 pairs of spots dorsally (Figs. 2D, 3D).

Dorsal ovipositor valves longer and more prominently toothed than in *L. cararensis* (Fig. 6).

In life the insects are vividly coloured in black, white, emerald green and red. The eyes are light gray mottled with black. The brownish tints of the head and pronotum and the yellow tints of the eyes and of the spots and markings seen in pinned specimens are artifacts of preservation.

COMMENT

All known localities (Fig. 7) are in lowland wet forest on or adjacent to the Caribbean slope between 100 and 600 m asl, but at opposite ends of the country, suggesting that the species may occur in intermediate localities too (though at low density, because not so far collected). Specimen 4 was one of a tight group of 6-8 individuals found feeding voraciously on the leaves of the tree *Cordia alliodora* (Boraginaceae).

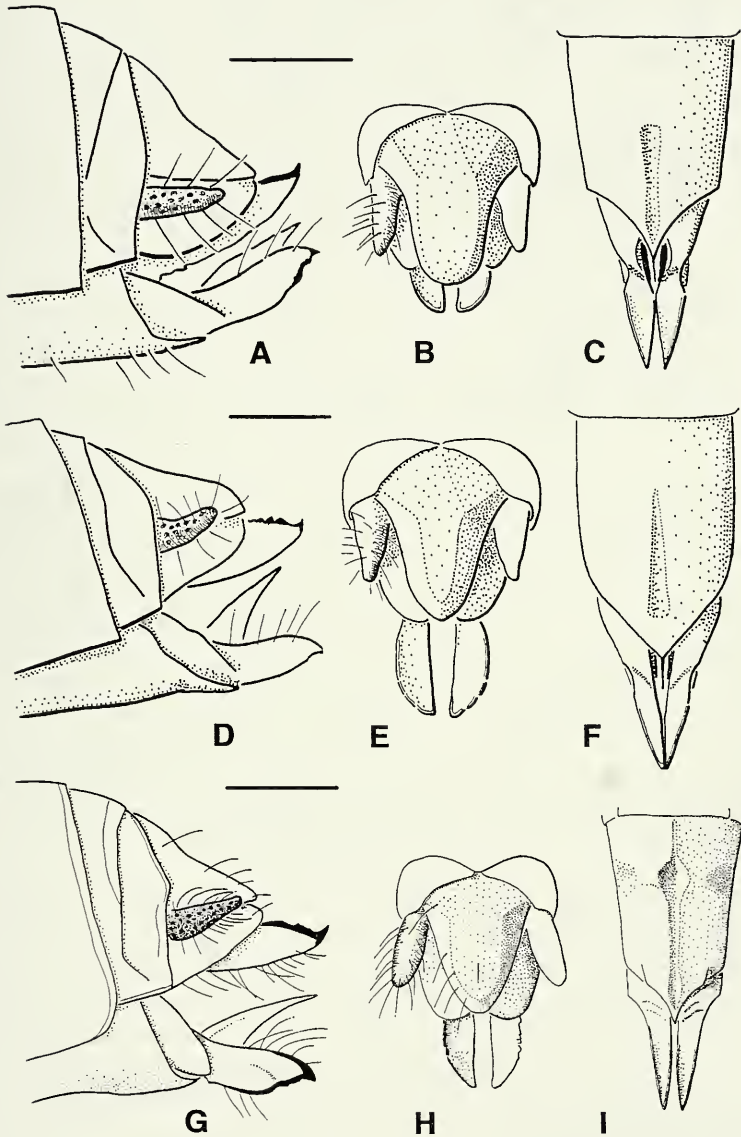


FIG. 6

Tip of abdomen of ♀. A-C, *L. cararensis*; D-F, *L. maculata*; G-I, *L. gamboensis*. Scale, 1 mm.



FIG. 7
L. cararensis and *L. maculata*, distribution map.

***Lagarolampis gamboensis* sp. n.**

MATERIAL EXAMINED: Holotype ♂. PANAMA: Canal Zone: Chico: 24-28 June 1933 (Greenhall A) (University of Michigan Museum of Zoology.) This locality is ambiguous: there are two possibilities, but both lie close to one another in the modern Provincia de Panamá: the Río Chico, 9°09' N, 79°44' W, and the community Chico, 9°16' N, 79°31' W. Allotype ♀. Prov. Colón: Gamboa: Pipeline Rd., 100-200 m asl., forest edge, on *Bytneria* (Sterculiaceae), 15 September 1997 (Rowell CHF, Bentos A). (Academy of Natural Sciences, Philadelphia).

♂ *holotype* (Fig. 8). Head. Antennal flagella broken short, apparently black. Eyes greenish brown (an artifact of preservation, see ♀ below), with 3 darker vertical bands at anterior margin. Head purple-brown, with numerous white marks on frons, around the eyes and on the mouthparts. Interocular space, posterior lateral margins of fastigium and lateral margins of frontal ridge, white.

Ground colour of remainder of animal, green.

Thorax. Medial purple stripe on pronotum, fading out posterior to 3rd sulcus. At least one pair of dorsolateral white spots touching edges of medial stripe, anterior to 1st sulcus; the specimen is faded and the white spots on thorax and abdomen difficult to see, their original pattern was probably the same as described for the ♀ below. Ventral margins of lateral lobes banded broadly with purple, posterior ventral angle touched with white. Elytron minute, not reaching the centre of the metathoracic notum, purple, edged with white. All legs green, hind knees reddish brown edged with black, tibial spines and spurs and tarsal claws green tipped with black. Front feet missing. External genitalia (Fig. 4C-D) green, decorated with black sclerotized areas, cerci blackish at tip. Internal genitalia (Fig. 5P-T) of type typical of genus.

♀ allotype (Fig. 8). Similar to ♂, with following differences. Basal segment of antenna green, remainder black, with 6 white bands and white tips. Eyes with 4 black bands at anterior margin, widening towards the centre of the eye. Coloration of head as in ♂, plus single medial white spot dorsal to medial ocellus.

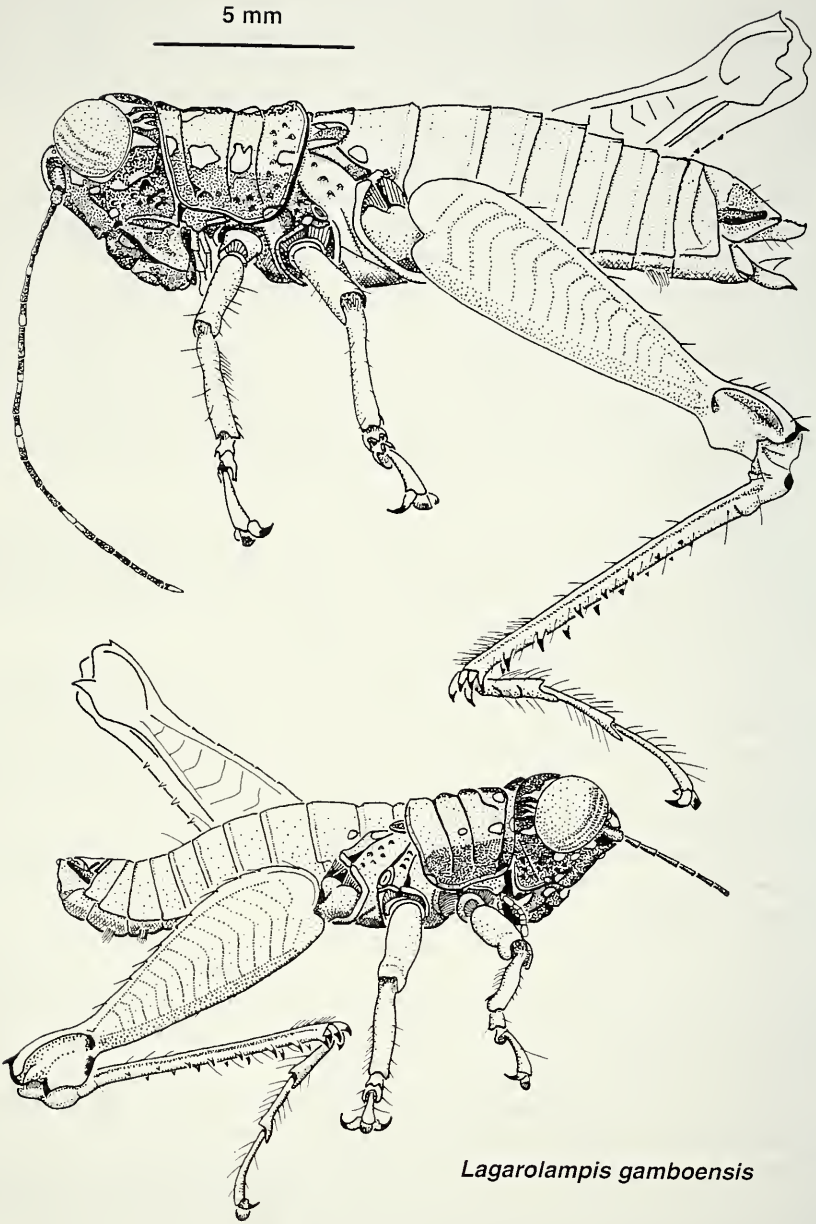
Ground colour of remainder of animal, green.

Thorax. 3 pairs of white spots on either side of the medial pronotal stripe: i) small, at anterior margin; ii) large, anterior to first sulcus; iii) small, between sulci 2 and 3. Four more pairs of white dots immediately above the ventral marginal band of the lateral lobes, lying between, anterior to, and behind the three sulci. White mark at posterior angle of lateral lobe. Prothoracic epimeron edged in white. White spot on mesothoracic episternum. Mesothoracic episternum and epimeron tinged purple-brown. Elytra purple-brown, bordered white, relatively larger than in ♂, almost reaching posterior edge of metanotum.

Abdomen. White spot on first abdominal tergite, just behind tip of elytron. Abdomen with narrow medial white stripe. Cerci and ovipositor valves (Fig. 6 G-I) green, tinged red brown. Upper part of hind knees red brown, posterior edge of knee edged dark green. Tibia green, tibial spines blackish brown. Lateral and ventral surfaces of hind tarsi, red brown.

In life the ♀ was bright green and purple, with white marks and conspicuous pale blue-gray eyes. Fading, especially of the eyes, occurs rapidly after death and preparation. The ♀ contained 4 large ripe eggs, more or less filling the body cavity (see also Descamps 1983: 21; this very small number of ovarioles is typical for group). Gut very small.

Dimensions and ratios are given in Table 1. All lie within the range set by other members of the genus.



Lagarolampis gamboensis

FIG. 8

Lagarolampis gamboensis. ♂ holotype, ♀ allotype, habitus.

DISCUSSION

L. maculata is similar to *L. cordobae* Descamps, 1978 from Colombia in both dimensions and coloration. Comparison is made more difficult by the absence of an adult Colombian ♂, but the morphological differences between the two appear to justify separate status. Although many flightless forest taxa of the Neotropics are very restricted in range, there are some (e.g. *Zoumolampis bradleyi*, also a member of the Lagarolampae, or *Pseudanniceris nigrinervis*, Ommatolampinae) of wide distribution, so the geographical distance between Costa Rica and Colombia is not alone an argument for species status. However, these other taxa are probably a continuous population (or at least were, prior to recent deforestation), whereas no linking *Lagarolampis* species is known from Panama (*L. gamboensis* is quite different in coloration). The ♀ *Lagarolampis maculata* shows numerous small differences in coloration relative to the *Lagarolampis cordobae* holotype, the most significant being the red colour of the antennae and the black pigment on the meso- and metathorax. Differences in the pattern of white spots, in contrast, are probably of no significance. DESCAMPS (1978) noted that the holotype and paratype ♀♀ of *L. cordobae*, from different parts of Colombia, differed in their pattern of spots. Similarly, the type material of *L. amazonica* has only 2 pairs of spots on the disc of the pronotum (DESCAMPS 1978), but the Ecuadorian specimen examined has 4 pairs, while otherwise agreeing exactly with the type description. Within the Costa Rican material of *L. maculata* there appears to be a small difference between the northern and the southern specimens. The latter are slightly smaller and have more numerous white spots on the pronotum, and the elytron of the ♂ is relatively smaller.

The Panamanian *L. gamboensis* is of a different coloration to all other members of the genus, but it appears to have no morphological characters which might justify a separate genus.

Apart from the observed feeding of *L. maculata* on *Cordia alliodora* (Boraginaceae) no host plants of the genus are known. AMÉDÉGNATO (1997) lists *L. amazonica* as being polyphagous on tree foliage, but gives no further details. Species of *Lagarolampis* are typically found on shrubs and trees of the forest understorey (DESCAMPS 1976: 373; pers. obs.), often at forest edges or in successional forest. To date they have not been found in insecticide catches from the canopy in the Caribbean forests of Costa Rica (pers. obs.), DESCAMPS (1976) does not include them in his list of species from the crowns of Amazonian trees, and AMÉDÉGNATO (1997) lists *L. amazonica* as being found in the "intracanalopy", which all together may indicate that the understorey is their normal habitat. If this is the case, they are rare (see also Amédégnato, loc. cit.). Suitable habitat for the genus however exists on the Caribbean slope of Central America far to the north of Costa Rica, and *L. maculata* or a related form may well extend as far as Belize.

ACKNOWLEDGEMENTS

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TABLE 1A. Dimensions of *Lagarolampis* spp.

Dimensions in millimetres:		<i>Lagarolampis amazonica</i>				<i>Lagarolampis versicolor</i>	<i>Lagarolampis cordobae</i>
MALES							
Provenance		Peru	Ecuador	Ecuador		Colombia	
Type status		Holotype				Holotype	
Specimen no.		Paris coll.	96010	Paris coll.	MEAN	(Paris coll.)	
Hind femur		8.65	8.63	8.70	8.67	10.09	No males known
Rostrum-subgen. plate			13.06	13.38	13.22	15.39	
Pronotum (midline)			2.57	2.43	2.50	3.06	
Pronotum longest		2.75	2.80	3.09	2.95	3.24	
Interocular space			0.10	0.09	0.10	0.1	
Antennal pedicel (width)			0.41	0.42	0.42	0.5	
Antenna			13.00	>11	13.00	14.1	
T3 tarsus 1 + 2			2.61	2.80	2.71	3.27	
T3 tarsus 3			1.88	1.77	1.83	2.37	
Elytron length			0.46	0.28	0.37	0.44	
Ratios							
Femur/Pronotum		3.15	3.08	2.82	2.95	3.11	
L/P			4.66	4.33	4.50	4.75	
Interoc./P			0.04	0.03	0.03	0.03	
Interocular/pedicel			0.24	0.21	0.23	0.20	
Tarsus 3/ 1+2			0.72	0.63	0.68	0.72	
Tarsus 1+2+3/F			2.83	3.00	2.92	3.50	
Tarsus 1+2+3/P			2.81	2.68	2.74	3.38	
Ant/P			4.64		4.64	4.35	
Elytron/Pronotum			0.18	0.12	0.15	0.14	
FEMALES							
Type status		Allotype				Paratype	
Specimen no.			Paris coll.		Paris coll.	Holotype	Paratype
						Paris coll.	Paris coll.
Hind femur		10.05	9.98		12.56	12.74	11.62
Rostrum-subgen. plate			17.37		19.87	21.67	22
Pronotum (midline)			2.90		3.4	3.9	3.4
Pronotum longest		3.05	3.35		4.08	4.43	4.27
Interocular space			0.16		0.23	0.15	0.18
Antennal pedicel (width)			0.50		0.51	0.62	0.55
Antenna			>10		16.58		12.31
T3 tarsus 1 + 2			3.18		3.81	4.12	3.72
T3 tarsus 3			2.21		2.7	2.57	2.19
Elytron length			0.85		0.81	1.07	>0.8
Ratios							
Femur/Pronotum		3.30	2.98		3.08	2.88	2.72
Length/Pronotum			5.19		4.87	4.89	5.15
Interoc./Pronotum			0.05		0.06	0.03	0.04
Interocular/pedicel			0.32		0.45	0.24	0.33
Tarsus 3/ 1+2			0.69		0.71	0.62	0.59
Tarsus 1+2+3/F			3.40		4.02	4.32	3.91
Tarsus 1+2+3/P			3.16		3.63	3.50	3.06
Ant/P					4.06		2.88
Elytron/Pronotum			0.29		0.24	0.27	0.29

their collections, Dr. C. Amédégnato for discussion, Dr. D. Quintero (Panama City) for geographical information about Panamanian localities, Sra. A. Bentos-Pereira (Montevideo), Dr. N. Elsner (Köln) and Frau I. Singh (Basel) for assistance in the field, and the members of the Instituto Nacional de Biodiversidad de Costa Rica and the Smithsonian Tropical Research Institute in Panama for logistic help.

TABLE 1B. Dimensions of *Lagarolampis* spp.

Dimensions in millimetres:

		<i>Lagarolampis maculata</i> n.sp.			<i>Lagarolampis cararensis</i> n.sp.	<i>Lagarolampis gamboensis</i> n.sp.
MALES						
	Type status	Holotype	Paratype	MEAN	Holotype	Holotype
	Specimen no.	96039	97187		91250	(UMMZ coll.)
Hind femur		10.14	9.35	9.75	8.82	9.11
Rostrum-subgen. plate		16.27	15.59	15.93	13.32	15.1
Pronotum (midline)		3.20	2.91	3.06	2.76	2.73
Pronotum longest		3.46	3.31	3.39	3.26	3.11
Interocular space		0.13	0.10	0.12	0.13	0.06
Antennal pedicel (width)		0.53	0.55	0.54	0.45	0.4
Antenna		13.96	11.96	12.96	11.30	
T3 tarsus 1 + 2		3.21	3.01	3.11	3.03	2.85
T3 tarsus 3		2.36	2.08	2.22	1.77	1.97
Elytron length		0.88	* >0.43	<0.88	* <1.0	0.63
Ratios						
Femur/Pronotum		2.93	2.82	2.88	2.71	2.93
L/P		4.70	4.71	4.71	4.09	4.86
Interoc./P		0.04	0.03	0.03	0.04	0.02
Interocular/pedicel		0.25	0.18	0.21	0.29	0.15
Tarsus 3/ 1+2		0.74	0.69	0.71	0.58	0.69
Tarsus 1+2+3/F		3.44	3.23	3.34	3.23	3.07
Tarsus 1+2+3/P		3.29	2.99	3.14	2.70	2.89
Ant/P		4.03	3.61	3.83	3.47	0.00
Elytron/Pronotum		0.28				0.23
FEMALES						
	Type status	Allotype	Paratype	MEAN	Allotype	Allotype
	Specimen no.	94038	80183		91251	97361
Hind femur		11.64	11.34	11.49	10.70	10.61
Rostrum-subgen. plate		19.50	19.00	19.25	17.58	18.02
Pronotum (midline)		3.38	3.56	3.47	3.29	3.09
Pronotum longest		3.94	3.75	3.85	3.61	3.56
Interocular space		0.17	0.18	0.18	0.16	0.15
Antennal pedicel (width)		0.50	0.45	0.48	0.46	0.49
Antenna		13.33	13.19	13.26	12.40	12.4
T3 tarsus 1 + 2		3.90	3.89	3.90	3.48	3.47
T3 tarsus 3		2.53	2.25	2.39	2.27	2.31
Elytron length		0.81	0.90	0.86	1.32	1.22
Ratios						
Femur/Pronotum		2.95	3.02	2.99	2.96	2.98
Length/Pronotum		4.95	5.07	5.01	4.87	5.06
Interoc./Pronotum		0.04	0.05	0.05	0.04	0.04
Interocular/pedicel		0.34	0.40	0.37	0.35	0.31
Tarsus 3/ 1+2		0.65	0.58	0.61	0.65	0.67
Tarsus 1+2+3/F		4.12	4.09	4.10	3.69	3.69
Tarsus 1+2+3/P		3.52	3.29	3.40	3.23	3.28
Ant/P		3.38	3.52	3.45	3.43	3.48
Elytron/Pronotum		0.24	0.25	0.25	0.40	0.39

* not completely visible.

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Biodiversité aquatique de Madagascar 30: le genre *Cheirogenesia* Demoulin, 1952 (Ephemeroptera, Palingeniidae)

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Aquatic biodiversity of Madagascar 30: the genus *Cheirogenesia* Demoulin, 1952 (Ephemeroptera, Palingeniidae). - The endemic genus *Cheirogenesia* is poorly known and supposed to be monospecific with the single species *Ch. decaryi* (Navàs, 1926). Numerous collections from different regions of Madagascar led us to discover several populations of this genus. In the present paper, we redescribe *Ch. decaryi* from material recently collected in the suburbs of Antananarivo, as well as two new species, *Ch. edmundsi* sp. nov. (Mangoro basin) and *Ch. laurencae* sp. nov. (Rianila basin). Affinities among them are quoted. Geographical and ecological data are also presented. The most striking discovery is the fact that neither males nor females perform flight, but rather skim the water surface.

Key-words: *Cheirogenesia* - Madagascar - new species - distribution - behaviour

INTRODUCTION

L'étude des Ephemeroidea malgaches entreprise par les membres du Laboratoire de Recherche sur les Systèmes Aquatiques et leur Environnement (CNRE-ORSTOM) et du Musée cantonal de Zoologie à Lausanne dans le cadre du projet "Biodiversité et biotypologie des eaux continentales malgaches" s'est révélée riche en nouvelles espèces. Ainsi les trois genres présents dans la Grande Île, *Proboscidoplocia* (Polymitarcyidae), *Eatonica* (Ephemeridae) et *Cheirogenesia* (Palingeniidae) qui étaient monospécifiques, possèdent respectivement sept (ELOUARD & SARTORI 1997; ELOUARD *et al.* 1999), trois (ELOUARD *et al.* 1998) et au moins trois espèces.

La présence de Palingeniidae à Madagascar est connue depuis plus de 70 ans. Déjà en 1926, NAVÀS décrivait l'espèce *Anagenesia decaryi* sur la base de plusieurs spécimens capturés dans la région de Tananarive (Antananarivo) et dans le " Sud et Centre " de la Grande Île. Dans son travail de 1952, DEMOULIN crée le genre

Cheirogenesia pour cette espèce, se basant notamment sur la forme très particulière de l'aile antérieure qui présente une analogie frappante avec celle d'une chauve-souris. En 1969, McCafferty érige un nouveau genre et une espèce nouvelle d'Ephemeridae, *Fontainica josettae*, sur la base de jeunes larves décrites sans autre appellation par Fontaine (1968). En 1976 enfin, McCafferty & Edmunds décrivent pour la première fois une larve de *Cheirogenesia*, sous le nom de *Ch. decaryi*, et mettent en synonymie la combinaison *Fontainica josettae*. A ce jour donc, le genre *Cheirogenesia* n'est connu que de quelques imagos mâles, d'un lot de larves et d'une larvule, provenant tous de localités différentes.

Grâce à l'obligeance du Dr J. Legrand, du MNHN de Paris, nous avons pu examiner l'holotype de *Ch. decaryi*. De plus, de nombreuses prospections effectuées depuis 1991 par l'équipe du LRSAE (ORSTOM-CNRE) et celle du Musée de Zoologie à Lausanne ont permis de capturer de très nombreux individus appartenant à ce genre, tant au stade larvaire qu'imaginal.

Dans ce premier travail, consacré aux stades ailés, le mâle de l'espèce type du genre, *Ch. decaryi* (Navàs), est redécrit de la région d'Antananarivo; la subimago femelle est décrite pour la première fois. Deux autres espèces sont également proposées comme nouvelles, sur la base d'imagos mâles et subimagos femelles. Leurs larves feront l'objet d'une description ultérieure.

Les holotypes et une partie des paratypes sont déposés au Musée de Zoologie à Lausanne. D'autres paratypes sont également déposés au MNHN, Paris, ainsi qu'au CNRE à Antananarivo, Madagascar.

DESCRIPTIONS

Cheirogenesia decaryi (Navàs, 1926)

Anagenesia decaryi Navàs 1926

Cheirogenesia decaryi Demoulin 1952

nec *Cheirogenesia decaryi* McCafferty & Edmunds 1976

IMAGO ♂

Coloration (matériel en alcool et vivant): tête brun-gris, yeux noirs, ocelles blanchâtres. Scape antennaire blanchâtre, pédicelle et flagelle brun moyen. Vestiges mandibulaires de couleur blanc-grisâtre. Thorax brun moyen, plus clair le long de la ligne médiane. Prothorax translucide près de sa marge antérieure. Aile brun-gris. Pattes brun gris, avec des maculations longitudinales brunes sur les fémurs. Tergites abdominaux brun moyen avec deux taches claires allongées en position antéro-médiane (Fig. 1). Une bande plus foncée part du milieu de la marge tergale et rejoint obliquement la marge postérieure. Sternites uniformément brun clair; traces de maculations en abat-jour peu visibles. Chaîne nerveuse ventrale blanchâtre. Paracercue brun foncé; cercues brun-gris.

Tête: yeux grands, obovales; distance interoculaire égale aux 2/3 de la largeur d'un oeil (Fig. 2). Pièces buccales vestigiales, vestiges mandibulaires bien visibles, atteignant la base du prothorax.

Thorax: toutes les pattes sont de longueur normale, non atrophiées. Patte antérieure portant une griffe à deux ongles presque symétriques, l'un pointu, l'autre obtus (Demoulin, 1952, fig. 3D). Pattes médianes et postérieures portant des ongles longs et symétriques. Tarses de toutes les pattes à 5 articles. Aile antérieure caractéristique (Fig. 5): nervure costale profondément échancrée entre les nervures longitudinales des champs radial et médian. Gémination des nervures radiales et médianes, à l'exception de la nervure R_1 . Les nervures transverses n'atteignent pas la marge costale, mais sont remplacées par des plis de l'aile. Champs cubital et anal à marge costale rebordée. Champs costal et sous costal de l'aile postérieure également rebordé. Nervure costale peu échancrée. Nervures transverses principalement présentes entre la nervure costale et la première nervure radiale.

Abdomen: pleurites abdominaux très développés. Gonopodes de trois articles, le premier très développé, les deux derniers réduits à de petits moignons. Stylogère très largement échancré. Lobes péniens très divergents, en V dans la partie proximale, brusquement élargis, avec une saillie en forme de talon. Marge externe des lobes légèrement convexe, boudinés, et brusquement rétrécis à l'apex, formant un tétou (Fig.7).

Paracerbe réduit à quelques segments.

Taille: longueur du corps, 21-27 mm; longueur de l'aile antérieure, 14-18 mm; longueur des cerques, 15-20 mm.

SUBIMAGO ♀

Tête et thorax brun foncé. Pattes antérieures entièrement atrophiées; pattes médianes et postérieures atrophiées au niveau des tarses. Aile antérieure laiteuse, moitié distale souvent teintée de gris. Marge costale nettement moins échancrée que chez le ♂ (Fig. 6). Nervures transverses moins abondantes, surtout dans le champ cubital qui est au demeurant plus développé que chez le ♂. Abdomen plus clair que chez le ♂, mais avec les mêmes dessins sur les tergites. Sternites uniformément blanchâtres, chaîne nerveuse ventrale bien visible; 9e sternite plus foncé, avec deux taches allongées noirâtres.

Taille: longueur du corps, 22-28 mm; longueur de l'aile antérieure, 15-22 mm; longueur des cerques, 6-10 mm.

OEUF

Forme discoïde typique des Palingeniidae (Fig. 10). Surface chorionique lisse sans structure apparente; micropyle en position submarginale; plage micropylaire très peu marquée. Diamètre: 300-360µm.

MATÉRIEL EXAMINÉ

Un spécimen épinglé, ♂ holotype (MNHN, Paris), et portant les étiquettes suivantes: (1) Muséum Paris Madagascar Tananarive R. Decary 1921, (2) T g(?) 221, (3) *Anagenesia decaryi* Nav. P. Navás S.J. det, (4) TYPE.

Autre matériel:

12 larves, bassin de la Betsiboka, riv. Ikopa, Ambohimambola, près du pont, 47°25'54"E, 18°56'40" S, alt. 1257 m; stat. St02-27, prélèv. P0242, le 30/04/94. 18 ♂ ♂,

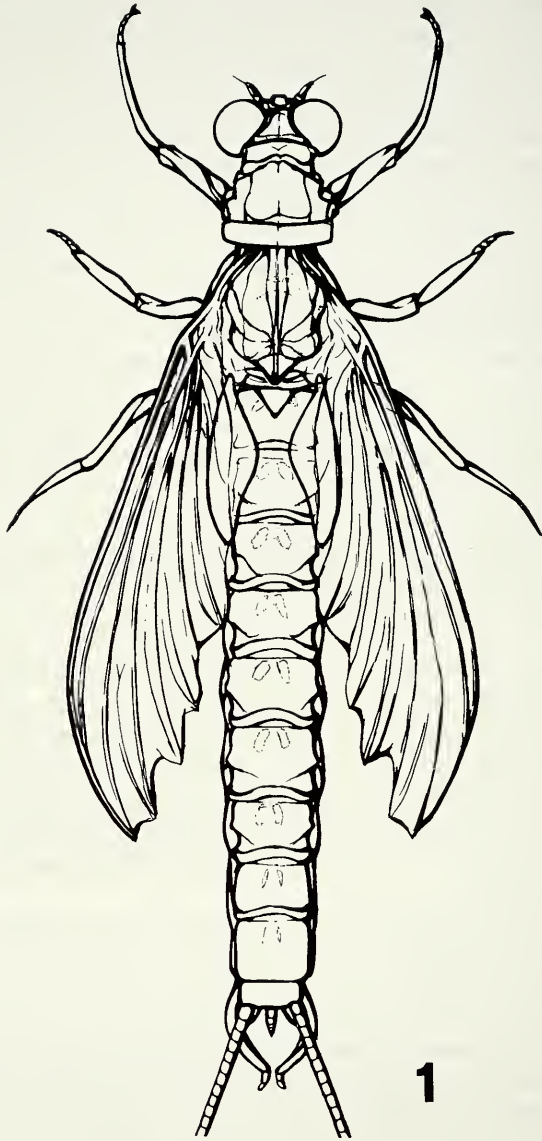


FIG. 1
Cheirogenesia decaryi (Navàs, 1926), imago mâle.

20 ♀♀, bassin de la Betsiboka, riv. Ikopa, Ankazobe-Ambohimanambola Tana, Sablière, 47°34'38" E, 18°55'43" S, alt. 1255 m; stat. St02-03, prélèv. P0287, le 14/03/95. 154 ♂♂, 13 ♀♀, bassin de la Betsiboka, riv. Ikopa, Hotel le Hintsy-Tana, 1500 m en amont de P0287, 47°35'23" E, 18°55'58" S, alt. 1256 m; stat. St02-33, prélèv. P0288, le 15/03/95. 198 ♂♂, 122 ♀♀, 50 exuvies larvaires, même station, prélèv. P0576, le 22/03/96.

***Cheirogenesia edmundsi* sp. n.**

Cheirogenesia decaryi sensu McCafferty & Edmunds 1976

IMAGO ♂

Coloration similaire à celle de *Ch. decaryi*. Teinte générale plus claire. Tergites bruns-clairs, sternites abdominaux beiges, sans aucune trace de maculation.

Tête: yeux très grands, ovales (Fig. 3); distance interoculaire inférieure à la moitié de la largeur de l'oeil.

Thorax: ailes antérieures et postérieures semblables à celles de *Ch. decaryi*. Nervation typique du genre.

Abdomen: base des lobes péniens à marges subparallèles; lobes divergents après la saillie, à marges postérieures subrectilignes et brusquement rétrécis à l'apex, formant un téton (Fig. 8).

Taille: longueur du corps, 25-28 mm; longueur de l'aile antérieure, 16-18 mm; longueur des cerques, 14-17 mm.

SUBIMAGO ♀ ET OEUF

Semblables à ceux de *Ch. decaryi*.

Moitié apicale de l'aile antérieure nettement teintée de gris.

Taille: longueur du corps, 21-29 mm; longueur de l'aile antérieure, 18-24 mm; longueur des cerques, 7-8 mm.

MATÉRIEL EXAMINÉ

1 imago ♂ holotype, bassin du Mangoro, riv. Mangoro, Pont routier - Route: Tana-Moramanga, 48°06'32" E, 18°52'32" S, alt. 840 m; stat. St07-01, prélèv. P0243, le 6/05/94.

157 ♂♂, 130 ♀♀ paratypes, même station, même date que l'holotype.

Autre matériel:

24 imagos ♂♂, même station, prélèv. P0106, le 2/04/92. 35 larves, même station, prélèv. P0375, le 17/04/95. 17 ♂♂, 25 ♀♀, même station, prélèv. P0377, le 20/04/95.

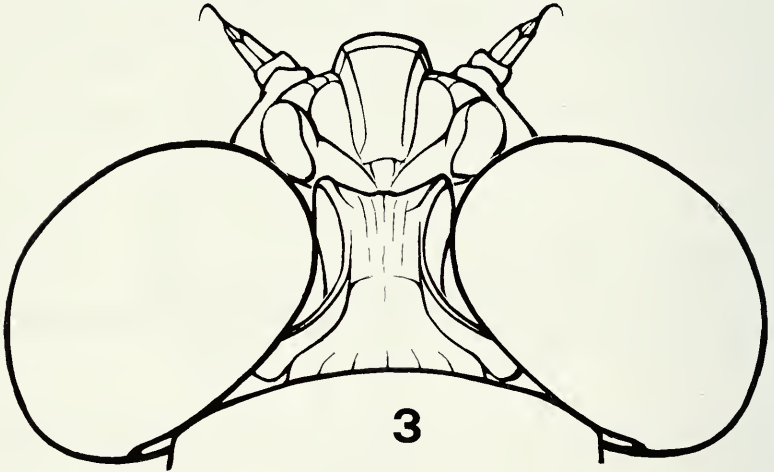
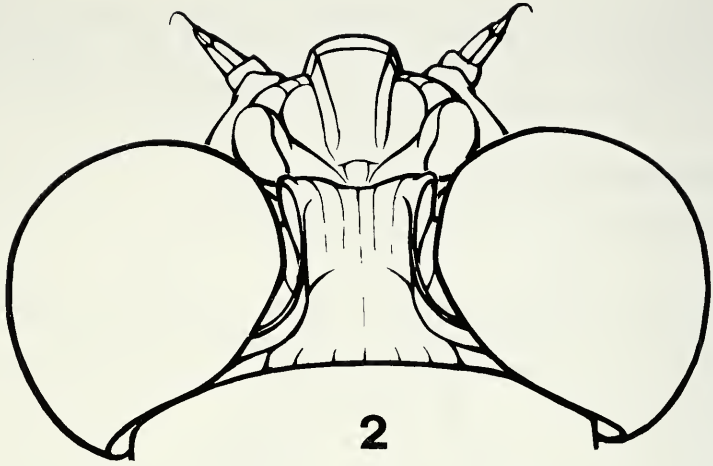
ETYMOLOGIE

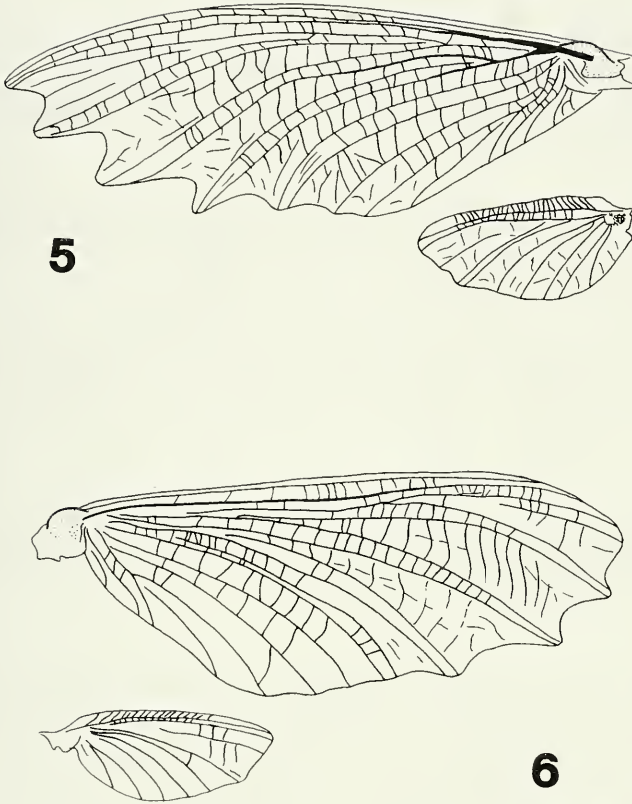
Cette espèce est dédiée à G.F. Edmunds Jr. (Salt Lake City, USA), qui fut le premier à collecter des spécimens de cette espèce.

***Cheirogenesia laurencae* sp. n.**

IMAGO ♂

Coloration générale plus foncée que chez *Ch. decaryi*. Tergites bruns foncés, sternites abdominaux brun moyen, maculations blanchâtres en abat-jour bien visibles.





FIGS 5 - 6

Ailes antérieure et postérieure de *Ch. decaryi*; fig. 5: imago mâle, fig. 6: imago femelle.

Tête: yeux très grands, obovales (Fig. 4); distance interoculaire égale aux $2/3$ de la largeur de l'oeil.

Thorax: ailes antérieures et postérieures semblables à celles de *Ch. decaryi*. Nervation typique du genre.

Abdomen: base des lobes péniens à marges internes en forme de "U" bien visible; lobes peu divergents après la saillie, à marges postérieures subrectilignes, et peu rétrécis à l'apex, formant un téton peu prononcé (Fig. 9)

Taille: longueur du corps, 27-29 mm; longueur de l'aile antérieure, 16-19 mm; longueur des cerques, 18-21 mm.

FIGS 2 - 4

Tête en vue dorsale des trois espèces de *Cheirogenesia*; fig. 2: *Ch. decaryi*, fig. 3: *Ch. edmundsi* sp. nov., fig. 4: *Ch. laurencae* sp. nov.

SUBIMAGO ♀ ET OEUF

Semblables à ceux de *Ch. decaryi*.

Moitié apicale de l'aile antérieure nettement teintée de gris.

Taille: longueur du corps, 21-29 mm; longueur de l'aile antérieure, 18-24 mm; longueur des cerques, 7-8 mm.

MATÉRIEL EXAMINÉ

1 imago ♂ holotype, bassin du Rianila, riv. Sahatandra. Pont routier Ambarikadera. Croisement vers Lakato, Aff. de Rianila., 48°21'07" E. 18°57'23" S, alt. 925m, station St17-10, prélèv. P0248, le 26/10/94.

33 ♂♂, 12 ♀♀ paratypes, même station, même date que l'holotype.

Autre matériel:

25 larves, même station, prélèv. P0376, le 17/04/95. 11 larves même station, prélèv. P0506, le 19/10/95. 18 larves, bassin du Rianila, aff. Sahatandra, Route Lakato, près de 5 km début route Lakato, 48°21'02" E. 18°59'37" S. alt. 935m, station St17-33, prélèv. P0517, le 20/10/95.

ETYMOLOGIE

Cette espèce est dédiée à Laurence Ruffieux (Neuchâtel), éminente collègue et amie, qui a participé à plusieurs prospections et qui a fait d'importantes recherches sur la physiologie des espèces de *Cheirogenesia*.

DISCUSSION

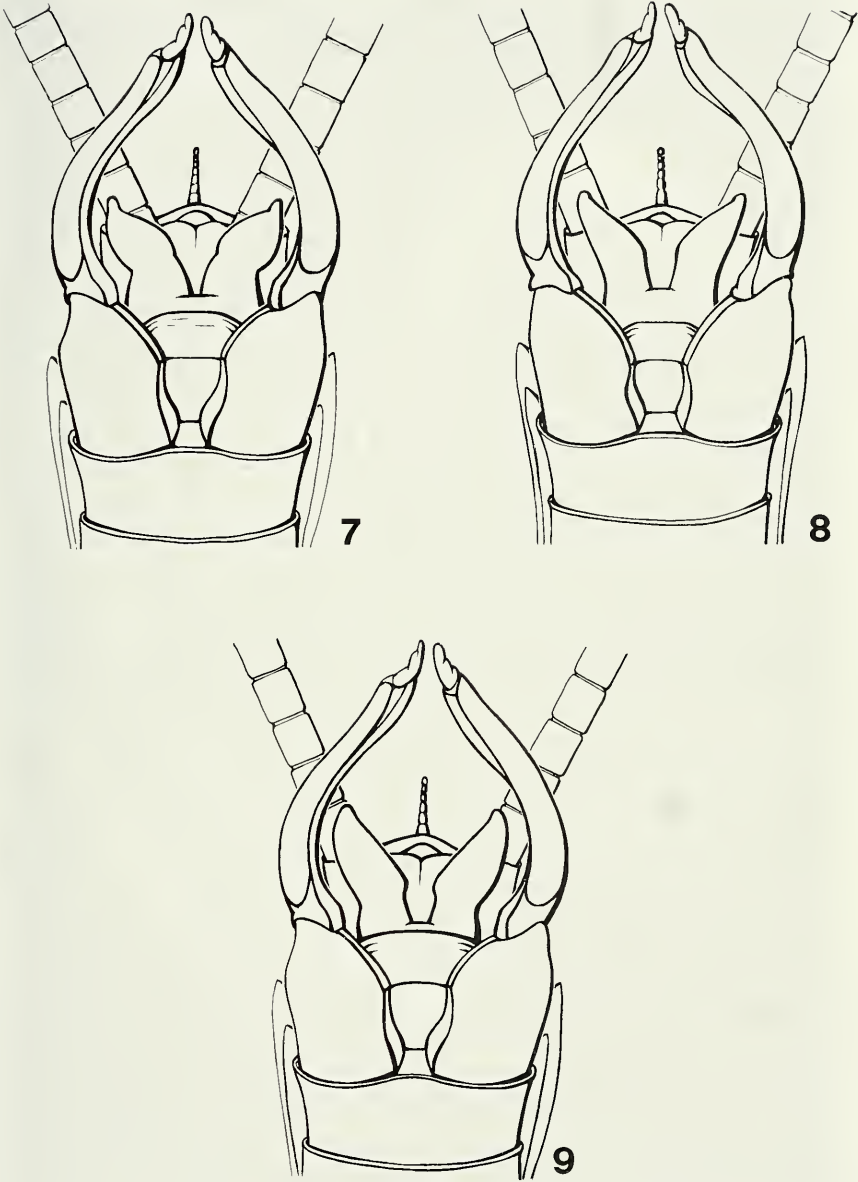
Les trois espèces mentionnées dans ce travail sont très proches l'une de l'autre. Elles se distinguent cependant aisément. La coloration mise à part, les imagos mâles de *Ch. edmundsi* sp. nov. se reconnaissent à la forme et à la taille de leurs yeux plus grands que chez les deux autres espèces. La forme des génitalia, que ce soit la base des lobes péniens aussi bien que l'apex, est caractéristique de chaque espèce. Le fait que la population du Mangoro soit différente de l'espèce nominale avait déjà été supposé par McCAFFERTY & EDMUNDS (1976).

DISTRIBUTION ET ÉCOLOGIE

Les larves de *Cheirogenesia* possèdent une écologie proche de celles d'autres Palingeniidae, telle celle de *Palingenia longicauda* (SARTORI *et al.* 1995). Elles sont fousseuses et colonisent les méandres des cours d'eau, principalement dans les zones d'érosion où elles forent des trous dans le substrat fin composé majoritairement de limons et d'agile relativement compacts. D'ailleurs tous les Palingeniidae colonisent les zones potamiques des fleuves et rivières, surtout situées à basse altitude. A Madagascar, il en est de même pour certaines espèces de *Cheirogenesia*. Toutefois, la géomorphologie du pays a créé des zones potamiques d'altitude sur les Hautes Terres (altitude supérieure à 1200 m), qui sont colonisées par certaines espèces, telle *Ch. decaryi*.

Chaque espèce étudiée n'est pour l'instant connue que d'un seul bassin.

Ch. decaryi a été collectée dans plusieurs stations le long de l'Ikopa (haut bassin de la Betsiboka), dans la banlieue de la capitale Antananarivo (Fig. 11). La rivière possède un débit moyen d'environ 30 m³.s⁻¹. L'environnement est majoritairement



FIGS 7 - 9

Génitalia, en vue ventrale des trois espèces de *Cheirogenesia*: fig. 7: *Ch. decaryi*, fig. 8: *Ch. edmundsi* sp. nov., fig. 9: *Ch. laurencae* sp. nov.

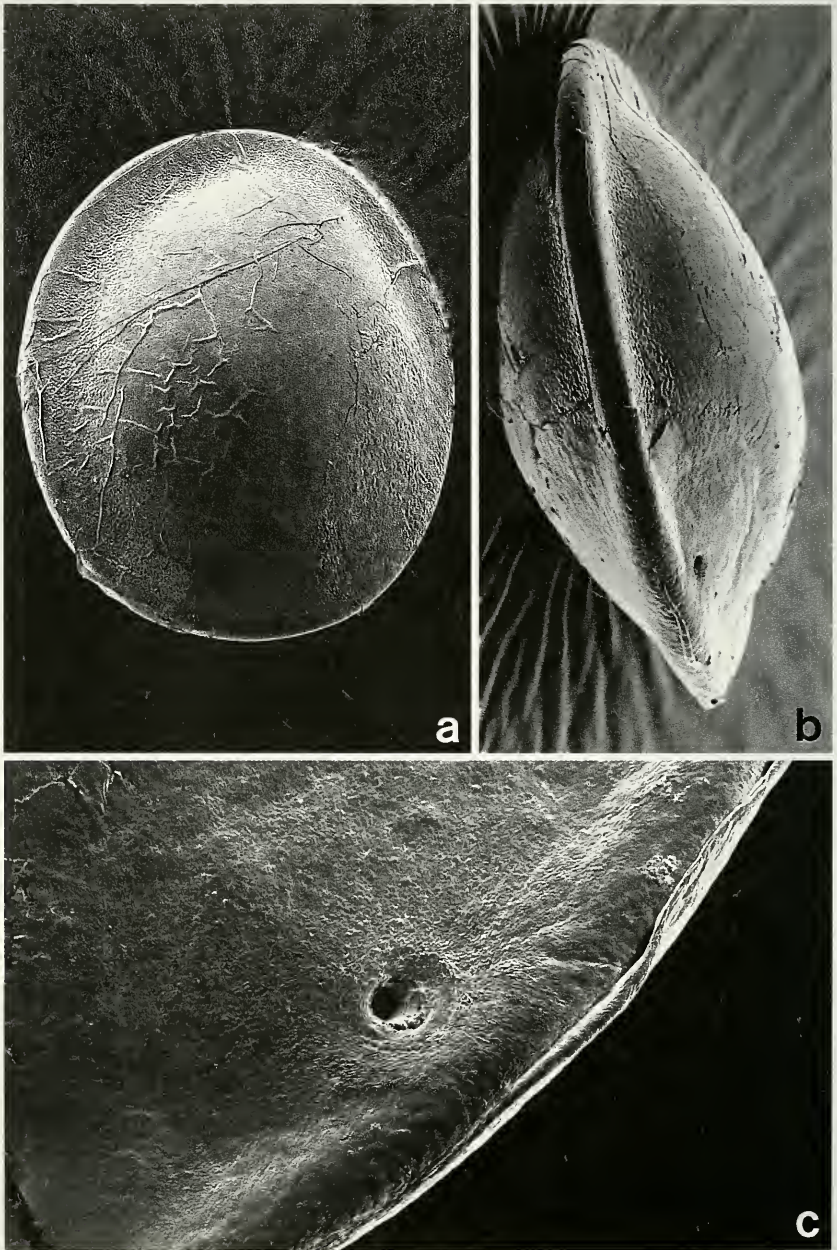


FIG. 10

Oeuf de *Ch. edmundsi* sp. nov., de face (a), de profil (b) et détail de la région micropylaire (c).

constitué de rizières. Les larves creusent des trous horizontaux. La période d'émergence a lieu généralement entre la dernière semaine de mars et la première semaine d'avril, soit à la fin de la saison des pluies (fin de l'été austral).

Ch. edmundsi sp. nov. colonise plusieurs stations le long du Mangoro (Fig. 11). Le fleuve possède un débit moyen d'environ $90 \text{ m}^3 \cdot \text{s}^{-1}$. L'environnement est constitué par une forêt pluviale dégradée ("savoka"). Les larves colonisent les berges dans une zone à écoulement laminaire située entre deux rapides. Les trous sont creusés horizontalement. La période d'émergence se déroule entre la fin du mois d'avril et le début du mois de mai, soit au début de la saison sèche (automne austral).

Ch. laurencae sp. nov. a été découverte sur plusieurs stations le long de la Sahatandra (bassin du Rianila) (Fig. 11). Contrairement aux deux autres rivières, celle-ci est nettement plus petite, avec un débit moyen inférieur à $5 \text{ m}^3 \cdot \text{s}^{-1}$. L'environnement est constitué par une forêt pluviale primaire. Les larves creusent des trous horizontaux. La période d'émergence a lieu à la fin du mois de septembre, soit vers la fin de la saison sèche (printemps austral).

Le genre *Cheirogenesia* est relativement répandu à Madagascar (Fig. 11). A ce jour, une vingtaine de localités sont connues, tant sur les bassins de la côte ouest que ceux de la côte est. Les altitudes des stations de récolte de ce genre varient du niveau de la mer à 1300 m. Pour la majorité d'entre elles, nous ne possédons que des larves. Dans certaines stations, elles ne creusent pas leurs trous horizontalement, mais verticalement, à la manière des *Eatonica* (Ephemeridae). Les deux comportements sont parfois visibles dans la même station. Il ne nous est pas encore possible de dire si ces comportements reflètent des différences taxinomiques ou si elles ne sont que l'expression des potentialités de colonisation d'une même espèce. Néanmoins, au vu du fort taux d'endémicité par bassin observé chez les Ephéméroptères malgaches, il est probable que plusieurs de ces populations appartiennent à des espèces différentes de celles décrites dans le présent travail.

COMPORTEMENT

Pour les trois espèces présentées dans ce travail, le comportement des stades ailés est le même. Les émergences ont lieu tôt le matin. Les premiers individus sortent de l'eau environ une heure et demie avant le lever du soleil, soit aux environs de 4h30. Il est très difficile dans ces conditions de pouvoir observer convenablement cette première phase. Les subimagos mâles muent sur l'eau, immédiatement après la remontée de la larve à la surface. Il est possible que l'émergence des larves se fasse sous l'eau. Ce qui est certain, c'est que nous n'avons jamais capturé de subimagos mâles! Le fait que les mâles passent par ce stade est prouvé par la présence d'exuvies subimaginale à la surface de l'eau.

Comme pour les autres Palingeniidae, les femelles restent au stade subimaginal. L'extrême brièveté du stade subimaginal des mâles fait que les émergences sont synchrones. Il n'y a pas de phénomène de protandrie comme chez *Palingenia longicauda* par exemple (LANDOLT *et al.*, 1995).



FIG. 11

Cartes de distribution des espèces de *Cheirogenesia* à Madagascar: A: stations prospectées, B: stations à *Cheirogenesia* spp., C: ● *Ch. decaryi* sp. nov., ■ *Ch. edmundsi* sp. nov., ◆ *Ch. laurenceae* sp. nov.

Le maximum d'émergence a lieu aux alentours de 5h00. Les accouplements se déroulent immédiatement et la ponte suit tout de suite. L'apogée de l'activité de reproduction est atteinte entre 5h15 et 5h30. Dès ce moment, le nombre d'individus diminue et au lever du jour, vers 6h00, il ne reste presque plus d'individus sur l'eau.

Dans les grandes lignes, l'activité de reproduction de *Cheirogenesia* est semblable à ce que l'on connaît des autres Palingeniidae. La différence fondamentale est que dans ce genre, ni les mâles ni les femelles ne volent. Ces insectes se déplacent tels des hydroglisseurs à la surface de l'eau, et sont incapables de quitter l'interface eau-air. Tous les individus jetés en l'air sont incapables de supporter leur propre poids et retombent à la surface de l'eau. L'étude de cette adaptation unique chez les Ephéméroptères, ainsi que ses causes et conséquences, fait l'objet d'une étude séparée (RUFFIEUX *et al.*, 1998). La microendémicité marquée des *Cheirogenesia* est très certainement une conséquence de la perte du vol des adultes; il devient en effet impossible à ces insectes de passer d'un bassin à l'autre.

REMERCIEMENTS

Nos remerciements s'adressent au Dr Jean Legrand (MNHN de Paris) pour avoir mis à notre disposition l'holotype de *Ch. decaryi*. La plupart des dessins sont l'oeuvre de Christophe Roulet. Les photographies au microscope électronique à balayage ont été réalisées au Centre de Microscopie Electronique de l'Université de Lausanne par Geneviève L'Eplattenier.

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Hyphessobrycon wajat n. sp. from La Plata basin in Argentina (Characiformes: Characidae)

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***Hyphessobrycon wajat* n. sp. from La Plata basin in Argentina (Characiformes: Characidae).** - *Hyphessobrycon wajat*, a new species is described from the río Paraná basin in Argentina. This species can be distinguished from its congeners by the following combination of characters: dorsal fin with a black spot, first two dorsal rays with their basal half dusky black, rays 4 to 8 and membranes completely black. Presence of a triangular caudal spot, covering all the base of the caudal fin rays, reaching symmetrically the end of the fin along its central rays. Three to five teeth on the maxilla. Two to four tricuspid teeth on the outer series of the premaxilla. Males lacking hooks on pelvic fins. Low body depth, between 22.8 and 28.8% of standard length.

Key-words: Characiformes - Characidae - *Hyphessobrycon* - new species.

INTRODUCTION

The genus *Hyphessobrycon* is a very speciose taxon within the family Characidae. There are about 70 nominal species, most of them living in the Amazonian basin (GÉRY 1977). Nineteen species were described from La Plata basin and South East Brazil (GÉRY 1977; RINGUELET *et al.* 1978; MIQUELARENA *et al.* 1980; WEITZMAN 1985; MAHNERT & GÉRY 1987; UJ & GÉRY 1989). The aim of this paper is to describe a new species from La Plata basin in Argentina.

MATERIAL AND METHODS

Methods for counts and measurements follow FINK & WEITZMAN (1974) except where noted. Measurements were taken with a dial calliper reading 0.02 mm.

Cleared and stained (C&S) specimens were dissected under a WILD M-5 stereomicroscope, cleared in a buffered trypsin solution and stained following the procedures of TAYLOR & VAN DYKE (1985).

Total vertebral count, taken in cleared and stained specimens includes all vertebrae of the Weberian apparatus, and the fused PU_1+U_1 of the caudal skeleton counted as one vertebra.

The examined material is deposited in MLP (Departamento Científico Zoología Vertebrados, Museo de La Plata, Argentina) and in MHNG (Muséum d'histoire naturelle, Genève, Switzerland).

COMPARATIVE MATERIAL (standard length, SL): *Hyphessobrycon anisitsi*; JRC pers. collection, 1 ex., 36.7 mm SL, (C&S), Argentina, Entre Ríos province, río Uruguay basin, Arroyo Marmol, between Colón and Ubajay. *Hyphessobrycon arianae*; MHNG 2412.79 (holotype), 1 ex. 22.7 mm SL, Paraguay, Dept. Caaguazu, río Güyrau-gua, affl. of the río Monday, 3 km East of Juan Frutos. MHNG 2412.80-81 (paratypes), 12 exs. 17.6-23.6 mm SL, (2 exs. C&S), same locality as holotype. *Hyphessobrycon cf. bifasciatus*; MLP 8408, 1 ex. 34.4 mm SL, Argentina, Corrientes province, pond in road Bella Vista-San Roque. MLP 8409, 1 ex., 30.8 mm SL, Argentina, Corrientes province, Arroyo Batel. *Hyphessobrycon eques*; MLP 8999, 3 exs., 23.3-27.9 mm SL, Argentina, Corrientes, río Santa Lucía, JRC pers. collection, 2 exs., 28.7-29.6 mm SL (C&S), Argentina, Corrientes province, Bella Vista, Riacho Carrizal. *Hyphessobrycon elachys*; MLP 6431, 3 exs., 16.0-20.0 mm SL, Argentina, Corrientes province, San Cosme. *Hyphessobrycon guarani*; MHNG 2366.99 (holotype), 1 ex. 29.8 mm SL, Paraguay, río Alto Paraná in Puerto Bertoni, Dept. Alto Paraná. MHNG 2366.100 (paratypes), 7 exs. 23.5 mm SL, (2 exs. C&S), same locality as holotype. *Hyphessobrycon luetkeni*; MLP 8796, 9 exs., 24.4-35.0 mm SL, Argentina, Formosa province, creek in the national road Formosa-Clorinda, 37 km far from Clorinda. MLP 6451, 13 exs., 14.2-21.6 mm SL, Argentina, Formosa province. *Hyphessobrycon meridionalis*; MLP 8407, 2 exs., 32.2-34.0 mm SL, Argentina, Corrientes province, pond in road Bella Vista-San Roque. JRC pers. collection, 3 exs., 33.0-40.9 mm SL (C&S), Argentina, Buenos Aires province, Berisso, Los Talas ponds. *Hyphessobrycon reticulatus*; MLP 8776, 3 exs., 30.0-36.8 mm SL, Argentina, Buenos Aires province, Delta del Paraná, Isla Talavera, Irigoyen Channel.

RESULTS

Hyphessobrycon wajat sp. n.

Fig. 1

HOLOTYPE: MLP 9321, 27.6 mm SL, Argentina, Corrientes province, Laguna Brava (58° 44' W-27° 33' S). November 1989, R.J. Fernandez.

PARATYPES: MLP 7853, 10 exs., 25.3-27.8 mm SL, Argentina, Chaco province, Resistencia city, río Negro (59° 00' W-27° 26' S). February 1965?, M. Galván. MLP 7875, 10 exs., 21.9-27.6 mm SL, Argentina, Chaco province, Resistencia city, Laguna Blanca (59° 00' W-27° 26' S). December 1965, M. Galván. MLP 9322, 5 exs., 29.2-31.0 mm SL, Argentina, Corrientes province, Laguna Iberá (57° 08' W-28° S). November 1997, A. Almirón & J. Casciotta. MHNG 2593.96, 5 exs., 28.5-30.0 mm SL, Argentina, Corrientes province, Laguna Iberá (57° 08' W-28° 31' S). November 1997, A. Almirón & J. Casciotta.

DIAGNOSIS

Hyphessobrycon wajat is distinguished from other species of *Hyphessobrycon* by the presence of a black spot on dorsal fin, first two dorsal rays with their basal dusky black, rays 4 to 8 and membranes completely black. A triangular caudal spot, covering all the base of the caudal fin rays, reaching symmetrically the end of the fin along its central rays. Three to five teeth on the maxilla. Two to four tricuspid teeth on the outer series of the premaxilla. Males lacking hooks on pelvic fins. Lower body depth, between 22.8 and 28.8% of SL.

DESCRIPTION

Morphometric values are given in table 1. Body elongate, laterally compressed. Greatest depth at pelvic fin origin. Predorsal body profile slightly convex. Body

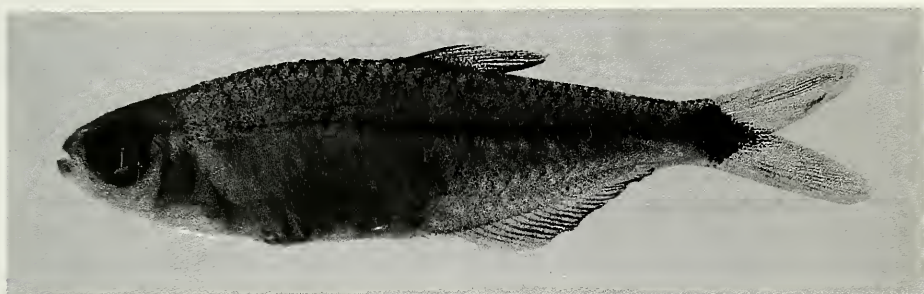


FIG. 1

Hyphessobrycon wajat, sp. n. holotype, MLP 9321, male, 27.6 mm SL; Argentina, Corrientes provinces, río Paraná basin, Laguna Brava.

profile along the dorsal fin base and posteriorly straight. Dorsal fin origin equidistant between the pelvic fin and the anal fin origins. Ventral body profile convex from snout tip to the pelvic fin origin, and almost straight from the latter point to the caudal fin base. Caudal peduncle slender. Head length less than 25% of the standard length, relatively deep, compressed. Eye large. Snout short, rounded, mouth terminal, tip of the snout slightly anterior to dentary. Third suborbital with its ventral margin in contact with the preopercular canal.

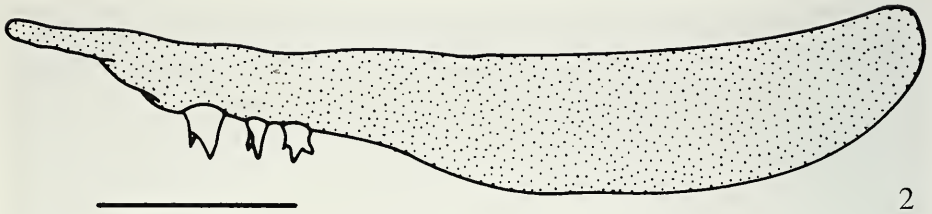
Maxilla slender, long, dorsal margin less curved than the ventral one (Fig. 2). Posterior tip of the maxilla surpasses the anterior margin of orbits. Maxilla with 3 to 5, usually 4 teeth. Maxillary teeth very small with one to three cusps. Premaxilla with

TABLE 1

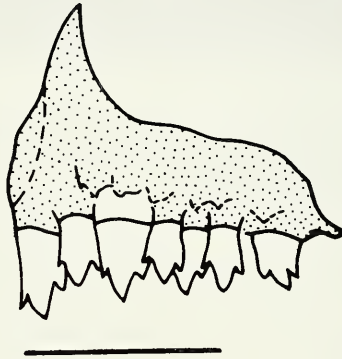
Morphometric characters of *Hyphessobrycon wajat*. Standard length is expressed in mm, measurements are percentages of standard length except the orbital diameter, snout length, and interorbital width, which are in percentage of head length. N: number of individuals; SD: standard deviation.

	Holotype	N	range	mean	SD
Standard length	27.6	20	21.9-27.6		
Body depth	27.1	20	22.8-28.8	26.5	1.46
Head length	23.5	20	22.2-25.1	23.7	0.80
Predorsal length	54.3	20	50.3-59.2	54.1	2.01
Caudal peduncle length	11.2	20	11.9-14.0	12.7	0.62
Caudal peduncle depth	10.1	20	8.2-10.4	9.5	0.46
Dorsal fin base	12.6	20	11.9-14.6	13.6	0.78
Anal fin base	33.3	20	29.5-36.0	32.5	1.49
Orbital diameter	38.4	20	38.1-47.4	41.2	2.43
Snout length	20.0	20	18.0-24.6	21.6	1.79
Interorbital width	30.7	20	29.5-37.2	33.8	2.44

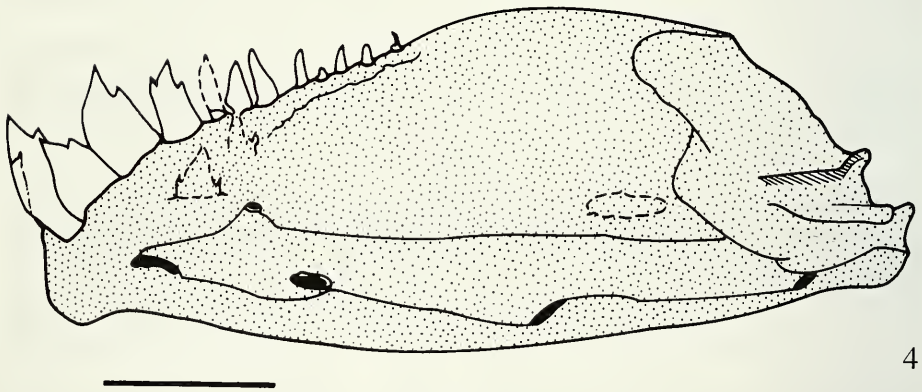
two tooth rows (Fig. 3). Inner premaxillary row with 4 to 5, usually 4 teeth. Teeth size bigger at the symphysis. Outer series bearing 2 to 4 teeth. Outer teeth about half the size of the inner ones. Both outer and inner teeth tricuspid, with the central cusp larger



2



3



4

FIGS 2-4

2. *Hyphessobrycon wajat*, sp. n. (MLP 7853), left maxilla, lateral view. Scale bar: 0.5 mm. 3. *Hyphessobrycon wajat*, sp. n. (MLP 7853), left premaxilla, lateral view. Scale bar: 0.5 mm. 4. *Hyphessobrycon wajat*, sp. n. (MLP 7853), left lower jaw, lateral view. Scale bar: 0.5 mm.

than the lateral ones. Dentary with 4 large tricuspid and 7 to 8 small unicuspid teeth (Fig. 4). Second teeth inserted anteriorly to the rest of the teeth of this series.

Dorsal fin rays ii, 8. Anal fin rays iii, 23 (4 exs. and the holotype), iii, 24 (15 exs.), iii, 25 (1 ex.). Last ray, which is divided, is counted as two. Anal fin with tiny hooks in males. Distal margin of anal fin straight in males, and concave in females. Pectoral fin rays i, 9 (8 exs.), i, 10 (11 exs.), i, 11 (1 ex. and holotype). Posterior tip of

pectoral fin reaching the pelvic fin origin. Pelvic fin rays i, 6 (15 exs. and the holotype), i, 7 (5 exs.). Pelvic fin without hooks in males. Posterior tip of the pelvic fin in males, longer than those of females. In males the tip of this fin reaches the first anal fin rays. Adipose fin present. Caudal fin rays i, 9/8, i (3 exs. C&S and the holotype). Caudal fin deeply forked, lower caudal fin lobe slightly longer than the dorsal one.

Scales 34 (6 exs. and the holotype), 35 (8 exs.), 36 (6 exs.) in lateral series. Seven to 10 (usually 8) perforated lateral line scales. Nine to 10 transverse scales from the dorsal fin to the anal fin origins.

Vertebrae counted only in cleared and stained specimens 35 (16+19, 1 ex.), 36 (16+20, 3 exs.).

Color in alcohol: Color description based on holotype unless otherwise noted (Fig. 1). Adult males and females with similar color pattern except for the dorsal, anal, and caudal fins which are more pigmented in males. Ground color pale yellow, nearly white.

Dorsally head, premaxilla, and anterior portion of lower jaw with many small dark chromatophores. Small dark chromatophores around the lower margin of orbit, extending anteriorly to the premaxilla.

Scales of the dorsal half of body bearing small chromatophores on their outer margin, forming a reticulate pattern above midline. Scattered chromatophores between anal fin base and midline, following myopsepta.

Narrow dark midlateral stripe extending from about the 5th scale of the lateral series to the caudal spot, chromatophores of this stripe larger than those of the rest of the body. Humeral spot somewhat ovoid, elongate dorso-ventrally, not well preserved in the holotype.

Pectoral fin with scattered chromatophores on the first rays. Pelvic fin hyaline.

Dorsal fin spot present, first two dorsal rays with their basal half dusky black, rays 4 to 8 and membranes completely black.

Anal fin dusky black, across 2/3 of its distal portion, from the 5th ray to the end of the fin. The remaining portion of the fin with scattered chromatophores.

Caudal spot symmetrical and conspicuous, formed by medium sized chromatophores. Caudal spot extended onto the base of the marginal caudal rays at the base. Posteriorly, on caudal fin, the spot is triangular, reaching the tip of the middle caudal rays.

Color in life: Dorsal half of body yellow, ventral one silvery. Pectoral and pelvic fins hyaline. Dorsal fin red bearing a black spot as described above. Anal fin red with the first six rays whitish, distal portion, from the 5th ray onwards black. Caudal fin red with a deeply black spot as described above.

ETYMOLOGY: The specific name *wajat* is derived from the Mataco-Mataguayo word "waját" meaning fish. The Matacos is one of the main ethnic groups inhabiting the North East of Argentina where some fishes of this species were collected.

DISTRIBUTION: This species is known from the río Paraná basin in Argentina (Fig. 5).

COMPARISON: Considering the artificial groups of GÉRY (1977) for the species of *HypheSSobrycon*, *H. wajat* should be compared with the following groups: 1- species



FIG. 5

Geographic distribution of *Hyphessobrycon wajat* sp. n. . Triangle: indicates type locality (Argentina, Corrientes province, río Paraná basin, Laguna Brava). Circle: indicates two localities, Chaco province, Resistencia city, río Negro and Laguna Blanca. Square: Corrientes province, Laguna Iberá.

with humeral and caudal spot and a suborbital in contact with the preopercular canal (group d). This group includes *Hyphessobrycon duragenys* and *Hyphessobrycon reticulatus*. *Hyphessobrycon wajat* differs from these species in having more anal fin rays. 2- species bearing caudal spot (group c), *H. wajat* differs from these species in having a black dorsal fin spot, absent in group c. 3- species having a black spot on the dorsal fin, such as the *Hyphessobrycon callistus* group (f); *H. wajat* can be distinguished from this group in having a caudal fin spot which is absent in the (f) group. 4- species included in the *H. compressus* group (g) (*H. compressus*, and *H. milleri*) are similar to *H. wajat* in having a dorsal fin spot, however this group has higher number of longitudinal scales (45 to 49 instead of 34-36 in *H. wajat*).

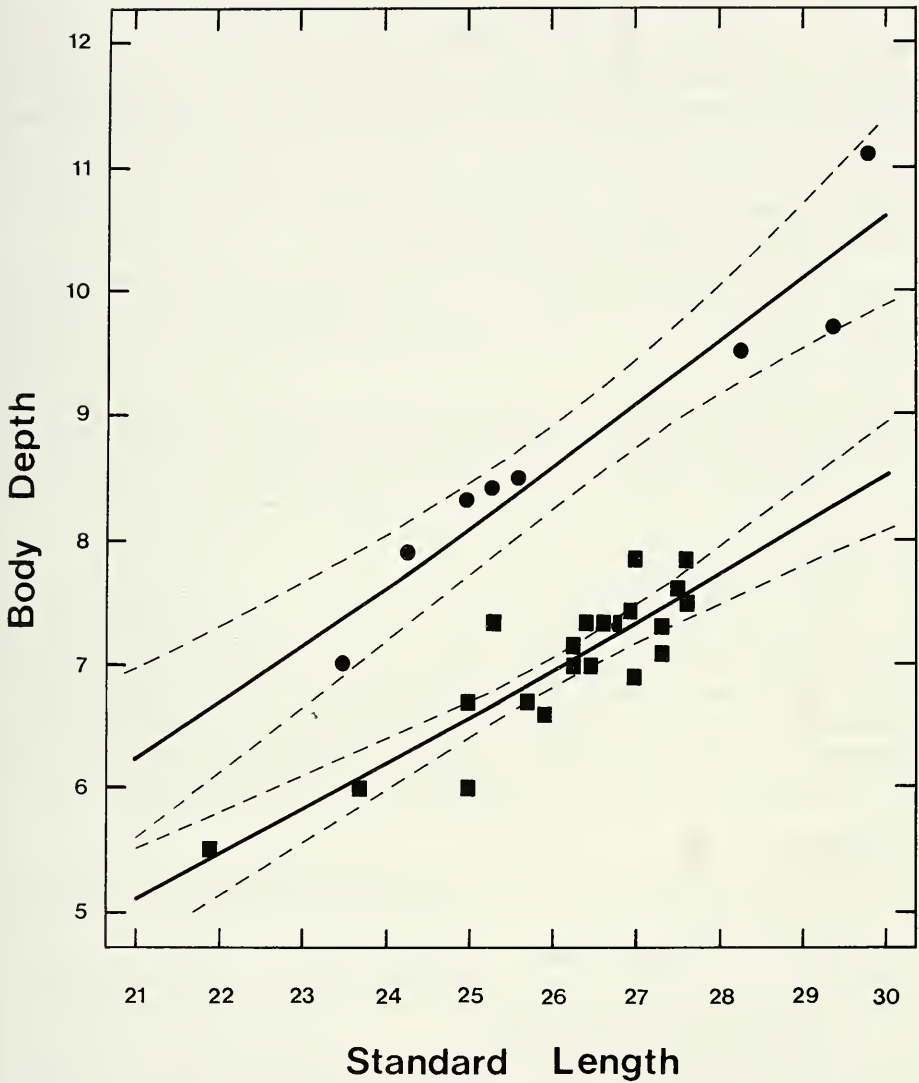


FIG. 6

Body depth as a function of SL for *H. wajat* sp. n. (squares) ($\ln Y = -2.73087 + 1.43248 \ln X$; $r = 0.897$) and *H. guarani* (circles) ($\ln Y = -2.72693 + 1.49641 \ln X$; $r = 0.957$).

Besides the species groups considered by GÉRY (1977) mentioned above, *H. wajat* should be compared with *H. guarani* described by Mahnert & Géry (1987) and *H. arianae* described by UJ & GÉRY (1989). *Hyphessobrycon wajat* is close to *H. guarani* in overall similarity. However *H. wajat* differs from *H. guarani* in the following character states. In *H. guarani* the caudal spot is asymmetrical and

restricted to the central rays extended from the base to the tip of the caudal fin. At the base of the caudal fin, the spot does not reach the marginal rays. In *H. wajat* the caudal spot is symmetrical and extended to the tip of the caudal fin. At the base of the caudal fin it includes the marginal rays. The dorsal fin spot in *H. guarani* is restricted to the base and tip of posterior rays, in *H. wajat* the dorsal spot includes the basal half of the two first rays and the whole 4 to 8 rays. A lower body depth, 3.4-4.1 in *H. wajat* versus 2.8-3.2 in *H. guarani* (Fig. 6). *Hyphessobrycon wajat* lacks hooks on the pelvic fin rays in males, present in *H. guarani*.

Hyphessobrycon wajat differs from *H. arianae* by the presence of great number of tricuspid maxillary teeth (3-5 instead of 1-2 teeth with 5 cusps in each tooth in *H. arianae*) and the greater number of anal-fin rays (26-30, vs 18-23 in *H. arianae*). *Hyphessobrycon wajat* has the second tooth in the dentary implanted forward, whereas all teeth in *H. arianae* are placed in the same line. *Hyphessobrycon wajat* lacks the pseudotympanum at humeral region present in *H. arianae*. The dorsal fin in *H. wajat* bears a black spot whereas in *H. arianae* the dorsal fin is uniformly grayish. *Hyphessobrycon wajat* has 19 to 20 caudal vertebrae instead of 17-18 in *H. arianae*.

ACKNOWLEDGEMENTS

We are grateful to S. Muller for the loan of *H. guarani* and *H. arianae* (Muséum d'histoire naturelle, Genève, Suisse). To M. Martinez (Museo de La Plata, La Plata, Argentina) who help us with the native specific name. To C. Tremouilles for help with the figures. To M. Azpelicueta (Museo de La Plata, La Plata, Argentina) for the critical review of the manuscript and S. Menu-Marque (Facultad de Ciencias Exactas y Naturales, Buenos Aires, Argentina) who kindly revised the English.

