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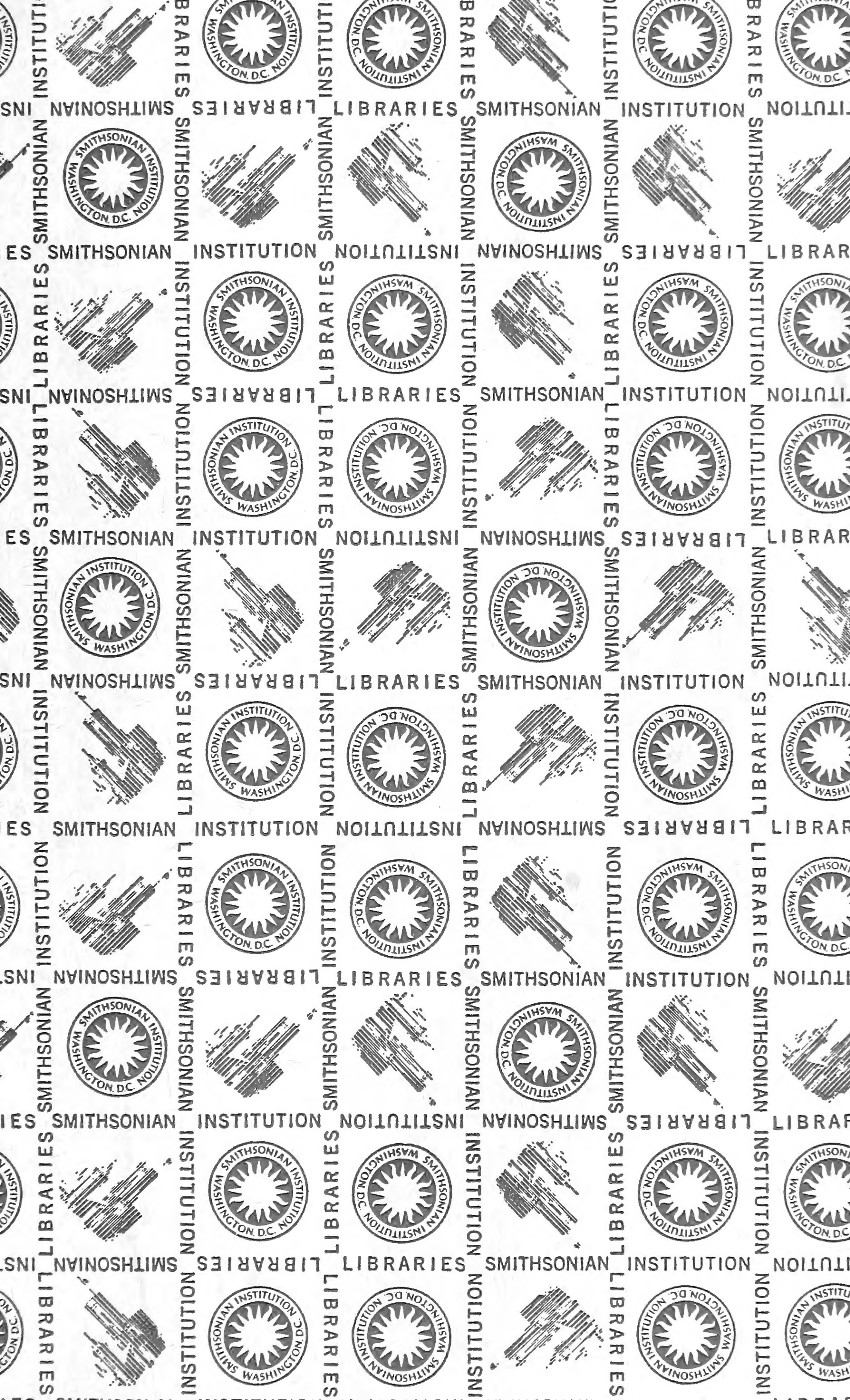
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REVUE SUISSE
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ANNALES

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

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IMPRIMERIE SRO-KUNDIG
SEPTEMBRE 1990

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REVUE SUISSE DE ZOOLOGIE

TOME 97 — FASCICULE 1

Publication subventionnée par l'Académie suisse des Sciences naturelles
et la Société suisse de Zoologie

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Directeur du Muséum d'Histoire naturelle de Genève

FRANÇOIS BAUD
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DANIEL BURCKHARDT
Chargé de recherche au Muséum d'Histoire naturelle de Genève

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Revue suisse Zool.	Tome 97	Fasc. 3	p. 505-621	Genève, septembre 1990

Review of the Scaphidiidae (Coleoptera) of Thailand

by

Ivan LÖBL * [1]

With 181 figures

ABSTRACT

Review of the Scaphidiidae (Coleoptera) of Thailand. — The review is based on all available material from Thailand: 135 species in 12 genera are recognized. Following species are described as new: *Cyparium siamense, Pseudobironium subglabrum, Baeocera bremeri, B. pyricola, B. schwendingeri, B. uncata, B. schreyeri, B. vidua, B. pseudinculta, B. suthepensis, B. erroris, B. karen, B. deharvengi, B. insolita, B. barbara, B. pubiventris, B. innocua, Scaphisoma vagans, S. invisum, S. gracilendum, S. lepidum, S. mirandum, S. agile, S. suthepense, S. fastum, S. canaliculatum, S. operosum, S. lannaense, S. velox, S. pseudamabile, S. segne, S. egenum, S. pressum, S. valens, S. dives, S. incurvum, S. favens, S. spissum, S. meracum, S. siamense, S. bispinosum, S. cuspidatum, S. khao, S. morosum, S. karen, Baeotoxidium siamense, Scaphobaeocera laevis, S. alticola, S. maculata, S. incisa, S. tenella, S. spira, S. uncata, S. obducta, S. sabapensis, S. robustula, S. valida, S. burckhardti, Toxidium pubistylis, T. styligerum, T. incompletum, Scaphoxium avidum, Bironium troglophilum, B. bidens. Baeocera decipiens* Löbl is relegated to synonymy of *B. pigra* and *Baeocera robertiana* nom. nov. is proposed to replace *B. roberti* Löbl, 1986. Key to genera, and keys to Thai species of *Pseudobironium, Baeocera, Scaphisoma, Scaphobaeocera, Toxidium,* and *Scaphoxium* are given. *Scaphidium* and *Cyparium* are under-represented in studied material which possibly includes 50% of the species actually occurring in Thailand.

INTRODUCTION

Scaphidiids are fungivorous, usually very lively staphylinoid beetles. The adults which are exclusively studied here, are characterized by a large 1st ventrite (3rd abdominal

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[1] Publication supported by the Georges and Antoine Claraz Foundation.

sternite) and truncate elytra, which leaves the apex of the abdomen uncovered. Family rank is usually given to the group, although some modern authors give it subfamily status within the Staphylinidae (KASULE 1966, LAWRENCE 1982). The traditional treatment is preferred here until the phylogeny of staphylinids and related groups is better understood.

Some years ago I desired to revise the Oriental scaphidiids, but it became obvious that the material housed in collections was insufficient. Even on my first trip to tropical Asia, in 1970 to Sri Lanka — at that time still Ceylon — I noticed that scaphidiids were more diverse than expected. Experience from subsequent trips convinced me that it is best to work up material from areas in which a fairly high proportion of species has been collected or is available for study. Although this approach has some disadvantages, it does provide useful information on local faunas whose special features might be more easily noted. In addition, gaps in knowledge will be relatively smaller, thus enabling keys to work more reliably.

Scaphidiids, along with other small beetles, have not yet been adequately collected in most of warm temperate and tropical Asia. Thailand together with Laos, Cambodia and China are countries particularly neglected in this respect. In 1985, the National Research Council of Thailand approved my project to review the Thai scaphidiids, and in the same year I undertook a collection expedition together with my colleague Daniel H. Burckhardt. The bulk of the material treated in the present study was gathered on that expedition. However, some additional material from other sources substancially helped to complete the data.

TECHNIQUES

Material. We carried out field work in seven areas in Northwestern, Western, Central, and Eastern Thailand (Fig. 1). Altogether we spent 25 days in the field, excluding travelling time. The sampling was negatively affected by the climate: we suffered from havy rainfall which stopped us at Sop Pong, whilst Kaeng Krachan and Khao Sabap National Park were drought-stricken. Most of the material comes from sifted samples of forest litter and from fresh fungi growing on dead wood. Specimens were extracted in "Winkler/Moczarski" extractors (BESUCHET *et al.*, 1987). The main additional sources of material were pitfall traps. Many specimens were also found singly on fungi. Specimens were collected and conserved in 70% alcohol/10% acetic acid. Most males (all males in many groups) were dissected, the aedeagi cleared and mounted in Canada balsam. Dry material was dissected after relaxing in water or diluted ammonium hydroxide (NH_4OH).

Available material totaled more than 1800 specimens in 135 species. This may represent some 50% of the species actually occurring in Thailand. In this respect scaphidiids compare with Steninae (ROUGEMONT, 1983).

Bionomics. No attempt has been made to observe the life history of any species during the short time spent in Thailand. Although less abundant than paederines or pselaphids, scaphidiids constitute a significant component of the forest litter community. The presumably myxomycetophagous *Baeocera, Scaphobaeocera, Scaphoxium* and many *Scaphisoma* have been found regularly in moist accumulations of debris in shady places, especially in ravines, depressions, along fallen trunks, at foot of large trees etc... These beetles occur also in sites regularly devastated by fire. *Scaphidium, Cyparium,* and many *Scaphisoma* feed on fresh fungi growing on dead wood. They are difficult to find if climatic conditions are unfavourable, and they are generally collected more or less incidentally. Therefore, this group is under-represented in the studied material.

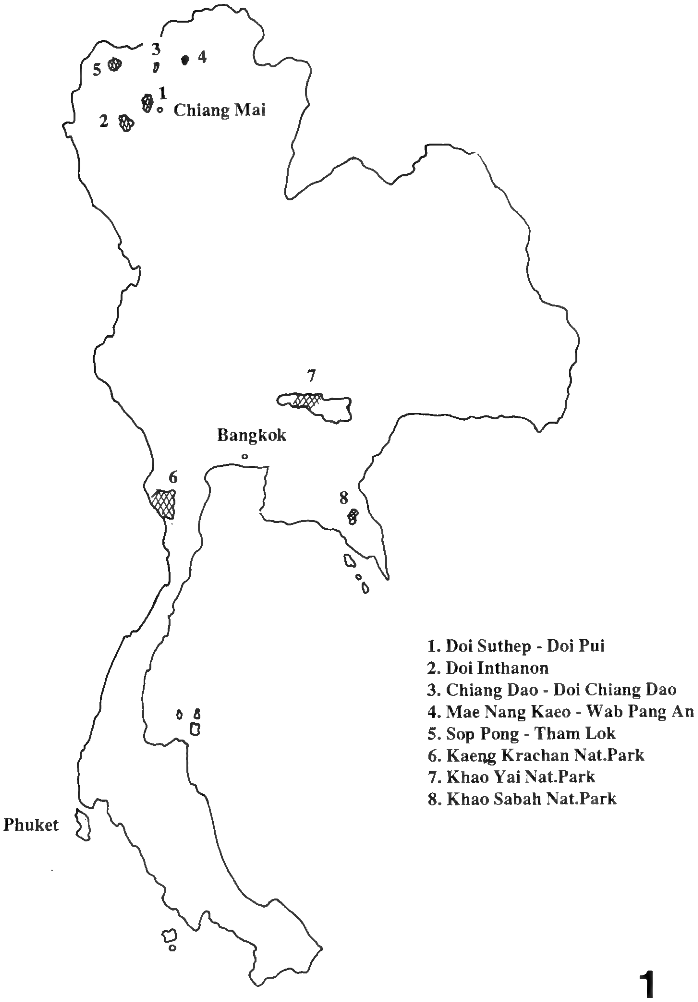

FIG. 1.

Map of Thailand. Main collecting sides numbered.

Distribution records. The name of the province precedes the first respective locality record, except for the Khao Yai National Park which covers portions of several provinces. It was difficult to locate some remote collecting spots in the primery forest of the Park. However, most specimens were taken only a few kilometers away from the Headquarters of the Park. Only Thai specimens are treated in this paper, with the exception of the holotype and one paratype of *Scaphisoma operosum* from Malaysia, two paratypes of *Scaphisoma morosum* and one specimen of *Scaphicoma arcuatum* from Burma, and one paratype of *Scaphobaeocera tenella* from India. Locality data of a few incompletely-labelled, older specimens are given in inverted commas. Names of collectors are given in parenthesis, except for D. H. Burckhardt and the author, collectors of the remaining specimens.

Diagnostic characters. As in my previous papers, the length of specimens is measured from the middle of the apical pronotal margin to the inner apical angle of the elytra. However, in *Scaphidium* and *Cyparium* the total length is given. Size of immature specimens (usually smaller) has not been taken in account. Width refers to the maximum body width. Length of the mesepimeron and width of the metepisternum refer to their respective exposed portions. Apical angles of the elytra are compared in dorsal view. Colour is described from specimens which are observed with artificial light, and is thus paler than under natural conditions (dark reddish would be black). The relative length of antennal segments III to XI is measured at the same magnification in all my papers since 1974. Although to a certain degree infraspecifically variable, the size of the segments provides good characters in some species. The same is true for the size of the metacoxal areas (plates in my previous papers). Precise identification requires in most groups examination of the male genitalia. The internal sac is often complex and the parameres bear membranous lobes. These structures are difficult to see unless the aedeagus is properly cleared and carefully mounted. Students should be aware that different parts of the genitalia may vary to some degree, and in addition, the shape and position of structures within the internal sac depend on muscles attaching the latter to the median lobe. Therefore the aedeagi are to be examined very carefully, and when compared with the figures, small differences should not be uncritically interpreted as specific. Keys to species are based on external characters whenever possible, often on colour pattern. Naturally, they cannot be used for identification of immature specimens.

Other material. I have examined the type material of all previously described species which are included here. Only papers pertaining to the treated species and their synonymy are cited. For synonymy of genera and their type species, see Löbl 1978, 1979*a* and 1981*b*. Institutions in which material is deposited are listed below, together with the abbreviations used in the text.

BMH	B. Bishop Museum, Honolulu
FMNH	Field Museum Natural history, Chicago
MHNG	Muséum d'Histoire naturelle, Genève
MHNP	Muséum National d'Histoire naturelle, Paris
SMNS	Staatliches Museum für Naturkunde, Stuttgart
NHB	Naturhistorisches Museum, Basel
ZML	Zoological Museum, Lund

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This study was made possible with the approval of the National Research Council of Thailand. I wish to express my gratitude to the Authorities of the Council, and to the Director of the National Park Division, Mr. Seri Vejaboosakorn, for furnishing the necessary authorizations. Special acknowledgement is given to the Director and staff of the Forestry Department, Mae Hong Son, and to the Responsables and staff of the Doi Inthanon, Kaeng Krachan, Khao Sabap and Khao Yai National Park. Without their generous help it would certainly have been impossible to carry out our field work so efficiently.

The following institutions and individuals made collections available: M. Brancucci (Naturhistorisches Museum, Basel), H. Franz (Mödling), D. H. Kistner (Chicago), the late T. Palm (Uppsala), G. A. Samuelson (Bernice P. Bishop Museum, Honolulu), M. Satô (Nagoya), M. Schawaller (Staatliches Museum für Naturkunde, Stuttgart). Their assistance and loan of specimens is gratefully acknowledged.

Several colleagues generously donated material from their own collections. I would like to thank here once more H. J. Bremer (Düsseldorf), E. Heiss (Innsbruck) and G. M. de Rougemont (London). I am particularly grateful to P. Schwendinger (Innsbruck) for collecting on my behalf, and to L. Deharveng (Toulouse) and J.-P. Besson (Tarbes) for the gift of specimens collected by the French Speleological Expedition (FSE).

My cordial thanks are due also to H. Bänzinger (Chiang Mai) for his hospitality and assistance during our stay in and around Chiang Mai.

SYSTEMATICS

ACHARD (1924) published a classification of the Scaphidiidae in which he recognized seven tribes, and in some of them several subtribes. Although many of the characters used prove to be of no phylogenetic significance (i.e. approximate coxae in ''Toxidiini'', shape of the antennae in ''Cerambyciscaphini'') a more natural classification of the group has yet to be proposed. Therefore, I prefer not to use suprageneric names within the scaphidiids. The treatment of genera in the present paper, as in my previous studies, does, however, reflect the traditional system.

KEY TO THAI GENERA OF SCAPHIDIIDAE

(Genera in parenthesis are not recorded but may occur in Thailand).

1 Segments of antennal club symmetrical. Scutellum large. Robust species ... 2

— Segments VII to X, sometimes also other antennal segments, asymmetrical. Scutellum completely covered, or its small apical portion exposed. Usually small, graceful, species ... 4

2 Eye not notched. Pro- and mesotibiae bearing rows of spines. Pronotum lacking transverse row of punctures ... *Cyparium*

— Eye notched. Tibiae lacking row of spines. Pronotum with a sub-basal row of coarse punctures ... 3

3 Base of elytron impressed to receive basal angle of pronotum. Elytra without longitudinal striae ... *Scaphidium*

— Base of elytron not impressed; basal pronotal angles not extended apically. Elytra with deep longitudinal stria ... *(Ascaphium)*

4 Third antennal segment short, asymmetrically triangular. First ventrite with coxal areas ... 5

— Third antennal segment elongate, cylindrical or somewhat stouter apically, usually symmetrical, not triangular. Coxal area absent from first ventrite .. 8

5 Body, except for isolated macrosetae, apparently glabrous. Pubescence on pronotum and elytra extremely short, usually not emerging from points ... 6

— Dorsal and ventral surface of body and legs conspicuously pubescent ... 7

6 Apical segment of maxillary palpus about as wide as preceding and tapering ... *Scaphisoma*

— Apical segment of maxillary palpus enlarged and flattened, with a groove on external margin .... *(Caryoscapha)*
7 Mesepimeron distinct .... *Sapitia*
— Mesepimeron obsolete .... *(Mystrix)*
8 Meso- and metacoxae distant. Body not conspicuously narrowed 9
— Meso- and metacoxae approximate. Body conspicuously narrow 12
9 Antennal insertion lying near upper eye margin. Legs and antennae very long .... *Bironium*
— Antennal insertion lying near lower eye margin, close to frontoclypeal suture. Legs and antennae not so long 10
10 Mesepimeron distinct. Basal angle of pronotum extending ventroapically to near anterior margin of metepisternum .... *Baeocera*
— Mesepimeron obsolete. Basal angle of pronotum not extended apically, removed from anterior margin of metepisternum 11
11 Antennal segments VII to XI elongate, XI somewhat longer than X .... *Pseudobironium*
— Antennal segments VII to X about as long as wide, XI elongate, about as long as VIII, IX and X together .... *(Amaloceromorpha)*
12 Mesepimeron distinct 13
— Mesepimeron obsolete 14
13 Elytron with parasutural stria, usually microsculptured and iridescent .... *Scaphobaeocera*
— Elytron without parasutural stria, lacking microsculpture, not iridescent .... *Baeotoxidium*
14 Third antennal segment curved externally. Antennal insertions near frontoclypeal suture .... *Scaphoxium*
— Third antennal segment straight, antennal insertion removed from frontoclypeal suture 15
15 Legs and antennae moderately long. Antennae reaching only somewhat behind level of elytral base. Tarsi not or moderately longer than metatibiae. Sutural stria of elytron usually shortened anteriorly .... *Toxidium*
— Legs and antennae very long. Antennae reaching far behind level of elytral base. Metatarsi much longer than metatibiae. Elytron with sutural stria reaching base .... *Scaphicoma*

Scaphidium Olivier

Most of the larger scaphidiids are assigned to *Scaphidium* which includes more than 200 species. As the related genera of Scaphidiini, *Scaphidium* is not well defined, and most of the tropical species have not yet been adequately characterized.

Scaphidium lunatum Motschulsky

Scaphidium lunatum Motschulsky, 1859: 94.
Scaphidium lunulatum (sic); Pic 1921*a*: 158.
Scaphidiolum lunatum; Achard 1924*b*: 91.

Material examined: 2, Chiang Mai, Chiang Dao, 450 m, 5.-11.IV.58 (Maa) (MHNG, BMH).

Distribution: Burma, Thailand. — New to Thailand.

Remarks. The origin of the type from "Ind. or." is not known.

Scaphidium grande Gestro

Scaphidium grande Gestro, 1880: 50.
Scaphidium grande; ACHARD 1920*a*: 56; 1920*b*: 125; 1920*d*: 211; 1924*b*: 91.
Scaphidium grande; PIC 1915*c*: 3; 1920*a*: 189.

Material examined: 1, Chiang Mai, Doi Pui, 15.VI.85 (NMB).

Distribution: North India, Burma, Thailand, Laos, Malaysia, Vietnam, Indonesia, Taiwan. — New to Thailand.

Scaphidium species A

Material examined: 1, Chiang Mai, Chiang Dao, Tham Ban Doi, Phae Daeng, 3.VIII.85 (FSE); 2, Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss).

Remarks. This species resembles *biseriatum* Champion but is stouter and has coarser punctate elytra.

Scaphidium baconi Pic

Scaphidium baconi Pic, 1915*d*: 43.
Scaphidium assamense Pic, 1915*d*: 43.
Scaphidium baconi; ACHARD 1922: 263.

Material examined: 1, Chiang Mai, Doi Suthep, 1100 m, IV.86, pit-fall trap (Schwendinger) (MHNG).

Distribution: India, Thailand. — New to Thailand.

Scaphidium sp. B

Material examined: 1, Chiang Mai, Chiang Dao, 450 m, 5.-11.IV.58 (Maa) (BMH).

Remarks. This female specimen is very similar to a syntype of *sondaicum* Gestro I have examined but differs in having coarser microsculpture on the ventrites 2 to 5.

Cyparium Erichson

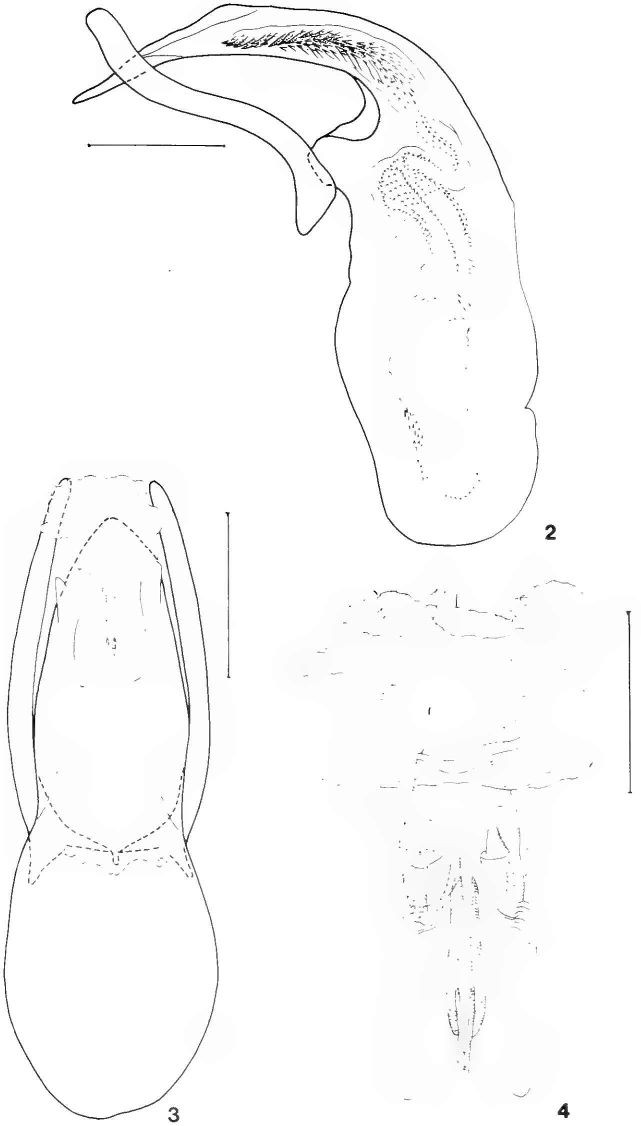
Cyparium may be readily distinguished from other scaphidiids by their compact antennal club, not notched eyes, stout body, and spinose pro- and mesotibiae. Members of the genus are frequently found in the tropics and subtropics of the New World while Old World species are poorly represented in collections, *mikado* Achard from Japan excepted. So far 44 species were described, two are represented in the Thai collections.

Cyparium siamense sp. n.

Holotype ♂: Khao Yai Nat. Park, forest near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Paratypes: 1♂, Chiang Mai, Doi Angkhang, 10 km W Fang, 920 m, 18.III.87 (Schwendinger); 1♀, Doi Suthep, 1200 m, 15.I.87 (Schwendinger) (MHNG).

Length 3.2-3.4 mm (2.4-2.5 mm from apical margin of pronotum to apex of elytra), pronotum 1.5 mm wide at base, elytra combined 1.7-1.8 mm wide. In general appearence very similar to *tamil* Löbl from which it differs in following characters: body smaller and paler reddish brown. Frons narrower, smallest interval between eyes 0.15-0.17 mm. Lateral margin of pronotum sinuate near base, lateral margin keel distinct in basal half (dorsal view). Scutellum shorter, its exposed portion at base wider than long. Lateral



Figs 2 to 4.

2. *Cyparium siamense* sp. n., holotype, aedeagus; 3. *Pseudobironium subglabrum* sp. n., holotype, aedeagus; 4. dtto, internal sac. Scale = 0.2 mm (2, 3), 0.1 mm (4).

margin keel not visible at wider than long. Lateral margin keel in dorsal view not visible at largest point of elytron. Elytral punctation less coarse, sutural margin of elytron and sutural stria flat and impressed. Punctation on visible tergites coarser, especially medially, that on pygidium coarser than on propygidium. Metasternum with two deep longitudinal impressions just in front of apical intercoxal process, latter somewhat convex in mid-line. Punctation on lateral portion of 1st visible ventrite irregular and sparse.

Sexual characters of male. Segments 1 to 3 of protarsi distinctly enlarged. Aedeagus (fig. 2) 0.95 mm long.

Remarks. Only 15 species of *Cyparium* are recorded from Asia. Among them *montanum* Achard, *plagipenne* Achard, *variegatum* Achard, *bowringi* Achard and *tenenbaumi* Pic are characterized by the colour pattern. *C. mikado* Achard, *sibiricum* Solsky, *laevisternale* Nakane as well as *tenenbaumi* differ from *siamense* by much larger size of body, *khasianum* Löbl may be separated by coarsely punctate lateral portion of metasternum and microsculptured hypomeron, *semirufum* Pic, *testaceum* Pic and *punctatum* Pic differ from *siamense,* as well as from *tamil* and *khasianum,* in havin 6 or 7 rows of coarse punctures on each elytron. Finally, *monticola* Miwa & Mitono and *formosanum* Miwa & Mitono are not adequately described and their respectives types have not been located. According to the original figure of *formosanum* I would gues rather a *Pseudobironium* under this name, althought some of the characters noted in the description (elytron with four rows of punctures, large size) are those of *Cyparium. C. monticola* is not figured but its description suggest rather a *Pseudobironium* or a large species of the genus *Baeocera.*

Cyparium semirufum Pic

Cyparium semirufum Pic, 1917: 3.

Material examined: 1, Chiang Mai, Chiang Dao, 450 m, 5.-11.IV.58, on dead tree (Maa) (BMH).

Distribution: Vietnam, Thailand. — New to Thailand.

Remarks. This specimen differs slightly from examined *semirufum* from Vietnam by somewhat coarser punctation on 1st ventrite, propygidium und pygidium. The species may be readily distinguished from *siamense* by large size (length 3 mm from apical margin of pronotum to apex of elytra, maximum width 2.0-2.2 mm), paler rufous colour of body, elytron with 6 rows of coarse punctures, and metasternum without any impression.

Pseudobironium Pic

The genus includes 21 described species all Oriental or East Palearctic and *globosum* Löbl from New Caledonia. *Pseudobironium* are moderately large to large scaphidiids with broad, not keeled mesosternum, not visible mesepimera, alongate 3rd antennal segment, complete suturo-basal stria of elytron, stout tibiae, and 1st ventrite without coxal areas. Their body is less vaulted than in most other scaphidiids of similar size and, with exception of a few species with particular colour pattern, they are difficult to distinguish. The four species found in Thailand may be separated by the following key.

1 Body unicolorous reddish to black 2
— Pronotum and elytra maculate .... species indet b.
2 Maxillary palpus slender, with apical segment more than 3 × longer than wide 3
— Maxillary palpus short and stout, apical segment less than 2 × longer than wide .... *sparsepunctatum*

3 Larger species about 3.5 mm long. Body rufous. Antennae long, with apical segment more than 3× longer than wide .... *carinense*

— Small species 2.2 mm long. Body blackish. Antennae shorter, with apical segment 2× longer than wide .... *subglabrum*

Pseudobironium carinense (Achard)

Morphoscapha carinense Achard, 1920*b*: 134.

Material examined: 2, Chiang Mai, Doi Chiang Dao, 1060 m, 17.VII.86 (Schwendinger); Doi Chiang Dao, 450 m, 5.-11.IV.58 (Maa) (MHNG, BMH).

Distribution: Burma, Thailand. — New to Thailand.

Remarks. *P. castaneum* Pic described from Vietnam is very similar and possibly synonym with *carinense*.

Pseudobironium sparsepunctatum (Pic)

Amalocera sparsepunctata Pic, 1915*b*: 31.
Morphoscapa banguyi Achard, 1920*b*: 134.
Pseudobironium sparsepunctatum; LÖBL 1982*d*: 790.

Material examined: 1, Mae Hong Sop Pong, 600-700 m, 12.XI.85 (MHNG); 1, Songkhla (W), Watterfall 2 km SE Satun Rd., 16.I.64 (Samuelson) (BMH).

Distribution: Thailand, Malaysia (Sarawak, Sabah inc. Banggi), Philippines (Palawan). — New to Thailand.

Pseudobironium species

Pseudobironium species indet. b.; LÖBL 1982*a*: 160.
Pseudobironium; LÖBL 1984*a*: 62.

Remarks. So far 3 ♀ are recorded from Meghalaya and from Doi Pui, Chiang Mai prov. The species is left undescribed until males will be available for examination.

Pseudobironium subglabrum sp. n.

Holotype ♂: Chiang Mai, Doi Inthanon, 1650 m, 17.XI.85 (MHNG).

Length 2.2 mm. Body moderately convex, almost black. Apical segments of abdomen, tibiae and tarsi reddish. Antennal segments I to VI yellowish, following segments pale brown. Apical segment of maxillary palpus slender, about 3,5 × longer than broad, at base slender than apex of segment III. Antennae moderately long, relative length/width of segments: III 16/7, IV 25/6, V 29/7, VI 20/7, VII 30/10, VIII 27/10, IX 29/12, X 27/13, XI 34/17. Pronotum at base 1.45 mm wide, with basal third of lateral margin oblique and lateral carina visible in dorsal view. Pronotal punctation rather dense and very fine, barely visible at 12× magnification. Elytra combined 1.6 mm wide, contours oblique in middle portion; lateral carina visible from base to apex in dorsal view; interval between sutural margin and sutural stria flat, very finely punctate; sutural stria shallow, finely punctate; basal stria impunctate; lateral and epipleural striae punctate; discal punctuation sparse and very fine, on most of the elytral surface only somewhat coarser than that on pronotum, decidedly denser and coarser on a narrow impressed apical area and on a small flattened apico-lateral area. Punctation on pygidium very fine. Punctation of mesosternum dense and fine, that of mesepisternum and lateral portions of metasternum very sparse and extremely fine, barely visible at 100× magnification.

Median portion of metasternum rather flat, without microsculpture, its apical 1/4 (apical intercoxal process smooth) densely and rather coarsely punctate, with punctures as large or somewhat smaller than intervals; narrow median strip smooth in front of the densely punctate area. Punctation irregular and sparse on each side of the smooth strip. Mesocoxal areas 0.06 mm long, with coarsely punctate margins. Visible abdominal segments (including the laterobasal portion of 1st ventrite) with distinct microsculpture consisting of punctures. First ventrite very finely and sparsely punctate; lateral portions impunctate, on each side with a transverse impressed line and a small round impression. Protibiae straight, 0.46 mm long. Mesotibiae and metatibiae curved, 0.67 mm and 0.84 mm long respectively. Segments 2 to 5 of mesotarsi about 2.2× longer that segment 1; segments 2 to 5 of metatarsi about 1.8× longer than segment 1.

Male. Segments 1 to 3 of protarsi enlarged. Aedeagus (figs 3 and 4) 0.74 mm long.

This species is similar to *almoranum* Champion from which it may be easily distinguished by the finer punctation of the pronotum and elytra, shallower sutural striae of elytra, and broader apical portion of the median lobe of the aedeagus.

Baeocera Erichson

Baeocera are small-sized scaphidiids with 3rd antennal segment slender, maxillary galea narrow, coxal cavities not or moderately approximate, 1st ventrite coarsely punctate or ridged at base (lacking coxal lines), basal angles of pronotum usually covering anterior portion of metepisternum, mesepimeron distinct. Most of the Thai scaphidiids collected by sifting forest litter belong to this genus. Some 160 species have been described to date, 7 of which are recorded below, and further 15 are described as new.

KEY TO THE THAI SPECIES OF BAEOCERA

1 Lateral portion of metasternum impunctate or very finely punctate (100× magnification) (coarse punctures margining mesocoxal lines excepted) 2
— Lateral portion of metasternum all over coarsely punctate or with apical row of coarse punctures 7
2 Pygidium coarsely punctate and with keeled lateral margin ...... *pubiventris*
— Pygidium finely very finely punctate, lateral margin not keeled 3
3 Sutural stria extended along basal margin of elytron to humeral area and joint with lateral stria ...... *barbara*
— Sutural stria more or less extended along basal margin of elytron but not joint with lateral stria 4
4 Laterobasal portion of 1st ventrite ridgy. Basal third of elytron very finely punctate. Small species 1.1 mm long ...... *bremeri*
— Base of 1st ventrite margined with coarse, more or less elongate punctures, not ridgy. Larger species 5
5 Pronotum and elytra all over evenly and very finely punctate ...... *khasiana*
— Elytral centre much coarser punctate than base or than pronotum 6
6 Apical 2/5 of elytron much finer punctate than centre of elytron ...... *innocua*
— Apical portion of elytron only somewhat finer punctate than centre of elytral disk ...... *insolida*
7 Lateral portion of metasternum with dense row of coarse punctures along apical margin and few additional coarse punctures between anterior and apical margins 8

— Metasternum lacking distinct row of punctures along apical margin 9

8 Apical antennal segment barely longer than penultimate. Length 1.4 mm .... *schwendingeri*

— Apical antennal segment distinctly longer than penultimate. Length 1.45-1.60 mm .... *pyricola*

9 Pronotum conspicuously coarsely punctured (12× magnification). Hypomeron with several distinct punctures .... species indet.

— Pronotum usually very finely punctate (50-100×). Hypomeron impunctate .. 10

10 Most of elytral surface distinctly punctured. Apical portion of elytron not or only somewhat finer punctured than central part of elytron 11

— Punctation on apical 1/3 to 1/2 of elytron very fine, much finer than that on central area of elytron 17

11 Metatarsus short, as long or somewhat longer than half of metatibia. Length 1.70-2.25 mm .... *mussardi*

— Metatarsus long, as long as or somewhat longer than 4/5 of metatibia. Usually smaller species 12

12 Sutural and lateral striae more or less extended along basal margin of elytron and often joint 13

— Sutural stria short, obsolete near pronotal lobe, not curved and not extended along base of elytron .... *schreyeri*

13 Lateral portion of metasternum with few coarse punctures most of which are lying near metepisternum .... *uncata*

— Most of metasternal surface densely and more or less coarsely punctate 14

14 Metepisternum distinct, with deep, large, punctate suture .... *serendibensis*

— Metepisternum indistinct, with suture indicated by outer row of coarse metasternal punctures 15

15 Apical half of parameres of aedeagus narrowed .... *pigra*

— Parameres not narrowed apically 16

16 Parameres of aedeagus slender and straight. Internal sac with rows of sclerotized denticles along ejaculatory duct .... *vidua*

— Apical part of parameres more or less divergent. Internal sac without denticles, ejaculatory duct vesicular before entering into complex of sclerites .... *longicornis*

17 Sutural stria extended along base of elytron to humeral area, not joint with lateral stria 18

— Sutural stria extended along base to lateral area and joint with lateral stria . 20

18 Internal sac of aedeagus with a basal tuft of sclerotized spicules; parameres notched subapically 19

— Aedeagus without any spicules; parameres not notched .... *deharvengi*

19 Apical portion of parameres wide and short, interval between notch and apex about 0.05 mm long, 1.5 to 2× longer than wide at widest point (just behind notch) .... *franzi*

— Apical portion of parameres slender, interval between notch and apex 0.06-0.08 mm long, 3 to 4× longer than wide at widest point (just behind notch) .... *ventralis*

20 Parameres narrowed basally and apically of level of apex of median lobe, not enlarged at apex .... *suthepensis*

— Shape of the parameres different 21

21 Smaller species, usually less than 1.35 mm long. Parameres slender 22
— Larger species 1.35-1.50 mm long. Parameres of aedeagus large, especially in basal half .... *pseudinculta*
22 Parameres almost straight. Internal sac with a large vesica formed by enlarged ejaculatory duct .... *karen*
— Apical portion of parameres distinctly curved. Internal sac without vesicular ejaculatory duct .... *erroris*

Baeocera mussardi mussardi (Löbl)

Eubaeocera mussardi Löbl, 1971: 944.
Baeocera mussardi mussardi; Löbl 1979*a*: 89.

Material examined: 3, Phetchaburi, Kaeng Krachan Nat. Park, near Headquaters, 200 m, 16.XI.85 (MHNG); 2, Samutprakan, Pattaya, 28.II.79 (Palm) (ZML).

Distribution: Sri Lanka, Thailand. — New to Thailand.

Remarks. Surprisingly, no significant differences are found to separate the Thai specimens from the Ceylonese ones while specimens collected in India may be readily distinguished (Löbl 1979*a*).

Baeocera serendibensis (Löbl)

Eubaeocera serendibensis Löbl, 1971: 946.
Baeocera serendibensis; Löbl 1979*a*: 89; 1984*a*: 65.

Material examined: 8, Mae Hong Son, Tham Lok Forest Park, 8 km N Sop Pong, 700 m, 11. and 13.XI.85; 2, near Sop Pong, 600-700 m, 12.XI.85; 26, Phetchaburi, Kaeng Krachan Nat. Park, 200-450 m, 16.-19.XI.85; 1, Chantaburi, Khao Soi Dao, 300 m, 7.V.87 (Schwendinger) (all MHNG).

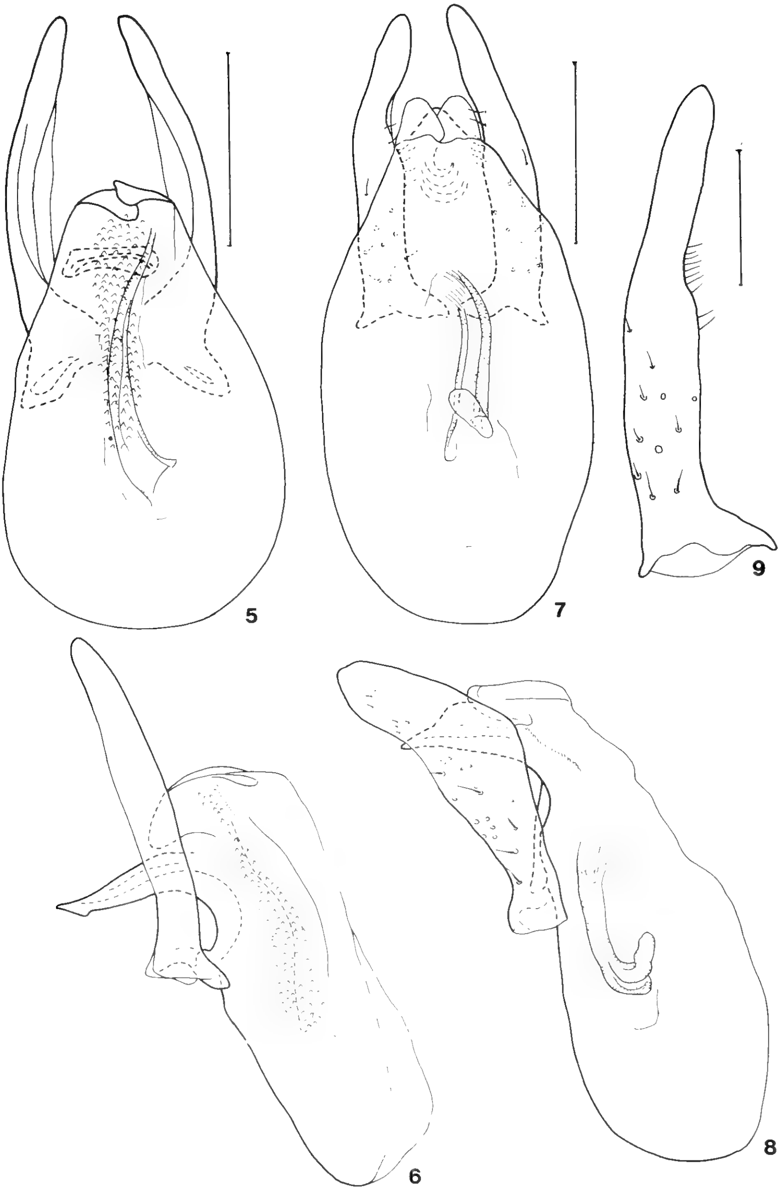
Distribution: Sri Lanka, India, Pakistan, Thailand. — New to Thailand.

Remarks. This is a variable and possibly polytypic species. In most of the Thai specimens the 1st ventrite is more or less coarsely punctate, the elytron is very finely punctate only on a large basal area, and the internal sac of the aedeagus bears two slender sclerites. Curiously, one male and two females from the Kaeng Krachan Nat. Park differ in having the elytra finely punctate apically, the 1st ventrite almost impunctate behind the basal row of the coarse elongate punctures, and in the male one of the sclerites of the internal sac is enlarged similar to some of the specimens from North India and Pakistan.

Baeocera bremeri sp. n.

Holotype ♂: Khon Kaen: Khon Kaen, 21.II.81, on light (Saowakontha) (MHNG).

Length 1.1 mm, width 0.76 mm. Body dark brown to blackish with reddish shine. Apex of elytra, abdomen, coxae, femora and tibiae ochreous, tarsi yellowish, antennal segments I-V ochreous, following segment brown. Eyes large. Antennae rather short, relative length of segments as: III 8, IV 9, V 11, VI 10, VII 15, VIII 13, IX 18, X 17, XI 23; segment III somewhat more than 2× longer than wide; IV 3× longer than wide, somewhat slender than III; V and VI barely wider than III, about 2.5× longer than wide; VII and VIII each about 2× longer than wide, much wider than VI; VIII to XI distinctly wider than VII, XI 2.5× longer than wide. Pronotal punctation sparse and very fine, indistinct at 25×; lateral margin keels of pronotum not visible in dorsal view. Scutellum completely covered by pronotal lobe. Elytra rather narrowed apically; lateral margin keel visible in middle portion but not near base or apex (dorsal view); sutural margin elevated; sutural stria fine, impunctate, curved along basal margin and extended to middle of basal



FIGS 5 to 9.

5 and 6. *Baeocera bremeri* sp. n., holotype, aedeagus; 7 and 8. *Baeocera pyricola* sp. n., holotype, aedeagus; 9. dtto, paramere. Scale = 0.1 mm (5-8), and 0.05 mm (9).

width; interval between sutural margin and sutural stria flat, very finely punctate; lateral stria with a few very fine punctures; discal punctation very fine and sparse, similar as that on pronotum on whole basal third and on inner portion of elytral disk (up to apex); outer half of disk (basal third excepted) closely and relatively coarsely punctate, in middle of lateral portion punctures larger than intervals between them. Propygidium and basal portion of pygidium densely and rather finely punctate, apical portion of pygidium very finely punctate. Hypomeron smooth. Mesosternum impunctate, with a very low barely visible median keel. Mesepimeron about 2× longer than interval between its inner end and mesocoxa. Median portion of metasternum moderately vaulted, with rather large smooth central area limited laterally and apically by very dense, coarse setiferous punctures, latter larger than intervals between them. Lateral portion of metasternum rather densely and very finely punctate, on anterior half very finely ridgy. Mesocoxal area 0.06 mm long, subtriangular, with distinct marginal punctures. Metepisternum almost flat, 0.10 mm wide in almost parallel-sided apical half, from middle on anterad narrowed; suture deep, convexly rounded in anterior half, straight in apical half, distinctly punctured. Apical abdominal segments with microsculpture consisting of punctures. Abdominal pubescence short. Median portion of 1st ventrite densely and coarsely punctate, except on a very finely punctate area near apical margin. Lateral portion of 1st ventrite ridgy in basal half, with ridges up to 0.12 mm long and intervals between the ridges rather coarsely punctate. Tibiae straight, metatibia 0.33 mm, as long as metatarsus.

Sexual caracters of male. Segments 1 to 3 of protarsi distinctly enlarged. Aedeagus (figs 5 and 6) 0.31 mm long.

The aedeagus in *bremeri* is similar to that in *schirmeri* Reitter, *myrmidon* (Achard), *gerardi* (Pic) and *palmi* Löbl. The new species may be easily separated from the Mediterranean *schirmeri* and the Afro-tropical *gerardi* and *palmi* by the conspicuous elytral punctation and by the very finely punctate lateral portion of the metasternum. It differs from *myrmidon* by the longer ridges and by basal punctation on the 1st ventrite, and by the distal portion of the median lobe which is conspicuously bent.

Baeocera pyricola sp. n.

Holotype ♂: Mae Hong Son, Tham Lok Forest Park, 8 km N Sop Pong, 11 and 13.XI.85 (MHNG).

Paratypes: 2♀, Mae Hong Son, as holotype; 2♂, Chiang Mai, Doi Inthanon, 1250 m, near Forestry Department, 6.XI.85; 1♀, Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Length 1.45-1.60 mm, width 1.01-1.10 mm. Dark reddish brown to blackish, tarsi and antennae yellowish. Eyes large. Antennae long, relative length of antennomeres as: III 16, IV 19, V 24, VI 23, VII 25, VIII 22, IX 25, X 24, XI 34 (holotype); segments III to VI very slender, evenly wide; V and VI 6 to 7× longer than wide; VII and VIII slender, with long apical funicle, each 4-5× longer than wide, VIII somewhat wider than VI; IX to XI distinctly wider than VII, XI about 3.5× longer than wide. Pronotum with regularly rounded lateral margins; lateral keels not visible in dorsal view; punctation extremely fine, barely visible at 100× magnification. Basal angle of pronotum covering base of epipleuron, not extended behind level of middle of mesepimeron. Point of scutellum exposed. Elytra moderately narrowed apically; lateral margin almost straight in middle; lateral keel visible in dorsal view only near base; sutural margin not elevated; sutural stria rather fine, coarsely punctate, extended along base and joint with lateral stria; interval between sutural margin and sutural stria flat, rather coarsely punctate; lateral stria distinctly punctate; punctation dense and coarse all over except on a narrow laterobasal area which is as finely punctate as pronotum, coarse punctures not well delimited, usually larger then interval between them. Hypomeron impunctate. Pygidium very finely punctate, lacking marginal keel. Mesosternum not keeled, impunctate. Mesepimeron variable large, about as long as intervals between its inner end and mesocoxa. Median portion of metasternum vaulted; with large impunctate central area limited laterally by a row of coarse punctures, and apically limited by one or two irregular rows of coarse punctures. Lateral portion of metasternum with an impressed, coarsely punctate line parallel to apical margin, coarsely punctate anterior margin and several coarse punctures near lateral margin, remaining surface smooth. Mesocoxal area narrow, 0.02 mm long, with coarse marginal punctures. Metepisternum flat, at widest point 0.04-0.05 mm, gradually narrowed anteriorly, inner suture straight, deep, coarsely punctured, curved near mesepimeron. First ventrite coarsely and rather sparsely punctate, with most punctures decidedly smaller than intervals between them; basal row of punctures dense, not interrupted in middle, extended to lateral keel, consisting of coarse, not elongate punctures. Following ventrites very finely punctate, with microsculpture consisting of points. Abdominal pubescence normally long. Tibiae barely curved, metatibiae 0.48-0.55 mm long, about 1.2× longer than metatarsi.

Sexual characters of male. Segments 1 to 3 of protarsi somewhat enlarged. Aedeagus (Figs 7 to 9) long 0.35-0.40 mm.

This new species is closely related to *pilifera* Löbl (see discussion under *schwendingeri* sp. n.). It may be distinguished by the smaller size of the body and by the parameres of the aedeagus which are shallowly notched.

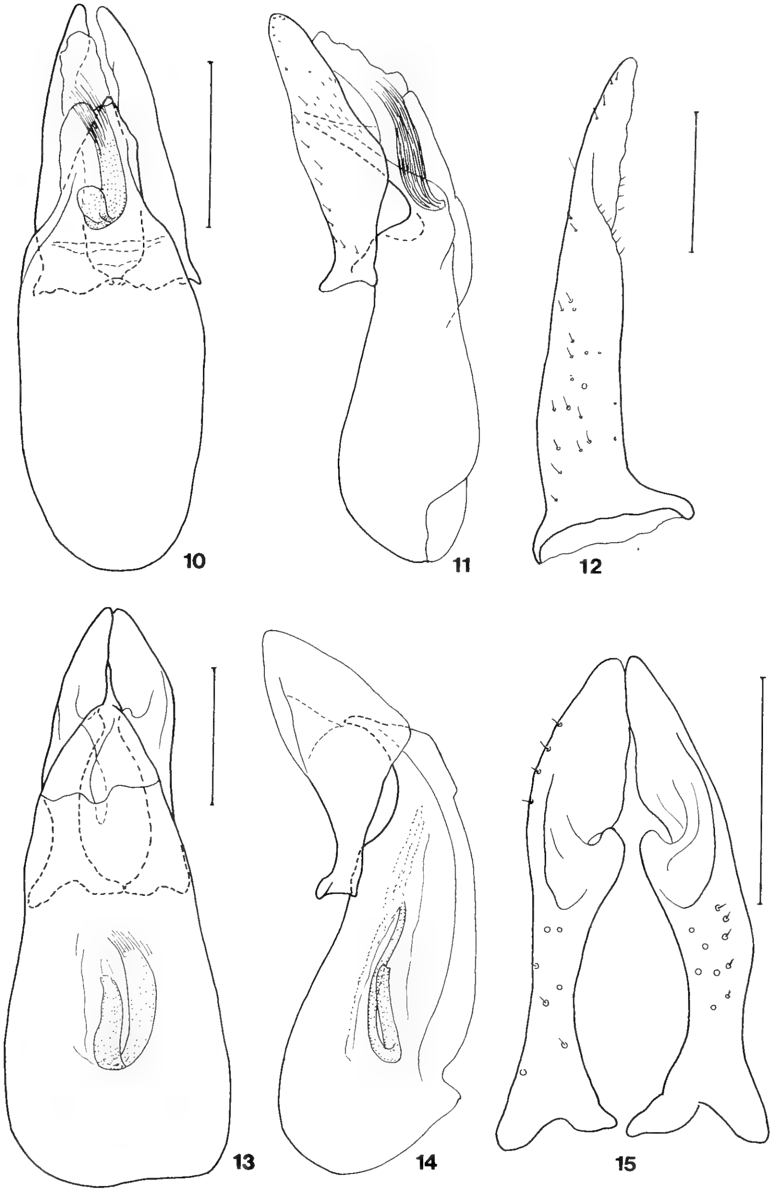
Baeocera schwendingeri sp. n.

Holotype ♂: Kanchanaburi, Sai Yok Nat. Park, 100 m, 21.VII.87 (Schwendinger) (MHNG).

Length 1.4 mm, width 0.90 mm. Body reddish brown, apex of abdomen, tarsi and antennae yellowish. Eyes large. Antennae long, relative length of segments as III 14, IV 20, V 22, VI 20, VII 25, VIII 24, IX 26, X 25, XI 27; antennomeres III to VI slender, almost evenly wide, IV and VI about 5× longer than wide, V about 5.5× longer than wide; VII and VIII with long apical funicle, VII 3.5× longer than wide, VIII almost 5× longer than wide; IX about as wide as VII, XI wider, not quite 3× longer than wide. Pronotum as in *pyricola*. Point of scutellum exposed. Elytra similar as in *pyricola* but sutural margin somewhat elevated, punctation not so coarse, with almost smooth, narrow lateroapical area, most of coarse discal punctures smaller or as large as intervals between them; punctures on lateral area before the centre coarser, larger than intervals. Ventral surface as in *pyricola,* except for somewhat finer punctation and for metepisternum which is 0.03 mm wide in anterior third, then gradually enlarged apically, near metepimeron 0.05 mm wide. Protibiae somewhat curved, meso- and metatibiae straight, metatibiae 0.46 mm long.

Sexual characters of male. Segments 1 to 3 of protarsus somewhat enlarged. Aedeagus (Figs 10 to 12) 0.34 mm long.

B. schwendingeri shares with *pilifera* and *pyricola* the peculiar metasternal punctation and similar male genitalia. The three species form a holophyletic group characterized also by short basal angles of pronotum, impunctate mesosternum, elytron with complete sutural stria, long antennae with slender apical funicle on the segments VII and VIII.



FIGS 10 to 15.

10 and 11. *Baeocera schwendingeri* sp. n., holotype, aedeagus; 12. dtto, paramere; 13 and 14. *Baeocera uncata* sp. n., holotype, aedeagus; 15. dtto, parameres. Scale = 0.1 mm (10, 11, 13-15) and 0.05 mm (12).

B. schwendingeri may be easily separated from *pyricola* and *pilifera* by its smaller size, and by relatively short distal antennomere which is only somewhat longer than the antennomeres VII, IX or X.

Baeocera uncata sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, 1550 m, north slope, 4.XI.85 (MHNG).

Paratypes: 1♂, Chiang Mai, Doi Inthanon, 1250 m, ravine near Forestry Department, 6.XI.85; 1♂, Mae Hong Son, Tham Lok Forest Park, 8 km N Sop Pong, 700 m, 11.-13.XI.85 (MHNG).

Length, 1.65-1.70 mm, width 1.16-1.22 mm. Body dark reddish brown, tarsi and antennae paler to yellowish. Eyes large. Relative length of antennal segments as: III 16, IV 20, V 25, VI 22, VII 26, VIII 24, IX 26, X 22, XI 25 (holotype); III to VI slender, evenly wide, III about 4× longer than wide, IV 5× longer than wide, V 6× longer than wide; VI 5.5× longer than wide, VII and VIII each about 4× longer than wide, VII much wider than VI; VIII somewhat narrower than VII, wider than VI; IX slightly wider, XI much wider than VII, and 2.5× longer than wide. Pronotum laterally rounded; lateral keels not visible in dorsal view; punctation very fine and sparse, barely visible at 50× magnification; basal angle reaching to center of mesepimeron. Distal part of scutellum exposed. Elytra rather strongly narrowed apically; lateral margin rounded; lateral keel visible only near base in dorsal view; sutural margin not elevated; sutural stria deep, extended along base and joint with lateral stria; both, lateral and sutural striae rather coarsely punctate; interval between sutural margin and sutural stria flat, finely punctate; punctation very fine near base, elsewhere more or less coarse, on inner portion of disk rather sparse (punctures decidedly smaller than intervals) on outer portion dense (punctures often larger than intervals betweens them). Apical segments of abdomen with microsculpture consisting of punctures. Pygidium very finely punctate, margin not keeled. Hypomeron impunctate. Mesepimeron shorter than interval between ist inner end and mesocoxa. Median portion of metasternum somewhat vaulted, with large smooth central area limited laterally and apically by coarse punctures. Punctation on lateral portion of metasternum irregular, coarse and sparse, with a row of punctures along the anterior margin. Mesocoxal area narrow, 0.03-0.04 mm long, with coarse marginal punctures. Metepisternum somewhat vaulted, 0.09-0.11 mm wide, anterad not or barely narrowed, suture deep, straight, distinctly punctured. Punctation on 1st ventrite irregular, coarse and more or less sparse; basal row of coarse punctures dense, extended laterally to or almost to lateral keel, not interrupted in middle, consisting of elongate punctures (except in middle). Tibiae somewhat curved, metatibiae 0.53-0.57 mm long.

Sexual characters of male. Segments 1-3 of protarsus barely enlarged. Lobe of 6th ventrite small, about 0.04 mm long, widely rounded. Aedeagus (Figs 13 to 15) 0.45 mm long.

This species is very similar and closely related to *micros* (Achard) with which it shares most of the taxonomically significant characters, including those of the male genitalia. It differs by the larger metepisterna and by the shape of the wider parameres and the stouter sclerite of the internal sac.

Baeocera ventralis (Löbl)

Eubaeocera ventralis Löbl, 1973*b:* 157.
Baeocera bhutanensis Löbl, 1977*a*: 251.
Baeocera ventralis; Löbl 1984*a*: 76.

Material examined: 4, Chiang Mai, Doi Inthanon, 1250 m, ravine near Forestry Department, 6.XI.85; 12, Mae Hong Son, Tham Lok Forest Park, 8 km NE Sop Pong, 700 m, 11. and 13.XI.85; 1, Petchaburi, Kaeng Krachan Nat. Park, near Headquarters, 200 m, 16.XI.85 (all MHNG).

Distribution: Thailand, North India, Bhutan, North Pakistan.

Baeocera franzi (Löbl)

Eubaeocera franzi Löbl, 1973*b*: 158.

Material examined: 35, Chiang Mai, ravine 1 km below Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 10, rd for Wab Pang An 50 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.1985; 1, Doi Inthanon, 910 m, 23.II.87 (Schwendinger); 25, Doi Chiang Dao, 450 m, 7.V.87 (Schwendinger); 6, Mae Hong Son, Tham Lok Forest Park, 8 km N Sop Pong, 700 m, 11-13.XI.85; 34, Phetchaburi, Kaeng Krachan Nat. Park, 300-450 m, 17.-19.XI.85; 62♂, 74♀ Khao Yai Nat. Park, forest near Headquarters, 750-850 m, 26.XI.-3.XII.85; 27, hills east of Heo Suwat Waterfalls, Khao Yai Nat. Park, 800-900 m, 1.XII.85 (all MHNG).

Distribution: Thailand.

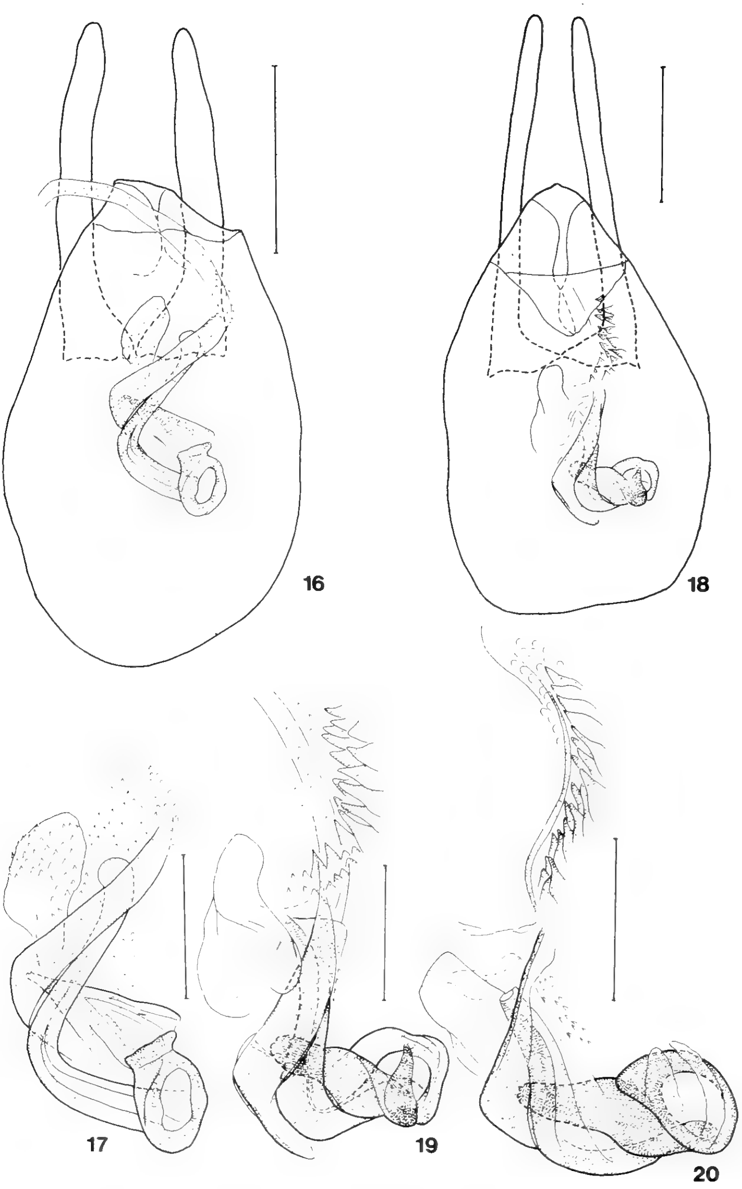
Remarks. Males of *franzi* may be separated from those of *ventralis* by the shape of the parameres of the aedeagus. The females have been identified from samples in which males of only one of the two species were found.

Baeocera schreyeri sp. n.

Holotype ♂: Chiang Mai, Doi Inthanon, 1250 m, ravine near Forestry Department, 6.XI.85 (MHNG).

Paratypes: 14♂, 12♀ as holotype; 1♀, Doi Inthanon, 1020 m, 17.II.87 (Schwendinger); 2♂, 4♀, Doi Suthep, 1050-1550 m, 4 and 5.XI.85; 10♂, 9♀, ravine 1 km below Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 6♂, 6♀, ravine near rd for Wab Pang An, 900 m, 50 km NE Chiang Mai (via Chiang Rai), 3.XI.85 (all MHNG).

Length 1.05-1.15 mm, width 0.72-0.82 mm. Body reddish brown to blackish, apex of abdomen, antennae and tarsi paler, usually yellowish. Eyes moderately large. Antennae rather long, relative length of segments as: III 12, IV 11, V 15, VI 14, VII 17, VIII 15, IX 18, X 17, XI 21 (holotype); segments III to VI evenly wide, VI almost 5 × longer than wide; VII and VIII slender, their distal funicle distinct, each about 4 × longer than wide, VII distinctly wider than VI; VIII barely wider than VI; IX to XI large, much wider than VII, XI about 2.5 × longer than wide. Pronotum regularly rounded laterally and with marginal keels not visible in dorsal view; punctation very fine, barely visible at 50 × magnification. Point of scutellum usually completely covered, in some specimens exposed. Elytra barely narrowed basally, distinctly narrowed from middle to apex; lateral margin rounded; lateral keel in dorsal view either not visible or exposed near to base; sutural margin usually elevated, except near base; sutural stria fine and coarsely punctured, abbreviated, evanescent 0.05-0.10 mm before reaching level of pronotal lobe; row of punctures accompanying sutural stria extended along basal margin about to middle of basal width of elytron; punctation between sutural margin and sutural stria relatively coarse; whole discal surface, humeral area included, coarsely and densely punctate, with punctures larger than intervals between them and larger than sutural stria punctures. Pygidium very finely punctate. Hypomeron smooth. Apical portion and lateral margin of mesosternum distinctly punctate. Mesepimeron 2 to 2.5 × longer than interval between its inner end and mesocoxa. Median portion of metasternum all over rather coarsely and very densely punctate (also on the usually smooth central area). Punctures on lateral portion of metasternum coarser than those on middle area of metasternum (the apical forming



FIGS 16 to 20.

16. *Baeocera schreyeri* sp. n., paratype from rd to Wab Pang An, aedeagus; 17. dtto, internal sac; 18. *Baeocera vidua* sp. n., holotype, aedeagus; 19 dtto, internal sac; 20. *Baeocera pigra* (Löbl) from Khao Yai Nat. Park, internal sac. Scale = 0.1 mm (16, 18) and 0.05 mm (17, 19, 20).

transverse row excepted), and usually somewhat elongate, forming more of less distinct longitudinal rows. Mesocoxal area narrow, 0.02 mm long, with coarse marginal punctures. Metepisternum flat, 0.03-0.05 mm wide, parallel-sided, its inner suture straight, deep and coarsely punctured. First ventrite all over densely and coarsely punctate, with punctures usually somewhat coarser than those on middle part of metasternum; basal row of punctures not interrupted in middle, extended laterally to pleural line, with several elongate lateral punctures. Following ventrites very finely punctured, with extremely fine microsculpture consisting of punctures. Tibiae straight, metatibiae 0.34-0.37 mm long, about 1.2× longer than tarsi.

Sexual characters of male. Segments 1 to 3 of protarsi somewhat enlarged. Aedeagus (Figs 16 and 17) 0.33-0.40 mm long.

B. schreyeri is a member of the *lenta* group and appears closely related to *hygrophila* Löbl. It may be separated from the latter by smaller size of the body (which is usually paler), punctate central area of the metasternum, distinct suture of the metepisternum, shorter apical portion of the median lobe of the aedeagus and by the shape of the parameres and sclerites of the internal sac.

I name this species in honour of Dr. Leslie J. Schreyer, New York.

Baeocera pigra (Löbl)

Eubaeocera pigra Löbl, 1971: 953.
Eubaeocera decipiens Löbl, 1973*b*: 160, **syn. nov.**
Baeocera pigra; Löbl 1979*a*: 93; 1984*a*: 67; 1986*c*: 345.

Material examined: 5, Khao Yai Nat. Park, forest near Headquarters, 750-850 m, 26.XI.-3.XII.85; 2, Khao Yai Nat. Park, forest east Heo Suwat Waterfalls, 800-900 m, 1.XII.85; 2, Chiang Mai, Doi Pui, north slope, ca 1500 m, 19.XII.88 (Trautner & Geigenmüller); 2, Doi Suthep, north slope, ravine, 1400 m, 5.XI.85; 1, Doi Inthanon, 1250 m, ravine near Forestry Department, 6.XI.85; 1, ravine 1 km below Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 1, Mae Hong Son, Tham Lok Forest Park, 8 km N Sop Pong, 700 m, 13.XI.85 (MHNG, SMNS).

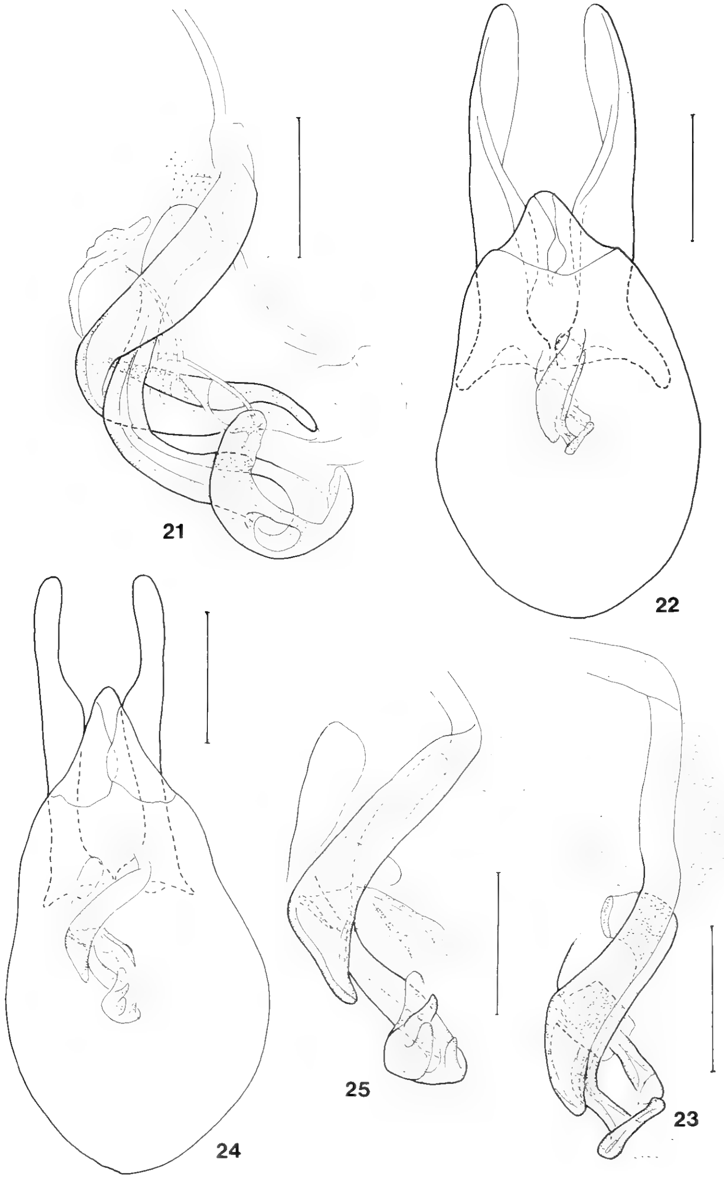
Distribution: Sri Lanka, India, Thailand.

Baeocera vidua sp. n.

Holotype ♂: Chiang Mai, Doi Inthanon, 1250 m, ravine near Forestry Department, 6.XI.85 (MHNG).

Length 1.40 mm, width 0.94 mm, aedeagus 0.42 mm long (Figs 18 and 19). Body dark reddish brown, antennae and legs paler. Most characters as in *wittmeri* Löbl from which it may be distinguished by less rounded lateral margin of elytron, very finely punctate humeral area, rather finely punctate sutural stria, very fine and sparse punctation on almost entire lateral portion of 1st ventrite, rows of sclerotized teeth of the internal sac of the aedeagus lying distally of the complex of sclerites, and inner margin of parameres not notched behind the base.

Both, *wittmeri* and *vidua* share with *pigra* (Löbl) the similar median lobe and internal sac of the aedeagus but the parameres are curved and conspicuously wider in the latter. These three species form a sub-group of the *lenta*-group and are difficult to distinguish by external characters.



FIGS 21 to 25.

21. *Baeocera longicornis* (Löbl) from Doi Inthanon, internal sac; 22. *Baeocera pseudinculta* sp. n., holotype, aedeagus; 23. dtto, internal sac; 24. *Baeocera suthepensis* sp. n., paratype from Doi Suthep, aedeagus; 25. dtto internal sac. Scale = 0.1 mm (22, 24) and 0.05 mm (21, 23, 25).

Baeocera longicornis (Löbl)

Eubaeocera longicornis Löbl, 1971: 955.

Material examined: 1, Chiang Rai, Mae Yao, II.87 (Rougemont); 43, Chiang Mai, Doi Suthep, 1400-1550 m, 4.-5.XI.85; 2, Doi Pui, cca 1500 m, 19.XII.88 (Trautner & Geigenmüller); 3, Doi Inthanon, ravine near "Forestry Department", 6.XI.85; 2, Mae Nang Kaeo, 50 km NE Chiang Mai (via Chiang Rai), 3.XI.85; 2, road for Wab Pang An, 50 km NE Chiang Mai (via Chiang Rai) 900 m, 3.XI.85; 3, Doi Chiang Dao, 1200 and 1500 m, 21.XII.80 (Deharveng & Gouze); 1, Mae Hong Son, Tham Lok Forest Park, 8 km N Sop Pong, 13.XI.85 (MHNG, SMNS).

Distribution: Sri Lanka, Thailand. — New to Thailand.

Remarks. The vesicula of the ejaculatory duct is variable large. In some of the 30 ♂ examined it is just as voluminous as in *vesiculata* Löbl (Fig. 21). As the punctation on the 1st ventrite is often very similar in these two species only the parameres provide sure distinguish features.

Baeocera pseudinculta sp. n.

Holotype ♂: Khao Yai Nat. Park, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Paratypes: 29♂, 24♀, as holotype; 1♂, Khao Yai Nat. Park, 4.-5.V.87 (Schwendinger); 7♂, 5♀ Khao Yai Nat. Park, east Heo Suwat Watterfalls, 800-900 m, 1.XII.85; 2♂, 7♀, Chiang Mai, ravine 1 km below Mae Nang Khaeo, 54 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 2♂, 5♀, ravine near road for Wab Pang An, about 50 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 1♀, Doi Suthep, 1400 m, ravine, northern slope, 5.XI.85; 1♀, Doi Inthanon, 1650 m, 7.XI.85 (all MHNG).

Length 1.35-1.50 mm, width 0.85-1.0 mm, aedeagus 0.45-0.50 mm long. Body reddish brown to blackish, apex of abdomen, tarsi and antennae paler. In external characters very similar to *inculta* Löbl with which it shares the shape of the body, long antennae with slender antennomeres, complete sutural stria of elytron (extended along base and joint with lateral stria), same punctation on dorsal and ventral surface (lateral portion of metasternum coarsely and densely punctate, with punctures not or barely elongate, punctation on 1st ventrite very fine excepted for coarse, not elongate basal punctures, and elytron coarsely punctate only on basal half). As in *inculta,* the mesocoxal area is very narrow, the suture of metepisternum is deep and coarsely punctured, the mesepimeron is long and the distal portion of the median lobe of the aedeagus is short. *B. pseudinculta* may be separated from *inculta* by the shape of the parameres and by the sclerites of the internal sac of the aedeagus (Figs 22 and 23). In this new species the basal portion of the parameres is much larger in all of the 23♂ examined, and the internal sac differs significantly from that in *inculta.*

Baeocera suthepensis sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, north slope, 1550 m, 4.XI.85 (MHNG).

Paratypes: 9♂, 13♀, as holotype, north and south slopes, 1400-1550 m, 4.-5.XI.85; 1♂, Doi Pui, north slope, ca 1500 m, 19.XII.88 (Trautner & Geigenmüller); 2♂, 1♀, Doi Inthanon, 1650 m, ravine, 7.XI.85 (MHNG, SMNS).

Very similar to the previous species and coloured in the same way. Length 1.30-1.45 mm, width 0.90-0.96 mm, length of aedeagus 0.44-0.47 mm. It differs from *pseudinculta* and also from *inculta* by the punctation on the latero-anterior portion of the metasternum which consist of more or less distinctly elongate coarse punctures. Only the aedeagus (Figs 24 and 25) provides sure diagnostic characters: parameres apically not enlarged as in *inculta* and in basal half much slender than in *pseudinculta;* distal portion of the median lobe longer than in these species, internal sac with a rather large bulbous basal sclerite while in *pseudinculta* and *inculta* the basal sclerite is slender and oblique and the guide-sclerite is distinctly hook-shaped.

Baeocera erroris sp. n.

Holotype ♂: Chanthaburi, Khao Sabap Nat. Park, hills NE Phliu Waterfalls, 150-300 m, 23.-24.XI.85 (MHNG).

Paratype: 1 ♀, as holotype (MHNG).

Length 1.25 mm, width 0.86 mm, aedeagus (Figs 26 and 27) 0.40 mm long. Body reddish brown, legs and antennae paler. With the same essential external characters as in *inculta* and *pseudinculta,* but smaller and with shorter antennae and shorter legs. *B. erroris* shares with both species short apical portion of median lobe of aedeagus. The parameres are rather similar as in *inculta* but only somewhat enlarged in the middle part and not enlarged at apex. The internal sac of *erroris* provides sure diagnostic features which enable to separate this species from the relatives. The shape of the guide-sclerit resembles rather that in *suthepensis* while the basal portion of the complex of sclerites is significantly different.

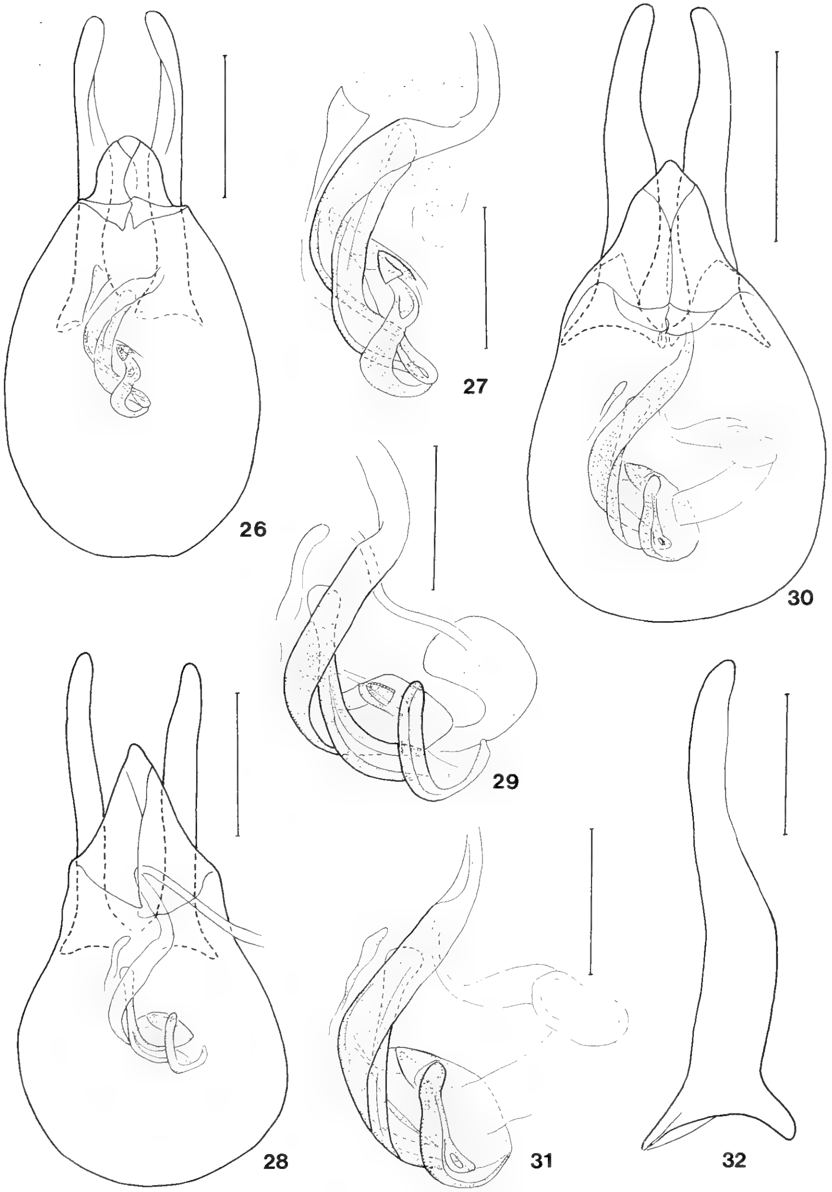
Baeocera karen sp. n.

Holotype ♂: Phetchaburi, Kaeng Krachan Nat. Park, 450 m, 18.XI.85 (MHNG).

Paratypes: 30♂, 24♀, as holotype; 13♂, 19♀, Chiang Mai, road to Wab Pang An, 50 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 27♂, 28♀, ravine 1 km below Mae Nang Kaeo, 900 m, 54 km NE Chiang Mai (via Chiang Rai), 3.XI.85; 1♂, Chiang Dao, 500 m, 17.XII.80 (Deharveng) (all MHNG).

Length 1.20-1.35 mm, width 0.76-0.82 mm, aedeagus (Figs 28 and 29) 0.30-0.35 mm long. Body reddish brown to blackish, antennae and legs paler. The combination of the external characters is similar as in *pseudinculta / suthepensis / erroris.* From *pseudinculta* it may be separated by smaller size, less convex body and shorter antennae. The coarse punctures on the lateral portion of the metasternum are not or only somewhat elongate, never as elongate as in *suthepensis,* and the elytral punctation is denser than in *erroris.* In all specimens of *karen* the basal area and the apical 1/3 to 2/5 of elytron are very finely punctate contrasting to the remaining elytral surface which is coarsely punctate. Also the 1st ventrite is very finely punctate, except for the basal margin. The aedeagus in *karen* exhibits features not found in *pseudinculta/suthepensis/erroris:* parameres straight and almost evenly wide, and ejaculatory duct forming a large vesica. The distal portion of the median lobe is fairly long, much longer than in *pseudinculta* or *erroris,* but similar to than in *suthepensis.* In the contrary, no differences have been found between the aedeagi in *karen* and in *vesiculata,* although both species may be readily separated by their punctation (in *vesiculata* the elytron is evenly covered by dense and coarse punctation, and the 1st ventrite is relative coarsely punctate also). Although 56 aedeagi of *karen* were examined, no notable variations in any of the characters has been found, and in the externe characters the hiatus between *karen* and *vesiculata* seems to be invariable.

Remarks. In *deharvengi* the internal sac of the aedeagus is very similar to that of *karen.* More details are given in the description of the latter species.



FIGS 26 to 32.

26. *Baeocera erroris* sp. n., holotype, aedeagus; 27. dtto, internal sac; 28. *Baeocera karen* sp. n., paratype from Kaeng Krachan Nat. Park, aedeagus; 29. dtto, internal sac; 30. *Baeocera deharvengi* sp. n., holotype, aedeagus; 31. dtto, internal sac; 32. dtto, paramere. Scale = 0.1 mm (26, 28, 30) and 0.05 mm (27, 29, 31, 32).

Baeocera deharvengi sp. n.

Holotype ♂: Khao Yai Nat. Park, forest near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Paratypes: 4♂, 3♀, as holotype; 1♂, 2♀, Khao Yai Nat. Park., hills east Heo Suwat Waterfalls, 800-900 m, 1.XII.85 (MHNG).

Length 1.15-1.25 mm, width 0.82-0.87 mm. Body reddish brown, legs and antennae paler. Aedeagus (Figs 30 to 32) 0.31-0.33 mm long. With the same combination of external characters as in *ventralis* or *franzi:* pronotum very finely punctate; elytron with coarse punctation only on its anterior half (in *ventralis/franzi* some of coarse punctures often also behind middle of elytron); sutural stria of elytron obsolete on humeral area, not joint with lateral stria; coarse punctation on metasternum dense, formed by not or somewhat elongate punctures; metepisternum narrow, its suture indicated by outer row of coarse punctures; base of 1st ventrite not ridged or wrinkled, basal punctures not or somewhat elongate, punctation on median portion of 1st ventrite fine but distinct, on outer half of lateral portion almost obsolete (basal punctures excepted). The only feature enabling to distinguish *deharvengi* from *franzi/ventralis,* and also from the similar *manasensis* Löbl, seems to be the less dense and less coarse punctures on basal half of elytron which are smaller or about as large (laterally) as the intervals between them. Also *manasensis* Löbl exhibits the same combination of externe characters, but the coarse elytral punctures are decidedly larger than in *ventralis/franzi.*

B. deharvengi may be easily distinguished from the latter two species by the aedeagus which is rather similar to that in the externally very distinct *longicornis* and *vesiculata* (parameres not notched sub-apically, internal sac without spicules, ejaculatory duct forming a vesicula). It differs from that of *manasensis* especially in the parameres (not abruptly narrowed in the middle) and in the structures of the internal sac. *B. deharvengi,* on the basis of its aedeagus, appears to be closely related to *karen.* The straight parameres and complete sutural stria of elytron in the latter provide good distinguishing characters.

Baeocera species near *puncticollis* Löbl

Material examined: 1♀, Chiang Mai, Doi Angkhang 10 km W Fang, 1500 m, 20.III.87 (Schwendinger) (MHNG).

Remarks. This is a conspicuous species. It resembles *puncticollis* Löbl by the relatively coarsely punctate pronotum and by several distinct punctures on the hypomeron. It may be separated from the latter by the sutural stria of the elytron curved along base, the much finer elytral and metasternal punctation and by the shape of the antennomeres VI to VIII (relative length/width of segments VI 13/4; VII 20/7; VIII 10/4; segment VI apically enlarged). Although this specimen obviously represents an undescribed species, I prefer not to name before males become available.

Baeocera khasiana Löbl

Baeocera khasiana Löbl, 1984*a*: 77.

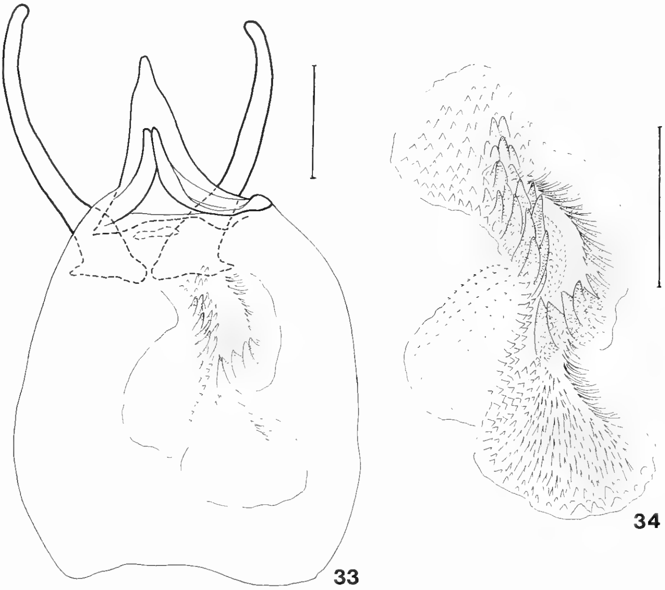
Material examined: 1, Chiang Mai, Doi Inthanon, 1780 m, 3.III.87 (Schwendinger); 1, Doi Chiang Dao, 2000 m, 21.XII.80 (Deharveng & Gouze); 1, Mae Hong Son, Doi Chang, 1950 m, 20 km E Pai, 10.IV.87 (Schwendinger) (all MHNG).

Distribution: India, Thailand. — New to Thailand.

Remarks. *B. khasiana* Löbl is a conspicuous species without any known closer relatives. Unfortunately, all Thai specimens are females so that their identity remains to be confirmed. They differ somewhat from the type-series (from Meghalaya) by the finer elytral punctation.

Baeocera insolita sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).



FIGS 33 and 34.

33. *Baeocera insolita* sp. n., holotype, aedeagus; 34. dtto, internal sac. Scale = 0.1 mm.

Length 1.35 mm, width 0.95 mm. Body dark reddish brown, tarsi and antennae yellowish. Eyes large. Antennae moderately long, relative length of segments as: III 12, IV 13, V 15, VI 14, VII 18, VIII 13, IX 19, X 17, XI 25; segments III to VI slender, III 3× longer than wide, IV somewhat slender than III or V, almost 4× longer than wide, V and VI 4× longer than wide; VII and VIII only moderately larger than VI, VII 3.5× longer than wide, VIII 2.5× longer than wide, barely slender than VII; IX-XI much wider than VII, XI 3× longer than wide. Pronotum very finely punctate, punctures barely visible at 25× magnification; lateral pronotal margins rounded, lateral keels not visible in dorsal view. Minute point of scutellum exposed. Elytra moderately narrowed apically; lateral keel not visible in dorsal view; sutural margin not elevated; sutural stria deep, extended along basal margin to humeral hump, not joint with lateral stria, latter distinctly punctate; interval between sutural margin und sutural stria flat, very finely punctate; punctation similar as on pronotum near base and on apical 2/5, elytron elsewhere densely and coarsely punctate, with punctures about as large as intervals between them. Pygidium not keeled, its punctation very fine. Hypomera impunctate. Mesepimeron more than 3× longer than interval between its inner end and mesocoxa. Median portion of metasternum almost flat, rather sparsely and coarsely punctate (except on a small impunctate median area). Lateral portion of metasternum extremely finely punctate. Mesocoxal area very narrow, 0.02 mm long, with coarse marginal punctures not extending laterally behind level of top of mesepimeron. Metepisternum almost flat, at largest point 0.11 mm, narrowed anterad, its impunctate suture somewhat sinuate. Abdomen without microsculpture. Punctation on ventrites extremely fine. First ventrite with dense and coarse row of elongate basal punctures, barely interrupted in middle, extended laterally almost to pleural line; longest punctures about 0.05 mm. Tibiae barely curved, metatibiae 0.45 mm long.

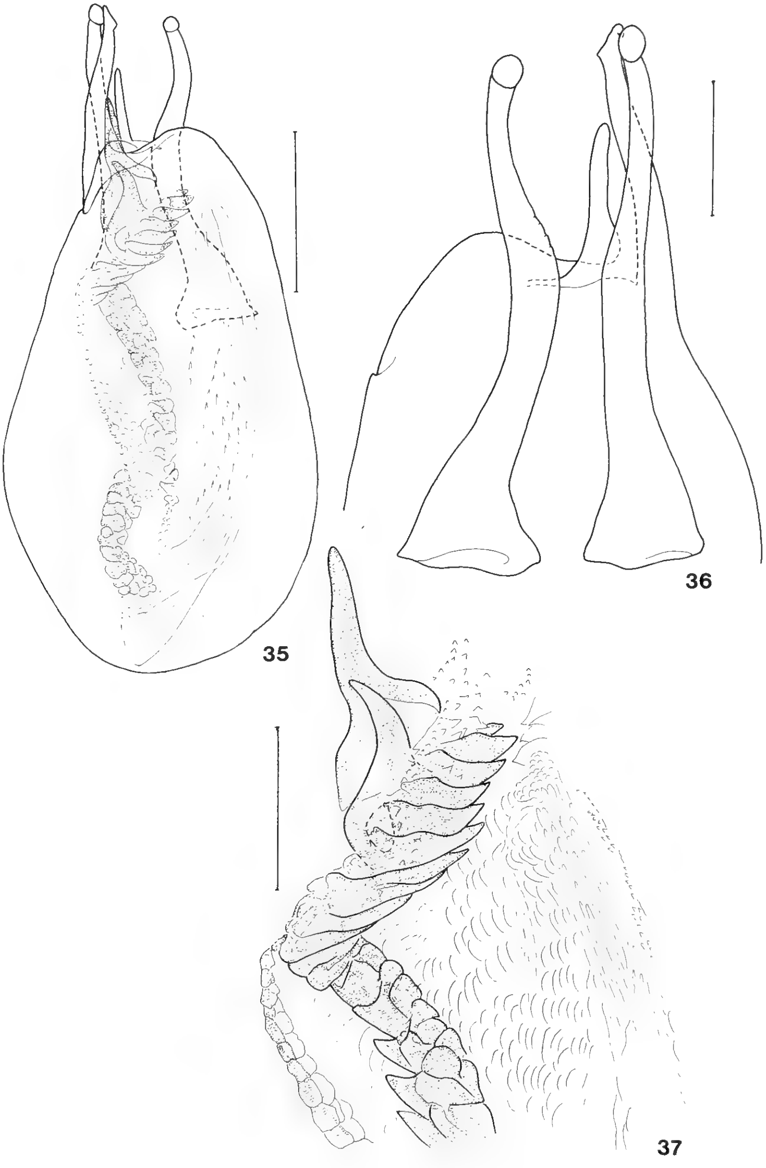
Sexual characters of male. Segments 1 to 3 of protarsi distinctly enlarged, 1st segment narrower than apex of tibia. Apical lobe of 6th ventrite triangular, 0.04 mm long. Aedeagus (Figs 33 and 34) 0.54 mm long.

B. insolita differs notably from all other members of the genus I have examined. The median lobe of its aedeagus is provided with two symmetrically curved, apically convergent dorso-apical sclerotized lobes, as in species of the *Scaphisoma haemorrhoidale*-group. These lobes open when internal sac extruded.

Baeocera barbara sp. n.

Holotype ♂: Khao Yai Nat Park, forest near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Length 1.4 mm, width 1.04 mm. Dark reddish brown, tarsi and antennae yellowish. Eyes large. Antennae moderately long, relative length of segments as: III 11, IV 14, V 19, VI 15, VII 23, VIII 21, IX 24, X 22, XI 32; segment III less than 3× longer than wide, wider than three following ones; IV to VI slender, IV and VI each about 4× longer than wide, V about 5 times longer than wide; VII and VIII subparallel, almost evenly wide, distinctly wider than VI, VII 4×, VIII about 3.5× longer than wide, both slender than IX; XI distinctly wider than VII, 3× longer than wide. Pronotum with lateral margins oblique in basal half, rounded apically (sinuate in lateral view), with lateral keels exposed in apical half, obsolete near base in dorsal view; punctation sparse and very fine, barely visible at magnification 25×. Exposed portion of scutellum large. Elytra moderately narrowed apically; lateral margin almost straight in middle; lateral keel visible in basal third (dorsal view); sutural margin somewhat elevated; sutural stria deep, extended along basal margin and joint with lateral stria; interval between sutural stria and sutural margin flat, barely impressed, very finely punctate; most of elytral surface sparsely and very finely punctate, with punctures as small or somewhat larger than those on pronotum; small area between basal 1/4 and middle of elytron irregularly and coarsely punctate, coarse punctures gradually deepened (not well delimited), some of them larger than intervals. Sutural stria punctate, lateral stria impunctate. Pygidium rather densely and very finely punctate. Hypomeron impunctate. Mesepimeron about 3× longer than interval between its inner end and mesocoxa. Metasternum in median portion vaulted, with two longitudinal rows of coarse punctures on each side of smooth central area, on lateral portion almost impunctate. Mesocoxale area very narrow, 0.02 mm long, with coarse marginal punctures extended laterally along anterior margin of metasternum to level of centre of mesepisternum. Metepisternum vaulted, impressed along straight inner impunctate suture, at largest point 0.12 mm, narrowed anteriorly; abdominal segments not microsculptured. Ventrites sparsely and extremely finely punctate, except for coarse row of basal punctures on 1st ventrite which is not interrupted in middle and extends to pleural keel; lateral punctures distinctly elongate. Tibiae slightly curved, metatibia 0.57 mm long.



FIGS 35 to 37.

35. *Baeocera barbara* sp. n., holotype, aedeagus; 36. dtto, distal half of median lobe with parameres, ventral view; 37. dtto, distal portion of internal sac. Scale = 0.2 mm (35) and 0.1 mm (36, 37).

Sexual characters of male. Segments 1 and 2 of protarsus distinctly enlarged, narrower than tibia, segment 3 of protarsus and segment 1 of mesotarsus somewhat enlarged. Lobe of 6th ventrite subtriangular, 0.12 mm long; apical margin at each side of lobe concavely notched. Aedeagus (Figs 35 to 37) 0.83 mm long.

This new species is related to *macrops* (Löbl) from which it may be easily distinguished by the larger size, the elytral punctation (in *macrops* most of the elytral surface is coarsely punctate), the median lobe of the aedeagus provided with a long dorsoapical apophyse and by the structures of the internal sac, especially by the two large toothlike distal sclerites.

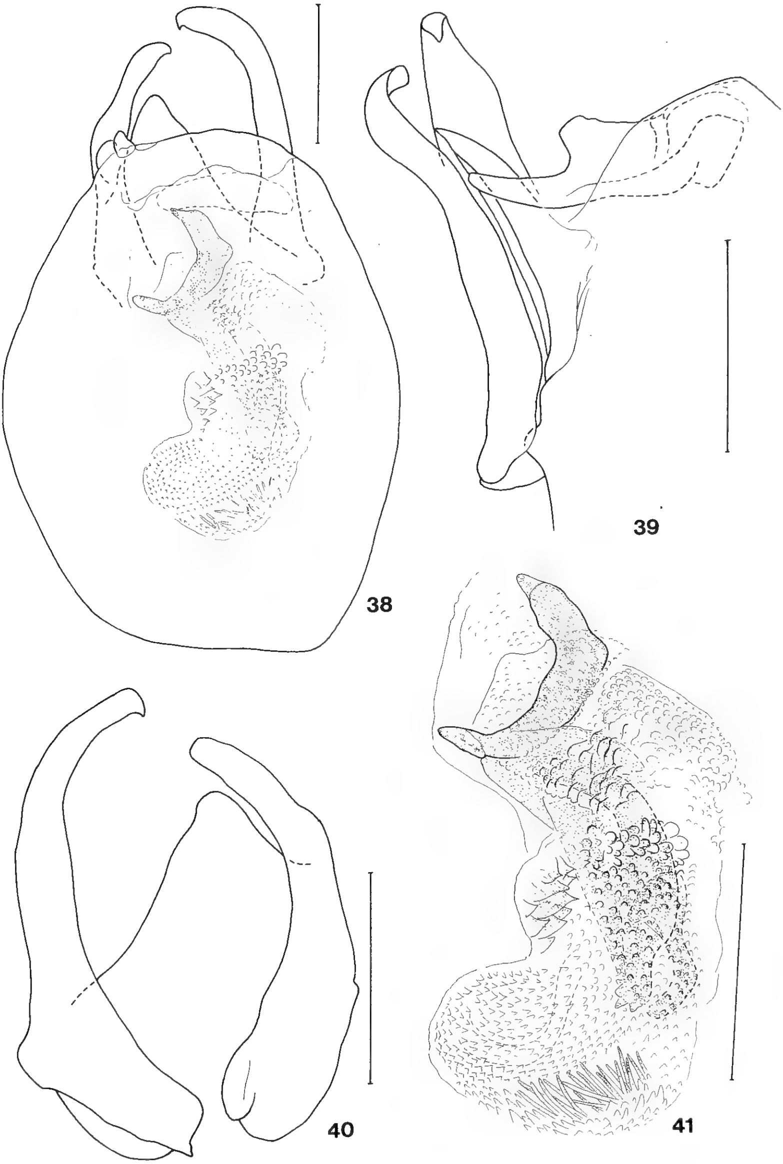
Baeocera pubiventris sp. n.

Holotype ♂: Chiang Mai, ravine 1 km below Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85 (MHNG).

Paratypes: 1 ♀, Chiang Mai, as holotype; 1 ♀, road for Wab Pang An, 500 m from road Chiang Mai — Chiang Rai (ca 50 km NE Chiang Mai), 900 m, 3.XI.85 (MHNG).

Length 1.85 mm, width 1.3 mm. Body ochreous, tarsi and antennae yellowish. Eyes large. Antennae long, relative length of antennomeres: III 16, IV 20, V 22, VI 20, VII 27, VIII 25, IX 28, X 29, XI 33 (holotype). Segments III to VI slender, evenly wide, III 4×, IV and VI each 5× longer than wide; VII and VIII moderately enlarged, VII 4.5× longer than wide, barely larger than VIII which is 4× longer than wide; IX and X somewhat wider than VII, XI distinctly wider, about 3× longer than wide. Pronotum with lateral margins rounded (sinuate in lateral view); lateral margin keels in dorsal view obsolent except near basal and apical angle; discal punctation sparse and very fine, consisting of not well delimited punctures barely visible at magnification 25×. Visible portion of scutellum rather large. Elytra moderately narrowed apically; middle portion of lateral margin straight, basal and apical third of latter rounded; lateral keel in dorsal view distinct; sutural stria deep, extended along base to humeral protuberance; punctation very fine near base and along sutural margin, elsewhere rather coarse and dense, consisting of gradually deepened punctures which are usually as large or larger than intervals between them; interval between sutural margin and sutural stria impressed. Punctation on propygidium dense and rather coarse, except near apical margin; punctation on pygidium barely finer but decidedly sparser. Pygidium with complete marginal keel, at apex narrow and rounded. Hypomeron impunctate. Mesepimeron about 4× longer than interval between its inner end and mesocoxa. Median portion of metasternum slightly vaulted, with a dense row of coarse punctures forming an U. Lateral portion of metasternum sparsely and extremely finely punctate, several rather coarse punctures at anterior margin excepted. Mesocoxal area 0.03 mm long, not narrowed laterally, with very dense row of coarse marginal punctures extended laterally. Metepisternum somewhat vaulted, at widest point 0.14-0.16 mm, anterad narrowed, with deep suture. Abdomen without microsculpture. Ventrites sparsely and very finely punctured, except for several less fine setiferous punctures lying near apical margin on median portion of ventrites I to VI, and for very dense and coarse, elongate basal punctures on 1st ventrite. Pubescence on median portion of ventrites long and erected. Protibia straight, meso- and metatibia somewhat curved. Metatibia 0.71-0.74 mm long, about 1.3× longer than metatarsus.

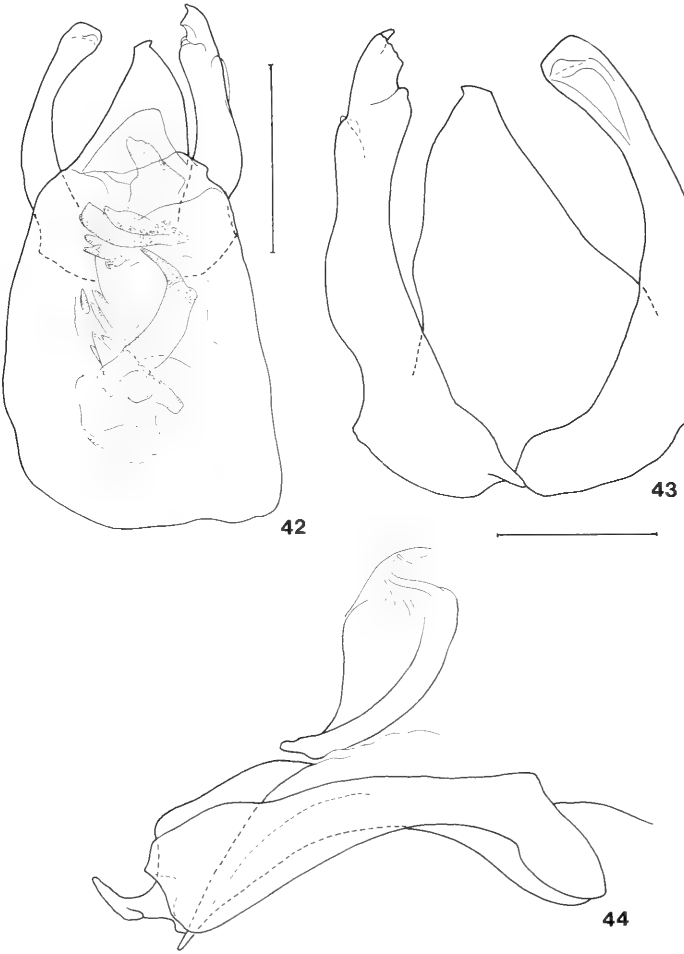
Sexual characters of male. Segment 1 of pro- and mesotarsus gutter-like, strongly enlarged, larger (protarsus) or as large (mesotarsus) as apex of tibia. Segment 2 of protarsus somewhat enlarged. Apical lobe of 6th ventrite triangular, 0.08 mm long. Aedeagus (Figs 38 to 41) 0.93 mm long.



FIGS 38 to 41.

38. *Baeocera pubiventris* sp. n., holotype, aedeagus; 39. dtto, distal portion of median lobe with parameres, lateral view; 40. dtto, ventral view; 41.dtto, internal sac. Scale = 0.2 mm.

Remarks. This species belongs to the group *monstrosa,* and is similar and certainly closely related to *gilloghyi* (Löbl) with which it shares simple parameres of the aedeagus. In all other members of the group the right paramere is enlarged and lobed and the left paramere has either a basal apophyse (*inaequicornis* Champion, *breveapicalis* (Pic), *producta* (Pic), *doriai* (Pic), *takizawai* Löbl, *robertiana* nom. n.*) or is simple (*monstrosa* (Löbl), *paradoxa* (Löbl), *nakanei* (Löbl). *B. pubiventris* may be distinguished from *gilloghyi* by longer and denser abdominal pubescence and, as from all other species of the genus, by the shape of the parameres and of the sclerotized pieces of the internal sac.



FIGS 42 to 44.

42. *Baeocera innocua* sp. n., holotype, aedeagus; 43. dtto, distal portion of median lobe, ventral view; 44. dtto, lateral view. Scale = 0.2 mm (42) and 0.1 mm (43, 44).

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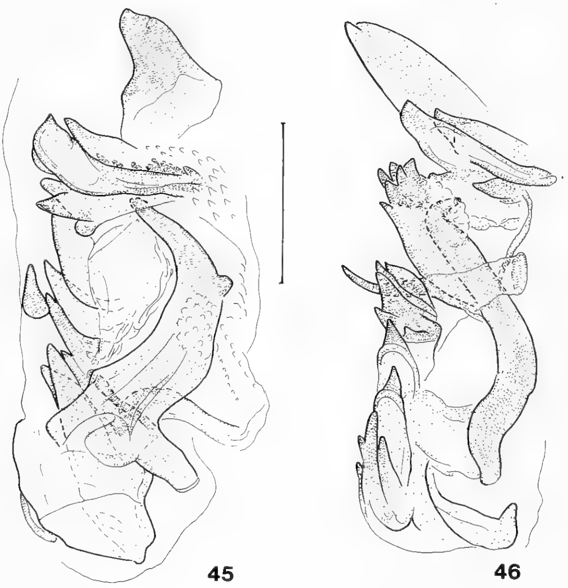
* *Baeocera robertiana* **nom. nov.** for *Baeocera roberti* Löbl, 1986, from Sumatra (*Archs Sci. Genève* 39: 87-89); nec *Baeocera mussardi roberti* Löbl, 1979, from South India (Revue suisse Zool. 86: 89-90).

Baeocera innocua sp. n.

Holotype ♂: Khao Yai Nat. Park, hills east of Heo Suwat Waterfalls, 800 m, 1.XII.85 (MHNG). Paratype ♂: as holotype (MHNG).

Length 1.5-1.6 mm, width 1.07-1.12 mm. Similar to *pubiventris* and *gilloghyi,* differs from both as from other species of the group *monstrosa* by the shape of the parameres and by the structures of the internal sac. *B. innocua* may be separated from *pubiventris* by the combination of the following characters: body smaller, antennae shorter. Relative length of antennomeres in holotype: III 12, IV 15, V 18, VI 16, VII 22, VIII 19, IX 24, X 23, XI 32. Segment III 3×, IV and VI 4×, V 4.5× longer than wide; VII and VIII about 3× longer than wide; XI somewhat larger than X, about 3.5× longer than wide. Basal pronotal angle reaching anterior margin of metepisternum. Finely punctate basal portion of elytron larger, about as long as 1/6 of maximal elytral length. Interval between sutural margin and sutural stria not impressed. Pygidium finely punctate, lacking marginal keel. Mesepimeron 3× longer than distance between its inner end and mesocoxa. Metepisternum narrower, 0.11 mm wide. Punctation on ventrites 1 to 6 evenly fine (except for basal row on 1st ventrite), pubescence on median portion of ventrites rather short. Metatibia 0.57-0.62 mm long, 1.3× longer than metatarsus.



FIGS 45 and 46.

45. *Baeocera innocua* sp. n., holotype, internal sac; 46. dtto, paratype, lateral view. Scale = 0.1 mm.

Sexual characters of male. Segments 1 and 2 of pro- and mesotarsi distinctly enlarged, narrower than apex of tibiae. Apical lobe of 6th ventrite triangular, 0.07 mm long. Aedeagus (Figs 42 to 46) 0.55-0.57 mm long.

Scaphisoma Leach

This is the largest genus of the scaphidiids including almost 500 species. It is characterized by short 3rd antennomere; large maxillary galea; slender, apically narrowed last segment of maxillary palpus; apically protruding basal angles of pronotum; mesepimeron almost always dinstinct; 1st ventrite with coxal areas (except in *ineptum* Löbl from Borneo, *carolinae* Casey from North America and unidentified species from South America); distinct epipleura; distant meso- and metacoxae.

The aedeagi are in many species symmetrical with simple tubular internal sac and slender parameres (i.e. *rufum, pseudorufum, invisum*), as in primitive staphylinids (Omaliinae). Many other species exhibit modified aedeagus. The modification may affect the articular process of the median lobe only (some species of the *unicolor*-group), the whole median lobe *(maindroni)* or only its distal portion (*pictum*- and *haemorrhoidale*-group), and/or the parameres and the internal sac. All degrees of complexity and combinations of these modifications may be found so that it is virtually impossible to separate the species groups in satisfactory defined genera.

KEY TO THE THAI SCAPHISOMA

1 Elytral disk with at least some very coarse punctures arranged in somewhat oblique rows. Abdominal microsculpture distinct, consisting of transverse waves or lines 2

— Elytral disk without rows of coarse punctures 9

2 Whole apical third of elytron very finely punctate 3

— Whole or almost whole elytral disk coarsely punctate 4

3 Anterior half or two thirds of elytron densely and coarsely punctate. Hypomeron and lateral portion of metasternum microsculptured .... *rufescens*

— Most of elytral disk finely punctate, coarse punctures arranged in 3 rows, few additional coarse punctures situated on a small latero-central area .... *pseudatrox*

4 Apical fourth or fifth of elytron yellowish or ochreous, similar as abdomen .... *rouyeri*

— Elytral colouration different 5

5 Hypomeron lacking microsculpture .... *cribripenne*

— Hypomeron with microsculpture consisting of longitudinal striae 6

6 Punctation on lateral and central part of pronotum almost evenly fine 7

— Pronotum laterally much coarser punctate than on center 8

7 Parameres of aedeagus evenly slender between middle and apex. Apex of elytron not markedly darkened .... *rougemonti*

— Parameres wider at apex than in middle portion (width of hyaline lobe excepted). Apex of elytron darkened .... *delictum*

8 Middle portion of parameres narrowed. At least some punctures on lateral portion of pronotum only somewhat larger than intervals between them .... *pseudodelictum*

— Parameres narrowest behind their middle. All punctures on lateral portion of pronotum much larger than intervals between them .... species C

9 Minute species, body less than 1 mm long. Elytra immaculate. Antennae moderately long .... cf. *minutissimum*

— Body usually notably longer than 1 mm, if only somewhat longer elytra maculate or antennae conspicuously long 10

10 Antennomeres III and IV conspicuously short, IV as long as to 1.5× longer than III 11
— Antennomere IV slender, at least 2× longer than III or III conspicuously elongate *(solutum)* 15
11 Mesepimeron obsolete .... *lepidum*
— Mesepimeron distinct 12
12 Elytron with sutural stria not extended along basal margin .... *gracilendum*
— Sutural stria extended along basal margin to humeral area of elytron, or at least to middle of basal width 13
13 Abdominal microsculpture consisting of points .... species A
— Abdominal microsculpture formed by distinct transverse striae 14
14 Body rufous, elytra immaculate .... *pseudorufum*
— Body blackish, elytron with a large reddish spot and yellowish apex .... species B
15 Elytron with sutural stria curved at base and distinctly extended along basal margin 16
— Sutural stria often curved at base but not extended laterally along basal margin of elytron 24
16 Sutural and lateral striae joint at humeral area of elytron .... *mirandum*
— Sutural and lateral striae not joint 17
17 Elytra maculate. Large species about 1.8 mm long. Pronotum coarsely punctate .... *rufonotatum*
— Elytra immaculate. Pronotum finely punctate. Smaller species 18
18 Mesocoxal area large, longer than metacoxal area 19
— Mesocoxal area narrow, shorter than metacoxal area 21
19 Body very dark reddish brown to blackish, 1.6-1.8 mm long. Elytron near base coarser punctate than pronotum. Median portion of 1st ventrite denser and coarser punctate than lateral portions .... *suthepense*
— Body pale reddish brown, 1.2-1.5 mm long. First ventrite all over very finely punctate 20
20 Apical portion of median lobe of aedeagus convexly curved in lateral view .... *brunneonotatum*
— Apical portion of median lobe sinuate in lateral view .... *agile*
21 Body rather pale reddish brown. Metacoxal area very large and very convex, reaching about centre of 1st ventrile .... *rufum*
— Body dark reddish brown to blackish. Metacoxal area small and narrow, much shorter than half of 1st ventrite 22
22 Rows of coarse punctures at margines of metacoxal areas extended along mediobasal margin of 1st ventrite and joint together. Mesocoxal areas margined by coarse punctures .... *fastum*
— Mediobasal margin of 1st ventrite without a row of coarse punctures. Mesocoxal areas with fine marginal punctures 23
23 Mesepimeron much shorter than interval between its end and mesocoxa. Lateral portion of base of 1st ventrite and metacoxal area margined by elongate punctures .... *canaliculatum*
— Mesepimeron about as long as interval between its end and mesocoxa. Metacoxal area margined by round punctures, basal margin of 1st ventrite laterally of metacoxal area impunctate .... *unicolor*
24 Pronotum bicoloured, elytra maculate 25

— Pronotum unicoloured 26

25 Pronotum pale, with two dark median fasciae. Sutural striae of elytra almost parallel .... *paliferum*

— Pronotum pale with black base and black spot on mediobasal area. Sutural striae of elytra conspicuously divergent anteriorly .... species D

26 Pronotal punctation conspicuous, distinct at 10× magnifications. Lateral portion of metasternum coarsely punctate .... *valens*

— Pronotum finely or very finely punctate, with punctures not or barely visible at 10× magnification. Lateral portion of metasternum usually very finely punctate, eventually with coarse punctures arranged in a transverse row 27

27 Elytral disk finely or very finely punctate, punctures along sutural stria and on interval between it and sutural margin coarse. Sutural striae anteriorly strongly divergent 28

— Elytral punctation different. Sutural striae parallel or moderately divergent anteriorly 30

28 Pronotum as dark as elytral base, elytra not or indistinctly maculate .... *jacobsoni*

— Pronotum paler than elytral base, elytra distinctly maculate 29

29 Lateral portion of metasternum with a row transverse of punctures in front of metacoxa .... *dohertyi*

— Lateral portion of metasternum lacking a transverse row of punctures .... *lannaense*

30 Small species 1.1-1.2 mm long. Metasternum with a row of punctures in front of metacoxa .... *javanum*

— Larger species or metasternum lacking a transverse row of punctures 31

31 Pronotum and elytra unicoloured, ochreous or reddish brown. Apical portion of elytron not or barely paler than centre of elytron 32

— Elytron maculate and/or with large well delimited pale apical portion, or pronotum and elytra evenly dark reddish brown to black 41

32 Metasternum with deep elongate median impression. Parameres of aedeagus bilobed .... *operosum*

— Metasternal centre not impressed, or with a foveiform impression lying behind middle, or with two medio-apical shallow impressions. Parameres not bilobed 33

33 Metasternum lacking a row of punctures in front of metacoxa. Ventrites not microsculptured or with microsculpture consisting of points 34

— Metasternum with a row of punctures in front of metacoxa. Ventrites usually with microsculpture consisting of striae 38

34 Articular process of median lobe very large 35

— Articular process of median lobe small, inconspicuous 36

35 Distal portion of median lobe slender .... *nietneri*

— Distal portion of median lobe flattened and strongly enlarged .... *maindroni*

36 Length 1.7 mm. Elytron finely punctate, non of discal punctures larger than intervals between them. Metacoxal area more than 0.10 mm long .... *segne*

— Length 1.5-1.6 mm. Elytron rather coarsely punctate, at least some discal punctures notably larger then intervals between them 37

37 First ventrite with coarse basal punctures between metacoxal areas. Parameres of aedeagus not narrowed apically .... *pressum*

— First ventrite very finely punctate between metacoxal areas. Parameres of aedeagus narrowed apically .... *aurun*

38 Elytron with base distinctly finer punctate than centre, and humeral area almost as finely punctate as pronotum .... *scabiosum*

— Elytral base about as coarsely punctate as centre, punctation on humeral area much coarser than that on pronotum 39

39 Medio-apical portion and centre of metasternum about evenly finely punctate. Laterobasal portion of 1st ventrite distinctly microsculptured .... *dives*

— Medio-apical portion of metasternum coarser punctate than centre. Laterobasal portion of 1st ventrite not microsculptured 40

40 Punctures on mediobasal portion of 1st ventrite decidedly coarser than on lateral portion .... *bispinosum*

— Punctation on 1st ventrite evenly fine (marginal punctures of metacoxal area excepted) .... *siamense*

41 Body ocreous, elytron with dark spots or fasciae 42

— Colour pattern different 47

42 Sutural striae of elytra diverge anteriorly .... *binhanum*

— Sutural striae of elytra parallel in anterior portion 43

43 Small species 1.05-1.15 mm long. Elytral and pronotal punctation about evenly fine. Metasternum lacking transverse row of punctures in front of metacoxa .... *invisum*

— Larger species. Elytra much coarser punctate than pronotum. Metasternum with a distinct row of punctures in front of metacoxa 44

44 Elytron darkened along base, sometimes also darkened along sutural margin and behind center .... *atronotatum*

— Elytron darkened at apex, sometimes also along basal margin 45

45 Smaller species 1.45-1.55 mm long. Mesepimeron about 2× longer than interval between its end and mesocoxa 46

— Larger species 2 mm long. Mesepimeron about as long as interval between its end and mesocoxa .... *velox*

46 Parameres of aedeagus only in apical portion enlarged and with weakly sclerotized inner margin .... *amabile*

— Parameres largest before middle, inner margin (base excepted) weakly sclerotized .... *pseudamabile*

47 Body very dark reddish brown to black, elytra with a distinct pale basal or posthumeral spot and pale apical area 48

— Colour pattern different 50

48 Elytra with sutural striae parallel or barely divergent anteriorly, on basal 1/3 about as finely punctate as pronotum and much finer punctate than on center .... *cederholmi*

— Sutural striae distinctly divergent anteriorly, punctation similar on inner basal portion and on center of elytron 49

49 Larger species 1.45-1.60 mm long. Anterior elytral spot small, usually yellowish and well delimited .... *tetrastictum*

— Smaller species 1.20-1.40 mm long. Anterior elytral spot fairly large, usually reddish and not well delimited .... *obliquemaculatum*

50 Metasternum with a distinct transverse row of rather coarse punctures parallel to metacoxa 57

—	Metasternum without any trace of row of punctures in front of metacoxa, if several very fine puncture form an indistinct row, impressed behind center	51
51	Body blackish to black, apex of elytron not or very narrowly paler	52
—	Body dark reddish brown to black, elytron with large pale apical area	53
52	Humeral area of elytron almost smooth, punctation behind it coarse and very dense, punctures much larger than intervals between them	*vagans*
—	Humeral area of elytron very finely punctate, surface behind it finely punctate, punctures as large or smaller than intervals	*solutum*
53	Elytron with large finely punctate basal portion extended laterally to middle third of lateral length	*innotatum*
—	Finely punctate basal portion of elytron much shorter	54
54	Metasternum laterally microsculptured (except on narrow anterior portion)	*favens*
—	Metasternum not microsculptured or microsculptured only near apical margin	55
55	Metasternum with a foveiform impression behind center. Elytral pale apical area longest near lateral margin	*cuspidatum*
—	Metasternum medio-apically flattened, not impressed. Pale apical area about evenly long at lateral and sutural margin	56
56	Metacoxal area not or barely longer than mesocoxal area. Apical 1/4 of elytron pale	*incurvum*
—	Metacoxal area notably longer than mesocoxal area. Apical 1/3 of elytron pale	*spissum*
57	Elytron with apex as dark or barely paler than remaining surface	*meracum*
—	Elytron distinctly bicoloured, dark reddish brown to black with yellowish or ochreous apical portion	58
58	Smaller species 1.25-1.40 mm long. Aedeagus small, less than 0.5 mm long	*egenum*
—	Larger species, at least 1.5 mm long. Aedeagus notably more than 0.5 mm long	59
59	Paramere of aedeagus with a conspicuous tooth in middle of inner margin	*armatum*
—	Paramere of aedeagus lacking tooth on inner margin	60
60	Internal sac of aedeagus with a large flat elongate sclerite, and with rows and bunches of smaller sclerites	61
—	Internal sac of aedeagus with bunches and rows of small sclerotized teeth or spines, lacking a large unpaired sclerit	62
61	Large sclerit of internal sac sinuate	*tortile*
—	Large sclerit of internal sac almost regularly narrowed apically, not sinuate	*khao*
62	Sclerotized teeth in apical portion of internal sac approximate, forming a single bunch	*morosum*
—	Apical sclerotized teeth of internal sac widely separated, forming two rows	*karen*

Scaphisoma rufum Achard

Scaphosoma rufum Achard, 1923: 115.
Scaphisoma rufum; Löbl 1966: 132; 1970: 756; 1972: 117; 1986*a*: 142.

Material examined: 1, Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.1985; 1, Khao Yai Nat. Park, hills east Heo Suwat Waterfalls, 900 m, 1.XII.1985 (MHNG).

Distribution: India, Thailand, Singapore, Japan (Ryukyu's). — New to Thailand.

Scaphisoma pseudorufum Löbl

Scaphisoma pseudorufum Löbl, 1986*a*: 143.

Material examined: 1, Phuket; island Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (MHNG).

Distribution: India, Thailand. — New to Thailand.

Scaphisoma species A

Material examined: 1, Chiang Mai, Doi Inthanon, 2300 m, pit-fall trap, VIII.87 (Schwendinger); 1, Doi Suthep, 1600 m, 4.XI.85 (MHNG).

Remarks. Both specimens are females. They cannot be associated with any known species, but are similar to *funiculare* Löbl in general appearance (size of body, short 4th antennomere, elytron with laterally extended sutural stria, very finely punctate metasternum, abdominal microsculpture consisting of points). They differ from the latter species in the very finely punctate pronotum, antennomere V about 3 × longer than IV and almost as long as VI, body less convex, reddish brown with paler apex of elytra.

Scaphisoma species B

Material examined: 1, Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Remarks. This specimen is a female representing a fairly well characterized species which may be distinguished by the combination of the following features: body 1.8 mm long; elytron with a large reddish discal spot, and apex yellowish; pronotum finely and densely punctate; elytron with sutural stria extended to humeral area, median portion or metasternum densely punctate; abdominal microsculpture consisting of transverse lines; antenna conspicuously short, antennomere IV minute, somewhat longer than III, about as long as 1/3 of V, antennomere VI distinctly longer than V.

Scaphisoma rufonotatum Pic

Scaphosoma rufonotatum Pic, 1926*b*: 143.

Material examined: 1, Phuket, island Phuket, hills near Surin Beach, 1.-6.XI.86 (Heiss) (MHNG).

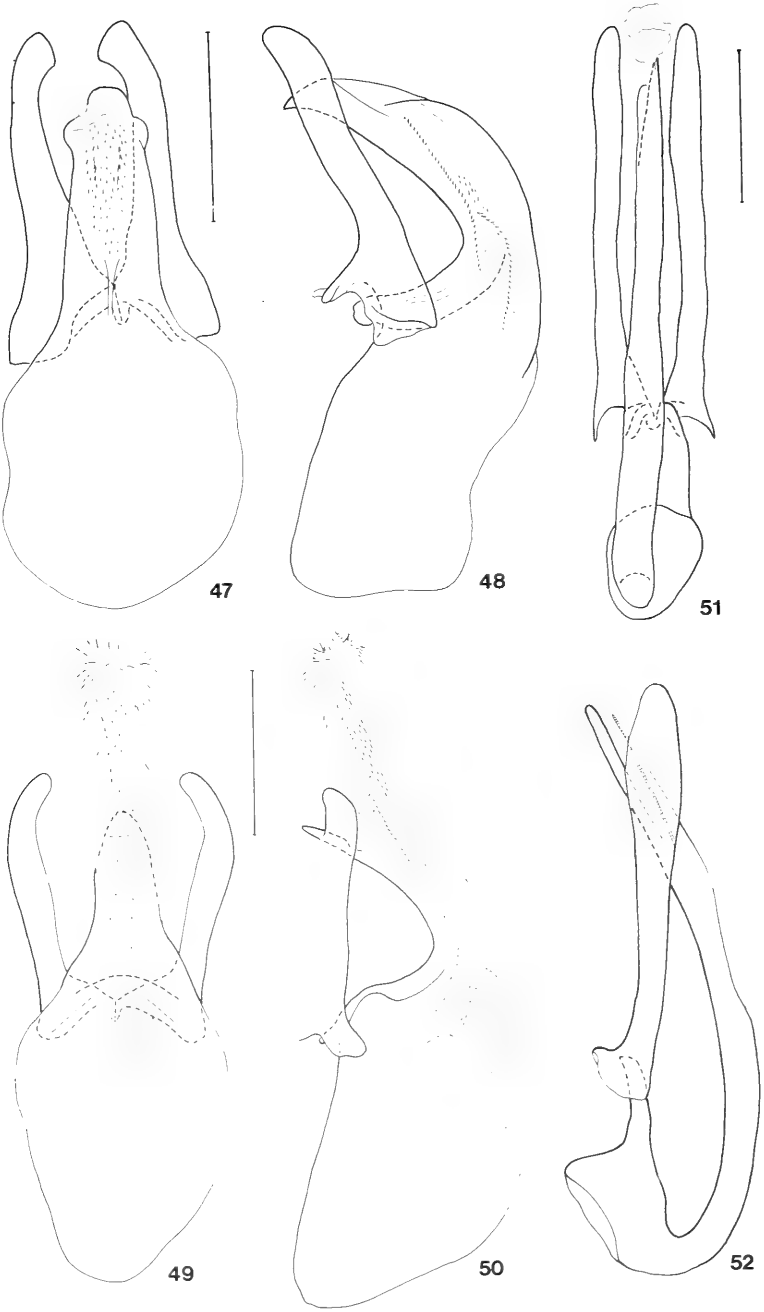
Distribution: Vietnam, Thailand. — New to Thailand.

Remarks. The Thai specimen is a female and its identity should by confirmed. However, the species is well characterized and I have not found any feature distinguishing it from Vietnamese specimens of *rufonotatum*.

Scaphisoma vagans sp. n.

Holotype ♂: Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23.-24.XI.85 (MHNG).

Paratypes: 1 ♀ as holotype; 1 ♂, 1 ♀ Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85; 1, "M TAK" (Sedlacek) (all MHNG).



FIGS 47 to 52.

47 and 48. *Scaphisoma vagans* sp. n., paratype from Khao Yai Nat. Park, aedeagus; 49 and 50. *Scaphisoma invisum* sp. n., paratype from Khao Sabap Nat. Park, aedeagus; 51 and 52. *Scaphisoma gracilendum* sp. n., holotype, aedeagus. Scale = 0.1 mm.

Length 1.25-1.30, width 0.85-0.88 mm. Body very dark, almost blackish, apex of abdomen ochreous, femora and tibiae reddish, tarsi and antennae yellowish. Diagnostic characters as in *bayau* Löbl, except for longer antennae and different elytral punctation. Relative length of antennal segments as: III 5, IV 15, V 15, VI 19, VII 22, VIII 19, IX 22, X 24, XI 28 (holotype). Elytral punctation decidedly coarser and denser than in *bayau,* on central portion of elytron much denser than elsewhere, near apex moderately dense and coarse, on humeral area about as fine as on pronotum. Aedeagus (Figs 47 and 48) 0.28-0.40 mm long.

This species is similar to *simplex* by the elytral punctation, but the coarse and dense punctures are situated on a smaller area, and the body is much paler than in the latter. *S. vagans* differs from both, *bayau* and *simplex,* in the shape of the parameres of the aedeagus.

Scaphisoma invisum sp. n.

Holotype ♂: Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23-24.XI.85 (MHNG).

Paratypes: 10♂, 11♀, as holotype; 1♂, Chiang Mai, Doi Inthanon, 1650 m, 7.XI.85 (MHNG).

Length 1.05-1.15 mm, width 0.78-0.83 mm. Body moderately convex, ochreous, with elytra darkened on basal fourth (but usually not on humeral area), along sutural striae and on apical fourth; apex of abdomen, legs and antennae yellowish. Antennae long, relative length of segments: III 7, IV 15, V 19, VI 15, VII 24, VIII 19, IX 25, X 25, XI 29 (holotype). Pronotum with rounded lateral margins; lateral keel usually visible in dorsal view; punctation very fine, visible at 24× magnification. Point of scutellum exposed. Elytra moderately narrowed apically, with rounded lateral margins; lateral keel visible in dorsal view, except in apical portion; apical margin rounded, inner apical angle lying in or somewhat behind level of outer angles; sutural margin not elevated; sutural stria rather fine, not or very shortly curved near base; interval between sutural margin and sutural stria flat, very finely punctate; discal punctation very fine, as or somewhat more distinct as that on pronotum. Pygidium extremely finely punctate. Mesepimeron conspicuously oblique, longer than interval between its end and mesocoxa. Metasternum all over very densely and extremely finely punctate; median portion weakly convex, without medio-apical impressions. Mesocoxal area large, about 0.10 mm long, almost subcylindrical, with very finely punctate margin. Metepisternum flat, 0.07-0.10 mm wide, anterad not or moderately narrowed, with straight inner margin. Abdominal segments with microsculpture consisting of short transverse lines. First ventrite similarly punctate as metasternum; metacoxal area 0.07 mm long, its margin convex, very finely punctate. Tibiae slender, I and II somewhat curved.

Sexual characters of male. Segments 1 to 3 of protarsi somewhat enlarged. Aedeagus (Figs 49 and 50) 0.30-0.33 mm long.

This species may be readily distinguished by its colour pattern and large mesocoxal areas. It is possibly related to *discretum* Löbl which has a similar aedeagus, but no synapomorphy is found linking these two species. *S. discretum* may be easily separated from *invisum* by dark colour of the body and conspicuously short antennomere IV.

Scaphisoma gracilendum sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).
Paratype ♂, as holotype (MHNG).

Length 1.3 mm, width 0.90 mm. Body rather convex. Upper surface very dark, almost black, thorax ventrally somewhat paler, abdomen dark reddish brown. Femora and tibiae reddish brown, antennae and tarsi ochreous to yellowish. Antennae moderately long, relative length of segments: III 4, IV 6, V 12, VI 18, VII 23, VIII 14, IX 21, X 20, XI 27 (holotype); III minute, IV very short, about 1.5× longer than III; V wider than IV, about 2.5× longer than wide; VI wider than V, 3× longer than wide; VII large, much wider than VI, 3× longer than wide; VIII barely wider than VI, almost 2.5× longer than wide; XI as wide as VII, 3.5× longer than wide. Pronotum with rounded lateral margins; lateral keels not visible in dorsal view; punctation very fine, barely visible at 50× magnification. Point of scutellum exposed. Elytra strongly narrowed apically; lateral margins rounded; lateral keels in dorsal view visibles from base to apex; apical margines somewhat rounded, inner apical angle lying behind level of outer angles; sutural margin not elevated; sutural striae fairly deep, slightly divergent from apex to middle, then parallel, curved externally near base, not extended along basal margin; interval between sutural margin and sutural stria flat, with a very dense row of rather coarse punctures becoming obsolete apically; punctation almost all over coarse and dense, very fine and sparse (similar as on pronotum) on a large laterobasal, up to 0.15 mm long area, and apically along lateral margin; on a rather large laterocentral area punctation particularly dense, with almost confluent punctures. Propygidium and base of pygidium relatively coarsely punctured, most of pygidium finely punctured. Mesepimeron about as long as interval between its end and mesocoxa. Metasternum sparsely and very finely punctate, except in and around two medioapical impressions; central portion of metasternum flat, area between mesocoxae convex. Mesocoxal area 0.06 mm long, with convex, finely punctate margin. Metepisternum almost flat, anterad narrowed, with inner margin impressed, convexly rounded in apical 1/3, oblique in anterior 2/3. Abdominal segments with microsculpture consisting of points. Lateral portion of 1st ventrite very finely and sparsely punctate, on median portion coarsely and rather densely punctate; metacoxal area 0.09 mm long, extended laterally only somewhat behind level of point of mesepimeron, its margin strongly convex, coarsely punctate. Tibia somewhat curved.

Sexual characters of male. Segments 1 and 2 of protarsi distinctly enlarged, segment 3 somewhat widened. Aedeagus (Figs 51 and 52) 0.37 mm long.

This species is characterized by the strongly developed articular process of the very slender and symmetric median lobe of the aedeagus. A similar condition is found in *politum* Macleay from Australia and *nanulum* Löbl from New Caledonia. *S. gracilendum* differs from them conspicuously by the elytral punctation which reminds that in species of the *imitator-subconvexum* group.

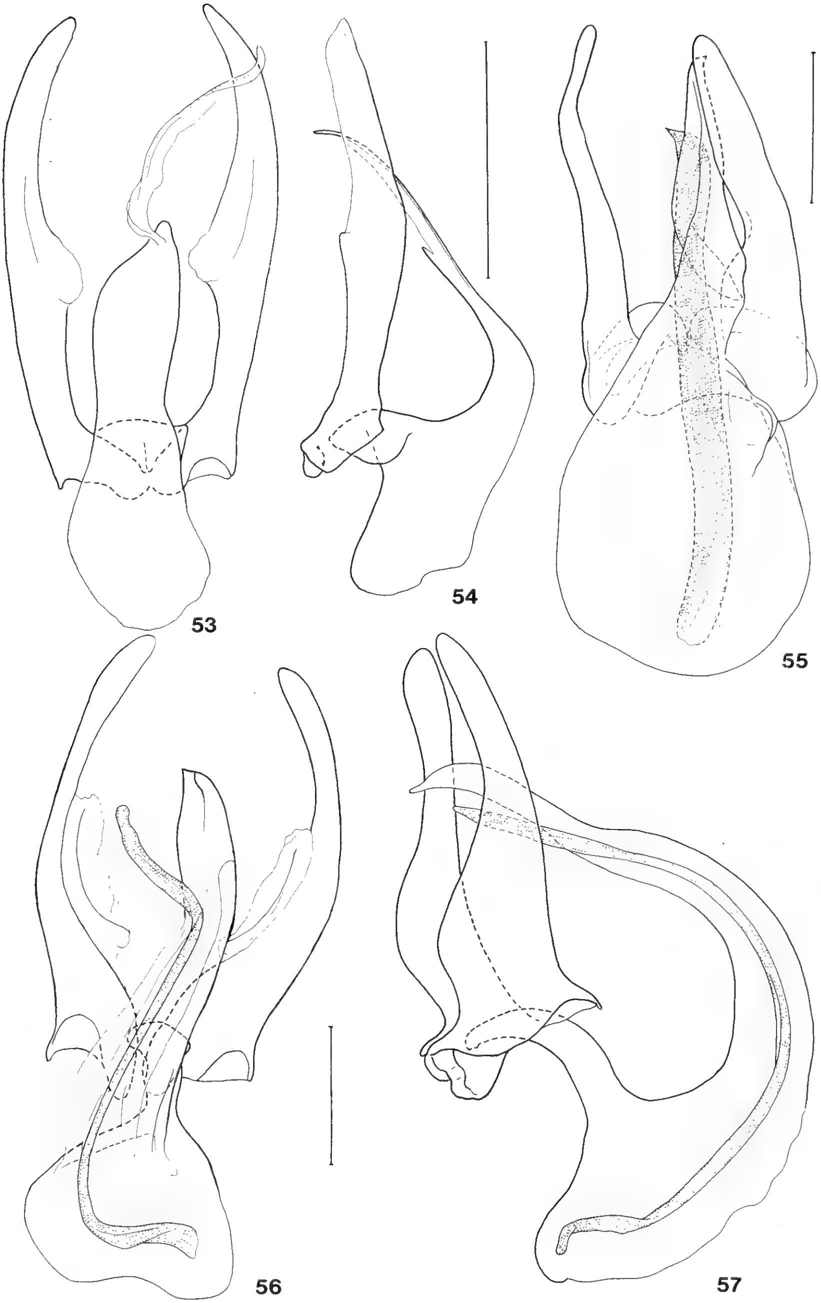
Scaphisoma cf. **minutissimum** Champion

Scaphisoma minutissimum Champion, 1927: 278.

Material examined: 12, Chantaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23-24.XI.85; 7, Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Distribution: India, Thailand. — New to Thailand.

Remarks. The Thai specimens are decidedly darker than the Indian ones and exhibit notable variability in the size of the body (length 0.72-0.95 mm, width 0.52-0.67 mm, aedeagus 0.20-0.27 mm long) and in the length of the antennomeres, especially that of the 4th which is about 1.5-2× longer than the minute 3rd one. The species is relatively flat, the antennomere V is longer than III and IV together, the elytron in basal 1/3 to 1/2 about as finely punctate as the pronotum, near apex coarser punctate that the latter, the sutural



FIGS 53 to 57.

53 and 54. *Scaphisoma lepidum* sp. n., holotype, aedeagus; 55. *Scaphisoma mirandum* sp. n., holotype, aedeagus; 56 and 57. *Scaphisoma agile* sp. n., paratype from Doi Suthep, aedeagus. Scale = 0.1 mm.

stria fine, somewhat curved at base, not extended along basal margin, and the lateral keel in dorsal view distinct. The margins of the meso- and metacoxal areas are rounded, the inner margin of the metepisternum is usually somewhat concave; the abdominal segments lack microsculpture (180× magnification). The median lobe of the aedeagus has a well developed articular process and very slender distal portion.

The species is very similar to *sadang* Löbl from which it differs by longer antennomere IV and larger metacoxal areas.

Scaphisoma lepidum sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Paratypes: 1♀ as holotype; 2♂, 6♀, Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23-24.XI.85 (MHNG).

Length 1.05-1.15 mm, width 0.75-0.83 mm. Body very dark reddish brown to blackish, abdomen as body or paler, with yellowish apex, femora and tibiae ochreous, tarsi and antennae yellowish. Most diagnostic characters as in *imitator* Löbl from which it differs in having antennal segment IV usually somewhat longer (relative length of antennomeres in holotype: III 4, IV 6, V 12, VI 15, VII 21, VIII 14, IX 19, X 19, XI 26); mesocoxal area 0.05-0.06 mm long; metasternum with two deep medio-apical impressions and several coarse punctures in an arround them; metacoxal areas 0.07-0.09 mm long, surface between them densely and rather coarsely punctate; aedeagus (Figs 53 and 54) 0.23-0.26 mm long, median lobe rather wide, not tapering, with obtuse point; parameres bearing inner membranous lobe.

Remarks. Three derived characters link this species with *subconvexum* (Pic), *murutum* Löbl, *imitator* Löbl, *mimicum* Löbl: short antennomere IV, irregular elytral punctation, and obsolete mesepimera. Besides, these species share small-sized body, sutural striae of elytra not extended along the basal margin, relatively large meso- and metacoxal areas, abdominal microsculpture consisting of points, and slender aedeagus. All these features are found also in other species but not in combination.

Scaphisoma mirandum sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Length 1.4 mm, width 0.90 mm. Body and femora ochreous, apex of abdomen, tibiae, tarsi and antennae paler than body, almost yellowish. Antennae long, relative length of antennomeres: III 8, IV 15, V 20, VI 22, VII 28, VIII 24, IX 29, X 29, XI 30; IV slender, about 5× longer than wide, V somewhat wider than IV, almost 6× longer than wide; VI markedly wider than V, well 4× longer than wide; VII 4× longer than wide; VIII barely wider than VI, about 4× longer than wide; XI somewhat wider than VII, about 4× longer than wide. Pronotum with lateral margins moderately and regularly rounded; lateral keels visible in dorsal view only near base; punctation sparse and very fine, almost obsolete at 24× magnification. Point of scutellum exposed. Elytra moderately narrowed apically; lateral margin moderately rounded; lateral keel in dorsal view visible from base to apex; apical margin truncate; inner apical angle lying somewhat behind level of outer angles; sutural margin elevated; sutural stria deep, curved externally at base and extended laterally, at humeral area narrowed to basal margin and joint with lateral stria; interval between sutural margin and stria flat, densely and rather finely punctate; discal punctation dense, coarse, punctures relatively well delimitated, about as large or somewhat smaller than intervals, only near apical margin much smaller. Punctation on pygidium extremely fine. Mesepimeron longer than interval between its top and mesocoxa. Metasternum all over extremely finely punctate (200×), median portion moderately convex, with two deep foveiform apical impressions. Mesocoxal area small, almost parallel, about 0.03 mm long, marginal punctures coarse, few coarse punctures extended laterally along anterior margin of metasternum. Metepisternum somewhat convex, 0.11 mm wide, somewhat narrowed anterad, inner margin impressed, convexly rounded at anterior angle and in apical 1/4. Ventrites very finely punctate, except for several coarse punctures in middle of basal margin of 1st ventrite, latter not microsculptured. Metacoxal area large, 0.12 mm long, subtriangular, with inner margin oblique and coarsely punctate, outer margin almost perpendicular to base and impunctate. Following ventrites and visible tergites with microsculpture consisting of points. Tibiae slender and straight.

Sexual characters of male. Segments 1-3 of protarsi moderately enlarged. Lobe of 6th ventrite very small, 0.05 mm long, pointed. Aedeagus (Fig. 55) 0.42 mm long.

This species may be readily distinguished from other *Scaphisoma* of similar size and colour by joint sutural and lateral striae at elytral base, unusual shape of the metacoxal area, and shape of the aedeagus.

Scaphisoma maindroni Achard

Scaphosoma maindroni Achard, 1920*e*: 240.
Scaphosoma mutatum Champion, 1927: 276.
Scaphisoma maindroni; Löbl 1979*a*: 102; 1986*a*: 151; 1986*c*: 346.

Material examined: 2, Chiang Mai, Doi Suthep, 890 and 1180 m, pit-fall trap, IV. and VIII. 86 (Schwendinger); 1, Doi Inthanon, 910 m, 23.II.87 (Schwendinger); 11, Chiang Rai, ca 30 km E Chiang Rai, 12.III.82 (Rougemont) (all MHNG).

Distribution: Pakistan, India, Burma, Thailand, Vietnam, China.

Scaphisoma unicolor Achard

Scaphosoma unicolor Achard, 1923: 113.
Scaphisoma unicolor; Löbl 1970: 772; 1980: 110.

Material examined: 2, Chiang Mai, Doi Suthep, 1500 m, 11.XI.85 (Schwendinger) (MHNG).

Distribution: Japan, Taiwan, Thailand. — New to Thailand.

Remarks. The size of the body varies more than stated in Löbl, 1970. The largest specimens are 1.80-1.85 long.

Scaphisoma brunneonotatum Pic

Scaphosoma brunneonotatum Pic, 1923*a*: 17.
Scaphisoma brunneonotatum Löbl, 1980: 110; 1982*c*: 105.

Material examined: 2, Chiang Mai, Doi Suthep, 890 and 1180 m, II. and IV.86, pit-fall trap (Schwendinger) 21, Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85; 1, Phetchaburi, Kaeng Krachan Nat. Park, 300-400 m, 25-30 km from Headquarters, 17.XI.85 (all MHNG).

Distribution: Thailand, Vietnam, Taiwan, Japan (Ryukyu's).

Scaphisoma agile sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, 1180 m, pit-fall trap, III.86 (Schwendinger) (MHNG).

Paratypes: 10♂, 2♀, as holotype, I. to VI.86; 2♂, 2♀, same data but 1100 m, IV.86; 10♂, 5♀, same but 970 m, III.97; 2♂, 2♀, same but 960 m, III.86; 1♂, 3♀, same but 950 m, VI. and VIII.86; 28♂, 15♀, 12 specimens, same but 890 m, III. and IV.86 (all MHNG).

Length 1.2-1.5 mm, width 0.85-1.10 mm. Body rather pale reddish brown, apical portion of elytra, apex of abdomen, legs and antennae paler, ochreous to yellowish. Very similar to *brunneonotatum* with which it shares most of the external characters. In *agile* the body is in average larger, besides the punctation is denser and more distinct on the apical third of elytron, on the median portion of the metasternum, and in male on the mediobasal portion of the 1st ventrite. The meso- and metacoxal areas are larger, 0.06-0.09 mm and 0.05-0.06 mm long respectively, and the shape of the median lobe of the aedeagus (Figs 56 and 57) is characteristic.

In *agile* the distal portion of the median lobe is sinuate in lateral view, while it is almost evenly curved in *brunneonotatum* and *besucheti.* These three species share a curved, conspicuously long articular process of the median lobe, the same shape of the parameres and most of the external characters. *S. agile* is uneasy to separate form *brunneonotatum* if aedeagus not examined. From *besucheti* it may be distinguished by finer elytral punctation.

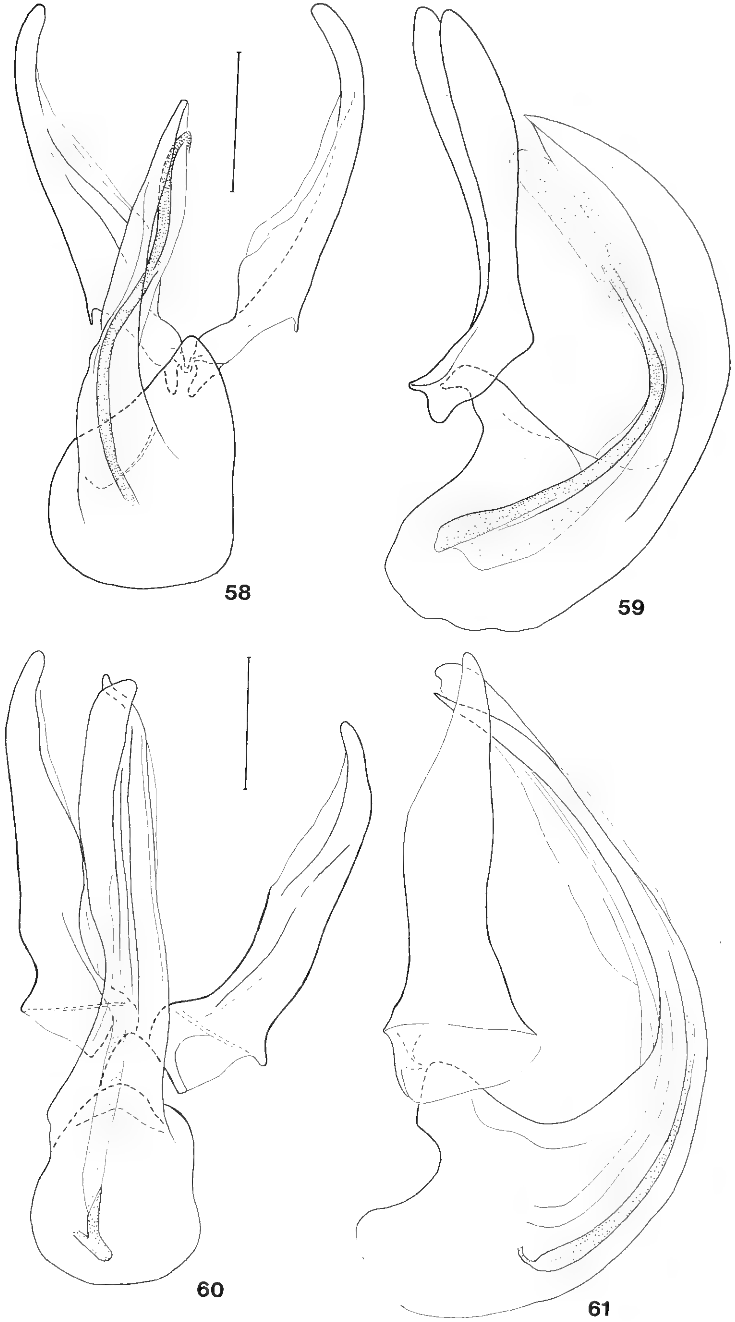
Scaphisoma suthepense sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, 1180 m, III.86, pit-fall trap (Schwendinger) (MHNG).

Paratypes: 10♂, 5♀, as holotype, but II.-IX.86 and 87; 1♀, Chiang Mai, Doi Pui, north slope, 1500 m, 19.XII.88 (Trautner & Geigenmüller); 1♂, Chiang Mai, Doi Angkhang, 10 km W Fang, 1500 m, 20.III.67 (Schwendinger) (MHNG, SMNS).

Length 1.6-1.8 mm, width 1.12-1.30 mm. Body very dark reddish brown to black, apex of abdomen, legs and antennae paler. Antennae fairly long, relative length of antennomeres: III 5, IV 15, V 19, VI 17, VII 23, VIII 15, IX 23, X 22, XI 26 (holotype). Very similar to *spurium* Löbl, with following combination of diagnostic characters: Pronotum very finely punctate. Point of scutellum exposed. Sutural stria of elytron curved and extended along base about to middle of basal width. Elytral punctation dense and rather coarse, much coarser than that on pronotum, except for finely punctate surface near sutural stria. Mesepimeron about as long as interval between its end and mesocoxa. Metasternum very densely and rather coarsely punctate on median area, elsewhere sparsely and very finely punctate. Mesocoxal area large, subtriangular, 0.08-0.11 mm long, with impunctate margines. Metepisternum 0.14-0.15 mm wide, narrowed anteriorly, inner margin impressed, straight, apically rounded. First ventrite not microsculptured, medially with relatively dense and distinct setiferous punctures, elsewhere very finely and sparsely punctate. Metacoxal area 0.05-0.07 mm long, with coarse marginal punctures. Following ventrites with microsculpture consisting of extremely fine points. Aedeagus (Figs 58 and 59) 0.40-0.48 mm long.

This species may be separated from *spurium* by longer sutural striae, the metepisternite impressed along the inner suture, the shorter metacoxal area, the less distinct abdominal microsculpture, and in males by sparser punctation on median portion of the 1st ventrite and by the shape of the parameres and median lobe of the aedeagus. Females in *suthepense* exhibit very finely and sparsely punctate 1st ventrite (medially and laterally) while in *spurium* the median portion of the 1st ventrite is very densely punctate (however, much finer than in male).



FIGS 58 to 61.

58 and 59. *Scaphisoma suthepense* sp. n., paratype from Doi Suthep, aedeagus; 60 and 61. *Scaphisoma nietneri* Löbl from Kaeng Krachan Nat. Park, aedeagus. Scale = 0.1 mm.

Both species differ notably by the shape of the parameres in lateral view (in *spurium* from the wide base gradually narrowed).

Scaphisoma nietneri Löbl

Scaphisoma nietneri Löbl, 1971: 969.

Material examined: 23, Phetchaburi, Kaeng Krachan Nat. Park, 20-25 km from Headquarters, 300-400 m, 17.XI.85; 1, Keng So Pa, 23.XII.79 (Rougemont) (all MHNG).

Distribution: Sri Lanka, Thailand — New to Thailand.

Remarks. The length of the body varies more than stated in the description (from 1.4 to 1.7 mm), which is to be completed by following characters: mesepimeron somewhat longer than interval between its end and mesocoxa; metasternum in both sexes all over very finely punctate, without erected setae on median portion; mesocoxal area 0.06-0.09 mm long, strongly convex to subtriangular, with impunctate margin; 1st ventrite all over very finely punctate, except for coarse punctures at margin of metacoxal area; latter distinctly convex, 0.04-0.06 mm long, markedly shorter that mesocoxal area; following ventrites with extremely fine microsculpture consisting of points.

The aedeagus is 0.44-0.52 mm long, the parameres have a membranous inner margin (Figs 60 and 61), not enlarged as figured in LÖBL (l.c.). I have now dissected 13 males from the Thai collections and a further male from Sri Lanka. In all these specimens the parameres are apically narrowed, but the contures are sometimes rather obsolete. The incorrect figure in LÖBL (1971) is obviously due to a fragment of an intersegmental membrane mistaken for the inner apical part of the paramere.

Scaphisoma fastum sp. n.

Holotype ♂: Chiang Mai, Chiang Dao, 450 m, 5-11.IV.58 (Maa) in a dead tree (BBMH). Paratypes: 1♂ as holotype; 1♂ "Chiang Mai, V.74" (Sedlacek) (MHNG).

Length 1.5-1.6 mm width 1.05-1.17 mm. Body more or less dark reddish brown, apex of elytra darkened. Apical abdominal segments, legs and antennae ochreous to yellowish. Antennae long, relative length of antennomeres: III 5, IV 10, V 19, VI 19, VII 27, VIII 17, IX 28, X 25, XI 30 (holotype); segment IV about 2.5× longer than wide, V barely wider than IV, almost 5× longer than wide; VI somewhat wider than V, about 4× longer than wide; VII about 4.5× longer than wide; VIII slightly wider than VI, about 3.5× longer than wide; XI about as wide as VII and 5× longer than wide. Pronotum with lateral margins rounded and lateral keels in dorsal view visible in basal half; punctation dense, more or less fine, at least some punctures distinct at 12× magnification. Point of scutellum exposed. Elytra laterally fairly rounded, apically strongly narrowed; lateral keel visible in dorsal view from base to apex; apical margin somewhat convex; inner apical angle about in same level as outer angles; sutural margin not or somewhat elevated; sutural stria rather shallow, curved at base and extended laterally to humeral area, not joint with lateral stria; interval between sutural stria and sutural margin flat, with a row of fine punctures; punctation dense (sparser than on pronotum) and fine, punctures shallow and not well delimited, usually somewhat larger than pronotal ones and at least somewhat smaller than intervals between them. Pygidium densely and very finely punctate, with microsculpture consisting of punctures. Mesepimeron slender, shorter than interval between its end and mesocoxa. Metasternum very finely punctate, medially moderately convex, without distinct impressions. Mesocoxal area narrow, 0.03 mm long, with parallel, coarsely punctate margin, few coarse punctures extended laterally along metasternal suture. Metepisternum almost flat, at widest point 0.13 mm wide, narrowed anterad, inner margin not impressed, straight. First ventrite very finely and densely punctate, except for coarse punctures at margins of metacoxal areas and along basal margin between coxae, not microsculptured. Coxal area 0.05-0.06 mm long, rounded. Following ventrites with microsculpture consisting of punctures. Tibiae straight and slender.

FIGS 62 to 64.

62. *Scaphisoma fastum* sp. n., holotype, aedeagus, dorsal view; 63. dtto, lateral view; 64. dtto, parameres, ventral view. Scale = 0.2 mm.

Sexual characters of male. Segments 1-3 of protarsi somewhat enlarged. Aedeagus (Figs 62 to 64) 0.66-0.73 mm long.

This new species is closely related to *ruficolor* (Pic) with which it shares most of the external characters, including the conspicuous row of coarse punctures on the base of the

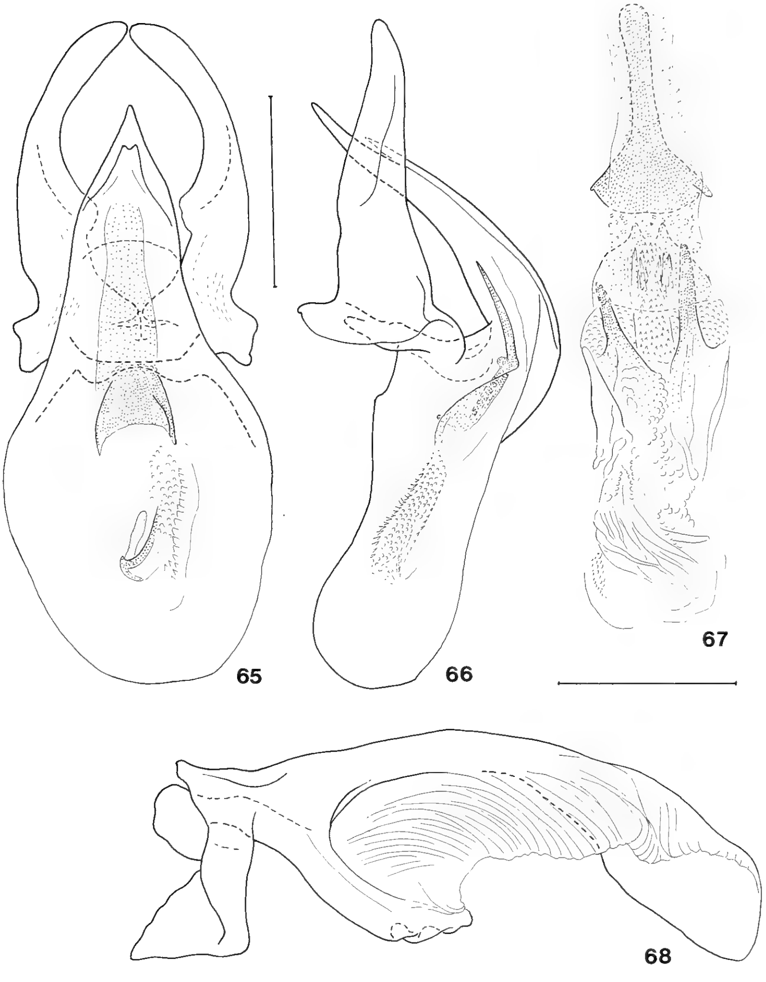
1st ventrite, and a very similar aedeagus. However, the parameres provide good distinguishing features. In *fastum* the distal portion of the right paramere is much slender than in *ruficolor,* and the left paramere bears a membranous subapical lobe absent from *ruficolor*. Similar aedeagi as in *ruficolor* and *fastum* are found in *anomalum* Löbl and *ramosum* Löbl from the Philippines and in *blandum* Löbl from New Guinea. These species are characterized by following synapomorphies: median lobe asymmetrical, with large basal bulbous part and hook-like distal part bearing a ventral tubercle; internal sac with a sclerotized flagellum; parameres asymmetrical, enlarged, with narrow elongate basal portion, and narrowed apical portion of the right paramere; articular tubercle moderately developed. In *anomalum, ramosum* and *blandum* the sutural stria of elytron is not extended along basal margin. Besides, these species differ also in the shape of the parameres, and *blandum* may be readily distinguished by its colour pattern.

Scaphisoma canaliculatum sp. n.

Holotype ♂: Pradu Pah, 50 km N Lampang, 620 m, 18.I.86 (Schwendinger) (MHNG).

Length 1.85 mm, width 1.20 mm. Dorsal surface very dark, almost black, except for reddish brown to ochreous abdomen, dark reddish brown ventral surface, femora and tibiae, and pale tarsi and antennae. Antennae long, relative length of segments: III 6, IV 12, V 18, VI 17, VII 24, VIII 17, IX 25, X 25, XI 34; segment IV slender, about 3 × longer than wide; V wider than IV, 4 × longer than wide; VI markedly wider than V, 3 × longer than wide; VII about 3.5 × longer than wide, wider than VI; VIII about as VI; XI about as wide as VII, almost 5 × longer than wide. Pronotum with strongly rounded lateral margins; lateral keels not visible in dorsal view; punctation very fine, barely visible at 50 × magnification. Point of scutellum exposed. Elytra apically fairly narrowed; lateral margin almost regularly rounded; lateral keel not visible in dorsal view; apical margin truncate; inner apical angle lying behind level of outer angle; sutural margin not elevated; sutural stria deep, parallel to sutural margin, curved at base and extended along basal margin about to middle of basal width; interval between sutural margin and stria narrow, flat, densely and finely punctate; punctation dense and rather coarse, with well delimited punctures usually distinctly smaller than intervals between them; humeral area very finely punctate; surface near apical margin denser punctate than elsewhere. Pygidium apparently lacking microsculpture, punctation dense and rather fine near base, very fine apically. Mesepimeron small, about as long as half of interval between its end and mesocoxa. Metasternum all over very finely and sparsely punctate; median portion somewhat convex, lacking apical impressions. Mesocoxal area very narrow, about 0.03 mm long, with fine marginal punctures. Metepisternum somewhat convex, 0.13 mm wide, anterad narrowed, inner margin straight, impressed below level of metasternum margin. First ventrite not microsculptured, with a dense basal row of coarse elongate punctures margining lateral portion of base and metacoxal area, punctation behind that row and on center rather sparse and fine, near apical margin very fine. Metacoxal area very small, 0.03 mm long, with somewhat convex margin. Following ventrites with well visible microsculpture (24 ×) consisting of punctures. Tibiae slender, straight.

Sexual characters of male. Segments 1-3 of protarsi strongly enlarged, 1 and 2 of mesotarsi moderately enlarged. Apical margin of 5th ventrite sinuate. Lobe of 6th ventrite 0.06 mm long, broadly rounded. Aedeagus (Figs 65 and 66) 0.67 mm long.



Figs 65 to 68.

65 and 66. *Scaphisoma canaliculatum* sp. n., holotype, aedeagus; 67. *Scaphisoma atronotatum* Pic from Kalew, Burma, internal sac; 68. dtto, paramere. Scale = 0.2 mm.

This species belongs to the *pictum* group as shown by the structure of the median lobe of the aedeagus. It differs drastically from other members of that group in the shape of the sclerites of the internal sac. Besides, it is well characterized by the combination of the external features, especially by the colour pattern, the small coxal areas, the abdominal punctation and the microsculpture.

Scaphisoma jacobsoni Löbl

Scaphisoma jacobsoni Löbl, 1975: 287.

Material examined: 2, Chanthaburi, Khao Sabap Nat. Park, 150-300 m, 23.-24.XI.85; 3, Phuket, island Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (all MHNG).

Distribution: Thailand, Malaysia (Sarawak, Penang), Indonesia (Java, Sumatra). — New to Thailand.

Scaphisoma dohertyi Pic

Scaphosoma dohertyi Pic, 1915*a*: 24.

Scaphisoma dohertyi; Löbl 1981*c*: 107, 1986*a*: 174.

Material examined: 7, Chanthaburi, Khao Sabap Nat. Park, 150-300 m, 23.-24.XI.85; 4, Kanchanaburi, Sai York Nat. Park, 100 m, 21.VII.87 (Schwendinger); 1, Phuket, island Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (all MHNG).

Distribution: Indonesia (Java), Malaysia (Pahang, Sarawak), Vietnam, Thailand, North India.

Scaphisoma binhanum (Pic)

Pseudoscaphosoma binhanum Pic, 1922: 2.

Scaphisoma binhanum; Löbl 1976: 222, 1979*a*: 108, 1981*c*: 106, 1986*a*: 174.

Material examined: 1, Mae Hong Son, Tham Lok Forest Reserve, 8 km N Sop Pong, 700 m, 11 & 13.XI.85; 8, Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23.-24.XI.85; 6, Phuket, island Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (all MHNG).

Distribution: India, Thailand, Vietnam, Indonesia (Java). — New to Thailand.

Remarks. The proximally expanded apical portion of the parameres and 1st ventrite in male lacking apical teeth distinguish *binhanum* from *dohertyi*. The female in these two species may be separated by the shape of the sutural striae of elytra, and by the elytral punctation.

Scaphisoma atronotatum Pic

Scaphosoma atronotatum Pic, 1920*c*: 24; 1921*a*: 165.

Scaphisoma atronotatum; Löbl 1973*a*: 152.

Material examined: 5, Chiang Mai, Doi Suthep, 1500 m, 11.XI.86 (Schwendinger); 5, Doi Inthanon, 7.XI.85, 1720 m (all MHNG).

Distribution: Burma, Thailand. — New to Thailand.

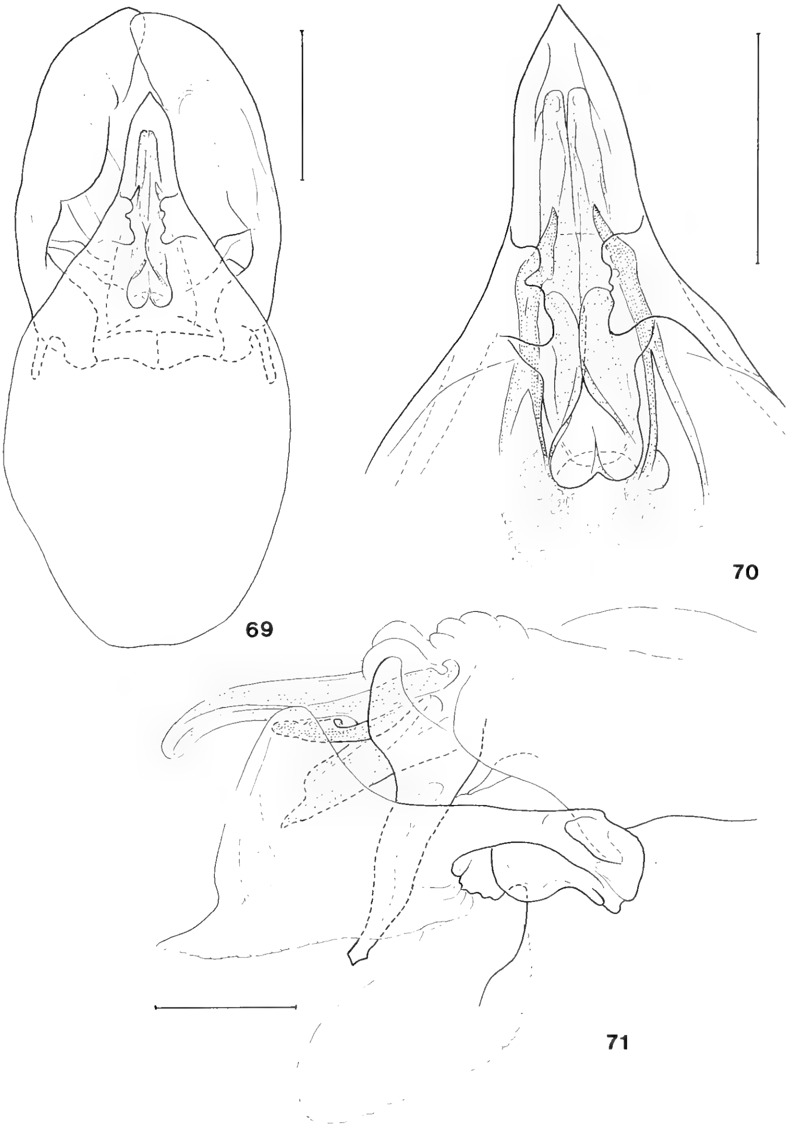
Remarks. New material enables to complete the published figures of the aedeagus by more details (Figs 67 and 68). The parameres are post-basally enlarged and have strongly sclerotized inner margin, similar to that in *khasianum* Löbl and *surya* Löbl, but the dorso-apical wall of the bulbous part of the median lobe is expanded and overlapping the distal portion, as in *dohertyi* and *binhanum*.

Scaphisoma operosum sp. n.

Holotype ♂: Malaysia, Cameron Highlands, 22.-30.III.84 (Rougemont) (MHNG).

Paratypes: 1♂, as holotype; 4♂, 5♀, Thailand, Chiang Mai, Doi Chiang Dao, 450 m, 7.V.87 (Schwendinger) (all MHNG).

Length 1.7-2.0 mm, width 1.15-1.35 mm. Body reddish brown, elytra at apex usually paler, apex of abdomen and legs pale reddish brown or ochreous, antennae yellowish.



FIGS 69 to 71.

69. *Scaphisoma operosum* sp. n., holotype, aedeagus; 70. dtto, distal portion of median lobe; 71. dtto, paratype from Doi Chiang Dao, distal portion of median lobe in lateral view, with paramere, internal sac extruded. Scale = 0.3 mm (69) and 0.2 mm (70, 71).

Antennae long, segments very slender, their relative length as: III 7, IV 21, V 33, VI 28, VII 30, VIII 22, IX 29, X 26, XI 34 (holotype); V and VI evenly wide, slightly wider than IV, VI 7× longer than wide, VIII only somewhat wider than VI. Pronotum with somewhat rounded lateral margins; lateral keels in dorsal view not or barely visible; punctation rather dense and fine, distinct at 20× magnification, punctures weel delimited, near base coarser than on center. Point of scutellum exposed. Elytron slightly narrowed apically; lateral margin distinctly rounded; lateral keel in dorsal view exposed from base to apex, apical margin somewhat rounded; inner apical angle lying in same level as outer angle; sutural margin not elevated; sutural stria shallow, parallel to margin, barely curved near base; interval between latter and suture flat, with a row of fine or very fine puncture; discal punctation dense and more or less coarse, punctures rather well delimited, often larger than intervals between them (in holotype decidedly smaller), near base similar as on center. Pygidium very finely and sparsely punctate, as ventrites with microsculpture consisting of transverse lines. Mesepimeron about 1.5× longer than interval between its end and mesocoxa. Metasternum convex between mesocoxae, with medio-apical portion flattened and impressed, and more or less distinctly impressed median line; covered with microsculpture, except on anterolateral portion; punctation almost all over sparse and very fine, on a more or less extended medio-apical area punctures dense and relatively coarse, and with a dense transverse row of coarse punctures in an impressed stria in front of metacoxa. Mesocoxal area 0.06-0.07 mm long, margin rounded and distinctly punctate. Metepisternum flat, 0.14-0.18 mm wide, anterad narrowed, inner margin impressed, straight, except near angles. First ventrite sparsely and very finely punctate, on mediobasal area several punctures coarser. Metacoxal area 0.08-0.11 mm long, with convex, rather coarsely punctate margin. Tibiae slender, I straight, II and III somewhat curved in apical third.

Sexual characters of male. Segments 1 and 2 of protarsi and mesotarsi strongly enlarged (1st segment about as large as apex of tibia), segment 3 of pro- and mesotarsi moderately enlarged. Fifth ventrite with two short apical ridges each bearing a long hair, surface between them flattened and somewhat impressed; apical lobe of 6th ventrite wide and short, 0.04-0.05 mm long, with rounded margin. Aedeagus (Figs 69 to 71) 1.07-1.35 mm long.

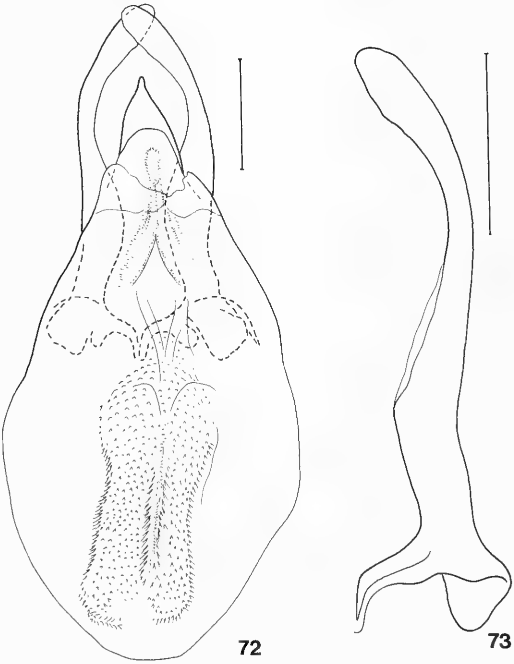
This new species is closely related to *laminatum* Löbl with which it shares a similar median lobe. It may be readily distinguished by the impressed center of metasternum and by the shape of the parameres which are not dorsally dilated in *laminatum.*

Scaphisoma lannaense sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XIII.85 (MHNG).

Paratypes: 1♂, 3♀, as holotype; 1♀, Chanthaburi, Khao Sabap Nat. Park, 150-300 m, 23.-24.XI.85 (all MHNG).

Length 1.4-1.6 mm, width 0.97-1.10 mm. Head, pronotum, and hypomera ochreous. Elytra blackish, each with a large reddish post-basal spot and reddish to yellowish on apical 1/5 to 1/3. Ventral surface of thorax dark reddish brown to blackish, 1st ventrite more or less darkened, following ventrites ochreous, abdominal apex yellowish. Legs ochreous, antennae yellowish, long. Relative length of antennomeres: III 7, IV 17, V 25, VI 21, VII 28, VIII 24, IX 31, X 28, XI 36 (holotype). Pronotum with moderately rounded lateral margins, lateral keels not visible in dorsal view; punctation rather coarse and very dense near base (especially on mediobasal area), with most punctures much larger than intervals and distinct at 20× magnification; elsewhere pronotal punctation finer and less dense, consisting of punctures usually smaller than intervals and almost indistinct at 20× magnification. Distal portion of scutellum exposed. Elytra moderately narrowed apically; lateral margin moderately rounded; lateral keels well visible from base to apex in dorsal view; apical margin rounded; inner apical angle lying in same level as outer angle; sutural margin elevated; sutural stria deep, fairly divergent anterad, suddenly curved obliquely towards basal margin, somewhat behind level of scutellum, accompanied with a row of coarse punctures (becoming fine to very fine apically); interval between sutural stria and margin impressed, with two rows of coarse punctures (one row apically); discal punctation rather sparse and very fine, consisting of extremely shallow punctures, punctures near sutural stria coarse. Pygidium very finely punctate. Mesepimeron slender, about 2× longer than interval between its top and mesocoxa. Metasternum between meso- and metacoxae with microsculpture consisting of transverse striae; punctation all over very fine, except for few moderately coarse punctures in front of apical intercoxal process; with two deep medio-apical impressions. Mesocoxal area narrow, 0.03-0.04 mm long, parallel, with coarse marginal punctures. Metepisternum convex, 0.14-0.15 mm wide, anterad narrowed, inner margin impressed, convexly rounded in apical 2/3 and with convex anterior angle. Abdominal segments with microsculpture consisting of transverse lines. First ventrite very finely punctate, just behind intercoxal process a few relatively coarse punctures. Metacoxal area 0.04-0.06 mm long, convex, marginal punctures coarse. Tibiae slender, I and II curved, III straight.



FIGS 72 and 73.

72. *Scaphisoma lannaense* sp. n., holotype, aedeagus; 73. dtto, paramere. Scale = 0.1 mm.

Sexual characters of male. Segments 1 to 3 of protarsi somewhat enlarged. Sixth ventrite lacking apical lobe. Aedeagus (Figs 72 and 73) 0.53-0.59 mm long.

This species resembles *dohertyi* by the coloration, the conspicuous shape of the sutural stria of the elytron, and the elytral punctation. It may be readily separated from *dohertyi* by coarser pronotal punctation and by the metasternum lacking a row of punctures in front of the metacoxa. *S. lannaense* belongs to the *pictum* group (symmetrical aedeagus with bifid distal portion of the median lobe). It differs from all species placed in the group in the combination of following characters: elytron maculate, with sutural stria divergent anterad, and internal sac of aedeagus lacking sclerotized pieces.

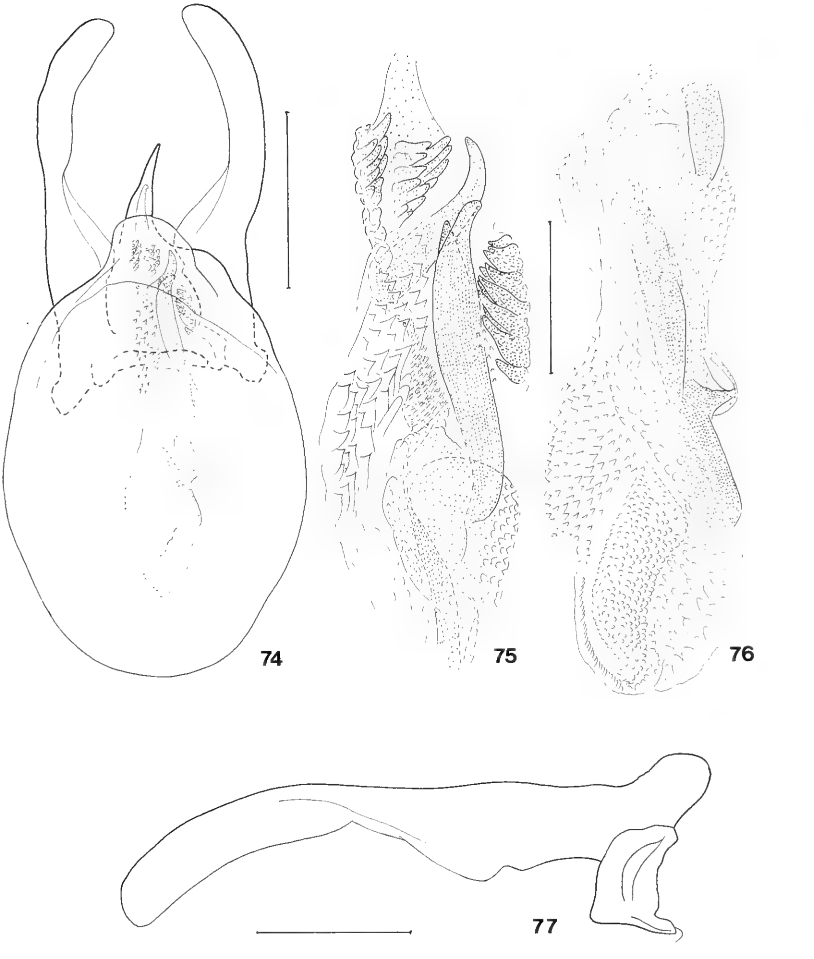
Scaphisoma velox sp. n.

Holotype ♂: Phetchaburi, Kaeng Krachan Nat. Park, 30 km from Headquarters, 450 m, 18.XI.85 (MHNG).

Length 2.0 mm, width 1.4 mm. Body ochreous, apical abdominal segments, legs and antennae paler, almost yellowish. Elytra weakly alutaceous, darkened at apex, and with a somewhat paler narrow transverse subapical area. Antennae long, relative length of antennomeres as III 7, IV 22, V 32, VI 29, VII 35, VIII 30, IX 35, X 32, XI 40; IV about 5 × longer than wide, V somewhat wider than IV, well 6 × longer than wide, VI slightly wider than V, not quite 6 × longer than wide, VII well 4 × longer than wide; VIII barely wider than VI, 5 × longer than wide; XI about as wide as VII, and about 4 × longer than wide. Pronotum with lateral margins oblique in basal half, rounded apically; lateral keels not visible in dorsal view; punctation dense and very fine, barely distinct at 24 × magnification. Point of scutellum exposed. Elytra with distinct pubescence; lateral margin rounded; lateral keel in dorsal view visible from base almost to apex; apical angle truncate; inner apical angle lying behind level of outer angle; sutural margin elevated; sutural stria deep, almost parallel to margin, somewhat curved near base, evanescent near pronotal lobe; interval between sutural stria and margin flat, densely and rather finely punctate; punctation dense and rather coarse, punctures well delimited, larger than intervals between them (especially near apex), at base decidedly finer than on center (but coarser than on pronotum); minute humeral hump impunctate. Pygidium extremely finely punctate, with microsculpture consisting of transverse striae. Mesepimeron about as long as interval between its end and mesocoxa. Metasternum with microsculpture consisting of transverse striae; median portion strongly convex, apically flattened, with fine and very dense punctation medio-apically (punctures about as large as intervals), sparsely and very finely punctate elsewhere, except for a dense row of rather coarse punctures in a deeply impressed line in front of metacoxa. Mesocoxal area 0.06 mm long, with rounded, rather coarsely punctate margin. Metepisternum convex, 0.15 mm wide, anterad moderately narrowed, inner margin deeply impressed, straight except near angles. Ventrites microsculptured as pygidium. First ventrite very finely and sparsely punctate, just on a small mediobasal area punctation distinctly denser and less fine; metacoxal area 0.12 mm long, with rounded margin coarsely punctate. Tibiae rather stout, I straight, II and III somewhat curved.

Sexual characters of male. Segments 1 and 2 of pro- and mesotarsi strongly enlarged, 1 about as large as apex of tibia; segment 3 of pro- and mesotarsi moderately enlarged. Lobe of 6th ventrite narrow, 0.10 mm long. Aedeagus (Figs 74 to 77) 0.55 mm long.

S. velox shares many external characters (microsculpture, long antennae, transverse row of punctures in front of metacoxa, elytron with sutural stria not extended along basal



FIGS 74 to 77.

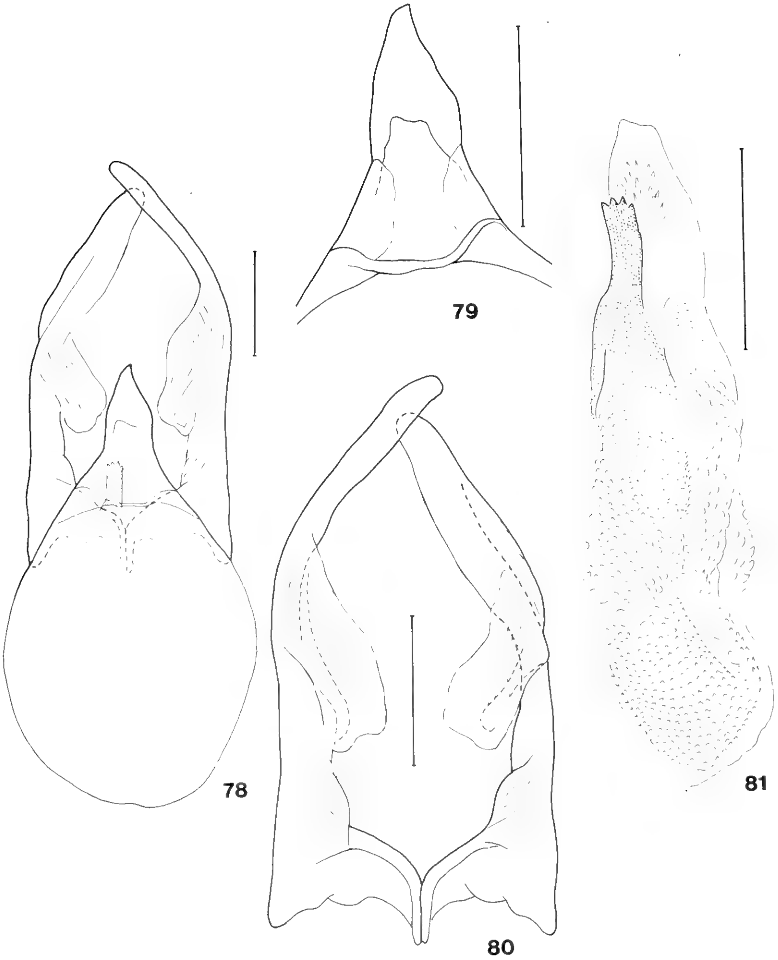
74. *Scaphisoma velox* sp. n., holotype, aedeagus; 75. dtto, distal portion of internal sac; 76. dtto, basal portion of internal sac; 77. dtto, paramere. Scale = 0.3 mm (74) and 0.1 mm (75-77).

margin) with species of the groups *pictum, binhanum, tricolor* and *haemorrhoidale.* But the aedeagus lacks the autapomorphies of these groups, and the median lobe differs in the shape of its apical portion. The species is also distinguishable by the complex internal sac and by alutaceous elytra. The asymmetry in the parameres as figured is possibly due to an artefact.

Scaphisoma solutum sp. n.

Holotype ♂: Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23.-24.XI.85 (MHNG).

Length 1.3 mm, width 0.83 mm. Body very dark reddish brown, apex of abdomen and femora ochreous. Antennae, tibiae and tarsi pale, almost yellowish. Antennae long, relative length of antennomeres: III 8, IV 10, V 19, VI 18, VII 22, VIII 18, IX 24, ×23, XI 28; III conspicuously elongate; IV slender, 3× longer than wide; V somewhat wider



Figs 78 to 81.

78. *Scaphisoma solutum* sp. n., holotype, aedeagus; 79. dtto, distal portion of median lobe; 80. dtto, parameres, 81. dtto, internal sac. Scale = 0.1 mm.

than IV, about 5× longer than wide; VI somewhat wider than V, about 4× longer than wide; VII wider than VI, not quite 4× longer than wide; VIII wider than VI, almost 4× longer than wide; XI barely wider than VII, more than 4× longer than wide. Pronotum with moderately rounded lateral margins and barely visible lateral keels in dorsal view; punctation dense and very fine, punctures well delimited and distinct at 20× magnification, much smaller than intervals between them. Point of scutellum exposed. Elytra fairly narrowed apically; lateral margin rounded in anterior half, oblique in apical half; lateral keel distinct from base to apex; apical margin truncate; inner apical angle lying in level of outer angle; sutural margin not elevated; sutural stria rather deep, parallel to suture, evanescent at level of scutellum; interval between sutural stria and margin flat, with a row of very fine punctures; discal punctation dense and fine, near base similar as that on pronotum, elsewhere somewhat coarser, with punctures well delimited, most of them smaller than intervals. Pygidium very finely punctate, with microsculpture consisting of transverse striae. Mesepimeron very slender, about 2× longer than interval between its top and mesocoxa. Metasternum all over very finely punctate; median portion convex, without impressions; microsculpture consisting of transverse striae distinct on median and lateroapical portions, absent from laterobasal area. Mesocoxal area barely 0.03 mm long, with almost parallel, distinctly punctate margin. Metepisternum flat, 0.08 mm wide, anterad moderately narrowed, with almost straight not impressed inner margin. Visibles ventrites as pygidium very finely punctate and microsculptured; metacoxal area 0.07 mm long, convex, with fine marginal punctures.

Sexual characters of male. Segments 1-2 of protarsi enlarged. Lobe of 6th ventrite wide and very short, almost indistinct. Aedeagus (Figs 78 to 81) 0.60 mm long.

This species exhibits rather unusual aedeagal characters. It seems to represent an isolated group possibly related to the *pictum*-group. Its most striking features are the asymmetrical distal portions of the parameres and of the median lobe and the large, not overlapped ostium.

Scaphisoma rouyeri Pic

Scaphosoma (Scutoscaphosoma) rouyeri Pic, 1916: 3.
Scutoscaphosoma subovatum Pic, 1920*c*: 24.
Scaphisoma rouyeri; Löbl 1981*b*: 156.

Material examined: 1, Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23-24.XI.85; 3, Khao Yai Nat. Park, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Distribution: Malaysia (Sarawak), Indonesia (Java), Thailand. — New to Thailand.

Scaphisoma rufescens (Pic)

Pseudoscaphosoma punctatum var. *rufescens* Pic, 1920*c*: 24.
Scutoscaphosoma distinctipenne Pic, 1923*b*: 195.
Scaphisoma rufescens; Löbl 1981*b*: 157.

Material examined: 7, Chiang Mai, Chiang Dao, 450 m, 5-11.IV.58 (Maa); 1, Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (BMH, MHNG).

Distribution: Malaysia (Sabah, Sarawak), Indonesia (Kalimantan), Singapore, Vietnam, Thailand. — New to Thailand.

Scaphisoma cribripenne (Pic)

Scutoscaphosoma cribripenne Pic, 1923*a*: 17.
Scaphisoma cribripenne; Löbl, 1981*b*: 158.

Material examined: 3, Chiang Mai, Chiang Dao, 450 m, 5-11.IV.58 (Maa) (BMH, MHNG).

Distribution: Vietnam, Thailand. — New to Thailand.

Scaphisoma delictum Löbl

Scaphisoma delictum Löbl, 1981*b*: 158.

Material examined: 1, Mae Hong Son, Sop Pong Forest Park, 600-700 m, 12.XI.85 (MHNG).

Distribution: Vietnam, Thailand. — New to Thailand.

Scaphisoma rougemonti Löbl

Scaphisoma rougemonti Löbl, 1984*c*: 996.

Material examined: 3, Chiang Mai, Chiang Dao, 450 m, 5-11.IV.58 (Maa) (BMH, MHNG).

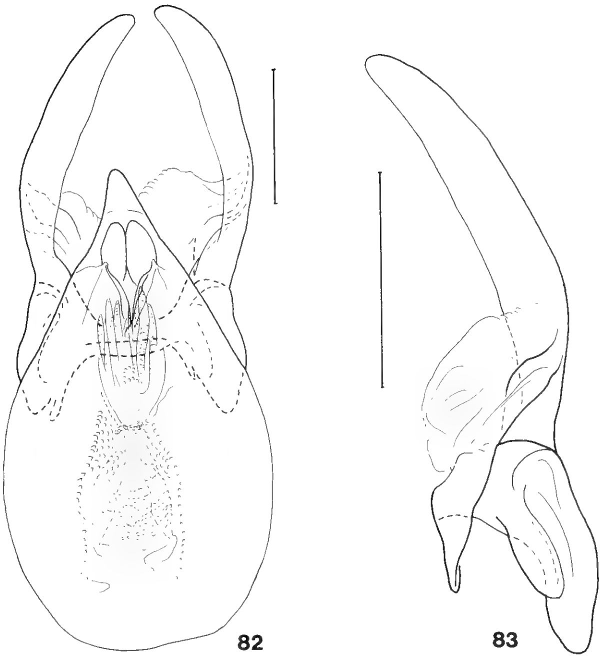
Distribution: Burma, Thailand. — New to Thailand.

Scaphisoma pseudatrox sp. n.

Holotype ♂: Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23-24.XI.85 (MHNG).

Paratypes: 2♂, 1♀ as holotype; 2♂, Khao Yai Nat Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Length 1.2-1.4 mm, width 0.83-0.97 mm. Dorsal surface black, body ventrally somewhat paler; elytron with a large reddish spot covering most of basal half but not extended to basal or lateral margin and not reaching sutural stria; apical portion of elytron (more than fourth of maximum length), apex of abdomen and legs ochreous; antennae yellowish. Pronotum with rounded lateral margins, lateral keels not or barely visible in dorsal view; pronotal punctation fine in middle and near apical and lateral margins (visible at 24× magnification), on mediobasal area distinctly coarser than in middle. Point of scutellum exposed. Elytra rather flat, with rounded lateral margins and distinct lateral keels in dorsal view; sutural margin not elevated; inner apical angle lying about in same level as outer angle; interval between sutural margin and stria flat, densely and coarsely punctate; sutural stria deep, near base somewhat curved, accompanied by coarse punctures; disk with 3 oblique rows of very coarse punctures extended apically to apical third, and with few additional very coarse punctures on mediolateral area; inner basal area densely and coarsely punctate, remaining elytral surface more of less sparsely and finely or very finely punctate. Pygidium very finely punctate. Hypomeron without microsculpture. Median portion of metasternum and abdominal segments with microsculpture consisting of transverse striae, microsculpture absent from mes- and metepisternum, and from laterobasal portion of 1st ventrite. Lateral portion of metasternum finely punctate except for coarse punctures in transverse impressed stria parallel to metacoxa; median portion of metasternum rather coarsely punctured in and around two apical impressions, anterad gradually finer punctate. Metepisternum 0.08-0.10 mm wide, narrowed anteriorly, inner margin rounded apically. Ventrites very finely and sparsely punctate, except on narrow mediobasal area of 1st ventrite which is densely and rather coarsely punctate. Mesocoxal area 0.4-0.5 mm long, with rounded, coarsely punctate margin; metacoxal area 0.06-0.09 mm long, with convex, coarsely punctate margin.



FIGS 82 and 83.

82. *Scaphisoma pseudatrox* sp. n., holotype, aedeagus; 83. dtto, paramere. Scale = 0.1 mm.

Sexual characters of male. Segments 1 to 3 of protarsi enlarged. Lobe of 6th ventrite very short, rounded. Aedeagus (Figs 82 and 83) 0.46-0.51 mm long.

This new species is a member of the *rouyeri* group. It shares with *atrox* Löbl wide parameres and long sclerotized teeth in apical portion of the internal sac, but differs conspicuously by the elytral punctation and coloration, and by the parameres not enlarged apically.

Scaphisoma pseudodelictum Löbl

Scaphisoma pseudodelictum Löbl, 1986*a*: 180.

Material examined: 3, Chiang Mai, Doi Suthep, 800 m, 12.VI.86 and 1050 m, 14.XI.87 (Schwendinger); 9, Chiang Dao, 450 m, 5-11.IV.58 (Maa); 26, Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG, BMH).

Distribution: North India, Thailand. — New to Thailand.

Remarks. In the Khao Yai specimens the apical portions of the parameres are less enlarged than those in specimens from other localities.

Scaphisoma species C

Material examined: 3, Chiang Mai, Chiang Dao, 450 m, 5-11.IV.58 (Maa) (BMH, MHNG).

This species is characterized by conspicuously dense and coarse pronotal punctation. The aedeagus is similar to that in *delictum* and *pseudodelictum,* but larger and with relatively short enlarged apical portion of parameres. Unfortunately, the internal sac in the single male is extruded and its structure cannot be compared with that in other species.

Scaphisoma javanum Löbl

Scaphisoma javanum Löbl, 1979*b*: 326; 1982*b*: 5.

Material examined: 2, Chanthaburi, Khao Sabap Nat. Park, 150-300 m, 23.-24.XI.85; 1, Khao Yai Nat. Park, 750-850 m, near Headquarters, 26.XI.-3.XII.85 (all MHNG).

Distribution: Thailand, Malaysia (Sarawak, Sabah), Indonesia (Java). — New to Thailand.

Remarks. I have carefully reexamined several aedeagi and found that its apical portion is not trifid, as in species of the *haemorrhoidale* group. In *javanum* it seems to be similar to that in species of the *rouyeri* group, with which it also shares lobed parameres.

Scaphisoma paliferum Löbl

Scaphisoma paliferum Löbl, 1984*c*: 999.

Material examined: 2, Chiang Mai, Doi Suthep, 1500 m, 11.XI.85 (Schwendinger); 1, Doi Suthep, III.87 (Rougemont); 2, Doi Pui, 25.I. and 14.III.82 (Rougemont) (all MHNG).

Distribution: Burma, Thailand. — New to Thailand.

Remarks. These specimens exhibit almost exactly the same conspicuous colour pattern as the types.

Scaphisoma species D

Material examined: 1 ♀, labelled "W. Tak"/"J. H. Sedlacek Collector" (MHNG).

This species resembles *testaceomaculatum* (Pic) in colour pattern and in having anterad strongly divergent sutural striae of elytra. In both species the pronotal base is blackish, with an anteriorly enlarged black mediobasal area, but in Thai specimen the remaining surface of the prothorax is ochreous (yellowish in *testaceomaculatum*) and the elytral spot is much larger than in all specimens of *testaceomaculatum* I have seen. Besides, the elytral punctation in the Thai specimen is coarser than that in *testaceomaculatum.*

Scaphisoma amabile Löbl

Scaphisoma amabile Löbl, 1984*c*: 998.

Material examined: 8, Chiang Mai, Doi Suthep, 1050 m, 14.IX.87 (Schwendinger); 1, Doi Suthep, III.87 (Rougemont) (all MHNG).

Distribution: Burma, Thailand. — New to Thailand.

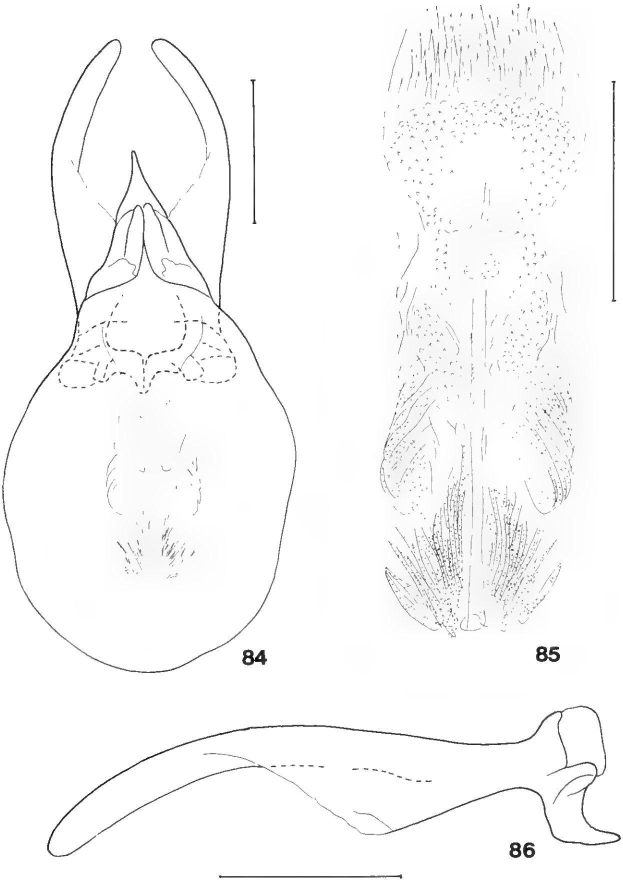
Scaphisoma pseudamabile sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Paratypes: 5♂, 9♀, as holotype; 1♀, Chiang Mai, Doi Suthep, 800 m, 12.V.86 (Schwendinger) (all MHNG).

Length 1.2-1.5 mm, width 0.85-1.0 mm. Body ochreous, apex of elytra distinctly darkened, elytral base sometimes somewhat darkened. In external characters extremely similar to *amabile* Löbl from which it differs by elytra with less well delimited darkened areas, sutural striae parallel from their middle to curved anterior portion, metacoxal area somewhat shorter (0.05-0.06 mm) and sometimes only barely longer than mesocoxal area.

As in *amabile,* the transverse row of punctures in front of the metacoxa is well marked and usually lying in an impressed stria. The length of the antennomeres is almost the same in both species (in holotype of *pseudamabile:* III 5, IV 16, V 22, VI 19, VII 25, VIII 21, IX 26, X 26, XI 32).



Figs 84 to 86.

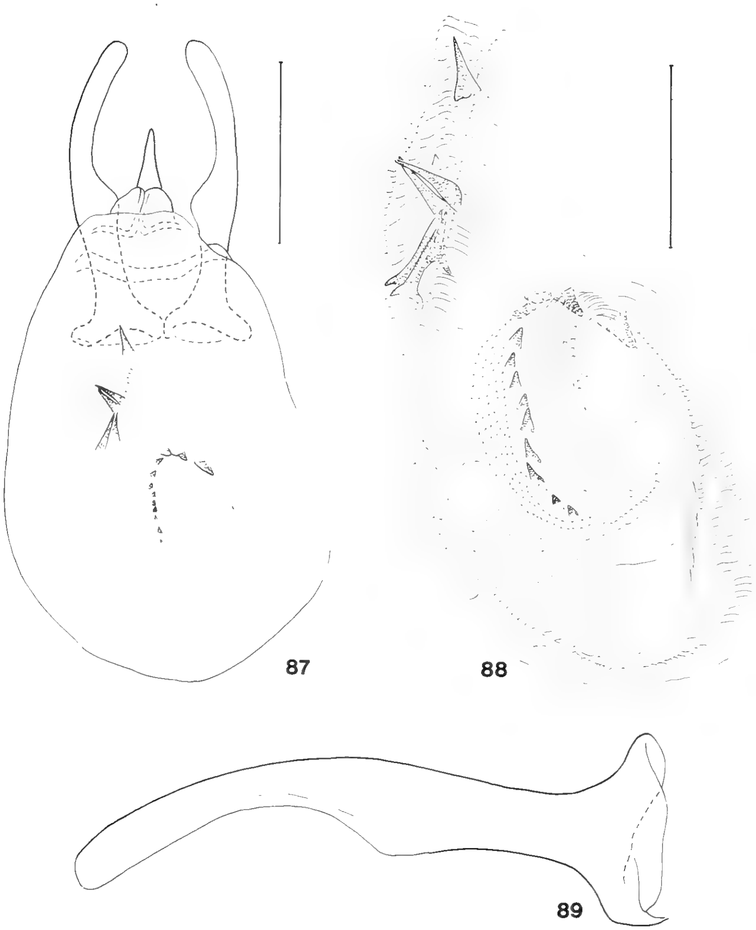
84. *Scaphisoma pseudamabile* sp. n., paratype from Khao Yai Nat. Park, aedeagus; 85. dtto, internal sac; 86. dtto, paramere. Scale = 0.1 mm.

This new species is characterized by the aedeagus which is 0.52-0.59 mm long (Figs 84 to 86) differing notably from that of *amabile* in the shape of the parameres.

Scaphisoma segne sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, south slope, 1450 m, 4.XI.85 (MHNG).

Length 1.7 mm, width 1.12 mm. Body ochreous, apical abdominal segments and tibiae somewhat paler, tarsi and antennae yellowish. Antennae rather long, relative length of antennomeres: III 6, IV 10, V 19, VI 22, VII 25, VIII 20, IX 25, X 25, XI 30; segment IV rather slender, about 3 × longer than wide; V distinctly wider than IV, 4 × longer than



Figs 87 to 89.

87. *Scaphisoma segne* sp. n., holotype, aedeagus; 88. dtto, internal sac; 89. dtto, paramere. Scale = 0.2 mm (87) and 0.1 mm (88, 89).

wide; VI slightly wider than V, 4× longer than wide; VII about 3.5× longer than wide; VIII somewhat wider than VI, well 3× longer than wide; XI about as wide as VII, 4× longer than wide. Pronotum with rounded lateral margins and not visible lateral keels in dorsal view; punctation moderately dense and extremely fine, barely visible at 50× magnification. Point of scutellum exposed. Elytra rather strongly narrowed apically, with rounded lateral margin; lateral keel in dorsal view visible from base to apex; apical margin truncate; inner apical angle situated somewhat behind level of outer angle; sutural margin not elevated; sutural stria shallow, parallel to suture, curved near base, evanescent laterally of pronotal lobe; interval between sutural stria and margin flat, very finely punctate; punctation near base about as that on pronotum, on apical 2/3 dense and fine, formed by relatively well delimited punctures most of which are smaller than intervals between them. Pygidium very finely punctate and with microsculpture consisting of points. Mesepimeron about 1.5× longer than interval between its end and mesocoxa. Metasternum without microsculpture; centre moderately convex, lacking impression; punctation very fine and sparse, only on medio-apical area denser, formed by larger but very shallow punctures. Mesocoxal area 0.05 mm long, margin convex, almost indistinctly punctured. Metepisternum flat, 0.15 mm wide, somewhat narrowed anteriorly, inner margin impressed, straight, only near angles rounded. First ventrite lacking microsculpture, laterally very finely and sparsely punctate, on median part rather densely and less finely punctate. Metacoxal area large, 0.12 mm long, margin convex, with fine, almost indistinct punctures. Following ventrites with microsculpture consisting of punctures. Tibias slender, I and III straight, II somewhat curved.

Sexual characters of male. Segments 1 to 3 of protarsi and 1 and 2 of mesotarsi enlarged. Lobe of 6th ventrite triangular, 0.06 mm long. Aedeagus (Figs 87 to 89) 0.70 mm long.

The distal portion of the median lobe seems to be dorsally split as in members of the *haemorrhoidale*-group. Should the split prove to be incomplete, the species may belong to the *rouyeri*-group.

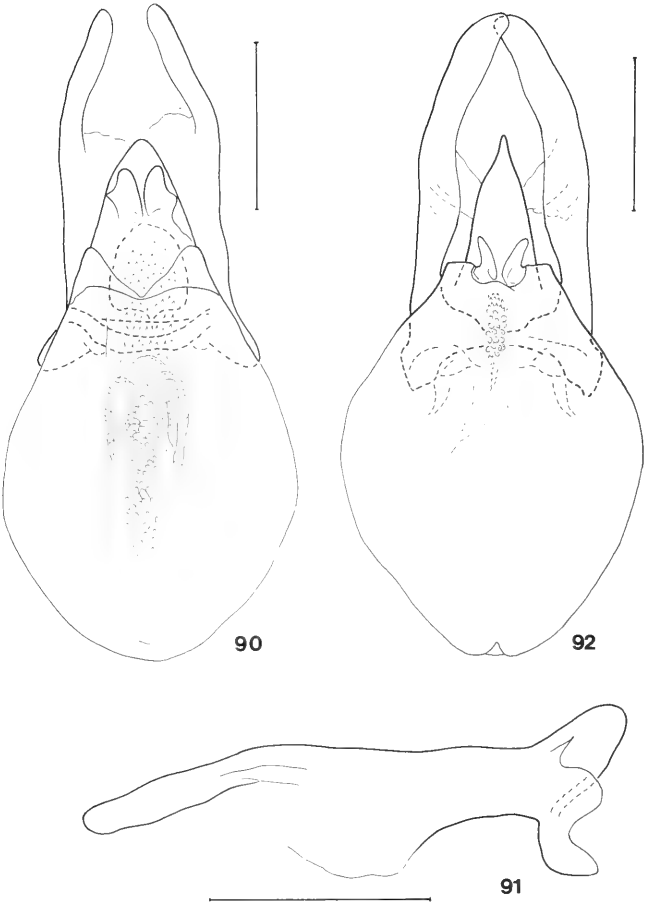
S. segne may be readily identified by the characteristic structures in the internal sac.

Scaphisoma egenum sp. n.

Holotype ♂: Khao Yai Nat. Park, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Paratypes: 7♂, 10♀, as holotype (MHNG); 3♂, 3♀, Chiang Mai, Doi Chiang Dao, 450 m, 7.V.87 (Schwendinger) (MHNG), 1♀ Chiang Dao, 450 m, 5.-11.IV.58 (Maa) (BMH).

Length 1.25-1.40 mm, width 0.83-0.97 mm. Body more or less dark reddish brown to black, apical 1/4 to 1/3 of elytra ochreous or yellowish. Apical abdominal segments, femora and tibiae ochreous, tarsi and antennae usually still somewhat paler. Antennae similar as in other species of the *haemorrhoidale*-group, relative length of antennomeres: III 5, IV 13, V 20, VI 16, VII 18, VIII 16, IX 19, X 18, XI 25 (holotype). Pronotum with rounded lateral margins; lateral keels not visible in dorsal view; punctation fairly dense and very fine, barely visible at 24× magnification. Minute point of scutellum exposed. Elytron fairly narrowed apically; lateral margin moderately rounded; lateral keel usually distinct in dorsal view from base to apex; apical margin somewhat rounded; inner apical angle lying behind level of outer angle; sutural margin elevated; sutural stria rather fine, somewhat divergent anteriorly, barely curved near base, finely punctate; interval between sutural stria and margin flat, with a row of very fine punctures; punctation on basal 1/4 sparse and fine to very fine, towards centre denser and coarser, about on apical 3/5 fairly dense and rather coarse, with punctures usually distinctly smaller than intervals. Pygidium extremely finely punctate, as on ventrites with microsculpture consisting of transverse striae. Mesepimeron distinctly longer than interval between its end and mesocoxa. Metasternum with moderately convex and very finely punctate centre; medio-apical portion flattened, densely and relatively coarsely punctate, with microsculpture consisting of transverse striae, lacking impressions or very shallowly impressed near metacoxa. Lateral portion of metasternum lacking microsculpture, sparsely and very finely punctate, with a more or less irregular row of fine punctures in front of metacoxa. Mesocoxal area 0.06-0.07 mm long, with oblique inner and rounded outer margin, and very fine marginal punctures. Metepisternum flat, 0.09-0.11 mm wide, moderately narrowed anteriorly,



FIGS 90 to 92.

90. *Scaphisoma egenum* sp. n., paratype from Khao Yai Nat. Park, aedeagus; 91. dtto, paramere; 92. *Scaphisoma pressum* sp. n., holotype. Scale = 0.1 mm (90, 91) and 0.2 mm (92).

inner margin not or barely impressed, straight except near angles. First ventrite all over sparsely and very finely punctate; not microsculptured on laterobasal area. Tibiae straight, slender.

Sexual characters of male. Segments 1 to 3 of protarsi and 1 and 2 of mesotarsi distinctly enlarged. Aedeagus (Figs 90 and 91) 0.34-0.41 mm long.

This species may be readily separated from other members of the *haemorrhoidale*-group having lobed parameres by the small size of the body and by the colour pattern.

The specimens from Chiang Dao are notably darker than those from Khao Yai Nat. Park.

Scaphisoma scabiosum Löbl

Scaphisoma scabiosum Löbl, 1986*a*: 191.

Material examined: 6, Chiang Rai, Nam Tok, Ban Du, III.87 (Rougemont); 2, 10 km W Wiang Pa Pao, Ban Huay Ya Sai, 780 m, 28.I.88 (Schwendinger).

Distribution: India (Meghalaya), Thailand. — New to Thailand.

Scaphisoma aurun Löbl

Scaphisoma aurun Löbl, 1979*a*: 110; 1986*a*: 191.

Material examined: 1, Chiang Mai, Doi Inthanon, 910 m, 23.II.87 (Schwendinger); 1, Doi Chiang Dao, 450 m, 7.V.87 (Schwendinger); 2, Chiang Dao, 600 m, 23.XII.80 (Deharveng, Gouze) (all MHNG).

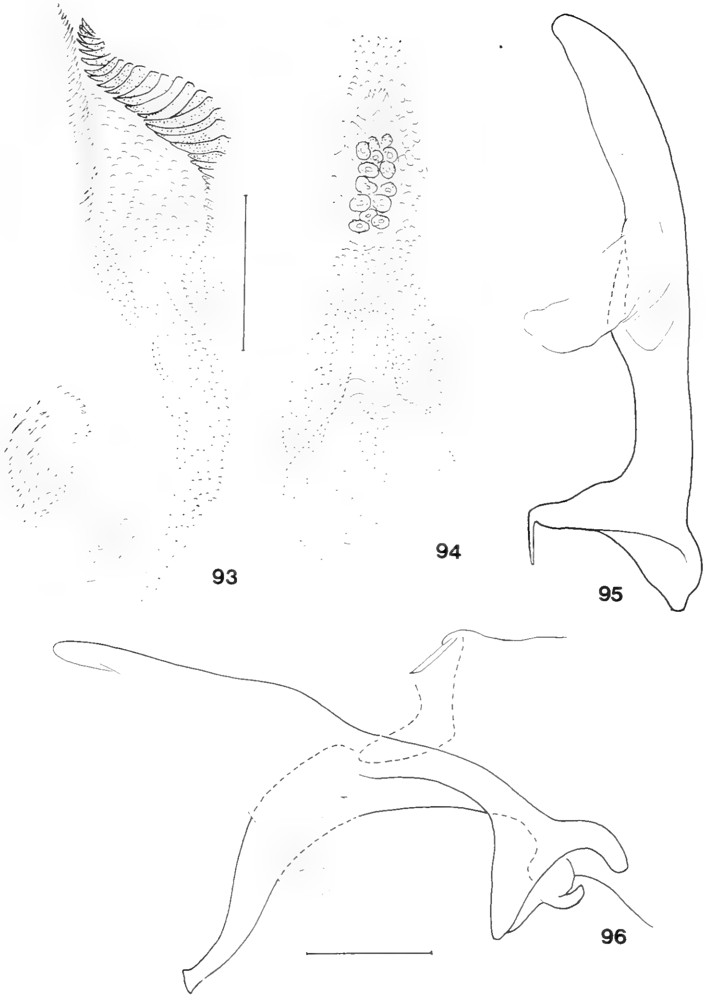
Distribution: India, Thailand. — New to Thailand.

Scaphisoma pressum sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Paratypes: 3♂, 1♀ as holotype (MHNG), 1♂ Nakhon Ratchasima, Sakaerat Exp. Station, 14.VIII.70 (Franz) (coll. Franz).

Length 1.5-1.6 mm, width 1.0-1.20 mm. Body ochreous, legs and antennae yellowish. Very similar to *aurun* from which it differs by the 1st ventrite lacking coarse mediobasal punctures, and by the aedeagus. Antennae very long, relative length of antennomeres as III 7, IV 17, V 27, VI 22, VII 27, VIII 22, IX 28, X 24, XI 28 (holotype). Mesocoxal area 0.05-0.06 mm long, margin convex, distinctly punctured; metacoxal area 0.06-0.08 mm long, margin convexly rounded and coarsely punctured. Lobe of 6th ventrite small, triangular, 0.05 mm long. Aedeagus (Figs 92 to 96) 0.81-0.87 mm long. Distal portion of median lobe more curved than in *aurun,* and with divergent short dorsal branches. Internal sac lacking a pair of median sclerites, and includes a bunch of sclerotized teeth orientated ventrally. Parameres larger than in *aurun*.



FIGS 93 to 96.

93. *Scaphisoma pressum* sp. n., holotype, internal sac in lateral view; 94. dtto, dorsal view; 95. dtto, paramere; 96. dtto, distal portion of median lobe in lateral view with paramere. Scale = 0.1 mm.

Scaphisoma cederholmi Löbl

Scaphisoma cederholmi Löbl, 1971: 983; 1986*a*: 193.

Material examined: 1, Chiang Mai, 14.XI.68 (Satô); 1, Kanchanaburi, Sai Yok Nat. Park, 21.VII.87 (Schwendinger); 1, Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85; 1, Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (all MHNG).

Distribution: Sri Lanka, India (Assam), Thailand.

Scaphisoma tetrastictum Champion

Scaphosoma tetrastictum Champion, 1927: 275.
Scaphisoma tetrastictum; Löbl 1979*a*: 108, 1980: 116, 1981*c*: 109, 1986*a*: 191.

Material examined: 1, Chiang Mai, Doi Suthep, 1500 m, 4.XI.86 (Schwendinger); 1, Doi Pui, north slope, 1500 m, 19.XII.88 (Trautner & Geigenmüller); 1, Chiang Rai, env. 30 km E Chiang Rai, 12.III.82 (Rougemont); 1, Mae Hong Son, Tham Lok Forest Park, 8 km N Sop Pong, 700 m, 11. & 13.XI.85 (MHNG, SMNS).

Distribution: India, Burma, Thailand, Vietnam, Taiwan. — New to Thailand.

Scaphisoma obliquemaculatum Motschulsky

Scaphisoma obliquemaculatum Motschulsky, 1863: 435.
Scaphosoma rufomaculatum Pic, 1921*b*: 5.
Scaphosoma luteoapicale Pic, 1923*a*: 17.
Scaphosoma mahense Scott; Vinson 1943: 197.
Scaphisoma obliquemaculatum; Löbl 1971: 984, 1976: 273, 1977b: 43.

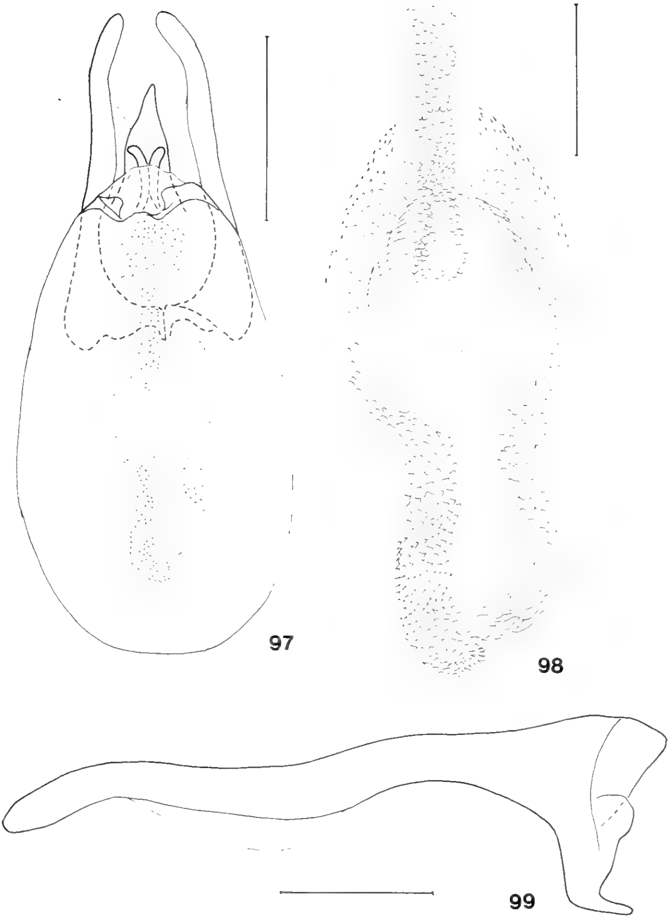
Material examined: 4, Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85; 2, Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23-24.XI.85 (all MHNG).

Distribution: Sri Lanka, Thailand, Vietnam, Indonesia (Java, Sumatra, Sulawesi) Malaysia (Sarawak), Mascarene archipelago. — New to Thailand.

Scaphisoma valens sp. n.

Holotype ♂: Chiang Mai, Doi Inthanon, 1650 m, 7.XI.85 (MHNG).
Paratypes: 1♂, 2♀ as holotype (MHNG).

Length 1.55-1.70 mm, width 1.10-1.15 mm. Body, femora and tibiae ochreous, antennae, tarsi and apex of abdomen yellowish. Antennae long, similar as in other species of the *haemorrhoidale*-group; relative length of antennomeres in holotype: III 8, IV 17, V 23, VI 21, VII 26, VIII 22, IX 26, X 25, XI 27. Pronotum with rounded lateral margins, lateral keels not visible in dorsal view; punctation dense and coarse, punctures distinct at 10× magnification. Punctures relatively well delimited, at least some as large or larger than intervals between them. Point of scutellum exposed. Elytron with rounded lateral margin; lateral keel in dorsal view barely visible, obsolete in middle portion; apical margin truncate; inner apical angle situated behind level of outer angle; sutural margin not elevated; sutural stria moderately deep, parallel to margin, not curved near base, coarsely punctate; interval between sutural stria and margin flat, narrow, coarsely punctate; discal punctation all over dense and coarse, decidedly coarser than on pronotum, punctures deep, rather well delimited, mostly larger than intervals between them. Pygidium extremely finely punctate, with microsculpture consisting of punctures. Mesepimeron about 2× longer than interval between its top and mesocoxa. Metasternum not microsculptured, in middle convex, flattened between metacoxae; punctation coarse, sparse on centre, dense just in front of apical intercoxale apophyse, moderately dense on lateral portion, with punctures forming a transverse row in front of metacoxa. Mesocoxale area small, about 0.04-0.06 mm long, rounded, with coarse marginal punctures. Metepisternum convex, 0.13-0.15 mm wide, anteriorly moderately narrowed, with distinctly punctate inner portion; inner margin impressed, rounded or somewhat sinuate. First ventrite not microsculptured, coarsely and sparsely punctate on median portion, very finely and sparsely punctate on lateral portion. Metacoxal area 0.08-0.09 mm long, margin convex, coarsely punctate. Following ventrites obsiously lacking microsculpture, 5th ventrite with extremely fine microsculpture (180×) consisting of transverse lines or waves. Tibiae slender, pro- and mesotibiae straight, metatibiae somewhat curved.



Figs 97 to 99.

97. *Scaphisoma valens* sp. n., paratype from Doi Inthanon, aedeagus; 98. dtto, internal sac, 99. dtto, paramere. Scale = 0.2 mm (97) and 0.1 mm (98, 99).

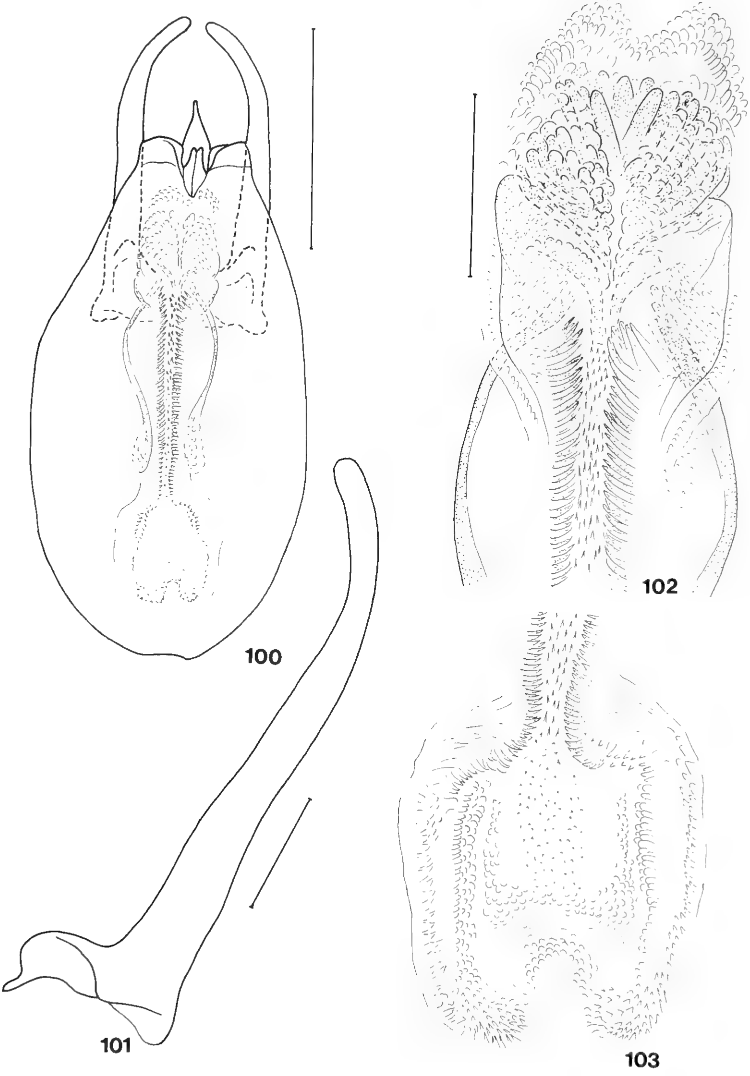
Sexual characters of male. Segments 1 and 2 of protarsi fairly widened, segment 3 somewhat widened. Aedeagus (Figs 97 to 99) 0.75-0.83 mm long.

This species belongs also to the *haemorrhoidale*-group. It may be identified by the combination of the external characters.

Scaphisoma dives sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, 1550 m, ravine, north slope, 4.XI.85 (MHNG).

Paratypes: 4♂, 2♀ as holotype; 2♂, 1♀, Doi Suthep, 1450 m, southern slope, 4.XI.85; 1♀, Doi Suthep, 1400 m, north slope, 5.XI.85; 5♂, 1♀, Doi Suthep, III.87 (Rougemont); 2♂, 11♀, Doi Pui, 1500 m, north slope, 19.XII.88 (Trautner & Geigenmüller); 1♂, Doi Inthanon, 1250 m, ravine near Forestry Department, 6.XI.85 (MHNG, SMNS).



FIGS 100-103.

100. *Scaphisoma dives* sp. n., holotype, aedeagus; 101. dtto, paramere; 102. dtto, apical portion of internal sac; 103. dtto, basal portion of internal sac. Scale = 0.3 mm (100) and 0.1 mm (101-103).

Length 1.75-1.95 mm, width 1.17-1.32 mm. Body reddish brown, elytra sometimes somewhat paler at apex, paler area not well delimited; femora and tibiae about as body, apex of abdomen and tarsi somewhat paler. Antennae yellowish, long. Antennomeres slender, their relative length: III 6, IV 19, V 32, VI 26, VII 29, VIII 26, IX 29, X 26, XI 31 (holotype); segment IV-VI almost evenly wide, VI more than 6× longer than wide, VII about 4× longer than wide, VIII well 6× longer than wide, only slightly wider than VI. Pronotum and elytra similar as in *siamense* and *bispinosum*. Pronotal punctation very fine, barely visible at 24× magnification. Elytron with lateral keel not visible near apex (dorsal view), inner apical angle lying in or somewhat behind level of outer angles, sutural margin elevated, sutural striae also in anterior half very feebly but distinctly divergent, interval between sutural stria and margin rather coarsely punctate, discal punctation coarse and dense, near sutural stria sparser and finer than on center; punctures near basal margin usually notably finer but not sparser than on center and decidedly coarser than on pronotum; minute humeral bump impunctate. Mesepimeron somewhat longer than interval between its top and mesocoxa. Metasternum all over sparsely and very finely punctate (dense row of coarse punctures in front of metacoxa excepted); centre convex, medio-apical area flattened, lacking impressions, apical portion with microsculpture consisting of transverse striae, as that on visible abdominal segments. Mesocoxal area 0.09-0.11 mm long, apically rounded, inner margin oblique or barely rounded, finely punctate, outer margin oblique, impunctate. Metepisternum 0.14-0.16 mm wide, moderately narrowed anteriorly, inner margin impressed, straight, near angles rounded. First ventrite all over sparsely and very finely punctate. Metacoxal area 0.09-0.12 mm long, with rounded, distinctly punctured margin. Tibiae straight, slender.

Sexual characters of male. Segments 1-3 of protarsi notably enlarged, 1 and 2 of mesotarsi somewhat enlarged. Lobe of 6th ventrite 0.10-0.12 mm long, rather slender, gradually narrowed. Aedeagus (Figs 100 to 103) 0.87-1.0 mm long.

This species may be readily distinguished from members of the *haemorrhoidale*-group having not lobed parameres, by the shape of the sclerotized structures of the internal sac, especially by two slender bunches of filamentous sclerites at each side of median rows of denticules.

Scaphisoma incurvum sp. n.

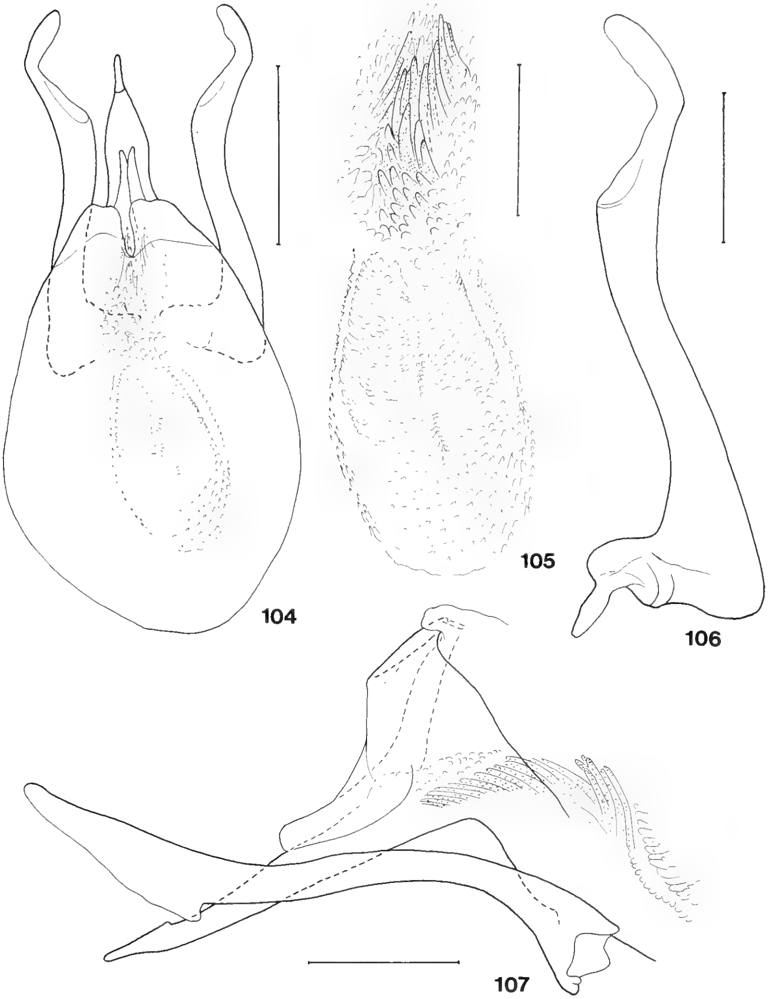
Holotype ♂: Phetchaburi, Kaeng Krachan Nat. Park, 300-400 m, 25-30 km from Headquarters, 17.XI.85 (MHNG).

Paratypes: 6♂, 8♀ as holotype; 1♂, as holotype but 200 m, near Headquarters, 16.XI.85; 14♂, 13♀, same but 450 m, 30-35 km from Headquarters, 18-19.XI.85 (all MHNG).

Length 1.35-1.55 mm, width 0.92-1.05 mm. Body dark reddish brown. Elytron with apical 1/4 ochreous to yellowish, as pale as apical abdominal segments, femora and tibiae. Tarsi and antennae yellowish. Relative length of antennomeres: III 4, IV 15, V 22, VI 18, VII 20, VIII 16, IX 19, X 18, XI 25 (holotype). In most external characters similar to *prehensor* Champion, differs by finer punctate elytra, mesepimeron somewhat longer than interval between its top and mesocoxa; metasternum lacking microsculpture and transverse row of punctures in front of metacoxa, mesocoxal area 0.08-0.09 mm long, with very fine marginal punctures, metacoxal area 0.08-0.10 mm long.

Sexual characters of male. Segments 1 to 3 of protarsi distinctly enlarged, segments 1 and 2 of mesotarsi somewhat enlarged. Aedeagus (Figs 104 to 107) 0.66-0.87 mm long.

This species may be readily distinguished by the peculiar shape of the parameres.



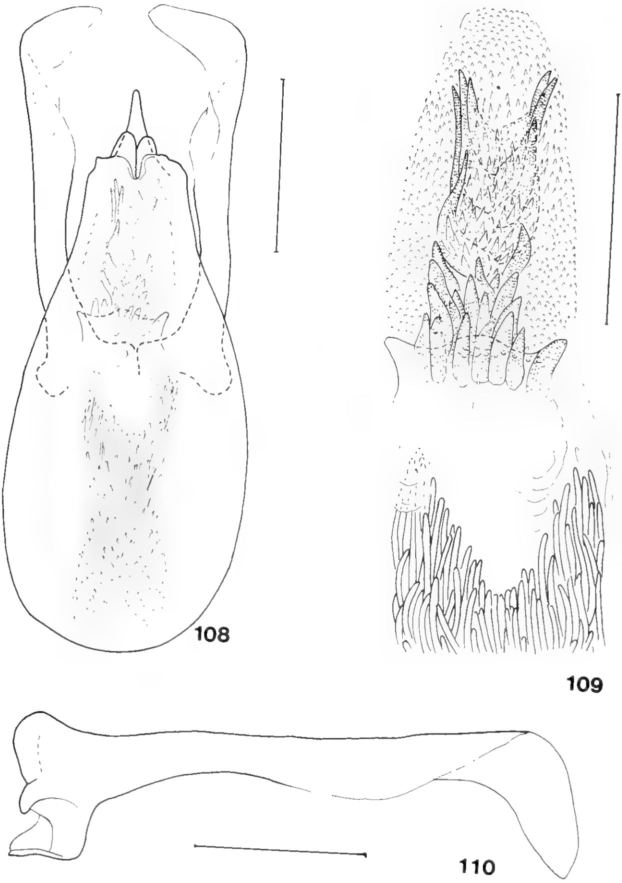
FIGS 104 to 107.