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***Troglocyclocheilus khammouanensis*, a new genus and species of cave fish from the Khammouan karst, Laos (Teleostei: Cyprinidae)**

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***Troglocyclocheilus khammouanensis*, a new genus and species of cave fish from the Khammouan karst, Laos (Teleostei: Cyprinidae).** - *Troglocyclocheilus khammouanensis*, new genus, new species, is distinguished by the absence of externally visible eyes, the presence of several rows of sensory papillae on the head, the shape of the mouth, lips and rostral fold, the slender and smooth last simple dorsal ray, and the lateral line scales with a notch on the posterior margin. Other southeast and east Asian cave cyprinids are discussed. The sensory function of the 'parietal processes' or 'parietal organs' of some species of *Sinocyclocheilus* (and its synonym *Gibbibarbus*) is doubted and an hydrodynamic function is hypothesized instead. The publication dates and authorship of *S. hyalinus*, *Protocobitis* and *P. typhlops* are discussed and lectotypes are designated for *S. hyalinus* and *P. typhlops*. *Barbus speleops* from Tham Phu Khieo, Thailand, belongs to the genus *Poropuntius* (nov. comb.).

Key-words: *Troglocyclocheilus* - cave fishes - taxonomy - *Sinocyclocheilus* - *Protocobitis*.

INTRODUCTION

Little information is available in the literature on Laotian fishes and by the end of 1995 only some 220 species were recorded in the scientific literature. Surveys conducted in 1996 and 1997 have increased this figure to about 360 and the total fish fauna of the country is expected to be around 500 species. Most of the earlier ichthyological activity focussed on the Mekong mainstream and there is little information on the Mekong tributaries. A significant exception is the just published survey of the Nam Theun and Xe Bangfai basins (KOTTELAT 1998). These basins include and are bordered by several limestone formations; lack of time, equipment and appropriate experience precluded their inclusion in the survey, although their potential as fish habitat was obvious.



FIG. 1

Map of the Khammouan karst northeast of Thakhek. Stippled: hills (corresponds approximately to area above 200-250 masl). 1. Tham Khoun Dôn; 2. Tham Houay Sai (resurgence); 3. Ban Phôndou; 4. Tham Kagnung; 5. Tham Houay Sai (sink).

Karst formations are widely distributed throughout Laos (FROMAGET 1927). The Khammouan karst (northeast of Thakhek, in Khammouan Province) is the most extensive one and has been the subject of most of the speleological investigations conducted in the country, even if these investigations are still quite limited (MOURET & VACQUIÉ 1993; BESSON *et al.*, sous presse; MOURET 1999). The Khammouane karst is made mainly of dolomites and dolomitic limestones dating to the late Palaeozoic (Devonian, Carboniferous, Permian). The summits of the hill ranges which make up this area have an average altitude of 600-800 m; the area seems to present a great number of swallow holes (pits perched on summits), most of them of very difficult access as a result of the very dissected tower-karst morphology. See MOURET *et al.* (1997: 6) for a geological map. Sinks and resurgences are numerous at the foot of the hills, and complete crossing from sinks to resurgences are common. These phenomenon have already been described in the earliest topographic surveys of Laos. CUPET (1900: 183) reports crossing the estimated 3 km [in fact 7.5 km] Nam Hin Boun tunnel in a canoe; he also mentions the underground course of the Xe Bangfai (p. 191). These two tunnels and others have been explored by Macey in March 1905 (MACEY 1908) and more recently between 1994 and 1997 (MOURET *et al.* 1994, 1996, 1997) (for aerial photographs of the entrance and resurgence, see KOTTELAT 1998: fig. 2a-c). Some of these tunnels are still the normal way to access some villages located in the interior of the karstic area (e.g. Ban Na polje). Noteworthy is that the succession of three tunnels on the lower Nam Kading reported by MACEY and which he estimated to represent about 7 km of subterranean river course, do not appear on the recent 1:100000 topographical maps.

The resurgence of the Nam Dôn is located at the southwestern edge of the Khammouan karst, near Ban Phôngou (Fig. 1). The resurgence itself ends after a few meters at a sump (a flooded passage) but a cave a couple meters away (Tham Khoun Dôn) is connected with the resurgence and allowed the exploration of more than 3 km of passages. Tham Khoun Dôn and the nearby Tham Houay Sai resurgences are the assumed resurgences of the waters of the Ban Vieng polje on the northeast, probably exiting the polje mainly through the Tham Kagnung and Tham Houay Sai sinks (note, a sink and a resurgence have the same name, but are distinct cavities; see Fig. 1). The distance between the sinks and the resurgences is about 7 km. This system has been studied in 1996-97 by a French team (mainly C. Mouret, F. Brouquisse and J.-F. Vacquié) who has surveyed about 8 km of passages. Cave divers (F. Auber, F. Bréhier, A. Espinasse, D. Sablé) explored the Nam Dôn resurgence itself in February 1998 for about 270 m. Blind cave fishes were found 150 m from the entrance, at a depth of 23 m.

This paper reports the discovery of the first cave fish from this formation and from Laotian waters. Future exploration will undoubtedly result in the discovery of several more species in the extensive limestone formations of the country.

MATERIAL AND METHODS

Methods for counts and measurements follow KOTTELAT (1984a, 1990). Toponymy and spelling follows the 1983 1:100,000 E48-90 Lao P. D. R. topographic map, on which Figure 1 is based. Co-ordinates were obtained from these maps. Abbre-

viations used are: NRM, Swedish Museum of Natural History, Stockholm; CMK, collection of first author; SL, standard length. Vertebrae are divided into preanal and caudal vertebrae; caudal vertebrae are those whose haemal spine is posterior to the anteriormost anal-fin pterygiophore.

Troglocyclocheilus n. gen.

Type species. *Troglocyclocheilus khammouanensis*, new species.

DIAGNOSIS. *Troglocyclocheilus* is distinguished from all genera of cyprinid fishes known from southeast Asia by the combination of the following characters: absence of externally visible eyes; several rows of sensory papillae on lateral and dorsal sides of head; mouth horse-shoe shaped, with thin and smooth lips, post-labial groove interrupted medially; articulation of lower jaw salient and in contact with its homolog of the other side of body (Fig. 2); last simple dorsal ray slender and smooth; posterior margin of lateral line scales with a notch (Fig. 3).

ETYMOLOGY. From the Greek trogle, hole, and *Cyclocheilus*, a generic name proposed for cyprinid fishes with which this genus is supposedly related (a name erroneously considered preoccupied and subsequently replaced by *Cyclocheilichthys*). Gender masculine.

Troglocyclocheilus khammouanensis n. sp.

Figs 2-4

HOLOTYPE. NRM 42535, 40.3 mm SL; Laos: Khammouan Prov.: Khoung Nam Dôn, resurgence of Nam Dôn [stream] near Ban Phôndou [village]; 17°33'50"N 104°52'20"E; F. Bréhier, 24 February 1998.

DIAGNOSIS. See generic diagnosis.

DESCRIPTION. General appearance is shown in Figure 4. Morphometric data of holotype, in percents of SL: total length 131.8; head length 31.0; predorsal length 51.6; prepelvic length 52.6; preanal length 73.7; head depth 15.9; body depth 18.9; depth of caudal peduncle 11.7; length of caudal peduncle 16.9; body width 13.9; length of dorsal-fin base 24.8; depth of anal fin 21.3; length of pelvic fin 17.4; length of pectoral fin 19.1; length of upper caudal-fin lobe 24.8; length of median caudal rays 14.1; length of lower caudal-fin lobe 32.3.

Fins not very well preserved and most membranes damaged. Dorsal fin with 4 simple and 8 branched rays, last one split to the base; last simple ray slender and not serrated posteriorly; distal edge concave. Pectoral fin pointed or falcate, with 1 simple and 14 branched rays. Pelvic fin pointed, with 1 simple and 8 branched rays; axillary scale present but not conspicuously different from or larger than other scales; origin at vertical of 2nd branched dorsal ray and 13th lateral line scale. Anus separated from anal-fin origin by 2 or 3 irregularly set scales. Anal with 3 simple and 5 branched rays, last one split to the base; distal edge concave. Caudal fin forked, with 10+9 principal rays, 9+8 being branched; 9 upper rudimentary rays and 8 lower.

Body entirely scaled, scales in predorsal area and on belly conspicuously smaller than on flank and organised in somewhat irregular rows. 36+2 scales along lateral line, about 20 predorsal scales, $1/25/1/8^{1/2}$ scales in transverse line, $1/24/1/3^{1/2}$ scales in transverse line on caudal peduncle, 4 scales between lateral line and pelvic origin. Lateral line pore at the apex of a notch along posterior margin of scale. Lateral line canals simple. No scale sheath at anal- and dorsal-fin base. Apparently, several rows of sensory papillae on dorsal and lateral sides of head, and possibly on skin folds on throat (due to the fixation, rows of papillae are poorly preserved; the approximate position and organisation of those tentatively recognised is shown in Fig. 2).

No tubercles on snout. Mouth horse-shoe shaped, with slender and continuous lips. Postlabial groove interrupted medially. Deep rostral groove. Rostral fold with a median part and a large lateral fold on each side of jaw. Two pairs of small barbels, one in the rostral groove immediately in front of corner of mouth, one (very slender) immediately in front of lateral part of rostral fold. Symphyseal knob on lower jaw. Articulation of lower jaw salient and adjacent to its homolog of the other half of body. 4+14 outer gill-rakers on right anterior gill arch. Pharyngeal teeth 5,3,2; all but one teeth were no longer attached to bone when examined; the formula is based on teeth sockets and the number of teeth recovered in the connecting tissues.

Vertebrae: 21 preanal + 14 caudal.

ETYMOLOGY. Named for the Khammouan limestone formation.

HABITAT AND FIELD OBSERVATIONS. FB observed 4 or 5 fish all about the size of the holotype while diving, about 150 m from the entrance of the Nam Dôn resurgence and under 23 m of water. The fish were immediately above the substrate (blocks and clay). They were swimming about 50 cm above the bottom, hiding near the bottom when disturbed; they were moving swiftly, but only for short distances, about 50-100 cm. A second dive was organised in order to catch them. It was late and time was only available to catch a single specimen. The next day the team was due to move to another area and it was not possible to obtain additional specimens. The species has not been seen in any other siphons (turbid water, too great distance from bottom, etc.). Shrimps were also present; they apparently have normally developed eyes.

Troglocyclocheilus khammouanensis is apparently known to the local fishermen who report catching it in their nets in July when floods flush them from the cave(s). They reportedly call it "paa kham khong" ("fish which crosses the streams"). Villagers in Ban Thônglôm (18°00'40"N 104°24'50"E) and Ban Khen (18°04'20"N 104°27'10"E) also report occasionally collecting blind cave fishes in the Nam Hinboun during the wet season; this may refer to the present species and/or other species. The presence of other hypogean species is expected in this area.

In an adjacent resurgence of the same system (Tham Houay Sai, also near Ban Phôndou, 17°33'40"N 104°52'50"E), J. Lordon collected *Chela laubuca* (Hamilton, 1822) in a lake about 800 m from the cave entrance (CMK 14418).

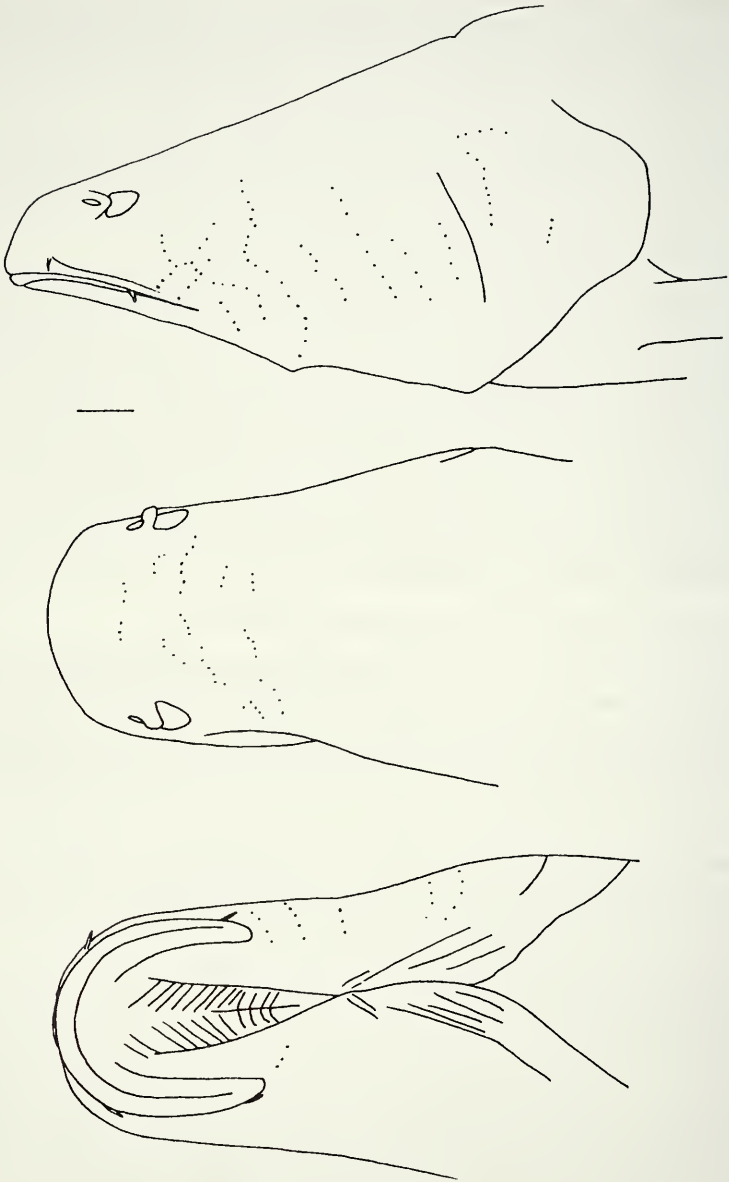


FIG. 2

Troglodyclocheilus khammouanensis, NRM 42535, 40.3 mm SL. Head in dorsal, lateral and ventral view, showing approximate position of rows of papillae. Scale bar 1 mm.

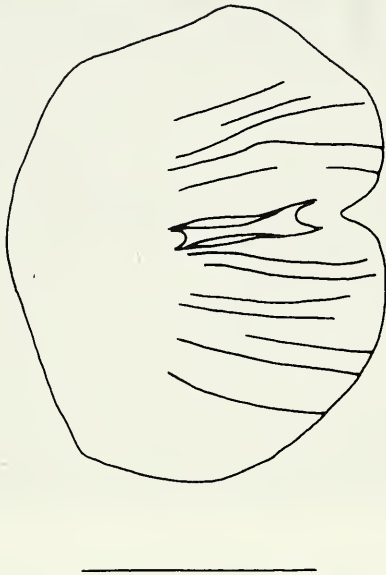


FIG. 3

Troglodyclocheilus khammouanensis, NRM 42535, 40.3 mm SL; lateral line scale, right side, under dorsal-fin origin. Scale bar 1 mm.

DISCUSSION

A phylogenetic analysis of the Cyprinidae is not yet available and with a single available specimen which cannot be dissected and the scarcity of both data and phylogenetic hypotheses supported by data, it is obviously premature to further discuss the relationships of *Troglodyclocheilus*.

Troglodyclocheilus shares a number of characters with *Cyclocheilichthys*: rows of sensory papillae on head; mouth horse-shoe shaped, with thin and smooth lips, postlabial groove interrupted medially; articulation of lower jaw salient and adjacent to its homolog of the other side of body; rostral fold with a median part and a large lateral fold on each side of jaw; one slender barbel (not always present in *Cyclocheilichthys*) immediately in front of lateral rostral fold and one in the rostral groove immediately in front of corner of corner of mouth.

Beside the absence of externally visible eyes, *Troglodyclocheilus* is distinguished from *Cyclocheilichthys* in having the last simple dorsal ray slender and smooth (vs. bony and serrated posteriorly), a more slender body (body depth 18.9% SL, vs. 25-46; SONTIRAT 1976: table 12), absence of anal and dorsal-fin sheath scales (vs. presence), scales on predorsal area and belly smaller than those on flank and organised

in somewhat irregular rows (vs. not conspicuously distinct from those on the flank), posterior margin of lateral line scales with a notch (vs. rounded or slightly concave), and head papillae organised in a few irregular and widely set rows (vs. regular and very closely set rows). Most or possibly all these character states could possibly be considered as adaptations to the cave environment, but there is no reason, with the available data, to assume that *Troglocyclocheilus* is derived from a *Cyclocheilichthys* ancestor (which would mean that *T. khammouanensis* should be treated as a species of *Cyclocheilichthys*). There is no reason to support this hypothesis rather than another. The main diagnostic character of *Cyclocheilichthys* is the presence of numerous closely-set rows of papillae on almost the whole surface of the head. In *Troglocyclocheilus*, the pattern of the rows of papillae is much less complex, the individual papillae are larger and the rows more widely spaced. A reversal of the complexity of the sensory papillae from the state observed in *Cyclocheilichthys* to that of *Troglocyclocheilus* would seem surprising in a cave environment as, on the contrary, one would expect that a complex sensory papillae pattern could be an advantage for a blind cave fish. The advantages (if any) of having a notched lateral line scales is unknown, but it is tempting to imagine that somehow this affects the efficiency of the lateral line system, which again would be a clear advantage for a blind cave fish. Therefore, we prefer to hypothesize that while *Troglocyclocheilus* is possibly related to *Cyclocheilichthys*, its immediate relationships are not with *Cyclocheilichthys* but with some other lineage. Cephalic sensory papillae apparently appeared in several cyprinid lineages, or they secondarily disappeared in several lineages; in several genera they are known only in juveniles (see below). With some 30 taxa new to science out of 162 collected in a one month survey in the surface waters in the immediate vicinity of the type locality (KOTTELAT 1998) and with the total documented Laotian fish fauna rising from about 220 to 360 between March 1996 and June 1997 (KOTTELAT, unpublished), the potential to discover an extant epigean ancestor to *Troglocyclocheilus* is still real.

Rows of sensory papillae are known in adults of a few genera of southeast Asian cyprinids. They are easier to observe in formalin fixed specimens; in alcohol fixed specimens (like the holotype of *T. khammouanensis*), it is more difficult to observe and describe them with accuracy. In *Cyclocheilichthys* and *Neobarynotus*, most of the head is covered by very closely set and regular rows of papillae while in *Troglocyclocheilus* the rows are irregular and widely spaced. In juveniles of *C. repasson* about 40 mm SL, the rows of papillae are less numerous and the space between them is wider than in adults; it is possible that in larger specimens of *Troglocyclocheilus* the number of rows of papillae could increase too. In *Eirmotus* and *Oreichthys* there are only a few rows of papillae, but these genera are distinguished in having fewer scales in lateral row (19-23, vs. 36+2 in *Troglocyclocheilus*), an incomplete lateral line (vs. complete). In addition, *Eirmotus* has a serrated last simple dorsal ray (vs. smooth) and *Oreichthys* has (at least in large individuals of some populations) a vertical row of up to 5 pores on the anterior scales of the flank (vs. absence).

Although missing in adults, rows of papillae are present in juveniles of *Tor* and *Neolissochilus* and probably in several other genera (juvenile material of many genera

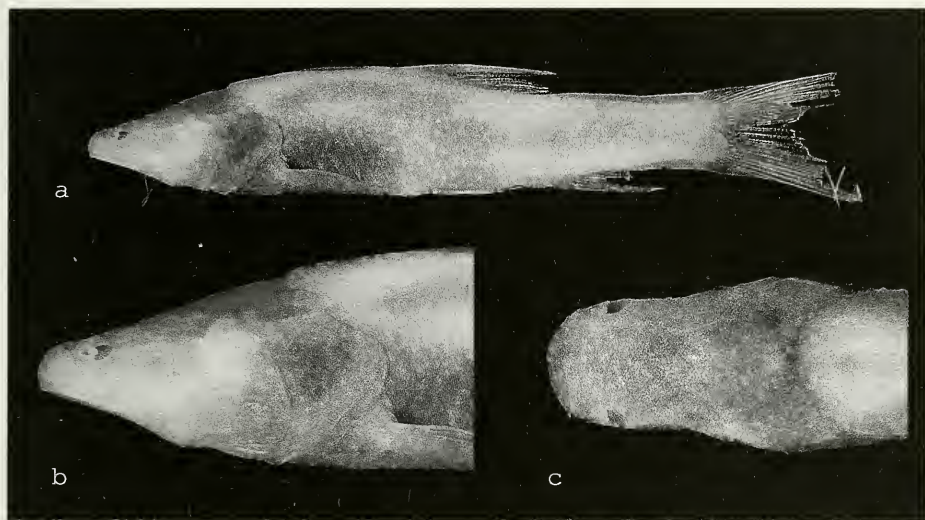


FIG. 4

Troglodyclocheilus khammouanensis. NRM 42535, holotype, 40.3 mm SL.



FIG. 5

Laos: Khammouan Prov.: Khoung Nam Dôn, resurgence of Nam Dôn near Ban Phôngdou; 24 February 1998 (Photograph by André Espinasse).

is not available to check this character). *Tor* and *Neolissochilus* share with *Troglocyclocheilus* the smooth last simple dorsal ray, but are easily distinguished by the shape, position and structure of the lips (fleshy and often with median lobes, vs. thin and without lobe), snout (fleshy and usually projecting, vs. not projecting), rostral fold (without, vs. with lateral folds), and scales (large scales, less than 30 in lateral line in most species, lateral line scales not notched, vs. smaller scales, 36+2 in lateral line, lateral line scales with a notch along posterior margin). Rows of sensory papillae are also known in South Asian and African cyprinids.

Rows of papillae have also been reported in *Sinocyclocheilus* Fang, 1936 a genus known only from the Yangtze basin in China. The genus is of interest as it includes a number of hypogean species (see brief synopsis in CHEN & YANG 1993) but the sensory papillae are neither mentioned in the English text of the original description nor shown on the figures of the hypogean species: *S. angularis* Zheng & Wang, 1990, *S. microphthalmus* Li, 1989, *S. hyalinus* Chen & Yang, 1993, *S. anatirostris* Lin & Luo, 1986 and *S. anophthalmus* Chen & Chu (in CHEN *et al.* 1988) and it is not known whether they are effectively missing. *Gibbibarbus cyphotergus* Dai, 1988 is apparently a species of *Sinocyclocheilus*; the original description mentions and figures the sensory pores, but does not mention how this genus would differ from the very similar looking *Sinocyclocheilus*.

(*A note on nomenclature*: The original description of *S. hyalinus* is usually given as authored by Chen & Yang, in CHEN *et al.* 1994. In fact, the name is already mentioned in CHEN & YANG [1993], accompanied by a list of characters, especially in Table 2. This satisfies the conditions of arts. 10-13 of the International Code of Zoological Nomenclature and makes the name available from CHEN & YANG [1993: 123]. Similarly, the names *Protocobitis* and *P. typhlops* are available from YANG & CHEN [1993: 125] in the same volume and not from YANG *et al.* [1994: 92, 93]. CHEN & YANG [1993] did not designate a holotype for *S. hyalinus*, so that all specimens used for their account are syntypes; they did not list the specimens used, but this account is derived from the CHEN *et al.* [1994] description, thus the specimens listed in CHEN *et al.* [1994] as holotype and paratypes are syntypes. Specimen KIZ [Kunming Institute of Zoology] 916001 cannot be holotype as the holotype should be designated in the original description. In order to ensure stability, KIZ 916001 is here designated as lectotype of *S. hyalinus*. The same reasoning applies to *P. typhlops* which is available from the YANG & CHEN [1993] account in which 7 specimens are listed but none designated as holotypes. Thus these 7 specimens are syntypes and, KIZ 9180001, listed as holotype by YANG *et al.* [1994], has no holotype status. KIZ 9180001 is here designated as lectotype).

Sinocyclocheilus is distinguished from *Troglocyclocheilus* in having more scales along lateral line (61-84 [some cave species are naked], vs. 36+2), lateral line scales with an entire margin (vs. notched), and an osseous and serrated last simple dorsal ray (vs. slender and smooth). *Troglocyclocheilus* has a small dorsal hump immediately behind the head, and, if the holotype were a juvenile, this hump could be much more conspicuous in larger specimens, possibly paralleling the development

observed in some *Sinocyclocheilus*. Such humps are known in a variety of cypriniforms, e.g. *Gila cypha* and *Xyrauchen texanus* from the Colorado River; several *Puntius* of Mindanao (see HERRE 1924: pls. 1-2; WOODS 1968) and seem to have an hydrodynamic function and to be an adaptation to fast flowing waters. MILLER (1946: 415) commented that "the action of the current against the prominent nape tends to force the fish down toward the bottom or the sides, where the flow is not so torrential as in midwater".

Several species of *Sinocyclocheilus* have what Chinese authors (ZHENG & WANG 1990; CHEN & YANG 1993) have called "parietal process", "parietal projection" or "parietal organ". LIN & LUO (1986: 381) report "frontal processes". CHEN & YANG noted that "the more specialized the species, the more developed the parietal projection, and by contrast the more reduced the other sense organs" and concluded that the "parietal projections" have a sensory function. This hypothesis suffers from serious shortcomings: it has not been demonstrated that the projections are homologous in all species; it has not been unambiguously demonstrated that the projections are processes of the parietal bones; and there is no histological data to indicate a sensory function. As these projections are always associated with a conspicuous dorsal hump, we hypothesize that, as the hump, they have an hydrodynamic function. Another evolutive advantage of the hump and projections could be to prevent the fish from entering too small cavities into which they might become wedged.

Projections in similar position are also observed in other (epigeal) fishes, like the acanthurid genus *Naso* La Cèpède, 1802 and males of the family Kurtidae. The function is not known in *Naso* (in one species the projections are known only in males), but in Kurtidae the process is used to hold the eggs.

Poropuntius speleops (Roberts, 1991) nov. comb.

A single other species of hypogean cyprinid has been described from mainland southeast Asia, *Barbus speleops* Roberts, 1991. The generic position of this species has not been addressed in the original description, the author flatly stating "[the species'] phyletic relationships to surface dwelling forms is unknown, and therefore it is assigned arbitrarily to the barbine type genus *Barbus*". *Barbus*, as presently understood, being restricted to Europe, North Africa and southwestern Asia, this decision is hardly understandable. ROBERTS (1991: 107) reported that some tubules of the lateral line have one or two short ventero-posteriorly directed branches, a character diagnostic for *Poropuntius* and some species of *Cyclocheilichthys* (*C. enoplos*, *C. furcatus*; see SONTIRAT 1976) and *Cosmochilus* (*C. harmandi*; see DURAND 1940: 10, pl. 3; KOTTELAT 1984b: 799, fig. 2). The absence of cephalic sensory papillae and the head morphology exclude inclusion of *B. speleops* in *Cyclocheilichthys*; the absence of papillae on lips and the overall appearance exclude inclusion in *Cosmochilus*. ROBERTS (1991) also reports the presence of melanopores which are probable vestiges of upper and lower marginal stripes on the caudal fin. Such stripes are present in several genera of cyprinids, but they are especially conspicuous and diagnostic in *Poropuntius*, *Hampala* and in some species of *Barbodes* and *Garra*. All but *Poropuntius* have simple

(unbranched) lateral line tubules. The absence of the adhesive disc excludes inclusion of *B. speleops* in *Garra*; the overall appearance, especially the slender body, excludes inclusion in *Barbodes*; and the small mouth (not reaching vertical of front margin of eye) and the overall appearance exclude inclusion in *Hampala*. None of the characters listed by ROBERTS disagrees with what is presently known of *Poropuntius* species and we consider *B. speleops* as a species of *Poropuntius*. Apparently, a single species of *Poropuntius* is presently recorded from the Mae Nam Mun basin (in which Tham Phu Khieo, the type locality of *P. speleops* is located), and this species is identified as *P. laoensis* (see KOTTELAT 1998: 48, for diagnosis and illustration). Several other species of *Poropuntius* have been collected in the Mekong basin in Laos and one may expect that more than one species occur (occured) in the Mae Nam Mun basin.

The title of the original description of *P. speleops* explicitly describes the fish as blind, but the eyes are present (although apparently vestigial in adults) and no information is provided which could permit to comment on the functionality of the eyes. It seems thus inappropriate or premature to describe this fish as blind (unable to see).

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**A revision of the *Scopaeus debilis* species group,
with description of a new species from Madagascar
(Coleoptera, Staphylinidae, Paederinae)**

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**A revision of the *Scopaeus debilis* species group, with description of a
new species from Madagascar (Coleoptera, Staphylinidae, Paederinae).**

- The *S. debilis* species group is defined. It comprises five species in the Old World, which are diagnosed with external morphological, genital and meristic characters, and for which distributional patterns are provided: *S. debilis* Hochhuth, *S. filiformis* Wollaston, *S. madagascarensis* sp. n., *S. mendosus* Fagel and *S. udus* Fagel. Seven new synonymies are established: *Scopaeus afghanicus* Scheerpeltz, *S. boops* Scheerpeltz, *S. ibericus* Coiffait = *S. debilis* Hochhuth, *Scopaeus richteri* Scheerpeltz, *S. schaeuffelei* Scheerpeltz, *S. schremmeri* Scheerpeltz, *S. tenuis* Eppelsheim = *S. filiformis* Wollaston. Lectotypes are designated for *Scopaeus filiformis* Wollaston, *S. infirmus* Erichson [= *Luzea infirma* (Erichson)], *S. richteri* Scheerpeltz, *S. schaeuffelei* Scheerpeltz, *S. schremmeri* Scheerpeltz, *S. scitulus* Baudi and *S. tenuis* Eppelsheim.

Key-words: Staphylinidae - Paederinae - *Scopaeus debilis* species group - West Palaearctic region - Afrotropical region - Oriental region - taxonomy - distribution.

INTRODUCTION

«Qu'est le *Scopaeus debilis* Hochhuth?» FAGEL (1959) asked in a contribution on this old species, which HOCHHUTH (1851) described from Armenia, and which according to earlier authors (e.g. BERNHAUER & SCHUBERT 1910; FAUVEL 1878, 1902; SCHEERPELTZ 1933) should be distributed widely across the West Palaearctic region and even in the Cape Verde Islands. Moreover, judging from specimens, which were determined by well-known specialists but not published, *S. debilis* was supposed to occur throughout Africa and Asia and even in Argentina (FAGEL 1959). The truth is that *S. debilis* has been confused with similar species, and BERNHAUER & SCHUBERT (1910) and SCHEERPELTZ (1933) in the Coleopterorum Catalogus considered both *S. scitulus* Baudi and the very widespread *S. filiformis* Wollaston as conspecific with

S. debilis. Without having seen type specimens of both *S. debilis* and *S. scitulus*, Fagel (1959) revalidated *S. filiformis*, but erroneously revalidated *S. scitulus*, which in fact is a younger synonym of *S. debilis*, and applied the name *S. debilis* to a then undescribed species, which COIFFAIT (1968) later named *S. talyschensis*. In consequence of that even until now both the names *S. debilis* and *S. scitulus* were used for the same species. Only recently, GUSAROV (1992) fixed the name *S. debilis* by designating a lectotype.

In his revision of Afrotropical *Scopaeus* species FAGEL (1973) already combined Central African species related to *S. debilis* in a species group, which he named the *S. tenuis* group according to the African *S. tenuis* Eppelsheim. Because this name is a junior synonym of *S. filiformis* and because *S. debilis* is the best known species in the group and has the longest use, the present author uses the name *S. debilis* species group.

When examining the available type specimens of all *Scopaeus* species from the Old World, the author recognized seven additional synonyms of *S. debilis* or *S. filiformis*. Within the material from the Muséum National d'Histoire Naturelle, Paris, a new species from Madagascar, which fits the *S. debilis* group, was discovered. The *S. debilis* group currently comprises five species, which are widespread in Europe, Africa and Asia.

The present revision gives a definition of the *S. debilis* species group and provides descriptions of the five species together with ecological and distributional informations.

MATERIAL AND METHODS

This revision is based on type material and on additional material from the institutions and private collections listed below. Detailed data from labels are given only for type specimens. Under synonymy, only primary references are given.

- BMNH = The Natural History Museum, London
- DEIC = Deutsches Entomologisches Institut, Eberswalde
- FCNB = Frey Collection, Naturhistorisches Museum, Basel
- FMNH = Field Museum of Natural History, Chicago
- GRCL = G. de Rougemont Private Collection, London
- HECO = Hope Entomological Collections, Oxford
- HNHM = Hungarian Natural History Museum, Budapest
- ISNB = Institut Royal des Sciences Naturelles de Belgique, Brussels
- JFCG = J. Frisch Private Collection, Gießen
- JJCU = J. Janák Private Collection, Ústí nad Labem
- LSNK = Landessammlungen für Naturkunde, Karlsruhe
- MCSN = Museo Civico di Storia Naturale «Giacomo Doria», Genova
- MHNG = Muséum d'histoire naturelle, Genève
- MKCH = M. Kahlen Private Collection, Hall in Tirol
- MLZT = Museo di Zoologia Sistemática della Università, Turin
- MNHN = Muséum National d'Histoire Naturelle, Paris
- MRAC = Musée Royal de l'Afrique Centrale, Tervuren
- MSCB = M. Schülke Private Collection, Berlin
- MZCO = Zoological Museum, Copenhagen
- MZKI = Zoological Museum, Kiev
- MZLU = Zoological Museum, Lund

- NHMB = Naturhistorisches Museum, Basel
NHMC = Natural History Museum and Institute, Chiba
NHMW = Naturhistorisches Museum, Wien
NMEC = Naturkundemuseum, Erfurt
SMTD = Staatliches Museum für Tierkunde, Dresden
SMNS = Staatliches Museum für Naturkunde, Stuttgart
SMWN = State Museum of Namibia, Windhoek
TMSA = Transvaal Museum, Pretoria
VACH = V. Assing Private Collection, Hannover
ZMHB = Museum für Naturkunde, Berlin
ZSMC = Zoologische Staatssammlung, München

The terminology of the aedeagus follows FRISCH (1994), and the spermatheca and the sclerites of the genital segments are termed as in FRISCH (1996). The illustrations of the male abdominal sternites lack the fine primary setae. Abdominal sternites and tergites are counted from the morphological first segment. Measurements and ratios are based on ten specimens at least, which include both sexes and the maximum range of variation in body size and form. They are defined and abbreviated as follows:

Total length = interval from the apical margin of the mandibles to the end of the abdomen, pending on the state of the specimens; forebody length = interval from the apical margin of the mandibles to the posterior margin of the elytra at the suture; length of head = interval from the apical margin of the clypeus to the posterior margin; HLW = head length : head width; PLW = pronotal length : pronotal width; HPW = width of head : pronotal width; HPL = length of head : pronotal length; PSL = pronotal length : elytral sutural length (excluding scutellum); PLL = pronotal length : elytral lateral length; ELW = elytral lateral length : elytral width; ET = eye length : temporal length (both measured laterally); MT = mesotibial length : mesotibial width; A = length (measured without the basal and distal tapering) : width of the antennal segments 1-11; T = length : width of the central area (between the sclerite margins) of the tergite 10; V = length : width of the central area of the female valve.

TAXONOMY OF THE *SCOPAEUS DEBILIS* SPECIES GROUP

FAGEL (1959, 1973) already mentioned the conspicuous morphological similarity of the species of this group, which might be easily distinguished by the quite small (2.4-3.1 mm; forebody 1.4-1.7 mm) and little convex, more or less light brown coloured body and by the discernibly narrow protarsomeres 1-4, which are slightly wider than long, and which in most remaining species groups are notably wider. Because of the fine, dense microsculpture, which overlies the indistinct puncturation, especially the forebody of the species appears relative dull with exception of *S. madagascarensis* sp. n., of which the forebody is not microsculptured but clearly punctured and shining. While *S. debilis* from the West Palaearctic region is the largest and most darkly coloured species of the group, and while *S. madagascarensis* sp. n. differs by the unicolorous light orange brown, shining body, the remaining species are hard to

identify without the male sexual characters. The head is relatively slender (HLW 1.12-1.23) and widest on the level of the eyes, because the tempora are not enlarged but about parallel or in most specimens somewhat narrowed toward the strongly rounded hind angles. The hind margin of the head is straight or slightly convex. The appendages are relatively slender. The distal antennomeres are about quadrate, and the mesotibia is slender (MT 5.6-7.2) but not thickened as in several species groups of *Scopaeus*. Because the species of the *S. debilis* group without exception are good flyers, they are characterized furthermore by relative large eyes (ET 0.67-0.88), which are little shorter than the tempora, entire metathoracic wings and quite long elytra, which are at the suture about as long as the pronotum or up to a seventh longer (PSL 0.84-1.05), and which are distinctly exceeding the pronotal length laterally by about a seventh up to a third (PLL 0.69-0.85).

The laterotergites 9 (figs 27-30) have an obtuse, dorsal dilatation and a very slender, distal tooth. The tergites 10 (figs 31-35) and the valves (figs 36-40) are relative slender. Sternites 8 in the male bear a medio-apical incision, which is very short and triangular in *S. filiformis* (figs 20, 21), *S. mendosus* (fig. 23) and *S. madagascarensis* (fig. 24), or which is extended into a conspicuously narrow, median incision in about the distal fifth (*S. debilis*, fig. 19; *S. udus*, fig. 22).

The shape of the aedeagi generally fits the description of the aedeagus in *Scopaeus* by FRISCH (1994). Because the aedeagi of the species of the *S. debilis* group are quite different in some characters, no general description is provided here (see also discussion). The spermathecae of the species treated here also fit the basic form in *Scopaeus* as shown by FRISCH (1996), but they are distinguished by a distinct lateral branch of the ductus (see arrow in figs 46, 47).

Scopaeus debilis Hochhuth

Figs 1-3, 19, 27, 31, 36, 41, 42

Scopaeus debilis Hochhuth, 1851: 50. Lectotype ♀. Armenia, Chadoir (MZKI); designated by GUSAROV (1992); examined.

Scopaeus (Scopaeus) debilis; COIFFAIT 1952: 7.

Scopaeus (Hyposcopaeus) debilis; COIFFAIT 1960: 285.

Scopaeus scitulus Baudi, 1857: 103. Lectotype ♂. Italy, Piedmont (MLZT); here designated (examined); synonymized by FAUVEL 1886: 36.

Scopaeus (Hyposcopaeus) scitulus; COIFFAIT 1960: 285.

Scopaeus boops Scheerpelz, 1931: 411. Holotype ♀. Greece. Corfu. Potamos, 01.04.1929, Beier (NHMW); examined. Syn. n.

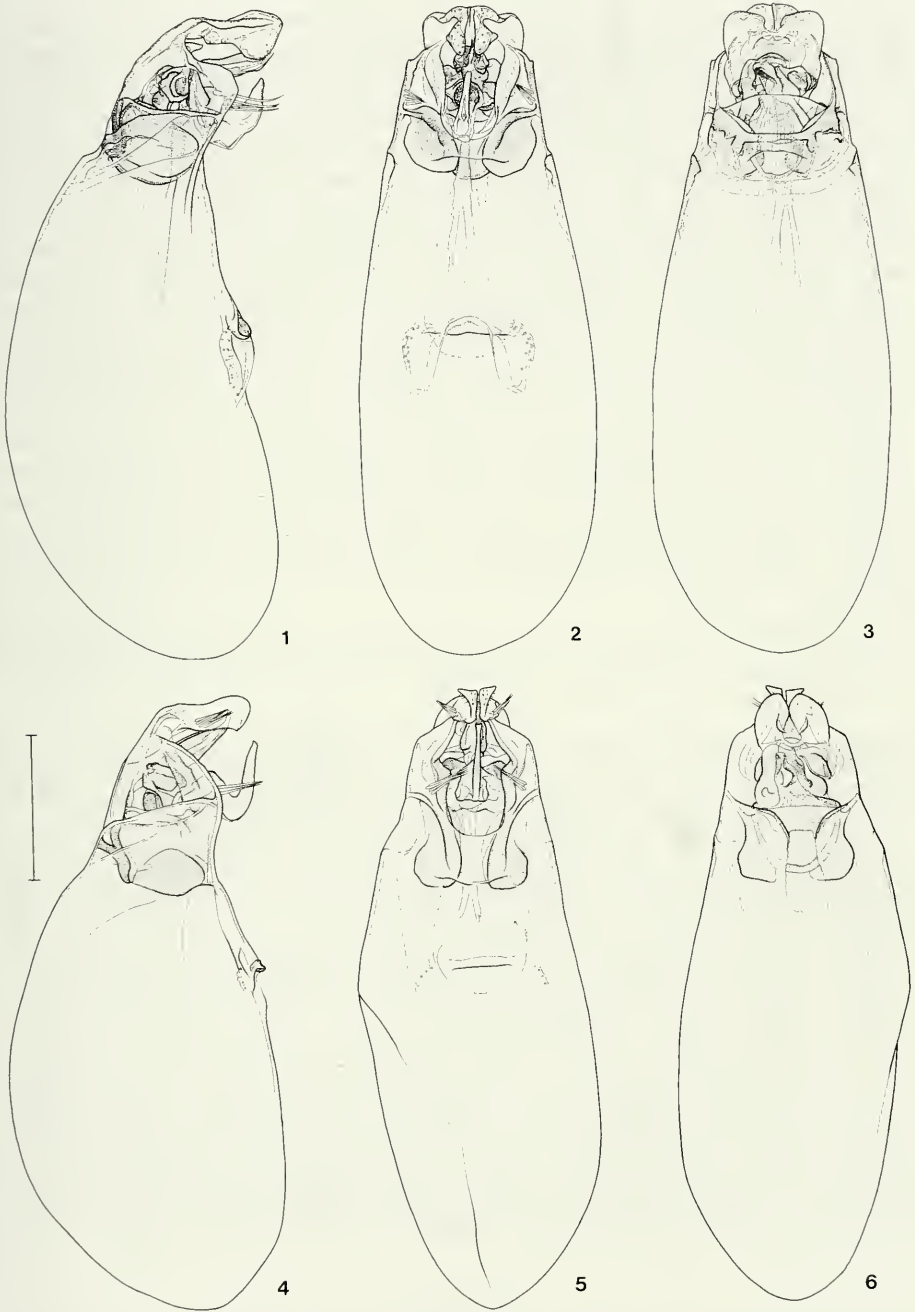
Scopaeus (Hyposcopaeus) ibericus Coiffait, 1952: 6. Holotype ♂. Spain, Murcia, 10.04.1950, Coiffait (MNHN); examined. Syn. n.

Scopaeus afghanicus Scheerpelz, 1960: 76. Holotype ♂. Afghanistan, Kabul, Gilli (NHMW); examined. Syn. n.

Scopaeus (Hyposcopaeus) afghanicus; COIFFAIT 1984: 190.

Scopaeus debilis Ganglbauer, 1895; BOHÁČ *et al.*, 1993: 46.

DESCRIPTION. Length 2.9-3.1 mm; forebody 1.6-1.7 mm. Body usually dark brown to blackish brown with about the distal half of the elytra and the appendages lighter brown, except the femora, the antennae from segment 3 and the penultimate segment of the maxillary palpi. Elytra frequently lightened gradually toward the hind margin.



FIGS 1-6

Scopaeus debilis, ♂, Tunisia, Kasserine: aedeagus in 1) lateral, 2) ventral, 3) dorsal view.
S. filiformis, ♂ lectotype: aedeagus in 4) lateral, 5) ventral, 6) dorsal view. Scale bar = 0.1 mm.

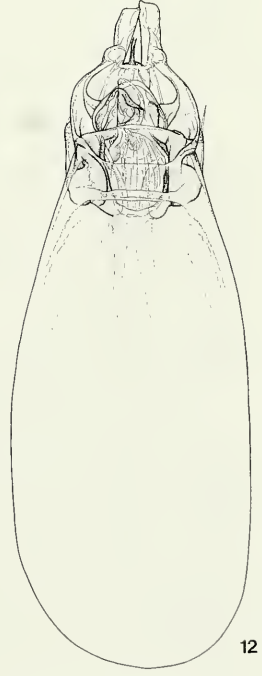
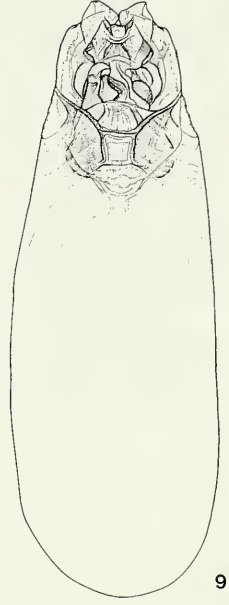
but often the light brown colour is set off against the dark basal half and somewhat extended along the suture. Frequently the dark brown colour of the elytra is extended or reduced more or less, and specimens with evenly light brown elytra occur. Specimens from Near East (Kazakhstan, Turkmenistan) usually differ by an even light brown body with a slightly darker head and light brown elytra. Mesotibia very slender, 6.4 to 6.9 times longer than wide. Distal antennomeres feebly transverse. Male sternite 8 (fig. 19) with a very narrow, parallel incision at about the distal fifth and notably concave distolateral margins. Aedeagus (figs 1-3) somewhat bean-shaped, with relatively short apical lobes, which in ventral view are strongly dilated and ventrally bent at the base, and of which the distal halves are dilated and rounded toward the apex in lateral view. Dorsal margins of the apical lobes strongly bent laterally, each forming a deep, lateral groove in ventral view. Dorsal lobe very short, hardly visible in dorsal view, regularly bent ventrally and in lateral view somewhat projecting from the base of the apical lobes. Lateral lobes prominent and nearly semicircular in lateral view, forming an obtuse angle in dorsal view, each bearing a group of few, long setae. Endophallic spine strongly enlarged but shortly filiform at the apex, reaching the apex of the apical lobes. Ventral endophallic process very narrow in ventral view, dilated and strongly hooked distally in lateral view. Spermatheca (figs 41, 42) variable with process very slender and chamber triangular.

RATIOS. HLW 1.16-1.23; PLW 1.17-1.35; HPW 1.06-1.12; HPL 0.98-1.07; PSL 0.84-0.97; PLL 0.69-0.78; ELW 1.21-1.31; ET 0.67-0.86; MT 6.4-6.9; A 2.6, 1.4, 1.7, 1.4, 1.2, 1.2, 1.2, 1.1, 1.1, 1.1, 1.8; T 2.1; V (♀) 6.4.

MATERIAL EXAMINED (1133 specimens). Afghanistan: holotype ♂ of *S. afghanicus*, Kabul (NHMW); Farah (NHMW); Herat (MNHN); Kabul (NHMW); Kapiza (LSNK); Konduz (MNHN, NHMW); Quandahar (NHMW). Albania (NHMW). Algeria: Beskra (BMNH, MNHN); Lemdiyya (ISNB); M'Sila (MNHN); Tizi-Ouzou (MNHN). Armenia: lectotype ♀ of *S. debilis* (MZKI). Austria: Burgenland (MKCH). Azerbaijan (NHMW). Bosnia-Herzegovina (BMNH, DEIC, HNHM, MHNG, NHMW, SMTD, ZMHB). Bulgaria: Bács-Kiskun (NHMW); Blagoevgrad (JFCG, NHMB, ZMHB); Burgas (FCNB, MNHN); Varna (NHMW). Croatia (FCNB, MNHN, NHMW, VACH). Cyprus: paralectotype ♀ of *S. scitulus* (DEIC); (DEIC, ISNB, JFCG, MCSN). France: Alpes-Maritimes (SMFD, MHNG, MNHN); Ariège (MNHN); Haute-Corse (DEIC, MHNG); Haute-Garonne (MNHN); Hautes-Pyrénées (FCNB); Pyrénées-Antiques (MNHN); Pyrénées-Orientales (MNHN); Tarn (MNHN); Var (MHNG); Vaucluse (HNHM, MNHN). Georgia (ZMHB). Greece: holotype ♀ of *S. boops*, Corfu, Potamos (NHMW); Attici (MNHN, NHMW); Corfu (ZMHB); Crete (MHNG, NHMW); Kos (MZLU); Naxos (JFCG); Parnassos (JFCG); Peloponnese (JFCG, NHMB); Pindhos Óros (MNHN); Thessaloniki (MNHN). Hungary: Hajdú-Bihar (HNHM); Pécs (VACH); Somogy (HNHM); Szabolcs-Szatmár-Bereg (HNHM). Iran: Azarbayjan - E Sharqi (NMPC); Gilan (HNHM); Khorasan (NHMW); Tehran (HNHM, NHMW); Zanjan (NMPC). Iraq (HNHM). Israel: Hefa (NHMW); Tel Aviv (NHMW). Italy: lectotype ♂ and paralectotypes 4 ♀ (MLZT) and 2 ♂, 6 ♀ (DEIC) of *S. scitulus*, Piedmont: Calabria (MHNG); Emilia-Romagna (MNHN, ZMHB); Friuli-Venezia Giulia (MKCH, MSCB); Liguria (DEIC, MCSN, MNHN, NHMW); Piedmont

FIGS 7-12

Scopaeus filiformis. ♂, Namibia, Kavango: aedeagus in 7) lateral view. *S. filiformis*, ♂, Egypt, Cairo: aedeagus in 8) lateral, 9) dorsal view. *S. udus*, ♂, Namibia, Kavango: aedeagus in 10) lateral, 11) ventral, 12) dorsal view. Scale bar = 0.1 mm.



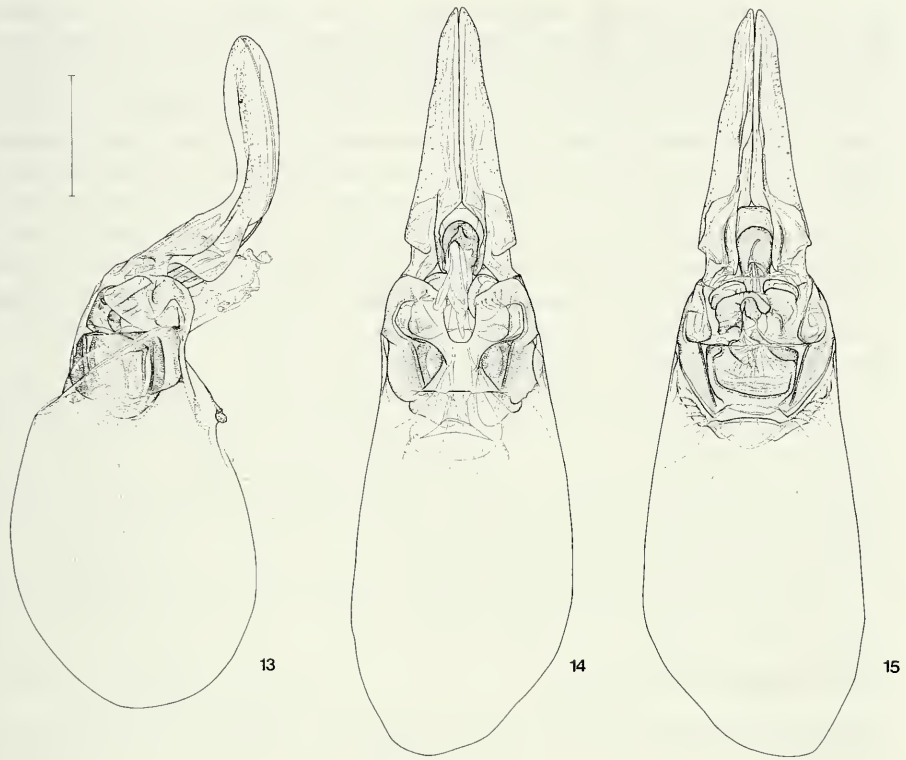
(DEIC, HNHM, MNHN, NHMW); Sardinia (VACH); Sicily (MZCO, MZLU, NHMW); Trentino-Alto Adige (JFCG, MNHN); Tuscany (DEIC, MNHN, SMTD); Veneto (ZMHB). Kazakhstan: Cimkent (NHMW); Dzambul (NMEC). Lebanon: Jabal Lubnan (NHMW). Malta (BMNH). Morocco: Fès (MNHN); Marrakech (FCNB, MNHN); Taza (MNHN). Portugal: Beja (MNHN); Faro (MNHN). Romania: Dobruja (NHMW); Tulcea (HNHM). Russia: Volgograd Oblast (ZMHB). Slovenia (MHNG). Spain: holotype ♂ of *S. ibericus*, Murcia (MNHN); Andalucia (BMNH, DEIC, ISNB, MHNG, MNHN, MZLU); Valencia (MHNG). Switzerland: Ticino (NHMG). Syria: Aleppo (JFCG). Tadshikistan: Gissarskij Chrebet (NHMW); Kul' Ab (JFCG); Taldy-Kurgau (JFCG). Tunisia: Gafsa (FMNH); Kairouan (JFCG); Kasserine (JFCG); El Kef (JFCG, NHMW, ZMHB); Tunis (FMNH). Turkey: Adana (JFCG, NMPC); Ankara (MNHN); Antalya (JFCG, NHMB, VACH); Aydin (NHMB); Hakkari (JFCG); Icel (NHMB); Istanbul (BMNH, MHNG); Izmir (VACH); Kocaeli (BMNH); Mardin (NHMW); Mugla (JFCG); Yosgat (JFCG). Turkmenistan: Cardzou (NHMW); Tasauz (JFCG); Ukraine: Odessa (JFCG).

DISTRIBUTION. *Scopaeus debilis* is a Western Palaearctic species and widely distributed in the Mediterranean region and in Middle East reaching the Hindu Kush Mountains in Afghanistan. The distributional pattern of *S. debilis* appears to follow mountainous regions, and the species obviously avoids lowland deserts. Thus, while *S. debilis* is widespread around the Mediterranean Sea and on the Mediterranean islands, it is still unknown from Libya, Egypt and the deserts in the Near East and in the Arabian Peninsula. In North-West Africa, the Sahara is the southern distributional barrier, and the range obviously follows the Atlas Mountains, where *S. debilis* is recorded south-westwards to Marrakech. The northernmost finds are confirmed from Central France (Indre region: COIFFAIT 1968), South Switzerland (Ticino), North Italy, Austria (Burgenland), Slovakia, the Danube plain in Romania, the Russian Volgograd and South Kazakhstan (Cimkent, Dzambul). The westernmost records are from Portugal and the Western Pyrenees. In Near and Middle East, the distribution is confirmed southwards to Israel (Tel Aviv), Iraq, the Iranian region Khorasan and Quandahar in Afghanistan.

Scopaeus debilis reaches Central Europe only in the extreme south, and several records have to be rejected. According to specimens from his collection, Scheerpeltz (in litt., in HORION 1965) mentioned *S. debilis* from all Austrian regions. In fact, there is not one specimen from Austria in the Scheerpeltz collection (NHMW). In Austria, *S. debilis* is confirmed only from the Ponto-Mediterranean influenced Burgenland (MKCH). Furthermore, the record of *S. debilis* from Moravia (Opava: REITTER 1909; BOHAC 1985) appears little plausible, and BOHAC *et al.* (1993) later doubted the autochthonous presence in the Czech Republik and Slovakia. Only recently, JASZAY & BOHAC (1994) gave a plausible record of *S. debilis* from Slovakia.

Records of *S. debilis* from Saudi Arabia (Ar-Riyad, Al-Hufuf: COIFFAIT 1981), Central Algeria (El Golea: FAUVEL 1902), Egypt (Cairo: FAUVEL 1878, 1886, 1902; Lower Egypt: FAGEL 1959) and from the Cape Verde Islands (BERNHAEUER & SCHUBERT 1910) refer certainly to *S. filiformis*, which FAUVEL (1902) and many subsequent authors mistook for a synonym of *S. debilis*.

BIONOMICS. BOHAC (1985) and HORION (1965) considered *S. debilis* to be a xerothermophilous species which lives in dry places like xerothermous or sandy meadows, embankments and hillsides, and which was also found in nests of *Formica rufa* (Hymenoptera: Formicidae). This ecological characterisation has to be rejected. As



FIGS 13-15

Scopaeus mendosus, ♂ paratype, Zaire, Haut-Zaire: aedeagus in 13) lateral, 14) ventral, 15) dorsal view. Scale bar = 0.1 mm.

most *Scopaeus* species, *S. debilis* is a thermo-hygrophilous inhabitant of damp, sunny margins and banks of rivers and streams, obviously preferring sandy or gravelly river banks without muddy sediments and rich vegetation. *Scopaeus debilis* occurs from sea-level up to high-altitude valleys, and in the Iranian Elburz Mountains it is confirmed from 2000m above sea-level.

COMMENTS. HOCHHUTH (1851) gave no information about the number of specimens from which he described *S. debilis*. The only available original specimen (MZKI) was designated as lectotype by GUSAROV (1992). *Scopaeus scitulus* was described for specimens from Piedmont (Po river) and Cyprus (BAUDI 1857). The specimens in the Baudi collection (MLZT) bear no locality labels, but according to the description (BAUDI 1857) they are from Piedmont. When describing *S. scitulus*, BAUDI (1857) erroneously distinguished the species from *S. debilis* by the alleged smaller size and longer antennae. FAUVEL (1873a, 1873b) doubted that both were distinct species, and later (FAUVEL 1886) he synonymized *S. scitulus* and gave several records under the name *S. debilis*, which partly refer to *S. filiformis*, which FAUVEL (1902) also considered to be a synonym of *S. debilis*.

While many authors used the correct name *S. debilis* (e.g. BERNHAUER & SCHUBERT 1910; BINAGHI 1935; CICERONI *et al.* 1995; GANGLBAUER 1895; PORTA 1926; SCHEERPELTZ 1925, 1931), others treated the species under its younger synonym *S. scitulus*. First of all MULSANT & REY (1877) and PORTEVIN (1929) overlooked the name *S. debilis*. Recently FAGEL (1959) misinterpreted *S. debilis* and, while using the younger synonym *S. scitulus*, applied the name *S. debilis* to *S. talyschensis* Coiffait (GUSAROV 1992), which does not belong to the *S. debilis* group. I saw the holotype of *S. talyschensis* (MNHN) and agree with Gusarov's representation. While COIFFAIT (1952) in his paper on French *Scopaeus* species first used the name *S. debilis*, he later followed FAGEL (1959) and treated the species under the younger synonym *S. scitulus* (COIFFAIT 1968, 1981, 1984) just as have many recent authors (e.g. BOHAC *et al.* 1993; BOHAC 1985, 1994; HORION 1965; LOHSE 1964; LUCHT 1987).

Concerning the occurrence in Central Europe, Scheerpeltz (in litt. 1964) informed HORION (1965) that the Central European form was *S. debilis*, while *S. scitulus* is a different species from the Mediterranean region. This statement is completely absurd. Furthermore, BINAGHI (1939) falsely applied the name *S. boops*, which in fact is a synonym of *S. debilis*, to a then undescribed species, which the author later (FRISCH 1994) named *S. graecus*.

Scopaeus debilis must not be confused with *S. minutus* var. *debilis* Mulsant & Rey, which is a synonym of *S. minutus* (FRISCH 1997).

Scopaeus filiformis Wollaston

Figs 4-9, 20, 21, 32, 37, 43, 44

Scopaeus filiformis Wollaston, 1867: 243. Lectotype ♂, Cape Verde Is. (BMNH); here designated (examined); synonymized with *S. debilis* by FAUVEL 1902: 85; revalidated by FAGEL, 1959: 5.

Scopaeus (Hyposcopaeus) filiformis; COIFFAIT 1960: 285.

Scopaeus tenuis Eppelsheim, 1885: 128. Lectotype ♂, Ghana (Côte d'Or). "Adda" (NHMW); here designated (examined). Syn. n.

Scopaeus schaeuffelei Scheerpeltz, 1961: 5. Lectotype ♂, Iran, Sistan Va Baluchestan, Iranshar, 800m, 1.-10.04.1954, Richter & Schäuuffele (NHMW); here designated (examined). Syn. n.

Scopaeus (Hyposcopaeus) schaeuffeli; COIFFAIT 1984: 190 (misspelling).

Scopaeus richteri Scheerpeltz, 1961: 5. Lectotype ♂, Iran, Jiroft, Anbar-Abad, 21.-30.04.1956, Richter (SMNS); here designated (examined). Syn. n.

Scopaeus schrenneri Scheerpeltz, 1963: 437. Lectotype ♂, Egypt, Assuan, 17.01.1962, Nubia expedition of the NHMW (NHMW); here designated (examined). Syn. n.

Scopaeus (Hyposcopaeus) infirmus; COIFFAIT 1960: 288.

DESCRIPTION. Length 2.4-2.8 mm; forebody 1.4-1.6 mm. Body usually light brown with appendages and frequently the pronotum lighter yellowish brown, and with the head and the elytra somewhat darker. Often the elytra are clearly blackened except the humeral callus, the distal fourth and the suture, which are light yellowish brown. Frequently unicolorously light brown specimens with a slightly lighter, yellowish pronotum occur. Distal antennomeres about quadrate. Male sternite 8 (figs 20, 21) with a variable, triangular emargination at about the distal tenth, which in most specimens is slightly acute-angled extended proximally, and with regularly rounded hind margins. Aedeagus (figs 4-9) similar to that of *S. debilis* (figs 1-3), but not

curved and somewhat smaller, furthermore distinguished by the following characters: apical lobes in lateral view only slightly widened toward the apex, which is rounded distally and somewhat hooked proximally, and each bearing a lateral group of few, long setae. Apex of the apical lobes in ventral view dilated triangularly and truncate distally. Ventral endophallic process in lateral view less widened and stronger hooked-shaped. Frequently specimens occur, in which the aedeagus appears to differ by little raised apical lobes, which are retracted between the lateral lobes, and of which the apices are invisible in dorsal view (figs 8, 9). In specimens from southern Africa (Namibia, Botswana, South Africa) the aedeagus appears more stubby with the apical lobes and the ventral endophallic process somewhat shorter and broader (fig. 7). Spermatheca (figs 43, 44) variable with process and chamber notably widened.

RATIOS. HLW 1.12-1.23; PLW 1.19-1.26; HPW 1.06-1.12; HPL 0.98-1.09; PSL 0.9-1.0; PLL 0.71-0.8; ELW 1.13-1.29; ET 0.71-0.88; MT 5.7-6.7; A 2.3, 1.8, 1.6, 1.5, 1.3, 1.2, 1.2, 1.0, 1.0, 1.0, 1.9; T 2.1; V (♀) 6.4.

MATERIAL EXAMINED (2622 specimens). Algeria: Tassili Najjer (MNHN). Angola: Benguela (MRAC). Botswana: Chobe (ZMHB); Ngamiland (BMNH, JFCG, ZMHB). Cameroon: Nord (MRAC). Cape Verde Is.: lectotype ♂ (BMNH) and paralectotypes 1♂ (ISNB), 1♂ (HECO) and 7♀ (BMNH) of *S. filiformis*; (DEIC, ZMHB). Chad: Kanem (MRAC); Tandjilé (MRAC). China: Hong-Kong (GRCL). Djibouti (FCNB). Egypt: lectotype ♂ and paralectotypes 2♂, 7♀ of *S. schremmeri*, Aswan (NHMW); paratypes 2♀ of *S. schremmeri*, Wadi Halfa (NHMW); Al-Jizah (JFCG, MFCB, NHMW); Al-Qahira (FCNB, ISNB, JFCG, MFCB, MNHN, NHMB, NHMW); Al-Qalyubiyah (BMNH); Siwah (BMNH, JFCG). Ethiopia: Bale (MRAC); Gamo Gofa (MNHN, MRAC); Ilubabor (BMNH, MRAC); Shewa (BMNH); Sidamo (MRAC). Gabon: Ogooué-Ivindo (MHNG). Ghana: lectotype ♂ (NHMW) and paralectotypes 2♀ (NHMW) and 1♂ (ISNB) of *S. tenuis*, "Adda"; Ashanti (HNHM, JFCG, MHNG); Brong-Ahafo (HNHM); Northern Region (FMNH, HNHM); Volta (HNHM); Western Region (HNHM). Guinea (HNHM, JFCG, ZMHB). India: Andhra Pradesh (BMNH); Goa (HNHM); Madhya Pradesh (HNHM); Orissa (HNHM); Tamil Nadu (HNHM, MHNG, NHMB). Indonesia: Jawa (BMNH, ISNB, NHMW); Jawa Barat (NHMC); Borneo (ISNB); Lombok (GRCL, SMNS); Sulawesi Tengah (BMNH); Sumatra (ZMHB); Sumba (NHMB); Sumbawa (SMNS). Iran: lectotype ♂ (SMNS) and paralectotypes 1♂, 6♀ of *S. schaeuffelei*, Sistan Va Baluchestan, Iranshar (NHMW, SMNS); paralectotypes 1♂, 3♀ of *S. schaeuffelei*, Jiroft, Anbar-Abad (NHMW, SMNS); lectotype ♀ (SMNS) and paralectotypes 2♀ of *S. richteri*, Jiroft, Anbar-Abad (NHMW); Hormozgan (MNHN, NMPC); Kerman (NHMW); Sistan Va Baluchestan (JFCG, NHMW, NMPC). Ivory Coast: Bingerville (MRAC); Ferkéssédougou (MRAC); Lakota (FMNH). Japan: Kagoshima (NHMC); Okinawa (NHMC). Kenya: Eastern (JFCG); Lake Turkana (HNHM). Laos: Louangphrabang (VACH). Malaysia: Perak (NHMC); Sabah (MHNG). Mali: Kayes (ISNB); Ségou (MRAC). Mauretania (MNHN). Morocco: Agadir (GRCL, MNHN); Tiznit (MNHN). Namibia: Kavango (JFCG, ZMHB). Nepal: Bagmati (JFCG); Nigeria: Kaduna (BMNH); Oyo (BMNH); Plateau (JFCG, VACH); Oyo (BMNH, MZCO). Philippines: Bukidnon (NHMB); Laguna (GRCL); Palawan (MZCO, NHMB); Panay (NHMB); Quezon (NHMB); Rizal (BMNH, NHMW, ZMHB). Rwanda (MRAC, ZMHB). Saudi Arabia: Al-Hufuf (NHMB); Riyadh (NHMB). Senegal: Saint-Louis (MNHN); Thiès (MNHN). Somalia: Bari (ISNB). South Africa: Kaap (BMNH); Transvaal (BMNH, FMNH, NHMB, NHMW, TMSA). Sudan: Al-Jazirah (BMNH); Al-Khartoum (ZSMC); An-Nil Al-Azraq (ZMHB); Ash-Shamaliyah (NHMW, ZSMC); Wad Madani (ZMHB). Taiwan (NHMC). Tanzania: Arusha (HNHM, MRAC); Morogoro (HNHM, MRAC); Tanga (HNHM). Thailand: Chanthaburi (NHMC); Chiang Dao (NHMB); Chumphon (MSCB, NHMB); Fang (NHMB); Khao Yai (MHNG); Khon Kaen (ZMHB); Ranong (NHMB); Uthai Tani (JFCG, NHMB, ZMHB). Turkey: Mugla (JFCG). Uganda: Central Buganda (BMNH). Vietnam: Bac Phan

(ISNB, HNHM); Nam Phan (MHNG, MNHN); Trung Phan (HNHM). Yemen: Adan (BMNH, JFCG); Ahwar (BMNH). Zaïre: Equateur (MRAC); Haut-Zaïre (MRAC); Kasai-Oriental (MRAC); Kivu (MRAC); Shaba (MRAC). Zambia: Northern (ZMHB). Zimbabwe: Mashonaland South (BMNH); Mashonaland North (JFCG, ZMHB).

DISTRIBUTION. Presumably due to its ability to fly and its obvious flying skill (light traps!) *Scopaeus filiformis* became widespread throughout the tropics and subtropics of the Afrotropical, Indian and Oriental regions. The occurrence in the New World appears improbable but cannot be excluded as no material from Nearctical and Neotropical regions was examined. Described from the Cape Verde Islands, *S. filiformis* is recorded throughout Africa from Morocco (Agadir), the Central Sahara (Tassili Najjer) and Egypt (Nile Delta) in the north southwards to the Cape province in South Africa, and there are obviously no large distributional gaps. *Scopaeus filiformis* is known from the Arabian Peninsula northwards to Riyadh. The record from South-West Turkey (Fethiye region) is the only confirmation from the Mediterranean region and the northernmost known locality. In Asia, the species is confirmed from South Iran, from Central and South India, and further eastwards from North Thailand (Chiang Dao), North Vietnam (Bac Phan), Hong Kong, Taiwan and South Japan (Kagoshima) southwards over the Philippines, Sumatra, Borneo and Sulawesi to the Lesser Sunda Islands.

FAGEL (1959) mentioned *S. filiformis* from Senegal and countries neighbouring the gulf of Guinea. Later (FAGEL 1973), his concept on the distribution of *S. filiformis* included just the Cape Verde Islands and the Senegal, and he referred other records to different species from the respective group.

BIONOMICS. Similar to *Scopaeus debilis*, *S. filiformis* is a hygro-thermophilous species inhabiting damp, sandy to gravelly river banks, which are exposed to sun. WOLLASTON (1867) already mentioned *S. filiformis* from river banks. In Turkey (Fethiye region), the author collected the species together with *S. debilis* on a gravelly, damp bank of a dry stream. Thus, in Anatolia both species occur sympatrically and syntopically. *Scopaeus filiformis* shows distinct flying skill and was repeatedly captured in large numbers with light traps.

COMMENTS. The type specimens in the Wollaston collection (BMNH) bear no locality labels, but according to the description, WOLLASTON (1867) described *Scopaeus filiformis* from the Cape Verde Islands St. Antao, St. Vincente, St. Iago, Fogo and Brava. A paralectotype from the Hope Entomological Collections, Oxford, is labelled "St. Antao".

FAUVEL (1902) and SCHEERPELTZ (1925) considered *S. filiformis* as a synonym of *S. debilis*. FAGEL (1959) revalidated *S. filiformis* and described the primary and secondary male sexual characters, but his illustration of the aedeagus is inaccurate, as well as the aedeagal features, with which he (FAGEL 1959, 1973) tried to distinguish the synonyms *S. tenuis* and *S. filiformis*. Furthermore, FAGEL (1973) erroneously tried to distinguish *S. filiformis* from other species of the group by the shape of the head, which he characterized as broadest at the tempora.

The synonym *S. schaeuffelei* is based on specimens from Egypt, of which the aedeagus is characterized by very little raised apical lobes (figs 8, 9). Although this

shaping of the aedeagus is typical for most specimens from Egypt, it occurs throughout the range of *S. filiformis* and is no character to define a species.

COIFFAIT (1960, 1984) applied the name *S. infirmus* Erichson, 1840 to specimens of *S. filiformis* from Egypt (Cairo), as Coiffait's illustration of the aedeagus shows undoubtedly. In fact, *S. infirmus* belongs to the genus *Luzea* Blackwelder, and it was first treated as *L. infirma* (Erichson) by JARRIGE (1960). In order to confirm this combination, the lectotype (♂, Egypt, leg. Ehrenberg; 2 paralectotypes, end of abdomen lost, same data as lectotype; ZMHB) is here designated, and its aedeagus (figs 48-50) is compared with that of the closely related *L. caucasica* (Luze) (figs 51-53), of which lectotype (♂, "Caucasus"; NHMW) was also examined.

Scopaeus udus Fagel

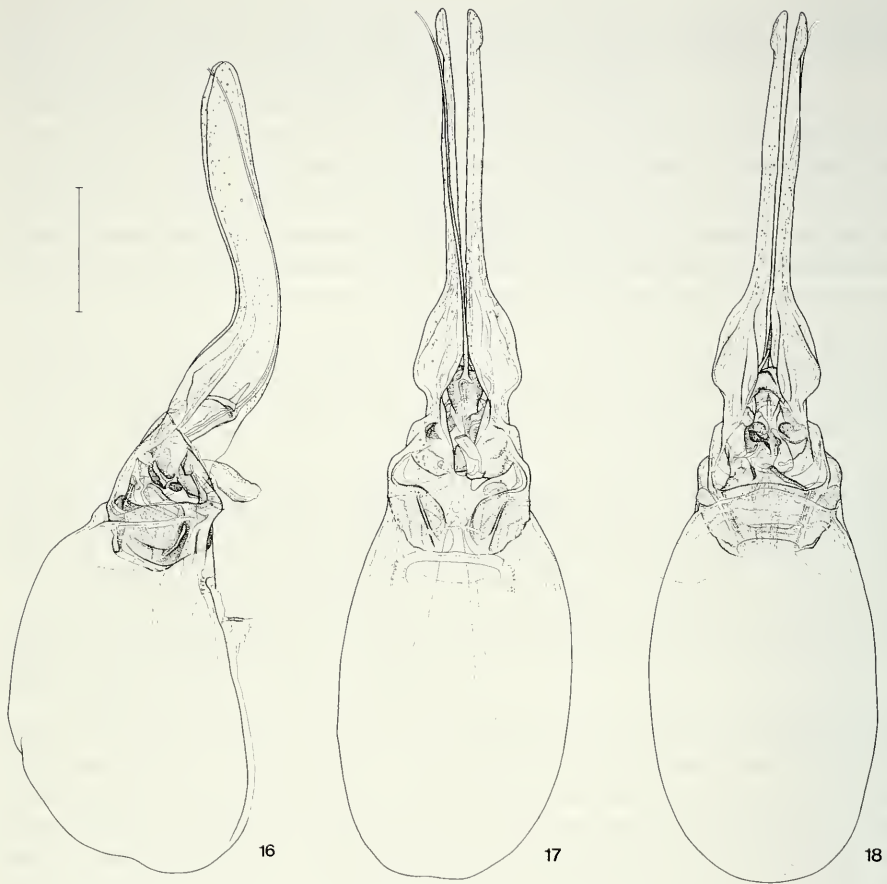
Figs 10-12, 22, 25, 28, 33, 38, 45

Scopaeus udus Fagel, 1973: 42. Holotype ♂, Zimbabwe, Nuanetsi River, Majinji Pan., 04.-05.1961 (BMNH); examined.

DESCRIPTION. Length 2.8-2.9 mm; forebody 1.5-1.6 mm. Body usually unicolorously light brown, the head somewhat darker, the pronotum slightly lighter yellowish brown, but little contrasting. In some specimens the head and the elytra except about the distal fourth and the suture are darker brown. Distal antennomeres slightly transverse. Hind margin of the male sternite 7 (fig. 25) with a short emargination in the middle third, which is extended into a large, shallow impression surrounded by median pointed, long setae proximally and laterally. Male sternite 8 (fig. 22) with a very narrow, median incision at about the distal fifth and straight hind margins. Aedeagus (figs 10-12) bearing somewhat ventrally bent, triangular apical lobes, of which the dorsal margins are slightly concave in lateral view. Apical lobes in dorsal view widely separate at the base with nearly parallel inner and outer margins and truncate apices, which each bear a short, apical dent. Dorsal lobe reduced to a nearly semicircular vestige, which is visible only in dorsal view. Lateral lobes somewhat prominent in lateral view but not projecting in dorsal view, each bearing a group of very long setae, which is oriented ventro-apically. Endophallic spine very strong and slightly thickened at the basal two-thirds, distal third almost filiform and bent distally between the apical lobes. Ventral endophallic process acuminate and little prominent, straight but not hook-shaped as in *S. debilis* (fig. 1) and *S. filiformis* (figs. 4, 7, 8). Ventral opening of the phallobase dilated distally into a strongly prominent, triangular tooth. Spermatheca as in fig. 45.

RATIOS. HLW 1.13-1.19; PLW 1.16-1.26; HPW 1.06-1.11; HPL 1.02-1.07; PSL 0.87-0.95; PLL 0.7-0.75; ELW 1.14-1.28; ET 0.79-0.85; MT 5.6-7.2; A 2.7, 1.4, 1.8, 1.5, 1.3, 1.0, 0.9, 0.9, 0.9, 0.9, 2.0; T 2.1; V (♀) 6.4.