104. *Scaphisoma incurvum* sp. n., paratype from Kaeng Krachan Nat. Park, aedeagus; 105. dtto, internal sac; 106. dtto, paramere; 107. dtto, distal portion of median lobe in lateral view with paramere. Scale = 0.2 mm (104) and 0.1 mm (105-107).

Scaphisoma favens sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, 1180 m, IX.87, pit-fall trap (Schwendinger) (MHNG).

Length 2.0 mm, width 1.25 mm. Body, femora and tibiae reddish brown, elytron yellowish apically, its pale portion not well delimited but covering decidedly more than 1/4 of elytral length. Apex of abdomen, tarsi and antennae yellowish. Antennae long, relative length of segments: III 5, IV 20, V 30, VI 25, VII 28, VIII 24, IX 27, X 26, XI 30. Pronotum with regularly rounded lateral margins, in dorsal view not visible lateral keels, rather dense and very fine punctation distinct at 24× magnification. Point of scutellum exposed. Elytra laterally rounded, fairly narrowed apically; lateral keel visible in dorsal view from base to apex, apical margin truncate; inner apical angle right, lying in level of outer angle; sutural margin elevated except in anterior fourth; sutural stria rather deep, moderately divergent from apex to anterior fourth, then parallel with margin, curved at base, not extended along basal margin; intervals between sutural stria and margin flat, densely punctate; punctation dense and rather coarse, punctures on basal half usually smaller, on apical half larger than intervals, finely punctate humeral area narrow.



Figs 108-110.

108. *Scaphisoma favens* sp. n., holotype, aedeagus; 109. dtto, internal sac; 110. dtto, paramere. Scale = 0.3 mm (108) and 0.2 mm (109, 110).

Pygidium extremely finely punctate. Mesepimeron somewhat longer than interval between its top and mesocoxa. Metasternum with distinct microsculpture consisting of striae (transverse on centre and near metacoxa, oblique or longitudinal on lateral portion), surface near anterior margin not microsculptured; centre moderately convex, with very fine and rather sparse punctation; two medio-apical shallow impressions denser and somewhat coarser punctate; lateral portion very sparsely and extremely finely punctate. Mesocoxal area 0.10 mm long, rounded, marginal punctures fine. Metepisternum flat, very finely punctate, 0.16 mm wide, anteriorly moderately narrowed, inner margin impressed, somewhat sinuate, in apical 1/4 distinctly convex. Abdominal segments with well visible microsculpture consisting of transverse striae. First ventrite sparsely and very finely punctate, on mediobasal portion several punctures coarser. Metacoxal area 0.06 mm long, margin rounded and finely punctate. Protibiae barely curved, rather stout; meso- and metatibiae straight, mesotibiae rather stout, metatibiae slender.

Sexual characters of male. Segments 1 to 3 of protarsi and 1 and 2 of mesotarsi strongly enlarged, segment 1 of protarsi nearly as large as protibia, segment 1 of mesotarsi larged than apex of mesotibia. Lobe of 6th ventrite 0.18 mm long, slender, moderately tapering apically, with rounded apical margin. Aedeagus (Figs 108 to 110) 1.10 mm long.

This new species is also a member of the *haemorrhoidale*-group. It may be distinguished from other species of similar size and colour pattern by the metasternal microsculpture and the shape of the parameres of the aedeagus.

Scaphisoma spissum sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, 1400 m, 5.XI.85 (MHNG).

Length 1.6 mm, width 1.12 mm. Body very dark, almost black, apical third of elytra, apical abdominal segments, femora and tibiae ochreous. Hypomera very dark reddish brown. Tarsi and antennae yellowish. Relative length of antennomeres: III 5, IV 15, V 24, VI 23, VII 24, VIII 22, IX 24, X 23, XI 27. Most external diagnostic characters as in *prehensor* Champion from which it differs by the metasternum and the 1st ventrite all over very finely punctate, the former without a transverse row of punctures parallel to the metacoxa. The mesepimeron is decidedly longer than the intervals between its top and the mesocoxa, as in some specimens of *prehensor.*

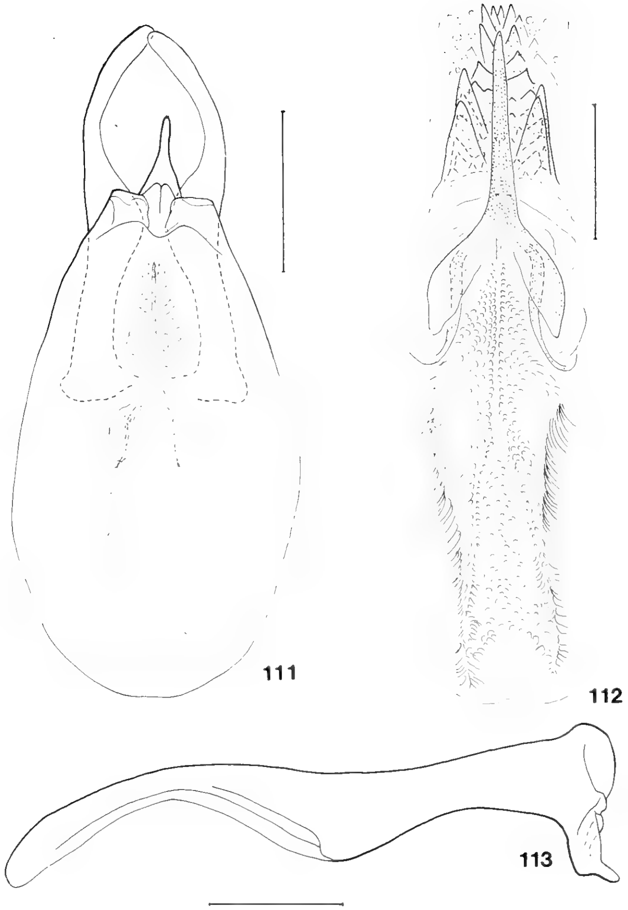
Sexual characters of male. Segments 1 to 3 of protarsi moderately enlarged. Lobe of 6th ventrite 0.11 mm long, slender, somewhat narrowed apically, with convex apical margin. Aedeagus (Figs 111 to 113) 0.81 mm long.

This species can be positively identified only by its aedeagus which differs from that in other members of the *haemorrhoidale*-group by the internal sac bearing a long symmetrical median sclerit.

Scaphisoma meracum sp. n.

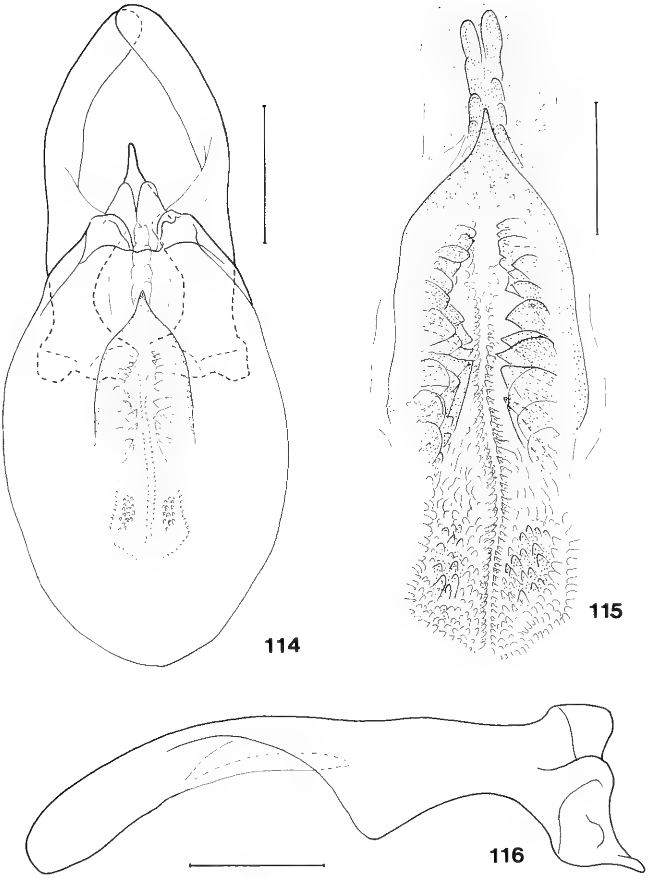
Holotype ♂: Chiang Mai, Doi Suthep, 1400 m, ravine, 5.XI.85 (MHNG).
Paratype ♂: Chiang Mai, Doi Suthep, 1180 m, pit-fall trap, VI.87 (Schwendinger) (MHNG).

Length 1.9 mm, width 1.27 mm. Body very dark reddish brown to blackish. Apex of abdomen, femora and tibiae ochreous, tarsi and antennae yellowish. Antennae similar as in other species of the group *haemorrhoidale,* with slender segments of relative length: III 6, IV 20, V 27, VI 22, VII 26, VIII 22, IX 26, X 25, XI 28 (holotype). Pronotum with regularly convex lateral margins; lateral keels not visible in dorsal view; punctation rather



Figs 111 to 113.

111. *Scaphisoma spissum* sp. n., holotype, aedeagus; 112. dtto, internal sac; 113. dtto, paramere. Scale = 0.2 mm (111) and 0.1 mm (112, 113).



FIGS 114 to 116.

114. *Scaphisoma meracum* sp. n., holotype, aedeagus; 115. dtto, internal sac; 116. dtto, paramere. Scale = 0.2 mm (114) and 0.1 mm (115, 116).

dense and very fine, almost indistinct at 24× magnification. Minute point of scutellum exposed. Elytra fairly narrowed apically, lateral margin almost regularly rounded; lateral keel visible (but not very distinct) from base to apex in dorsal view; apical margin truncate; inner apical angle lying behind level of outer angles; sutural margin elevated; sutural striae fine, moderately divergent anteriorly, somewhat curved near base, evanescent at basal margin near pronotal lobe, finely punctate; interval between sutural stria and margin flat, with a dense row of fine punctures; punctation dense and rather coarse, punctures relatively well delimited, mostly as large or somewhat larger than intervals between them, on a very narrow basal area very fine. Pygidium and ventrites with microsculpture consisting of transverse striae, and very finely punctate. Mesepimeron longer than intervals between its top and mesocoxa. Metasternum lacking impressions, with convex, densely and very finely punctate centre, medio-apical area flattened; punctation behind centre dense and more or less coarse, largest punctures near metacoxa (larger than intervals); lateral portion of metasternum very finely and sparsely punctate, with a dense row of rather coarse punctures in front of metacoxa; apical intercoxal process almost impunctate; medio-apical area and surface between meso- and metacoxa microsculptured as abdomen. Mesocoxal area 0.08 mm long, subtriangular, with inner margin oblique, outer margin rounded; marginal punctures fine. Metepisternum 0.14 mm wide, moderately narrowed anteriorly, in outer half convex, inner half flat; inner margin impressed, straight, only near angles rounded. First ventrite not microsculptured laterobasally; punctation very fine and sparse laterally, denser on centre, between metacoxae coarser than on remaining surface. Metacoxal area 0.09 mm long, with convex, distinctly punctate margin. Tibiae straight, slender.

Sexual characters of male. Segments 1 to 3 of protarsi and 1 of mesotarsi strongly enlarged, 2 and 3 of mesotarsi somewhat enlarged. Lobe of 6th ventrite 0.12 mm long, relatively large at base, tapering apically, with rounded apical margin. Aedeagus (Figs 114 to 116), 0.94-0.98 mm long.

This species seems to be closely related to *spissum*. It may be readily separated from the latter by the colour pattern of elytra and by the larger parameres and shape of the sclerotized pieces of the internal sac.

Scaphisoma innotatum Pic

Scaphosoma innotatum Pic, 1926*a*: 46.
Scaphisoma innotatum; Löbl 1981*c*: 110, 1986*a*: 201.

Material examined: 3, Chiang Mai, Doi Chiang Dao, 450 m, 7.V.87 (Schwendinger) (MHNG).

Distribution: India, Thailand, Vietnam. — New to Thailand.

Remarks. No notable differences are found between the Thai and Vietnamese specimens (see discussion in Löbl, 1986*a*).

Scaphisoma armatum Löbl

Scaphisoma armatum Löbl, 1986*a*: 206.

Material examined: 3, Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85; 1, Chiang Mai, Doi Angkhang, 10 km W Fang, 1500 m, 20.III.87 (Schwendinger); 1, Chiang Rai, 10 km W Wiang Pa Pao, Ban Huay Ya Sai, 780 m, 28.I.88 (Schwendinger) (all MHNG).

Distribution: North India, Thailand. — New to Thailand.

Remarks. Only data on males are recorded. Additional seven females from Khao Yai and Doi Angkhang have been tentatively associated with the males.

Scaphisoma tortile Löbl

Scaphisoma tortile Löbl, 1984*c*: 1004.

Material examined: 19, Phetchaburi, Kaeng Krachan Nat. Park, 300-450 m, 25-35 km from Headquarters, 17-19.XI.85; 1, Chiang Mai, Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 950 m, 3.XI.85; 1, Chiang Rai, 10 km W Wiang Pa Pao, Ban Huay Ya Sai, 780 m, 28.I.88 (Schwendinger) (all MHNG).

Distribution: Burma, Thailand. — New to Thailand.

Remarks. This species may be easily identified by the shape of the sinuate large median sclerit of the internal sac of the aedeagus.

Scaphisoma siamense sp. n.

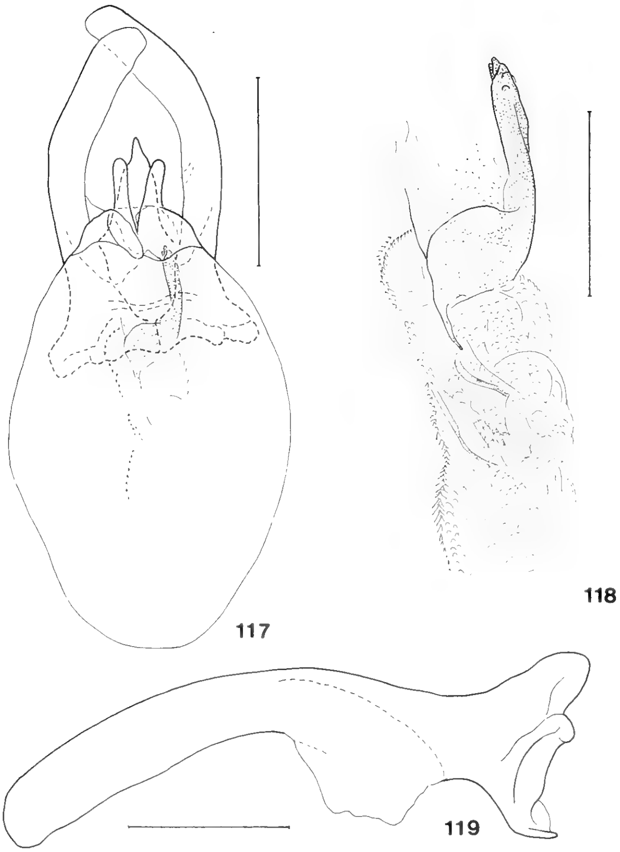
Holotype ♂: Chiang Mai, Doi Inthanon, ravin near Forestry Department, 1250 m, 6.XI.85 (MHNG).

Paratypes: 1♂ as holotype and 1♂, Doi Inthanon, 1650 m, 7.XI.85; 1♂, Doi Inthanon, 1780 m, 7.III.87 (Schwendinger) (all MHNG).

Length 1.55-1.70 mm, width 1.0-1.12 mm. Body ochreous or reddish brown, tarsi and antennae yellowish. Antennae moderately long, relative length of antennomeres as: III 6, IV 16, V 21, VI 18, VII 24, VIII 20, IX 22, X 20, XI 25 (holotype); IV slender, V slightly wider, about 5× longer than wide; VI somewhat wider than V and 4× longer than wide, VII about 4× longer than wide. Pronotum strongly narrowed apically; lateral margins regularly convex; lateral keels in dorsal view visible only near base; punctation very fine, barely visible at 50× magnification. Point of scutellum exposed. Elytron strongly narrowed apically; lateral margin rounded; lateral keel visible in dorsal view from base to apex; apical margin truncate; inner apical angle lying behind level of outer angles; sutural margin not elevated; sutural stria shallow, divergent from apex to middle, then parallel to suture, curved at base, evanescent near pronotal lobe; interval between sutural stria and margin flat, narrow, with a very dense row of fairly fine punctures; discal punctation dense et rather coarse, punctures not well delimited, most as large or larger than intervals between them; punctation much finer on a very narrow humeral area. Pygidium sparsely and very finely punctate, as ventrites with microsculpture consisting of transverse lines. Mesepimeron longer than interval between its top and mesocoxa. Metasternum not microsculptured, median portion somewhat convex anteriorly, flattened apically, without impressions; apical area densely and rather finely punctate, a row of coarse punctures in front of metacoxa distinct; most of metasternal surface sparcely and very finely punctate. Mesocoxal area 0.08 mm long, subtriangular, with punctate inner and impunctate outer margin. Metepisternum flat, 0.13-0.14 mm wide, moderately narrowed anteriorly; inner margin somewhat impressed, straight, near angles rounded. First ventrite all over very finely and sparsely punctate; laterobasal area not microsculptured; metacoxal area 0.08-0.09 mm long, margin convex, coarsely punctate. Tibias straight, slender.

Sexual characters of male. Segments 1 to 3 of protarsi and 1 and 2 of mesotarsi distinctly enlarged. Lobe of 6th ventrite slender, 0.05 mm long, pointed. Aedeagus (Figs 117 to 119) 0.67-0.71 mm.

This species may be readily separated from other members of the *haemorrhoidale*-group by the shape of the parameres and structures of the internal sac.



FIGS 117 to 119.

117. *Scaphisoma siamense* sp. n., paratype from Doi Inthanon, aedeagus; 118. dtto. internal sac; 119. dtto, paramere. Scale = 0.2 mm (117) and 0.1 mm (118, 119).

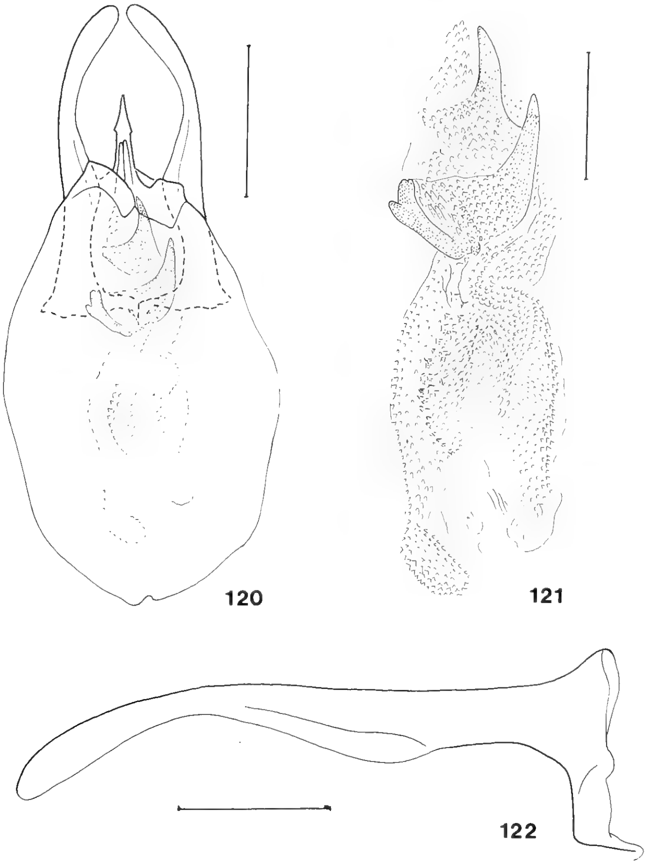
Scaphisoma bispinosum sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, 1450 m, ravine, south slope, 4.XI.85 (MHNG).

Paratype ♂: Chiang Mai, Doi Inthanon, ravine near Forestry Department, 1250 m, 6.XI.85 (MHNG).

Length 1.7 mm, width 1.12-1.14 mm. Very similar to *siamense,* but pronotum not as finely punctate, with punctures distinct at 20× magnification, sutural margin of elytra elevated, sutural striae parallel, except on apical portion, elytral base coarsely punctate except for an very small impunctate humeral bump, and disk somewhat coarser punctured. Antennae longer (relative length of antennomeres in holotype as: III 6, IV 17, V 27, VI 25, VII 28, VIII 23, IX 28, X 26, XI 30). Metasternum flattened only on apical intercoxal process, rather coarsely punctate area extended from latter to level of mesocoxae, mesocoxal area 0.07 mm long, with rounded, distinctly punctate margin. First ventrite on median portion decidedly coarser punctured than on lateral portion, metacoxal area 0.10 mm long. Lobe of 6th ventrite wider, in ♂ 0.07 mm long.

Aedeagus (Figs 120 to 122) 0.77-0.80 mm long.



FIGS 120 to 122.

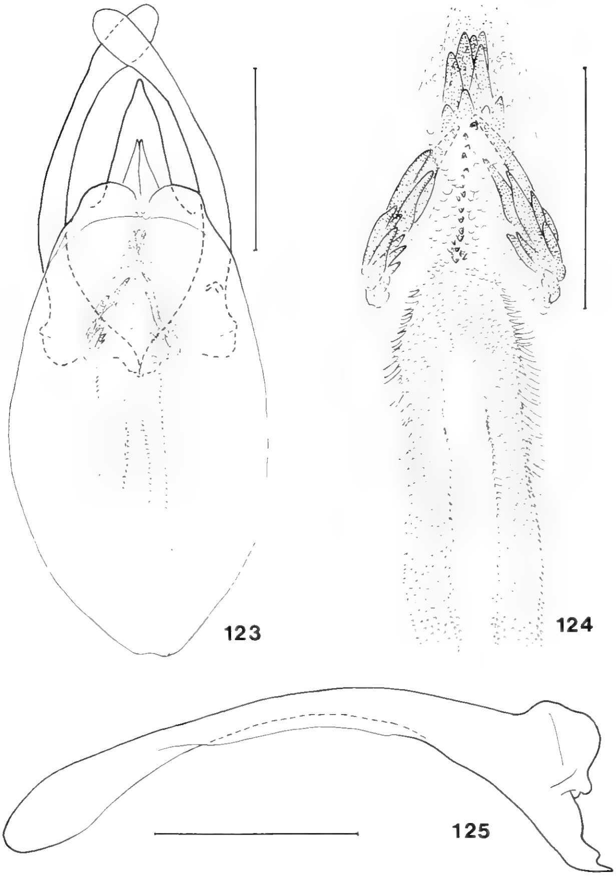
120. *Scaphisoma bispinosum* sp. n., holotype, aedeagus; 121. dtto, internal sac; 122. dtto, paramere. Scale = 0.2 mm (120) and 0.1 mm (121, 122).

Scaphisoma cuspidatum sp. n.

Holotype ♂: Chiang Mai, Doi Inthanon, 1650 m, 7.XI.85 (MHNG).

Paratypes: 5♂, as holotype; 6♂, 3♀, Doi Inthanon, 1780 m, 3.III.87 (Schwendinger); 2♂, Mae Hong Son, Doi Chang, 20 km E Pai, 10.IV.87 (Schwendinger) (all MHNG).

Length 1.85-2.10 mm, width 1.25-1.45 mm. Body very dark reddish brown to black. Elytron with ochreous or yellowish apical portion, pale area longer than fourth of elytron on inner half, extended anteriorly on outer part and reaching almost middle of lateral length of elytron. Relative length of antennomeres: III 6, IV 20, V 28, VI 25, VII 28, VIII 23, IX 27, X 25, XI 31 (holotype). Coloration and most external characters as in *minax* Löbl, from which it differs by lateral keel of elytron usually not visible behind basal third; apical margin of elytron truncate or somewhat rounded; metasternum along apical margin and between meso- and metacoxa with microsculpture consisting of transverse striae; punctation on medio-apical portion of metasternum very fine; transverse row of punctures on lateral portion of metasternum absent or indicated by several very fine punctures; mesocoxal area 0.08-0.09 mm long; metacoxal area 0.12-0.14 mm long, impression behind centre of metasternum somewhat smaller.



Figs 123 to 125.

123. *Scaphisoma cuspidatum* sp. n., paratype from Doi Inthanon, aedeagus; 124. dtto, internal sac; 125. dtto, paramere. Scale = 0.3 mm (123) and 0.2 mm (124, 125).

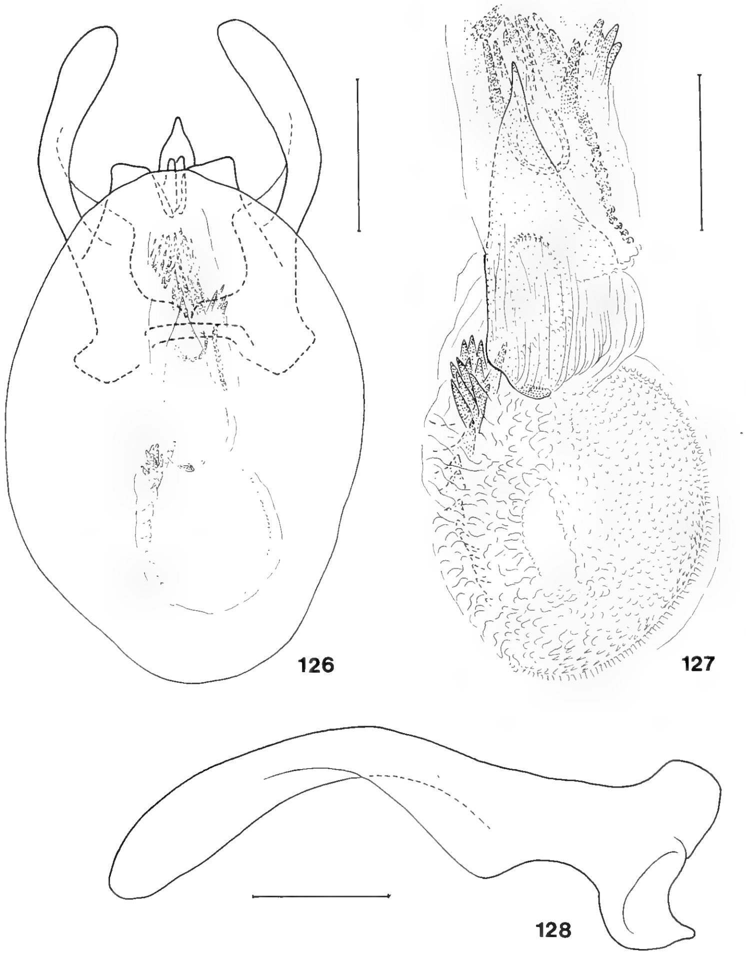
Sexual characters of male. Segments 1 to 3 of protarsi strongly enlarged, 1 and 2 of mesotarsi somewhat enlarged. Lobe of 6th ventrite 0.10-0.12 mm long, apically somewhat tapering, with rounded apical margin. Aedeagus (Figs 123 to 125) 0.96-1.07 mm long.

This species differs drastically from *minax* by the shape of the parameres and by the structure of the internal sac of the aedeagus.

Scaphisoma khao sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG). Paratypes: 10♂, as holotype.

Specimens not included in type material: 9♀, as holotype (MHNG).



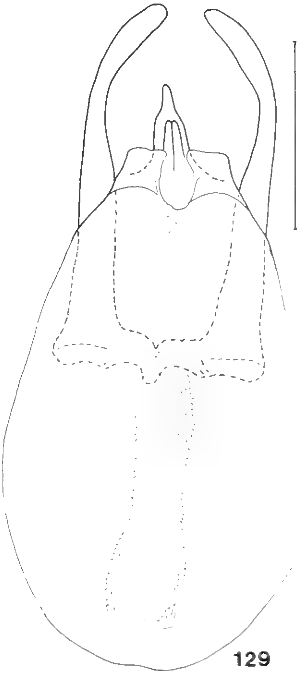
FIGS 126 to 128.

126. *Scaphisoma khao* sp. n., paratype from Khao Yai Nat. Park, aedeagus; 127. dtto, internal sac; 128. dtto, paramere. Scale = 0.2 mm (126) and 0.1 mm (127, 128).

Length 1.5-1.6 mm, width 1.0-1.10 mm. Body dark reddish brown to black, apical third of elytra ochreous or yellowish. Apical abdominal segments and legs ochreous, antennae yellowish. Relative length of antennomeres: III 5, IV 15, V 23, VI 20, VII 23, VIII 20, IX 23, X 22, XI 26 (holotype). External diagnostic characters as in *prehensor* or *tortile*.

Sexual characters of male. Segments 1 to 3 of protarsi and 1 and 2 of mesotarsi strongly enlarged. Lobe of 6th ventrite 0.10-0.12 mm long, tapering apically, with rounded apical margin. Aedeagus (Figs 126 to 128) 0.83-0.86 mm long.

This species may be distinguished only by the shape of the parameres and of the structures of the internal sac. The latter bears a large flat median sclerotized piece, a laterobasal row of strongly sclerotized teeth, and two slender bunches and one wider bunch of sclerotized teeth laterally and apically of median piece. The row of punctures in front of the metacoxa are always well developed.



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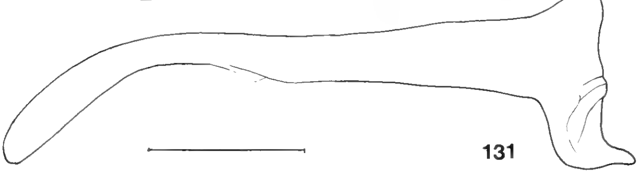


131

Figs 129 to 131.

129. *Scaphosoma morosum* sp. n., paratype from Khao Yai Nat. Park, aedeagus; 130. dtto, internal sac; 131. dtto, paramere. Scale = 0.2 mm (129) and 0.1 mm (130, 131).

Scaphisoma morosum sp. n.

Holotype ♂: Chiang Mai, road to Wab Pang An, ravine, 50 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85 (MHNG).

Paratypes: 1♂, Chiang Mai, Doi Suthep, 1400 m, 5.XI.85; 1♂, Doi Suthep, 1090 m, 2.XII.85 (Schwendinger); 3♂, Doi Suthep, III.87 (Rougemont); 1♂, Doi Inthanon, ravine near Forestry Department, 1250 m, 6.XI.85; 1♂, Doi Chiang Dao, 450 m, 7.V.87 (Schwendinger); 1♂, Doi Angkhang, 10 km W Fang, 1500 m, 20.III.87 (Schwendinger); 1♂, Khao Yai Nat. Park, Khao Khieo, 1150 m, 28.XI.85; 1♂, Burma, Shane State, Kalew, 1300 m, 19.III.82 (Rougemont); 1♂, Burma, Shane State, Taunggyi, 18.III.82 (Rougemont) (all MHNG).

Length 1.65-1.80 mm, width 1.10-1.20 mm. Extremely similar to the preceding species, as well as to *tortile* and *prehensor*. The pale apical portion of elytron is usually narrowed, about as long as 1/4 of the maximal elytral length but in two specimens it is as long as 1/3 of elytral length, and the medio-apical portion of the metasternum is finer punctate. The species may be distinguished only by the eadeagus (Figs 129 to 131) which is 0.71-0.84 mm long. The internal sac is similar to that in cf. *bedeli* (LÖBL 1986*c*) but the apical sclerotized teeth are smaller, less numerous and apparently straight. The parameres being gradually narrowed from the enlarged base to apical curved portion differ notably from those in the latter species.

Scaphisoma karen sp. n.

Holotype ♂: Chiang Mai, Doi Inthanon, 1650 m, ravine, 7.XI.85 (MHNG).

Paratypes: 20♂, as holotype; 6♂, same data but 1750 m; 2♂, Chiang Mai 2♂, Doi Inthanon, 1630 m, 25.II.87 (Schwendinger); 1♂, Doi Inthanon, 1780 m, 3.III.87 (Schwendinger); 1♂, Doi Pui, 1500 m, north slope, 19.XII.88 (Trautner & Geigenmüller); 4♂, Doi Suthep, 1550 m, north slope, 4.XI.85; 1♂, same data but 1400 m, 5.XI.85 (MHNG, SMNS).

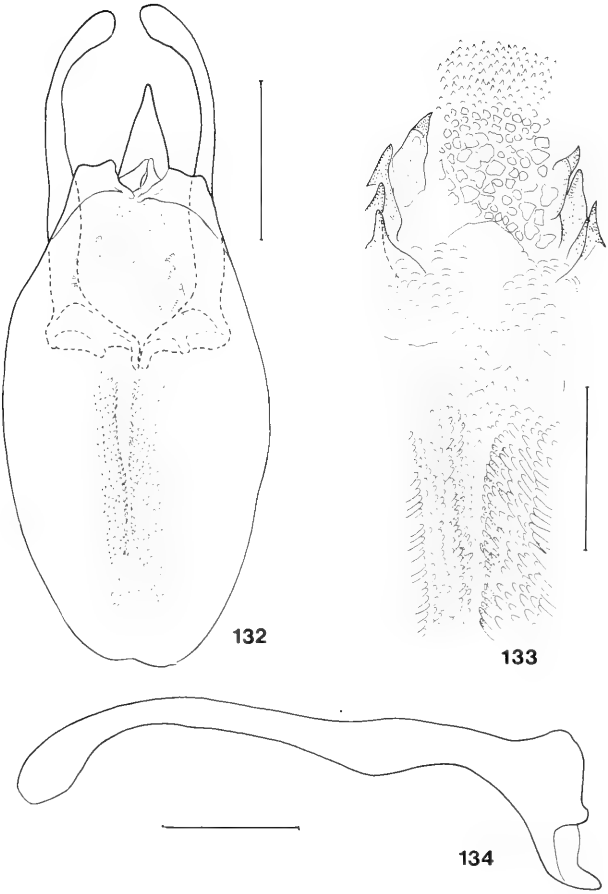
Material not included in type series: 33♀, Doi Inthanon, 1650 m and 2♀ 1720 m; 3♀, Doi Suthep 1550 m and 1♀, 1450 m (MHNG).

Length 1.65-1.90 mm, width 1.08-1.30 mm, aedeagus 0.68-0.86 mm long. Body dark reddish brown to blackish, pronotum often somewhat paler than most of elytral surface. Elytra with pale brown to yellowish apical portion not quite as long as 1/3 of elytron on inner half, and longer than 1/3 of elytron on outer half. Antennae long, relative length of antennomeres in holotype as: III 6, IV 20, V 26, VI 23, VII 26, VIII 22, IX 26, X 24, XI 30. Diagnostic relevant characters as in the preceding species and in *tortile-prehensor*, but metasternum often very shallowly impressed in centre, and row of punctures in front of metacoxa relatively fine.

The species seems to be closely related to *necopinum* Löbl with which it shares a similar aedeagus (Figs 132-134). The parameres are sinuate and enlarged postbasally and apically in *karen* while in *necopinum* they are evenly large in basal half (the base excepted). The structures of the internal sac are also significantly distinct from those in *necopinum* or in other members of the *haemorrhoidale*- group.

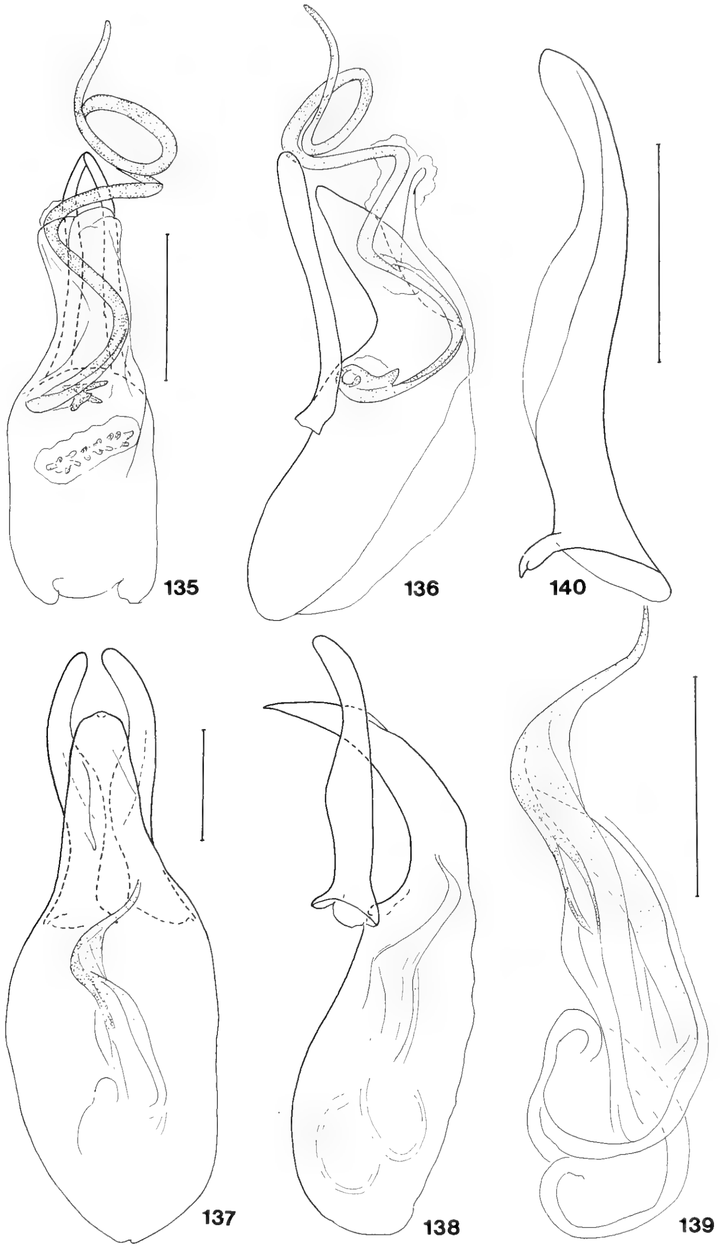
Baeotoxidium Löbl

Members of this genus may be separated from *Baeocera* by fairly approximate meso- and metacoxae, and differ from *Scaphobaeocera* by the elytra lacking parasutural striae. Five species confined to Sri Lanka and India have been described up to date. A further species occurs in Thailand.



Figs 132 to 134.

132. *Scaphisoma karen* sp. n., paratype from Doi Inthanon, aedeagus; 133. dtto, internal sac; 134. dtto, paramere. Scale = 0.2 mm (132) and 0.1 mm (133, 134).



FIGS 135-140.

135 and 136. *Baeotoxidium siamense* sp. n., holotype, aedeagus with extruded flagellum; 137 and 138. *Scaphobaeocera laevis* sp. n., holotype, aedeagus; 139. dtto, internal sac; 140. dtto, paramere. Scale = 0.1 mm.

Baeotoxidium siamense sp. n.

Holotype ♂: Chiang Mai, 33 km NE Chiang Mai (via Chiang Rai) cca 500 m, 3.XI.85 (MHNG).

Paratypes: 3 ♀, Khao Yai Nat. Park, hills east of Heo Suwat Waterfalls, 800-900 m, 1.XII.85 (MHNG).

Length 1.2-1.3 mm, dorsoventral diameter 0.73-0.77 mm; pronotum 0.73-0.77 mm wide at base; elytra 0.85-0.91 mm long, combined 0.77-0.90 mm wide. Body dark reddish brown, apical segments of abdomen, tarsi and antennae yellowish. Antennae long, relative length of segments: III 10, IV 15, V 16, VI 16, VII 16, VIII 15, IX 17, X 18, XI 23 (holotype). Segments III to VI slender, almost of same width, VII about 3,5 × longer than wide, fairly wider than VI or VIII, VIII just slightly wider than VI, well 4 × longer than wide; XI 3 × longer than wide, wider than VII. Pronotal punctation very fine, visible at × 50 magnification. Point of scutellum exposed. Elytra not flattened in lateral view; sutural stria deep, extended along basal margin and joint with lateral stria; interval between sutural margin and sutural stria not (holotype) or moderately elevated (paratypes); discal punctation very fine and sparse on most of the surface, several relatively coarse punctures forming sometimes irregular rows on anterior half of elytron. Hypomeron lacking longitudinal ridge or stria. Punctation on lateral portion of metasternum sparse and very fine, that on middle portion rather coarse and dense, small median area in anterior half and posterior intercoxal process smooth. Mesocoxal area 0.03 mm long, with coarse, elongate marginal punctures extending laterally almost to middle of mesepimeron. Metepisternum almost flat, 0.10 mm wide, internal suture deeply impressed and rounded anteriorly. First ventrite as metasternum not microsculptured, basal punctures coarse and somewhat elongate, coarser than marginal punctures of mesocoxal areas (holotype) or about as coarse as latter (paratypes). Following ventrites and visible tergites with microsculpture consisting of punctures. Tibiae straight, metatibiae 0.38-0.40 mm long.

Male. Segments 1 to 3 of protarsi slightly enlarged. Aedeagus (Figs 135 and 136) 0.31 mm long.

This species may be easily distinguished by the elytron with complete sutural stria joint to the lateral stria. Besides, it differs drastically in having a much longer flagellar sclerit of internal sac of aedeagus than that in other species.

Scaphobaeocera Csiki

This genus differs from other scaphidiids having approximate meso- and metacoxae by the elytron with a parasutural stria. In most of the species the body is dorsally and ventrally microsculptured, and usually at least the elytra are iridescent. The microsculpture consist always of transverse striae, and the punctation is similar in most species. All *Scaphobaeocera* have small mesocoxal areas which are usually 0.02-0.03 mm long, and margined with fine or very fine punctures (in *inculta* marginal punctured are coarse, in *obducta* the mesocoxal areas are 0.04 mm long). Besides aedeagal characters only few other features may be used to distinguish the species. Therefore, relatively many specimens from the Thai collections could not be identified and are not included in the present study.

Scaphobaeocera is distributed over warm temperate and tropical Asia (from Pakistan to Japan), Melanesia, Micronesia, Australia, the Afrotropical region, and the Mascarene and Seychelles islands. So far 46 species have been named, further 12 are described below.

KEY TO THE THAI *Scaphobaeocera*

1 Hypomeron with longitudinal stria 2
— Hypomeron without stria 7
2 Apical antennal segment about 2× longer than penultimate segment. Small species, 0.90-1.20 mm long 3
— Apical antennal segment about 1.1 to 1.6× longer than penultimate. Usually larger species 4
3 Internal sac of aedeagus with spiral flagellum forming 4 complete circles .... *dorsalis*
— Flagellum of internal sac more or less spiral, forming 1 or 2 circles .... *delicatula*
4 Antennal segment VII distinctly longer than VI 5
— Antennal segment VII as long as segment VI 6
5 Length 1.6 mm, body reddish brown .... *robustula*
— Length 1.1 mm, body blackish .... *uncata*
6 Pronotum finer punctate than lateral portion of metasternum. Length 1.8-1.9 mm .... *valida*
— Lateral portion of metasternum as finely punctate as pronotum. Length 1.40-1.45 mm .... *burckhardti*
7 Apical antennal segment somewhat shorter or as long as penultimate and distinctly shorter than segment IX .... *spinigera*
— Antennal segment XI longer than segment X or IX 8
8 Body blackish, elytron with reddish spot and very narrowly yellowish apex .... *maculata*
— Colour pattern different 9
9 Body dark reddish brown to blackish, elytron with 2 paler transverse bands .... *alticola*
— Colour pattern different 10
10 Anterior metasternal margin with 2 or 3 coarse elongate punctures, similar punctures margining mesocoxal area .... *discreta*
— Anterior metasternal margin impunctate, mesocoxal area margined with fine, not or barely elongate punctures 11
11 Pronotum and elytra not microsculptured .... *laevis*
— Elytra and usually pronotum microsculptured 12
12 Lateral portions of metasternum and 1st ventrite not microsculptured .... *nuda*
— Lateral portions of metasternum and 1st ventrite microsculptured 13
13 Anterior portion of metasternum with a median stria 14
— Metasternum lacking median stria 15
14 Flagellum forming 3 or 4 complete circles .... *difficilis*
— Flagellum forming 6 complete circles .... *spira*
15 Parameres of aedeagus subapically notched .... *incisa*
— Parameres not notched 16
16 Lateral wal of median lobe extended apically behind level of articular process .... *nobilis*
— Median lobe of aedeagus different 17
17 Articular process of median lobe strongly protruding apically .... *tenella*
— Articular process of median lobe small or indistinct, not protruding apically

. . . . 18

18 Antennal segments III and VIII slender, each more than 3 × longer than wide, III only somewhat shorter than IV . . . . *sabapensis*

— Antennal segments III and VIII shorter, III much shorter than IV 19

19 Antennal segment V longer than VI. Small species 1.0-1.05 mm long . . . . . *obducta*

— Antennal segments V and VI evenly long or VI barely shorter than V. Larger species 1.3-1.4 mm long . . . . *minuta*

Scaphobaeocera laevis sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, 1450 m, south slope, 4.XI.85 (MHNG).

Paratypes: 2 ♀, as holotype; 3 ♂, Doi Suthep, 1550 m, north slope, 4.XI.85; 1 ♀, Doi Inthanon, near Forestry Department, 1250 m, 6.XI.85 (MHNG).

Material not included in type series: 1 ♀, Mae Hong Son, Tham Lok Forest Park, 8 km N Sop Pong, 700 m, 11. and 13.XI.85 (MHNG).

Length 1.2 to 1.4 mm, width 0.73-0.77 mm, dorsoventral diameter 0.66-0.78 mm. Body reddish brown, femora and tibiae barely paler, tarsi and antennae yellowish. Dorsal and ventral surface of body not microsculptured and not iridescent. Relative length of antennal segments: III 6, IV 14, V 17, VI 17, VII 16, VIII 12, IX 16, X 15, XI 22 (holotype); III relatively short, about 1.5 × longer than wide; IV to VI evenly wide, IV well 4 ×, V and VI about 5 × longer than wide; VII much wider than VI, about 2.5 × longer than wide; VIII fairly wider than VI, about 2.5 × longer than wide; XI somewhat wider than VII, 3 × longer than wide. Pronotal punctation very fine, barely visible at 50 × magnification. Hypomeral stria absent. Point of scutellum exposed. Elytra irregularly, finely punctate, punctures all over much coarser than pronotal ones; parasutural stria short, extremely shallow. Median portion of metasternum flat, apically densely and very finely punctate, with or without median impression. Lateral portions of metasternum and 1st ventrite evenly sparsely and very finely punctate. Metepisternum flat, evenly 0.06-0.09 mm wide, with straight inner suture. Tibiae straight.

Sexual characters of male. Segments 1 to 3 of protarsi strongly enlarged, narrower than tibia. Aedeagus (Figs 137 to 140) 0.50-0.55 mm long.

This species exhibits an unusual type of internal sac of the aedeagus and thus appears to represent an isolated group. Besides, it may be distinguished from other Asian species by the shape of the parameres and by the dorsal surface of body lacking microsculpture.

The female from Mae Hong Son, Tham Lok Forest Park, 8 km N Sop Pong differs slightly from *laevis* by its smaller size (1.1 mm) and by convex centre of metasternum which is densely punctate only on a very narrow area.

Scaphobaeocera nuda Löbl

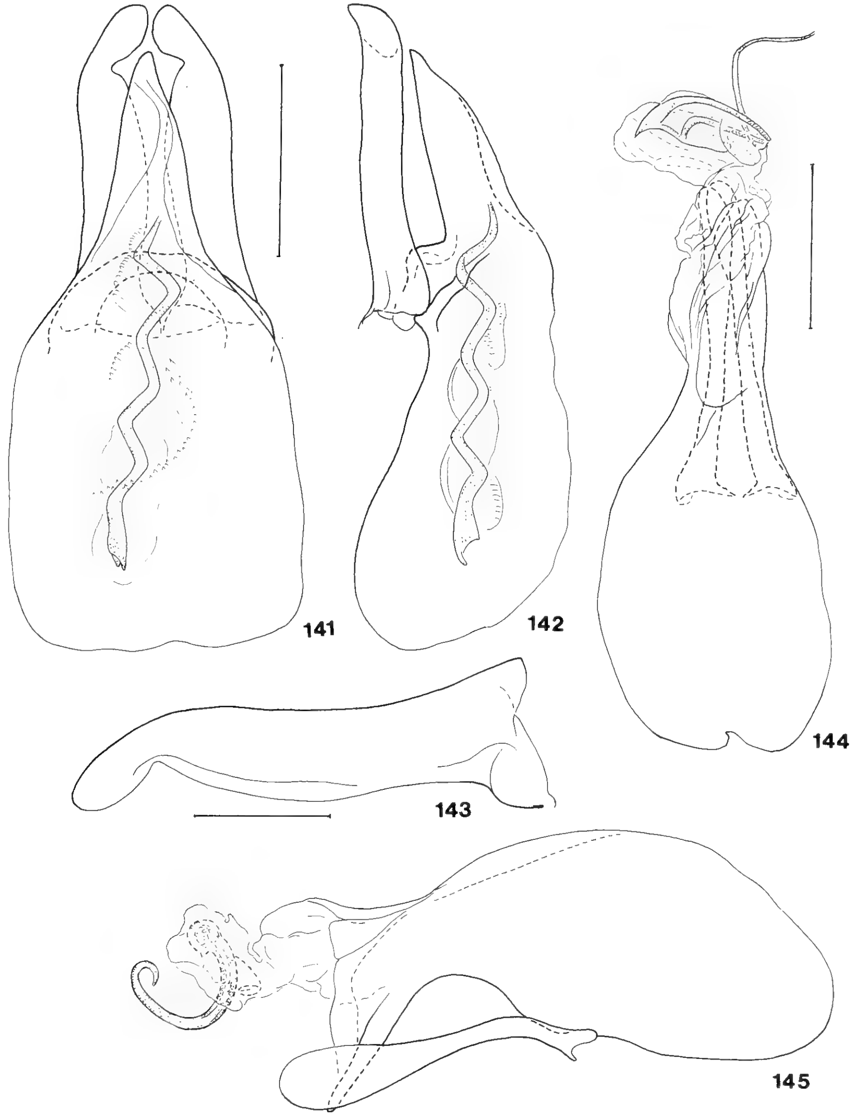
Scaphobaeocera nuda Löbl, 1979*a*: 117; Löbl, 1984*a*: 84.

Material examined: 10, Mae Hong Song, Tham Lok Forest Park, 8 km N Sop Pong, 700 m, 11. and 13.XI.85; 6, Chiang Mai, Doi Suthep, 1050 and 1450 m, 4.-5.XI.85; 1, Doi Pui, 1660 m, 17.XI.86 (Schwendinger); 4, Doi Inthanon, 1250 and 1720 m, 6.-7.XI.85; 1, below Mae Nang Khao, 900 m, 54 km NE Chiang Mai (via Chiang Rai), 3.XI.85; 1, Khao Yai Nat. Park, hills E Heo Suwat Waterfalls, 800 m, 1.XII.85; 2, Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23.-24.XI.85 (all MHNG).

Distribution: India, Thailand. — New to Thailand.

Scaphobaeocera incisa sp. n.

Holotype ♂: Chiang Mai, road to Wab Pang An, 50 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85 (MHNG).



Figs 141 to 145.

141 and 142. *Scaphobaeocera incisa* sp. n., holotype, aedeagus; 143. dtto, paramere; 144 and 145. *Scaphobaeocera alticola* sp. n., paratype, aedeagus with extruded internal sac. Scale = 0.1 mm (141, 142, 144, 145) and 0.05 mm (143).

Paratypes: 2♂, 9♀, Chiang Mai, Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 3.XI.85; 3♂, 1♀, Doi Suthep, 1210 m, 30.I.87 (Schwendinger) (all MHNG).

Length 1.30-1.45 mm, width 0.72-0.78 mm, dorsoventral diameter 0.73-0.79 mm. Body, femora and tibiae ochreous or reddish brown. Apex of abdomen and tarsi somewhat paler, antennae yellowish. Pronotum and elytra iridescent. Relative length of antennal segments: III 8, IV 14, V 18, VI 16, VII 16, VIII 14, IX 18, X 18, XI 28 (holotype); segments III and IV about evenly wide, III 2,5×, IV 4× longer than wide; V and VI evenly wide, somewhat wider than IV, V 4.5×, VI 4× longer than wide; VII much wider than VI, somewhat more than 2× longer than wide; VIII 3× longer than wide, wider than VI; XI 3.5× longer than wide, wider than VII. Pronotum, elytra, mesepisternum, mesepimeron, lateral portions of metasternum and 1st ventrite microsculptured, microsculpture sometimes extremely fine, visible at higher magnification (over 100×). Punctation on pronotum sparse and very fine, barely visible at 50× magnification. Hypomeral stria absent. Elytron with well marked parasutural stria; punctation very fine, distinctly coarser and denser than that on pronotum, on apical area denser and coarser than on centre. Metasternum lacking median impression, with convex and impunctate centre; medio-apical area of metasternum flat, densely and finely punctate; lateral portions of metasternum and 1st ventrite sparsely and very finely punctate. Metepisternum flat, 0.05-0.07 mm wide, inner suture straight or barely concave. Tibiae straight.

Sexual characters of male. Segments 1 to 3 of protarsi enlarged, 1 and 2 somewhat, 3 distinctly narrower than tibia. Aedeagus (Figs 141 to 143) 0.29-0.34 mm long.

This species may be distinguished by the shape of the subapically notched parameres, and by the relatively long strongly sclerotized articular process of the median lobe.

Scaphobaeocera maculata sp. n.

Holotype ♀: Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23.-24.XI.85 (MHNG).

Length 1.3 mm, width 0.71 mm, dorsoventral diameter 0.73 mm. Body black, elytron with a reddish oblique spod on anterior half (apically approximate to sutural stria), and narrowly yellowish apex; apex of first and second ventrite and following ventrites and visibles tergites, and legs ochreous, antennae ochreous, with segments I to VI paler than following. Pronotum and elytra distinctly iridescent and microsculptured. Mesepimeron, metasternum and ventrites distinctly microsculptured. Relative length of antennal segments: III 8, IV 11, V 12, VI 9, VII 13, VIII 7, IX 15, X 16, XI 23; III almost 3× longer than wide, IV about as wide as III, somewhat more than 3× longer than wide; V and VI almost evenly wide, V 3× longer than wide, VI 2× longer than wide; VII 2× longer than wide; VIII about 1.5× longer than wide, narrower than VII but wider than VI; XI about 3× longer than wide, notably wider than VII. Hypomeral stria absent. Point of scutellum exposed. Elytron with parasutural stria obsolete on anterior third. Punctation on pronotum and elytron very fine, visible at 24× magnification, on apical portion of elytron somewhat coarser. Metasternum very finely punctate on lateral portion and on anterior half of median area, very densely and relatively coarsely punctate on apical half of median area; centre with a deep elongate-foveiform impression narrowed anteriorly and continuing as a stria. Metepisternum evenly 0.07 mm wide, flat, with straight inner suture. Tibiae straight.

This species may be readily distinguished by its conspicuous colour pattern.

Scaphobaeocera alticola sp. n.

Holotype ♂: Chiang Mai, Doi Inthanon, 2500 m, 23.X.86 (Schwendinger) (MHNG).

Paratypes: 3♂, 2♀ as holotype; 1♂, Doi Inthanon, 2500 m, 9.II.86 and 2♀, 2530 m, 16.II.-18.IV.87, pit-fall trap and VIII.87 (Schwendinger); 1♀, Doi Inthanon, 2500 m, 1.VIII.85 (Deharveng); 1♀, Doi Inthanon, 2500 m, 9.XI.85 (all MHNG).

Length 1.2-1.5 mm, width 0.64-0.76 mm, dorsoventral diameter 0.67-0.78 mm. Head and pronotum dark reddish brown to blackish. Most of elytron as dark as or darker than pronotum, but two reddish transverse fasciae more or less paler; anterior fascia basal, posterior lying between middle and apical fourth of elytron; apical margin of elytron narrowly yellowish. Ventral side of thorax and 1st ventrite dark reddish brown, following ventrites usually paler, apex of abdomen, legs and antennal segments I to VI ochreous, segments VII to XI somewhat darkened. Pronotum not, elytra distinctly iridescent. Microsculpture on pronotum almost obsolete, that on elytra, mesepisternum, mesepimeron, metasternum and abdomen distinct. Relative length of antennal segments: III 9, IV 13, V 15, VI 14, VII 15, VIII 10, IX 15, X 15, XI 22 (holotype); III less than 3× longer than wide; IV about 4× longer than wide, as wide as III; V and VI somewhat wider than IV, V about 4× longer than wide, VI 3.5× longer than wide; VII 2.5× longer than wide; VIII 2× longer than wide, wider than VI, decidedly narrower than VII; XI somewhat more than 2× longer than wide, much wider than VII. Hypomeral stria absent. Minute point of scutellum exposed. Punctation on pronotum and elytra very fine, on apical portion of elytra somewhat coarser than on elytral centre. Parasutural stria distinct except on anterior fourth of elytron. Median area of metasternum flat, without any impression or stria, rather densely and coarsely punctate, except on glabrous centre. Lateral portion of metasternum very finely punctate. Metepisternum flat, 0.04-0.05 mm wide anteriorly and apically, somewhat narrowed in middle; inner suture somewhat concave. Tibiae straight.

Sexual characters of male. Segments 1 to 3 of protarsi rather strongly enlarged, narrower than apex of tibia. Aedeagus (Figs 144 and 145) 0.32-0.34 mm long.

This species may be readily identified by its colour pattern. The internal sac of the aedeagus, unfortunately extruded in all examined specimens, has a complex base and moderately long, slender flagellum. A similar condition is found in several species, i.e. *timida* Löbl, *dispar* Löbl, *tibialis* Löbl, *formosana* (Achard) which all differ in the shape of the parameres and in the combination of external character.

Scaphobaeocera dorsalis Löbl

Scaphobaeocera dorsalis Löbl, 1980: 118; 1984*a*: 91.

Material examined: 1, Khao Yai Nat. Park, 750-850 m, 26.XI.-3.XII.85; 2, Chiang Mai, Chiang Dao, 450 m, 5.-11.IV.58 (Maa) (MHNG, BMH).

Distribution: North India, Thailand, Taiwan. — New to Thailand.

Remarks. Only males are identified and recorded here. I have not found any character to distinguish females of *dorsalis* from *delicatula* having a relatively short apical antennal segment.

Scaphobaeocera delicatula Löbl

Scaphobaeocera delicatula Löbl, 1971: 986.

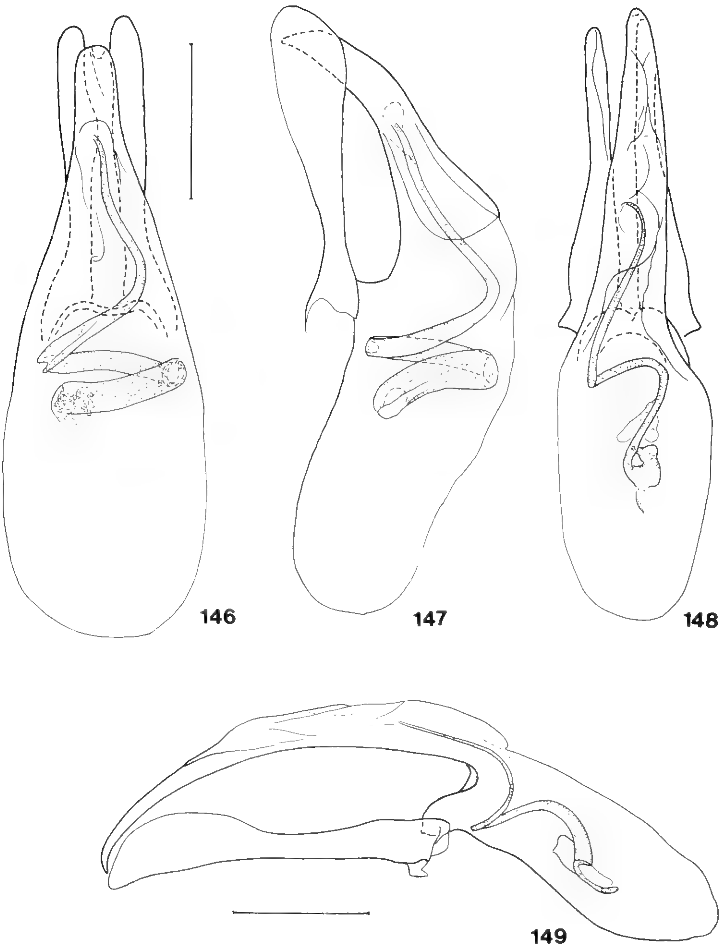
Material examined: 10, Khao Yai Nat. Park, 750-850 m, 26.XI.-3.XII.85; 1, Khao Yai Nat. Park, hills east Heo Suwat Waterfalls, 900 m, 1.XII.85; 1, Chanthaburi, Khao Sabap Nat. Park, near Phliu Waterfalls, 150-300 m, 23.-24.XI.85 (all MHNG).

Distribution: Sri Lanka, Thailand. — New to Thailand.

Remarks. The length of the apical antennal segment is notably variable, about 3 to more than 4× longer than wide and about as long as the two preceding segments to almost as long as the three preceding segments together.

Scaphobaeocera sabapensis sp. n.

Holotype ♂: Chanthaburi, Khao Sabap Nat. Park, 150-300 m, 23.-24.XI.85 (MHNG).
Paratypes: 5♂, 1♀ as holotype (MHNG).



Figs 146 to 149.

146 and 147. *Scaphobaeocera sabapensis* sp. n., holotype, aedeagus; 148 and 149. *Scaphobaeocera uncata* sp. n., aedeagus, holotype. Scale = 0.1 mm.

Length 1.15-1.30 mm, width 0.61-0.65 mm, dorsoventral diameter 0.68-0.72. Body, femora and tibiae reddish brown, apical abdominal segments, tarsi and antennae yellowish. Pronotum, elytra, mesepisternum, mesepimeron, lateral portions of metasternum and abdomen microsculptured and iridescent. Microsculpture very fine, sometimes barely visible at 100× magnification. Antennae long, relative length of segments: III 12, IV 14, V 15, VI 16, VII 17, VIII 14, IX 19, X 18, XI 21 (holotype); segments III slender, more than 3× longer than wide; IV to VI evenly wide, somewhat narrower than III, IV about 4× longer than wide, VI almost 5× longer than wide; VII notably wider than III but slender, about 3.5× longer than wide; VIII somewhat wider than III, 3.5× longer than wide; XI 3× longer than wide. Pronotal punctation very fine, distinct at 50× magnification. Hypomeral stria absent. Point of scutellum exposed. Elytral punctation less fine than that on pronotum, near apex not coarser than on centre; parasutural stria relatively deep, extended fairly far anteriorly. Median portion of metasternum very densely and very finely punctate, with shallow elongate impression; median stria absent. Lateral portion of metasternum sparsely and very finely punctate. Metepisternum more or less vaulted, 0.05-0.06 mm wide anteriorly, somewhat narrowed apically, inner suture deep, straight or somewhat rounded apically. Lateral portion of 1st ventrite still finer punctate than that of metasternum. Tibiae straight.

Sexual characters of male. Segments 1 to 3 of protarsi enlarged, narrower than apex of tibia. Aedeagus (Figs 146 to 147) 0.38-0.41 mm long.

S. sabapensis may be distinguished from similar species by the conspicuously slender antennal segments III and VIII, in combination with medially impressed metasternum.

Scaphobaeocera nobilis Löbl

Scaphobaeocera nobilis Löbl, 1984*a*: 91.

Material examined: 7, Khao Yai Nat Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85; 2, Chiang Mai, Doi Suthep, 800 m, 12.V.86 (Schwendinger); 1, Doi Suthep, 1210 m, 30.I.87 (Schwendinger); 1, Doi Suthep, Mahidol Waterfalls, 1100 m, 20.II.87 (Schwendinger) (all MHNG).

Distribution: Bhutan, Thailand. — New to Thailand.

Remarks. These specimens are almost identical in external and genital characters.

Scaphobaeocera minuta (Achard)

Toxidium minutum Achard, 1919: 364.
Scaphobaeocera minuta; Löbl, 1971: 989; 1984*a*: 86.

Material examined: 11, Khao Yai Nat. Park, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Distribution: North India, Thailand. — New to Thailand.

Remarks. The shape of the enlarged base of the flagellum in the four Thai males examined differs slightly from that in the two available males from North India. In absence of other distinctive characters the Thai specimens are believed to be conspecific with the Indian ones.

Scaphobaeocera difficilis Löbl

Scaphobaeocera difficilis Löbl, 1979*a*: 113; 1986*a*: 88; 1986*c*: 350.

Material examined: 3, Chiang Mai, below Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 1, Doi Angkhang, 10 km W Fang, 1650 m, 22.IV.87 (Schwendinger); 1, Doi Chiang Doa, 450 m, 7.V.87 (Schwendinger); 1, Chiang Dao, 700 m, forest near cave, 27.XII.80 and

1, Doi Chiang Dao, 1500 m, 21.XII.80 (Deharveng & Gouze); 1, Doi Pui, 1500 m, north slope, 19.XII.88 (Geigenmüller & Trautner); 1, Doi Suthep, 1090 m, 2.XII.85 (Schwendinger); 12, Doi Suthep, 1050 m, 1400 m, 1450 m and 1500 m, north and south slopes, 4.-5.XI.85; 3, Doi Inthanon, 2500 m, 9.XI.85 (MHNG, SMNS).

Distribution: India, Pakistan, Thailand. — New to Thailand.

Remarks. The median metasternal stria is variably deep. Sometimes it is very fine and difficult to see if the specimens are not properly mounted.

Scaphobaeocera discreta Löbl

Scaphobaeocera discreta Löbl, 1986*a*: 888; 1986*c*: 350.

Material examined: 1, Chiang Mai, Doi Angkhang, 10 km W Fang, 1500 m, 20.III.87 (Schwendinger) (MHNG).

Distribution: North India, Thailand. — New to Thailand.

Remarks. This species may be readily identified. Besides characters used in the key it has extremely small antennal segment VIII and not iridescent elytra.

Scaphobaeocera uncata sp. n.

Holotype ♂: "Thai, W. Tak IX" (Sedlacek) (MHNG).

Length 1.1 mm, width 0.61 mm, dorsoventral diameter 0.64 mm. Body blackish, antennae, femora and tibiae rather dark reddish brown, apex of abdomen and tarsi ochreous. Pronotum and elytra iridescent. Pronotum, elytra and abdomen rather distinctly microsculptured (100× magnification), metasternal microsculpture visible only at higher magnification, that on mesepisternum and mesepimeron almost obsolete. Relative length of antennal segments: III 7, IV 10, V 14, VI 10, VII 16, VIII 10, IX 17, X 16, XI 25; segment III almost 2× longer than wide; IV somewhat narrower than III, almost 3× longer than wide; V as wide as III, 3.5× longer than wide; VI wider than V, 2× longer than wide; VII notably wider than VI, somewhat more than 2× longer than wide; VIII somewhat wider than VI, almost 2× longer than wide; XI somewhat wider than VII, 3× longer than wide. Pronotal punctation very fine and sparse, barely visible at 50× magnification. Hypomeral stria distinct. Minute point of scutellum exposed. Elytral punctation very fine and sparse anteriorly, similar as the pronotal one, apically becoming coarser and denser, on apical portion still very fine although much coarser than on pronotum or elytral base; parasutural stria long and well visible. Median portion of metasternum convex, impunctate on centre, extremely finely and densely punctate on apical part, with relatively coarse punctures between meso- and metacoxa. Lateral portions of metasternum and 1st ventrite evenly extremely finely and sparsely punctate. Metepisternum flat, evenly 0.03 mm wide, inner suture straight. Tibiae straight.

Sexual characters of male. Segments 1 to 3 of protarsi strongly enlarged, narrower than tibia. Aedeagus (Figs 148 and 149) 0.45 mm long.

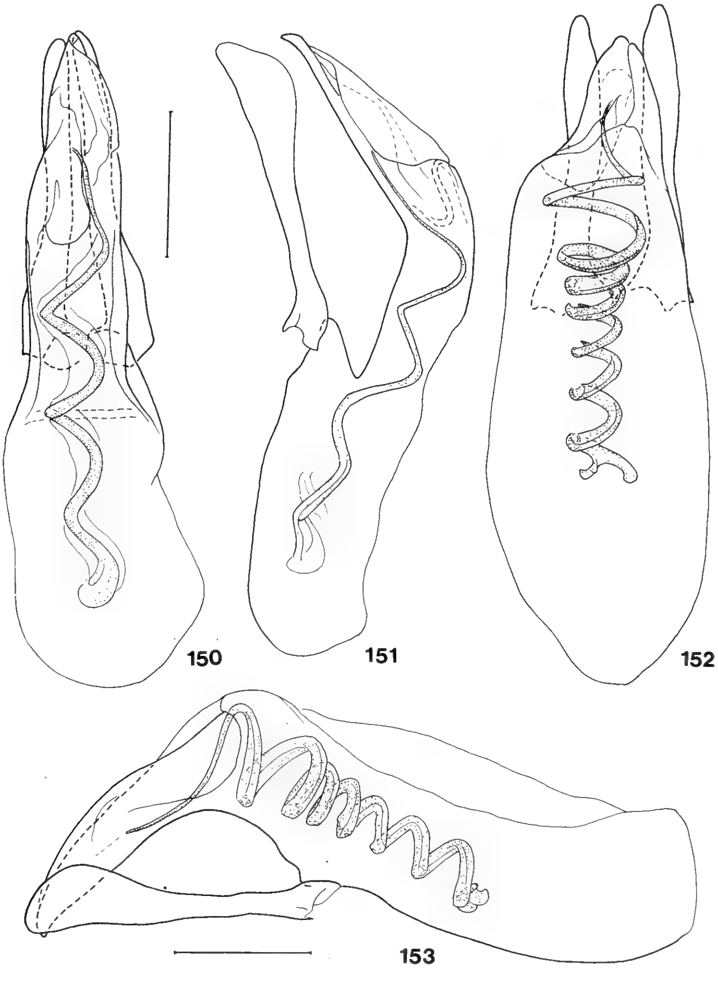
This species is characterized by the slender aedeagus with articular processi apically expanded and with relatively short flagellum enlarged and hook-shaped at base. It may be readily distinguished from other small-sized species having distinct hypomeral stria by the relative length of the antennal segments.

Scaphobaeocera tenella sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).

Paratype ♂: India, Meghalaya, Khasi Hills, 16 km E Mawsynran, 1000 m, 27.X.78 (Besuchet, Löbl) (MHNG).

Length 1.15-1.20 mm, width 0.56-0.58 mm, dorsoventral diameter 0.62-0.65 mm. Body very dark reddish brown to blackish, legs and apical abdominal segments reddish brown, antennae yellowish. Pronotum, elytra and 1st ventrite distinctly iridescent. Pronotum, elytra, mesepisternum, mesepimeron, lateral portions of metasternum and



FIGS 150 to 153.

150 and 151. *Scaphobaeocera tenella* sp. n., holotype, aedeagus; 152 and 153. *Scaphobaeocera spira* sp. n., holotype, aedeagus. Scale = 0.1 mm.

1st ventrite microsculptured. Relative length of antennal segments as: III 7, IV 10, V 12, VI 12, VII 12, VIII 8, IX 13, X 14, XI 19 (holotype). Segment III about 2× longer than wide; IV as wide as III, 3× longer than wide; V and VI barely wider than IV, each more than 3× longer than wide; VII distinctly wider than VI or VIII, somewhat more than 2× longer than wide; VIII about 1.5× longer than wide; XI notably wider than VII, somewhat more than 2× longer than wide. Pronotal punctation very fine, dense, well visible at × 50× magnification. Hypomeral stria absent. Scutellum almost completely covered by pronotal lobe. Elytral punctation very fine and dense, near base similar to than on pronotum, on apical portion notably coarser; parasutural stria distinct behind anterior third of elytron. Median portion of metasternum flat, very densely and finely punctate, with small and shallow impression in holotype, absent from paratype. Lateral portions of metasternum and 1st ventrite evenly very finely and sparsely punctate. Metepisternum flat, evenly 0.03 mm wide, with straight inner margin. Tibiae straight.

Sexual characters of male. Segments 1 to 3 of protarsi strongly enlarged, about as wide as tibia. Aedeagus (Figs 150 and 151) 0.40-0.42 mm long.

This species shares with *stipes* Löbl and *uncata* expanded and apically protruding articular processi of the median lobe. It differs drastically from both by the shape of the flagellum which is conspicuously long and in basal half apparently sinuate (in the paratype forming distinct apical circles).

The Indian specimen was not treated in LÖBL, 1984*a*, because its aedeagus was thought anomalous.

Scaphobaeocera spinigera Löbl

Scaphobaeocera spinigera Löbl, 1979*a*: 116; 1984*a*: 91; 1986*c*: 349.

Material examined: 1, Chiang Mai, Doi Angkhang, 10 km W Fang, 1460 m, 21.V.86 and 6, 1500 m, 30.X.87 (Schwendinger); 2, Mae Nang Kaeo, 950 m, 54 km NE Chiang Mai (via Chiang Rai), 3.XI.85; 4, Doi Suthep, 1050, 1400, 1450 and 1550 m, 4.-5.XI.85; 2, Doi Inthanon, 1250 and 1650 m, 6.-7.XI.85; 1, Doi Inthanon, 1760 m, 3.III.87 (Schwendinger) (all MHNG).

Distribution: North Pakistan, India, Thailand. — New to Thailand.

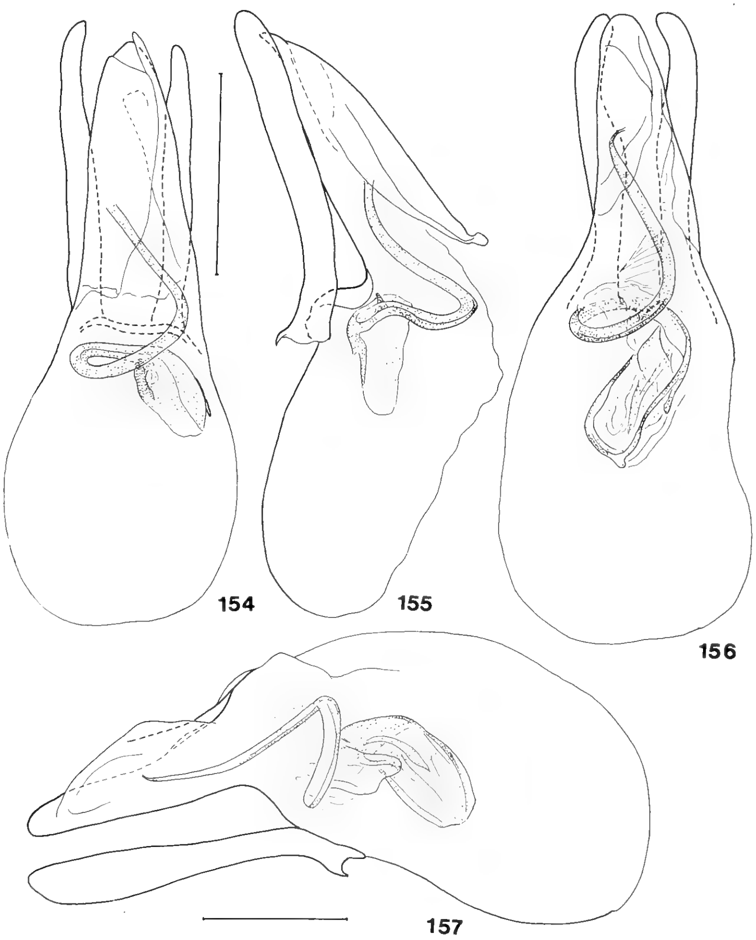
Scaphobaeocera spira sp. n.

Holotype ♂: Khao Yai Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).
Paratype ♀: Khao Yai Nat. Park, Khao Kieo, 1150 m, 28.XI.85 (MHNG).

Length 1.45-1.50 mm, width 0.78 mm, dorsoventral diameter 0.83-0.86 mm. Body blackish, apex of abdomen and legs ochreous or reddish brown, antennae yellowish. Pronotum, elytra and ventrites iridescent. Microsculpture on pronotum, elytra and abdomen very fine, barely visible at 100× magnification, that on mesepisternum, mesepimeron and metasternum still finer, distinct at 180× magnification. Relative length of antennal segments: III 8; IV 12, V 12, VI 10, VII 16, VIII 9, IX 16, X 18, XI 23 (holotype); segment III about 2× longer than wide; IV as wide as III, 3× longer than wide; V barely wider than IV; VI somewhat more than 2× longer than wide, wider than V; VII more than 2× longer than wide; VIII not quite 2× longer than wide, somewhat wider than VI; XI about 2.5× longer than wide, much wider than VII. Hypomeral stria absent. Punctation on pronotum and elytron evenly very fine but apical portion of elytron with points somewhat coarser. Distal part of scutellum exposed. Parasutural stria very shallow, obsolet on anterior third of elytron. Lateral portions of metasternum and 1st ventrite evenly very finely punctate. Middle portion of metasternum flat, with a median stria in anterior half. Tibiae straight.

Sexual characters of male. Segment 1 and 2 of protarsi strongly enlarged, almost as large as apex of tibia. Segment 3 of protarsi enlarged, narrower than 2 or 1. Aedeagus (Figs 152 and 153) 0.49 mm.

This species shares with *confusa* Löbl (from Queensland) the flagellum forming six complete circles and the apically widened parameres (lateral view). Its differs however from the latter by slender distal part of median lobe of aedeagus which is ventrally concave. Besides, *spira* may be readily distinguished from *confusa* by larger size of the body, microsculpture on the dorsal surface and metasternum with a median stria.



FIGS 154 to 157.

154 and 155. *Scaphobaeocera obducta,* holotype, aedeagus; 156 and 157. *Scaphobaeocera validа* sp. n., holotype, aedeagus. Scale = 0.1 mm.

Scaphobaeocera obducta sp. n.

Holotype ♂: Khao Yai Nat Park, near Headquarters, 750-850 m, 26.XI.-3.XII.85 (MHNG).
Paratype ♂: as holotype (MHNG).

Length 1.0-1.05 mm, width 0.60-0.63 mm, dorsoventral diameter 0.61-0.65 mm. Body blackish, apical abdominal segment, femora and tibiae reddish brown. Tarsi and antennae paler, almost yellowish. Body not iridescent. Thoracic microsculpture extremely fine, barely distinct at 180× magnification, that on elytra and abdomen visible at 90× magnification. Antennae short, relative length of segments: III 7, IV 10, V 12, VI 10, VII 13, VIII 9, IX 14, X 13, XI 20 (holotype); segment III about 2× longer than wide; IV barely slender than III, well 3× longer than wide; V and VI as wide as III, V 4× longer than wide, VI 3× longer than wide; VII not quite 3× longer than wide, notably wider than VI, VIII somewhat wider than VI, more than 2× longer than wide; XI much wider than VII, almost 3× longer than wide. Pronotal and elytral punctation sparse and almost evenly extremely fine. Hypomeral stria absent. Minute point of scutellum exposed. Parasutural stria of elytron very shallow. Median portion of metasternum flat, not impressed and without stria, all over very densely and finely punctate. Lateral portions of metasternum and 1st ventrite very sparsely and extremely finely punctate. Mesocoxal area relatively large, 0.04 mm long, with coarse marginal punctured. Metepisternum flat, 0.05-0.06 mm wide apically, narrowed anteriorly, with straight inner suture. Tibiae straight.

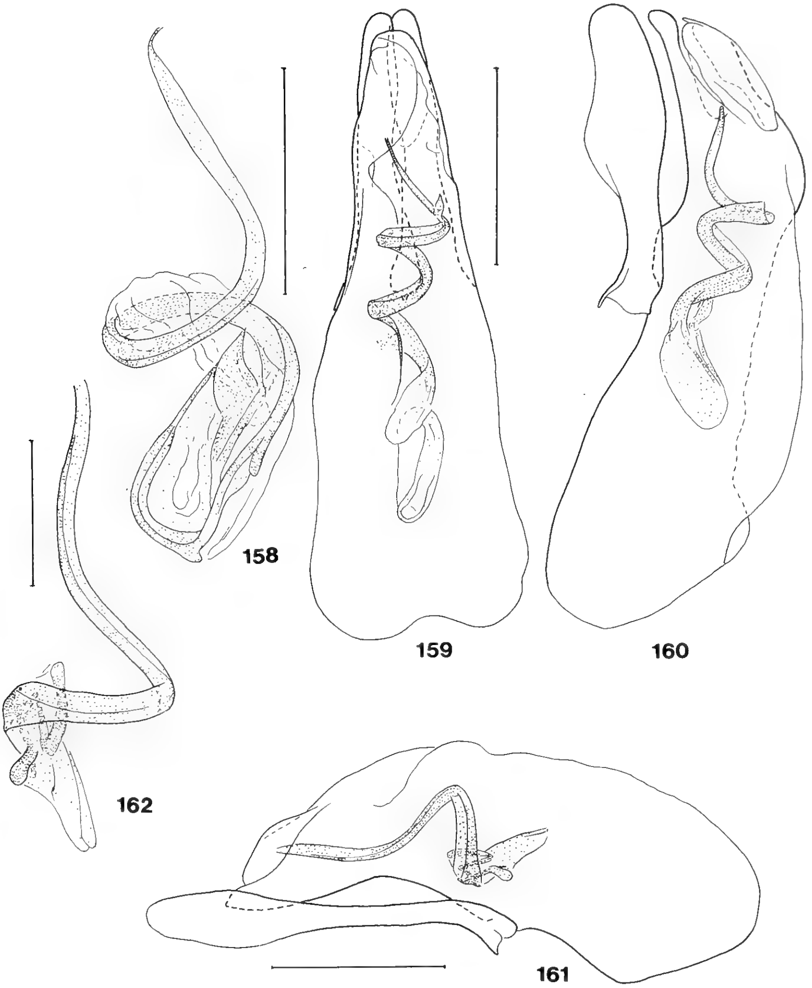
Sexual characters of male. Segments 1 to 3 of protarsi distinctly enlarged, narrower than tibiae. Aedeagus (Figs 154 and 155) 0.26-0.27 mm long.

S. obducta may be distinguished from other species of similar size by the combination of following characters: body not iridescent, blackish, apical antennal segment about 1.5× longer than penultimate, mesocoxal area 0.04 mm long, parameres of aedeagus almost evenly wide (lateral view), flagellum forming a single circle, and its conspicuously enlarged base bearing a distally protruding denticle.

Scaphobaeocera valida sp. n.

Holotype ♂: Khao Yai Nat. Park, hills east of Heo Suwat Waterfalls, 900 m, 1.XII.85 (MHNG).
Paratypes: 2♀ as holotype (MHNG).

Length 1.8-1.9 mm, dorsoventral diameter 1.02-1.05 mm, elytra combined 1.02-1.08 mm wide. Body rather pale reddish brown. Apex of abdomen, legs and antennae somewhat paler than body. Pronotum and elytra iridescent and distinctly microsculptured. Antennae long, relative length of segments: III 9, IV 19, V 22, VI 21, VII 22, VIII 9, IX 22, X 22, XI 28 (holotype); segments III to VI slender, almost evenly wide; III almost 2× longer than wide, IV to VI each about 4× longer than wide; VII almost 3× longer than wide; VIII somewhat wider than VI, about 1.3× longer than wide; XI somewhat wider than VII, 3× longer than wide. Hypomeron with distinct stria. Pronotal punctation very fine and sparse. Scutellum completely covered by pronotal lobe. Elytral punctation similar to pronotal near base, apically denser and coarser, on apical third many punctures not well delimited, relatively large, as large or larger than intervals between them; parasutural stria very shallow and long. Mesepisternum, mesepimeron, lateral portion of metasternum and abdominal segments microsculptured. Punctation on lateral portion of metasternum, 1st visible ventrite and pygidium sparse and very fine, coarser than that on pronotum. Median portion of metasternum lacking impression or stria, flattened, punctation very dense, anteriorly rather fine, on apical half coarse.



FIGS 158 to 162.

158. *Scaphobaeocera valida* sp. n., holotype, internal sac; 159 and 160. *Scaphobaeocera burckhardti* sp. n., holotype, aedeagus; 161 and 162. *Scaphobaeocera robustula* sp. n., aedeagus (161) and internal sac (162). Scale = 0.1 mm (158-161), 0.05 mm (162).

Metepisternum flat, not narrowed anteriorly, 0.05-0.06 mm wide; inner suture concave. Tibia I straight, II and III curved.

Sexual characters of male. Segments 1-3 of protarsi strongly enlarged, somewhat narrower than apex of tibia. Aedeagus (Figs 156 to 158) 0.43 mm long.

This species may be separated from other members of the genus having hypomeral stria by the combination of the following characters: body reddish brown, relatively large;

antenna with segments V to VII evenly long, XI about 1.3 × longer than X; metasternum coarser punctate than pronotum; metepisternum narrow; meso- and metatibia curved; parameres of aedeagus moderately enlarged apically, not lobed; internal sac as figured.

Scaphobaeocera burckhardti sp. n.

Holotype ♂: Chanthaburi, Khao Sabap Nat. Park, forest above Phliu Waterfalls, 150-300 m, 23-24.XI.85 (MHNG).

Paratypes: 2♂ as holotype (MHNG).

Length 1.40-1.45 mm, dorsoventral diameter 0.73-0.75 mm, elytra combined 0.67-0.72 mm wide. Body rather pale, ochreous. Apical abdominal segments, legs and antennae almost yellowish. Pronotum almost indistinctly, elytra distinctly iridescent. Antennae moderately long, relative length of segments: III 8, IV 15, V 17, VI 17, VII 17, VIII 12, IX 18, X 18, XI 24 (holotype); segment III more than 2 × longer than wide, about as wide as V or VI; IV somewhat slender than III, 5 × longer than wide; V and VI each about 5 × longer than wide; VII much wider than VI, 2.5 × longer than wide; VIII about 2.5 × longer than wide, slender than VII, wider than VI; XI wider than VII, 3 × longer than wide. Pronotal punctation very fine, barely visible at 50 × magnification, pronotal microsculpture indistinct at 100 ×. Scutellum not visible. Hypomeron with a distinct longitudinal stria. Elytra as in *valida,* but punctation near base coarser than that on pronotum. Mesepisternum, mesepimeron, lateral portion of metasternum and abdominal segments with distinct microsculpture. Punctation on lateral portion of metasternum and on 1st ventrite about as fine as that on pronotum. Median portion of metasternum lacking impression or stria; punctation very dense and fine except on small smooth area on anterior half. Metepisternum 0.02-0.04 mm wide, not narrowed anteriorly; inner suture straight. Pro- and mesotibiae straight. Metatibiae straight in basal fourth or third then narrowed and curved, becoming gradually stouter from middle to apex.

Sexual characters of male. Segments 1-3 of protarsi strongly enlarged, wider than apex of tibia. Aedeagus (Figs 159-160) 0.31-0.34 mm long.

S. burckhardti is characterized by the shape of the ventrally lobed parameres in combination with the shape of the spiral flagellum.

Scaphobaeocera robustula sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, north slope, 1450 m, 4.XI.85 (MHNG).

Paratype ♂: Doi Suthep, 850 m, 31.I.87 (Schwendinger) (MHNG).

Length 1.6 mm, dorsoventral diameter 0.92 mm, elytra combined 0.92 mm wide. In most external characters similar to *valida,* microsculpture finer, on pronotum and on sternal parts of thorax barely visible at 100 × magnification. Pronotum weekly, elytra distinctly iridescent. Relative length of antennal segments in holotype: III 9, IV 15, V 17, VI 17, VII 21, VIII 12, IX 21, X 21, XI 24; segments IV-VI and XI shorter, VIII longer than in *valida,* 2 × longer than wide, XI less than 3 × longer than wide. Elytral punctation finer than in *valida,* only on apical third distinctly denser and coarser than on pronotum. Metepisternum very narrow, barely 0.02 mm large, inner suture concave. Punctation on metasternum and abdomen finer than in *valida,* basal punctures of 1st ventrite fine, not elongate. Pro- and mesotibiae stright, metatibiae curved.

Sexual characters of male. Segments 1-3 of the protarsi strongly enlarged. Aedeagus (Figs 161 and 162) 0.36-0.39 mm long.

Toxidium LeConte

This genus is not well defined. The Old World species placed in *Toxidium* belong to several groups which possibly deserve genus rank (Löbl 1984*a*). Four of the five Thai species are members of the Asian *aberrans* group. The fifth species shares with them most of the significant characters but have the elytron with complete sutural stria. The species may be separated by the following key:

1 Sutural stria of elytron incomplete, not joint with basal stria, or basal stria absent 2
— Sutural stria complete, curved along base and extended (basal stria) along basal margin, joint there with lateral stria .... species indet.
2 Sutural stria very short, developed only in apical portion of elytron. Larger species, at least 2.3 mm long 3
— Sutural stria long, extended from apex almost to base of elytron. Smaller species, not longer than 2.1 mm .... *styligerum*
3 Elytron with distinct basal stria 4
— Basal stria of elytron absent .... *incompletum*
4 Mesosternum smooth laterally of median keel. Mesocoxal area shorter than half of interval between its margin and apical margin of metasternum .... *robustum*
— Mesosternum ridgy. Mesocoxal area as long as or longer than half of interval between its margin and apical margin of metasternum .... *pubistylis*

Toxidium robustum Pic

Toxidium robustum Pic, 1930: 58.
Toxidium robustum; Löbl 1984*a*: 97.

Material examined: 1, labelled "WTak" and 1, "NTak" (Sedlacek) (MHNG).

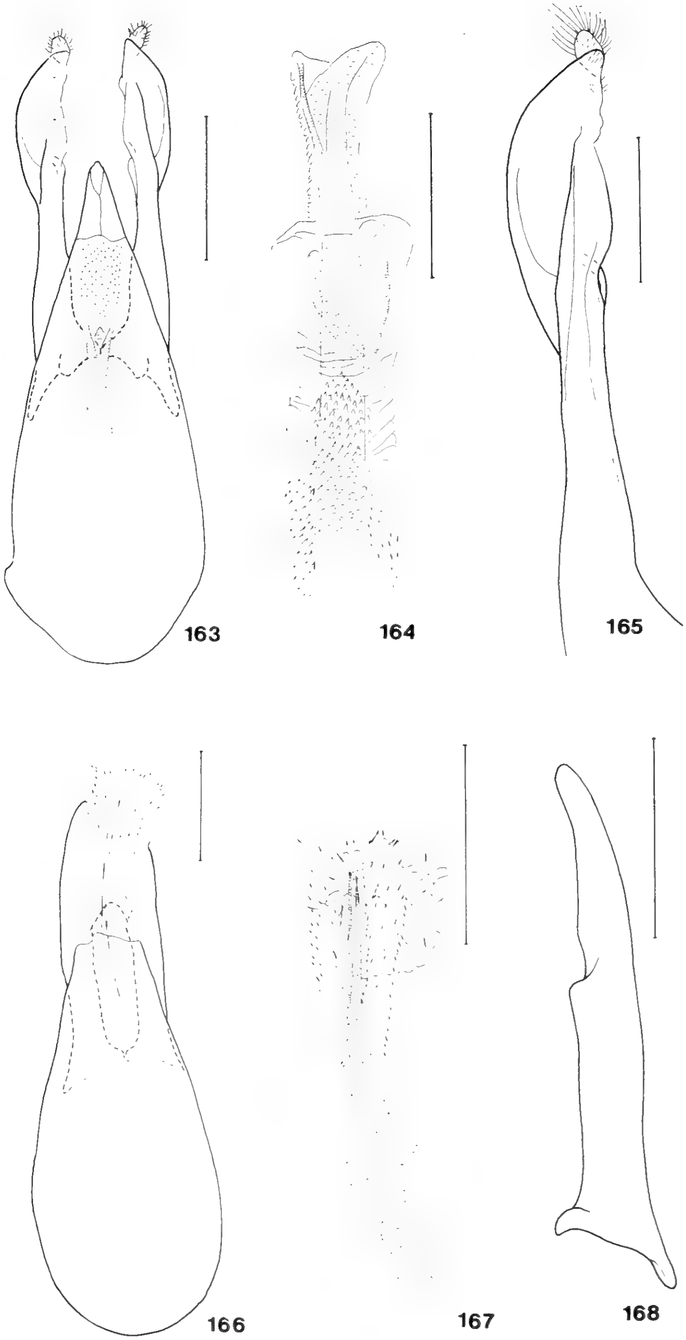
Distribution: Burma, Thailand. — New to Thailand.

Toxidium pubistylis sp. n.

Holotype ♂: Khao Yai Nat. Park, forest east of Heo Suwat Watterfalls, 800-900 m, 1.XII.85 (MHNG).

Paratype ♂: Chiang Mai, ravine near road to Wab Pang An, 50 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85 (MHNG).

Length 2.40-2.45 mm. Body dark reddish brown. Apical segments of abdomen, femora and tibiae somewhat paler, antennae and tarsi much paler. Antennae long, relative length of segments: III 24, IV 28, V 31, VI 26, VII 29, VIII 23, IX 28, X 28, XI 32 (holotype). Segment VII 3.5 × longer than wide, VIII 4 × longer than wide, XI 3 × longer than wide. Punctation on pronotum dense and very fine, barely visible at 50 ×. Point of scutellum exposed. Elytra combined 1.38-1.41 mm wide; sutural stria short, shallow, extended from apex to middle third of elytron; basal stria shallow, not joint with lateral stria; lateral and epipleural striae parallel together in basal half of elytron; discal punctation irregular, consisting of more or less fine punctures, some coarser ones form irregular longitudinal rows on basal half of elytron. Wings fully developed. Mesosternum ridgy, with a long, well developed and sharply delimited median keel. Remaining ventral surface of thorax very finely punctate and apparently not microsculptured. Median portion of metasternum somewhat convex, with two apical impressions. Mesocoxal areas 0.09-0.10 mm long, as long as or barely longer than half of smallest interval between them



FIGS 163 to 168.

163. *Toxidium pubistylis* sp. n., holotype, aedeagus, 164. dtto, paratype, internal sac; 165. dtto, holotype, paramere; 166. *Toxidium styligerum* sp. n., holotype, aedeagus, 167. dtto, internal sac; 168. dtto, paramere. Scale = 0.2 mm (163) and 0.1 mm (164-168).

and apical margin of metasternum. Metepisternum convex, 0.12 mm wide, with deep and wide internal suture which is rounded anteriorly. First ventrite lacking microsculpture except for that on its apical margin; following ventrites and visible tergites with very fine microsculpture consisting of punctures. Tibiae straight.

Sexual characters of male. Segment 1 of protarsi distinctly enlarged, segments 2 and 3 barely enlarged. Aedeagus (Figs 163 to 165) 0.85-0.87 mm long.

Remarks. Unlike other species of *Toxidium, pubistylis* is characterized by a pubescent lobe on the apex of the parameres of the aedeagus. This species would run in my key (LÖBL 1984*a*) to *diffidens* from which it may be separated by the darker body, the more irregular elytral punctation, the ridged mesosternum, and medio-apical impressions on the metasternum.

Toxidium styligerum sp. n.

Holotype ♂: Chiang Mai, Soi Suthep, forest at summit, 1600 m, 4.XI.85 (MHNG).

Paratypes: 1 ♀ as holotype; 1 ♀, Chiang Mai, Doi Inthanon, 1250 m, near Forestry Department, 6.XI.85 (MHNG).

Length 1.85-2.05 mm. Body dark brown, more or less reddish, elytra apically paler, apical segments of abdomen and legs paler reddish brown to yellowish. Antennae moderately long, segments I to VI almost yellowish, following segments pale brown. Relative length of antennal segments: III 19, IV 19, V 25, VI 23, VII 24, VIII 17, IX 22, X 22, XI 30 (holotype). Segment VII somewhat more than 4× longer than wide, VIII and XI about 4× longer than wide. Punctation on pronotum moderately dense and very fine, barely visible at magnification 24×. Point of scutellum exposed. Elytra combined 1.0-1.15 mm wide; sutural stria rather shallow, relatively long, extended from apex to basal third or basal fourth of elytron; basal stria shallow, joint to lateral stria; lateral and epipleural striae parallel together in basal half of elytron; punctation very fine near base and on apical portion, elsewhere rather coarse, dense and relatively regular. Wings fully developed. Mesosternum with rather coarse punctures at lateral margins, elsewhere smooth; mesosternal median keel low and not well delimited. Punctation on ventral side of body sparse and very fine, except for coarser punctures on margines of mesosternum, mesocoxal area and base of 1st ventrite. Metasternum apparently without microsculpture, its median portion convex, flattened just in front of apical process. Mesocoxal areas 0.07-0.10 mm long, longer than half of smallest interval between them and apical margin of metasternum. Metepisternum flat, 0.08-0.10 mm wide, with deep, rather wide and almost straight inner suture. Abdomen as in *pubistylis.* Protibiae somewhat curved, meso- and metatibiae straight.

Sexual characters of male. Segments 1 and 2 of protarsi distinctly, segment 3 baryle enlarged. Aedeagus (Figs 166 to 168) 0.49 mm long.

T. styligerum resembles *curtilineatum* Champion by the elytron with relatively long sutural stria and by apically narrowed parameres of the aedeagus. It can be easily distinguished from the latter by its smaller size, finer punctate apical portion of elytra and by the internal sac of the aedeagus as figured.

Toxidium incompletum sp. n.

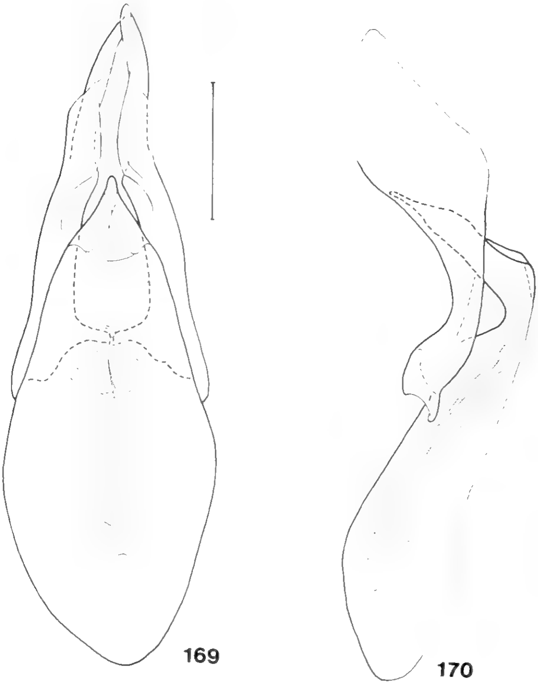
Holotype ♂: Chiang Mai, Chiang Dao, 450 m, 5.-11.IV.58, in a dead tree (Maa) (BMH).

Paratype ♀: as holotype (MHNG).

Length 2.40 mm. Body black, femora and tibia reddish brown, tarsi, antennae and apical segments of abdomen pale reddish brown to yellowish. Antennae long, relative length of segments: III 25, IV 27, V 29, VI 23, VII 28, VIII 18, IX 27, X 25, XI 32; segment VII about 2.5×, VIII 3×, XI somewhat more than 2× longer than wide. Pronotal punctation rather dense and very fine, distinct at magnification 24×. Point of scutellum exposed. Elytra combined 1.38-1.45 mm wide; sutural stria shallow and short, distinct only along apical fourth of sutural margin; basal stria not developed; lateral and epipleural striae as in *styligerum;* punctation rather fine, specially near the base, with some irregularly disposed coarser punctures. Mesosternum finely punctate, median keel barely developed. Punctation on ventral side of body as in *styligerum.* Metasternum lacking microsculpture, with median portion flattened. Mesocoxal areas 0.05-0.06 mm long, about as long as 1/3 of smallest interval between them and apical margin of metasternum. Metepisternum convex, 0.08 mm wide, moderately narrowed anteriorly, with inner suture deep, punctured, somewhat concave. Abdominal microsculpture as in *pubistylis* and *styligerum.* Tibiae straight.

Male. Segments 1 and 2 of protarsi moderately enlarged, segment 3 barely enlarged. Aedeagus (Figs 169 and 170) 1.0 mm long.

T. incompletum shares with other species of the *aberrans* group (*aberrans* Achard, *curtilineatum* Champion, *robustum* Pic, *vagans* Löbl, *diffidens* Löbl, *pubistylis* sp. n., *styligerum* sp. n.) all diagnostic significant characters but the basal stria of the elytron. It may be readily distinguished from other species also by conspicuously dilated apical part of the parameres.



Figs 169 and 170.

Toxidium incompletum sp. n., holotype, aedeagus. Scale = 0.2 mm.

Toxidium species

Material examined: 2♀, Khao Yai Nat. Park, forest near Headquarters, 750-850 m, 26.XI.-3.XII.85; 1, Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (MHNG).

Remarks. This is a conspicuous species which resembles *pygmeum* Löbl and *montanum* Löbl from Sri Lanka by the complete sutural stria of the elytron. It differs from the latter two species by much larger size, unicolorous dark reddish brown pronotum and elytra, longer antennae, and deeper sutural/basal stria of the elytron.

Scaphoxium Löbl

The genus is well defined by the apically lobed hypomeral part of prothorax and curved 3rd antennomere (autapomorphies). As in *Scaphicoma* it lacks visible mesepimera, the meso- and metacoxae are approximate and the aedeagus is slender and bears parameres abruptly narrowed in apical portion. *Scaphoxium* may be separated from the latter also by much shorter antennae and tarsi, and by antennal insertion lying rather close to the clypeal margin. Twenty four species are included in the genus, most of which distributed over tropical Asia. One occurs in Japan, and a few in Melanesia and North Queensland. Furthermore, several unidentified Afrotropical species are represented in the collection of MHNG. Among the Thai collections, 5 species were identified, one of them is new.

Key to the Thai species of *Scaphoxium*

1 Metasternum medially impressed 2
— Median portion of metasternum not impressed 3
2 Apophyse of paramere of aedeagus slender and curved, overlapping a small membranous lobe. Internal sac with conspicuous row of spiculi. Antennomere IV not shorter than III. Larger species, 1.4-1.6 mm long .... *sparsum*
— Parameral apophyse short and wide, touth-like. Internal sac very finely and densely spinous, with an U-shaped sclerit in middle. Antennomere IV usually distinctly shorter than III. Smaller species, 1.2-1.4 mm long......... *intermedium*
3 Internal sac of aedeagus with weakly sclerotized elongate vesica .... *singlanum*
— Internal sac of aedeagus with strongly sclerotized pieces 4
4 Apical pair of sclerites of internal sac hook-like, not enlarged, central sclerit not developed. Lateral portion of 1st ventrite sometimes distinctly microsculptured .... *taiwanum*
— Internal sac with two pairs of elongate sclerites and one short central sclerite, elongate apical sclerites enlarged distally. Lateral portion of 1st ventrite without microsculpture .... *avidum* sp. n.

Scaphoxium singlanum Löbl

Scaphoxium singlanum Löbl, 1984*a*: 101.

Material examined: 2, Chiang Mai, Doi Suthep, 1450 m, 4.XI.85; 2, Doi Suthep, 1100 and 1120 m, I.86, pit-fall trap (Schwendinger); 1, Doi Inthanon, ravine near Forestry Department, 1250 m, 6.XI.85; 1, Doi Inthanon, 1720 m, 7.XI.85; 2, Doi Inthanon, 1020 m, 17.II.87 (Schwendinger) (all MHNG).

Distribution: India, Thailand. — New to Thailand.

Remarks. These specimens are larger than the Indian ones (Thai specimens: length 1.35-1.45 mm, dorso-ventral diameter 0.72-0.87 mm, maximum width 0.70-0.73 mm), and their aedeagi are longer (0.55-0.60 mm). All other diagnostic features including the peculiar shape of the internal sac are the same as in the type-series from Singla, Darjeeling district.

Scaphoxium intermedium Löbl

Scaphoxium intermedium Löbl, 1984*a*: 101.
Scaphoxium intermedium; Löbl 1986*c*: 350.

Material examined: 1, Chiang Mai, below Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 1, Doi Inthanon, 1020 m, 17.II.87 (Schwendinger); 21, Mae Hong Son, Tham Lok Forest Park, 8 km E Sop Pong, 700 m, 11. and 13.XI.85 (all MHNG).

Distribution: India, Thailand. — New to Thailand.

Scaphoxium taiwanum Löbl

Scaphoxium taiwanum Löbl, 1890: 121.
Scaphoxium? taiwanum; Löbl 1986*c*: 351.

Material examined: 1, Chiang Mai, Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 950 m, 3.XI.85 (MHNG).

Distribution: India, Thailand, Taiwan. — New to Thailand.

Remarks. The aedeagus of the Thai specimen is as large as that in the holotype (from Taiwan) while the apical sclerites of the internal sac are slender, as in the two males from India (Löbl 1986*c*).

Scaphoxium sparsum Löbl

Scaphoxium sparsum Löbl, 1979*a*: 121.
Scaphoxium sparsum; Löbl 1984*a*: 100.

Material examined: 1, Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (MHNG).

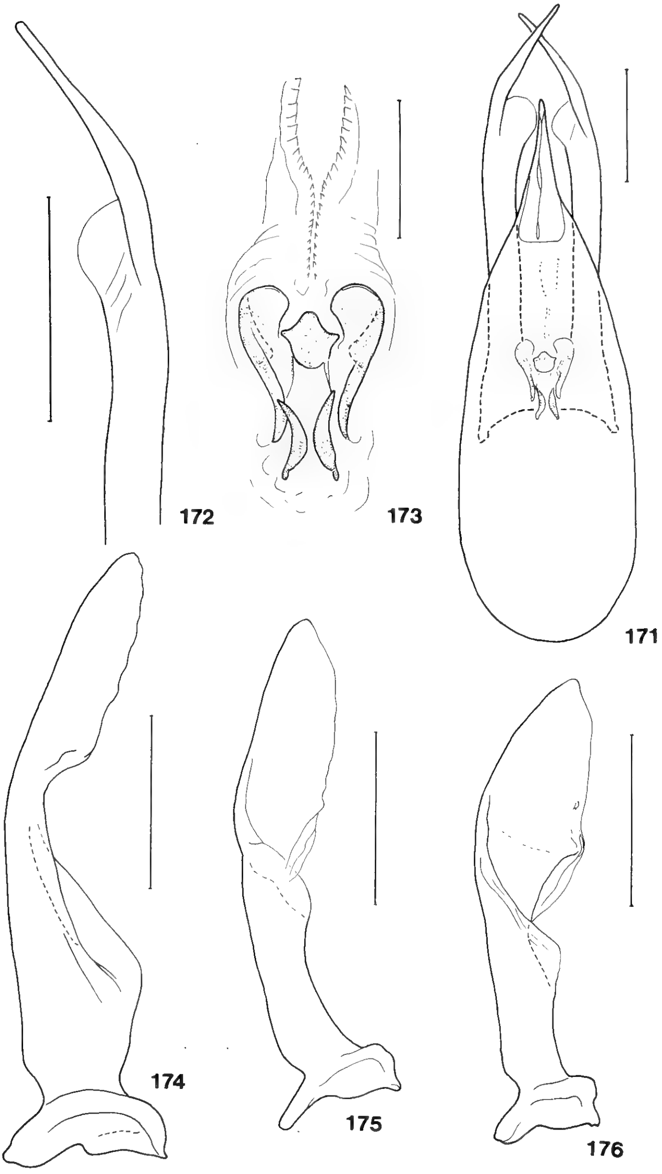
Distribution: India, Thailand. — New to Thailand.

Scaphoxium avidum sp. n.

Holotype ♂: Chiang Mai, ravine near road to Wab Pang An, 50 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85 (MHNG).

Paratypes: 1♂, Chiang Mai, Doi Inthanon, ravine near Forestry Department, 1250 m, 6.XI.85; 2♂, 1♀, Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (all MHNG).

Length 1.5-1.6 mm, dorsoventral diameter 0.80-0.87 mm, pronotum at base 0.67-0.74 mm wide, elytra combined 0.73-0.79 mm wide. Body reddish brown to blackish, pronotum somewhat less dark than elytra, apical abdominal segments, femora and tibiae reddish brown, tarsi and antennae yellowish. Relative length of antennal segments: III 12, IV 12, V 14, VI 14, VII 19, VIII 14, IX 17, X 16, XI 22 (holotype). Segments VII, VIII and XI each about 3 × longer than wide. Punctation on pronotum very fine, barely visible at magnification 24 × . Scutellum completely covered by pronotal lobe. Elytral base about as finely punctate as pronotum, middle portion of elytron decidedly coarser punctate than base, with puncture visible at magnification 12 × , apical area of elytron still somewhat



FIGS 171 to 176.

171. *Scaphoxium avidum* sp. n., holotype, aedeagus; 172. dtto, apical half of paramere; 173 dtto, internal sac; 174. *Bironium distinctum* (Achard) from Doi Pui, paramere; 175. *Bironium troglophilum* sp. n., holotype, paramere; 176. *Bironium bidens* sp. n., paratype from Doi Suthep, paramere. Scale = 0.1 mm (171, 173), 0.05 mm (173), 0.2 mm (174-176).

coarser and also denser punctate than central area. Sutural stria of elytron evanescent 0.15-0.10 mm behind level of pronotal lobe. Median impression of mesosternum very shallow, with a very fine elongate ridge in apical half. Median portion of metasternum somewhat convex anteriorly, flattened apically, extremely finely punctate near apical margin. Lateral portion of metasternum with several distinct punctures. Mesocoxal area 0.05-0.07 mm long, shorter than interval between its margin and metacoxa, with marginal punctures distinct. Metepisternum flat, 0.05-0.07 mm wide; inner suture wide, concave. Abdomen microsculptured as in *singlanum*. Basal punctures on 1st ventrite distinct. Metatibiae 0.39-0.44 mm long.

Sexual characters of male. Segments 1 to 3 of protarsi enlarged. Apical margin of 5th ventrite emarginate. Aedeagus (Figs 171 to 173) 0.54-0.59 mm long.

Remarks. Unlike in other species of the genus the basal portion of the internal sac in *avidum* is provided with two pairs of short sclerites joined to a small central sclerit. By this feature *avidum* may be readily distinguished from other species including those having similarly lobed parameres, and lacking median metasternal impression.

Scaphicoma Motschulsky

This genus includes 12 species occuring in tropical Africa, Asia and Melanesia. *Scaphicoma* is characterized by approximate meso- and metacoxae, antennal insertion situated fairly distant above clypeal suture, basal pronotal angles rounded and not protruding, reduced mesepimera, very long and slender antennomeres III to XI, and very long tarsi.

Scaphicoma arcuatum (Champion)

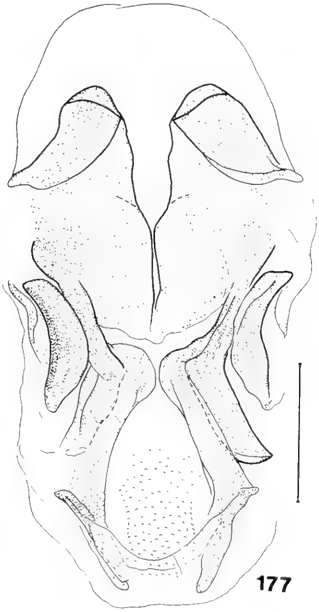
Toxidium arcuatum Champion, 1927: 272.
Scaphicoma arcuatum; LÖBL 1984*a*: 105.

Material examined: 1, Chiang Mai, road to Wab Pang An, 50 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 1, Mae Nang Kaeo, 54 km NE Chiang Mai, 900 m, 3.XI.85; 1, Doi Pui, 1250 m, 14.III.82 (Rougemont); 2, Khao Yai Nat. Park, forest east of Heo Suwat Waterfalls, 800-900 m, 1.XII.85; 2, Khao Yai. Nat. Park, near Headquarters, 750-850 m, 26.XI.-3.XXII.85; 1, labelled "Thai W. Tak V. 55" (Sedlacek); 2, Phuket, hills near Surin Beach, 1.-6.XI.87 (Heiss) (all MHNG).

Distribution: North India, Burma (1, Taunggi, 6.IV.80 (Rougemont)), Thailand. — New to Thailand and to Burma.

Bironium Csiki

Bironium may be readily distinguished by the very long legs and antennae, and by the antennal insertion situated at upper margin of eye, the rounded basal angles of pronotum, the not visible mesepimera, and the large median portion of metasternum. So far 23 valid species are recognized, all confined to Asia and New Guinea. Four species were found in Thailand, two of which are new and described below.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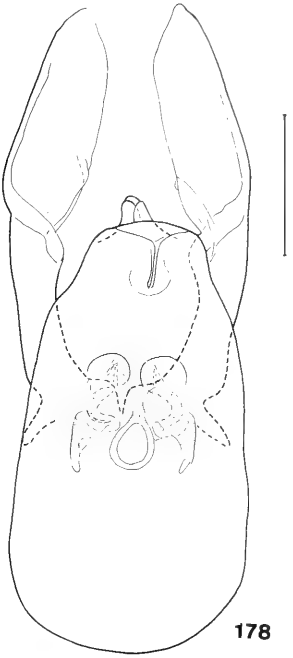
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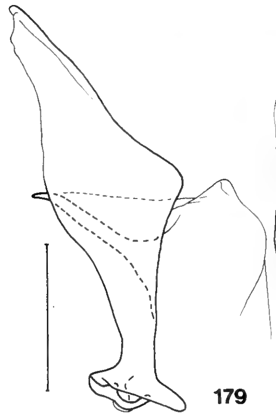
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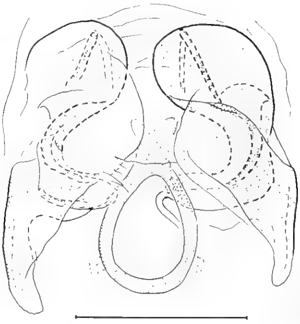
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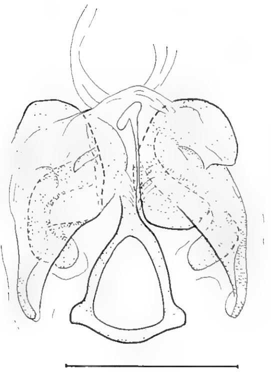
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FIGS 177 to 181.

177. *Bironium distinctum* (Achard) from Doi Pui, internal sac; 178. *Bironium troglophilum* sp. n., holotype, aedeagus; 179. dtto, distal portion of median lobe with paramere, lateral view; 180. dtto, internal sac; 181. *Bironium bidens* sp. n., paratype from Doi Suthep, internal sac. Scale = 0.1 mm (177, 180, 181), 0.2 mm (178, 179).

Bironium distinctum (Achard)

Heteroscapha distinctum Achard, 1920*f*: 265.
Heteroscapha distinctum; Pic 1920*c*: 24; 1921*a*: 163.
Heteroscapha distincta; Champion 1927: 272.
Bironium distinctum; Löbl 1984*a*: 106.

Material examined: 2, Chiang Mai, Doi Pui, 1250 m, 14.III.82 (Rougemont); 2, Doi Suthep, III.87 (Rougemont) (all MHNG).

Distribution: Burma, Thailand.

The species is defined by the combination of following characters:

Length 2.20-2.45 mm. Body very dark reddish brown to blackish, without any paler spots. Elytron with 3 rows of coarse punctures: 1st and 2nd starting at same level near base, 3rd row starting behind a small humeral hump. Inner (1st) row short, extended somewhat behind level of middle of elytron, lying in a shallowly impressed line; 2nd and 3rd row lying in grooves, almost evenly long, extended at least to apical fifth of elytron. Interval between sutural margin and sutural stria vaulted. Interval between sutural stria and 1st row irregularly, more or less distinctly (sometimes coarsely) punctate. Intervals between 1st and 2nd row and between 2nd and 3rd row vaulted, very finely punctate. Interval between 3rd row and lateral stria coarsely and very densely punctate in basal half, further on very finely punctate. Mesosternum impunctate, not ridgy, median keel distinct. Median portion of metasternum impressed, with a few coarse punctures; anterior margin of mesocoxal process with several elongate punctures, not ridgy. Punctation on lateral portion of metasternum coarse and dense, consisting of large and round, not confluent punctures. Metepisternal suture sparsely punctate. In male segments 1 to 3 of protarsi moderately enlarged, with short pubescence, 6th visible ventrite lacking any particular sexual characters. Parameres of aedeagus enlarged (in dorsal view) postbasally and apically (Fig. 174); internal sac containing a complex armature more or less sclerotized, lacking a proximal ring (Fig. 177).

Remarks. *B. coomani* (Pic) from Vietnam shares most of these characters but is somewhat larger and decidedly paler than the specimens of *distinctum* I have seen so far. Unfortunately, the single type specimen of *coomani* deposited in MHNP is a female (bearing original labels handwritten by Pic "Hoa Binh" and "*Coomani* n. sp."), and no other specimen is available which could be associated with *coomani*.

Besides *distinctum* and *coomani* following unicolorous species have elytra with distinct rows of coarse punctures: *feai* (Achard) from Burma and Thailand, *tonkineum* (Pic) from Vietnam, *trisulcatum* (Heller), *bisulcatum* Löbl and *rufescens* Löbl from the Philippines, *borneense* Löbl from Sabah, and two new species described below. The Sabah and Philippine species may be easily separated by their smaller size, *trisulcatum* also by not keeled, smooth mesosternum. *B. feai* and *tonkineum* are larger than *distinctum* (length 3.2-3.4 mm) and differ conspicuously in having two rows of coarse punctures lying in deep grooves starting fairly far behind the elytral base which is just as densely and coarsely punctate as most of the remaining elytral surface.

Bironium troglophilum sp. n.

Holotype ♂: Mae Hong Son, Sop Pong, Tham "Plaa", 28.VII.85 (Besson) (MHNG).

Paratypes: 4♂, 2♀, as holotype; 1♂, 1♀, Mae Hong Son, Sop Pong, Tham "Pi", 22.VII.85 (Leclerc) (MHNG); 1♀, Chiang Mai, Chiang Dao, cave (Sedlacek) (MHNG).

Length 2.25-2.45 mm. Body, femora and tibiae reddish brown, tarsi and antennae paler, almost yellowish. In general appearance similar to *distinctum* from which it differs by following characters: Elytron with inner (1st) row of punctures irregular. Coarse punctation on laterobasal portion of elytron less dense. Mesocoxal process of metasternum finely striate at anterior margin. Lateral portion of metasternum smooth near apical margin and on a small area at latero-anterior angle, its remaining surface with coarse and dense punctation formed by somewhat elongate and partly confluent punctures. Suture of metepisternum impunctate.

Sexual characters of male. Segments 1 to 3 of protarsi as in distinctum, 6th ventrite with simply pointed elongate median touth about 0.02 mm high. Aedeagus (figs 175, 178-180) 0.88-0.90 mm long, with parameres slender near base and internal sac provided with a ring-like proximal sclerit.

Remarks. According to J. P. Besson (pers. comm.), hunderts of *Bironium* where observed on the walls of the cave Tham ''Plaa''. Surprisingly, when collecting around Sop Pong, no specimens of this species where found but 7 specimens of *bidens. B. troglophilum* has fully developed wings and does not exhibit any morphological character showing cave adaptation.

Bironium bidens sp. n.

Holotype ♂: Chiang Mai, Doi Suthep, 1400 m, northern slope, 5.XI.85 (MHNG).

Paratypes: 2 ♀, Chiang Mai, as holotype; 1 ♂, 2 ♀, Doi Suthep, 1450 and 1550 m, 4.XI.85; 1 ♂, Doi Suthep, 1050 m, 5.XI.85; 4 ♂, 1 ♀, Doi Pui, about 1500 m, 19.XII.88 (Trautner & Geigenmüller); 1 ♂, 1 ♀, Doi Inthanon, 1250 m, ravine near Forestry Department, 6.XI.85; 1 ♂, 1 ♀, Doi Inthanon, 1020 m, 17.II.87 (Schwendinger); 4 ♂, 5 ♀, ravine below Mae Nang Kaeo, 54 km NE Chiang Mai (via Chiang Rai), 900 m, 3.XI.85; 5 ♂, 2 ♀, Mae Hong Son, Sop Pong, Tham Lok Forest Park, 700 m, 11. 6 13.XI.85 (MHNG, SMNS).

Length 2.05-2.25 mm. Body dark reddish brown, femora and tibiae paler reddish, tarsi and antennae almost yellowish. In external characters very similar to the previous species from which it differs in sexuals characters.

Male. Segments 1-3 of protarsi slightly enlarged, 6th visible ventrite with a rather large median touth-like protuberance which is about 0.05 mm high and emarginate medially (bidentate in caudal view). Aedeagus (figs 176, 181) 0.83-0.85 mm long. Internal sac almost as in *troglophilum* but parameres notably wider behind their base and each with a tiny but distinct lobe on the enlarged apical portion.

Remarks. All specimens were found in moist forest litter.

Bironium feai (Achard)

Heteroscapha feai Achard, 1914: 195; 1920*b*: 135.

Material examined: 2, Chiang Mai, Doi Suthep, 1270 m, 5.XI.85; 5, Doi Suthep, 1180 m, 11.IV.86 (Schwendinger); 4, Doi Pui, 1250 m, 14.III.82 (Rougemont); 2, ''W. Tak'' (Sedlacek) (all MHNG).

Distribution: Burma, Thailand. — New to Thailand.

Remarks. *B. feai* differs conspicuously from all known members of the genus but *tonkineum* (see discussion below *distinctum*). The sole available specimen of *tonkineum* is a female type preserved in MHNP. It differs from *feai* in having almost smooth medio-apical part of the mesosternum (while the latter is ridged in *feai*).

Sapitia Achard

Sapitia species live on fungus gardens in termite nest but occasionally are found in light, malaise, or pit-fall traps. The genus is confined to Asia and includes three species. It differs conspicuously from other Thai scaphidiids by dense pronotal and elytral pubescence. The two species collected in Thailand may be readily separated by iridescent elytra and smaller, less than 0.10 mm long postcoxal areas of the 1st ventrite in *versicolor* (Pic), and not iridescent elytra and larger, at least 0.15 mm long postcoxal areas in *lombokiana* Achard.

Sapitia lombokiana Achard

Sapitia lombokiana Achard, 1920*c*: 208.
Baeoceridium (Baeoceridiolum) sericeum Pic, 1922: 2.
Sapitia lombokiana; Löbl 1978: 55.

Material examined: 2, Khao Yai Nat. Park, Heo Suwat Waterfall area (ex fungus garden, Nest T-1070) (D. H. & A. C. Kistner) (FMNH, MHNG).

Distribution: Vietnam, Thailand, Indonesia (Lombok, Sumatra). — New to Thailand.

Sapitia versicolor (Pic)

Baeoceridium versicolor Pic, 1920*b*: 242.
Sapitia versicolor; Löbl 1978: 56.

Material examined: 1, Chiang Mai, Doi Suthep, 1180 m, I.87, pit-fall trap (Schwendinger); 2, Nakhon Nayok, Wang Takrai Park, 4.-7.IX.78, on light (Bremer) (MHNG).

Distribution: Malaysia (Sabah), Indonesia (Sumatra), Thailand. — New to Thailand.

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Description d'une nouvelle espèce de *Prorastriopes* de Suisse (Collembola Symphypleona)

par

Pierre NAYROLLES * et Charles LIENHARD **

Avec 6 figures

ABSTRACT

Description of a new species of *Prorastriopes* from Switzerland (Collembola Symphypleona). — *Prorastriopes sauteri* n. sp. is described and illustrated from the Upper Engadine Valley (Grisons) and the Alps of southern Switzerland (Ticino).

Prorastriopes sauteri n. sp.

Matériel

Matériel type. — Holotype femelle et 25 paratypes (4 jeunes, 11 femelles et 10 mâles): SUISSE (Grisons): Haute Engadine: Samedan, env. 1800 m, versant sud, végétation sur éboulis, 20.VII.1988, piège Barber, W. Sauter leg.

Dans sa révision de la famille des Bourletiellidae, BETSCH (1977) a montré que les genres *Andiella* Stach, 1955 et *Fasciosminthurus* Gisin, 1960 sont synonymes de *Prorastriopes* Delamare-Deboutteville, 1947.

Les caractères morphologiques, notamment chétotaxiques, sont jusqu'à présent très peu connus dans ce genre; fort heureusement chaque espèce européenne de *Prorastriopes* présente une coloration particulière qui permet de l'identifier à la loupe binoculaire. Les individus étudiés dans ce travail présentant un pattern de coloration différent des autres espèces européennes connues, appartiennent donc à un taxon nouveau.

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Autre matériel. — SUISSE (Tessin): Piora, env. 2000 m, Seslerio-Caricetum, 19.VII.1983, piège Barber, W. Sauter leg.: 2 ex.

Dépôt du matériel. — Muséum d'Histoire naturelle de Genève, Suisse. Matériel type en préparation: holotype et 6 paratypes (2 jeunes, 2 femelles et 2 mâles); matériel type en alcool: 8 paratypes (4 femelles et 4 mâles); autre matériel: 2 ex. en alcool. — Laboratoire d'Ecobiologie des Arthropodes édaphiques, Université P. Sabatier, Toulouse, France. Matériel type en préparation: 7 paratypes (2 jeunes, 3 femelles et 2 mâles); matériel type en alcool: 4 paratypes (2 femelles et 2 mâles).

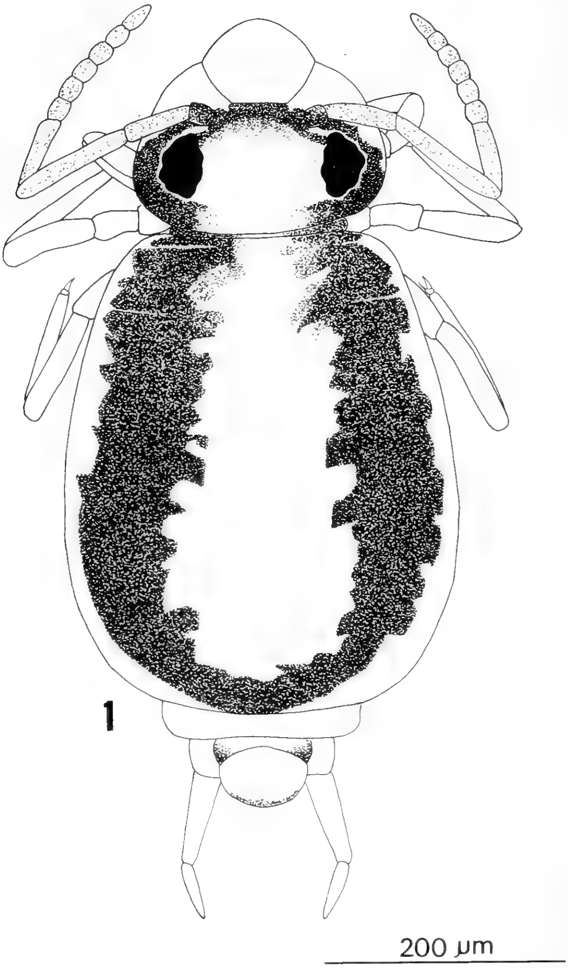


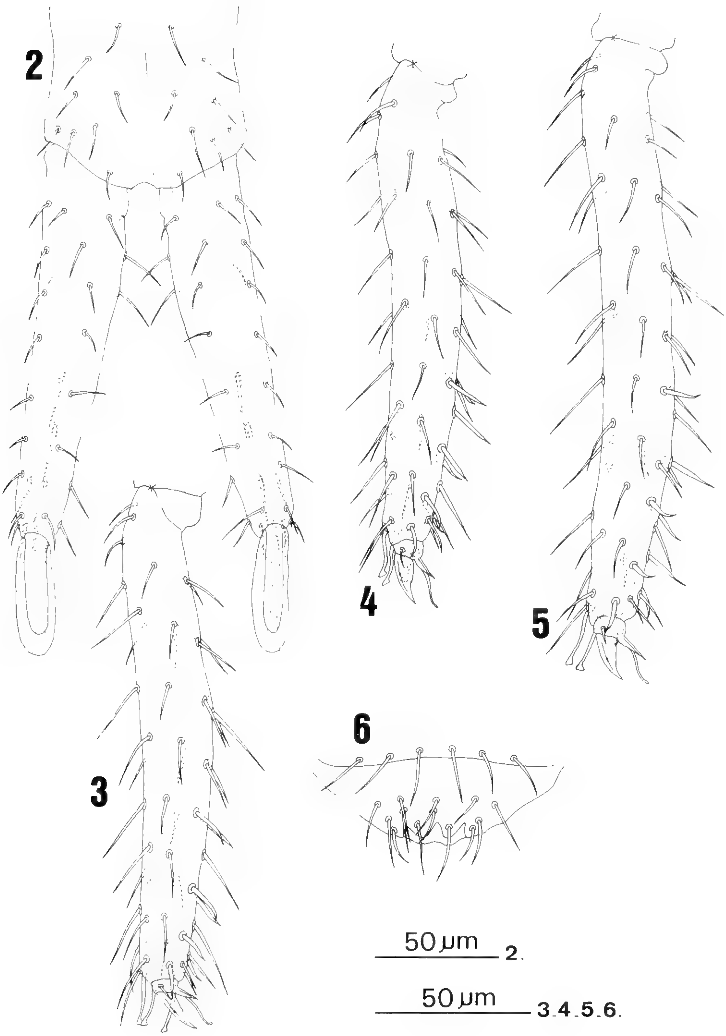
FIG. 1.

Prorastriopes sauteri n. sp.: habitus.

Description

Taille: mâle = 0,4-0,5 mm; femelle = 0,5-0,65 mm.

Coloration (fig. 1): le dos du grand abdominal est entouré d'une bande violet sombre. La teinte claire du reste du corps est jaune très pâle chez les femelles, légèrement rosée



FIGS 2-6.

Prorastriopes sauteri n. sp.: Fig. 2, furca. Figs 3 à 5, tibiotarses respectivement des pattes antérieures, moyennes et postérieures. Fig. 6, labre.

Chétotaxie tibiotarsale de *Prorastriopes sauteri* n.sp.

		P1	P2	P3
Soies primaires	Soies des verticilles absentes	Ia	Ia;Vp	Ia;IVp;Vp
	Soies K	-	-	-
	Soies FP	+	+	+
Soies secondaires	Fondamentales (Vai et Vpi)	+	+	+
	Soies FS	FSa;FSai;FSpi	FSa;FSai;FSpi	FSa;FSai;FSpi
	Soies des interverticilles présentes	3a; 3p; 4a1; 4ai1; 4pi1; 4ai2; 4pi2	3a; 3p; 4a1; 4ai1; 4i1; 4pi1; 4ai2; 4pi2	2a; 3a; 3ai; 3i; 3pi; 4a1; 4ai1; 4i1; 4pi1; 4ai2; 4pi2
	Organes ovales	O2pe	O2pe	O2pe
	Soies de forme particulière	Ipi;Ip;Ipe:ergots capités Iai;IIai;IIpi;IIIai;IIIpi; IVai;IVpi:épines aplaties à l'apex	Ipi;Ip;Ipe:ergots capités Iai;IIai;IIpi;IIIai;IIIpi;IVai; IVi;IVpi;:épines aplaties à l'apex	Ip;Ipe:ergots capités Iai;Ipi;IIai;IIpi;IIIai;IIIi; IIIpi;IVai;IVi:épines aplaties à l'apex
	Soies variables	3p; 4pi2	3p; 4pi2	2a; 4pi2

chez les mâles. Le petit abdominal présente trois petites taches, une à l'apex de la valve anale supérieure et une paire dorso-latérale sur l'abdomen V. Les petites taches d'abdomen V sont plus ou moins développées; elles sont parfois absentes. La zone interoculaire est très claire; seules quelques taches de pigment violet peuvent être présentes vers l'avant et à proximité des yeux. La partie dorsale de la tête est violet sombre autour de la région comprise entre les deux yeux; la zone postéro-médiane reste dépigmentée. La partie de la tête située au-dessous du front est blanche. Les taches oculaires sont noires. Le premier article antennaire est violet sombre, les autres sont violet clair. Les pattes et la furca sont blanches.

Chétotaxie du corps: armement en trichobothries typique des Bourletiellidae: A, B, C, D et E avec A, B et C en ligne. Soies du grand abdominal fines, sans dimorphisme sexuel secondaire.

Tête: 8 + 8 ocelles, 2 soies par tache oculaire. Chétotaxie labrale: 6/5-5-4 (fig. 6, une soie a été omise par erreur sur cette figure). Soies céphaliques toutes fines.

Antennes: rapports antennaires identiques chez les mâles et les femelles. Nous donnons les moyennes (observations sur 6 femelles et 4 mâles): ant. I: II: III: IV = 1: 2: 2, 9: 6, 3; ant.: diag. céphal. = 1,7. Une trichobothrie à la face inférieure de ant. II (caractéristique de la famille des Bourletiellidae). Sensilles de l'organe antennaire III libres dans deux dépressions séparées. Ant. IV à sept subsegments (1 + 5 + 1) et une vésicule exsertile apicale.

Pattes (figs 3, 4 et 5): la chétotaxie tibiotarsale est donnée sous forme de tableau (la nomenclature est celle de NAYROLLES, 1988). Epines tibiotarsales brusquement aplaties. Trois ergots capités sur les pattes antérieures et moyennes, deux sur les pattes postérieures. Soie Ja du tibiotarse de P1 sans ailette. Empodium avec un corps empodial granuleux terminé par une forte pointe et un long filament empodial qui dépasse l'apex de l'ongle et n'est pas épaissi à son extrémité. Ongle avec une minuscule dent interne et une paire de dents latérales.

Furca (fig. 2): chétotaxie dentale antérieure: 3, 2, 1, 1, ...1- Mucron sans soie, la lamelle ventrale est large avec deux crêtes nettement séparées.

Petit abdominal: sur la valve anale supérieure des femelles cinq soies circumanales, épaissies, simples. Appendice anal droit, non frangé. Rapport appendice anal: mucron de 0,65 à 0,79 (observations sur 6 femelles).

Discussion

Le genre *Prorastriopes* est caractérisé par des épines tibiotarsales internes aplaties brusquement, et par un corps empodial se terminant par une forte pointe et un long filament. Ces caractères sont bien exprimés chez *P. sauteri.* En plus, la soie Ja du tibiotarse de P1 est dépourvue d'ailette chez *P. sauteri* et d'autres espèces du genre que nous avons observées. Chez les espèces des genres *Bourletiella, Deuterosminthurus* et *Heterosminthurus* que nous avons pu examiner, cette soie porte une ailette.

Les espèces européennes de *Prorastriopes* présentant un filament empodial non épaissi ainsi que trois ergots capités aux pattes pro- et mésothoraciques et deux aux métathoraciques sont: *P. carpaticus* (Nosek, 1978), *P. circumfasciatus* (Stach, 1956), *P. lacazei* (Denis, 1924), *P. melanocephalus* (Dallai, 1966), *P. virgulatus* (Skorikow, 1899). *P. sauteri* n. sp. par ses caractères se rapproche donc de ces cinq espèces; il en diffère par son pattern de coloration.

REMERCIEMENTS

Nous remercions très cordialement le professeur Willi Sauter (Institut d'entomologie de l'Ecole polytechnique fédérale de Zurich) de nous avoir confié ce matériel très intéressant.

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Bythinella padiraci Locard, 1902: anatomie et systématique (Mollusca: Prosobranchia: Bythinellidae)

par

R. BERNASCONI *

Avec 3 figures

ABSTRACT

Bythinella padiraci **Locard, 1902: anatomy and taxonomy (Mollusca: Prosobranchia: Bythinellidae.** — *Bythinella padiraci* Locard, 1902 from the cave stream of Padirac (France) is for the first time anatomically described; on this basis *B. padiraci* is related to the group of *B. viridis* (Poiret 1801).

De la rivière souterraine de Padirac (dpt. Lot, France) LOCARD (1902) avait décrit cette espèce sur des critères conchyliologiques uniquement. Je donne ici pour la première fois les caractéristiques anatomiques d'une population d'exemplaires vivants recueillis par Ph. DROUIN au Gouffre de Padirac et envoyés au Muséum d'histoire naturelle de Genève (IV.1989). Je remercie M. Yves FINET qui m'a transmis et permis d'examiner ce lot.

Coquille

Provenance: rivière souterraine de Padirac (dpt. Lot), affluent de Joly, secteur boulevard Durand (entre Chaos Fabriol et siphon), à 5 km du gouffre d'entrée. Lot recueilli au cours de l'expédition «Padirac 1985» (communication de Ph. Drouin). Matériel: 12 coquilles, avec animal (lot avril 1989).

Coquille de petite taille, plutôt obèse; spire conoïde-obtuse de 3½ à 4 tours bien arrondis, sommet obtus-aplati, suture très accusée, ouverture sub-circulaire à peine oblique; fente ombilicale étroite. Hauteur (H) = 2,18 mm ($\sigma \pm 0,13$ mm); diamètre maximal (D) = 1,46 mm ($\sigma \pm 0,12$ mm): index H/D = 1,49 ($\sigma \pm 0,06$).

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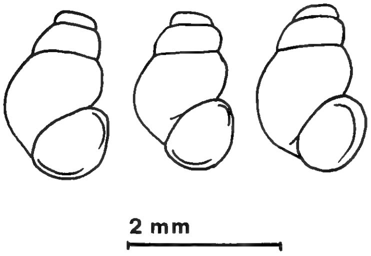

FIG. 1.

Bythinella padiraci: coquilles.

Anatomie

Matériel: 3 ♀, 1 ♂ (exemplaires en éthanol 70% V/V).

Tête et corps dépigmentés; taches oculaires absentes. Opercule ovoïde corné, 820 à 900 × 550 à 655 µm, avec 1-1½ tours à stries peu visibles. Cténidium: (14)18 à 19 lamelles branchiales jusqu'à 205 × 35 µm; osphradium ovoïde, 140 à 240 × 50 à 70 µm. Un exemplaire ne possède pas de lamelles branchiales visibles. Organes reproducteurs ♂: pénis

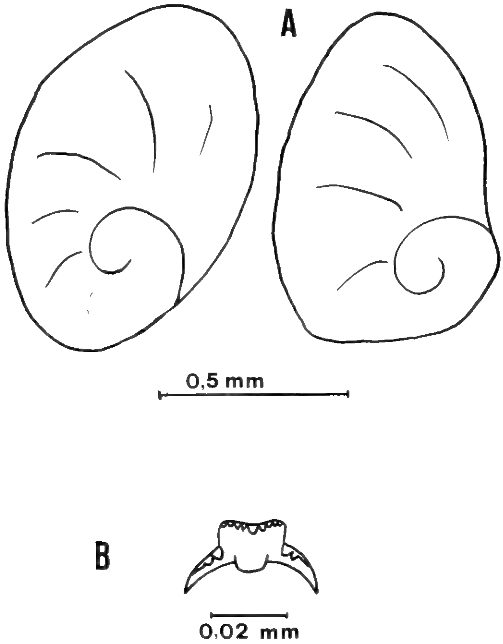

FIG. 2.

Bythinella padiraci: (A) opercule; (B) dent centrale de la radula.

mince 500 × 50 µm avec apex arrondi, dépassant le flagellum; flagellum trapu 420 × 140 µm avec glande tubuleuse du flagellum 2000 × 70 µm, repliée 8 fois. Rapport flagellum/glande tubuleuse 1: 4,8. Organes reproducteurs ♀ : oviducte proximal avec une anse boursouflée; à son insertion avec l'utérus (glande accessoire de l'oviducte) se trouve un réceptacle séminal petit, sessile, de 60 à 105 × 35 à 50 µm; bourse copulatrice sacciforme-allongée, soit repliée en J, soit arquée, 270 à 620 × 80 à 210 µm; partie distale de l'utérus arrondie, non effilée, 700 × 250 µm. Rapport bourse copulatrice/canal d'insertion sur l'oviducte de 1,1 à 1,8. Radula taenioglosse 1: 8 à 1: 12, longueur 450 à 725 µm. Formule:

$$R = \frac{4 + 1 + 4}{2 + 2}; \qquad L = (4)3 + 1 + 3(4) = 7(9); \qquad M1 = 18\text{-}22; \qquad M2 = 18\text{-}22$$

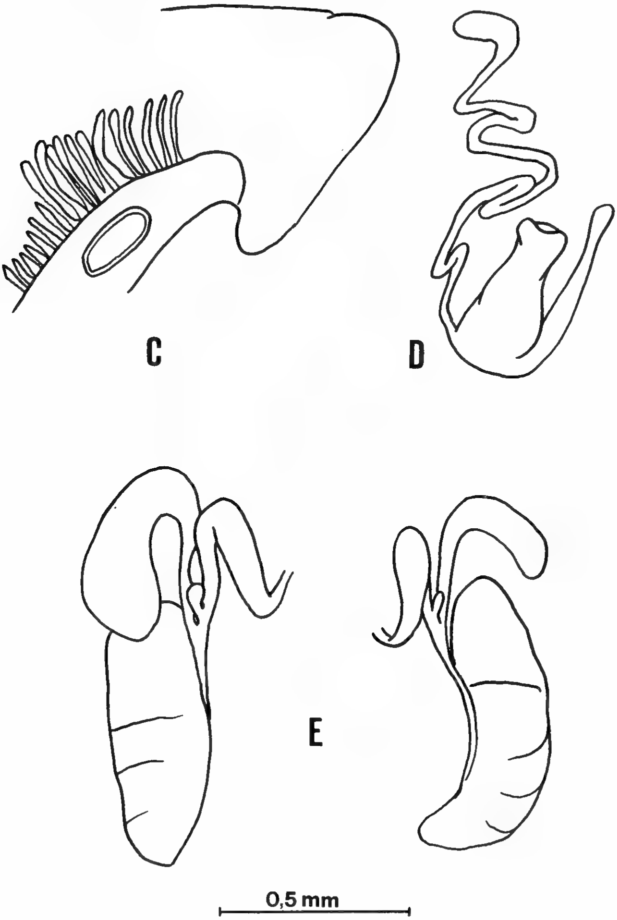

Fig. 3.

Bythinella padiraci: (C) lamelles branchiales et osphradium; (D) organes reproducteurs ♂; (E) organes reproducteurs ♀.

Variabilité

Déjà Locard (1902) avait signalé la variabilité de la coquille de *B. padiraci.* L'espèce-type est décrite avec L = 3 à 3,5 mm et D = 1,5 à 1,75 mm, présentant des «var. *minor, curta, elongata, ventricosa* etc.», souvent avec un encroûtement noirâtre modifiant la coquille. La population étudiée ici correspond à la var. *curta* ou *minor.*

Le matériel typique de Locard (1902) avec ses dimensions plus grandes et la présence d'«yeux qui ne sont le plus souvent que des résidus pigmentaires sans rapport avec le nerf optique», provient de la partie touristique de la rivière souterraine, éclairée et eutrophe. La population étudiée ici a été recueillie pour la première fois dans la zone profonde de la rivière souterraine et se caractérise par l'absence totale de pigment et de yeux.

Systématique

L'étude anatomique, notamment des organes reproducteurs ♂, confirme l'appartenance de *B. padiraci* au genre *Bythinella.* C'est à côté de *B. pupoides* ssp. *phreaticola* Bernasconi, 1989 la deuxième espèce de *Bythinella* dépigmentée et aveugle connue en France. Quels sont ses rapports avec les autres *Bythinella* de France? Locard (1902) avait rapproché *B. padiraci* de *B. opaca* Ziegler, 1850 in Frauenfeld, 1856/57 et surtout de *B. gracilis* Locard, 1893. Germain (1911) l'avait placée dans le groupe de la *B. gracilis,* puis l'avait mise en synonymie avec *B. opaca gracilis* (Germain, 1931). *B. opaca* est synonyme de *B. schmidti* (Küster, 1852) de Yougoslavie (Radoman 1976); les anciennes citations de «*B. opaca*» dans les départements de la Lozère et de l'Aveyron demeurent par conséquent douteuses, la présence de *B. schmidti* en France demandant à être confirmée par l'étude de l'anatomie des spécimens. *B. gracilis* a été rapprochée par Germain (1911) de *B. reyniesii,* puis de *B. opaca* (Germain 1931).

Par les caractéristiques anatomiques maintenant connues, il apparaît que *B. padiraci* n'appartient pas au groupe (Formenkreis) de la *B. schmidti* tel qu'il a été caractérisé (Bernasconi 1989) par une bourse copulatrice tubulaire allongée repliée en U, atteignant jusqu'à 1000 µm de longueur; par la dent latérale de la radula avec 9 à 11 denticules; ce groupe comprend les espèces suivantes: *B. schmidti* (Küster, 1852), *B. pupoides* (Paladilhe, 1869), *B. austriaca* (Frauenfeld, 1856) et *B. micherdzinkii* Falniowski, 1980.

B. padiraci se distingue aussi des deux espèces suivantes, anatomiquement connues, qui présentent des yeux et du pigment noir et une partie distale de l'utérus effilée, dont la radula est inconnue (Boeters 1973), dont la coquille possède un index H/D supérieur à 1,6: *B. reyniesi* (Dupuy, 1851), caractérisée en plus par un pénis plus court que le flagellum, et *B. bicarinulata* Des Moulins, 1827), caractérisée en plus par une bourse copulatrice courte ovale et par une coquille à spires carénées.

B. padiraci s'apparente au groupe (Formenkreis) de *B. viridis* tel qu'il a été caractérisé dans Bernasconi (1989); les espèces de ce groupe connues en France se distinguent de *B. padiraci,* non seulement par la présence d'yeux et de pigment noir et par un nombre légèrement supérieur de lamelles branchiales (17-22) mais aussi par les caractères suivants: *B. viridis* (Poiret, 1801) possède une bourse copulatrice bien plus courte, ne dépassant pas la longueur du canal d'insertion (rapport inférieur à 1); sa radula est inconnue (Boeters 1983). *B. carinulata* (Drouet, 1868) possède une coquille présentant des spires carénées, une ouverture anguleuse et un index L/D de 1,5 à 1,7.

B. carinulata ssp. *viridiformis* Bernasconi, 1989, possède une coquille à spires ± carénées et une ouverture anguleuse. *B. vesontiana* Bernasconi, 1989 possède une coquille avec L = 2,6 à 3,1 mm et L/D = 1,6 à 1,9.

Les autres espèces de *Bythinella* françaises ne sont pas encore révisées anatomiquement et elles ne seront pas prises en considération ici; il s'agit notamment de: *B. ferussaci* Des Moulins, 1828; *B. conoidea* De Reynies, 1843; *B. desmoulinsi* Dupuy, 1849; *B. eutrepha* Paladilhe, 1867; *B. gracilis* Locard, 1893.

RÉSUMÉ

On donne les caractéristiques conchyliologiques et pour la première fois anatomiques d'une population de *Bythinella padiraci* Locard, 1902, provenant de la rivière souterraine de Padirac (locus typicus). On met en évidence les différences entre cette espèce et les autres *Bythinella* françaises dont l'anatomie est connue; on place *B. padiraci* dans le groupe de la *Bythinella viridis*.

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Sphaeromatidae from Réunion Island, southern Indian Ocean, with description of a new species of *Paraleptosphaeroma* Buss & Iverson, 1981 (Crustacea: Isopoda)

by

Hans-Georg MÜLLER *

With 7 figures

ABSTRACT

Paraleptosphaeroma indica n. sp. is described as the first member of the genus from the Indian Ocean. It was found together with *Paraciliacea mossambica* Barnard, 1914 on coral reefs at Réunion Island and is closely related to *Paraleptosphaeroma glynni* Buss & Iverson, 1981 from Panamá Pacific and the island Dominica in the Caribbean.

INTRODUCTION

Up to now there has been no report on marine isopods from the volcanic island La Réunion in the tropical southern Indian Ocean. While working there on the small fringing reefs along the west-coast in January-February 1989 only two species of Sphaeromatidae could be found in the reef-lagoons and on the reef-flats by the author. One of these belongs to an unknown species, as the second member of the genus *Paraleptosphaeroma* Buss & Iverson, 1981. The presence of that genus in the Indian Ocean greatly expands its known range from Panamá Pacific and the Caribbean.

Specimens are deposited in the Senckenberg-Museum, Frankfurt a. M., Germany (SMF), Muséum d'Histoire naturelle, Genève, Suisse (MHNG), Muséum national

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d'Histoire naturelle, Paris, France (MNHN) and the Seto Marine Biological Laboratory, Kyoto University, Japan (SMBL).

Paraciliacea mossambica Barnard, 1914

Material: 1♂, 1♀, 11 immature specimens (SMF 18603); seagrass-bed *(Syringodium isoetifolium)* near la Saline-les-Bains, 1-1.5 m, 26 January 1989.

P. mossambica apparently has a wide distribution in the south-west Indian Ocean. Up to now it was known from the south-eastern coast of Africa, Madagascar and Aldabra Atoll, Seychelles (see KENSLEY 1988: 41; MONOD 1971: 176). A redescription of the ♂ has been given by Monod.

Paraleptosphaeroma indica n. sp. (Figs 1-7)

Material: Holotype — ♂ (SMF 18599). Type locality: La Réunion, reef-flat near la Saline-les-Bains, from dead corals in 0.5-1 m; 18-20 January 1989. Paratypes — 1♂, 6♀♀ 4 ovigerous, 2 larvigerous), 1 immature specimen (SMBL); together with holotype. 3♂♂, 3♀♀ (2 ovigerous, 1 larvigerous), 3 immature specimens, 1 postmanca (2♂♂, 2 ovigerous ♀♀ in MHNG, others in MNHN); reef-flat near la Saline-les-Bains, from dead corals in 0.5-1 m, shortly after cyclon "Firinga"; 3 and 5 February 1989. 2♂♂, 7 ovigerous ♀♀, 4 immature specimens (SMF 18600); reef-lagoon near la Saline-les-Bains, from dead corals covered with algae, 0.5-1.5 m; 21-22 January 1989. 26♂♂, 35♀♀ (27 ovigerous, 7 larvigerous), 16 immature specimens, 1 manca (SMF 18601); reef-lagoon near la Saline-les-Bains, from mainly dead corals, shortly after cyclon "Firinga", 0.5-1 m; 30 January-4 February 1989. 1 ovigerous female (SMF 18602); seagrass-bed *(Syringodium isoetifolium)* in reef-lagoon near la Saline-les-Bains, 1-1.5 m, 26 January 1989.

Etymology. The specific name refers to the geographic area of the type locality, the Indian Ocean.

Description of male. Total length (frontal margin of cephalon to tip of pleotelson) about 1.8 mm, maximum width (at pereonite V) about 1.4 mm. Body extremely flattened, oval in outline (Fig. 1A). Cephalon 2.4 times wider than long, with large, posterolateral eyes consisting of about twenty, well pigmented ocellae; anterior margin of cephalon slightly concave. Pereonite I longest, others being subequal in length and increasing in width from pereonite II to V; lateral margins of all pereonites smooth with well developed membrana cingula (for explanation of this term see BUSS & IVERSON 1981: 4). Pleotelson slightly domed, sub-triangular with apex truncated. The whole body inclusive of first antennae and uropods dorsally provided with many small pigment patches; in most specimens observed, two larger, half-moon-like pigmentations on the dorsolateral surface of pereonite IV can be found.

First and second peduncle articles of antenna I strongly flattened and expanded anteriorly, bearing membrana cingula (Fig. 2A); third peduncular article unmodified, 4.5 times longer than broad; flagellum of four articles of which the first one is shortest and broadest, bearing three feathered sensory setae; articles 2-4 decreasing in length and width distally; penultimate and terminal article each with one aesthetasc. Peduncle of second antenna of four articles, none modified; second article shortest, third and fourth longest and subequal in length, bearing two feathered sensory setae; flagellum of nine setose articles (Fig. 2B). Incisor of left mandible and small lacinia mobilis with three coupling hooks; setal row of 3 setae with terminal serrations; molar strongly developed with many tubercles and some short setae; palp of mandible three-segmented; two

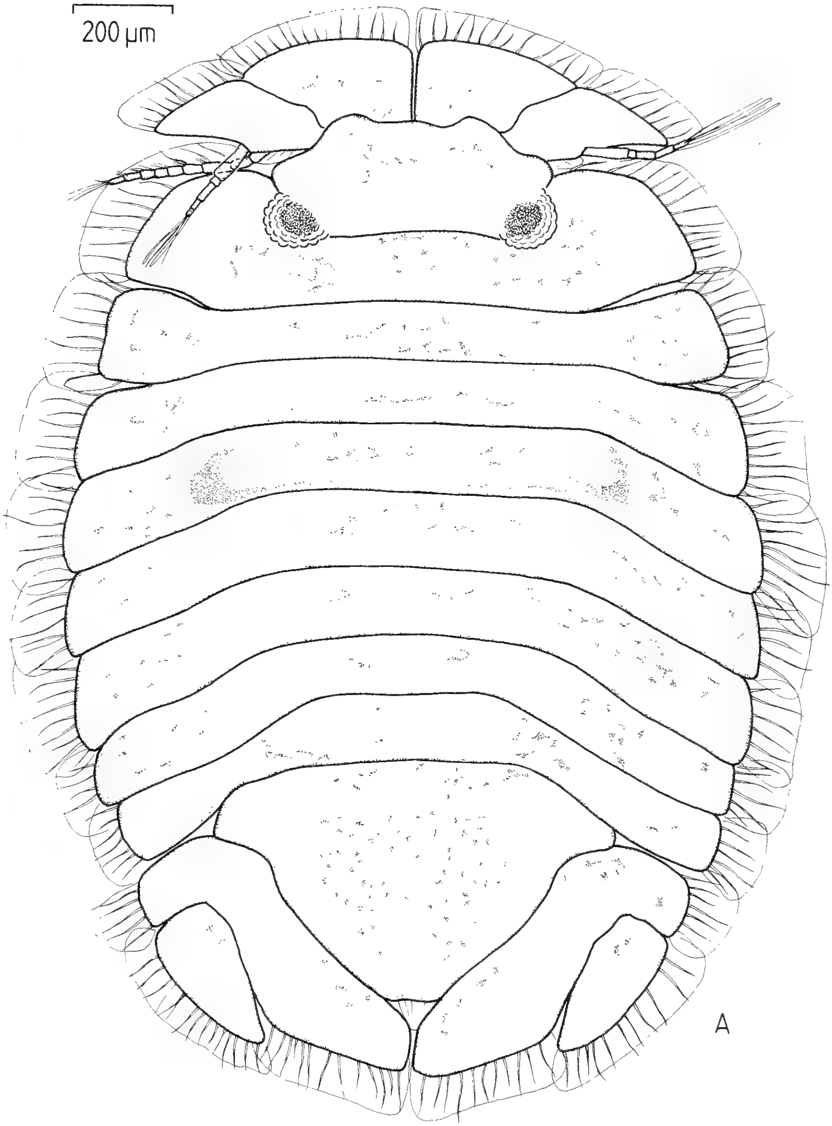

FIG. 1.

Paraleptosphaeroma indica sp. nov., male. A. habitus, dorsal.

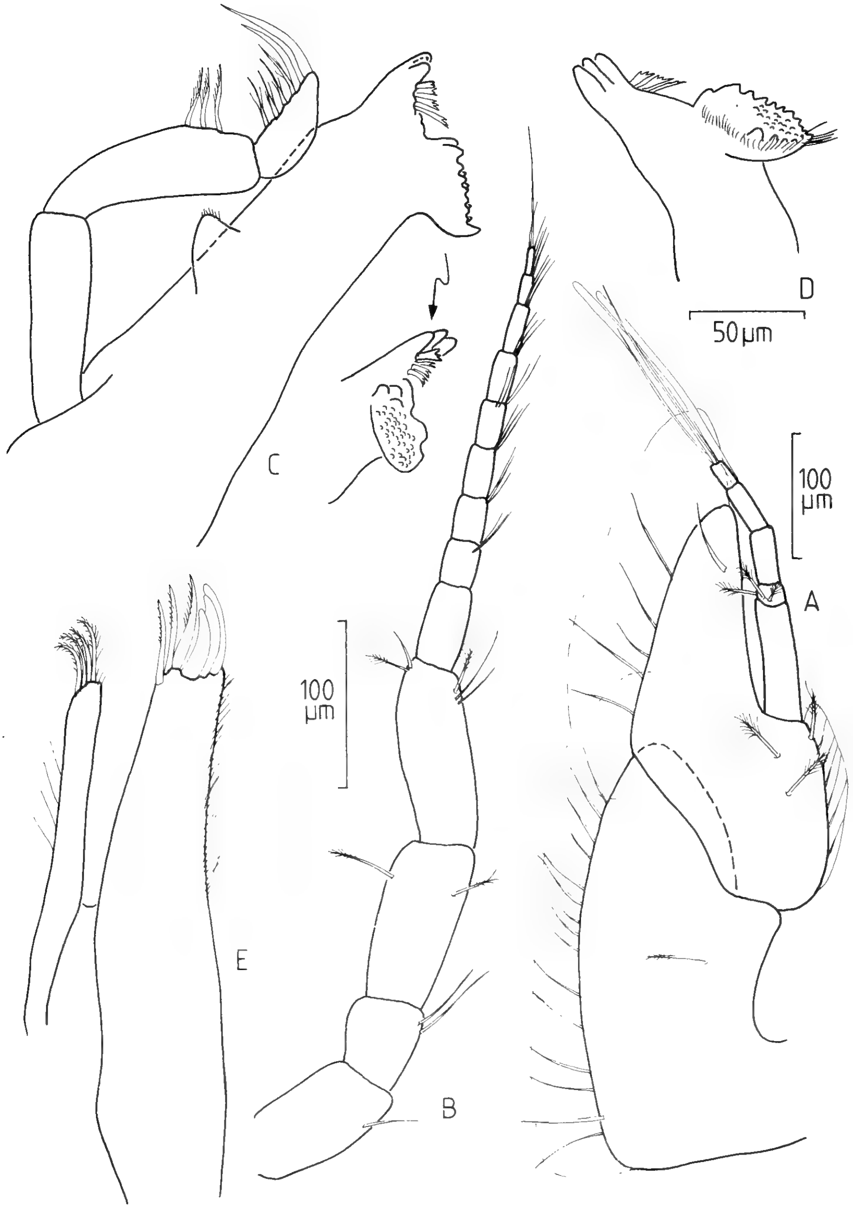

FIG. 2.

Paraleptosphaeroma indica sp. nov., male. A. antenna I; B. antenna II; C. left mandible; D. incisor and molar process of right mandible; E. maxilla I.

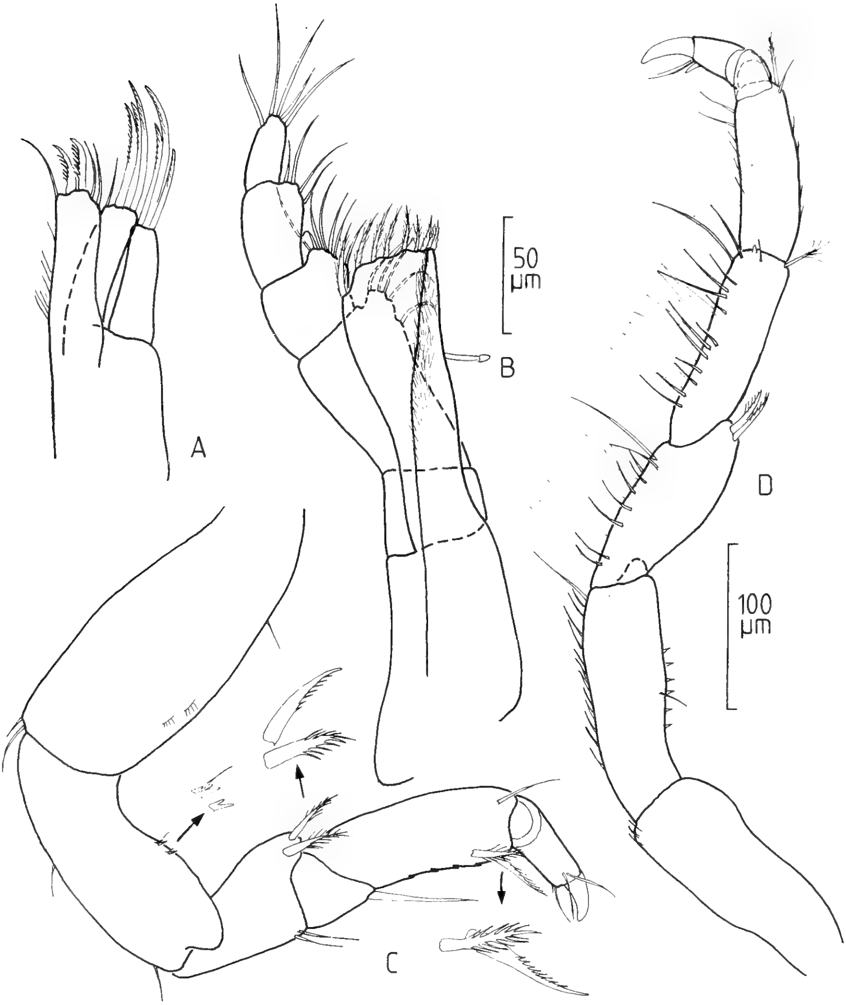

FIG. 3.

Paraleptosphaeroma indica sp. nov., male. A. maxilla II; B. maxilliped; C. pereopod I; D. pereopod II.

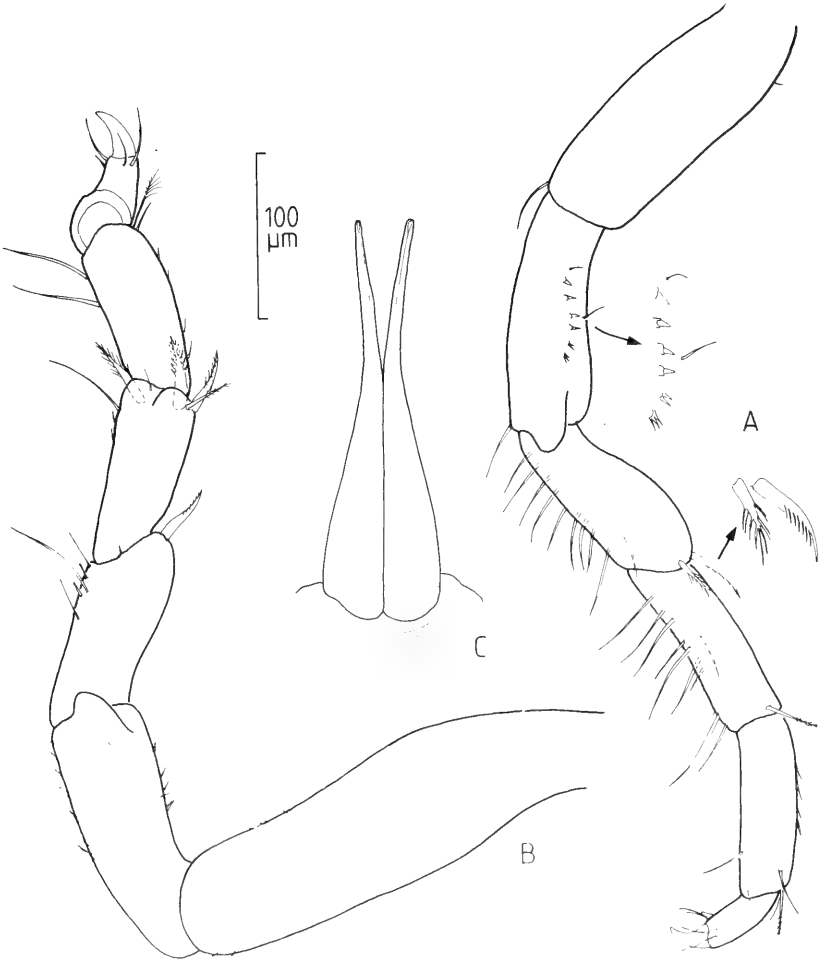

FIG. 4.

Paraleptosphaeroma indica sp. nov., male. A. pereopod III; B. pereopod VII; C. penes.

proximal segments longest and subequal in length, distal one only half the length of first and second; second segment with three, third segment with 6 setae, shape as figured (Fig. 2C). Right mandible without lacinia mobilis, otherwise as left mandible (Fig. 2D). First maxilla with 3 serrated and 3 strong simple spines on outer lobe; inner lobe with 4 distal fringed spines (Fig. 2E). Maxilla II with four long, curved spines on inner and outer lobe of outer ramus; additionally, inner lobe of outer ramus with distal simple seta; inner ramus with 3 distal simple setae and 2 robust, serrated spines (Fig. 3A). Maxilliped with narrow endite, bearing eight distal plumose setae and one coupling-hook on medial

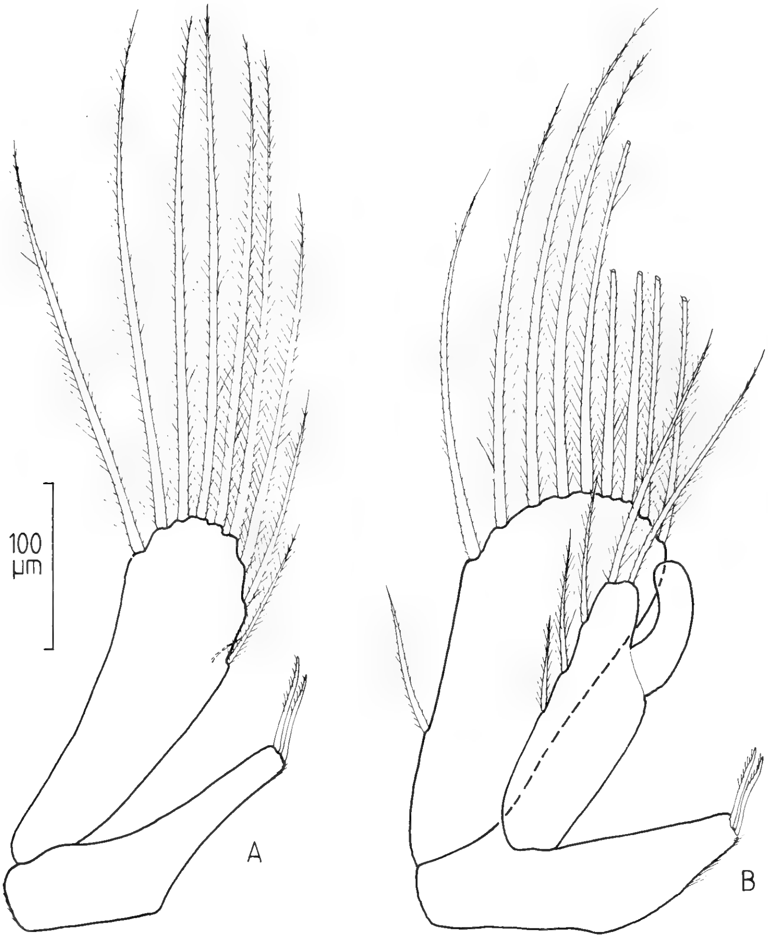

FIG. 5.

Paraleptosphaeroma indica sp. nov., male. A. pleopod I; B. pleopod II.

margin; five-segmented palp with second segment longest, about two times longer than first palp segment (Fig. 3B). Pereopod I with triangular carpus, bearing posterodistal, elongate spine; posterodistal margin of propodus and anterodistal corner of merus with two strong, serrated spines; anterior margin of ischium with two short bifid spines and small simple seta; unguis short, less than half the length of dactylus (Fig. 3C). Pereopod II, carpus about three times longer than wide; posterior margin of carpus and merus with several simple setae of different lengths and 7-8 spine-like membranous structures which are difficult to observe and have not been mentioned in the description of the other

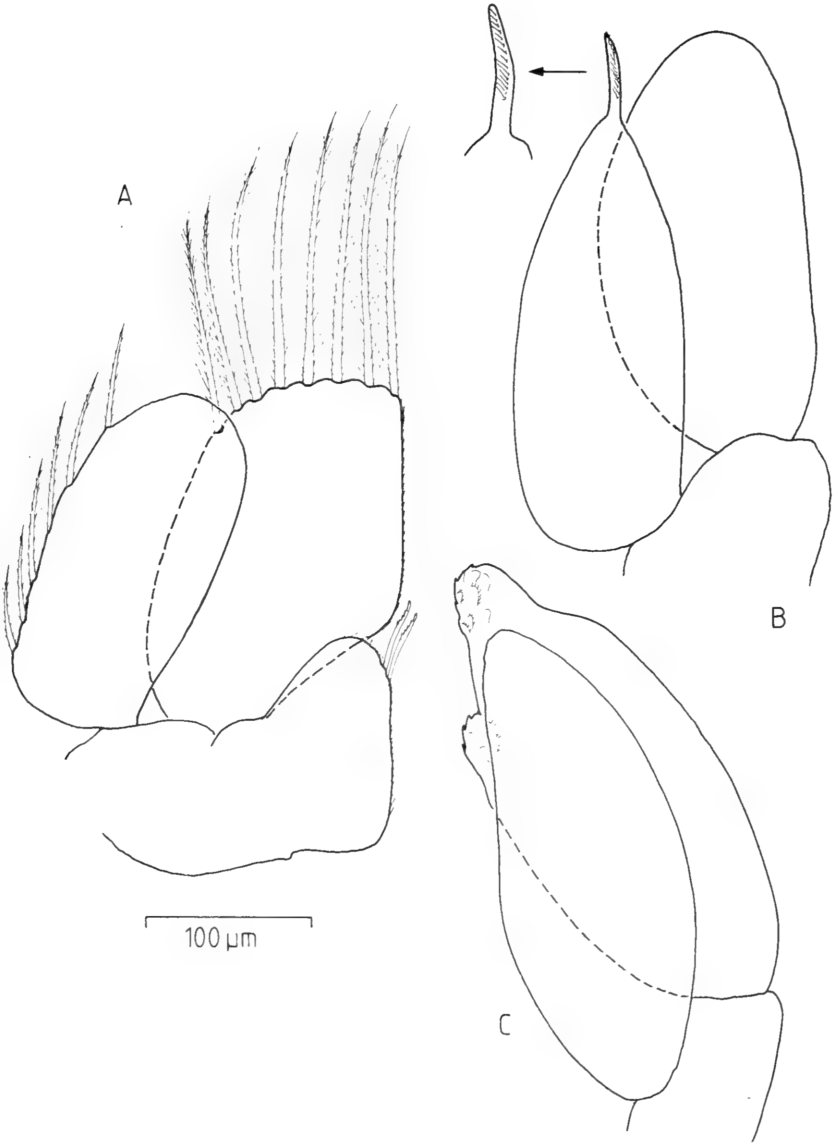

FIG. 6.

Paraleptosphaeroma indica sp. nov., male. A. pleopod III; B. pleopod IV; C. pleopod V.

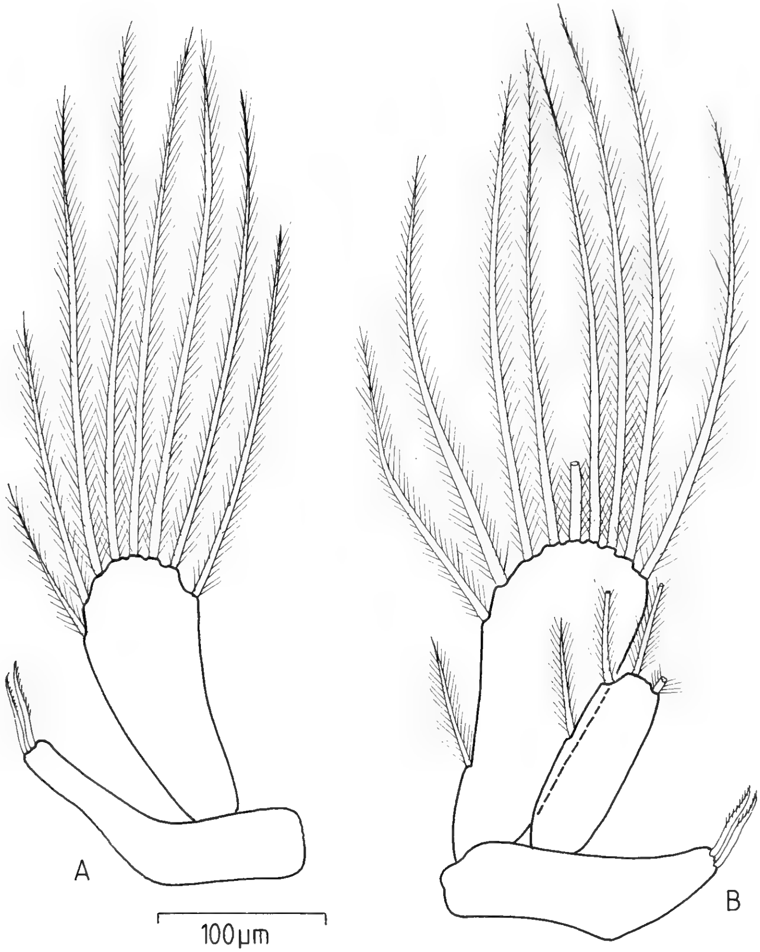

FIG. 7.

Paraleptosphaeroma indica sp. nov., female. A. pleopod I; B. pleopod II.

member of the genus, *Paraleptosphaeroma glynni* Buss & Iverson, 1981; anterodistal corner of merus with two short, serrated spines; posterior margin of ischium with row of short simple setae; anterior margin of ischium with 6 very short spines and a simple seta (Fig. 3D); pereopod III similar to pereopod II; however, only distal third of posterior margin of carpus bearing three membranous, spine-like structures (Fig. 4A). Pereopod VII, carpus distally with 3 strong, plumose and serrated spines, together with one feathered sensory seta; anterodistal corner of merus with single serrated spine (Fig. 4B). Pereopods IV-VII quite similar to each others. Penes about 6.9 times longer than width at base, tapering to narrow rounded apex in distal half (Fig. 4C). Pleopod I, exopod about three times longer than wide, with 9 distal plumose setae; endopod totally reduced; medial margin of basis strongly produced into narrow process bearing two retinaculae (Fig. 5A). Pleopod II, exopod two times longer than wide, with one plumose seta at ectal margin and 9 plumose setae distally; endopod narrow, 3.2 times longer than wide, about 0.8 times the length of exopod; five plumose setae along ectal and distal margin; appendix masculina curved and distally rounded, extending beyond distal margin of endopod; basis of pleopod II produced into narrow medial process with two distal retinaculae; this process more robust than in pleopod I (Fig. 5B). Pleopod III with oval exopod bearing 6 plumose setae along ectal margin; endopod somewhat larger than exopod, with 8 distal plumose setae; inner margin of basis with rounded lobe bearing 2 retinaculae (Fig. 6A). Pleopod IV, endopod oval without any setae; oval exopod tapering into short narrow process at apex, bearing row of about 15 short setules (Fig. 6B). Shape of both pleopod V exopod and endopod roughly elongate-oval; endopod with two distal rounded bosses bearing scale-like structures (Fig. 6C). Uropods twice as long as wide, both rami flattened; endopod extending beyond apex of pleotelson; exopod of half length of the endopod; ectal margins of both endopod and exopod with membrana cingula (Fig. 1A).

Female. Quite similar to male in general habitus and size, except of sexual characters. Exopod of first pleopod with 8 distal plumose setae (Fig. 7A). Pleopod II, exopod slightly narrower than in male; endopod about 2/3 length of exopod, about three times longer than wide, bearing 4 plumose setae in distal half (Fig. 7B).

Remarks. The present new species, *P. indica* is quite similar in its general habitus and shape of appendages to *P. glynni* Buss & Iverson, 1981 from Panamá Pacific (Buss & Iverson 1981) and the caribbean island Dominica (Kensley 1987: 576), implying that both are sister species. The most reliable feature to distinguish these species is the shape of the endopod of the second male pleopod. In *P. glynni* the endopod is about 2.3 times longer than wide and shorter than half the length of the exopod. Also, the distal lobe of the endopod bears only 3-5 short, simple setae (see Buss & Iverson 1981: 5, Figs 2H, J). As pointed out in the description of *P. indica,* the endopod of the second male pleopod is 3.2 times longer than wide and has about 0.8 times the length of the exopod. Contrary to *P. glynni* it bears 5 plumose setae which are much longer than in that species. Several males of *P. indica* have been examined and it seems that the shape of the endopod of the second male pleopod and its length ratio to the exopod are constant characters without recognizable variability. Females are distinguishable through the setation of the second pleopodal endopod, bearing two plumose setae in *P. glynni* and four plumose setae in *P. indica.*

The new species is a common member of the reef community at Réunion island where it has been found more numerous in the reef-lagoon near la Saline-les-Bains shortly after the strong cyclon "Firinga". Nearly all of the specimens have been found associated with dead coral substratum.

Acknowledgments

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Contribution à la faune du Chili: puces nouvelles ou peu connues de la partie sud (Insecta, Siphonaptera)

par

J. C. BEAUCOURNU * et D. A. KELT **, ***

Avec 29 figures

ABSTRACT

A contribution to the fauna of Chile: new or little known fleas (Insecta, Siphonaptera) from southern provinces. — A new collection of small mammals in southern Chile has yielded about 700 fleas. *Ctenoparia intermedia* n. sp., *Plocopsylla wilesi* n. sp., *Plocopsylla silewi* n. sp., *Tiamastus gallardoi* n. sp. and the female, yet unknown, of *Listronius ulus* (Jordan et Rothschild, 1923) are described. *Barreropsylla excelsa* Jordan, 1953, *Ectinorus ixanus* (Jordan, 1942), *E. levipes* (Jordan et Rothschild, 1923), *E. onychius onychius* (J. et R., 1923), *Listronius ulus* and *L. fortis* (J. et R., 1923) are new for Chile.

De septembre 1985 à avril 1987, l'un de nous (D. A. K.) étudiant la taxonomie, l'écologie et la biogéographie des petits mammifères terrestres au Chili a eu l'occasion, dans les provinces d'Osorno (X^e région) et surtout d'Aisen (XI^e région), de récolter près de 700 puces sur les hôtes étudiés (Octodontidae principalement avec 12 espèces, Ctenomyidae, avec 1 espèce). Cette prospection est, en ce qui concerne les Siphonaptères, particulièrement intéressante car très peu de choses sont connues sur le sud de ce pays (SMIT et ROSICKY, 1972; BEAUCOURNU et GALLARDO, 1978).

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TABLEAU 1

Puces récoltées dans les provinces d'Osorno et d'Aisén (Chili)
de septembre 1985 à avril 1987

	M	F	Total	s. r.
Famille Hystrichopsyllidae				
1 — *Ctenoparia inopinata*	2	7	9	/
2 — *Ctenoparia intermedia* n. sp.	2	4	6	/
3 — *Ctenoparia jordani*	0	2	2	/
4 — *Ctenoparia topali*	5	9	14	/
Famille Ctenophthalmidae				
5 — *Agastopsylla boxi boxi*	43	52	95	0,8
6 — *Chiliophylla allophyla allophyla*	1	0	1	/
7 — *Neotyphloceras crassispina hemisus*	30	46	76	0.75
8 — *Neotyphloceras crassispina chilensis*	13	11	24	
Famille Stephanocircidae				
9 — *Plocopsylla reigi*	2	0	2	/
10 — *Plocopsylla lewisi*	13	18	31	/
11 — *Plocopsylla wilesi* n. sp.	4	6	10	/
12 — *Plocopsylla silewi* n. sp.	4	3	9	/
13 — *Sphinctopsylla ares*	37	94	131	0,4
14 — *Craenopsylla minerva wolffhuegeli*	2	16	18	/
15 — *Barreropsylla excelsa* *	2	1	3	/
Famille Rhopalopsyllidae				
16 — *Tiamastus gallardoi* n. sp.	13	60	73	0,21
17 — *Tetrapsyllus tantillus*	38	49	87	0,77
18 — *Tetrapsyllus maulinus*	1	0	1	/
19 — *Tetrapsyllus rhombus*	6	8	14	/
20 — *Ectinorus (E.) ixanus* *	3	4	7	/
21 — *Ectinorus (E.) levipes* *	2	2	4	/
22 — *Ectinorus (Ichyonus) onychius onychius* *	28	39	67	0,7
23 — *Listronius ulus* *	3	5	8	/
24 — *Listronius fortis* *	3	2	5	/

* Espèces nouvelles pour le Chili.

Vingt-quatre taxa appartenant à 4 familles (tabl. 1) sont représentés dans notre matériel: 4 sont nouveaux pour la science, 6 autres sont citées pour la première fois du Chili dont *Listronius ulus* (Jordan et Rothschild, 1923) jusqu'à présent seulement connu par le mâle holotype et dont nous pouvons décrire la femelle. Les types des taxa nouveaux sont déposés dans les collections du Laboratoire de Parasitologie de la Faculté de médecine de Rennes, France (ultérieurement au Laboratoire d'entomologie du Muséum national d'Histoire naturelle de Paris); des paratypes sont au Field Museum of Natural History, Chicago, USA. Il en est de même pour les autres espèces qui sont réparties entre ces départements.

ETUDE SYSTÉMATIQUE

Famille **Hystrichopsyllidae**

1 — **Ctenoparia inopinata** Rothschild, 1909

Matériel. 22 km W NW de Puerto Octay (Osorno), IX.1985, sur *Akodon longipilis* 1 femelle; Coyhaique, Reserva Nacional Coyhaique (Aisén), II.1987, sur *Ak. olivaceus* 2 mâles, 6 femelles.

Cette espèce est la plus répandue du genre bien que le mâle n'en ait été décrit que récemment (BEAUCOURNU *et al.,* 1986); elle est signalée de la majeure partie du Chili, de la province de Coquimbo au nord (non publié, Gallardo rec.) à celle d'Aisén: ces dernières captures sont les plus hautes en latitude qui soient connues; sauf mention spéciale, ceci sera également valable pour toutes les espèces citées ici.

C. inopinata vient également d'être récoltée en Argentine, dans la province de Neuquén (BEAUCOURNU et ALCOVER, 1990).

Les *Akodon* s. l. *(A. longipilis, A. olivaceus, A. sanborni)* sont ses hôtes préférentiels.

2 — **Ctenoparia intermedia** sp. n.

Matériel. 4,5 km E Coyhaique Alto (Aisén) (46°40 S, 72° W), III.1987, mâle HOLOTYPE, femelle ALLOTYPE, 1 mâle, 2 femelles paratypes sur *Reithrodon physodes,* sur *Auliscomys micropus* 2 femelles paratypes.

Description: cette nouvelle espèce est intermédiaire (d'où le nom) entre *jordani* Smit, 1955 et *propinqua* Beaucournu et Gallardo, 1988.

Capsule céphalique: cténidie génale de 7 dents dans les deux sexes, l'apex de la *gena* étant visible (sauf chez l'holotype). Sétation céphalique non caractéristique.

Thorax: cténidie pronotale de 32 à 33 dents chez les mâles, 31 à 34 chez les femelles: ce nombre est légèrement supérieur à celui noté chez *C. jordani* (28 à 31) ou *C. propinqua* (30) mais, sans doute, de peu de valeur taxonomique.

Tibia III portant 9 encoches tibiales (comme chez *propinqua*; 8, ou 9, chez *jordani*) contenant 2, 2, 3, 3, 3, 1 ou 2, 3, 4, 3 à 5 soies. Dernier segment tarsal des pattes, classique, avec les 5 paires de soies latérales.

Abdomen: 1 spinule est présente sur les tergites II et III, dans les 2 sexes, à l'exclusion de l'holotype qui en montre également 1, de chaque côté, sur le tergite IV. Partie basale de la marge postérieure du sternite VI de la femelle, doucement concave (fig. 6). Tergite VII avec 2 soies antésensiliales chez les mâles (fig. 1) (de ratio approximative 0,5-1); chez les femelles, il nous est impossible de donner le chiffre caractéristique de ce taxon car les 4 exemplaires montrent respectivement: 3 et 2 soies (allotype: figs 6 et 6'), 3 et 2, 2 et 2, 2 et 2; dans ces derniers cas, la longueur de la soie interne est assez variable allant, en ratio, de 0,5 à 0,7. Si l'on peut préjuger sur un échantillonnage aussi faible, le chiffre serait de 2 comme chez *jordani,* alors qu'il serait de 3 chez *propinqua.* Sternite VII du mâle à marge postérieure concave (elle est pratiquement droite chez les deux autres espèces affines).

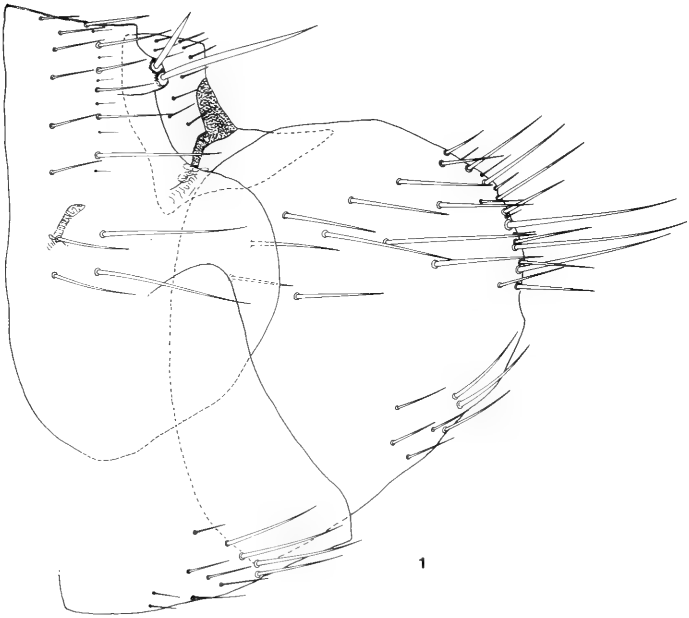
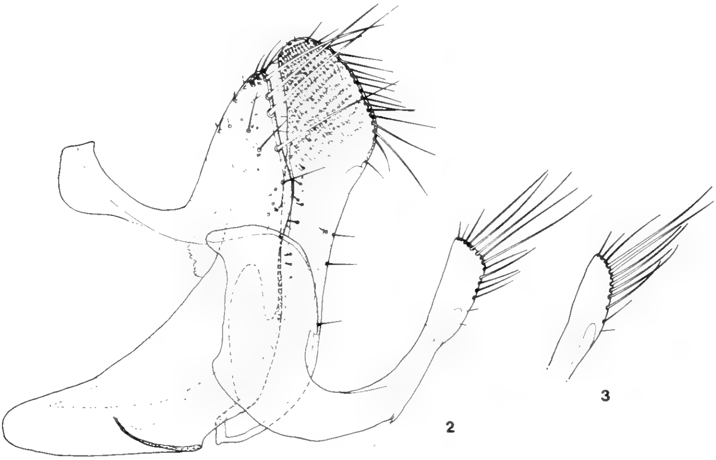


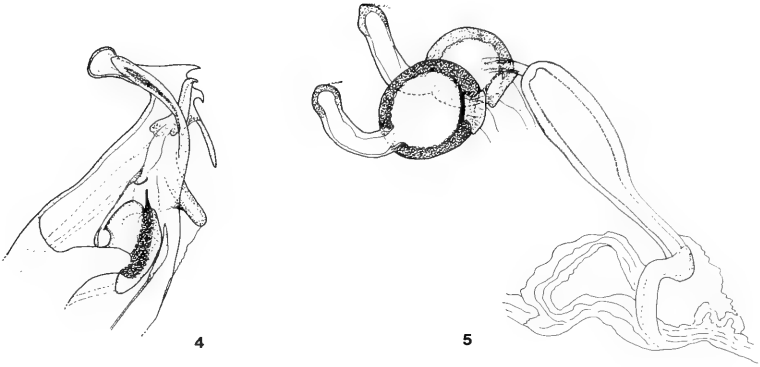
FIG. 1.

Ctenoparia intermedia n. sp., mâle holotype: tergite VI, segment VII, tergite VIII.



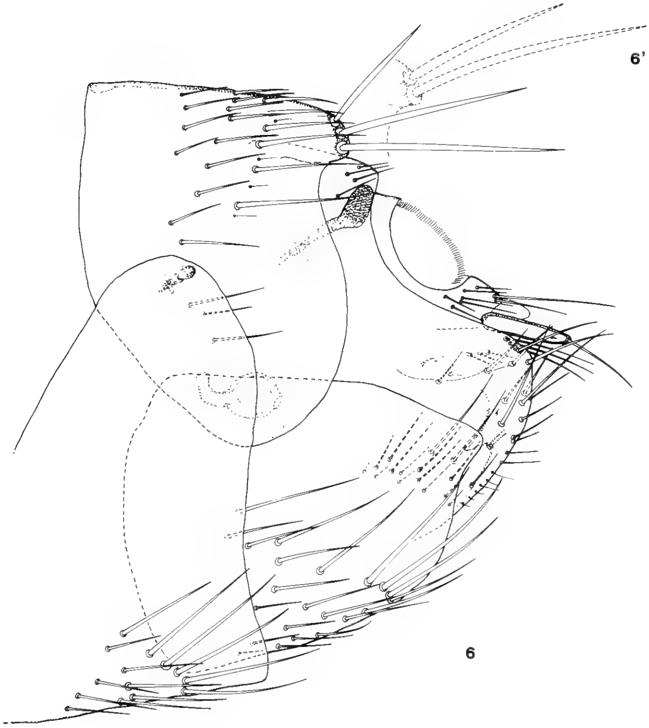
FIGS 2 et 3.

Ctenoparia intermedia n. sp., mâles. 2: segment IX, holotype; 3: apex du bras distal du sternite IX, paratype.



Figs 4 et 5.

Ctenoparia intermedia n. sp. 4: apex du phallosome, holotype; 5: spermathèque et *ducti,* femelle paratype.



Figs 6 et 6'.

Ctenoparia intermedia n. sp. 6: segments terminaux de la femelle allotype; 6': soies antésensiliales du côté droit du même exemplaire.

Segments génitaux mâles et phallosome:

Segment VIII (fig. 1): tergite montrant un stigmate allongé (comme chez *jordani*) et non triangulaire; sternite apparemment non séparable de celui de *propinqua*.

Segment IX (fig. 2): basimère plus court que le télomère, sa marge postérieure nettement convexe au niveau de la *fovea* (qui est comme chez *jordani*, peu visible); cette pièce est plus massive que chez les taxa apparentés. Télomère proche de celui de *propinqua* mais sans convexité basale. Soies marginales droites; soies internes très nombreuses, insérées jusqu'à l'apex du télomère, ne descendant pratiquement pas au-delà de la plus grande largeur de la pièce. Sternite IX: bras distal montrant une partie apicale plus large que la zone médiane. Cet apex est de forme variable (figs 2 et 3), mais montre une chétotaxie plus abondante que chez *jordani* et même *propinqua*.

Phallosome (fig. 4) caractéristique: de morphologie intermédiaire entre celles montrées par *C. jordani* et *C. propinqua*, il est immédiatement reconnu à sa protubérance dorso-apicale beaucoup plus allongée que chez *jordani* mais non recourbée en bas et en avant comme chez *propinqua*.

Segments modifiés femelles (fig. 6):

Soies du tergite VIII et surtout des sternites VI et VII relativement épaisses (comme chez *jordani*). Stigmate du t. VIII à bords subparallèles (et non triangulaire). Sternite VII caractéristique, la partie la plus saillante de sa marge postérieure étant au niveau de l'angle dorsal.

Spermathèque (fig. 5) à *bulga* subsphérique et montrant un collet au niveau de *l'area cribriformis; hilla* présentant une *papilla* plus ou moins nette. *Ductus communis* long, à parois épaisses mais non sclérifiées et, le plus souvent, difficiles à distinguer.

Dimensions (insectes montés): mâles et femelles 3,8 mm.

3 — **Ctenoparia jordani** Smit, 1955

Matériel. 14,5 km N NW de Puerto Octay (Osorno), VII.1985, sur *Oryzomys longicaudatus* 2 femelles.

Cette espèce, toujours peu abondante, a la même répartition générale que *C. inopinata:* Argentine (Smit, 1955) et Chili (Beaucournu *et al.*, 1986).

L'hôte préférentiel semble être *Oryzomys longicaudatus*.

4 — **Ctenoparia topali** Smit, 1963

Matériel. Coyhaique, Reserva Nacional Coyhaique (Aisén), XI.1986, sur *Auliscomys micropus* 1 femelle; *d°*, III.1987, sur *Akodon olivaceus* 2 mâles, 3 femelles, sur *Oryzomys longicaudatus* 3 mâles, 5 femelles.

Espèce décrite d'Argentine (province du Rio Negro) sur un unique mâle; elle a été depuis retrouvée, tant dans ce pays (Beaucournu et Alcover, 1990), qu'au Chili (Beaucournu *et al.*, 1986) d'où nous venons de décrire la femelle (Beaucournu *et al.*, 1988).

C. topali paraît moins spécifique que *C. inopinata* et *C. jordani* bien que toujours récoltée sur Cricetidae.

Famille **Ctenophthalmidae**

5 — **Agastopsylla boxi boxi** Jordan et Rothschild, 1903

Matériel. 4,5 km E Coyhaique Alto (Aisén), XII.1986, sur *Auliscomys micropus* 1 mâle, 1 femelle, sur *Akodon longipilis* 2 mâles, 10 femelles; *d°*, III.1987 sur *Aul. micropus* 9 mâles, 8 femelles, sur *Ak. longipilis* 4 mâles, 4 femelles, sur *Reithrodon physodes* 3 mâles, 6 femelles; Coyhaique, Reserva Nacional Coyhaique (Aisén), III.1987, sur *Akodon olivaceus* 1 mâle, 1 femelle; Puerto Ibáñez, El Salto (Aisén), XI.1986, sur *Ak. longipilis* 9 mâles, 2 femelles; *d°*, II.1987, sur *Aul. micropus* 1 femelle, sur *Ak. longipilis* 1 mâle, 1 femelle; Puerto Ibáñez, Rocky Bluff (Aisén), IV.1987, sur *Phyllotis xanthopygus* 7 mâles, 8 femelles; Chile Chico (Aisén), III.1987, sur *Akodon xanthorhinus* 3 mâles, 7 femelles, sur *Reithrodon physodes* 1 femelle, sur *Phyllotis xanthopygus* 3 mâles, 2 femelles.

A. boxi boxi a été décrit d'Argentine (province de Chubut) et il y a été retrouvé à plusieurs reprises (SMIT, 1955; SMIT, 1963; BEAUCOURNU et GALLARDO, 1988); une seule station était connue du Chili, dans la province de Magellanes, donc plus au sud que nos prospections (SMIT et ROSICKÝ, 1972). *A. boxi gibbosa* Beaucournu et Alcover (1990), seule sous-espèce connue, vient d'être décrite d'Argentine, dans la province de Neuquén.

Cette espèce a une spécificité assez large, bien qu'apparemment liée aux Cricetidae.

Les 95 exemplaires récoltés donnent un sex-ratio de 0,8, chiffre classique chez les Siphonaptères.

6 — **Chiliopsylla allophyla allophyla** (Rothschild, 1908)

Matériel. 7 km E SE Puerto Octay (Osorno), IX.1985, sur *Irenomys tarsalis* 1 mâle.

C. a. allophyla n'est connue que de quelques stations au Chili (deux seulement sont publiées) et en Argentine (SMIT, 1955; HOPKINS et ROTHSCHILD, 1966) où elle semble toujours rare, ceci pouvant tenir à sa phénologie, à son écologie ou à une spécificité plus stricte. Une sous-espèce vient d'être décrite de la province de Neuquén, Argentine (*C. a. tonnii* Beaucournu et Alcover, 1990) où le fort déséquilibre noté dans le sex-ratio (0,12) serait en faveur d'une écologie particulière.

7 — **Neotyphloceras crassispina hemisus** Jordan, 1936

Matériel. 4,5 km E Coyhaique Alto (Aisén), XII.1986, sur *Auliscomys micropus* 1 mâle, sur *Akodon longipilis* 4 mâles, 4 femelles, sur *Reithrodon physodes* 1 femelle; *d°*, III.1987, sur *R. physodes* 2 mâles, 2 femelles, sur *Ak. longipilis* 8 mâles, sur *Aul. micropus* 3 femelles; *d°*, XI.1987, sur *Chelemys macronyx* 1 mâle, 6 femelles; Coyhaique, Reserva Nacional Coyhaique (Aisén), XI.1986, sur *Aul. micropus* 3 femelles; *d°*, III.1987, sur *Akodon olivaceus* 8 mâles, 9 femelles; Puerto Ibáñez, El Salto (Aisén), XI.1986, sur *Aul. micropus* 1 femelle, sur *Ak. longipilis* 1 mâle, 14 femelles; *d°*, II.1987, sur *Aul. micropus* 1 mâle, 1 femelle; *d°*, III.1987, sur *Ak. longipilis* 4 mâles, 2 femelles; Puerto Ibáñez, Rocky Bluff (Aisén), IV.1987, sur *Phyllotis xanthopygus* 2 femelles.

Cette sous-espèce est, semble-t-il (*cf.* SMIT, 1968) surtout connue d'Argentine (de la province du Rio Negro au sud, jusqu'à la frontière nord vraisemblablement) et de Bolivie. Une station était connue du Pérou (SMIT, *op. cit.*) et une seule autre, publiée du Chili (SMIT et ROSICKÝ, 1972) nettement au sud des nôtres (51°05 S, 73°00 W). BEAUCOURNU et ALCOVER (1990) ont attiré l'attention sur la présence de populations mixtes, ce qui s'ajoutant à la mosaïque de répartition des trois sous-espèces décrites pourrait faire rediscuter de leur validité.

Quoi qu'il en soit, *N. crassispina* s. l. est généralement commun et de large spécificité.

8 — **Neotyphloceras crassispina chilensis** Jordan, 1936

Matériel. ca. 2,5 km Chile Chico (Aisén), III.1987, sur *Akodon xanthorhinus* 2 mâles, 2 femelles, sur *Reithrodon physodes* 2 mâles, sur *Phyllotis xanthopygus* 9 mâles, 9 femelles.

Calculé sur l'ensemble des deux sous-espèces le sex-ratio est de 0,75 sur 100 exemplaires, chiffre très voisin de celui trouvé par BEAUCOURNU et ALCOVER (1990) en Argentine, et calculé sur un nombre identique.

Famille **Stephanocircidae**

9 — **Plocopsylla reigi** Beaucournu et Gallardo, 1978

Matériel. Coyhaique, Reserva Nacional Coyhaique (Aisén), II.1987, sur *Akodon olivaceus* 1 mâle, sur *Oryzomys longicaudatus* 1 mâle.

P. reigi est, pour le moment, seulement signalé du Chili: provinces de Malleco (types) (BEAUCOURNU et GALLARDO, 1978) et de Santiago (SCHRAMM et LEWIS, 1988).

Sa spécificité n'est pas établie car bien que décrite de *Ctenomys,* sur lesquels, en certaines stations, elle est indiscutablement commune, elle a depuis, été prélevée sur divers Cricetidae.

10 — **Plocopsylla lewisi** Beaucournu et Gallardo, 1988

Matériel. 4,5 km E Coyhaique Alto (Aisén), II.1987, sur *Reithrodon physodes* 2 mâles; Coyhaique, Reserva Nacional Coyhaique (Aisén), III.1987, sur *Akodon olivaceus* 1 femelle, sur *Oryzomys longicaudatus* 1 femelle; Puerto Ibáñez, Rocky Bluff (Aisén), IV.1987 sur *Phyllotis xanthopygus* 7 mâles, 10 femelles, sur *Akodon longipilis* 4 mâles, 6 femelles.

Tout récemment décrite d'Argentine (province du Rio Negro), cette *Plocopsylla* est signalée la même année du Chili par SCHRAMM et LEWIS (1988): province de Santiago (des femelles seulement de la Parva, identifiées par JAMESON et FULK (1977) comme *P. chiris* (Jordan, 1931) et des individus des deux sexes, de Farellones).

Comme beaucoup de Craneopsyllinae cette puce semble pouvoir parasiter de nombreux Cricetidae: *Euneomys* est le genre le plus cité, mais on ne peut tirer de conclusions sur d'aussi courtes séries.

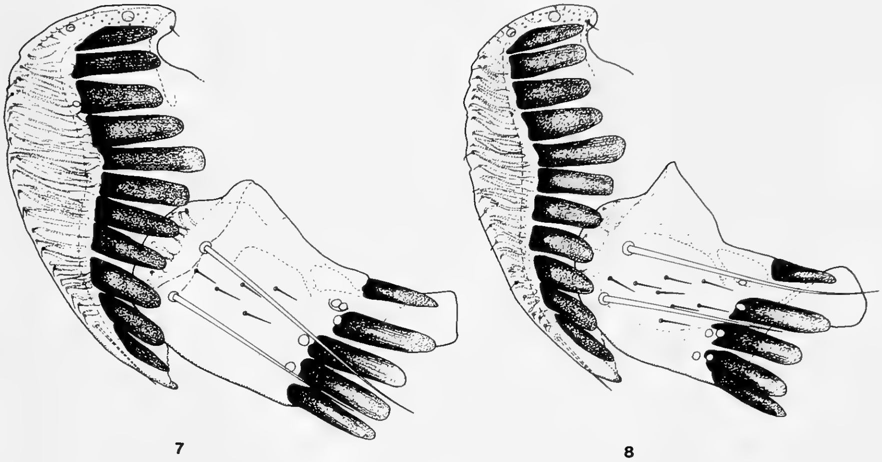
Il est regrettable que SCHRAMM et LEWIS (*op. cit.*) n'ait pas indiqué l'origine des exemplaires qu'ils dessinent, car d'assez nombreuses différences sont notables entre le matériel type (identique à celui d'Aisen) et leurs illustrations. Citons le processus fixe et la chétotaxie du bras distal du sternite IX essentiellement. Ceci prend une particulière importance avec la découverte des espèces que nous décrivons ci-après. Nous serions assez enclins, à penser au vu de leurs dessins, que le taxon de Schramm et Lewis est nouveau.

11 — **Plocopsylla wilesi** n. sp.

Matériel. ca. 2,5 km Chile Chico (Aisén) (46°30 S, 72° W), 330 m, III.1987, sur *Akodon xanthorhinus* le mâle HOLOTYPE, sur *Phyllotis xanthopygus* la femelle ALLOTYPE, 3 mâles, 5 femelles paratypes.

Le nom spécifique et celui du taxon suivant sont des anagrammes de *lewisi,* ceci rappelant la cohésion de ce complexe.

Description: immédiatement rapprochée de *P. angusticeps* Mahnert, 1982 et de *P. lewisi* par l'allure générale du tergite IX.



FIGS 7 et 8.

Plocopsylla spp., capsule céphalique (*partim*). 7: *P. wilesi* n. sp., mâle paratype; 8: *P. silewi* n. sp., mâle holotype.

Capsule céphalique (fig. 7): cténidie frontale et casque très proches de ceux de *P. lewisi* (et respectivement, donc, de 11 et 12 dents chez les mâles et les femelles), la soie interne du bord antero-ventral est insérée au niveau de la base de la dent la plus inférieure. *Gena* un peu plus longue que haute, le processus génal variable, souvent plus ou moins rectiligne à l'apex.

Thorax: comme chez *P. lewisi* mais cténidie pronotale avec généralement une ou deux dents de plus (ce qui n'est pas, bien sûr, significatif sur un échantillon aussi réduit); 3 *pseudosetae* (rarement 2) sous le mésothorax, de chaque côté.

Abdomen: même chétotaxie que chez *P. lewisi.* Tergite VII chez le mâle (fig. 9) une soie antésensiliale développée et une, très petite mais non vestigiale, plus médiane (de même que chez *P. lewisi, cf.* BEAUCOURNU et GALLARDO, 1988, fig. 2); chez la femelle, deux soies de même longueur (fig. 13).

Segments génitaux mâles: segment VIII (fig. 9) de même structure générale que chez *P. lewisi.* Notons essentiellement, comme différence, un tergite moins arrondi, non échinulé, possédant une apophyse très longue; sternite apparemment plus massif.

Segment IX (fig. 11). Tergite: processus interne assez trapu (mais ce caractère a une certaine variabilité); processus fixe à apex arrondi, strié, s'élargissant doucement; télomère proche de celui de *lewisi* mais apophyse verticale plus large et soie modifiée de l'apophyse horizontale différente (ce critère n'est appréciable que sur plusieurs exemplaires étant donnée la structure complexe de cette soie). Sternite: apex du bras distal large, bien isolé par un rétrécissement subapical, portant plusieurs petites soies spiniformes (5 à 6) sclérifiées. Au-dessous du rétrécissement, 2 soies subégales, très modifiées, aplaties, larges, incolores, l'inférieure striée à l'apex. Ce segment est très différent chez *P. lewisi* (*cf.* BEAUCOURNU et GALLARDO, *op. cit.,* fig. 3).

Phallosome: apparemment non caractéristique.

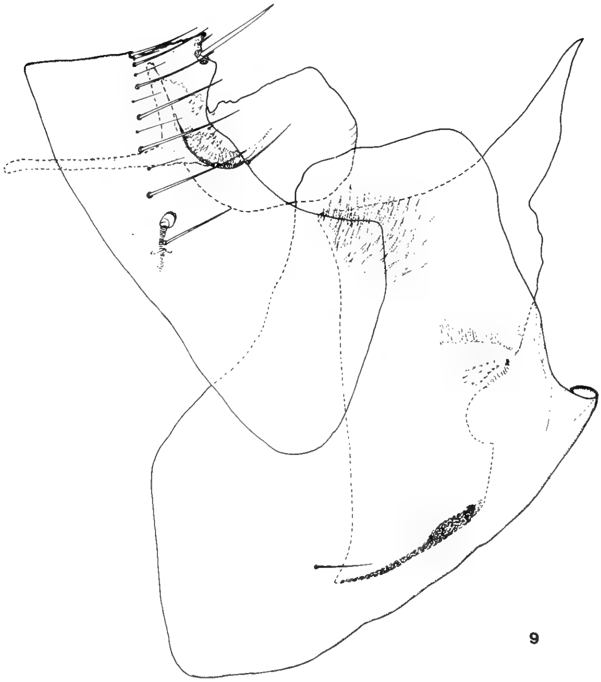


Fig. 9.

Plocopsylla wilesi n. sp., mâle holotype, segments VII et VIII.

Segments génitaux femelles et spermathèque:

Stigmate relativement court, s'élargissant peu à l'apex. Marge postérieure du tergite VIII (fig. 13) ondulée, avec 3 soies internes (deux longues, une courte) à l'angle postero-ventral qui n'est pas saillant. Stylet anal (fig. 15) relativement court et large.

Spermathèque (fig. 17): *bulga* à bords subparallèles, base de la *hilla* prenant naissance à l'intérieur de la *bulga*; ces derniers caractères, comme les *ducti* sont identiques à ceux rencontrés chez *P. lewisi. Ducti* comme chez *P. lewisi.*

Dimensions (insectes montés): mâles: 2,4 mm sans les soies distales (2,6 avec les soies); femelles: 2,2 mm.

Nous discuterons des affinités de *P. wilesi* n. sp. après la description du taxon suivant.

12 — **Plocopsylla silewi** n. sp.

Matériel. ca. 2,5 km S Chile Chico (Aisén), 330 m, III.1987, sur *Akodon xanthorhinus,* mâle HOLOTYPE, femelle ALLOTYPE, 3 mâles et 2 femelles paratypes.

Il y a sympatrie et peut-être syntopie avec *P. wilesi:* l'espèce hôte est identique, mais les parasites de plusieurs rongeurs de cette espèce et de cet endroit furent réunis.

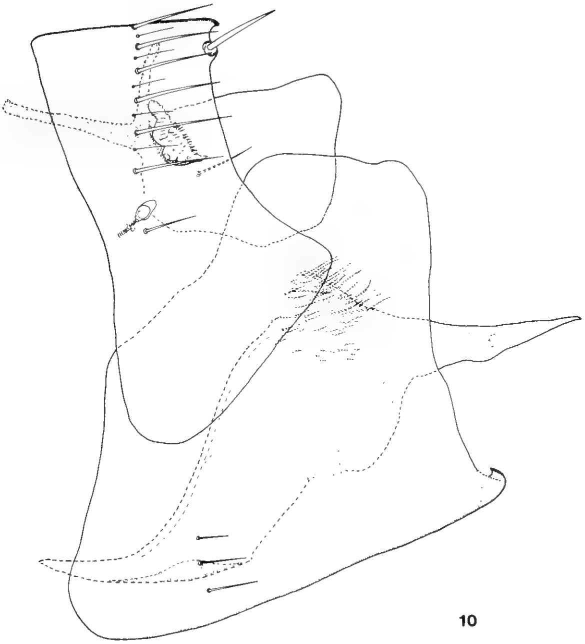


FIG. 10.

Plocopsylla silewi n. sp., mâle holotype, segments VII et VIII.

Description: espèce proche de *P. lewisi* et de *P. wilesi* mais, capsule céphalique mise à part, manifestement plus apparentée à *P. angusticeps.*

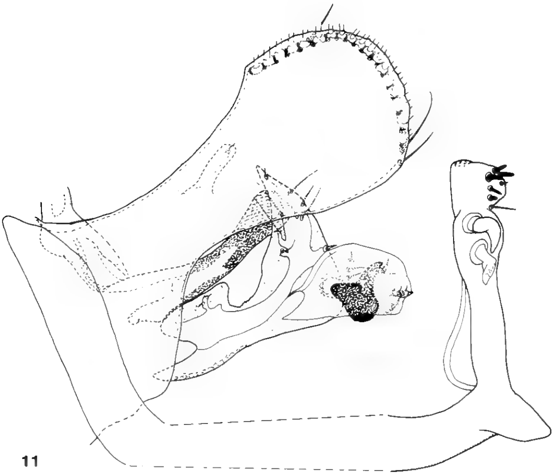
Capsule céphalique (fig. 8): partie précténidienne de la cténidie frontale relativement étroite. La soie interne du bord antéro-ventral est insérée au-dessous de la base de la dent la plus inférieure. *Gena* presque aussi haute que longue; processus génal arrondi.

Thorax: cténidie pronotale de 20 à 22 dents. Deux *pseudosetae* de chaque côté chez les mâles (3 chez 1 exemplaire), 1 ou 2 chez les femelles: ces *pseudosetae* sont bien sclérifiées.

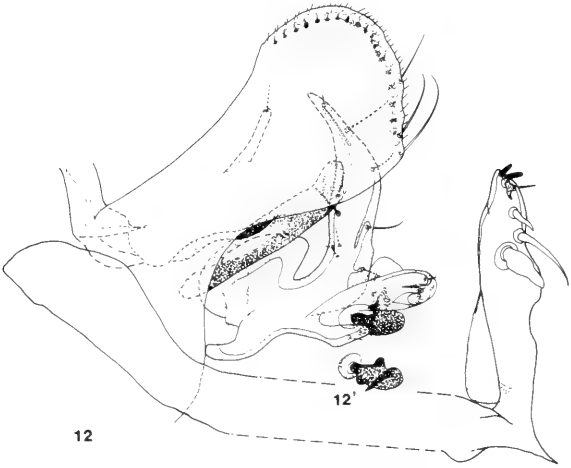
Abdomen: spinules présentes sur t. II à t. V chez les mâles (2 ou 3, 3, 3, 1); chez les femelles toujours présentes sur t. II et t. III (2 à 4, 3), présentes (2 ou 1) sur t. IV et t. V, ou absentes. Pour le reste, même chétotaxie que *P. lewisi* et *P. wilesi.*

Tergite VII: chez le mâle (fig. 10) une seule soie antésensiliale, sans soie accessoire; chez la femelle (fig. 14), 2 soies subégales.

Segments génitaux mâles: segment VIII (fig. 10): tergite quadrangulaire, relativement développé, sans zone échinulé, l'apophyse étant égale ou plus courte que la marge dorsale; sternite intermédiaire entre ceux de *lewisi* et de *wilesi,* semblant caractérisé par un long prolongement rétrograde ventral.



11



12'

12

FIGS 11, 12 et 12'.

Plocopsylla spp. 11: *P. silewi* n. sp., segment IX (*partim*); 12: *P. silewi* n. sp., segment IX (*partim*); 12': *P. silewi,* soie modifiée d'un paratype.

Segment IX (fig. 12). Tergite: basimère de même forme générale que chez les deux espèces précédentes mais apex asymétrique; processus interne long et grêle; processus fixe subrectiligne, légèrement redressé à l'apex qui est strié. Télomère, très proche de celui *d'angusticeps:* apophyse verticale longue, étroite, à apex effilé et doucement recourbé, apophyse horizontale étroite avec une soie modifiée de structure complexe (figs 12, 12'). Sternite, caractéristique: bras distal à apex triangulaire portant 2 courtes soies spiniformes obtuses et sclérifiées et une soie contournée et pointue moins sclérifiée; 3 soies aplaties, non sclérifiées, de taille croissante de haut en bas, insérées dans la partie inférieure du tiers apical.

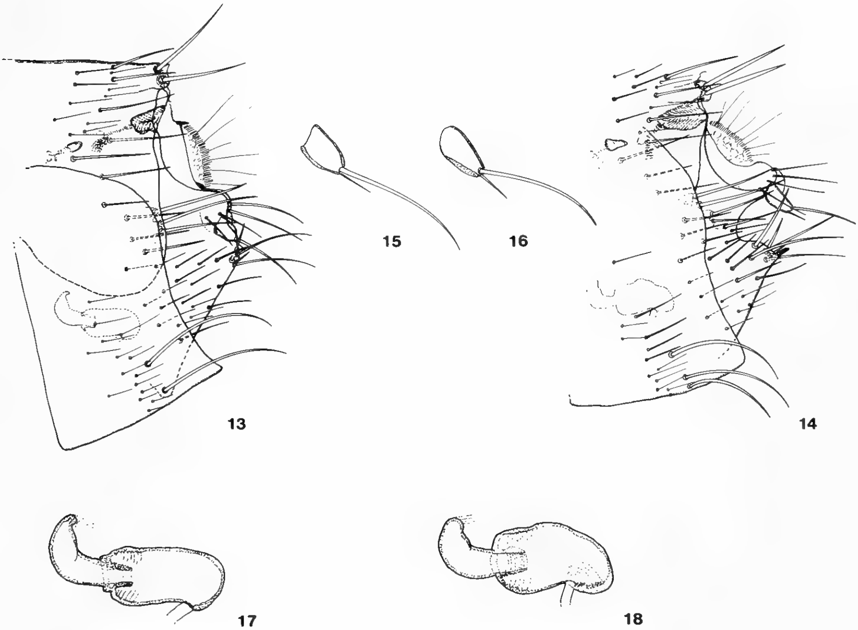
Phallosome: apparemment non distinctif.

Segments génitaux femelles et spermathèque:

Tergite VIII: stigmate grand, assez voisin de celui de *P. lewisi*; marge dorsale caractérisée par un lobe triangulaire, étroit, surplombant une large concavité; angle postero-ventral saillant; 3 soies internes à l'angle postéro-ventral. Stylet anal long (fig. 16).

Spermathèque (fig. 18): *bulga* fortement asymétrique avec une convexité sur le bord dorsal, nettement plus large que chez les espèces affines; *hilla* prenant naissance à l'intérieur de la *bulga; ducti* comme chez *P. lewisi* et *P. wilesi* (rappelons que la femelle de *P. angusticeps* est encore inconnue).

Dimensions (insectes montés): mâles: 1,8 mm sans les soies terminales (2 mm avec); femelles: 2,2 mm.



Figs 13 à 18.

Plocopsylla spp. 13: *P. wilesi* n. sp., femelle allotype, segments terminaux: 14: *P. silewi* n. sp., femelle allotype, *d°*; 15: *P. wilesi,* allotype, stylet anal; 16: *P. silewi, d°*; 17: *P. wilesi,* allotype, spermathèque; 18: *P. silewi, d°*.

Discussion: Plocopsylla wilesi n. sp. et *P. silewi* n. sp. appartiennent (ainsi peut-être que *P. kasoganaga* Schramm et Lewis, 1988) au complexe *angusticeps-lewisi* qui correspond au Groupe A, sous-groupe A2 de ces auteurs *(op. cit.).*

L'autonomie de *P. wilesi* par rapport à *P. silewi* étant manifeste, il convient de discuter les affinités de ces espèces avec les autres taxa.

P. lewisi se sépare de:

— *P. wilesi* chez le mâle par le sternite IX essentiellement (mais aussi le basimère et le télomère), chez la femelle par le stylet anal.

— *P. silewi* dans les deux sexes par la largeur de la zone précténidienne, chez le mâle par le segment IX dans son ensemble, chez la femelle par le tergite VIII et la spermathèque.

P. angusticeps n'est connue que par le mâle holotype immédiatement caractérisé par l'extrême étroitesse de sa zone précténidienne, mais on ne peut écarter l'hypothèse d'une malformation individuelle (Mahnert, *in litt.),* due, par exemple, à une dessication du cocon. Même dans cette hypothèse, il se sépare de toute manière de *P. wilesi,* et, si l'on peut se fier aux dessins, différents, du sternite IX de l'holotype donnés respectivement par Mahnert (1982) et Schramm et Lewis (1988), elle ne peut se confondre avec *P. silewi.* Par ailleurs, Schramm et Lewis *(op. cit.)* considèrent une femelle, sympatrique, de *P. angusticeps,* rattachée à *P. chiris* Jordan (1931) par Mahnert *(op. cit.),* comme *P. lewisi.* Il nous semble utile d'étudier l'éventualité qu'il s'agisse de la femelle de *P. angusticeps* dont le mâle serait alors effectivement tératologique au seul niveau de la capsule céphalique, ce qui est classique dans les circonstances évoquées plus haut.

P. kasoganaga n'est, elle, connue que par quelques femelles dispersées en Argentine. Les seuls critères la séparant de *P. lewisi* (mais les dessins ne donnent que la spermathèque et un fragment du tergite VIII) sont la sétation (interne) de l'angle postero-ventral du t. VIII et le stylet anal plus conique. Ce dernier caractère agrée avec celui de *P. wilesi,* mais la sétation du t. VIII est différente (comparer la figure 13 du présent travail et la figure 89 de Schramm et Lewis, 1988). *P. silewi* est facilement écartée par la morphologie de sa spermathèque (comparer la figure 18 du présent travail et la figure 14 de Schramm et Lewis, 1988).

13 — **Sphinctopsylla ares** (Rothschild, 1911)

Matériel. 14,5 km N. NW Puerto Octay (Osorno) VIII.1986 sur *Oryzomys longicandatus* 1 femelle; Coyhaique, Reserva Nacional Coyhaique (Aisén), XI.1986, sur *Chelemys macronyx* 1 mâle; d°, III.1987, sur *C. macronyx* 1 mâle; 4,5 km E Coyhaique Alto (Aisén), XII.1986, sur *Auliscomys micropus* 1 femelle, sur *Akodon longipilis* 2 mâles, 10 femelles; d°, III.1987, sur *Reithrodon physodes* 1 femelle, sur *Ak. xanthorhinus* 1 mâle, 1 femelle, sur *Ak. longipilis* 6 femelles, sur *Aul. micropus* 2 mâles, 5 femelles; Coyhaique, Reserva Nacional Coyhaique (Aisén), III.1987, sur *Oryzomys longicaudatus* 7 mâles, 25 femelles, sur *Ak. olivaceus* 18 mâles, 34 femelles, sur *Geoxus valdivianus* 1 mâle; Puerto Ibáñez El Salto (Aisén), III.1987, sur *Ak. longipilis* 4 mâles, 8 femelles; Puerto Ibáñez, Rocky Bluff (Aisén), IV.1987, sur *Phyllotis xanthopygus* 1 femelle.

Puce euryxène, très abondante par place et, ici, la mieux représentée de sa famille. Elle est bien connue d'Argentine et du Chili et est la seule espèce du genre signalée du sud de la région néotropicale.

Son sex-ratio est aberrant: dans nos récoltes, 0,4 sur 131 exemplaires. Beaucournu et Alcover (1990) trouvent en Argentine le chiffre voisin de 0,5 sur 158 puces. A noter que dans ces deux cas il s'agit exclusivement de puces récoltées sur les hôtes. Le sex-ratio dans les nids est inconnu.

14 — **Craneopsylla minerva wolffhuegeli** (Rothschild, 1909)

Matériel. ca. 2,5 km S Chile Chico (Aisén), III.1987, sur *Phyllotis xanthopygus* 2 mâles, 6 femelles, sur *Reithrodon physodes* 10 femelles.

A notre connaissance, Macchiavello (1948) est le seul à signaler ce taxon du Chili, dans la province d'Atacama, sur *Akodon* sp. Rappelons que la forme nominative vient d'être trouvée dans le nord du Chili, province de Tarapaca (Beaucournu et Gallardo, 1989).

C. m. wolffhuegeli est connue de divers points d'Argentine, du Brésil et, selon MACCHIAVELLO *(op. cit.)* du Pérou et d'Equateur, ces deux références étant mises en doute par JOHNSON (1957). Le Pérou, au moins, est cependant confirmé par HOPKINS et ROTHSCHILD (1956) mais sur un nouveau prélèvement.

15 — **Barreropsylla excelsa** Jordan, 1953

Matériel. Puerto Ibáñez (Aisén), II.1987, sur *Akodon longipilis* 2 mâles, 1 femelle.

Bien que cette espèce soit, ici, citée pour la première fois du Chili, elle y était déjà connue par une femelle prélevée sur *Geoxus valdivianus* sur l'île de Chiloë en janvier 1987, récolté par J. C. Torrés-Mura: cette station n'avait pas été publiée car sur une femelle unique, de morphologie peu exubérante par rapport à celle du mâle, il pouvait s'agir d'un taxon nouveau; il n'en est rien, en fait.

Barreropsylla excelsa, unique membre de la tribu des *Barreropsyllini,* a été décrit, puis retrouvé, en Argentine dans la province du Rio Negro (JORDAN, 1953; SMIT, 1955; BEAUCOURNU et GALLARDO, 1988) et récemment dans celle, voisine, de Neuquén (BEAUCOURNU et ALCOVER, 1990). Aucune autre station ne semble connue de cette puce, toujours peu abondante dans les prélèvements.

Il s'agit manifestement d'une puce relativement euryxène, sa spécificité semblant la limiter aux Cricetidae. Ecologie inconnue, mais nous aurions tendance à croire qu'il s'agit d'une espèce surtout nidicole.

Famille **Rhopalopsyllidae**

16 — **Tiamastus gallardoi** n. sp.

Matériel. ca. 2,5 km S Chile Chico (Aisén), (46°30 S, 72°W), XI.1986, sur *Ctenomys* (sp. n.?) aff. *colburni,* mâle HOLOTYPE, femelle ALLOTYPE, 12 mâles et 59 femelles paratypes.

Nous sommes heureux de dédier cette nouvelle espèce, parasite de *Ctenomys,* à notre collègue et ami Milton N. Gallardo (Valdivia, Chili) en hommage à ses travaux sur les mammifères (les Ctenomyidae en particulier), en remerciement pour sa fructueuse collaboration et en témoigne de notre très cordiale amitié.

En plus des dépôts précisés dans l'introduction, un couple de paratypes est déposé dans les collections d'Entomologie du Muséum d'Histoire naturelle de Genève.

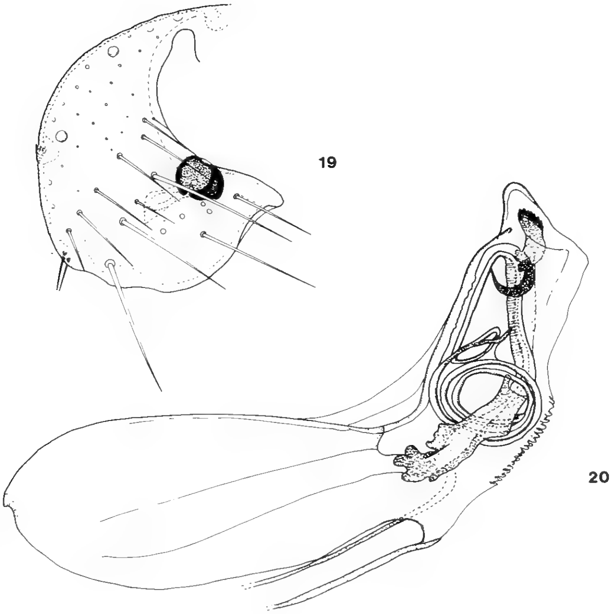
Description:

Capsule céphalique (fig. 19): œil relativement petit mais non vestigial et bien pigmenté (évoquant celui de *T. plesius* Jordan, 1942, *T. palpalis* (Rothschild, 1911), *T. subtilis* Jordan et Rothschild, 1923, *T. callens* (Jordan et Rothschild, 1923). Dans les deux sexes, palpe labial atteignant l'apex du trochanter. Deuxième segment du palpe maxillaire au moins deux fois aussi long que le premier; marge postérieure concave. Rangée frontale bien développée; 3 rangées occipitales.

Thorax: 12 à 16 soies sur le métépimeron dont le stigmate est, environ, 2 fois plus haut que large (ils sont ronds sur l'abdomen). Quatrième segment du tarse III environ 2 fois aussi long que large.

Segments génitaux mâles et phallosome:

Segment VIII: sternite en triangle équilatéral (fig. 21). Segment IX (fig. 21): basimère aussi long que haut, son bord dorsal arrondi; marge postéro-ventrale concave. Une zone



Figs 19 et 20.

Tiamastus gallardoi n. sp., mâle holotype; 19: partie antérieure de la capsule céphalique; 20: phallosome.

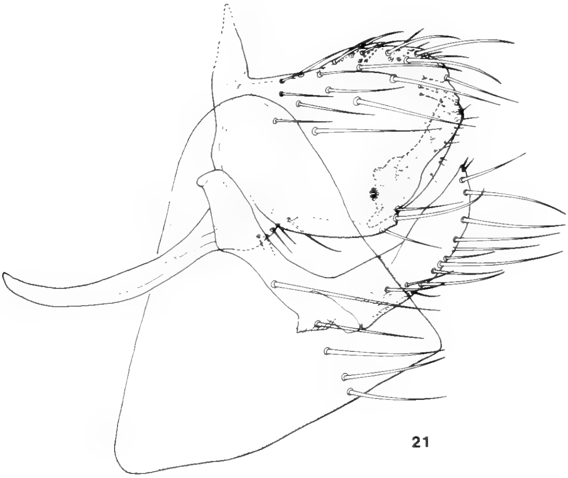


Fig. 21.

Tiamastus gallardoi n. sp., mâle holotype, sternite VIII, segment IX.

nettement pigmentée sur le basimère à l'apex du télomère. Télomère nettement plus court que la hauteur du basimère, à bords subparallèles; zone acétabulaire un peu plus courte que la zone libre. Sternite à bras distal large et à apex pointu, sa marge ventrale portant 8 à 10 soies bien développées.

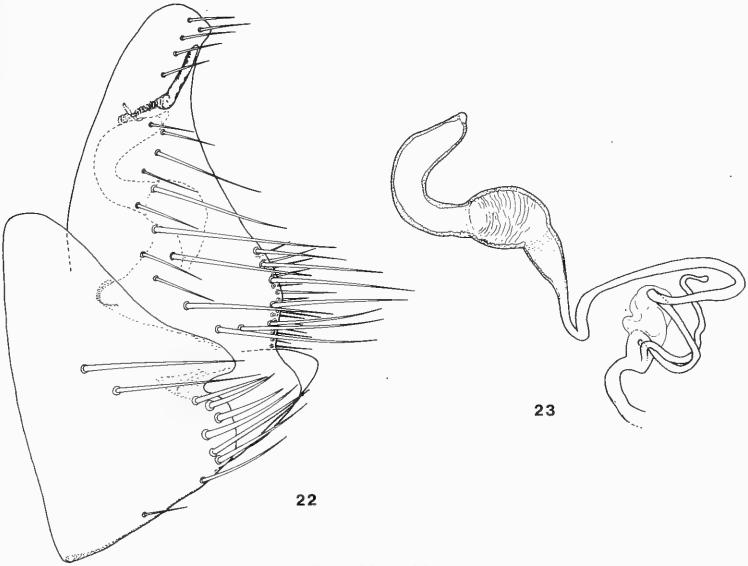
Phallosome (fig. 20): classique du genre, mais l'extrémité du *ductus* faisant 2½ circonvolutions autour de la pièce basale.