MATERIAL EXAMINED (5477 specimens). Angola: paratype ♂, Cunene, Donguena, Mare Báné (MRAC); Cunene (BMNH). Botswana: Central (BMHN); Chobe (ZMHB); Ghanzi (BMNH); Ngamiland (BMNH); North-East (BMNH). Mozambique: Sofala (MNNH). Namibia: Grootfontein (BMNH); Hereroland Wes (JFCG, ZMHB); Kaokoland (SMWN, TMSA); Karasburg (BMNH); Kavango (ZMHB); Keetmanshoop (ZMHB); Maltahöhe (ZMHB); Mariental (NMEC); Namaland (SMWN); Okahandja (BMNH, ZMHB); Omaruru (BMNH); Outjo (BMNH, NHMW, SMWN, TMSA, ZMHB); Owambo (SMWN, ZMHB); Tsumeb (BMNH, ZMHB). South Africa: Cape (ZMHB); Natal (BMNH); Transvaal (BMNH, FMNH, TMSA). Zambia:



FIGS 16-18

Scopaeus madagascarensis sp. n., ♂ holotype: aedeagus in 16) lateral, 17) ventral, 18) dorsal view. Scale bar = 0.1 mm.

Northern (ZMHB); Western (ZMHB). Zimbabwe: holotype ♂, Nuanetsi River, Majinji Pan. (BMNH); paratypes 2♂, 5♀ (MRAC), 8♂, 33♀ (BMNH). Nuanetsi River, Majinji Pan.; paratypes 2♀, Nuanetsi River, Malipati (BMNH); paratype ♂ (MRAC), paratypes 1♂, 3♀ (BMNH), Matabeleland South, Matopo Hills, Maleme Dam.; Matabeleland North (ZMHB).

DISTRIBUTION. *Scopaeus udus* is widespread in the southern Afrotropical region. The species is confirmed from South Africa northwards to South Angola (Cunene), North Zambia and Central Mozambique (Sofala).

BIONOMICS. Little is known about the habitat of *Scopaeus udus*. According to the locality labels, the species most likely occurs on damp river banks, and it was repeatedly captured with light traps.

COMMENTS. The aedeagus of the holotype lacks the in dorsal view right apical lobe. A paratype specimen from Zaire (Matabeleland North, Hwange) belongs to *Scopeus punctatellus* Fauvel.

Scopeus mendosus Fagel

Figs 13-15, 23, 26, 29, 34, 40, 46

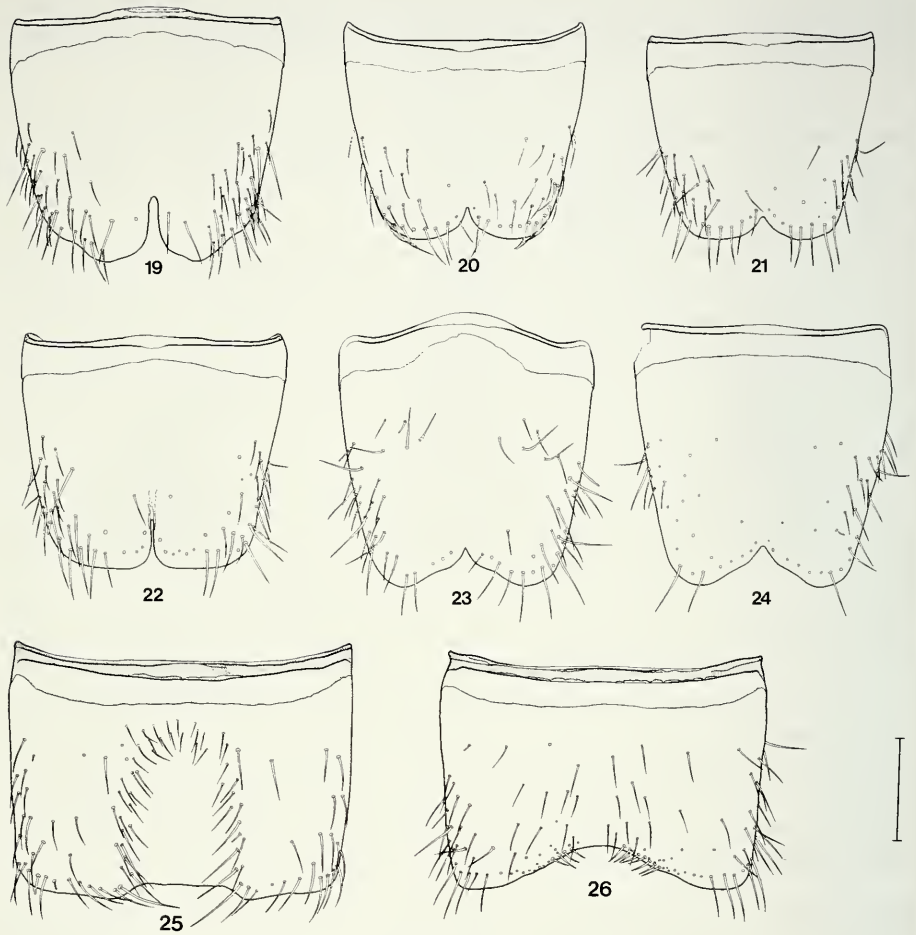
Scopeus mendosus Fagel, 1973: 43. Holotype ♂, Zaire, Kivu, Mwenga, Kitutu, 650m, 04.1958, Leleup (MRAC); examined.

DESCRIPTION. Length 2.4-2.8 mm; forebody 1.4-1.6 mm. Body light brown, the elytra except the hind margin and the suture and the head somewhat to clearly darker, the pronotum and the appendages lighter yellowish brown. Elytra usually evenly lightened more or less toward the yellowish brown distal margins, but frequently the light distal seventh and the suture are set off against the darker elytral surface. Distal antennomeres quadrate. Hind margin of the male sternite 7 (fig. 26) widely emarginate, bearing short setae, which stand close together. Male sternite 8 (fig. 23) with a wide distal emargination having an acute-angled apex and slightly concave lateral margins. Aedeagus (figs 13-15) with extended apical lobes, which in lateral view are somewhat bent ventrally at the basal half and recurved distally at the apical half. Basal half bearing a strong, ventral enlargement, distal half regularly widening but shortly narrowed toward the rounded apex. Apical lobes oblong-triangular in dorsal view, each with a basal angle, from which the straight lateral margins are narrowed regularly toward the acute apices. Dorsal lobe as long as the basal quarter of the apical lobes, broad at the base with rounded lateral margins in dorsal view and being strongly curved ventrally and acuminate in lateral view. Lateral lobes without groups of setae, being prominent and regularly rounded in lateral view. Endophallic spine relative strong at the basal third but filiform distally, reaching the apex of the apical lobes. Ventral endophallic process conspicuously enlarged in lateral view, membranous with only the dorsal margin stronger sclerotized. Spermatheca as in fig. 46.

RATIOS. HLW 1.18-1.23; PLW 1.21-1.28; HPW 1.02-1.09; HPL 0.98-1.05; PSL 0.88-1.02; PLL 0.74-0.84; ELW 1.16-1.25; ET 0.7-0.81; MT 5.7-6.7; A 2.7, 1.8, 2.3, 1.8, 1.4, 1.3, 1.0, 1.0, 1.0, 1.0, 1.8; T 2.1; V (♀) 6.4.

MATERIAL EXAMINED (180 specimens). Cameroon: Nord (MRAC). Central African Republic (ZMHB). Gabon: paratypes 1♂, 4♀, Ogooué-Ivindo, Makokou (MRAC). Ivory Coast: paratype ♂, Ferkessédougou (MRAC); paratype ♂, Adiopodoume (MRAC). Kenya: Coast (MNHN). Madagascar: Antananarivo (ISNB); Antsiranana (JCU, JFCG, MNHN); Fianarantsoa (MRAC); Mahajanga (MNHN); Toamasina (MNHN); Toliara (MNHN). Namibia: Kavango (JFCG, ZMHB). Tanzania: paratypes 2♂, Arusha, Longido (MRAC); Arusha (HNHM); Kilimanjaro (MNHN). Zaire: holotype ♂ and paratypes 2♂, Kivu, Mwenga, Kitutu (MRAC); paratype ♂, Haut-Zaire, Kasenyi (MRAC). Zambia: Northern (ZMHB).

DISTRIBUTION. *Scopeus mendosus* is distributed in Equatorial Africa between Sahel and about 20 degrees south and occurs also in Madagascar. The northernmost records are from Ivory Coast, North Cameroon, the Central African Republic and South Kenya. *Scopeus mendosus* is confirmed as far south as North Namibia (Kavango), North Zambia and North-East Tanzania.



FIGS 19-26

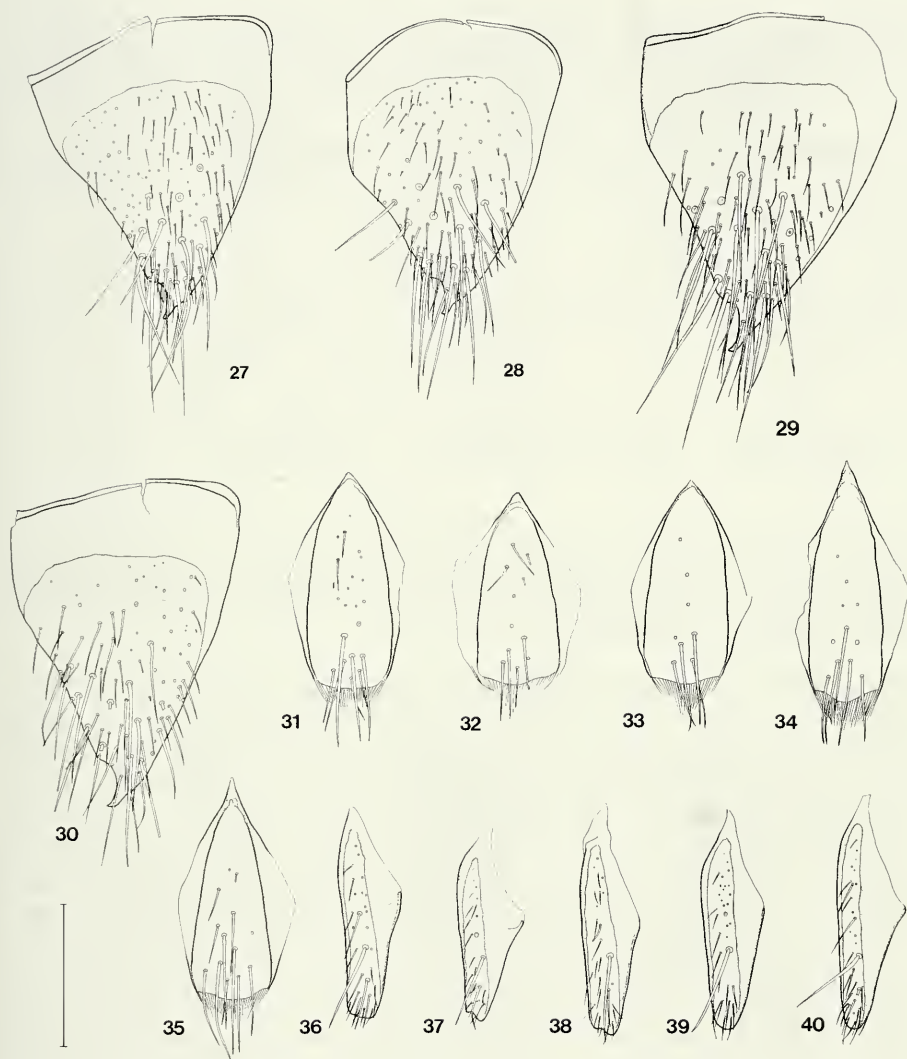
♂ sternite 8: 19) *Scopaes debilis*, Tunisia, Kasserine; 20) *S. filiformis*, lectotype; 21) *S. filiformis*, Namibia, Kavango; 22) *S. udus*, Namibia, Kavango; 23) *S. mendosus*, paratype, Gabon, Ogooué-Ivindo; 24) *S. madagascarensis* sp. n., holotype. ♂ sternite 7: 25) *S. udus*, Namibia, Kavango; 26) *S. mendosus*, paratype, Gabon, Ogooué-Ivindo. Scale bar = 0.1 mm.

BIONOMICS. According to the locality labels, this species was frequently taken with light traps near rivers and creeks. Like related species it obviously lives on damp, sunny river banks.

***Scopaes madagascarensis* sp. n.**

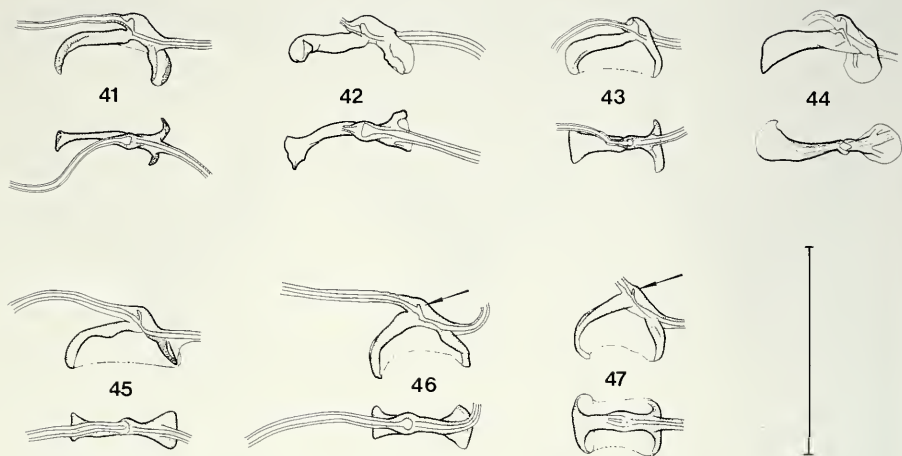
Figs 16-18, 24, 30, 35, 39, 47

DESCRIPTION. Length 2.5-2.9 mm; forebody 1.5-1.6 mm. Body unicolorously light orange brown, the appendages except the antennae light yellowish brown. Forebody in opposition to the remaining species of this group clearly punctate and quite shining



FIGS 27-40

♀ laterotergite 9: 27) *Scopaeus debilis*, Turkey, Mugla; 28) *S. udus*, paratype, Zimbabwe, Nuanetsi River; 29) *S. mendosus*, paratype, Gabon, Ogooué-Ivindo; 30) *S. madagascarensis* sp. n., paratype, Madagascar, Mahajanga. ♀ tergite 10: 31) *S. debilis*, Turkey, Mugla; 32) *S. filiformis*, paralectotype; 33) *S. udus*, paratype, Zimbabwe, Nuanetsi River; 34) *S. mendosus*, paratype, Gabon, Ogooué-Ivindo; 35) *S. madagascarensis* sp. n., paratype, Madagascar, Mahajanga. ♀ valve: 36) *S. debilis*, Turkey, Mugla; 37) *S. filiformis*, paralectotype. 38) *S. udus*, paratype, Zimbabwe, Nuanetsi River; 39) *S. madagascarensis* sp. n., paratype, Madagascar, Mahajanga; 40) *S. mendosus*, paratype, Gabon, Ogooué-Ivindo. Scale bar = 0.1 mm.



FIGS 41-47

Spermatheca: 41) *Scopaeus debilis*, Turkey, Mugla; 42) *S. debilis*, lectotype; 43) *S. filiformis*, Turkey, Mugla; 44) *S. filiformis*, paralectotype; 45) *S. udus*, paratype, Zimbabwe, Nuanetsi River; 46) *S. mendosus*, paratype, Gabon, Ogooué-Ivindo; 47) *S. madagascarensis* sp. n., paratype, Madagascar, Mahajanga. Scale bar = 0.1 mm.

because of the absence of microsculpture. Distal antennomeres feebly transverse. Elytra somewhat shorter than those of the other members of this species group, at the suture about as long as pronotum and laterally exceeding the pronotal length by at most a fifth. Distal margin of the male sternite 8 (fig. 24) as in *S. mendosus*, but the median incision slightly wider and less acute. Aedeagus (figs 16-18) similar to that of *S. mendosus* (figs 13-15), but distinguished by the following characters: apical lobes conspicuously lengthened and slender with in lateral view almost parallel margins, being slightly bent ventrally at the basal half and recurved dorsally at the distal half. Apical lobes, in dorsal view, strongly dilated at the basal third, then very narrow and almost parallel at about the distal two-thirds toward the slightly widened apical portion. Dorsal lobe relatively short and narrow in dorsal view, strongly curved ventrally and bearing an apical spine, which is recurved distally. Lateral lobes little projecting and rounded in both lateral and dorsal view, bearing some short setules. Endophallic spine shortly thickened and rounded at the base, extended into a thin flagellum reaching the apex of the apical lobes. Ventral endophallic process membranous, narrow at the base and somewhat dilated distally. Spermatheca (fig. 47) with strongly curved, wide portions.

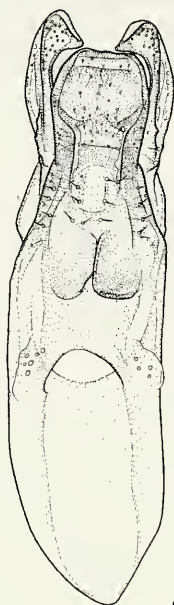
RATIOS. HLW 1.13-1.2; PLW 1.19-1.26; HPW 1.0-1.08; HPL 0.97-1.05; PSL 0.96-1.05; PLL 0.8-0.85; ELW 1.09-1.23; ET 0.72-0.85; MT 5.7-6.5; A 2.5, 1.4, 1.3, 1.1, 1.1, 1.0, 1.0, 0.9, 0.9, 0.9, 1.8; T 2.1; V (♀) 6.4.

FIGS 48-53

Luzea infirma, ♂ lectotype: aedeagus in 48) lateral, 49) ventral, 50) dorsal view. *Luzea caucasica*, ♂, Caucasus: aedeagus in 51) lateral, 52) ventral, 53) dorsal view. Scale bar = 0.1 mm.



48



49



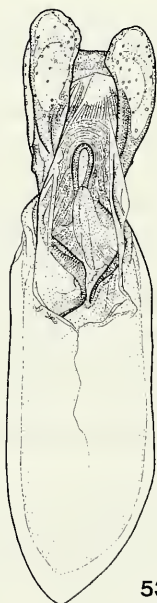
50



51



52



53

MATERIAL EXAMINED. Holotype ♂, Madagascar: Toliara, Sakaraha, Zombitsy, Griveaud (MNHN). Paratypes. 1 ♀, same data as holotype (MNHN). 1 ♂, 3 ♀, Madagascar: Cape Diego, 1916, Friederichs (ZMHB). 1 ♂, 1 ♀, Madagascar: Mahajanga, Tsaramandroso, Ampijoroa (JFCG, MNHN). 1 ♂, 1 ♀, Madagascar: Mahajanga, Katsepe, 24.-31.12.1997, Moravec (JCU).

DISCUSSION

The five species combined in the *Scopaeus debilis* group share some external morphological characters, which are used here to define a species group, and which were given in the chapter "Taxonomy of the *S. debilis* species group". Nevertheless, it appears difficult to judge whether the external characters as well as the features of the terminal sclerites are apomorphic and if they are suitable to define a monophyletic group.

While the species of this group agree completely by the general shape of the body, two subgroups are distinguishable according to the shape of the aedeagi and the male sternites 8. *Scopaeus debilis*, *S. filiformis* and *S. udus* appear closely related by the male sternites 8 (figs 19-22), of which the hind margin bears a narrow, short triangular emargination, that is extended into a very narrow, parallel incision in *S. debilis* and *S. udus*, and by the aedeagus (figs 1-12) having short, ventrally bent apical lobes, a short endophallic spine, a well sclerotized ventral endophallic process and prominent lateral lobes being studded with long setae. Unlike this, *S. mendosus* and *S. madagascarensis* share male sternites 8 (figs 23, 24), of which the hind margins have much wider triangular emarginations with slightly concave lateral margins. Furthermore, these two species from southern Africa and Madagascar are distinguished from the *S. debilis* subgroup by the following aedeagal features (figs 13-18): the apical lobes are conspicuously lengthened and curved dorsally at the apical half, and the endophallic spine is filiform and also strongly extended. The ventral endophallic process is membranous, and the lateral lobes bear no setae. The shape of the apical lobes appears apomorphic in both subgroups, and especially the membranous ventral endophallic process in *S. mendosus* and *S. madagascarensis* characterizes both as sister species. Both the *S. debilis* subgroup and the *S. mendosus* subgroup agree in the presumably apomorphic shape of the short, ventrally curved, acuminate dorsal lobe and of the endophallic flagellum, which is very robust at the base but filiform distally and reaching the apex of the apical lobes. The species agree furthermore in the small lateral branch of the ductus of the spermathecae (figs 41-47), which is regarded as synapomorphic feature as well, but as the spermathecae of many species groups remain unexamined, this synapomorphy is quite hypothetical. Thus, both subgroups are combined as sister groups in a monophyletic *Scopaeus debilis* species group.

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***Paladilhia bessoni* n.sp. (Gastropoda Prosobranchia Hydrobiidae)
des eaux souterraines karstiques de la Haute Soule
(Pyrénées Atlantiques, France).**

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***Paladilhia bessoni* n.sp. (Gastropoda Prosobranchia Hydrobiidae) from karstic groundwater of Haute Soule, Pyrénées Atlantiques, France.** - Empty shells of peculiar size were discovered already in 1980 in the Bidalunia ko karbia, an episodically flooded cave near Alçay at 430 m of altitude, living animals only seventeen years later in a sump at low water level. All sampled specimens were females; their anatomy, operculum and radula as well as the shell biometry are described. This new *Paladilhia* species differs clearly from *P. pleurotoma*; it is the first representative of *Paladilhia* in the Pyrenees. The same species was found recently also in Uthurbietta spring near Aussurucq.

Key-words: *Paladilhia* - new species - Gastropoda - Prosobranchia - Hydrobiidae - karstic groundwater - Pyrenees - France.

INTRODUCTION

Un nouveau taxon d'Hydrobidés des eaux karstiques souterraines, dont la découverte remonte à 1980, est décrit ici. En cette année, J.P. Besson (Parc National Les Pyrénées, Tarbes) découvrit dans les alluvions de la Grotte - exsurgence temporaire de Bidalunia ko karbia (commune de Alçay, Pyrénées Atlantiques) des coquilles vides qui, à défaut d'un examen anatomique, n'étaient pas déterminables avec certitude. En 1997 enfin, lors d'une visite effectuée après une décrue dans cette même grotte, J.P. Besson réussit à trouver quelques exemplaires vivants. Ces exemplaires se trouvaient au fond d'un siphon avec des résidus d'eau à une distance d'environ 130 m de l'entrée et à une profondeur d'environ 16 m depuis l'entrée et d'environ 9 m en-dessous du niveau d'eau habituel. La cavité a été explorée pour la première fois en 1980, son développement actuel est de 360 m, sa profondeur est de 26 m; elle se trouve à 430 m d'altitude.

Entre 1997 et 1998 A. Bertrand (Centre National de la Recherche Scientifique, Laboratoire souterrain de Moulis) a collectionné différents lots de mollusques provenant de la résurgence d'Uthurbietta, située à Aussurucq (massif des Arbailles), à environ 7 km à vol d'oiseau d'Alçay. La morphologie et la biométrie des coquilles vides d'Uthurbietta a permis d'établir la conspécificité avec les exemplaires de Bidalunia.

MÉTHODES

Les dimensions des coquilles ont été mesurées au binoculaire WILD M5 muni d' un oculaire à micromètre étalonné; hauteur et diamètre maximum selon définition internationale; évaluation statistique au moyen du programme StatView® pour MacIntosh (moyennes \pm écart standard; dispersion; médian et quantiles).

L' examen des chairs, de l' opercule, de la radula a été fait par dissection en utilisant un binoculaire WILD M5, et un microscope LEITZ Laborlux 11® muni d' un oculaire à micromètre étalonné (x100 à x1000 immersion huile); colorations à l' éosine et au bleu de méthylène.

Microphotographies avec une camera ALPA Reflex avec dispositif à soufflet NIVEX; pellicule Ilford FP Plus.

Photographies au microscope électronique à balayage (figs. 2 à 9) par le Muséum d' histoire naturelle de Genève (M. Jean Wüest).

Paladilhia bessonii n.sp.

MATÉRIEL EXAMINÉ

Série type: Lots de Bidalunia ko karbia, Alçay, Pyrénées Atlantiques, de 1980 et 1997 (leg. Besson), total 37 exemplaires (dont 28 coquilles vides et 9 exemplaires avec chairs; deux exemplaires avec chairs reçus semi-vivants en eau, les autres conservés en éthanol).

H o l o t y p e (coquille): Dimension de la coquille: 5.09 mm x 2.17 mm; dernier tour 50.0% de la longueur totale, rapport Longueur / Diamètre 2.34. MHNG n° 24616 (Fig.1).

Localité type: Grotte - exsurgence de Bidalunia ko karbia, Alçay, Pyrénées Atlantiques; altitude 430 m. Leg. J.P. Besson, Tarbes, 1980.

La nouvelle espèce est dédiée à M. Besson.

P a r a t y p e s (coquilles et anatomie): les exemplaires de Bidalunia des lots de 1980, de février 1997 et de novembre 1997. MHNG n° 24617 (4 paratypes, localité idem que holotype); M.H.N.Paris: ma collection (y-inclus préparations microscopiques).

Autre station: Lots de Uthurbietta, Aussuruq, Pyrénées Atlantiques, de 1997 et 1998 (leg. Bertrand), total 26 exemplaires (coquilles vides uniquement).



FIG. 1

Paladilhia bessonii n.sp. Holotype. Bidalunia, Alçay, échelle = 1 mm.

DESCRIPTION

Figs 1 à 5 et 6 à 9

Coquille lancéolée conique, 6.5 tours de spire peu convexes à croissance régulière, sutures profondes, sommet petit et obtus. Perforation ombilicale étroite. Ouverture oblongue, péristome continu un peu évasé, le bord externe arqué. Test lisse, dernier tour parfois avec quelques lignes spirales plus ou moins oblitérées (env. 40 - 50 lignes par mm longitudinal).

TAB. I

Biométrie de la coquille de *Paladilhia bessoni* (n= nombre de coquilles mesurées; L= longueur; D= diamètre maximum; dT= longueur du dernier tour en % de L):

	Série type lots de Bidalunia	Autre station lots de Uthurbietta
n	37	26
L (mm)	4.47 ± 0.50	4.37 ± 0.34
L min. et max. (mm)	3.10 et 5.54	3.70 et 5.35
D (mm)	1.97 ± 0.19	1.85 ± 0.15
D min. et max. (mm)	1.58 et 2.31	1.58 et 2.25
Rapport L/D	2.27 ± 0.15	2.37 ± 0.13
L/D min. et max	1.90 et 2.61	2.10 et 2.63
dT (%)	52.8 ± 2.8	49.8 ± 5.8
dT min. et max.	48.6 et 59.8	38.8 et 66.9

ANATOMIE:

Animal dépigmenté, sauf quelques granules pigmentaires derrière le mufle; taches oculaires absentes. Deux tentacules mobiles, cylindriques-aplatissés, dépigmentés, avec une dizaine de cils de quelques 30 µm de longueur au sommet.

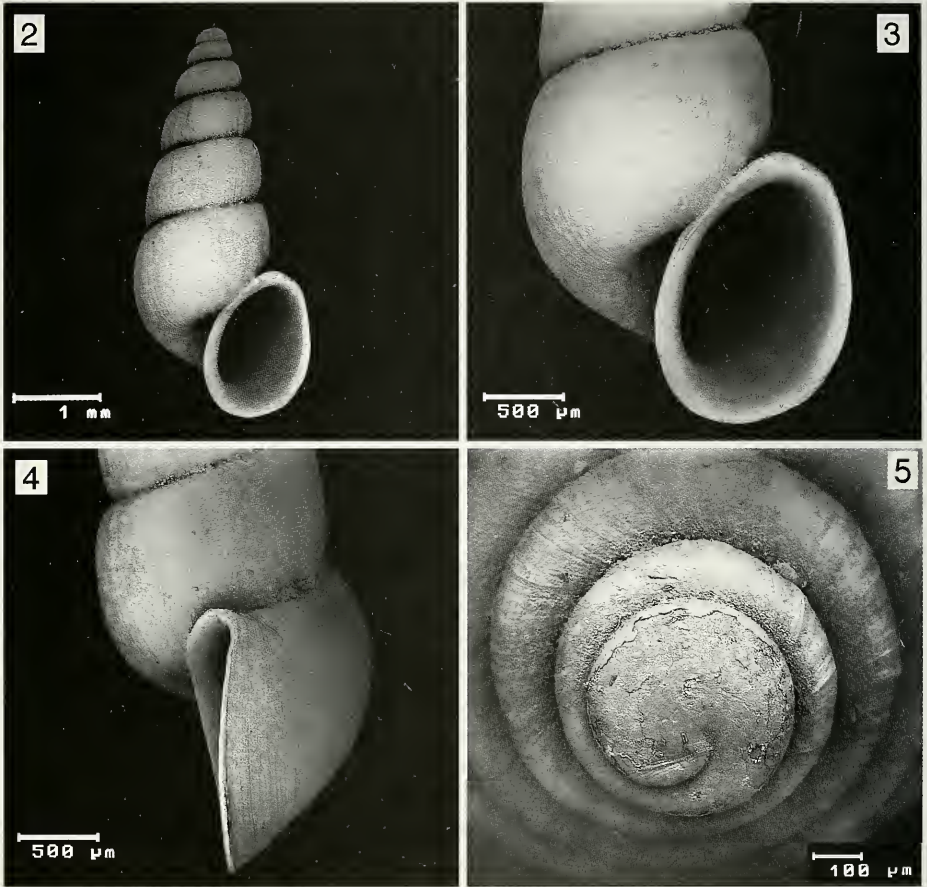
Opercule: presque ovale, vitreux, simple, inerme (1105 à 1240 µm x 690 à 760 µm) (Fig.10).

Cténidium: avec 16 à 20 lamelles branchiales (env. 140 à 200 x 30 à 35 µm); osphradium ovale (env. 210 à 300 x 90 à 125 µm). Bord du manteau sans pédoncule palléal visible (Fig.11).

Intestin: sans boucles distales, les boulettes fécale s'y trouvent en position perpendiculaire. Estomac avec caecum du stylet, sans appendice coecale (Fig. 12).

Oviducte palléal (glande albumineuse et glande capsuleuse) relativement petit (env. 800 µm) (Figs. 12 et 13), en position fortement postérieure par rapport au bord du manteau, par ce fait les orifices de l'oviducte palléal (gonopore) et de l'intestin sont particulièrement distants. Bourse copulatrice sacculiforme (env. 150 à 200 x 70 à 100 µm) collée contre la glande albumineuse. Un réceptacle séminale (env. 90 à 150 x 40 à 70 µm). Avant son insertion dans la glande albumineuse l'oviducte présente des plissements en zig-zag (probablement par la contraction due à l'alcool de conservation) qui forment comme un peloton; une boucle élargie de l'oviducte rénal manque, un canal gonopéricardial n'est pas détectable (Fig. 13).

Organes reproducteurs mâles: inconnus jusqu'ici.



FIGS 2 - 5

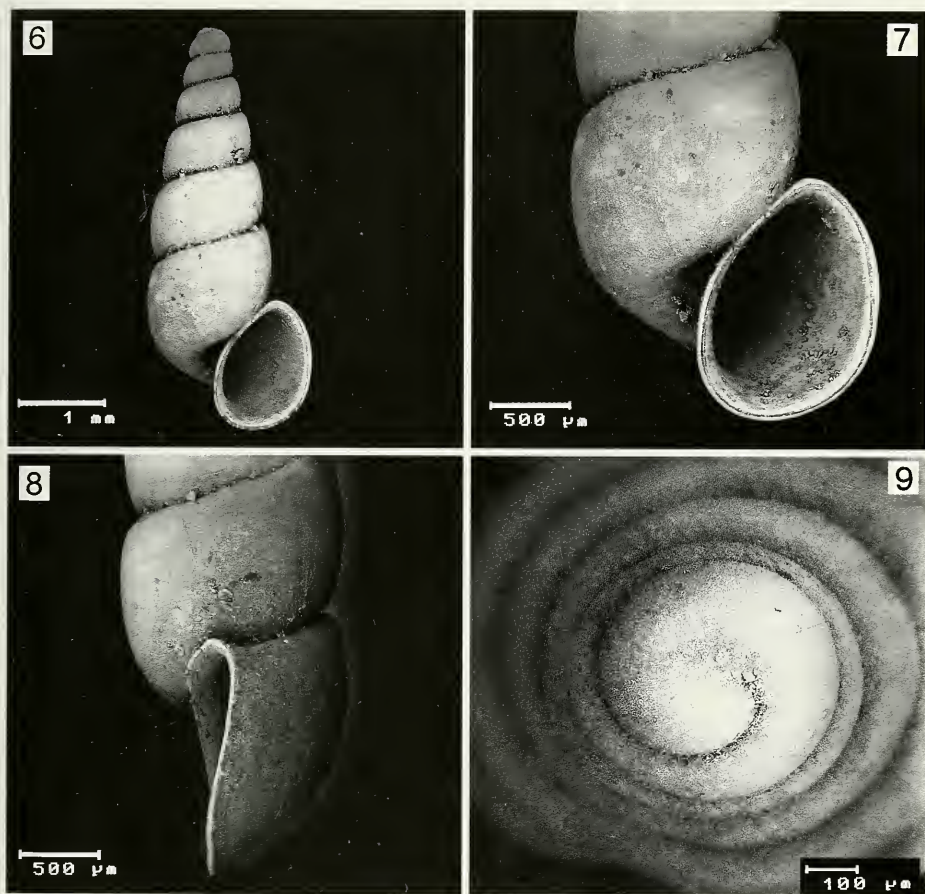
Paladilthia bessoni n.sp., Paratype. Bidalunia, Alçay. Fig. 2 échelle = 1 mm; fig. 3 et fig. 4 échelle = 0.5 mm; fig. 5 échelle = 0.1 mm.

Radula: schéma taenioglosse typiques des Hydrobidés, la dent centrale porte deux paires de basocônes (Fig. 14). Formule: R= 5+1+5 / 2+2; L= 4+1+5; M1= env. 15-17; M2= env. 16.

DIAGNOSE ET DISCUSSION

Les exemplaires examinés étaient tous des femelles, l' anatomie mâle reste ainsi inconnue.

Les exemplaires étudiés ici présentent les caractères distinctifs du genre *Paladilthia* Bourguignat, 1865 définis sur l'espèce type *Paladilthia pleurotoma* Bourguignat, 1865 (BOETERS 1971 et 1973; BOETERS & GITTEBERGER 1990; BODON & GIUSTI, 1991) soit:



FIGS 6 - 9

Paladilhia bessoni n.sp., Uthurbietta, Aussurucq. Fig.6 échelle = 1 mm; fig.7 et Fig.8 échelle = 0.5 mm; Fig.9 échelle = 0.1 mm.

- a. - dent centrale de la radula avec deux paires de basocônes (différence avec les genres à coquille lancéolée conique pouvant atteindre de grandes dimensions: *Bythiospeum* Bourguignat, 1882, *Bythiospeum* [*Paladilhiopsis*] Pavlovic, 1913, *Palacanthilhiopsis*, Bernasconi, 1988);
- b. - oviducte rénal sans boucle élargie et sans canal gonopéricardial (différence comme ci-dessus);
- c. - oviducte palléal relativement petit et distant du bord du manteau (différence comme ci-dessus);
- d. - intestin sans boucle distale en Z (différence comme ci-dessus);

- e. - opercule lisse et inerme, sans longue épine cornée d'environ 500 μm (différence avec *Palacanthilhiopsis* Bernasconi, 1988);
- f. - microsculpture de la coquille pratiquement absente (différence avec *Bythiospeum* [*Paladilhiopsis*] Pavlovic, 1913, *Palacanthilhiopsis* Bernasconi, 1988).

Le pénis de *Paladilhia* a été décrit et figuré uniquement par BOETERS 1971; il ne diffère pas de celui des genres cités ci-dessus et ne présente aucun caractère distinctif.

La présence d'un petit pédoncule palléal, interprété par BOETERS 1971 comme caractère distinctif du genre *Paladilhia*, semble être soit un caractère distinctif au niveau de l'espèce, soit un caractère inconstant comme c'est le cas, par exemple, chez *Hydrobia truncata* Vanatta, 1924 (DAVIS, MCKEE & LOPEZ 1989).

Paladilhia bessoni représente ainsi une nouvelle espèce de *Paladilhia* facilement reconnaissable à ses dimensions exceptionnelles, à l'absence d'une "encoche pleurotomoidale" de l'ouverture, et au bord externe de l'ouverture arqué mais peu projeté en avant, ce qui la distingue de la *Paladilhia pleurotoma* Bourguignat, 1865 des alluvions du Lez près Montpellier (= *Paladilhia moitessieri* Bourguignat, 1865 = *Paladilhia gervaisiana* Bourguignat, 1865 = *Paladilhia masclaryana* Bourguignat, 1866 = *Paladilhia bourguignati* PAL., 1866).

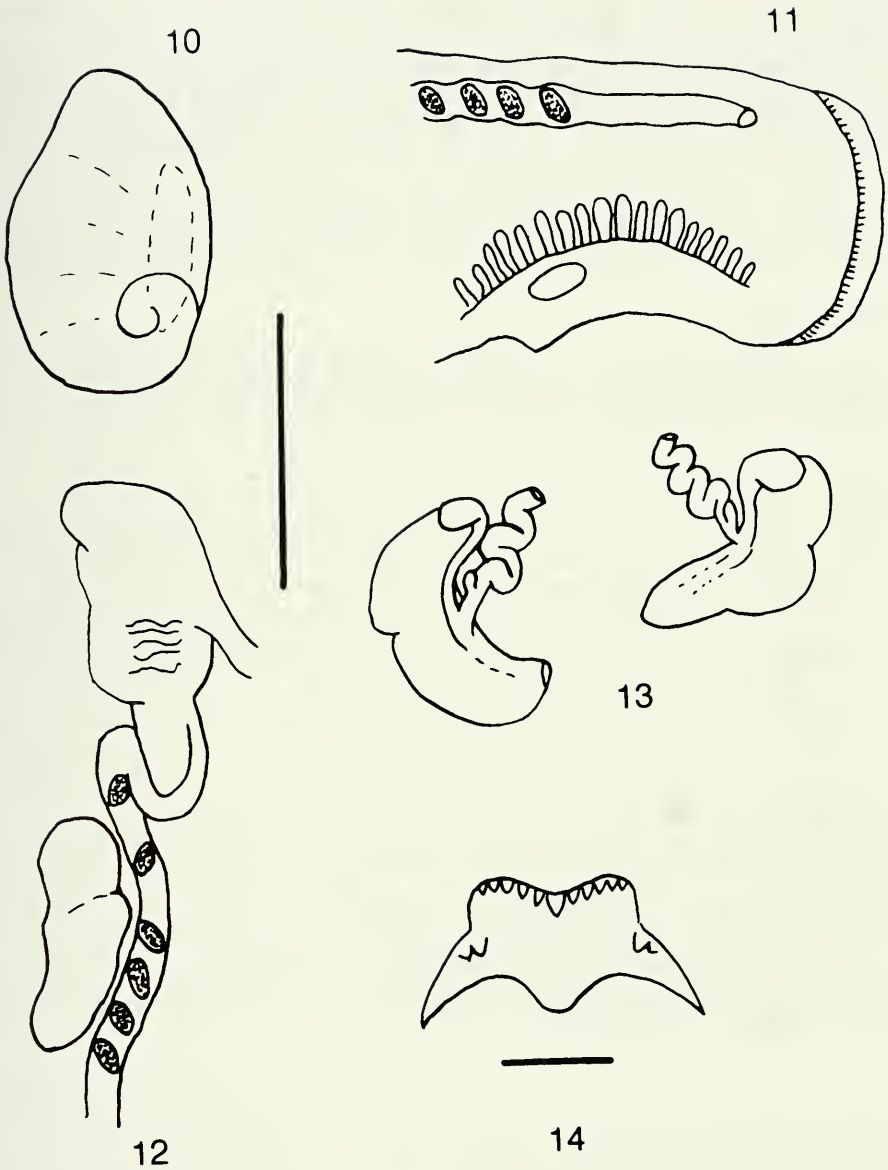
La biométrie d'un lot de *Paladilhia pleurotoma* de la localité type (forage de l'aquifère du Lez à Triadou, Hérault; leg. Malard 1992) était caractérisée par les paramètres suivants:

TAB. 2
Biométrie de la coquille de *Paladilhia pleurotoma*

	lot du Lez, locus typicus
n	11
L (mm)	3.39 \pm 0.24
L min. et max. (mm)	2.92 et 3.83
D (mm)	1.44 \pm 0.15
D min. et max. (mm)	1.07 et 1.62
Rapport L/D	2.37 \pm 0.18
L/D min. et max.	2.04 et 2.73

Paladilhia conica Paladilhe, 1867 (= *Paladilhia pleurotoma* var. *conica* in: GERMAIN 1931), également décrite des alluvions du Lez près Montpellier diffère de *Paladilhia bessoni* par ses dimensions réduites (L = 2.5 mm; D = 1.5 mm), par sa forme trapue, par sa fente pleurotomoidale profonde et bien développée.

Paladilhia bessoni ne pourrait non plus être identifiée avec la "*Lartetia*" *umbilicata* Locard, 1901 de la grotte de Trabuc, Gard, dont l'identité reste nébuleuse en l'absence de données sur son anatomie, sa radula, son opercule. D'après la description originale, la coquille mesurerait 4.0 à 4.5 mm x 1.75 à 2.0 mm; les dimensions moyennes d'un lot de la localité type en ma possession sont bien plus modestes: L = 2.75 mm (Lmax. 3.12 mm) et D = 1.37 mm (Dmax. 1.53 mm). L'espèce est caractérisée par un ombilic ouvert et profond et par l'absence de microsculpture.



FIGS 10-14

Paladilhia bessoni n. sp., Paratypes. Bidalunia, Alçay. Fig. 10 Opercule; fig. 11 Ctenidium et Osphradium; fig. 12 Estomac, intestin, oviducte palléal; fig. 13 Oviductes palleaux; fig. 14 Dent centrale de la radula. Figs. 10-13 échelle = 1000 μ m; fig. 14 échelle = 10 μ m.

L'anatomie de *Paladilhia bessoni* est très semblable à celle de *Paladilhia pleurotoma* de la source et aquifère du Lez (BOETERS 1971 & 1973; BODON & GIUSTI 1991; BERNASCONI, inédit). Notamment la radula de *P. bessoni* est semblable à celle de *Paladilhia pleurotoma* (fig. 19 dans BODON & GIUSTI 1991); la dent centrale ne diffère que par des dimensions un peu plus grandes (26 µm entre les ailes, 12 µm en hauteur; 14 µm au bord supérieur dentelé chez *P. bessoni*, contre 19 µm resp. 8 µm resp. 9 µm chez *P. pleurotoma*). De plus, *Paladilhia pleurotoma* n'a que 11 lamelles branchiales et possède un tentacule palléal; le peloton de plis de l'oviducte rénal semble propre à *Paladilhia bessoni* (à moins d'être dû à une rétraction artificielle).

DISTRIBUTION

Paladilhia bessoni est la première *Paladilhia* trouvée dans les Pyrénées. En effet *Paladilhia pleurotoma* n'est connue que de l'Hérault (bassin du Lez au nord de Montpellier, localité type) et des Bouches-du-Rhône (Sénas) (BOETERS 1973).

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Remarks on the genus *Metriomantis* Saussure & Zehntner and descriptions of two new species and a new genus: *Rehniella* gen. n. (Insecta Mantodea).

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Remarks on the genus *Metriomantis* Saussure & Zehntner and descriptions of two new species and a new genus: *Rehniella* gen. n. (Insecta Mantodea). - The constitutive members of *Metriomantis* Saussure & Zehntner are re-examined. The genus includes six species: *M. cupido* Saussure, *M. ovata* Saussure & Zehntner, *M. paraensis* Giglio-Tos, *M. pilosella* Giglio-Tos, *M. occidentalis* n. sp. and *M. boliviana* n.sp. A new genus, *Rehniella*, is proposed for *Metriomantis planicephala* Rehn. *Metriomantis amplipennis* (Stål) is re-assigned to *Photina*. *Metriomantis pilosa* Chopard is a junior subjective synonym of *M. ovata*.

Key-words: Systematic - Mantodea - Mantidae - Photininae - neotropics.

INTRODUCTION

The genus *Metriomantis* Saussure & Zehntner, 1894 is one of the poorly known American mantids. Eight species were described from neotropical rain-forest (Fig. 1). They are known from few specimens, and some in one sex only. Therefore, the species definitions of older authors lack detail. A study of a large number of specimens of *Metriomantis*, including type material of *Metriomantis cupido* Saussure, 1869; *Metriomantis ovata* Saussure & Zehntner, 1894; *Metriomantis planicephala* Rehn, 1916; *Metriomantis gracilicollis* Beier, 1931 and a cotype of *Metriomantis pilosa* Chopard, 1912 provided new information on the group.

MATERIALS AND METHODS

The material examined is deposited in the following institutions: Muséum d'histoire naturelle de Genève (MHNG); Academy of Natural Sciences of Philadelphia (ANSP); Muséum National d'histoire naturelle Paris (MNHN); Zoologische Staatssammlung Munich (ZSM); Pontificia Universidad del Ecuador, Departamento de Biología y Museo (QCAZ); Facultad de Ciencias, Universidad de la Republica de Montevideo (FSRM); Zoologisches Museum Hamburg (ZMH).

Drawings were made using a Leica MZ8 stereomicroscope and camera lucida. Anatomical terminology follows SNODGRASS (1935), except for the male genitalia that follows LA GRECA (1954).

SYSTEMATICS

Saussure & Zehntner erected the genus *Metriomantis* for *Cardioptera cupido* Saussure, 1869 presumably from Brazil; and described *Metriomantis biramosa* from Brazil and *Metriomantis ovata* from French Guyana (Cayenne). The descriptions of these species were based a single female each. Five additional species were described subsequently: *M. pilosa* Chopard, 1912 from French Guyana, *M. pilosella* Giglio-Tos, 1915 from Guyana, *M. paraensis* Giglio-Tos, 1915 *M. planicephala* Rehn, 1916 and *M. gracilicollis* Beier, 1931 from Brazil. GIGLIO-TOS (1927) included following species: *M. cupido*, *M. ovata*, *M. pilosa*, *M. pilosella*, *Photina amplipennis* Stål, 1877 and *Photina breviceps* Stål, 1877 from Brazil. He transferred *M. biramosa* to *Photinella* Giglio-Tos, and did not mention *M. planicephala*. BEIER (1935) considered *Metriomantis* as a subgenus of *Photina* Burmeister, 1838 and included following species: *M. cupido*, *M. ovata*, *M. amplipennis*, *M. pilosa*, and *M. paraensis*; he transferred *M. breviceps* and *M. gracilicollis* to *Hicetia* Saussure & Zenthner, 1894, the latter species as a synonym of *Hicetia goeldiana* Saussure & Zenthner. Recently TERRA (1995) followed the classification of BEIER (1935).

As regards the downgrading of *Metriomantis* to the level of sub-genus, it is my opinion that *Metriomantis* must be maintained at the genus level because it has particular features that distinguish it clearly from *Photina*. These characteristics in the males concern: a great slenderness of the pronotum, the presence of six spines plus apical spine at the external margin of the anterior femora, the presence of long dense pubescence on the middle and posterior legs and the different shape of the copulatory apparatus.

A study of the type material of *M. breviceps* and *M. gracilicollis* (ZSM), showed consistence with BEIER (1935). Both species share with members of *Hicetia* Saussure & Zehntner a slender pronotum, very transverse frontal shield and lack of long hairs on the middle and posterior legs.

A large series of 30 specimens (ANSP) of both sexes, from French Guyana, British Guyana, and Brazil, certainly conspecific since they do not show conflicting differences between sexes, some of them were collected in the same locality (Kartabo in British Guyana) and at the same time, was compared with a male cotypus of *M. pilosa* (ANSP) and the female holotype of *M. ovata* (MHNG): the male specimens possess the characters of *M. pilosa*. (Figs 16, 18, 19, 22, 23, 24, 25, 27); the female specimens have the characters of *M. ovata* (Figs 12, 14). Thus *M. pilosa* is a junior subjective synonym of *M. ovata*, **syn. nov.**

Metriomantis planicephala Rehn, 1916 has not been mentioned since described. The type material (ANSP) and additional specimens I have examined exhibit following diagnostic characters: a stocky shape of the pronotum (Fig. 31), the presence of small pronotal tubercles, and the copulatory apparatus as in Figs 32, 33, 34. These charac-



FIG. 1

Geographic distribution of the species of the genus *Metriomantis* Sauss. & Zehnt.: ● *M. occidentalis* sp. n.; ▲ *M. paraensis* Giglio-Tos; ■ *M. boliviana* n. sp.; ☆ *M. cupido* Sauss.; □ *M. pilosella* G-Tos; ★ *M. ovata* Sauss. & Zehnt.

ters are distinctive from *Metriomantis*, therefore it is necessary to erect for this species a new genus *Rehniella* n. gen..

In 1887 STÅL based *Photina amplipennis* on a female from Brazil, characterised by the presence of six spines on the external margin of anterior femora, it was initially assigned to *Cardioptera vitrea* by SAUSSURE (1871). GIGLIO-TOS (1927) transferred this species to *Metriomantis*, described the male (from Bolivia) which differed from the holotype by the presence of six spines plus an apical one rather than five spines. Thus *M. amplipennis*, with five external femoral spines, is a member of *Photina*. The male, misidentified by Giglio-Tos as *Metriomantis amplipennis*, is likely a member of *Photinella* Giglio-Tos because it shares with members of that genus a shorter pronotum, the shape of the copulatory apparatus (Fig. 29) and the absence of dense pubescence on the middle and hind legs.

In conclusion, the genus *Metriomantis* includes with certainty the 6 following species: *M. cupido*, *M. ovata*, *M. paraensis* and *M. pilosella*, and two new species described below.

***Metriomantis occidentalis* sp. n.**

Figs 1, 2, 3, 9, 13, 17, 26

Holotype, male: Ecuador, Station Yasuni 400 m (Napo), 23.9.1995 (leg. E. Baquero, F. Maza,QCAZ).

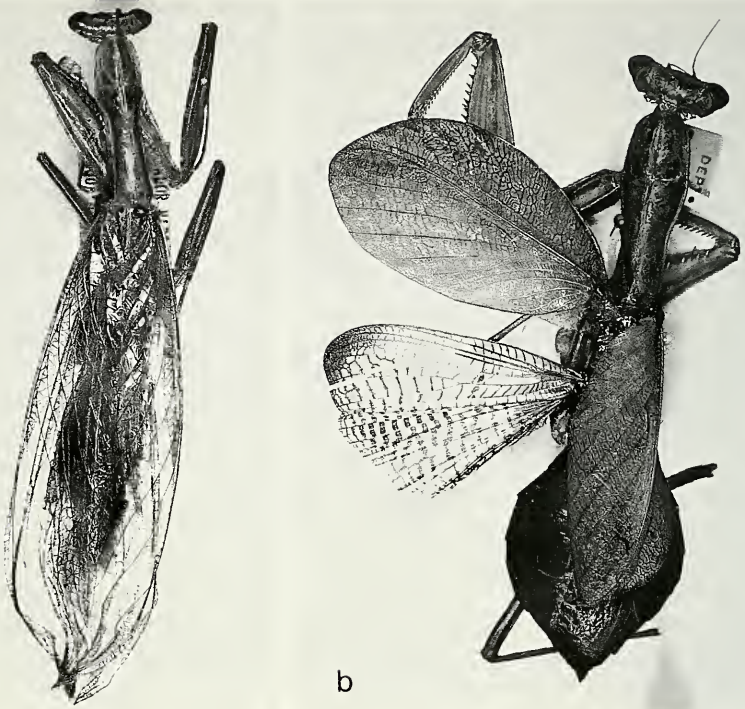


FIG. 2

Metriomantis occidentalis sp. n.: a, male holotype; b, female allotype.

Allotype, female: Colombia (MNHN).

Additional material examined: Ecuador, Loreto (Napó) 15.3.1996, 1 male (leg. Lombardo, coll. author).

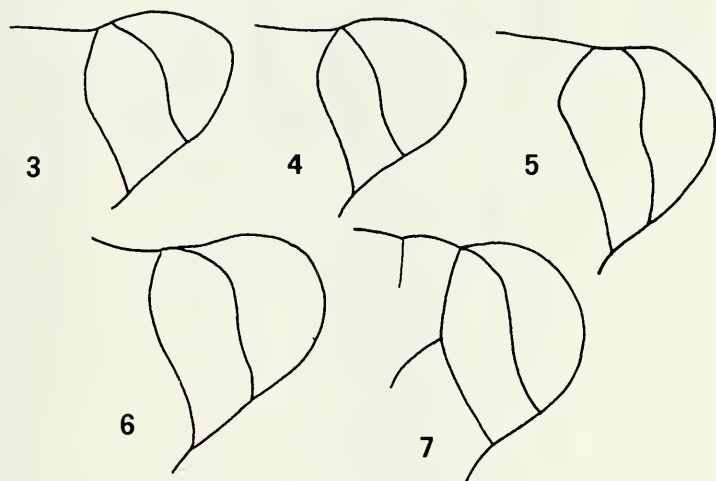
DIAGNOSIS

Rather slender in appearance, uniformly green. Head with oblong eyes. Middle and hind legs with long pubescence, male copulatory apparatus with long narrow process at anterior right margin of ventral phallomere.

DESCRIPTION

Holotype

Head- about 1.7 times as wide as pronotal supracoxal dilatation; fastigium of vertex curved upwards, with big, ovoid eyes (Fig. 3); frontal shield transverse, pentagonal, with upper margin forming obtuse angle; antennae long, with short pubescence at apex of each segment. Maxillary and labial palpi ochraceous, with black inner surface of last segment.



FIGS 3-7

Head of the male of: 3, *M. occidentalis* sp. n.; 4, *M. boliviana* sp. n.; 5, *M. ovata* Sauss. & Zehnt. from Santarem, French Guyana; 6, *M. pilosa* Chop. cootypus; 7, *R. planicephala* (Rehn).

Thorax- pronotum (Fig. 9) ochraceous, moderately elongate, about 5 times as long as its minimum width; lateral margins smooth; supracoxal dilatations elliptical and not marked; metazone/prozone ratio: 2.4. Anterior legs ochraceous: anterior coxae about 0.68 time as long as pronotum, prismatic with triangular section; with smooth internal margins; internal apical lobes divergent. Anterior femora long, about 4 times as long as maximum width; superior margin smooth; external margin with 6 ochraceous spines with black apices; internal margin with 16-18 spines of which the larger ones have inner dark surface in the holotype, while in the other male specimen they have only black apices. Anterior tibiae ochraceous with 15 external spines and 18 internal spines. Mid and hind legs moderately slender, with long dense soft pubescence. Metatarsi longer than combined total length of other segments. Hind wings well developed, extending well beyond abdominal apex. Tegminae hyaline, with green veins, 3.46 times as long as their maximum width; costal area moderately narrow, with veins parallel.

Abdomen- cylindrical and covered with soft pubescence. Supranalplate triangular. Cerci long and cylindrical, subgenital plate oval and with two well developed styles.

Copulatory apparatus- well sclerotized; ventral phallomere (Fig. 17) oval, longer than wide, without distal process but with long narrow process at anterior right margin. Ventral lamina of left phallomere (Fig. 26) with strong process, projecting down; phalloid apophysis not well developed.

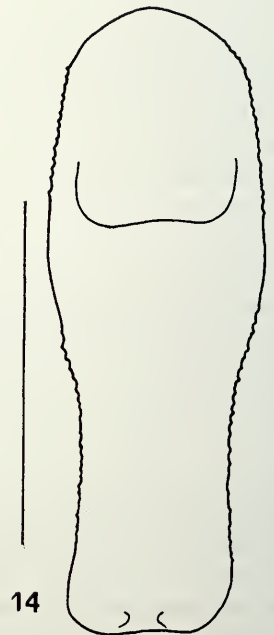
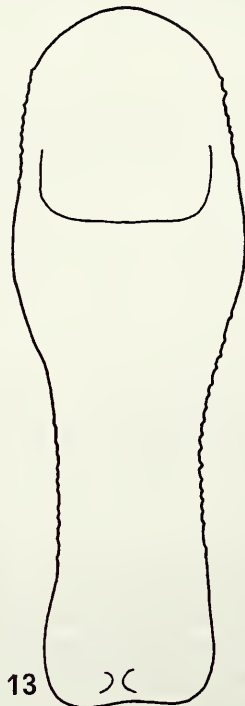
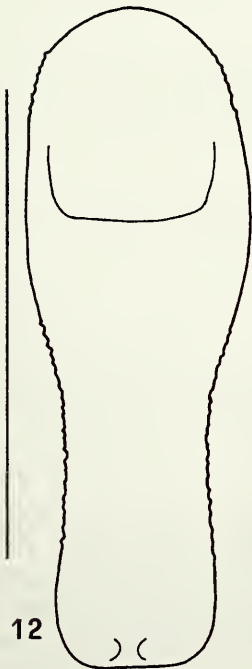
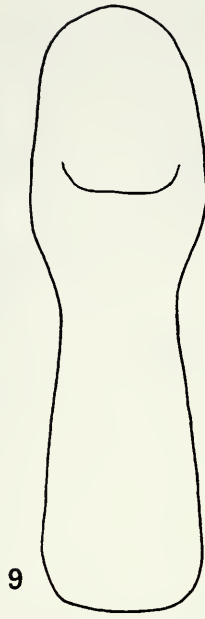
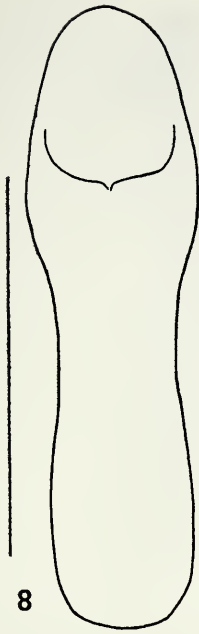




FIG. 15
Holotype of *M. boliviana* sp. n.

Measurements (in mm).- Length body 49; width of head 7.3; length of pronotum 14.8-15.2; length of prozone 4.4; width of supracoxal dilatation 4-4.3; minimum width of pronotum 2.8-3.2; length of fore coxae 10.1; length of fore femora 13; length mid femora 15; length mid tibia 11; length hind femora 16; length hind tibia 14; length tegminae 45.

Allotype

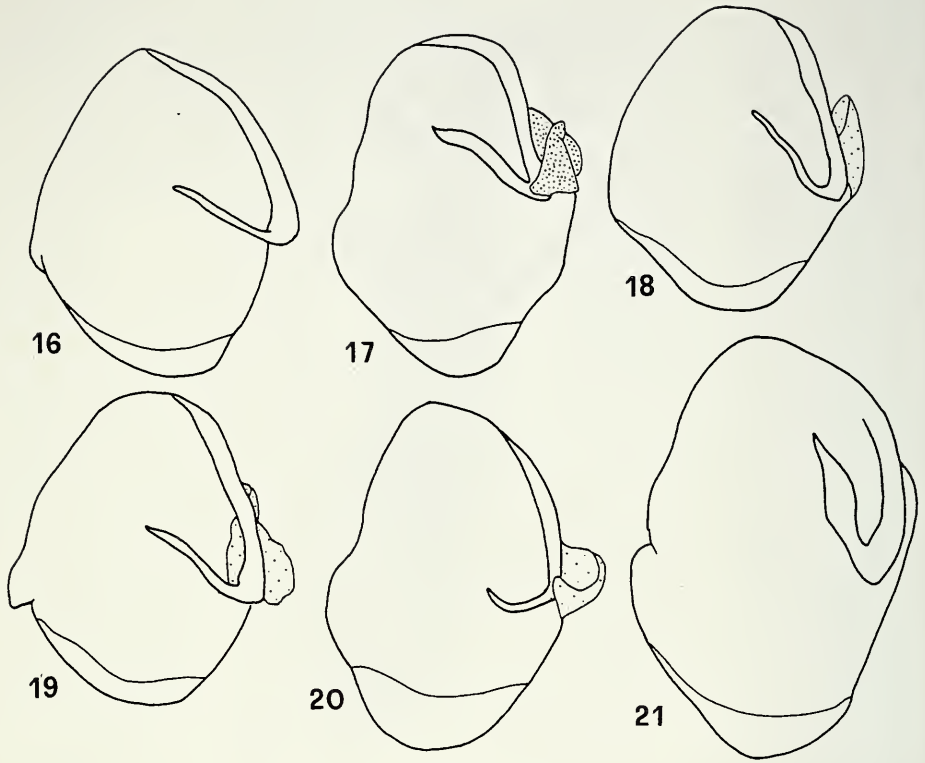
Head- very similar to that in male, broad, 1.56 times as wide as pronotal supracoxal dilatation; eyes oval; vertex curved; frontal shield transverse.

FIGS 8-11

Pronotum of the male of: 8, *M. boliviana* n. sp.; 9, *M. occidentalis* n. sp.; 10, *M. ovata* Sauss. & Zehnt. from Santarem, French Guyana; 11, *M. pilosa* Chop., cootypus. Scale bars = 5 mm.

FIGS 12-14

Pronotum of the female of: 12, *M. ovata* Sauss. & Zehnt., typus; 13, *M. occidentalis* sp. n.; 14, *M. ovata* Sauss. & Zehnt. from Kartabo, British Guyana. Scale bar = 5 mm.



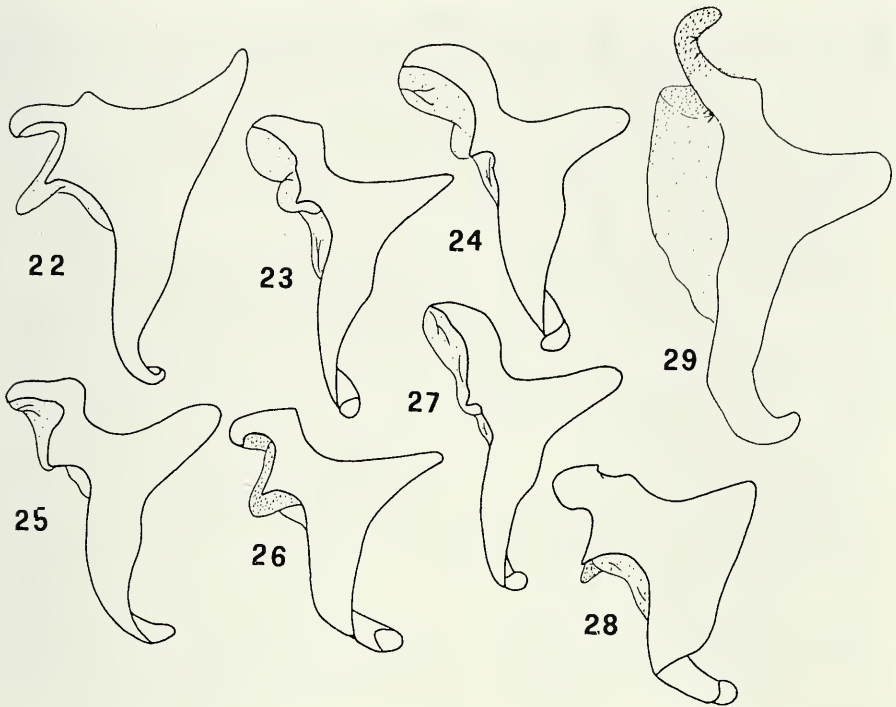
FIGS 16-21

Ventral phallomere of: 16. *M. ovata* Sauss. & Zehnt. from Santarem, French Guyana; 17. *M. occidentalis* sp. n.; 18. *M. ovata* Sauss. & Zehnt. from Carvoeiro, Brasil; 19. *M. ovata* Sauss. & Zehnt. from Kartabo, British Guyana; 20. *M. pilosa* Chop. cootypus; 21. *M. boliviana* sp. n..

Thorax- pronotum (Fig. 13) robust, 4.7 times as long as its minimum width; supra-coxal dilatation not well developed; lateral margins with small teeth. Anterior legs robust and ochraceous; anterior coxae 0.77 times as long as pronotum, with small tubercles in internal margins. Anterior femora about 3.7 times as long as maximum width. Wings well developed, not reaching the abdominal apex. Tegminae green, oval, curved at apex; costal area about 0.6 times as wide as discoidal area. Meta-thoracic wings longer than the tegminae; transversal yellow strips present at level of transversal veins of discoidal area. Middle and hind legs without pubescence.

Abdomen- ochraceous; supranal plate triangular with acute apex.

Measurements (in mm).- Length body 52; width of head 9.2; length of pronotum 16.8; length of prozone 5.8; width of supra-coxal dilatation 5.6; minimum width of pronotum 3.8; length of fore coxae 13; length of fore femora 15.5; length mid femora 17; length mid tibia 15; length hind femora 18; length hind tibia 16; length tegminae 28.



FIGS 22-29

Ventral lamina of the left phallomere of: 22, *M. pilosa* Chop. cootypus; 23, *M. ovata* Sauss. & Zehnt. from Kartabo British Guyana; 24, *M. ovata* Sauss. & Zehnt. from Carvoeiro, Brasil; 25, *M. ovata* Sauss. & Zehnt. from Santarem, French Guyana; 26, *M. occidentalis* sp. n.; 27, *M. ovata* Sauss. & Zehnt. from Oyapok, French Guyana; 28, *M. boliviana* sp. n.; 29, *Photinella brevis* (Rehn) from Bolivia.

Metriomantis boliviana sp. n.

Figs 1, 4, 8, 15, 21, 28

Holotype, male: Bolivia, Region Chapare, 28.8.1945 (leg. Zischka, ZSM).

Paratype, male, same data as holotype.

Additional material examined: Bolivia, R. Japacani 1 male (leg. J. Steinbach, ANSP).

DIAGNOSIS. Similar in colour and shape to *M. occidentalis*, but with eyes less acute and shape of the copulatory apparatus different.

DESCRIPTION

Holotype

Head- about 1.86 times as wide as pronotal supracoxal dilatation; fastigium of vertex moderately curved upwards; ovoid eyes with a moderately acute apex (Fig. 4). Frontal shield transverse, upper margin moderately curved; antennae long, with short pubescence at apex of each segment; maxillary and labial palpi ochraceous with a shiny dark strip on their inner surface.

Thorax- pronotum (Fig. 8) ochraceous and rather elongate; about 5 times as long as minimum width; lateral margins smooth, supracoxal dilatation oval; metazone/prozone ratio 2.45. Anterior legs ochraceous and robust: anterior coxae about 0.72 times as long as pronotum, prismatic with triangular section, with smooth margins and divergent internal apical lobes. Anterior femora 4 times as long as maximum width; anterior margin smooth; external margin with 6 ochraceous spines with black apex; internal margin with 14 spines, of which those big with black inner surface. Anterior tibiae ochraceous with a horizontal black line and with 14-15 external spines and 18 internal spines. Mid and hind limbs well developed, delicate in appearance, and as former species with long dense pubescence. Wings well developed, extending well beyond abdominal apex. Tegminae hyaline, with green veins, about 3.60 times as long as their maximum width; costal area narrow, with veins parallel.

Abdomen- abdomen cylindrical, with long soft pubescence; supranal plate triangular; subgenital plate large, with two well developed styles; Cerci long and cylindrical.

Copulatory apparatus- copulatory apparatus well sclerotized: ventral phallomere oval (Fig. 21) without distal process, but with a long anterior process, larger at about half its length and with an acuminate apex. Ventral lamina of left phallomere (Fig. 28) with a well developed anterior process; phalloid apophysis not well developed.

Measurements (in mm): Length body 53-55; width of head 6.9-7.3; length of pronotum 15; length of prozone 4.2-4.3; width of pronotum supracoxal dilatation 3.8-4.3; length of fore coxae 10.4-10.7; length of fore femora 11.8-12.2; length mid femora 14-15; length mid tibia 11-12; length hind femora 14-15; length hind tibia 12-13; length tegminae 43-45.

REMARKS: *Metriomantis boliviana* is very similar to *M. occidentalis*, but differs in the following characters: the eyes are less acute, the lateral margins of the prozone are more rounded and the shape of the copulatory apparatus is distinctive. These two new species may be distinguished easily from *M. ovata* and *M. pilosa* by shape of the pronotum (Figs 8-14), genitalia (Figs 16-28) and oblong eyes (Figs 3-7).

Rehniella gen. n.

Figs 7, 30, 31, 32, 33, 34

Type species. *Metriomantis planicephala* Rehn, 1916

Etymology. Dedicated to J.A.G. Rehn for her contribution to the knowledge of Mantids.

Diagnosis. Rather stocky in appearance, uniformly green. Head with rounded eyes. Tegminae with the opaque costal area. Middle and hind legs with dense long pubescence. Copulatory apparatus with ventral lamina of left phallomere with a long narrow lateral process.

DESCRIPTION

Head- Head moderately broad, with rounded eyes (Fig.7). Frontal shield pentagonal.

Thorax- pronotum robust (Fig. 30), rather short and enlarging in front; dorsal surface with tubercles, bigger in female; lateral margins smooth in the males and denticulate in the female; supracoxal dilatation is not well developed. Anterior legs robust:

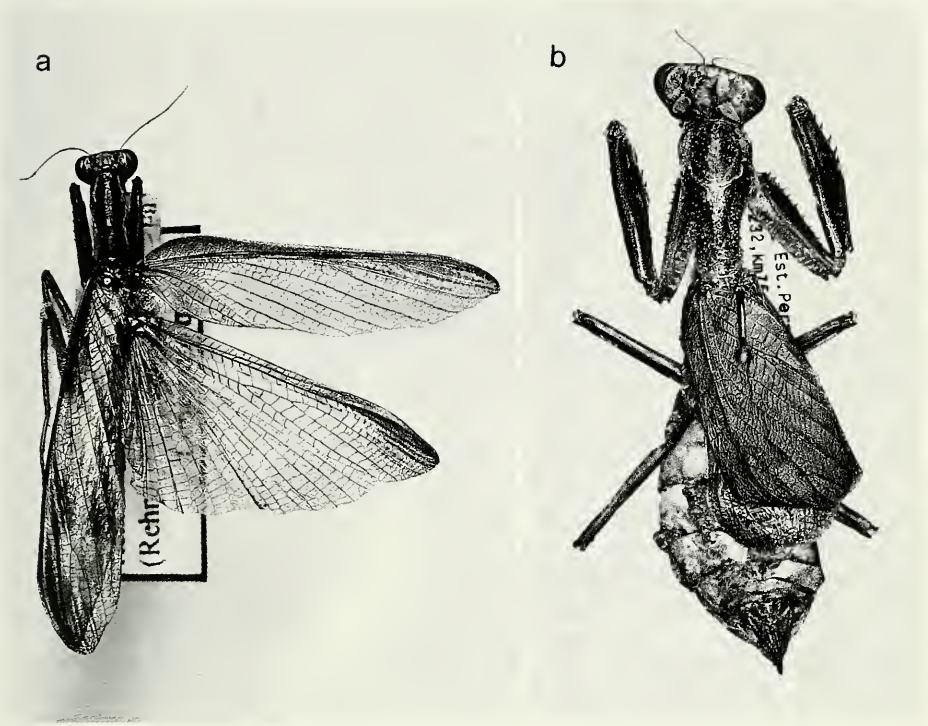


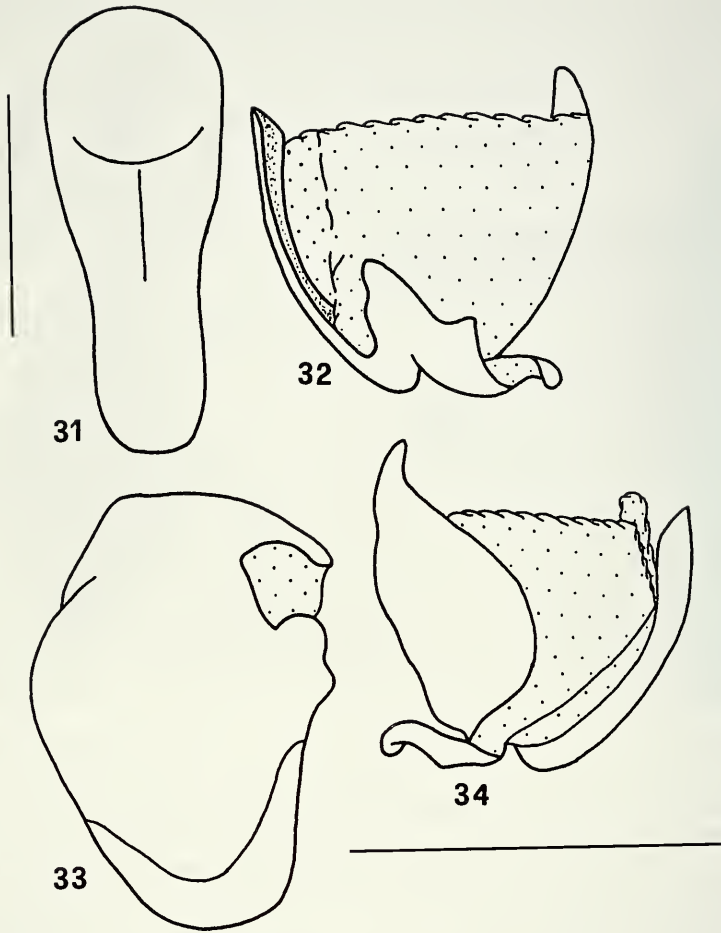
FIG. 30

Rehniella planicephala (Rehn): a, male; b, female.

anterior coxae extending well beyond the posterior margin of pronotum, with weakly recurved spines; inner surface with a series of small tubercles, ivory in colour, and of various sizes. Anterior femora robust; superior margin smooth; external margin with 6 spines; internal margin with 13 spines, with a small ivory callouses at base of big spines. Anterior tibiae with 17-18 external spines and 14 internal spines. Mid and hind legs rather robust; smooth in female, very hirsute in male. Hind wing well developed, extending well beyond the apex of abdomen in male, short in female. Costal area, and a part of discoidal area of tegmina in the male opaque with numerous hyaline windows. Metathoracic wing hyaline, with numerous horizontal opaque strips.

Abdomen- abdomen cylindrical; supranal plate triangular; cerci cylindrical, last one subconical.

Male copulatory apparatus- well sclerified. Ventral phallomere (Fig. 32) without distal processes. Left phallomere (Figs 33,34) with a membranous phalloid apophysis; dorsal lamina well developed; ventral lamina reduced in median part, with long and narrow lateral process that derives from left posterior angle of ventral lamina.



Figs 31-34

Rehniella planicephala (Rehn) male: 31, pronotum; 32, ventral phallomere; 33, ventral view of the left phallomere; 34, dorsal view of the left phallomere. Scale bars: 31= 5 mm; 32, 33, 34 = 2 mm.

REMARKS. This genus is very similar to *Metriomantis* and the most substantial differences concern: the shape of the pronotum (Figs 8-10, 31) that in *Rehniella* is more robust, enlarging in front and with the dorsal surface scattered of small tubercles; the shape of the ventral lamina of left phallomere (Figs 22-28, 33) that in *Rehniella* is reduced in median part and with a long, narrow lateral process.

Rehniella planicephala (Rehn, 1916) (nov. comb.)*Metriomantis planicephala* Rehn, 1916 42: 259.

Holotype female, Ceará Mirim, State of Rio Grande do Sul, Brazil (Stanford Expedition: leg. W. Mann, ANSP).

Allotype male, same data as the type (ANSP).