Segments génitaux femelles, spermathèque et ducti: sternite VII (fig. 22) montrant un lobe bien développé plus grand que l'échancrure qu'il surplombe; cuticule pigmentée à ce niveau. Le caractère le plus marquant semble être la chétotaxie composée de soies fortes pour toute la rangée submarginale.

Segment VIII: tergite (fig. 22) avec une convexité portant 5 à 6 soies longues, externes, marginales et 12 à 15 internes courtes.

Spermathèque et *ducti* (fig. 23): spermathèque relativement grande (fig. 22). *Hilla* longue et arquée; *bulga* à bords supérieur et inférieur convexes, environ 1½ fois plus longue que haute: *area cribiformis* très développée faisant une angulation variable avec la *bulga* (de 90° à 120° environ) se continuant graduellement avec le *ductus spermathecae.* Structure mal discernable et paraissant variable au niveau de la *perula. Ductus obturatus* faisant environ les ⅖ du *d. spermathecae.*

Dimensions (insectes montés): mâles 1,6 mm; femelles 1,8 mm.



FIGS 22 et 23.

Tiamastus gallardoi n. sp.; 22: femelle allotype, sternite VII et segment VIII; 23: paratype, spermathèque et *ducti.*

Discussion: Tiamastus gallardoi n. sp. se distingue facilement, chez le mâle, de toutes les espèces connues: la plus proche est *T. plesius* (dont ce sexe vient seulement d'être décrit: Beaucournu et Gallardo, 1989) qui s'en sépare entre autre par un basimère moins massif et un télomère plus grêle. La femelle s'apparente au groupe d'espèces *subtilis* - *palpalis* - *plesius* - *callens* par sa spermathèque. *T. callens* est facilement écartée par le sinus du sternite VII; toutes s'en séparent par la rangée de soies submarginales de ce sternite qui sont, chez *T. gallardoi* plus épaisses et, relativement plus marginales.

Nous n'avons récolté *T. gallardoi* que sur *Ctenomys.* Mais alors que *Tetrapsyllus maulinus,* en compagnie de qui nous l'avons récolté, est non seulement strictement lié à ces rongeurs souterrains, mais montre des caractères morphologiques en relation avec cette adaptation (œil vestigial en particulier), rien n'indique chez ce nouveau *Tiamastus* une relation avec cette écologie particulière. Ceci est vrai, d'ailleurs, pour d'autres puces de ce genre, régulièrement ou fréquemment récoltées sur des Ctenomyidae, comme *T. callens, T. plesius* ou *T. palpalis.*

17 — **Tetrapsyllus (Tetrapsyllus) tantillus** (Jordan et Rothschild, 1923)

Matériel. ca. 2,5 km S Chile Chico (Aisén), XI.1986, sur *Reithrodon physodes* 8 mâles, 3 femelles; *d°,* III.1987, sur *Akodon xanthorhinus* 6 mâles, 9 femelles, sur *Phyllotis xanthopygus* 5 mâles, 8 femelles; 4,5 km Coyhaique Alto (Aisén), XII.1986, sur *Ak. longipilis* 1 mâle, 1 femelle, sur *Euneomys* sp. 3 femelles; *d°,* III.1987, sur *R. physodes* 2 mâles, 7 femelles, sur *Ak. longipilis* 3 mâles, 1 femelle; Puerto Ibáñez, El Salto (Aisén), XI.1986, sur *Auliscomys micropus* 5 femelles, sur *Ak. longipilis* 4 mâles, 9 femelles; *d°,* 2,5 km N (Aisén), IV.1987, sur *Ak. longipilis* 4 mâles, 1 femelle; *d°,* Rocky Bluff (Aisén), IV.1987 sur *Ph. xanthopygus* 5 mâles, 2 femelles.

T. tantillus est le Rhopalopsyllidae le mieux représenté dans nos récoltes. Il est bien connu, autant d'Argentine que du Chili. Les deux femelles signalées comme *Tetrapsyllus* sp. aff. *tantillus* (BEAUCOURNU et GALLARDO, 1978) et provenant de la Cumbre (Ultima Esperanza) sur *Ctenomys magellanicus,* sont à rattacher à *T. tantillus* et proviennent de l'une des deux stations les plus méridionales pour cette puce (50° 40 S), l'autre étant celle de SMIT et ROSICKÝ (1972): 51° 05 S.

Il s'agit encore d'une espèce euryxène. Son sex-ratio, sur 87 exemplaires est de 0,77 (0,8 sur 68 captures *in* BEAUCOURNU et ALCOVER, 1990).

18 — **Tetrapsyllus (Tetrapsyllus) maulinus** Beaucournu et Gallardo, 1978

Matériel. ca. 2,5 km S Chile Chico (Aisén), XI.86 sur *Ctenomys* sp. aff. *colburni* 1 mâle.

Cf. aff. *colburni* constitue un hôte nouveau pour ce taxon, stenoxène, lié aux Ctenomyidae. La rareté relative de cette puce est, sans aucun doute, en relation avec ce fait.

19 — **Tetrapsyllus (Tetrapsyllus) rhombus** Smit, 1955

Matériel. 7 km E SE Puerto Octay (Osorno), IX.1985, sur *Akodon olivaceus* 1 mâle, 1 femelle; Coyhaique, Reserva Nacional Coyhaique (Aisén), XI.1986, sur *Auliscomus micropus* 1 femelle; *d°,* III.1987, sur *Ak. olivaceus* 2 mâles, 2 femelles, sur *Geoxus valdivianus* 1 femelle; 4,5 km E Coyhaique Alto (Aisén), XII.1986, sur *Ak. longipilis* 1 mâle, 1 femelle; *d°,* III.1987, sur *Reithrodon physodes* 2 femelles; Puerto Ibáñez, El Salto (Aisén), II.1987 à IV.1987, sur *Ak. longipilis* 2 mâles.

Rarement abondante mais euryxène. Connue d'Argentine (SMIT, 1955; SMIT, 1963; BEAUCOURNU et GALLARDO, 1988; BEAUCOURNU et ALCOVER, 1990), comme du Chili (SMIT, 1955; non publié: Gallardo rec.).

20 — **Ectinorus (Ectinorus) ixanus** (Jordan, 1942)

Matériel. Puerto Ibáñez, El Salto (Aisén), II.1987, sur *Auliscomys micropus* 2 femelles, sur *Akodon longipilis* 3 mâles, 2 femelles.

Espèce nouvelle pour le Chili. Sa répartition connue ne concernait que l'Argentine (province de Mendoza: JORDAN, 1942; province de Chubut:Mahnert, *in litt.*). Cette puce semble rare et clairsemée.

21 — **Ectinorus (Ectinorus) levipes** (Jordan et Rothschild, 1923)

Matériel. Puerto Ibáñez, El Salto (Aisén), XI.1986, sur *Akodon longipilis* 2 mâles, 1 femelle; *d°,* II.1987, sur *Ak. longipilis,* 1 femelle.

Puce également nouvelle pour le Chili. Seulement signalée d'Argentine: provinces de Chubut (JORDAN et ROTHSCHILD, 1923) et du Rio Negro (SMIT, 1963; BEAUCOURNU et GALLARDO, 1988).

Apparemment rare et sporadique, comme la précédente.

22 — **Ectinorus (Ichyonus) onychius onychius** (Jordan et Rothschild, 1923)

Matériel. 4,5 km E Coyhaique Alto (Aisén), XII.1986, sur *Euneomys* sp. 1 femelle; *d°,* III.1987, sur *Reithrodon physodes* 1 femelle; Coyhaique, Reserva Nacional Coyhaique (Aisén), III.1987, sur *Akodon olivaceus* 1 mâle; Chile Chico (Aisén), III.1987, sur *Ak. xanthorhinus* 1 mâle, 17 femelles, sur *Phyllotis xanthopygus* 4 mâles, 1 femelle, sur *R. physodes* 4 mâles, 6 femelles, sur *Eligmodontia typus* 2 femelles; Puerto Ibáñez, El Salto (Aisén), II.1987, sur *Auliscomys micropus* 1 femelle; *d°,* II.1987, sur *Ak. longipilis* 5 mâles, 8 femelles; *d°,* Rocky Bluff (Aisén), IV.1987, sur *Ph. xanthopygus* 2 femelles.

E. onychius onychius est nouveau pour le Chili: cette sous-espèce avait, à vrai dire, déjà été signalée de ce pays (province de Santiago) par JAMESON et FULK (1977), mais SMIT (1987) a montré que les 2 mâles concernés constituaient un taxon inédit qu'il a décrit sous le nom d'*E. (Ichyonus) onychius deplexus.*

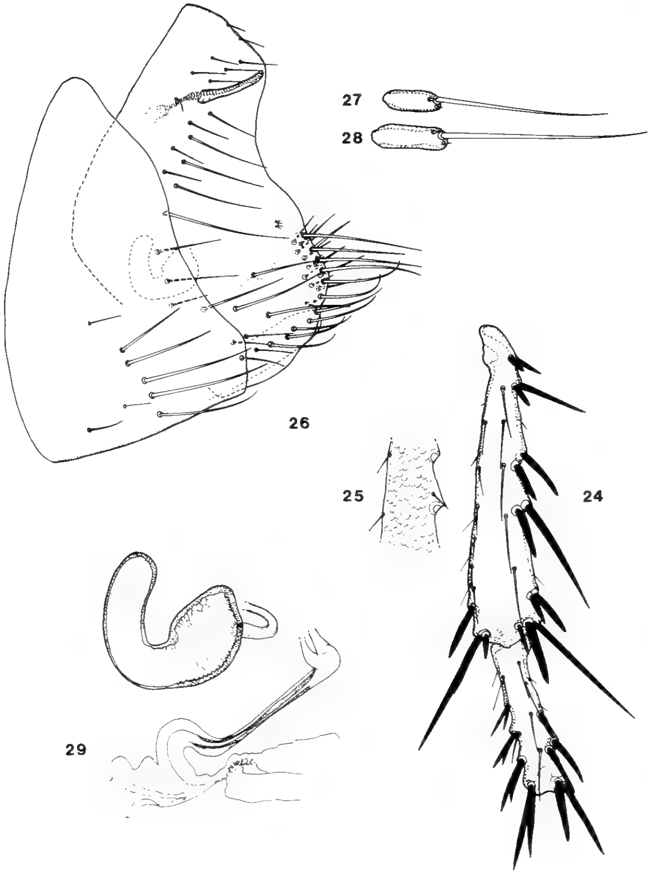
Notre matériel bien qu'appartenant sans problème à *E. onychius onychius* et ne constituant en aucune façon un taxon nouveau (segment IX du mâle, sternite VII et stylet anal de la femelle) est original: le *pseudo-hamulus* (*sensu* Smit, 1987) est atypique et évoque plutôt celui de *E. onychius angularis* Smit et Rosický, 1972: ceci est normal puisque nos stations (46°40 S) sont, à peu près, équidistantes entre celles de la forme nominative (en Argentine, 42°33 S) et celle de *E. o. angularis* (au Chili, 51°05 S).

23 — **Listronius ulus** (Jordan et Rothschild, 1923)

Matériel. 4,5 km E Coyhaique Alto (Aisén), XII.1986, sur *Reithrodon physodes* 1 mâle; *d°,* III.1987, sur *Akodon longipilis* 2 mâles, 2 femelles, sur *Auliscomys micropus* 1 femelle; Coyhaique, Reserva Nacional Coyhaique (Aisén), III.1987, sur *Ak. olivaceus* 2 femelles dont la femelle néallotype).

Listronius ulus est, apparemment, une très rare espèce, puisque connue seulement par le mâle holotype, récolté en 1919 à Leleque (Chubut) Argentine. Cette puce est donc nouvelle pour le Chili et notre matériel (3 mâles, 5 femelles) nous permet de décrire l'autre sexe. L'un de ces exemplaires est désigné comme neallotype. Les coordonnées de l'holotype et du neallotype sont, respectivement: 42°28 S, 71°06 W et 46°40 S, 72° W.

Redescription: mâles parfaitement concordant avec les dessins de JORDAN et ROTHSCHILD (1923), JORDAN (1942) et SMIT (1987).



FIGS 24 à 29.

Listronius spp.; 24: *Listronius ulus* (Jordan et Rothschild, 1923), femelle néallotype, tibia et tarse III (1^er^ segment); 25: *♂*, face interne du tibia III; 26: *♂*, sternite VII et segment VIII; 27: *♂*, stylet anal; 28: *L. fortis*, stylet anal d'une femelle de Coyhaique (Aisén); 29: *L. ulus*, néallotype, spermathèque, *ductus bursae* et départ des *ducti*.

Alors que les mâles de *L. ulus* et *L. fortis* sont extrêmement différents (à faible grossissement, les genitalia de *L. fortis* évoque plus *Chaetopsylla* qu'un *Rhopalopsyllidae*!), il est curieux de constater l'extrême similitude entre les femelles de ces deux espèces, espèces que nous avons d'ailleurs trouvées en sympatrie (Coyhaique, Reserva Nacional Cohaique, Campamento Municipal Trapananda).

Comme chez le mâle, en dehors des segments génitaux, le caractère essentiel pour séparer *L. ulus* de *L. fortis* (nous ne parlerons pas de *L. robertsianus* qui semble endémique des îles Malouines (ou Malvinas, ou Falklands) est la forme (plus grêle) des pattes et surtout leur chétotaxie, tout particulièrement celle du tibia et du premier segment du tarse III. SMIT (1987) a opposé dans ses dessins les tibias du mâle de *L. ulus* et de la femelle de *L. fortis:* les différences entre les deux espèces sont en fait moins marquées, car il y a là (et on pouvait s'en douter en comparant les tarses mâles et femelles de *L. fortis*), un caractère sexuel secondaire. Chez les mâles, les soies marginales externes de la marge postérieure sont plus courtes que chez les femelles. Tibia III chez *L. ulus* (fig. 24) montrant 6 encoches d'insertions de soies contre 7 chez *L. fortis.* Segment I du tarse III (fig. 24) avec 4 encoches sur la marge antérieure et 3 sur la marge postérieure chez *L. ulus* (contre, respectivement, 6 et 4 chez *L. fortis*). Face interne du tibia III (fig. 25) montrant la même structure écailleuse que chez la femelle de *L. fortis* (*cf.* SMIT, 1987).

Segments terminaux ne permettant pas sur un exemplaire isolé l'identification spécifique, bien que le lobe basal du sternite VIII semble plus marqué chez *L. ulus* (fig. 26) que chez *L. fortis* (*cf.* par exemple SMIT, 1963). De même le stylet anal semble plus court (fig. 27) que chez *fortis* (fig. 28).

Spermathèque (fig. 29) légèrement différente de celle de *L. fortis* (comparer avec la figure 8 de Smit, 1963). *Ducti* ne semblant pas montrer de caractères spécifiques.

Dimensions (insectes montés): mâles et femelles, 2,3 mm.

24 — **Listronius fortis** (Jordan et Rothschild, 1923)

Matériel. Coyhaique, Reserva Nacional Coyhaique (Aisén), III.1987, sur *Akodon olivaceus* 2 femelles; Puerto Ibáñez, El Salto (Aisén), II.1987, sur *Ak. longipilis* 3 mâles.

L. fortis est une espèce nouvelle pour le Chili. Elle n'était signalée que d'Argentine occidentale: provinces de Chubut (JORDAN et ROTHSCHILD, 1923), du Rio Negro (SMIT, 1963) et de Neuquén (BEAUCOURNU et ALCOVER, 1990).

Toutes les captures dont l'hôte est connu proviennent d'*Akodon* spp. Il est vraisemblable qu'il s'agit, comme pour la précédente d'une espèce nidicole bien que l'arc pleural soit normalement développé.

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A phylogenetically interesting sphaeriodesmid milliped from Oaxaca, Mexico (Polydesmida: Sphaeriodesmidae)

by

Richard L. HOFFMAN *

With 15 figures

ABSTRACT

Proeilodesmus mecistonyx is described as a new genus and species of Sphaeriodesmidae, from a single specimen taken in a cave in north-eastern Oaxaca. The species is remarkable in that several character systems, upon the derived state of which the family has been diagnosed, are represented by the generalized condition producing, in effect, a sphaeriodesmid not completely modified for rolling into a sphere. The concurrence of these exceptional plesiomorphies creates a possible model for an ancestral level stage in the sphaeriodesmid clade. The opportunity afforded by description of this animal is taken to review the postulated affinities of the families Sphaeriodesmidae and Holistophallidae, in the light of a species which partly bridges the hitherto substantial hiatus between the two.

INTRODUCTION

Recently I received, through the kindness of Professor J. M. Demange (Muséum National d'Histoire naturelle, Paris) a small collection of millipeds from Mesamerican caves, included amongst material sent to him for identification by M. Villy Aellen, Director of the Muséum d'Histoire naturelle, Genève. As is often the case with cave material picked up incidentally, most of the specimens thus coming to my hand were females and immatures, but one vial commanded attention as at first glance it appeared to contain a large male pterodesmine cryptodesmid. Examination replaced one surprise with another and greater: the specimen proved to be a sphaeriodesmid, but one not

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modified for volvation! Despite this apparent contradiction in terms, there can be no doubt, as will be made clear in subsequent drawings and descriptions, that the animal embodies enough basic characters of the Sphaeriodesmidae that no other placement can be defended. Concomittantly, the family definition obviously must be modified to accommodate this new and disjunct member. In fact, one might even justly use the term "charter member" in a phylogenetic sense, as the species has obviously retained, in many facets of its body form, the image of what the ancestor of modern sphaeriodesmids may have looked like.

I wish to express at this point my best thanks to Professor Demange and Professor Aellen for the opportunity to study one of the most interesting diplopods that has come before me in many years. The advantage of his familiarity with sphaeriodesmids ensured authoritative review of an early draft of the manuscript by Dr. William A. Shear.

Family **Sphaeriodesmidae**

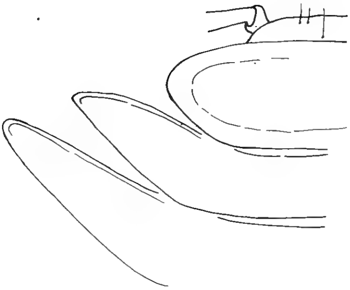
In its present context, the Sphaeriodesmidae contains about 90 nominal species organized into 15 genera and three subfamilies. Although outlying species occur in eastern United States, Panama, and the West Indies, the metropolis of the family is clearly in southern Mexico and Guatemala, which are inhabited by dozens of species referable to the nuclear genus *Sphaeriodesmus* in its present, very inclusive sense. In commenting on this melange, SHEAR (1986: 81) has noted fantastic diversity in gonopod structure despite essential identity of body form among its components (eventual resolution of this "genus" into smaller and more homogenous taxa is almost inevitable).

The relationship of the family to other volvant polydesmidans is reviewed briefly in a concluding essay. For the immediate context, it can be noted that its internal classification is by no means satisfactory and will not be until a painstaking revision of all known (and a host of still undescribed) species can be accomplished. The most recent arrangement (HOFFMAN, 1980) proffers three subfamilies, Sphaeriodesminae, Desmoninae, and Bonetesminae, probably a far-too conservative concept. Possibly cyclodesmines, presently merged into the nominate subfamily, warrant restoration to some level of recognition, and quite likely *Bonetesmus* represents disjunction of family-group importance. In some ways, the new genus described here is different enough from all of the foregoing to require higher category status. I believe however, that pending comprehensive revisionary study, a moratorium can be invoked against piecemeal alterations. In particular, a reevaluation of the structure of *Cyclodesmus,* based on fresh topotypic material, would appear to be of primary importance.

FIGS 1-8.

Structural details, Proeilodesmus and Sphaeriodesmus.

Figs 1-5: *Proeilodesmus mecistonyx,* n. sp. — 1: Epicranium and first three body segment, left side, dorsal aspect. — 2: Right paranota of segments 2-6, lateral aspect, with distribution of surface striation indicated in part on segment 4. — 3: Left side of segments 17-20, dorsal aspect, separation of paranota represents natural condition and not the result of flattening. — 4: Posterior view of left side of midbody segment, showing extreme elongation of paranota (much greater than diameter of body cavity) and shape of legs. — 5: Tarsal claw of midbody leg. — Figs 6-8: *Sphaeriodesmus neglectus* Carl. — 6: Left side of segments 17-20, posterodorsal aspect, showing compaction of segments typical of sphaeriodesmids generally. — 7: Posterior aspect of left side of midbody segment, showing proportions and paranota and legs, for contrast with Fig. 4. — 8: Tarsal claw of midbody leg. All figures drawn X15 except 5 and 8, X90.



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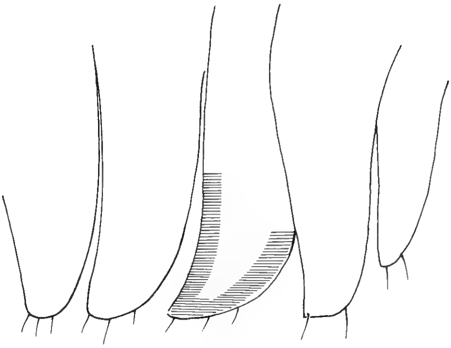

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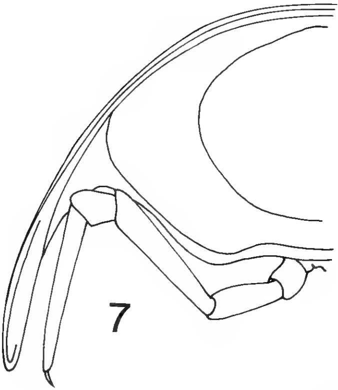

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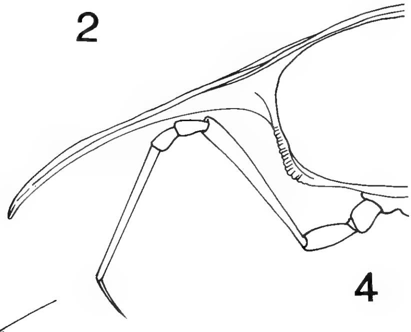

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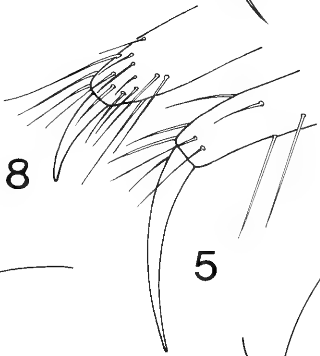

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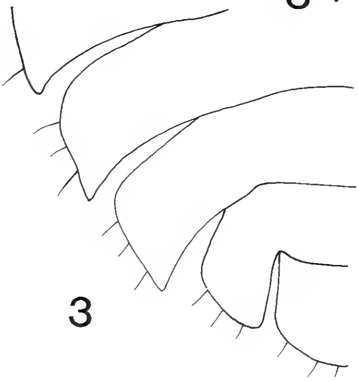

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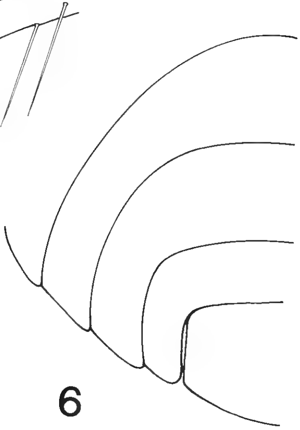

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The large number of species and frequent abundance of individuals suggest that the ability to enroll into a compact sphere conferred a distinct advantage on these animals. Under its security, they seem to have accepted the constraints of a successful body plan and specific differentiation is largely limited to secondary sexual characters (where, to be sure, it is indulged with a vengeance). Volvation has been adopted by a number of millipeds (glomerids, sphaerotheriids, sphaeriodesmids, cryptodesmids, oniscodesmids, and doratodesmids) as well as terrestrial isopods, all utilizing variations on a few basic structural modifications. Generally the dorsum is arched and its convexity is continued ventrad by distally narrowed paranota or comparable tergal extensions; the ultimate tergum (telson, epiproct) is broadened and flattened; the last five or six segments tend to be reduced and notably compacted; and one or two of the anteriormost terga (2nd-5th) are laterally expanded and provide a circular basis against which the apices of other terga abut during volvation. In glomerids, sphaerotheriids, and oniscoid isopods, the effect produced is that of a sphere; in polydesmoids the form is of a flattened sphere or disk.

To enhance enrolling, most segmental prozona are strongly reduced, and metasterna just large enough to accomodate the coxal sockets. Ozopores tend to be very small or lost entirely. Even though most sphaeriodesmids (and other polydesmidan volvants) are epigaean, they have foresaken the almost universal ordinal trait of bright color patterns and are uniformly white, gray or testaceous beneath the usual surface coating of soil particles.

An impression of the tergal modifications in sphaeriodesmids may be gained by inspection of figures 6 and 7, drawn from *S. neglectus* Carl, a fairly representative species. All members of the family have the same general body form (aside which anterior paranota are enlarged), and even though they have obviously evolved from some kind of ''normal'' polydesmidan ancestor, heretofore no approximation of that prototype was known to be extinct or fossilized. Now *Proeilodesmus* goes a long way to bridging the gap. But in addition to retention of some obvious plesiomorphies, the genus has developed a few innovations peculiar to itself, perhaps the result of adaptation to cave life. It is interesting to speculate that, in becoming a troglobiont at some remote time, the organism may have escaped whatever selective pressures provided the option of volvation to its epigaean relatives.

Proeilodesmus gen. nov.

Type species: *P. mecistonyx,* sp. nov.

Diagnosis: A sphaeriodesmid genus with the following distinctive characters: labrum with five small median teeth; anterior paranota only slightly modified, 4th slightly larger than others, 3rd and 5th subequal; paranota of mid-body segments remarkably wide and

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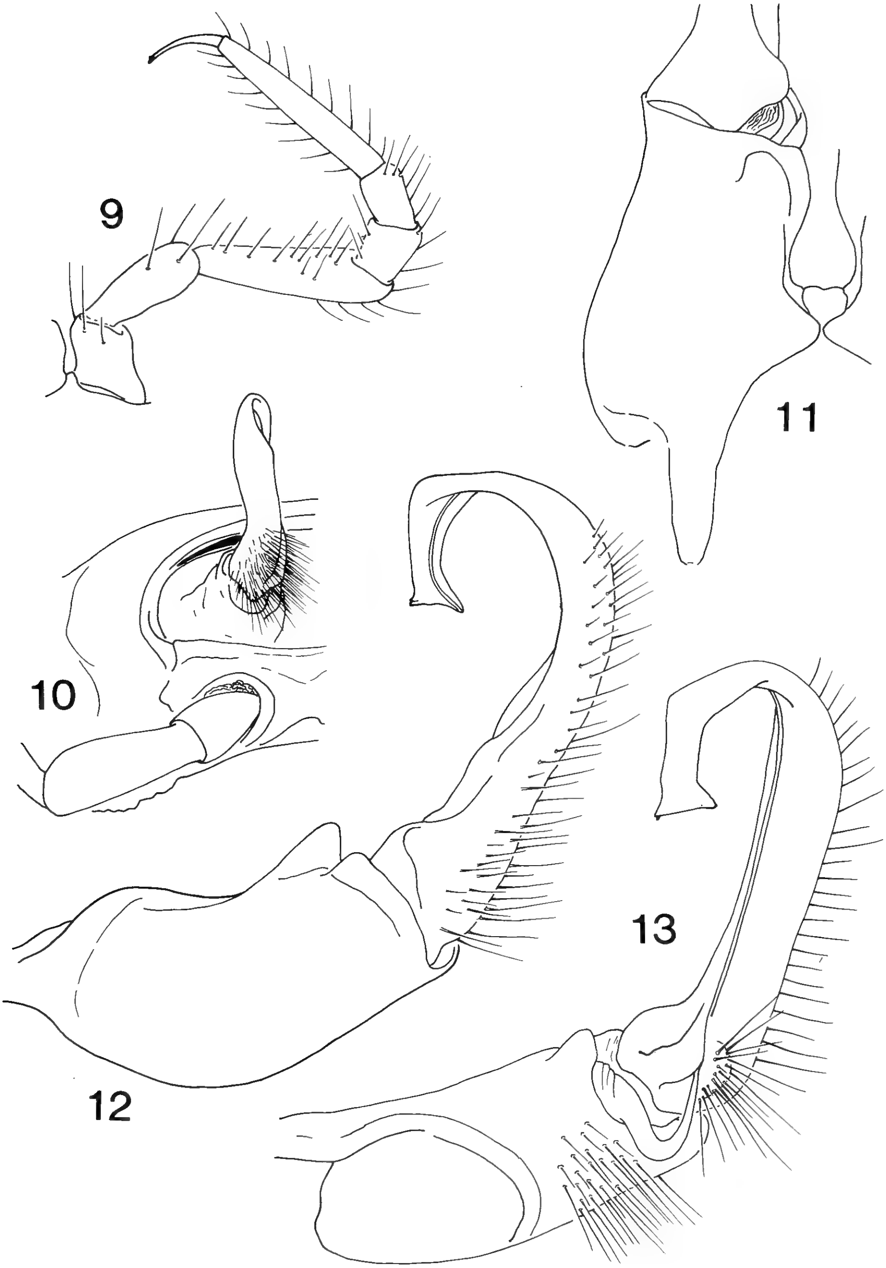
FIGS 9-13.

Secondary sexual characters, *Proeilodesmus.*
Fig. 9. — Right leg of first pair of male, aboral aspect, showing elongated and totally unmodified podomeres. — 10: Right side of 7th segment, ventral aspect, showing gonopod *in situ.* — 11: Coxa and base of telopodite of left gonopod, dorsal aspect, showing mesal parasternal lobes, and sternum (stippled). — 12: Right gonopod, lateral view. — 13: Left gonopod, mesal view. Figs 9 and 10 drawn X15, 11-13 X90.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only slightly deflexed ventrad (Fig. 4), the apices only slightly exceeding level of sterna; paranota of posteriormost segments overlapping only at base; lateral edges of all paranota with three setae; tarsal claw as long as prefemur (twice as long as in sphaeriodesmids of equal size); all legs, including first pair, remarkably long and slender.

Gonopods (Figs 10-13) of typical sphaeriodesmid form. Coxae dorsoventrally compressed, with small supracannular apophysis, a small median sternal remnant present, but coxae also in contact through large medially projecting lobes near base of apodemes; paracannular setal field present. Telopodite attached at about 45° angle, prefemoral region elongate, only slightly enlarged proximally, distal third of telopodite recurved proximomedially through just over a half-circle; prostatic groove mostly visible in mesal aspect. First pair of legs long and slender, without modifications. Characters of female unknown.

Distribution: Known only from the type locality of the single included species, in northeastern Oaxaca, Mexico.

Name: Composed of the greek terms *pro* – (in the sense of early or antecedent) + *eilos* (able to roll up) + *-desmus,* a common suffix used in this order; literally meaning a sphaeriodesmid not yet able to enroll.

Proeilodesmus mecistonyx sp. nov.

Figures 1-5, 9-13

Material: Male holotype (Mus. Genève), from the cave "Nita Diplodocus" at Cerro Rabon, northeast of Huautla de Jimenez, Oaxaca, Mexico; U. Widmer and Philippe Rouiller leg. (Cerro Rabon Project), 21 March 1987. Cf. JEANNIN, 1987.

Diagnosis: With the characters of the genus.

Holotype: Adult male, body at present fragmented but approximately 24 mm in length, widths of selected metaterga as follows: 1-4.0 mm; 2-6.1 mm; 3-8.0 mm; 4-9.3 mm; 6-9.5 mm; 8-9.7 mm; 12-9.6 mm; 14.9.3 mm; 16-8.3 mm; 18-6.0 mm.

Surface of head smooth and polished; labrum slightly prolonged ventrad with a vague labroclypeal offset each side, median labral notch with five equal-sized small teeth. 2-2 epicranial setae, 1-1 interantennal setae, frontal setae sparse, numerous and irregular, lower labral setae about 10-10, upper series about 6-6, each set in a distinct fovea. Interantennal isthmus broad. Epicranial suture distinct but not impressed. Antennae long and slender, articles in decreasing length order $2=3=5>6>4$; articles 5 and 6 with small distal field of short sensory setae, four terminal sensory cones; setation uniform and sparse, setae about as long as basal diameter of each article. Surface of gnathochiliarium essentially glabrous. Mandibles larger than normal for sphaeriodesmids, and individual filaments of the pectinate lamellae longer.

Collum (Fig. 1) transversely-ellipsoidal, nearly flat, anterior edge slightly bisinuate, posterior edge evenly arcuate, forming obtuse angle with anterior at laterial ends; anterior edge with fine but distinct margin, and a single short seta at each end; a submarginal transverse row of 3-3 longer setae in front of posterior edge.

Second segment transverse, its paranota directed anteriad and evenly acuminate to lateral apices, only outermost smooth, median areas slightly convex, all margins compressed and flattened. Four marginal setae at each end, and two transverse series of hairs middorsally, about 6-6 medially and ca. 12-12 near posterior edge. Third segment much larger than second, paranota broader and about the outer half decurved; surface as described for 2nd, apical setae reduced to one or two at each end, and middorsal series also reduced. Subsequent segments with paranota increasingly deflected ventrad (shape of anterior paranota, Fig. 2) and prozona more strongly developed, becoming about half as long as metazona middorsally. Anterior rim of paranota continued directly across dorsum as posterior edge of prozona.

Paranota laterally acuminate and subacutely rounded back to about 9th segment, thereafter becoming more truncated and increasing in length; by 14th segment an angular posterior corner is developed. Anterior edges smooth, posterior minutely granulose-denticulate. Form of posterior paranota (Fig. 3).

Epiproct broad, truncate, galeate, the two pairs of apical setae displaced to the underside of the median rim. Two other pairs of setae remain on the edge. Paraprocts smooth and shiny, indistinctly divided by an oblique depression, no well-defined mesal rims evident. Hypoproct large, in the form of an equilateral triangle with rounded angles, its length about equal to exposed commissure of paraprocts, its surface smooth and nearly flat; paramedian setae small, set on edge.

Podosterna small, slightly elevated, with transverse impression, narrow, intercoxal space about a third of coxal length, decreasing gradually posteriad until coxae of last pair are in contact. Prozona narrowed ventrad, almost obliterated midventrally but produced into low blunt lobe on each side just above base of anterior legs. Sides of metazona smooth, notably flared posteriad just laterad to coxal base. Stigmata unusually small, forming minute subpyriform tubercles atop each coxal condyle. Legs (Fig. 4) very long and slender, femora and tarsi especially elongated, all podomeres sparsely set with long setae; tarsal claws (Fig. 5) twice length normal for the family, even on 1st pair of legs.

Anterior legs and sterna unmodified, legs of 1st pair (Fig. 9) without trace of femoral gland or process. Gonopod aperture small and oval (Fig. 10), posterior edge produced into an elevated thickened rim. Gonopods (Figs 11-13) as described in the generic heading, of the basic generalized sphaeriodesmoid form.

Remarks: Attention is directed to an unusual structural feature not observed by me in other diplopods although perhaps overlooked. As roughly indicated in Fig. 2, the periphery of each paranotum of *Proeilodesmus,* as seen with low magnification, appears to be very finely longitudinally striated. The ''striations'' extend quite to the caudal edge in all cases, but appear not to attain the anterior edge because of the abrupt upturn of the anterior margin. In fact the ''striations'', as can be seen when the paranota are backlighted, are really fine internal tubules which originate with the parenchymatous internal core of the paranota and extend to the surface on the entire periphery. If not secretory in nature, I cannot imagine what the function of such a pervasive system might be.

Commentary on the superfamily Sphaeriodesmoidea

As implied in the group name, sphaeriodesmids have specialized in volvation and their structure represents a suite of concommittant apomorphies. Heretofore the affinities of the family have been only marginally addressed, and a definite position has yet to be established.

In his first attempt at classification of polydesmidans, O. F. Cook (1895) admitted the single family Oniscodesmidae (with the genera *Cyphodesmus, Oniscodesmus,* and *Sphaeriodesmus*) to include the volvating taxa then known to him. Only a short time later, he (Cook 1896: 28) recognized four families: Oniscodesmidae, Cyclodesmidae, Cyrtodesmidae, and Doratodesmidae for volvant species without making any useful contrasts between them and with only the remark that *Oniscodesmus* showed ''a very evident relationship to the Pterodesmidae [a cryptodesmoid group not adapted for volvation].'' In his definitive paper of 1898, after the examination of many pertinent species, COOK noted that the ability to enroll the body had probably evolved independently at least three times within the Polydesmida, and defined five families to reflect this popular convergence. Most of Cook's distinctions were based on details of body form, and although the monophyly of his taxa can hardly be disputed, he offered no insights on their affinities with other families of the order.

Appearing during the same year, ATTEMS' first classification of polydesmidans (1898: 266) recognized three coordinate groups Cyrtodesminae, Oniscodesminae, and Sphaeriodesminae, the first containing *Cyrtodesmus* and *Doratodesmus* (amongst others), the second embraced *Oniscodesmus* and four other genera, and the third was composed of *Cyclodesmus, Sphaeriodesmus,* and *Cyphodesmus.* It was not a bad arrangement for the time, but curiously, in the main textual accounts of these groups appearing in the next year (ATTEMS 1899: 378-392) the first two subfamilies were combined under *Oniscodesmus* without a word of explanation.

R. I. POCOCK (1909) followed the precedents set by COOK and accepted his 1898 classification except for reducing Cyrtodesmidae and Cyclodesmidae to subfamily status under Oniscodesmidae and Sphaeriodesmidae respectively. Pocock also supported the view (credited to Brolemann) that sphaeriodesmids might be related to chelodesmoids whereas oniscodesmids were possibly derived from the polydesmoid group. However, in his magisterial classification of polydesmidans BROLEMANN (1916) did not develop such lines of affinity, and grouped all volvating species into the single family Oniscodesmidae which was divided into Oniscodesminae and Sphaeriodesminae. Referring to this family in its broad sense, BROLEMANN (1916: 559) noted that the gonopods were basically the same as in chelodesmoids, which is, however, strictly true only for the sphaeriodesmid components. In his 1916 ''Essai'' BROLEMANN did not speculate on the actual relationships of these taxa, aside from ranking the Oniscodesmidae in his suborder Leptodesmidi. Brolemann's disposition was accepted in toto by ATTEMS in the organization of the Polydesmida as he treated it in 1938-40. A step backward was taken by VERHOEFF in 1941, who suggested the Oniscodesmidae and Sphaeriodesmidae be placed in a new suborder Sphaerosomita (an exaltation of parallel evolution!).

The most recent consideration of the situation was embodied in my recent (HOFFMAN 1980) ''Classification of the Diplopoda'' in which sphaeriodesmids are retained in the suborder Chelodesmidea in close association with the Holistophallidae, whilst the other families (Oniscodesmidae, Cyrtodesmidae, Doratodesmidae) are placed at various locations within the Polydesmidea. Owing to space constraints, no extended documentation was provided, but a few points were adduced to justify union of sphaeriodesmids and holistophallids in the same superfamily.

Present knowledge of *Proeilodesmus* permits renewed attention to this latter relationship as well as, of course, position of the genus within the phylogeny of sphaeriodesmids.

Although the Sphaeriodesmidae is a familiar taxon, frequently treated in taxonomic literature, the Holistophallidae remains little-known and under-appreciated. Originally proposed in 1909 to contain only its monotypic type genus, the family was absorbed into the Rhachodesmidae by BROLEMANN (1916) and by ATTEMS (1926, 1940), and did not emerge with a separate identity until the appearance of the checklist of Mesamerican millipeds (LOOMIS, 1968) which admitted the Holistophallidae with no fewer than seven genera. During the early 1960's, the family had come under scrutiny and considerable revisionary work (unfortunately still incomplete) was accomplished. The main characters were worked out and several genera placed in the Rhachodesmidae were re-allocated for the list which I provided Mr. Loomis.

The major diagnostic features of the family include: 1. drastic displacement of the stigmata from the normal supracoxal location to a new position in the stricture (or even into the prozonum!), 2. development of large, horizontal paranota which are unusually thin toward the edges with only minimal peritrematic expansion, 3. the occurrence of prominent tarsal scopulae on legs 1-5 of males in most if not all genera. The body form adheres closely to a basic groundplan in all known species (about a dozen described, an equal number still unpublished), but male genitalia display an astonishing diversity ranging from perfectly ''normal'' chelodesmoid patterns to prodigies of condensation in which only a monarticular remnant persists. Except for this monotonous fidelity in body form despite all these gonopodal permutations one could, in consistency with the standards of other families, set up a new family for nearly every holistophallid genus.

In proposing a superfamily to include both holistophallids and sphaeriodesmids (HOFFMAN, 1980), I turned for justification to two points: one being shared form of the gonapophyses (very long, slender, and tubular), the other the remarkable similarity of gonopod structure in several holistophallid and sphaeriodesmid genera. *Tunodesmus* was cited as an example of this character, and it is appropriate at this time to present tangible verification. The gonopod drawings given in the original description of *Tunodesmus* (CHAMBERLIN, 1922) show only the gonopods *in situ,* which reveals a minimum of information. I give here (Fig. 14) an illustration of the left gonopod of *T. orthogonus* made from mesal aspect, and believe that any systematist familiar with sphaeriodesmids would readily accept this drawing as one made from a species related, e.g., to *S. iglesia* SHEAR (1986: fig. 40) or *S. neglectus* CARL (1902: fig. 107). The body of the animal, of course, is endowed with the usual holistophallid attributes and could not possibly be mistaken for anything else. Species of other holistophallid genera, moreover, have gonopod telopodites of a simpler formation, comparable to sphaeriodesmids of the *S. mexicanus* group.

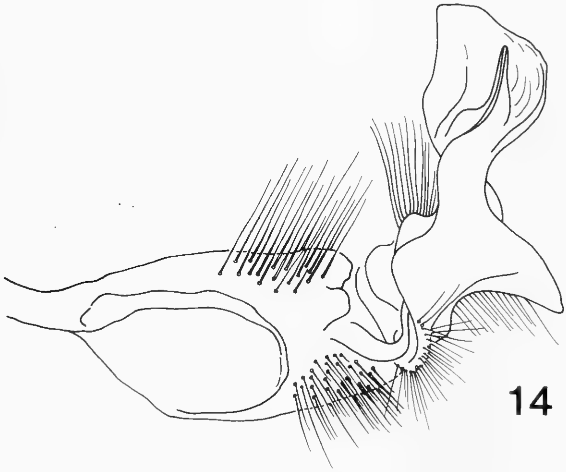

FIG. 14.

Tunodesmus orthogonus Chamberlin, left gonopod of male holotype to show overall similarity in proportions and setation with the gonopods of many species of sphaeriodesmids.

As already noticed in a preceding heading, the gonopods of *Proeliodesmus* adhere closely to a simple generalized form (Figs 11-13) such as occurs in many species of *Sphaeriodesmus*. While there is no evidence that even such flagrant plesiomorphy as the body form of *Proeilodesmus* correlates with the polarity of any other character system, perhaps it is justifiable to suppose as did SHEAR (1986: 82) that the simpler telopodite structure may be generalized within *Sphaeriodesmus*. If so, it could be construed as a symplesiomorphy of that genus, *Proeilodesmus,* and the Holistophallidae, antedating the divergence of the two families as do also the synapomorphic gonapophyses.

The fact that the range of Holistophallidae coincides with the area of greatest diversity of sphaeriodesmoids is instructive and suggests that the two originated from some common ancestor in the same general region, possibly during an archipelagic phase of Mesamerican landscape (perhaps along with the present-day Rhachodesmidae).

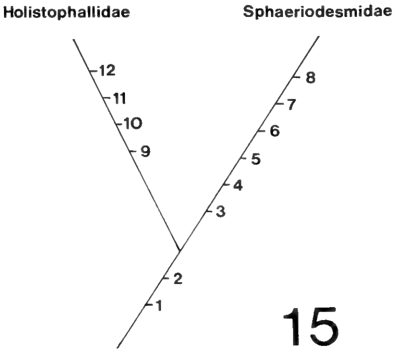

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TABLE 1.

Character states in the Sphaeriodesmoidea

Character	Plesiomorphic state	Apomorphic state
Gonocoxal setation	Sparse, irregular, absent	1. Profuse fields
Gonapophyses	Absent or small	2. Long, tubular
Prozonal size	Equal to metazona	3. Greatly reduced
Ozopores	Present	4. Reduced or absent
Paranotal shape	Normal for order	5. Strongly acuminate laterad
Shape of epiproct	Subtriangular, acute	6. Quadrate, broadened
Size of stigmata	Normal for order	7. Reduced, circular
Anterior paranotal shape	None evidently enlarged	8. 4th & 5th enlarged
Location of stigmata	Normal position	9. Displaced into stricture
Subtarsal scopulae, male legs	Absent	10. Present, legs 1-7
Gonosternum	Present	11. Absent
Shape of gonaperture	Oval, moderate in size	12. Reduced or enlarged

To encapsulate the foregoing commentary in the form of a cladogram, I provide the following summary of important characters and their relative polarity, the numbers corresponding to those entered on the tree itself (Fig. 15). As usual, estimation of generalized versus derived status has been done chiefly from ''out-group'' comparison. Since current knowledge of milliped classification does not permit identification of a ''sister-group'' taxon of equivalent rank to the Sphaeriodesmoidea, the out-group has been the chelodesmoid families perceived to be basically unspecialized, e.g., Chelodesmidae, Xystodesmidae, Oxydesmidae collectively. No clues are presently available from the area of ontogenic changes.

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Palpigrades endogés de Singapour et de l'Indonésie

par

Bruno CONDÉ *

Avec 9 figures

ABSTRACT

Endogean Palpigrades from Singapore and Indonesia. — A collection of twenty one specimens from Singapore (4), Java (13) and Bali (4) collected by D. H. Murphy in 1968, and by B. Hauser and C. Lienhard in 1987 included four species of the genera *Eukoenenia* (1), *Koeneniodes* (2) and *Prokoenenia* (1). The latter, with a new species, is recorded for the first time from the Oriental Region.

INTRODUCTION

L'examen de 21 spécimens de Palpigrades récoltés d'une part dans la réserve naturelle de Bukit Timah, sur l'île de Singapore (D. H. Murphy, 1968), d'autre part au Jardin botanique de Bogor, à Java, et dans une forêt primaire de Bali (B. Hauser et C. Lienhard, 1987), a permis de les répartir entre 3 genres et 4 espèces. La seule espèce appartenant au genre *Eukoenenia* et les deux espèces se rapportant au genre *Koeneniodes* étaient déjà connues, la première de Sumatra, les autres de Madagascar, La Réunion et Maurice. Le genre *Prokoenenia,* représenté par une espèce inédite, était encore inconnu dans la région malaise, mais présent à Madagascar, quoique l'espèce malgache n'ait apparemment que de lointaines affinités avec celle que nous décrivons ici et avec les espèces de l'Ouest du continent américain, dont l'une, *P. wheeleri,* est le type du genre.

Il nous est agréable de souligner que le professeur D. H. Murphy (Université de Singapore) a généreusement confié au Muséum de Genève une série de prélèvements intégraux de la faune du sol, par Berlese, qui font partie du projet de recherches exhaustives sur

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Bukit Timah qu'il mène depuis des décennies. Nous lui devons ainsi les premiers Palpigrades de Singapore.

Le matériel est déposé au Muséum d'Histoire naturelle de Genève, Département des Arthropodes et Insectes II. Je remercie très chaleureusement M. J. Chevelu pour l'exécution minutieuse des nombreuses figures illustrant cette note, d'après les originaux à la mine de plomb.

Eukoenenia lienhardi Condé, 1989

Singapore. Bukit Timah Nature Reserve, forest litter, 7.XII.1968-2, D. H. Murphy leg.: 1 femelle adulte, 1 immature *A*. Bukit Timah Nature Reserve, forest litter, 7.XII.1968-4, D. H. Murphy leg.: 1 immature *A*. Bukit Timah Nature Reserve, forest litter, "Slope II soil", D. H. Murphy leg.: 1 mâle juvénile *C*.

Java: Sar-87/31. Jardin botanique de Bogor: dans la partie «Nursery» sous les dalles du chemin entre les serres, 260 m, 28.XI.1987, C. Lienhard leg.: 1 femelle adulte.

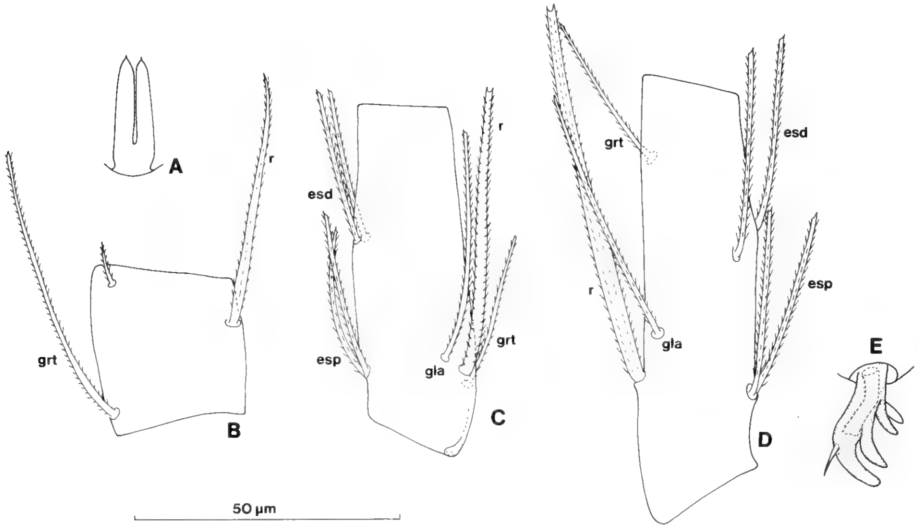

Fig. 1.

Eukoenenia lienhardi Condé, 1989, femelle adulte de Singapore: *A*. Organe frontal médian. *B*. Basitarse 3 de la patte locomotrice I. *C*. Basitarse de la patte locomotrice IV. — *Koeneniodes frondiger* Remy, 1950, femelle adulte de Bali: *D*. Basitarse de la patte locomotrice IV. *E*. Phanère en crochet du sternite V. Explication des lettres dans le texte.

Longueurs. — Femelles adultes (les nombres en deuxième position se rapportent à la femelle de Bogor). Corps: 0,60 mm (contracté); 1 mm, sans flagelle; bouclier prosomien: 0,22; 0,21 mm; basitarse IV: 67,5; 67 µm; B/bta: 3,25; 3,18.

Mâle juvénile. Corps: 0,88 mm (extension moyenne), fragment de flagelle (5 articles); bouclier prosomien: 0,20 mm; basitarse IV: 57,8 µm; B/bta: 3,46.

Immatures *A*. Corps: 0,68; 0,75 mm; bouclier prosomien: 0,17; 0,18 mm; basitarse IV: non mesurable; 41 µm; B/bta: 4,39 [1].

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[1] Dans la description du spécimen de Sumatra (1989:422, ligne 18), lire: basitarse IV:47 µm.

Femelles adultes.

Prosoma. — L'organe frontal médian, mal vu chez l'holotype, est allongé (environ 2 fois ¾ aussi long que large), à branches subrectilignes terminées en une courte pointe; il ressemble, en plus allongé (2,8 à 2,4), à celui de l'immature A représenté dans la description originale (1989, fig. 6, A). Deux éléments aux organes latéraux; 3 chez la femelle de Bogor. A la patte I, la longueur de la soie raide du basitarse 3 est presque 1 fois ½ et environ 1 fois ⅓ celle du bord tergal de l'article (t/r = 0,65; 0,76); cette soie est insérée au voisinage du ⅓ distal du bord sternal (s/er = 1,46; 1,67). A la patte IV, la soie grêle tergale (*grt*) est plus courte que la soie grêle latérale (*gla*). Le rapport t/r est 1,26 et 1,35; le rapport t/er est 3,10 à gauche et 3,75 à droite à Singapore, et 2,65 seulement à Bogor. Ces valeurs sont comparées, dans le tableau I, à celles des holotypes de *E. lienhardi* et de *E. singhi.*

Tableau I.

	bta 3, I t/r	 s/er	bta IV t/r	 t/er	gla/grt
E. lienhardi ♀ holo.	0,71	2,32	1,29	3,10	1
E. lienhardi ♀ Sing.	0,65	1,46	1,26	3,10-3,75	1,46
E. lienhardi ♀ Bogor	0,76	1,67	1,35	2,65	1,22
E. singhi ♀ holo.	0,76	1,55	1,34	2,35	1

Les nouveaux spécimens s'écartent de l'holotype de *lienhardi* par la position plus distale du phanère *r* du basitarse 3, comme chez *singhi.* Le spécimen de Bogor se rapproche aussi de *singhi* par le t/r du basitarse IV. Enfin, le spécimen de Singapore partage avec celui de Bogor l'inégalité des phanères *gla* et *grt.*

Opisthosoma. — Le premier volet génital présente une échancrure médiane non vue chez le type où cette région est aplatie et sans doute déformée; une paire de lobes subtriangulaires, à pubescence relativement longue et espacée, prolongent le volet de part et d'autre de l'échancrure, au-delà de l'insertion des phanères a_1 et a_2; les positions et les longueurs relatives des soies a_1-a_3 de la rangée distale sont conformes à la description originale, de même que les sclérifications du 2ᵉ volet et du réceptacle séminal. En VI, les poils glandulaires sont au moins 1 fois ½ aussi longs qu'en V (1,66; 1,52). Segments IX à XI avec respectivement 15 $(7+s+7)$, 11 $(5+t+5)$ et 12 $(5+t+5+s)$ phanères (Singapore), et 14 $(6+t+6+s)$, 11 $(5+s+5)$ et 10 $(5+5)$ (Bogor).

Mâle C.

Prosoma. — Deuto-tritosternum avec 2/6 soies. Chélicères avec 8 dents aux mors. Au basitarse IV, t/r = 1,23; t/er = 2,57. Le phanère *grt* est plus court que *gla*, comme chez l'adulte; une *esp* présente (6 phanères en tout).

Opisthosoma. — Volets génitaux correspondant à la variante n° 2 (Condé 1984*b*). Poils glandulaires VI/V = 1,75.

Immatures A.

Prosoma. — Organe frontal médian typique (cf. Condé 1989, fig. 6, A). Deuto-tritosternum avec une paire de soies. Chélicères avec 7 dents. Au basitarse IV, t/r = 1,14; t/er = 2,40 (3 phanères en tout).

Opisthosoma. — Poils glandulaires VI/V = 1,77. Les massifs glandulaires des sternites IV à VI sont très distincts (non vus chez le spécimen de la localité typique).

DISCUSSION. — Le complexe *singhi-lienhardi* est fondé sur 4 femelles adultes provenant de stations éloignées les unes des autres: Varanasi (Benarès) au nord-est de l'Inde pour l'holotype de *singhi,* Sumatra pour l'holotype de *lienhardi,* Java (Bogor) et Singapore. Les divergences notées entre les trois spécimens adultes rapportés à *lienhardi* peuvent être du niveau de la population, peut-être de la sous-espèce. Il est impossible d'en décider sur un matériel aussi restreint. Les limites de *singhi* et de *lienhardi* devront aussi être précisées; la forme de l'organe frontal médian et les sclérifications du 2^{e} volet génital sont, pour l'instant, les meilleurs critères discriminants.

Koeneniodes frondiger Remy, 1950

JAVA: Sar-87/31. Jardin botanique de Bogor: dans la partie «Nursery» sous les dalles du chemin entre les serres, 260 m, 28.XI.1987, C. Lienhard leg.: 3 femelles adultes, 1 femelle juvénile *B.*

BALI: Sar-87/37. Ubud: «Monkey Forest», sous les pierres du talus au-dessus de la route traversant le bois, 200 m, 30.XI.1987, B. Hauser leg.: 4 femelles adultes.

Longueurs. — Femelles adultes. Corps (5 spécimens mesurés): 0,77-1,05 mm (extension moyenne); bouclier prosomien (5 spécimens mesurés): 0,24-0,26 mm; basitarse IV: 82,5-86 μm, $\bar{X} = 84{,}5$ μm (n = 7); B/bta: $\bar{X} = 3$.

Femelle juvénile. Corps: 0,69 mm (extension moyenne), sans flagelle (0,51-1 mm, stade L_2 de REMY 1952, 1958, 1960); bouclier prosomien: 0,20; basitarse IV: 62,5 μm; B/bta: 3,2.

Femelles adultes.

Prosoma. — La chétotaxie du deuto-tritosternum comporte 9(5/4) 4 fois, 10(5/5) 2 fois ou 12(5/2/5) phanères, disposés en gros sur deux rangées formées de 5 ou 4 éléments avec, une fois, une rangée intermédiaire de 2. Les types (Madagascar) présentaient la formule 5/4; REMY (1952, 1958) a ensuite mentionné la formule 5/5 chez une femelle adulte de La Réunion puis, à Maurice, les formules 4/4 et 6/5 chez 2 individus, en plus des dispositions déjà décrites.

TABLEAU II.

formules	4/4	5/4	5/5	5/2/5	6/5
nombre de cas (n = 18)	1	10	5	1	1

Les caractères du basitarse IV sont très exactement ceux des types. Soie raide égale aux 5/6 du bord tergal de l'article (t/r = 1,16-1,23; $\bar{X} = 1{,}19$ (n = 7), insérée vers le ⅓ proximal de l'article (t/er = 2,73-3,38; $\bar{X} = 3{,}02$ (n = 7). La soie grêle tergale a émigré vers l'extrémité distale de l'article, comme chez *E. deharvengi* Condé et *E. berndi* Condé.

Opisthosoma. — Le premier volet génital porte, sur sa région médiane, de courtes soies à base renflée, au nombre de 5 (5 cas), 6 (1 cas) ou 8 (1 cas), disposées de façon asymétrique, sauf chez le spécimen à 6 soies (deux rangées longitudinales de 3). Une variation plus limitée a été constatée par REMY (1950, 1952, 1958): 7 soies chez les types et un spécimen de La Réunion, 6 ou 7 chez ceux de Maurice.

Le tube exsertile du IV^{e} segment porte, chez tous, 4 rangées de 4 gros phanères apicaux. Les crochets du V^{e} segment ont tous 5 dents, la proximale plus étroite et plus transparente que les suivantes, la distale en forme d'épine aigüe. Ces formations, bien décrites par REMY (1950) et d'aspect constant, ne peuvent être confondues avec les crochets plus simples de *K. berndi* Condé, 1988, l'espèce la plus voisine.

Femelle B.

Prosoma. — Six soies deuto-tritosternales sur deux rangs de 3, l'antérieur formant un V largement ouvert, le postérieur rectiligne; 6 est le nombre le plus souvent observé à Madagascar (2 individus sur 2), La Réunion (17 sur 26) et Maurice (66 sur 87).

Chélicères avec 8 dents à chaque mors; 7 selon REMY (1958: 97), chez le seul spécimen étudié de ce point de vue; c'est une anomalie ou un lapsus, ce nombre ne correspondant pas à une espèce ayant 9 dents aux chélicères des adultes.

Basitarse IV: 62,5 µm; t/r = 1,12; t/er = 2,55. Les autres phanères sont *gla,* légèrement distal à *r*; *grt,* le phanère le plus court et le plus distal; une *esp* et les deux *esd* (6 phanères en tout).

Opisthosoma. — Volet génital avec 3 soies à base renflée sur la région médiane (3 ou 4 le plus souvent, parfois 5, exceptionnellement 6 dans le matériel de Remy).

Ce spécimen est inséparable du juvénile de Papouasie nommé *K.* cf. *frondiger* (CONDÉ 1981: 942); en revanche, il s'écarte un peu des spécimens des stades correspondants de *K. berndi* par les valeurs des rapports t/r et t/er (tableau III).

TABLEAU III.

	bta IV (µm)	Prg	t/r	t/er
K. frondiger	62,5 (84,5)	3-6	1,12 (1,19)	2,55 (3,02)
K. cf. *frondiger*	66,5	3	1,29	2,55
K. berndi ♀ B	64,5-76,2 (86)	2-3,6	1,32-1,47 (1,45)	1,92-1,97 (2,25)
K. berndi ♂ C	61,8	2	1,53	2,03

Les nombres entre parenthèses se rapportent aux femelles adultes. Prg = phanères à base renflée du volet génital.

Koeneniodes frondiger a été décrit de Madagascar, d'après les deux femelles adultes récoltées sur Nosy-Mamoko, dans la baie d'Ampasindava, près du puits du village, puis retrouvé sur Nosy-Be, dans le cimetière d'Ambanoro (2 ♀ ad., 10 juvéniles) (REMY 1960). L'espèce s'est avérée être le Palpigrade le plus commun à La Réunion (REMY 1952) où 112 des 145 spécimens déterminés lui appartenaient, peuplant les jardins et les parcs, les villages, les champs de canne à sucre, mais aussi des biotopes un peu moins altérés. A Maurice, la situation est encore plus frappante, puisque 233 individus sur les 239 déterminés appartiennent à cette espèce qui semble particulièrement plastique et dont la présence sur les deux Mascareignes pourrait bien avoir pour origine des activités humaines, comme l'a souligné REMY (1958) qui n'a trouvé aucun Palpigrade, ni dans les forêts ni dans les landes de ces îles, où les stations apparemment favorables ne manquaient pas et abritaient une grande variété d'autres micro-Arthropodes.

La patrie de *Koeneniodes frondiger* est ainsi fort douteuse, puisque les localités malgaches elles-mêmes (village, cimetière) appartiennent à l'environnement humain. Le site de Bali qui est une forêt primaire pourrait éclairer l'origine orientale de cette espèce, à laquelle j'ai déjà rapporté (cf. ci-dessus) un juvénile de Papouasie. Le fait que l'espèce la plus voisine, *Koeneniodes berndi* Condé 1988, soit de Bornéo (Sabah) est également en faveur d'un foyer d'évolution situé en Asie tropicale, plutôt qu'à Madagascar.

Koeneniodes madecassus Remy, 1950

JAVA: Sar-87/31. Jardin botanique de Bogor: dans la partie «Nursery» sous les dalles du chemin entre les serres, 260 m, 28.XI.1987, C. Lienhard leg.: 1 femelle juvénile *B* avec *Eukoenenia lienhardi* et *Koeneniodes frondiger*.

Longueurs. — Corps: 0,94 mm (extension), sans flagelle (0,75-0,88 mm, REMY 1952); bouclier prosomien: 0,23 mm; basitarse IV: 57,5 µm; B/bta: 4.

Prosoma. — Un seul élément à chaque organe latéral. 10 + 10 soies de longueurs moyennes sur le bouclier. Les 3 soies deuto-tritosternales sur un V à peine marqué. Chélicères avec 8 dents à chaque mors.

Basitarse IV plus court que le tibia correspondant (92/121). La soie raide (*r*) légèrement plus longue que le bord tergal de l'article (98/92, t/r = 0,93) (très légèrement plus courte chez le type) et insérée au milieu de ce bord (t/er = 1,93-2), comme chez le type. Les autres phanères sont *gla* et *grt,* de longueurs subégales, le premier proximal à *r,* le second inséré au même niveau, et les deux *esd* (5 phanères en tout).

Opisthosoma. — Volet génital conforme à la description de REMY (1952: 75-76, figs 3 et 4), sauf la présence de 3 soies submédianes, au lieu de 2 (4 + 3 + 4); il possède en outre deux paires de très courtes soies au bord interne de l'échancrure apicale. 3 + 3 soies épaisses au sternite V (2 + 3 chez REMY). Cinq soies grêles du sternite VI (4 chez REMY), environ 2 fois plus longues que les phanères du sternite V, et beaucoup plus grêles. Segments VIII avec 5 + *s* + 5, IX à XI avec 4 + 4 phanères chacun.

Koeneniodes madecassus a été décrit de Madagascar, d'après une femelle adulte d'Hellville (Nosy-Bé), prise au pied d'une borne-fontaine; un juvénile des environs d'Ambanja, trouvé près de la pompe d'une féculerie est mentionné, mais non décrit. L'espèce fut retrouvée sur La Réunion (REMY 1952) à Saint-Joseph, Saint-Denis, Sainte-Rose et au Bois Blanc (23 individus, dont 9 femelles adultes, 3 femelles juvéniles (*B*) et 11 immatures *A*), dans des lieux habités ou dans des cultures (cours de cases, jardins, champs de canne, bord de canal etc.). Elle est présente aussi à Maurice (1 femelle adulte, 1 femelle juvénile (*B*), 3 immatures *A*), au Jardin botanique de Pamplemousses, à Trianon et Réunion, généralement en compagnie de *K. frondiger.* A La Réunion, *K. madecanus* est beaucoup plus abondant dans l'arrondissement du Vent (21) que dans celui Sous-le-Vent (2) où les chutes annuelles de pluie sont notablement moins importantes, tandis que *K. frondiger* se rencontre avec à peu près la même fréquence dans les deux zones. Les densités relatives des deux espèces sont, de toute façon, très éloignées l'une de l'autre: 23/112 à La Réunion et 5/233 à Maurice. Dans le présent matériel, *K. madecassus* est aussi en minorité (1/8) par rapport à *K. frondiger.*

L'origine géographique de *K. madecassus* qui est présent aussi sur Sri Lanka (Peradeniya, Galle, REMY, 1961) suscite les mêmes remarques que celle de *K. frondiger,* à cette différence près que si ses biotopes dans la région madécasse appartiennent aussi à l'environnement humain, sa nouvelle station indo-malaise en fait également partie.

Prokoenenia javanica n. sp.

JAVA: Sar-87/30. Jardin botanique de Bogor: dans la partie «Nursery» sous les dalles du chemin entre les serres, 260 m, 28.XI.1987, B. Hauser leg.: 2 femelles adultes (holotype et paratype), 1 femelle juvénile *B*. Sar-87/31. Jardin botanique de Bogor: idem, C. Lienhard leg.: 1 mâle adulte (paratype), 1 immature *A*. Ont été laissés en alcool, sans traitement éclaircissant, un mâle et une femelle adultes [1].

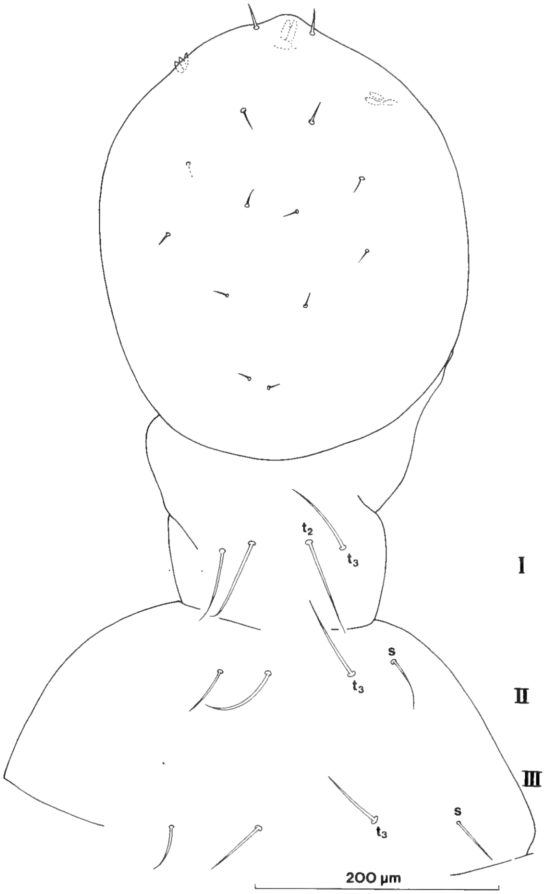

FIG. 2.

Prokoenenia javanica n. sp., femelle adulte holotype. Bouclier prosomien et trois premiers tergites. Explication des lettres dans le texte.

Longueurs. — Femelles adultes (les nombres en deuxième position se rapportent au paratype). Corps: 1,55 mm (extension), sans flagelle; 1,30 mm, flagelle: 1,55 mm; bou-

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[1] Les très gros phanères glandulaires de l'opisthosome de la femelle sont visibles sous la binoculaire et permettent une discrimination des sexes.

clier prosomien: 0,37; 0,35 mm; basitarse IV: 148; 150,5 µm; patte IV à partir du tibia: 0,42; 0,42 mm; B/bta: 2,50; 2,32; bta/ti: 0,97; 0,90.

Mâle adulte. Corps: 1,25 mm (extension moyenne), sans flagelle; bouclier prosomien: 0,32 mm; basitarse IV: 145 µm; patte IV à partir du tibia: 0,43 mm; B/bta: 2,20; bta/ti: 0,96.

Femelle juvénile. Corps: 0,92 mm (extension moyenne), sans flagelle; bouclier prosomien: 0,30 mm; basitarse IV: 121 µm; patte IV à partir du tibia: 0,35 mm; B/bta: 2,48; bta/ti: 0,96.

Immature *A*. Corps: 0,73 mm, sans flagelle; bouclier prosomien: 0,22 mm; basitarse IV: 74,5 µm; patte IV à partir du tibia: 0,24 mm; B/bta: 3; bta/ti: 0,93.

Femelle holotype.

Prosoma. Organe frontal médian trapu, un peu plus de 2 fois aussi long que large (2,3); ses branches, à bords latéraux légèrement convexes, peu atténuées vers l'apex qui présente une pointe minuscule; la base est courte, égale au ¼ environ de la longueur totale de l'organe. Organes latéraux comprenant 3 éléments dont la forme générale rappelle, en un peu plus petit, celle des branches de l'organe médian.

Bouclier avec 7 + 7 soies courtes, sauf celles des deux paires antérieures qui sont environ 2 fois plus longues que les autres (10-11/5-6). Segment libre sans t_1, les intermédiaires (t_2) environ 1 fois ¼ (1,22) aussi longs que les latéraux (t_3). Huit soies deuto-tritosternales (4 + 4) en une rangée transversale.

Chélicères avec 8 dents à chaque mors. Trois longs phanères, barbelés sur leurs ⅔ distaux, sur l'article basal.

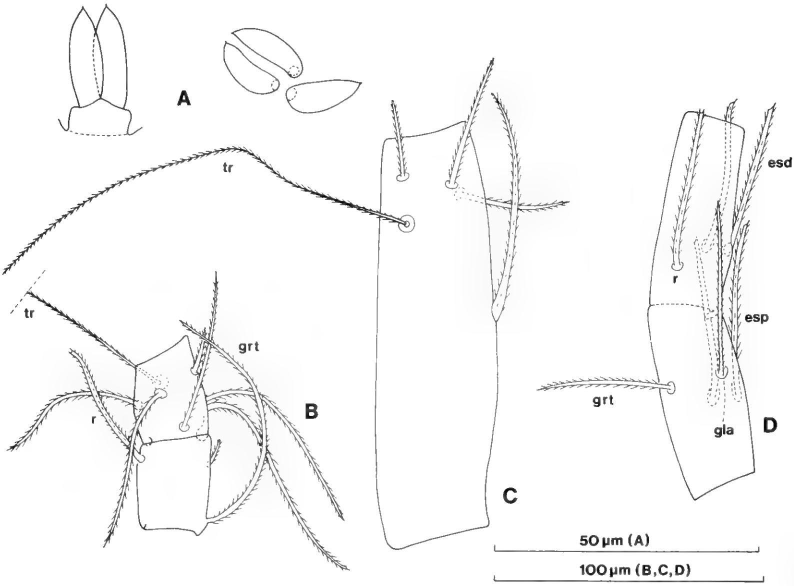

Fig. 3.

Prokoenenia javanica n. sp., femelle adulte holotype: *A*. Organe frontal médian et organe latéral. — *B*. Basitarses 3 et 4 de la patte locomotrice I. *C*. Tibia de la patte locomotrice IV. — *D*. Basitarse de la patte locomotrice IV. Explication des lettres dans le texte.

Pédipalpes et pattes locomotrices I et IV. Longueurs relatives des articles (moyenne des appendices droits et gauches, sauf en IV): pédipalpes: ti = 74, bta 1 = 38,5, bta 2 = 28,5, ta 1 = 17, ta 2 = 19, ta 3 = 37,5; pattes I: ti = 79, bta 1 + 2 = 70,5, bta 3 = 19,5, bta 4 = 21,5, ta 1 = 16,5, ta 2 = 18, ta 3 = 56; pattes IV: ti = 81, bta = 79, ta 1 = 26, ta 2 = 37.

Aux pattes I, la soie raide du basitarse 3 est 1 fois ¼ aussi longue que le bord tergal de l'article (56/43, t/r = 0,76) et est insérée vers le ⅕ distal du bord sternal (30/38, s/er = 1,26), son apex atteignant environ la moitié de la longueur du tarse 1.

Aux pattes IV, le basitarse est à peine plus court que le tibia (79/81, bta/ti = 0,97) et, mesuré au niveau de *r,* environ 5 fois ⅓ aussi long que large; la soie raide est presque 2 fois ½ plus courte que le bord tergal de l'article (69/170, t/r = 2,46) et est insérée aux ⅗ distaux de ce bord (102/170, t/er = 1,66), son apex dépassant à peine le bord distal de l'article. Les 6 autres phanères sont la soie grêle tergale, dressée et courte (*grt,* 56), la soie grêle latérale (*gla,* 75) et les 2 paires de soies sternales (*esp, esd*), les éléments de chaque paire insérés au même niveau et subégaux (72, 65). Une pseudo-articulation, située vers le milieu de l'article, se trouve bien en deçà de l'insertion de *r.*

Le tibia porte, non loin de l'apex, une trichobothrie tergale dont la tige est sensiblement plus longue (ca 190/170) que l'article.

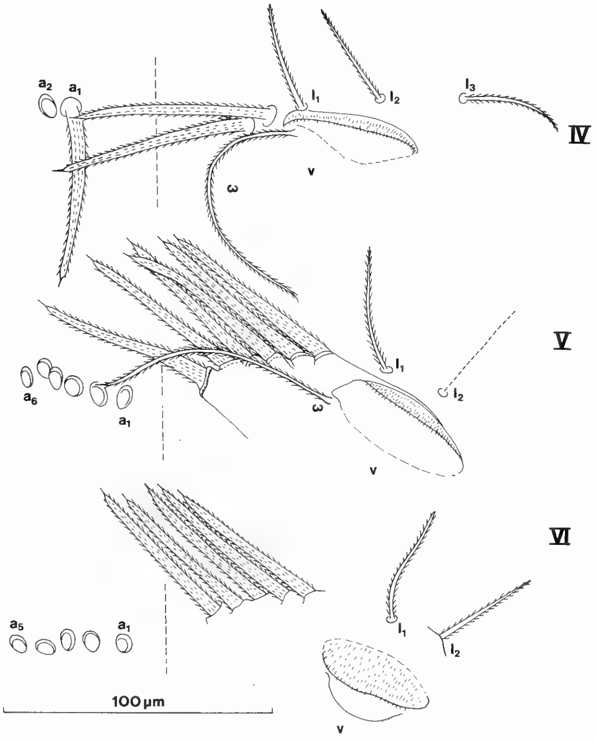

FIG. 4.

Prokoenenia javanica n. sp., femelle adulte holotype. Sternites IV à VI de l'opisthosome. Explication des lettres dans le texte.

Opisthosoma. — Tergites II à V avec une paire de poils assez forts (t_3), comprise entre une paire de soies grêles (s); en II, ils sont un peu plus courts que leur écartement (31/35); de III à V, ils sont légèrement plus courts qu'en II et environ 2 fois plus courts que leur écartement ($\bar{X} = 25,3/53,6$); en VI, un phanère asymétrique (t_1), très légèrement plus court que les autres (22/26), se trouve sur la moitié gauche du tergite; en VII, une paire de t_1 est présente, ceux-ci étant un peu plus courts que leur écartement (27/33) et que les t_3 (31). Segments VIII à XI avec respectivement 11 $(5+s+5)$, 8 $(4+4)$, 7 $(3+s+3)$ et 7 $(3+t+3)$, les poils médians et, en IX, les submédians sternaux, plus courts.

Premier volet génital avec 11 + 11 soies ($a4$ présents); à la rangée distale, les phanères sont de longueurs légèrement croissantes de $a1$ à $a4$, avec un écart plus marqué entre $a2$ et $a3$ (20, 23 et 31, 35). Le deuxième volet porte sur chaque moitié 2 phanères distaux (y, z) et un phanère proximal (x), ce dernier inséré à l'extrême bord latéral et paraissant ainsi appartenir au sternite (comme son homologue $st1$ des juvéniles *B* et *C*), plutôt qu'au volet; la longueur diminue un peu de x à z (43, 40, 34). Deux orifices glandulaires submédians ($g1$), très visibles, à la face interne du premier volet; le deuxième volet présente deux groupes d'orifices glandulaires ($g2$), un antérieur de 3, disposés plus ou moins en triangle, et un postérieur de 4 en ligne.

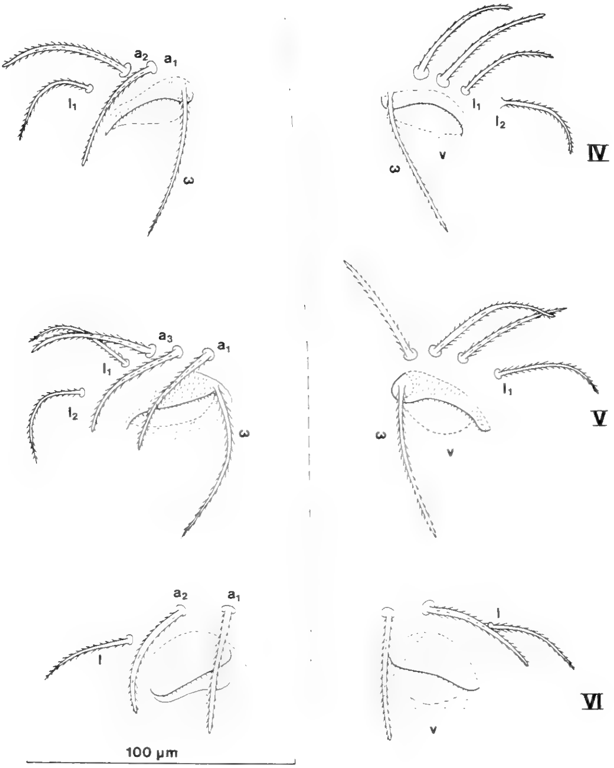

FIG. 5.

Prokoenenia javanica n. sp., mâle adulte paratype. Sternites IV à VI de l'opisthosome. Explication des lettres dans le texte.

Le réceptacle séminal présente, en coupe optique, des contours rappelant la forme d'une cloche dont l'orifice serait antérieur; de chaque côté, une grosse formation sacciforme dont la surface est ridée et la structure compacte, apparemment sclérifiée, en particulier au niveau d'une corne latéro-antérieure. De telles formations sont inconnues chez les autres genres de Palpigrades. Il en est de même de l'apodème en T renversé dont les branches latérales, beaucoup plus longues que le pied, parcourent les lobes du deuxième volet et qui est solidaire, à la jonction des branches latérales, d'un apodème en croissant (*ac*), plus volumineux et plus profond, creusé d'une étroite lumière qui conflue avec la cavité creusée dans la partie centro-médiane de l'apodème en T.

Les soies grêles latérales (*st*2, *st*3 des autres genres) sont dédoublées (*st*2 à *st*5), elles le sont aussi en IV et V (*s*1 à *s*4); en VI, il n'y en a que 3 (*s*1 à *s*3).

Sternite IV avec deux groupes parasagittaux de 2 très grosses soies glandulaires (a_1, a_2) dont la longueur est sensiblement égale à l'écartement; l'alignement de leurs fines barbules donne l'impression de cannelures longitudinales; une soie plus grêle et plus longue que toutes les autres, à base légèrement bulbeuse (ω) s'insère au voisinage de a_2, au bord interne de l'orifice de la vésicule exsertile (*v*); 3 soies latérales ordinaires (l_1 à l_3) forment une rangée transverse en avant de l'orifice de la vésicule. Au sternite V, les groupes parasagittaux sont proches l'un de l'autre, chacun comprenant 6 soies glandulaires (a_1 à a_6) de même calibre que celles du sternite IV, mais un peu plus courtes ($\bar{X} = 71/79$) et une soie ω; deux soies latérales seulement (l_1, l_2). Au sternite VI, chaque groupe compte 5 soies (a_1 à a_5), un peu plus courtes que les précédentes ($\bar{X} = 65$); le phanère ω fait défaut, de même que la soie l_3. En VII, une rangée de 3 + 3 soies ordinaires, celles de la paire parasagittale plus courtes.

Femelle paratype.

Prosoma. — Sept soies deuto-tritosternales (3 + 1 + 3) en une rangée transversale. Au basitarse IV, t/r = 2,60; t/er = 1,62.

Opisthosoma. — Segments VIII à XI avec respectivement 14 (7 + 7), 8 (4 + 4), 8 (4 + 4) et 7 (3 + *t* + 3), le poil médian tergal (XI) et les poils submédians sternaux (VIII-X) plus courts et grêles que les autres.

Sternites IV, V et VI avec respectivement 2 + 2, 7 + 7 et 7 + 7 très grosses soies glandulaires (a_1-a_2, a_1-a_7); une soie ω en IV et V, comme chez l'holotype.

Le flagelle, long de 1,55 mm est sensiblement égal à la longueur du corps en extension et presque 4 fois et demi aussi long que le bouclier prosomien (4,4). Il est formé de 16 articles, après l'anneau basal, dont les longueurs relatives sont les suivantes: 16 (anneau), 38, 42, 45, 45, 38, 49, 44, 54, 44, 47, 60, 67, 55, 63, 60, 34. Un verticille apical de longues épines aux articles I à III, V, VII et IX.

Mâle paratype.

Prosoma. — Huit soies deuto-tritosternales (4 + 4) en une rangée transversale. Au basitarse IV, t/r = 2,39; t/er = 1,62.

Opisthosoma. — Segments VIII à XI avec respectivement 11 (5 + *s* + 5), 8 (4 + 4), 7 (3 + *s* + 3) et 7 (3 + *t* + 3) poils.

Aire génitale portant 23 + 23 phanères, répartis entre les 3 volets qui en ont respectivement 13 + 13, 5 + 5 et 5 + 5. Le premier volet présente une rangée antérieure de 2 + 2 poils (a_1, a_2), en arrière de laquelle chaque lobe porte 5 phanères proximaux et 6 distaux parmi lesquels 2 sont des fusules (f_1, f_2), à base non dilatée; les canaux évecteurs (c_1, c_2), de faible calibre, mis en évidence par le contraste interférentiel. Au deuxième volet, chaque lobe, subtriangulaire, se termine en une longue pointe et possède 5 soies, 3 distales (*a, b,* *c*) insérées au sommet d'un triangle et 2 proximales (*d, e*) sur le bord interne. Les lobes du troisième volet ressemblent à ceux du deuxième par leur forme générale subtriangulaire et leur longue pointe distale; une soie proximale (w_1) et 4 distales (w_2, *x, y, z*).

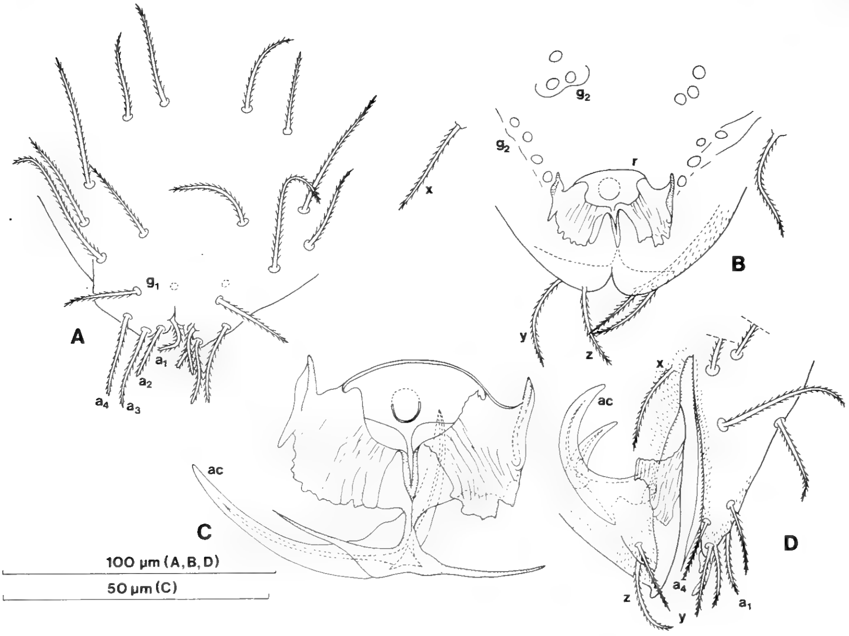

FIG. 6.

Prokoenenia javanica n. sp., femelle adulte holotype: *A*. Premier volet génital. *B*. Deuxième volet génital. *C*. Détail de la région du réceptacle séminal. Femelle adulte paratype. *D*. Volets génitaux en vue latérale; la portion moyenne du deuxième volet, représentée en coupe optique, montre les deux branches canaliculées de l'apodème en croissant et la formation sacciforme à la surface ridée. Explication des lettres dans le texte.

Remarque. Par analogie avec *Prokoenenia millotorum,* de Madagascar, chez laquelle le premier volet possède 3 paires de fusules, bien décrites par REMY (1950: 138-139), j'avais supposé (CONDÉ 1984*a*: 139) qu'il pouvait s'agir d'un caractère commun aux représentants du genre *Prokoenenia,* ce que ne permettait pas d'établir avec certitude les figures imprécises de RUCKER (*P. wheeleri*) et surtout de SILVESTRI (*P. californica*). L'aire génitale de *P. javanica* est au contraire conforme à celle de Palpigrades du genre *Eukoenenia,* à cette réserve près que tous les phanères décrits chez ce dernier sont présents simultanément.

Sternites IV à VI avec respectivement 2, 3 et 2 paires de phanères plus épais que leurs voisins qui semblent homologues aux très gros poils glandulaires décrits chez les femelles (notés a_1 . . . a_7), mais sont situés plus latéralement, au-dessus de l'orifice de la vésicule exsertile, et dont la nature sécrétoire n'est pas démontrée, car aucun massif glandulaire sous-jacent n'a été vu. A l'extérieur de ces groupes, une ou deux paires de soies plus grêles (l_1, l_2) en IV et V, une seule (*l*) en VI. En outre, une paire de phanères ω en IV et V.

Une comparaison des figures 4 et 5, reproduites à la même échelle, met en évidence le dimorphisme extraordinaire des sternites IV à VI qui pourrait faire penser à deux espèces distinctes. Toutefois, les autres caractères utilisés dans la systématique des Palpigrades ne permettent pas de séparer les spécimens des deux sexes.

Comme l'immature *A* étudié (cf. infra) présente déjà des caractères qui l'apparentent à la femelle (phanères épais, massifs glandulaires), on peut supposer, soit l'existence de deux immatures *A* différents, soit une régression des glandes et du calibre des poils au cours des stades suivants. On constate, d'autre part, que les sternites V et VI du mâle adulte ont le même nombre de phanères que ceux de la femelle juvénile.

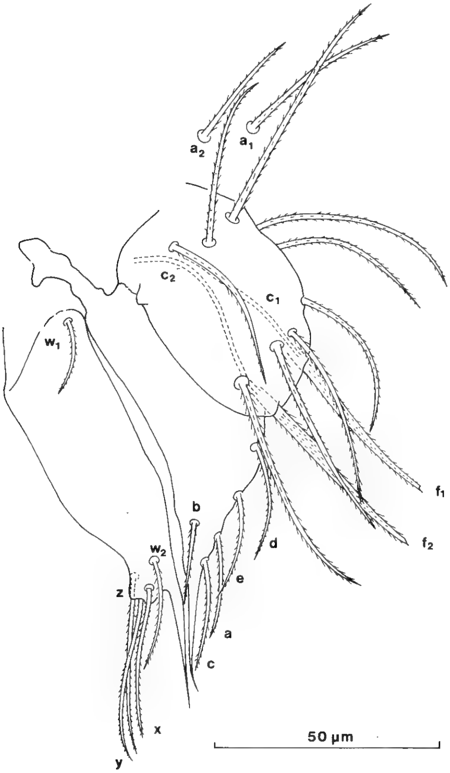

FIG. 7.

Prokoenenia javanica n. sp., mâle adulte paratype. Volets génitaux en vue latérale. Explication des lettres dans le texte.

Femelle juvénile.

Prosoma. — Trois éléments lancéolés et acuminés, environ 3 fois aussi longs que larges, à chaque organe latéral. Six soies deuto-tritosternales (3 + 3) en une rangée transversale.

Chélicères avec 8 dents à chaque mors. Au basitarse IV, t/r = 2,41 et t/er = 1,57, l'apex de *r* dépassant sensiblement le bord distal de l'article. Les 7 phanères de l'adulte sont présents, en particulier les deux *esp*.

Opisthosoma. — Volets génitaux correspondant à la variante n° 3 à 6 + 6 phanères (CONDÉ 1984*b*). Sternites IV et VI avec 2 soies glandulaires (a_1, a_2), à chaque groupe parasagittal, et sternite V avec 3 soies (a_1, a_2, a_3). Deux soies latérales (l_1, l_2) en IV et V; une seule en VI. Une soie ω en IV et V.

Segments VIII à XI avec respectivement 11 ($5+t+5$), 9 ($4+s+4$), 7 ($3+s+4$) et 7 ($3+t+3$) poils.

Immature A

Prosoma. Organes latéraux avec trois éléments lancéolés à gauche et deux à droite; une seule soie deuto-tritosternale médiane.

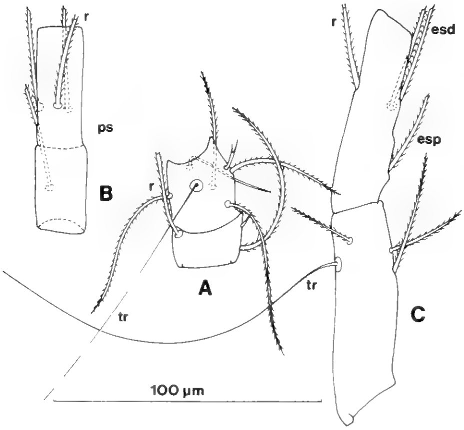

FIG. 8.

Prokoenenia javanica n. sp., immature *A: A.* Basitarses 3 et 4 de la patte locomotrice I. *B.* Basitarse IV, face dorsale, montrant des indices (rétrécissement, limite transversale faiblement marquée) de pseudoarticulation (ps). *C.* Tibia et basitarse IV. Explication des lettres dans le texte.

Chélicères avec 7 dents à chaque mors.

Aux pattes IV, le tibia porte une trichobothrie tergale dont la tige et un peu plus de 1 fois ½ aussi longue (ca 116/71) que l'article, et 3 phanères ordinaires subapicaux. Le basitarse ne présente que des indices à peine perceptibles de la pseudo-articulation observée aux stades suivants; t/r = 2,26 et t/er = 1,59, l'apex de *r* dépassant sensiblement le bord distal de l'article; une soie proximale (*esp*) et les deux soies distales (*esd*) sont présentes.

Opisthosoma. — Pas de vésicules exsertiles. Les sternites IV à VI possèdent 2 soies glandulaires (a_1, a_2) à chaque groupe parasagittal, et les massifs glandulaires sous-jacents sont déjà fort développés. Deux soies latérales (l_1, l_2) en IV. Une soie ω en IV et V. Sternite VII, avec 2 + 2 soies grêles et longues.

Segments VIII à X avec chacun 6 (3 + 3) poils, ceux de la paire latéro-tergale plus développés que les autres; XI avec 7 (3 + t + 3), le médian tergal étant le plus court. Anneau basal moins individualisé par rapport au premier article du flagelle (seul présent chez cet individu) qu'aux stades suivants.

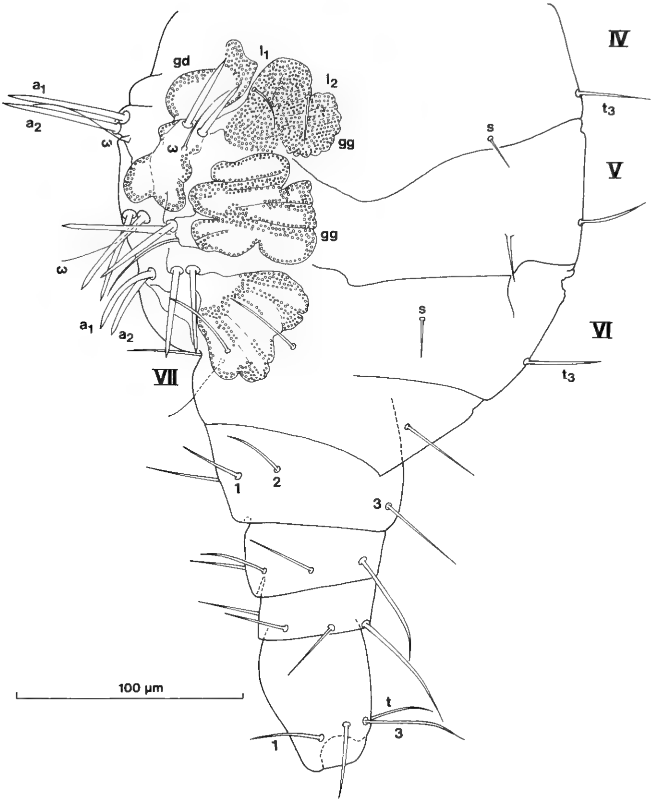

Fig. 9.

Prokoenenia javanica n. sp., immature *A*. Opisthosome à partir du segment IV, en vue latérale gauche. Etant donné l'orientation des sternites, les longueurs des phanères a_1 et a_2 sont fonction de leur direction par rapport à l'observateur. Les pubescences habituelles des phanères ont été omises pour alléger le dessin. gd, gg = massifs glandulaires droit et gauche; explication des autres lettres dans le texte.

Affinités. — La seule espèce du genre *Prokoenenia* connue de l'Ancien-Monde, *P. millotorum* Remy, 1950, de Madagascar (Nosy-Bé, dans la réserve naturelle de Lokobe, et Tuléar), est très différente de *P. javanica* n. sp. Les sternites IV à VI de l'opisthosome, identiques chez les deux sexes, ne possèdent qu'une seule paire de poils pubescents épais (notés a_1), présumés excréteurs, insérés près du bord interne de l'orifice de la vésicule exsertile, et surtout le premier volet génital du mâle porte trois paires de fusules, caractère unique chez un Palpigrade. La nouvelle espèce présente davantage de ressemblances avec les trois autres espèces nominales du genre dont les descriptions sont malheureusement trop incomplètes pour permettre une comparaison aussi détaillée qu'il serait souhaitable.

La première décrite, *P. chilensis* (Hansen, 1901) est basée sur un juvénile *B* ou *C*, l'état juvénile étant une certitude, mais le sexe demeurant incertain; ces remarques sont en désaccord avec la sentence de Hansen (*loc. cit.*: 226): «*probably immature and certainly a female*». Sans tenir compte de la chétotaxie du volet génital, représenté à trop faible échelle, *javanica* juvénile s'écarte au moins de *chilensis* par le deuto-tritosternum (3 + 3 en un rang transversal, vs 4 + 4 phanères sur 2 rangs en V) et les sternites opisthosomiens IV-VI (2 + 2,3 + 3,2 + 2 poils glandulaires, vs 3 + 3 poils «*long, robust*» à chaque sternite). Les adultes de la seconde espèce, de loin la mieux connue de celles du Nouveau-Monde (Rucker 1901, 1903; Hansen 1901; Silvestri 1913) possèdent 14 à 16 soies au deuto-tritosternum (7 à 9 en une rangée postérieure et 7 sur un V antérieur), 4 éléments aux organes latéraux du prosome, et 3 + 3 longs poils glandulaires aux sternites IV et V, le VI^{e} en étant dépourvu; aucune différence entre les sexes n'a été relevée au niveau des sternites IV à VI. *P. californica* Silvestri, 1913 enfin, la dernière espèce décrite, fut établie pour un unique mâle adulte avec 12 soies au deuto-tritosternum (8 en une rangée postérieure et 3 sur un V antérieur), 5 éléments aux organes latéraux du prosome et une paire de longues soies au VI^{e} sternite de l'opisthosome.

Quoique incomplètes, ces descriptions permettent de considérer *P. javanica* comme une espèce distincte, plus voisine de *wheeleri* et de *californica* que de *millotorum*. Certains critères, comme la présence de la trichobothrie du tibia IV et de la soie ω, ou certains détails des volets génitaux, ne peuvent être pris en compte, faute d'éléments de comparaison. Le tableau IV résume les principaux caractères différentiels des adultes des 3 espèces affines, et des juvéniles *B* et *A* de *P. javanica*.

Tableau IV

	o.l.	d.t.	IV	V	VI	t
P. wheeleri (♂, ♀)	4	14-16	3	3	0	6
P. californica (♂)	5	11	3	3	1	7
P. javanica (♀)	3	8-7	2	6-7	5-7	13-16
P. javanica (♂)	3	8	2	3	2	7
P. javanica B (♀)	3	6	2	3	2	7
P. javanica A	3 + 2	1	2	2	2	6

o.l. = organes latéraux; d.t. = deuto-tritosternum; IV-VI poils glandulaires par demi sternite de l'opisthosome; t = total des poils glandulaires des demi sternites.

La présence d'une *Prokoenenia* alliée à *wheeleri* dans la région orientale n'est pas liée au milieu artificiel d'un Jardin botanique, car on en connaît d'autres exemples en pleine nature (inédit). Elle est moins surprenante si l'on considère les ressemblances déjà constatées entre les faunes endogées de la Côte pacifique américaine et celles de l'Est asiatique.

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Présence d'*Argna biplicata* (Michaud, 1831) (Gastropoda: Pulmonata: Pupillacea) dans le sud de la France

par

Villy AELLEN et Yves FINET *

Avec 2 figures

ABSTRACT

Presence of *Argna biplicata* **(Michaud, 1831) (Gastropoda: Pulmonata: Pupillacea) from Southern France.** — *Argna biplicata* (Michaud, 1831), a rare species known mainly from Pleistocene deposits in the Alps, is reported to live in caves in Southern France. A brief systematic account of the genus *Argna* is given.

INTRODUCTION

Argna biplicata (Michaud, 1831) (en français: «maillot biplissé») est un mollusque dont la distribution en Europe s'étend de l'Espagne à la Grèce. GITTENBERGER (1985) distingue trois sous-espèces:

— *Argna biplicata biplicata* dans le sud-est de la France et en Italie, jusqu'en Toscane et dans les Appenins au voisinage de l'Adriatique (province de Pescara).
— *A. biplicata excessiva* (Gredler, 1856) dans les Alpes du nord-est de l'Italie, du sud du Tyrol et jusqu'en Carinthie autrichienne.
— *A. biplicata ulterior* Klemm, 1962 en Grèce.

La trouvaille provenant d'Espagne appartiendrait à la sous-espèce type ou à une forme proche (GITTENBERGER, 1985).

L'espèce *biplicata,* connue auparavant sous les noms génériques de *Sphyradium* Hartmann, *Coryna* Westerlund ou *Agardhia* Gude, est actuellement assignée au genre *Argna* Cossmann.

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Argna Cossmann, 1889

1844 *Sphyradium* Hartmann. Erd- und Süsswasser-Gastropoden der Schweiz: 53 (pour *S. ferrari* Porro) (non Charpentier, 1837).

1887 *Coryna* Westerlund. Fauna paläarct. Reg. lebenden Binnenconch. 3: 78, 87 (pro *Sphyradium* Hartmann non Charpentier; non *Coryna* Billberg, 1833).

1889 *Argna* Cossmann. Annu. géol. univ. Paris 5 (1888): 1104 (pro *Coryna* Westerlund non Billberg).

1911 *Agardhia* Gude. Proc. malac. Soc. Lond. 9: 361 (pro *Coryna* Westerlund non Billberg).

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Le genre *Argna* est connu depuis le Miocène (ZILCH, 1959). Il est subdivisé par ZILCH (1958; 1959: 171-172) et GROSSU & NEGREA (1968) en deux sous-genres: *Argna* s. str. (espèce type: *A. ferrari* (Porro)) et *Agardhiella* Hesse, 1923 (espèce type: *A. truncatella* (L. Pfeiffer). GITTENBERGER (1974), sur base de différences anatomiques dans l'appareil génital, considère *Argna* Cossmann et *Agardhiella* Hesse comme deux genres à part entière et séparés.

Traditionnellement inclus dans la famille des Pupillidae (THIELE, 1963), le genre *Argna* est placé dans les Argnidae par HUDEC (1965), qui propose cette nouvelle famille sur la base de la description de l'appareil génital d'*Argna bielzi* (Rossmässler, 1859).

ABRÉVIATIONS UTILISÉES: MHNG: Muséum d'Histoire naturelle, Genève; RMNH: Rijksmuseum van Natuurlijke Historie, Leiden.

DISTRIBUTION GÉOGRAPHIQUE ET HABITAT

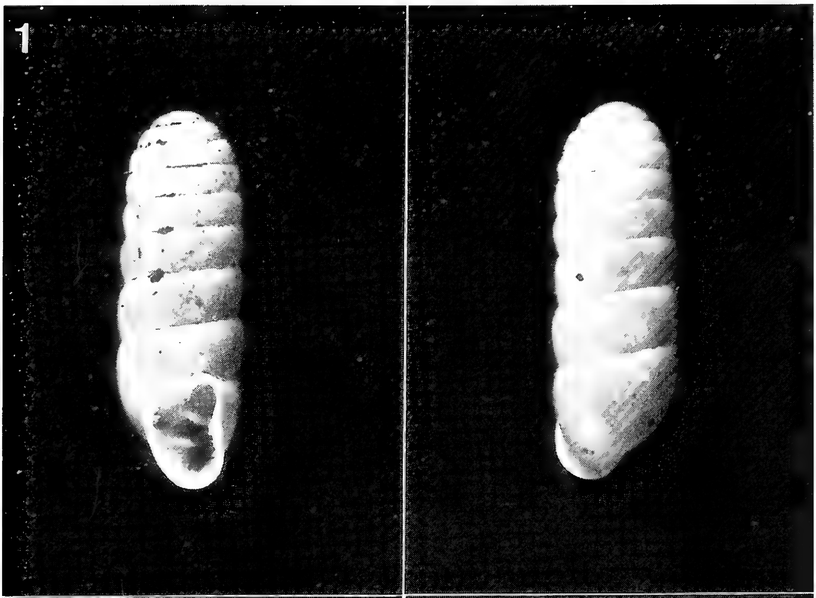
Au début de ce siècle, certains auteurs considéraient *Argna biplicata* uniquement comme une espèce fossile du Pléistocène, ne se rencontrant qu'exceptionnellement à l'état vivant dans la nature à l'heure actuelle (CAZIOT & MARGIER, 1909; CAZIOT & MAURY, 1909).

La localité type est «Lyon, dans les alluvions du Rhône»; MICHAUD (1831) indique encore «très rare. — cabinet de M. Terver, qui me l'a communiqué».

LOCARD (1894) la mentionne également dans les alluvions du Rhône à Lyon, ainsi que CAZIOT & MARGIER (1909), comme espèce quaternaire. CAZIOT (1910) la signale dans les alluvions du Loup dans les Alpes-Maritimes. KOBELT (*in* ROSSMÄSSLER, 1899), qui considère *biplicata* Michaud et *excessiva* Gredler comme deux espèces distinctes, signale la première dans le sud de la France et en Italie, et la seconde dans le Trentin et dans les Alpes de Vénétie jusqu'à Malborghetto.

En 1908, E.-G. Racovitza a récolté une coquille vide dans la grotte: baume du Colombier, Roquefort-les-Pins, Alpes-Maritimes (JEANNEL & RACOVITZA, 1910). C'est GERMAIN (1911) qui l'a étudiée et identifiée comme *Pupa biplicata*.

GERMAIN (1930) indique que les seuls individus vivants des espèces du genre *Agardhia* (=*Argna*) se rencontrent dans la région de Saint-Martin-de-Lentosque (Alpes-Maritimes, France); toutes les autres localités semblent se rapporter à des coquilles recueillies vides et «qui sont, peut-être, des formes quaternaires» (GERMAIN, 1930: 432),



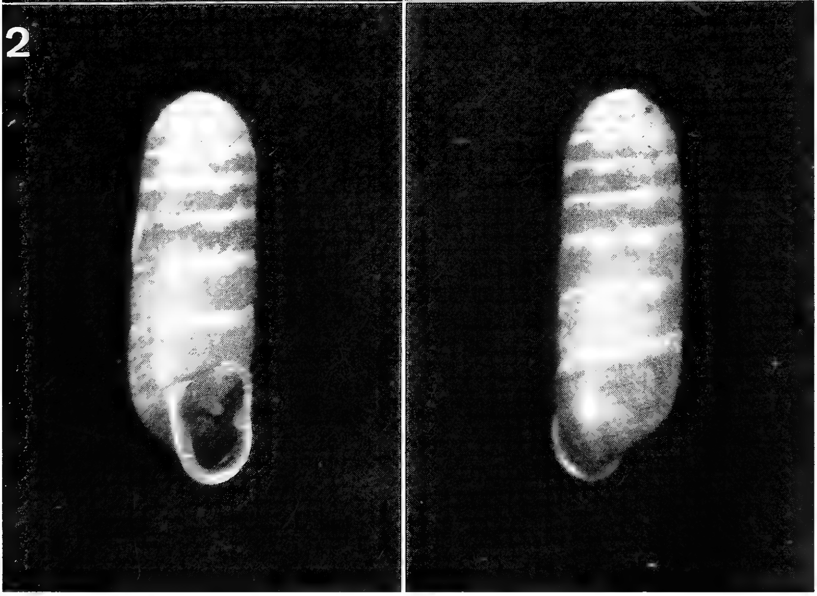


FIG. 1.

Argna biplicata (Michaud); coquille vide récoltée le 10.IX.1956 dans la grotte de la Chèvre d'Or (MHNG 988.230 - coll. V. Aellen).

FIG. 2.

Argna biplicata (Michaud); exemplaire récolté vivant le 15.IX.1988 dans la grotte de la Chèvre d'Or (MHNG 988.202 - coll. V. Aellen).

surtout présentes dans le Pliocène de la France et de l'Italie septentrionale, avec des formes analogues à celles du groupe d'*A. biplicata*; toujours selon le même auteur, les individus récoltés vivants habiteraient les stations humides, sous les pierres, parmi les mousses, ou encore dans les cavernes, principalement dans les Alpes Apuanes et les Apennins (Italie) ainsi que dans le sud du Tyrol, et plus rarement en France.

Zilch (1958) insiste également sur le mode de vie souterrain pour plusieurs espèces du genre *Argna.*

Grossu & Negrea (1968) confirment qu'*Argna* comprend des espèces vivantes actuelles, mais que leur distribution est limitée en Europe aux régions montagneuses des Alpes, des Carpathes et des Balkans; selon ces mêmes auteurs, on trouve souvent des coquilles dans les alluvions des rivières ou des torrents, avec des formes actuelles et des formes fossiles quaternaires; sans évoquer une espèce particulière, les auteurs signalent que les formes vivantes sont difficiles à découvrir et généralement récoltées à peu d'exemplaires à cause de leur mode de vie endogée ou cavernicole: «on les trouve seulement dans les régions montagneuses, où elles mènent une existence souterraine, entre les racines des plantes, en pénétrant profondément entre les fissures, et on les rencontre aussi dans des cavernes; elles préfèrent un substrat calcaire». En fait, les trouvailles dans les grottes sont très rares. Si l'on se réfère à Jeannel (1926) et à Wolf (1934-1938), seulement trois grottes sont signalées: la baume du Colombier et deux grottes d'Italie (provinces de Pise et de Reggio nell'Emilia).

DONNÉES RÉCENTES

En ce qui concerne l'espèce *Argna biplicata,* des récoltes plus récentes ont montré qu'elle pouvait se rencontrer vivante en d'autres localités que celle donnée par Germain (1930); Gittenberger (1974) mentionne l'occurrence de la sous-espèce *A. b. biplicata* (Michaud) vivante en Italie (Force di Cardeto, Alpes Apuanes, Ligurie-Toscane: RMNH 734; la sous-espèce *A, b. excessiva* (Gredler) est mentionnée vivante dans le sud de l'Autriche (près d'Ober Federaun, Alpes de Villach, Carinthie: RMNH 529). L'auteur décrit également l'anatomie de l'appareil génital des deux sous-espèces.

Une trouvaille faite par l'un des auteurs (V. A.) en 1956, et identifiée par E. Binder, est signalée dans la grotte de la Chèvre d'Or (Aellen, 1984; cf. ci-dessous).

Gittenberger (comm. pers.) cite également d'autres localités pour les spécimens en collection dans le Rijksmuseum van Natuurlijke Historie à Leiden. Des coquilles fraîches, translucides, d'*Argna b. biplicata* ont notamment été trouvées en France dans les localités suivantes:

France, Dép. Var, Pont de la Siagne, 9 km au SSW de Grasse. Dép. Alpes-Maritimes, 5 km au NW de Saint-Cézaire-sur-Siagne. Dép. Alpes-Maritimes, au N de Monti, 5 km au N de Menton.

D'autres récoltes effectuées récemment pour le Muséum de Genève (coll. V. Aellen) confirment l'existence d'*Argna biplicata* (Michaud) vivant dans deux localités des Alpes-Maritimes, dans le sud de la France; les spécimens récoltés ont été identifiés comme appartenant à la sous-espèce *A. b. biplicata* (Figures 1 et 2).

Matériel récolté: France, Alpes-Maritimes, baume du Colombier, près de Roquefort-les-Pins: 4 ex. vivants, 19.VII.1988 (MHNG n° 988.203). France, Alpes-Maritimes, grotte de la Chèvre d'Or, près de Roquefort-les-Pins: 1 coquille vide, 10.IX.1956 (MHNG n° 988.230) (Fig. 1); 1 coquille vide, 9.IV.1988 (MHNG n° 988.106); 2 ex. vivants + 2 coq.

vides, 15.IX.1988 (MHNG n° 988.202) (Fig. 2); 2 coquilles vides, 10.I.1989 (MHNG n° 989.108); 2 ex. vivants (dont 1 juvénile), 25.III.1989 (MHNG n° 989.113).

Biotope et observations de terrain:

La baume du Colombier est la même grotte où Racovitza avait récolté une coquille vide en 1908. Dans un travail de 1989, CONDÉ résume les données écologiques concernant cette grotte, fournies par l'un de nous (V. A.). Autrefois beaucoup plus humide, la baume du Colombier est actuellement moins favorable pour la faune cavernicole (CONDÉ, 1989, p. 92). Toutefois, des *Argna biplicata* vivants y ont donc encore été trouvés. C'est essentiellement sur les racines traversant le plafond que vivent les mollusques. En avril 1908, Racovitza notait une température de 13°C (JEANNEL & RACOVITZA, 1910). Le 19 juillet 1988, elle était de 14,5°C.

Quant à la grotte de la Chèvre d'Or, située à 2,5 km au NNE de la baume du Colombier, elle a fait l'objet d'une courte étude faunistique (AELLEN, 1984); c'est dans ce travail qu'est signalée la présence d'*Agardhia biplicata.* Il s'agit de la trouvaille d'une coquille vide, mais récente, faite le 10 septembre 1956. L'humidité de la grotte est variable; elle est surtout forte au printemps. Les températures relevées à toutes les saisons oscillent de 10° à 14°C. Les petits mollusques vivants ont été aussi trouvés sur des racines descendant du plafond. La présence permanente d'*Argna biplicata* dans cette grotte est confirmée par le fait qu'un jeune y a été observé le 25 mars 1989. D'autre part, le 15 septembre 1988, alors que la grotte était exceptionnellement sèche, deux mollusques vivants y ont été récoltés.

Les trouvailles de ces dernières années dans ces deux grottes permettent de compter *Argna biplicata* parmi la catégorie des troglophiles, au moins dans les Alpes-Maritimes. Cependant, les autres trouvailles faites dans toute l'aire de répartition de l'espèce montrent qu'il s'agit en général d'un endogé typique.

RÉSUMÉ

Argna biplicata (Michaud, 1831) est une espèce connue principalement à l'état fossile au Pléistocène; présente surtout dans les Alpes françaises, italiennes et du sud de l'Autriche, elle est rarement récoltée vivante; la présente note mentionne l'existence d'individus vivants dans deux grottes du sud de la France. La systématique et la synonymie du genre *Argna* sont brièvement rappelés.

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Review of Eupsilobiinae (Coleoptera: Endomychidae) with Descriptions of New Genera and Species from South America

by

J. PAKALUK * and S. A. ŚLIPIŃSKI **

With 59 figures

ABSTRACT

The world genera of Eupsilobiinae (Coleoptera: Endomychidae) are reviewed. Four genera are recognized: *Eidoreus* Sharp is known from widely scattered localities; *Microxenus* Wollaston, formerly placed in the endomychid subfamily Mycetaeinae, is known from South Africa and Mexico; a new genus, *Chileolobius,* is known from Chile and Brazil; and another new genus, *Ibicarella,* is known from Brazil. Five new species of *Chileolobius* are described; *C. cekalovici, C. chilensis,* and *C. notatus* are known only from Chile, while *C. sinimbu* and *C. convexus* are known only from southeastern Brazil. Two new species of *Ibicarella, I. plaumanni* and *I. rotundata,* are described; they are known only from southeastern Brazil.