Additional material examined. Rio Grande, Bahia (Brazil) 30.XII.1907 1 male (leg. Haseman, ANSP); Bahia; Feira de Santana 12.III.1981, 3 males (leg. Roppa, Carbonell, Roberts, ANSP); Bahia, 800 m, 17-19.XI.1974, 1 male (Roberts, Carbonell, ANSP); Est. Pernambuco Br 232, Km 75, cerca de Gravatá, X.1994, 2 females (leg. M. S. Souza, C. S. Carbonell, FSRM).

ACKNOWLEDGEMENTS

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***Molostromgylus mbopi* sp.n. (Nematoda, Trichostrongylinea, Molineoidea), parasite de *Molossops* spp. (Chiroptera, Molossidae) au Paraguay.**

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***Molostromgylus mbopi* n. sp. (Nematoda: Trichostrongylinea, Molineoidea) parasite of three *Molossops* species (Chiroptera, Molossidae) from Paraguay.** - A new species of the genus *Molostromgylus* parasite of *Molossops planirostris*, *M. abrasus* and *M. temmincki*, from Paraguay is described. It differs from the sole species of the genus, *Molostromgylus acanthocolpos* (DURETTE-DESSET & VAUCHER 1996) by several characters: cephalic plates absent; deirids posterior to excretory pore level, the synlophe with only 2 alae and 2 ventral ridges in male, different pattern of the synlophe along the whole body in female; caudal bursa with rays 9 arising from dorsal ray prior to or at same level as division of the latter, rays 10 shorter than rays 9, a few, large spines present in ovejector region, tail about twice as long as wide at its basis in female.

Key-words: Nematoda - Molineoidea - Molineidae - Anoplostrongylineae - *Molostromgylus* - molossid bats - Paraguay.

INTRODUCTION

Nous poursuivons dans ce travail l'étude des Nématodes Trichostrongles parasites des Chauves-souris du genre *Molossops* récoltées lors des différentes missions du Muséum de Genève au Paraguay à partir de 1979. Nous décrivons une deuxième espèce du genre *Molostromgylus* Durette-Desset & Vaucher, 1996, récoltée chez *Molossops temmincki*, chez *M. planirostris* et chez *M. abrasus*.

MATÉRIEL ET MÉTHODES

Les Nématodes ont été fixés au formol à 4% et conservés dans de l'alcool à 70°. Ils sont déposés dans les collections du Muséum de Genève (INVE) et dans celles du Muséum national d'histoire naturelle de Paris (KP). Les données complètes concernant les mesures des spécimens sont déposées dans la bibliothèque du laboratoire de Biologie parasitaire du Muséum de Paris sous le n° 879 KP, N 17900.

Le synopse est étudié selon la méthode de DURETTE-DESSET (1985). La description du synopse étant très complexe chez la femelle, la nomenclature suivante a été utilisée pour simplifier la description: le nombre de crêtes dorsales est indiqué en premier suivi du nombre de crêtes ventrales. On aura par exemple le stade 2/3, c'est-à-dire 2 crêtes dorsales et 3 crêtes ventrales. Ces stades ne tiennent pas compte des ailes.

Molostromylylus mbopi n.sp.

MATÉRIEL-TYPE:

- Chez *Molossops planirostris* (intestin grêle): Paraguay, prov. Misiones, Aroyo Aguaray, 20 km au sud de San Juan Bautista, mâle holotype (24533 INVE), femelle allotype (24534 INVE), 5 mâles, 4 femelles, 2 femelles immatures paratypes (24535 INVE), 16/10/1982.

Autre matériel:

- Chez *Molossops planirostris*: prov. Concepcion, 20 km au sud de l'estancia Estrella, 1 femelle (24536 INVE), 16/10/1979; prov. Misiones, rio Aguaray, 1 mâle, 1 femelle (24537 INVE), 16/10/1982; 4 mâles, 6 femelles (24538 INVE), 17/10/1982; prov. Alto Paraguay, estancia Laguna General Diaz, 3 mâles, 1 femelle (880 KP), 19/11/1987.

- Chez *Molossops abrasus*: prov. Alto Parana, Puerto Palma, 6 mâles, 3 femelles (24540 INVE), 12/09/1981; 4 mâles, 2 femelles (179 KP), 12/09/1981; 2 mâles, 2 femelles (24542 INVE), 12/09/1981; 1 mâle, 1 femelle (184 KP), 12/09/1981; 2 mâles, 3 femelles (24544 INVE), 12/09/1981; 2 mâles, 3 femelles (24545 INVE), 12/09/1981; prov. Cordillera, Caballero, Aroyo Paso Ybucu, 1 mâle, 1 partie postérieure femelle (272 KP), 25/03/1985.

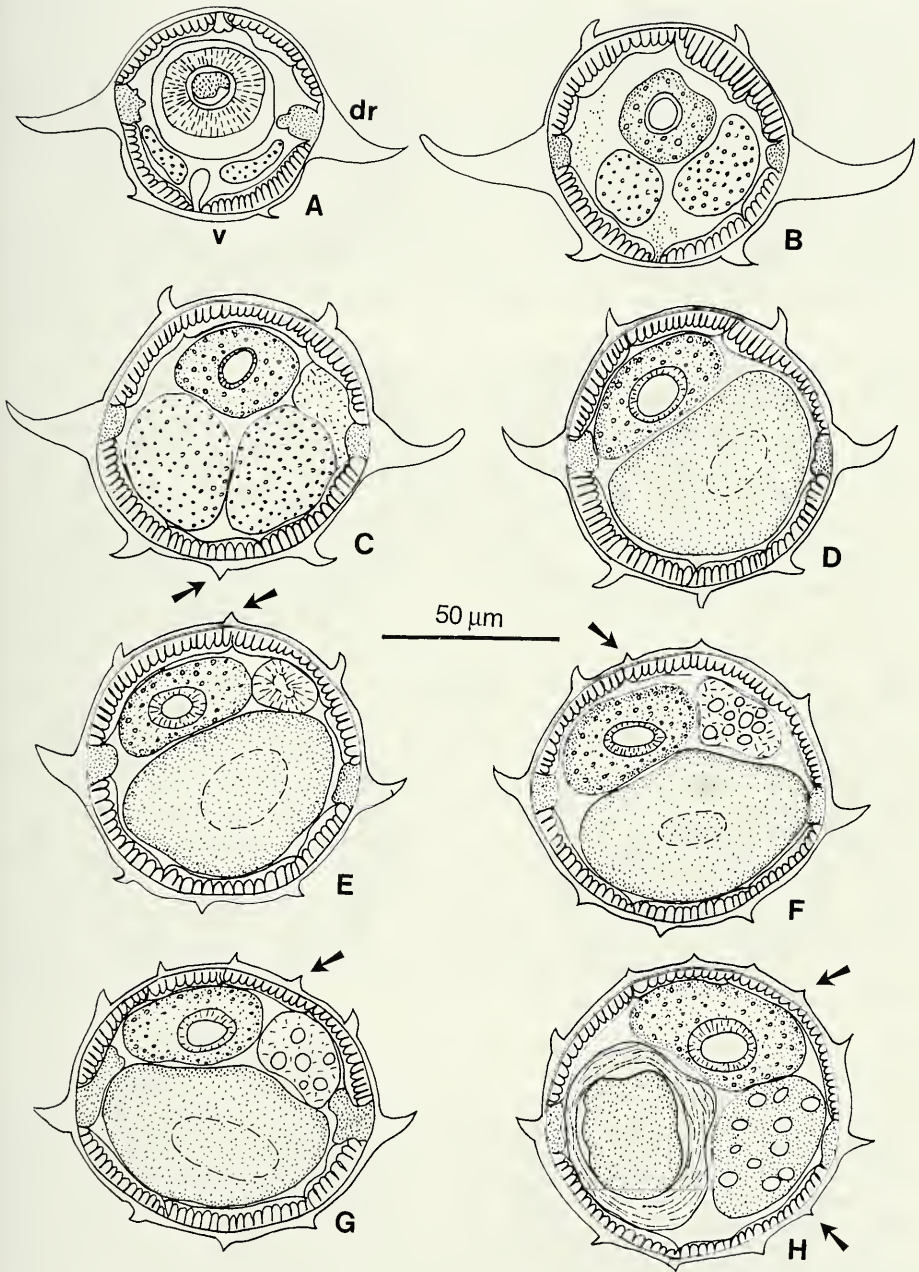
- Chez *Molossops temmincki*: prov. Presidente Hayes, 23 km à l'est de Pozo Colorado, 1 femelle (25128 INVE), 7/10/1983, coparasite d'un mâle de *Molostromylylus acanthocolpos*.

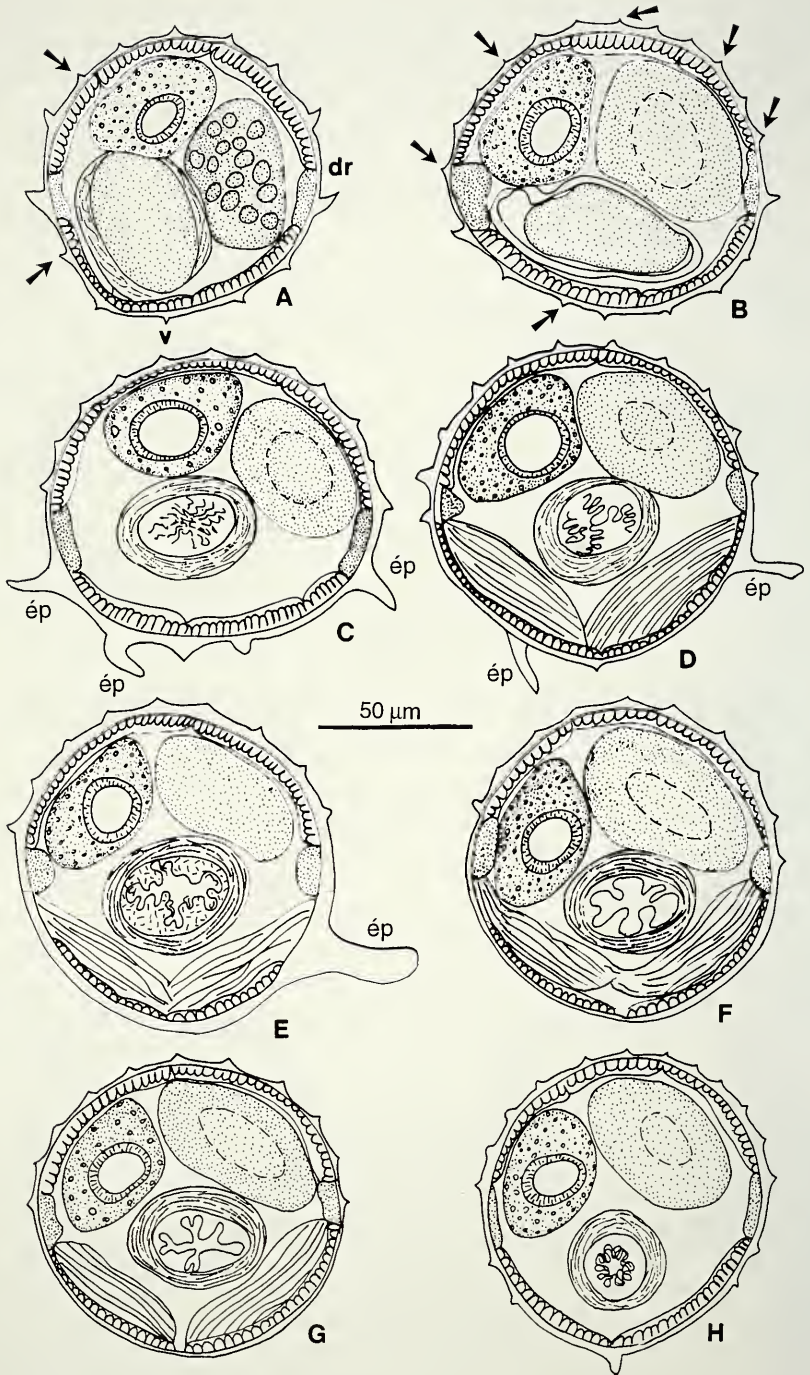
Petits Nématodes ne présentant aucun enroulement. Pore excréteur situé dans le deuxième tiers de l'oesophage, en position variable par rapport au bord antérieur des glandes excrétrices mais toujours proche de celles-ci. Glandes excrétrices très développées. Sinus excréteur d'abord dirigé perpendiculairement à la paroi du corps. Déirides de forme triangulaire et en position latéro-dorsale, plus ou moins proches du pore excréteur mais toujours situées postérieurement à celui-ci (fig. 3, H, I).

Tête: Vésicule céphalique simple, présentant un renflement antérieur plus court que la partie postérieure, toujours légèrement plus courte du côté ventral que du côté dorsal (fig. 3, G). Présence d'une petite dent oesophagienne dorsale (fig. 3, E, G). En vue apicale, bouche arrondie entourée de deux grosses amphides, de 4 papilles labiales externes (2 dorsales et 2 ventrales) et de quatre papilles céphaliques. Absence de plaques céphaliques (fig. 3, E).

FIG. 1

Molostromylylus mbopi n.sp. chez *Molossops planirostris*. Femelle paratype (longue de 6.0 mm), coupes transversales du corps. A - à la jonction oesophago-intestinale, naissance de 2 crêtes ventrales, stade 0/2; B - à 500 µm en arrière de la tête, naissance de 2 crêtes dorsales, stade 2/2; C - à 900 µm en arrière de la tête, naissance d'une crête ventrale, stade 2/3; D - au milieu du corps (à 2.6 mm en arrière de la tête), stade 2/3; E - à 3.5 mm en arrière de la tête, naissance d'une crête dorsale stade 3/3; F - à 4.8 mm en arrière de la tête, naissance d'une crête dorsale, stade 4/3; G - à 4.85 mm en arrière de la tête, naissance d'une crête dorsale, stade 5/3; H - à 250 µm en avant de la vulve, naissance d'une crête dorsale et d'une crête ventrale, stade 6/4. Toutes les coupes sont orientées comme la figure A. Abréviations: dr = droit; v = ventre. Les flèches indiquent la naissance de nouvelles crêtes cuticulaires.





Synlophé: (étudié en coupe transversale du corps chez 1 mâle et 1 femelle paratypes).

Dans les deux sexes, le corps est parcouru par des crêtes cuticulaires continues mais le nombre et la disposition de ces crêtes sont très différents selon le sexe. Le seul facteur commun est la présence de 2 ailes latérales qui naissent en arrière de la vésicule céphalique (figs 3, B; 4, A) et disparaissent entre 100 et 300 μm en avant de la bourse caudale chez le mâle (figs 3, D; 4, A) et au niveau de la trompe chez la femelle. Les ailes atteignent leur maximum de largeur (20 μm pour le mâle, 35 μm pour la femelle) à 250 μm de la tête chez le mâle et à 500 μm chez la femelle. La largeur décroît ensuite progressivement d'avant en arrière mais les ailes restent toujours plus développées que les autres crêtes tout le long du corps chez le mâle et jusqu'au niveau distal de l'utérus antérieur chez la femelle.

Chez le mâle, en plus des deux ailes latérales, 2 crêtes ventrales seulement naissent entre 30 et 120 μm en arrière de l'oesophage et disparaissent entre 300 et 400 μm en avant de la bourse caudale. Chez la femelle, longue de 6.0 mm, le nombre de crêtes augmente d'avant en arrière. Deux crêtes ventrales naissent entre 30 et 90 μm en avant de la jonction oesophago-intestinale (fig. 1, A) puis apparaissent 2 crêtes dorsales à 500 μm en arrière de la tête (fig. 1, B) et 1 crête ventrale 100 μm plus postérieurement ce qui donne un stade 2/3 (fig. 1, C, D). Ce stade 2/3 reste constant sur la première moitié du corps. A 3.5 mm en arrière de la tête apparaît une crête dorsale médiane (fig. 1, E) puis une crête dorsale gauche (fig. 1, F) et enfin une crête dorsale droite. Ce stade 5/3 (fig. 1, G) reste constant sur environ 400 μm jusqu'au niveau de la partie proximale de l'utérus antérieur. Entre ce niveau et celui de la partie proximale du vestibule antérieur, on passe successivement par les stades 6/4 (fig. 1, H), 7/5 (fig. 2, A), et 12/6 (fig. 2, B). A environ 40 μm en avant de la vulve, alors que les ailes latérales sont réduites à la taille des autres crêtes, certaines crêtes s'élargissent pour former de grosses épines latéro-ventrales (figs 2, C, E) dont le nombre (toujours inférieur à 10), la forme et la disposition varient selon les spécimens (figs 5 E-G). Juste en avant de la vulve, toutes les crêtes ventrales disparaissent (fig. 2, F). Absentes juste en arrière de la vulve (fig. 2, G), elles réapparaissent au niveau de la partie proximale du vestibule postérieur (fig. 2, H et 3, A) puis toutes les crêtes disparaissent progressivement jusqu'au niveau de la queue (figs 5, H, I).

FIG. 2

Molostromgylus mbopi n.sp. chez *Molossops planirostris*. Femelle paratype (longue de 6.0 mm), coupes transversales du corps. A - à 200 μm en avant de la vulve, naissance d'une crête dorsale et d'une crête ventrale, stade 7/5; B - à 150 μm en avant de la vulve, naissance de 5 crêtes dorsales et d'une crête ventrale, stade 12/6; C - au niveau de la trompe antérieure, les crêtes ventrales se modifient, certaines disparaissent, d'autres grossissent, les ailes disparaissent; D - à 40 μm en avant de la vulve, des épines apparaissent; E - à 20 μm en avant de la vulve, les crêtes ventrales ont disparu; F, G - coupes juste en avant et en arrière de la vulve; H - à 100 μm en arrière de la vulve, les crêtes ventrales réapparaissent. Toutes les coupes sont orientées comme la figure A. Abréviations: ép = épine; dr = droit; v = ventre. Les flèches indiquent la naissance de nouvelles crêtes cuticulaires.

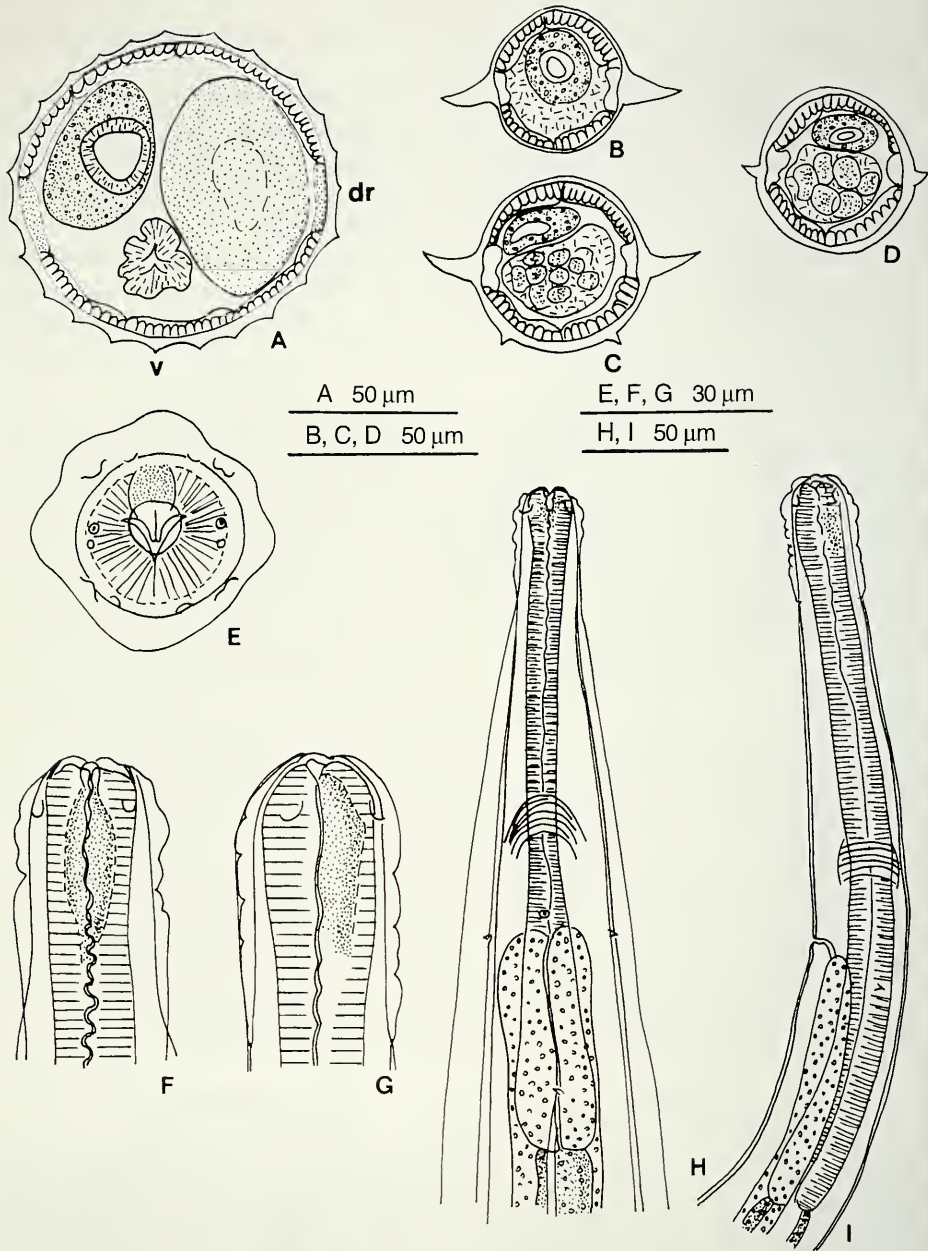


FIG. 3. *Molostrongylus mbopi* n. sp. chez *Molossops planirostris*. A - D: coupes transversales du corps. A - Femelle paratype (longue de 6.0 mm), à 150 μm en arrière de la vulve, la partie ventrale est entièrement parcourue par des crêtes. B - D: Mâle paratype (long de 1.57 mm). B - à la limite oesophago-intestinale; C - au milieu du corps; D - en avant de la bourse caudale. E - G: tête. E - femelle, vue apicale. F, G: mâle paratype. F - vue ventrale; G - vue latérale gauche. H, I: extrémité antérieure. H - vue ventrale; I - vue latérale gauche. (A - D, F - I: paratypes; E: 183 KP). Toutes les coupes sont orientées comme la figure A. Abréviations: dr = droit, v = ventre.

Dans les deux sexes, les ailes ont une orientation latéro-dorsale. Chez le mâle, les 2 crêtes ventrales sont orientées perpendiculairement à la paroi du corps. Chez la femelle, les crêtes ont une orientation ventro-dorsale fortement marquée dans la partie antérieure. Cette orientation disparaît progressivement et au niveau de la partie proximale du vestibule antérieur, toutes les crêtes sont orientées perpendiculairement à la paroi du corps (fig. 2, B).

Mâle holotype: long de 1.68 mm et large de 50 μm dans sa partie moyenne, ailes comprises. Vésicule céphalique haute de 52/55 μm sur 31 μm de large dans sa partie moyenne. Anneau nerveux, pore excréteur et deirides situés respectivement à 130 μm , 170 μm et 185 μm de l'apex. Oesophage long de 275 μm , soit 16,4 % de la longueur totale du corps (fig. 3, H, I).

Bourse caudale plus large que haute, de type 2-3 (fig. 4, B-D). Côtes 2 et 3 disposées selon un V largement ouvert. Côtes 3 de longueur équivalente aux côtes 5. Côtes 4 et 6 de longueur équivalente, plus petites que les côtes 3 et 5. Papilles des côtes 4 légèrement plus proches de celles des côtes 5 que des côtes 3. Côtes 8 naissant presque à la racine de la dorsale, perpendiculairement à celle-ci. Elles dessinent un large arc de cercle et n'atteignent pas le bord de la bourse caudale. Dorsale relativement longue et épaisse, atteignant le bord de la bourse caudale. Les côtes 9 se détachent de la côte dorsale dans sa partie distale, au niveau de la division de cette dernière (fig. 4, H). Cette disposition se retrouve chez la plupart des spécimens. Chez certains spécimens, elles se détachent avant cette division (fig. 4, B-D) ou après (fig. 4, E-G). Côtes 10 plus courtes que les côtes 9, généralement pointues à leur extrémité. (fig. 4, B-D, H). La forme des côtes 9 est variable selon les spécimens: soit elles ont une forme classique (fig. 4, D-H); soit elles apparaissent plus courtes que les côtes 10 mais dans ce cas, elles sont prolongées par un cône qui atteint le bord de la bourse caudale (fig. 4, B, C).

Spicules non ailés, longs de 120 μm , en forme de cône allongé, à extrémité unique et arrondie, parfois en forme de bouton (fig. 4, B, D). Gubernaculum en forme de lame en vue ventrale (fig. 4, B-D). Vu de profil, il mesure 34 μm de haut sur 5 μm de large dans sa partie moyenne. Cône génital de forme triangulaire, haut de 13 μm sur 22 μm à sa base. Il porte sur sa lèvre ventrale un papille zéro allongée et deux papilles 7 filiformes sur sa lèvre dorsale (fig. 4). Ces papilles sont rarement observables. Spermatozoïdes très visibles dans le canal déférent, arrondis à une extrémité, effilés à l'autre, longs d'environ 13 μm (fig. 4, I).

Moyennes, minima et maxima des principales mensurations des 6 mâles paratypes et de l'holotype: longueur: 1,71 (1,57-1,8) mm; longueur de l'oesophage: 253 (235-275) μm ; rapport longueur de l'oesophage sur longueur du corps: 15,3 (13,9-16,4)%; longueur des spicules: 123 (120-130); rapport longueur de spicules sur longueur du corps: 7,2 (6,7-8,3)%.

Moyennes, minima et maxima des principales mensurations des 8 autres mâles parasites de *Molostromglylus planirostris*: longueur: 1,95 (1,65-2,6) mm; longueur de l'oesophage: 268 (215-310) μm ; rapport longueur de l'oesophage sur longueur du corps: 13,8 (11,6-15,3) %; longueur des spicules: 110 (137-190); rapport longueur des spicules sur longueur du corps: 7 (5,4-10,3) %.

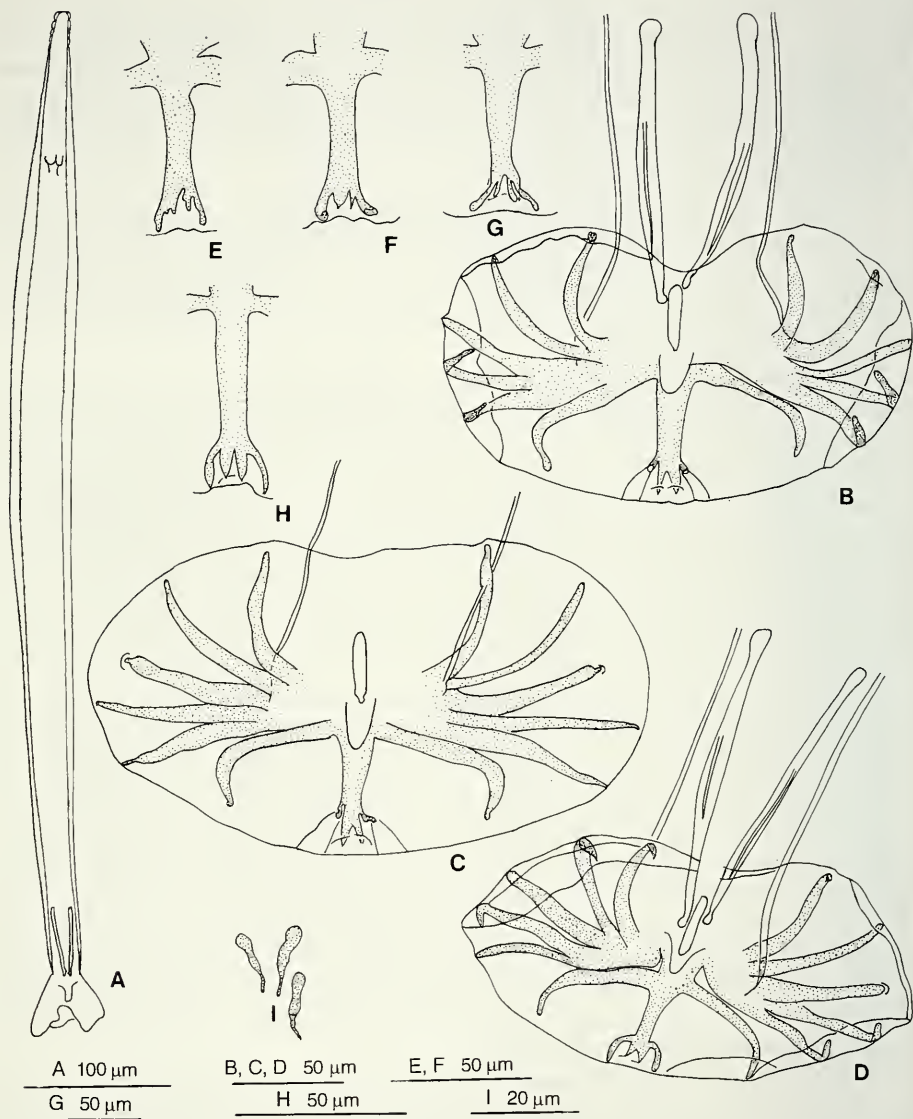


FIG. 4

Molostromylyus mbopi n.sp., mâles. A, D - H: chez *Molossops planirostris*. B, C, I: chez *Molossops abrasus*. A - silhouette montrant la variation de la taille des ailes tout le long du corps, vue ventrale. B - D: bourses caudales en vue ventrale. Seule la bourse C est complètement étalée. E - H: différents types de côtes dorsales, montrant la variabilité de la forme des côtes 9 et 10 mais avec des côtes 9 toujours plus grandes que les côtes 10. I: - spermatozoïdes dans le canal déférent. (A, D, E - F: paratypes; G: 24537 INVE; H: 880 KP; B, C, I: 24540 INVE).

Moyennes, minima et maxima des principales mensurations des 17 mâles de *Molostromglylus abrasus*: Longueur: 1,99 (1,75-2,7) mm; longueur de l'oesophage: 286 (255-325) μm ; rapport longueur de l'oesophage sur longueur du corps: 11,4 (10,7-16,7) %; longueur des spicules: 114 (103-125); rapport longueur des spicules sur longueur du corps: 5,7 (4,1-6,6) %.

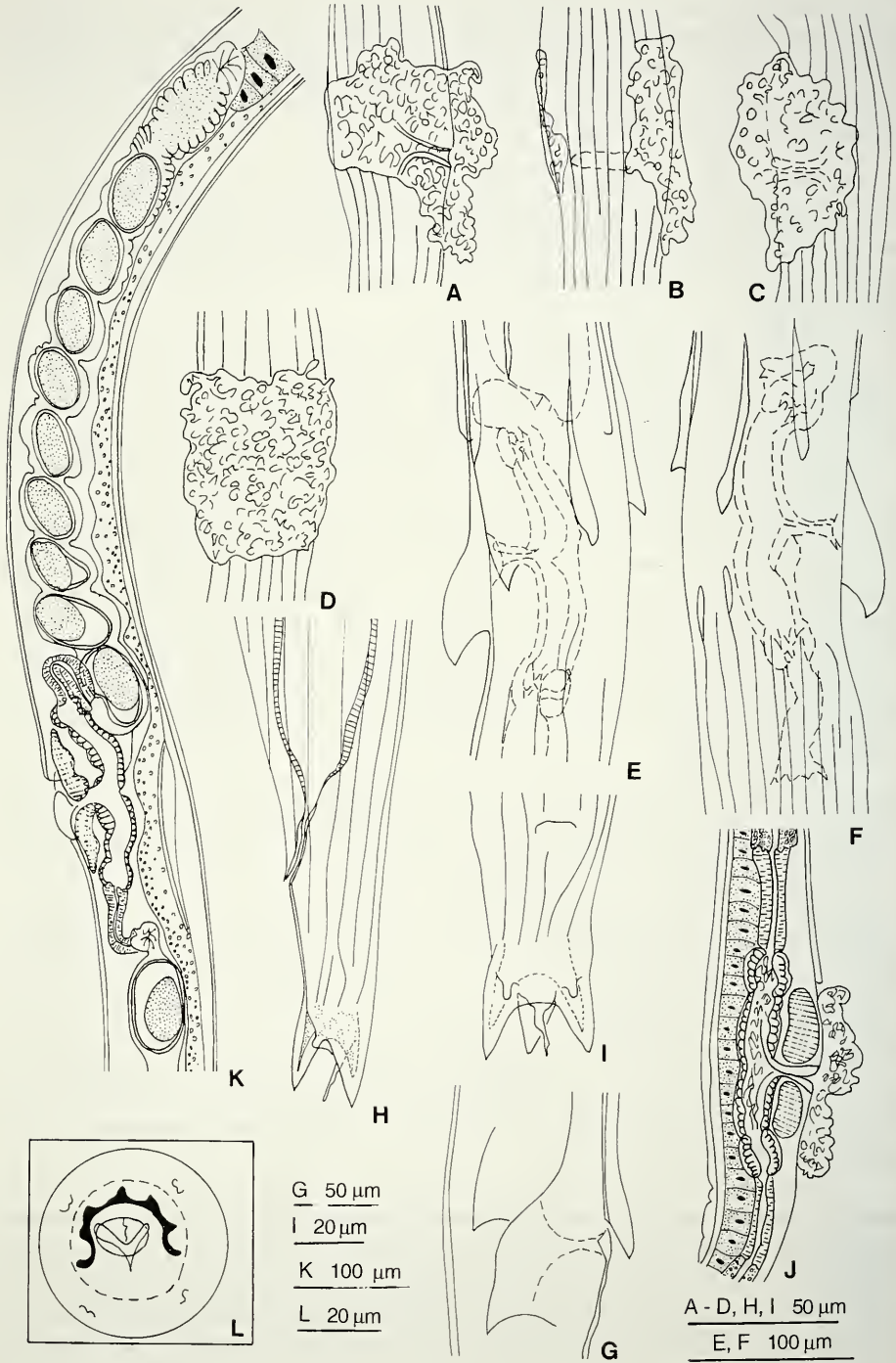
Femelle allotype: longue de 3,75 mm, large de 70 μm dans sa partie moyenne, ailes comprises. Vésicule céphalique haute de 51/53 μm sur 37 μm de large dans sa partie moyenne. Anneau nerveux, pore excréteur et deirides situés respectivement à 135 μm , 170 μm et 180 μm de l'apex. Oesophage long de 270 μm soit 7,2 % de la longueur totale du corps.

Didelphie. La vulve s'ouvre à 950 μm de la pointe caudale, soit au début du quart postérieur du corps (25,3 %). Présence d'un anneau copulateur au niveau de la vulve interrompu sur la face dorsale (fig. 5, A-D). Cet anneau est absent chez les 3 autres femelles paratypes matures. L'anneau est présent chez une des 8 femelles parasites de *M. planirostris* et chez 4 des 12 femelles parasites de *M. abrasus*. Ouverture vulvaire soutenue par deux massifs musculaires longs chacun d'environ 40 à 45 μm sur 32 μm de large. Vagina vera long de 35 μm (fig. 5, J, K), dirigé perpendiculairement à la paroi du corps et divisant le vestibule en deux parties de longueur sensiblement équivalente. Vestibule: 82 μm ; sphincters: 26 x 31 μm ; trompe antérieure: 55 μm , postérieure: 60 μm ; branches utérines très courtes: 425 μm pour l'antérieure, 575 μm pour la postérieure, soit moins du tiers de la longueur totale du corps. La branche utérine antérieure contient deux oeufs et la branche postérieure, un. Les oeufs, au stade 2 à 4 blastomères, sont hauts de 80 μm sur 40 μm de large (fig. 5, K). Présence d'épines vulvaires (fig. 5, E-G).

Queue allongée, presque deux fois plus haute que large à sa base (55 x 30 μm). Elle porte une épine caudale médiane, une grosse pointe dorsale, deux grosses pointes latéro-ventrales et deux tubercules latéraux (fig. 5, H). Les phasmides, en forme de boutons, sont visibles juste en avant des pointes latéro-ventrales (fig. 5, I).

Moyennes, minima et maxima des principales mensurations des 3 femelles paratypes et de l'allotype: Longueur: 4,86 (3,75-6,0) mm; longueur de l'oesophage: 330 (270-365) μm ; rapport longueur de l'oesophage sur longueur du corps: 6,8 (5,9-7,2) %; position de la vulve par rapport à la queue: 1375 (950-1750) μm ; rapport position de la vulve sur longueur du corps: 28,3 (22,3-29,1) %; longueur totale des deux branches utérines: 1467 (1000-1750); rapport de la longueur des branches utérines sur la longueur du corps: 30,2 (26,7-35) %; longueur de la queue: 50 (55-64) μm ; largeur de la queue à sa base: 30,7 (30-33) μm ; rapport hauteur de la queue sur sa largeur: 52,1 (50-54,5) %.

Moyennes, minima et maxima des principales mensurations des 8 autres femelles parasites de *Molostromglylus planirostris*: Longueur: 4,525 (3,75-4,9) mm; longueur de l'oesophage: 334 (300-370) μm ; rapport longueur de l'oesophage sur longueur du corps: 7,4 (6,9-8) %; position de la vulve par rapport à la queue: 1312 (1050-1550) μm ; rapport position de la vulve sur longueur du corps: 29 (25,3-27,8) %; longueur totale des deux branches utérines: 1227 (960-1570); rapport de la longueur



des branches utérines sur la longueur du corps: 27,1 (20,2-32,2) %; longueur de la queue: 80 (60-120) μm ; largeur de la queue à sa base: 37 (30-50) μm ; rapport hauteur de la queue sur sa largeur: 45,6 (37-58,8) %.

Moyennes, minima et maxima des principales mensurations des 7 femelles parasites de *Molostromglylus abrasus*. Longueur: 4,64 (4,0-4,95) mm; longueur de l'oesophage: 355 (320-385) μm ; rapport longueur de l'oesophage sur longueur du corps: 7,7 (7-9) %; position de la vulve par rapport à la queue: 1350 (1400-1450) μm ; rapport position de la vulve sur longueur du corps: 29,1 (27,5-30,7) %; longueur totale des deux branches utérines: 1031 (995-1575); rapport de la longueur des branches utérines sur la longueur du corps: 22,2 (23,6-32,1) %; longueur de la queue: 68,1 (52-85) μm ; largeur de la queue à sa base: 35,7 (30-50) μm ; rapport hauteur de la queue sur sa largeur: 52,4 (46,3-67) %.

PRÉVALENCE ET CHARGE PARASITAIRE

Chez *Molossops abrasus*, la prévalence est de 100 % (7 hôtes examinés), alors qu'elle est de 70 % (10 hôtes examinés) chez *M. planirostris*. La prévalence¹ est de 84 % et la charge parasitaire moyenne de 4,8 (1 à 16 individus). L'abondance est de 4,05.

La comparaison des mêmes données pour le Trichostrongle voisin, *Molostromglylus acanthocolpos* révèle une prévalence nettement inférieure de 52 % sur 29 hôtes examinés, une charge parasitaire moyenne plus élevée, de 7,07 (1 à 16 individus), avec une abondance légèrement inférieure de 3,4.

DISCUSSION

Les spécimens décrits ci-dessus ne peuvent être classés que dans le genre monospécifique *Molostromglylus* Durette-Desset & Vaucher, 1996 (Molineidae) dont ils possèdent les principaux caractères: chez le mâle, les côtes 2 et 3 sont de taille équivalente à celle des côtes 5 et 6; la côte dorsale est longue et divisée dans son tiers distal; les côtes 8 sont plus courtes que la côte dorsale; les spicules se terminent par une pointe mousse; chez la femelle, la région de l'ovéjecteur est pourvue d'épines vulvaires.

¹ Dans le calcul de la prévalence sont comptés des fragments d'individus (partie antérieure ou postérieure) qui ne sont pas signalés dans le matériel examiné. La présence d'un individu de *M. mbopi* chez *M. temmincki* est considérée comme accidentelle et n'est pas prise en compte.

FIG. 5

Molostromglylus mbopi n. sp., femelles. A - D, G - K: chez *Molossops planirostris*. E, F: chez *Molossops abrasus*. A - D: détail de l'anneau copulateur. A - vue latérale droite; B - vue dorsale; C - vue latérale gauche; D - vue ventrale. E - G: épines périvulvaires. E - vue latérale gauche; F: vue latérale droite; G - vue latérale droite. H, I: queue. H - vue latérale gauche; I - détail des pointes caudales, vue ventrale. J - ovéjecteur avec anneau de copulation, vue latérale droite. K - ovéjecteur et branche utérine antérieure, vue latérale gauche. (A - D, G - J: paratypes; K: 24538 INVE; E, F: 24540 INVE). *Molostromglylus acanthocolpos* chez *Molossops planirostris*, mâle. L - tête, vue apicale (279 KP).

Cependant les spécimens ci-dessus diffèrent de *Molostrongylus acanthocolpos*, parasite de *Molossops temmincki* au Paraguay par de nombreux caractères: absence de plaques céphaliques, synophe avec seulement 2 ailes et 2 crêtes ventrales chez le mâle, avec une disposition des crêtes différente le long du corps chez la femelle; deirides situées en arrière du pore excréteur; longueur de l'oesophage atteignant en moyenne moins de 10 % de la longueur du corps chez le mâle, moins de 12% chez la femelle contre respectivement 12 et 15% chez *M. acanthocolpos*. Côtes 2 et 3 de longueur équivalente à celles des 5 et 6; côtes 9 de la bourse caudale se détachant de la côte dorsale avant la division de cette dernière ou à son niveau; côtes 10 plus courtes que les côtes 9; chez la femelle, longueur des branches utérines atteignant plus de 20% de la longueur du corps (28% en moyenne chez les spécimens parasites de *Molossops planirostris* et 22% chez ceux parasites de *Molossops abrasus*) alors que cette longueur est inférieure à 20% chez *M. acanthocolpos*; présence de grosses épines, peu nombreuses dans la région de l'ovéjecteur; queue presque deux fois plus haute que large à sa base.

Le nom de la nouvelle espèce est donné en référence au nom vernaculaire des Chauve-souris en guarani.

RÉPARTITION ET SPÉCIFICITÉ PARASITAIRE DES DEUX ESPECES DU GENRE *Molostrongylus*

M. mbopi apparait inféodé à *Molossops planirostris* et *Molossops abrasus*. Un seul individu a été trouvé chez *Molossops temmincki*. En revanche, *M. acanthocolpos* apparait inféodé à *Molossops temmincki* malgré la présence de 2 mâles et de 2 femelles chez 2 *Molossops planirostris*.

La répartition géographique des hôtes et des parasites se chevauchent largement. *M. mbopi* n.sp. et *M. acanthocolpos* cohabitent dans les mêmes localités de capture des départements de Concepcion, Presidente Hayes, Alto Paraguay et Misiones. *M. mbopi* n.sp. a de plus été récolté en Alto Parana et *M. acanthocolpos* en Itapua.

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Notes on Palearctic and Oriental Phrenapatini (Coleoptera: Tenebrionidae), with descriptions of four new species

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Notes on Palearctic and Oriental Phrenapatini (Coleoptera: Tenebrionidae), with descriptions of four new species. - A key to the Palearctic and Oriental genera of Phrenapatini (Tenebrionidae) is presented. *Picnotagalus* Kaszab, 1939 is considered as a junior synonym of *Scolyto-caulus* Fairmaire, 1896. A check-list of the Palearctic and Oriental species of Phrenapatini is provided, new taxonomic and faunistic data of several species are added. The following new species are described: *Dioedus sumbawacus* sp.n. (Sumbawa), *Pseudophthora sabahca* sp.n. (Sabah), *Pseudophthora lomboca* sp.n. (Lombok), *Taiwanotagalus nepalicus* sp.n. (Nepal).

Key-words: Coleoptera - Tenebrionidae - Phrenapatini - taxonomy - Palearctic - Oriental.

INTRODUCTION

The species of the tenebrionid tribe Phrenapatini (Phrenapatinae including Archaeoglenini) form a homogenous and probably monophyletic group, inhabiting nearly all arboreal habitats, but are particularly speciose in tropical forests. KASZAB (1977), when treating the Papuan-Pacific species of Phrenapatini, presented diagnostic characters and a key for the genera from that region. The data on Palearctic and Oriental species have never been summarized. The aim of this paper is not a revision of the species but the presentation of new material (including 4 new species) accumulated in studied collections. With this new material, 22 species of Phrenapatini are now known from the southern Palearctic and Oriental regions.

Whereas the genera are outlined by distinct characters (see key of the genera) the species characters are quite poor (proportions of pronotum and elytra, body size, punctuation) and their infraspecific variability is still unknown. The aedeagi of nearly all published species of the Phrenapatini (about 100 species) are hitherto unknown, and the general morphology and generic differences, if any, are not described or figured. This is probably due to the smallness and weak sclerotization of the aedeagi in this tribe. In general, the aedeagus of Phrenapatini consists of a basal piece

*) Contribution to Tenebrionidae, no. 25. For no. 24 see: *Entomologische Zeitschrift* 108: 501-503.

ventrally sutured and of closed paired parameres forming a tube-like structure enclosing the penis (Figs 10-13).

ABBREVIATIONS

MHNG Muséum d'histoire naturelle Genève.

NHMB Naturhistorisches Museum Basel.

SMNS Staatliches Museum für Naturkunde Stuttgart.

KEY TO THE PALEARCTIC AND ORIENTAL GENERA OF PHRENAPATINI

- 1 Antenna with only 9 antennomeres, antennal club with 2 antennomeres
 *Taiwanotagalus* Masumoto, 1982
- Antenna with 11 antennomeres, antennal club with 2-4 antennomeres 2
- 2 Antennal club with 4 antennomeres, cheeks with distinct border, mandibles big and modified *Scolytocaulus* Fairmaire, 1896
 (*Picnotagalus* Kaszab, 1939 syn.n.)
- Antennal club with 2-3 antennomeres, cheeks without border, mandibles normal 3
- 3 Antennal club with 2 antennomeres, head ventrally with or without deep antennal grooves *Dioedus* LeConte, 1862
- Antennal club with 3 antennomeres, head ventrally with deep antennal grooves 4
- 4 Pronotum with broad lateral margins, protibia laterally only with a few spines, Palearctic species *Clamoris* Gozis, 1886
- Pronotum with fine lateral margins, protibia laterally with distinct dentation, Oriental (and Pacific-Papuan) species . . . *Pseudophthora* Kaszab, 1970

CHECK-LIST OF THE PALEARCTIC AND ORIENTAL SPECIES OF PHRENAPATINI

Clamoris canalicollis (Lewis, 1894)

Distribution: Japan.

Clamoris crenata (Mulsant, 1860)

Material: SW France, St. Girons, VIII.1980 leg. J. Roppel, 2 ex. SMNS. France, Dept. Gironde, between Soulac, Montalivet and Lac de Hourtin, VIII/IX. 1989 leg. J. Martens, 1 ex. SMNS. Spain, Jaen, Sierra de Cazorla, 15.V.1960 leg. C. Besuchet, 10 ex. MHNG, 2 ex. SMNS. Algeria, Gde Kabylie, Akfadou forest, 9 km W Adekar, 1300 m, 17.V.1988 leg. C. Besuchet, D. Burckhardt & I. Löbl, 5 ex. MHNG, 1 ex. SMNS.

Distribution: Southern France (type locality), Italy, Spain, Portugal (Español 1979), Algeria (new record).

Clamoris formosana (Masumoto, 1982)

Distribution: Taiwan.

Dioedus fruhstorferi Bremer, 1995*Distribution:* Sulawesi.**Dioedus girardi** Bremer, 1995*Distribution:* Southern India.**Dioedus impressicollis** (Gebien, 1913)*Remarks:* Type not in the Frey Collection (NHMB).*Distribution:* Philippines.**Dioedus loffleri** Kaszab, 1977

Fig. 1

Material: Borneo, Sabah, Mt. Kinabalu NP, below Layang Layang, 2595 m, 2.V.1987 leg. A. Smetana, 1 ex. MHNG. Borneo, Sabah, Mt. Kinabalu, 1500 m, 30.IV.1987 leg. D. Burckhardt & I. Löbl, 1 ex. MHNG. Borneo, Sabah, Crocker Range NP, Gunung Emas, 1600 m, 6.-18.VI.1996 leg. J. Kodada, 1 ex. SMNS.

Distribution: Borneo/Sabah.**Dioedus minimus** (Gebien, 1927)

Figs 3-4

Material: N Sumatra, 30 km SW Brastagi, Gunung Sinabung, 1300-1800 m, 22.II.1991 leg. L. Bocák & M. Bocáková, 1 ex. NHMB, 1 ex. SMNS. W Malaysia, Cameron Highland, Gunung Beremban, 1.-3.IV.1990 leg. A. Riedel, 1 ex. SMNS.

Remarks: Although the single female from Malaysia is somewhat convexer than both specimens from Sumatra, I hope not to fail in assigning both series to a single species. The body size (2.2-2.3 mm), proportions of pronotum and elytra as well as the dorsal punctuation show no distinct differences (Figs 3-4). The type is not in the Frey Collection (NHMB).

Distribution: Sumatra (type locality), W Malaysia (new record).**Dioedus miyakensis** (Nakane, 1963)*Distribution:* Japan.**Dioedus schultzei** (Gebien, 1913)*Remarks:* The type is not in the Frey Collection (NHMB).*Distribution:* Philippines.**Dioedus sumatranus** (Gebien, 1927)*Remarks:* 1 paratype is in the Frey Collection (NHMB).*Distribution:* Sumatra.

Dioedus sumbawacus sp.n.

Figs 2, 10

Distribution: Sumbawa.**Dioedus tokaranus** (Nakane, 1963)*Distribution:* Japan.**Pseudophthora cederholmi** Kaszab, 1980*Distribution:* Sri Lanka.**Pseudophthora indica** Kaszab, 1979

Fig. 6

Material: India, Tamil Nadu, Kodaikanal, N Munnar, 27.-29.VIII.1989 leg. A. Riedel, 7 ex. SMNS.*Distribution:* Southern India.**Pseudophthora lomboca** sp.n.

Figs 7, 12

Distribution: Lombok.**Pseudophthora sabahca** sp.n.

Figs 8, 13

Distribution: Borneo/Sabah.**Scolytocaulus bouchardi** Fairmaire, 1896

Fig. 9

Material: N Sumatra, Partungkoan, Samosir, 1600 m, 28.VIII.1991 leg. D. Erber, 1 ex. SMNS. N Sumatra, Brastagi, Gunung Sibayak, 1450-1900 m, 19.-23.II.1991 leg. L. Bocák & M. Bocáková, 3 ex. NHMB, 1 ex. SMNS. Borneo, Sabah, Mt. Kinabalu NP, Headquarters, 1500-1600 m, 11.-15.XI.1996 leg. W. Schawaller, 2 ex. SMNS. Borneo, Sabah, Mt. Kinabalu NP, Headquarters at Liwagu River, 1500 m, 30.IV. & 17.V.1987 leg. A. Smetana, 2 ex. MHNG. Borneo, Sabah, Batu Punggul Resort, 24.VI.-1.VII.1996 leg. J. Kodada, 1 ex. SMNS. Malaysia, Cameron Highlands, Gunung Beremban, 1.-3.IV.1990 leg. A. Riedel, 8 ex. SMNS.*Remarks:* *Scolytocaulus bouchardi* (Fig. 9) differs from the new combined *horni* from Sri Lanka in particular by the proportions of the pronotum and elytra. In *horni* the lateral margins of the pronotum are distinctly narrowed towards the base, in *bouchardi* these margins are nearly parallel; in *horni*, the elytra are said to be 1.7 times longer than pronotum, in *bouchardi* this relation is 2.10-2.45 times. The punctation of the propleures is somewhat different in the single series.*Distribution:* Sumatra (type locality), Borneo (new record), Malayan Peninsula (new record), Philippines (Kaszab 1980).**Scolytocaulus horni** (Kaszab, 1939) comb.n.*Remarks:* For this species the monospecific genus *Picnotagalus* Kaszab, 1939 has been established. The diagnostic characters of this genus (antennal club with 4 antennomeres, head with deep antennal grooves, cheeks with border, big modified

mandibles) fully correspond with *Scolytocaulus* Fairmaire, 1896, thus *Picnotagalus* Kaszab, 1939 is considered as a junior subjective synonym of *Scolytocaulus* Fairmaire, 1896.

Distribution: Sri Lanka.

***Scolytocaulus kabakovi* Kaszab, 1980**

Distribution: Vietnam.

***Taiwanotagalus klapperichi* Masumoto, 1982**

Distribution: Taiwan.

***Taiwanotagalus nepalicus* sp.n.**

Figs 5, 11

Distribution: Nepal.

DESCRIPTIONS OF NEW SPECIES

***Dioedus sumbawacus* sp.n.**

Figs 2, 10

HOLOTYPE (male): Indonesia, W Sumbawa, Batudulang, 30 km S Sumb. Besar, 1000 m, 10.II.1994 leg. Bolm, SMNS.

PARATYPES: Same data as holotype, 2 ex. (sex not determined) SMNS.

DESCRIPTION

Body light castaneous, partly with some irregularly scattered dark spots; body length 4.4-4.8 mm. Head with dense punctation, distance between punctures equal to 1-4 diameters; clypeus with smaller punctation; clypeal suture fine; frons with distinct excavation; cheeks without border, elevated but not surpassing anterior margin of clypeus; eyes prominent; interocular distance equal to 4-5 eye diameters; antenna with 11 antennomeres, proportions of antennomeres see Fig. 2; head ventrally only with flat antennal grooves. Pronotum (Fig. 2) with relation width/length 1.53; anterior corners surpass middle of anterior margin; punctation as on head, between punctation with scattered micropunctures (magnification 70x); anterior margin with a small median semicircled impression and a faint hump on each side (Fig. 2); lateral margin equal on its total length. Elytra (Fig. 2) about 1.4 times longer than width combined; 9 rows of punctures, distances between punctures equal to 2-4 diameters; second row with 40 punctures; rows 1-2 reaching apex, rows 3+6 joined before apex and enclosing joined rows 4+5; intervals convex, wrinkled, with very sparse micropunctures as on pronotum. Abdominal sternites 1-4 with somewhat smaller punctation than on abdominal sternite 5. Protibia in both sexes in distal internal third with a few long yellow hairs; protibia laterally with 4-5 distinct teeth, mesotibia with 3-4 finer spines, metatibia without spines. Aedeagus see Fig. 10.

REMARKS: *Dioedus sumbawacus* sp.n. shares the anterior impressions of the pronotum with *sumatranus* (Gebien, 1927) from Sumatra and *fruhstorferi* Bremer, 1995 from

Celebes. However, in addition to the different proportions of the pronotum and elytra, in *sumatranus* the pronotal impression is circle-like and the cheeks surpass the anterior margin of the clypeus (according to the description), in *fruhstorferi* the cheeks are even more prominent. Close relationships to the Papuan-Pacific species (KASZAB 1977) are not recognizable.

***Pseudophthora lomboca* sp.n.**

Figs 7, 12

HOLOTYPE (male): Indonesia, Lombok, Sapit-Semalun Bumbang, 900-1500 m, 14.-16.II.1994 leg. Bolm, SMNS.

PARATYPES: Same data as holotype, 4 ex. (sex not determined) SMNS.

DESCRIPTION

Body light castaneous; body length 3.6-4.0 mm. Head with dense punctation, distance between punctures equal to 1-4 diameters; clypeus with nearly equal punctation; clypeal suture nearly invisible; cheeks without border; eyes flat, not prominent; interocular distance equal to 6-7 eye diameters; antenna with 11 antennomeres, proportions of antennomeres see Fig. 7; head ventrally with deep antennal grooves. Pronotum (Fig. 7) with relation width/length 1.38; anterior corners surpass middle of anterior margin; punctation as on head, between punctation with scattered micropunctures (magnification 70x); lateral margin equal on its total length. Elytra (Fig. 7) about 1.2times longer than width combined; 9 rows of punctures, distances between punctures equal to 1-2 diameters; second row with 26 punctures, punctures distally distinctly diminished; row 1 reaching apex, rows 2+7 joined before apex and enclosing joined rows 3+6 and joined rows 4+5; intervals convex, with very sparse micropunctures as on pronotum. Abdominal sternites 1-4 with small and scattered punctation, abdominal sternite 5 with rough punctation as on pronotum. Protibia in both sexes in distal internal third with a tuft of long yellow hairs; protibia laterally with 4-5 distinct teeth, mesotibia with 2-3 finer spines, metatibia without spines. Aedeagus see Fig. 12.

REMARKS: This species can easily be recognized within the genus, also in comparison with few the Papuan and Pacific species (KASZAB 1977), by the relatively short elytra being only 1.2times longer than width combined, additional by the distally diminishing punctures of the elytral rows.

***Pseudophthora sabahca* sp.n.**

Figs 8, 13

HOLOTYPE (male): Borneo, Sabah, Mt. Kinabalu NP, Sayap, 1000 m, 25.-29.XI.1996 leg. W. Schawaller, SMNS.

PARATYPE: Borneo, Sabah, Mt. Kinabalu NP, Poring Hot Springs, Langanan river, 850 m, 14.V.1987 leg. D. Burckhardt & I. Löbl, 1 female MHNG.

DESCRIPTION

Body light castaneous; body length 3.0 mm. Head with dense punctation, distance between punctures equal to 1-4 diameters; clypeus with nearly equal punctation; clypeal suture fine; cheeks without border; eyes flat, not prominent; interocular distance

equal to 5-6 eye diameters; antenna with 11 antennomeres, proportions of antennomeres see Fig. 8; head ventrally with deep antennal grooves. Pronotum (Fig. 8) with relation width/length 1.47; anterior corners surpass middle of anterior margin; punctation as on head, between punctation with scattered micropunctures (magnification 70x); lateral margin equal on its total length. Elytra (Fig. 8) about 1.5times longer than width combined; 9 rows of punctures, distances between punctures equal to 1-2 diameters; second row with 30-31 punctures; rows 1-2 reaching apex, rows 3+6 joined before apex and enclosing joined rows 4+5; intervals convex, with very sparse micropunctures as on pronotum. Abdominal sternites 1-4 with small and scattered punctation, abdominal sternite 5 with rough punctation as on pronotum. Protibia in both sexes in distal internal third with a tuft of long yellow hairs; protibia laterally with 4-5 distinct teeth, mesotibia with 2-3 finer spines, metatibia without spines. Aedeagus see Fig. 13.

REMARKS: *Pseudophthora sabahca* sp.n. differs mainly from the few other Oriental congeners by the smaller body size and by different proportions of pronotum and elytra. Additionally, in *cederholmi* the elytral punctation is extinct distally.

Taiwanotagalus nepalicus sp.n.

Figs 5, 11

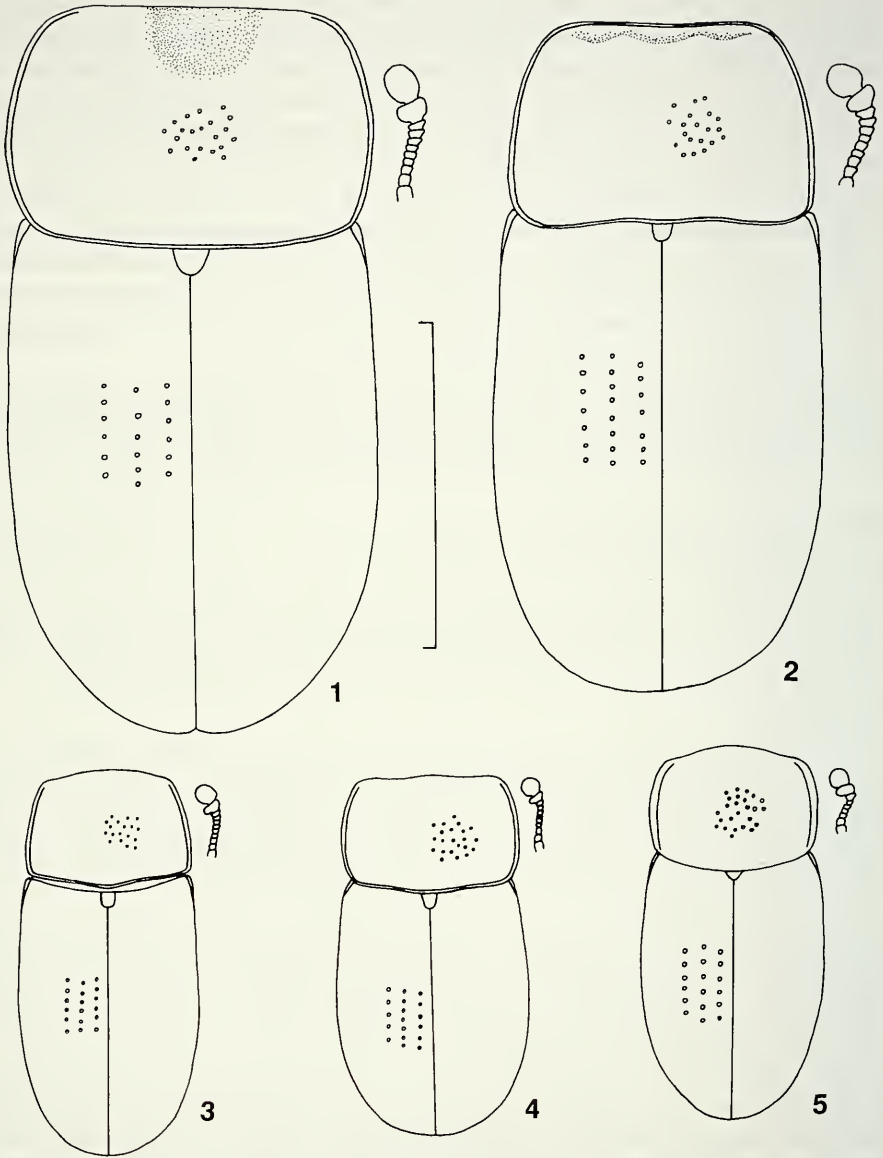
HOLOTYPE (male): Nepal, Khandbari Distr., forest above Ahale, 2300 m, 26.III.1982 leg. A. & Z. Smetana, MHNG.

PARATYPES: Same data as holotype, 1 ex. (sex not determined) MHNG, 1 female SMNS. Nepal, Sankhua Sabha Distr., Arun valley between Mure and Hurure, 2050-2150 m, mixed broadleaved forest, 9.-17.VI.1988 leg. J. Martens & W. Schawaller, 1 female SMNS.

DESCRIPTION

Body light castaneous; body length 2.0 mm. Head with dense punctation, distance between punctures equal to 0.5-3 diameters; clypeus with sparser and finer punctation; clypeal suture fine; cheeks without border; eyes flat, not prominent; interocular distance equal to 6-7 eye diameters; antenna with 9 antennomeres, proportions of antennomeres see Fig. 5; head ventrally with deep antennal grooves. Pronotum (Fig. 5) with relation width/length 1.33; anterior margin in the middle surpasses anterior corners; punctation somewhat coarser than on head, between punctation with scattered micropunctures (magnification 70x); lateral margin equal on its total length. Elytra (Fig. 5) about 1.4times longer than width combined; 9 rows of punctures, distances between punctures equal to 1-2 diameters; second row with 23-25 punctures; rows 1-2 reaching apex, rows 3+6 joined before apex and enclosing joined rows 4+5; intervals convex, with very sparse micropunctures as on pronotum. Abdominal sternites 1-4 with small and scattered punctation, abdominal sternite 5 with rough punctation as on pronotum. Protibia in both sexes in distal internal third with a few long yellow hairs; pro- and mesotibia laterally with 1-2 spines, metatibia without spines. Aedeagus see Fig. 11.

REMARKS: The new species possesses all described genus characters, in particular the antenna with only 9 antennomeres, the last 2 antennomeres broad, the head with deep ventral antennal grooves and the cheeks without border. It differs notably from the single hitherto described species, *klapperichi* from Taiwan (according to the des-

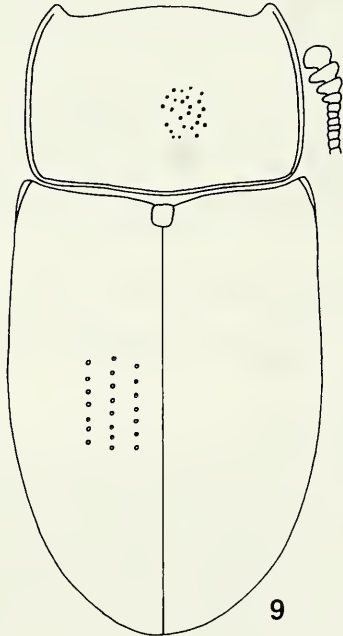
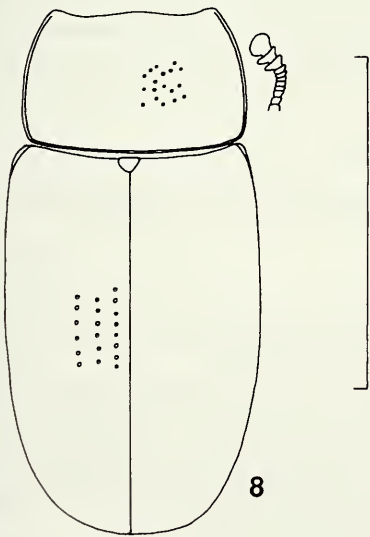
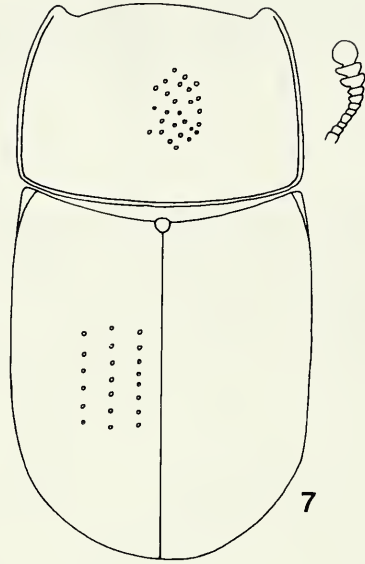
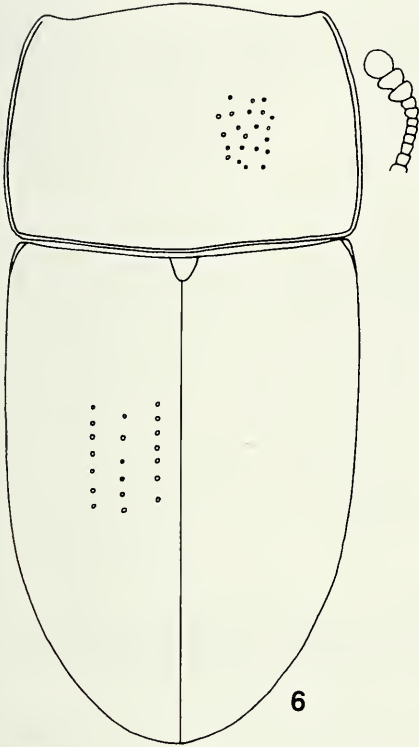


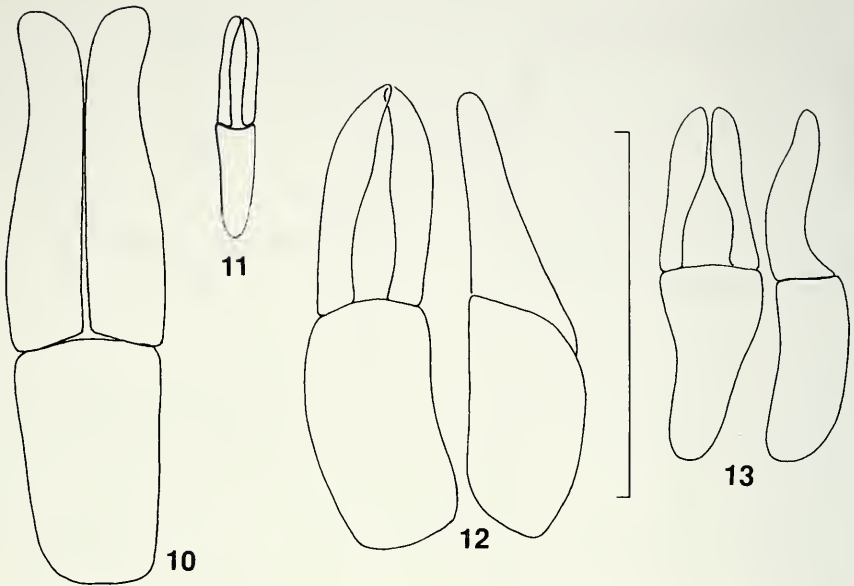
FIGS 1-5

Dorsal view of pronotum and elytra with punctation, antenna. - 1: *Dioedus loffleri* from Sabah; 2: *Dioedus sumbawacus* sp.n., holotype; 3: *Dioedus minimus* from Sumatra; 4: *Dioedus minimus* from Cameron Highland; 5: *Taiwanotagalus nepalicus* sp.n., holotype. - Scale line 2.0 mm.

FIGS 6-9

Dorsal view of pronotum and elytra with punctation, antenna. - 6: *Pseudophthora indica* from India; 7: *Pseudophthora lomboca* sp.n., holotype; 8: *Pseudophthora sabahca* sp.n., holotype; 9: *Scolytocaulus bouchardi* from Sabah. - Scale line: 2.0 mm.





Figs 10-13

Aedeagus. - 10: *Dioedus sumbawacus* sp.n. in dorsal view; 11: *Taiwanotagalus nepalicus* sp.n. in dorsal view; 12: *Pseudophthora lomboca* sp.n. in dorsal (left) and lateral (right) view; 13: *Pseudophthora sabahca* sp.n. in dorsal (left) and lateral (right) view. - Scale line: 0.5 mm.

cription and figure), by the proportions of the pronotum: in *klapperichi* the relation width/length is 1.66, in *nepalicus* sp.n. 1.33; in *klapperichi* the anterior corners of the pronotum surpass the anterior margin, in *nepalicus* sp.n. the anterior margin surpasses the anterior corners: in *klapperichi* the lateral margin is somewhat broader and more reflexed than in *nepalicus* sp.n.

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Revision of the genus *Trilophus* Andrewes from the Oriental region (Coleoptera, Carabidae)

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Revision of the genus *Trilophus* Andrewes from the Oriental region (Coleoptera, Carabidae). - The genus *Trilophus* Andrewes is revised and distinguished to the next related genera. A key is provided for all 28 species. The 4 species *T. interpunctatus* Putzeys, *T. hispidulus* Putzeys, *T. schmidtii* Putzeys, and *T. birmanicus* Bates are redescribed and lectotypes/paralectotypes are designated. The following 24 new species are described: *T. acuminatus* n. sp., *T. alternans* n. sp., *T. appulsus* n. sp., *T. arcuatus* n. sp., *T. baehri* n. sp., *T. convexus* n. sp., *T. crinitus* n. sp., *T. ellipticus* n. sp., *T. elongatus* n. sp., *T. fuscus* n. sp., *T. hirsutus* n. sp., *T. imitator* n. sp., *T. latiusculus* n. sp., *T. loebli* n. sp., *T. lompei* n. sp., *T. palpireductus* n. sp., *T. parallelus* n. sp., *T. schawalleri* n. sp., *T. serratulus* n. sp., *T. serratus* n. sp., *T. setosus* n. sp., *T. tonkinensis* n. sp., *T. variabilis* n. sp., and *T. weberi* n. sp. The distribution of the species is displayed in maps. Four different main distribution patterns are distinguished. The possible relationships of the species groups and species described in a cladogram are based on a reconstructed phylogeny applying the methods proposed by Hennig. Phylogenetic evidence demonstrates that species showing most plesiomorphic character states are concentrated in NE-India, Thailand, and Indochina assumed to be the region of origin for the genus. Sri Lanka, the South Malayan islands up to west of Wallace's line, the Himalayas up to northern Pakistan, and Taiwan are inhabited by species showing a higher degree of apomorphic characteristics.

Key-words: Coleoptera - Carabidae - Scaritinae - *Trilophus* - taxonomy - phylogeny - Oriental region

CONTENT	Page
Introduction	430
Material	431
Methods	432
Terms and Morphology	433
Distinguishing <i>Trilophus</i> from related Oriental genera	436
The Genus <i>Trilophus</i> Andrewes	436
Key to the species of the genus <i>Trilophus</i>	440

The species	444
Discussion	495
Phylogenetic aspects	495
Zoogeographic aspects	502
Alphabetical list of the species	506
Acknowledgements	506
References	535

INTRODUCTION

The genus *Trilophus* Andrewes (Coleoptera: Carabidae, Scaritinae) belongs to the tribe Clivinini (Clivinini according to BASILEWSKY 1973) and occurs exclusively in the Oriental region.

The species are ground living, fossorial, and hydrophile and inhabit environments from lowland up to mountainous regions from northern Pakistan to the Malayan archipelago. Most of the specimens were collected by applying sifting methods or light traps. Due to these methods recent collections often include larger numbers of specimens whereas the old recordings consist mostly of very small series or single specimens. Old recordings as well as collections made in light traps include only macrophthalmic species whereas shifting methods revealed species with humicol adaptations, also.

Between 1846 and 1892 five species were described from India, Burma, and Siam. Four of them, *impunctatus* Putzeys, *interpunctatus* Putzeys, *hispidulus* Putzeys, and *schmidti* Putzeys, were assigned to the genus *Dyschirius* Bonelli (PUTZEYS 1867, 1877) and one, *birmanicus* Bates, to *Oxydrepanus* Putzeys (BATES 1892).

In 1926, ANDREWES suggested that all these species are better placed in the genus *Oxydrepanus* (ANDREWES 1926) known so far from South America. This had already been recognised by BATES (1892) but not stated in particular. ANDREWES (1926) also synonymized *schmidti* Putzeys with *birmanicus* Bates. In 1927, ANDREWES found that these species are belonging to a separate group and form a genus of its own. Based on them he described the genus *Trilophus* (ANDREWES 1927). Because he could not clearly interpret the interspecific characters, he synonymized all of them and stated *Trilophus interpunctatus* (Putzeys, 1867) as the only valid taxon. In addition, he distinguished three varieties with names of previously described species (ANDREWES 1927, 1929, 1930).

Thirty years later JEANNEL performed his "Révision des petits Scaritides endogés..." (JEANNEL 1957). He stated that Andrewes' *Trilophus interpunctatus* var. *impunctatus* Putzeys belongs to the separate genus *Trilophidius* Jeannel as *Trilophidius impunctatus* (Putzeys). The genus *Trilophidius* is not revised in this contribution.

For the genus *Trilophus*, faunistical recordings are missing. This may be due to the fact that the species could not be identified exactly until now and that most of the material was collected during the last recent decade.

During the past years, I had the opportunity to study Scaritinae material from different localities of the Oriental region. Among the specimens checked there was

often material belonging to the genus *Trilophus*. In 1994, I was unable to define the species more precisely. So, at that time all material was provisionally placed under the taxon *Trilophus interpunctatus* (Putzeys), and the need for revision of the group noted (BALKENOHL 1994).

MATERIAL

Thanks to the kindness of many curators and private collectors it was possible to base this investigation on 944 *Trilophus* specimens out of about 80 populations. The material consists of the available type material as well as material of different expeditions carried out between the beginning of this century and 1996. Although collected at many and very different localities of the Oriental region from north-west Pakistan to Bali, the study is incomplete due to the limited material and the spotty collecting. For some populations of a species only a few specimens were available and in few cases only one specimen was available at all.

Old type material is distributed over various public collections. Most of these specimens could be located and in addition, material seen by Putzeys and Andrewes. As usually, old type material consisted of syntypes. For this material a lectotype and paralectotype(s) have been designated and redescriptions performed for all of these species.

Most of the old type material bears several labels. All label information is listed for each of those specimens. Because I could not decide in some cases which of the different locality spelling is valid, all information given on labels was listed as it appears on the labels. If the genitalia of old type material were prepared this was performed specimen by specimen to avoid any possibility of confusion of labels. The original pins have been reused and if possible the old paper cards have been glued additionally to the pins. This was done to keep all information available for future investigation.

THE MATERIAL EXAMINED IS DEPOSITED IN FOLLOWING COLLECTIONS:

BMNH	The Natural History Museum [= British Museum (Natural History)], London, United Kingdom
CBA	Collection of author, Denzlingen near Freiburg, Germany
CBL	Collection Petr Bulirsch, Lovosice, Czech Republic
CBM	Collection Dr. Martin Baehr, München, Germany
CBB	Collection Jaroslav Básta, Brno, Czech Republic
CDW	Collection Dr. Alexander Dostal, Wien, Austria
CFW	Collection H. Franz, Wien, Austria
CNCI	Canadian National Collection, Ottawa, Ontario, Canada
CSR	Collection Joachim Schmidt, Rostock, Germany
CWB	Collection David W. Wrase, Berlin, Germany
HNHM	Hungarian Natural History Museum, Budapest, Hungary
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium
MCSN	Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy
MHNG	Muséum d'histoire naturelle, Genève, Switzerland
MNHP	Muséum National d'Histoire Naturelle, Paris, France
MZUF	Museo Zoologico de "La Specola", Firenze, Italy
NHMB	Naturhistorisches Museum Basel, Switzerland

NHMW	Naturhistorisches Museum, Wien, Austria
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany
ZMHB	Museum für Naturkunde der Humboldt Universität, Berlin, Germany
ZSM	Zoologische Staatssammlung, München, Germany

Other abbreviations:

EI	relative eye index
PT	paratype
wod	without other data
x	arithmetic mean (used in descriptions under measurement)

METHODS

It is obvious to note that the surface of the small specimens has to be clean. Acetic ethyl ester has proven to be best to remove thin layers of dirt from head, pronotum, and elytra of dry material in order to recognise punctures and fine structures on the surface.

Magnifications between 40 and 140 X were used for investigation. Measurements were taken at a magnification of 40 X by using an ocular micrometer. Total length was measured including closed mandibles. The length of the elytra does not include the pedunculus. The width was measured at the maximum width of both elytra and represents the general width of the species. The length of the pronotum was measured along the median line including the flange-like base, and the width was determined at the widest part. If possible, up to 30 specimens per species were measured. Some of these measurements were used to obtain ratios of the pronotum and elytra. These data may help in expressing the relative body shape. *Trilophus* is poorly represented in most collections and therefore statistical analysis of geographic variation is hardly possible. Very often there was only limited material available or if there was more material of a species at hand it often consisted of samples of different populations with limited number of specimens, each. So, descriptive statistics could be performed only exceptionally. In all cases, the mean, range and number of samples measured are given.

The condition of wings was investigated in all specimens in which the sex was determined. If brachypterous specimens were detected, all available material was investigated to note possible di- or polymorphism. The length and width of elytron was used as a relative measurement to express the degree of wing-atrophy.

The genitalia dissected had to be totally cleaned from tissue for unequivocal assignment. They were mounted in a medium according to LOMPE (1989). A small transparent Celon-card was used instead of a paper-card. These Celon-cards are stored on the same needle as the specimens but were placed on a slide for microscopic observation. The aedeagi of some species with fully developed eyes are more sclerotized and were treated with KOH to clear up inner structures. In a few specimens, the endophallus was everted by blowing into the median lobe at base with a fine glass capillette (see Fig. 115). However, this method, like hooking and pulling with a fine needle, can not be performed on a routine basis because the median lobe is too small (~0.3 mm). In addition, these methods often can not be applied without damaging the specimen because the material was collected in other than acetic ethyl ester. During

preparation of the parameres the apical setae tend to break at their basis. Therefore preparation has to be done carefully. In case of loss the setigerous punctures have to be identified. Magnification of 100 to 400 X was used for microscopic investigation of the aedeagi.

It should be mentioned that shrinking of the aedeagus was observed in a few specimens of the old material. In nearly all cases there was enough recent material available so that assigning of the old material could be performed.

There was material on hand which I could not assign with certainty. In all cases, this material consists of few or single specimens and mainly of females. These uncertain specimens are listed as "variations" under the species which I think they may belong to be next related to. However, they were not designed and labelled as type material and may belong to new additional species or subspecies. This method applied by BAEHR (1992) is considered as a critical hint for the user as well as of value for future revisions of the genus.

Theoretically it is assumed that gene flow exists between conspecific populations. If the morphological gap is constantly large enough, it is considered that the populations are not conspecific. In cases of clear sympatry, recognition of species was not difficult due to the obviously different male genitalia. Good examples are *T. appulsus* n. sp. and *T. serratulus* n. sp. or *T. birmanicus* Bates and *T. schmidti* Putzeys. Because of the fact that this revision is based on external morphological characters and characters of the genitalia only - beside sparse hints from the collecting notes in few species - but not on physiological, cytological, ecological, behavioural, or other characters, it is possible that two allopatric populations are described as two species although they may be extremities of a conspecific population respectively members of a circle of races. In such cases information on clinal variation would be of high interest. However, the material available is still too limited to investigate these interesting questions in detail. If transition of characters with only slight or indistinct gaps was observed and geographic, climatic, or other barriers are missing it is considered that gene flow is uninterrupted, even if the morphological gap between the extremities is distinct. In those cases, the material was assigned to one species, as in *T. variabilis* n. sp., for example. In summary, the basic principles applied by WHITEHEAD (1972) for the genus *Schizogenius* Putzeys and other modern revisions on Carabidae (e.g., BAEHR 1992, 1997) are followed.

TERMS AND MORPHOLOGY

In general, terms and descriptions of characters were based on JEANNEL (1957) and KULT (1959) with the following specifications.

The eyes of some *Trilophus* species exhibit remarkable interspecific differences. Some species show a certain degree of reduction or only a smaller part of the eyes is located dorsally. This character is conspicuous but hard to judge if only single specimens are on hand. This is true also for species with setigerous punctures on the intervals 3 and 5. In order to describe this character more exactly, a ratio - the "relative eye-index" - is used for these species. This ratio is calculated according to the

following formula: maximum width of head measured dorsally at the eyes minus minimal width of frons measured at the inner side of the eyes which is usually at the same line as the maximal width of head. The result is the width of eyes visible dorsally. The width of frons is divided by the width of eyes resulting in the "relative eye-index". For example, for *Trilophus birmanicus* Bates with fully developed and hemisphaerically protruding eyes, the "relative eye-index" is 1.8. For *T. serratulus* n. sp. in which dorsally visible part of the eyes is reduced by approximately 70%, the "relative eye-index" is 4.4. This index has been shown to be more precise than using only the width of eyes. Descriptive statistics of this character is displayed in Fig. 177 for species with setigerous punctures on intervals 3 and 5. Species not mentioned in Fig. 177 have fully developed eyes.

All species exhibit a triangular-like tubercle on the clypeus prolonged on the middle of the frons as a carina, and showing interspecific variation. This carina is called "keel". Some species exhibit a small median impression behind the keel.

The anterior transverse line on the pronotum is weakly developed in most species. However, very often its place is taken by a line of dark pigment under the surface of the pronotum. Only the impression of the transverse line is mentioned in descriptions but not this pigment character.

There is a fine furrow laterally and parallel to the reflexed margin of the pronotum, called "submarginal furrow" (cf. KULT 1947). The anterior part is visible only ventrally. By contrast to most Clivinini, it turns dorsally at about the middle of the pronotum and in some of the species it is prolonged up to the basal constriction, whereas the reflexed margin ends at or before the posterior setigerous puncture. The proepisterna are swollen posterolaterally and visible from above. The degree of this tumidity differs interspecifically. Species with less tumid proepisterna usually exhibit longer and more distinct submarginal furrows.

The base of the pronotum is prolonged respectively produced into a swollen ring. This ring is called "flange". In lateral view, the flange can be interspecifically more or less convex or acute. The dorsal furrow (constriction) between the flange and the pronotum is of different interspecific depth and width.

In the genus *Trilophus*, chaetotaxy provides distinctive characters.

In *T. alternans* n. sp., the labrum is 5-setose. In all other species the labrum is 7-setose. However, in almost all species the 2nd lateral seta is very small and situated towards the base. Often, both setae are not visible directly (covered by the clypeus, covered with glue, rubbed off). But the setigerous punctures are distinctly visible in a slide preparation (Fig. 3). This may be one reason why ANDREWES (1929) described the labrum of *Trilophus* as having 5 setae.

The base of the elytron exhibits 2 setigerous punctures with varying location, both of them arise from tubercles, the regular one near the suture and the 2nd near the humerus. The 2nd is a prolongation of the setigerous tubercles located as an uninterrupted row in the marginal channel of the elytron and extending in *Trilophus* anteriorly over the humerus. However, the basilateral puncture is distinctly separated from the row of the marginal channel by a tooth and it is clearly situated at the base.

In all species, the intervals of the elytra exhibit rows of short setae. These setae are much smaller than the setae arising from the tubercles located in the lateral channel of the elytron. The interval directly beneath the suture (first interval) never bears setae. Very often, setae located on the other intervals respectively very near beside the striae were rubbed off. Due to the fact that the setigerous punctures on intervals are sometimes located near the striae, a magnification of 70 X was used to distinguish between the fine setigerous punctures and punctures of the striae. Setae which are not rubbed off can be seen best by using movable yellow light which can be focused, whereas white light is used to recognise punctures which setae were rubbed off. Counting the intervals with setigerous punctures, four groups of species can be divided: species with setae located on intervals 3 and 5, 3 and 5 and 7, 2 to 6, and 2 to 7. These patterns seem to be extremely constant within the species. Among the 944 specimens checked there was no case out of the pattern. However, within an interval with setae, the number of setigerous punctures varies intraspecifically. The inner intervals usually have larger numbers of setae, and they also show larger variation. For example, species with 23 setae on interval 3 may have up to 2 setae more or less. Intraindividual variation was also observed between the two elytra of the same specimen. As a rule, the number of setigerous punctures given in descriptions refers to the left elytron. Usually the setae are located on the disk. However, in few species the setigerous punctures are extended to the basal and/or apical declivity.

Beside the elytron, the following could be observed: The lateral side of the profemora possesses 14 setigerous punctures which seem to vary in location, but this was not studied in detail. On the pronotum, *Trilophus setosus* n. sp. exhibits more than the regular 2 setigerous punctures at each site of the lateral channel.

Numerous specimens show a yellow spot at the base and/or at the tip of the apex of the elytron. This varies extremely intraspecifically in nearly all of the species exhibiting this characteristic and consequently its diagnostic value is very limited.

In some species the reflexed lateral margin of the elytron is serrate. If present, the teeth are not particularly big. However, the small teeth are clearly visible at a magnification of 40 X if not stated otherwise. The indistinct undulation due to the broad tubercles in the lateral channel and visible more or less distinctly in some specimens is not considered to be serrate.

In contrast to other Clivinini, the legs of *Trilophus* offer only limited distinctive characters. In the anterior tibia, interspecific differences were noted in the length and form of the lateral upper spine and in the movable spur. Other slightly developed differences in the legs seem to be intraspecific variations (but see chaetotaxy: profemora).

The parameres of the male genitalia are conspicuously elongated basally. These long processes are called "petioles". The description of the male genitalia always refer to the natural non-everted position of the aedeagus.

Sexual dimorphism: In some of the species, the surface of the terminal abdominal sternite exhibits different reticulation (e.g., in the *interpunctatus*-group) or a different extent of reticulation (e.g., *T. ellipticus* n. sp.). The male protarsi of *Trilophus* are not dilated. The terminal segment of the labial palpomeres possesses a small sensory field in males.

DISTINGUISHING *Trilophus* FROM RELATED ORIENTAL GENERA

The „Key to Oriental Genera of Clivinini“ (BALKENOHL 1996) leads to the genera *Trilophus* Andrewes, and *Trilophidius* Jeannel. It separates *Trilophus/Trilophidius* from other closely-related Oriental Clivinini, e.g., *Syleter* Andrewes. However, the key does not distinguish between *Trilophus* and *Trilophidius*. In addition, occurrence of the genus *Leleuporella* Basilewsky in the Oriental region was unknown until recently (BALKENOHL 1997).

Table 1 may help for easier characterisation of *Trilophus* as well as for updating the key.

Genus **Trilophus** Andrewes, 1927

Trilophus Andrewes, 1927: 263;

Trilophus Andrewes; ANDREWES 1929: 381, type species: *Dyschirius interpunctatus* Putzeys 1867;

Trilophus Andrewes; ANDREWES 1930: 356;

Trilophus Andrewes; CSIKI 1933: 639;

Trilophus Andrewes; BURGEON 1935: 153;

Trilophus Andrewes; JEANNEL 1957: 140;

Trilophus Andrewes; BALKENOHL 1994: 26.

Type species: *Dyschirius interpunctatus* Putzeys, 1866, by subsequent designation, Andrewes, 1927.

DIAGNOSIS: Clypeus elevated as broad triangular tubercle, prolonged on vertex as keel; apical segment of maxillary palpomere conspicuously securiform; segment 2 of antennae attached excentrically to scapus; reflexed margin of pronotum turning mesially in posterior half, proepisternum tumid posterolaterally, distinctly visible in dorsal view; pronotum at base with constriction dorsally, limited laterally by short carinae, elongated into a flange; median line distinctly adjoining constriction; disc conspicuously convex anterior constriction; elytron with 2 basal setigerous tubercles, one near suture and one at humerus; intervals with series of setigerous punctures varying on intervals 3 and 5 to 2 to 7; median lobe of aedeagus strongly arcuate, with minute pili, parameres with conspicuously long petioles basally. Distinguished from the closely related genera *Trilophidius* Jeannel and *Leleuporella* Basilewsky by the conspicuously long petioles of the parameres and the strongly arcuate aedeagus of the male genitalia. In contrast to *Trilophidius*, the median line of the pronotum reaches the basal constriction, the constriction is limited laterally by small carinae, and setae are present on more than the 3rd interval of the elytron. *Leleuporella* is different mainly in the unequal intervals and the comb-like setae on the elytron, the missing triangular-like tubercle on the frons of the head, and the ventral paramere which is nearly completely reduced.

DESCRIPTION

Figs 1-5

Size: Small, 2.0 to 3.3 mm, elongate.

Colour: Shiny, without metallic tinge. Head, pronotum, elytra, ventral surface, brown, in some species yellow. Base and apex of elytron in some species with yellow

TAB. I

Distinguishing characters of the genera *Trilophus*, *Trilophidius*, and *Leleuporella*

Character	GENUS		
	<i>Trilophus</i> Andrewes	<i>Trilophidius</i> Jeannel	<i>Leleuporella</i> Basilewsky
HEAD			
clypeus	triangular	triangular	carinae
frons	keel-like prolongation of triangle	keel-like prolongation of triangle shorter	carinae of different pattern
palpi	securiform	securiform	bottle-like
mandibles	moderately long and acute	shorter	elongated and acute
neck	constriction intimated laterally	constricted by punctures	carinae
PRONOTUM			
median line	to base	not reaching base	to base
convexity at base	conspicuous	flattened	conspicuous
constriction-like channel at base	dorsally, separated laterally by carinae	dorsally and laterally, not separated by carinae	dorsally and laterally, not separated by carinae
ELYTRON			
lateral setae at base	present	present	absent
setae on intervals	2. - 7., different patterns	3.	3. and 5.
form of setae	upright, pointing to all directions	upright, pointing to all directions	distinctly regular, comb-like
distance of intervals	regular	regular	4 th broader as others
convexity of intervals	distinctly convex	flattened	moderately convex
depths of striae	deep	flat	moderately deep
AEDEAGUS			
shape	medium sized or big, strongly arcuate	small, slightly arcuate	moderately big, slightly arcuate
apex	spatulate and flattened bilaterally, or stick-like	broadly rounded, flattened ventrally at apex	spatulate and flattened dorso-ventrally
endophallus	with bristles	without bristles	with bristles
PARAMERES			
reduced	no	no	ventral one reduced
petioles	conspicuously long	short	no petioles
setae at apex	usually 2 (but exceptionally up to 4)	2	asetose
OCCURRENCE			
region	Oriental region	Ethiopian and Oriental region	Ethiopian and Oriental region

spot. Mouthparts, legs, antennae yellow to yellow-brown. Wings of clypeus, anterior margin of supraantennal plates, and reflexed margin of elytra in some species paler or transparent yellowish.

Head: A third to quarter smaller than pronotum, moderately elongate anteriorly. Clypeus fused to frons. Clypeus, wings, supraantennal plates more or less distinctly reflexed margined; Clypeus stright or excised anteriorly, with usually moderately broad channel between tubercle and reflexed margin, completely fused with wings, one clypeofrontal seta at each side, wings obtusely or distinctly projecting, devided from supraantennal plates by notches; supraantennal plates vaulted, prolonged posteriorly as decreasing carinae at margin of eye; clypeus elevated as broad triangular tubercle, increasing evenly from channel of clypeal margin and falling steeply posteriorly, prolonged on frons as keel of variable length and form; clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly by splitting into two furrows each at mid-eye level, forming a carina between furrows at each side, with 2 supraorbital setae at each side. Each furrow with broad indistinct fovea posterior tubercle and in some species with 2nd distinct fovea mostly situated at mid-eye level. Frons convex, usually with reticulation, in some species with more or less developed transverse furrow between eyes crossing keel at midway, arising in posterior fovea of longitudinal furrow, interrupted by keel. Neck smooth, constriction at posterior eye level not deep, more or less broadly interrupted at middle. Eyes either hemisphaerically or reduced interspecifically up to 50%. Genae either indistinct or enlarged. Area with isodiametric reticulation laterally posterior genae, distinct in most of the species. Antennal grooves short, not reaching over maxillary fissure. Labrum straight or excised anteriorly, trapeziform, usually with isodiametric reticulation, 5- or 7-setose, fringed laterally. Mandible of moderate length, broadened basally, moderately curved, sharp at apex, ventral furrow with row of fine setae. Apical segment of maxillary palpomere conspicuously securiform, with oval depression dorsally, pubescent ventrally; terminal segment of labial palpomere bottle-like, widened, with indistinct small sensory field in males, penultimate segment bisetose (quadrisetose as in FEDORENKO 1996, fig. 74, p. 19 not observed), ligula with 2 long apical setae separated, paraglossae slender, membranous. Mentum and submentum devided by deep furrow, with two pairs of setae each, median tooth triangular, acute at apex, lobes elongate, much longer as tooth, rounded anteriorly. Antennae pubescent from segment 4 onwards, segment 4 to 10 elongate to moniliform, scapus with long seta in apical half, scapus and segment 2 more or less excentrically attached.

Pronotum: Not globose, in lateral view conspicuously convex basally to constriction. Outline usually subcordate, oblongo-angustate in basal third, usually as long as wide, maximum width at middle or behind middle, commonly narrowed at anterior angles. Surface smooth or with fine wrinkles. Marginal channel with anterior and posterior setigerous puncture (exception *T. setosus* n. sp.). Reflexed lateral border of different length, reaching from anterior angle over anterolateral and in most of the species to posterolateral setigerous puncture, turning mesially in posterior half, extended to basal constriction as obtuse vault with submarginal furrow visible as fine line in some species. Lateral channel usually sharp and deep throughout. Proepisternum

tumid laterally in posterior part, distinctly visible from above. Anterior angles distinct or rounded off, in some species slightly projecting; posterior angles missing; no basal foveae. Anterior transverse line flat, broad, in some species broadly interrupted at middle, sometimes completely missing. Median line distinct, not adjoining anterior transverse line, not reaching anterior margin, in most species deeper and broader to base, adjoining basal constriction. Basal constriction conspicuous, developed dorsally as deep and more or less broad channel, limited dorsolaterally by short but conspicuous longitudinal carinae. Ringlike flange turgid, broader as channel of constriction.

Elytron: Varying in shape from oblongo-elongate with parallel sides up to regularly elliptical. Lateral view of anterior two thirds regularly convex, flattened or transversally depressed, evenly convex posteriorly. Maximum width at or behind middle. Base truncated rectangularly by forming a distinct humerus, obliquely, or regularly convex up to base without visible humerus. Reflexed lateral margin reaching up to peduncle, finer at base, smooth or serrate, humeral tooth of different form and size, situated in prolongation of 6th or 7th stria or 7th interval. Marginal channel usually broad, with series of uninterrupted setigerous tubercles with long setae, prolonged anteriorly over humeral angle, with fold-like carina at apex crossing in some species completely marginal channel, in some species rudimentary; Two conspicuous basal setigerous tubercles, one situated at declivity of 2nd interval and another one at humerus anterior humeral tooth. Scutellar stria intimated in some species. Seven visible punctuate striate striae, deeper mesially, first reaching apex, others ending before or on apical declivity. Intervals of equal distance, with series of uninterrupted setigerous punctures separated into four groups as following: punctures on intervals 3 and 5, 3 and 5 and 7, 2 to 6, and 2 to 7. Setae short, fine, projected upright. Interval 8 forming obtuse carina apically, partly covering lateral channel in most of the species.

Ala: Fully developed or reduced up to one third of the length and width of elytron.

Ventral surface: Proepisternum shiny, flattened ventrolaterally, laterally with submarginal furrow of different depth and length commonly with fine transverse wrinkles, furrow between prosternum and proepisternum developed more or less distinctly, anterior coxal cavities closed, with keel in between. Mesosternum with well developed peduncle, with scutellum dorsally. Metacoxal cavities slightly separated by triangle central part of first visible abdominal sternite. Sternites 3 to 5 of abdomen with pair of paramedian ambulatory setae. Terminal sternite (sternite 6) with apical reticulation of different appearance; 2 apical setae at each side widely separated. Ventral strigae distinct.

Legs: Anterior legs of fossorial type, femur stout, conspicuously swollen, flattened at inner side, with 14 long setae on outer side. Lateral upper spine of protibia of different length, turned more or less ventrally and/or outward; movable spur of different length and curvature; two small lateral teeth. Mesotibia without spur, with some indistinct tubercles laterocaudally, not densely hirsute at inner side; tarsomeres of legs not distinctly fine, first one elongated, usually as long as a third of all five.

Male genitalia: Genital ring closed, sclerotized. Median lobe conspicuously arcuate in most species, with irregularly scattered minute pili; apex usually spatulate,

in few species stick-like; preputial opening large, commonly situated lateroventrally. Endophallus with groups of bristles and usually with teeth. In some species with additional group of bristles/teeth at apical cup. No flagellum visible. Parameres asymmetrical, with conspicuously elongate petioles at base, usually with 2 long nematiform apical setae, each.

Female genitalia: Stylomere sclerotized, conspicuously curved apically, in most species acute at apex, elongate, with 2 ensiform setae and usually 4 long nematiform setae basally, no seta at apex, in some species additional seta between ensiform setae.

Larvae and way of life: Nothing is known so far about the immature stages. This is also true for the next related genera *Trilophidius* Jeannel, *Leleuporella* Basilewsky, and *Syleter* Andrewes.

Habitat: Most species collected in the lowland have fully developed wings. Some of them were collected at light and according to the very limited information available they were collected near water or in swampy habitats or in forests. Species with reduced wings or which wings exhibit polymorphism were mostly collected in the Himalayas or in isolated mountain regions in Meghalaya, South India, or on islands. Available data show that those species were mostly sifted from moist detritus.

Distribution: From the border of the Palaearctic region in North of Pakistan over the Oriental region including the Himalayas, Formosa, and Sri Lanka up to Java.

KEY TO THE SPECIES OF THE GENUS *Trilophus*

In general, the species can be best distinguished by the male genitalia. Therefore it is strongly recommended not only to use the key but also to compare the figures of the male genitalia.

- 1 Setigerous punctures on intervals 3 and 5 of elytron, **and** on one or more other interval(s) 2
- Setigerous punctures on intervals 3 and 5 of elytron, only 11
- 2 Setigerous punctures on intervals 3 and 5 and 7 (group *alternans*) 3
- Setigerous punctures on each of the intervals 2 to 6 or 2 to 7 5
- 3 Eyes flat, reduced, posterior third enclosed by genae; wings of head rounded anteriorly; reflexed lateral margin of elytra serrate (Fig. 17) *T. alternans* n. sp.
- Eyes large, protruding, genae small; wings of head acutely projecting anteriorly; reflexed lateral margin of elytra smooth 4
- 4. Median line of pronotum fine, invisible in anterior third, not adjoining basal constriction; basal constriction not limited laterally by longitudinal small carinae (Fig. 18); palpi of normal size; macropterous *T. lompei* n. sp.
- Median line of pronotum deep, complete, adjoining basal constriction; basal constriction limited laterally as usual by small longitudinal carinae (Fig. 19); palpi conspicuously shortened; brachypterous *T. palpireductus* n. sp.
- 5 Setigerous punctures on each of the intervals 2 to 6; maximum width of pronotum at middle (group *hispidulus*) 6

- Setigerous punctures on each of the intervals 2 to 7; maximum width of pronotum at end of 2nd third (group *hirsutus*) 9
- 6 Length more than 3.1 mm; elytra flattened in basal half; first stria in basal two thirds as deep as striae 2 to 4 *T. fuscus* n. sp.
- Length less than 3.1 mm; elytra depressed transversally in basal half; first stria in basal two thirds deeper than striae 2 to 4 7
- 7 Base of elytra truncated convexly; frons with no trace of median impression behind keel; reflexed lateral margin of pronotum reaches posterior setigerous puncture (Fig. 6) *T. hispidulus* Putzeys
- Base of elytra truncated more obliquely; frons with small but distinct median impression behind keel; reflexed lateral margin of pronotum reaches scarcely to posterior setigerous puncture 8
- 8 Reflexed lateral margin of pronotum reaches scarcely posterior setigerous puncture (Fig. 8); surface of head moderately elongate chagreened laterally to keel and on frons *T. baehri* n. sp.
- Reflexed lateral margin of pronotum ends at middle between anterior and posterior setigerous puncture (Fig. 9); surface of head smooth laterally to keel and indistinctly striolate on frons *T. crinitus* n. sp.
- 9 Pronotum convex, with 2 lateral setigerous punctures situated in lateral marginal channel, longer than wide 10
- Pronotum flattened, with 5 lateral setigerous punctures situated in lateral marginal channel, wider than long (Fig. 16); setigerous punctures on intervals situated at middle *T. setosus* n. sp.
- 10 Pronotum with median line fine (Fig. 14); eyes well developed, protruding; reflexed margin of elytron smooth *T. hirsutus* n. sp.
- Pronotum with median line sharp, deep (Fig. 15); eyes reduced, flattened; reflexed margin of elytron subserrate *T. arcuatus* n. sp.
- 11 Elytra parallel, eyes fully developed but not hemisphaerically convex, thought somewhat elongate and/or flattened (group *interpunctatus*) 12
- Elytra rounded at lateral margin with maximum width at or behind middle; eyes hemisphaerically protruding, regularly convex, or reduced . . . 14
- 12 Segment 5 - 10 of antennae moniliform; striae 2 - 7 of elytra slightly impressed, intervals flattened; eyes slightly convex; marginal channel of pronotum small totally (Fig. 1); length 2.2 - 2.6 mm *T. interpunctatus* Putzeys
- Segments 5 - 10 of antennae elongate; striae 2 - 7 of elytra distinctly impressed, intervals distinctly convex; eyes moderately convex; marginal channel of pronotum deep anteriorly, broader and flattened posteriorly 13
- 13 Striae ending at beginning of apical declivity; row of setigerous punctures of 3rd interval ending on apical declivity; longitudinal furrows on frons with conspicuous rounded fovea at each side, frons with isodiametric reticulation; margin of clypeus with small channel at middle; length 2.5 - 2.7 mm *T. parallelus* n. sp.

- Striae reaching nearly up to apex, ending on obtuse vault-like carina of 8th interval; row of setigerous punctures of 3rd interval reaching up to tip of apex; foveae in furrows on frons indistinct; frons with longitudinal reticulation; margin of clypeus with broad and flattened channel at middle; length 2.3 - 2.5 mm *T. appulsus* n. sp.
- 14 Maximum width of elytra at middle, margin regularly rounded from humerus to apex 15
- Elytron dilated behind middle, margin either straight but diverging posteriorly, or much less rounded anteriorly than posteriorly 21
- 15 Elytron slightly transversally depressed in anterior half, base truncated obliquely or rectangularly; eyes fully developed, large; alae fully developed (group *acuminatus*, partly) 16
- Elytra convex in lateral view or slightly explanate on disk, base oblique, slightly concave; eyes reduced; alae reduced (group *ellipticus*, partly) 17
- 16 Elytra conspicuously oblongo-elongate, base truncated rectangularly (Fig. 30); supraantennal plates with longitudinal reticulation; antennae elongate; reflexed margin of pronotum complete *T. elongatus* n. sp.
- Elytra subelongate, base truncated obliquely (Fig. 29); supraantennal plates smooth; antennae submoniliform; reflexed margin of pronotum ending at middle between lateral setigerous punctures . . . *T. acuminatus* n. sp.
- 17 Reflexed margin of elytra smooth, outline conspicuously elliptical (Fig. 22); setigerous punctures of pronotum somewhat removed from lateral channel; length 2.6 - 2.9 mm *T. ellipticus* n. sp.
- Reflexed margin of elytra finely or distinctly serrate, outline subelliptical or elongate; setigerous punctures of pronotum situated at/in lateral channel 18
- 18 Eyes conspicuously reduced, nearly flat in dorsal view; genae as high as and covering half of eyes; frons finely irregularly reticulated; maximum width of pronotum at posterior third 19
- Eyes reduced but convex; genae nearly not as high as eyes, covering eyes by one third; maximum width of pronotum slightly behind middle . . . 20
- 19. Reflexed margin of elytra distinctly serrate; fold-like carina of marginal channel at apex intimated at margin, not crossing channel; proepisterna less distinct in dorsal view (Fig. 27) *T. serratus* n. sp.
- Reflexed margin of elytra finely serrate; fold-like carina of marginal channel at apex distinct, crossing channel completely; proepisterna moderately tumid (Fig. 24) *T. serratulus* n. sp.
- 20 Anterior margin of labrum moderately concave; clypeus regularly excised; anterior margin of pronotum straight; fold-like carina of marginal channel at apex of elytra intimated at margin, not crossing channel; proepisterna less distinct (Fig. 26) *T. schawalleri* n. sp.
- Anterior margin of labrum straight; clypeus nearly straight at middle; anterior margin of pronotum slightly bisinuate; fold-like carina of

- marginal channel at apex of elytra distinct, crossing channel completely; proepisterna moderately tumid (Fig. 28) *T. convexus* n. sp.
- 21 Eyes reduced; genae distinct; fold-like carina of marginal channel at apex of elytra distinct, completely crossing channel (group *ellipticus*, partly) 22
- Eyes fully developed; genae indistinct; fold-like carina of marginal channel at apex of elytra indistinct, not crossing channel completely (group *acuminatus*, partly) 24
- 22 Eyes conspicuously reduced; genae conspicuous; frons of head with irregular reticulation; antennae moniliform; margin and channel of elytra stronger developed; apex of aedeagus spatulate (Figs 122, 125, 130, 133) 23
- Eyes reduced but still distinctly convex; genae covering a quarter of eye only; frons of head with isodiametric reticulation; antennae elongate; margin and channel of elytra gracile, apex of aedeagus stick-line (Figs 111, 114, 115) *T. variabilis* n. sp.
- 23 Reflexed lateral margin of pronotum extended over posterior setigerous puncture; base of elytra truncated rectangularly; anterior three quarters of pronotum slightly convex in lateral view (Fig. 51); apex of aedeagus conspicuously flattened *T. loebli* n. sp.
- Reflexed lateral margin of pronotum just reaching posterior setigerous puncture; base of elytra truncated slightly convex; anterior third of pronotum flattened in lateral view (Fig. 53); apex of aedeagus moderately flattened *T. weberi* n. sp.
- 24 Reflexed lateral margin of pronotum ending before posterior setigerous puncture, marginal channel broadened, flat posteriorly and ending at middle between punctures (Fig. 31); clypeus and wings of head distinctly shortened; pronotum flattened and broadened, median line not deep at middle *T. latiusculus* n. sp.
- Reflexed lateral margin of pronotum ending at posterior setigerous puncture, marginal channel smaller and deeper, ending at posterior puncture; clypeus and wings of head normal for genus; pronotum not flattened and broadened, median line deep at middle 25
- 25 Anterior margin of pronotum straight; maxillary palpi slightly shortened; keel on frons blunt, shorter as triangle-like elevation of tubercle *T. imitator* n. sp.
- Anterior margin of pronotum bisinuate or convex; maxillary palpi typical for genus; keel on frons of head sharp, as long or longer than triangle-like elevation of tubercle (group *schmidtii*) 26
- 26 Frons of head with isodiametric reticulation; maximum width of pronotum behind middle, lateral channel of same depth and width in whole length; eyes hemisphaerically protruding; apex of aedeagus stick-like (Figs 103, 106) *T. birmanicus* Bates
- Frons of head with fine longitudinal reticulation; maximum width of pronotum at middle, lateral channel of different depth and width from

- anterior angles to posterior setigerous punctures; eyes large and convex but not hemisphaerically protruding; apex of aedeagus spatulate 27
- 27 Clypeus, wings, and supraantennal plates finely margined; median line of pronotum fine at middle, anterior margin slightly convex (Fig. 12); base of elytron truncated obliquely, base and tip of apex yellowish; humeral tooth moderate; apex of aedeagus moderately arcuate (Fig. 99) *T. schmidti* Putzeys
- Clypeus, wings, and supraantennal plates distinctly margined; median line of pronotum conspicuously sharp throughout, anterior margin bisinuate (Fig. 20); base of elytron truncated convexly, base and apex of same colour as disk; humeral tooth sharply projecting; apex of aedeagus hook-like arcuate (Fig. 107) *T. tonkinensis* n. sp.

THE SPECIES

GROUP *hispidulus*

Diagnostic combination of characters: Species of this group may be distinguished by the following combination of characters: Medium to large sized; wings of clypeus rounded anteriorly, eyes fully developed, genae small, antennae subelongate to moniliform, labrum with regular transverse reticulation; maximum width of pronotum at middle, anterior transverse line intimated at extremities, posterolateral tumidity of the proepisterna conspicuous, size of flange big; setae on the elytron present on each of the intervals 2 to 6.

Trilophus hispidulus Putzeys, 1866

Figs 6, 39, 72-75, 158

Dyschirius hispidulus Putzeys, 1866: 98;

Oxydrepanus hispidulus Putzeys; ANDREWES 1926: 378;

Trilophus interpunctatus var. *hispidulus* Putzeys; ANDREWES 1927: 265;

Trilophus interpunctatus var. *hispidulus* Putzeys; ANDREWES 1929: 385;

Trilophus interpunctatus var. *hispidulus* Putzeys; ANDREWES 1930: 357.

MATERIAL EXAMINED

A. Type material. Lectotype (by present designation): ♂. Labels: silver, small / yellow, small, Siam Bgk. / brown, *Dyschirius hispidulus* Putz. dét. J. Putzeys / white, red, Syntype / white, *Trilophus interpunctatus* P. v. *hispidulus* Putz. cotype H.E. Andrewes 1928 / brown, Soc. Ent. Belg. Coll. Putzeys; (IRSNB).

Paralectotypes: 2 ♀. Labels: silver, small, / yellow, small, Siam Bgk. / white, Siam Bangkok Coll. Castelnau / white, *Dyschirius hispidulus* Putz. teste Putzeys / white, Museo Civico di Genova; (MCSN).

Comments: PUTZEYS (1867: 98) based his description on 3 specimens from Siam. They are available and served as type material. These individuals obviously represent a close series due to the following reasons: Identical material (paper-cards, pins) was used for mounting. The size, colour, and material of the original labels are identical, and the handwriting (by Putzeys) is identical including the wording/abbreviations. In addition, there are 5 specimens available, partly showing labels "teste Putzeys" or "det. J. Putzeys". They were not considered as type material because they were all labelled differently, the material, colour, size, and handwriting of the labels is different, or they were labelled other than Siam (comp. B.).

B. Other material. 1 ♂. Labels: green, small / beige, Siam Bangkok / yellow-brown, *Dyschirius hispidulus* P. / white, Siam Bangkok Coll. Castelnau / white *Dyschirius hispidulus* Putz. teste Putzeys / white, Museo Civico di Genova; (MCSN); - 1 ♀. Labels: silver, small / blue, Siam Bangkok / white, Siam Bangkok Coll. Castelnau / white, *Dyschirius hispidulus* Putz. teste Putzeys / white, Museo Civico di Genova; (MCSN); - 1 ♀. Labels: silver, small / yellow, *Dyschirius hispidulus* P. / white, Siam Bangkok Coll. Castelnau / white, *Dyschirius hispidulus* Putz. teste Putzeys / white, Museo Civico di Genova; (MCSN); - 1 ♀. Labels: white, Siam, Bangkok / brown, Soc. Ent. Belg. Coll. Putzeys / brown, *Dyschirius hispidulus* Putz. dét. J. Putzeys (IRSNB); - 1 ♂. Labels: yellow, Calcutta / brown, Soc. Ent. Belg. Coll. Putzeys / grey, *Dyschirius schmidti* Putz. dét. J. Putzeys / white, red, Syntype; (IRSNB); - 1 ♀. Labels: blue, Siam / white, Bowring. 63.47* / white, *Trilophus interpunctatus* v. *hispidulus* Putz. compared with type H.E.A. (BMNH); - 1 ♂, Indo Chine, Cambodia 1913/14, Coll. Dussault, wod (NHMB); - 2 ♂, NO-Thailand, Khon Kaen, 25.V.1980, 23.11.1980, at light, leg. S. Saowakontha (ZMHB/CBA); - 1 ♀, Laos, Ventiane 64 R, Coll. J. Ochs in Coll. M. Curti, wod (MHNG); - 1 ♀, Labels: Bangkok / Kauf 8.1936 von Staudinger / F. van Emden Bequest. B.M. 1960-129. This specimen has been received without head and prothorax (BMNH).

DIAGNOSIS: A medium sized species with subelongate elytra, conspicuously tumid proepisterna, rudimentary anterior transverse line on the pronotum, setigerous punctures present on each of the intervals 2-6 of the elytra, and an indistinct incomplete fold-like carina in the channel at the apex of the elytra. Distinguished from the related species *T. crinitus* by the complete reflexed lateral margin of the pronotum, and from *T. fuscus* and *T. baehri* by the missing reticulation behind the keel on the frons of the head.

REDESCRIPTION

Measurements: Lectotype: Length 2.55 mm, width 0.85 mm, ratio length/width of pronotum 1.02, ratio length/width of elytra 1.71. Other material: Length 2.55 - 3.05 mm ($x = 2.75$ mm*), width 0.82 - 0.98 mm ($x = 0.89$ mm*), ratio length/width of pronotum 1.00 - 1.07 ($x = 1.05$ *), ratio length/width of elytra 1.70 - 1.79 ($x = 1.73$ *); (*n = 13).

Colour: Head, pronotum, elytron and ventral surface middle to dark brown. Base of elytron with intimated light-brown spot. Mouthparts and legs yellow-brown. Wings of clypeus and anterior part of supraantennal plates transparent yellowish. Mandibles black at apex.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates inconspicuously margined; Clypeus moderately excised anteriorly, wings broad, obtusely projecting, divided from supraantennal plates by slight notches; supraantennal plates conspicuously convex; keel on vertex shorter than tubercle, anteriorly as elevated as tubercle, decreasing posteriorly. Clypeus and frons divided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly by splitting into two furrows at mid-eye level, forming a carina between furrows. Frons distinctly convex, with inconspicuous reticulation laterally to keel. Slight neck constriction at posterior eye level, broadly interrupted at middle. Eyes large, protruding, posterior quarter of ventral part enclosed by genae. Genae small, not projecting laterally. Labrum stright, thought slightly bisinuate. Mandibles distinctly acute at apex. Antennae reaching basal constriction of pronotum, segment 4 to 10 submoniliform.

Pronotum (Fig. 6, 39): Lateral view: Anterior half moderately convex, slightly flattened posterior basal constriction; frontal view: moderately convex, slightly flattened at median line. Outline subcordate, slightly longer than wide, maximum width at middle, narrowed distinctly at anterior angles. Anterior margin slightly bisinuate. Reflexed lateral border evenly rounded, reaching to posterior setigerous puncture, more distinctly rounded anteriorly, extended to basal constriction as obtuse vault. Proepisternum strikingly tumid laterally in posterior part. Anterior angles distinct, blunt, slightly projecting. Anterior transverse line intimated at extremities. Median line distinct, deeper and broader in basal half. Surface smooth. Ringlike flange turgide, convex, twice as broad as channel of constriction.

Elytron (Fig. 6): Anterior half transversally depressed. Subelongate, sides nearly straight anterior middle but diverging, evenly rounded in apical half. Maximum width behind middle. Base truncated convexly. Marginal channel broad, fold-like carina at apex indistinct, incomplete; reflexed margin conspicuous from humeral tooth to apex. Humeral tooth moderate, situated in extended projection of 6th stria, turning dorsally and backwards. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus and a smaller one at declivity of second interval. Scutellar stria intimated, with fine carina laterally to scutellar stria. First stria conspicuously deep, stria 2 to 5 fairly deep, punctuate, other striae developed as rows of punctures. Intervals 1 to 5 moderately convex, other more flattened, 8th forming obtuse carina in apical 2 fifths, 2 to 6 with series of 16 to 22 setigerous punctures situated at middle. First stria reaching apex, all others ending abruptly on apical obtuse vault-like carina of 8th interval.

Ala: Fully developed.

Lower surface: Proepisternum smooth, without submarginal furrow, furrow between prosternum and proepisternum invisible in anterior third. Terminal segment of abdominal sternite with transverse reticulation.

Protibia: Movable spur as long as spine. Spine stout, turned distinctly ventrally and slightly laterally.

♂: *Aedeagus* (Figs. 72, 75): Median lobe moderately arcuate at middle, nearly straight in lateral view. Apex spatulate, narrowed and slightly arcuate apically. Endophallus with bristles. Parameres (Figs. 73, 74), bisetose.

♀: *Stylomere* (Fig. 158): Broadened mesially, slightly arcuate.

Distribution: The species is found in Thailand, Laos, and Cambodja (Fig. 180).

Remarks: The material from „Nagpur“ listed in Andrewes (1929, 1930) could not be located. Andrewes's (1930) record „Sumatra“ possibly refers to *T. setosus* n. sp.

***Trilophus fuscus* n. sp.**

Figs 7, 40, 61-64

Type material: Holotype: ♂, Thailand, NE Bangkok, Khao Yai Nat. Park E Heo Suwat Waterfalls, 800 - 900 m, 01.XII.1985, leg. I. Löbl & D. Burckhardt (MHNG).

Paratype: 1 ♂, same data as holotype (CBA).

DIAGNOSIS: A big sized species with oblongo ovate elytra, rudimentary anterior transverse line on the pronotum and median line conspicuous in total length, and

setigerous punctures present on the interval 2 -6 of the elytra. Distinguished from the related species *T. hispidulus*, *T. baehri*, and *T. crinitus* by the big size, the elongate elytra, the lateral channel of the pronotum which is elongated to the basal constriction as distinct submarginal furrow, and the slender palpomeres. Moreover, *T. crinitus* is distinguished by the incompletely reflexed lateral margin of the pronotum, *T. hispidulus* by the distinct and complete fold-like carina at the apex of the elytra, and *T. baehri* by the short keel on the frons of the head.

DESCRIPTION

Measurements: Length 3.30 mm; width 1.02 / 1.03 mm, 1.03 (PT); ratio length/width of pronotum 1.04 / 1.07, ratio length/width of elytra 1.78 / 1.80.

Colour: Head, pronotum, elytron, and ventral surface conspicuously dark brown. Base of elytron with broad light-brown spot, small but distinct yellowish spot at apex. Mouthparts yellow. Legs and antennae middle-brown.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates finely margined. Clypeus regular and slightly excised anteriorly, wings obtuse, slightly projecting, devided from supraantennal plates by notches; supraantennal plates conspicuously convex; keel on vertex sharp, as long and as elevated as tubercle. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Each furrow diverging posteriorly by splitting into 2 furrows at mid-eye level, forming carina between furrows; 2nd foveae in furrows flat. Frons moderately convex, with elongate reticulation nearly up to neck constriction, small but distinct median impression behind keel. Neck constriction at posterior genae level slight, not interrupted at middle. Eyes large, subelongate, protruding, posterior fifth of ventral part enclosed by genae. Genae short, not projecting laterally. Labrum 3-lobed. Antennae not reaching basal constriction of pronotum, segment 4 to 10 subelongate.

Pronotum (Figs. 7, 40): Lateral view: regularly convex; moderately and regularly convex in frontal view. Outline subcordate, slightly longer than wide, maximum width at middle, narrowed at anterior angles. Anterior margin slightly bisinuate. Reflexed lateral border evenly rounded from anterior angle to posterior setigerous puncture, extended distinctly to basal constriction as obtuse vault and submarginal furrow. Proepisternum strikingly tumid posterolaterally. Anterior angles rectangularly projecting. Anterior transverse line intimated at extremities. Median line distinct, deeper and broader in basal two thirds. Surface with few scattered very minutely sticked punctures. Ringlike flange acute, twice as broad as the small and deep channel of constriction.

Elytron (Fig. 7): Anterior half flattened, evenly convex in posterior half. Elongate, sides nearly straight anterior middle but diverging, evenly rounded in apical half. Maximum width at middle. Base truncated obliquely, with intervals tubercle-like elevated at basal declivity. Marginal channel broad, fold-like carina at apex crossing channel completely; reflexed margin conspicuous from humeral tooth to apex, reaching up to peduncle but with short interruption in front of humerus. Humeral tooth moderate, situated in extended projection of 7th interval, turning dorsally and backwards. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at

humerus and a smaller one at declivity of second interval. Scutellar stria intimated, no carina laterally to scutellar stria. First stria on disc as deep as stria 2 to 4, 5th fairly deep, punctuate, other striae developed as rows of punctures. Intervals 1 to 5 slightly convex, other more flattened, 8th forming obtuse carina in apical half, 2 to 6 with series of 18 to 23 setigerous punctures situated at middle. First stria reaching apex with increasing depth, all others ending finely before obtuse apical vault-like carina of 8th interval.

Ala: Fully developed.

Lower surface: Proepisternum with few scattered minutely stuck punctures, with submarginal furrow in anterior quarter, furrow between prosternum and proepisternum invisible in anterior fifth. Terminal segment of abdominal sternite with conspicuous transverse reticulation.

Protibia: Movable spur shorter than spine. spine moderately turned ventrally.

♂: *Aedeagus* (Figs. 61, 64): Median lobe slender in dorsal view, distinctly arcuate at middle, slightly arcuate in lateral view. Apex spatulate, arcuate, slightly twisted, cross section convex. Parameres (Figs. 62, 63) bisetose.

♀: *Stylomere* unknown.

Distribution: Known from the type locality in the mountainous region north-east of Bangkok (Fig. 180).

Etymology: The name refers to the conspicuously dark-brown colour of the species.

***Trilophus baehri* n. sp.**

Figs 8, 41, 65-67, 159

Type material: Holotype: ♂, Java occident., Pengalengan, 4000', 1893, leg. H. Fruhstorfer, wod (MNHP).

Paratypes: 1♂, Java occident., Mons Tjikorai, 4000', 1892, leg. H. Fruhstorfer, 1892 (CBA); 1♀. same data as holotype (MNHP).

DIAGNOSIS: A medium sized species with subelongate elytra, slight anterior transverse line on the pronotum, and setigerous punctures present on intervals 2 - 6 of the elytra. Distinguished from the related species *T. hispidulus*, *T. fuscus*, and *T. crinitus* by the strikingly tumid proepisterna, and the different aedeagus.

DESCRIPTION

Measurements: Length 2.60 - 2.80 mm; width 0.82 - 0.90 mm; ratio length/width of pronotum 0.97 - 1.04, ratio length/width of elytra 1.68 - 1.78.

Colour: Head, pronotum, elytron, and ventral surface middle-brown. Mouthparts, antennae, and legs yellow.

Head: A third to quarter smaller than pronotum. Clypeus, wings, supraantennal plates finely margined. Clypeus regular and slightly excised anteriorly, wings obtusely projecting, devided from supraantennal plates by notches; supraantennal plates conspicuously convex; keel on vertex sharp, as long and as elevated as tubercle, decreasing posteriorly. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly, with 2nd fovea at eye level. Supraorbital furrow divided from frons by distinct carina; carina separated from

supraantennal plates by fine transverse incision. Frons moderately convex, with elongate reticulation up to neck constriction, small but distinct median impression behind keel. Neck constriction at posterior genae level indistinct, broadly interrupted at middle. Eyes subelongate, slightly flattened laterally. Genae distinct, not projecting laterally, enclosing eyes posteriorly by one-sixth. Labrum straight anteriorly. Antennae reaching to basal constriction of pronotum, segment 4 to 10 subelongate.

Pronotum (Figs. 8, 41): Lateral view: disc flattened anteriorly, middle part moderately convex, conspicuously convex posteriorly to basal constriction; frontal view: moderately convex, flattened at median line, conspicuously convex at lateral margin. Outline subcordate, stout, as long as wide, maximum width at middle, narrowed at anterior angles. Anterior margin slightly bisinuate. Reflexed lateral border evenly rounded from anterior angle nearly up to posterior setigerous puncture, extended to basal constriction as distinct obtuse vault. Proepisternum strikingly tumid laterally in posterior part. Anterior angles obtuse, pointed. Anterior transverse line intimated at extremities. Median line distinct, deep in total length. Surface with few scattered very minutely stuck punctures, few fine transverse wrinkles near lateral border. Ringlike flange convex, twice as broad as channel of constriction.

Elytron (Fig. 8): Slightly depressed transversally in anterior half. Elongate, sides nearly straight in basal two thirds but diverging, evenly rounded apically. Maximum width behind middle. Base truncated obliquely. Marginal channel broad, fold-like carina at apex crossing channel completely; reflexed margin conspicuous from humeral tooth to apex. Humeral tooth distinct, situated in extended projection of 7th interval, turning dorsally and backwards. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus and a smaller one at declivity of 2nd interval. Scutellar stria intimated, small carina laterally to scutellar stria. First stria deep, striae 2 to 5 fairly deep, punctuate, other striae developed as rows of punctures. Intervals 1 to 6 slightly convex, other more flattened, 8th forming obtuse carina in apical half, 2 to 6 with series of 18 to 20 setigerous punctures situated at middle. First stria reaching apex with increasing depth, all others more fine apically, ending before obtuse vault-like carina of 8th interval.

Ala: Fully developed.

Lower surface: Proepisternum with few scattered minutely stuck punctures, with submarginal furrow in anterior quarter, furrow between prosternum and propisternum invisible in anterior fifth. Terminal segment of abdominal sternite with conspicuous transverse reticulation.

Protibia: Movable spur as long as spine. Spine turned distinctly ventrally.

♂: *Aedeagus* (Figs. 65, 67): Median lobe arcuate at middle, slightly arcuate in lateral view. Apex spatulate, moderately arcuate, explanate. Endophallus with few bristles and small teeth. Parameres (Figs. 65, 66), bisetose.

♀: *Stylomere* (Fig. 159): Broad basally, distinctly arcuate, acute apically.

Distribution: Known from the type localities in Java (Fig. 180).

Etymology: The species is dedicated to Dr. Martin Baehr for worthwhile discussions during generating of the manuscript.

Remarks: It should be mentioned that the aedeagus of the holotype is figured in JEANNEL (1957, p. 138, Fig. 6). The original slide preparation has been let as it is. The aedeagus is broken into separate parts and not totally dissected from tissue. However, it could be clearly recognised that it belongs to the holotype although the figure given in JEANNEL (1957, p. 138) does not display the shape and sinuosity correctly.

Trilophus crinitus n. sp.

Figs 9, 42, 160

Type material: Holotype: ♀, Java, Batavia, 1878, leg. Lansberge, wod (MCSN).

DIAGNOSIS: A medium sized species with subelongate elytra, rudimentary anterior transverse line on the pronotum, conspicuously tumid proepisterna, and setigerous punctures present on intervals 2 - 6 of the elytra. Distinguished from the related species *T. hispidulus*, *T. fuscus*, and *T. baehri* by the extremely shortened reflexed lateral margin of the pronotum which ends behind the anterior setigerous puncture.

DESCRIPTION

Measurements: Length 2.80 mm; width 0.91 mm, ratio length/width of pronotum 1.05, ratio length/width of elytra 1.70.

Colour: Head, pronotum, elytron, ventral surface, and front legs middle-brown. Mouthparts, intermediate and hind legs yellowish. Two basal segments of antennae yellowish, other segments darkened. Vault of supraantennal plates yellowish.

Head: A third to quarter smaller than pronotum. Clypeus and wings conspicuously margined; supraantennal plates distinctly margined. Clypeus moderately excised anteriorly, wings obtusely projecting, devided from supraantennal plates by notches; supraantennal plates conspicuously convex; surface of clypeus with isodiametric microsculpture, keel on vertex sharp, as long and as elevated as tubercle. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows with 2nd fovea each. Furrows diverging posteriorly by splitting into 2 furrows at mid-eye level, forming carina between furrows. Frons moderately convex, smooth laterally to keel, indistinct striolation at posterior eye level, small but distinct median impression behind keel. Neck constriction at posterior genae level indistinct, broadly interrupted at middle. Eyes hemispherical, protruding. Genae inconspicuous. Anterior margin of labrum distinctly excised. Antennae not reaching basal constriction of pronotum, segment 4 to 10 moniliform.

Pronotum (Figs. 9, 42): Lateral view: moderately convex; moderately convex in frontal view. Outline subcordate, slightly longer than wide, maximum width at middle, narrowed at anterior angles. Anterior margin nearly straight. Reflexed lateral border shortened, stopping after surpassing anterior setigerous puncture, visible as obtuse vault before reaching basal constriction. Proepisternum conspicuously tumid posterolaterally. Anterior angles obtuse. Anterior transverse line intimated at extremities. Median line distinct, totally deep and broad. Surface with few scattered minutely sticked punctures on surface. Ringlike flange subconvex, twice as broad as channel of constriction.

Elytron (Fig. 9): Slightly depressed transversally in anterior half. Subelongate, sides slightly and evenly rounded in anterior half, stronger apically. Maximum width

at middle. Base truncated obliquely. Marginal channel broad, fold-like carina at apex crossing channel completely; reflexed margin smooth, distinct from humeral tooth to apex, fine at base. Humeral tooth moderate, situated in extended projection of 7th interval, turning dorsally and backwards. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus and a smaller one at declivity of 2nd interval. Scutellar stria intimated at declivity, small carina laterally to scutellar stria. First stria deep, stria 2 to 5 fairly deep, punctuate, other striae developed as rows of punctures. Intervals 1 to 5 slightly convex, other more flattened, 8th forming obtuse carina in apical third, 2 to 6 with series of 18 to 20 setigerous punctures situated at middle. First stria reaching apex, all others ending finely in posterior quarter.

Ala: Fully developed.

Lower surface: Proepisternum with few scattered minutely stuck punctures, with fine submarginal furrow in anterior fifth, furrow between prosternum and proepisternum invisible in anterior fifth. Terminal segment of abdominal sternite with conspicuous subtransverse reticulation.

Protibia: Lateral upper spine stout, short, curved distinctly dorsally. Movable spur as long as spine.

♂: *Aedeagus* unknown.

♂: *Stylomere* (Fig. 160): Conspicuously broadened basally, moderately arcuate.

Distribution: Known from the type locality Jakarta (former Batavia) in Java (Fig. 180).

Etymology: The name refers to the setae on the intervals 2-6 of the elytra.

GROUP **hirsutus**

Diagnostic combination of characters: Species of this group may be distinguished by the following combination of characters: Medium sized; wings of clypeus acute projecting, antennae subelongate, labrum with irregular reticulation; maximum width of pronotum at posterior third, posterolateral tumidity of the proepisterna distinct to conspicuous, form of flange acute and channel of constriction narrow; elytra transversally depressed in lateral view, setae present on each of the intervals 2 to 7.

Trilophus hirsutus n. sp.

Figs 14, 33, 82-85, 153

Type material: Holotype: ♂, India, Kerala, Palghat Hills, Malampuzha Dam, 150 m. 27.XI.1972, leg. I. Löbl, C. Besuchet, R. Mussard (MHNG).

Paratypes: 7♂, 2♀, same data as holotype (MHNG/CBA).

DIAGNOSIS: A medium sized species with subelongate elytra, moderately tumid proepisterna, absent anterior transverse line of the pronotum, and setigerous punctures present on intervals 2 - 7 of the elytra. In contrast to *T. hirsutus*, the related species *T. arcuatus* and *T. setosus* exhibit both, a fully developed median line and a well developed anterior transverse line on the pronotum.

DESCRIPTION

Measurements: Length 2.60 - 2.88 mm ($x = 2.74$ mm*); width 0.80 - 0.89 mm ($x = 0.84$ mm*); ratio length/width of pronotum 1.04 - 1.07 ($x = 1.06$ *); ratio length/width of elytra 1.70 - 1.80 ($x = 1.74$ *); (*n = 10).

Colour: Head, pronotum, elytron, and ventral surface dark-brown. Base of elytron and tip of apex with distinct yellow spot. Mouthparts and antennae yellow.

Head: A quarter smaller than pronotum. Clypeus, wings, supraantennal plates distinctly margined. Clypeus regularly and moderately excised anteriorly, wings rectangular, divided from supraantennal plates by notches; supraantennal plates conspicuously convex; clypeus with indistinct transverse reticulation anteriorly, keel on vertex decreasing, shorter as elevated tubercle. Clypeus and frons divided from supraantennal plates by deep longitudinal furrows. Supraorbital furrow divided from frons by distinct carina. Carina separated from supraantennal plates by slight incision. Frons convex, with variable reticulation nearly up to neck constriction (holotype without, some paratypes with indistinct elongate reticulation). Neck constriction at posterior genae level indistinct, broadly interrupted at middle. Eyes protruding hemisphaerically. Genae short, covering one fifth of eye in dorsal view. Labrum slightly excised anteriorly, with irregular to slightly transverse reticulation. Antennae not reaching basal constriction, segment 4 to 10 subelongate.

Pronotum (Figs. 14, 33): Lateral view: Anterior third slightly flattened, middle part convex, conspicuously convex to basal constriction; conspicuously convex in frontal view. Outline subcordate, longer than wide, maximum width at end of 2nd third, evenly narrowed in anterior half. Anterior margin convex. Reflexed lateral border evenly rounded from anterior angle to posterior setigerous puncture, not extended to basal constriction as obtuse vault. Proepisternum moderately tumid posterolaterally. Anterior angles slightly projecting. Anterior transverse line hardly visible at extremities. Median line fine totally, not deep, invisible in anterior quarter. Surface smooth. Ringlike flange acute, nearly as broad as channel of deep constriction.

Elytron (Fig. 14): Slightly depressed transversally in anterior half. Subelongate, slightly and evenly rounded in anterior three quarters, stronger apically. Maximum width behind middle. Base truncated nearly rectangular to suture. Marginal channel broad, fold-like carina at apex crossing channel completely (indistinct in some PTs); reflexed margin conspicuous from humeral tooth to apex. Humeral tooth inconspicuous, situated in extended projection of 7th stria, turning dorsally and backwards. Lateral margin smooth. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus and a smaller one at declivity of 2nd interval. Scutellar stria intimated at declivity, carina laterally to scutellar stria. First stria on disc as deep as stria 2 to 6, punctuate, stria 7 developed as rows of punctures. Intervals 1 to 4 distinctly convex, 5 and 6 moderately convex, other more flattened, 8th forming obtuse carina in apical quarter, 2 to 7 with series of 21 to 16 setigerous punctures situated at inner striae. First stria reaching apex with increasing depth, all others ending abruptly before apical obtuse vault-like carina of 8th interval.

Ala: Fully developed.

Lower surface: Proepisternum with few scattered minutely stuck punctures, with submarginal furrow in anterior quarter, furrow between prosternum and proepisternum invisible in anterior fifth. Terminal segment of abdominal sternite with moderate transverse reticulation in apical half.

Protibia: Movable spur slightly shorter than spine, turning ventrally in apical quarter. Praeapical lateral denticle sharp and well developed, 2nd smaller, more rounded.

♂: *Aedeagus* (Figs. 82, 85): Median lobe big, slender, regularly arcuate. Apex flattened, fractuate, acuminate. Endophallus with bristles and teeth. Parameres (Figs. 83, 84), bisetose.

♀: *Stylomere* (Fig. 153): Slender, gently arcuate.

Distribution: Known from the type locality in Kerala, South India (Fig. 181).

Etymology: The name refers to the increased number of setae on nearly all of the intervals of the elytron.

***Trilophus arcuatus* n. sp.**

Figs 15, 34, 86-89, 154

Type material: Holotype: ♂, Ceylon, Northern, Puliyan Kulam, 6.II.1970, leg. I. Löbl, C. Besuchet, R. Mussard (MHNG).

Paratypes: 5♂, 1♀, same data as holotype (MHNG/CBA); 1♀, same data but Madhu Road, 5.II.1970 (MHNG).

DIAGNOSIS: A medium sized species with subelongate elytra, conspicuously tumid proepisterna, nearly complete anterior transverse line and fully developed median line on the pronotum, and setigerous punctures present on intervals 2 - 7 of the elytra. Distinguished from the related species *T. hirsutus* and *T. setosus* by the reduced eyes of which half is enclosed by the genae, the flat paralateral sulci on the pronotum, and the lateral margin of the elytra which are subserrate.

DESCRIPTION

Measurements: Length 2.59 - 2.88 mm ($x = 2.74$ mm*); width 0.79 - 0.92 mm ($x = 0.86$ mm*); ratio length/width of pronotum 1.00 - 1.09 ($x = 1.04$ *); ratio length/width of elytra 1.71 - 1.78 ($x = 1.74$ *); (*n = 8).

Colour: Head, pronotum, elytron, and ventral surface middle-brown. Base of elytron with yellow spot. Mouthparts, antennae, and legs yellow. Vault of supra-antennal plates yellowish.

Head: A quarter smaller than pronotum. Clypeus, wings, supraantennal plates finely but distinctly margined. Clypeus regularly and moderately excised anteriorly, wings rectangular, divided from supraantennal plates by notches; supraantennal plates conspicuously convex; keel on vertex decreasing, as long as elevation of tubercle. Clypeus and frons divided from supraantennal plates by deep longitudinal furrows. Supraorbital furrow divided from frons by distinct carina. Carina separated from supraantennal plate by slight incision. Frons convex, Surface with indistinct longitudinal reticulation, decreasing posteriorly. Neck constriction at posterior genae level indistinct, broadly interrupted at middle. Eyes reduced, slightly convex, posterior half of ventral part enclosed by genae. Genae conspicuous, as high as eyes, covering half of eye in dorsal view. Area with isodiametric reticulation laterally posterior neck constriction small. Labrum slightly excised anteriorly, with irregular reticulation. Antennae not reaching basal constriction, segment 4 to 10 subelongate.

Pronotum (Figs. 15, 34): Lateral view: Slightly flattened anteriorly, moderately convex at middle, conspicuously convex to basal constriction; conspicuously convex in frontal view. Outline subcordate, slightly longer than wide, maximum width at posterior third, narrowed in anterior third. Anterior margin straight. Reflexed lateral border evenly rounded, reaching from anterior angle over posterior setigerous puncture by diameter of puncture, extended to basal constriction as obtuse vault. Proepisternum strikingly tumid posterolaterally. Anterior angles sharp. Anterior transverse line flat, elongated towards median line. Median line sharp, moderately deep in whole length. Surface with fine transverse wrinkles, indistinct paralateral sulcus parallel to marginal channel. Ringlike flange acute, slightly broader as channel of constriction.

Elytron (Fig. 15): Slightly depressed transversally in anterior half. Subelongate, slightly and evenly rounded in anterior three quarters, stronger in apical quarter. Maximum width behind middle. Base truncated slightly oblique. Marginal channel broad, fold-like carina at apex distinct, incomplete; reflexed margin conspicuous from humeral tooth to apex. Humeral tooth distinct, situated in extended projection of 7th interval, turning dorsally and backwards. Lateral margin subserrate. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus and a smaller one at declivity of 2nd interval. Scutellar stria intimated at declivity, carina laterally to scutellar stria. All stria deep, punctuate. Intervals distinctly convex, 8th forming obtuse carina in apical quarter, 2 to 6 with series of 16 to 11, and 7 with 7 to 10 setigerous punctures, approaching inner striae. First stria reaching apex, all others ending abruptly before apical obtuse vault-like carina of 8th interval.

Ala: Reduced, length and width two thirds of elytron each.

Lower surface: Proepisternum with submarginal furrow in anterior third, furrow between prosternum and proepisternum distinct throughout. Terminal segment of abdominal sternite with moderate transverse reticulation in apical two thirds.

Protibia: Lateral upper spine as long as movable spur, turned moderately ventrally.

♂: *Aedeagus* (Figs. 86, 89): Median lobe moderately and regularly arcuate, flattened in apical half. Apex spatulate, broad, conspicuously arcuate. Endophallus with few small teeth. Parameres (Figs. 87, 88), bisetose.

♀: *Stylomere* (Fig. 154): slender, conspicuously arcuate.

Distribution: Known from the type locality in Northern Sri Lanka (Fig. 181).

Etymology: The name focuses on the conspicuously arcuate apex of the aedeagus.

Trilophus setosus n. sp. (Figs 16, 35, 76, 77)

Type material: Holotype: ♂, Sumatra, Palembang, leg. Dr. Förster, wod (MNHP).

DIAGNOSIS: A medium sized species with subelongate and nearly elliptical outline of the elytra, strikingly tumid proepisterna, complete anterior transverse line on the pronotum, and setigerous punctures present on intervals 2 - 7 of the elytra. Distinguished from all other species by the pronotum which exhibits a reduced reflexed lateral margin and 5 setigerous punctures on each side.

DESCRIPTION

Measurements: Length 2.78 mm; width 0.93 mm; ratio length/width of pronotum 0.93, ratio length/width of elytra 1.67.

Colour: Head, pronotum, elytra, and ventral surface dark-brown. Apex of elytron with indistinct yellow spot. Mouthparts, antennae, intermediate and hind legs dark-yellow. Front legs middle-brown. Vault of supraantennal plates and tubercle of clypeus yellowish.

Head: A quarter to third smaller than pronotum. Clypeus amargined, straight. Wings and supraantennal plates finely margined, wings sharply projecting, devided from supraantennal plates by notches; supraantennal plates conspicuously convex; keel on vertex fine, small, shorter as tubercle. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly. Supraorbital furrow divided from frons by fine carina. Carina separated from supraantennal plate by small incision. Frons moderately convex, with elongate reticulation behind keel, without neck constriction. Eyes hemispherical. Genae short, not projecting laterally, enclosing eyes posteriorly by one-sixth. Labrum with 2 teeth but not deeply excised, with irregular reticulation. Antennae just reaching basal constriction, segment 4 to 10 subelongate.

Pronotum (Figs. 16, 35): Lateral view: Anterior third slightly flattened, convex posteriorly to basal constriction; conspicuously flattened in frontal view. Outline sub-rectangular, wider than long, maximum width at end of 2nd third, narrowed at anterior angles. Anterior margin slightly convex. Reflexed lateral border reaching from anterior angle to middle, not extended to basal constriction as obtuse vault, with 4 setigerous punctures at margin, a fifth puncture isolated posteriorly. Proepisternum strikingly tumid posterolaterally. Anterior angles obtuse, not projecting. Anterior transverse line broad, flat, extended finely to middle. Median line sharp, deep in posterior half. Surface smooth. Ringlike flange acute, three times as broad as small channel of constriction.

Elytron (Fig. 16): Slightly depressed transversally in anterior half. Subelongate, slightly elliptical, evenly rounded in anterior three quarters, stronger apically. Maximum width behind middle. Base truncated nearly straight. Marginal channel broad, fold-like carina at apex distinct but not completely crossing channel; reflexed margin conspicuous from humeral tooth to apex. Humeral tooth inconspicuous, situated in extended projection of 7th interval, turning dorsally. Lateral margin smooth. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus and a smaller one at declivity of 2nd interval. Scutellar stria intimated at declivity, carina laterally to scutellar stria. All stria deep on disc, punctuate. Intervals 1 to 6 distinctly convex, other moderately convex, 8th forming obtuse carina in apical third, 2 to 7 with series of 17 to 12 setigerous punctures, situated irregularly at middle. First stria reaching apex with increasing depth, all others ending in apical third.

Ala: Fully developed.

Lower surface: Proepisternum smooth, fine submarginal furrow visible at anterior angles, furrow between prosternum and proepisternum visible up to anterior margin. Terminal segment of abdominal sternite with some reticulation in apical third, other part conspicuously shiny.

Protibia: Lateral upper spine turned conspicuously ventrally and moderately outward; movable spur shorter than spine, turning slightly ventrally.

♂: *Aedeagus* (Fig. 76): Median lobe coarctate at apical half. Apex conspicuously arcuate, thickened but spatulate. Endophallus with bristles. Parameres (Figs. 76, 77), bisetose.

The drawing was made from an old preparation (slide) deposited beside the specimen in MNHP. It could not be turned in lateral view for inspection.

♀: *Stylomere*: unknown.

Distribution: Known from the type locality Palembang in Sumatra (Fig. 181).

Etymology: According to the increased number of setae on the pronotum.

GROUP *alternans*

Diagnostic combination of characters: Species of this group may be distinguished by the following combination of characters: Medium to big sized; antennae subelongate, labrum with regular transverse reticulation; maximum width of pronotum at middle, posterolateral tumidity of the proepisterna moderately developed, size of flange small, form acute, channel of constriction narrow; shape of elytra elliptical, channel of lateral margin carinate at apex, setae present on the intervals 3, 5, and 7.

Trilophus alternans n. sp.

Figs 17, 36, 78-81, 155

Type material: Holotype: ♂, Formosa, Korotou, 1.-15.VII.1907, leg. H. Sauter (ZMHB). Paratypes: 2 ♂, 3 ♀, same data as holotype (ZMHB/CBA).

DIAGNOSIS: A medium sized species with elliptical outline of the elytra, moderately tumid proepisterna, weakly developed anterior transverse line and complete median line on the pronotum, and setigerous punctures present on intervals 3, 5, and 7 of the elytra. Distinguished from the related species *T. lompei* and *T. palpireductus* by the lateral margin of the elytra which is serrate, by the flat reduced eyes, and by the labrum which is 5-setose.

DESCRIPTION

Measurements: Length 2.65 - 2.80 mm (\bar{x} = 2.70 mm*); width 0.84 - 0.91 mm (\bar{x} = 0.88 mm*); ratio length/width of pronotum 1.00 - 1.03 (\bar{x} = 1.01*); ratio length/width of elytra 1.64 - 1.69 (\bar{x} = 1.66*); (*n = 6).

Colour: Uniformly middle-brown. Mouthparts and antennae slightly paler.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates finely margined. Clypeus regularly and slightly excised anteriorly, wings rounded, slightly projecting, devided from supraantennal plates by notches; supraantennal plates distinctly convex; tubercle on clypeus acute-angular, falling steeply in posterior half, keel on vertex sharp, as long and as elevated as tubercle. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows with 2nd fovea, diverging posteriorly, splitting into two furrows at mid-eye level, forming a carina between furrows. Frons convex, with scattered finely sticked punctures on surface, 2-3 rugae and indistinct reticulation laterally to keel. Neck constriction absent. Eyes

reduced, flat, posterior third enclosed by genae. Genae not projecting laterally. Labrum 5-setose, moderately excised anteriorly. Antennae not reaching basal constriction of pronotum, segment 4 to 10 subelongate.

Pronotum (Figs. 17, 36): Lateral view: Slightly transversally depressed at level of anterior transverse line, moderately convex on disc, moderately and regularly convex in frontal view. As long as wide, maximum width at middle, evenly narrowed in anterior third. Anterior margin straight. Reflexed lateral border rounded from anterior angle to posterior setigerous puncture, extended to basal constriction as obtuse vault with fine submarginal furrow. Lateral channel fine, flattened posteriorly. Proepisternum distinctly tumid posterolaterally. Anterior angles blunt, slightly projecting. Anterior transverse line weakly developed. Median line conspicuously deep in whole length, reaching level of anterior transverse line. Surface with scattered minutely stuck punctures and fine transverse wrinkles laterally. Ringlike flange acute, nearly as broad as deep channel of constriction.

Elytron (Fig. 17): Anterior half flattened. Subelongate, elliptical. Margin slightly and evenly rounded in basal half, distinctly rounded in apical half. Maximum width at middle. Base truncated obliquely. Marginal channel broad, fold-like carina at apex indistinct; reflexed margin conspicuous from humeral tooth to apex, serrate to end of 2nd third. Angel of humerus indistinct; humeral tooth distinct, situated in extended projection of 6th stria, turning dorsally and backwards. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus and a smaller one at declivity of second interval. Scutellar stria indistinct, with tubercle-like carina laterally to scutellar stria. First stria as deep as stria 2 to 5, punctuate, other striae developed as rows of punctures. Intervals 1 to 6 moderately convex, other more flattened, 8th forming obtuse carina in apical 2 fifths, 3rd with 18-20, 5th with 14-15, and 7th with 6-7 setigerous punctures situated at middle. First stria reaching apex, all others ending abruptly apically before obtuse vault-like carina of 8th interval.

Ala: Reduced, length and width two thirds of elytron. each.

Lower surface: Proepisternum with indistinct reticulation, fine submarginal furrow in anterior quarter, furrow between prosternum and proepisternum distinct, conspicuously deep in basal 2 thirds. Terminal segment of abdominal sternite with fine transverse striolation.

Protibia: Movable spur shorter than spine, turned ventrally.

♂: *Aedeagus* (Figs. 78, 81): Median lobe moderately arcuate at middle, flattened laterally. Apex spatulate, distinctly arcuate apically, conspicuously explanate. Parameres (79, 80), bisetose.

♀: *Stylomere* (Fig. 155): Slender, fine.

Distribution: Known from the type locality in Taiwan (Fig. 182).

Etymology: The name refers to the altering chaetotaxy on the intervals of the elytron.

***Trilophus lompei* n. sp.**

Figs 18, 37, 68-71, 156

Type material: Holotype: ♂, India, Kerala, Cardamon Hills, Valara Fall, 450 - 500 m, 27.XI.1972, leg. I. Löbl, C. Besuchet, R. Mussard (MHNG).

Paratypes: 1 ♂, same data as holotype; 2 ♀, Kerala, Cardamon Hills, Mundakayam, 100 m, 9.XI.1972, leg. I. Löbl, C. Besuchet, R. Mussard (MHNG/CBA); 1 ♂, Kerala, Cardamon Hills, ca. 50 km NW Pathanamthitta nr. Pambaiyar, 300m, 77°05'E, 09°25'N, 27.-29.XII.1993, leg. Boukal & Keyrál (CBL).