Keys are included for the genera of Eupsilobiinae and the species of *Chileolobius* and *Ibicarella,* and a lectotype is designated for *Microxenus laticollis.* Taxonomically useful structures are discussed and illustrated, and the taxonomic histories of the previously described genera are discussed.

Twenty-eight characters are used for elucidating the phylogenetic relationships of the four genera. Three trees are presented and their implications for character transformations are discussed. Two of these trees are isomorphic. The generic relationships that we hypothesize are (*Ibicarella* + (*Chileolobius* + (*Microxenus* + *Eidoreus*)).

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INTRODUCTION

The Eupsilobiinae are a poorly understood group that has recently (SEN GUPTA & CROWSON 1973 SASAJI 1986, 1987) received attention due to their inconsistent placement historically within the Clavicornia and their likely importance in understanding the phylogeny of the cerylonid series. This subfamily, as treated in this paper, consists of four genera: *Chileolobius* and *Ibicarella,* both endemic to South America, are new; *Microxenus* Wollaston, known from Mexico and South Africa, was previously placed in the endochymid subfamily Mycetaeinae; and *Eidoreus* Sharp, a widespread group, is the type genus. The most distinctive feature of eupsilobiines is the tentorium (Figs 10, 20, 35) with its elongate, widely divergent anterior arms meeting medially. These beetles are separated from other members of the cerylonid series (CROWSON 1955) by the following combination of characters: antennal club one or two-segmented, maxilla with distinct lacinia, maxillary and labial palps not aciculate, procoxae internally closed and externally widely open, mesocoxae laterally open, hind metacoxae transverse, tarsi 4-4-4 with claws simple, abdomen with five spiracles, first ventrite with femoral lines, and last ventrite simple, not crenulate apically. The placement of Eupsilobiinae within the cerylonid series seems clear, although the precise position of this group is obscure. CROWSON (1981) suggests a close relationship with Coccinellidae, while SASAJI (1986, 1987) emphasizes the distinctive structures of Eupsilobiinae (= Eidoreinae) and places them in the Endomychidae.

Immatures for the subfamily are unknown, and little information about the biology or habitats of adults has been published. Despite several published references to eupsilobiines being collected from or in the vicinity of ant nests, *Eidoreus* and *Microxenus* are not listed as likely or potential associates of ants in three reviews of this subject (KISTNER 1982; WHEELER 1910; WILSON 1971). For example, *Chileolobius convexus,* described below, was taken with *Pachycondyla* Smith in Brazil; *Eidoreus minutus* Sharp was taken twice with ants in Seychelles, once in an ant nest under a stone and once in a decayed log with *Pheidole punctulata* Mayr (ARROW 1922); *Microxenus laticollis* Wollaston was taken from an ant nest in South Africa (WOLLASTON 1861). Clearly, the possible association of some eupsilobiine species with ants needs to be more fully investigated. Most other collecting records for eupsilobiines are from mixed forest litter or vegetative debris.

Another interesting aspect of these beetles is the peculiar distribution of *Eidoreus.* Most published reports or data from specimens that we have seen are from widely scattered islands, with specimens from mainland localities rare. For example, CASEY (1895) reported *Eidoreus politus* (Casey) from a sandy islet near Key West, Florida, SHARP (1885) reported *E. minutus* from Hawaii, and ARROW (1922, 1927) subsequently reported this species from the Seychelles and the Samoan Islands. We have seen additional material of *Eidoreus* from Cuba, the Virgin Islands, Guadeloupe, the Galopagos, the Mascarene Islands, Seychelles, Sri Lanka, Fiji, French Polynesia, and the Solomon Islands. In addition, SASAJI (1986) reports *Eidoreus* from Japan. Conversely, SEN GUPTA and CROWSON (1973) studied specimens from Mexico and Belize.

CASEY (1895) established the tribe Eupsilobiini for *Eupsilobius politus* Casey and placed this species in the murmidiine Cucujidae. Subsequently, SEN GUPTA and CROWSON (1973) suggested that this genus was sufficiently distinct to be made the type of a separate subfamily of Endomychidae. This suggestion was followed by STROHECKER (1986), LAWRENCE (in press), and SASAJI (1986, 1987), although Sasaji used the name Eidoreinae which is a junior synonym.

The first genus described for this subfamily was *Eidoreus* which was established by SHARP (1885) for a new species of Erotylidae, *E. minutus,* from Hawaii. KOLBE (1910) established a new genus and species, *Pseudalexia sechellarum,* for a sphaerosomatine Endomychidae, but this species was subsequently synonymized with *Eidoreus minutus* by ARROW (1922). Other workers were perplexed by this genus and were uncertain where it should be placed in Coleoptera. KUHNT (1911) placed it in dacnine Erotylidae, ARROW (1925) in euxestine Erotylidae, VAN EMDEN (1928) near primitive Coccinellidae, HETSCHKO (1930) and ARNETT (1960) in murmidiine Colydiidae, SEN GUPTA and CROWSON (1973) synonymized *Eupsilobius* with *Eidoreus* and placed it in Endomychidae, STROHECKER (1986) listed it as a eupsilobiine Endomychidae but expressed considerable reservation, SASAJI (1986) established a new subfamily of Endomychidae, the Eidoreinae, for *Eidoreus* unaware of Casey's name Eupsilobiini, and this was followed in another paper (SASAJI 1987).

WOLLASTON (1861) established *Microxenus* for a new species, *M. laticollis* from South Africa and placed the genus in Mycetophagidae near *Mycetaea* Stephens. Subsequently, CSIKI (1905, 1910) placed *Microxenus* in the mycetaeine Endomychidae near *Exysma* Gorham. STROHECKER (1953) essentially followed this arrangement.

MUSEUM ACRONYMS

The following acronyms indicate depositories for specimens used in this study:

AMNH	American Museum of Natural History, New York
ANIC	Australian National Insect Collection, Canberra City
BMNH	British Museum (Natural History), London
BPBM	Bishop Museum, Honolulu
CASC	California Academy of Sciences, San Francisco
CNCI	Canadian National Collection of Insects, Ottawa
FMNH	Field Museum of Natural History, Chicago
JPCC	J. Pakaluk Collection
MAIC	M. A. Ivie Collection
MHNG	Muséum d'Histoire naturelle, Genève
SEMC	Snow Entomological Museum, University of Kansas, Lawrence
USNM	National Museum of Natural History, Washington
ZMPA	Instytut Zoologii, Polska Akademia Nauk, Warszawa

Eupsilobiinae Casey

Eupsilobiini Casey, 1895: 454.
Euspilobiini, Sasaji, 1986: 229 (error).
Eidoreinae Sasaji, 1986: 235 (syn. n.).

This subfamily appears to be a monophyletic group, although virtually all of the characters that unite these genera, such as the recurved mesal arms of the tormae, distinctive tentorium, and well-developed internal apodemes on the ventrites, requires dissection and clearing of cuticular structures for proper examination.

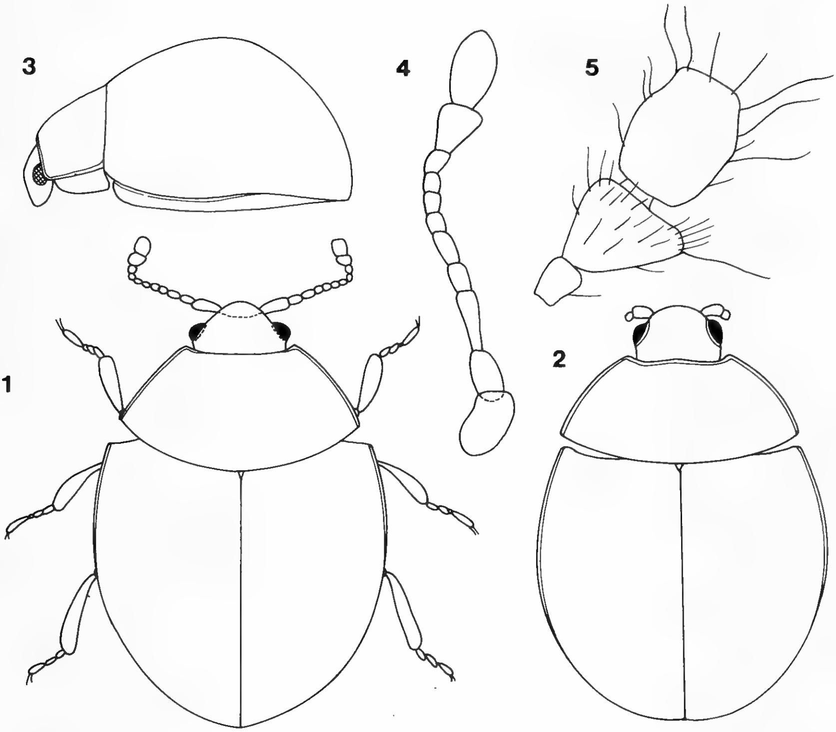
KEY TO GENERA OF EUPSILOBIINAE

1. Fronto-clypeal suture absent; antennal grooves long, extending well-beyond eyes (Fig. 35); prosternal process narrow, acute or rounded, never expanded apically (Fig. 36); elytra with humeral regions concave to receive hind angles of pronotum; abdomen with five ventrites .... *Chileolobius* gen. n.
— Fronto-clypeal suture present; antennal grooves short, ending at about middle of eyes (Fig. 20); prosternal process wide, expanded apically (Fig. 13); elytra with humeral regions unmodified; abdomen with six ventrites .... 2.
2. Body less convex (greatest depth/elytral length less than 0.50), ovate to obovate; antenna 10-segmented; metasternum with femoral lines; aedeagus with median lobe highly coiled .... 3.
— Body highly convex (greatest depth/elytral length greater than 0.60), subhemisphaerical; antenna 11-segmented; metasternum without femoral lines; aedeagus with median lobe curved, but not highly coiled .... *Ibicarella* gen. n.
3. Pronotum smooth, without sulci; hypomeron modified to receive antenna; mesosternum modified, with anterior projection; scutellum normal, triangular, distinctly visible at 25 × magnification .... *Eidoreus* Sharp
— Pronotum with distinct sulci; hypomeron unmodified for receiving antenna; mesosternum without anterior projection; scutellum minute, transverse, barely visible at 50 × magnification .... *Microxenus* Wollaston

Chileolobius gen. n.

Species in this genus are easily recognized by the lack of a fronto-clypeal suture, concave elytral humeri to receive the produced hind angles of the pronotum, five ventrites, and other characters included in the key. This genus is presently known only from a few scattered localities in northern Chile and southeastern Brazil; assiduous collecting in neighboring regions will likely produce many additional specimens and species. The Chilean species are smaller and flatter; these are superficially most similar to *Eidoreus,* but they are easily separated by the characters listed above.

Description. Length 1.20-1.95 mm. Body (Figs 32, 34, 38) ovate to round, weakly to strongly convex, pubescence short to absent. Head transverse. Eye extremely reduced, coarsely faceted, in distinct dorsal groove (as in *Displotera* Reitter). Fronto-clypeal suture absent. Antenna 10- or 11-segmented with 1- or 2-segmented club; antennal groove (Fig. 35) long, extending well beyond eye. Labrum (Fig. 42) transverse, weakly sclerotized, almost completely exposed, with anterior edge truncate to weakly emarginate medially; tormae with mesal arms recurved, directed anteriorly; labral rods absent. Mandible (Fig. 40) bifid apically, with prominent subapical tooth; mola reduced, transversely ridged; prostheca fringed. Maxilla (Fig. 41) with 4-segmented palp; galea broad, with apical setae; lacinia with apical setae. Labium with 3-segmented palp; mentum trapezoidal, widest at middle. Gular sutures indistinct. Tentorium (Fig. 35) with anterior and posterior arms fused, posterior transverse bridge straight. Pronotum (Figs 32, 34, 38) transverse, with anterior edge emarginate, posterior edge evenly rounded, usually emarginate, lateral edge margined for anterior 2/3, with hind angles produced, covering base of elytra. Prosternum (Fig. 36) prominent anteromedially, covering gular region of head; hypomeron concave; antennal groove extremely short, on anterolateral margin; intercoxal process short, rounded or acute apically, never extending beyond middle of coxa. Procoxa rounded, contiguous medially, with narrow internal extension,



FIGS 1-5.

Ibicarella spp. 1, 5 *I. plaumanni*; 2-4 *I. rotundata*. 1, 2 dorsal outline; 3, lateral outline; 4, antenna; 5, antennal club.

its cavity internally closed, externally widely open. Mesosternum extremely prominent medially (Fig. 37), covering procoxae, subequal in width to mesocoxa, junction of meso- and metasternum straight-line type, without internal knobs. Mesocoxa round, trochantin concealed, its cavity laterally open. Metasternum 0.85 × length of first ventrite, with femoral lines, postcoxal pits absent. Metacoxa round, widely separated. Leg (Fig. 43) with trochanterofemoral attachment oblique, heteromeroid; femur swollen, excavate to receive retracted tibia; tibia without apical spurs; tarsi (Fig. 44) 4-4-4 in both sexes, segments 1 and 2 partially fused, 2 and 3 weakly lobed; claws simple, empodium absent. Scutellum minute, triangular. Elytra partially fused along suture, with humeral region partially concave to receive pronotal hind angles, punctation irregular; epipleuron incomplete. Wing absent. Abdomen (Fig. 37) with 5 ventrites; 1 subequal in length to 2-4, with broad, truncate intercoxal process, femoral lines long, incomplete; 2-4 subequal in length; 2-5 with internal, anterolateral apodemes. Aedeagus (Figs 48-54) with short, subcylindrical tegmen, tegminal strut absent; median lobe about 0.8 × as long as abdomen, about 1.5 × longer than tegmen, with T-shaped capsule.

Type species. *Chileolobius notatus* sp. n.

Etymology. The generic name is derived from the name of the country "Chile" and the Latin lobus, meaning projection, referring to the acute prosternal process; the gender is masculine.

KEY TO SPECIES OF *CHILEOLOBIUS*

1. Length 1.75-1.95 mm. Prosternal process wide, rounded apically. Vestiture of dorsum distinctly visible at 10× magnification, dense; known distribution Brazil .... 2.
— Length 1.20-1.40 mm; prosternal process narrow, subacuminate apically; vestiture of dorsum barely visible at 10× magnification or indistinct; known distribution Chile .... 3.
2. More convex, greatest depth/elytral length about 0.50; clypeus rounded anteriorly (Fig. 30); body rounder, about 1.35× longer than wide .... *convexus* sp. n.
— Less convex, greatest depth/elytral length about 0.37; clypeus almost truncate anteriorly (Fig. 33); body more elongate, about 1.50× longer than wide .... *sinimbu* sp. n.
3. Antennal club 1-segmented; body elongate, about 1.80× longer than wide; elytra about 2.90-3.00× longer than pronotum; body reddish brown .... *chilensis* sp. n.
— Antennal club 2-segmented; body ovate, about 1.50-1.63× longer than wide; elytra about 3.60-3.90× longer than pronotum; body dark brown to black . 4.
4. Elytra and venter with pale maculae (Fig. 38); aedeagus as in Figures 48 & 49 .... *notatus* sp. n.
— Elytra and venter unicolorous; aedeagus as in Figure 47 .... *cekalovici* sp. n.

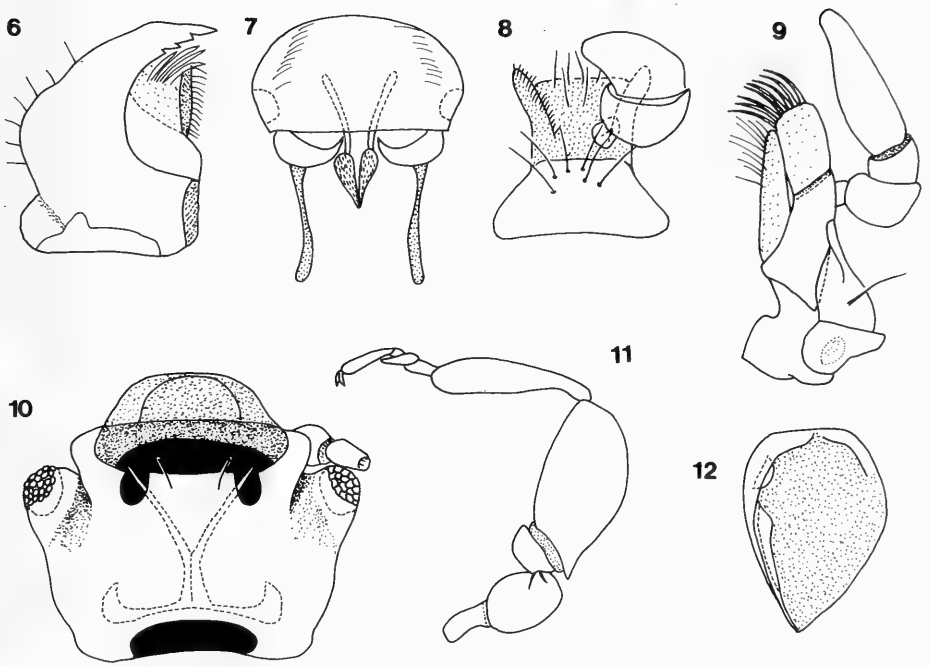
Chileolobius cekalovici sp. n.
(Figs 47, 51-54)

This is the smallest species of *Chileolobius* and is recognized by its size, unicolorous elytra, and slightly flattened body.

Description. Length 1.2 mm. Body ovate, 1.70× longer than wide, moderately convex, greatest depth/elytral length 0.33, black; vestiture of extremely short hairs, barely visible at 80× magnification; dorsum almost glabrous. Antenna as in Figure 47. Clypeus narrow, anterior edge truncate. Frons and vertex punctate, punctures separated by their diameters, cuticle between punctures smooth, shiny. Pronotum 0.34× longer than wide; lateral margin visible from above in anterior 1/2; posterior edge widely emarginate medially; disc punctate, punctures sparser than on vertex, cuticle between punctures smooth, shiny. Elytra 1.15× longer than wide, 3.61× longer than pronotum, widest at basal 1/5; lateral edges arcuate, convergent anteriorly, margin almost entirely visible from above; punctures on disc similar in size and density to pronotal punctures. Aedeagus as in Figures 51-54.

Type. Holotype (male): CHILE. Concepcion Prov.: Hualpen, December 1971, T. Cekalovic (MHNG).

Etymology. This species is named for Thomas Cekalovic who collected the only known specimen.



FIGS 6-12.

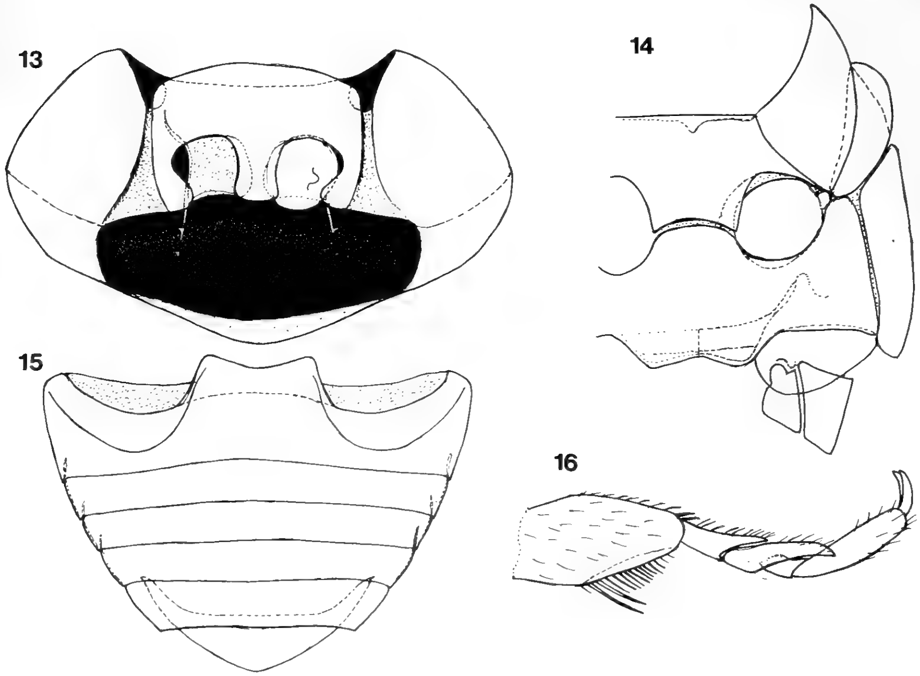
Ibicarella plaumanni. 6, mandible, ventral; 7, labrum, dorsal; 8, labium, ventral; 9, left maxilla, ventral; 10, head, ventral; 11, foreleg; 12, elytron, ventral.

Chileolobius chilensis sp. n.

(Figs 35-37, 40-45, 50, 56)

The relatively large size of this species and its unicolorous elytra separate it from other Chilean species. It is the only species with a ten-segmented antenna with a one-segmented club.

Description. Length 1.4 mm. Body ovate, 1.83× longer than wide, moderately convex, greatest depth/elytral length 0.31, reddish brown to brown; vestiture variable, always sparse, short hairs always present, some hairs 0.5-0.6× length of antennal segment 2, distinct at 20× magnification; dorsum finely punctate. Antenna (Fig. 56) 10-segmented, with 1-segmented club. Clypeus with anterior edge truncate. Frons and vertex punctate, punctures separated by their diameters, cuticle between punctures smooth, shiny. Pronotum (Fig. 36) 0.42× longer than wide; lateral margin narrow, visible from above in anterior 2/3; posterior edge almost truncate, not emarginate medially; disc punctate, punctures finer than on vertex, separated by 1.5-2.5× their diameters, cuticle between punctures smooth, shiny. Elytra 1.15× longer than wide, 2.94× longer than pronotum, widest at anterior 1/3; lateral edges arcuate, convergent anteriorly, margin almost entirely visible from above; punctures on disc similar in size and density to pronotal punctures. Aedeagus as in Figure 50.



Figs 13-16.

Ibicarella plaumanni. 13, prothorax, ventral; 14, pterothorax (part), ventral; 15, abdomen, ventral; 16, apex of protibia and tarsus.

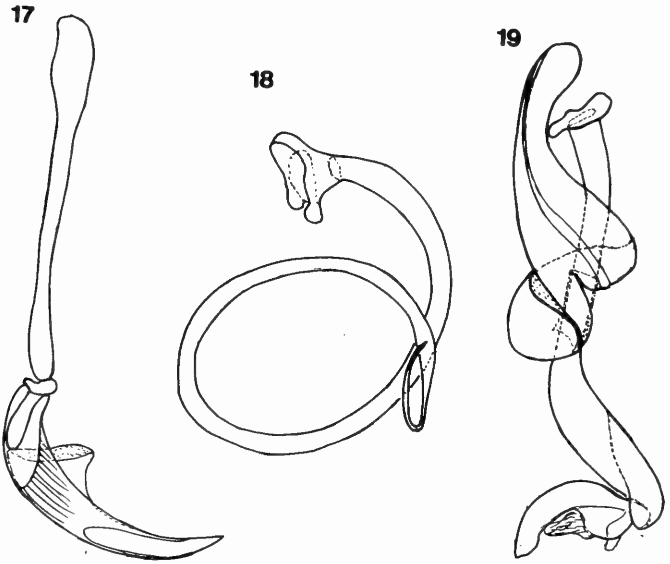
Types. Holotype (male): Chile. Coquimbo Prov.: 10 km W Canela Baja, 30 September 1967, under stones, L. and C. W. O'Brien (ANIC). Paratypes: Chile. Santiago Prov.: Cerro San Cristobal, August 1946, L. Pena (ANIC); Valparaiso Prov., Valparaiso, Rivera (ANIC); Prov. unknown: El Cobre, Quebrada el Soldado, 15 July 1961, L. Smith (ZMPA).

Etymology. The name *chilensis* is based upon the only country where this species has been collected.

Chileolobius convexus sp. n.
(Figs 30-32)

This species is easily distinguished from most other species by its large size. It differs from *C. sinimbu* by the key characters and its elytral pubescence which is longer and denser on *C. convexus*. A specimen deposited in the Field Museum of Natural History was taken with *Pachycondyla* (Formicidae).

Description. Length 1.75-1.95 mm. Body (Fig. 32) ovate, almost rounded, 1.35× longer than wide, convex (Fig. 31), greatest depth/elytral length 0.50, brown; vestiture of moderately dense, yellow hairs, subequal in length to antennal segment 2, distinct at 10× magnification; dorsum shiny. Clypeus (Fig. 30) with anterior edge rounded. Frons and vertex punctate, setose, punctures separated by their diameters, cuticle between punctures densely reticulate, feebly shiny. Pronotum 0.32× longer than wide; lateral margin almost invisible from above; posterior edge widely emarginate medially; disc punctate, punctures similar in size and density to those on vertex, cuticle between punctures smooth, shiny. Elytra 1.04× longer than wide, 3.50× longer than pronotum, widest at anterior 1/5; lateral edges arcuate, convergent anteriorly, margin extremely narrow, invisible from above; punctures on disc irregular, similar in size and density to pronotal punctures, cuticle between punctures smooth, shiny.



Figs 17-19.

17, 18 *Microxenus* sp. aedeagus; 17, tegmen, ventral; 18, median lobe. 19, *Ibicarella plaumanni*, aedeagus, dorsal.

Types. Holotype (female): Brazil. Santa Catarina: Nova Teutonia, July 1957, forest floor litter, F. Plaumann (ANIC). Paratypes: Four with same data as holotype, except one collected 17 August 1944 with *Pachycondyla* and three taken from Seara in May 1958 (FMNH, JPCC).

Etymology. The Latin name *convexus* refers to this species highly convex dorsum.

Chileolobius notatus sp. n.

(Figs 38, 39, 46, 48, 49, 55)

The relatively small dark brown body with numerous, tiny brown elytral maculae distinguishes this species from others in the genus.

Description. Length 1.25 mm. Body (Fig. 38) ovate, 1.60× longer than wide, moderately convex (Fig. 39), greatest depth/elytral length 0.35, dark brown, except head, lateral margins of pronotum, and small, irregular spots on elytra that are brown; vestiture absent; dorsum punctate. Antenna as in Figure 55. Clypeus prominent, anterior edge truncate. Frons and vertex sparsely punctate, cuticle between punctures weakly reticulate, shiny. Pronotum 0.32× longer than wide; lateral margin narrow, barely visible from above in anterior 1/2; posterior edge deeply, widely emarginate medially; disc punctate, their diameters 1.40× larger than punctures on frons, separated by 2.0-4.0× their diameters, cuticle between punctures almost smooth, shiny. Elytra 1.13× longer than wide, 3.84× longer than pronotum, widest at anterior 1/4; lateral edges arcuate, convergent anteriorly (Fig. 38), margin relatively broad, basal 3/4 visible from above; punctures on disc extremely fine, sparse, cuticle between punctures shiny. Aedeagus as in Figures 48 & 49, median lobe extremely thin, long, and coiled.

Type. Holotype (male): CHILE. Concepcion Prov.: 8 km S Florida, 6 September 1973, T. Cekalovic (ANIC).

Etymology. The name *notatus* is from the Latin nota, meaning marked, referring to the spots on the dorsum.

Chileolobius sinimbu sp. n.

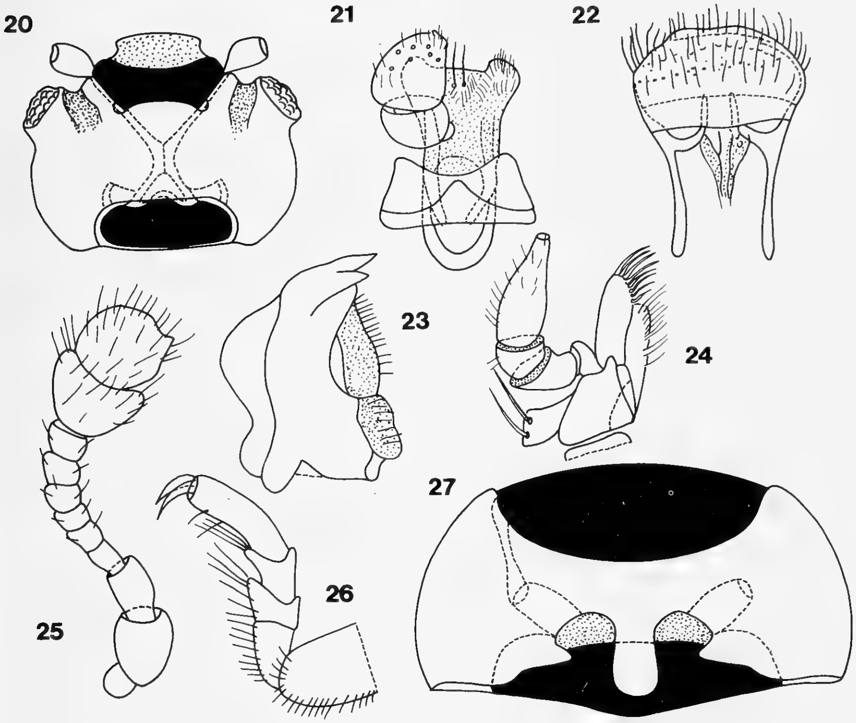
(Figs 33, 34)

This species is most similar to *C. convexus* but is easily separated by the key characters and others discussed earlier.

Description. Length 1.91 mm. Body (Fig. 34) slightly elongate, 1.50× longer than wide, moderately convex, greatest depth/elytral length 0.37, black; vestiture sparse, pale, hairs subequal in length to antennal segment 2, barely visible at 10× magnification; dorsum shiny. Antenna as in *Chileolobius convexus,* with large, 2-segmented club. Clypeus (Fig. 33) with anterior edge almost truncate. Frons and vertex punctate, punctures extremely fine, sparse, cuticle between punctures densely reticulate, shiny. Pronotum 0.31× longer than wide; lateral margin narrow, visible from above in anterior 1/3; posterior edge widely emarginate medially; disc with punctures, vestiture, and surface sculpture similar to vertex. Elytra 1.10× longer than wide, 3.85× longer than pronotum, widest at anterior 1/3; lateral edges arcuate, convergent anteriorly, margin extremely narrow, almost entirely visible from above; punctures on disc irregular, sparse, slightly coarser than pronotal punctures.

Type. Holotype (female): BRAZIL. Rio Grande do Sul: Sinimbu, 29.30'×52.30', 200 m, September 1960, F. Plaumann (ANIC).

Etymology. The name of the species is taken from the type locality of Sinimbu, Brazil; it is a noun in apposition.



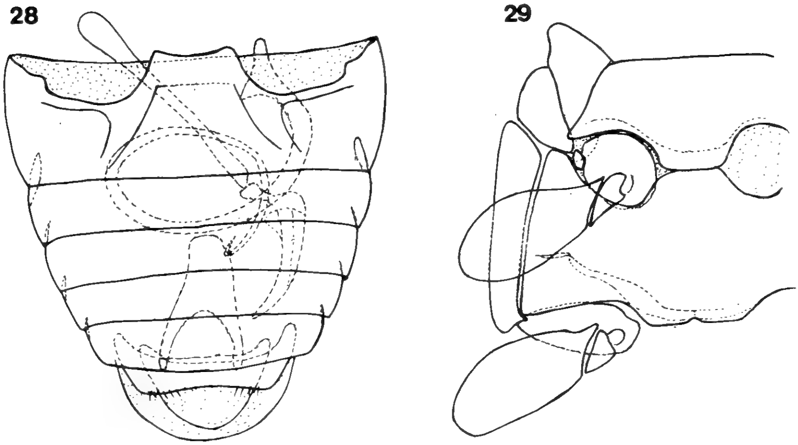
FIGS 20-27.

Microxenus sp. (from Mexico). 20, head, ventral; 21, labium, ventral; 22, labrum, dorsal; 23, mandible, dorsal; 24, maxilla, ventral; 25, antenna; 26, apex of protibia and tarsus; 27, prothorax, ventral.

Eidoreus Sharp

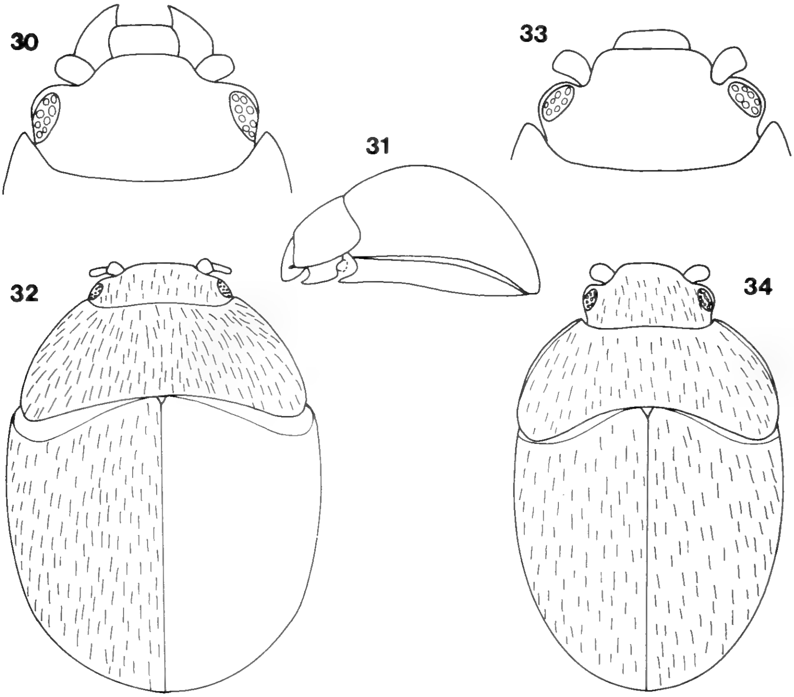
Eidoreus Sharp, 1885: 146. Type species, by monotypy, *E, minutus* Sharp.
Eupsilobius Casey, 1895: 454. Type species, by monotypy, *E. politus* Casey.
Pseudalexia Kolbe, 1910: 34. Type species, by monotypy, *P. sechellarum*.
Euspilobius, Sasaji, 1986: 230 (error).

Within Eupsilobiinae species of *Eidoreus* are superficially most similar to the Chilean species of *Chileolobius. Eidoreus* can be separated from these other genera, however, by their distinct fronto-clypeal suture, ten-segmented antenna with a two-segmented club, lack of pronotal sulci, modified mesosternal process, and well-developed femoral lines on the metasternum and first ventrite. Outside this subfamily they resemble *Coluocera* Motschulsky but are easily separated by a number of characters, including a distinctly two-segmented antennal club, presence of femoral lines, and six ventrites. SASAJI (1986) presented a detailed redescription of this genus with illustrations of important structural features.



Figs 28, 29.

Microxenus sp. (from Mexico). 28, abdomen, ventral; 29, pterothorax (part), ventral.



Figs 30-34.

Chileolobius spp. 30-32, *C. convexus,* 33, 34 *C. sinimbu.* 30, 33 head, dorsal outline; 31, lateral outline; 32, 34 dorsal outline.

Material examined. Thirty-nine specimens from Fiji, French Polynesia (Tubuai Islands), the Solomon Islands (Guadalcanal), United States (Southern Florida), Cuba, Guadeloupe, Reunion, and Ecuador (Galopagos Islands) (BMNH, BPBM, CNCI, JPCC, MHNG, SEMC, USNM).

Ibicarella gen. n.

These beetles superficially resemble some Endomychidae (such as *Rhymbomicrus* Casey) and certain scymnine Coccinellidae. They are dark-colored with a highly convex, subhemisphaerical body. They can be separated from other genera of Eupsilobiinae by the characters used in the key.

Description. Length 1.15-1.70 mm. Body (Figs 1, 2) broadly rounded, subglobose, shiny. Head (Fig. 10) transverse. Eye reduced, coarsely faceted. Fronto-clypeal suture present, arcuate. Antenna (Fig. 4) 11-segmented with loose, 2-segmented club, segment 10 weakly asymmetrical; antennal groove (Fig. 10) moderately long, apex extending to about middle of eye. Labrum (Fig. 7) transverse, sclerotized, almost completely exposed, with anterior margin broadly rounded; tormae with mesal arms recurved, directed anteriorly; labral rods narrow and divergent anteriorly. Mandible (Fig. 6) bifid apically; mola well-developed, transversely ridged; prostheca fringed. Maxilla (Fig. 9) with 4-segmented palp; galea blunt; lacinia without apical or mesal spines. Labium (Fig. 8) with 3-segmented palp; mentum trapezoidal; ligula slightly expanded apically. Gular sutures indistinct. Tentorium (Fig. 10) with anterior and posterior arms broadly fused at base to posterior transverse bridge. Pronotum (Fig. 13) transverse, with anterior edge emarginate, posterior edge evenly rounded, without medial lobe, lateral margin complete. Prosternum prominent anteromedially; hypomeron concave; antennal groove narrow, deep. Procoxa rounded, with narrow internal extension, its cavity internally closed, externally widely open. Mesosternum subequal in width to mesocoxa, junction of meso- and metasternum straight-line type, without internal knobs. Mesocoxa round, trochantin partially exposed, its cavity laterally open. Metasternum subequal in length to first ventrite, without femoral lines or postcoxal pits. Metacoxa transverse, widely separated. Leg (Fig. 11) with trochanterofemoral attachment oblique, subheteromeroid; femur swollen in middle, tibia without apical spurs; tarsi 4-4-4 in both sexes, segments 1 and 2 lobed; claws simple, empodium absent. Scutellum minute, triangular. Elytral punctation irregular; epipleuron (Fig. 12) incomplete. Wing reduced or absent, if present subcubital fleck present, undivided. Abdomen (Fig. 15) with 6 ventrites; 1 slightly longer than 2, with broad, truncate intercoxal process, femoral lines complete; 2-4 subequal in length, with internal, anterolateral apodemes; 5 without internal apodemes; 6 partially exposed, flexible. Aedeagus (Fig. 19) with short, subcylindrical tegmen, tegminal strut absent; median lobe about 0.8 × as long as abdomen, about 1.5 × longer than tegmen, with T-shaped capsule.

Type species. *Ibicarella plaumanni* sp. n.

Etymology. The generic name is derived from the type locality for one of its species; the gender is feminine.

KEY TO SPECIES OF *IBICARELLA*

1. Length 1.70 mm. Elytral margins visible from above for basal 1/2 (Fig. 1). Anterior edge of pronotum distinctly margined its entire width .... *rotundata* sp. n.

— Length 1.15 mm. Elytral margins visible from above for basal 2/3 (Fig. 2). Anterior edge of pronotum distinctly margined medially, lines effaced laterally .... *plaumanni* sp. n.

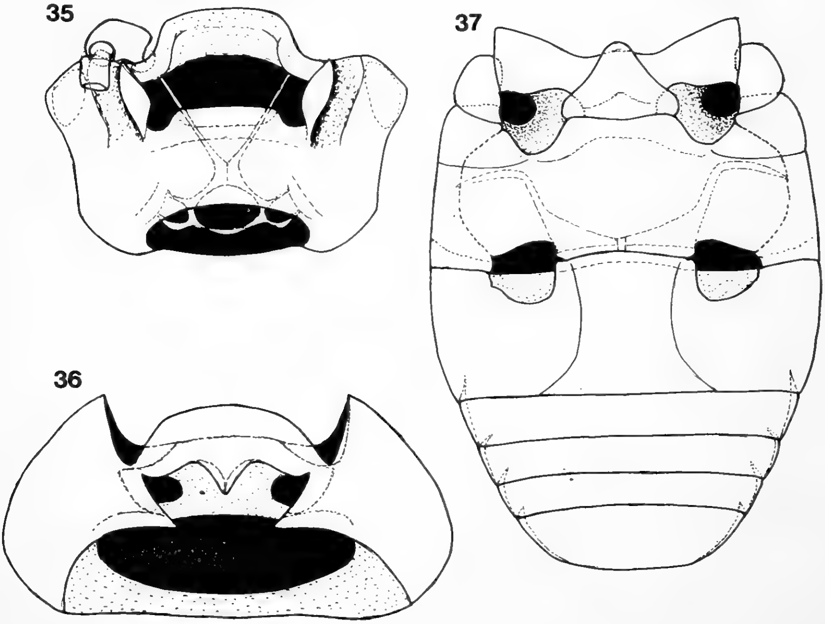
Ibicarella plaumanni sp. n.
(Figs 1, 5, 6-12, 13-16, 19)

This is one of the smallest species of Eupsilobiinae. Its size, slightly less convex body, and other characters listed in the key separate it from *I. rotundata.*

Description. Length 1.15 mm. Body (Fig. 1) 1.23 × longer than wide, highly convex, greatest depth/elytral length 0.61, dark brown to almost black; vestiture of extremely fine, appressed dark hairs, barely visible at 80 × magnification, sometimes hairs virtually absent; dorsum shiny. Antenna as in Figure 5. Eye lightly pigmented, with about 30 facets. Supraocular carina weak, not well-developed. Frons and vertex finely punctate. Pronotum 0.43 × longer than wide, widest at hind angles; anterior edge distinctly margined laterally, effaced medially; posterior edge unmargined; disc extremely convex, punctation irregular, punctures finer than on vertex, cuticle between punctures smooth, shiny. Elytra 2.75 × longer than pronotum; margins broader than pronotal margins, visible from above for at least basal 2/3, sometimes for its entire length, disc weakly punctate, almost smooth. Aedeagus as in Figure 19.

Types. Holotype (male): Brazil. Santa Catarina: Nova Teutonia, 300-500 m, 27.11' × 52.28', July 1977, F. Plaumann (MHNG). Paratypes: Six with same locality and collector, but July 1969, October 1972, and December 1972 (AMNH, JPCC, MHNG, ZMPA).

Etymology. This species is named for Fritz Plaumann who collected all known specimens.



Figs 35-37.

Chileolobius chilensis. 35, head, ventral; 36, prothorax, ventral; 37, pterothorax and abdomen, ventral.

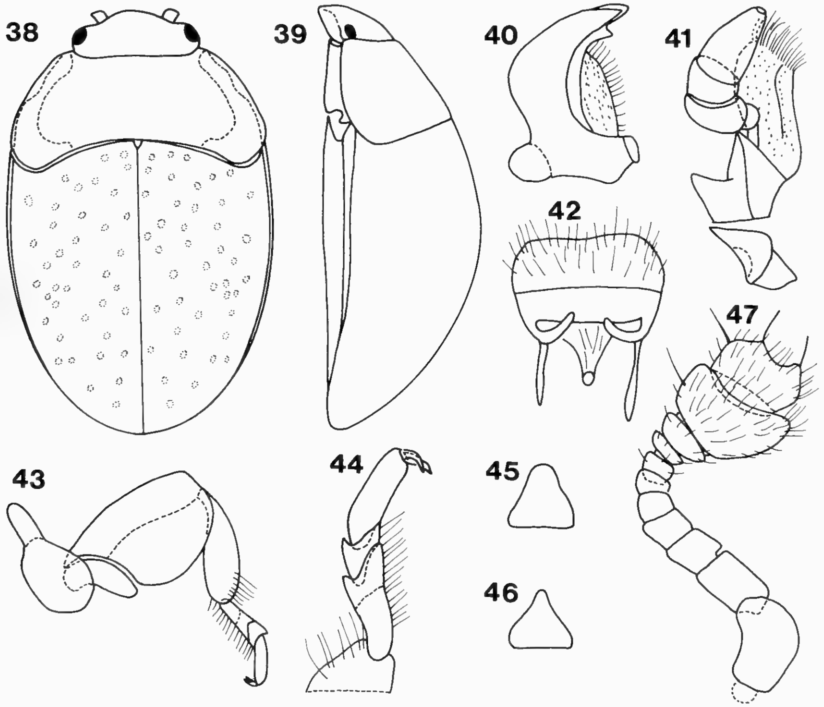
Ibicarella rotundata sp. n.
(Figs 2-4)

This is the most convex and one of the largest species of Eupsilobiinae. The characters discussed under *I. plaumanni* separate the two species of this genus.

Description. Length 1.70 mm. Body (Fig. 2) 1.36× longer than wide, extremely convex, greatest depth/elytral length 0.73, black; vestiture of extremely short, appressed dark hairs, barely visible at 60× magnification, sometimes hairs virtually absent; dorsum shiny. Antenna as in Figure 4. Eye lightly pigmented, with about 25-30 facets. Supraocular carina distinct. Frons and vertex finely punctate. Pronotum 0.50× longer than wide, widest at hind angles; anterior edge distinctly margined for its entire width; posterior edge finely margined medially; disc convex (Fig. 3), punctation dense, punctures coarser, denser than on vertex. Elytra 2.30× longer than pronotum; margins slightly broader than pronotal margins, visible from above for basal 1/2; punctate, punctures finer than on pronotum.

Types. Holotype (female): BRAZIL. Santa Catarina: Ibicare, 600 m, 27.09'×51.18', September 1960, F. Plaumann (ANIC). Paratypes: Two with same data as holotype (ANIC, ZMPA).

Etymology. The name *rotundata* is from the Latin rotundus, meaning round, referring to the dorsal outline in lateral view.



FIGS 38-47.

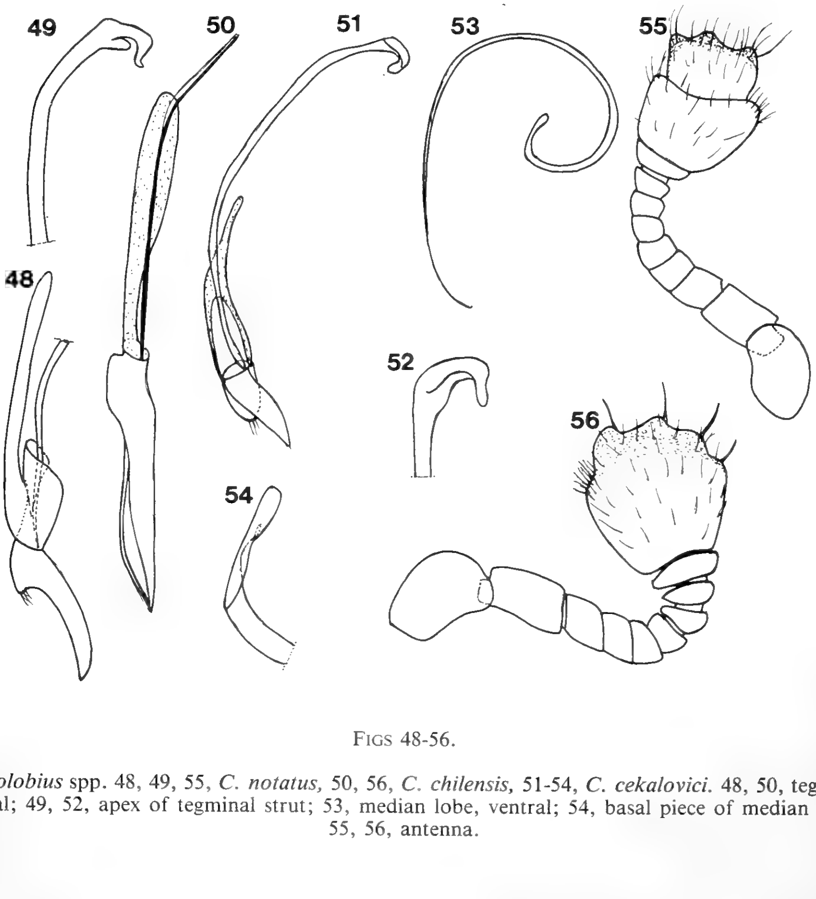
Chileolobius spp. 38, 39, 46, *C. notatus,* 40-45, *C. chilensis,* 47, *C. cekalovici.* 38, dorsal outline; 39, lateral outline; 40, mandible, dorsal; 41, maxilla, ventral; 42, labrum, dorsal; 43, foreleg; 44, protarsus; 45, 46, mesosternal process; 47, antenna.

Microxenus Wollaston
(Figs 17, 18, 20-29)

Microxenus Wollaston, 1861: 139. Type species, by monotypy, *M. laticollis* Wollaston.

This genus appears to be the sister-group to *Eidoreus.* It is unique among Eupsilobiinae for its pronotal sulci, although these can be reduced and difficult to see in some specimens. The characters in the key and the distinctive V-shaped femoral lines on the first ventrite separates this genus from all others.

Description. Length 1.25-1.40 mm. Body elongate-oval, moderately convex, vestiture of very fine, appressed hairs. Head (Fig. 20) transverse. Eye moderately large, coarsely faceted. Fronto-clypeal suture present, weakly arcuate. Antenna (Fig. 25) 10-segmented with 2-segmented club; antennal groove (Fig. 20) short, weakly impressed, apex extending to about posterior edge of eye. Labrum (Fig. 22) transverse, sclerotized, completely exposed, with anterior margin broadly rounded; tormae with mesal arms recurved, directed anteriorly; labral rods short, subparallel. Mandible (Fig. 23) bifid apically; mola well-developed, transversely ridged; prostheca fringed. Maxilla (Fig. 24) with 4-segmented palp; galea blunt; lacinia without apical or mesal spines. Labium (Fig. 21) with



Figs 48-56.

Chileolobius spp. 48, 49, 55, *C. notatus,* 50, 56, *C. chilensis,* 51-54, *C. cekalovici.* 48, 50, tegmen, ventral; 49, 52, apex of tegminal strut; 53, median lobe, ventral; 54, basal piece of median lobe; 55, 56, antenna.

3-segmented palp; mentum trapezoidal, with distinctly raised triangular area medially; ligula slightly expanded apically. Gular sutures indistinct. Tentorium (Fig. 20) with anterior arms fused, with lyriform posterior transverse bridge. Pronotum (Fig. 27) transverse, with anterior edge entire, posterior edge with medial lobe, lateral margin complete, basal transverse impression and short, lateral sulci distinct to barely visible, without foveae. Prosternum with intercoxal process about 0.4× diameter of procoxa, weakly carinate and extremely weakly divergent apically, with apex evenly rounded; hypomeron concave, without antennal grooves. Procoxa rounded, with long, narrow internal extension, its cavity internally closed, externally widely open. Mesosternum subequal in width to mesocoxa, junction of meso- and metasternum straight-line type, without internal knobs. Mesocoxa round, trochantin exposed, its cavity laterally open. Metasternum about 1.4× longer than first ventrite, femoral lines complete, postcoxal pits absent. Metacoxa transverse, widely separated. Leg with trochanterofemoral attachment oblique (Fig. 29), subheteromeroid, trochanter long; femur swollen; tibia without apical spurs; tarsi (Fig. 26) 4-4-4 in both sexes, segments 1 and 2 partially fused, 2 and 3 slightly lobed; claws simple, empodium absent. Scutellum minute, transverse. Elytral punctation irregular; epipleuron incomplete. Wing with single, reduced anal vein, subcubital fleck present, undivided. Abdomen (Fig. 28) with 6 ventrites; 1 much longer than 2, with broad intercoxal process, femoral lines incomplete; 2-5 subequal in length, with internal, anterolateral apodemes; 6 partially exposed, flexible. Aedeagus (Figs 17, 18, 28) with short, cylindrical tegmen, tegminal strut long, articulated, with parameres reduced; median lobe extremely long with T-shaped capsule.

Types. Lectotype (here designated) of *Microxenus laticollis:* SOUTH AFRICA. Cape Prov.: Cape Town, Mr. Bewicke (BMNH). Paralectotypes not examined.

Other material. Twenty-nine specimens from Mexico and South Africa (BMNH, CASC, JPCC, MAIC, ZMPA).

PHYLOGENY

The precise position of Eupsilobiinae within the cerylonid series of Clavicornia is presently unknown. Based upon preliminary data and analyses, the eupsilobiines appear to belong to a monophyletic subgroup characterized by five abdominal spiracles in adults. Other cerylonid series taxa with this apomorphy are murmidiine, ostomopsine, and cerylonine Cerylonidae, Discolomidae, Coccinellidae, and other Endomychidae. Further resolution of the relationships among these taxa will ultimately depend upon understanding the ground plans for these suprageneric taxa, as many of these groups have both states of important characters present or the polarity of a character is uncertain.

For the phylogenies presented below (Figs 57-59), the numbers on the trees, and in the discussions of these trees, refer to the following characters, with the apomorphic condition listed first and the plesiomorphic condition following in brackets. Characters were polarized using outgroup comparisons of groups presumed to be closely related to Eupsilobiinae, such as some Cerylonidae and primitive Endomychidae. Often, however, both states of a character occur in the outgroup, so the polarity is determined by comparing the distribution of these characters among other primitive members of the cerylonid series. Additional hypotheses of relationships (Figs 58 & 59) are presented using the Byturidae-Biphyllidae lineage as the outgroup. These analyses, and their implications, will be discussed later.

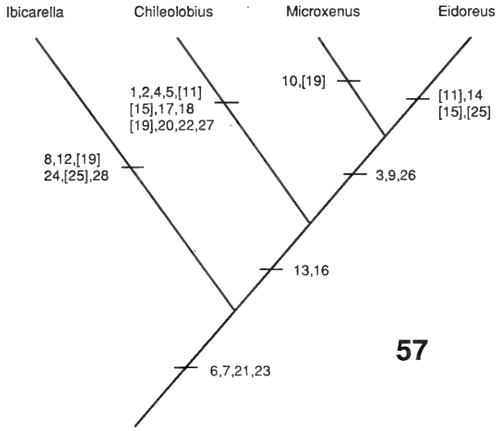


FIG. 57.

Proposed phylogeny of eupsilobiine genera. Numbers refer to characters listed in text, and apparent homoplasies are in brackets.

(1) Frontal-clypeal suture: absent [present]. Although the suture is absent in the Biphyllidae and Byturidae, we prefer to interpret the absence of the suture here as derived. Within the cerylonid series the suture is present in all other groups except highly derived forms, such as Coccinellidae, Corylophidae, and cerylonine Cerylonidae.

(2) Antennal groove: long [short]. The presence of distinct, subocular antennal grooves is common throughout the Clavicornia. Short grooves extend to about the middle of the eye, whereas long grooves extend beyond the posterior edge of the eye. Short grooves occur in Byphyllidae and a variety of groups within the cerylonid series. It appears that the absence of grooves (or reduced to a trace) and long grooves are both derived conditions, and these have arisen repeatedly.

(3) Antenna: 10-segmented [11-segmented]. Eleven-segmented antennae are plesiomorphic for Coleoptera, occur in the Biphyllidae and Byturidae, and represent the ground plan for all families of the cerylonid series except Discolomidae and Sphaerosomatidae. Ten-segmented antennae have also evolved within *Chileolobius (C. chilensis).*

(4) Labrum with apical edge: truncate [rounded]. Both states occur within the cerylonid series; the polarity of this character is uncertain.

(5) Labral rods: absent [slender]. Both of these states occur throughout the cerylonid series, in addition to broad, club-like labral rods. We suggest that the slender condition is plesiomorphic and labral rods have repeatedly been lost or enlarged. The polarity of this character is uncertain.

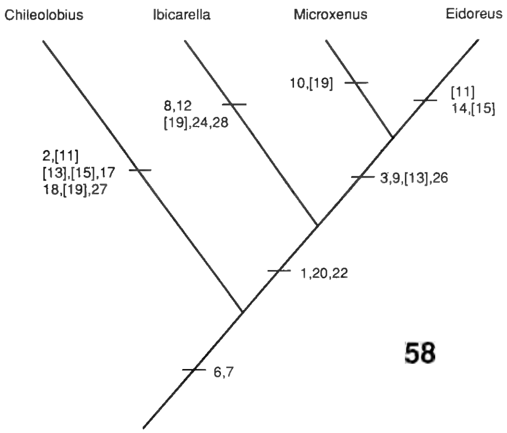
(6) Tormae with mesal arms: recurved, pointing anteriorly [perpendicular or convergent, pointing posteriorly]. Recurved mesal arms of the tormae are only known in Eupsilobiinae and some cerylonine Cerylonidae with highly developed piercing mouthparts.

(7) Tentorium with anterior arms: meeting [separate]. The anterior arms are separate in Biphyllidae, Byturidae, and all groups in the cerylonid series except ostomopsine

Cerylonidae, Corylophidae, and most Endomychidae. The apomorphic condition has almost certainly evolved more than once in the cerylonid series.

(8) Tentorium with posterior arms: fused with posterior bridge [separate from posterior bridge]. This appears to be unique to *Ibicarella,* although a similar condition occurs in some bothriderine Bothrideridae.

(9) Tentorium with posterior bridge: lyriform [straight or weakly curved]. The distribution of a lyriform posterior bridge in the cerylonid series is uncertain. We have not, however, recorded it from any other members of the cerylonid series; it appears to be unique to *Microxenus* and *Eidoreus.*



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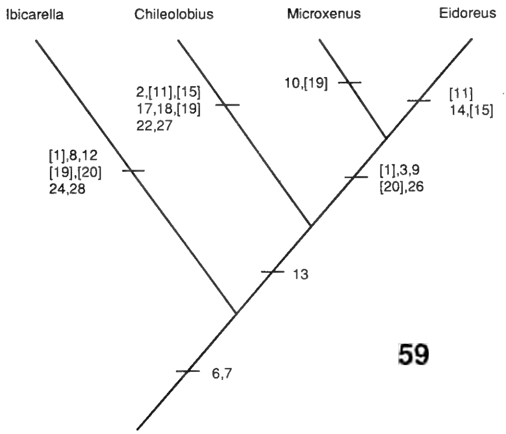

59

FIGS 58, 59.

Alternative phylogenies of eupsilobiine genera. Numbers refer to characters listed in text, and apparent homoplasies are in brackets.

(10) Pronotum with sulci: present [absent]. Many groups in the cerylonid series and the Biphyllidae have paired pits or submarginal carinae on the pronotum. Otherwise, well-developed sulci are restricted to Endomychidae and a single species of Cerylonidae. Within Endomychidae this character varies greatly in the Mycetaeinae and Mychotheninae, while virtually all of the "higher" endomychids have these sulci present. A notable exception is the Indo-Pacific genus *Cyclotoma* Mulsant.

(11) Hypomeron: modified to receive antenna [unmodified]. The hypomeron is unmodified in Biphyllidae, Byturidae, and virtually all members of the cerylonid series. Distinct antennal cavities are present in murmidiine and some cerylonine Cerylonidae.

(12) Prosternum with elongate, narrow, subparallel antennal grooves: present [absent]. This appears in *Ibicarella.* Such grooves are not present in primitive members of the cerylonid series that we examined.

(13) Prosternum with anterior edge: rounded [straight]. Most of the primitive groups in the cerylonid series, in addition to Byturidae and Biphyllidae, have the plesiomorphic condition. Such diverse endomychids as *Austroclemmus* Strohecker, *Catapotia* Thomson, *Endocoelus* Gorham, and *Periptycus* Blackburn have the anterior edge of the pronotum either rounded or slightly projecting medially; all of these genera, however, have the medial portion of the prosternum distinctly raised from the lateral portions of the prosternum. Other members of the cerylonid series, such as the cerylonids *Angolon* Dajoz, *Axiocerylon* Grouvelle, *Lapethus* Casey, *Murmidius* Leach, and *Thyroderus* Sharp, have the anterior portion of the prosternum raised as a distinct plate that protects the head when retracted.

(14) Prosternum with anterior edge: emarginate medially [entire]. The polarity of this character was determined by functional outgroup comparison using *Chileolobius* as the outgroup.

(15) Mesosternal anterior projection: present [absent]. The projection occurs in *Eidoreus* and *Chileolobius.*

(16) Metasternum with femoral lines: present [absent]. The distribution of femoral lines in the Clavicornia is enigmatic. The polarity of this character is uncertain.

(17) Elytra along suture: partially fused [unfused]. Fused elytra are almost always associated with loss of wings, xeric conditions, or both. In addition to *Chileolobius, Ibicarella* also has wings that are vestigial or absent but without partially fused elytra. This character can be polarized by functional outgroup comparison with the preferred phylogeny (Fig. 57) and one of the alternative phylogenies (Fig. 59).

(18) Elytra with humeri: concave to receive posterior angles of prothorax [convex or flat]. Within Eupsilobiinae this is unique to *Chileolobius* and can be polarized as character 17. A notable similarity is in an undescribed cerylonine from South America and the euxestine *Bradycycloxenus* Arrow.

(19) Tibial spur formula: 0-0-0 [2-2-2]. A formula of 2-2-2 is plesiomorphic for Coleoptera. Many different combinations appear within the cerylonid series, the Byturidae are 2-2-2, and the Biphyllidae are primitively 2-2-2.

(20) Trochanterofemoral attachment: heteromeroid [normal]. As the name implies, heteromeroid trochanters are widespread in the Heteromera. The attachment is weakly heteromeroid in *Ibicarella, Eidoreus,* and *Microxenus.* Weakly heteromeroid trochanters are also present in euxestine and some cerylonine Cerylonidae and most Corylophidae. *Chileolobius* has strongly heteromeroid trochanters. Byturidae, Biphyllidae, and Bothrideridae have strongly heteromeroid trochanters, while all other members of the cerylonid series have the trochanterofemoral attachment weakly heteromeroid or oblique. The polarity of this character is uncertain and depends upon the outgroup selected. We

do not believe that Eupsilobiinae is closely related to Bothrideridae, so we have chosen to interpret the strongly heteromeroid trochanters as derived within the subfamily.

(21) First ventrite with femoral lines: present [absent]. Femoral lines are present in Biphyllidae, Coccinellidae, corylophodine and primitive Corylophidae (see Pakaluk and Lawrence, 1986), some Bothrideridae, many Cerylonidae, and a few Endomychidae, e.g., *Austroclemmus, Displotera,* and an undescribed neotropical genus of Mychotheninae. The presence of femoral lines may not be the ground plan for Eupsilobiinae. Rather, it may unite eupsilobiines with its sister group. As the above discussion suggests, the polarity of this character is uncertain.

(22) Number of ventrites present: five [six]. Five ventrites are present in Byturidae and Biphyllidae, while both states are present in many of the families of the cerylonid series. When both states are present, it appears that six ventrites are present in the primitive members of these families, as illustrated by sticholotidine Coccinellidae. Conversely, all Corylophidae have six ventrites, except for an undescribed genus from Tasmania that has five ventrites; this genus appears to represent one of the most basal lineages within the family (J. Pakaluk, unpublished data). From these data, the direction of the transformation within the cerylonid series, as well as the number of times it has evolved, is uncertain. If the phylogenies depicted in figures 57 or 59 are used, this character can be polarized by functional outgroup comparison.

(23) Ventrites with internal apodemes: present [absent]. Internal apodemes are absent in Byturidae and Biphyllidae. Within the cerylonid series they are present in all Bothrideridae, Cerylonidae, Discolomidae, Sphaerosomatidae, as well as eupsilobiine, mychothenine, holoparamecine, and merophysiine Endomychidae. For the remaining families, Corylophidae, Lathridiidae, Coccinellidae, and other Endomychidae, these apodemes are occasionally present, but the vast majority of genera lack these structures. As with character 21, this feature may not be ancestral for Eupsilobiinae but unite it with other groups. It is not clear if this character has evolved repeatedly or if it is plesiomorphic for the cerylonid series and has been lost many times.

(24) Ventrites with internal apodemes on segments: 2-4 [2-5]. Based upon examination of other taxa in the cerylonid series, the reduction is presumed to be apomorphic. If one alternative phylogeny is accepted (Fig. 58), this character can be polarized by functional outgroup comparison.

(25) Aedeagus with parameres: absent [present]. Reduction or loss of parameres has occurred many times. Parameres are absent in some Biphyllidae, many Cerylonidae, many Endomychidae, Corylophidae, and Lathridiidae.

(26) Aedeagus with median lobe: coiled [curved]. A highly coiled median lobe is rare within the cerylonid series, although a comparable type occurs in the endomychid *Afralexia* Strohecker and a few Cerylonidae. This character can be polarized by functional outgroup comparison with all of the trees presented.

(27) Aedeagus with tegminal strut: fixed [articulated]. This character can be polarized, for two phylogenies (Figs 57 & 59), by functional outgroup comparison. The strut is articulated in most Bothrideridae, Biphyllidae, Byturidae, and ostomopsine Cerylonidae.

(28) Aedeagus with tegminal strut: absent [present]. A tegminal strut is present in Byturidae, Biphyllidae, Lathridiidae, Coccinellidae, Bothrideridae, and some Cerylonidae. The strut has probably been lost several times in the cerylonid series.

In the following discussion of the preferred (Fig. 57) and alternative phylogenies (Figs 58 & 59), numbers refer to the apomorphic states of the characters listed above. The exceptions are characters 1 and 20 (for Figs 58 & 59) and character 22 (for Fig. 58). In the subsequent discussion of these characters the polarities are reversed, so that the apomorphic states are in brackets. For the alternative phylogenies (Figs 58 & 59), some characters are deleted due to uncertain polarities. In these instances, the numbers that refer to particular conditions have not been changed to make comparisons between trees easier. Thus, figures 58 and 59 have a character 26, for example, on the internode supporting the *Microxenus-Eidoreus* clade, although there are only 22 characters in these analyses.

The preferred phylogeny (Fig. 57) has 28 characters, as listed above, with a length of 33 steps and a Consistency Index of 0.85. Homoplasious characters are 11, 15, 19, and 25. Characters 11, 15, and 19 are convergent on all three phylogenies, with a Consistency Index of 0.50 (11, 15) and 0.33 (19).

An alternative phylogeny (Fig. 58) relies upon a strict application of the outgroup method for polarizing characters. Thus, characters 4, 5, 16, 21, 23, and 25 are deleted since both states occur in the outgroup (here selected as the Byturidae-Biphyllidae lineage), and the polarities of characters 1, 20, and 22 are reversed. This analysis has 22 characters, with a length of 27 steps (this translates to 26 steps on the preferred phylogeny (Fig. 57) if the same characters are deleted, since all of them exept character 25 are completely consistent) and a Consistency Index of 0.81. As with the preferred phylogeny (Fig. 57), characters 11, 15, and 19 are homoplasious (still with seven steps for these three characters) and character 25 was deleted. An additional homoplasy is character 13 with a consistency of 0.50.

Yet another alternative phylogeny (Fig. 59) is one step longer than figure 58 if character 22, number of ventrites, is restored to the polarity used for the preferred phylogeny (Fig. 57). This seems reasonable since this reduction in number of ventrites, which is similar to the reduction in number of antennal segments, has occurred repeatedly in Coleoptera. Here the number of characters is still 22, with a length of 28 steps, and Consistency Index of 0.79. Character 13, however, is restored to be completely consistent, while the new homoplasies are characters 1 and 20, each with a consistency of 0.50.

Regardless of the hypothesis of relationships that is accepted, *Microxenus* and *Eidoreus* consistently are supported as sister groups. We prefer the phylogeny presented in figure 57 for several reasons, including: the general discussion of character evolution in the cerylonid series presented under the section describing characters; it is the shortest (most parsimonious) tree; of the homoplasies not shared by all three trees, it seems most reasonable to us that the loss of parameres could have evolved twice within the Eupsilobiinae, rather than the multiple evolution of character 13 or characters 1 and 20, suggested by the alternative phylogenies (Figs 58 & 59).

It is clear from this analysis that our understanding of the evolution of the cerylonid series of Clavicornia is poor and that this group needs considerably more study before its members may be grouped into a natural classification, recognizing monophyletic groups only. We hope that this preliminary outline of some useful characters in the cerylonid series, here applied to the Eupsilobiinae, is an initial step toward a comprehensive understanding of this enigmatic group of beetles. These conclusions are necessarily tentative, until a more intimate and detailed knowledge of the clavicorns is available. As work in progress by us and others reaches fruition, we hope that it will not only allow us to test the hypotheses proposed here, but to clarify the relationships of the Clavicornia in general.

ACKNOWLEDGEMENTS

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Review of the genus *Hypostomus* Lacépède, 1803 from Southern Brazil, with descriptions of three new species (Pisces, Siluriformes, Loricariidae)

by

Roberto E. REIS*, Claude WEBER & Luiz R. MALABARBA***

With 31 figures

ABSTRACT

The South Brazilian species of the loricariid catfish genus *Hypostomus* Lacépède, 1803 are reviewed. Eight species were found in the area: *H. aspilogaster* (Cope, 1894), *H. commersonii* Valenciennes, 1840, *H. luteus* (Godoy, 1980), *H. regani* (Ihering, 1905), *H.* cf. *ternetzi* (Boulenger, 1895), *H. isbrueckeri* sp. n., *H. roseopunctatus* sp. n., and *H. uruguayensis* sp. n. *Hypostomus luteomaculatus* (Devincenzi & Teague, 1942) is synonymized with *H. regani.* Lectotypes are designated for *H. aspilogaster, H. limosus* (Eigenmann & Eigenmann, 1888), and *H. regani.* A key, descriptions and illustrations are provided for all species included.

RESUMO

É feita uma revisão das espécies do gênero *Hypostomus* Lacépède, 1803 (Loricariidae) do sul do Brasil. Oito espécies foram encontradas na área: *H. aspilogaster* (Cope, 1894), *H. commersonii* Valenciennes, 1840, *H. luteus* (Godoy, 1980), *H. regani* (Ihering, 1905), *H. ternetzi* (Boulenger, 1895), *H. isbrueckeri* sp. n., *H. roseopunctatus* sp. n., e *H. uruguayensis* sp. n. *Hypostomus luteomaculatus* (Devincenzi & Teague, 1942) é considerada sinônimo de *H. regani.* Lectótipos são designados para

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H. aspilogaster, H. limosus (Eigenmann & Eigenmann, 1888) e *H. regani.* São apresentadas uma chave, descrições e ilustrações de todas as espécies.

INTRODUCTION

The genus *Hypostomus* Lacépède, 1803 is one of the most diverse and complex groups of South American freshwater catfishes. Like most other Neotropical groups studied in the past two centuries, the species of *Hypostomus* have been only briefly and incompletely described, and the available descriptions are often useless for species identification. This, allied to a very limited knowledge of general distribution patterns in South

FIG. 1.

Localities of specimens examined: black circle: *H. commersonii*; circled star: *H. isbrueckeri* sp. n.; asterisk: *H. ternetzi*; star: *H. uruguayensis* sp. n. Some symbols represent more than one lot or locality.

American rivers, has resulted in a proliferation of misidentifications in the literature. This can be exemplified in the laguna dos Patos system in Rio Grande do Sul, as will be discussed below.

In this work we present a taxonomic review of the species of the genus *Hypostomus* from Southern Brazil, chiefly the Rio Grande do Sul State. This geopolitical area comprises mainly two hydrographic systems (Figs 1, 2), viz. most of the laguna dos Patos system, with the Jacui river as its main tributary, and the upper and middle parts of the rio Uruguay basin. We believe that regional revisions of diverse and complex groups of freshwater fishes such as *Hypostomus* are an efficient way, and often the only practicable one, to solve problems at the specific level, as was successfully done by BOESEMAN (1968) with *Hypostomus* from Surinam, WEBER (1985, 1986 and 1987) with *Hypostomus* from Paraguay, NIJSSEN & ISBRÜCKER (1983) with *Corydoras* from Colombia, NIJSSEN & ISBRÜCKER (1986) with *Corydoras* from Peru and Ecuador, among others.

FIG. 2.

Locality of specimens examined: black circle: *H. regani*; circled star: *H. aspilogaster*; asterisk: *H. luteus*; star: *H. roseopunctatus* sp. n. Some symbols represent more than one lot or locality.

METHODS

Specimens examined in this study belong to the fish collections of the Academy of Natural Sciences of Philadelphia, Philadelphia (ANSP); British Museum (Natural History), London (BMNH); Faculdad de Humanidades y Ciencias, Montevideo (FHCM); Museu de Ciências da Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre (MCP); Museum of Comparative Zoology, Cambridge (MCZ); Muséum d'Histoire naturelle de Genève, Genève (MHNG); Museo de Historia Natural de Montevideo, Montevideo (MHNM); Muséum national d'Histoire naturelle, Paris (MNHN); Museu de Zoologia da Universidade de São Paulo, São Paulo (MZUSP); National Museum of Natural History, Washington (USNM); and Zoologisches Museum Berlin, Berlin (ZMB). Other abbreviations are: L1 and L2, lower and upper confidence limits; SD, standard deviation; and SL, standard length.

The measurements and terminology in tables 1 to 8 follow BOESEMAN (1968) and WEBER (1985). Pore-opercle distance refers to the distance between the last pore of the preopercle-mandibular sensory canal and the posterior margin of opercle. All morphometric and meristic data were treated by routine statistical methods and processed with the microcomputer program DATAX, available from MCP Fish Section.

KEY TO SPECIES OF *HYPOSTOMUS* FROM SOUTHERN BRAZIL

1 — Dorsum of body homogeneously dark, without conspicuous dots; cleithral width 2.8-2.9 in SL; lower caudal-fin ray 1.8-2.0 in SL .... *H. ternetzi* (rio Uruguay and rio Paraguay systems)

1' — Dorsum of body with conspicuous roundish marks; cleithral width 3.0-4.1 in SL; lower caudal ray 2.2-4.0 in SL 2

2 — Light roundish dots on a darker ground 3

2' — Dark roundish dots on a lighter ground 5

3 — Less than 17 teeth in each premaxillary or dentary; caudal peduncle 7.8-9.0 in SL .... *H. roseopunctatus* sp. n. (rio Uruguay system)

3' — More than 21 teeth in each premaxillary or dentary; caudal peduncle 9.0-10.9 in SL 4

4 — Teeth in each premaxillary or dentary 57-111; interorbital width 2.3-2.7 in HL; fins with the same dark ground colour of body .... *H. regani* (rio Uruguay and upper rio Paraná system)

4' — Teeth in each premaxillary or dentary 22-40; interorbital width 2.9-3.6 in HL; entire body or at least fins yellow .... *H. luteus* (rio Uruguay system)

5 — Lateral scutes 28-31 6

5' — Lateral scutes 25-27 7

6 — Lateral keels very weak, sometimes hardly discernible; lower caudal ray 3.0-3.5 in SL; 3-5 scutes bordering the posterior margin of the supraoccipital bone .... *H. aspilogaster* (rio Uruguay and rio Jacui systems)

6' — Lateral keels strong, sometimes very rough; lower caudal ray 2.5-2.9 in SL; 1-2 scutes bordering the posterior margin of the supraoccipital bone ......

.... *H. commersonii*
(rio Uruguay and rio Jacui systems)

7 — Upper caudal ray equal or longer than head length, 2.2-3.0 in SL; margin of caudal fin strongly concave, with big conspicuous darker dots and never with an yellow band .... *H. uruguayensis* sp. n.
(rio Uruguay system)

7' — Upper caudal ray shorter than head length, 3.4-4.1 in SL; margin of caudal fin truncated to slightly concave, homogeneously dark, often with an yellow (whitish in alcohol preserved specimens) distal band on mature males .....
.... *H. isbrueckeri* sp. n.
(rio Uruguay system)

Hypostomus aspilogaster (Cope)

(fig. 2, 3-5; tab. 1)

Plècostomus aspilogaster Cope, 1894: 100-101 (type-locality: rio Jacui, Rio Grande do Sul, Brazil).

Specimens examined:

Type-specimens:

Lectotype (by present designation) ANSP 21781 (203.7 mm SL); Paralectotypes ANSP 21782 (120.9, 187.3 and 148.7 mm SL), rio Jacui, Rio Grande do Sul, Brazil, H. H. Smith.

Other specimens:

Laguna dos Patos system, Brazil, Rio Grande do Sul:

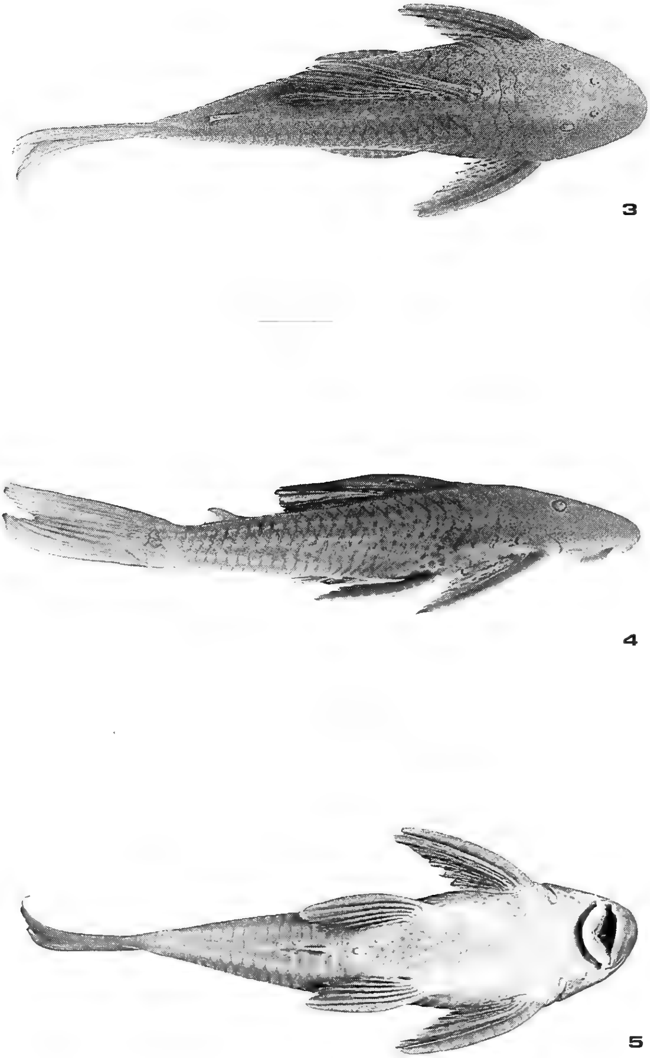
MCP 12321 (1), MCP 12141 (7) and MZUSP 37858 (13), mouth of rio Telho into the rio Jaguarão, Jaguarão, 7-8 Jan 1987, R. E. Reis, P. V. Azevedo & I. A. Costa. MCP 10886 (1), rio Guaiba at Ponta Grossa, Porto Alegre, 14 May 1986, E. P. Lerner & P. V. Azevedo. MCP 09696 (9), rio Guaiba at Ponta Grossa, Porto Alegre, 1 Dec 1983, Z. M. S. Lucena, L. R. Malabarba & I. A. Costa. MCP 10884 (1), rio Guaiba, between ilha do Junco and ilha das Pombas, Porto Alegre, 19 Feb 1986, E. P. Lerner & P. V. Azevedo. MCP 11258 (2), rio Jaguarão at "Prainha", near the mouth of rio Telho, Jaguarão, 7 Jan 1987, R. E. Reis, P. V. Azevedo & I. A. Costa. MCP 08995 (2), rio Camaquã at Passo da Guarda, Alto Alegre, Canguçu, 13-14 May 1982, U. Kehl. MCP 08950 (1), rio Camaquã at "eixo da barragem", Camaquã, Oct 1974, J. J. Bertoletti & M. F. Oliveira. MCP 11482 (2), rio Cai at road between Pareci Novo and São Sebastião do Cai, 30 Jun 1987, L. R. Malabarba, E. H. L. Pereira, M. Ries & L. M. Bernardini. MCP 11265 (4), rio Jaguarão at Passo do Centurião, Erval, 8-9 Jan 1987, R. E. Reis, P. V. Azevedo & I. A. Costa. MCP 08709 (1), MCP 08712 (1), and MCP 08715 (1), rio Jaguarão, Jaguarão, 29 Dec 1975, J. J. Bertoletti, E. P. Lerner & M. Bombim. MHNG 2311.52 (4), small creek crossing the road BR-290 at Arroio dos Ratos, 24 Oct 1982, C. A. S. Lucena & L. R. Malabarba.

Rio Uruguay system, Brazil, Rio Grande do Sul:

MCP 10877 (1), rio Cati, road between Quarai and Santana do Livramento, 23 Jul 1986, R. E. Reis, P. V. Azevedo & L. A. C. Bergmann.

Uruguay:

MCP 11088 (1), Río Taquarembó, Ansina, Taquarembó, 5 Oct 1985, C. A. S. Lucena & C. P. Silva.



FIGS 3-5.

Hypostomus aspilogaster, MCP 08995 (218.8 mm SL); 3) dorsal, 4) lateral, and 5) ventral view.

TABLE 1.

Morphometric and meristic data of *Hypostomus aspilogaster.*
a - lectotype, b - paralectotype.

Character	a	b	n	Range			95% confidence limits		SD
				low	high	mean	L1	L2	
Standard length (A) (mm)	202.8	120.9	20	137.7	266.2	202.0			33.806
				Ratios of standard length					
Predorsal distance (D)	2.6	2.7	20	2.6	2.9	2.7	2.696	2.767	
Head length (E)	3.3	3.3	20	3.2	3.6	3.4	3.362	3.468	
Cleithral width (F)	3.5	3.4	20	3.7	4.1	3.9	3.828	3.937	
Length of dorsal fin spine (K)	3.0	3.2	17	3.2	3.8	3.5	3.387	3.576	
Length of dorsal fin base (L)	3.5	4.0	20	3.7	4.6	4.1	4.034	4.256	
Dorsal base to adipose spine (M)	5.4	6.2	20	4.2	5.1	4.5	4.432	4.652	
Trunk length (N)	4.5	4.1	20	4.0	4.8	4.4	4.304	4.488	
Pectoral fin spine length (O)	3.2	3.3	20	3.2	3.8	3.5	3.399	3.572	
Abdominal length (P)	5.2	5.1	20	4.8	5.4	5.1	5.044	5.200	
Pelvic fin spine length (Q)	3.7	4.0	20	4.1	4.6	4.3	4.215	4.345	
Caudal peduncle length (R)	3.1	3.2	20	2.7	3.1	2.9	2.885	2.986	
Caudal peduncle depth (S)	10.6	10.4	20	11.0	12.7	12.0	11.750	12.216	
Adipose fin spine length (T)	15.4	14.6	20	14.7	21.2	17.0	16.212	17.779	
Upper caudal ray length (U)	3.2	3.6	13	3.0	3.5	3.2	3.130	3.312	
Lower caudal ray length (V)	3.3	3.3	17	3.0	3.5	3.2	3.116	3.276	
				Ratios of head length					
Head depth (G)	1.8	1.8	20	1.6	1.9	1.8	1.743	1.800	
Snout length (H)	1.7	1.7	20	1.6	1.7	1.7	1.659	1.692	
Horizontal eye diameter (I)	8.0	6.0	20	6.7	8.6	7.7	7.490	7.942	
Least interorbital width (J)	2.7	2.6	20	2.8	3.1	2.9	2.880	2.963	
Rictal barbel	7.7	9.2	20	6.3	10.2	7.6	7.152	8.122	
Right mandibular ramus	5.8	5.8	20	5.7	7.4	6.5	6.326	6.762	
Pore-opercle distance	5.6	5.3	20	5.0	6.5	5.5	5.335	5.674	
				Counts					
Series of lateral scutes	30	30	20	29	31	30.1			0.447
Predorsal scutes	4	4	20	3	4	3.3			0.444
Scutes at dorsal fin base	8	8	20	8	10	8.7			0.571
Dorsal to adipose fin scutes	9	8	20	8	10	9.0			0.605
Adipose to caudal fin scutes	—	—	20	4	6	5.7			0.587
Scutes at anal fin base	2	2	20	2	3	2.8			0.444
Anal to caudal fin scutes	16	15	20	14	17	15.3			0.639
Teeth on left premaxilla	41	27	20	25	55	36.8			7.587
Teeth on right premaxilla	47	22	20	24	53	36.5			7.388
Teeth on left dentary	35	28	20	25	56	39.7			8.298
Teeth on right dentary	34	24	20	26	54	39.5			8.029
Plates bordering supraoccipital	4	4	18	3	5	3.6			0.777

Diagnosis: *Hypostomus aspilogaster* is distinguished from all other *Hypostomus* species in Southern Brazil by the larger number of lateral scutes: 29-31 versus 25-27 in all other species except *H. commersonii* and *H. regani.* From *H. commersonii* it is distinguished by the number of scutes bordering the posterior margin of the supraoccipital bone: 3-5 in *H. aspilogaster* and 1-2 in *H. commersonii. H. commersonii* also has a longer lower caudal fin spine (2.5-2.9 in SL; 3.0-3.5 in *H. aspilogaster*), and the lateral scutes are much rougher than those of *H. aspilogaster. Hypostomus regani* occasionally has 29 lateral scutes, but it is distinguished from *H. aspilogaster* by its larger eye, longer dorsal fin spine, longer adipose fin spine, larger number of teeth, possession of 1-2 plates bordering the supraoccipital bone (see tabs. 1 and 4), and inverse colour pattern, that is, light dots on darker ground.

Description: standard length of examined specimens 120.9 to 266.2 mm; other meristic and morphometric data summarized in table 1.

Head completely covered with dermal ossifications dorsally except for a comparatively large, roughly ovate naked area on snout tip. Dorsal margin of orbit slightly elevated, hardly continuing in an inconspicuous ridge on posttemporal plate and following scutes. Usually three, sometimes 4 or 5 scutes bordering posterior margin of supraoccipital bone. Body moderately low; dorsal profile gently descending from origin of dorsal fin to end of caudal peduncle. Caudal peduncle wide, roughly ovate in cross-section; widely flattened ventrally. Dorsal scutes between end of dorsal fin base and adipose fin flattened in their dorsal portion; those closer to dorsal fin usually not meeting in midline and with a central area lacking odontodes.

Outer face of upper lip covered with small scutelets; maxillary barbel comparatively short. Teeth very thin but not very numerous, with very small outer cusp.

Body completely covered with rows of smooth scutes dorsally, even in larger specimens. Abdomen and ventral surface of head ranging from completely naked in smaller specimens to completely covered with small scutelets in larger individuals.

Adipose fin spine short and curved. Caudal fin margin concave.

Colour in alcohol: ground colour of dorsal surface light- or yellowish-brown to dark grey-brown; lighter ventrally. Black or dark-brown small, roundish dots scattered all over dorsal surface, fins, and abdomen; smaller and closer together on head. This pattern usually inconspicuous on caudal fin.

Colour in life: living specimens of *H. aspilogaster* just alike alcohol preserved specimens.

Hypostomus commersonii Valenciennes

(Fig. 1, 6-8; tab. 2)

Hypostomus Commersonii Valenciennes, in Cuvier & Valenciennes, 1840: 495-497 (type-locality: Río de La Plata, Uruguay and rio São Francisco, Brazil; restricted to Río de La Plata, Montevideo, Uruguay, by WEBER, 1896).

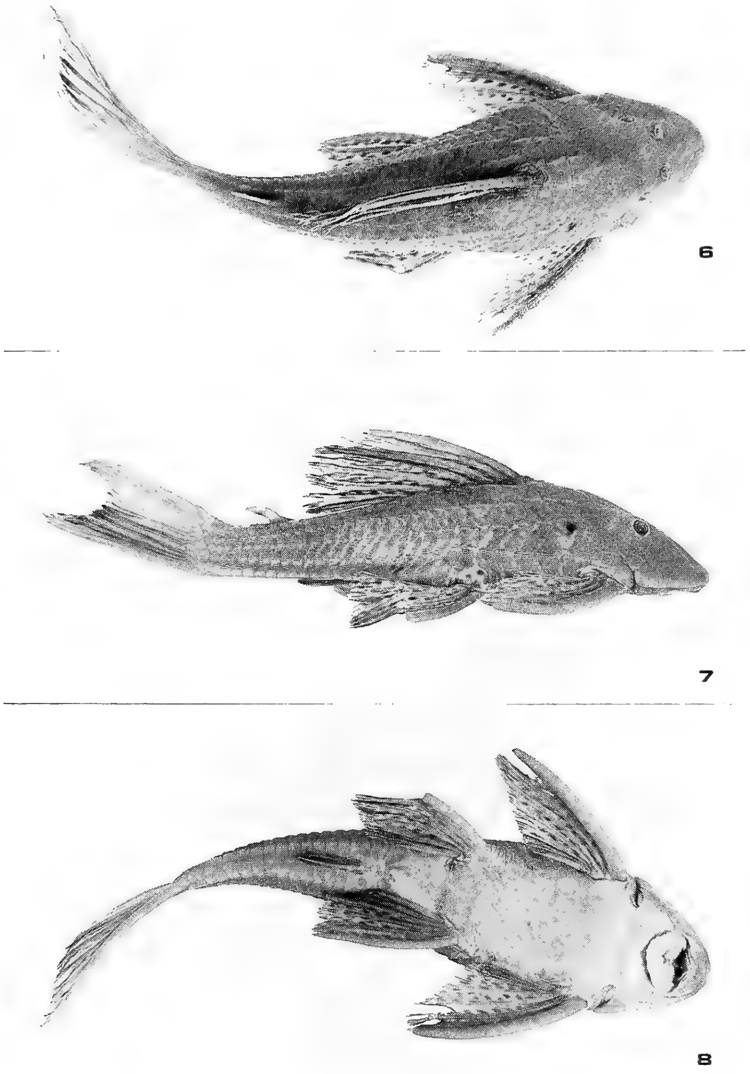
Plecostomus spiniger Hensel, 1870: 73-75 (type-locality: rio Cadeia, Rio Grande do Sul, Brazil).

Plecostomus limosus Eigenmann & Eigenmann, 1888: 167 (type-locality: Rio Grande do Sul; restricted to laguna dos Patos system by MALABARBA, 1989).

Specimens examined:

Type-specimens:

Lectotype of *H. commersonii:* MNHN 99.24.5.7 (423 mm SL — dry specimen), Río de La Plata, Montevideo, Uruguay, A. d'Orbigny. Paralectotypes MNHN 99.24.5.1 (386 mm SL — dry specimen), same data as lectotype; MNHN 99.24.5.4-3 (208.7 and 356.3 mm SL — dry specimens), rio São Francisco, Brazil, 1822, A. Saint-Hilaire.



FIGS 6-8.

Hypostomus commersonii, MCP 11718 (174.0 mm SL); 6) dorsal, 7) lateral, and 8) ventral view.

Holotype of *P. spiniger:* ZMB 7444 (320 mm SL), rio Cadeia, Rio Grande do Sul, Brazil, R. Hensel. (Photograph and measurements kindly made by Dr. H.-J. Paepke, ZMB).
Lectotype of *P. limosus* (by present designation): MCZ 7869 (159.5 mm SL), Rio Grande do Sul, Apr 1865, Dom Pedro II. Paralectotypes MCZ 7869 (162.8 mm SL) and BMNH 1904.1.28: 1 (166.5 mm SL), same data as lectotype.

Other specimens:

Laguna dos Patos system, Brazil, Rio Grande do Sul:

MCP 11237 (8), mouth of rio Telho into rio Jaguarão, Jaguarão, 7-8 Jan 1987, R. E. Reis, P. V. Azevedo & I. A. Costa. MCP 08741 (1) and MCP 8371 (1×), creek at Lomba do Sabão, Viamão, 22 Oct 1975, E. P. Lerner. MCP 09009 (1), creek at Lomba do Sabão, Viamão, 25 Aug 1982, E. P. Lerner, J. J. Bertoletti & R. Wildhouser. MCP 08940 (1), MCP 08926 (1), MCP 08927 (1), MCP 08925 (1), MCP 08947 (1), MCP 08948 (1), and MCP 08951 (1), rio Camaquã at "eixo da barragem", Camaquã, Oct 1974, J. J. Bertoletti & M. F. Oliveira. MCP 10020 (1), rio Taquari-Mirim, Venâncio Aires, 18 Nov 1983, C. A. S. Lucena & L. R. Malabarba. MCP 11270 (8), arroio Jaguarão at Passo do Centurião, Erval, 8-9 Jan 1987, R. E. Reis, P. V. Azevedo & I. A. Costa. MCP 10939 (1), rio Camaquã at Passo da Guarda, Alto Alegre, Canguçu, 13-14 May 1982, U. Kehl. MCP 06874 (1), rio Guaiba at Ponta do Jacaré, Saco dos Macacos, Barra do Ribeiro, 27 Dec 1984, E. P. Lerner & C. A. S. Lucena. MCP 08522 (1), small creek at Distrito Monte Belo, Bento Gonçalves, 22 Jan 1977. MCP 10454 (1), rio Guaiba at ilha Mauá, Porto Alegre, 29 Jan 1985, J. J. Bertoletti & C. A. S. Lucena. MCP 10530 (2), rio Guaiba at Ponta do Jacaré, Barra do Ribeiro, 27 Sep 1985, R. E. Reis, J. J. Bertoletti & R. Foschiera. MCP 06887 (1), rio Guaiba at Ponta Grossa, Porto Alegre, 27 Sep 1985, R. E. Reis, J. J. Bertoletti & R. Foschiera. MCP 08711 (1), MCP 08718 (1), MCP 08719 (1), rio Centurião, Jaguarão, 29 Dec 1975, J. J. Bertoletti, M. Bombim & E. P. Lerner. MCP 08727 (1), rio Jaguarão, Jaguarão, 29 Dec 1975, M. Bombim, J. J. Bertoletti & E. P. Lerner.

Rio Uruguay system, Brazil, Rio Grande do Sul:

MCP 12217 (1) and MCP 12218 (1), rio Pelotas at Pinhal da Serra, Esmeralda, 20 Aug 1988, Mr. Pedro. MCP 12219 (1), rio Pelotas at Pinhal da Serra, Esmeralda, 20 Aug 1988, Mr. Pedro. MCP 11091 (1), MCP 11089 (1), and MCP 11090 (1), exit of Sanchouri Dam at São Marcos, Uruguaiana, 22 Jul 1987, L. A. C. Bergmann, P. V. Azevedo & R. E. Reis. MCP 9045 (1), creek at road (BR-153) between Bagé and Aceguá, about 33 km South of Bagé, 25 Oct 1982, C. A. S. Lucena & L. R. Malabarba. MCP 12332 (2), rio Pelotas at Pinhal da Serra, Esmeralda, 5-9 Oct 1988, Mr. Pedro. MCP 12637 (1), rio Uruguay at "Rancho da Amizade", São Borja, 31 Oct-1 Nov 1988 C. A. S. Lucena, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 10829 (4), rio Conceição, Augusto Pestana, 12 Sep 1986, C. P. Silva & F. Korndorfer. MCP 10489 (6), rio Conceição, Ijui, 3 Dec 1985, C. P. Silva & F. Korndorfer. MCP 06630 (5), rio Conceição, Augusto Pestana, 9 Jul 1986, C. P. Silva & F. Korndorfer. MCP 10490 (1), rio Conceição, Barreiro, Ijui, 3 Dec 1985, C. P. Silva & F. Korndorfer. MCP 10491 (4), rio Conceição, Ijui, 2 Dec 1985, C. P. Silva & F. Korndorfer. MCP 10485 (2), rio Conceição at "CTG", Ijui, 4 Dec 1985, C. P. Silva & F. Korndorfer. MCP 10487 (1), rio Conceição, Ijui, 4 Dec 1985, C. P. Silva & F. Korndorfer. MCP 10496 (1), rio Conceição at Linha 8, Esquita Dutra, Ijui, 5 Dec 1985, C. P. Silva & F. Korndorfer. MCP 10221 (1), small creek tributary of rio Ijui, at road between São Luiz Gonzaga and Ijui, 19 Nov 1984, R. E. Reis & L. R. Malabarba. MCP 10891 (2), rio Piratini at "Fazenda dos Hinz", Distrito de Coimbra, Santo Angelo, 20 Dez 1985, L. R. Malabarba, R. E. Reis & S. B. Mallmann. MCP 11752 (1), mouth of rio Ijui-Mirim, Pirapó, 11 Nov 1987, J. J. Bertoletti, E. P. Lerner, P. V. Azevedo, C. A. S. Lucena & L. A. C. Bergmann. MCP 05890 (12), sanga das Aguas Frias (about 100 m from rio Uruguay), Irai, 22 Dec 1985, L. R. Malabarba & R. E. Reis. MCP 09500 (1), rio Toropi, Mata, 13 Sep 1983, L. R. Malabarba, R. E. Reis & C. A. S. Lucena. MCP 09253 (1), rio Miracatu, Manoel Viana, 14-15 Sep 1983, R. E. Reis, C. A. S. Lucena & L. R. Malabarba. MCP 11718 (4), MCP 12215 (5), and MCP 12216 (5), rio Potiribu at Parque Assis Brasil, Ijui, 11 Aug 1987, F. Korndorfer & Winckler. MCP 11862 (2) and MCP 11875 (5), rio Potiribu at Parque Assis Brasil, Ijui, 17 Dec 1987, F. Korndorfer & Winckler.

Santa Catarina:

MCP 12334 (2), rio Canoas at road between Abdom Batista and Anita Garibaldi, Campos Novos, 8-9 Sep 1988, L. A. C. Bergmann, E. H. L. Pereira, P. V. Azevedo & A. Ramires. MCP 12356 (2), rio Canoas between Vargem and São José do Cerrito, Campos Novos, 10 Sep 1988, L. A. C.

Bergmann, E. H. L. Pereira, P. V. Azevedo & A. Ramires. MCP 12727 (2), rio Canoas at Passo do Canoas, road (SC-458) between Tupitinga and Celso Ramos, Campos Novos, 10 Nov 1988, C. A. S. Lucena, E. H. L. Pereira, P. V. Azevedo & A. Ramires. MCP 12920 (1), rio Jacutinga at road (BR-283) between Seara and Concórdia, 9-10 Dec 1988, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires.

TABLE 2.

Morphometric and meristic data of *Hypostomus commersonii*.
a - lectotype of *Hypostomus commersonii*, b - lectotype of *Plecostomus limosus*, and c — holotype of *Plecostomus spiniger*.

Character	Type-specimens				Range			95% confidence limits		
	a	b	c	n	low	high	mean	L1	L2	SD
Standard length (A) (mm)	423.0	159.5	320.0	23	111.1	301.3	202.4			38.487
					Ratios of standard length					
Predorsal distance (D)	2.7	2.5	3.1	23	2.2	2.8	2.6	2.516	2.621	
Head length (E)	3.5	3.3	3.8	23	2.6	3.5	3.2	3.146	3.306	
Cleithral width (F)	3.9	3.6	4.6	23	3.0	4.0	3.6	3.540	3.731	
Length of dorsal fin spine (K)	—	3.1	—	18	2.6	3.4	3.1	2.948	3.185	
Length of dorsal fin base (L)	4.0	3.5	—	23	3.3	3.9	3.7	3.562	3.741	
Dorsal base to adipose spine (M)	4.4	5.5	—	23	4.8	6.2	5.4	5.198	5.558	
Trunk length (N)	4.6	4.1	—	23	3.6	4.3	3.9	3.844	4.018	
Pectoral fin spine length (O)	4.0	3.4	—	21	3.1	3.6	3.4	3.306	3.442	
Abdominal length (P)	4.6	4.9	—	23	4.7	5.7	5.2	5.092	5.294	
Pelvic fin spine length (Q)	—	4.1	—	23	3.5	4.6	4.1	3.992	4.218	
Caudal peduncle length (R)	3.0	3.3	—	23	3.0	3.5	3.2	3.173	3.305	
Caudal peduncle depth (S)	12.1	10.8	—	23	9.7	12.6	11.2	10.852	11.516	
Adipose fin spine length (T)	13.2	16.3	—	23	13.0	19.4	15.8	14.963	16.578	
Upper caudal ray length (U)	—	—	—	14	2.7	3.2	2.9	2.826	2.993	
Lower caudal ray length (V)	—	—	—	16	2.5	2.9	2.7	2.639	2.791	
					Ratios of head length					
Head depth (G)	1.7	1.6	1.8	23	1.5	1.7	1.6	1.596	1.646	
Snout length (H)	1.6	1.7	1.4	23	1.7	1.8	1.7	1.702	1.726	
Horizontal eye diameter (I)	11.3	7.1	9.2	23	6.7	9.5	8.3	7.995	8.588	
Least interorbital width (J)	2.6	2.6	2.8	23	2.4	2.8	2.6	2.540	2.658	
Rictal barbel	—	6.8	—	23	5.6	11.1	7.3	6.653	7.994	
Right mandibular ramus	9.2	7.7	6.4	22	7.3	9.7	8.5	8.197	8.811	
Pore-opercle distance	—	5.2	—	23	4.6	6.1	5.0	4.892	5.196	
					Counts					
Series of lateral scutes	29	28	—	23	28	30	28.5			0.593
Predorsal scutes	3	3	3	23	3	3	3.0			0.000
Scutes at dorsal fin base	8	9	—	23	8	10	9.0			0.367
Dorsal to adipose fin scutes	8	7	—	23	7	8	7.6			0.499
Adipose to caudal fin scutes	6	5	6	23	3	6	4.9			0.668
Scutes at anal fin base	2	3	3	23	2	3	2.6			0.499
Anal to caudal fin scutes	15	14	15	23	13	15	13.7			0.619
Teeth on left premaxilla	—	31	27	22	22	45	30.5			5.788
Teeth on right premaxilla	—	29	28	22	22	48	32.0			6.525
Teeth on left dentary	—	29	32	22	20	55	31.5			7.475
Teeth on right dentary	—	29	44	22	22	48	31.5			7.015
Plates bordering supraoccipital	1	1	1	23	1	2	1.2			0.388

Uruguay:

MCP 09856 (1), MCP 09857 (1), MCP 09858 (1), MCP 09859 (1), MCP 09860 (1), MCP 09861 (1), MCP 09862 (1), MCP 09863 (1), MCP 09864 (1), MCP 09865 (1), MCP 09866 (1), MCP 09867 (1), MCP 09868 (1), MCP 09869 (1) and MCP 09870 (1), Río Negro, Arreria Farm, Depto. Cerro Largo, 19-21 May 1984, C. A. S. Lucena & others.

Diagnosis: *Hypostomus commersonii* is distinguished from other *Hypostomus* species inhabiting Southern Brazil by the presence of four very rough lateral ridges on flanks. *H. commersonii* has 28-30 lateral scutes (25-27 in remaining species except H. aspilogaster and *H. regani*). From *H. regani,* it is easily distinguished by its smaller eye, smaller snout, smaller mandibular ramus, smaller number of teeth (see tabs 2 and 4) and by presenting the inverse colour pattern, that is, dark dots on lighter ground. From *H. aspilogaster,* it is distinguished by the longer lower caudal ray and by having 1-2 scutes bordering the posterior margin of the supraoccipital bone (3-5 in *H. aspilogaster*).

Description: standard length of examined specimens 111.1 to 423.0 mm; other meristic and morphometric data summarized in table 2.

Head completely covered with dermal ossifications dorsally, except for a small, roughly ovate naked area on snout tip, which usually disappears in larger specimens. Dorsal margin of orbit slightly elevated, continuing in a low ridge on posttemporal plate. Another low ridge on supraoccipital, diverging in two separate ridges on predorsal plates always present. Usually one, sometimes two scutes bordering posterior margin of the supraoccipital bone. Body deep; dorsal profile gently descending from origin of dorsal fin to end of caudal peduncle. Caudal peduncle roughly ovate in cross-section; slightly flattened ventrally. Dorsal scutes between end of dorsal fin base and adipose fin spine somewhat flattened in their dorsal portions; those closer to dorsal fin sometimes with a central area devoided of odontodes.

Outer face of upper lip covered with small scutelets; maxillary barbel comparatively short. Teeth small and not much numerous; with a well developed outer cusp of about half length of inner.

Body completely covered with rows of scutes with a rough keel, forming four rough ridges along flanks. These ridges sometimes very strong. Abdomen and lower surface of head usually covered with minute scutelets, even in smaller specimens.

Distal half of pectoral fin spine of larger specimens usually covered dorsally with proeminent odontodes anteriorly curved. Adipose fin spine very strong but short and curved. Caudal fin margin concave to strongly concave; medium-sized outer rays.

Colour in alcohol: ground colour of dorsal surface light- to dark-brown; slightly lighter to whitish ventrally. All body and fins covered with very small, roundish, black or dark-brown dots; smaller and closer together on head. This pattern sometimes inconspicuous on caudal fin and ventral portion of caudal peduncle.

Colour in life: living specimens of *H. commersonii* usually darker than alcohol preserved specimens.

Remarks: *H. commersonii* is by far the largest species in Southern Brazil, attaining more than half a meter. *H. commersonii* was the only species found inhabiting lentic, open environments such as large lagoons and freshwater swamps.

Hypostomus luteus (Godoy)
(fig. 2, 9-14; tab. 3)

Plecostomus luteus Godoy, 1980: 29-32, figs 15, 16 (type-locality: rio Pelotas at Volta Grande Dois, Marcelino Ramos, Rio Grande do Sul, Brazil).

Specimens examined:

Type specimen:

Holotype: unregistered, formalin preserved specimen in the personal collection of Manoel Pereira de Godoy, Pirassununga, São Paulo (221.8 mm SL), rio Pelotas at Volta Grande Dois, Marcelino Ramos, Rio Grande do Sul, Brazil, 15 Apr 1980, M. P. Godoy.

Other specimens:

Brazil, Rio Grande do Sul:

MCP 12813 (3) and MHNG 2430.72 (1), rio Pelotas at road between Anita Garibaldi and Esmeralda, 5-9 Sep 1988, Mr. Pedro. MCP 12807 (1), rio Pelotas at road between Anita Garibaldi and Esmeralda, 19-20 Feb 1989, R. E. Reis, P. V. Azevedo, E. H. L. Pereira & L. A. C. Bergmann. MCP 12812 (3), rio Pelotas at road between Anita Garibaldi and Esmeralda, 11-12 Dec 1988, R. E. Reis, P. V. Azevedo, E. H. L. Pereira, L. A. C. Bergmann & A. Ramires.

Santa Catarina:

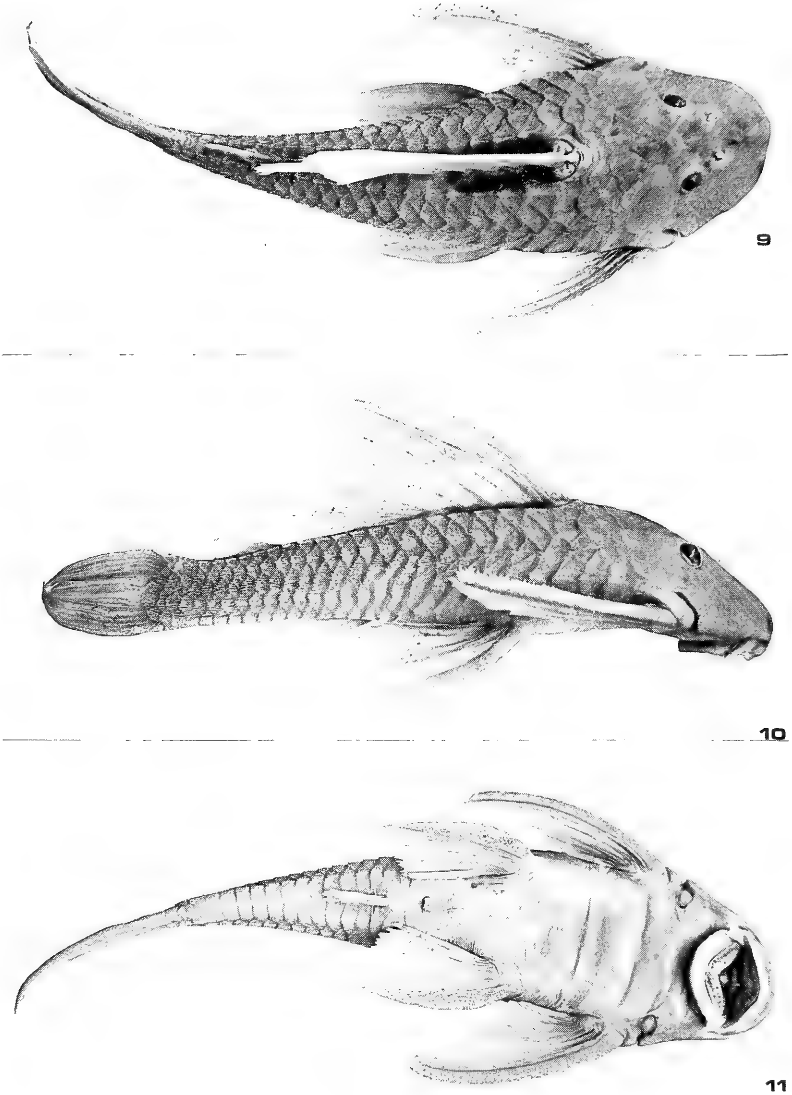
MCP 12815 (1), rio Canoas at road between Anita Garibaldi and Abdom Batista, Campos Novos, 8-9 Feb 1988, R. E. Reis, P. V. Azevedo, E. H. L. Pereira & L. A. C. Bergmann. MCP 12816 (1), rio Canoas at road between Vargem and São Jose do Cerrito, Campos Novos, 16 Jul 1988, R. E. Reis, P. V. Azevedo, E. H. L. Pereira & L. A. C. Bergmann. MCP 12814 (1), rio Canoas at road between Vargem and São José do Cerrito, Campos Novos, 10 Sep 1988, R. E. Reis, P. V. Azevedo, E. H. L. Pereira & L. A. C. Bergmann. MCP 12493 (1), rio Jacutinga at road BR-283 between Seara and Concórdia, Concórdia, 2 Oct 1988, A. Ramires, P. V. Azevedo, E. H. L. Pereira & L. A. C. Bergmann. MCP 12806 (2), rio Uruguay at mouth of rivers Pelotas and Canoas, Barracão, 18-19 Feb 1989, R. E. Reis, P. V. Azevedo, E. H. L. Pereira, L. A. C. Bergmann & A. Ramires. MCP 12744 (1), rio Canoas at road between Anita Garibaldi and Abdom Batista, Campos Novos, 11-12 Nov 1988, C. A. S. Lucena, P. V. Azevedo, E. H. L. Pereira & A. Ramires. MCP 12735 (2), rio Canoas at Passo do Canoas, road SC-458 between Tupitinga and Celso Ramos, Campos novos, 10 Nov 1988, C. A. S. Lucena, P. V. Azevedo, E. H. L. Pereira & A. Ramires. MCP 12749 (1), rio Canoas at road between Vargem and São José do Cerrito, Campos Novos, 12-13 Nov 1988, C. A. S. Lucena, P. V. Azevedo, E. H. L. Pereira & A. Ramires. MCP 12810 (1), rio Canoas at road between Anita Garibaldi and Abdom Batista, Campos Novos, 22-23 Jan 1989, C. A. S. Lucena, P. V. Azevedo, E. H. L. Pereira & A. Ramires. MCP 12808 (1), rio Canoas at road between Anita Garibaldi and Abdom Batista, Campos Novos, 22-23 Jan 1989, C. A. S. Lucena, P. V. Azevedo, E. H. L. Pereira & A. Ramires. MCP 12809 (1), rio Canoas at Passo do Canoas, road SC-458 between Tupitinga and Celso Ramos, Campos novos, 21-22 Jan 1989, C. A. S. Lucena, L. A. C. Bergmann, P. V. Azevedo, E. H. L. Pereira & A. Ramires. MCP 12492 (1), rio Uruguay at Itá, 1 Oct 1988, P. V. Azevedo, E. H. L. Pereira, L. A. C. Bergmann & A. Ramires.

Diagnosis: large *Hypostomus luteus* specimens are distinguished from all other *Hypostomus* species by the impressive bright yellowish-orange colour (pale yellowish in alcohol-preserved specimens). Smaller specimens usually have at least the entire caudal fin and usually also the dorsal fin yellow, and small yellow dots scattered on the dorsal surface. Besides *H. luteus,* the following two South Brazilian species have light dots on darker ground: *H. roseopunctatus* and *H. regani.* The three species are characterized by the number of jaw teeth 6-16 in *H. roseopunctatus,* 22-40 in *H. luteus,* and 57-111 in *H. regani.*

TABLE 3.

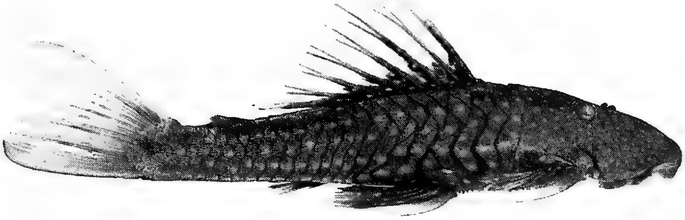
Morphometric and meristic data of *Hypostomus luteus.*

Character	holotype	n	Range			95% confidence limits		SD
			low	high	mean	L1	L2	
Standard length (A) (mm)	221.8	20	134.7	312.5	227.0			39.665
			Ratios of standard length					
Predorsal distance (D)	2.7	20	2.5	2.8	2.6	2.547	2.624	
Head length (E)	3.2	20	3.0	3.4	3.2	3.112	3.213	
Cleithral width (F)	3.6	20	3.1	3.5	3.3	3.222	3.302	
Length of dorsal fin spine (K)	3.1	20	2.5	3.1	2.9	2.791	2.959	
Length of dorsal fin base (L)	3.6	20	3.1	3.7	3.5	3.417	3.555	
Dorsal base to adipose spine (M)	6.0	20	5.4	6.5	6.0	5.795	6.145	
Trunk length (N)	4.4	20	4.2	4.7	4.4	4.355	4.473	
Pectoral fin spine length (O)	3.1	20	2.8	3.3	3.1	3.059	3.182	
Abdominal length (P)	4.7	20	4.4	5.0	4.7	4.654	4.801	
Pelvic fin spine length (Q)	3.9	20	3.7	4.4	4.0	3.884	4.051	
Caudal peduncle length (R)	3.1	20	3.1	3.5	3.3	3.203	3.297	
Caudal peduncle depth (S)	9.5	20	9.0	10.2	9.7	9.544	9.785	
Adipose fin spine length (T)	14.2	20	11.0	13.7	12.4	12.105	12.787	
Upper caudal ray length (U)	3.6	18	3.2	4.0	3.6	3.435	3.672	
Lower caudal ray length (V)	3.3	17	3.1	3.8	3.4	3.291	3.525	
			Ratios of head length					
Head depth (G)	1.8	20	1.7	1.9	1.8	1.735	1.792	
Snout length (H)	1.7	20	1.5	1.7	1.6	1.580	1.617	
Horizontal eye diameter (I)	6.5	20	5.9	7.4	6.7	6.505	6.879	
Least interorbital width (J)	3.2	20	2.9	3.6	3.3	3.194	3.340	
Rictal barbel	—	20	5.9	9.4	7.7	7.200	8.173	
Right mandibular ramus	4.9	19	4.8	6.1	5.4	5.239	5.487	
Pore-opercle distance	—	20	6.5	8.3	7.1	6.918	7.332	
			Counts					
Series of lateral scutes	26	20	25	27	26.0			0.394
Predorsal scutes	3	20	3	3	3.0			0.000
Scutes at dorsal fin base	9	20	8	9	8.5			0.513
Dorsal to adipose fin scutes	6	20	6	7	6.5			0.513
Adipose to caudal fin scutes	4	20	3	5	3.8			0.550
Scutes at anal fin base	2	20	2	3	2.6			0.510
Anal to caudal fin scutes	12	20	12	14	13.0			0.510
Teeth on left premaxilla	25	20	25	36	30.3			3.242
Teeth on right premaxilla	27	19	22	38	29.7			4.148
Teeth on left dentary	26	20	27	39	32.9			3.731
Teeth on right dentary	26	19	27	40	33.7			3.784
Plates bordering supraoccipital	5	20	2	6	3.5			1.192



FIGS 9-11.