DIAGNOSIS: A medium to big sized species with subelliptical outline of the elytra, distinctly tumid proepisterna, nearly complete anterior transverse line on the pronotum, and setigerous punctures present on intervals 3, 5, and 7 of the elytra. Distinguished from the related species *T. alternans* and *T. palpireductus* by the incomplete median line of the pronotum which is visible on the disc of the pronotum only as well as by the rectangular base of the elytra.

DESCRIPTION

Measurements: Length 2.62 - 3.07 mm ($x = 2.76$ mm*); width 0.89 - 0.98 mm ($x = 0.93$ mm*); ratio length/width of pronotum 0.99 - 1.00 ($x = 1.00$ *); ratio length/width of elytra 1.56 - 1.60 ($x = 1.59$ *); (*n = 5).

Colour: Head, pronotum, elytron, ventral surface, and front legs middle-brown. Base of elytron with distinct small yellow spot, spot at apex indistinct. Mouthparts and antennae yellow. Mandibles dark-brown. Intermediate and hind legs yellowish-brown.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates margined. Clypeus deeply excised anteriorly, wings acute, projecting, devided from supraantennal plates by distinct notches; supraantennal plates distinctly convex; keel on vertex decreasing, more than twice as long as tubercle (as long as tubercle in 2 paratypes from different localities). Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows with 2nd fovea at eye level each, diverging posteriorly, devided from supraorbital furrow by distinct carina; carina separated from supraantennal plates by fine transverse incision. Frons convex, with scattered finely sticked punctures on surface, flat transverse furrow at posterior end of keel (distinct in holotype and 2 paratypes, indistinct in one paratype). Neck constriction absent. Eyes large, protruding, posterior quarter enclosed by genae. Genae not projecting laterally. Area with isodiametric reticulation laterally posterior eyes small. Labrum slightly excised anteriorly. Antennae just reaching basal constriction of pronotum, segment 4 to 10 subelongate.

Pronotum (Figs. 18, 37): Lateral view: Transversally depressed at anterior transverse line, conspicuously convex from anterior transverse line to basal declivity; frontal view: moderately convex, slightly flattened laterally. As long as wide, maximum width at middle. Anterior margin indistinctly bisinuate. Reflexed lateral border rounded from anterior angle to posterior setigerous puncture, extended to basal constriction as obtuse vault. Lateral channel fine, flattened posteriorly. Proepisternum distinctly tumid posterolaterally, but visible from above. Anterior angles marked, slightly projecting. Anterior transverse line more distinct. Median line fine, invisible in anterior third, interrupted before basal declivity, indistinctly adjoining basal constriction. Surface with scattered minutely sticked punctures and fine transverse wrinkles laterally. Basal constriction conspicuous, not limited laterally by small longitudinal carinae. Ringlike flange acute, slightly broader as channel of constriction.

Elytron (Fig. 18): Disc flattened in anterior half. Oblongo-oval, subelliptical. Maximum width at middle, evenly narrowed in anterior third. Base truncated nearly straight. Marginal channel broad, fold-like carina at apex incomplete, indistinct; reflexed margin conspicuous from humeral tooth to apex. Humeral tooth moderate, situated in extended projection of 6th stria, turning dorsally and backwards. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus and a smaller one at declivity of second interval. Scutellar stria indistinct, with tubercle-like carina laterally to scutellar stria. First stria deep, stria 2 to 5 fairly deep, punctuate, other striae developed as rows of punctures. Intervals 1 to 4 moderately convex, other more flattened, 8th forming obtuse vault in apical quarter, 3rd with 18-19, 5th with 12-14, and 7th with 7-8 setigerous punctures situated at inner striae; setae long. First 2 striae reaching apex, all others ending in apical third.

Ala: Fully developed.

Lower surface: Proepisternum with distinct submarginal furrow in anterior quarter, furrow between prosternum and proepisternum distinct. Terminal segment of abdominal sternite with some fine transverse striolation at middle.

Protibia: Movable spur shorter and finer than spine, both distinctly turned ventrally.

♂: *Aedeagus* (Figs. 68, 71): Median lobe distinctly arcuate, concave laterally. Apex spatulate, distinctly arcuate apically, conspicuously explanate. Parameres (Figs. 69, 70), bisetose.

♀: *Stylomere* (Fig. 156): Big, strongly arcuate towards apex.

Distribution: Known from two localities at Cardamom Hills in Kerala (Fig. 182).

Etymology: The species is dedicated to Dr. Arvid Lompe who has made an easy to use and excellent method available for enclosing small genitalia of insects.

***Trilophus palpireductus* n. sp.**

Figs 19, 38, 157

Type material: Holotype: ♀, Indonesia, Bali, Lake Tamblingan, forest litter, 1300 m, 30.X.1991, leg. I. Löbl (MHNG).

DIAGNOSIS: A medium sized species with elongate elytra, moderately tumid and elongate proepisterna, flat but nearly complete anterior transverse line and complete median line of the pronotum, and setigerous punctures present on intervals 3, 5, and 7 of the elytra. Distinguished from the related species *T. alternans* and *T. lompei* by the elongate shape as well as by the shortened palpi.

DESCRIPTION

Measurements: Length 2.82 mm; width 0.87; ratio length/width of pronotum 0.98; ratio length/width of elytra 1.81.

Colour: Head, pronotum, elytron, ventral surface, and front legs dark-brown. Mouthparts, intermediate and hind legs paler. Antennae middle-brown, yellow at apical half.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates finely margined; slightly excised anteriorly; wings obtuse, projecting, divided from

supraantennal plates by slight notches; supraantennal plates convex; tubercle on clypeus obtuse-angular, keel on vertex decreasing, shorter as tubercle. Clypeus and frons divided from supraantennal plates by deep longitudinal furrows. Furrows with deep 2nd fovea, diverging posteriorly, splitting into two furrows at mid-eye level, forming a carina between furrows. Frons convex, with scattered finely stuck punctures and indistinct reticulation on surface, indistinct median impression behind keel. Neck constriction flat, indistinct, interrupted at middle. Eyes large, protruding, less than posterior third enclosed by inconspicuous genae. Labrum slightly excised anteriorly. Antennae not reaching basal constriction of pronotum, segment 4 to 10 subelongate. Palpi conspicuously shortened, distinctly hollowed out dorsally

Pronotum (Figs. 19, 38): Lateral view: Slightly flattened anteriorly, conspicuously convex to basal constriction.; moderately and regularly convex in frontal view. As long as wide, maximum width at middle, narrowed in front of anterior angles. Anterior margin slightly bisinuate. Reflexed lateral border rounded from anterior angle to posterior setigerous puncture, extended to basal constriction as obtuse vault. Lateral channel fine, flattened posteriorly. Proepisternum moderately tumid posterolaterally, distinctly elongated. Anterior angles obtuse-angled but marked. Anterior transverse line flat, indistinct. Median line conspicuously deep in whole length, reaching level of anterior transverse line. Surface with fine transverse lateral wrinkles anteriorly and scattered minutely stuck punctures. Ringlike flange acute, slightly broader as deep channel of constriction.

Elytron (Fig. 19): Disc flattened in anterior half. Distinctly elongate, subelliptical. Margin nearly stright in basal half but diverging, hyperbolic in apical third. Maximum width at middle. Base truncated slightly convex to suture. Marginal channel broad, fold-like carina at apex indistinct; reflexed margin conspicuous from humeral tooth to apex. Humeral tooth moderately developed, situated in extended projection of 7th interval, turning dorsally and backwards. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus and a smaller one at declivity of second interval. Scutellar stria indistinct, fine carina laterally to scutellar stria. Stria 1 and 2 deep on disc, 3 to 5 moderately deep, punctuate, other striae developed as rows of punctures. Intervals 1 to 6 moderately convex, other more flattened, 8th forming obtuse carina in apical third, 3rd with 19, 5th with 15, and 7th with 3-4 setigerous punctures situated at middle; setae of 7th interval situated in apical half. First stria reaching apex, 1-6 ending abruptly before apical obtuse vault-like carina of 8th interval.

Ala: Reduced, length and width two thirds of elytron, each.

Lower surface: Proepisternum with indistinct reticulation, indistinct submarginal furrow in anterior quarter, furrow between prosternum and proepisternum distinct, conspicuously deep in basal 2 thirds. Terminal segment of abdominal sternite with indistinct transverse striolation apically.

Protibia: Lateral upper spine stout, turned moderately ventrally; movable spur as long as spine, nearly straight. Praeapical lateral denticles of same size.

♂: *Aedeagus* unknown.

♀: *Stylomere* (Fig. 157): Small, broad at base.

Distribution: Known from the type locality in Bali, Indonesia (Fig. 182).

Etymology: The name refers to the reduced palpi.

GROUP *interpunctatus*

Diagnostic combination of characters: Species of this group may be distinguished by the following combination of characters: Small sized; wings of clypeus rounded anteriorly, eyes flattened though slightly reduced, distinct reticulation present on frons of the head posterior keel, antennae moniliform, labrum with regular transverse reticulation; pronotum flattened in lateral view, maximum width at middle, posterolateral tumidity of the proepisterna moderately developed, size of flange bigger, form convex and channel of constriction broad; shape of elytra parallel, setae present on intervals 3 and 5. Aedeagus relatively small in comparison to body size.

Trilophus interpunctatus Putzeys, 1866

Figs 1, 48, 95-98, 162

? *Phreoryctes debilis* Schmidt-Göbel, 1846: Tab. III, 6 (*Dyschirius debilis* Schmidt-Göbel, Csiki, 1927: 524);

Dyschirius interpunctatus Putzeys, 1866: 97;

Dyschirius interpunctatus Putzeys; PUTZEYS 1878: 174;

Oxydrepanus interpunctatus Putzeys; ANDREWES 1926: 378;

Trilophus interpunctatus Putzeys; ANDREWES 1927: 265;

Trilophus interpunctatus Putzeys; ANDREWES 1929: 383;

Trilophus interpunctatus var. *schmidtii* Putzeys; ANDREWES 1930: 356.

Trilophus interpunctatus Putzeys; JEANNEL 1957: 140.

MATERIAL EXAMINED.

A. Type material. Lectotype (by present designation): ♀. Labels: yellow, small, D. *interpunctatus*, Ind. Bor. Lc. Chd. / grey, *Dyschirius interpunctatus* Putz dét. J. Putzeys / brown Soc. Ent. Belg. Coll. Putzeys / white, red, Syntype / white, *Trilophus interpunctatus* Putz. cotype, H.E. Andrewes 1928 (IRSNB).

Comments: PUTZEYS description (1867: 98) is based on 2 specimens from "Inde boréale" (North of India) of which one is available at IRSNB. This specimen was designated as the lectotype. According to ANDREWES (1929) the other one should be at MNHP but could not be located.

B. Other material. 5♂, 2♀, Nepal, Chitwan Nat. Park, Saura, 22.-26.V.1990, leg. S. Bily (CBL/CBA); 1♂, 1♀, Nepal, Terai, Sauraha-Chitwan 20.-15.V.1992, leg. J. Moravec (NHMB/CBA).

DIAGNOSIS: A small oblongo-elongate species with parallel margin and small channel of the elytra, and setigerous punctures present on the intervals 3 and 5 of the elytra. Distinguished from the related species *T. appulsus* n. sp. and *T. parallelus* n. sp. by the subparallel margin of the pronotum, the moniliform antennae, the flattened intervals, the less impressed striae on the elytron, the more slight convexity of the eyes, and the elongated keel on the frons of the head.

REDESCRIPTION

Measurements: Length 2.23 - 2.58 mm ($x = 2.38$ mm*), width 0.68 - 0.76 mm ($x = 0.74$ mm*), ratio length/width of pronotum 1.03 - 1.08 ($x = 1.06$ *), ratio length/width of elytra 1.74 - 1.80 ($x = 1.77$ *); (*n = 10).

Colour: Head, pronotum, ventral surface, and elytra light-brown. Palpi, antennae, middle and hind legs yellowish.

Head (Fig. 1): A quarter smaller than pronotum. Clypeus, wings, supraantennal plates finely margined; Clypeus regularly excised anteriorly, wings rectangular but rounded, divided from supraantennal plates by slight notches; supraantennal plates convex; tubercle on clypeus falling steeply in posterior quarter, keel on vertex fine but sharp, not so elevated but longer than elevation of tubercle. Clypeus and frons divided from supraantennal plates by deep and broad longitudinal furrows. Furrows diverging posteriorly, with flat 2nd foveae at mid-eye level, fine carina between supraorbital setae and frons at each side reaching from mid-eye to hind-eye level. Frons convex, a bit dull, with longitudinal reticulation. Neck constriction at posterior eye level, moderately interrupted at middle. Eyes slightly convex, somewhat flattened, eye-index 2.2. Genae not as high as eyes, enclosing eyes in posterior quarter. Labrum slightly excised anteriorly. Mandibles acute. Antennae short, segment 10 reaching posterior setigerous puncture of pronotum, segment 5 to 10 moniliform.

Pronotum (Figs. 1, 48): Lateral view: anterior third flattened, posterior part slightly convex, only moderately convex at basal constriction; frontal view: flattened at median line, moderately convex laterally; sides subparallel, slightly longer than wide, maximum width at middle, narrowed regularly at anterior angles. Anterior margin bisinuate. Reflexed lateral border and channel fine in total length, slightly convex at middle, extended to basal constriction as obtuse vault. Proepisternum moderately tumid posterolaterally. Anterior angles obtuse rounded. Anterior transverse line flat, indistinct, reaching nearly up to middle. Median line distinct, sharp. Surface partly covered with indistinct reticulation and few fine transverse wrinkles laterally. Basal constriction conspicuously deep. Ringlike flange fine, slightly convex, 1.5 times broader as channel of constriction.

Elytron (Fig. 1): Anterior two thirds explanate, transverse depression intimated. Oblongo-elongate, sites parallel at middle. Maximum width at middle. Base truncated subrectangularly. Marginal channel narrow; reflexed margin fine but distinct from humeral tooth to apex, forming distinct fold-like carina at apex, crossing marginal channel completely. Humeral tooth fine, situated in extended projection of 7th interval. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 6th interval and a smaller one at declivity of second interval. Stria 1 moderately, others slightly impressed, punctuate, other striae developed as rows of partly connected slightly impressed punctures. Intervals 1 to 4 slightly convex, others flattened. 8th interval forming obtuse overhanging carina in apical third, covering half of marginal channel. Interval 3 and 5 with series of 18 to 14 setigerous punctures, approaching inner stria. First stria reaching apex, all others ending on apical declivity.

Ala: Fully developed.

Lower surface: Proepisternum with submarginal furrow in anterior quarter fine but distinct, furrow between prosternum and proepisternum distinct, adjoining anterior margin. Terminal segment of abdominal sternite with distinct transverse reticulation in both sexes.

Protibia (Fig. 1): Lateral upper spine turned distinctly ventrally and slightly outward; movable spur a bit shorter than spine, slightly turned ventrally.

♂: *Aedeagus* (Figs. 95, 98): Small, median lobe conspicuously arcuate at middle, slender in apical half. Apex spatulate, explanate, slightly convex. Endophallus with bristles and about 7 teeth. Parameres (Figs. 96, 97), bisetose (in one of the specimens from Nepal with additional fine pilus at apex).

♀: *Stylomere* (Fig. 162): Broadened basally, slender mesially, elongate, with acute elongate apex.

Distribution: South of central Nepal (Fig. 183). The lectotype is labelled "North of India", not displayed in Fig. 183.

Variations: 1 ♀, Kierpur, Purnea dist., Bihar, 19.IX.19915, C. Pavia, "among roots of Cannas", Indian Museum Calcutta, "*Trilophus interpunctatus* Putz. compared with type H.E.A.", H.E. Andrewes Coll., "figured specimen F.B.I." (BMNH). The specimen resembles in many characters the lectotype of *T. interpunctatus*. However, its margin of the elytron is a bit broader and the sides are not exactly as parallel as the other specimens. In addition, the styli are not as slender as in the lectotype. Without male from this locality, a clear decision about the status can not be given.

Remarks: *Phreoryctes debilis* Schmidt-Göbel was described by an illustration (SCHMIDT-GÖBEL 1846, Tab. III, 6) without written description, and synonymized by PUTZEYS (1878) with *Dyschirius interpunctatus* Putzeys. However, the drawing could refer to a *Syleter*, *Trilophidius*, *Dyschirius*, or even an unusual *Clivina*. Based on his investigation, Andrewes found that the material serving Schmidt-Göbel for the illustration is lost. Therefore I share Andrewes' opinion "there seems now to be no possibility of deciding what the species is" (ANDREWES 1929, p. 415).

***Trilophus appulsus* n. sp.**

Figs 11, 44, 93, 94

Type material: Holotype: ♂, Pakistan sept., envs. Punjab, Rawalpindi Lake, 3.IV.1986, débris alluvion, leg. S. Vit. (MHNG).

Paratype: 1 ♂, same data as holotype (CBA).

DIAGNOSIS: A small oblongo-elongate species with parallel margin and small channel of the elytra, and setigerous punctures present on the intervals 3 and 5 of the elytra. Distinguished from the related species *T. interpunctatus* Putzeys and *T. parallelus* n. sp. by the slightly reduced but convex eyes, the lateral margin of the elytra which is subserrate, the reduced wings, and the missing apical fold-like carina in the channel of the elytron. In contrast to *T. parallelus*, the aedeagus is spatulate at the apex, the intervals on the elytron are moderately convex, and the striae are moderately deep. In contrast to *T. interpunctatus* the antennae are elongate, the pronotum is regularly rounded at sides with the anterior angles distinctly marked. Distinguished from all other species by the row of setae on the 3rd interval of the elytra which is extended to the tip of the apex.

DESCRIPTION

Measurements: Length 2.27/2.45 mm; width 0.72/0.77 mm; ratio length/width of pronotum 1.08/1.12; ratio length/width of elytra 1.74.

Colour: Head, pronotum, ventral surface, elytra, and front legs brown. Palpi, antennae, intermediate and hind legs, base and tip of apex of elytra yellow-brown.

Head: A quarter smaller than pronotum. Clypeus, wings, supraantennal plates distinctly margined; clypeus moderately excised anteriorly, wings obtusely projecting, acute at tip, devided from supraantennal plates by obtuse-angled notches; supraantennal plates vaulted; keel on vertex sharp, as long as elevation of tubercle. Clypeus and frons devided from supraantennal plates by deep and broad longitudinal furrows with 2nd fovea, each. Furrows diverging posteriorly, turning mesially before neck. Carina between furrow and frons at each side starting at mid-eye level, ending at posterior eye-level. Frons convex, with intimated median impression behind keel and longitudinal reticulation. Neck constriction at posterior eye-level flat, broadly interrupted at middle. Eyes slightly reduced but distinctly convex, eye-index 2.2, two fifths of eyes enclosed by genae. Genae not tumid, not as high as eyes, unit of eye and gena forming regular rounded vault. Labrum straight anteriorly, indistinctly bisinuate. Mandibles slender. Antennae long, reaching over basal constriction of pronotum, segment 5 to 10 submoniliform.

Pronotum (Figs. 11, 44): Lateral view: anterior third flattened, slightly convex at middle, vaulted and steeply declivous in posterior quarter to basal constriction; frontal view: flattened at middle, moderately and regularly convex laterally. Sides rounded. Longer than wide, maximum width at middle. Anterior margin slightly bisinuate. Reflexed lateral border evenly rounded up to posterior setigerous puncture, extended to basal constriction as fine line and obtuse vault. Lateral channel small anteriorly, broader and flattened to posterior setigerous puncture. Proepisternum moderately tumid posterolaterally. Anterior angles marked. Anterior transverse line indistinct, flat. Median line sharp, deeper posteriorly. Surface with few transverse wrinkles. Ringlike flange convex, twice as broad as channel of constriction. Constriction not deep.

Elytron (Fig. 11): Explanate on disc. Oblongoelongate, sites rounded at humerus and at apical third, nearly stright and parallel in anterior half. Maximum width at middle. Base truncated subrectangularly. Marginal channel moderately small; fine serration at reflexed margin just traceable at 50 X in anterior two thirds, margin distinct from humeral tooth to apex, no fold-like carina at apex. Humerus rounded, humeral tooth fine, slightly projecting, situated in extended projection of 7th interval. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 6th interval and a smaller one situated in extended projection of 2nd interval, adjoining 2nd stria. Stria 1 and 2 conspicuously deep, 3 and 4 moderately deep, all punctuate, 6 and 7 developed as rows of partly connected punctures, striae not reaching declivity of elytron at base. Intervals 1 to 4 moderately convex, suture impressed at base, 8th forming obtuse slightly overhanging carina in apical third, hardly covering marginal channel. Interval 3 with series of 15 setigerous punctures, approaching inner stria, interval 5 with 13 setigerous punctures situated at middle. First stria conspicuously deep apically, all others ending at beginning of apical declivity.

Ala: Reduced, length and width two thirds of elytron, each.

Lower surface: Proepisternum with submarginal furrow in anterior quarter,

fine, furrow between prosternum and proepisternum profound, bending to anterior angle as fine line, adjoining submarginal furrow. Terminal segment of abdominal sternite with distinct isodiametric to irregular reticulation at middle (in females unknown).

Protibia: Movable spur as long as spine.

♂: *Aedeagus* (Figs. 93, 94): Small, median lobe slender, slightly arcuate and flattened toward apex; apex spatulate, convex. Endophallus with bristles. Parameres (Fig. 93), bisetose.

♀: *Stylomere* unknown.

Distribution: The species was collected from floated detritus in Pakistan at the Rawalpindi Lake (Fig. 183).

Etymology: The species was flooded to the shore which is expressed by the name.

***Trilophus parallelus* n. sp.**

Figs 10, 43, 90-92, 161

Type material: Holotype: ♂, India, Meghalaya, Darugiri, Garo Hills, 450 m, 19.V.1976, leg. W. Wittmer, C. Baroni Urbani (NHMB).

Paratypes: 1 ♂, 3 ♀, same data as holotype (NHMB/CBA); 1 ♀, same data as holotype but labelled "Coll. Dostal Wien" (CDW). 1 ♂, Barway, P. Cardon / *Phreoryctes interpunctatus* Putz. det. M. Maindron 1910 (IRSNB).

Diagnosis: A small oblongo-elongate species with parallel margin and small channel of the elytra, and setigerous punctures present on the intervals 3 and 5 of the elytra. Distinguished from the related species *T. interpunctatus* Putzeys and *T. appulsus* n. sp. by the stick-like apex of the aedeagus, the isodiametric reticulation on the frons of the head, the distinctly convex intervals, and the conspicuously impressed first 2 striae on the elytron.

DESCRIPTION

Measurements: Length 2.46 - 2.64 mm ($x = 2.57$ mm*), width 0.75 - 0.82 mm ($x = 0.79$ mm*), ratio length/width of pronotum 1.00 - 1.06 ($x = 1.02$ *), ratio length/width of elytra 1.79 - 1.84 ($x = 1.82$ *); (*n = 6).

Colour: Head, pronotum, ventral surface, and elytra brown. Palpi, antennae, intermediate and hind legs yellow-brown, yellow spots in some specimen at base and apex of elytron, supraantennal plates and wings of clypeus yellowish transparent.

Head: A quarter smaller than pronotum. Clypeus, wings, supraantennal plates finely but distinctly margined; Clypeus regularly excised anteriorly, wings obtuse angled, divided from supraantennal plates by slight notches; supraantennal plates convex, keel-like prolonged to hind-eye level; tubercle on clypeus falling in posterior third, keel on vertex sharp, as elevated and as long as elevation of tubercle. Clypeus and frons divided from supraantennal plate by deep longitudinal furrows. Furrows diverging posteriorly, with 2 foveae, posterior fovea with flat granula, interrupting furrow conspicuously, fine carina between supraorbital setae and frons at each side reaching from furrow at mid-eye to hind-gena level. Frons convex, with isodiametric reticulation. Neck constriction at posterior eye level, moderately interrupted at middle.

Eyes slightly reduced but distinctly convex, eye-index 2.15. Genae not as high as eyes, enclosing eyes in posterior fifth. Labrum slightly excised anteriorly. Mandibles acute. Antennae long, reaching over basal constriction of pronotum, segment 5 to 10 submoniliform.

Pronotum (Figs. 10, 43): lateral view: anterior third flattened, middle part slightly convex, moderately convex to basal constriction; frontal view: moderately and regularly convex; sides rounded, as long as wide, maximum width slightly behind middle, narrowed regularly at anterior angles. Anterior margin bisinuate. Reflexed lateral border evenly rounded, extended over posterior setigerous puncture by diameter of puncture, extended to basal constriction as fine but distinct submarginal furrow and obtuse vault. Lateral channel deep, broader and flattened posteriorly. Proepisternum moderately tumid laterally in posterior part, distinctly visible from above. Anterior angles marked. Anterior transverse line flat, indistinct, visible laterally. Median line distinct, sharp. Surface with few transverse wrinkles. Basal constriction deep. Ringlike flange convex, twice as broad as channel of constriction.

Elytron (Fig. 10): Anterior two thirds explanate, transverse depression intimated. Oblongo-elongate, sites parallel at middle. Maximum width at middle. Base truncated rectangularly. Marginal channel moderately small; reflexed margin distinct from humeral tooth to apex, fold-like carina at apex indistinct, not crossing marginal channel. Humeral tooth fine, situated in extended projection of 7th interval. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 5th interval and a smaller one at declivity of second interval adjoining stria one. Stria one and 2 conspicuously, 3 and 4 moderately impressed, punctuate, others developed as rows of partly connected moderately impressed punctures. Intervals 1 to 3 distinctly convex, 4 to 6 moderately convex, 8th interval forming obtuse slightly overhanging carina in apical third, hardly covering marginal channel. Interval 3 with series of 15 to 17 setigerous punctures, approaching inner stria, interval 5 with 13 to 15 setigerous punctures situated at middle. Setigerous punctures of interval 3 reaching up to apical tip of elytron. First stria conspicuously deep apically, all others ending apically on obtuse vault-like carina of 8th interval.

Ala: Fully developed.

Lower surface: Proepisternum with submarginal furrow in anterior quarter distinct, furrow between prosternum and proepisternum profound, adjoining anterior margin. Terminal segment of abdominal sternite: male with transverse reticulation in apical two thirds, female with indistinct transverse reticulation interrupted at middle by distinct isodiametric reticulation.

Protibia: Lateral upper spine turned distinctly ventrally and slightly outward; movable spur shorter than spine, slightly turned ventrally.

♂: *Aedeagus* (Figs. 90, 92): Small, median lobe arcuate at middle, slender in apical third. Apex flattened but not spatulate, slightly convex. Endophallus with bristles and 3 teeth apically. Parameres (Figs. 90, 91), bisetose.

♀: *Stylomere* (Fig. 161): Slender, conspicuously arcuate.

Distribution: Found in Meghalaya in the western located Garo Hills (Fig. 183).

Variation: In some of the females the outline of the elytra is very slightly diverging posteriorly. However, the appearance is still subparallel.

Remarks: The locality "Barway" from one of the paratypes could not be interpreted.

Etymology: The name is derived from the parallel shape of the elytra.

GROUP *schmidti*

Diagnostic combination of characters: Species of this group may be distinguished by the following combination of characters: Medium sized; wings of clypeus rounded anteriorly, eyes fully developed, genae small, distinct reticulation present on frons of the head posterior keel, antennae elongate, labrum with regular transverse reticulation; maximum width of pronotum at middle, posterolateral tumidity of the proepisterna moderately developed, form of flange acute and channel of constriction narrow; maximum width of elytra behind middle, shape in lateral view transversally depressed, setae present on intervals 3 and 5.

Trilophus schmidti Putzeys, 1877

Figs 2-5, 12, 45, 99-102, 163

Dyschirius schmidti Putzeys, 1877: 41;

Oxydrepanus schmidti Putzeys; ANDREWES 1926: 378;

Trilophus interpunctatus var. *schmidti* Putzeys; ANDREWES 1927: 265;

Trilophus interpunctatus var. *schmidti* Putzeys; ANDREWES 1929: 384;

Trilophus interpunctatus var. *schmidti* Putzeys; ANDREWES 1930: 357.

MATERIAL EXAMINED

A. Type material. Lectotype (by present designation): ♂, labels: yellow, Calcutta Dhn. / yellow, small, D. schmidti P. Calcutta Dhn. / grey, *Dyschirius schmidti* Putz dét. J. Putzeys / brown Soc. Ent. Belg. Coll. Putzeys / white, red, Syntype / white *Trilophus interpunctatus* P. v. *schmidti* Putz. cotype H.E. Andrewes 1928 (IRSNB).

Paralectotype (by present designation): 1 ♀. Labels: yellow, small, Calcutta Dhn. / grey, *Dyschirius schmidti* Putz dét. J. Putzeys / brown Soc. Ent. Belg. Coll. Putzeys / white, red, Syntype / white *Trilophus interpunctatus* Putz. V. Schmidti Putz. Andrewes dét. (IRSNB).

Comments: PUTZEYS (1877: 41) based his description on 4 specimens from Calcutta. Three of the specimens are available. However, they include two species. One male and one female are designed as lecto- and paralectotype of *T. schmidti* Putzeys because the specimens resemble more to the short description of Putzeys. The other male could be identified as *T. birmanicus* Bates. It is assumed that the 4th specimen went back into the collection Dohrn. This collection was deposited in the museum Stettin and lost during the 2nd world war (HORN *et al.* 1990).

B. Other material. 7♂, 12♀, 81 specs., S-Vietnam, Nam-Cat Tien Nat. Park, 1.-15.V.1994, leg. P. Pacholatko & L. Dembicki (NHMW/CBA); 3 specs., same data but 24.-27.V.1996 (CBL/CBA); 4♂, 7♀, 350 specs., same data but leg. Zacharda (CBL/CBA); 5 specs., same data but leg. P. Pacholatko (CBB/CBA); 1♂, Thailand, Chiang Rai, 10 km W Wiang Pa Pao, Ban Huay Ya Sai, 780 m, 28.I.1988, leg. P. Schwendinger (MHNG); 1♂, Thailand, NE Bangkok, Khao Yai Nat. Park, 750 - 850 m, 26.XI.-3.XII.1985, leg. I. Löbl, D. Burckhardt (MHNG); 1♂, 1♀, same data but E Heo Suwat Waterfalls, 800 - 900 m, 1.XII.1985, (MHNG); 1♀, NW Thailand, Chom Thong, 24.-27.IV.1991, leg. J. Horák (CDW); 1♀, Thailand, Thanon Thong Chai, Fang, 19°55'N, 99°12'E, 300 m, 25.V.1991, leg. D. Král & V. Kuban (NHMB); 1♀, same data but Lansang, 16°48'N, 98°57'E, 500 m, 18.-24.IV.1991 (NHMB).

DIAGNOSIS: A small to medium sized species with subelongate and transversally depressed elytra, moderately tumid proepisterna, complete median line of the pronotum, and setigerous punctures present on intervals 3 and 5 of the elytra. Distinguished from the related species *T. birmanicus* and *T. tonkinensis* by the smaller size, and the flat and small anterior transverse line which is distinct at the edges of the pronotum only. Moreover, it is distinguished by the apex of the aedeagus which is stick-like in *T. birmanicus* and conspicuously arcuate in *T. tonkinensis*.

REDESCRIPTION

Measurements: Length 2.38 - 2.90 mm ($x = 2.58$ mm*), width 0.73 - 0.93 mm ($x = 0.80$ mm*), ratio length/width of pronotum 1.0 - 1.09 ($x = 1.04$ *), ratio length/width of elytra 1.69 - 1.79 ($x = 1.77$ *); (*n = 30).

Colour: Head, pronotum, ventral surface, and elytra brown. Mouthparts, antennae, intermediate and hind legs yellow, front legs yellow-brown.

Head (Figs. 2-5): A quarter smaller than pronotum. Clypeus, wings, supra-antennal plates finely margined; Clypeus regularly excised anteriorly, wings obtuse angled, devided from supraantennal plates by slight notches; supraantennal plates convex; keel on vertex sharp, as long and as elevated as tubercle. Clypeus and frons devided from supraantennal plates by deep and broad longitudinal furrows. Furrows diverging posteriorly, with 2nd distinct fovea, each, indistinct transverse carina in some specimens posterior tubercle. Short carina between furrow and frons at each side reaching from mid-eye level to hind supraorbital seta. Frons convex, with fine longitudinal reticulation, more distinct at level of keel, slight median impression behind keel in some specimens. Slight neck constriction at posterior eye level, moderately interrupted at middle. Eyes large, convex, eye-index 1.8, posterior sixth enclosed by genae. Genae short, developed as small groin. Labrum broad, moderately excised anteriorly. Antennae ending before reaching basal constriction of pronotum, segment 4 to 10 elongate.

Pronotum (Figs. 12, 45): lateral view: anterior four fifths slightly convex, regularly convex in posterior fifth to basal constriction; frontal view: regularly convex. As long as wide, maximum width at middle, narrowed in anterior third. Anterior margin slightly convex. Reflexed lateral border evenly rounded from anterior angle to posterior setigerous puncture, extended to basal constriction as submarginal furrow. Proepisternum moderately tumid posterolaterally. Anterior angles distinct, obtuse. Anterior transverse line flat, more distinct laterally. Median line distinct, fine at middle, deeper posteriorly. Surface with few fine transverse wrinkles. Basal constriction broad. Ringlike flange subacute, twice as broad as channel of constriction.

Elytron (Fig. 12): Anterior half transversally depressed. Subelongate, sites rounded, thought nearly straight in anterior half but diverging. Maximum width behind middle. Base truncated obliquely. Marginal channel moderately broad, fold-like carina at apex incomplete; reflexed margin distinct from humeral tooth to apex. Humeral tooth moderate, situated in extended projection of 7th interval, not projecting. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 6th interval (approaching 5th stria) and a smaller

one adjoining 2nd stria. Scutellar stria intimated. Stria 1 conspicuously deep, stria 2 to 5 deep, punctuate, other striae developed as rows of deep and partly connected punctures. Intervals 1 to 5 moderately convex, other more flattened. 8th interval forming obtuse overhanging carina in apical quarter, covering half of marginal channel. Interval 3 with series of 12 to 16 setigerous punctures, approaching more or less inner stria, interval 5 with 11 to 14 setigerous punctures situated at middle. First stria reaching apex, all others ending on apical declivity.

Ala: Fully developed.

Lower surface: Proepisternum with submarginal furrow visible in anterior quarter, furrow between prosternum and proepisternum distinct, adjoining anterior margin. Terminal segment of abdominal sternite with fine transverse reticulation in apical half.

Protibia: Lateral upper spine turned distinctly ventrally and slightly outward.

♂: *Aedeagus* (Figs. 99, 102): Median lobe conspicuously arcuate at middle, apical half more straight, moderately broadened in lateral view, apex spatulate. Endophallus with bristles and teeth. Parameres (Figs. 100, 101), bisetose.

♀: *Stylomere* (Fig. 163): Broad, moderately arcuate.

Distribution: The species is found in West Bengal, South Vietnam, and Thailand (Fig. 184).

Remarks: In the 455 specimens investigated from South Vietnam variability was observed mostly in the outline of the pronotum and elytra: In a few specimens there is a trend to be more or less parallel at the sides. Some of the specimens from Thailand exhibit an indistinct transverse carina on the frons of the head pointing to the posterior end of the keel.

Doubtful specimens: 1 ♂, Sarda, Bengal, F.W.C., "Trilophus interpunctatus Putz. H.E.A." (BMNH): The apex of the aedeagus is more arcuate than in all other specimens of *T. schmidtii*. This specimens was received without head and with very damaged legs.

Trilophus birmanicus Bates

Figs 13, 46, 103-106, 164

Oxydrepanus birmanicus Bates, 1892: 283;

Oxydrepanus schmidtii Putzeys; ANDREWES 1926: 378;

Trilophus interpunctatus Putzeys; ANDREWES 1927: 265;

Trilophus interpunctatus Putzeys; ANDREWES 1929: 383;

Trilophus interpunctatus Putzeys; ANDREWES 1930: 356.

MATERIAL EXAMINED

A. Type material. Lectotype (by present designation): ♂, labels: light brown, Birmania, Katha, Fea, 11.6.1885 / light brown, red, Typus / light brown, birmanicus Bates / red brown, *Oxydrepanus birmanicus* (es. tip.) Bates / light brown, *Oxydrepanus Birmanicus* Bates / red, Museo Civ. Genova / red, Syntypus *Oxydrepanus birmanicus* Bates 1892 (MCSN).

B. Other material. 1 ♂, labels: yellow, small, Calcutta / grey, *Dyschirius schmidti* Putz dét. J. Putzeys / brown Soc. Ent. Belg. Coll. Putzeys / white, red, Syntype (IRSNB); 1 ♀, labels: Schmidt Putz, Birma, Helf. / Ex. Musaeo L. Fairmaire 1896 (MNHP); 1 ♀, India, Meghalaya, Khasi Hills, ss/Cherrapunjee, 1200 m, 26.X.1978, leg. I. Löbl, C. Besuchet (MHNG); 1 spec. (received with an empty abdomen), labels: Dysch. Schmidt Putz Birma / Ex. Musaeo L. Fairmaire 1896 (MNHP); 1 ♀, Thailand, NE Bangkok, Khao Yai Nat. Park, E Heo Suwat Waterfalls, 800-900 m, 1.XII.1985, leg. I. Löbl, D. Burckhardt (MHNG); 1 ♂, India, Bowring 63.47*, "*Trilophus interpunctatus* v. *schmidti* Putz. compared with type H.E.A." (BMNH); 2 ♀, India: Assam, Jorhat, Tea soil, 1970, C.I.E. A3612, 502/6, pres. By Com. Inst. Ent. B M 1970-I, det. *Trilophus interpunctatus* var *schmidti* Putz. (BMNH); 2 ♀, Assam, Manas, 200 m, 22.X.1978, leg. I. Löbl, C. Besuchet (MHNG/CBA); 4 ♂, 1 ♀, Assam, Kaziranga, 75 m, 7.-9.V.1976, leg. W. Wittmer, C. Baroni Urbani (NHMB/CBA); 1 ♂, same data but nat. pres. 12.-15.V.1991, leg. St. Jakl, (CDW).

Comments: BATES (1892: 283) based his description on 2 specimens, one from northern Birma (Katha) and one from the south of Birma (Meetan, Tenasserim). The specimen from Katha is available and is designed as the lectotype. In the aedeagus dissected shrinking was observed. However, there was enough other material available. So, a realistic figure of the aedeagus can be given. Among the material investigated there is one of the 4 individuals serving PUTZEYS (1877) for the description of *Dyschirius schmidti* (specimen from IRSNB). As can be noticed by the confusion within the type series of *T. schmidti*, the species is difficult to distinguish by external characters but easily by the shape of the male genitalia: *T. schmidti* possesses a spatulate apex (comp. Figs. 99, 102) whereas the apex of the aedeagus of *T. birmanicus* is stick-like.

The species *birmanicus* Bates, synonymized by ANDREWES (1926, 1927, 1929, 1930) with *interpunctatus* Putzeys and *schmidti* Putzeys, is different. This conclusion can be drawn clearly from external characters as well as from characters of the aedeagus.

DIAGNOSIS: A big sized species with elongated and transversally depressed elytra, less tumid proepisterna, complete median line of the pronotum, and setigerous punctures present on intervals 3 and 5 of the elytra. Distinguished from the related species *T. schmidti* and *T. tonkinensis* by the small pronotum, the acuminate apex of the elytra, and by the stick-like apex of the aedeagus.

REDESCRIPTION

Measurements: Length 2.69 - 3.12 mm ($x = 2.85$ mm*), width 0.82 - 1.0 mm ($x = 0.98$ mm*), ratio length/width of pronotum 0.98 - 1.09 ($x = 1.03$ *), ratio length/width of elytra 1.68 - 1.78 ($x = 1.72$ *); (*n = 16).

Colour: Head, pronotum, ventral surface, elytra, and front legs red brown. Mouthparts, antennae, intermediate and hind legs yellow-brown.

Head: A quarter smaller than pronotum. Clypeus, wings, supraantennal plates distinctly margined; Clypeus minutely excised anteriorly, nearly straight, wings obtuse angled, devided from supraantennal plates by intimated notches; supraantennal plates convex; keel on vertex sharp, longer and less elevated as tubercle. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly, with distinctly broad 2nd fovea at front-eye level, short carina between furrow and frons at each side, arising at supraantennal plate and reaching nearly up to hind supraorbital seta, bending slightly mesially posteriorly. Frons convex, with isodiametric reticulation, more distinct posterior tubercle, slight median impression behind keel. Indistinct neck constriction at posterior eye level. Eyes large, voluminous,

hemisphaerically protruding, eye-index 1.8. Genae short, developed as small groin. Labrum broad, moderately excised anteriorly. Antennae reaching up to basal constriction of pronotum, segment 4 to 10 elongate.

Pronotum (Figs. 13, 46): lateral view: anterior three quarters slightly and regularly convex, moderately convex in posterior quarter up to basal constriction; frontal view: regularly convex, stronger convex laterally to marginal channel. Relatively small, longer than wide, maximum width at middle, narrowed in anterior third. Anterior margin slightly bisinuate. Reflexed lateral border evenly rounded from anterior angle to posterior setigerous puncture, extended distinctly over posterior setigerous puncture as submarginal furrow, furrow not reaching basal constriction. Proepisternum moderately tumid posterolaterally. Anterior angles distinctly marked, obtuse. Anterior transverse line flat but deeper laterally. Median line sharp, deeper posteriorly. Surface with few fine transverse wrinkles. Basal constriction broad. Ringlike flange acute, one half broader as channel of constriction.

Elytron (Fig. 13): Anterior half transversally depressed. Elongate, sites nearly straight in anterior half but slightly diverging. Maximum width slightly behind middle. Base truncated obliquely. Marginal channel moderately broad, fold-like carina at apex incomplete; reflexed margin distinct from humeral tooth to apex. Humeral tooth situated in extended projection of 7th interval, moderately projecting. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 6th interval (approaching 5th stria) and a smaller one adjoining 2nd stria. Stria 1 to 3 conspicuously deep, stria 4 to 7 moderately deep, punctuate. Intervals 1 to 6 moderately convex, 8th forming obtuse overhanging carina in apical quarter, covering half of marginal channel. Interval 3 with series of 15 to 19 setigerous punctures, situated at middle, interval 5 with 13 to 15 setigerous punctures approaching inner stria. First stria reaching apex, 2nd approaching apex, all others ending apically before obtuse vault-like carina of 8th interval.

Ala: Fully developed.

Lower surface: Proepisternum with submarginal furrow visible at anterior angle, furrow between prosternum and proepisternum distinct, not reaching anterior margin. Terminal segment of abdominal sternite with distinct transverse reticulation in apical two thirds.

Protibia: Lateral upper spine turned distinctly ventrally.

♂: *Aedeagus* (Figs. 103, 106): Median lobe conspicuously arcuate throughout, moderately broadened in lateral view, apex arcuate, stick-like. Parameres (Figs. 104, 105), bisetose, petioles not as elongated as in other species.

♀: *Stylomere* (Fig. 164): Broad basally, moderately arcuate.

Distribution: The species is found in NE India (Assam, Meghalaya), Birma, near Bangkok, and Calcutta (Fig. 184).

Variations: 1 ♀, labels: "Dysch. Schmidt Putz Birma" (MNHP): Clypeus more excised, wings moderately acute, elytron not so elongate, length 3.05 mm, width 0.95 mm.

Trilophus tonkinensis n. sp.

Figs 20, 47, 107-110, 165

Type material: Holotype: ♂, N Vietnam, Hanoi, 40 m, 29.X.1963, leg. T. Pocs, á la lumière, (HNHM).

Paratypes: all N Vietnam: 3♂, 3♀, 3 specs., same data as holotype, and 17 specs., same data but 2./3./4./29./30.X.1963, (HNHM/CBA); 2 specs., same data but 1.-10.XII.1963, leg. Manninger (HNHM); 1♂, 1 spec., same data but 11./15.XII.1971, leg. Gy. Topál (HNHM); 1 spec. Same data but 7.V.1987, leg. Matskási, Oláh, Topál, at light, (HNHM); 2 specs., same data but 21.V.-11.VI.1986, leg. J. Horák (CDW); 1♂, same data but 22.V.-10.VI.1986, leg. J. Macek (NHMB) 1♀, same data but 30.VI.1990, leg. A. Olexa (NHMB); 1♂, same data but 1909, Coll. A. Bonhoure, MAI, (MNHP); 1♂, 1♀, 8 specs., same data but Hotel Kim lien, collected on lamp, 28.-31.V.1966, Exp. Gy. Topál (HNHM/CBA); 1♂, 43 specs., Tuong linh near Phu ly, 24.-28.V.1966, collected on lamp, Exp. Gy. Topál (HNHM/CBA), 1 spec., same data but 19.-23.V.1966 (HNHM); 1♂, same data but 19.-23.V.1966, sifted from detritus (HNHM); 12 specs., same data but 19.-23.V. and 24.-28.V. 1966, collected on lamp, Exp. Gy. Topál (HNHM/CBA); 1♂, 5 specs., Xuan dinh NW of Hanoi, 26.-29.IV.1966, sifted litter, Exp. Gy. Topál (HNHM/CBA); 1♂, 2 specs., Prov. Nghe-An, Quy-chau, forêt pluv. Trop., semidecid., à la lumière, 25.VIII.1963, leg. T. Pocs (HNHM); 1 spec. Nguyen, Thai, Prov. Bac Thai, 40 m, 21°24'N, 105°50'E, at light, 23.V.1987, leg. Matskási, Oláh, Topál (HNHM); 2♀, Prov. Ha-Tinh. Hűong-Sön, 150 m, forêt trop. Pluv., á la lumière, 15.VIII.1963, leg. T. Pocs (HNHM); 11♂, 15♂, Phu-Lang-Thuong, Indo Chine. Coll. Dussault, 1911 (NHMB/CBA); 1♂, same data but Song-Chay, 1908 (NHMB); 1♂, same data but Chien-Hoa, 1907 (NHMB); 1♂, 1 spec., Ninh Binh, Cuc Phuong, at light, 1.X.1986, leg. Mészáros, Oláh, Vásárhely (HNHM); 1♂, 1 spec., same data but 3.-10.V.1966, Exp. Gy. Topál (HNHM); 1 spec., same data but 12.-18.V.1966, sifted litter of forest (HNHM); 1 spec., Cuc-Phűong, Bông, jungle, at lamp, 11.-23.XII.1965, leg. T. Pocs (HNHM); 1 spec., Res. Cuc-Phűong, Dang, forêt tropic. Pluv., á la lumière, 200 m, 16.IX.1963, leg. T. Pocs (HNHM); 1♂, Tonkin, Hoa Binh, A. de Cooman, Coll. Ch. Alluaud, „Trilophus interpunctatus PUTZ. Det. Andrewes“ (MNHP); 1♂, 3♀, pr. Hanamninh, Namdinh, 14.VI.1985, leg. Vít. Kubán (NHMB/CBA); 1♀, Annam, Laos, wod., "Trilophus interpunctatus v. schmidtí Putz. compared with type H.E.A." (HNHM).

DIAGNOSIS: A bigger sized species with oblongo ovate and transversally depressed elytra, moderately tumid and elongated proepisterna, complete median line of the pronotum, and setigerous punctures present on intervals 3 and 5 of the elytra. Distinguished from the related species *T. schmidtí* and *T. birmanicus* by the stronger rounded lateral margin of the elytra, the lateral channel of the pronotum which is broader anteriorly, and by the conspicuously arcuate apex of the aedeagus.

DESCRIPTION

Measurements: Length 2.45 - 2.98 mm ($x = 2.72$ mm*); width 0.82 - 0.96 mm ($x = 0.88$ mm*); ratio length/width of pronotum 1.0 - 1.08 ($x = 1.03$ *); ratio length/width of elytra 1.68 - 1.78 ($x = 1.73$ *); (*n = 30).

Colour: Head, pronotum, ventral surface brown, elytra red-brown. Mouthparts, antennae, legs yellowish brown.

Head: A quarter smaller than pronotum. Clypeus, wings, supraantennal plates distinctly margined; clypeal margin nearly stright, wings obtusely projecting, devided from supraantennal plates by intimated notches; supraantennal plates vaulted, prolonged to mid-eye level as carina; keel on vertex sharp, as long and as elevated as tubercle of clypeus, reaching to middle eye-level. Transverse furrow crossing keel without interrupting. Clypeus and frons devided from supraantennal plates by deep and broad longitudinal furrows with 2nd distinct fovea, each. Carina between furrow

and frons at each side starting at mid-eye level, ending at hind eye level. Frons convex, with median impression behind keel and fine longitudinal reticulation. Neck constriction at posterior genae level intimated. Eyes well developed, protruding, eye-index 2.0, one sixth of eyes enclosed by genae. Genae inconspicuous, unit of eye and gena nearly hemisphaerically. Labrum slightly excised anteriorly. Antennae long, reaching nearly up to basal constriction of pronotum, segment 5 to 10 elongate.

Pronotum (Figs. 20, 47): Lateral view: anterior two thirds slightly flattened, convex in posterior third up to basal constriction; frontal view: moderately convex. Slightly longer than wide, more slender anteriorly, maximum width at middle. Anterior margin bisinuate, convex at middle. Reflexed lateral border evenly rounded up to posterior setigerous puncture, extended to basal constriction as obtuse vault. Proepisternum distinctly tumid posterolaterally. Anterior angles distinctly marked, slightly projecting. Anterior transverse line flat, intimated at extremities (elongated mesially in some paratypes). Median line conspicuously sharp, deeper posteriorly (in few paratypes indistinctly adjoining basal constriction). Surface with few fine transverse wrinkles. Ringlike flange acute, three times as broad as channel of constriction.

Elytron (Fig. 20): Transversally depressed in anterior third. Elongate, sites moderately convex. Maximum width behind middle. Base truncated convexly. Marginal channel broad, fold-like carina at apex incomplete; reflexed margin distinct from humeral tooth to apex. Humerus distinctly angled, humeral tooth sharply projecting, situated in extended projection of 6th stria. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 5th stria and a smaller one situated in extended projection of 2nd interval. Stria 1 to 4 conspicuously deep, 5 moderately deep, all punctuate, 6 and 7 slightly impressed, developed as rows of connected punctures. Intervals moderately convex, 8th forming obtuse overhanging carina in apical third, covering one third of marginal channel. Interval 3 with series of 15 to 19 setigerous punctures approaching inner stria, interval 5 with 12 to 16 setigerous punctures, situated at middle, punctures of both intervals situated more closely in basal third. First stria conspicuously deep and broad apically, 2nd elongate at apex, all others ending before apical declivity with decreasing length.

Ala: Fully developed. Most of the species were collected at light.

Lower surface: Proepisternum with submarginal furrow distinct in anterior third, furrow between prosternum and proepisternum profound. Slight flat fovea anteriorly below submarginal furrow. Terminal segment of abdominal sternite with transverse reticulation in apical half, indistinct in females.

Protibia: Movable spur nearly as strong as spine.

♂: *Aedeagus* (Figs. 107, 110): Median lobe arcuate and broadened at middle, flattened in apical half; apex spatulate, conspicuously convex. Endophallus basally with 3 groups of teeth and some bristles, another group of teeth at apical cup. Parameres (Figs. 108, 109), bisetose, basal petioles shorter.

♀: *Stylomere* (Fig. 165): Slender at base, strongly arcuate apically.

Distribution: The species is found in North of Vietnam at low altitude (Fig. 184).

Etymology: The name refers to the region the species is known to occur.

Remarks: In addition to the variation given in the description, the following was observed. In 5 of the 157 specimens, the lateral margin of the elytra exhibit traces of serrulation visible at a magnification of 60 X. 10% of the specimens show no median fovea on frons whereas in few specimens the fovea is indistinct. In 5 specimens the pronotum is slightly broader anteriorly.

GROUP **ellipticus**

Diagnostic combination of characters: Species of this group may be distinguished by the following combination of characters: Smaller sized; paler coloured, some species are yellow; wings of clypeus acute projecting, eyes more or less reduced, genae big and often as high as the eyes, keel on frons of the head elongated, distinct reticulation present posterior keel, antennae moniliform, labrum with regular transverse reticulation; posterolateral tumidity of the proepisterna moderately developed, size of flange small; shape of elytra more or less regularly elliptical, setae present on intervals 3 and 5, alae reduced (in *T. variabilis* polymorphous).

Trilophus schawalleri n. sp.

Figs 26, 54, 134-137, 171

Type material: Holotype: ♂, India, Assam, Manas, 200 m, 21.X.1978, leg. I. Löbl & C. Besuchet (MHNG).

Paratypes: 12♂, 7♀, 26 spec., same data as holotype (MHNG/CBA); 2♂, India, W. Bengal, Darjeeling dist., Singla and Teesta, 250 and 300 m, 10./17.X.1978 leg. I. Löbl & C. Besuchet (MHNG/CBA).

DIAGNOSIS: A very small species with subelliptical lateral margin of the elytra, and distinctly reduced eyes. In lateral view, the elytra are conspicuously convex. Distinguished from other members of the group by the very small size, the straight anterior margin of the pronotum, subserrate lateral margin of the elytra, and the laterally flattened aedeagus.

DESCRIPTION

Measurements: Length 2.03 - 2.33 mm ($x = 2.18$ mm*); width 0.67 - 0.77 mm ($x = 0.72$ mm*); ratio length/width of pronotum 1.0 - 1.09 ($x = 1.03$ *); ratio length/width of elytra 1.56 - 1.73 ($x = 1.65$ *); (*n = 30).

Colour: Head, pronotum, ventral surface, and elytra brown. Mouthparts, margin of supraantennal plates, base of elytra, legs yellow-brown. Antennae yellow.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates distinctly margined; clypeus moderately and regularly excised anteriorly, wings obtusely projecting, devided from supraantennal plates by obtuse-angled notches; supraantennal plates vaulted, prolonged to mid-eye level as fine carina; keel on vertex sharp, longer as elevation of tubercle, reaching to mid-eye level. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly, with 2nd distinct fovea, each. Sharp carina between furrow and frons at each side starting at mid-eye level, ending at hind-eye level. Frons convex, with fine irregular to

isodiametric reticulation at both sides of keel, fine but distinct fovea behind keel. Neck constriction at posterior eye level, distinct and broad laterally, shallow at middle. Eyes distinctly reduced but convex, eye-index 2.6, a quarter of eyes enclosed by genae. Genae distinct, not as high as eyes, unit of eye and gena forming regularly rounded vault. Labrum moderately excised anteriorly. Antennae not short, segment 9 reaching up to posterior setigerous puncture of pronotum, segment 5 to 10 moniliform.

Pronotum (Figs. 26, 54): Lateral view: anterior two thirds moderately convex, conspicuously convex in posterior third up to basal constriction; frontal view: moderately and regularly convex. Slightly longer than wide, maximum width at middle, slightly convex at middle. Anterior margin straight. Reflexed lateral border slightly rounded at middle up to posterior setigerous puncture, extended to basal constriction as indistinct obtuse vault. Proepisternum moderately tumid posterolaterally. Anterior angles distinct. Anterior transverse line more distinctly approaching median line. Median line sharp, deeper posteriorly. Surface with minutely stuck punctures and some fine irregular transverse wrinkles. Ringlike flange convex, twice as broad as channel of constriction.

Elytron (Fig. 26): Convex on disc in lateral and frontal view. Outline sub-elliptical, humerus rounded, apex slightly retracted. Maximum width slightly behind middle. Base truncated convexly (subconvexly in some paratypes). Marginal channel moderately broad, fold-like carina at apex crossing channel completely; reflexed margin transparent yellowish, minutely serrate in anterior two thirds, margin distinct from humeral tooth to apex. Humerus indistinct, humeral tooth indistinct, situated in extended projection of 7th interval. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 5th stria and a smaller one situated in extended projection of 2nd interval. Stria 1 and 2 adjoining at basal setigerous puncture. Stria 1 to 3 conspicuously deep, 4 moderately deep, all punctuate, 5 to 7 developed as rows of partly connected punctures, 2nd to 7th shortened at base. Intervals slightly convex, suture impressed at base, 8th forming obtuse overhanging carina in apical fifth, covering a quarter of marginal channel. Interval 3 and 5 with series of 8 to 11 setigerous punctures, approaching inner stria. First stria conspicuously deep apically, all others ending on apical declivity. Interval 8 with carina at apex.

Ala: Reduced, length and width one half of elytron, each.

Lower surface: Proepisternum with submarginal furrow hardly visible in anterior quarter; furrow between prosternum and proepisternum distinct. Slight broad fovea anterior coxal cavities. Terminal segment of abdominal sternite with indistinct transverse reticulation, in apical half.

Protibia: Movable spur shorter than spine.

♂: *Aedeagus* (Figs. 134, 137): Median lobe slender, arcuate at middle; apex spatulate, convex. Endophallus with bristles and teeth, 2nd group of teeth at apical cup. Parameres (Figs. 135, 136), bisetose.

♀: *Stylomere* (Fig. 171): Moderately broadened at base, fine mesially and apically, acute, regularly arcuate.

Distribution: The species is found in Assam (Fig. 186).

Etymology: The species is dedicated to Dr. Wolfgang Schawaller who has collected numerous Scaritinae-material in the Himalayas.

Variations: 2♀, Nepal, Terhatum Dist., oberhalb Nessum, 1750 m, baumreiches Kulturland, 16. IX.1983, leg. J. Martens & Daams (SMNS); 1♀, O-Nepal, Tengpoche, Khumbu, 3470 m, 1979, leg. B. Bhakta (NHMB): In these specimen the frons of the head is nearly smooth and the fold-like carina in the marginal channel of the elytron is nearly invisible. In addition, the habitus resembles a bit to *T. serratulus* n. sp.: 1♂, Sikkim, Chuba Khola nr. Sintam, 25.IV.1977, leg. B. Bhakta (NHMB): The elytra of this specimen are dilated behind middle. Although the aedeagus is different the specimen can not be assigned to date.

***Trilophus variabilis* n. sp.**

Figs 21, 49, 111-117, 166

Type material: Holotype: ♂, Nepal, prov. Bagmati, Nagarjun forest near Kathmandu, 1650 m, 2.IV.1981, leg. I. Löbl. A. Smetana (MHNG).

Paratypes: 4♂, 5♀, same data as holotype (MHNG/CBA); 21♂, 15♀, same data as holotype but Gokarna Forest nr. Kathmandu, 1300 and 1400 m, 31.III.1981 and 20.X.1983, (MHNG/CNCI/CBA); 1♂, 1♀, 4 specs., Gokarna, wod, leg. H. Franz (NHMW/CDW/CBA); 1♀, same data as holotype but Burlang Bhanjyang, 2600 m, 5.IV.1981 (MHNG); 1♀, same data as holotype but Malemchi Khola nr. Malemchi, 2100 m, 15.IV.1991 (MHNG); 1♂, 3♀, same data as holotype but below Tarke Ghyang, 2600 m, 25.IV.1981 (MHNG/CBA); 2♀, same data as holotype but Chipling, 2300 m, IV.1981 (CNCI/CBA); 2♀, Distr. Kathmandu, Godwari, 1600 m, 31.III.1984, leg. I. Löbl (MHNG); 2♀, Kathmandu, Gokaruban and Godavari, 12.IV. and 25.V.1976, leg. W. Wittmer. C. Baroni Urbani (NHMB); 1♂, 2♀, 3 specs., Zentral-Nepal, Weg v. Pokhara z. Goropani, and Goropani, IX.-X.1971, leg. H. Franz (NHMW/CDW/CBA); 1♀, Z.-Nepal, Kini-Kakari, Helambu, 1980, leg. H. Franz (NHMW); 1♂, Umg. Dhampus b. Pokhara, wod, leg. H. Franz. (NHMW/CDW); 1♂, 2♀, Barabhise geg. Ting-Sang-La, wod, leg. H. Franz (NHMW/CDW); 2♂, 2♀, Nagarkotpedi, 1550 m, wod, leg. H. Franz, (NHMW/CDW/CBA); 2♂, 7♀, Zentral-Nepal, Chapagaon, Bordzobaray, wod, leg. H. Franz. (NHMW/CDW); 2♀, India, Meghalaya, Barapani Old Road, 1000m, 14.V.1976, leg. W. Wittmer, C. Baroni Urbani (NHMB/CBA).

DIAGNOSIS: A medium sized species with subelliptical margin, broad lateral channel of the elytra, and slightly reduced eyes. Distinguished from other members of the group by the elongate antennae, the stick-like apex of the aedeagus, and the accessory setae at the apex of the parameres.

DESCRIPTION

Measurements: Length 2.54 - 2.86 mm ($x = 2.75$ mm*); width 0.77 - 0.93 mm ($x = 0.88$ mm*); ratio length/width of pronotum 1.01 - 1.07 ($x = 1.04$ *); ratio length/width of elytra 1.66 - 1.87 ($x = 1.73$ *); (*n = 30).

Colour: Head, pronotum, elytron, ventral surface, and front legs middle-brown. Base of elytron with broad yellowish macula, small yellow spot at apex. Palpi transparent yellow. Antennae, intermediate and hind legs yellow.

Head: A third smaller than pronotum. Clypeus distinctly margined, wings and supraantennal plates finely margined, wings rectangular but rounded, with isodiametric reticulation; clypeus regularly excised anteriorly, wings projecting, notches between wings and supraantennal plates intimated by obtuse angles; supraantennal plates convex; keel on vertex sharp, as elevated and as long as elevation of tubercle. Clypeus

and frons devided from supraantennal plates by deep and broad longitudinal furrows. Furrows diverging posteriorly, with distinct 2nd fovea, each, carina between furrow and frons reaching from mid-eye level to hind supraorbital seta. Frons convex, with isodiametric reticulation on both sides of keel. Neck constriction at posterior eye level intimated, flat, broadly interrupted at middle. Eyes slightly reduced, moderately convex, eye-index 2.5, posterior quarter enclosed by genae. Genae slightly tumid, nearly as high as eyes, unit of eye and gena forming regular rounded vault. Labrum slightly excised anteriorly. Antennae reaching slightly over basal constriction of pronotum, segment 4 to 10 subelongate.

Pronotum (Figs. 21, 49): Lateral view: Anterior third somewhat flattened, middle part slightly convex, conspicuously convex in posterior third to basal constriction; frontal view: more convex at middle than laterally; longer than wide, maximum width at middle, regularly narrowed from maximum width to anterior setigerous punctures, more distinctly to anterior angles. Anterior margin straight. Reflexed lateral border rounded to anterior angle and to posterior setigerous puncture, nearly parallel to median line at middle, extended over posterior setigerous puncture by diameter of puncture, extended to basal constriction as fine line. Proepisternum moderately tumid posterolaterally. Anterior angles well marked by obtuse angle. Anterior transverse line intimated at extremities. Median line distinct, deeper posteriorly. Surface with some fine transverse wrinkles and microscopic isodiametric reticulation laterally, best visible at anterior angles. Ringlike flange acute, 1.5 times broader than channel of constriction.

Elytron (Fig. 21): Explanate in 2ndquarter of anterior half. Subelongate, subelliptical. Maximum width slightly behind middle. Base truncated rectangularly. Marginal channel broad, fold-like carina at apex crossing channel completely; reflexed margin conspicuous from humeral tooth to apex, minutely serrate in anterior two thirds. Humeral tooth moderate, situated in extended projection of 7th interval. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 6th interval and a smaller one at declivity of second interval. Stria 1 and 2 deep, stria 3 to 5 moderately deep, punctuate, other striae not impressed, developed as rows of partly connected finer punctures. Inner intervals moderately convex, 8th forming obtuse overhanging carina in apical third, covering a third of marginal channel. Interval 3 and 5 with series of 14 to 18 setigerous punctures, situated somewhat irregularly at middle of intervals. First stria reaching apex, all others ending before obtuse carina of 8th interval.

Ala: Polymorphous (see Tab. 1).

Lower surface: Proepisternum with submarginal furrow visible in anterior quarter as subtle line, furrow between prosternum and proepisternum distinct, not adjoining anterior margin. Terminal segment of abdominal sternite with distinct transverse reticulation in apical two thirds.

Protibia: Lateral upper spine turned conspicuously ventrally; movable spur shorter than spine, turned ventrally at apex.

♂: *Aedeagus* (Figs. 111, 114, 115): Median lobe totally arcuate, bisinuate in lateral view. Apex stick-like, with lateral furrow. Endophallus with spines. Apex of both parameres bi- to quadrisetose (Figs. 112, 113, 116, 117, variable, see Tab. 2).

♀: *Stylomere* (Fig. 166): Conspicuously broad towards base, moderately arcuate.

Distribution: The species is found all over Central Nepal (Fig. 186).

Etymology: The name focuses on the variability of the elytra and the male parameres.

Variations: 1 ♀, Nepal, Dhading Dist., unter Samari Banjyang, 1000 - 1300 m, 27.VII.1983, Kulturland, leg. J. Martens & W. Schawaller (SMNS): The elytra of the specimen are slender, more elongate, and nearly parallel laterally.

Comments: In this species, extraordinary variability can be observed mostly conspicuous in the alae, the outline of the elytra, and the parameres of the males: In most of the specimens, the length of the alae are two thirds of the elytra. Some specimens show alae having a length of three quarters of the elytra. In 3 specimens the alae are folded at the radial cell, and 3 specimens are fully winged (Tab. 2). Parallel to this variability the outline of the elytra is different: Specimens with shorter alae exhibit more apically dilated elytra whereas in specimens with longer alae the outline of the elytra is more parallel-elongate. Although none of the specimen was

TAB. 2

T. variabilis n. sp.. Size of wings in different subpopulations from Central Nepal (n = 69).

length*)	Wings status	♂	No. of specimens	♀
0.66	not folded	21		17
0.75	not folded	13		12
1.00	folded at radial cell	1		2
1.50	fully developed	0		3

*) elytron (= 1.0) served as relative measurement

TAB. 3

T. variabilis n. sp.. Number of setae at the apex of male parameres in different subpopulations from Central Nepal (n = 33)

No. of apical setae at parameres		No. of specimens
dorsal	ventral	
2	2	4
2	2(+1)*	3
2	3	8
2	4	1
3	2	5
3	3	6
3	3(+1)*	1
3	4	2
4	3	2
4	4	1

*) small seta additionally present

collected at light it is assumed that the species is still vagile and the different subpopulations are in contact. Variability is also present in the number of apical setae of the parameres but without relationship to that in the alae. In the 33 males investigated the number of setae varies from 2 to 4 (Tab. 3). The variation in the wing size and the apical setae of the parameres is equal for specimens among the subpopulations. On the other hand, the aedeagi did not exhibit such variation. Outline, internal structures, and apex are relatively homogenous.

***Trilophus ellipticus* n. sp.**

Figs 22, 50, 118-121, 167

Type material: Holotype: ♂, India, Meghalaya, Khasi Hills, Shillong, 1850 - 1950 m, 25.X.1978, leg. I. Löbl, & C. Besuchet (MHNG).

Paratypes: 8 specimens, same data as holotype; 11 spec., same data as holotype but Mawphlang, 1800 m. 28.X.1998 (MHNG / CBA); 3 spec., same data as holotype but Mawphlang, 1850 m, 15.V.1976, leg. W. Wittmer, U. Baroni Urbani (NHMB/CBA).

DIAGNOSIS: A medium sized species with regularly elliptical lateral margin and conspicuously broad lateral channel of the elytra, and distinctly reduced eyes. Distinguished from other members of the group by the pointed humeral tooth, the laterally intimated anterior transverse line and the anteriorly broadened lateral channel of the pronotum, and by the isolated posterior setigerous punctures. Distinguished from all other species by the conspicuously regular elliptical shape of the elytra.

DESCRIPTION

Measurements: Length 2.60 - 2.90 mm ($x = 2.74$ mm*); width 0.82 - 0.93 mm ($x = 0.88$ mm*); ratio length/width of pronotum 1.0 - 1.08 ($x = 1.04$ *); ratio length/width of elytra 1.61 - 1.76 ($x = 1.70$ *); (*n = 23).

Colour: Head, pronotum, elytron, and ventral surface dark-brown. Base of elytron with yellow spot, small indistinct spot at apex in some paratypes. Mouthparts, antennae, intermediate and hind legs yellow, front legs middle-brown. Supraantennal plates yellowish anteriorly.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates distinctly margined; clypeus moderately and regularly excised anteriorly, wings rectangularly projecting, obtuse, devided from supraantennal plates by slight notches; supraantennal plates convex, carina-like prolonged to hind-eye level; tubercle on clypeus falling steeply in posterior half, keel on vertex sharp, as long and as elevated as tubercle, reaching to hind-eye level. Clypeus and frons devided from supraantennal plates by deep and broad longitudinal furrows. Furrows diverging posteriorly, with 2nd distinct fovea, each. Short carina between furrow and frons at each side starting at mid-eye level, ending before posterior supraorbital seta. Frons convex, with fine isodiametric reticulation up to neck, slight median impression behind keel in some paratypes. Neck with slight constriction at posterior eye level, broadly interrupted at middle. Eyes distinctly reduced, slightly convex, eye-index 3.3, posterior third enclosed by genae. Genae conspicuous, moderately tumid, nearly as high as eyes, unit of eye and gena forming regular rounded vault. Labrum slightly excised anteriorly. Antennae short, segment 10 ending at posterior setigerous puncture of pronotum, segment 5 to 10 moniliform.

Pronotum (Figs. 22, 50): lateral view: anterior four fifths moderately flattened, moderately convex in posterior fifth up to basal constriction; frontal view: moderately and regularly convex. As long as wide, maximum width at middle, more distinctly narrowed in anterior third. Anterior margin straight to slightly concave. Reflexed lateral border evenly rounded from anterior angle to posterior setigerous puncture, extended to basal constriction as obtuse vault. Marginal channel broadened anteriorly in most of the specimens. Marginal setigerous punctures somewhat removed from reflexed border. Proepisternum less tumid laterally but still distinctly visible from above. Anterior angles distinct, obtuse. Anterior transverse line distinct at extremities, flat, not visible on disc. Median line sharp, deeper and broader posteriorly. Surface smooth, with few fine transverse wrinkles. Basal constriction broad. Ringlike flange subconvex, three times as broad as channel of constriction.

Elytron (Fig. 22): Anterior two thirds moderately convex. Elliptical, sites conspicuously and regularly rounded from humerus to apex. Maximum width at middle. Base truncated convexly. Marginal channel conspicuously broad, fold-like carina at apex intimated; reflexed margin distinct from humeral tooth to apex. Humeral tooth distinct, situated in extended projection of 6th stria. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 5th stria and a smaller one situated in extended projection of 2nd interval. Stria 1 to 5 deep, punctuate, 6 and 7 developed as rows of deep and partly connected punctures, 3rd to 7th shortened at base. Intervals moderately convex, flattened apically, first forming short but distinct carina at base, 8th forming obtuse overhanging carina in apical quarter, covering a quarter of marginal channel. Interval 3 and 5 with series of 11 to 13 setigerous punctures, approaching more or less inner stria. First stria conspicuously deep apically, all others ending apically before obtuse vault-like carina of 8th interval with decreasing length.

Ala: Rudimentary, length and width one third of elytron each.

Lower surface: Proepisternum with submarginal furrow in anterior quarter fine but distinct, furrow between prosternum and proepisternum distinct, much finer in anterior fifth. Slight broad fovea anteriorly below submarginal furrow. Terminal segment of abdominal sternite with fine transverse reticulation, in males in apical half, in females in apical two thirds.

♂: *Aedeagus* (Figs. 118, 121): Median lobe slender, moderately arcuate, bisinuate in lateral view; apex spatulate, explanate. Endophallus with bristles and row of small teeth. Parameres (Figs. 119, 120). bisetose.

♀: *Stylomere* (Fig. 167): Conspicuously broad at base, strongly arcuate.

Distribution: The species is found in the upper eastern highlands of Meghalaya (Fig. 186).

Etyymology: The name is derived from the regular elliptical outline of the elytra.

Variations: 1♀, Meghalaya, Upper Shilong, 1900 m, 13.V.1976, leg. W. Wittmer, C. Baroni Urbani (NHMB): This specimen exhibits a more excised clypeus, anteriorly narrowed supraantennal plates, and the eyes are smaller (EI 4.0).

***Trilophus loebli* n. sp.**

Figs 23, 51, 122-125, 168

Type material: Holotype: ♂, Pakistan, Chitral, Kalas, 1900 m, 28.V.1983, leg. I. Löbl, & C. Besuchet (MHNG).

Paratypes: 2♂, 2♀, 6 specimens, same data as holotype; 1♂, same data as holotype but Madaglasht, 2700 m, 26.V.1983; 1♂, 1♀, 8 specimens., Pakistan, Dir, Dir, 1500 m, 20.V.1983, and 2 spec. 1600 m, 22.V.1983, all leg. I. Löbl, & C. Besuchet (MHNG/CBA).

DIAGNOSIS: A small sized yellow species with elliptical lateral margin of the elytra, and conspicuously reduced eyes. In lateral view, the elytra are conspicuously convex. Distinguished from other members of the group by the relatively small pronotum which lateral margin is stright and distinctly narrowed anteriorly. Distinguished from all other species by the reflexed lateral margin of the pronotum which is elongated widely over the posterior setigerous puncture.

DESCRIPTION

Measurements: Length 2.28 - 2.58 mm ($x = 2.46$ mm*); width 0.74 - 0.80 mm ($x = 0.78$ mm*); ratio length/width of pronotum 1.0 - 1.04 ($x = 1.01$ *); ratio length/width of elytra 1.70 - 1.81 ($x = 1.74$ *); (*n = 24).

Colour: Head, pronotum, elytron, ventral surface, and front legs yellow to yellow-brown. Base of elytron broadly yellowish, yellow spot at apex. Mouthparts, vault of supraantennal plates, antennae, intermediate and hind legs yellow.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates distinctly margined; clypeus moderately and regularly excised anteriorly, wings projecting, rectangular, devided from supraantennal plates by distinct notches; supraantennal plates convex, carina-like prolonged to mid-eye level; keel on vertex sharp, longer as elevation of tubercle, reaching to mid-eye level. Clypeus and frons devided from supraantennal plates by deep and broad longitudinal furrows. Furrows diverging posteriorly, with 2nd distinct fovea, each. Short carina between furrow and frons at each side starting at mid-eye level, ending at posterior supraorbital seta. Frons convex, with fine irregular reticulation up to neck. Neck with slight constriction intimated at posterior eye level. Eyes conspicuously reduced, slightly convex, eye-index 4.6, nearly half of eyes enclosed by genae. Genae conspicuous, distinctly tumid posteriorly, as high as eyes, vault of eye and gena elongated posteriorly. Labrum slightly excised anteriorly. Antennae not short, segments big, segment 10 reaching over posterior setigerous puncture of pronotum, segment 5 to 10 moniliform.

Pronotum (Figs. 23, 51): Small. Lateral view: anterior quarter moderately convex, conspicuously convex in posterior three quarters up to basal constriction; frontal view: moderately and regularly convex. As long as wide, maximum width at middle, more straightly narrowed in anterior half. Anterior margin straight. Reflexed lateral border straight in anterior third, evenly rounded to posterior setigerous puncture, extending over posterior setigerous puncture, extended to basal constriction as fine line and obtuse vault. Marginal channel fine throughout. Proepisternum less tumid laterally but still distinctly visible from above. Anterior angles distinct. Anterior transverse line flat, distinct, elongated to middle but not reaching median line. Median line conspicuously sharp in total, deeper and broader posteriorly. Surface

indistinctly and irregularly reticulated. Ringlike flange convex, three times as broad as channel of constriction.

Elytron (Fig. 23): Explanate on disc. Subelongate, elliptical. Maximum width behind middle. Base truncated rectangularly. Marginal channel moderately broad, fold-like carina at apex fine, crossing channel completely; reflexed margin distinct from humeral tooth to apex. Humerus rounded, humeral tooth fine, situated in extended projection of 7th interval. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 6th interval and a smaller one situated in extended projection of 2nd interval. Stria 1 and 2 conspicuously deep, 3 to 5 moderately deep, all punctuate, 6 and 7 developed as rows of partly connected punctures, 3rd and 4th shortened at base. Intervals slightly convex, first forming short carina at base, 8th forming obtuse overhanging carina in apical third, covering a third of marginal channel. Interval 3 and 5 with series of 15 to 12 setigerous punctures, approaching more or less inner stria. First stria conspicuously deep apically, all others ending apically before obtuse vault-like carina of 8th interval with decreasing length.

Ala: Reduced but still folded at radial cell.

Lower surface: Proepisternum with submarginal furrow indistinct, traceable in anterior quarter, furrow between prosternum and proepisternum distinct. Terminal segment of abdominal sternite with distinct transverse to irregular reticulation in apical three fourths.

♂: Aedeagus (Figs. 122, 125): Median lobe slender, arcuate, slightly fractuate at middle; apex spatulate, conspicuously flattened. Endophallus with bristles. Parameres (Figs. 123, 124), bisetose.

♀: *Stylomere* (Fig. 168): Slender, fine.

Distribution: The species is found at the western border of Pakistan north of Peshawar, districts Chitral and Dir (Fig. 186).

Etymology: The species is dedicated to Dr. Ivan Löbl who has collected many of the species described in this contribution.

***Trilophus serratulus* n. sp.**

Figs 24, 52, 126-129, 169

Type material: Holotype: ♂, Pakistan, Swat, Marghuzar, 1300 m, 8.V.1983, leg. I. Löbl, & C. Besuchet (MHNG).

Paratypes: 6 specimens, same data as holotype (MHNG/CBA); 4 spec. Pakistan sept., envs. Punjab, Rawalpindi Lake, forêt de savane, 24.-26.IV.1984, and debris alluvion, 3.IV.1984, all leg. S. Vit (MHNG/CBA).

DIAGNOSIS: A small sized yellow species with elliptical and finely serrated lateral margin of the elytra, and conspicuously reduced eyes. In lateral view, the elytra are conspicuously convex. Distinguished from other members of the group by the pronotum which is widest at the posterior third, the conspicuously sharp median line, and the isolated and distinct teeth on the endophallus of the aedeagus.

DESCRIPTION

Measurements: Length 2.18 - 2.54 mm ($x = 2.43$ mm*); width 0.67 - 0.81 mm ($x = 0.77$ mm*); ratio length/width of pronotum 1.1 - 1.25 ($x = 1.17$ *); ratio length/width of elytra 1.67 - 1.77 ($x = 1.71$ *); (*n = 11).

Colour: Uniformly dark-yellow. Base and apex of elytron, mouthparts, and antennae paler.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates finely but distinctly margined; clypeus moderately and regularly excised anteriorly, wings rectangularly projecting, divided from supraantennal plates by obtuse-angled notches; supraantennal plates vaulted, prolonged to mid-eye level as fine carina; keel on vertex sharp, longer as elevation of tubercle, reaching to mid-eye level. Clypeus and frons divided from supraantennal plates by deep and broad longitudinal furrows. Furrows diverging posteriorly, with 2nd distinct fovea, each. Carina between furrow and frons at each side starting at mid-eye level, ending at posterior supraorbital seta. Frons convex, with fine irregular reticulation up to neck constriction. Neck constriction at posterior eye level distinct, broadly interrupted at middle. Eyes conspicuously reduced, flattened, eye-index 4.5, half of eyes enclosed by genae. Genae conspicuous, slightly tumid, nearly as high as eyes, unit of eye and gena forming regularly rounded vault. Labrum nearly straight anteriorly. Antennae not short, segment 10 reaching over posterior setigerous puncture of pronotum, segment 5 to 10 moniliform.

Pronotum (Figs. 24, 52): Lateral view: Flattened at anterior transverse line, conspicuously convex posteriorly up to basal constriction; frontal view: moderately and regularly convex. Slightly longer than wide, maximum width at posterior third, evenly rounded in anterior three quarters. Anterior margin bisinuate. Reflexed lateral border evenly rounded up to posterior setigerous puncture, extended to basal constriction as fine line and obtuse vault. Marginal channel more distinct at anterior angles. Proepisternum moderately tumid posterolaterally. Anterior angles distinctly projecting. Anterior transverse line distinct, flattened, elongated to middle but not reaching median line. Median line conspicuously sharp in total, deeper posteriorly. Surface indistinctly and irregularly reticulated. Ringlike flange convex, three times as broad as channel of constriction.

Elytron (Fig. 24): Explanate on disc. Subelongate, elliptical. Maximum width at middle. Base convex, finely and irregularly reticulated. Marginal channel broad, fold-like carina at apex distinctly crossing channel completely; reflexed margin finely serrate in anterior two thirds, margin distinct from humeral tooth to apex. Humerus obtuse-angled, humeral tooth indistinct (more distinct in some females), situated in extended projection of 6th stria. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 5th stria and a smaller one situated in extended projection of 2nd interval. Stria 1 to 4 (5) conspicuously deep, 5 and 6 moderately deep, all punctuate, 6 and 7 developed as rows of partly connected punctures, 2nd to 4th shortened at base. Intervals slightly convex, suture impressed at base, 8th forming obtuse overhanging carina in apical third, covering a quarter of marginal channel. Interval 3 and 5 with series of 11 to 15 setigerous punctures, approaching more or less inner stria. First stria conspicuously deep apically, all others ending apically before obtuse vault-like carina of 8th interval with decreasing length.

Ala: Reduced, length and width two thirds of elytron, each.

Lower surface: Proepisternum with submarginal furrow in anterior quarter, indistinct; furrow between prosternum and proepisternum distinct. Slight broad fovea

anteriorly below submarginal furrow. Terminal segment of abdominal sternite with irregular transverse reticulation in apical two thirds.

Protibia: Movable spur shorter than spine.

♂: *Aedeagus* (Figs. 126, 129): Median lobe slender, arcuate; apex spatulate, cross section convex. Endophallus with bristles and few distinct and isolated teeth. Parameres (Figs. 127, 128), bisetose, ventral one with additional fine pilus at apex.

♀: *Stylomere* (Fig. 169): Fine, slender mesially and apically, strongly arcuate at apex.

Distribution: The species occurs in north-west Pakistan north of Peshawar (district Swat) and at the Rawalpindi Lake (Fig. 186).

Etymology: The name refers to the minute teeth at the margin of the elytron.

***Trilophus weberi* n. sp.**

Figs 25, 53, 130-133, 170

Type material: Holotype: ♂, Inde, Uttar Pradesh, Kumaon, Bhim Tal, 1500 m, 4.X.1979, leg. I. Löbl (MHNG).

Paratypes: 15 specimens, same data as holotype but 1500 m and 1800 m (MHNG/CBA).

DIAGNOSIS: A medium sized yellow species with subserrate lateral margin of the elytra, and distinctly reduced eyes. Distinguished from other members of the group by the stright but diverging lateral margin of the elytra, the complete anterior transverse line of the pronotum, and the anteriorly flattened pronotum (lateral view).

DESCRIPTION

Measurements: Length 2.40 - 2.64 mm ($x = 2.49$ mm*); width 0.67 - 0.80 mm ($x = 0.78$ mm*); ratio length/width of pronotum 0.98 - 1.09 ($x = 1.04$ *); ratio length/width of elytra 1.68 - 1.78 ($x = 1.73$ *); (*n = 16).

Colour: Head, pronotum, elytron, ventral surface, and front legs yellowish light-brown. Base of elytron broadly yellow. Palpi, antennae, intermediate and hind legs yellow.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates distinctly margined; clypeus slightly and regularly excised anteriorly, wings rectangularly projecting, devided from supraantennal plates by obtuse-angled notches (in some paratypes by intimated notches); supraantennal plates vaulted, prolonged to mid-eye level as carina and turning to eye; keel on vertex sharp, longer as elevation of tubercle, reaching nearly to hind-eye level. Clypeus and frons devided from supraantennal plates by deep and broad longitudinal furrows with 2nd distinct fovea, each. Furrows diverging posteriorly, turning mesially before neck. Carina between furrow and frons at each side starting at mid-eye level, ending at hind genae level. Frons convex, with median impression behind keel and fine irregular reticulation. Neck constriction at posterior eye level intimated. Eyes distinctly reduced, slightly convex, eye-index 3.3, two fifths of eyes enclosed by genae. Genae conspicuous, tumid, nearly as high as eyes, unit of eye and gena forming regular rounded vault. Labrum broad, moderately excised anteriorly. Antennae of moderate length, segment 10 just reaching posterior setigerous puncture of pronotum, segment 5 to 10 moniliform.

Pronotum (Figs. 25, 53): Lateral view: Anterior third flattened, conspicuously convex posteriorly up to basal constriction; frontal view: flattened at middle, moderately and regularly convex laterally. Slightly longer than wide, maximum width at middle. Anterior margin bisinuate. Reflexed lateral border evenly rounded up to posterior setigerous puncture, extended to basal constriction as fine line and obtuse vault. Proepisternum moderately tumid posterolaterally. Anterior angles distinctly marked. Anterior transverse line flat, distinct, elongated to middle. Median line conspicuously sharp in total, surpassing anterior transverse line, deeper posteriorly. Surface with few transverse wrinkles. Ringlike flange convex, three times as broad as channel of constriction.

Elytron (Fig. 25): Explanate on disc. Subelongate, sites rounded at humerus and at apical third, nearly stright at middle but diverging. Maximum width behind middle. Base slightly convex. Marginal channel broad, fold-like carina at apex distinctly crossing channel completely; reflexed margin serrate in anterior two thirds, margin distinct from humeral tooth to apex. Humerus obtuse-angled, humeral tooth indistinct, situated in extended projection of 7th interval. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 5th stria and a smaller one situated in extended projection of 2nd interval. Stria 1 to 4 conspicuously deep, 5 moderately deep, all punctuate, 6 and 7 developed as rows of partly connected punctures. Intervals slightly convex, suture impressed at base, 8th forming obtuse overhanging carina in apical third, covering nearly two thirds of marginal channel. Interval 3 and 5 with series of 10 to 15 setigerous punctures, approaching more or less inner stria. First stria conspicuously deep apically, all others ending apically before obtuse vault-like carina of 8th interval with decreasing length.

Ala: Reduced, length and width half of elytron, each.

Lower surface: Proepisternum with submarginal furrow in anterior quarter, fine, furrow between prosternum and proepisternum profound. Slight broad fovea anteriorly below submarginal furrow. Terminal segment of abdominal sternite with irregular transverse reticulation, in apical two thirds.

Protibia: Movable spur shorter than spine.

♂: Aedeagus (Figs. 130, 133): Median lobe slender, arcuate; apex spatulate, convex. Endophallus with bristles and few teeth, 2nd group of few teeth at apical cup. Parameres (Figs. 131, 132) bisetose, ventral one occasionally with additional fine pilus at apex.

♀: *Stylomere* (Fig. 170): Medium sized, strongly arcuate mesially.

Distribution: The species is known from the type locality in Uttar Pradesh, Kumaon (Fig. 186).

Etymology: The species is dedicated to Prof. Dr. Friedrich Weber (Münster) to his 60th birthday.

***Trilophus serratus* n. sp.**

Figs 27, 55, 138-141, 172

Type material: Holotype: ♂, Nepal, Kathmandu, Umgeb. Kakani, 6.V.1993, leg. Kleeberg (MHNG).

Paratypes: 1 ♀, India, Darjeeling distr., Monshong, 1400 m, 5.V.1979, leg. B. Bhakta (NHMB); 1 ♂, Nepal, Chandam Bari, 3350 m, 23.V.1979, leg. B. Bhakta (CBA).

DIAGNOSIS: A small sized species with elongate elliptical lateral margin of the elytra, and conspicuously reduced eyes. In lateral view, the elytra are conspicuously convex. Distinguished from other members of the group by the pronotum which is widest at the posterior third, and the strikingly conspicuous serration of the lateral margin of the elytron which separates the species from all other species of the genus.

DESCRIPTION

Measurements: Length 2.21 / 2.40 / 2.45 mm; width 0.72 / 0.77 mm; ratio length/width of pronotum 1.0; ratio length/width of elytra 1.68 / 1.73.

Colour: Head, pronotum, ventral surface, and elytra red-brown. Supraantennal plates, wings, front of legs middle brown. Mouthparts, intermediate and posterior legs yellowish brown.

Head: A third smaller than pronotum, not elongate as in other species. Clypeus, wings, supraantennal plates finely but distinctly margined; clypeus slightly and regularly excised anteriorly, wings obtuse but projecting, devided from supraantennal plates by obtuse-angled notches; supraantennal plates vaulted, prolonged to mid-eye level as fine carina; keel on vertex sharp, longer as elevation of tubercle, reaching nearly to posterior eye-level. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly, with 2nd distinct fovea, each. Carina between furrow and frons at each side starting at mid-eye level, ending at posterior supraorbital seta. Frons convex, with fine irregular reticulation up to neck constriction, distinct transverse rugae at each side of keel and intimated median impression posterior keel. Broad indistinct neck constriction at posterior genae level. Eyes conspicuously reduced, slightly convex, eye-index 4.2 / 4.3, half of eyes enclosed by genae. Genae conspicuous, moderately tumid posteriorly, as high as eyes. Labrum broadly V-shaped anteriorly. Antennae moderately long, segment 10 reaching up to posterior setigerous puncture of pronotum. segment 5 to 10 moniliform.

Pronotum (Figs. 27, 55): Lateral view: Flattened at anterior transverse line, conspicuously convex posteriorly up to basal constriction; frontal view: moderately and regularly convex. As long as wide, maximum width at posterior third, nearly stright but diverging in anterior two thirds. Anterior margin nearly straight. Reflexed lateral border gently rounded at middle, more at anterior angle and posterior setigerous puncture, extended to basal constriction as obtuse vault and fine submarginal furrow. Proepisternum weaker tumid but distinctly visible from above. Anterior angles distinct, obtuse. Anterior transverse line extremely flat but approaching middle. Median line sharp, deeper posteriorly. Surface with some fine irregular transverse wrinkles. Ringlike flange acute, three times as broad as channel of constriction.

Elytron (Fig. 27): Slightly explanate on disc. Elongate, elliptical. Maximum width at middle. Base slightly convex. Marginal channel broad, fold-like carina at apex indistinct, incomplete; reflexed margin distinctly serrate in anterior three quarters, margin distinct from humeral tooth to apex. Humerus obtuse-angled, humeral tooth sharply projecting, situated in extended projection of 6th stria. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 5th stria and a smaller one situated in extended projection of

2nd interval. Stria 1 and 2 conspicuously deep, 3 to 5 moderately deep, all punctuate, 6 and 7 developed as rows of partly connected punctures, 2nd to 4th shortened at base. Intervals slightly convex, suture impressed at base, 8th forming obtuse overhanging carina in apical third, covering a third of marginal channel. Interval 3 and 5 with series of 12 to 15 setigerous punctures, approaching more or less inner stria. First stria conspicuously deep and broad apically, 2nd elongate at apex, all others ending before apical declivity with decreasing length.

Ala: Reduced, length and width one half of elytron, each.

Lower surface: Proepisternum with submarginal furrow in anterior third, distinct; furrow between prosternum and proepisternum distinct. slight broad fovea anteriorly below submarginal furrow. Terminal segment of abdominal sternite with transverse reticulation, in apical two thirds.

Protibia: Movable spur shorter than spine.

♂: *Aedeagus* (Figs. 138, 141): Median lobe arcuate at middle; apex spatulate, convex. Endophallus with bristles, 2nd group of bristles and few teeth at apical cup. Parameres (Figs. 139, 140), bisetose.

♀: *Stylomere* (Fig. 172): Moderately broad at base, broadened apically, slightly arcuate at middle.

Distribution: The species is found in Central Nepal and Darjeeling (Fig. 186).

Etymology: The name refers to the distinct serrate margin of the elytron.

***Trilophus convexus* n. sp.**

Figs 28, 56, 142-145

Type material: Holotype: ♂, Tonkin, Tam Dao, leg. H. Perrot, wod; separate label: Coll. H. Perrot in Coll. M. Curti MHNG-1991 (MHNG).

DIAGNOSIS: A small to medium sized species with elliptical and subserrate lateral margin of the elytra, and distinctly reduced eyes. Distinguished from other members of the group by the distinct and broadened anterior transverse line of the pronotum, and the broad lateral channel of the elytron. This is the only species with completely rounded humerus.

DESCRIPTION

Measurements: Length 2.33 mm; width 0.82 mm; ratio length/width of pronotum 1.0; ratio length/width of elytra 1.61.

Colour: Head, pronotum, ventral surface, and elytra brown. Mouthparts, margin of supraantennal plates, wings of clypeus, legs brownish-yellow. Antennae yellow-brown.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates finely but distinctly margined; clypeus nearly stright truncated, wings distinctly rectangularly projecting but rounded, devided from supraantennal plates by obtuse-angled notches; supraantennal plates vaulted, prolonged to hind-eye level as fine carina; carina turning to eye; keel on vertex sharp, longer as elevation of tubercle, reaching to mid-eye level. Slight transverse furrow crossing keel without interrupting. Clypeus and frons devided from supraantennal plates by deep and broad longitudinal furrows. Furrows diverging posteriorly, with 2nd distinct fovea, each. Carinae between furrow and frons

at each side short. Frons convex, with fine isodiametric reticulation, fine fovea behind keel. Neck constriction indistinct, visible at sides. Eyes distinctly reduced, moderately convex, eye-index 3.1. Genae distinct, nearly as high as eyes, enclosing eyes by one third, unit of eye and gena forming regularly rounded vault. Labrum straight anteriorly. Antennae shortened, segment 10 reaching up to posterior setigerous puncture of pronotum, segment 5 to 10 submoniliform.

Pronotum (Figs. 28, 56): Lateral view: moderately convex; frontal view: moderately convex, slightly flattened laterally. As long as wide, maximum width at middle. Anterior margin slightly bisinuate, convex at middle, sides evenly convex. Reflexed lateral border gently rounded at middle up to posterior setigerous puncture, extended to basal constriction as indistinct obtuse vault with fine line representing submarginal furrow, disappearing basally. Proepisternum moderately tumid posterolaterally. Anterior angles distinct, slightly projecting. Anterior transverse line distinct at extremities, elongated and broadened mesially. Median line sharp, deeper posteriorly. Surface with some fine irregular transverse wrinkles. Ringlike flange convex, three times as broad as channel of constriction.

Elytron (Fig. 28): Slightly convex anteriorly in lateral view, distinctly convex in frontal view. Outline nearly elliptical, humerus rounded totally. Maximum width at middle. Base conspicuously convex. Marginal channel conspicuously broad, fold-like carina at apex indistinct, incomplete; reflexed margin broad, transparent yellowish, conspicuous at base, minutely serrate in anterior three quarters. Humerus intimated, humeral tooth indistinct, not projecting, situated in extended projection of 6th interval. Two conspicuous basal setigerous punctures with tubercles, one adjoining lateral margin at humerus at extended projection of 5th interval and a 2nd one situated in extended projection of 2nd interval. Additional longitudinal tubercle without setigerous puncture situated in first interval at base. Stria 1 to 4 conspicuously deep, 5 moderately deep, all punctuate, 5 to 7 developed as rows of partly connected punctures, 7th shortened at base and apically. Intervals conspicuously convex, obtuse apical carina of 8th interval indistinct. Interval 3 and 5 with series of 16 setigerous punctures, approaching more or less inner stria. First stria conspicuously deep apically, all others ending on apical declivity. Interval 8 with short sharp carina at apex.

Ala: Reduced, length one half, width one third of elytron, each.

Lower surface: Proepisternum flattened anteriolaterally, with submarginal furrow fine in anterior quarter; furrow between prosternum and proepisternum distinct. Terminal segment of abdominal sternite with indistinct transverse reticulation in apical half.

Protibia: Movable spur as long as spine, turned ventrally in apical half.

♂: *Aedeagus* (Figs. 142, 145): Median lobe slender, moderately arcuate at middle, hollowed out laterally; apex spatulate, cross section convex. Endophallus with bristles and teeth, 2nd group of teeth at apical cup. Parameres (Figs. 143, 144), bisetose, attenuate apically.

♀: *Stylomere* unknown.

Distribution: Known from the type locality in North Vietnam (Fig. 186).

Etymology: The name pays attention to the distinct convexity of the elytra shape.

GROUP **acuminatus**

Diagnostic combination of characters: Species of this group may be distinguished by the following combination of characters: Medium sized; wings of clypeus acute projecting, eyes well developed, genae small, keel on frons of head small, labrum with regular transverse reticulation; posterolateral tumidity of the proepisterna just visible, size of flange small; lateral channel of elytra carinate at apex, setae present on intervals 3 and 5.

Trilophus acuminatus n. sp.

Figs 29, 57, 146-149, 173

Type material: Holotype: ♂, Sumatra, Palembang, leg. Dr. Foerster, wod (MNHP).

Paratype: 1 ♀, W Java, Cibodas, 50 km E Bogor, 1400 m, 3.-6.XI.1989, leg. I. Löbl, P. Agosti, D. Burekhardt (MHNG).

DIAGNOSIS: A medium sized species with subelongate and slightly transversally depressed elytra, elongated eyes, and less rounded lateral margin of the pronotum. Distinguished from other members of the group by the anterior transverse line of the pronotum which is just visible at the extremities, the shortened reflexed lateral margin which ends at middle between the anterior and posterior setigerous puncture, the moniliform antennae, and the apically pointed parameres of the male genitalia.

DESCRIPTION

Measurements: Length 2.58/2.66 mm; width 0.84/0.85 mm; ratio length/width of pronotum 1.02/1.07; ratio length/width of elytra 1.67/1.69.

Colour: Head, pronotum, ventral surface, and elytra brown. Anterior tip of supraantennal plates, wings of clypeus, mouthparts, intermediate and posterior legs, and first three segments of antennae yellowish brown. Other segments of antennae darkened.

Head: A third to quarter smaller than pronotum. Clypeus, wings, supraantennal plates finely but distinctly margined; clypeus slightly and regularly excised anteriorly, wings rectangularly projecting but rounded, devided from supraantennal plates by slight obtuse-angled notches; supraantennal plates vaulted, prolonged to anterior supraorbital seta as fine carina; keel on vertex blunt, shorter as elevation of tubercle, just reaching over anterior eye-level. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly, without 2nd fovea. Carina between furrow and frons at each side small, inconspicuous. Frons convex, with finely sticked punctures, no median impression posterior keel. Indistinct neck constriction just traceable laterally. Eyes large, elongated, moderately convex, eye-index 2.00/2.22, dorsally visible part of genae rudimentary. Labrum moderately excised anteriorly. Antennae of moderate size, segment 11 reaching over posterior setigerous puncture of pronotum, segment 5 to 10 subelongate.

Pronotum (Figs. 29, 57): Lateral view: anterior three quarters slightly convex, moderately convex in posterior quarter up to basal constriction; frontal view: flattened at middle. Slightly longer than wide, maximum width behind middle. Anterior margin straight. Reflexed lateral border reduced, ending at middle between anterior and

posterior setigerous puncture, extended over posterior setigerous puncture up to basal constriction as obtuse vault and extreme fine submarginal furrow. Proepisternum weakly tumid laterally. Anterior angles rounded but distinct, formed by prolongation of reflexed margin. Anterior transverse line visible at extremities. Median line sharp, not deep at middle. Surface with few fine irregular transverse wrinkles laterally. Ringlike flange convex, four times as broad as channel of constriction.

Elytron (Fig. 29): Slightly depressed transversally in anterior half. Subelongate, sites rounded regularly in anterior two thirds, gently narrowed at humerus. Maximum width slightly behind middle. Base truncated obliquely. Marginal channel moderately broad, fold-like carina at apex incomplete, indistinct; reflexed margin smooth, margin distinct from humeral tooth to apex, extraordinary fine at base. Humerus obtuse-angled, somewhat rounded but distinct, humeral tooth small, not projecting, situated in extended projection of 6th stria. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 5th stria and a smaller one situated in extended projection of 2nd interval. Stria 1 and 2 conspicuously deep, 3 to 5 moderately deep, all punctuate, 6 and 7 developed as rows of partly connected punctures. Intervals 1 - 4 moderately convex, others more flattened, suture impressed at base, 8th forming obtuse slightly overhanging carina in apical third. Interval 3 with series of 15 setigerous punctures, approaching inner stria, interval 5 with 15 setigerous punctures situated at middle. First stria conspicuously deep and broad apically, all others ending on apical declivity with decreasing length.

Ala: Fully developed.

Lower surface: Proepisternum with submarginal furrow in anterior quarter indistinct; Terminal segment of abdominal sternite with indistinct transverse striolation in apical half. Ventral strigae weakly developed.

Protibia: Movable spur as long as spine, turned moderately ventrally.

♂: *Aedeagus* (Figs. 146, 149): Median lobe slender, slightly fractuate at middle, gently bisinuate in lateral view; apex spatulate, nearly stright. Endophallus with bristles and group of few teeth. Parameres (Figs. 147, 148), bisetose, both acuminately pointed at apex, ventral one twisted conspicuously.

♀: *Stylomere* (Fig. 173): Broadened at base, strongly arcuate at middle.

Distribution: Known from the two type localities in south-east Sumatra and west Java (Fig. 185).

Etymology: The name refers to the acutely pointed parameres of the male genitalia.

***Trilophus elongatus* n. sp.**

Figs 30, 58, 150-152, 174

Type material: Holotype: ♂, Java, Praeanger, Bandoeng Dago, 26.IV.1928, leg. F. C. Drescher (BMNH).

Paratypes: 1 ♀, same data as holotype but "lamp", 3.X.1929 (ZSM), 1 ♀, same data but 27.III.1930 (MNHP).

DIAGNOSIS: A medium sized species with gently rounded, conspicuously elongated, and slightly transversally depressed elytra, large eyes, and convex lateral margin of the pronotum. Distinguished from other members of the group by the acute

flange and narrow basal constriction of the pronotum, the shortened reflexed lateral margin which ends just before reaching the posterior setigerous puncture, and the elongated shape of the elytra which exhibits its maximum widths at middle.

DESCRIPTION

Measurements: Length 2.66 / 2.83 mm; width 0.84 / 0.90 mm; ratio length/width of pronotum 1.0; ratio length/width of elytra 1.75 / 1.81.

Colour: Head, pronotum, ventral surface, and elytra middle-brown. Anterior tip of supraantennal plates, wings of clypeus, palpi, intermediate and posterior legs, antennae yellowish brown. Base of elytron with yellow spot at declivity.

Head: A third smaller than pronotum. Clypeus, wings, supraantennal plates finely but distinctly margined; clypeus nearly straight at middle, wings rectangularly projecting but rounded, devided from supraantennal plates by obtuse-angled notches; supraantennal plates vaulted, prolonged to anterior supraorbital seta as fine carina; keel on vertex sharp, as long as elevation of tubercle. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly, with 2nd distinct fovea each. Fine transverse furrow posterior tubercle connecting foveae, interrupted by keel. Carina between furrows at each side distinct. Frons moderately convex, (in PT with longitudinal reticulation laterally to keel), no median impression posterior keel. Neck constriction visible laterally. Eyes large, moderately convex, eye-index 1.95 / 2.21, dorsally visible part of inconspicuous genae one quarter of eye. Labrum moderately excised anteriorly. Antennae long, segment 10 reaching over posterior setigerous puncture of pronotum, segment 5 to 10 subelongate.

Pronotum (Figs. 30, 58): Lateral view: flattened, posterior fifth conspicuously convex to basal constriction; frontal view: regularly and moderately convex. As long as wide, maximum width at middle. Anterior margin slightly convex. Reflexed lateral border just not reaching posterior setigerous puncture, fine posteriorly, extended over posterior setigerous puncture up to basal constriction as obtuse vault and fine submarginal furrow. Proepisternum weakly tumid posterolaterally. Anterior angles distinct, formed by prolongation of reflexed margin. Anterior transverse line intimated at extremities. Median line sharp, equally deep in whole length. Surface with few fine irregular transverse wrinkles. Ringlike flange acute, two to three times broader as channel of constriction.

Elytron (Fig. 30): Slightly depressed transversally in anterior half. Conspicuously elongate, sites rounded gently, slightly narrowed at humerus. Maximum width at middle. Base truncated rectangularly. Marginal channel broad, fold-like carina at apex indistinctly crossing channel; reflexed margin distinct from humeral tooth to apex, fine at base. Humerus obtuse-angled, distinct, humeral tooth small, slightly projecting, situated in extended projection of 6th stria. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 5th interval and a smaller one situated in extended projection of 2nd interval. Stria 1 to 5 conspicuously deep, 6 and 7 deep, all punctuate, 6 and 7 developed as rows of partly connected punctures. Intervals 1 - 5 distinctly convex, others more flattened, suture impressed at base, 8th forming obtuse overhanging carina in apical third, covering

half of marginal channel. Interval 3 with series of 16 to 18 setigerous punctures, approaching inner stria, interval 5 with 15 to 16 setigerous punctures situated at middle. First stria conspicuously deep and broad apically, all others ending on apical declivity with decreasing length.

Ala: Fully developed.

Lower surface: Proepisternum with submarginal furrow in anterior third indistinct; Terminal segment of abdominal sternite smooth in male, with distinct transverse reticulation in apical half in females. Ventral strigae conspicuous.

Protibia: Movable spur slightly shorter than spine, turned moderately ventrally.

♂: *Aedeagus* (Figs. 150, 152): Median lobe slender, arcuate at middle, stright in lateral view; apex spatulate, slightly turned dorsally. Endophallus with fine bristles basally, group of teeth at base of apical cup. Parameres (Figs. 150, 151), bisetose, both rounded at apex, ventral one twisted conspicuously.

♀: *Stylomere* (Fig. 174): Stout at base, base of apical ensiform seta conspicuously strong.

Distribution: Known from Bandoeng Dago near Kediri, Java (Fig. 185).

Etymology: The conspicuous elongated elytra are expressed by the name.

***Trilophus latiusculus* n. sp.**

Figs 31, 59, 175

Type material: Holotype: ♀, Depok, 11.IV.1948, leg. C.V. Nidek (ZSM).

DIAGNOSIS: A medium sized species with subelongate but broadened and flattened elytra, well developed eyes, and less rounded lateral margin of the pronotum. Distinguished from other members of the group by characters of the pronotum which is distinctly broadened and flattened, exhibits a broadened lateral channel, and a broadened anterior transverse line.

DESCRIPTION

Measurements: Length 2.50 mm; width 0.84 mm; ratio length/width of pronotum 0.96; ratio length/width of elytra 1.57.

Colour: Head, pronotum, ventral surface, and elytra middle-brown. Vault of supraantennal plates, wings of clypeus, mouthparts, legs, and antennae yellowish brown. Base of elytron broadly yellowish at declivity.

Head: A third smaller than pronotum, not elongate anteriorly. Clypeus, wings, supraantennal plates finely margined; clypeus regularly excised anteriorly, wings rectangularly projecting, with distinct isodiametric reticulation, divided from supraantennal plates by indistinct obtuse-angled notches; supraantennal plates vaulted, prolonged to anterior supraorbital seta as blunt carina; keel on vertex moderately sharp, as long as elevation of tubercle, reaching to mid-eye level. Clypeus and frons divided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly, with 2nd deep fovea each. Carina between furrow and frons at each side sharp, distinct. Frons moderately convex, with fine isodiametric reticulation laterally to keel, slight median impression posterior keel. Neck constriction traceable laterally, with group of punctures at posterior supraorbital puncture. Eyes well developed,

moderately convex, eye-index 2.19, dorsally visible part of inconspicuous genae one sixth of eye. Labrum distinctly excised anteriorly. Antennae long, segment 11 reaching to basal constriction of pronotum, segment 5 to 10 subelongate.

Pronotum (Figs. 31, 59): Lateral view: anterior three quarters slightly convex, conspicuously convex to basal constriction; frontal view: regularly and slightly convex. Slightly broader than wide, maximum width at middle, appearance conspicuously flattened and broadened in dorsal view. Anterior margin slightly convex. Reflexed lateral border just reaching posterior setigerous puncture, extended over posterior setigerous puncture as fine submarginal furrow. Lateral channel broadened, ending at middle of pronotum. Obtuse vault to basal constriction rounded. Proepisternum weakly tumid laterally. Anterior angles slightly projecting, rounded, formed by prolongation of reflexed margin. Anterior transverse line broad, indistinct, but approaching median line. Median line sharp, not deep at middle. Surface with few fine irregular transverse wrinkles. Ringlike flange convex, two times as broad as channel of constriction.

Elytron (Fig. 31): Flattened in anterior half. Subelongate but shorter and broadened, sites rounded gently in anterior half, slightly narrowed to humerus. Maximum width behind middle. Base truncated subconvexly. Marginal channel moderately broad, fold-like carina at apex indistinct, incomplete; reflexed margin distinct from humeral tooth to apex, fine at base. Humerus somewhat rounded but distinct, humeral tooth small, not projecting, situated in extended projection of 6th stria. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 6th interval and a smaller one situated in extended projection of 2nd interval, connected with first stria. Stria 1 to 4 deep, 5 moderately deep, all punctuate, 6 and 7 developed as rows of partly connected punctures. Intervals 1 - 5 moderately convex, others more flattened, suture impressed at declivity of base, 8th forming obtuse slightly overhanging carina in apical third. Interval 3 with series of 15 setigerous punctures, approaching inner stria, interval 5 with 14 setigerous punctures situated at middle. First stria conspicuously deep and broad apically, all others ending on apical declivity with decreasing length.

Ala: Reduced, length three quarters of elytron, width nearly as broad as elytron.

Lower surface: Submarginal furrow of proepisternum just traceable in anterior third. Terminal segment of abdominal sternite with distinct transverse reticulation in apical two thirds. Ventral strigae distinct.

Protibia: Movable spur slightly shorter than spine, turned moderately ventrally.

♂: *Aedeagus* unknown.

♀: *Stylomere* (Fig. 175): Medium sized, strongly arcuate basomesially.

Distribution: Known from the type locality in Depok, west Java (Fig. 185).

Etymology: The name was derived from the flattened pronotum which gives the shape a broadened appearance.

***Trilophus imitator* n. sp.**

Figs 32, 60, 176

Type material: Holotype: ♀, Preanger, Java, 4000 - 5000 Voet, G. Tangkoeban Prahoe, 21.XI.1929, F.C. Drescher; 2nd label: cultus ex gezeefd Ondg., Tjiater-Kina; 3rd label: H.E. Andrewes Coll. B.M. 1945 - 97 (BMNH).

Paratype: 1 ♀, Indonesia, Bali, dist. Besa Kih, 21.II.1987, leg. Taiti, C. Manicasteri (MZUF).

DIAGNOSIS: A medium sized species with subelongate elytra, and convex lateral margin of the pronotum. Distinguished from other members of the group by the small eyes, the distinct reticulation on the frons of the head posterior keel, the subelongate antennae, and the stright but diverging lateral margin of the elytra.

DESCRIPTION

Measurements: Length 2.46 / 2.58 mm; width 0.80 / 0.82 mm; ratio length/width of pronotum 0.98 / 1.0; ratio length/width of elytra 1.75.

Colour: Head, pronotum, ventral surface, and elytra middle-brown. Anterior tip of supraantennal plates, wings of clypeus, mouthparts, intermediate and posterior legs, and first three segments of antennae yellowish brown. Other segments of antennae slightly darkened. Declivity at base of elytron broadly yellowish.

Head: A third to quarter smaller than pronotum. Clypeus, wings, supraantennal plates finely but distinctly margined; clypeus slightly and regularly excised anteriorly, wings rectangularly projecting, rounded, devided from supraantennal plates by distinct obtuse-angled notches; supraantennal plates vaulted, prolonged to anterior supraorbital seta as fine carina; keel on vertex blunt, shorter as elevation of tubercle, just reaching over anterior eye-level. Clypeus and frons devided from supraantennal plates by deep longitudinal furrows. Furrows diverging posteriorly, with small but distinct 2nd fovea, each. Carina between furrow and frons at each side small. Frons convex, with isodiametric reticulation, no median impression posterior keel. Blunt and slight transverse carina crossing frons posterior tubercle, interrupted by keel. Indistinct neck constriction laterally. Eyes small but well developed, moderately convex, eye-index 2.4, dorsally visible part of genae inconspicuous. Maxillary palpi slightly shortened. Labrum slightly excised anteriorly. Antennae moderately long, segment 10 reaching up to posterior setigerous puncture of pronotum, segment 5 to 10 subelongate.

Pronotum (Figs. 32, 60): Lateral view: anterior three quarters moderately convex, distinctly convex in posterior quarter to basal constriction; frontal view: moderately and regularly convex. As long as wide, maximum width at middle. Anterior margin straight. Reflexed lateral border ending at posterior setigerous puncture, fine posteriorly, extended over posterior setigerous puncture up to basal constriction as obtuse vault and extreme fine submarginal furrow. Lateral channel ending before reaching posterior setigerous puncture. Proepisternum slightly tumid laterally but well visible from above. Anterior angles bend ventrally, dorsal visible part rounded. Anterior transverse line inconspicuous but approaching median line. Median line sharp, deeper posteriorly. Surface with few fine irregular transverse wrinkles. Ringlike flange convex, two times as broad as channel of constriction.

Elytron (Fig. 32): Flattened transversally in anterior half. Subelongate, broadened in posterior third, sites stright in anterior half but diverging. Maximum width behind middle. Base truncated obliquely. Marginal channel broad, fold-like carina at apex indistinct, incomplete; reflexed margin smooth, margin distinct from humeral

tooth to apex, fine at base. Humerus obtuse-angled, distinct, humeral tooth small, slightly projecting, situated in extended projection of 7th interval. Two conspicuous basal tubercles with setigerous punctures, one adjoining lateral margin at humerus at extended projection of 6th stria and a smaller one situated in extended projection of 2nd interval adjoining slightly first stria. Stria 1 and 2 conspicuously deep, 3 to 5 moderately deep, all punctuate, 6 and 7 developed as rows of partly connected punctures. Intervals 1 - 3 distinctly, 4 moderately convex, others more flattened, suture impressed at base, 8th forming indistinct slightly overhanging carina in apical third. Interval 3 with series of 14 / 17 setigerous punctures, approaching more or less inner stria, interval 5 with 12 / 14 setigerous punctures situated at middle. First stria conspicuously deep and broadened apically, all others ending abruptly on apical declivity with decreasing length.

Ala: Reduced, in holotype length up to radial cell but not folded, width three quarters of elytron; in paratype. length two thirds, width half of elytron.

Lower surface: Proepisternum with submarginal furrow in anterior quarter fine. Terminal segment of abdominal sternite with transverse reticulation in apical half. Ventral strigae conspicuous.

Anterior leg: Profemur: slightly shortened, thickened. Protibia: Movable spur shorter than spine, stright.

♂: *Aedeagus* unknown.

♀: *Stylomere* (Fig. 176): Medium sized, slightly arcuate; basal ensiform seta small.

Distribution: Known from the type localities in east Java and in Bali (Fig. 185).

Etymology: The name reflects the impression of the high similarity of the elytra with those of *T. latiusculus* n. sp.

Variation: In addition to the variation given in the description, the stylomeres of the female from Bali are slightly shorter and more thickened. Possibly, the population from Bali represents a subspecies of *T. imitator*. Without more material including investigation of the male genitalia of both of the subpopulations this can not be cleared.

DISCUSSION

PHYLOGENETIC ASPECTS

In general, the genus *Trilophus* is characterised by a high uniformity. In addition there are species known only by one sex, and of some species there are only single specimens available. This causes difficulties in evaluating the characters of these species and consequently settlement of the phylogenetic status at all. This is one reason why approaches are proposed only for the phylogenetic relationships.

For reconstruction of the phylogenetic relationships HENNIG'S (1966) method is followed in principle. As emphasised by LESCHEN & LÖBL (1995) a well defined sister taxon and outgroups for polarising the characters should be used, if possible. This group is available represented by the genus *Trilophidius* Jeannel and was primarily used. If this was not possible other Oriental and African groups of Clivinini were used

as outgroup(s) indicated in Tab. 4. For the direction of reading of character states the same outgroup(s) was(were) used. The numbering of the postulated character states in Tab. 4 corresponds to the numbers in the data matrix (Tab. 5) and the cladogram (Fig. 178).

TAB. 4

CHARACTERS AND CHARACTER STATES USED FOR THE PHYLOGENETIC RELATIONSHIPS PROPOSED. NUMBERS IN PARENTHESIS INDICATE DIFFERENT CHARACTER STATES, LETTERS DIFFERENT CHARACTER STATES OF A MORPHOCLINE.

1. Big to medium sized (0); plesiomorphic; very small body size (1); apomorphic. Members of the sister-group are medium and very small sized. With the exception of *Leleuporella* Basilewsky and few members of *Syleter* Andrewes all other Oriental Clivinini are much bigger. A very small body size is therefore inferred as apomorphic.
2. Brown (0); plesiomorphic. The sister-group is brown coloured as it is in *Syleter* and *Leleuporella*. Most members of the other Clivinini are black. The yellow colour (1) only present in some members of the ingroup is recognised as absence of pigmentation and considered to be apomorphic.
3. Wings of clypeus anteriorly rounded, not projecting (0); plesiomorphic. The character is present in the majority of members of the genus *Clivina* and related genera. In the more evolved Clivinini genera *Ancus* Putzeys, *Coryza* Putzeys, *Sparostes* Putzeys, *Oricitites* Andrewes, and *Leleuporella* the wings are acutely projecting. In the sister-group most of the members exhibit rounded clypeal wings. Acutely projecting wings (1) are inferred to be apomorphic.
4. Anterior margin of clypeus straight to moderately excised (0); plesiomorphic by outgroup comparison. Deeply V-shaped excised (1); not present in the sister-group and other Oriental Clivinini and inferred to be apomorphic.
5. Genae indistinct (0); plesiomorphic; genae enclosing the eyes posterolaterally as high as the eyes are present in 3 of the 12 members of the sister-group. The character is also present in few other Clivinini (e.g., in one member of *Leleuporella* from Africa) but all of these members also show many other highly derived characters. High of genae laterally as high as eyes (1) is therefore inferred to be apomorphic.
6. Length of genae short, inconspicuous (0); plesiomorphic by outgroup comparison; tumid, elongated (1); apomorphic. The character is not present in the sister-group. To my knowledge it is only present among the Clivinini in the Oriental genus *Sinesetosa* Balkenohl, the South-American species *Clivina urophthalma* Putzeys and *C. urophthalmoides* Kult and the genus *Camptodontus* Dejean, all of them belonging to very different lineages.
7. Eyes well developed, shape convex (0); plesiomorphic by outgroup comparison; deplanate or reduced (1); apomorphic. The character is present in few members of the sister-group. It is considered to be an adaptation to terrestrial conditions developed independently among the stocks of some Clivinini. In the ingroup the character is present in all members of the group *interpunctatus* and *ellipticus*. It is also present in 2 species out of 2 other groups and is presumably evolved independently among the groups.
8. Keel on frons short (0); plesiomorphic by outgroup comparison; distinctly elongated posteriorly (1); only present in the ingroup and inferred as apomorphic.
9. Frons with distinct regular reticulation behind keel (0); plesiomorphic. In the sister-group the character is present in some members. It is also present in the related genus *Syleter* and some other smaller Clivinini (for example *Lophocoryza* Alluaud, *Halocoryza* Alluaud, etc.). Reticulation behind keel absent or hardly traceable (1); apomorphic and possibly convergently developed.
10. Labrum anteriorly stright or slightly bisinuate (0); plesiomorphic, present in the sister-group and other Clivinini; deeply excised (1) present in some members of the ingroup and inferred as apomorphic perhaps independently evolved.

11. Presence of 7 labral setae (0) is considered to be plesiomorphic since this character is found in most members of Oriental and African *Clivina* Latreille and all members of *Pseudoclivina* Kult, *Ancus* Putzeys, *Coryza*, *Sinesetosia*, *Sparostes*, *Oricrites*, and in some members of *Syleter*. *Androzelma* Dostal, *Bohemia* Putzeys, *Rugilucivina* Balkenohl, and few members of *Clivina* exhibit 6 labral setae. Only several members of *Syleter*, some Australian *Clivina*, and single members of the sister-group and ingroup exhibit 5 labral setae. As far as I know, *Syleter* is the only genus having as a minimum one member with 3 labral setae. Therefore reduction from 7 to 5 labral setae (1) is inferred to be apomorphic.
12. Labral surface with regular reticulation (0): plesiomorphic by outgroup comparison as this character is present in the sister-group and nearly all other Clivinini; with irregular reticulation (1): inferred as apomorphic.
13. Maxillary palpomeres medium sized, slender apically (0): plesiomorphic by outgroup comparison; The character is present in the sister-group and the related genera *Syleter* and *Leleuporella*. Palpomeres shortened (1): apomorphic and presumably developed convergently in 2 species. In the other Clivinini the maxillary palpomeres are of different ground types (e.g., fusiform or ensiform) but not bottle-like and therefore not useable.
14. Antennomere 5-10 subelongate (0): plesiomorphic. In the sister-group the character is present only in some members. However, it is present in *Syleter* Andrewes and many of the other Clivinini. Antennomeres elongate (1), or moniliform (2): different apomorphic states and possibly independently evolved.
15. Length/width of pronotum medium sized (0): plesiomorphic by outgroup comparison since this character is present in the sister-group and nearly all other Clivinini; pronotum wider (1): apomorphic, present only in one member of the ingroup.
16. Proepisternum posterolaterally moderately tumid (0): plesiomorphic by outgroup comparison as present in the sister-group; slightly swollen, just visible from above (1), or strikingly tumid (2): different apomorphic states.
17. Pronotum regularly formed with maximum width at middle (0): plesiomorphic by outgroup comparison; maximum width situated at or in 2nd third (1): absent in the sister-group and inferred to be apomorphic. As far as I know, the character is present also in some members of *Syleter* and the African genus *Basilewskyana* Kult and presumably independently evolved in the ingroup.
18. Reflexed lateral margin of pronotum reaching over posterior setigerous puncture (0): plesiomorphic by outgroup comparison; not reaching posterior puncture (1), or ending in posterior third (2), or ending in anterior third (3): only present in the ingroup and inferred to be different apomorphic states.
19. Lateral margin of pronotum bisetose (0): plesiomorphic by outgroup comparison; 5-setose (1): present only in the ingroup and inferred as apomorphic.
20. Median line of pronotum conspicuously deep at base (0): plesiomorphic; weakly developed and not reaching channel of constriction (1): apomorphic. In the sister-group the median line is developed weakly but reaches distinctly the channel. As far as I know in all other Clivinini the line is deep at base and the character is therefore inferred to be plesiomorphic.
21. Median line of pronotum anteriorly deep and well developed (0): plesiomorphic by outgroup comparison; abruptly ending and absent in anterior third (1), or finely vanishing and absent (2): different apomorphic states only present in the ingroup.
22. Impression of anterior transverse line of pronotum visible laterally by 50% at a minimum (0): plesiomorphic by outgroup comparison since all Clivinini have a complete anterior transverse line and in the sister-group the line is visible by 50% or more in most of the members; line intimated at extremities (1): apomorphic. In the ingroup the character is present in different species groups and represents possibly a underlying synplesiomorphy.
23. Channel of pronotal constriction hollowed out concisely (0): plesiomorphic since it is present in the sister-group, *Syleter*, *Leleuporella*, and nearly all other Clivinini; V-shaped (1): apomorphic, only present in the ingroup and evolved in different species groups.
24. Form of pronotal flange convex (0): plesiomorphic by outgroup comparison; acute (1): apomorphic and only present in the ingroup and presumably independently evolved.

25. Size of pronotal flange small (0): plesiomorphic by outgroup comparison; 1.5 times as broad as channel of constriction or broader (1): only present in the ingroup and inferred as apomorphic. The flange can be up to 3 times as broad as the channel and the character possibly represents different states of a morphocline, not worked out in detail by measurements.
26. Shape of elytra (lateral margin, dorsal view) intermediate, subelongate, or elongate, also representing the typical ground shape among the Clivinini (0): plesiomorphic by outgroup comparison; parallel (1), or elliptical (2): different apomorphic states.
27. Shape of elytral disc flat in lateral view, also representing the typical shape among the Clivinini (0): plesiomorphic by outgroup comparison; transversally depressed in anterior half (1), or distinctly convex (2): inferred as different apomorphic states. Transversally depressed elytra are present also in some members of *Clivina*. A distinctly convex shape is not present among the Oriental Clivinini. If these characters are present in the sister-group is unknown.
28. Humerus with distinct angle (0): plesiomorphic as this character is present in most members of the ingroup and most of the other Clivinini; angle indistinct, obtusely rounded (1): apomorphic, presumably connected with elliptical shape of elytra and also present in 3 members of the sister-group.
29. Lateral margin of elytra smooth (0): plesiomorphic by outgroup comparison; subserrate (1), or serrate (2): different apomorphic states presumably convergently developed. To my knowledge the sister-group does not have this character but it is present in single Clivinini, e.g. *Leleuporella caeca* Basilewsky from Afrika. It is considered to be an adaptation to terrestrial conditions and occurs together with reduced eyes, tumid genae, and reduced alae.
30. Row of setae on interval 3 ending at the beginning of apical declivity (0): plesiomorphic by outgroup comparison; extended to tip of apex (1): only present in the ingroup and members of *Leleuporella*, and inferred to be apomorphic.
31. Setae on intervals: The outgroup as well as the majority of the Oriental and African Clivinini have setae on the 3rd interval only (14 of 19 genera compared). Two genera (*Leleuporella*, *Coryza*) have setae on intervals 3 and 5, and 2 genera (*Halocoryza*, *Sinesetosa*) on intervals 3, 5, and 7. These 4 genera are apotypic in many other characters and inferred as highly derivative groups. Among the Oriental and African Clivinini, there is no genus known to me which members have in addition setae on intervals 2, 4, and 6. In the ingroup presence of setae on intervals 3 and 5 (0) is considered to be plesiomorphic. Additional setae present on other intervals is inferred as apomorphic presenting a morphocline with the following different apomorphic states: setae additional on interval 2, 4, and 6 resulting in setae present on intervals 2-6 (a); setae additional on interval 7 resulting in setae on intervals 2-7 (b); loss of setae on intervals 2, 4, and 6 resulting in setae on intervals 3, 5, and 7 (c).
32. Alae fully developed (0): plesiomorphic by outgroup comparison; reduced (1): apomorphic and presumably convergently developed. For the species with polymorphous alae (*T. variabilis* n.sp.) the character is considered like fully winged species.
33. The type of the aedeagus is different from the sister-group as well as from *Clivina* and most of the other Clivinini. In the ingroup it exhibits an elongated spatula at apex. However, a spatulate apex is present in *Leleuporella* and at a minimum in one member of *Syleter* but with a different direction to the median lobe. Therefore an apex with spatula (0) is inferred to be plesiomorphic. Margin of spatula thickened or bend laterally (2), or stick-like (1): different apomorphic states only present in the ingroup and presumably developed independently.
34. A very small total size of the aedeagus in relation to body size is observed only in one species group of the ingroup and inferred to be apomorphic (1). Relation of aedeagus size to body size as in the sister-group and many other Clivinini: plesiomorphic (0).
35. Parameres with 2 apical setae (0): present in the sister-group and inferred to be plesiomorphic; with additional fine pilus at apex (1), or more than 2 well developed setae (2): presumably different apomorphic states perhaps developed independently.

For some of the characters assessing of the character states causes difficulties. This is true for one of the characters with opposite polarisation (27: shape of elytra, lateral view), and for characters in addition not well polarisable by outgroup comparison (33: apex of aedeagus; 35: setae at apex of parameres). These characters weakly support the cladogram.

Another difficulty arises from characters typical for some species groups but also present in members of other groups obviously representing homoplasies. Typical examples are 3: wings of clypeus, 8: keel on frons, and 9: reticulation on frons. These difficulties impeding considerably phylogenetic reasoning were also observed for other highly specialised Carabidae with common parallel evolution (BAEHR 1997).

Analysing the data matrix (Tab. 5) resulted in a cladogram with smallest number of branches (Fig. 178) with the following 7 species groups:

Hispidulus-group. The 4 species exhibit similar male and female genitalia considered to be of a plesiomorphic type. However *T. fuscus* exhibits an evolved spatula of the apex of the aedeagus. The group is heterogeneous with regard to the external characters: *T. hispidulus* has the most plesiomorphic characters, followed by *T. fuscus*. Mainly due to the specialised pronotum, *T. crinitus* is regarded as highly apomorphic and these characters are already visible but only slightly developed in *T. baehri*.

Hirsutus-group. In this group the aedeagi and the female genitalia are similar and plesiomorphic. The 3 species are highly apomorphic with regard to the external characters. Due to the highly derived characters of the pronotum, *T. setosus* is isolated. In *T. arcuatus*, the reduced eyes and alae, and the subserrate lateral margin of the elytra point to an adaptation to endogeous habitats. Out of this group, *T. hirsutus* is less specialised in the external characteristics and shows the most plesiomorphic parameres of the male genitalia.

Alternans-group. This is also a highly apomorphic group, and each of the 3 members show extreme specialisation. Beside other apomorphic characters, *T. alternans* exhibits a reduction of the setae on the labrum regarded as highly apomorphic. *T. palpireductus* seems to have more plesiomorphic characters. With regard to the internal characters the aedeagi of *T. alternans* and *T. lompei* are plesiomorphic.

Interpunctatus-group. This relatively homogenous group is moderately evolved in the external characters. Out of the 3 species, *T. appulsus* shows the highest evolved adaptations to endogeous conditions, whereas *T. interpunctatus* is assumed to have the most plesiomorphic characters. In the male genitalia however, which are very small only in this group, the group is more heterogeneous. Beside the very different patterns of the teeth on the endophallus, the aedeagus of *T. parallelus* is stick-like, considered as highly apomorphic.

Schmidti-group. The group is homogenous and combines plesiomorphic and very similar species. To my mind, of the recent species, *T. tonkinensis* represents the most primitive (in the sense of plesiomorphic) species of the genus, followed by *T. schmidti*. With regard to the male genitalia, *T. birmanicus* is most apomorphic, demonstrated by the stick-like apex of the aedeagus as well as the broad and elongated petioles of the parameres.

TAB. 5
 Character states of species of the genus *Trilophus* 1, 2, 3: different character states; a, b, c: different character states of a morphocline;
 ?: character state unknown

species	character states																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>hispidulus</i>	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0
<i>fuscus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
<i>baehri</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1
<i>crinitus</i>	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	2	0	3
<i>hirsutus</i>	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2	1	0
<i>arcuatus</i>	0	0	1	0	1	1	1	0	1	0	0	1	0	0	0	2	1	0
<i>setosus</i>	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2	1	2
<i>alternans</i>	0	0	0	0	0	1	1	0	1	1	1	0	0	0	0	0	0	0
<i>lompei</i>	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
<i>palpireductus</i>	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
<i>interpunctatus</i>	1	0	0	0	0	0	1	1	0	0	0	0	0	2	0	0	0	0
<i>appulsus</i>	1	0	0	0	0	1	1	0	0	0	0	0	0	2	0	0	0	0
<i>parallelus</i>	1	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0
<i>schmidti</i>	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
<i>tonkinensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
<i>birmanicus</i>	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0
<i>variabilis</i>	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
<i>schawalleri</i>	1	0	0	0	0	0	1	1	0	1	0	0	0	2	0	0	0	0
<i>ellipticus</i>	0	0	1	0	1	1	1	1	0	0	0	0	0	2	0	0	0	0
<i>loebli</i>	1	1	0	0	1	1	1	1	0	0	0	0	0	2	0	0	0	0
<i>serratulus</i>	1	1	1	0	1	1	1	1	0	0	0	0	0	2	0	0	1	0
<i>weberi</i>	1	1	1	0	1	1	1	1	0	1	0	0	0	2	0	0	0	0
<i>serratus</i>	1	0	1	0	1	1	1	1	0	1	0	0	0	2	0	0	1	0
<i>convexus</i>	1	0	1	0	1	1	1	1	0	0	0	0	0	2	0	0	0	0
<i>acuminatus</i>	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	2
<i>elongatus</i>	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	1	0	2
<i>latusculus</i>	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0
<i>initiator</i>	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0

TAB. 5 (cont.).

species	character states																
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
<i>lispidulus</i>	0	0	0	1	1	0	1	0	1	0	0	0	a	0	0	0	0
<i>fuscus</i>	0	0	0	1	0	1	1	0	0	0	0	0	a	0	2	0	0
<i>baehri</i>	0	0	0	1	1	0	1	0	1	0	0	0	a	0	0	0	0
<i>crinitus</i>	0	0	0	1	1	0	1	0	1	0	0	0	a	0	?	?	?
<i>liristatus</i>	0	0	1	1	0	1	0	0	1	0	0	0	b	0	0	0	0
<i>archatus</i>	0	0	0	0	0	1	0	0	1	0	1	0	b	1	0	0	0
<i>setosus</i>	1	0	0	0	0	1	1	0	1	0	0	0	b	0	0	0	0
<i>alternans</i>	0	1	2	0	0	1	0	2	0	1	2	0	c	1	0	0	0
<i>lonpei</i>	0	0	0	0	0	1	0	2	0	0	0	0	c	0	0	0	0
<i>palpireductus</i>	0	0	0	0	0	1	0	2	0	0	0	0	c	1	?	?	?
<i>interpunctatus</i>	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	0
<i>appulsus</i>	0	0	0	0	1	0	1	1	0	0	1	0	0	1	2	1	0
<i>parallels</i>	0	0	0	0	1	0	1	1	0	0	0	1	0	0	1	1	0
<i>schmidti</i>	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0
<i>tonkinensis</i>	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0
<i>birmanicus</i>	0	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0
<i>variabilis</i>	0	0	0	1	1	1	1	2	0	0	1	0	0	1	1	0	2
<i>schawalleri</i>	0	0	0	0	1	0	1	2	2	1	1	0	0	1	2	0	0
<i>ellipticus</i>	0	0	0	1	0	0	1	2	2	0	0	0	0	1	0	0	0
<i>loebli</i>	0	0	0	0	1	0	1	2	0	0	0	0	1	0	0	0	0
<i>serratulus</i>	0	0	0	0	0	0	1	2	0	0	1	0	0	1	2	0	1
<i>weberi</i>	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1
<i>serratus</i>	0	0	0	0	0	1	1	2	0	0	2	0	0	1	0	0	0
<i>convexus</i>	0	0	0	0	0	0	1	2	2	1	1	0	0	1	2	0	0
<i>acuminatus</i>	0	0	0	1	?	0	0	0	1	0	0	0	0	0	0	0	0
<i>elongatus</i>	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0
<i>laticulcus</i>	0	0	0	1	0	1	0	0	0	0	0	0	0	1	?	?	?
<i>imitator</i>	0	0	0	0	1	0	0	0	0	0	0	0	0	1	?	?	?

Ellipticus-group. This group combines highly apomorphic species with a similar direction of adaptations. All species possess reduced eyes and alae, nearly all of them have developed tumid genae and serration at the lateral margin of the elytra, and some species show depigmentation. All these characteristics are considered to be edaphic adaptations. With regard to these characters, *T. serratus*, *T. loebli*, and *T. serratulus* are highly apomorphic and can be considered as troglobiont or even neotroglobiont (in the sense of NITZU & JUBERTHIE 1996). *T. ellipticus* is not as high evolved. The adaptation has reached different stages, interspecifically, especially demonstrated by the regression in the evolution of the eyes in Fig. 177. In addition, the following can be observed: The smaller the eyes, the greater the variation of the eye-index (comp. Fig. 177). The degree of eye reduction does not correlate with the degree of alae reduction or with the development of the serration at the lateral margin of the elytra. These findings may presumably be caused by recent evolution of the species.

With focus on the external characteristics, *T. variabilis* is the most plesiomorphic species in view of the following combination of plesiomorphic character states: Wings of clypeus rounded, keel on the frons small, genae inconspicuous, pronotum moderately convex, parts of the population with fully developed alae (for the size of alae comp. Tab. 2). However, important apomorphic character states are the elliptical shape, subserrate lateral margin of elytron, and slightly reduced eyes. Strikingly apomorphic are the male genitalia with stick-like apex of the aedeagus and increased number of setae at the apex of the parameres (Tab. 3). With regard to the aedeagi, *T. schawalleri*, *T. serratulus*, and *T. convexus* exhibit apomorphic character states demonstrated by an evolved spatula of the apex.

Distribution of some character states of the elytra (26 - 29) are confusing in this group and the phylogenetic relationships of *T. variabilis* and *T. schawalleri* are not yet settled.

Acuminatus-group. The 4 species are provisionally assigned in the group. One reason is that the male genitalia of 2 species are unknown. The parameres of *T. acuminatus* and *T. elongatus* show apomorphic character states with focus on the extremely elongated petioles, but the shape of the aedeagus of *T. elongatus* is of the plesiomorphic type. With regard to the external characters, the group combines heterogeneous species with some synplesiomorphies. *T. acuminatus* and *T. latiusculus* seem to have the most apomorphic characters, mainly due to the specialised pronotum. *T. imitator* is most difficult to assess and the single female from Bali assigned to this species represent possibly a subspecies of *T. latiusculus* from Java. Anyway, assessment of the phylogenetic relationships is complicated and should be reassessed when more material is available.

ZOOGEOGRAPHIC ASPECTS

The genus *Trilophus* has been recorded exclusively from the Oriental region (Fig. 179). Although this region is far from being well investigated, rough distribution patterns can already be recognised.

Based on numerical evaluations, DARLINGTON (1971) pointed out emphatically that ancestral stocks originated where most of the species occur presently. He

compared the distances and relative numbers of stocks moved between the Oriental and Australian regions and drew conclusions based on these numerical considerations (DARLINGTON 1971). He also emphasised that dominant animals evolve in large areas with a favourable climate (DARLINGTON 1959), and he concluded the direction of dispersal according to the relative numbers and relative areas (DARLINGTON 1957). Because these hypothesis match in some parts with the distribution patterns of *Trilophus*, it is tempting to simply transfer them.

However, I believe that another approach is more favourable due to much stronger evidence: In a monophyletic taxon, the area of origin and most plesiomorphic forms are usually mutually related. Apomorphic taxa with highest degree of evolution usually occur at the border(s) of the distribution area. This was given a great deal of attention by HENNIG (1966) and BRUNDIN (1966), applied partly by WHITEHEAD (1972), and supported with much evidence by BAEHR (1992, 1997, 1998).

Although the phylogenetic relationships of *Trilophus* are evaluated only basically, the following patterns can be recognised based on Hennig's principles.

A main distribution area is surely the East Indian - Indochinese region (East India, Burma, Thailand, Indochina) located in the geographic centre of the Oriental region and inhabited by 8 species (Tab. 6, Fig. 179).

TAB. 6

GEOGRAPHICAL DISTRIBUTION PATTERNS AND NUMBER OF SPECIES. (): OF THE NUMBER OF SPECIES LISTED, (N) SPECIES ARE FOUND IN MEGHALAYA.

species-group	distribution patterns			
	Central (NE-India, Burma, Thailand, Indochina)	Ceylonese (Ceylonese subregion)	S-Indonesian (S-Malayan subregion)	Northern (northern edge of the Oriental region)
<i>hispidulus</i>	2	--	2	--
<i>hirsutus</i>	--	2	1	--
<i>alternans</i>	1	1	1	--
<i>interpunctatus</i>	1 (1)	--	--	2
<i>schmidti</i>	3 (1)	--	--	--
<i>ellipticus</i>	1 (1)	--	--	7
<i>acuminatus</i>	--	--	4	--
n species	8	3	8	9

It is remarkable that the species group with the most plesiomorphic characters (group *schmidti*, Fig. 184) is found in this area only. This is also strong evidence that this was probably the region of origin for the genus. According to the records, the next related species, *T. tonkinensis* and *T. schmidti*, are separated and it seems that distribution follows vicariance. However, the allopatric populations may be in contact by following a specific pattern at the contact zone (cf. SMITH 1965). So, a taxonomic re-

evaluation should be performed after sufficient records between North and South Vietnam and Laos are available. Interestingly, climate and vegetation of North and South Vietnam are different, and the climate and vegetation of South Vietnam and the area in Thailand inhabited by *T. schmidti* is of the same type (drier). This is also true for the area around Calcutta where *T. schmidti* is also recorded (Fig. 184). *T. birmanicus*, which is closely related to *T. schmidti*, is partly distributed sympatrically with *T. schmidti*. However, the aedeagus of *T. birmanicus* has highly apomorphic characters. Therefore, the possibility of hybridisation seems unlikely but it is not known whether it does occur.

It is assumed that *T. schmidti* has a wider distribution range, e.g., over Bengal and Bangladesh, and *T. tonkinensis* is supposed to be distributed over the south of China and possibly on the island of Hainan.

Out of the group *hispidulus*, *T. hispidulus* possesses the most plesiomorphic characters and has a central distribution pattern similar to *T. schmidti* (Fig. 180). *T. fuscus* is known from one locality near Bangkok only, and can hardly be interpreted. Due to similarities to North Vietnam in climate and vegetation, the island of Taiwan was assigned to the central distribution pattern. One rather apotypic species with atrophied wings (*T. alternans*, Fig. 182) is found on this island, regarded as an isolated species.

The East Indian - Indochinese region has apparently been the principal centre of dispersal.

Although centrally located geographically, Meghalaya is regarded as a special subarea. Beside *T. birmanicus*, which is found more in the lowland at the foot of the Khasi Hills, 2 other highly evolved species have been recorded exclusively in this area: *T. parallelus* was found in the western located Garo Hills, whereas *T. ellipticus* was collected in the separated eastern located massifs of the Khasi Hills. *T. ellipticus* is considered to be endemic due to its highly evolved adaptation to endogeneous habitats. Ancestors of *T. parallelus* and *T. ellipticus* have probably invaded Meghalaya separately.

The Ceylonese distribution pattern (matching the Ceylonese subregion of the Oriental region) includes 3 species out of 2 species groups (Tab. 6, Figs. 181, 182), all of them characterised by highly apomorphic external characters. The species are geographically isolated, *T. arcuatus* with atrophied wings on Sri Lanka, and *T. hirsutus* and *T. lompei* at different massifs in Kerala.

The South Indonesian distribution pattern includes 8 species of 4 different species groups (Tab. 6). The species are found on the islands of Sumatra, Java, and Bali (Figs. 180, 181, 182, 185). For 4 of the species (*T. baehri*, *T. palpireductus*, *T. acuminatus*, *T. imitator*) the labels are exact enough to indicate that the material was found in the mountains of the islands. With the exception of *T. elongatus*, *T. latiusculus*, and *T. imitator*, for which phylogenetic assessment is difficult, the species are apotypic. This kind of dispersal over the mountains of the islands of Indonesia mainly by small Carabid beetles was pointed out by DARLINGTON (1971) and called „mountain hopping“.

The south-eastward radiation seems to be strong because species of 4 groups are found on the islands. However, the genus has not crossed the Straits of Makassar (Wallace Line). Interestingly, members of the closely related Oriental and Ethiopian distributed genus *Trilophidius* Jeannel are found in South Thailand, the Malayan peninsula, Borneo, and Palawan (unpublished data), also not crossing the Straits of Makassar. On the other hand, the related genus *Syleter* Andrewes is spread from the Oriental region through New Guinea to Australia (DARLINGTON 1971).

The Northern distribution pattern includes 9 species of 2 species groups (Tab. 6, Figs. 183, 186) occurring along and in the mountain chains in the north of the Oriental region. *T. interpunctatus* has more plesiotypic characters and is found at the foot of mountains in Nepal. Unfortunately, the label of the lectotype indicates „north of India“, which is of limited value. However, it gives a hint that *T. interpunctatus* may be spread over a wider range. All other species have higher evolved characters including the development of atrophied wings. The North of Pakistan is inhabited by 3 species found in 3 different areas: The flightless *T. appulsus* was collected at the Lake Rawalpindi where the climate is rather dry. It is isolated from *T. serratulus* by the Indus River. The habitat of *T. serratulus* (Swat) is still influenced by the monsoon. The 3rd species (*T. loebli*) occurring in Dir and Chitral is isolated due to climatic conditions. The valleys opening to the west resulting in a more Palaearctic climate. This is also reflected in parts of the Flora (Löbl, pers. communication).

According to the present knowledge of the phylogenetic relationships a dispersal route from the central area to and along the Himalayas can be postulated for either of the species groups. During the Pleistocene the Himalayas possibly have acted as a refuge for preadapted ancestral stocks which were distributed formerly along the Himalayas in the present north of India causing the apparent disjunct distribution by splitting into separate isolates after dispersal.

Among the small Clivinini, many of the plesiomorphic characters of *Trilophus* are shared with the genus *Trilophidius* Jeannel considered to be the sister-group. *Trilophidius* is distributed with 11 species in equatorial Africa from Cote de Ivoire to Kenya. (BURGEON 1935, JEANNEL 1957, BASILEWSKY 1967, 1969) and 1 species in the Oriental region (JEANNEL 1957). I believe that *Trilophus* and *Trilophidius* are derived from a common ancestral stock originated in Africa. The ancestral stock could have developed before India was separated from the southern landmass (Gondwanaland) in late Jurassic. This scenario seems also to be true for the genus *Leleuporella* Basilewsky, which is related to *Trilophus/Trilophidius* and found as extremely specialised species in equatorial Africa as well as in Sri Lanka (BALKENOHL 1997). Hence, *Trilophus* could have been extinguished later in the present Africa because it has not been found there up to now. The other possibility would include that *Trilophus* is a relatively younger group which did not develop in Africa but evolved from an ancestral stock in the present India after India had separated from Africa. The genus then spread over the Oriental region in the Cretaceous.