Hypostomus luteus, MCP 12807 (279.0 mm SL); 9) dorsal, 10) lateral, and 11) ventral views.



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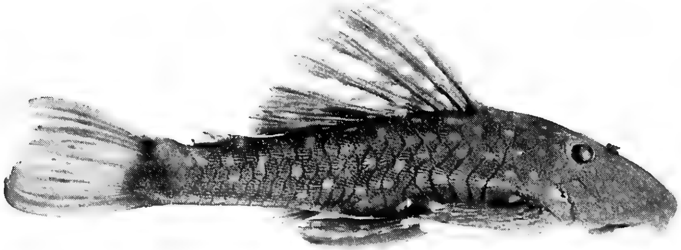

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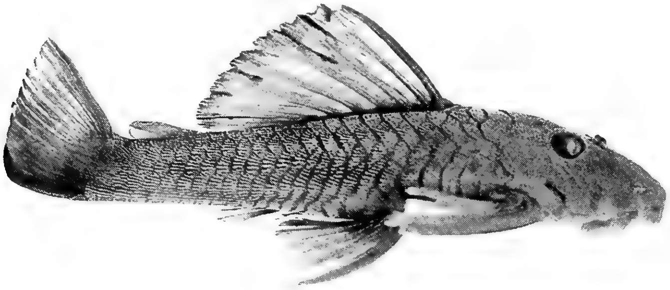

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FIGS 12-14.

Hypostomus luteus, progressive development of the yellow color: 12) MCP 12816 (226.0 mm SL), 13) MCP 12493 (134.7 mm SL), and 14) MCP 12492 (77.2 mm SL).

Description: standard length of examined specimens 134.7 to 312.5 mm; other meristic and morphometric data summarized in table 3.

Head covered with dermal ossifications dorsally, except for a roundish of ovate naked area on snout tip. Dorsal margin of orbit only slightly elevated, continuing in an inconspicuous ridge on posttemporal plate and on a series of scutes beginning just behind posttemporal plate (at least in larger specimens). Low ridges also present on predorsal and dorsal scutes. Usually three scutes bordering posterior margin of supraoccipital bone. Body moderately low; dorsal profile gently descending from origin of dorsal fin to end of caudal peduncle. Caudal peduncle roughly ovate in cross-section; slightly flattened ventrally. Ventral scutes of caudal peduncle somewhat expanded laterally, forming conspicuous lateral ridges in it lower margins, at least in larger specimens. Dorsal scutes between end of dorsal fin base and adipose fin spine flat in their dorsal portion; those closer to dorsal fin usually with a central area devoided of odontodes.

Outer face of upper lip covered with small scutelets, specially on lateral portions; maxillary barbel variable in size, moderately short. Teeth strong and not very numerous, with a well developed outer cusp of about half length of inner cusp.

Body completely covered with rows of comparatively smooth scutes dorsally; moderately rough in larger specimens. Abdomen variably covered with minute scutelets; with naked areas even in larger specimens. Ventral surface of head usually completely covered with scutelets, even in smaller specimens.

Distal half of pectoral fin spine of larger specimens usually covered dorsally with somewhat hypertrophied odontodes, slightly curved anteriorly. Adipose fin spine moderately long and straight. Caudal fin margin slightly concave, with comparatively short outer rays.

Colour in alcohol: except for the teeth, all yellow or yellowish orange areas described below become faint yellowish in alcohol preserved specimens.

Colour in life: small individuals up to about 80 mm SL are homogeneously grey-brown pigmented dorsally, without any light marks. During growth, scattered light-yellow dots appear all over the dorsal surface and fins. As growing proceeds further to about 130 mm SL the entire caudal fin and sometimes portions of the dorsal fin become strongly yellow or yellowish orange. In medium-sized individuals unpaired fins and portions of pectoral and ventral fins become yellow. The body scutes become yellow from the caudal peduncle to the head; larger specimens have either the posterior half or the entire body completely yellow. Tooth crowns strongly colored with orange.

Hypostomus regani (Ihering)
(figs 2, 15-17; tab. 4)

Plecostomus regani Ihering, 1905: 558-559 (type-locality: rio Piracicaba, São Paulo, Brazil).
Plecostomus luteomaculatus Devincenzi & Teague, 1942: 20-22, pl. 3, figs 2-3 (type-locality: rio Uruguay at Paysandu, Uruguay; new synonymy).

Specimens examined:

Type-specimens:

Lectotype of *P. regani* (by present designation): BMNH 1905.6.7: 3 (170.8 mm SL); rio Piracicaba, São Paulo, Brazil.

Paralectotypes of *P. regani*: BMNH 1905.6.7: 2 (ca. 233 mm SL), same data as holotype.

Holotype of *P. luteomaculatus*: MHNM CI359 (249.7 mm SL), Río Uruguay at Paysandu, Uruguay, 1941, G. W. Teague.

Other specimens:

Brazil, Rio Grande do Sul:

MCP 12658 (1), rio Uruguay at Porto de Santo Izidro, São Nicolau, 4-5 Nov 1988, C. A. S. Lucena, L. A. C. Bergmann, P. V. Azevedo, E. H. L. Pereira & A. Ramires. MCP 12804 (3), rio Uruguay at Porto de Santo Izidro, São Nicolau, 3-4 Jan 1989, R. E. Reis, L. A. C. Bergmann, P. V. Azevedo, E. H. L. Pereira & A. Ramires. MCP 12805 (1), mouth of rio Ijui, Roque Gonzales, 5-6 Jan 1989, R. E. Reis, L. A. C. Bergmann, P. V. Azevedo, E. H. L. Pereira & A. Ramires. MCP 11781 (1), rio Uruguay at "Rancho da Amizade", São Borja, 10 Nov 1987, J. J. Bertoletti, C. A. S. Lucena, E. P. Lerner, P. V. Azevedo & L. A. C. Bergmann. MCP 11734 (1), rio Uruguay at "Rancho da Amizade", São Borja, 10 Nov 1987, J. J. Bertoletti, C. A. S. Lucena, E. P. Lerner, P. V. Azevedo & L. A. C. Bergmann. MCP 10222 (1), routh of rio Ibicui, Itaqui, 19 Nov 1984, L. R. Malabarba & R. E. Reis. MCP 11860 (3), rio Potiribu, Pejuçara, 16 Dec 1987, Winckler & F. Korndorfer. MCP 11839 (1), rio Uruguay at "Rancho da Amizade", São Borja, 13 Dec 1987, R. E. Reis, L. A. C. Bergmann, P. V. Azevedo, E. H. L. Pereira & E. P. Lerner. MCP 11858 (2), rio Uruguay at "Rancho da Amizade", São Borja, 12 Dec 1987, R. E. Reis, L. A. C. Bergmann, P. V. Azevedo, E. H. L. Pereira & E. P. Lerner. MCP 10470 (2), rio Conceição, Ijui, 3 Dec 1985, C. P. Silva & F. Korndorfer. MCP 11772 (1), rio Comandai, Porto Lucena, 12 Nov 1987, J. J. Bertoletti, C. A. S. Lucena, E. P. Lerner, P. V. Azevedo & L. A. C. Bergmann. MCP 11769 (1), rio Uruguay at Vera Cruz, Porto Lucena, 12 Nov 1987, J. J. Bertoletti, C. A. S. Lucena, E. P. Lerner, P. V. Azevedo & L. A. C. Bergmann. MCP 05756 (1), rio Uruguay, about 2 km upstream of bridge at Irai, 22-23 Dec 1985, R. E. Reis, L. R. Malabarba & S. B. Mallmann. MCP 12416 (2), rio Piratini near the ferry, São Nicolau, 10 Apr 1988, E. P. Lerner, L. A. C. Bergmann, E. H. L. Pereira, P. V. Azevedo & R. Rossi. MCP 12417 (1), rio Piratini near the ferry, São Nicolau, 10 Apr 1988, E. P. Lerner, L. A. C. Bergmann, E. H. L. Pereira, P. V. Azevedo & R. Rossi. MCP 11795 (1), mouth of rio Ijui-Mirim, Pirapó, 11 Nov 1987, J. J. Bertoletti, C. A. S. Lucena, E. P. Lerner, P. V. Azevedo & L. A. C. Bergmann. MCP 11726 (1), mouth of rio Ijui-Mirim, Pirapó, 11 Nov 1987, J. J. Bertoletti, C. A. S. Lucena, E. P. Lerner, P. V. Azevedo & L. A. C. Bergmann. MCP 09257 (1), rio Santa Maria at road between Cacequi and São Simão, Cacequi, 13 Nov 1983, C. A. S. Lucena, L. R. Malabarba & R. E. Reis.

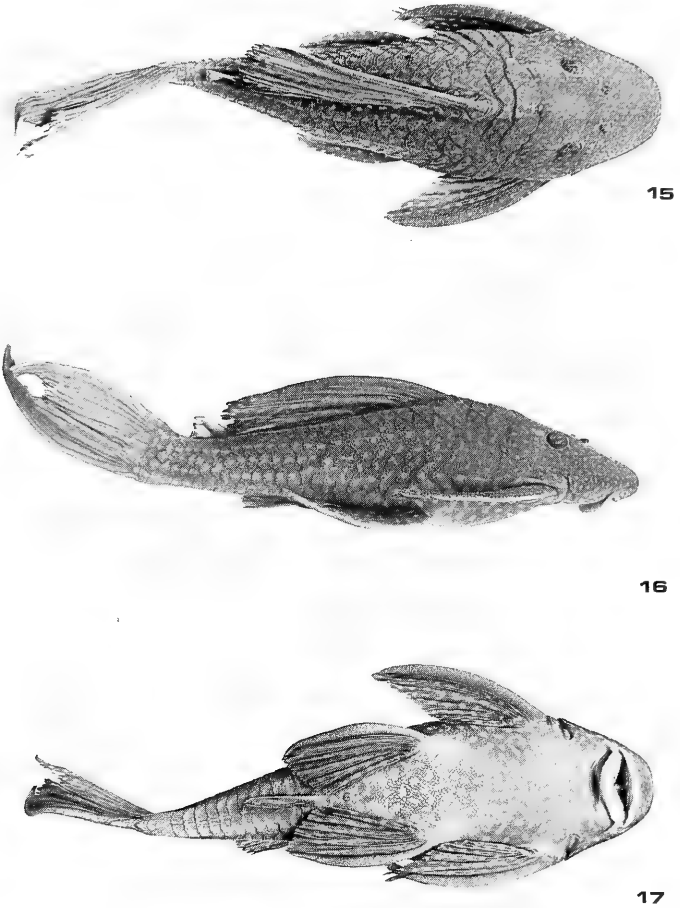
São Paulo:

MZUSP 23005 (1), rio Pardo at "Usina de Limoeiro", 13 Apr 1965, H. A. Britski. MZUSP 22636 (5, 2 measured), rio Paraná at Jupiá, 11 Dec 1960, P. E. Vanzolini & pty.

Diagnosis: *Hypostomus regani* is distinguished from other *Hypostomus* species inhabiting the rio Uruguay system by its characteristic violet-brown ground colour with light dots all over the dorsal surface. Two other species in that area share the light dots on darker ground: *H. roseopunctatus* and *H. luteus,* from which it differs in the larger number of teeth (57-111).

Description: standard length of examined specimens 136.6 to 281.2 mm; other meristic and morphometric data summarized in table 4.

Head covered with dermal ossifications dorsally, except for a small, roughly ovate naked area on snout tip. Dorsal margin of orbit very slightly elevated, hardly continuing in an inconspicuous ridge on posttemporal plate. A very low ridge on supraoccipital, diverging in two separate ridges on predorsal plates often present. Usually one, sometimes two scutes bordering posterior margin of supraoccipital bone. Body deep; dorsal profile gently descending from origin of dorsal fin to end of caudal peduncle. Caudal peduncle roughly ovate in cross-section; flattened ventrally. Dorsal scutes between end of dorsal-fin base and adipose-fin spine flattened in their dorsal portion; those closer to dorsal fin usually with a central area unprovided of odontodes.



FIGS 15-17.

Hypostomus regani, MCP 12804 (259.2 mm SL); 15) dorsal, 16) lateral, and 17) ventral views.

Outer face of upper lip covered with small scutelets on lateral portions; maxillary barbel variable in size, moderately short. Teeth very thin and numerous, with a very small outer cusp.

Body completely covered with rows of smooth scutes dorsally, even in larger specimens. Abdomen completely covered with minute scutelets, even in smaller specimens. Ventral surface of head usually completely covered with scutelets; small naked areas behind lower lip in smaller specimens.

Distal half of pectoral fin spine of larger specimens sometimes covered dorsally with proeminent odontodes anteriorly curved. Adipose fin spine long and straight or slightly curved. Caudal fin margin concave to strongly concave; medium-sized outer rays.

TABLE 4.

Morphometric and meristic data of *Hypostomus regani*.
a - holotype of *Plecostomus luteomaculatus,* b - lectotype
and c - paralectotype of *Plecostomus regani.*

Character	Population from the rio Uruguay system								Pop. from upper rio Paraná				
			Range			95% confidence limits						Range	
	a	n	low	high	mean	L1	L2	SD	b	c	n	low	high
Standard length (A) (mm)	249.7	20	136.6	281.2	210.8			42.476	170.8	233.0	3	180.6	241.0
					Ratios of standard length								
Predorsal distance (D)	2.5	20	2.4	2.8	2.6	2.549	2.639		2.5	2.5	3	2.4	2.8
Head length (E)	3.3	20	3.0	3.5	3.2	3.178	3.306		3.1	3.3	3	3.1	3.7
Cleithral width (F)	3.5	20	3.3	3.6	3.5	3.419	3.493		3.3	3.4	3	3.3	3.7
Length of dorsal fin spine (K)	2.2	19	2.2	2.7	2.5	2.471	2.612		2.5	2.5	3	2.1	2.7
Length of dorsal fin base (L)	3.7	20	3.4	4.1	3.7	3.576	3.775		3.6	3.7	3	3.5	3.6
Dorsal base to adipose spine (M)	5.5	20	5.0	6.5	5.8	5.577	6.006		5.6	5.4	3	5.3	5.9
Trunk length (N)	4.6	20	4.0	4.6	4.3	4.176	4.339		4.5	4.2	3	4.1	4.4
Pectoral fin spine length (O)	3.0	20	3.0	3.7	3.3	3.172	3.353		3.2	3.0	3	3.0	3.4
Abdominal length (P)	4.8	20	4.8	5.4	5.0	4.884	5.062		5.0	4.1	3	4.7	5.2
Pelvic fin spine length (Q)	3.5	20	3.4	4.1	3.7	3.620	3.792		3.5	3.7	3	3.3	4.2
Caudal peduncle length (R)	3.1	20	3.0	3.3	3.1	3.070	3.150		3.4	3.2	3	3.1	3.2
Caudal peduncle depth (S)	9.7	20	9.5	10.7	10.1	9.928	10.242		9.0	8.9	3	9.4	10.9
Adipose fin spine length (T)	11.3	20	9.8	13.3	11.7	11.159	12.214		9.6	10.5	3	9.5	13.4
Upper caudal ray length (U)	2.9	12	2.4	3.1	2.7	2.611	2.886		3.1	—	2	2.9	3.7
Lower caudal ray length (V)	2.8	15	2.2	3.2	2.7	2.508	2.810		2.7	3.8	3	2.5	3.5
					Ratios of head length								
Head depth (G)	1.8	20	1.5	1.7	1.6	1.611	1.668		1.8	1.7	3	1.6	1.7
Snout length (H)	1.6	20	1.5	1.6	1.5	1.521	1.564		1.6	1.5	3	1.5	1.5
Horizontal eye diameter (I)	6.0	20	4.9	6.2	5.6	5.436	5.776		5.1	5.3	3	5.0	5.3
Least interorbital width (J)	2.5	20	2.3	2.7	2.5	2.474	2.577		2.7	2.5	3	2.6	2.7
Rictal barbel	10.0	20	6.0	8.7	7.1	6.659	7.483		10.1	9.4	3	5.7	6.4
Right mandibular ramus	6.0	20	5.0	6.5	5.8	5.644	6.021		5.3	5.4	3	5.0	5.7
Pore-opercle distance	—	20	5.7	7.5	6.6	6.325	6.861		—	—	2	6.4	6.7
						Counts							
Series of lateral scutes	28	20	27	28	28.0			0.224	28	29	3	28	28
Predorsal scutes	3	20	3	4	3.2			0.410	4	4	3	3	4
Scutes at dorsal fin base	8	20	8	9	8.7			0.470	8	8	3	8	9
Dorsal to adipose fin scutes	8	20	6	8	7.2			0.523	7	7	3	7	8
Adipose to caudal fin scutes	5	20	3	5	4.4			0.598	5	5	3	4	4
Scutes at anal fin base	2	20	2	3	2.5			0.513	—	—	3	2	3
Anal to caudal fin scutes	16	20	14	16	14.4			0.587	—	—	3	13	14
Teeth on left premaxilla	67	16	57	101	77.8			12.797	86	90	3	65	90
Teeth on right premaxilla	—	16	63	111	79.3			11.791	84	105	3	61	92
Teeth on left dentary	—	16	62	98	75.4			10.243	72	91	3	66	83
Teeth on right dentary	68	16	61	103	76.3			10.767	62	—	3	68	93
Plates bordering supraoccipital	1	19	1	2	1.1			0.229	1	1	3	1	2

Colour in alcohol: ground colour of dorsal surface brown, grey-brown or violet-brown; slightly lighter to whitish ventrally. Except for ventral surface of caudal peduncle, body and fins covered with roundish or elongate, light-brown to yellowish dots. Dots smaller and closer together on head; usually aligned (sometimes forming actual lines) on posterior portion of flanks. Unpaired fin membranes sometimes darker than scutes.

Colour in life: living *H. regani* specimens usually strongly violet-brown with yellowish dots.

Remarks: Despite the fact that *Plecostomus luteomaculatus* was originally described from rio Uruguay we consider *P. luteomaculatus* as a junior synonym of *H. regani.* No diagnostic differences between specimens from upper rio Paraná and rio Uruguay were found. It is rare to find conspecific populations occurring in both the upper Paraná system and the rio Uruguay basin. Many recent studies (on *Cheirodon* and *Odontostilbe* [MALABARBA, 1988]; on *Acestrorhynchus, Oligosarcus,* and *Cynopotamus* [N. Menezes, pers. comm.]; on *Hoplias* [O. Oyakawa, pers. comm.]), of species that were previously believed to occur in both systems showed that the disjunct populations represent different species. Maybe a future study will produce diagnostic characters to revise the present concept of *H. regani.*

Hypostomus ternetzi (Boulenger)

(figs 1, 18-20; tab. 5)

Plecostomus ternetzi Boulenger, 1895: 525-526 (type-locality: Paraguay; figures in Boulenger, 1896).

Specimens examined:

Type-specimen:

Holotype: BMNH 1895.5.17: 6 (199.0 mm SL), Paraguay, C. Ternetz.

Other specimens:

Brazil, Rio Grande do Sul:

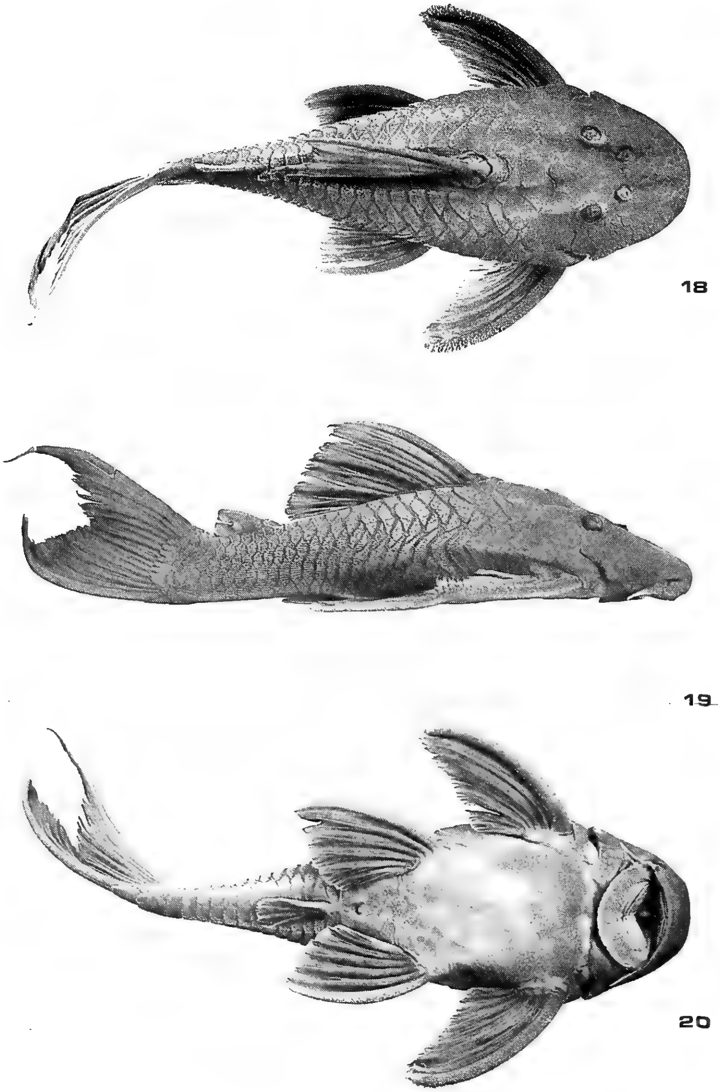
MCP 12523 (1), rio Uruguay at Porto de Santo Izidro, São Nicolau, 4-5 Nov 1988, C. A. S. Lucena, L. A. C. Bergmann, E. H. L. Pereira, P. V. Azevedo & A. Ramires. MCP 13048 (1), rio Uruguay at Porto de Santo Izidro, São Nicolau, 3-4 Jan 1989, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12524 (1), MHNG 2448.38 (1), rio Uruguay at "Rancho da Amizade", São Borja, 31 Oct-1 Nov 1988, C. A. S. Lucena, L. A. C. Bergmann, E. H. L. Pereira, P. V. Azevedo & A. Ramires.

Diagnosis: *Hypostomus ternetzi* is distinguished from other *Hypostomus* species inhabiting the rio Uruguay system by its homogeneous brown dorsal colour pattern, lack of any conspicuous dots, very wide body (2.8-2.9 in SL, versus 3.0-4.1 in remaining species), long lower caudal ray (1.8-2.0 in SL, versus 2.2-4.0 in remaining species), and by the deep caudal peduncle (7.7-8.1 in SL, versus 8.4-12.2 in remaining species) except *H. roseopunctatus* (7.8-9.0 in SL).

Description: standard length of examined specimens 119.6 to 177.1 mm; other meristic and morphometric data summarized in table 5.

Head covered with dermal ossifications dorsally except for a small, roughly squarish or ovate naked area on snout tip. Dorsal margin of orbit slightly elevated, continuing in an low ridge on posttemporal plate. Usually a single (in one specimen two) scutes bordering posterior margin of supraoccipital bone. Body comparatively more raised; dorsal profile gently descending from origin of dorsal fin to end of caudal peduncle.

Caudal peduncle strongly compressed; not much flattened ventrally. Ventral scutes of caudal peduncle somewhat expanded laterally, forming conspicuous lateral ridges in its lower margin. Dorsal scutes between end of dorsal fin base and adipose fin spine somewhat flattened in their dorsal portions, those closer to dorsal fin sometimes with a central area devoided of odontodes.



FIGS 18-20.

Hypostomus ternetzi, MCP 12523 (177.1 mm SL); 18) dorsal, 19) lateral, and 20) ventral views.

TABLE 5.

Morphometric and meristic data of *Hypostomus ternetzi.*

Character	holotype	n	Range		mean
			low	high	
Standard length (A) (mm)	199.0	4	119.6	177.1	154.3
		Ratios of standard length			
Predorsal distance (D)	2.2	4	2.3	2.4	2.4
Head length (E)	2.8	4	2.8	3.1	2.9
Cleithral width (F)	2.8	4	2.9	2.9	2.9
Length of dorsal fin spine (K)	2.7	3	2.7	3.1	2.8
Length of dorsal fin base (L)	3.5	4	3.6	3.9	3.7
Dorsal base to adipose spine (M)	6.5	4	6.1	7.1	6.6
Trunk length (N)	4.0	4	3.9	4.3	4.1
Pectoral fin spine length (O)	2.6	4	2.9	3.2	3.0
Abdominal length (P)	4.6	4	5.0	5.4	5.2
Pelvic fin spine length (Q)	3.1	4	3.4	3.8	3.6
Caudal peduncle length (R)	3.8	4	3.2	3.4	3.3
Caudal peduncle depth (S)	7.5	4	7.7	8.1	7.9
Adipose fin spine length (T)	9.1	4	9.2	10.2	9.7
Upper caudal ray length (U)	—	4	2.0	2.3	2.1
Lower caudal ray length (V)	—	3	1.8	2.0	1.9
		Ratios of head length			
Head depth (G)	1.6	4	1.5	1.6	1.6
Snout length (H)	1.6	4	1.6	1.6	1.6
Horizontal eye diameter (I)	6.7	4	6.2	6.9	6.7
Least interorbital width (J)	3.1	4	2.6	3.1	2.8
Rictal barbel	8.7	4	4.8	7.8	6.1
Right mandibular ramus	5.2	4	4.8	5.6	5.2
Pore-opercle distance	—	4	7.3	8.2	7.5
		Counts			
Series of lateral scutes	26	4	26	26	26.0
Predorsal scutes	3	4	3	3	3.0
Scutes at dorsal fin base	8	4	8	8	8.0
Dorsal to adipose fin scutes	6	4	6	6	6.0
Adipose to caudal fin scutes	3	4	3	3	3.0
Scutes at anal fin base	3	4	3	3	3.0
Anal to caudal fin scutes	—	4	13	13	13.0
Teeth on left premaxilla	—	4	65	88	72.8
Teeth on right premaxilla	56	4	64	92	74.5
Teeth on left dentary	—	4	60	91	71.0
Teeth on right dentary	47	4	61	85	73.0
Plates bordering supraoccipital	1	4	1	2	1.3

Outer face of upper lip usually with small odontodes areas, restricted to lateral portions; maxillary barbel moderately long. Teeth small and numerous, with a small outer cusp.

Body completely covered with rows of comparatively smooth scutes dorsally; low ridges on predorsal scutes and first scutes behind posttemporal plate. Abdomen margins covered with minute scutelets, leaving central area unprovided of scutelets (at least in three medium-sized specimens examined). Ventral surface of head covered with scutelets, except for a small area just behind lower lip.

Distal half of pectoral fin spines in one specimen covered dorsally with well developed, anteriorly curved proeminent odontodes (male?); less developed in others (females?). Adipose fin spine very long and robust; slightly curved. Caudal fin margin strongly concave with very long outer rays.

Colour in alcohol: dorsal surface of head and body with an homogeneous dark pattern; slightly lighter ventrally. Roundish dots slightly darker than dorsum sometimes hardly discernible (in one specimens) or completely absent. Fin membranes usually slightly darker than body.

Remarks: life colour pattern unknown. We have seen only the holotype, two specimens from Paraguay and four specimens from rio Uruguay. The two populations show minor differences. The few available specimens do not allow a conclusive analysis of the taxonomic status of the two populations.

Hypostomus isbrueckeri sp. n.

(figs 1, 21-24; tab. 6)

Etymology: *Hypostomus isbrueckeri* is named in honour of Dr. Isaäc J. H. Isbrücker (ZMA) who has extensively contributed to the knowledge of loricariid diversity.

Type-specimens:

Holotype: MCP 10488 (190.6 mm SL), rio Conceição, Ijui, Rio Grande do Sul, Brazil, 3 Dec 1985, C. P. Silva & F. Korndorfer.

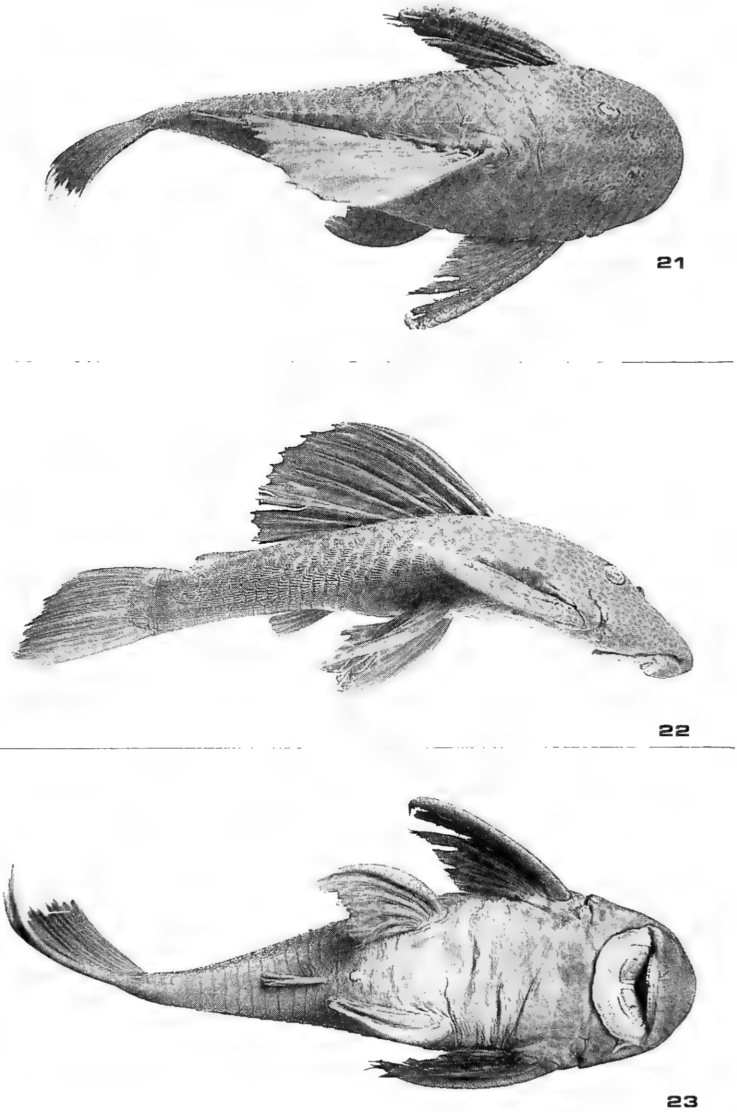
Paratypes:

Brazil, Rio Grande do Sul:

MCP 11861 (1), rio Potiribu, Pejuçara, 16 Dec 1987, F. Korndorfer & Winckler. MCP 12045 (2), rio Ligeiro between Marcelino Ramos and Maximiliano de Almeida, 24 May 1988, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & L. A. Avila. MCP 12495 (3), rio Ligeiro between Marcelino Ramos and Maximiliano de Almeida, 3 Oct 1988, E. H. L. Pereira, P. V. Azevedo, L. A. C. Bergmann & A. Ramires. MCP 10885 (1), rio Conceição, Augusto Pestana, 11 Sep 1986, C. S. Porto & F. Korndorfer. MCP 10862 (2), rio Conceição, Augusto Pestana, 11 Sep 1986, C. S. Porto & F. Korndorfer. MCP 12938 (1), same data as holotype. MCP 10486 (4), rio Conceição at Linha 8, Esquina Dutra, Ijui, 5 Dec 1985, C. S. Porto & F. Korndorfer. MCP 10495 (1), rio Conceição at the CTG of Ijui, 4 Dec 1985, C. S. Porto & F. Korndorfer. MCP 10494 (4), rio Conceição at Ijui, 2 Dec 1985, C. S. Porto & F. Korndorfer. MCP 12305 (2), rio Pelotas at Pinhal da Serra, Esmeralda, 20 Aug 1988, E. P. Lerner, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12306 (7), rio Pelotas at Pinhal da Serra, Esmeralda, 20 Aug 1988, E. P. Lerner, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12310 (15), rio Uruguay at Espigão Alto, Barracão, 19 Aug 1988, E. P. Lerner, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12307 (4), rio Uruguay at Espigão Alto, Barracão, 19 Aug 1988, E. P. Lerner, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12308 (1), rio Uruguay at Espigão Alto, Barracão, 19 Aug 1988, E. P. Lerner, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12494 (3), rio Uruguay at Itá, 1 Oct 1988, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires.

Santa Catarina:

MCP 12044 (1), rio Jacutinga, between Seara and Concórdia, Concórdia, 22 May 1988, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & L. A. Avila. MCP 12519 (5), rio Jacutinga, between Seara and Concórdia, Concórdia, 2 Oct 1988, E. H. L. Pereira, L. A. C. Bergmann,



FIGS 21-23.

Holotype of *Hypostomus isbrueckeri* sp. n., MCP 10488 (190.6 mm SL); 21) dorsal, 22) lateral, and 23) ventral views.

P. V. Azevedo & A. Ramires. MCP 12149 (3), rio Canoas between Vargem and São José do Cerrito, Campos Novos, 16 Jul 1988, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann & P. V. Azevedo. MCP 12164 (4), rio Canoas between Vargem and São José do Cerrito, Campos Novos, 16 Jul 1988, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann & P. V. Azevedo. MCP 12357 (1), rio Canoas between Vargem and São José do Cerrito, Campos Novos, 10-11 Nov 1988, E. H. L. Pereira, P. V. Azevedo, L. A. C. Bergmann & A. Ramires. MCP 12148 (2), rio Canoas at road between Abdon Batista and Anita Garibaldi, Campos Novos, 12 Jul 1988, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann & P. V. Azevedo. MCP 12333 (4), rio Canoas at road between Abdon Batista and Anita Garibaldi, Campos Novos, 8-9 Sep 1988, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12331 (3), rio Canoas between Vargem and São José do Cerrito, Campos Novos, 10-11 Nov 1988, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12358 (3), rio Canoas at road between Abdon Batista and Anita Garibaldi, Campos Novos, 8-9 Sep 1988, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. USNM 303680 (3), rio do Peixe at Volta Grande, Concórdia, 18 Aug 1988, E. P. Lerner, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12739 (5), rio Canoas between Vargem and São José do Cerrito, Campos Novos, 12-13 Nov 1988, E. H. L. Pereira, C. A. S. Lucena, P. V. Azevedo & A. Ramires. MCP 12743 (14), rio Canoas at road between Abdon Batista and Anita Garibaldi, Campos Novos, 10-11 Nov 1988, E. H. L. Pereira, C. A. S. Lucena, P. V. Azevedo & A. Ramires. MCP 12747 (6), rio Canoas at Passo do Canoas, road (SC-458) between Tupitinga and Celso Ramos, Campos Novos, 10 Nov 1988, E. H. L. Pereira, C. A. S. Lucena, P. V. Azevedo & A. Ramires. MCP 12845 (1), rio Canoas at road between Abdon Batista and Anita Garibaldi, Campos Novos, 22-23 Jan 1988, C. A. S. Lucena, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MZUSP 40257 (5) and MHNG 2448.39 (5), rio Canoas at Passo do Canoas, road (SC-458) between Tupitinga and Celso Ramos, Campos Novos, 21-22 Jan 1989, E. H. L. Pereira, C. A. S. Lucena, P. V. Azevedo, L. A. C. Bergmann & A. Ramires. MCP 12911 (1), rio Canoas between Vargem and São José do Cerrito, Campos Novos, 23-24 Jan 1989, E. H. L. Pereira, C. A. S. Lucena, P. V. Azevedo, L. A. C. Bergmann & A. Ramires. MCP 12918 (1), rio Canoas at road between Abdon Batista and Anita Garibaldi, Campos Novos, 22-23 Jan 1989, E. H. L. Pereira, C. A. S. Lucena, P. V. Azevedo, L. A. C. Bergmann & A. Ramires.

Diagnosis: *Hypostomus isbrueckeri* sp. n. is distinguished from all other *Hypostomus* species by the presence in mature males of a yellow vertical band (whitish in alcohol-preserved specimens) in the distal margin of caudal fin.

Description: standard length of examined specimens 129.2 to 246.4 mm; other meristic and morphometric data summarized in table 6.

Head covered with dermal ossifications dorsally, except for a naked area on snout tip, oval in shape. Dorsal margin of orbit not or very slightly elevated, continuing in a very inconspicuous ridge on posttemporal plate. Usually three scutes bordering posterior margin of supraoccipital; these scutes sometimes fragmented in four or five small scutelets. Body very low; dorsal profile gently descending from origin of dorsal fin to end of caudal peduncle. Caudal peduncle roughly ovate in cross-section; slightly flattened ventrally. Dorsal scutes between end of dorsal fin base and adipose fin spine flat in their dorsal portions; those closer to dorsal fin sometimes with a central area unprovided of odontodes.

Outer face of upper lip either with or without minute dermal ossifications; maxillary barbel variable in size, usually moderately long. Teeth small and numerous, with a small outer cusp.

Body completely covered with rows of comparatively smooth scutes dorsally; dorsal ridges of odontodes usually hardly discernible even in larger individuals. Anterior half of ventral surface usually naked; sometimes with a few minute scutelets scattered on

TABLE 6.

Morphometric and meristic data of *Hypostomus isbrueckeri* sp. n.

Character			Range			95% confidence limits		
	holotype	n	low	high	mean	L1	L2	SD
Standard length (A) (mm)	190.6	20	129.2	246.4	177.0			28.734
			Ratios of standard length					
Predorsal distance (D)	2.5	20	2.5	2.7	2.6	2.582	2.658	
Head length (E)	3.1	20	3.0	3.5	3.2	3.133	3.240	
Cleithral width (F)	3.2	20	3.2	3.6	3.4	3.340	3.438	
Length of dorsal fin spine (K)	3.3	18	3.0	3.7	3.3	3.252	3.420	
Length of dorsal fin base (L)	3.7	20	3.5	4.0	3.7	3.668	3.789	
Dorsal base to adipose spine (M)	5.4	20	5.1	5.9	5.4	5.322	5.561	
Trunk length (N)	4.3	20	4.0	4.9	4.5	4.365	4.579	
Pectoral fin spine length (O)	3.0	20	3.0	3.5	3.2	3.136	3.269	
Abdominal length (P)	4.6	20	4.5	5.0	4.7	4.648	4.798	
Pelvic fin spine length (Q)	3.9	20	3.9	4.5	4.2	4.086	4.234	
Caudal peduncle length (R)	3.3	20	2.9	3.3	3.1	3.072	3.175	
Caudal peduncle depth (S)	10.5	20	9.6	11.0	10.3	10.125	10.484	
Adipose fin spine length (T)	12.5	20	10.1	14.0	11.7	11.250	12.128	
Upper caudal ray length (U)	3.4	13	3.4	4.1	3.7	3.580	3.848	
Lower caudal ray length (V)	3.0	16	3.0	4.0	3.4	3.293	3.571	
			Ratios of head length					
Head depth (G)	2.0	20	1.8	2.1	1.9	1.893	1.975	
Snout length (H)	1.6	20	1.6	1.7	1.6	1.632	1.658	
Horizontal eye diameter (I)	6.1	20	5.4	6.5	6.0	5.809	6.092	
Least interorbital width (J)	3.2	20	3.1	3.6	3.3	3.244	3.365	
Rictal barbel	5.9	20	3.3	8.7	6.9	6.339	7.451	
Right mandibular ramus	5.3	20	4.5	5.8	5.1	4.890	5.263	
Pore-opercle distance	7.6	20	4.7	7.7	6.6	6.228	6.951	
			Counts					
Series of lateral scutes	27	20	27	27	27.0			0.000
Predorsal scutes	3	20	3	3	3.0			0.000
Scutes at dorsal fin base	8	20	8	9	8.6			0.503
Dorsal to adipose fin scutes	7	20	6	8	7.1			0.553
Adipose to caudal fin scutes	3	20	3	4	3.6			0.510
Scutes at anal fin base	2	20	2	3	2.4			0.503
Anal to caudal fin scutes	14	20	13	15	13.8			0.616
Teeth on left premaxilla	63	19	48	79	57.7			8.562
Teeth on right premaxilla	56	19	47	89	59.2			9.388
Teeth on left dentary	54	19	50	83	62.4			8.454
Teeth on right dentary	56	19	51	91	63.2			10.586
Plates bordering supraoccipital	3	20	2	5	3.5			0.887

abdomen of larger specimens. Ventral surface of head ranging from almost naked, except for a few scutelets in front of gill openings, to almost completely covered with minute ossifications.

Distal half of pectoral fin spines usually covered dorsally with anteriorly curved proeminent odontodes in larger specimens. Adipose fin spine moderately long; straight to slightly curved. Caudal fin margin slightly concave, ventral lobe longer than dorsal.

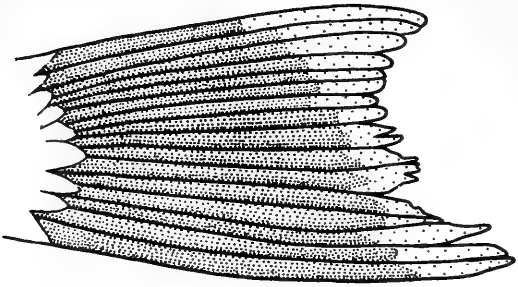


FIG. 24.

Hypostomus isbrueckeri sp. n., yellow band on caudal-fin margin of holotype, MCP 10488.

Colour in alcohol: ground colour of dorsal surface grey-brown; whitish to pale yellowish or even light grey-brown ventrally. Dorsal surface of head and body covered with roundish darker dots, smaller and closer together on head. Paired fins with same colour pattern. Dorsal fin dots may be confluent sometimes, forming small bars. Caudal fin usually darker than body and without dots. Mature males (four specimens dissected) with a whitish vertical band in caudal fin distal margin, varying in width.

Colour in life: living specimens present same basic colour but light band in caudal fin is yellowish-orange.

Hypostomus roseopunctatus sp. n.

(figs 2, 25-28; tab. 7)

Hypostomus sp. — WEBER, 1987: 280-283, figs 6, 7c (one specimen from rio Uruguay at Uruguaiana, Rio Grande do Sul, Brazil).

Etymology: *roseopunctatus,* from the latin *roseus,* pink and *punctatus,* meaning dotted, spotted, in allusion to the colour pattern.

Type-specimens:

Holotype: MCP 12239 (232.7 mm SL), rio Pelotas at road from Esmeralda to Anita Garibaldi, Rio Grande do Sul, Brazil, 5-9 Sep 1988, Mr. Pedro.

Paratypes:

Brazil, Rio Grande do Sul:

MCP 11770 (1), rio Comandai (rio Uruguay system), Porto Lucena, 11 Nov 1987, all collectors as holotype. MCP 11773 (1), and MHNG 2414.10 (1), rio Comandai (rio Uruguay system), Porto Lucena, 12 Nov 1987, same collector as holotype. MCP 11771 (1), mouth of rio Ijui-mirim into rio Ijui (rio Uruguay system), Pirapo, 11 Nov 1987, same collector as holotype. MCP 11840 (1), mouth of rio Ijui-mirim into rio Ijui (rio Uruguay system), Pirapo, 14 Dez 1987, R. E. Reis, L. A. C. Bergmann, P. V. Azevedo, E. H. L. Pereira & E. P. Lerner. MAPA 2315 (1), rio Uruguay at Uruguaiana, 14 May 1984, R. E. Reis. MCP 11805 (1), rio Uruguay at "Rancho da Amizade", São Borja, 10 Nov 1987, J. J. Bertoletti, C. A. S. Lucena, P. V. Azevedo, L. A. C. Bergmann & E. P. Lerner. MCP 12393 (2), mouth of rio Ijui-Mirim, Pirapó, 8 Apr 1988, E. P. Lerner, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & R. Rossi. MCP 12803 (3), mouth of rio Ijui, Roque Gonzales, 3-4 Jan 1989, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12802 (1), rio Uruguay at Porto de Santo Izidro, São Nicolau, 3-4 Jan 1989, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12800 (1), mouth of rio Ijui-Mirim, Pirapó, 7-8 Jan 1989, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12702 (1), mouth of rio Ijui-Mirim, Pirapó, 2-3 Nov 1988, C. A. S. Lucena,

TABLE 7.

Morphometric and meristic data of *Hypostomus roseopunctatus* sp. n.

Character	holotype	n	Range			95% confidence limits		SD
			low	high	mean	L1	L2	
Standard length (A) (mm)	232.7	20	105.8	232.7	168.0			41.447
			Ratios of standard length					
Predorsal distance (D)	2.7	20	2.4	2.8	2.6	2.531	2.649	
Head length (E)	3.3	20	2.8	3.3	3.1	3.020	3.176	
Cleithral width (F)	3.3	20	3.0	3.5	3.3	3.243	3.378	
Length of dorsal fin spine (K)	3.0	19	2.5	3.4	2.9	2.788	3.014	
Length of dorsal fin base (L)	3.5	20	3.0	4.0	3.3	3.251	3.446	
Dorsal base to adipose spine (M)	5.5	20	5.5	7.6	6.5	6.277	6.730	
Trunk length (N)	4.3	20	4.1	5.0	4.4	4.280	4.484	
Pectoral fin spine length (O)	3.0	20	2.7	3.4	3.0	2.951	3.130	
Abdominal length (P)	4.6	20	4.4	5.0	4.6	4.496	4.660	
Pelvic fin spine length (Q)	3.8	20	3.3	4.0	3.7	3.579	3.783	
Caudal peduncle length (R)	3.0	20	3.0	3.7	3.3	3.186	3.352	
Caudal peduncle depth (S)	8.9	20	7.8	9.0	8.5	8.376	8.697	
Adipose fin spine length (T)	11.6	20	9.5	15.3	11.1	10.489	11.687	
Upper caudal ray length (U)	—	17	2.8	3.8	3.2	3.057	3.338	
Lower caudal ray length (V)	3.3	16	2.4	3.6	2.9	2.760	3.108	
			Ratios of head length					
Head depth (G)	1.6	20	1.5	1.8	1.7	1.640	1.711	
Snout length (H)	1.6	20	1.6	1.7	1.7	1.635	1.672	
Horizontal eye diameter (I)	6.6	20	5.2	7.1	5.9	5.643	6.089	
Least interorbital width (J)	3.2	20	2.7	3.3	3.0	2.908	3.081	
Rictal barbel	6.9	20	3.3	8.9	4.8	4.195	5.480	
Right mandibular ramus	7.8	19	6.4	10.5	8.0	7.446	8.537	
Pore-opercle distance	6.5	20	6.2	7.8	6.9	6.692	7.089	
			Counts					
Series of lateral scutes	26	20	25	27	25.9			0.587
Predorsal scutes	3	20	3	3	3.0			0.000
Scutes at dorsal fin base	9	20	9	10	9.1			0.224
Dorsal to adipose fin scutes	6	20	5	6	5.9			0.308
Adipose to caudal fin scutes	4	20	2	4	3.5			0.607
Scutes at anal fin base	2	20	2	3	2.4			0.489
Anal to caudal fin scutes	14	20	11	14	12.8			0.696
Teeth on left premaxilla	9	20	6	14	9.0			1.892
Teeth on right premaxilla	10	20	6	16	9.4			2.681
Teeth on left dentary	12	20	7	15	12.2			2.238
Teeth on right dentary	12	19	7	16	10.5			2.294
Plates bordering supraoccipital	3	20	3	4	3.1			0.224

E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12682 (2), rio Uruguay at "Rancho da Amizade", São Borja, 31 Oct-1 Nov 1988, C. A. S. Lucena, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12952 (1), rio Pelotas at road between Anita Garibaldi and Pinhal da Serra, Esmeralda, 12-13 Dec 1988, R. E. Reis, L. A. C. Bergmann, E. H. L. Pereira, P. V. Azevedo & A. Ramires.

Santa Catarina:

MHNG 2448.40 (2), USNM 303681 (1), and MZUSP 40258 (1), rio Canoas at road between Abdom Batista and Anita Garibaldi, Campos Novos, 22-23 Jan 1989, C. A. S. Lucena, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12736 (1), rio Canoas at "Passo do Canoas", road SC-458 between Tupitinga and Celso Ramos, Campos Novos, 10 Nov 1988, C. A. S. Lucena, E. H. L. Pereira, P. V. Azevedo & A. Ramires. MCP 12994 (2), rio Uruguay at Itá, 7-8 Dec 1988, R. E. Reis, L. A. C. Bergmann, E. H. L. Pereira, P. V. Azevedo & A. Ramires.

Diagnosis: *Hypostomus roseopunctatus* sp. n. is distinguished from other *Hypostomus* species inhabiting Southern Brazil by the lower number of teeth in each premaxillary or dentary (6-16 versus more than 21 in the remaining species). The new species is similar to *H. microstomus* Weber (1987) in the small number of teeth in each premaxillary and dentary (6-16) differing in the size of the mandibular ramus; in the proportion of its length in the interorbital width 2.1-3.6 in the former versus 3.8-5.5 in *H. microstomus*; and in the possession of 3 scutes bordering the posterior margin of the supraoccipital, versus only one in *H. microstomus* (but one *H. microstomus* paratype with 3). Furthermore, *H. roseopunctatus* presents 9-10 scutes accompanying the dorsal fin base, and *H. microstomus* presents 6-7, usually 7. Another species from the upper rio Paraná system, *H. margaritifer* (Regan, 1908), has a small number of teeth. That species, however, shows 18-31 teeth in both upper and lower jaws, versus a maximum of 16 in *H. roseopunctatus*.

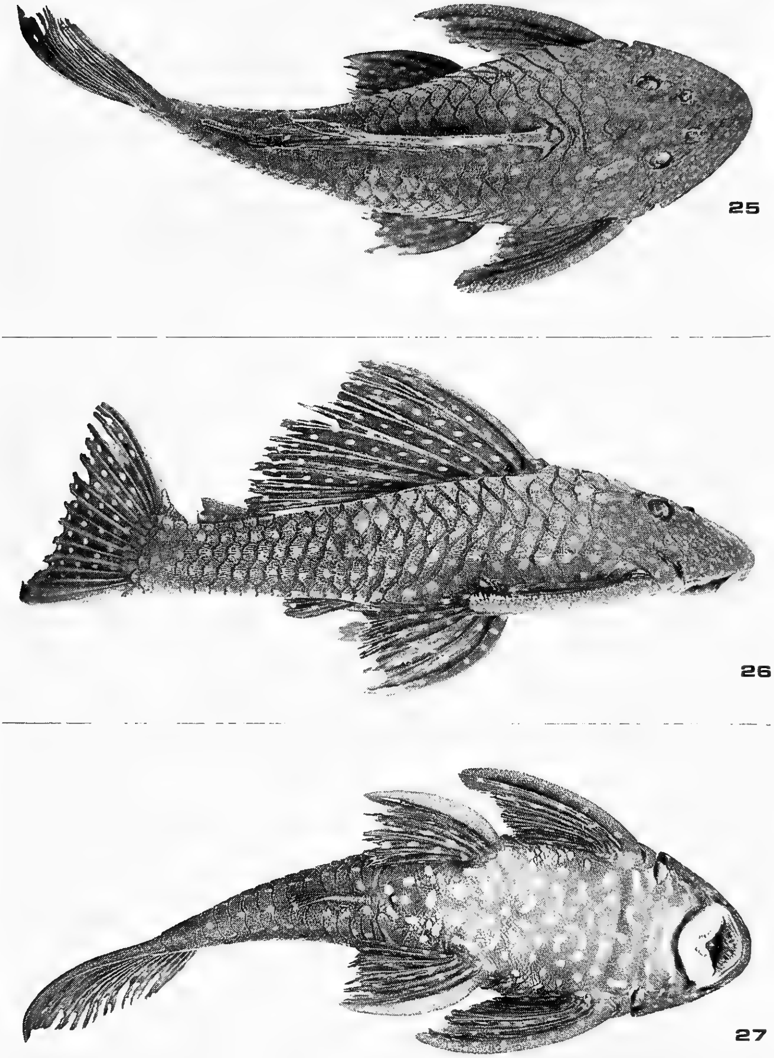
Description: standard length of examined specimens 105.8 to 232.7 mm. Other meristic and morphometric data summarized in table 7.

Head covered with dermal ossifications dorsally, except for a roundish naked area on snout tip. Dorsal margin of orbit elevated, continuing in a gently elevated ridge on post-temporal plate. Usually three (one specimen with 4 and another with 5) scutes bordering posterior margin of supraoccipital. Body not very deep; dorsal profile gently descending from origin of dorsal fin to caudal peduncle. Caudal peduncle roughly ovate in cross-section. Dorsal scutes between end of dorsal fin base and adipose fin spine flat in their dorsal portions; those closer to dorsal fin with a central area devoided of odontodes.

Outer face of upper lip with or without a few dermal ossifications; maxillary barbel long. Teeth big and strong, with a flat, wide outer and small inner cusp (fig. 28).

Body completely covered with rows of somewhat smooth scutes dorsally; first with very slightly prominent odontodes forming three low longitudinal ridges (hardly discernible in smaller individuals). A fourth ridge is present in lateral margin of ventral scutes of caudal peduncle, behind anal fin. Anterior half of ventral surface almost naked (in smaller individuals) to almost completely covered by scutelets. Head ranging from almost naked ventrally, except for a few scutelets in front of gill openings, to almost completely covered with scutelets. Abdomen almost naked, with just a few odontodes scattered between pectoral and pelvic fin insertions, to almost completely covered with small, squarish dermal ossifications.

Distal half of pectoral fin spines covered with slightly prominent odontodes, not modified into hooks, on dorsal surface. Caudal fin margin concave; ventral lobe longer than dorsal. Adipose fin spine moderately long and straight. Ventral spine of caudal fin as long as or slightly longer than the pectoral fin spine.



FIGS 25-27.

Holotype of *Hypostomus roseopunctatus* sp. n., MCP 12239 (232.7 mm SL); 25) dorsal, 26) lateral, and 27) ventral views.

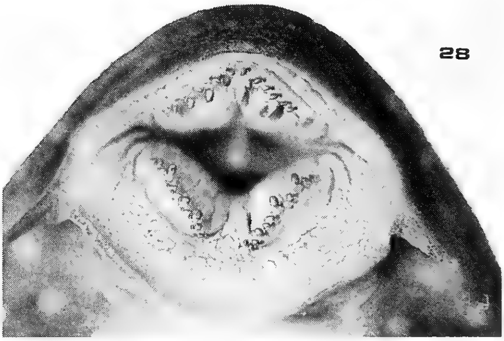


FIG. 28.

Holotype of *Hypostomus roseopunctatus* sp. n., detail of lips and teeth.

Colour in alcohol: ground colour of dorsal surface grey-brown; whitish to pale yellowish or also grey-brown ventrally. Body covered with roundish or ovate whitish to reddish-brown dots, smaller and more numerous on head; sometimes aligned on flanks. Spines, rays, and membranes of all fins with same dots irregularly arranged. Fin membranes slightly darker than scutes.

Colour in life: living specimens darker and slightly bluish with light pink dots.

Hypostomus uruguayensis sp. n.

(figs 1, 29-31; tab. 8)

Etymology: *Hypostomus uruguayensis* sp. n. is named after its type-locality.

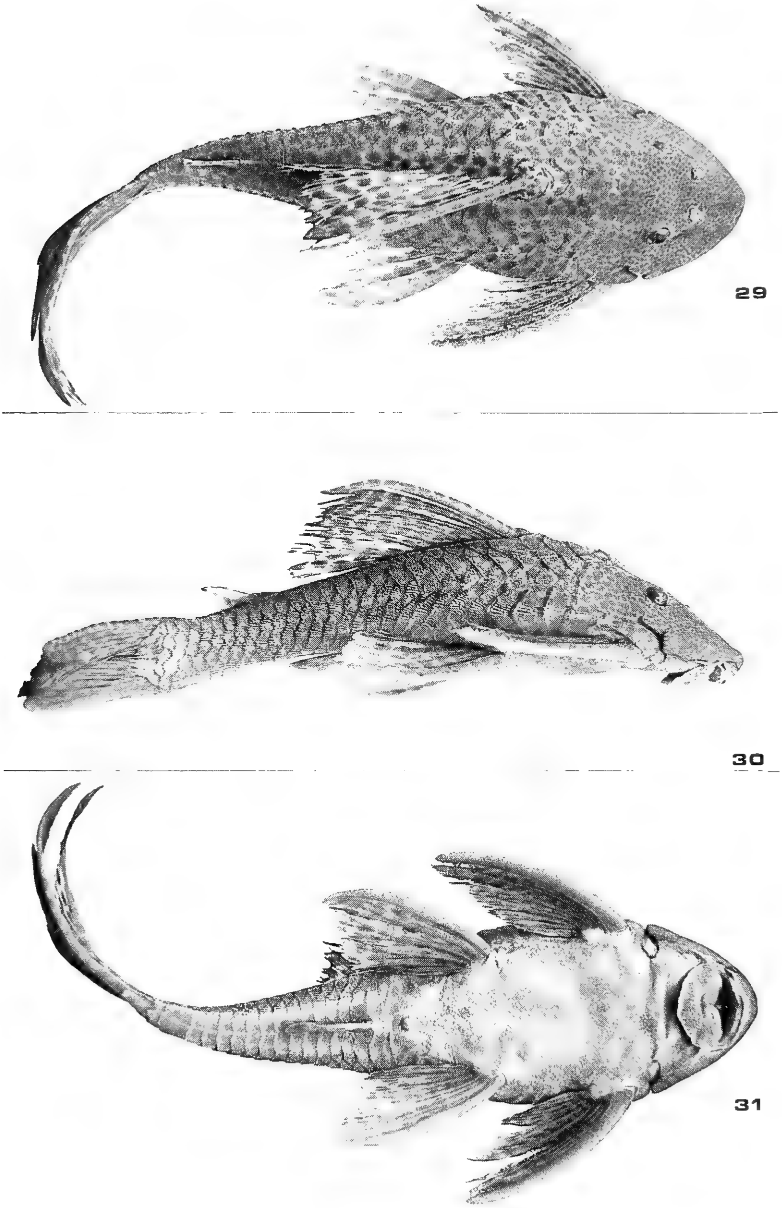
Type-specimens:

Holotype: MCP 11874 (195.6 mm SL), rio Uruguay at "Rancho da Amizade", São Borja, Rio Grande do Sul, Brazil, 12-13 Dez 1987, R. E. Reis, E. P. Lerner, E. H. L. Pereira, P. V. Azevedo & L. A. C. Bergmann.

Paratypes:

Brazil, Rio Grande do Sul:

MCP 11858 (2), MCP 12953 (2), MCP 11973 (3), and MHNG 2430.73 (2), same data as holotype. MCP 12679 (1), rio Uruguay at "Rancho da Amizade", São Borja, 31 Oct-1 Nov 1988, C. A. S. Lucena, A. Ramires, E. H. L. Pereira, P. V. Azevedo & L. A. C. Bergmann. MCP 11797 (1), rio Ijui-Mirim, Pirapó, 11 Nov 1987, J. J. Bertoletti, E. P. Lerner, C. A. S. Lucena, L. A. C. Bergmann & P. V. Azevedo. MCP 12678 (4), rio Ijui-Mirim, Pirapó, 2-3 Nov 1988, C. A. S. Lucena, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 12801 (1), rio Ijui-Mirim, Pirapó, 7-8 Jan 1989, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires. MCP 09252 (1), rio Maracatu (tributary of rio Ibicui), near Manoel Vianna, 14-15 Sep 1983, R. E. Reis, C. A. S. Lucena & L. R. Malabarba. MCP 12648 (1), rio Uruguay at Porto de Santo Izidro, São Nicolau, 4-5 Nov 1988, C. A. S. Lucena, A. Ramires, E. H. L. Pereira, P. V. Azevedo & L. A. C. Bergmann.



FIGS 29-31.

Holotype of *Hypostomus uruguayensis* sp. n., MCP 11874 (195.6 mm SL); 29) dorsal, 30) lateral, and 31) ventral views.

TABLE 8.

Morphometric and meristic data of *Hypostomus uruguayensis* sp. n.

Character	holotype	n	Range			95% confidence limits		SD
			low	high	mean	L1	L2	
Standard length (A) (mm)	195.6	20	148.3	259.9	201.2			28.186
			Ratios of standard length					
Predorsal distance (D)	2.5	20	2.4	3.0	2.6	2.540	2.681	
Head length (E)	3.3	20	3.1	3.6	3.3	3.281	3.411	
Cleithral width (F)	3.4	20	3.1	3.5	3.3	3.272	3.375	
Length of dorsal fin spine (K)	2.6	18	2.5	3.1	2.8	2.758	2.940	
Length of dorsal fin base (L)	4.2	20	3.7	4.5	4.1	4.007	4.232	
Dorsal base to adipose spine (M)	4.8	19	4.8	6.5	5.5	5.326	5.722	
Trunk length (N)	4.7	20	4.3	4.9	4.6	4.520	4.710	
Pectoral fin spine length (O)	3.1	20	2.9	3.4	3.2	3.141	3.275	
Abdominal length (P)	5.0	20	4.6	5.2	4.9	4.806	4.985	
Pelvic fin spine length (Q)	3.4	20	3.4	4.2	3.7	3.637	3.820	
Caudal peduncle length (R)	2.9	20	2.8	3.1	2.9	2.897	3.001	
Caudal peduncle depth (S)	9.8	20	9.4	10.5	10.0	9.892	10.167	
Adipose fin spine length (T)	11.2	19	10.3	13.0	11.5	11.213	11.884	
Upper caudal ray length (U)	2.2	14	2.2	3.0	2.6	2.443	2.678	
Lower caudal ray length (V)	2.3	13	2.3	2.8	2.6	2.524	2.722	
			Ratios of head length					
Head depth (G)	1.6	20	1.6	2.0	1.7	1.665	1.761	
Snout length (H)	1.6	20	1.6	1.8	1.7	1.665	1.703	
Horizontal eye diameter (I)	6.9	20	6.1	7.2	6.8	6.636	6.924	
Least interorbital width (J)	2.7	19	2.5	3.4	2.7	2.644	2.835	
Rictal barbel	5.6	20	4.3	10.2	6.4	5.826	6.926	
Right mandibular ramus	7.3	18	4.6	9.5	7.2	6.741	7.635	
Pore-opercle distance	6.7	20	5.4	7.8	6.4	6.083	6.630	
			Counts					
Series of lateral scutes	27	20	26	27	26.4			0.513
Predorsal scutes	2	20	3	3	3.0			0.000
Scutes at dorsal fin base	7	20	7	8	7.8			0.444
Dorsal to adipose fin scutes	8	19	6	8	6.6			0.597
Adipose to caudal fin scutes	4	19	3	5	4.1			0.459
Scutes at anal fin base	2	20	2	3	2.4			0.489
Anal to caudal fin scutes	15	20	13	15	14.0			0.605
Teeth on left premaxilla	47	18	42	89	53.4			11.147
Teeth on right premaxilla	50	19	42	88	54.2			11.013
Teeth on left dentary	37	18	37	92	52.1			12.473
Teeth on right dentary	48	19	41	91	52.6			11.577
Plates bordering supraoccipital	5	20	3	5	4.1			0.944

Santa Catarina:

MCP 12309 (1), rio Uruguay at Itá, 16 Aug 1988, E. P. Lerner, E. H. L. Pereira, P. V. Azevedo, L. A. C. Bergmann & A. Ramires. USNM 303682 (1), MZUSP 40259 (1), and MHNG 2448.41 (1), rio Uruguay at Itá, 7-8 Dec 1988, R. E. Reis, E. H. L. Pereira, L. A. C. Bergmann, P. V. Azevedo & A. Ramires.

Uruguay:

FHCM ZVCP68 (3), rio Cuareim (=Quarai) barra de Yucutujá, "El Ombu", Depto. Artigas, Feb 1982, Exp. Zool. Lab.

Diagnosis: *Hypostomus uruguayensis* sp. n. is distinguished from other *Hypostomus* species inhabiting the rio Uruguay system by its very light ground colour with darker dots, lower number of lateral scutes (26-27) and strongly concave caudal fin margin. *Hypostomus ternetzi* has a similar strongly concave caudal fin margin and a low number of lateral scutes (26), but is homogeneously dark dorsally. *Hypostomus uruguayensis* can be distinguished from that species by the body width (3.1-3.5 in SL) and depth of caudal peduncle (9.4-10.5 in SL) versus 2.9 and 7.7-8.1 in SL in *H. ternetzi,* respectively.

Description: standard length of examined specimens 148.3 to 259.9 mm; other meristic and morphometric data summarized in table 8.

Head covered with dermal ossifications dorsally, except for a small, roughly squarish or ovate naked area on snout tip. Dorsal margin of orbit very slightly elevated, continuing in a very inconspicuous ridge on posttemporal plate. Usually three scutes bordering posterior margin of supraoccipital bone; these scutes often fragmented in up to seven small scutelets. Body moderately low; dorsal profile gently descending from origin of dorsal fin to end of caudal peduncle. Caudal peduncle roughly ovate in cross-section; slightly flattened ventrally. Dorsal scutes between end of dorsal fin base and adipose fin spine flat in their dorsal portion; those closer to dorsal fin sometimes with a central area devoided of odontodes.

Outer face of upper lip usually with very small odontodes areas, restricted to lateral portions; maxillary barbel much variable in size, usually moderately long. Teeth very thin, small and numerous, with a large, well developed outer cusp, always longer than half inner cusp.

Body completely covered with rows of comparatively smooth scutes dorsally. Abdomen covered with minute dermal ossifications, even in smaller individuals; some naked areas often present near base of pelvic fins. Ventral surface of head ranging from almost naked, except for a few scutelets in front of gill openings, to almost completely covered with minute dermal ossifications.

Distal half of pectoral fin spines usually covered dorsally with well developed, anteriorly curved proeminent odontodes in larger specimens. Adipose fin spine moderately long and slightly curved. Caudal fin margin strongly concave with long outer rays.

Colour in alcohol: ground colour of dorsal surface pale-yellowish or very light yellowish-brown; whitish or light-yellowish ventrally. Dorsal surface of head and body covered with roundish grey-brown dots; smaller and closer together on head. All fins with same colour pattern; usually very conspicuous in dorsal fin membrane and somewhat arranged in stripes on caudal fin.

Colour in life: living individuals just like alcohol preserved specimens.

DISCUSSION

The large number of *Hypostomus* species names from the laguna dos Patos system in literature deserves some comments. Besides a museum collections survey, recent extensive and niche-explorative sampling throughout the laguna dos Patos system revealed two *Hypostomus* species: *H. commersonii* and *H. aspilogaster,* although nine species names have been cited in literature. Two of these, *H. spiniger* and *H. limosus,* are junior synonyms of *H. commersonii.* Five other species names are probably misidentifications, repeated in subsequent works: *Plecostomus bicirrosus* (synonym of *H. plecostomus*) cited by HENSEL (1870); *Plecostomus lima* (type-locality: rio das Velhas, Minas Gerais) cited by EIGENMANN & EIGENMANN (1890); *Plecostomus guacari* (synonym of *H. plecostomus*) cited by NICHOLS (1919); *Hypostomus wuchereri* (type-locality: Bahia) cited by BOSSEMEYER *et al.* (1981); and *Plecostomus plecostomus* (type-locality: Surinam) cited by BERTOLETTI (1986).

Plecostomus garmani Regan, 1904 was described from a single specimen from rio das Velhas, previously identified by EIGENMANN & EIGENMANN (1890) as *Plecostomus lima.* Erroneously, EIGENMANN (1910) cited all specimens previously identified as *P. lima* by EIGENMANN & EIGENMANN (1890) as *P. garmani,* including the material from Rio Grande do Sul. This citation was repeated in subsequent works.

Finally, FOWLER (1954) erroneously mentioned *Plecostomus robinii* (Valenciennes) from ''Villa de Barro, Rio Grande do Sul, Brazil'', following the citation ''Villa de Barro, Rio Grande, Brazil'' by Stigchel (1947).

Small hirudines are common external parasites of all *Hypostomus* species included in this study.

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ABSTRACTS

KEYNOTE LECTURE

PARASITES, PARASITOSES ET PARASITISME

André Aeschlimann, Institut de Zoologie, Chantemerle 22, 2000 Neuchâtel

Aujourd'hui, un toujours plus grand nombre de personnes souffrent de maladies dues aux parasites (parasitoses), et pas seulement dans le Tiers-Monde. On peut s'étonner de cette croissance alors que d'importantes campagnes anti-parasitaires ont été entreprises. Les échecs sont sans doute dûs à la stagnation permanente des conditions de vie des pays pauvres et à l'intervention de l'homme sur des biotopes fragiles. Mais, les changements des comportements de l'homme moderne (tourisme de masse, etc.) jouent aussi un rôle en cette affaire.

L'approche de la parasitologie peut être multiple. Le zoologiste décrira les *parasites* comme il le fait de toute autre espèce animale. Il en déterminera la place dans la systématique. Peut-être même, son étude classique permettra-t-elle d'en tirer des réflexions d'ordre évolutif.

Lorsqu'il s'agit de *parasitoses,* la définition, qui veut «qu'un parasite vit harmonieusement avec son hôte dans un état d'équilibre stable», est rompue. La présence de parasites par milliers (pression quantitative), le fait qu'ils peuvent s'égarer dans un mauvais organe ou s'engager dans un mauvais hôte, sont souvent les causes de pathologies graves, voire mortelles. Ceci n'est pas sans conséquences pour le parasite, car s'il tue son hôte, il tue aussi son milieu naturel et se suicide!

L'étude des associations hétérospécifiques est ambitieuse. Elle vise à mieux comprendre le phénomène de symbiose (phorésie, commensalisme, mutualisme, parasitisme, parasitoïdes). On se propose de définir ces termes et de montrer la complexité du *parasitisme*. On choisira l'exemple de la circulation, dans la nature, d'un micro-organisme pathogène, compte tenu des vertébrés (l'homme y compris) et des vecteurs disponibles, sans oublier la qualité du biotope. En d'autres termes, il s'agira de définir un «endémiotope» et de voir comment s'insère, à l'intérieur de nos limites, le cycle d'un parasite dans la vie de ses hôtes (survie, rencontre, identification et facilitation, fécondité et dispersion).

PARASITOLOGY: DOES IT SERVE ITS PURPOSES?

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The main topics selected for ZOOLOGIA 1990 by the Organizing Committee point out important new developments in parasitology.

Not only has this discipline become increasingly incorporated into the broad field of human and animal health; it has come to encompass relationships between plants and animals as well. More recently, it has become integrated into environmental and evolutionary research, too. No longer are parasites considered as mere vermin; they are now accepted as partners among the living creatures.

Without a doubt, detailed knowledge about parasites and their bionomics has greatly increased in recent years. To what extent, however, has that knowledge been used to solve problems of daily life, especially in disadvantaged parts of the world? Unless parasitologists accept the challenge of truly communicating with the local people, it is unlikely they will achieve much as far as the application of parasitological knowledge is concerned.

From a more fundamental viewpoint it may be worthwhile to look at parasitism as simply one other way in which life may materialize; to look at it as an example of adaptation to fast changing environmental conditions and as the example par excellence for symbiosis. Might some of the deleterious parasites not be outwitted by aiming at coexisting with them rather than at eradicating them?

Parasitology — as are all the sciences — is much more than a mere field of specialized knowledge; it is a way to humanism.

PARASITES AND MAN

KEYNOTE LECTURE

HERD IMMUNITY AND PARASITE TRANSMISSION

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The development of a safe, effective, and cheap vaccine is only the first step — albeit a vital one — towards control of a parasitic disease within a community. The dynamics of the interaction between a population of hosts and an infectious agent is inherently non-linear, and complex patterns of temporal changes in the incidence of infection can arise when immunisation programmes are initiated. This paper sketches how mathematical models that are soundly based on epidemiological data can help us understand the effects upon population-level or "herd" immunity of specific immunisation policies. Some of the questions that can be illuminated within such an analytic framework are: what proportion of the population should be immunised to achieve a desired degree of supression of infection? How is this affected by birth rates and other demographic factors? What is the best age to immunise? How does mass immunisation affect the age distribution of susceptible individuals, particularly in those age — classes most at risk from serious desease? How significant are genetic, social, or spatial heterogeneities in susceptibility or exposure to infection? And how does this affect herd immunity?

INTESTINAL PARASITES IN CHILDREN OF SMOKEY MOUNTAIN, A SQUATTER AREA OF MANILA, PHILIPPINES

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In 1988 a cross-sectional stool sample survey among 238 children aged 8 months to 15 years was performed in a squatter area of Manila, Philippines. Of each surveyed child a stool sample was examined with both the SAF method and the Kato/Katz method.

92% of the children were harbouring *Trichuris trichiura,* 80% *Ascaris lumbricoides,* and 10% hookworm. The prevalence of *Entamoeba coli* was 32%, and those of *Entamoeba histolytica* and *Giardia lamblia* 21% and 20%, respectively. *Cryptosporidium spp* could be found in four out of 64 diarrhoeal stool samples. Most children (84%) were affected by multiparasitism. 109 children (46% of all examined children) were harbouring two different parasites, 73 children (31%) were harbouring three, 17 children (7%) four and one child five different species of parasites.

The prevalence and intensity of infection of all parasites but *Giardia lamblia* was age-dependent and peaked in the age group 11 to 15 years.

There was a significant association between harbouring hookworm and/or *E. histolytica* and suffering from abdominal pain. Children who were moderately or heavily infected with *Trichuris* tended to be more stunted than children with very light or no *Trichuris* infection.

PHEROMONES IN THE FIELD: FROM SANDFLY BEHAVIOUR TO THE EPIDEMIOLOGY OF VISCERAL LEISHMANIASIS

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The male pheromone of *Lutzomyia longipalpis* can attract females in the laboratory, but its role in determining how males and females find each other and their vertebrate hosts in the field is unknown. In a series of experiments carried out in Amazonian Brazil, we found that males colonizing a new host site can indeed increase the recruitment rate of females. However, a comparison of peridomestic sites at equilibrium showed that, whilst more hosts attracted more males, females could not proportionally respond. The results have implications for the evolution of pheromones, and for sandfly control with pheromone traps.

THE EVOLUTION OF DRUG RESISTANCE IN DIRECTLY TRANSMITTED NEMATODES: THE EFFECTS OF PARASITE GENETIC HETEROGENEITY

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Genetic heterogeneity in parasite populations can be modelled by incorporating elements of population genetics within a general framework of the population dynamics of host-parasite disease interaction. A crude model of genetic heterogeneity, expressed as resistance and susceptibility within parasite alleles that segregate by simple Mendelian laws, is used to examine the evolution of resistance to chemotherapy in directly transmitted nematodes. Numerical simulations indicate that the outcome of a pattern of chemotherapy has a non-linear relationship with the frequency and intensity of application. Although the mean worm burden recovers rapidly from a single drug dose, the susceptible population may be suffieciently depressed to allow fixation of a rare, recessive resistant allele over a long time-scale. The outcome of repeated chemotherapy is related to a more complex interplay of two opposing effects on the homozygous resistant population: as the frequency of application decreases, the relative advantage over the susceptible population declines, but at the same time, declining heterozygote mortality has a positive effect on population growth. For low drug intensities, the latter is overwhelmed by the former and there is a clear progression from the fixation of resistance to fixation of susceptible with an intermediate region of disease eradication. However, for higher drug intensities, a more precarious balance is achieved between the two opposing effects on the resistant population and the narrow window of disease eradication is bounded at both ends by the fixation of resistance. In the unlikely event that the resistant allele is dominant, the possibility of disease eradication does not exist, and efforts have to be directed at controlling the intensity of infectiion rather than attempting its extermination.

INSTABILITY OF THE NUCLEAR CHROMATIN OF *TRYPANOSOMA BRUCEI BRUCEI* PROCYCLIC CULTURE FORMS

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Digestion of chromatin of *T. b. brucei* with micrococcal nuclease yielded DNA fragments which formed DNA ladders in agarose gels similar to those of rat liver. Numbers of base pairs per nucleosomal and linker DNA were identical in both species. However, the chromatin of trypanosomes was digested more rapidly by micrococcal nuclease than that of rat liver, and a slightly prolonged digestion yielded a high amount of DNA fragments of core-particle size.

Trimethylpsoralen, under longwave UV irradiation, crosslinks the two DNA strands where the DNA is not protected by proteins. The nucleosome filament organization of *T. b. brucei* chromatin could be shown by psoralen crosslinking of whole nuclei at physiological conditions, and after DNA purification, denaturation and spreading.

Psoralen crosslinking of soluble chromatin at low salt conditions t pH7 or pH10 resulted in an irregular array of single stranded (ss) bubbles separated by variable stretches of double stranded (ds) DNA. The ratio of the total length of ss bubbles to the contour length of the DNA molecules was low. Soluble chromatin, pretreated with 500 mM NaCl and psoralen crosslinked at 5 mM salt at pH7 or pH10 was to a high extent ds.

The results support the hypothesis that histone H1 may be absent from the chromatin of procyclic *T. b. brucei* and, in addition, that DNA-protein-interactions are less stable and more easily destabilized by experimental conditions such as the production of soluble chromatin, low or high salt incubation and pH changes as compared to rat liver chromatin.

PROTEOLYTIC ENZYME ACTIVITY IN THE MIDGUT OF *ANOPHELES ALBIMANUS*, A VECTOR OF HUMAN MALARIA

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The physiology of blood meal digestion has been studied in our laboratory in great detail for the vector of yellow fever, *Aedes aegypti.* The synthesis of intestinal trypsin was found to be stimulated by blood meal and promoted through endocrine control mechanisms. Surprisingly, considerable differences in proteolytic activities were encountered in the midgut of female *Anopheles albimanus* which will be reported and discussed.

Trypsin activity in the midgut starts to increase immediately after eclosion without any blood meal, reaching a peak of 30-40% of its maximum within 2-4 days and, in the absence of a blood meal gradually disappears thereafter during 10-20 days, the lifespan of sugar-fed females. This segment of trypsin activity is expressed only in intact females but drastically reduced in isolated abdomens, indicating control by the corpora allata. Decapitation experiments however, removing the neurosecretory control system had no effect, contrary to *Ae. aegypti.*

In case a blood meal is ingested 2-4 days after eclosion, trypsin activity rises to its maximum (100%) within 12-18 hr, considerably faster than in *Ae. aegypti.* Termination of digestion is characterized by a minimal trypsin activity of 15% of its maximum, but within another 12 hr it recovers, reaching again the level of 30-40%, characteristic for unfed females. This level of trypsin activity, apparently unique to *An. albimanus* among the mosquitoes tested, is interpreted as of preparatory significance for blood meal digestion. Immunological characterizations by using species-specific, polyclonal antitrypsin antibodies revealed that endocrine-controlled trypsin was identical to the blood meal-induced form of trypsin.

Aminopeptidase and carboxypeptidase A activities in blood-fed females show a similar pattern to trypsin activity but there is a temporal sequence of their peaks with 12 hr intervals.

In *An. gambiae, stephensi,* and *quadrimaculatus,* the other prominent vector species, trypsin activity behaves similar to *Ae. aegypti,* i.e. absent before and after a gonotrophic cycle, rendering *An. albimanus* as an example of unique adaptation of yet unknown significance as far as blood digestion is concerned.

Financial support by the Swiss NSF is acknowledged.

DOES CHLOROQUINE RESISTANCE OF *PLASMODIUM FALCIPARIUM* INTERACT WITH THE HUMAN IMMUNE SYSTEM?

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In vitro studies among children on the response of *Plasmodium falciparium* to chloroquine were conducted as part of the national long-term monitoring of drug resistance in a holo- to hyperendemic malarious area of Tanzania between 1983 and 1989. Overall, no significant increase in chloroquine resistance was observed. However, in under five year old children resistance increased during this period, whereas in schoolchildren resistance decreased from 1986 to 1989. A hypothesis based on antigenic differences between resistant and sensitive strains is put forward as an explanation of this age-specific pattern. If immunity develops principally against the most frequent parasite strains, then as immunity develops the numbers of the most frequent strains will be reduced, whilst the rare strains may become predominant and thus be detected in the blood of immune patients. Thus, in an endemic area, the observed resistance pattern will differ in non-immune infants from the resistance pattern in immune schoolchildren, as has been observed in the present study. These findings may have important implications for the control of malaria and the development of vaccines.

PAEDIATRIC CRYPTOSPORIDIOSIS
A CASE-CONTROL STUDY IN THE REGION OF BASEL, SWITZERLAND

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In 1988 a case/control-study was performed in urban and periurban areas of Basel to elucidate the epidemiology of *Cryptosporidium sp.,* an intestinal coccidian parasite.

From each participant suffering from diarrhoea, two stool smears were stained using the auramine-fluorescence and the modified-Ziehl-Neelson staining for diagnosis. Comprehensive viral, bacterial and parasitological studies were performed.

455 children aged up to 16 years suffering from diarrhoea took part in the study, 4.6% (2.1) were found positive for this parasite. The mothers of each case and two healthy controls were interviewed, using a standardized questionnaire with 122 questions concerning risk factors and symptoms of the illness.

The most important route of transmission was previous contact with a person suffering from diarrhoea. It showed a relative risk estimation for cryptosporidiosis of $OR = 85.0$ ($CI_{95\%} = 9.3\text{-}773$). Travelling abroad and contact with sick animals were also high risk factors with $OR = 5.2$ ($CI_{95\%} = 1.4\text{-}18.8$) and $OR = 4.9$ ($CI_{95\%} = 1.1\text{-}23.5$), respectively.

The consumption of contamined food and 'child specific' behavior, e.g. playing on the ground, were of minor importance.

Compared with 126 controls suffering from diarrhoea for other origin, respiratory symptoms were nearly significantly more frequent in children with cryptosporidiosis (35% vs 18%, $p = 0.07$).

The median duration of diarrhoea was 6 days and ranged from 1 up to 35 days. In contrast, shedding of oocysts of *Cryptosporidium sp.,* last 12.5 days and was prolonged significantly compared to the periode of diarrhoea ($p = 0.02$).

Three outbreaks of cryptosporidiosis detected in a kindergarten and two families endorsed that person-to-person contact is the main route of transmission in our area.

THE EFFECT OF INTRADOMICILLIARY SPRAYING ON MALARIA IN CHILDREN AGED BETWEEN 1 AND 10 YEARS IN NORTH-EAST TANZANIA

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Houses in two villages in the Mombo-Korogwe district, Tanzania, were sprayed with 2 gm/m^2 of DDT and 30 mg/m^2 of Lamdacyhalothrin (ICON) twice a year against *Anopheles arabiensis.* A third village was left untreated but evaluated for malaria.

The effect of the spraying on malaria was assessed by taking temperatures and blood slides fortnightly in children aged between 1 and 10 years before and after the intervention.

The results show that in general, house spraying led to a reduction in the geometric mean of parasite densities, and in the proportion of children with fever and positive for malaria, although there was some seasonal variation. Furthermore, Lambdacyhalothrin treatment, unlike DDT spraying, reduced significantly the percentage of childreen found positive for malaria.

The fact that house spraying has been shown to have an effect on malaria transmitted by species of *An. arabiensis* in this area, despite the fact that members of this species may show some exophilic tendencies, is quite encouraging. Factors which might explain these results are discussed.

POSTER SESSION

THE DEVELOPMENT OF THE CIRCUMSPOROZOITE PROTEIN OF *PLASMODIA* SPECIES IN THEIR MOSQUITO VECTOR (S)

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Malaria is a parasitic disease caused by a protozoan of the genus *Plasmodium,* which develops in the female mosquito (sporogonic development) and in the vertebrate host (hepatic cycle and erythrocytic cycle).

The sporozoites, the infective stages, are formed during the sporogonic cycle inside the oocysts. From there they migrate into the salivary glands. They are then injected into the blood of the host where they quickly reach the liver. The surface of the sporozoite is uniformly covered by the circumsporozoite protein (CS protein), which is thought to be involved in the penetration process of the hepatocytes. Our work is presently focused on the early stages of sporozoite development in the mosquito vector.

By using different monoclonal antibodies directed against the CS proteins we analysed the appearance of this protein in the following systems:

P. gallinaceum in *Aedes aegypti* (avian malaria)
P. berghei in *Anopheles stephensi* (rodent malaria)
P. falciparum in *Anopheles stephensi* (human malaria)

Three techniques (IFAT, Western blot analysis and CSP reaction) gave different informations. In the IFAT, which was the most sensitive method, the CS protein was already detected on occysts one week after the infective blood meal. Midgut and salivary gland sporozoites showed a similar reactivity with the CSP reaction and the immunoblots allowed a comparative analysis of the different CS proteins of the midgut and salivary gland sporozoites.

The data have been used to formulate different hypotheses on the role of the CS protein in the mosquito vector and in the vertebrate host.

Seroepidemiological study on tick-borne encephalitis (TBE) and lyme borreliosis in Switzerland. First results

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A seroepidemiological study on tick-borne encephalitis (TBE) and Lyme borreliosis — two human diseases vectored by *Ixodes ricinus* — is conducted in Switzerland. Tick-borne encephalitis, a nervous system disorder, is caused by a *Flavivirus* (Flaviviridae). Lyme borreliosis is a systemic disorder caused by a spirochete, *Borrelia burgdorferi.* Until 1984, 12 different natural foci of TBE were recognized near Schaffhausen (SH), Eglisau (ZH), Horgen (ZH), Thun (BE), Tierachern (BE), Steffisburg (BE), Ins (BE) and Seewis-Landquart (GR), whereas Lyme borreliosis is more widespread. Since 1984, many clinical cases of TBE were reported out of the natural foci, so that we suspect them to have extended to the west and the south of the country.

We attempt in this study to evaluate the present distribution of the natural foci of TBE and the comparative risk of foresters being exposed to the two pathogens.

Blood samples were collected from January to November 1989 among foresters in the cantons JU, NE, BE, FR, VS and GR. They were examined for specific antibodies (IgG) by enzyme-linked immunosorbent assays (ELISA). The presence of antibodies against TBE virus among people working far from the known natural foci, in comparison with Lyme borreliosis results, is discussed.

Biology of sandflies in Southern Switzerland

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In the Ticino, Southern Switzerland, three species of sandflies can be found:

Phlebotomus (Larroussius) perniciosus Newstead, 1911
Phlebotomus (Adlerius) mascittii Grassi, 1908
Sergentomyia (Sergentomyia) minuta Rondani, 1843

P. mascittii was present at low density levels (<8 individuals per m2 sticky paper), whereas *P. perniciosus* and *S. minuta* occurred in two distinct regions, the western part of the Mendrisiotto and the southern part of the Malcantone at a moderate (8-32 individuals per m2) or high density (>32 individuals per m2) respectively.

In the region of Sessa (Malcantone, 394 m above sea level) positive results with light traps were obtained in partially closed or sheltered rooms in villages only.

The seasonal distribution suggests a monophasic generation cycle for all three species. The first individuals caught were males, and all species reached their maximum density immediately after the highest seasonal temperature (July). At the beginning of August, after the first summer rains and a decrease in temperature, the population densities diminished continuously with a 'plateau' phase in mid-August, when temperatures usually rose again.

Human blood was identified in wild caught *Phlebotomus perniciosus* and *Phlebotomus mascittii* by dipstick ELISA tests on eluates of wild caught freshly engorged sandflies squashed on filter papers (V. Houba, WHO, Geneva), and by direct blood meal observations. However, these data are based on a small sample number (10) for freshly engorged females are very rarely trapped. *P. mascittii* was observed to be an indoor feeder.

Glucose and fructose were identified in males and females of both, *P. perniciosus* and *P. mascittii* by thin layer chromatography (carrier: cellulose, solvent: ethylacetate-pyridine-water, staining: aniline-diphenylamine).

Larval breeding sites of *P. mascittii* were identified with the help of emergence traps in two unused neighboring basements (constant humidity: 90%, and temperature: 19°C) in the middle of the village of Sessa. A total number of 40 (21 males, 19 females) individuals were trapped during three seasons.

CHANGES IN THE PROTEIN PROFILE OF DIFFERENT *BORRELIA BURGDORFERI* STRAINS AFTER REINTRODUCTION TO *IXODES RICINUS*

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Our objective was to study the influence of the passage of different strains of *Borrelia Burgdorferi* (BB) into *Ixodes ricinus* (Ir) on their protein profile.

Methods: BB was artificially introduced in Ir midgut by capillary feeding and reisolated 1 week and 10 weeks after these infections. The reisolates were examineed by SDS-PAGE and Western Blot analyses.

Results: Three phenomena were observed:

1. One European isolate (NE4) with small amount of 33 kD protein and another major protein with an apparent molecular weight of 22-23 kD was introduced to Ir. After this passage into the ticks, it lost this 22-23 kD protein and revealed 2 abundant proteins with an approximative molecular weight of 34 kD as well as one of 31 kD which was recognised by H5332.

2. After reisolation from ticks, two European strains (NE58 and NE202) presented a new protein with a low molecular weight of 23 kD. In contrast, two other strains (NE2 and NE83) lost this protein. Concerning the protein presence in the 31 and 32 kD range and the traces of 33 kD protein, these four strains did not show any change after reisolation from the ticks.

3. The four strains (B31, NE56, NE203 and B1) did not show any modification in their SDS-PAGE pattern after passage into the tick. The OspA and OspB remained unchanged.

Conclusion: passage into the tick induced changes between OspA/OspB and the 22-23 kD protein as revealed by SDS-PAGE and one strain became a new serotype reacting with H5332. Thus, Ir may induce changes in the antigenicity of strains. This phenomenon may enhance the importance of the vector-role of ticks in the epidemiology of the disease.

DNA ANALYSIS OF SWISS AND AMERICAN STRAINS OF *BORRELIA BURGDORFERI*

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Lyme disease is a tick-transmitted spirochetoses caused by the bacteria *Borrelia burgdorferi.* Although Lyme disease in North America has many features in common with the European forms of infection, it differs in frequency and severity of symptoms. Strains isolated from ticks from the USA and Switzerland were compared at the DNA level. The relationships were determined by: 1) RFLP's of chromosomal DNA; 2) Profiles and sequence homologies of (a) conventional supercoiled plasmids and (b) linear plasmids which are a unique feature of *Borrelia* species.

From the RFLP analysis strains can be grouped according to location (USA or Switzerland) although a few Swiss strains resemble the USA group. All the strains contain circular and linear plasmids and can be similarly grouped based on number and size of plasmid species and sequence homologies.

TICK-BORNE FEVER *(EHRLICHIA PHAGOCYTOPHILA)* AS A SIGNIFICANT DISEASE OF CATTLE IN SWITZERLAND

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Tick-borne fever (TBF), also called "pasture fever", is an infectious disease caused by *Ehrlichia (syn.: Cytoecetes) phagocylophyla* (Rickettsiaceae) which parasitizes circulating leucocytes, particularly neutrophils. The causative agent is transmitted by the tick *Ixodes ricinus* and usually infects bovines, ovines and wild ruminants. The disease is reported from the United Kingdom, The Netherlands, Norway, Finland, Ireland and Austria: So far most research efforts have mainly been conducted on sheep rather than on cattle. Unless complicated by other infections, the "pasture fever" seldom terminates fatally, but can act as a predisposing factor by undermining the immune response of the host animal to bacterial or viral infections.

In order to get a more detailed idea of the contaminated areas and the frequency of bovine TBF in Switzerland, we have examined a large number of blood samples from cattle presenting characteristic clinical symptoms collected throughout the country.

TBF — infected cattle showed the following symptoms: a very high fever, a dramatic decrease of the milk production and loss of appetite. According to cattle breeders, an increase of the abortion rate in pregnant cows has also been observed.

The present epidemiological and immunological investigations are based on the distribution of the disease in the Swiss cattle population and on the study of a TBF — endemic area. Consequently, a map of the geographical distribution of all reported and confirmed cases could be drawn.

In Switzerland, most TBF-cases (occurring each year in large numbers) are seen in two regions and they are always linked to the seasonal appearance of *I. ricinus.* Dairy cattle which had not previously been exposed to ticks are the most severely affected and react by an almost total loss in milk production.

In the second phase, the study was focused on a large area with a high prevalence of TBF in cattle and was concentrated on both, the host and the vector, resp. Since 1988, 400 to 500 animals from 20 farms from this area are being tested serologically by IFAT at regular intervals in order to establish possible relationships between the disease prevalence and immunity and the AB- titer.

THE TRYPANOLYTIC FACTOR OF NORMAL HUMAN SERUM

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In within the african trypanosomes *Trypanosoma brucei rhodesiense* infects man and causes the East African sleeping sickness. In contrast, *Trypanosoma brucei brucei* is not able to infect humans. Until now this is the only possible criteria to distinguish between the two closely related species. It has long been known that normal human serum contains a factor which causes the lysis of *T. b. brucei.* Several groups attempted to isolate and characterize the active agent and concluded from their biochemical analysis that components of a high density lipoprotein (HDL) fraction cause lysis.

Using ultracentrifugational flotation we have also been able to isolate an active fraction with a density slightly higher than the typical HDL fraction. Attempts to further purify this fraction failed. We designed therefore an alternative way to purify the trypanolytic factor.

The procedure comprises four chromatographic steps: affinity purification to eliminate albumin, two ion-exchange steps and a final gel filtration. A fraction was obtained, which was trypanolytic and did not contain apolipoprotein A-1.

Attempts to reproduce this method are hampered by a variety of technical problems such as appropriate procedures to concentrate human serum or fractions of it without loosing activity. Variations have also been detected in different serum pools in respect of the recovery of the active fraction after gel filtration.

The results gained so far are indicative for the absence of the typical HDL apolipoproteins from the active fractions. The nature of the different susceptibility of *T. b. rhodesiense* and *T. b. brucei* remains to be shown.

TICKS AND PIROPLASMS OF DOMESTIC ANIMALS IN THE MACEDONIA REGION OF GREECE

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A study was carried out on the presence of ticks and piroplasms in Macedonia. The author provides information on regional and seasonal distribution, host preference and localization on the host's body, for ticks parasitizing these animals. Data are given on distribution and prevalence of different piroplasm species of livestock. During the 1983-1986 period, 11610 ticks, belonging to 18 species and subspecies, were collected from cattle, sheep, goats and dogs. A total of 602 serum samples were collected from cattle, 721 from sheep and 487 from goats. For some of the animals blood smears were also prepared.

Rhipicephalus bursa and *Hyalomma marginatum marginatum* occurred in all bioclimatic zones, as well as the one-host ticks, *Boophilus annulatus* and *H. detritum scupense,* present in fewer localities. *R. turanicus, R. sanguineus, Ixodes gibbosus* and *H. anatolicum excavatum* were essentially represented in the mesomediterranean bioclimatic zone. *I. ricinus, Dermacentor marginatus* and *Haemaphysalis* ticks (*H. inermis, H. punctata, H. sulcata, H. parva*) were found frequently in the biotopes of the attenuated mesomediterranean and the submediterranean bioclimates. *Rhipicephalus* adults and the two-host *Hyalomma* ticks were active in the spring-summer period. *Ixodes, Dermacentor, Haemaphysalis,* as well as *H. d. scupense* and the immature stages of *R. bursa* appeared during automn and winter. The rare specimens of *H. m. rufipes, H. M. turanicum* and *Amblyomma variegatum* were probably introduced by migratory birds.

The indirect fluorescent antibody (IFA) test revealed that 41.4% of cattle sera were positive to *Theileria orientalis,* 2.0% to *T. annulata,* 21.6% to *Babesia bovis,* 15.2% to *B. bigemina,* 5.1% to *B. major* and 2.7% to *B. divergens. T. orientalis* has a wide distribution. Animals from 85% of the localities showed antibodies against this parasite. *B. bigemina* and *B. bovis* are often present together. Cattle possessed antibodies against these piroplasms in more than half of the localities. The prevalence of IFA activity for sheep and goat sera respectively was: 24.6 and 0.6% for *T. ovis,* 52.1 and 36.4% for *B. ovis,* 10.5 and 4.2% for *B. motasi,* 12.6 and 6.6% for *B. crassa. B. ovis* is a widespread parasite. Antibodies against it were found in animals from more than 90% of the localities. *T. ovis* is also common but it is confined essentially to sheep. Some of the positive titres were probably due to cross reactions, mainly when mixed infections occurred. By examination of Giemsa stained blood smears *T. orientalis, T. annulata* and a *Babesia sp.* were detected in cattle, *T. ovis* and *B. ovis* in sheep, and *Anaplasma ovis* in a goat.

NUCLEAR CHROMATIN OF *TRYPANOSOMA B. BRUCEI* BLOOD STREAM FORMS

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Procyclic forms of *T. b. brucei* can be cultivated in high quantities and previous investigations on the nuclear chromatin have been carried out with this stage of the parasite. In the present study, the nucleosome filaments of *T. b. brucei* from the blood of rats and their compaction pattern were analysed by electron microscopy. As compared to procyclic culture forms chromatin of blood stream forms showed salt dependent condensation, but formed no 30 nm fiber like rat liver chromatin. The compaction seemed to be independent of histone H1 and to function by an alternative mechanism.

Chromatin was digested with micrococcal nuclease, the DNA fragments purified and separated on agarose gels. Chromatin of blood stream forms proved to be much better protected from digestion than that of procyclic culture forms. It was even better protected than that of rat liver. It can be concluded that significant structural and functional differences exist not only between the chromatin of *T. b. brucei* and higher eukaryotes (rat), but also between various stages of the life cycle of the parasite.

MAMMALIAN AND AVIAN RESERVOIRS FOR *BORRELIA BURGDORFERI* IN A LYME BORRELIOSIS FOCUS IN SWITZERLAND

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Lyme borreliosis is a human systematic disease caused by a spirochete, *Borrelia burgdorferi,* that is vectored in Europe by *Ixodes ricinus* ticks.

We attempted in this study to evaluate the competence of small mammals and birds as reservoirs for *Borrelia burgdorferi.*

Feral rodents and birds were captured from April to October 1988 in a Lyme borreliosis focus on the Swiss Plateau.

Ticks were removed from these hosts and examined for spirochetes by direct fluorescent antibody (DFA) staining. Spirochete-infected larval and nymphal *Ixodes ricinus* were taken off *Apodemus flavicollis, Apodemus sylvaticus, Clethrionomys glareolus* and some ground-foraging birds, specially Turdidae.

Blood samples were cultured in a selective medium (BSKII). Motionless spirochetes have been isolated from blood of 4 *Apodemus sp.* and 2 *Erithacus rubecula.*

Serological surveys, using indirect immunofluorescence (IFA) assay, provided evidence of exposure of rodents and some bird species to borreliae in this Lyme borreliosis focus.

The tick xenodiagnosis were used to determine the reservoir competence of rodents. Laboratory-reared *Ixodes ricinus* larvae appeared to have inherited spirochetes after blood-feeding on infected *Apodemus sp.* and *Clethrionomys glareolus.* Some rodents proved infective for ticks up to one year after capture.

In this report, we demonstrate the reservoir ability of *Apodemus sp.* and *Clethrionomys glareolus* for *Borrelia burgdorferi.* Although the reservoir competence of birds has not been clearly determined, we suggest that certain bird species may help maintain Lyme borreliosis foci or establish new ones by dispersing infected ticks.

SEROLOGICAL FINDINGS IN RELATION WITH RISK FACTORS: A TWO YEAR FOLLOW-UP OF A POPULATION AT RISK

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Our purpose was to gain data on the prevalence of *Borrelia burgdorferi* (BB) infection in orienteers (sportsmen) who spend a lot of time in forest increasing the risk to be in contact with BB infected ticks. The infection rate of *Ixodes ricinus* (Ir) in Switzerland ranges from 5-50%.

Methods: the sportsmen were asked, twice a year, in spring and autumn, in 1986 (samples I and II) and 1987 (samples III and IV), to donate blood and to answer a questionnaire about history of tick bites and possible Lyme symptomatology. The sera were tested by ELISA (IgG).

Results: in sample I, 25% of the 1282 participants presented positive IgG titers. In sample II, 28% of the 804 participants were positive. In samples III and IV, 30% and 29% of 795 and 618 participants, respectively, were seropositive. During this 2 year study, the majority of titers remained stable. Only 4.3%, 5.4% and 3.6% shifted from negative to positive, between samples I and II (summertime), samples II and III (wintertime) and samples III and IV (summertime), respectively.

At the beginning of the study, 18 orienteers reported history of definite Lyme borreliosis in the past (61% with high IgG titers). Between samples I and II, 14 persons developed a definite Lyme borreliosis (71% with high IgG titers). Between samples III and IV, only one case of ECM, with seroconversion, was observed. 78% of the orienteers had a history of tick bites.

Conclusion: throughout this 2 year follow-up, we observed a rather stable serological status in the studied population frequently exposed to Ir. The high seroprevalence is in contrast to the low incidence of clinical disease.

DEVELOPMENT OF *BORRELIA BURGDORFERI* IN *IXODES RICINUS* DURING BLOOD MEAL

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Our objective was to study the development of *Borrelia burgdorferi,* agent of Lyme borreliosis, in its vector *Ixodes ricinus* and its possible modes of transmission by this thick.

Methods: in group I, the ticks were infected on gerbils by subcutaneous injection of spirochetes at the feeding site. After moulting, the ticks were allowed to feed on uninfected rabbits. In group II, females were infected artificially by the capillary method and then fed to repletion on uninfected rabbits. In group III, uninfected ticks were used as controls. Ticks were sampled daily from rabbits until the 6th day of the blood meal and the Dieterle silver stain method was employed to visualise the borreliae under the light microscope.

Results: in test groups I and II, spirochetes were found in the lumen of the midgut, in the hemolymph and in the acini and ducts of the salivary glands during blood meal. The number of systemic infected ticks increased with longer periods of feeding on the rabbit. Our results show that the spirochetes present after transstadial transmission and those ingested just 2 hours before the host attachment can induce a systematic infection in females during the blood meal.

Conclusion: the presence of *B. burgdorferi* in the acini and ducts of the salivary glands lets suppose the possibility of salivary transmission of this spirochete by females of *I. ricinus.*

PARASITES AND PLANTS

KEYNOTE LECTURE

HOST CHOICE AND COMMUNITY STRUCTURE AMONG HUMMINGBIRD FLOWER MITES

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Mites of the genera *Proctolaelaps* and *Rhinoseius* (Ascidae) feed on nectar and pollen within the flowers of plants pollinated by hummingbirds. Newly-flowering inflorescences are colonized by mites arriving on the bills of hummingbirds. Many different mite species from the same habitat may share the same hummingbird carriers but each mite species is scrupilously faithful to its own host plant species, disembarking only at its flowers. Where flowering is seasonal, mites shift regularly among hosts on an annual cycle. Preference experiments demonstrate thet each mite species prefers its own host nectar to the nectar of either alien hosts or miteless, hummingbird pollinated species; both attractive and repellent plant chemicals appear to be involved. Neither interspecific competition nor special adaptation to host conditions fully accounts for the degree and pattern of host fidelity. Ecological and behavioral evidence and a theoretical model point to a significant role for sexual selection in the evolution of host fidelity, arising from differential success in finding mates in a complex environment.

SYMPOSIUM

SEARCHING BEHAVIOUR OF PARASITOIDS: MECHANISMS AND CONSEQUENCES AT THE POPULATION LEVEL

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A case study involving the apple leaf miners *Phyllonorycter cydoniella* (D. & S.) and *Phyllonorycter blancardella* Fabr. (Lep., Gracillaridae) and their parasitoid complex is presented. The searching behaviour of *Sympiesis sericeicornis* Walker (Hym. Eulophidae) was studied in the field. The analysis of the ethograms is done with explorative statistics (Box-plots) and reveals that the females are able to quickly discriminate hosts of different quality. The foraging behaviour at the patch level is efficient too: the females are able to recognize and handle the suitable hosts first and leave the leaf without missing any suitable host. The consequences at the population level of the ''sampling'' behaviour of the females (sampling *with* replacement with unequal but constant probabilities) are explored.

The tridimensional position of each leaf harbouring mines was recorded in several apple trees with the aim to express the spatial distribution of parasitism as a function of the searching and attacking behaviour of single parasitoid females. A statistical procedure is first developed to characterise and classify the different spatial patterns. It is based on nearest-neighbours distances and Monte-Carlo tests, a computer intensive inferential method. In a second phase, a stochastic model of spatial parasitism, which includes various biological information, is developped for the parasitoid *Cirrospilus vittatus* Walker (Hym. Eulophidae) and tested in the field. The influence of the architecture of the tree on the percentage of parasitism is explored.

The approach cab be easily extended to other systems, such as herbivores and plants. An ongoing project on the searching behaviour of fruitflies in apple trees (in collaboration with M. Aluja, Xalapa Mexico, and R. Prokopy, Mass. USA) will be briefly presented. A short overview of the current projects in the group of V. Delucchi will be presented in the last part of the talk.

More information about the *Phyllonorycter* work can be found in: *Physiological Entomology, 13,* 373-390, *Ecological Entomology, 14,* 257-265 and *Ecology* (in press).

ON THE ROLE OF ODOR IN HOST RACE FORMATION IN *RHAGOLETIS POMONELLA*

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The shift of *Rhagoletis pomonella* from its native host hawthorn to introduced apples occurred within the last 150 years under sympatric conditions. The two host races are genetically distinct and differ in mean adult emergence times and host acceptance behaviors. The most likely traits contributing to host race formation in this species are those involved in timing of adult eclosion and host preference. Both host races are highly selective in their host choice. Allozyme analysis of over 750 adult flies caught from hawthorn and apple trees growing side by side revealed no host choice errors and indicates that these flies must spend very little time, if any, on non-host plants. Because *Rhagoletis* flies meet and mate on their hosts plants, differential host preference may be the major mechanism reducing gene flow between host races. Color and shape have been shown to influence host discrimination, but odor seems to be the main cue in host acceptance. Fruit odors are known to attract these flies, possibly over distances up to 30 m. We found differences in antennal sensitivity to host fruit odor extracts as well as to single odor compounds of fruit odors betweeen the apple and the hawthorn host race of *R. pomonella.* This suggests that odor perception at the antennae is an important factor determining host preference. Since peripheral sensitivity can be modified by changes in only one or a few gene(s), this may be an important mechanism in host race formation in the genus *Rhagoletis.*

INDUCIBLE RESISTANCE AND SAWFLY PERFORMANCE ON THE MOUNTAIN BIRCH IN NORTHERN FINLAND

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The effect of leaf damage simulating the feeding of early season insect herbivore species, e.g., *Epirrita autumnata,* to mountain birch, *Betula pubescens* ssp. *tortuosa,* on the performance of insect larvae was studied with several leaf-chewing sawfly species. I found variation in the results that was due to short- and long-term inducible responses and to the phenology of the herbivore species. Additional variation was caused by differences between seasons (years) and herbivore species. In general, early and mid-season species are more sensitive to induced reactions than late season species. The growth of the larvae of mid-season sawfly species was affected by both short- and long-term inducible reactions.

This result shows that early season species may escape short-term inducible reactions of the mountain birch in current year but may not avoid long-term effects. Seasonal deterioration of leaf quality may either mask the effects of inducible resistance or late season species may be better adapted to low-quality leaves. Thus, inducible resistance may play a role in competitive interactions between herbivore species in the leaf-chewing insect guild of the mountain birch.

INTRAGENERIC DIFFERENTIATION IN HOST PREFERENCE AND MODUS OF OVIPOSITION IN THE OLIGOPHAGOUS WEEVIL GENUS *LARINUS* — IN RELATION TO EVOLUTIONARY DIVERGENCE IN HOST AND PLANT PARASITE TAXON

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The analysis of processes determining the structure of communities of phytophagous insects requires an approach combining ecological with evolutionary aspects of differentiations of the taxa involved. Central to understanding are the niche concept especially predictions regarding the coexistence of species as well as the concept of coevolution of parasite strategies with defense mechanisms in host plants.

In the weevil genus *Larinus* composed of numerous oligophagous species exploiting host species of the tribe Cardueae (Asteraceae) — known as thistles — patterns of differentiation can be described covering several niche parameters.

A comparison of host preferences encompasses collection data, experimental feeding ranges and results of a biotest with host plant extracts. Additionally functional differences in oviposition are presented regarding range of exploited developmental stages and specific ways and positions of oviposition.

Niche divergence is divided into a larger component between 3 groups of species — largely identic to taxonomically recognized subgenera — and smaller deviations within groups. Differences between groups cover all niche parameters with functional deviations being correlated to morphological differences e.g. in rostrum shape. Differentiation of host ranges is in accordance with coevolution as phylogenies of host and parasite groups are parallel.

Within groups niches show higher degrees of overlap which may be reduced at a geographic level by existence of regional host specificity. The influence of "ressource tracking" in case of local absence of host species leading to extension of host ranges is discussed as an effect covering up a possibly underlying parallel phylogeny of host and parasite taxon.

ROOT-FEEDING INSECTS ON THISTLES: THEIR IMPACT ON PLANT PERFORMANCE AND POTENTIAL USE AS BIOCONTROL AGENTS

Heinz Müller, Zoologisches Institut der Universität, CH-4051 Basel

In a field study and a parallel experiment with potted plants, I analysed the impact of a root-feeding moth on survival, growth and reproduction of *Centaurea maculosa* (Compositae), under various levels of intra- and interspecific plant competition.

I will

1) present results on the impact of the three stress factors intraspecific competition, competition with the grass *Festuca pratensis,* and root herbivory by *Agapeta zoegana* (Lep.: Cochylidae), and discuss its underlying mechanisms,

2) discuss the effects of the root herbivores as a function of the plant's competitive environment (combined effects, cumulative stress model, predictability of compensatory plant responses), and

3) evaluate the potential impact of these root-feeders on the plant's population dynamics in view of their use as a biological control agent against this *Centaurea* species, which has become one of the major prairie weeds in North America since its introduction ca. 100 years ago.

HOST PLANT SELECTION BY THE CABBAGE FLY *DELIA RADICUM*

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Insect-plant relations are strongly influenced by chemical cues. Although this idea has a long history, as yet only a few examples exist in which the responsible chemicals are indeed identified. This presents a strong contrast to for instance the situation in sex-pheromone research, were chemical details of many active compounds are known. A major reason for this discrepancy is the fact that the behaviourally active compounds in plant are buried between thousands of other chemicals. Consequently a large amount of work is needed to isolate and identify these compounds. One of the main difficulties is that *a priori* nothing is none about the chemical involved, excluding the use of special techniques aimed at certain groups of compounds. It is therefore necessary to go through a long chain of purification steps- each time cheeking the biological activity of all fractions. As a result this type of research also has a strong multi-disciplinary element and needs the expertise of both chemists and biologists. The presented work is aimed at the identification of chemicals used by the cabbage fly, *Delia radicum,* to recognize its host plant. Some of the encountered difficulties will be discussed and present state of the research described.

DIFFERENTIATION IN MORPHOMETRICS AND DEVELOPMENTAL TIME IN *EURYTOMA TIBIALIS* BOHEMAN (HYMENOPTERA, EURYTOMIDAE)

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Laboratory reared adult endoparasitoids of *Eurytoma tibialis* BOHEMAN from 14 hosts and hostplant species were compared by using discriminant analysis of 21 morphometric characters and ANCOVA of developmental rate curves. The hosts are *Urophora, Chaetorellia, Orellia* and *Tephritis* species (Diptera, Tephritidae) in flowerheads of *Cirsium, Carduus, Carthamus* and *Centaurea* species (Asteraceae). The 14 populations of E. tibialis were separated into 5 morphometric groups on the first eight canonical variates. The groups were not changed by character-transformations like standardization with the size of the host or own body size. Morphometric groups mostly consist of specimens reared from related or congeneric host-plants, but phenology and habitat type of the hostplants are involved. An analysis of the nonlinear developmental rate curves showed differences in optimum temperature, developmental threshold and maximum rates of development between larvae from *Tephritis conura* and *Urophora congrua* with those associated with *Urophora*-species from *Centaurea*-hostplants. The morphospecies *E. tibialis* seems to be differentiated in "biotypes" (sensu Diehl and Bush 1984) a group of sibling species. Different developmental times can be interpreted as adaption to phenology of hosts and hostplants promoting allochrone speciation. The differentiation of *E. tibialis* is in agreement with the predictions from the "idiobiont/koinobiont"-hypothesis.

THE USE OF THE SAME HOST PLANT BY CRYPTIC AND APOSEMATIC CHRYSOMELIDS IS ASSOCIATED WITH DIFFERENT LIFE-CYCLE STRATEGIES

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Two species of leaf beetle (*Cassida viridis* and *Chrysolina fastuosa*) living in the same habitat (Labiates in damp biotopes) and sharing one of their host plants (*Galeopsis tetrahit*), make different use of this host plant and have different reproductive strategies. The contrast between the two species may be related to their opposed defensive strategies, through the insect apparency notion.

Cassida viridis is cryptic and chemically undefended. Its phenology, its location on the plant and the relative height of chosen plants reduce its probability to be found by a predator. On the other hand, the aposematic *Chrysolina fastuosa* presents for the same parameters a higher apparency.

As for the reproduction, differences seems to be related to the longer egg laying period for the aposematic species rather than to a tradeoff between defense and reproduction costs. Their contrasting phenologies involve different feeding strategies for the larvae of the two species, which are both chemically undefended.