Alphabetical list of the species		page
<i>acuminatus</i>	n. sp.	489
<i>alternans</i>	n. sp.	456
<i>appulsus</i>	n. sp.	463
<i>arcuatus</i>	n. sp.	453
<i>baehri</i>	n. sp.	448
<i>birmanicus</i>	Bates	469
<i>convexus</i>	n. sp.	487
<i>crinitus</i>	n. sp.	450
<i>ellipticus</i>	n. sp.	479
<i>elongatus</i>	n. sp.	490
<i>fuscus</i>	n. sp.	446
<i>hirsutus</i>	n. sp.	451
<i>hispidulus</i>	Putzeys	444
<i>imitator</i>	n. sp.	493
<i>interpunctatus</i>	Putzeys	461
<i>latusculus</i>	n. sp.	492
<i>loebli</i>	n. sp.	481
<i>lompei</i>	n. sp.	457
<i>palpireductus</i>	n. sp.	459
<i>parallelus</i>	n. sp.	465
<i>schawalleri</i>	n. sp.	474
<i>schmidti</i>	Putzeys	467
<i>serratulus</i>	n. sp.	482
<i>serratus</i>	n. sp.	487
<i>setosus</i>	n. sp.	454
<i>tonkinensis</i>	n. sp.	472
<i>variabilis</i>	n. sp.	476
<i>weberi</i>	n. sp.	484

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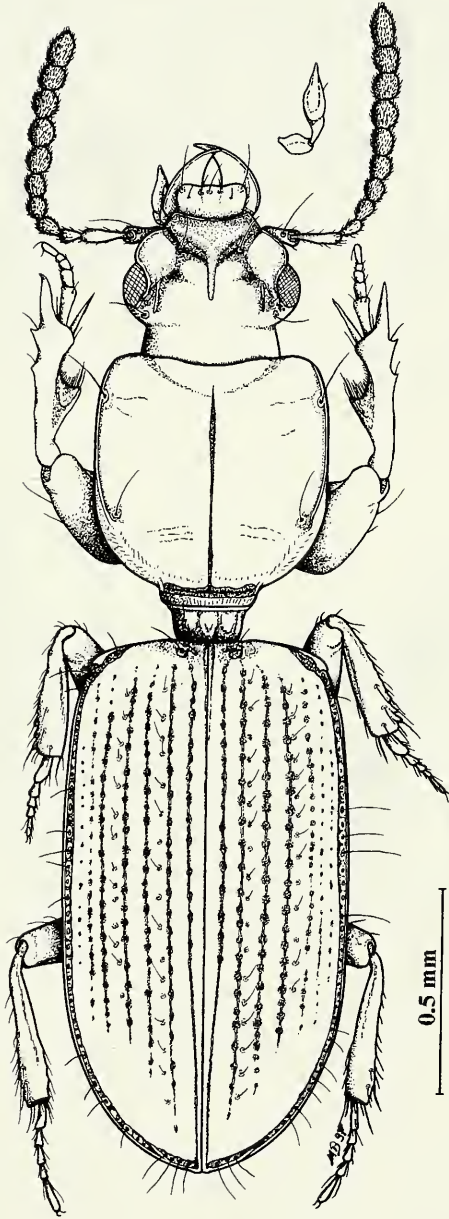
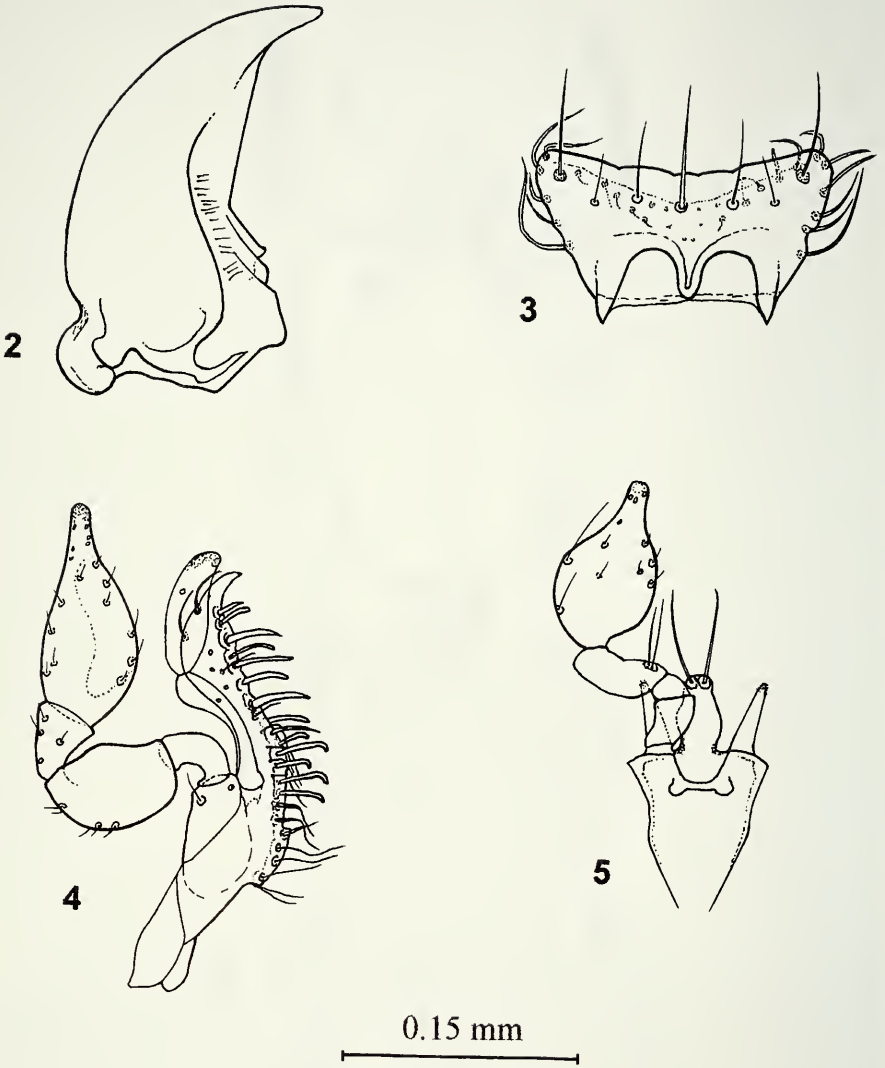


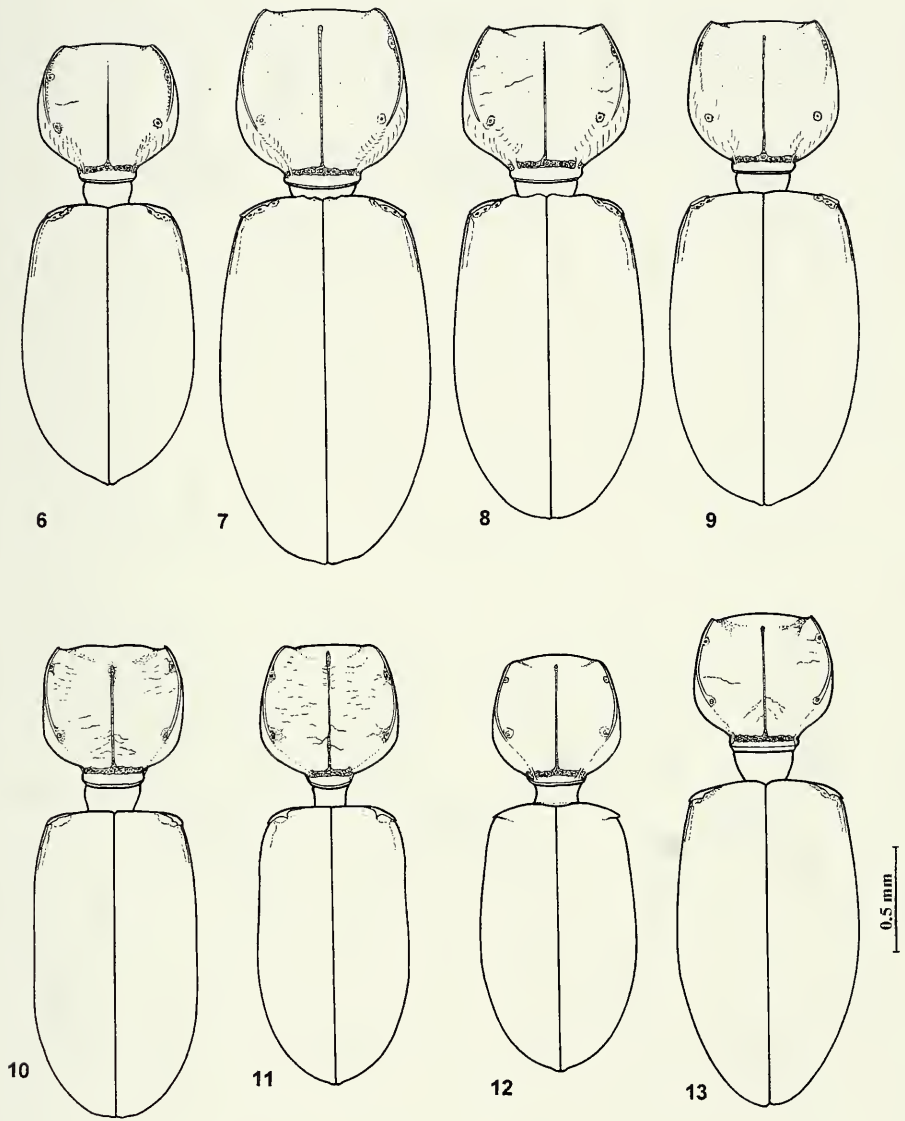
FIG. 1

Trilophus interpunctatus Putzeys, lectotype, habitus and maxillary palpus



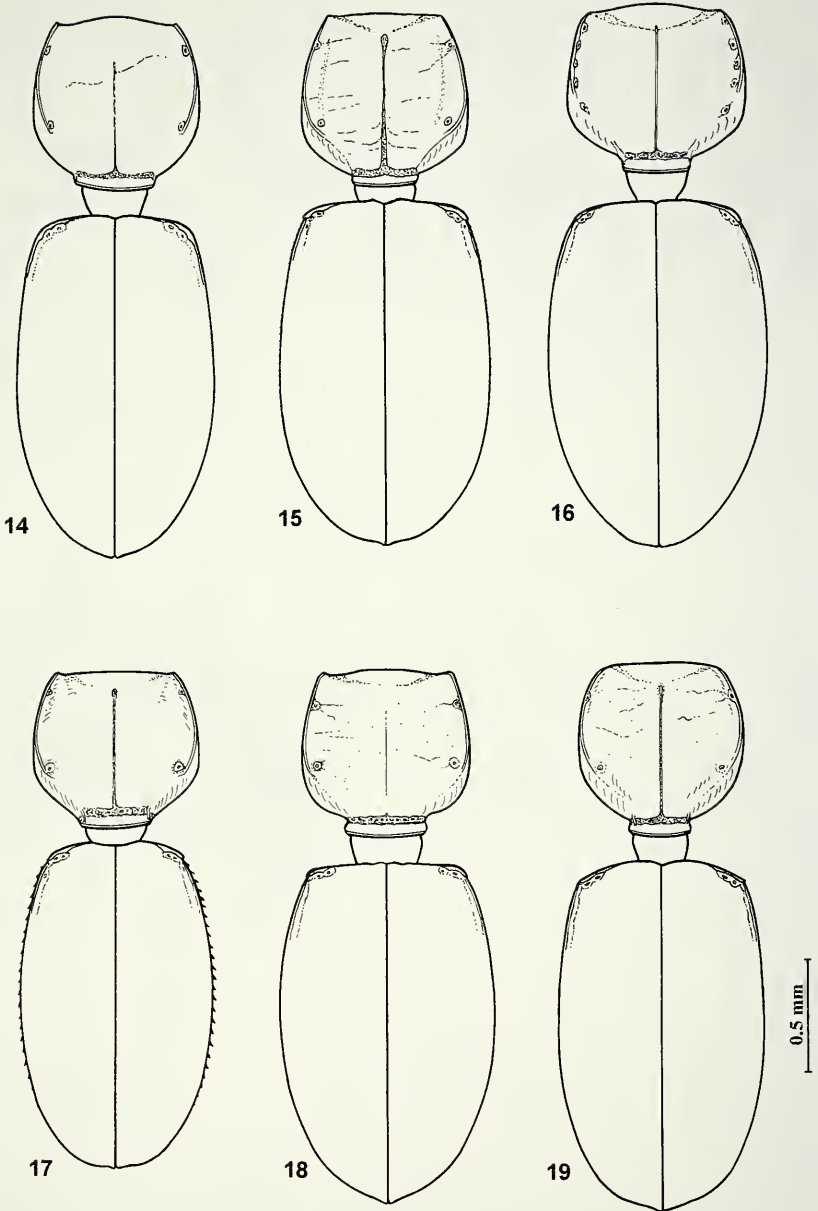
FIGS 2-5

Trilophus schmidti Putzeys. 2. right mandible; 3. labrum, dorsal view; 4. Maxilla and maxillary palpus; 5. glossa, paraglossa, and labial palpus.



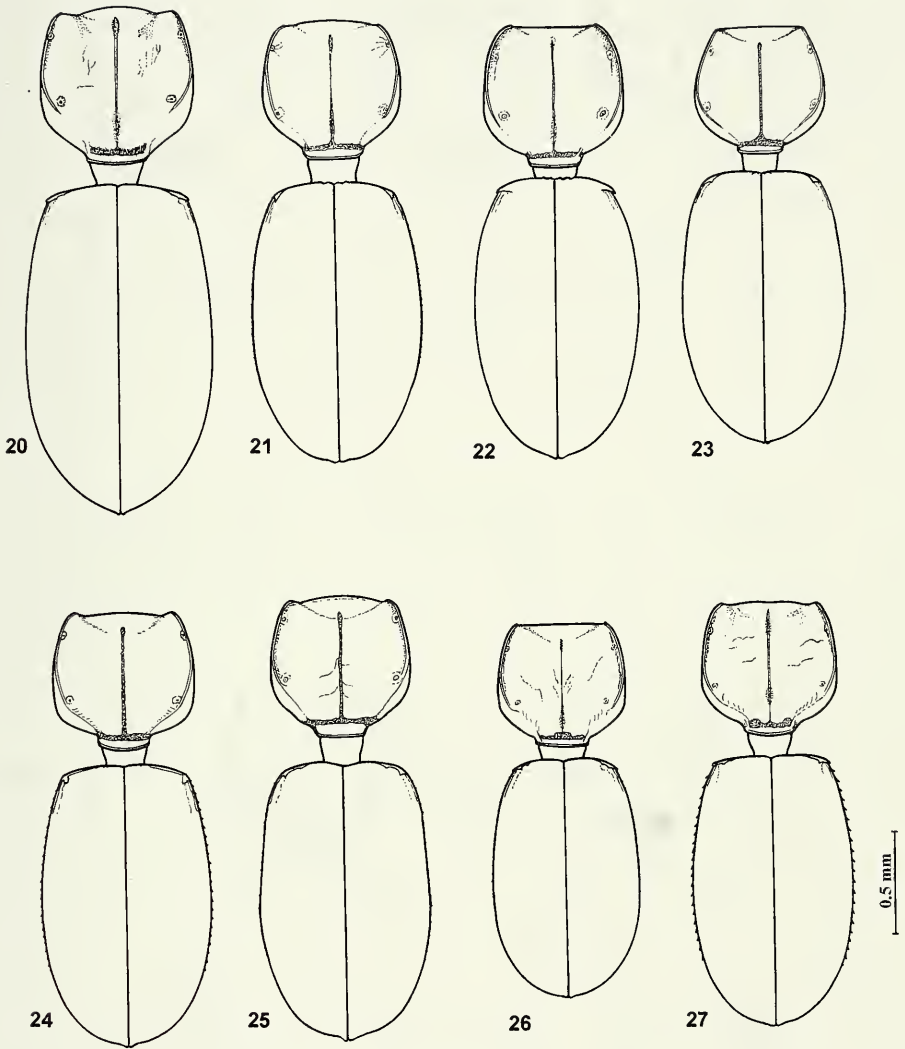
FIGS 6-13

Shape of pronotum and elytra, dorsal view. 6. *T. hispidulus* Putzeys; 7. *T. fuscus* n. sp.; 8. *T. baehri* n. sp.; 9. *T. crinitus* n. sp.; 10. *T. parallelus* n. sp.; 11. *T. appulsus* n. sp.; 12. *T. schmidti* Putzeys; 13. *T. birmanicus* Bates.



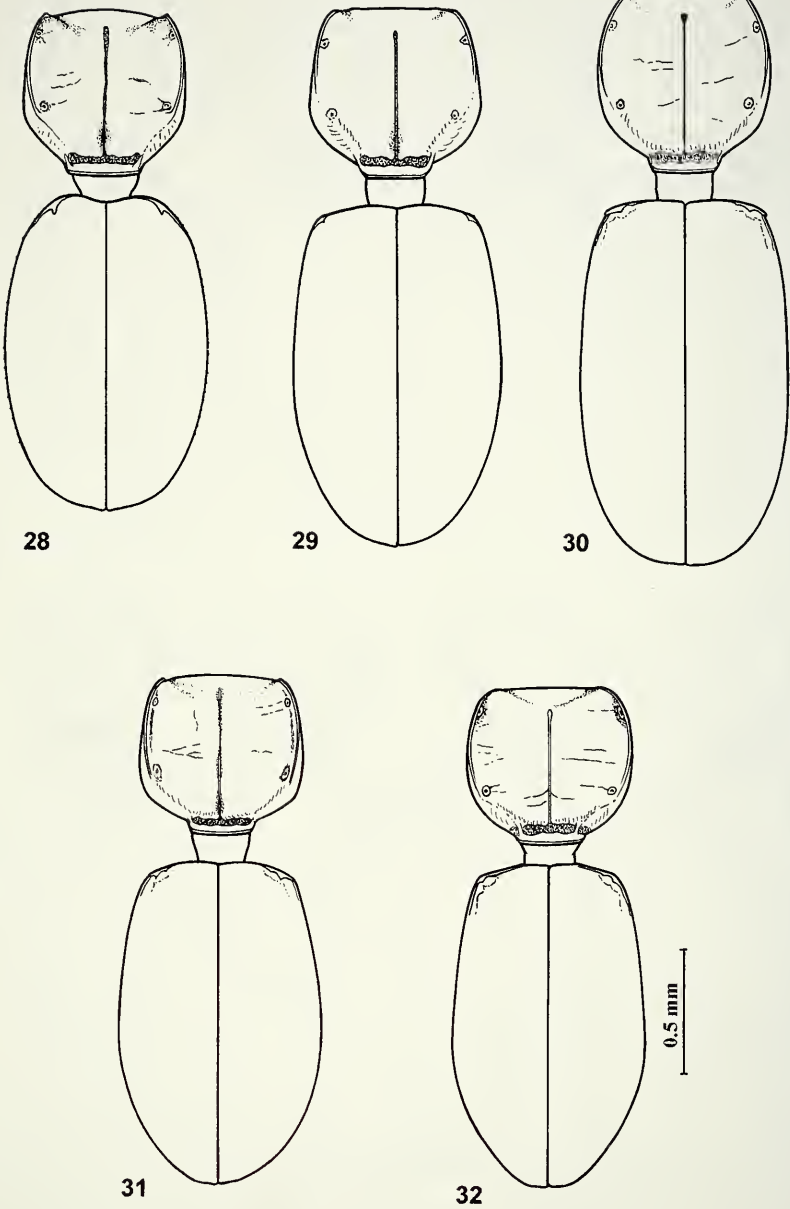
FIGS 14-19

Shape of pronotum and elytra, dorsal view. 14. *T. hirsutus* n. sp.; 15. *T. arcuatus* n. sp.; 16. *T. setosus* n. sp; 17. *T. alternans* n. sp.; 18. *T. lompei* n. sp.; 19. *T. palpireductus* n. sp.



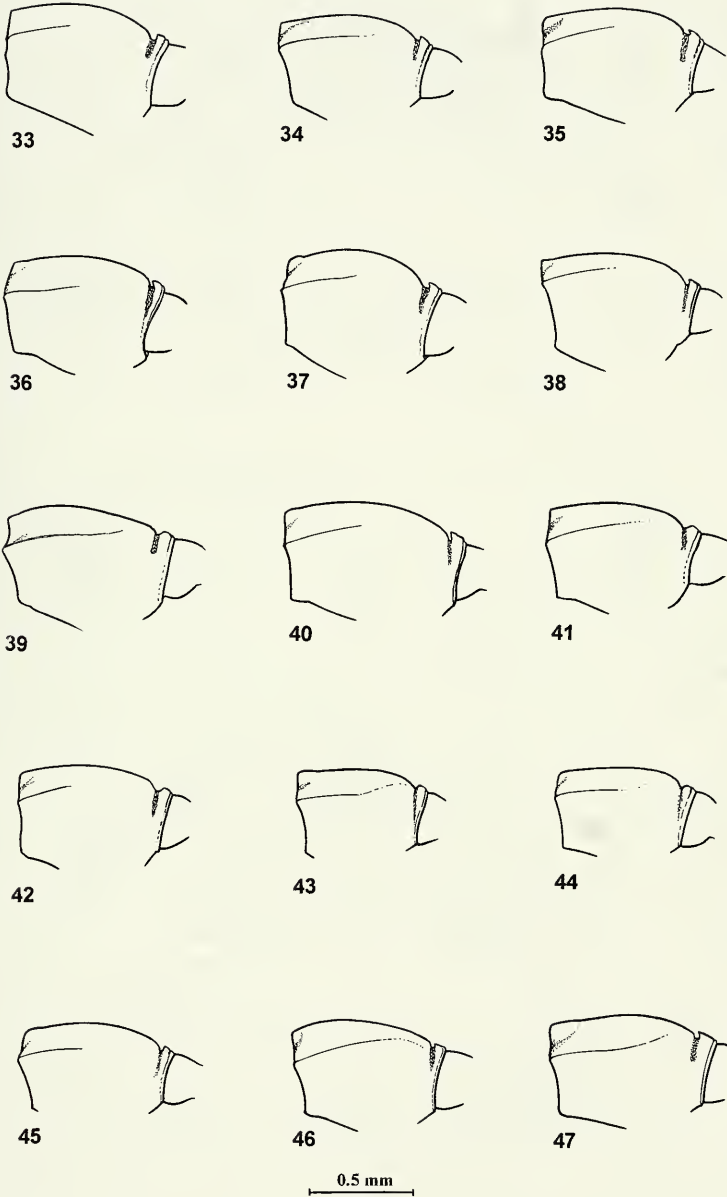
FIGS 20-27

Shape of pronotum and elytra, dorsal view. 20. *T. tonkinensis* n. sp.; 21. *T. variabilis* n. sp.; 22. *T. ellipticus* n. sp.; 23. *T. loebli* n. sp.; 24. *T. serratulus* n. sp.; 25. *T. weberi* n. sp.; 26. *T. schawalleri* n. sp.; 27. *T. serratus* n. sp.



FIGS 28-32

Shape of pronotum and elytra, dorsal view. 28. *T. convexus* n. sp.; 29. *T. acuminatus* n. sp.; 30. *T. elongatus* n. sp.; 31. *T. latiusculus* n. sp.; 32. *T. imitator* n. sp.



FIGS 33-47

Shape of pronotum, lateral view. 33. *T. hirsutus* n. sp.; 34. *T. arcuatus* n. sp.; 35. *T. setosus* n. sp.; 36. *T. alternans* n. sp.; 37. *T. lompei* n. sp.; 38. *T. palpireductus* n. sp.; 39. *T. hispidulus* Putzeys.; 40. *T. fuscus* n. sp.; 41. *T. baehri* n. sp.; 42. *T. crinitus* n. sp.; 43. *T. parallelus* n. sp.; 44. *T. appulsus* n. sp.; 45. *T. schmidti* Putzeys; 46. *T. birmanicus* Bates; 47. *T. tonkinensis* n. sp.



48



49



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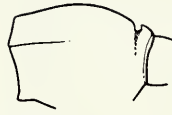
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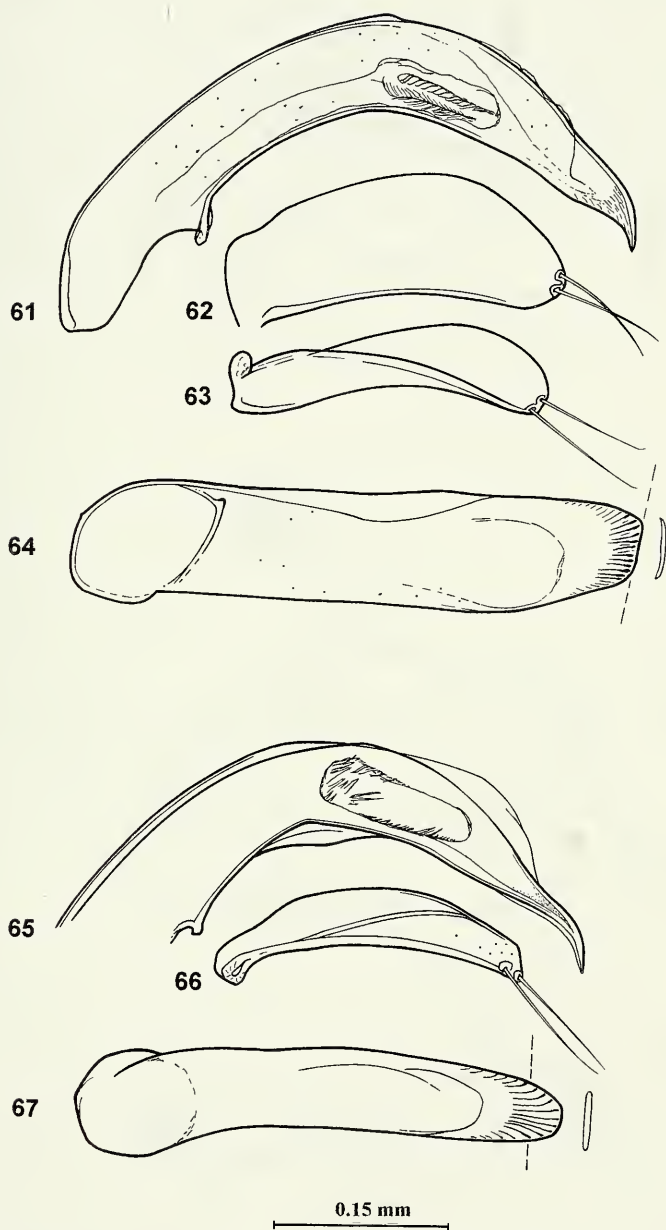
0.5 mm



60

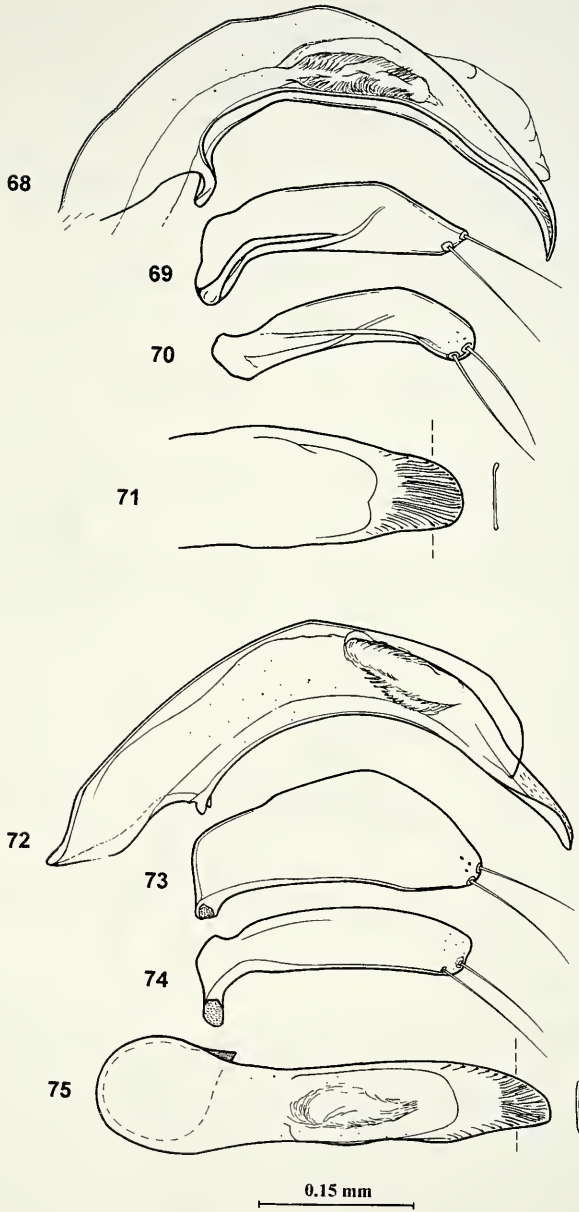
FIGS 48-60

Shape of pronotum, lateral view. 48. *T. interpunctatus* Putzeys; 49. *T. variabilis* n. sp.; 50. *T. ellipticus* n. sp.; 51. *T. loebli* n. sp.; 52. *T. serratulus* n. sp.; 53. *T. weberi* n. sp.; 54. *T. schawalleri* n. sp.; 55. *T. serratus* n. sp.; 56. *T. convexus* n. sp.; 57. *T. acuminatus* n. sp.; 58. *T. elongatus* n. sp.; 59. *T. latiusculus* n. sp.; 60. *T. imitator* n. sp.



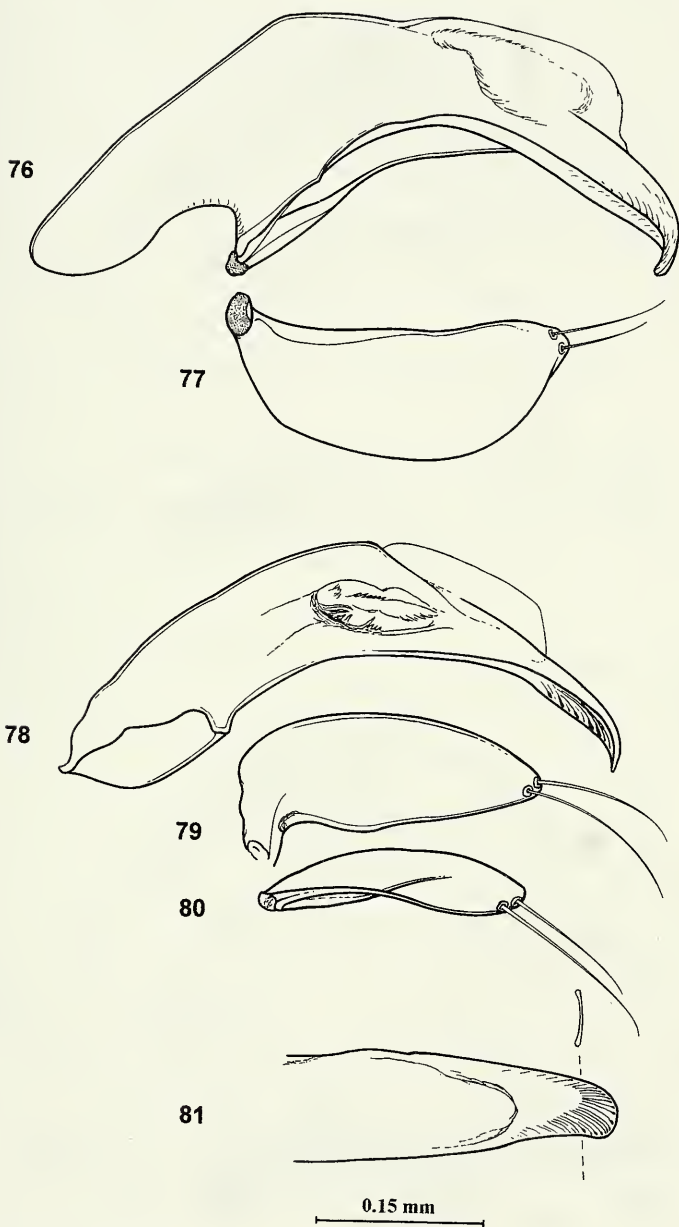
FIGS 61-64. *T. fuscus* n. sp., male genitalia; 61. Aedeagus, ventral view; 62. Ventral paramere; 63. Dorsal paramere; 64. Aedeagus, lateroapical view with cross-section of apex.

FIGS 65-67. *T. baehri* n. sp., male genitalia; 65. Aedeagus, ventral view with dorsal paramere; 66. Ventral paramere; 67. Aedeagus, lateroapical view with cross-section of apex



FIGS 68-71. *T. lompei* n. sp., male genitalia; 68. Aedeagus, ventral view; 69. Ventral paramere; 70. Dorsal paramere; 71. Aedeagus, lateroapical view with cross-section.

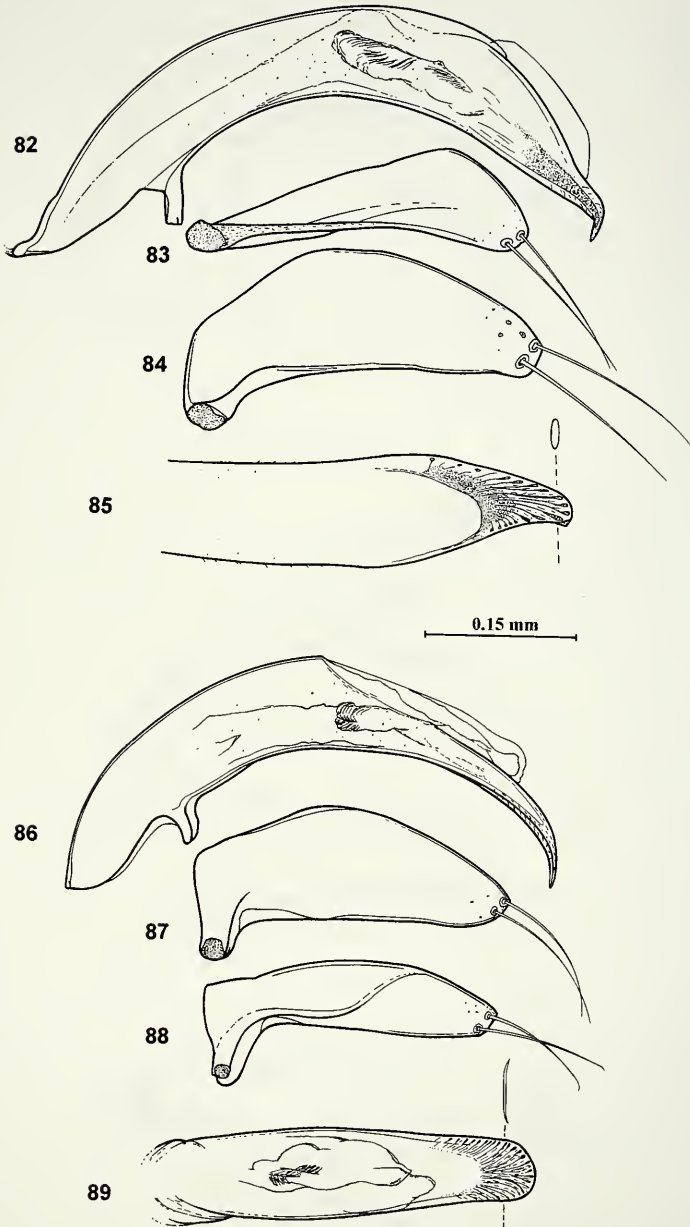
FIGS 72-75. *T. hispidulus* Putzeys, male genitalia; 72. Aedeagus, ventral view; 73. Ventral paramere; 74. Dorsal paramere; 75. Aedeagus, lateroapical view with cross-section of apex.



study in applying the method.

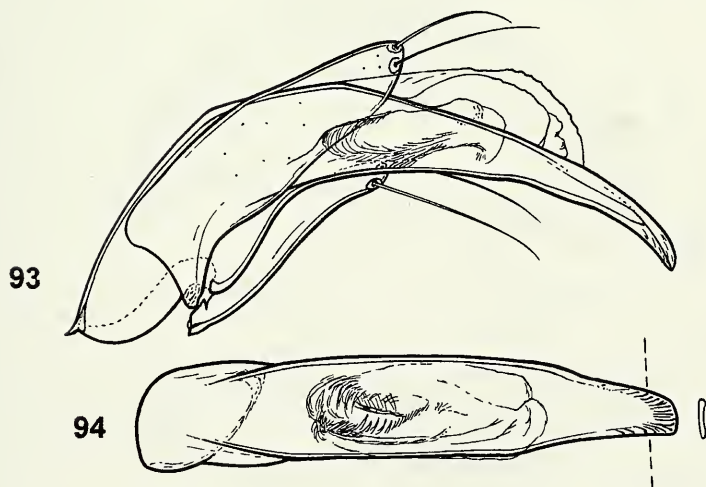
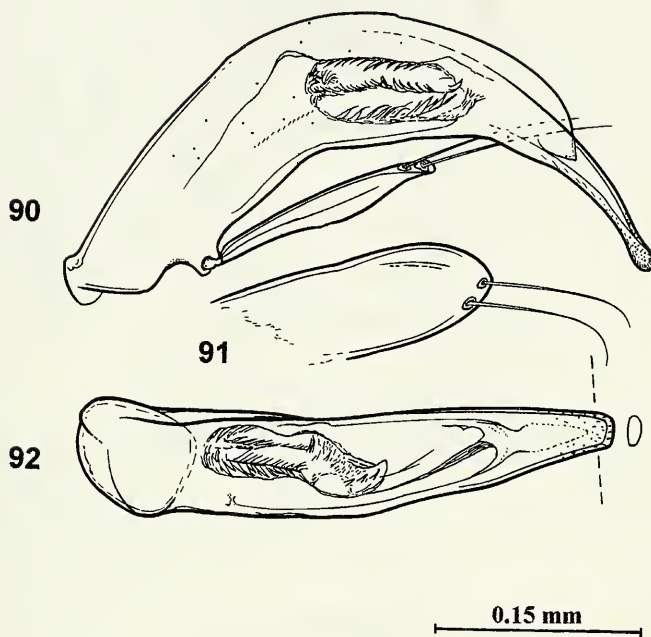
FIGS 76-77. *T. setosus* n. sp., male genitalia; 76. Aedeagus, ventral view with dorsal paramere; 77. Ventral paramere.

FIGS 78-81. *T. alternans* n. sp., male genitalia; 78. Aedeagus, ventral view; 79. Ventral paramere; 80. Dorsal paramere; 81. Aedeagus, lateroapical view with cross-section of apex.



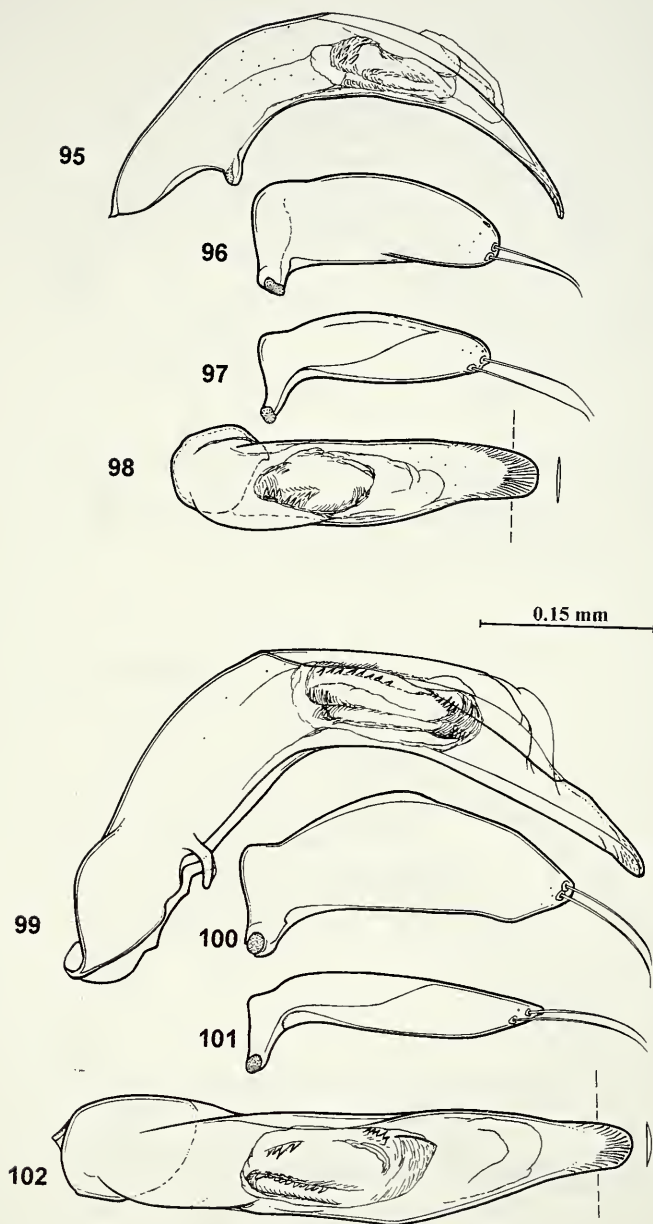
FIGS 82-85. *T. hirsutus* n. sp., male genitalia; 82. Aedeagus, ventral view; 83. Ventral paramere; 84. Dorsal paramere; 85. Aedeagus, lateroapical view with cross-section of apex.

FIGS 86-89. *T. arcuatus* n. sp., male genitalia; 86. Aedeagus, ventral view; 87. Ventral paramere; 88. Dorsal paramere; 89. Aedeagus, lateroapical view with cross-section of apex.



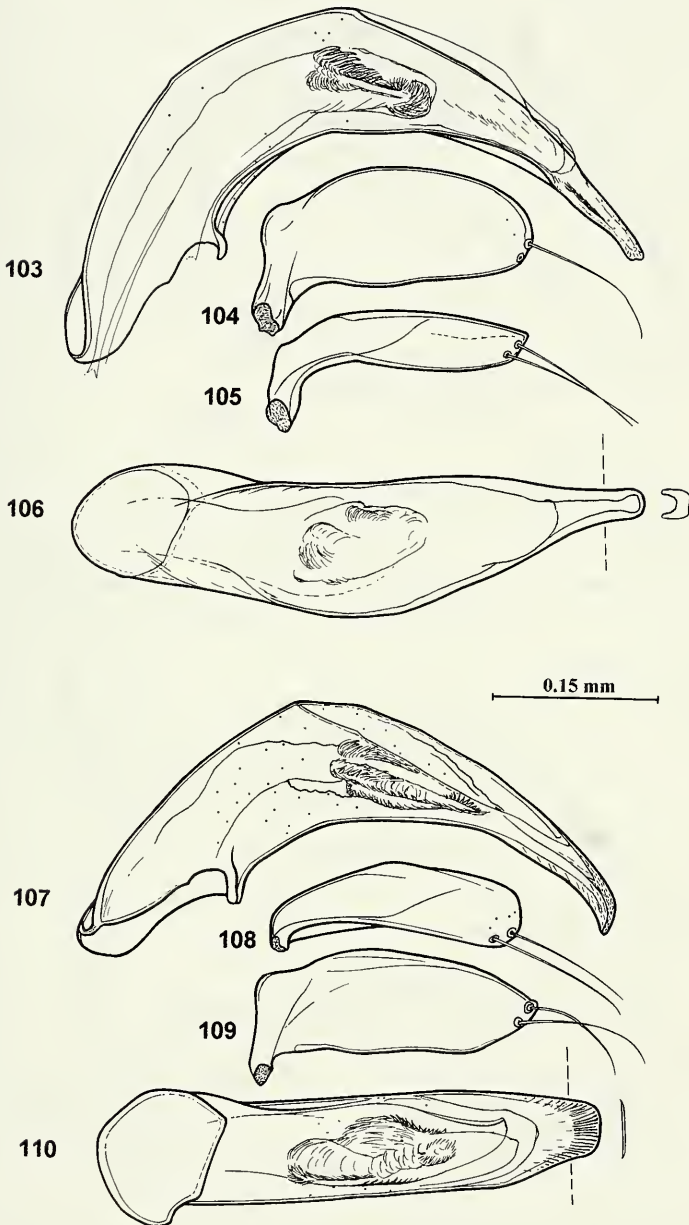
FIGS 90-92. *T. parallelus* n. sp., male genitalia; 90. Aedeagus, ventral view with ventral paramere; 91. Dorsal paramere; 92. Aedeagus, lateroapical view with cross-section of apex.

FIGS 93-94. *T. appulsus* n. sp., male genitalia; 93. Aedeagus, ventral view with parameres; 94. Aedeagus, lateroapical view with cross-section of apex.



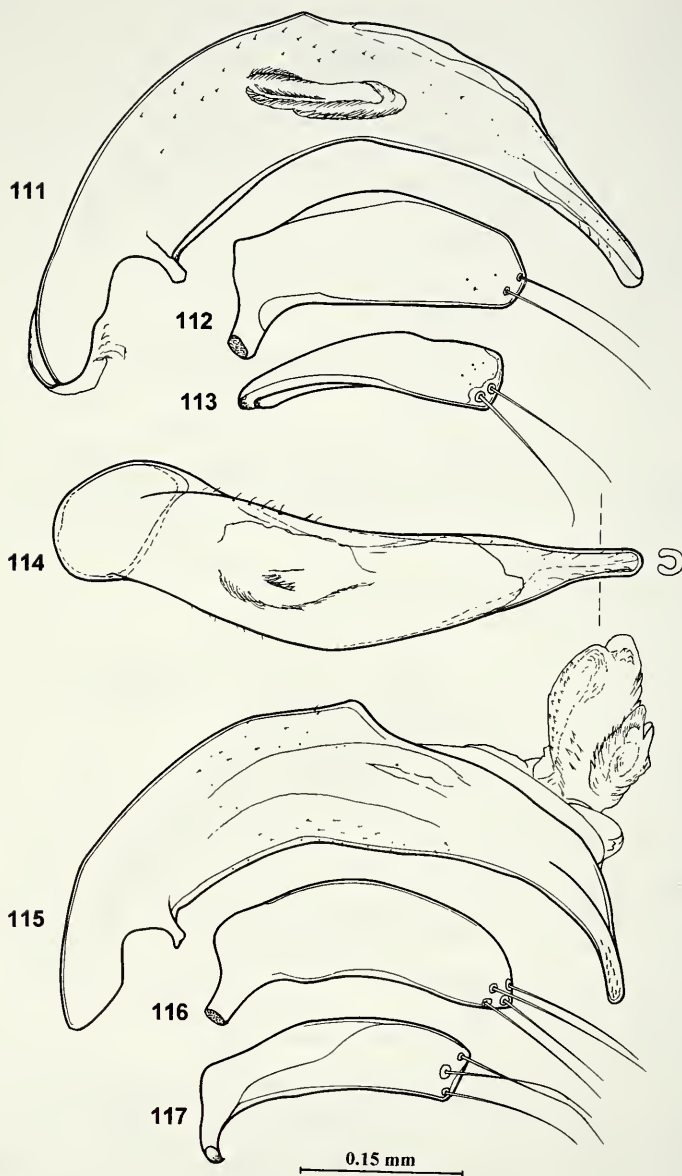
FIGS 95-98. *T. interpunctatus* Putzeys, male genitalia; 95. Aedeagus, ventral view; 96. Ventral paramere; 97. Dorsal paramere; 98. Aedeagus, lateroapical view with cross-section of apex.

FIGS 99-102. *T. schmidti* Putzeys, lectotype, male genitalia; 99. Aedeagus, ventral view; 100. Ventral paramere; 101. Dorsal paramere; 102. Aedeagus, lateroapical view with cross-section of apex.



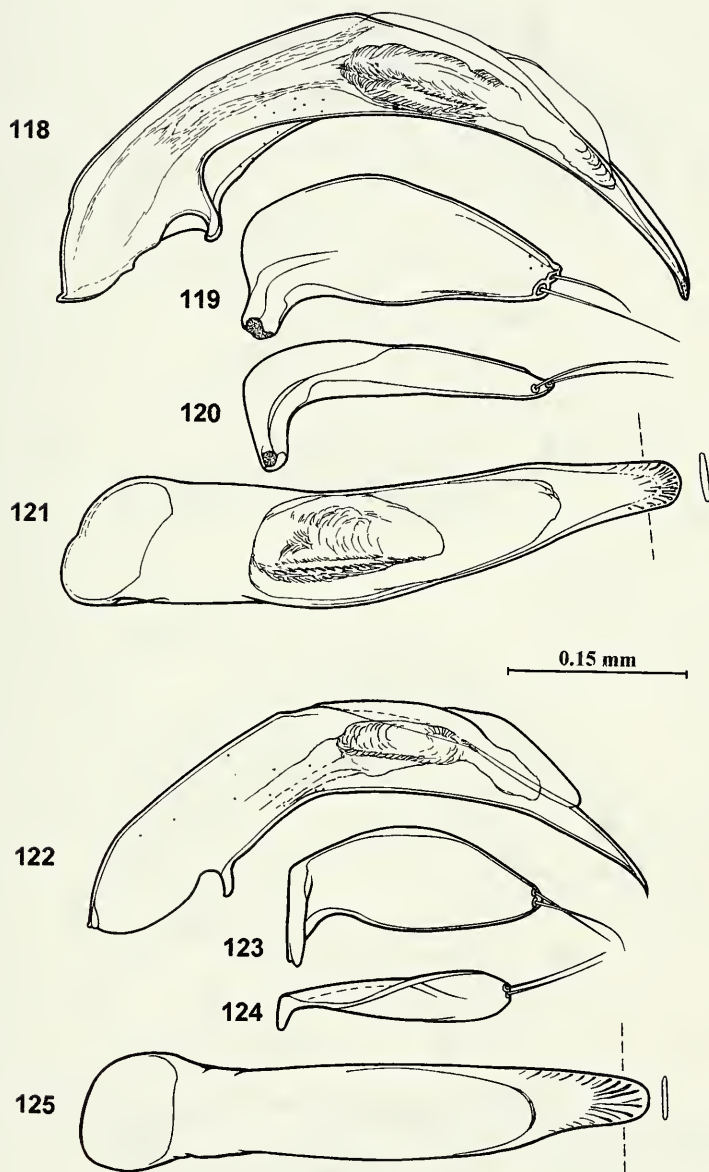
FIGS 103-106. *T. birmanicus* Bates, male genitalia; 103 Aedeagus, ventral view; 104. Ventral paramere; 105. Dorsal paramere; 106. Aedeagus, lateroapical view with cross-section of apex.

FIGS 107-110. *T. tonkinensis* n. sp., male genitalia; 107. Aedeagus, ventral view; 108. Ventral paramere; 109. Dorsal paramere; 110. Aedeagus, lateroapical view with cross-section of apex.



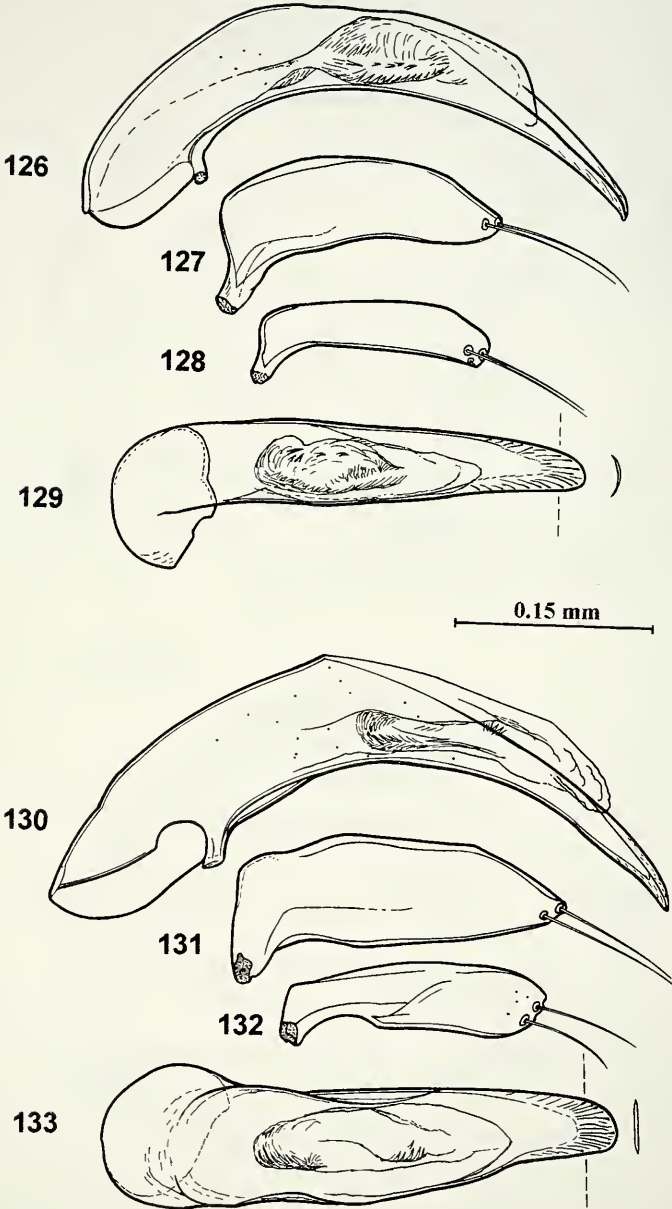
FIGS 111-114. *T. variabilis* n. sp., specimen from Gorkana Forest, male genitalia; 111. Aedeagus, ventral view; 112. Ventral paramere; 113. Dorsal paramere; 114. Aedeagus, lateroapical view with cross-section of apex.

FIGS 115-117. *T. variabilis* n. sp., specimen from Bagmati, Nagarjun Forest, male genitalia; 115. Aedeagus, ventral view with endophallus almost everted; 116. Ventral paramere; 117. Dorsal paramere.



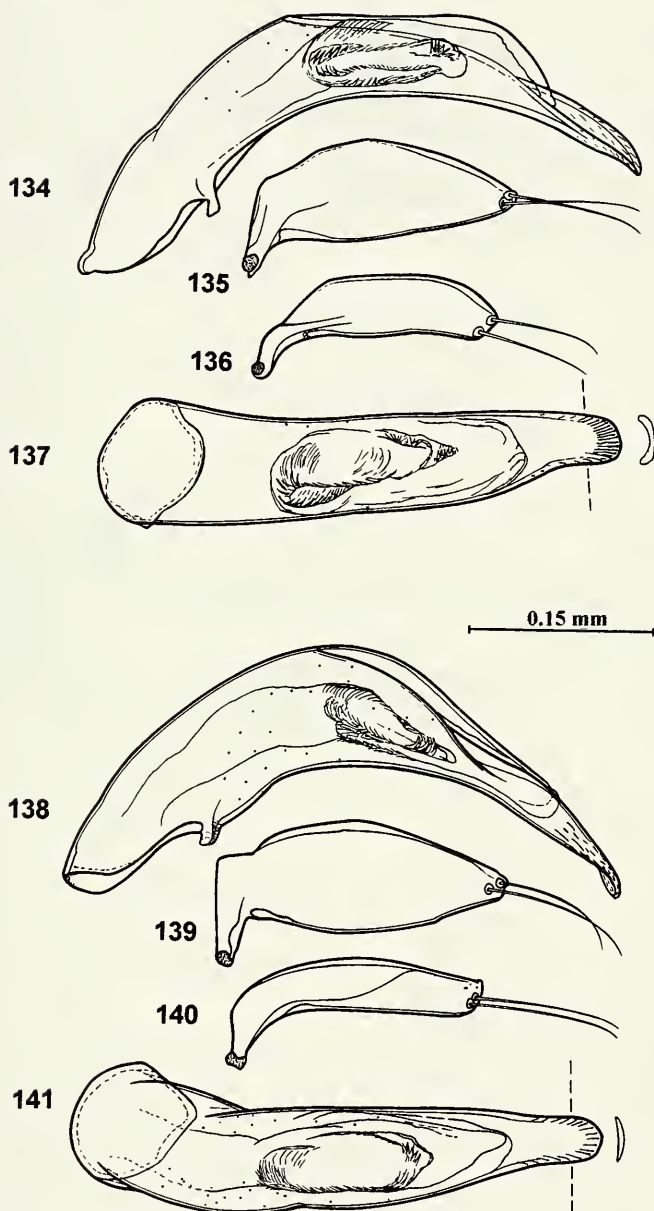
FIGS 118-121. *T. ellipticus* n. sp., male genitalia; 118. Aedeagus, ventral view; 119. Ventral paramere; 120. Dorsal paramere; 121. Aedeagus, lateroapical view with cross-section of apex.

FIGS 122-125. *T. loebli* n. sp., male genitalia; 122. Aedeagus, ventral view; 123. Ventral paramere; 124. Dorsal paramere; 125. Aedeagus, lateroapical view with cross-section of apex.



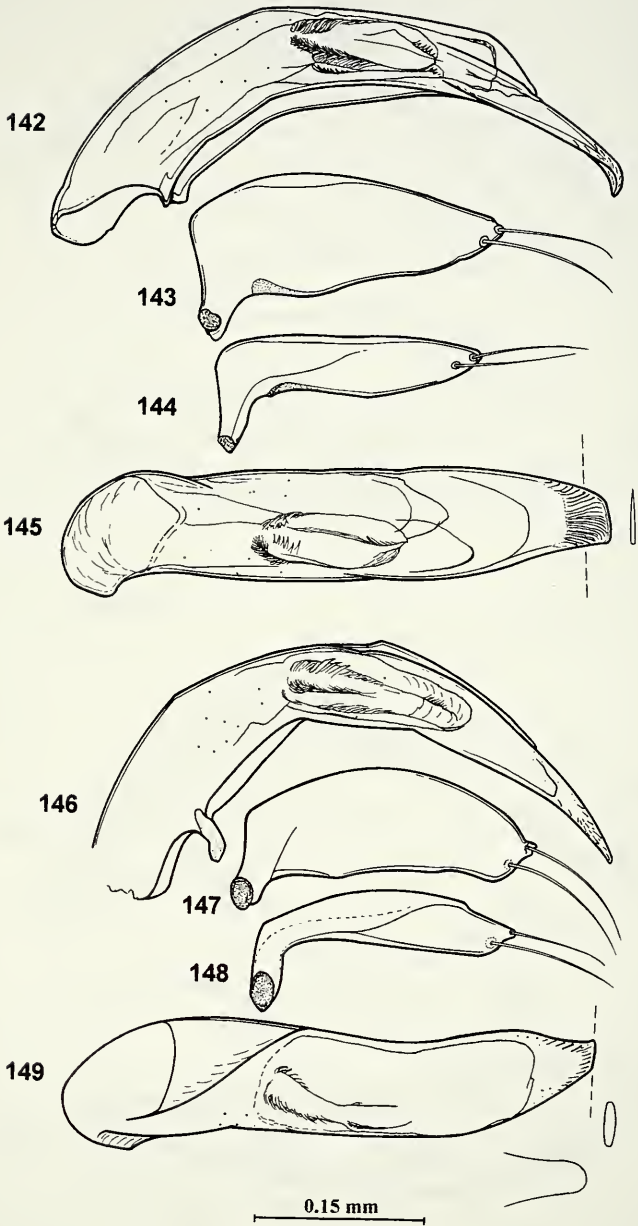
FIGS 126-129. *T. serratulus* n. sp., male genitalia; 126. Aedeagus, ventral view; 127. Ventral paramere; 128. Dorsal paramere; 129. Aedeagus, lateroapical view with cross-section of apex.

FIGS 130-133. *T. weberi* n. sp., male genitalia; 130. Aedeagus, ventral view; 131. Ventral paramere; 132. Dorsal paramere; 133. Aedeagus, lateroapical view with cross-section of apex.



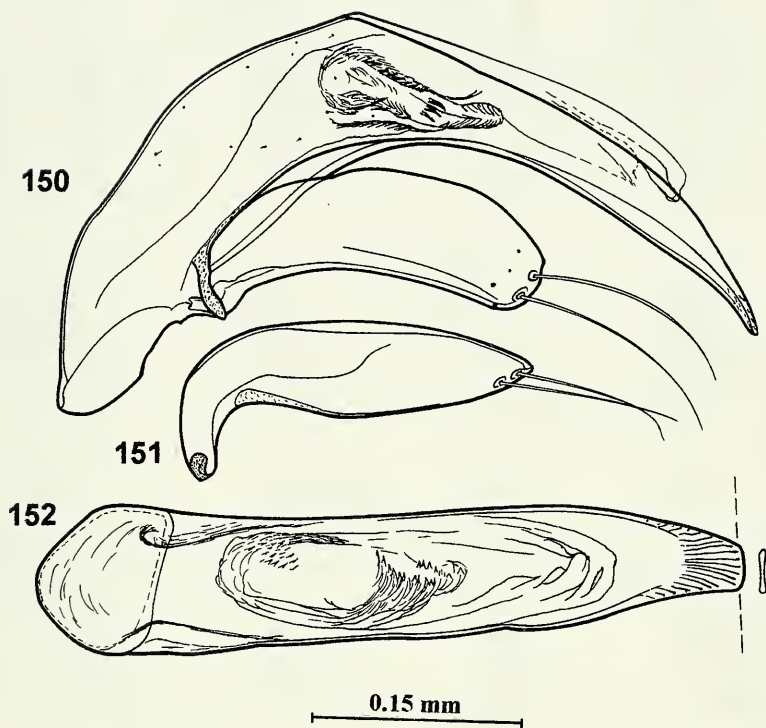
FIGS 134-137. *T. schawalleri* n. sp., male genitalia; 134. Aedeagus, ventral view; 135. Ventral paramere; 136. Dorsal paramere; 137. Aedeagus, lateroapical view with cross-section of apex.

FIGS 138-141. *T. serratus* n. sp., male genitalia; 138. Aedeagus, ventral view; 139. Ventral paramere; 140. Dorsal paramere; 141. Aedeagus, lateroapical view with cross-section of apex.



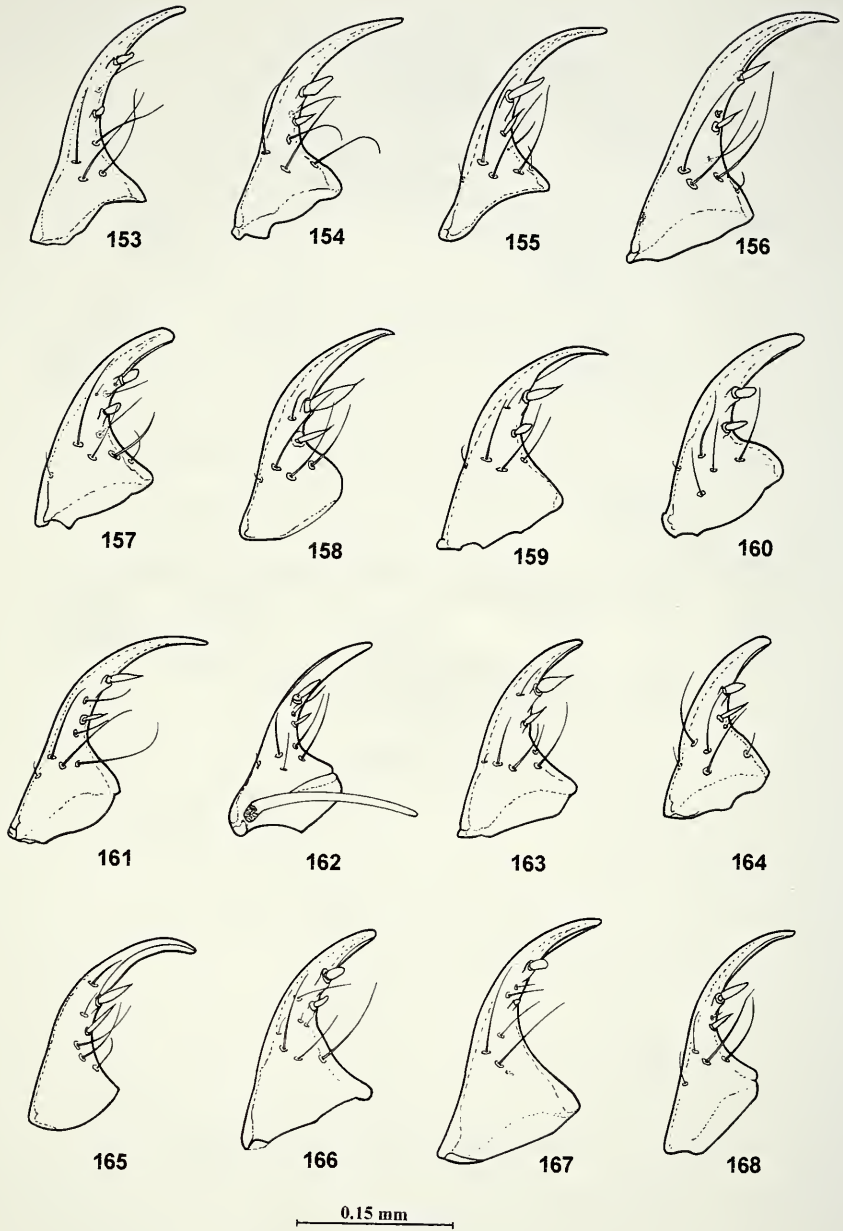
FIGS 142-145. *T. convexus* n. sp., male genitalia; 142. Aedeagus, ventral view; 143. Ventral paramere; 144. Dorsal paramere; 145. Aedeagus, lateroapical view with cross-section of apex.

FIGS 146-149. *T. acuminatus* n. sp., male genitalia; 146. Aedeagus, ventral view; 147. Ventral paramere; 148. Dorsal paramere; 149. Aedeagus, lateroapical view with cross-section of apex.

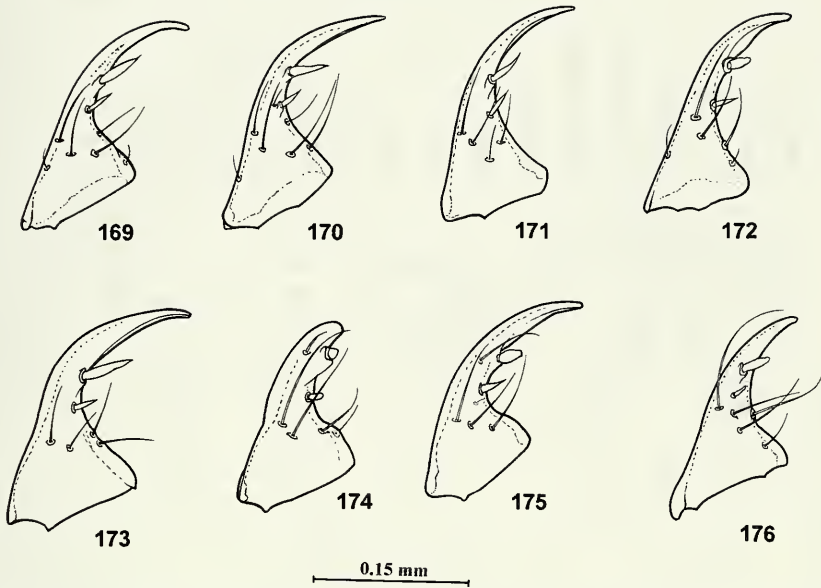


FIGS 150-152

T. elongatus n. sp., male genitalia; 150. Aedeagus, ventral view with dorsal paramere; 151. Ventral paramere; 152. Aedeagus, lateroapical view with cross-section of apex.



FIGS 153-168. Stylomere. 153. *T. hirsutus* n. sp.; 154. *T. arcuatus* n. sp.; 155. *T. alternans* n. sp.; 156. *T. lompei* n. sp.; 157. *T. palpireductus* n. sp.; 158. *T. hispidulus* Putzeys; 159. *T. baehri* n. sp.; 160. *T. crinitus* n. sp.; 161. *T. parallelus* n. sp.; 162. *T. interpunctatus* Putzeys; 163. *T. schmidtii* Putzeys; 164. *T. birmanicus* Bates; 165. *T. tonkinensis* n. sp.; 166. *T. variabilis* n. sp.; 167. *T. ellipticus* n. sp.; 168. *T. loebli* n. sp.



FIGS 169-176. Stylomere. 169. *T. serratulus* n. sp.; 170. *T. weberi* n. sp.; 171. *T. schawalleri* n. sp.; 172. *T. serratus* n. sp.; 173. *T. acuminatus* n. sp.; 174. *T. elongatus* n. sp.; 175. *T. latisculcus* n. sp.; 176. *T. imitator* n. sp.

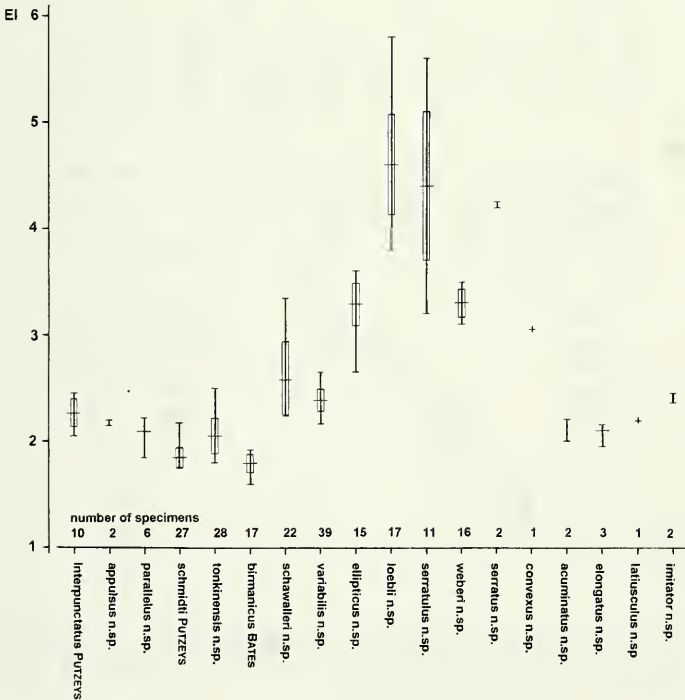


FIG. 177. Relative Eye-Index (EI) of species with setigerous punctures on intervals 3 and 5 of the elytron. Mean, absolute range, and standard deviation (s) is given. For calculation of the relative eye-index, see text (terms and morphology).

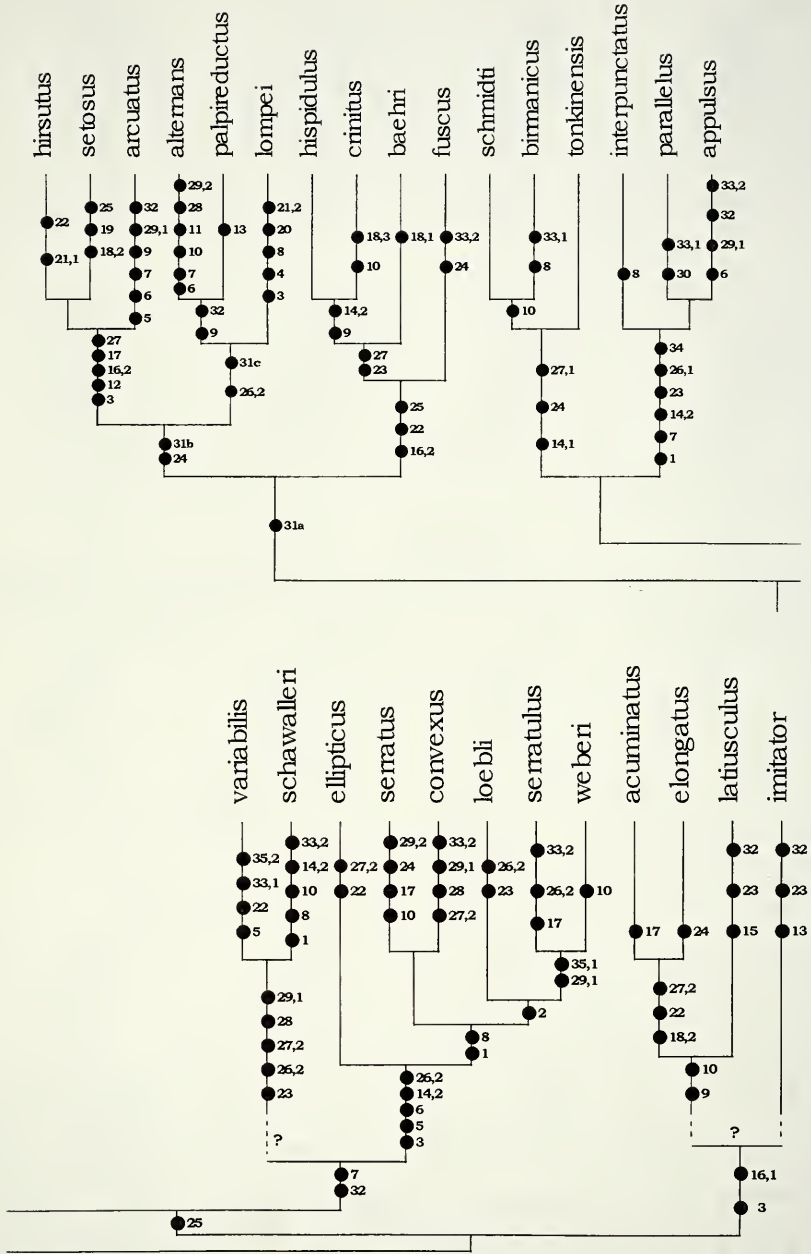


FIG. 178. Cladogram showing the supposed relationships among the species of the genus *Trilophus*. The cladogram is based on the characters listed in Tab. 4 and the data matrix given in Tab. 5. Interrupted lines indicate uncertain relationships.



FIG. 179. Distribution of the genus *Trilophus* in the Oriental region (recorded localities of all species plotted)



FIG. 180. Recorded distribution of species of the group *hispidulus*

- | | |
|---------------------------------|----------------------------|
| ○ T. <i>hispidulus</i> Putzeys, | × T. <i>fuscus</i> n.sp., |
| ▲ T. <i>baehri</i> n.sp., | ⊙ T. <i>crinitus</i> n.sp. |



FIG. 181. Recorded distribution of species of the group *hirsutus*

- | | | |
|----------------------------|----------------------------|---------------------------|
| ○ T. <i>hirsutus</i> n.sp. | × T. <i>arcuatus</i> n.sp. | ▲ T. <i>setosus</i> n.sp. |
|----------------------------|----------------------------|---------------------------|



FIG. 182. Recorded distribution of species of the group *alternans*
 ○ T. *alternans* n.sp., ▲ T. *lompei* n.sp., × T. *palpireductus* n.sp.



FIG. 183. Recorded distribution of species of the group *interpunctatus*
 ○ T. *interpunctatus* PUTZEYS × T. *parallelus* n.sp. ☆ T. *appulsus* n.sp.



FIG. 184. Recorded distribution of species of the group *schmidtii*

○ *T. schmidtii* PUTZEYS, ▲ *T. birmanicus* BATES, * *T. tonkinensis* n.sp.,



FIG. 185. Recorded distribution of species of the group *acuminatus*

○ *T. acuminatus* n.sp., * *T. elongatus* n.sp.,
 ▲ *T. latusculus* n.sp., * *T. imitator* n.sp.



FIG. 186. Recorded distribution of species of the group *ellipticus*

- *T. variabilis* n.sp., ▲ *T. schawalleri* n.sp., × *T. ellipticus* n.sp.,
 ◆ *T. loebli* n.sp., ⊙ *T. serratulus* n.sp., ★ *T. weberi* n.sp.,
 + *T. serratus* n.sp., ⊛ *T. convexus* n.sp.

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REVUE SUISSE DE ZOOLOGIE

Tome 106 — Fascicule 2

	Pages
BOČAKOVA, Milada. Several new <i>Melaneros</i> from Sri Lanka and southern India (Coleoptera, Lycidae)	269-276
TOMASZEWSKA, K. Wioletta. A new genus and species of Epipocinae (Coleoptera: Endomychidae) from Pakistan.	277-284
STEBNICKA, Zdzisława Teresa. Neotropical Eupariini: New and little known genera and species (Coleoptera: Scarabaeoidea: Aphodiinae).	285-300
LOURENÇO, Wilson R. & Lionel MONOD. A new species of <i>Ananteris</i> Thorell from French Guyana (Scorpiones, Buthidae).	301-306
ROWELL, C. Hugh F. New species of <i>Lagarolampis</i> Descamps (Orthoptera, Caelifera, Acridoidea, Romaleidae, Bactrophorinae) from Central America.	307-324
SARTORI, Michel & Jean-Marc ELOUARD. Biodiversité aquatique de Madagascar 30: le genre <i>Cheirogenesisia</i> Demoulin, 1952 (Ephemeroptera, Palingeniidae).	325-337
ALMIRON, Adriana E. & Jorge R. CASCIOTTA. <i>Hyphessobrycon wajat</i> n. sp. from La Plata basin in Argentina (Characiformes: Characidae).	339-346
KOTTELAT, Maurice & Franck BRÉHIER. <i>Troglocyclocheilus khammouanensis</i> , a new genus and species of cave fish from the Khammouan karst, Laos (Teleostei: Cyprinidae).	347-359
FRISCH, Johannes. A revision of the <i>Scopaeus debilis</i> species group, with description of a new species from Madagascar (Coleoptera, Staphylinidae, Paederinae).	361-383
BERNASCONI, Reno. <i>Paladilhia bessoni</i> n. sp. (Gastropoda Prosobranchia Hydrobiidae) des eaux souterraines karstiques de la Haute Soule (Pyrénées Atlantiques, France).	385-392
LOMBARDO, Francesco. Remarks on the genus <i>Metriomantis</i> Saussure & Zehntner and descriptions of two new species and a new genus: <i>Rehniella</i> gen. n. (Insecta Mantodea).	393-405
DURETTE-DESSET, Marie-Claude & Claude VAUCHER. <i>Molostromgylus mbopi</i> sp. n. (Nematoda, Trichostrongylina, Molineoidea), parasite de <i>Molossops</i> spp. (Chiroptera, Molossidae) au Paraguay.	407-418
SCHAWALLER, Wolfgang. Notes on Palearctic and Oriental Phrenapatini (Coleoptera: Tenebrionidae), with descriptions of four new species.	419-428
BALKENOHL, Michael. Revision of the genus <i>Trilophus</i> Andrewes from the Oriental region (Coleoptera, Carabidae).	429-537

	Pages
BOCAKOVA, Milada. Several new <i>Melaneros</i> from Sri Lanka and southern India (Coleoptera, Lycidae)	269
TOMASZEWSKA, K. Wioletta. A new genus and species of Epipocinae (Coleoptera: Endomychidae) from Pakistan.	277
STEBNICKA, Zdzisława Teresa. Neotropical Eupariini: New and little known genera and species (Coleoptera: Scarabaeoidea: Aphodiinae).	285
LOURENÇO, Wilson R. & Lionel MONOD. A new species of <i>Ananteris</i> Thorell from French Guyana (Scorpiones, Buthidae).	301
ROWELL, C. Hugh F. New species of <i>Lagarolampis</i> Descamps (Orthoptera, Caelifera, Acridoidea, Romaleidae, Bactrophorinae) from Central America.	307
SARTORI, Michel & Jean-Marc ELOUARD. Aquatic biodiversity of Madagascar 30: the genus <i>Cheirogenesia</i> Demoulin, 1952 (Ephemeroptera, Palingeniidae).	325
ALMIRON, Adriana E. & Jorge R. CASCIOTTA. <i>Hyphessobrycon wajat</i> n. sp. from La Plata basin in Argentina (Characiformes: Characidae).	339
KOTTELAT, Maurice & Franck BRÉHIER. <i>Troglocyclocheilus khammouanensis</i> , a new genus and species of cave fish from the Khammouan karst, Laos (Teleostei: Cyprinidae).	347
FRISCH, Johannes. A revision of the <i>Scopaeus debilis</i> species group, with description of a new species from Madagascar (Coleoptera, Staphylinidae, Paederinae).	361
BERNASCONI, Reno. <i>Paladilhia bessoni</i> n. sp. (Gastropoda Prosobranchia Hydrobiidae) from karstic groundwater of Haute Soule (Pyrénées Atlantiques, France).	385
LOMBARDO, Francesco. Remarks on the genus <i>Metriomantis</i> Saussure & Zehntner and descriptions of two new species and a new genus: <i>Rehniella</i> gen. n. (Insecta Mantodea).	393
DURETTE-DESSET, Marie-Claude & Claude VAUCHER. <i>Molostromgylus mbopi</i> sp. n. (Nematoda, Trichostrongylina, Molineoidea), parasite of three <i>Molossops</i> species (Chiroptera, Molossidae) from Paraguay.	407
SCHAWALLER, Wolfgang. Notes on Palearctic and Oriental Phrenapatini (Coleoptera: Tenebrionidae), with descriptions of four new species.	419
BALKENOHL, Michael. Revision of the genus <i>Trilophus</i> Andrewes from the Oriental region (Coleoptera, Carabidae).	429

Indexed in CURRENT CONTENTS, SCIENCE CITATION INDEX

PUBLICATIONS DU MUSÉUM D'HISTOIRE NATURELLE DE GENÈVE

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