Thus, defense, feeding and life cycle strategies are to be considered together for a better understanding of relationships between phytophagous insects and their host plants.

POSTER SESSION

OXYNA PARIETINA L. (DIPTERA: TEPHRITIDAE) ON *ARTEMISIA VULGARIS:* DENSITY DEPENDENCE OF THE MORTALITY FACTORS

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The fruit fly *Oxyna parietina* L. (Diptera: Tephritidae) is monophagous on mugwort (*Artemisia vulgaris* L., Asteraceae). Their larvae develop endophytic in the stemmark of the hostplant. The population density of the larvae suffers more or less strong fluctuations on different stands. As possible causes for these fluctuations three mortality factors were examined: two species of parasitoid wasp, *Pteromalus parietinae* GRAHAM and *Chlorocytus* sp. (Pteromalidae) and a mortality caused by unknown factors. Density dependence of these mortality factors will be shown and discussed.

BIOCHEMISCHE UNTERSUCHUNGEN ZUR POPULATIONSGENTIK VON *OREINA GLORIOSA* (COLEOPTERA, CHRYSOMELIDAE)

F. Eggenberger & M. Rowell-Rahier, Zoologisches Institut der Universität, Rheinsprung 9, CH-4051 Basel

Oreina ist eine Gattung alpiner Blattkäfer, die in Höhen zwischen 600 und 2100 m.ü.M. vorkommt. Die monophage Art *O. gloriosa* ist in halbschattigen Habitaten, meist auf ihrer Futterpflanze *Peucedanum ostruthium* (Apiaceae) anzutreffen. Ihrer auffälligen Färbung wegen ist *O. gloriosa* in erhöhtem Mass optisch orientierten Prädatoren ausgesetzt. Es ist deshalb nicht erstaunlich, dass *O. gloriosa* eine Verteidigungsstrategie zur Abwehr von Prädatoren entwickelt hat. Diese beruht auf der Ausscheidung von toxischen Substanzen (v.a. Cardenolide) mittels prothorakaler Drüsen.

Die Populationsdichte von *O. gloriosa* beträgt in drei untersuchten Populationen im Wallis (Schweiz) zwischen 4 und 10 Individuen pro qm. Untersuchungen des "Dispersals" haben ergeben, dass sich *O. gloriosa* nur sehr wenig bewegt. Isolation und die daraus resultierende genetische Differenzierung von geographisch deutlich getrennten Populationen scheint somit wahrscheinlich zu sein.

Zur Bestimmung der vermuteten genetischen Unterschiede zwischen den betreffenden Populationen wurden 6 Enzymioci von insgesamt 426 *O. gloriosa* gelelektrophoretisch untersucht. Die durch diese Allozymanalysen ermittelten Nei-Distanzen zwischen Populationen von 6 verschiedenen Standorten im Wallis sind mit den Entfernungen zwischen den jeweiligen Standorten positiv korreliert.

Chromatographische Analysen (HPLC) der prothorakalen Sekrete von *O. gloriosa* ergaben signifikante Unterschiede in der Zusammensetzung der Sekrete von Individuen verschiedener Populationen. Diese Unterschiede entsprechen den gelelektrophoretisch nachgewiesenen Nei-Distanzen.

Beide biochemischen Untersuchungen zeigen demnach unabhängig voneinander, dass zwischen Populationen der Blattkäferart *Oreina gloriosa* benachbarter Täler im Wallis Unterschiede bestehen, wobei zumindest die gelelektrophoretisch nachgewiesenen genetisch bedingt sind. Die ermittelten Unterschiede sind zwar relativ klein, nehmen aber deutlich mit der Entfernung zwischen den jeweiligen Standorten zu.

BIOLOGISCHE SCHÄDLINGSBEKÄMPFUNG: NEMATODEN (*HETERORHABDITIS*) ALS VEKTOREN IM BODEN FÜR BAKTERIEN (*XENORHABDUS* L.) IN DER BEKÄMPFUNG VON ZIERPFLANZENSCHÄDLINGEN

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SCHWERMETALLTOLERANZ VON *SILENE VULGARIS* (CARYOPHYLLACEAE): FOLGEN FÜR DIE HERBIVOREN (kein Text eingegangen)

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In Bergbaugebieten ehemaliger Zinkerzminen sind auf stark zink- und cadmiumhaltigen Pionierpflanzen phytophage Insekten anzutreffen. Neben dem Vorteil von geringerer Konkurrenz, könnte die Adaptation der Insekten an diese Pflanzen aber auch mit Einbussen verbunden sein, die in erster Linie mit der Entgiftung der schwermetallhaltigen Nahrung zusammenhängen.

Zur Abklärung allfälliger Kosten für die Phytophagen wurde die Wirkung verschieden hoher Zn und Cd Gehalte in *S. vulgaris* auf die Entwicklungsdauer, Biomasse, Überleben und Wahlvermögen von *Cassida azurea* (Coleoptera, Chrysomelidae), einem Spezialisten und von *Subcoccinella 24-punctata* (Coleoptera, Coccinellidae), einem Generalisten-Herbivoren untersucht.

Zur Kontamination des Pflanzenmaterials mit Schwermetallen wurden Sprosse von *S. vulgaris* eine bestimmte Zeit im Licht in Zn und Cd haltige Lösung bekannter Konzentration eingestellt. Dadurch konnten Sprosse mit etwa gleichem, doppeltem und zum Teil viermal so hohem Schwermetallgehalt, wie sie in *S. vulgaris* auf Böden ehemaliger Bergbauminen vorkommen, hergestellt werden. Die Entwicklung der Insekten wurde vom Erstlarvenstadium bis zum Adulttier untersucht. Zur Untersuchung des Erkennungsvermögens der Tiere von Schwermetallen in Pflanzenmaterial, wurden Frass- und Eiablagewahlversuche mit verschieden hoch kontaminierten Sprossen und ganzen Pflanzen durchgeführt.

Die Überlebensrate, Biomasse und Entwicklungsdauer von *C. azurea* und *S. 24-punctata* unterschied sich nicht zwischen Tieren auf Kontrollsprossen, Sprossen mit 800 ppm Zn, 4 ppm Cd und Sprossen mit 1600 ppm Zn, 8 ppm Cd. Bei beiden Arten weisen die Tiere von schwermetallhaltigen Sprossen gegenüber Kontrolltieren einen erhöhten Zn und Cd Gehalt auf. Weiter zeigte sich, dass die Spezialisten- und die Generalistenart weder beim Fressen noch bei der Eiablage zwischen schwermetallhaltigen Sprossen und Kontrollsprossen unterscheidet.

Speziationsprozesse bei Generalisten- und Spezialisten-Insektenarten auf schwermetallhaltigen *S. vulgaris* werden kurz diskutiert.

INTERACTIONS BETWEEN THE LAND SNALL *ARIANTA ARBUSTORUM* AND SOME ASTERACEOUS FOOD PLANS

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Specialist herbivores are adapted on a group of biochemically similar plants, while generalist herbivores can often feed on a variety of biochemically dissimilar plants. Their adaptation is therefore not so specific and often assumed to be less efficient. In this study, we investigate whether the land snail *Arianta arbustorum* can feed on plants containing pyrrolizidine alkaloids (PA). PA are highly toxic to mammals, but their effects on invertebrates are almost unknown. At our study site, a montane forest, two plants contain PA: *Adenostyles alliariae* and *Senecio fuchsii* (both asteraceae).

PA concentrations in the leaves fall throughout most of the season. Early in the season, old leaves show highest PA concentrations. Total nitrogen concentration is always highest in the youngest leaves and lowest in the oldest ones.

In the laboratory, *Ariana arbustorum* eats only small quantities of either *Adenostyles* or *Senecio,* and after a few days stops feeding at all, if no other food is offered. In the field, the leaves of both *Adenostyles* and *Senecio* are not attacked substantially except for the oldest ones. At the end of the season, herbivory increases markedly.

These results suggest that *Arianta arbustorum* is primarily selective concerning the age of the leaves it eats, and this has consequences for the amount of PA and nitrogen in ingests. Whether it has the ability to choose leaves with low PA or high nitrogen content will be studied this summer.

INVESTIGATION ON THREE *CHAMAESPHECIA* SPECIES AS POTENTIAL BIOCONTROL AGENTS AGAINST LEAFY SPURGE (*E. VIRGATA X ESULA*) AND THEIR SPECIFICITY ON OTHER EUPHORBIAS

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The objective of this study was to gather data on life cycles and especially the larval development, of Chamaesphecia species, in regard to their application as control candidates on leafy spurge *(Euphorbia virgata x esula).* In North America the hybrid, leafy spurge, is a perennial noxious weed causing vast agricultural damage due to its hardiness as a competitor and its adaptability on prairie country. This survey pertains to monophagous endophytic larvae of the genus *Chamaesphecia* (Fam. Sesiidae) specifically: *Ch. hungarica, Ch. palustris* and *Ch. bibioniformis.*

In situ as well as labratory observations were made of the interactions between these herbivorous moths and their spurges host plants. Field records included biotope assessments, particularly soil analysis, plant associations and eco-geographical comparisons between leafy spurge sites. Labratory studies included emergence rates, copulation successes, oviposition preferences and larval behaviour as well as development.

Biocontrol agents must fulfil the following conditions in order to be efficient: have a narrow host range, effectively hamper the target plant (attack sensible phenostage) and be an abundant and widely distributed species. Certain species are amply found on sites in the Balkan; Yugoslavia, Hungary and Czechoslovakia. They show a narrow host preference to their spurges (and sometimes leafy spurge) and effectively destroy root tissue. Possible speciation of *Chamaesphecia* on Euphorbia species are briefly discussed.

PARASITES AND EVOLUTION

KEYNOTE LECTURE

PARASITES AND SEXUAL SELECTION IN RED JUNGLE FOWL

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The significance of male ornaments in sexual selection has been a subject of controversy among biologists since Darwin. The question remains open whether ornaments are arbitrary signals that have become genetically coupled with the female's preference for them or truthful indicators of male heritable genetic quality. Using a species of intestinal roundworm, experimentally infected and control groups of roosters were compared in terms of ornaments as well as nonornamental traits. The eventual mating success of the roosters in mate choice trials was also determined. The roundworm disproportionately influences ornamental, as opposed to nonornamental, male traits. Hens preferred roosters which showed fewer signs of disease. Aspects of our study reveal that male-male competition and ornamentation are linked. The results overall indicate that female choice is designed by selection to distinguish healthy from diseased males by ornament development and that ornaments reflect design by selection for truthful advertisement of male health. Female choice and male ornamentation are best characterized in terms of psychological adaptations rather than in terms of behavioral or morphological adaptations. Psychological adaptations are information processing mechanisms. It seems that the psychology of jungle fowl hen's mate choice is designed to process information about male health. The psychology of male ornamentation regulates roosters' ornamentation during development via information about roosters' health and social status. The research on jungle fowl is used to illustrate how the analysis of the functional design of adaptations (in this case the design of female choice adaptation and the design of the adaptation of males that regulates ornamentation) can be used to infer how sexual selection has actually worked during evolutionary history.

Symposium

Population dynamics of *Galba truncatula* and its infection with *Fasciola hepatica* in a Swiss mountain area

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The liver fluke, *Fasciola hepatica,* is a world wide distributed parasite of herbivores, especially of cattle and sheep, and occasionally of man. Its intermediate snail host *Galba (Lymnaea) truncatula* was studied over a three-year period in natural habitats of the Eriztal (Berner Oberland) between 900 and 1500 m above sea level. The occurrence and some aspects of the population dynamics of the snail on one hand, the occurrence and the seasonal fluctuations of the developing stages of *F. hepatica* within the snails on the other hand have been observed.

In the mountain region considered, only one snail generation is completed within a season. The average snail infection rate with *F. hepatica* was between 5,0 and 7,5%, with great variations from year to year. Infected snails could be found in spring and autumn, but only in spring were the *F. hepatica* cercariae sufficiently developed to emerge from the snails and infest herbage.

It is concluded that cattle is at risk of infection virtually in spring (May, June), at the beginning of the pasture season.

The role of the parasitoid *Leptopilina* (Hymenoptera, Cynipidae) in the competitive interactions between the sibling species, *Drosophila melanogaster* and *D. simulans*

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In the field the two sibling species *Drosophila melanogaster* and *D. simulans* coexist in many places, and competition for food does occur among larvae exploiting the same fruits in association. In experimental systems they do not coexist and as a general rule *D. melanogaster* climinates *D. simulans.* We tested in experimental cages the role of the larvalendoparasitoid *L. boulardi* in the outcome of this interspecific competition.

Cages were initiated with 300 *D. simulans* and 200 *D. melanogaster.* Flies developed with overlapping generations. We compared the evolution of the ratio *simulans/melanogater* in the presence and in the absence of the parasitoid at two temperatures: 22 and 25°C.

At 25°C *D. simulans* was eliminated within 60 days in uninfested control cages, whereas in infested cages, both species coexisted up to the end of experiments (100 days) with an apparent equilibrium of 20% *D. simulans,* 80% *D. melanogaster.*

At 22°C *D. simulans* was eliminated in 100 days in control cages. On the other hand, it was at an advantage in infested cages as long as parasitoids were present, and took the best over *D. melanogaster.* Before *D. melanogaster* was eliminated, we discarded parasitoids. Then *D. melanogaster* took again the best and *D. simulans* fell down. Following further reintroduction of parasitoids, *D. simulans* was once more at an advantage and finally eliminated *D. melanogaster* in all infested cages.

Taken together these results establish that:

1 — In the absence of parasitoids, *D. melanogaster* was at an advantage over *D. simulans* and eliminated it at both temperatures (22 and 25°C).

2 — In the presence of parasitoids, the competiveness of *D. melanogaster* was reduced, being equal to that of *D. simulans* at 22°C, thus leading to coexistence of species, and lower at 25°, thus leading to its exclusion.

Thus according to temperature, the parasitoid *Leptipilina* either promotes the coexistence of host species, or inverts the outcome of interspecific competition.

Several mechanisms may contribute to this effect of parasitoids:

1 — Higher susceptibility of *D. melanogaster* larvae to parasitization, due both to preferential oviposition by parasitoid females and to their lower immune resistance to parasites, balances the competitive superiority of the species over *D. simulans.*

2 — Destruction of a number of flies by the parasitoid reduces the overall offspring production, thus lowering the intensity of competition for food among larvae.

3 — The presence of parasitized individuals among *Drosophila* larvae introduces a higher heterogeneity among competitors, thus changing the rules and the outcome of competition.

EVOLUTION THEORIES FOR EYE-FREQUENTING, FRUIT-PIERCING AND BLOOD-SUCKING LEPIDOPTERA

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The behaviour and economic importance of fruit-piercing noctuids have been reported in Asia, Africa and elsewhere in the course of the last hundred years. Noctuid eye-frequenters are known since the last century and additional taxonomic families (pyralids, geometrids, notodontids, sphingids, thyatirids) are now known with the same habits. The discovery of the remarkable blood-sucking noctuids in South East Asia date back to the 1960ies. Thanks to detailed investigations and casual observations on the presence and absence of these behavioural groups in Africa, Asia and Europe an attempt is made to postulate evolution theories in comparison with normal nectar-feeding moths. However, the taxonomic status, the morphological characteristics, anatomy, biology, geographic distribution, bioclimate and host range allow to speculate on the geologically recent development of these lepidopteran groups, particularly with regard to the evolution of the parasite behaviour of eye-frequenting and blood-feeding moths. There is still a need for investigations on the possible mechanical transmission of animal and human diseases, and the collaboration of specialists in this multidisciplinary research project is advocated.

THE EVOLUTION OF AN INTRACELLULAR SYMBIOSIS: THE EXAMPLE OF THE GENUS LEISHMANIA

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Leishmania (*L.*) are, like *Trypanosoma,* members of the family of Trypanosomatidae (Protozoa, Kinetoplastida). Most of the trypanosomatids lives in an extracellular microecological niche, some species have become adapted to an intracellular life but without showing pathogenicity (in reptiles), some are responsible of infections in mammals (vertebrate hosts): species belonging to the *donovani, tropica, braziliensis* and *mexicana* complexes. With the examples of the parasites whose life cycles are occuring in South America, the evolutive aspects of this surprising intracellular symbiosis (the phagolysosome compartment of macrophages is an extremely hostile niche!) are considered.

The co-evolution of this host-parasite relationship implicates some underlying processes:

* an ECOLOGICAL PREADAPTATION, *i.e.* the existence of potential hosts and vectors in the same place. *L.* parasites a wide range of definitive hosts but are highly specific for their phlebotomine vectors.

* a BIOLOGICAL PREADAPTATION, some parasite receptors (like the highly conserved surface Gp63) representing an ancestral adhesion mechanism with a survival advantage to getting inside the macrophage.

* a DYNAMIC RELATIONSHIP WITH THE HOST (strains variations of pathogenecity, heterogenecity of the cellular populations involved, existence of a mouse gene for resistance to *L.* infection,...) exhibiting an *r*-strategy.

The hypothesis of an evolution of this intracellular symbiosis leads to some questions on the origin of this intriguing pathway (predaptation? phagocytosis as a poorly specific event? different strategies of other intracellular parasites) and its stability (natural selection of the host (immune) response, big evolutionary jumps or selfish mutations?,...) in the time.

SOCIAL STRUCTURE AND INFECTION RISK IN OYSTERCATCHERS, *HAEMATOPUS OSTRALEGUS*

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The cestode, *Micrasomacanthus rectacantha* and the trematode, *Psilostomum brevicolle* are the two most common helminths (prevalence = 100%) infecting a population of Oystercatchers on the Exe estuary, Devon, UK. Both species are transmitted to Oystercatchers through cockle (*Cerastoderma edule*) intermediate hosts. Spatial and seasonal infection patterns in Oystercatchers and in cockles were monitored over 2 years to determine which specific sub-populations of birds were most at risk of helminth infection. Results indicated that factors (especially social status) which determine the feeding and habitat preferences of individual birds best explained the extremely variable intensities of infection. Most birds (80%) on the estuary are adults which specialize on uninfected mussels and have low helminth burdens. High intensity infections are associated with a small sub-population of juvenile birds which selectively feed on 'muddy' cockles. These juveniles are most at risk of infection in fall and early winter when larval abundance in cockles is highest. Previous long-term studies on ringed Oystercatchers from the Exe have indicated that when bird density is highest, increased social pressure acts to remove juvenile birds from mussel beds, onto surrounding mud-flats. There, they suffer decreased intake rate and increased mortality. Results from this study suggest they are also at greater risk of helminth infection.

GENETIC EXCHANGE AND THE EVOLUTION OF CHARACTERS IN AFRICAN TRYPANOSOMES

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Until recently, trypanosomes causing sleeping sickness in man were believed to reproduce primarily by binary fission. The question whether these parasites pass a sexual cycle has been the subject of controversy since the original description of these organisms. One reason for doubting the existence of genetic crosses in trypanosomes was that these parasites have their own ways of generating genotypic diversity, regardless of sex, and these phenomenons like antigenic variation have received much attention in recent years.

Trypanosomes of the subgenus *Trypanozoon* have a complex life cycle and differentiate into several distinct morphological forms in both insect vectors and mammalian hosts. The existence of genetic recombination could explain why phenotypic characters like e.g. variable surface glycoproteins, drug resistance and host specificity and pathogenicity do show some variety and instability. A direct demonstration of genetic exchange in *T. brucei* was provided by the discovery of hybrid trypanosomes, following simultaneous cyclical transmission of two *T. brucei* clones in the same tsetse flies. One important consequence of the discovery of gene exchange is that it may now be combined with molecular techniques to establish the genetic basis of the phenotypic characters mentioned above.

However, the mechanisms of genetic exchange in trypanosomes are still very unclear. The hybrid progeny so far analysed fall into two categories: 1. Subtetraploid heterokaryons, with an unstable DNA content which may have arisen from a simple fusion event and 2. Diploid hybrid organisms showing Mendelian inheritance of some characters depending on meiosis and syngamy. In addition, genetic exchange is obviously not an obligatory event for the successful completion of one part of the parasite's life cycle in the tsetse fly.

Analyses of joint locus frequencies suggest that trypanosome populations may be lacking some genotype combinations. These data could reflect a potential for the evolution of distinct parasite populations, each with their particular behavioural characteristics.

METADILEPIDIDAE: A FAMILY GOING WEST!

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The order Cyclophyllidea, the best known among cestodes, is composed of about fifteen families among which appear the Dilepididae F., 1907 and the Paruterinidae F., 1907. Both are widely accepted, as some characteristics, usually considered fundamental, are clearly different in each of them:

— Rostellum with a pouch and sacciform uterus in Dilepididae.
— Rostellum without a pouch and presence of a paruterine organ in Paruterinidae.

In 1947, the genus *Metadilepis* was created by Spassky for *Dilepis globacantha* F., 1913. This species is particular in harbouring neither a paruterine organ nor a rostellar pouch but was nevertheless classified amongst the Dilepididae by all systematicians. In 1959, Spassky created the subfamily of Metadilepidinae for *Metadilepis* and two other genera, and considered it to be closer to the Paruterinidae than the Dilepididae, despite the lack of a paruterine organ. Finally this taxon was raised up to the status of a family in which Spassky & Spasskaja (1977) consider eight genera, all of them with characteristics intermediate to the Dilepididae and the Paruterinidae.

The family Metadilepidae has surprisingly never been considered by Western authors and, to our knowledge, it has been cited for the first time in our 1989 discussion of *Skrjabinoporus.* This situation is rather astonishing when considering that Metadilepididae form a group, admittedly small, but homogeneous and having a very interesting position in cyclophyllidean systematics.

During a systematic survey of bird parasites in Ivory Coast, we have found several species of Metadilepididae, one of which belongs to a new genus. This material, together with the work of Russian authors, entitles us to:

a) confirm the validity of Metadilepididae

b) discuss the relative importance of criteria used in cyclophyllidean systematics at the level of the family

c) analyse the validity and homogeneity of metadilepididaean genera.

EVOLUTION OF PARASITE POPULATIONS: SPECIATION, SPECIFICITY, POPULATION GENETICS AND MODELISATION

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In the Mediterranean, *Lepeophtheirus thompsoni* Baird, 1850 specifically infests turbot (*Psetta maxima* L., 1758), whereas *L. europaensis* Zeddam, Berrebi, Renaud, Raibaut & Gabrion, 1988 infests brill (*Scophthalmus rhombus* L., 1758) and flounder (*Platichthys flesus* L., 1758). Experimental infestation of turbot by copepods from each of the three fish species showed an absence of any physiological incompatibility preventing natural development of the two parasite species, at least on one host species, i.e. turbot. Moreover, interspecific hybrids were obtained experimentally, which implies that: (i) there is no strict genetic barrier between the two species and (ii) the natural prezygotic isolation results from a choice of the most favorable habitat. Population genetics model indeed shows that this phenomenon may lead to genetic isolation under certain conditions depending firstly on the existence or not of density dependance (Soft or Hard selection models). We then discuss the origin and evolutionary consequences, in the Mediterranean, for *L. europaensis* populations parasitizing brill and flounder, two hosts separated by their taxonomic status and ecobiology. This situation might indeed lead to the establishment of a sympatric speciation.

MALE BREEDING COLORATION, FEMALE CHOICE AND PARASITES IN STICKLEBACKS

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We provide experimental evidence supporting the Hamilton-Zuk hypothesis. It assumes that females prefer brightly coloured males because the intensity of their breeding coloration is an indicator for resistance against the predominant parasites.

In male three-spined sticklebacks (*Gasterosteus aculeatus*) the intensity of the red breeding coloration correlated positively with physical condition. When given the choice of two similarly coloured males females preferred the slightly brighter one. Choice experiments under green light preventing the females from being able to use red colour cues caused the formerly preferred males to be chosen no more than randomly, although the males' courtship behaviour remained unchanged. Infection with *Ichthyophthirius multifiliis,* a common parasite of sticklebacks, reduced the males' physical condition and their intensity of breeding coloration. Tests under both light conditions revealed that the females recognized the formerly parasitized males by their decreased intensity of breeding coloration.

PASSERINE POLYGYNY: A ROLE FOR PARASITES?

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Parasites might influence the evolution of mating systems if they may play a role in the evolution of female choice and/or effect the outcome of male-male competition. Using sister taxon comparisons to control for the effects of phylogeny, I show for European and North American passerine birds, that the proportion of individuals infected with blood parasites is significantly lower in polygynous species than it is in monogamous species. This remains so even after controlling for the effects of body length, sampling effort, latitude, migratory behaviour, habitat, nest type and height, diet, nest dispersion, and male parental effort in nest building, incubation and feeding offspring. Several potential explanations of this association are discussed. One possibility is that polygynous species are, on average, more resistant to haematozoa infection. This could arise if there is heritable variation in resistance and if polygyny results in resistant males obtaining more mates. There are several other possible explanations, such as differences in risk of exposure, none of which can be easily distinguished by interspecific analyses, but which are amenable to intraspecific tests. The patterns I report are striking, and suggest that parasitic infection should be considered as a factor influencing passerine mating systems, which ever way the causal arrow goes.

THE EFFECTS OF PARASITES ON THE CONDITIONS FOR HE EVOLUTION OF SOCIAL BEHAVIOUR

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The model for evolution by kin selection was first formulated by Hamilton to describe the conditions for the spread of a gene for altruism in a population. Altruist genes will spread when benefits to the recipient of altruistic acts divided by the costs to the donor (in terms of offspring gained and lost) times the degree of relationship (r) between recipient and donor is greater than one. Subsequent discussions and applications of this model have implicitly assumed that degree of relationship varies independently from the costs and benefits of helping behaviour, such that raising r simply serves to lower the benefit/cost ratio which allows the spread of altruism genes. We discuss this assumption in light of experiments with bumble bees which show that high genetic relationship among individuals facilitates the transmission of an intestinal trypanosome parasite. Thus high relationship among interacting individuals increases an individual's inclusive fitness but also may carry costs associated with enhanced transmission of infectious diseases. Parasites and pathogens may therefore represent a previously unrecognized force affecting the conditions for the evolution of sociality and the genetic structure of social groups.

POSTER SESSION

EFFECTS OF PARASITES ON REPRODUCTION AND BODY CONDITION OF GREAT TITS (*PARUS MAJOR* L.)

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We tested whether two species of parasites, a flea (*Ceratophyllus gallinae*) and a bloodparasite (*Haemoproteus* sp.) affected body conditions of Great Tit nestlings and their parents.

By manipulating the amount of fleas in nest boxes during the egglaying period, we investigated whether effects of parasites on hosts were proportional to the population size of the parasite after fledging of offspring. Parameters measured were: hatching success, fledging success, length of incubation, weigth and tarsus length of nestlings and weigth of the parents. Presence of fleas affected the weight and tarsus length of nestlings. Broods from nests with no or small amounts of fleas weighed on average more and had longer tarsi, than broods from nests with high load of fleas. The lack of negative effects on the other parameters measured, can be due to host adaptations to the local flea population.

We examined 47 adult Great Tits for the occurence of blood-parasites. All 47 individuals had parasites of the genus *Haemoproteus.* The weight of the adult tits were negatively correlated with amount of *Haemoproteus,* thus indicating an influence on host condition.

It is likely that reduced body conditions of both nestlings and adults lowers their survival prospects.

THE ROLE OF PARASITOID FLIES (CONOPIDAE, DIPT.) FOR LIKE HISTORY VARIATION IN NATURAL POPULATIONS OF BUMBLEBEES (*BOMBUS,* HYM.)

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Simple theoretical models for annual eusocial colonies predict that stress-induced reduction in colony growth should lead to earlier reproduction, loss in the number of reproductives released and a shortened reproductive period. The parasitisation of adult bumblebees (*Bombus,* Hymenoptera) by conopid larvae (*Sicus, Physocephala,* Conopidae, Diptera) is known to increase mortality rate in populations of bees and could so impose such an ergonomic stress for heavily affected colonies. We measured prevalence of parasites in natural populations of bumblebees, *Bombus pascuorum* and *B. terrestris, B. lucorum* (polled as *B. terr/luc*) at various sites as well as the "classical" environmental factors resource availability (average densitiy of available flowers), interspecific competition (Hurlbert's index of resource overlap) and intraspecific competition (the ratio of conspecific worker abundance and resource availability). The contribution of these factors for the explanation of variation in the life history traits, as derived from the seasonal abundance pattern of workers and reproductives (males), was then assessed.

Multiple stepwise regression showed that parasite prevalence in worker bees accounts for a significant proportion of the variance in reproductive timing in populations of *B. pascuorum* whereas in *B. terr/luc* high prevalence leads to a lower reproductive success and an extended reproductive period. In the latter species reproductive timing was mainly influenced by resource availability. Moreover the effect of the various stress factors on the observed life history pattern seems to be seasonally different: Prevalence in conopids is more important later in the life cycle of the bumblebees. The possibility of different species-specific strategies in response to environmental stress is discussed.

Although no causal relationships is established, our data provide evidence for the importance of parasites for life history variation of their hosts.

ENDOCRINE INTERRELATIONSHIP BETWEEN THE PARASITOID CHELONUS SP. AND ITS HOST TRICHOPLUSIA NI

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The egg-larval parasitoid *Chelonus* sp. induces the precocious onset of metamorphosis in the 4th (penultimate) stadium of its host *Trichoplusia ni* (*T. ni*), emerges from the prepupa and then feeds on it. We measured qualitative and quantitative changes in ecdysteroids (ECDs) and juvenile hormone (JH) in unparasitised *T. ni,* in parasitised *T. ni* and their corresponding parasitoids as well as in unparasitised and parasitised eggs. For ECD determinations extracts were purified by C_{18} Sep-Pak and high pressure liquid chromatography (HPLC) and analysed by radioimmuno-assay with two relatively non-specific, complimentary antibodies. For JH determinations extracts were purified by a partition and HPLC or C_{18} Sep-Pak and were analysed by Galleria bioassay.

The fluctuations of the predominant ECDs, ecdysone (E), 20-hydroxyecdysone (20E), 20, 26-dihydroxyecdysone (2026E), and of JH were similar in parasitised 3rd to 4th-instar larvae and in unparasitised 4th to 5th-instar larvae. The parasitoids remain 1st-instar larvae for a long period of time and molt into their 2nd instar as late as on day 1 of the host's 4th stadium. Two days later they start to imbibe host's hemolymph and then molt into their 3rd (= last) larval instar. The parasitoid's ECDs started to increase around molting to the 2nd instar and thereafter fluctuated on a high level, 20E, 2026E and E being predominant. The JH titer was high in late 1st instar parasitoids, decreased to low levels at ecdysis into the 2nd instar and increased again to high levels later in the 2nd-instar. After ecdysis to the 3rd instar the JH titer fell. A comparison with the titer in host hemolymph revealed that both ECDs and JH fluctuate independently in parasitoid and host at most stages, suggesting that the parasite produces its own hormones. Experiments involving the injection of ^{3}H[E] into the host suggested that ECDs ingested by the parasitoid are converted into apolar compounds which are then released into the host. In embryos at the stage of eye pigmentation, parasitised eggs contained more immunoreactive mid-polar ECDs than unparasitised ones. 20E and 2026E were the predominant ECDs in both unparasitised and parasitised eggs, but the latter contained several additional ECDs which were not seen in unparasitised eggs. Shortly before hatching the ECDs were low in both parasitised and unparasitised eggs, but the content of JH was much higher in the former. At this stage the majority of parasitoids has already eclosed and teratocytes are released. The results of HPLC analysis indicated the presence of JH III together with Jhs I and II in parasitised eggs, but only JHs I and II in unparasitised eggs.

BRUTERFOLG DER SCHMAROTZERHUMMEL *PSITHYRUS RUPESTRIS* IN KOLONIEN VERSCHIEDENER WIRTSARTEN (HYMENOPTERA: APIDAE)

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Europäische *Psithyrus*-Arten gelten als wirtsspezifisch, jedoch liegen nur wenig Nestfunde vor, um dies zu bestätigen. Ziel unserer Arbeit ist es, unter experimentellen Bedingungen den Fortpflanzungserfolg verschiedener *Psithyrus*-Arten bei ihren in der Literatur genannten Wirten sowie bei anderen *Bombus*-Arten zu vergleichen. Der vorgestellte Poster betrifft Befunde an *P. rupestris* bei seinen Wirten *B. (Melanobombus) lapidarius* und *sicheli alticola,* sowie bei der nicht als Wirt genannten Hummelart *B. (Pyrobombus) pratorum.*

Zuchtmethode: Die Zucht erfolge unter quasi-natürlichen Bedingungen: Im Frühjahr bei der Nestsuche gefangene Königinnen wurden in kleinen Flugkäfigen mit angesetztem Nestkasten gehalten, Fütterung mit pollenreichen Blüten, Zuckerwasser und eventuell zusätzlich mit frischem Bienenpollen. Nestsuchende *Psithyrus*-Weibchen wurden einzeln in die Flugkäfige etablierter *Bombus*-Kolonien eingesetzt. Periodisch (alle 8-12 Tage) wurden die Kolonien unter Rotlicht kontrolliert und ausgezählt. Ausgefärbte *Psithyrus*-Nachkommen wurden entfernt und gewogen.

Befunde:

1. Eindringen: Für das Eindringen des *Psithyrus*-Weibchens in das *Bombus*-Nest war die Koloniegrösse von Bedeutung. In kleine *Melanobombus*-Kolonien (<10 Arbeiter) drang *P. rupestris* innert ein bis zwei Stunden ein, in grössere Kolonien erst nach zwei bis drei Tagen, wenn überhaupt.

Unter vergleichbaren Bedingungen betreffend Koloniegrösse drang *P. rupestris* in Nester von *B. pratorum* meist nicht oder allenfalls wesentlich später ein.

2. Okkupation: In Uebereinstimmung mit Literaturbefunden wurden die *Melanobombus*-Königinnen bei der Okkupation ihres Nestes von *P. rupestris* getötet. Dies lag aber (im Gegensatz zu Literaturangaben) daran, dass die *Melanobombus*-Königinnen eindringende *Psithyrus*-Weibchen angriffen und im anschliessenden Kampf mit *P. rupestris* getötet wurden. In den *B. pratorum*-Zuchten wurde *P. rupestris* nicht angegriffen und koexistierte mit der Königin.

3. Fortpflanzungserfolg:

Melanobombus-Kolonien: In den ersten vier Wochen nach Eindringen des *P. rupestris* schlüpften weitere Arbeiter. Die dann erreichte Volksgrösse blieb meist mehr als zwei Monate konstant. Der Fortpflanzungserfolg der *P. rupestris*-Weibchen stieg mit zunehmender Koloniegrösse (bis ca. 15 Arbeiter/Kolonie zum Zeitpunkt des Eindringens bzw. ca. 40 Arbeiter nach vier Wochen), schien aber bei grösseren Kolonien wieder abzunehmen (getestet: max. 20 bzw. 89 Arbeiter/Kolonie). Die meisten *Psithyrus*-Weibchen überlebten mehr als zwei Monate in der Kolonie, Arbeiter des Wirtsnestes produzierten erst gegen Ende dieser Zeit Männchen.

B. pratorum-Kolonien: *P. rupestris* konnte sich in Nestern von *B. pratorum* nicht fortpflanzen und diese nicht wesentlich an ihrer eigenen Entwicklung hindern.

EFFECTS OF PARASITE-RELATED WORKER MORTALITY ON COLONY DEVELOPMENT AND REPRODUCTIVE OUTPUT OF BUMBLEBEE COLONIES

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Parasites may represent a strong mortality factor for developing nosts of social insects. We tested the effect of parasitisation by conopid flies (Diptera) on bumble bee colonies by mimicing mortality. Forty-one nests of Bombus lucorum (Hymenoptera, Apidae) were kept in the lab and artificial daily mortality of 10% either early or late during the ergonomic phase was imposed. The effect of this extra mortality was measured by the investment into produced workers, gynes and males and by the timing of reproduction. Additional mortality leads to a fundamental fitness loss through decreased male production and a more subtle fitness loss through production of smaller gynes.

DISPERSAL IN THE METAPOPULATION-SYSTEM OF *UROPHORA CARDUI* L. (DIPTERA: TEPHRITIDAE) AND ITS ENDOPARASITOID *EURYTOMA SERRATULAE* LATR. (HYMENOPTERA, EURYTOMIDAE)

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The dispersal of the gall-forming tephritid *Urophora cardui* L., which is monophagous on *Cirsium arvense* (L.) Scop. (Asteraceae) in Mid-Europe, and its endoparasitoid *Eurytoma serratulae* Latr. from an experimental colony near Bayreuth was investigated over a period of 4 years. The dispersal rate of the endoparasitoid was not less than that of its host, and both had a dispersal rate one to two magnitudes higher than in previous studies, which found 100 m per generation maximally. Most newly founded colonies were small and had high extinction rates, but some colonies persisted with high populations densities. Estimated viability of the host U. cardui did not correlate with the distance from the dispersal centre. Bad weather in 1987 reduced the the number of new founded colonies, but not dispersal distances. In an independent survey in the Upper Palatinate (Bavaria), at the northern border of the natural distribution area, dispersal and extinction rates were investigated too (EBER 1988). Allozyme frequencies by starch gel electrophoresis and fixation indices (F_{ST}-values) showed in this area migration rates of

8-14% and high gene flow. The results are discussed in the view of the metapopulation concept. Here dispersal can increase the persistence of a host-parasitoid system despite unstable local dynamics. This concept emphasizes the importance of extinction of local populations, of recolonizing from surviving populations and of asynchromy between local dynamics. *U. cardui* and its endoparasitoid show all features of a metapopulation system.

SUPERPARASITISM AND LARVAL COMPETITION IN CONOPID FLIES PARASITIZING BUMBLEBEES

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Data on the distribution of parasitoid brood (Conopidae, Diptera) in populations of their bumblebee hosts (*Bombus,* Apidae) have been collected in two localities of Northwestern Switzerland. Conopid flies are solitary parasitoids of aculeate hymenoptera. The larva lives endoparasitically in the abdomen of adult bees and, after completing larval development, pupates *in situ.* Only one progeny per host emerges, but superparasitism, i.e. more than one brood per infested host, is now being shown to occur regularly. Bees were sampled in regular intervals throughout summer 1988 and either immediately dissected to check for the presence of parasitoid brood (eggs and larvae) or kept in the laboratory until the host died naturally to check for the presence of a conopid puparium (successful pupation). On average, 1.78 brood per infested host was observed at site Huggerwald, an 1.19 brood at site Allschwil. 32.3% of all bees contained parasitoid brood, in 28.5% of the cases a puparium was found after the natural death of the bee. The distribution of parasitoid brood among hosts is not different from Poisson. Frequency of successful pupation usually equals frequency of parasitoid brood in samples collected on the same occasion. At very high infestation intensities, frequency of puparia drops as compared to brood frequency. As a result, the percentage of killed hosts is close to a negative exponential function of infestation intensity, i.e. number of brood per average host. This kind of relationship is known from theory to enhance the stability of the host-parasitoid interaction.

GENETIC CROSSES IN AFRICAN TRYPANOSOMES

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The question as to whether African trypanosomes of the subgenus *Trypanozoon* undergo sexual processes is of major interest, especially with respect to the evolution and epidemiology of this parasite group. Until recently, *T. brucei*, the ausative agent of sleeping sickness in man and Nagana disease in cattle was believed to reproduce solely by binary fission. Evidence for a system of genetic exchange was first obtained indirectly from the analysis of enzyme electrophoretic variation between stocks isolated from natural populations, but the direct demonstration of gene exchange was only recently possible with the detection of "hybrid" trypanosomes obtained after the simultaneous transmission of two different *T. brucei* clones through the tsetse fly vector.

In the meantime further crosses with additional parental clones from throughout Africa have provided a considerable number of new hybrid isolates and a more detailed insight into the trypanosome's life cycle. Thus the application of methods such as isoenzyme analysis, pulse-field gel electrophoresis, analysis of kinetoplast DNA, measurement of DNA content of individual cells by cytofluorometry and the measurement of the kinetic complexity of the genome led to a differentiation of the hybrid progeny into two classes: 1. Subtetraploid heterokaryons with an unstable DNA content and 2. Diploid organisms showing Mendelian inheritance for at least some characters. Furthermore it became evident that different types of kDNA inheritance existed and though in mix infected tsetse very frequent, hybrid formation was not an obligatory event.

Still, many questions remain to be answered, especially such as the localisation of hybrid formation in the tsetse fly and the detection of an eventual meiosis in the parasite's life cycle. However the system of hybrid formation may be, genetic exchange and recombination are of fundamental importance for the generation of diversity of different parasite characters and thus may form a major constraint for disease control.

REEVALUATION DES RELATIONS PHYLOGÉNÉTIQUES DANS UN SYSTÈME HÔTES-PARASITES POISSONS (GADIDAE)-COPEPODES (CRUSTACÉS), MONOGÈNES (HELMINTHES)

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Une étude réalisée sur la spécificité des parasites (Copépodes Pennellidae et Monogènes Diclidophoridae) de deux taxa atlantiques de téléostéens (Gadidae), *Trisopterus luscus* (L., 1758) et *T. minutus minutus* (L., 1758), et d'un taxon méditerranéen *T. minutus capelanus* (Lacépède, 1800), nous a incité à réenvisager la systématique évolutive du genre *Trisopterus* Rafinesque, 1814.

Nous avons pour cela effectué une analyse génétique portant sur 17 locus nucléaires: 10 locus diagnostics permettent de différencier *T. m. minutus* par rapport à *T. m. capelanus* jusqu'ici considéré comme une sous-espèce méditerranéenne de *T. m. minutus.* Par contre, aucune divergence génétique significative ne sépare *T. luscus* de *T. m. capelanus.* Les résultats de cette étude nous permettent de reconsidérer la phylogénie de ces poissons et donc de proposer une nouvelle taxonomie.

Ces résultats confirment en tous points ceux obtenus sur la spécificité des parasites (Copépodes et Monogènes): en effet, si *T. m. minutus* est parasité par un Monogène qui lui est spécifique et n'héberge pas de Copépode. *T. m. capelanus* et *T. luscus* sont parasités par les mêmes taxa parasites. La spécificité parasitaire reflète donc les niveaux de spécialisation des génomes parasites aux génomes hôtes qui les abritent. Son analyse nous permet maintenant de pouvoir discuter de différentes modalités de l'évolution dans le système Gadidae-Copépodes et Monogènes.

NACHWEIS VON *ECHINOCOCCUS MULTILOCULARIS* UND *CYSTICERCUS FASCIOLARIS* IN DER BISAMRATTE (*ONDATRA ZIBETHICUS,* RODENTIA) IN DER SCHWEIZ

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Die Bisamratte ist in Nordamerika heimisch, wurde aber zu Beginn dieses Jahrhunderts als Pelzlieferant nach Europa eingeführt und in Farmen gezüchtet. In relativ kurzer Zeit besiedelten aus verschiedenen Farmen entwichene Tiere und ihre Nachfahren ganz Mitteleuropa. In der Schweiz traten Bisame erstmals 1935 in Erscheinung. Heute besiedeln die Tiere die nördliche Schweiz vom Jura bis ins Rheintal (SG). Die Ausbreitung ist noch im Gange.

Bisame sind, wie andere Nagetiere, als Träger von Bandwurmfinnen bekannt. In einer Studie wurden Lebern von Wildfängen aus verschiedenen Gebieten untersucht.

Besonderes Augenmerk wurde dabei auf *Echinococcus multilocularis* und *Taenia taeniaeformis* gerichtet.

Echinococcus multilocularis entwickelt sich in einem sylvatischen Lebenszyklus mit dem Fuchs als Endwirt und Nagetieren als Zwischenwirte. Gefährlich können die Finnen im Fehlwirt Mensch werden. Die Finnen sind sowohl beim Zwischenwirt, als auch beim Fehlwirt fast ausschliesslich in der Leber angesiedelt.

Taenia taeniaformis ist der häufigste Bandwurm der Hauskatzen und anderer Feliden. Zwischenwirte sind auch in diesem Zyklus viele Arten von Kleinnagern. Der Mensch tritt in diesem Kreislauf nicht als Fehlwirt auf. *Cysticercus fasciolaris,* die Finnen von *Taenia taeniaeformis,* findet man meist in oder an der Leber des Zwischenwirtes.

Bisher wurden 72 Bisamlebern aus fünf Kantonen (SG, SH, AG, SO, BS) auf Bandwurmfinnen untersucht (durch Herrn Prof. B. Hörning, Bern). 56% der Lebern wiesen keine Finnen auf. Bei 44% konnte *Cysticercus fasciolaris* nachgewiesen werden. 5,5% der Tiere waren zusätslich noch Träger der Finnen von *Echinococcus multilocularis.*

Durch die Untersuchung konnte erstmals gezeigt werden, dass die Bisamratte auch in der Schweiz Zwischenwirt sowohl von *Echinococcus multilocularis,* als auch von *Taenia taeniaeformis* ist.

GENERAL ZOOLOGY

POSTER SESSION

EXPERIMENTAL EVIDENCE FOR INTRA- AND INTERSPECIFIC COMPETITION IN TWO SPECIES OF ROCK-DWELLING LAND SNAILS

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The rock-dwelling land snails *Chondrina clienta* and *Balea perversa* were found sympatrically and allopatrically on the Baltic Island of Öland, Sweden. To examine intra- and interspecific interactions, juvenile snails of both species were kept for one year at different densities in single- and mixed-species groups on their natural substrate and food (pieces of limestone providing epi- and endolithic lichens). In a second experiment, the relative importance of exploitation and interference competition in the two snail species was evaluated.

In both species, juvenile growth rate, time to complete growth, adult shell size and survival were significantly influenced by the density of conspecifics, indicating intraspecific competition. The presence of *B. perversa* lowered the juvenile growth rate and increased the time to complete growth of *C. clienta,* while the latter increased the time to complete growth of *B. perversa.* In both species, smaller individuals died in higher proportions than did larger ones, suggesting that small snails were competitively inferior. Furthermore, both fecundity (number of young produced per adult snail during the experiment) and reproductive rate (number of young produced per 100 days of adult life) in *B. perversa* were negatively affected by increased density of conspecifics and by the presence of *C. clienta*. Thus, the influence of interspecific competition on different fitness components was asymmetric among these two land snail species.

The observed competitive interactions appeared to be a result of both exploitation competition and interference by mucus traits. Our experiments provide evidence for the potential importance of interspecific competition in two species of obligatory herbivores.

PHARMACOLOGY OF AMINOACID RECEPTORS ON LOCUST FLIGHT MOTONEURONS

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One of the central questions in neurobiology is the understanding of how neuronal networks are organized in the control of behavior. Insect nervous system preparations, particularly the flight system of locusts, play an important role in this field because they offer the double advantage of a relatively simple behavior and a nervous system amenable to intracellular recording techniques. However, the pharmacological basis of neuronal interactions in insects is still poorly understood. Detailed information is available on the pharmacology of a number of insect neurotransmitter receptors but this work has been done mainly on nerve somata, which do not participate in synaptic integration. Little is known about the neurotransmitter receptors present on the dendritic arborizations, mediating synaptic transmission.

To characterize the receptors for putative aminoacid neurotransmitters present on the dendritic arborizations of flight motoneurons of *Locusta migratoria,* the effects of pressure applications of glutamate, GABA, aspartate, taurine glycine and cysteine were studied using an animal preparation where neuropile intracellular recordings can be made during expression of the flight motor output (see Dubas, J. Exp. Biol., 148, 1990).

A majority of cells responded to applications of GABA, glutamate, aspartate and taurine. The prevalent effect triggered by these substances was an inhibition of spontaneous activity, accompanied by a conductance increase. Different cells responded with either a depolarization or a hyperpolarization at resting potential but always with a hyperpolarization at spiking threshold. Responses elicited by glutamate and aspartate had identical reversal potentials and cross-desensitized. Responses to GABA and taurine had more negative reversal potentials and did not cross-desensitize with those elicited by glutamate and aspartate. Ionic substitution experiments suggest that chloride conductances mediate the effects of glutamate and GABA. Few cells responded to applications of glycine and cysteine at resting potential. These results show that a variety of aminoacid receptors are present on the neuropile with properties similar to those identified on the somata. Further pharmacological characterization of these receptors is currently underway.

EIN FUNKTIONSMORPHOLOGISCHER BEITRAG ZUR ENÄHRUNGSBIOLOGIE DER ZWILLINGSARTEN *M. MYOTIS* (BORKHAUSEN, 1797) UND *M. BLYTHII* (TOMES, 1857) (MAMMALIA, CHIROPTERA)

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Gesichtstasthaare können für die Interpretation der taxonomischen und systematischen Verhältnisse innerhalb der Vespertilionidae herangezogen werden (HAFFNER & ZISWILER

1989). Weil Tasthaare wichtige Organe für die taktile Nahorientierung sind, widerspiegelt ihre Anzahl und Verteilung auch funktionelle Adaptationen.

Taxonomisch wie funktionell interpretierbare Merkmale eignen sich für die Diskussion der Koexistenz von Zwillingsarten. Interessante Untersuchungsobjekte sind deshalb die im Wallis sympatrisch lebenden und sogar Mischkolonien bildenden *M. myotis* und *M. blythii* (RUEDI, MADDALENA & ARLETTAZ, im Druck). Diese Zwillingsarten sind auf Grund externer morphometrischer Kriterien nur schwierig zu unterscheiden und ihre Jagdstrategien sind noch weitgehend unbekannt.

Unsere mikroanatomische Analyse der Gesichtshaut erlaubt eine gute Unterscheidung dieser zwei Arten. *M. blythii* hat eine für die Vespertilionidae typische geringe Anzahl von Tasthaaren und weist auf jeder Gesichtshälfte zwei ähnlich ausgebildete, stark vergrösserte Talgdrüsen aus, wie dies auch bei anderen Vertretern der Gattung *Myotis* der Fall ist. Demgegenüber lassen sich bei *M. myotis* ausnehmend viele Tasthaare nachweisen und die ventral gelegenen Talgdrüsen sind im Vergleich zu den dorsalen mächtig ausgebildet. Diese Unterschiede bestätigen die Aussage von RUEDI (1987), welcher mittels Enzymelektrophoreseuntersuchungen nachweisen konnte, dass es sich um zwei valide Arten handelt.

Unsere Resultate lassen erwarten, dass das Verhalten von *M. myotis* und *M. blythii* im Bezug auf die taktile Orientierung vollkommen unterschiedlich sein muss. Da die beiden Arten im Wallis Mischkolonien bilden und darum im Tagesschlafversteck und bei der Jungenaufzucht in derselben Umgebungssituation leben, darf man annehmen, dass die unterschiedlichen Möglichkeiten zur taktilen Orientierung hauptsächlich bei der nächtlichen Insektenjagd zum Ausdruck kommen dürften.

Kotanalysen weisen Laufkäfer als wichtigsten Bestandteil in der Ernährung von *M. myotis* aus (KOLB 1959, BAUEROVA 1978, GEBHARD & HIRSCHI 1985, STUTZ 1985), wobei über die Jagdstrategie dieser Art noch wenig bekannt ist.

Eine funktionsmorphologische Interpretation unserer Resultate lässt das Ergreifen der Laufkäfer vom Boden und das Stöbern nach in der Bodenbedeckung verkrochenen Laufkäfern als wahrscheinlich erscheinen und weist *M. myotis* als hochspezialisierten Bodenjäger aus. Über die Ernährung von *M. blythii* liegen keine umfassenden Untersuchungen vor. Unsere Resultate lassen nun vermuten, dass *M. blythii* kein spezialisierter Bodenjäger ist und Laufkäfer nicht dieselbe zentrale Rolle bei der Ernährung spielen.

Das sympatrische Vorkommen dieser Zwillingsarten dürfte darum wegen der divergenten Spezialisation bezüglich der Beutepräferenzen und der damit zusammenhängenden unterschiedlichen Jagdstrategien möglich sein.

SPECTRAL SENSITIVITY, ABSOLUTE THRESHOLD AND VISUAL FIELD OF TWO TICK SPECIES, *HYALOMMA DROMEDARII* AND *AMBLYOMMA VARIEGATUM*

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The spectral sensitivity in he wavelength range of 340-750 nm was determined with both a behavioural approach based on spontaneous positive phototaxis and the electroretinogram (ERG). The camel tick, *Hyalomma dromedarii,* has single-lens eyes that protrude above the body surface and has been reported to hunt ist host. The tropical bont tick, *Amblyomma variegatum,* on the other hand has comparatively flat single-lens eyes and is reported to ambush its host.

Concerning phototaxis *Hyalomma* showed two sensitivity maxima, one in the UV range (ca. 380 nm) and another in the blue-green range (ca. 500 nm). At higher intensities the relative sensitivity was more pronounced in the UV and at lower intensities more pronounced in the blue-green (reverse Purkinje shift). In *Amblyomma* there was a single sensitivity maximum in the blue range (ca. 480 mm). In the ERG of the eyes there was a maximum in the blue range (ca. 470 nm) in both species and a weak secondary maximum in the UV in *Hyalomma.* A comparison of the ERG result with the behavioural response revealed a close similarity of the sensitivity maxima in *Amblyomma* (470 nm in ERG and 480 nm in behaviour), whereas in *Hyalomma* a certain difference was seen (470 nm in ERG and 380 nm + 500 nm in behaviour).

The absolute sensitivity was very high in both species. The threshold irradiance of phototaxis was as low as 5.2×10^6 photons$\cdot$s$^{-1}\cdot$cm^2 in *Hyalomma* and 5.2×10^8 photons$\cdot$s$^{-1}\cdot$cm^{-2} in *Amblyomma*; the latter irradiance corresponds to the irradiance under the starlit night sky.

The visual field of the eyes was determined by ERG measurements. In both species the optical axis of each eye, i.e. the center of the visual field, was directed somewhat to the side and above the horizon. In *Hyalomma* this direction was 35° to the longaxis of the animal and 30° above the horizon for natural body posture during walking. In *Amblyomma* the corresponding angles were 39° and 33°, respectively. The size of the field (at 50 per cent sensitivity) in *Hyalomma* was relatively small, namely 14° in the horizontal and 25° in the vertical direction, compared to that of *Amblyomma* with 43° and 49°, respectively.

This is the first demonstration in ticks of the spectral and absolute sensitivity by behavioural approach and of the visual field by ERG. The results suggest that tick eyes possess features of both spider eyes and insect ocelli.

Physiology of yolk protein uptake into follicles of a cockroach (*Nauphoeta cinerea*)

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In cockroaches, as in many other insect species, yolk proteins (vitellogenis, vg) are synthesized in the fat body, released into the haemolymph and taken up into the follicles by receptor-mediated endocytosis. We investigated binding of vg to follicle membrane preparations and uptake of vg into intact follicles *in vitro.*

The binding assays and ligand blotting experiments indicated the presence of two classes of vg binding sites, one being located in the outer follicle compartments (follicle cell/basal lamina complex) and the other in the oocyte plasma membrane. Vg binding to the former was optimal at 10 mM calcium and to the latter at 0.3 mM calcium.

In artificial media vg uptake was dependent on the presence of divalent cations, calcium and barium stimulating vg uptake more effectively than strontium or magnesium. The optimal calcium concentration for uptake was 5 mM, and the stimulatory effect of 5mM calcium increased with increasing vg concentrations. The divalent transition element manganese also stimulated vg uptake, but appeared to act on other sites than calcium. The transition elements gadolinium, nickel, cobalt and zinc inhibited vg uptake, as did the organic calcium entry blocker verapamil and Quin2-AM, which chelates intracellular calcium. These data indicate an important role for calcium in endocytosis of vg.

In medium containing haemolymph the addition of juvenile hormone III stimulated vg uptake into intact follicles in a dose dependent manner in various series of experiments. In some cases no or only a slight effect was seen. We observed that the vg concentration and other components of the medium influence the effect of juvenile hormone III on vg uptake *in vitro*. Furthermore the competence of the follicles to respond to juvenile hormone was found to be variable.

PURIFICATION OF COBRA VENOM NERVE GROWTH FACTOR

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A rapid and easy purification method for nerve growth factor (NGF) from cobra (*Naja naja atra*) venom has been developed by using new chromatographic techniques and materials. Briefly, lyophilised cobra venom was separated first on a carboxymethyl-Sepharose ion exchange column into three major and at least 6 minor protein peaks with good reproducibility. Determination of activity using a dot immunobinding assay revealed immunoreactive NGF. This material was shown to express the characteristic biological NGF activity in a tumour cell line of rat chromaffin cells (PC-12). Results of a consecutive purification of the active NGF fraction using reversed phase liquid chromatography (RPLC) as well as its biochemical characterisation are presented and discussed.

HOHE-PH-WERTE ALS FOLGE DER EUTROPHIERUNG IN ANTHROPOGENEN NATURSCHUTZWEIHERN UND IHRE AUSWIRKUNGEN AUF LIBELLEN UND AMPHIBIEN

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In mehreren Naturschutzreservaten in der Umgebung von Basel wurde die Bestandessituation der Libellen überprüft. Neu errichtete Naturschutzreservate erreichten dabei nie eine Artenzahl, die vergleichbar war mit denjenigen in Kies- oder Lehmgruben der Umgebung.

Auf der Suche nach möglichen Faktoren fielen u. a. die hohen pH-Werte (bis >10) auf, die in vielen der untersuchten Gewässer vorherrschten. Neu errichtete Weiher, in denen die Besiedlung durch Makrophyten stark verlangsamt war, zeigten täglich sich aufbauende Verhältnisse mit hohen pH-Werte über die ganze Tiefe. Gewässer mit dichtem Pflanzenbewuchs zeigten pH-Profile mit hohen Werten an der Oberfläche und tiefen Werten in Sedimentnähe.

Am Beispiel von Heidelibellen (*Sympetrum spp.*) wurde der Einfluss erhöhter pH-Werte auf Libellen im Freiland untersucht. Sympetrumpopulationen zeigten eine signifikant positive Korrelation zwischen den pH-Werten in 9 verschiedenen Gewässern ähnlichen Bautyps und der jeweiligen Dauer der Emergenzperiode. Keine signifikanten Korrelationen konnten dagegen zwischen der Überlebensrate und den pH-Werten in den Weihern gefunden werden. Die Ergebnisse deuten als Folge hoher pH-Werte auf subletale Effekte, die sich in einer Verlängerung der Emergenzperiode äussern.

Unter Laborbedingungen wurde der Einfluss tagesperiodisch schwankender pH-Werte auf Kaulquappen des Grasfroschs (*Rana temporaria*) und des Laubfroschs (*Hyla arborea*) untersucht. Die Mortalitätsrate jüngerer Kaulquappen zeigte eine signifikant positive Korrelation mit dem pH-Wert. Bei älteren Larven (200-300 mg Körpermasse) war keine signifikante Beziehung feststellbar.

Jüngere Larven beider Arten wiesen im Gegensatz zu älteren Stadien unter höheren pH-Werten eine signifikant geringere Wachstumsrate auf. Zudem waren die mittleren maximalen pH-Werte während der ersten 20 Tage der Entwicklung negativ korreliert mit der Körpermasse zum Zeitpunkt der Metamorphose.

A SIMPLE METHOD TO EVALUATE THE DIGESTIVE EFFECT OF SNAKE VENOMS

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The most prominent and primary biological function of snake venoms is to weaken and immobilize large prey organisms before being swallowed. Secondly, they play an important role in defence. Since there is evidence that the different venom components evolved from ancestral digestive enzymes it is generally accepted that snake venoms also have some digestive functions. However, most of the attempts to show such digestive effects failed. A simple method is presented which allows to investigate the digestive function of snake venoms. For this purpose, a newborn white mouse of about 3 grams body weight is killed by breaking its neck. Then, 0.5 ml of snake venom dilution or physiological saline respectively is intraperitonealy injected through the thorax from cranial. The mouse is then put into a glass funnel closed with parafilm. After some days the liquified digest may be collected in a calibration cylinder. With this method it can be easily shown that liquid digests are found already six days after injection of the venom from the Common lance head *Bothrops atrox moojeni* (10 mg/ml), whereas digestive juices appear only after 12 days in the control animals. Further experiments to evaluate the dose-response relationship are in progress. Furthermore, this method is used to investigate the influence of divalent cations on the digestive activity of snake venom metalloproteinases.

STUDIES ON THE MODE OF ACTION OF RUSSELL'S VIPER (*VIPERA RUSSELLII*) VENOMS IN SMALL RODENTS

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Many Viperidae snake venoms immobilize prey organisms by initiating circulatory disturbances. Activation of the prey animal's blood coagulation cascade often contributes to such events in a more or less pronounced way. In Russell's Viper venoms, activators of coagulation factors X and V are present and also characterized. In an attempt to elucidate their contribution to the toxic potential of the venoms of three *V. russellii* subspecies, approximate LD_{50} tests were performed using eight to ten white mice per experiment. In a second series, the experimental animals were premedicated with recombinant Hirudin (5 mg/kg body weight) 30 minutes before i. v. venom injection. This premedication led to a two- to threefold decrease in lethality. The development of lung microthrombosis induces by the venoms was investigated in rats using ^{111}In-platelets and ^{125}I-fibrinogen. Platelet- and fibrinogen-derived radioactivity was observed in absence of hirudin, whereas hirudin was able to prevent both, ^{111}In platelet and ^{125}-fibrin deposition in the lungs. From these inhibition studies with the potent thrombin inhibitor hirudin (originally isolated from the salivary glands of the medicinal leech, *Hirudo medicinalis*) it is concluded that the main pathophysiological pathway to immobilize rodent prey organisms induced by Russell's Viper venoms is activation of their blood coagulation system.

Erfolgreiche Überwinterung dank Frostschutzsubstanzen und Unterkühlungsfähigkeit bei *Emtomobrya nivalis* L. (Insecta, Collembola)

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Die Überwinterungsbiologie der Collembolenart *Entomobrya nivalis* wurde in einem subalpinen Fichtenwald (1600 m ü. M.) untersucht. Die Insekten verbringen dort den grössten Teil ihres einjährigen Lebens auf den Bäumen; von Dezember bis März überwintern sie inaktiv unter losen Borkenstücken. Die gefrierempfindliche *E. nivalis* überlebt tiefe Temperaturen, insbesondere unter dem Gleichgewichts-Gefrierpunkt der Hämolymphe (ca. $-1{,}2$°C), nur dank verschiedener physiologischer Anpassungen. Dazu gehört eine ausgeprägte Unterkühlungsfähigkeit zusammen mit der Synthese zweier Typen Frostschutzsubstanzen: A) Hochmolekulare Substanzen (Peptide) bewirken u.a. eine thermische Hysterese, das heisst eine Differenz zwischen Schmelz- und Gefrierpunkt. Eine erhöhte Aktivität tritt bereits ab September auf und erreicht das mittlere Sommerniveau wieder Anfang Juni (Hysterese im Sommer 0,07°C; Winter >3°C). Wichtigster Induktionsfaktor ist die Temperatur (Schwellenwert im Labor ca. $+10$°C); Kurztag wirkt reizverstärkend. B) Ribit ist die einzige bedeutende Verbindung aus der Gruppe der niedermolekularen Substanzen. Messbare Konzentrationen sind nur von ca. Ende Oktober bis April vorhanden, wenn die Minimaltemperaturen regelmässig unter 0°C fallen; hohe Werte (Maxima >20µg/mg Frischgewicht) treten zudem nur auf, während sich E. nivalis im Hibernaculum befindet. Akklimatisation bei tiefen Temperaturen und Kurztag induzieren die Ribitproduktion nicht im erwarteten Ausmass. Weitere nötige Faktoren sind noch nicht bekannt.

Die erhöhte Aktivität der Hystereseverbindungen im Herbst und Frühling genügt als vorsorglicher Schutz vor gelegentlichen Frösten. Ribit unterstützt und/oder ergänzt das Frostschutzsystem im Winter. *E. nivalis* kann so mehrere Wochen in stark unterkühltem Zustand überleben. Die geschätzte kältebedingte Mortalität ist in einem durchschnittlichen Winter sehr gering (0-20%).

On the effects of spatial variation in temperature and food availability on laying date in great tits (*Parus major*)

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In population biology hypotheses about mechanisms acting on the individual are nearly always tested on yearly mean values of large groups. In principle, the same mechanisms could also explain part of the variation within groups. Can the within year environmental variation in breeding parameters be explained from detailed spatial information about the environment?

From prior to the onset of laying until fledging of first broods, daily minimum and maximum temperatures and weekly samples of available food were collected for several groups of three nestboxes differing in altitude of over 400 m during the breeding seasons of 1988 and 1989. In a first step we looked whether laying date is related to the local environmental conditions. There are very similar relationships between temperature and laying date within years as among years.

BIOCHEMICAL SYSTEMATICS IN BUMBLE BEES: THE SUBGENUS *BOMBIAS* (HYMENOPTERA: APIDAE)

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This contribution is part of a project investigating the systematics of bumble bees by enzyme electrophoretic techniques. The Subgenus *Bombias* is restricted to North America and, according to present views, consists of two subspecies (Krombein *et al.,* 1979), *B. n. nevadensis* and *B. n. auricomus. Bombus n. nevadensis* occurs principally from transmontane California E to 100°W longitude, where it is replaced by *auricomus.*

Bombus n. auricomus was originally described as a separate species, but Milliron (1961) found that this taxon is only subspecifically different from *nevadensis* and he stated that all intergradations between the two forms are to be found. Intergradation of the two forms of *nevadensis* between 102° and 98°W longitude in Nebraska was subsequently observed by LaBerge and Webb (1962).

In fact, intergradation was only inferred from coat color variation in areas of overlap of both taxa in the mid-western and northwestern United States and in Alberta. However, coat color variation is quite typical for bumble bees and in particular many North American bumble bee species show gradation from one color form to another, resulting in convergence toward local Müllerian mimikry groups (Plowright and Owen, 1980; Thorp *et al.,* 1983). Therefore one might alternatively speculate that *nevadensis* and *auricomus* are specifically distinct, but that one or the other or both species might converge at the western or eastern limits of their distribution to the eastern or Great Basin color pattern respectively.

We have tested this hypothesis by enzyme electrophoretic investigations, using specimens of both taxa from a wide area of their geographical distribution, including in particular areas of apparent overlap (as suggested by the distribution maps in Milliron, 1971) in southern Alberta, Montana, Nebraska and Iowa. The results are that both taxa are genetically highly differentiated. There is no evidence of intergradation as judged by these genetic data. We conclude that the taxa *nevadensis* and *auricomus* are specifically distinct.

GESCHLECHTSSPEZIFISCHE SAISONALE PRÄSENZ DER RAUHHAUTFLEDEMAUS *PIPISTRELLUS NATHUSII* (KEYSERLING & BLASIUS, 1839) (MAMMALIA, CHIROPTERA) IN DER ZENTRAL-, OST- UND SÜDSCHWEIZ

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Im Rahmen faunistischer Untersuchungen der Chiropterenfauna der Zentral-, Ost- und Südschweiz konnten in den Jahren 1978-1990 Nachweise von mehr als 400 Individuen von *P. nathusii* für rund 300 Fundorte erarbeitet werden. Dieses Datenmaterial belegt die ganzjährige Präsenz von *P. nathusii* im Untersuchungsgebiet, wobei die Anzahl der erfassten Individuen und das Geschlechtsverhältnis saisonal stark variieren.

— Die Mehrzahl der Nachweise stammt aus den Herbst- und Wintermonaten September bis März, während in den Frühjahrs- und Sommermonaten April bis August vergleichsweise weniger Tiere erfasst wurden. Quartiere, welche im Frühjahr von grösseren Gruppen besetzt waren, verwaisten in den Monaten Juni und Juli.

— In allen Monaten wurden mehr männliche als weibliche Tiere nachgewiesen und im Juli fehlen Nachweise von Weibchen vollständig.

— Es wurden nie sichtbar trächtige oder säugende Weibchen und auch keine frisch flüggen Jungtiere angetroffen. Im Herbst untersuchte Männchen wiesen oft prall gefüllte Nebenhoden auf.

Die hier vorliegenden umfangreichen und aktuellen faunistischen Daten belegen deutlich, dass sich *P. nathusii* im Untersuchungsgebiet hauptsächlich zur herbstlichen Paarungszeit und zum Überwintern einfindet und legen die Vermutung nahe, dass diese Fledermausart hier bei uns, wenn überhaupt, so doch kaum im ursprünglich erwarteten Ausmass Junge aufzieht. Der im Sommer grössere relative Anteil männlicher Tiere im Untersuchungsgebiet deutet auf eine saisonal grossräumige Aufteilung der Geschlechter hin. Im Zusammenhang mit Wiederfunden von Tieren im Herbst und Winter, welche im Sommer in der DDR und Weissrussland markiert wurden, lässt sich *P. nathusii* im Untersuchungsgebiet als typischer Wintergast aus dem Nordosten Europas charakterisieren.

Übertagende oder winterschlafende *P. nathusii* wurden in engen Spaltquartieren angetroffen. Bei den über 80 analysierten Quartieren handelte es sich hauptsächlich um Holzstapel, Rolladenkästen von Wohnhäusern und andere Fassadenhohlräume. Während in Quartieren mit nur einem Individuum sowohl im Herbst wie im Winter mehrheitlich Männchen erfasst wurden, konnte in Winterquartieren mit mehreren Tieren eine grössere Anzahl von Weibchen als Männchen nachgewiesen werden. Diese unterschiedlichen Geschlechtsverhältnisse könnten auf geschlechtsspezifische Überwinterungsstrategien von Männchen und Weibchen hindeuten, welche mit dem territorialen Paarungsverhalten der Männchen und dem fliessenden Übergang von der herbstlichen Paarungszeit zur Winterschlafperiode zusammenhängen dürften.

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Die Gattung *Edaphus* Motschulsky in Sumatra (Coleoptera, Staphylinidae)

65. Beitrag zur Kenntnis der Euaesthetinen

von

Volker PUTHZ *

Mit 11 Textfiguren

Abstract

The genus *Edaphus* Motschulsky **in Sumatra (Coleoptera, Staphylinidae) 65th Contribution to the Knowledge of Euaesthetinae.** — A synopsis of the *Edaphus* of Sumatra is given. 13 species are recorded, including one first record, and descriptions of 5 (+1) new species: *E. cordicollis* sp. n., *E. cuspidiventris* sp. n., *E. nitidifrons* sp. n., *E. perminimus* sp. n., *E. pulliclavis* sp. n. (+*E. spec. sum. a*), two of them with remarkable sexual characters on dorsal surface of the male's abdomen. A key to species is provided.

In dieser Arbeit stelle ich die bisher aus Sumatra bekannt gewordenen *Edaphus*-Arten zusammen. Denn es erscheint mir nützlich, den gegenwärtigen Kenntnisstand zu fixieren, bevor demnächst zu erwartende größere Ausbeuten zur Untersuchung anstehen. Den Anstoß lieferte eine kleine von J. Klapperich in Sumatra gemachte Ausbeute, die neben dem bisher unbekannten Männchen von *E. sumatrensis* Schaufuss noch vier weitere neue Arten enthielt, eine davon mit bemerkenswerten Sexualcharakteren des Männchens auf der Dorsalseite des Abdomens.

Heute liegen nur 13 *Edaphus*- Arten von Sumatra vor, sicher nur ein kleiner Bruchteil der tatsächlich dort lebenden Fauna. Von diesen 13 Arten leben 5 auch in Nachbargebieten (malayische Halbinsel, Borneo, Java), 8 müssen zur Zeit als endemisch angesehen werden.

Ich möchte es nicht versäumen, auch an dieser Stelle den Genfer Kollegen und dem British Museum, Natural History für Materialübermittlung und für die Überlassung von Belegexemplaren herzlich zu danken.

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Edaphus nitidifrons sp. n.

Diese neue Art gehört in die Gruppe des *E. cribricollis* Schauf. und hier zu den Arten mit abweichend- undeutlicher Stirnkantenbildung. Sie ist die Schwesterart des *E. subcarinatus* Puthz, dem sie auch außerordentlich ähnlich sieht.

Makropter, makrophthalm, rotbraun, glänzend, Pronotum ziemlich kräftig, Elytren sehr fein punktiert, Beborstung ziemlich dicht, anliegend.

Länge: 1,0-1,2 mm.

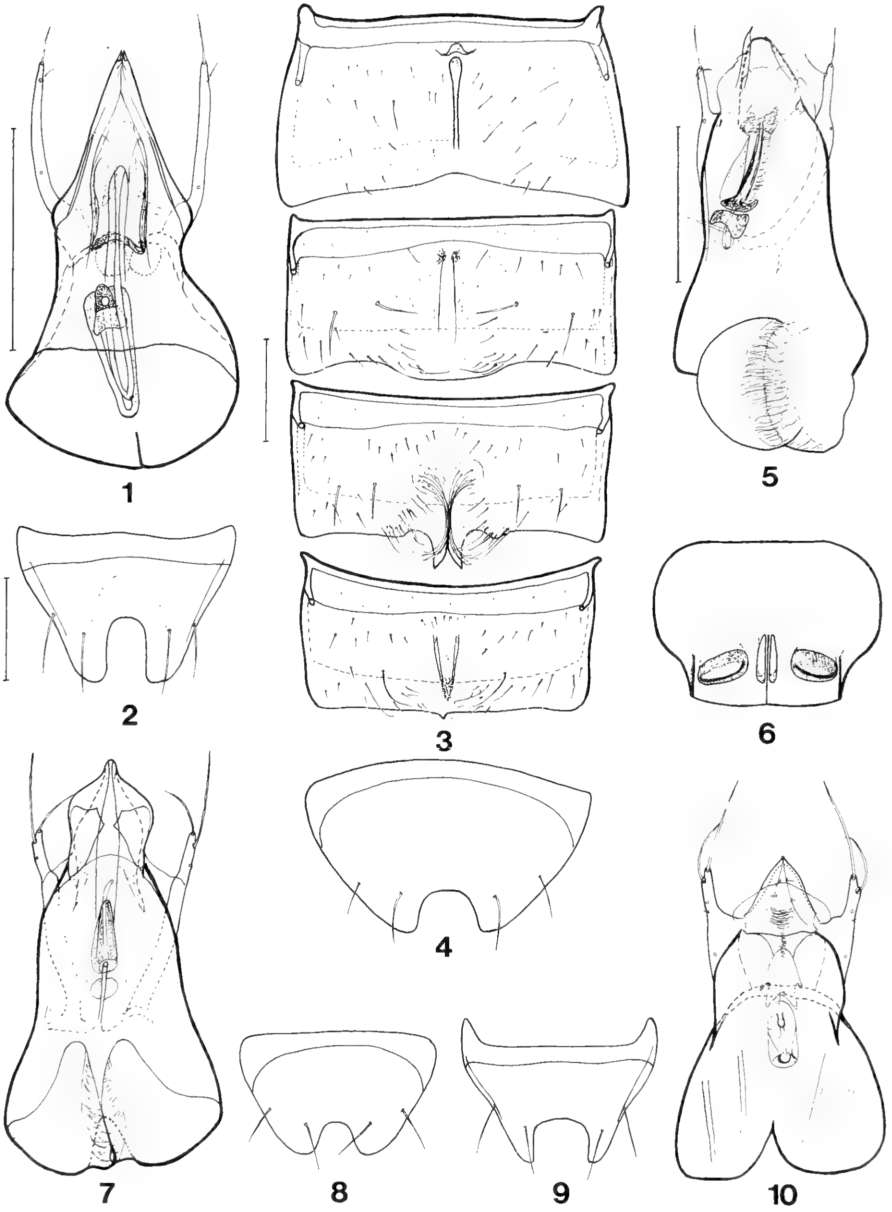
♂- Holotypus und 3 ♂♂, 2 ♀♀- Paratypen: Sumatra: Aceh-Selatan, Bahahrot, 100 m, VII-VIII.1983, J. Klapperich.

Kopf deutlich schmäler als das Pronotum (31: 35), Augen in beiden Geschlechtern sehr groß, gewölbt, fein facettiert, Wangen kurz, keine Schläfen (Wangen-, Augenlänge = 2: 11), Stirn mäßig breit (Augenabstand: 19,5), hintere Querfurche tief eingeschnitten, vorderer Mittelteil etwas breiter als jedes der Seitenstücke, mehr oder weniger deutlich etwas, breitrund gewölbt (aber nicht höckrig), vordere Seitenfurchen deutlich, vordere Seitenteile außen schmalkantig abgesetzt (am besten von lateral sichtbar), die Kante aber nicht gratartig- scharf erhoben, sondern nur leicht hervortretend, hinten, neben den Augen, in der Umgebung der Ocellen, sind die Seitenteile kräftig vertieft/ausgehöhlt, das 11. Fühlerglied würde fast in diese Aushöhlung hineinpassen, vorn sind die Seitenteile durch eine sehr kräftige Punktgrube unterbrochen; am Übergang zwischen vorderem Stirnmittelteil zum einfachen Clypeus werden einige sehr feine Punkte mehr oder weniger, eher weniger deutlich, insgesamt glänzt aber die sonst unpunktierte Stirn stark (Name!). Fühler schlank, aber kurz, zurückgelegt bei weitem nicht den Pronotumhinterrand erreichend, Keule sehr deutlich abgesetzt zweigliedrig, beim ♂ das 10. Glied gut so lang wie breit, das 11. Glied etwa 1,5× so lang wie das 10. Glied, beim ♀ das 10. Glied etwas breiter als lang, das 11. Glied gut 1,5× so lang wie das 10. Glied. Pronotum deutlich breiter als lang (35: 31), vorn seitlich kräftig konvex, hinten kräftig eingezogen (Seitenfaltenabstand: 24,5), an der Basis deutliche Seitenfältchen, 6 meist deutlich getrennte, ziemlich gleichgroße Grübchen und ein durchgehendes Mittelfältchen, Basis hinter den Grübchen unpunktiert; Punktierung wenig fein und ziemlich dicht, die Punkte sind deutlich größer als die Augenfacetten, ihre Abstände meist deutlich kleiner als die Punkte. Elytren leicht trapezoid, deutlich breiter als lang (54: 44), Schultern einfach, Seiten deutlich rundlich- erweitert, Hinterrand breit ausgerandet (Nahtlänge: 36); Punktierung mindestens doppelt so fein und erheblich weitläufiger als am Pronotum, Punktabstände erheblich größer als die Punkte. Abdomen fast glatt, der basale Mittelkiel des 3. Tergits reicht gut bis zur Tergitmitte.

Männchen: 8. Sternit (Fig. 2). 9. Sternit mit ziemlich großen dorsolateralen Wabenfeldern. Spermapumpe stark sklerotisiert, mit breiter Doppeltrompete, diese gut so lang wie der halbe Medianlobus, *vesica seminalis*? Aedoeagus (Fig. 1) dem der verwandten Arten prinzipiell sehr ähnlich.

Edaphus nitidifrons sp. n. unterscheidet sich von *E. subcarinatus* Puthz durch flacheren vorderen Stirnmittelteil, der ohne Kante in den Clypeus übergeht, durch seine etwas bedeutendere Größe und die Sexualcharaktere. In meiner Bestimmungstabelle (1979*b*) muß die neue Art bei Leitziffer 20 (21) eingefügt werden.

Holotypus und Paratypen im Muséum d'histoire naturelle, Genf, Paratypen auch in meiner Sammlung.



FIGS 1-10.

Ventralansichten der Aedoeagen (1, 5, 7, 10), 8. Sternit der Männchen (2, 4, 8, 9), Tergite 3- 6 (3) und Pronotumumriß (6) von *Edaphus nitidifrons* sp. n. (Paratypus) (1, 2), *E. cuspidiventris* sp. n. (Holotypus) (3- 5), *E. cordicollis* sp. n. (HT) (6), *E. sumatrensis* Schauf. (Babahrot) (7, 8), *E. pulliclavis* sp. n. (HT) (9, 10). — Maßstab = 0,1 mm (1 = 7, 10; 2 = 4, 8, 9).

Edaphus cordicollis sp. n.

Diese neue Art fällt durch ihren im Verhältnis zum Pronotum sehr schmalen Kopf und ihr breit- herzförmiges, stark gewölbtes Pronotum (Fig. 6, Name!) auf. Ihre Schwesterart kann ich zur Zeit nicht angeben.

Makropter, makrophthalm, rotbraun, glänzend, unpunktiert, Beborstung dünn, kurz, dicht, anliegend. Fühler, Taster und Beine gelblich, die Fühlerkeule braun.

Länge: 1,0-1,1 mm.

♂-Holotypus: Sumatra: Aceh- Selatan, 100 m, Paya Laot, Meulaboh, 2.VII.1983, J. Klapperich.

Kopf klein, viel schmäler als das Pronotum (28: 37), Augen groß, sehr fein facettiert, wie es auf den ersten Blick aussieht: fast die gesamten Kopfseiten einnehmend, Wangen aber deutlich, Schläfen kaum deutlich, weil direkt an die Augenrundung anschließend- eingezogen, bei stärkerer Vergrößerung aber unübersehbar (Wangen-, Augen-, Schläfenlänge = 2: 8: 1,5), Stirn mäßig breit (Augenabstand: 19), hintere Querfurche deutlich eingeschnitten, vordere Längsfurchen anfangs deutlich, nach vorn erloschen, vorderer Stirnmittelteil so breit wie jedes der Seitenstücke, eingesenkt, ganz flach, ohne besondere Absetzung in den einfachen Clypeus übergehend, vordere Seitenteile hinten kräftig erhoben, ziemlich breit- rund, nach vorn verflachend und oberhalb der Fühlerwurzeln mit dem vorderen Mittelteil zusammenfließend; keine Punktierung. Fühler ziemlich dünn und kurz, zurückgelegt den Hinterrand des Pronotums bei weitem nicht erreichend, Keule sehr deutlich abgesetzt zweigliedrig, 10. Glied kaum breiter als lang, 11. Glied fast doppelt so lang wie das 10. Glied. Pronotum (Fig. 6) erheblich breiter als lang (37: 28), stark gewölbt, breit herzförmig, an der Basis mit deutlichen Seitenfalten, durchgehendem Mittelfältchen sowie 4 großen Grübchen, die mittleren lang und schmal, nach vorn flach verlängert, die seitlichen breit, im Grund schmal, insgesamt aber eine ziemlich umfangreiche Höhlung bildend; keine Punktierung. Elytren breiter als lang (49: 42), etwa quadratisch, Schultern einfach, Seiten langgerundet, Hinterrand breit ausgeschnitten (Nahtlänge: 35); keine Punktierung, auch die Insertionsstellen der feinen Borsten kaum zu sehen. Abdomen glänzend, basaler Mittelkiel des 3. Tergits nur im proximalen Tergitdrittel.

Männchen: Sexualcharaktere können nicht beschrieben werden, weil das hintere Abdomen verlorengegangen ist.

Edaphus cordicollis sp. n. müßte in meiner Bestimmungstabelle (1979*b*) zwischen Leitziffer 136 und Leitziffer 161 eingeordnet werden; hier paßt von den dort verzeichneten Spezies aber keine. Wenn man die schlecht zu erkennenden Schläfen gesehen hat, müßte man zu 145 (146) *E. minutus* Puthz gelangen, der aber ein viel schmäleres Pronotum besitzt. Durch die eingangs genannten Merkmale ist diese neue Art von allen anderen beschriebenen Verwandten verschieden.

Holotypus im Muséum d'histoire naturelle, Genf.

Edaphus cuspidiventris sp. n.

Diese neue Art gehört äußerlich in die Nähe der Arten *E. rivalis* Puthz und *E. leileri* Puthz. Sie fällt durch ihre einzigartige Dorsalauszeichnung am Abdomen des Männchens auf (Fig. 3, Name !).

Makropter, makrophthalm, rotbraun, mäßig glänzend, ziemlich grob und dicht punktiert, dicht, anliegend beborstet.

Länge: 1,1-1,3 mm.

♂-Holotypus: Sumatra: Aceh- Selatan, Babahrot, 100 m, VII-VIII.1983. J. Klapperich.

Kopf deutlich schmäler als das Pronotum (31: 37), Augen groß, gewölbt, fein facettiert, fast die gesamten Kopfseiten einnehmend (Wangenlänge: Augenlänge = 2,5: 10), keine Schläfen, Stirn ziemlich breit (Augenabstand: 19), hintere Querfurche deutlich eingeschnitten, vordere Längsfurchen ebenfalls, etwas konvergent, vorn verflacht, vorderer Stirnmittelteil so breit wie jedes der Seitenstücke, konisch, deutlich, aber nicht stark, beulig erhoben, vorn ohne besondere Absetzung in den einfachen Clypeus übergehend, vordere Seitenstücke hinten (an der Querfurche) breit vertieft, dann oberhalb der Augen kurz und kräftig beulig erhoben, weiter vorn wieder etwas flacher; keine Punktierung. Fühler ziemlich schlank, zurückgelegt fast den Hinterrand des Pronotums erreichend, Keule deutlich zweigliedrig, 10. Glied etwas breiter als lang, 11. Glied nicht ganz doppelt so lang wie das 10. Glied. Pronotum deutlich breiter als lang (37: 32), vorn seitlich mäßig konvex, die Seiten teilweise fast gerade, hinten kräftig eingezogen (Seitenfaltenabstand: 25), an der Basis mit kräftigen Seitenfältchen, einem durchgehenden Mittelfältchen sowie 4 ziemlich großen Grübchen, die seitlichen leicht quer, aber nur wenig breiter als die inneren; Punktierung ziemlich grob und dicht, die Punkte sind erheblich gröber als die Augenfacetten, ihre Abstände kleiner als die Punkte, vor dem Mittelfältchen auf schmaler Partie größer; keine Punktierung hinter den Basalgrübchen. Elytren breiter als lang (52: 46), Schultern einfach, Seiten lang- gerundet, Hinterrand flach ausgeschnitten (Nahtlänge: 39); Punktierung deutlich, aber doch wenig feiner als am Pronotum und, im Gegensatz zu dort, wo sie eher quergerichtet erscheint, längsgerichtet, ebenfalls dicht, Grund glänzend. Abdomen (Fig. 3) ziemlich glatt, Mittelkiel des 3. Tergits fast bis zum Tergithinterrand reichend.

Männchen: Dorsalseite des Abdomens mit auffälligen Auszeichnungen am 3.-6. Tergit, darunter Kiele und Spitzen. 7. Sternit am Hinterrand sehr flach ausgerandet. 8. Sternit (Fig. 4). 9. Sternit dorsolateral mit ziemlich großen Wabenfeldern. Spermapumpe schwach sklerotisiert, schlauchförmig, etwa halb so lang wie der Medianlobus, *vesica seminalis* deutlich, aber nicht stark sklerotisiert, genauso lang wie die Spermapumpe. Aedoeagus (Fig. 5) mit apikal gerundetem Dorsalblatt, apikoventral gespalten, basal mit eigenartiger zweiteiliger Anschwellung, die median reißverschlußähnlich verbunden erscheint.

Edaphus cuspidiventris sp. n. ist im männlichen Geschlecht durch seine spezifische Abdominalauszeichnung von allen ähnlichen Arten zu unterscheiden. In meiner Bestimmungstabelle (1979*b*) muß er bei Leitziffer 124 (125) eingeordnet werden. Er unterscheidet sich von *E. rivalis* Puthz und *E. leileri* Puthz durch fehlende Schläfen, weniger grobe Punktierung, geringere Größe und die Sexualcharaktere.

Holotypus im Muséum d'histoire naturelle, Genf.

Edaphus sumatrensis Schaufuss

Edaphus sumatrensis Schaufuss, 1887, *Trudy russk. ent. obshch.* 21: 110.
Edaphus sumatrensis; Cameron, 1927, *Rec. S. Aust. Mus.* 3: 261.
Edaphus sumatrensis; Cameron, 1930, *Tijdschr. Ent.* 73: 330.
Edaphus sumatrensis; Puthz, 1974, *Philippia* 2: 88.

Von dieser Art war das Männchen bisher unbekannt. Die von J. Klapperich eingetragene Serie (4♂♂, 2♀♀: Sumatra: Aceh-Selatan, 100 m, Babahrot, VII.-VIII.1983; Museum Genf und coll. m.) zeigt, daß *E. sumatrensis* Schauf. zu den Spezies gehört, deren Männchen auf der Dorsalseite des Abdomens spezifische Sexualcharaktere tragen.

FIG 11.

Dorsalansicht des Abdomens von *Edaphus sumatrensis* Schaufuss.

Männchen: 3. Tergit außerordentlich lang, der basale Mittelkiel reicht etwas über die Tergitmitte hinaus. 4. Tergit mit breitem Medianeindruck (dieser wird auf dem Foto, Fig. 11, nicht deutlich), darin mit wenigen feinen, dicht stehenden Borsten. 5. Tergit apikal geschwungen- klammerförmig, median mit konvergenten Borsten. 6. Tergit in der Hinterrandmitte leicht ausgeschnitten, direkt in der Mitte mit einer Ansammlung von Borsten und Körnchen, auf der Oberfläche ebenfalls mit konvergenten Borsten. 7. Tergit median mit ovalem Borstenfeld, apikal mit dichter stehenden Borsten und einem Saum aus Kammschuppen. 8. Sternit (Fig. 8). 9. Sternit dorsolateral mit ziemlich großen Wabenfeldern. Spermapumpe deutlich sklerotisiert, kurz und breit, etwa so lang wie der Medianlobus, zweiteilig: außer dem Doppeltrompetenabschnitt mit einem kleineren, ovalen, hyalinen Teil, dieser nicht ganz so groß wie die Apikalpartie des Medianlobus; *vesica seminalis* nicht festgestellt. Aedoeagus (Fig. 7), das apikale Ventralblatt des Medianlobus breitlanzettlich, das Dorsalblatt schmäler, eher spitzwinklig; Parameren mit 2 langen Apikalborsten.

Das von CAMERON, 1930 von Fort de Kock gemeldete Stück, ein Weibchen, lag mir inzwischen aus dem BM vor: es handelt sich um die genannte Art.

Edaphus pulliclavis sp. n.

Diese neue Art erinnert mich an *E. martensi* Puthz (vor allem auch genitaliter), ich kann aber ihre Schwesterart nicht mit Sicherheit angeben.

Makropter, makrophthalm, rötlichbraun, glänzend, unpunktiert, wenig auffällig, mäßig dicht und mäßig anliegend beborstet. Fühler, Taster und Beine gelblich bis rötlichgelb, Fühlerkeule gebräunt (Name).

Länge: 1,0-1,1 mm.

♂-Holotypus und 1♂, 2♀♀- Paratypus: Sumatra: Aceh-Selatan, Babahrot, 100 m, VII-VIII.1983, J. Klapperich.

Kopf schmäler als das Pronotum, beim ♂ deutlicher als beim ♀ (28,5: 32,5/26,5: 31), Augen groß, fein facettiert, Wangen kurz, Schläfen so gut wie fehlend (Wangen-, Augen-, Schläfenlänge = 2,5: 8,5: 0,5), Stirn breit (Augenabstand: 18), hintere Querfurche breitrund eingeschnitten, vordere Seitenfurchen sehr deutlich, konvergent, vorderer Mittelteil so breit wie jedes der Seitenstücke, deutlich, aber nicht stark, konisch-längsbeulig erhohen, ohne besondere Absetzung in den einfachen Clypeus übergehend, vordere Seitenteile kräftig erhoben und so ohne deutliche Unterbrechung bis vorn; keine Punktierung. Fühler ziemlich kurz, zurückgelegt nicht den Pronotumhinterrand erreichend, Keule sehr deutlich abgesetzt zweigliedrig, beim ♂ das 10. Glied wenig breiter als lang, das 11. Glied doppelt so lang wie das 10. Glied, beim ♀ das 10. Glied gut 1,5× so breit wie lang, das 11. Glied auch doppelt so lang wie das 10. Glied. Pronotum etwas breiter als lang (32,5: 30), vorn seitlich kräftig gerundet, hinten kräftig eingezogen, an der Basis mit deutlichen Seitenfalten, durchgehendem Mittelfältchen sowie 4 kräftigen Grübchen, die mittleren nach vorne verlängert, fast dreimal so lang wie breit, die seitlichen leicht quer, etwas breiter als die mittleren; keine Punktierung. Elytren breiter als lang (45: 40), Schultern einfach, Seiten lang- rundlich erweitert, Hinterrand breit ausgeschnitten (Nahtlänge: 34); keine Punktierung, auch die Insertionspunkte der Beborstung nicht deutlich. Abdomen glänzend, fast glatt, basaler Mittelkiel des 3. Tergits etwa bis zur Tergitmitte reichend.

Männchen: 7. Sternit am Hinterrand flach, aber deutlich ausgerandet. 8. Sternit (Fig. 9). 9. Sternit dorsolateral mit ziemlich großen Wabenfeldern und apikomedian nicht spitz vorgezogen, sondern fein gekerbt. Spermapumpe mäßig stark sklerotisiert, doppelt so lang wie der Medianlobus, *vesica semicalis* stark sklerotisiert, etwa halb so lang wie der Medianlobus. Aedoeagus (Fig. 10), das vordere Dorsalblatt des Medianlobus mit 4 Borsten, Parameren mit je zwei langen, kräftigen Apikalborsten sowie einer winzigen, mittleren Borste.

Edaphus pulliclavis sp. n. müßte in meiner Tabelle der vorder- und hinterindischen *Edaphus* (1979*b*) zwischen Leitziffer 155 und 160 eingeordnet werden: Von *E. annamensis* Puthz unterscheidetet sich u.a. durch hinten, neben den Augen, nicht auffällig verbreiterte Seitenfurchen der Stirn, von *E. insperatus* Puthz durch breitere Elytren, von *E. sumatrensis* Schauf. wie unten in der Tabelle angegeben und von (*Edaphus 69 spec. b*) durch deutlich erhobenen vorderen Stirnmittelteil sowie durch geringere Größe; von *E. martensi* Puthz trennt man die neue Art sofort durch fehlende Punktierung, von allen durch die Sexualcharaktere.

Holotypus im Muséum d'histoire naturelle, Genf, Paratypen ebendort und in meiner Sammlung.

Edaphus perminimus sp. n.

Diese neue Art gehört zu den kleinsten der Gattung; ihre Schwesterart vermag ich nicht anzugeben.

Makropter, makrophthalm, Kopf, Pronotum, Vorder- und Hinterrand der Elytren, Tergite 3 und 4 sowie die Abdomenspitze gelblich braun, Elytrenmitte dunkler, bräunlich, 5. und 6. Tergit ebenfalls dunkler, ziemlich glänzend, aber nicht ganz glatt, Beborstung mäßig lang, anliegend, kaum auffällig.

Länge: 0,7-0,8 mm.

♀-Holotypus: West- Sumatra: Indrapoera, J. L. Weyers (ex coll. Cameron).

Kopf deutlich schmäler als die Elytren (20: 23), Augen mäßig fein facettiert, ziemlich groß und vorgewölbt, Wangen kurz, keine Schläfen (Wangenlänge: Augenlänge = 2: 6), Stirn breit (Augenabstand: 13), hintere Querfurche deutlich eingeschnitten, vordere Seitenfurchen deutlich, aber vorn erloschen, vorderer Mittelteil so breit wie jedes der Seitenstücke, ohne besondere Absetzung in den einfachen Clypeus übergehend, flach, aber deutlich erhoben, vordere Seitenteile einfach, breit erhoben; keine Punktierung. Fühler mäßig schlank, zurückgelegt nicht den Hinterrand des Pronotums erreichend, Keule deutlich zweigliedrig, 10. Glied deutlich etwas breiter als lang, 11. Glied nicht ganz doppelt so lang wie das 10. Glied. Pronotum breiter als lang (23: 21), vorn seitlich stark konvex, hinten kräftig eingeschnürt (Seitenfaltenabstand: 15,5), an der Basis mit deutlichen Seitenfalten, aber ohne Mittelfältchen, und bei erstem Zusehen jederseits der Mitte mit einer größeren, leicht queren Grube, die nach vorn ausgezogen ist und in der bei genauerer Betrachtung und variiertem Lichteinfall je zwei kleine Grübchen erkennbar werden (Pronotumbasis also insgesamt mit 4 Grübchen); keine Punktierung. Elytren wenig breiter als lang (30,5: 29), subquadratisch, Schultern einfach, Hinterrand flach ausgeschnitten (Nahtlänge: 24); die Oberfläche ist nicht punktiert, aber auch nicht glatt, sie trägt auf glänzendem Grund zahlreiche feine Körnchen. Abdomen fast glatt, basaler Mittelkiel des 3. Tergits nur im basalen Tergitdrittel.

Männchen: unbekannt.

Edaphus perminimus sp. n. sollte in meiner Bestimmungstabelle (1979*b*) bei Leitziffer 201 (202) oder bei Leitziffer 210 (211) eingeordnet werden: von *E. gracilis* Puthz unterscheidet er sich sofort durch breiteres Pronotum und den Kopfbau, von „72 spec. e“ durch fehlende Schläfen und die Elytrenskulptur.

Holotypus im British Museum, Natural History, London.

Edaphus spec. sum a

Aus Westsumatra liegt mir noch ein Weibchen einer neuen Art vor, das ich wegen fehlenden Männchens und weil es in eine Gruppe äußerlich sehr ähnlicher Species gehört noch nicht benennen will. Ich schließe es aber schon in die Tabelle (unten) ein und gebe hier die Proportionsmaße des Stückes bekannt:

1 ♀: West- Sumatra: Indrapoera, J. L. Weyers (ex coll. Cameron) (BM).

Kopfbreite: 23,5; Augenabstand: 16; Wangenlänge: Augenlänge: Schläfenlänge = 2,5: 6,5: 0,5; Pronotumbreite: 30; Pronotumlänge: 27; größte Elytrenbreite: 38; größte Elytrenlänge: 34; Nahtlänge: 28. Körperlänge: 1,0-1,2 mm.

BESTIMMUNGSTABELLE DER BISHER AUS SUMATRA BEKANNT GEWORDENEN *Edaphus*- ARTEN

1 (8) Stirn zwischen den vorderen Längsfurchen und den Augeninnenrändern mit einem schmalen, erhobenen Kiel, der etwa parallel zum Augeninnenrand, nahe demselben verläuft (dieser ist bei *E. nitidifrons* wenig deutlich ausgeprägt)

2 (3) Elytren unpunktiert. ♂: 8. Sternit (52: 24: 16). SpP etwa 2/5 so lang wie der Aedoeagus, Aedoeagus (Abb. 2, PUTHZ, 1979*b*). 0,8-1,2 mm .... *cribricollis* Schaufuss

Sumatra; Malaya.

3 (2) Elytren punktiert

4 (5) Elytren ebenso grob wie das Pronotum punktiert. ♂: 8. Sternit (50: 31: 13). SpP fast breiter als der Aedoeagus und etwa so lang wie dieser. Aedoeagus (Abb. 7, PUTHZ, 1979*b*). 1,0-1,2 mm .... *peninsularis* Puthz

Malaya: Sumatra (neu!): 1♀: Aceh- Selatan: Babahrot, 100 m, VII-VIII.1983, J. Klapperich; Mus. Genf).

5 (4) Elytren deutlich feiner als das Pronotum punktiert

6 (7) Kopf mit deutlichen Schläfen. ♂: 8. Sternit (47: 24: 15). SpP etwa so lang, etwa so breit wie der Aedoeagus. Aedoeagus (Abb. 9, PUTHZ, 1979*a*). 0,9-1,2 mm .... *fauveli* Puthz

Singapore, Malaya, Borneo, Sumatra (2♂♂, 1♀: Babahrot wie oben: Mus. Genf, coll. m.), Vietnam

7 (6) Kopf ohne Schläfen. ♂: 8. Sternit (Fig. 2). SpP 1/2 so lang wie der Medianlobus. Aedoeagus (Fig. 1). 1,0-1,2 mm .... *nitidifrons* sp. n.

Sumatra: Aceh- Selatan.

8 (1) Stirn zwischen den vorderen Längsfurchen und den Augeninnenrändern ohne schmalen, erhobenen Kiel, die vorderen Seitenstücke meist abgeflacht oder gewölbt, nie gratartig-schmal erhoben

9 (22) Pronotumbasis mit 4 Grübchen

10 (17) Pronotumbasis mit durchgehendem Mittelfältchen

11 (12) Vorderkörper grob und dicht punktiert. ♂: Dorsalseite des Abdomens mit auffälligen Auszeichnungen (Fig. 3). 8. Sternit (Fig. 4). Aedoeagus (Fig. 5). 1,1-1,3 mm .... *cuspidiventris* sp. n.

Sumatra: Aceh- Selatan

12 (11) Vorderkorper ohne Punktierung

13 (14) Pronotum außerordentlich gewölbt und breit-herzförmig (Fig. 6) (Breite: Länge >1,2), mittlere Grübchen stark nach vorn ausgedehnt. ♂: ? 1,0-1,1 mm .... *cordicollis* sp. n.

Sumatra: Aceh- Selatan

14 (13) Pronotum weniger gewölbt, „normal" (Breite: Länge <1,3), mittlere Grübchen nicht auffallend stark nach vorn ausgedehnt

15 (16) Die basalen Pronotumgrübchen etwa gleichgroß, die mittleren nicht längsausgezogen. Etwas kleinere Art. ♂ mit dorsalen Abdominalauszeichnungen (Fig. 11). 8. Sternit (Fig. 8). Aedoeagus (Fig. 7). 0,8-1,0 mm .... *sumatrensis* Schaufuss

Sumatra, auch Aceh- Selatan

16 (15) Die basalen Pronotumgrübchen ungleich groß, die äußeren leicht quer, die mittleren deutlich längs-ausgezogen, fast dreimal so lang wie breit. Etwas größere Art. ♂: Abdomen ohne Dorsalauszeichnungen. 8. Sternit (Fig. 9). Aedoeagus (Fig. 10). 1,0-1,1 mm .... *pulliclavis* sp. n.

Sumatra: Aceh- Selatan

17 (10) Pronotum ohne durchgehendes Mittelfältchen

18 (19) Größere Art, deutlich über 1,3 mm. Pronotum und Elytren ± deutlich punktiert. ♂: Abdomen mit Dorsalauszeichnungen. 8. Sternit ähnlich Fig. 8. Aedoeagus (Abb. 10, PUTHZ, 1979*a*), Medianlobus apikal mit zwei auffälligen Borsten. 1,4-1,7 mm .... *dentiventris* Fauvel

(*mandibularis* Cameron), Singapur, Sumatra: Fort de Kock

19 (18) Kleinere Arten, deutlich unter 1,3 mm. Pronotum unpunktiert

20 (21) Sehr kleine Art mit aufgehelltem Vord- und Hinterrand der Elytren, Elytren kaum breiter als lang mit sehr feinen Körnchen. Vordere Stirnseitenteile nicht unterbrochen. ♂: ?. 0,7-0,8 mm .... *perminimus* sp. n.

West-Sumatra: Indrapoera

21 (20) Größere, einfarbige Art, Elytren deutlich breiter als lang, ohne Grundskulptur. Vordere Stirnseitenteile vorn durch einen Punkt unterbrochen. ♂: ? 1,0-1,2 mm .... spec. sum a

West- Sumatra: Indrapoera

22 (9) Pronotumbasis mit 6 Grübchen

23 (24) Pronotum und Elytren deutlich punktiert. ♂: 8. Sternit ähnlich wie in Fig. 2. Aedoeagus (Abb. 13, PUTHZ 1979*a*) 1,3-1,6 mm .... *vulcanicola* Puthz

Sumatra: Sibajak Vulkan.

24 (23) Pronotum und Elytren unpunktiert. ♂: 8. Sternit (Abb. 9, PUTHZ, 1974). Aedoeagus (Abb. 4, PUTHZ, 1974). 0,8-1,0 mm .... *dilutus* Schaufuss
(*magnipennis* Bernhauer)

Sumatra (ohne nähere Angabe), Java, Vietnam, Luzon

ZUSAMMENFASSUNG

Diese Arbeit enthält eine Übersicht über die *Edaphus*-Arten aus Sumatra: 13 Spezies werden gemeldet, darunter eine Erstmeldung (*E. peninsularis* Puthz), 5 (+1) von ihnen sind neu und werden beschrieben: *E. cordicollis* sp. n., *E. cuspidiventris* sp. n., *E. nitidifrons* sp. n., *E. perminimus* sp. n. und *E. pulliclavis* sp. n. (+*E.* spec. sum a). Zwei Arten besitzen auffällige Sexualcharaktere auf der Dorsalseite des Abdomens der Männchen: *E. cuspidiventris* sp. n. und *E. sumatrensis* Schauf., von dem hier erstmalig das Männchen beschrieben wird.

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New species and records of coral reef inhabiting Caprellidae from Bora Bora and Moorea, Society Islands (Crustacea: Amphipoda)

by

Hans-Georg MÜLLER *

With 64 figures

ABSTRACT

New species and records are presented for the amphipod family Caprellidae from coral reefs at Bora Bora and Moorea, Society Islands. *Caprellina bispinosa* n. sp. and *Fallotritella polynesica* n. sp. are described. Notes on the habitat preference of the other species, *Hemiaegina minuta* Mayer, 1890 and *Metaprotella sandalensis* Mayer, 1898 are also given. *M. sandalensis* is redescribed with particular reference to its intraspecific variability.

The following account forms a part of a series surveying the coral-reef inhabiting invertebrates of tropical Pacific islands. It deals with the amphipod family Caprellidae, based on specimens collected by the author in February-March 1988 at Bora Bora and Moorea, Society Islands. Few published records are available regarding the Caprellidae from the tropical Pacific. From the Society Islands only one species, *Hemiaegina minuta* Mayer, 1890 from Bora Bora came to my knowledge (McCAIN & STEINBERG 1970: 51), a species also dealt with in that report. Altogether four species from exposed reef locations could be found, two being new to science. A redescription of the widely distributed but poorly known and variable species *Metaprotella sandalensis* Mayer, 1898 will be also given.

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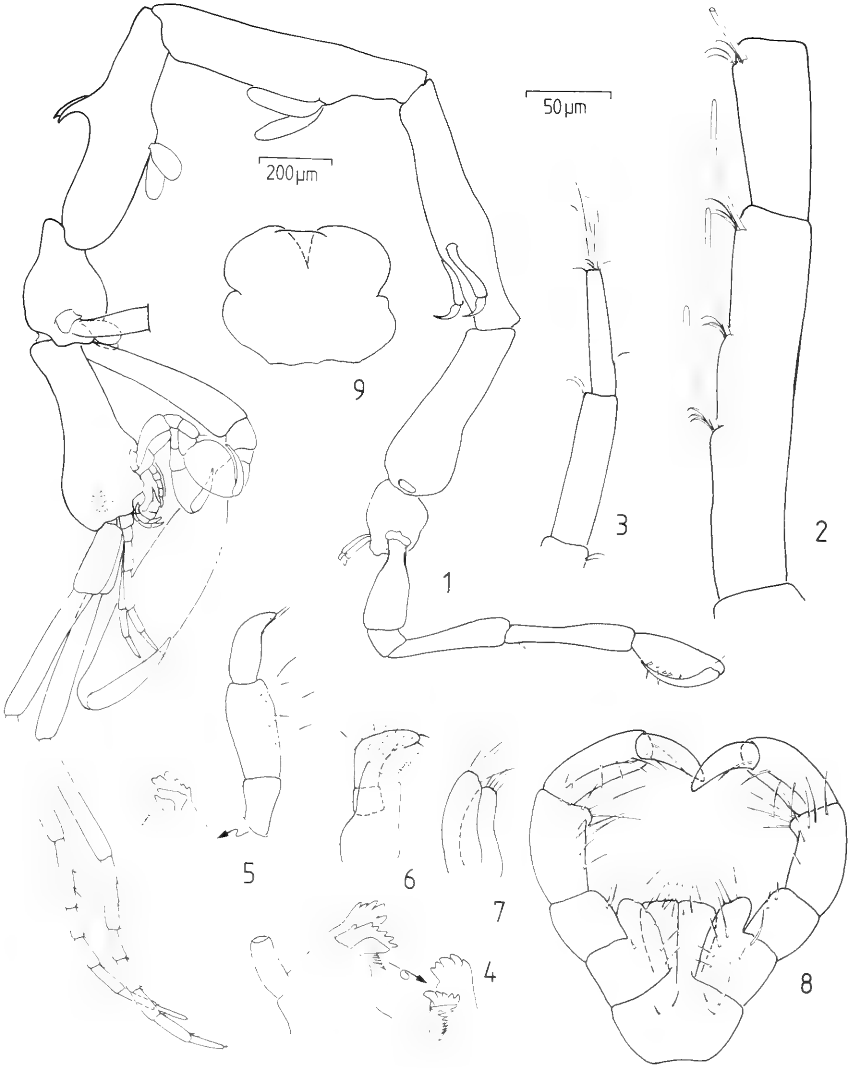


FIGS 1-9.

Caprellina bispinosa n. sp., ♂ holotype: 1) lateral view; 2) proximal articles of antenna 1 flagellum; 3) antenna 2 flagellum; 4) left mandible, two distal palp articles omitted; 5) right mandible; 6) maxilla 1; 7) maxilla 2; 8) maxilliped; 9) labrum.

Detailed information on the collecting localities is given in GALZIN & POINTIER (1985) and PIRAZZOLI *et al.* (1985).

Specimens are deposited in the Senckenberg-Museum, Frankfurt a.M. (SMF), the Muséum national d'Histoire naturelle, Paris (MNHN) and the Muséum d'Histoire naturelle, Genève (MHNG).

The research has been mainly carried out at the marine biological station Antenne Muséum at Moorea (director: Dr. René Galzin) and the Laboratoire de Biologie marine et Malacologie, Université de Perpignan, France (director: Dr. Bernard Salvat). My sincere thanks are due to these colleagues for their various help in organizing the field work and making it possible to use the facilities of that institutes.

Caprellina Thomson, 1879

Caprellina bispinosa n. sp. (Figs 1-20)

Holotype: ♂ (SMF 18311), Moorea; crest of barrier reef near Maharepa, about 2.6 km west of airport, dead corals, 0.5 m, March 1988.

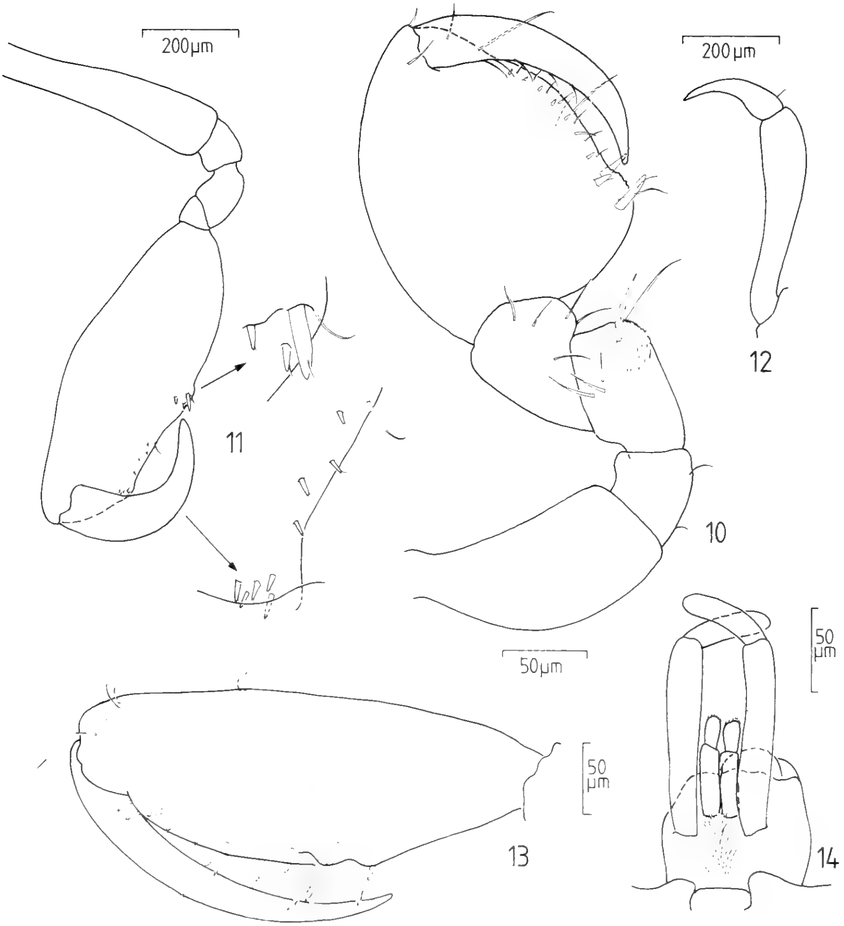
Paratypes: 2♂♂, 5♀♀, 1 juv., deposited as follows. — 3♀♀, 1 juv. SMF 18312; 1♂, 1♀ MHNG; 1♂, 1♀ MNHN; together with holotype.

Diagnosis: *Caprellina* with dorsal pair of anteriorly directed, curved and acute projections shorter than pereonite diameter, on pereonite 3.

Derivatio nominis: The specific name refers to the pair of acute projections on pereonite 3.

Description, ♂ holotype: Total length (front of cephalon to posterior margin of abdomen) 3.7 mm. Body smooth except for pair of curved, acute and anteriorly directed projections on dorsal surface of pereonite 3; pereonite 1 fused with cephalon, no suture line visible.

Antenna 1, about 4 times longer than antenna 2; peduncle of 3 segments, proximal one shortest and widest; flagellum with three proximal articles fused; flagellum with row of about 9 aesthetascs accompanied by some short, simple setae. Second antenna 6-segmented, fourth segment longest, each bearing some short simple setae. Mandible with 3-segmented palp; second segment with 5, third with 2 simple setae; incisor with 5-6 cusps, lacinia mobilis of left mandible with 6 cusps; incisor of right mandible with two accessory plates and one accessory plate in left mandible; spine row of about 7 short spines, molar absent. 2-segmented palp of maxilla 1 with about 8 simple setae on distal segment, lobe with 6 distal, serrate spines. Inner and outer lobe of second maxilla with 4 distal simple setae. Endite of maxilliped blunt, with 2 distal spines and 3 simple setae; palp 5-segmented, inner lobe of proximal segment roughly oval, with some simple setae; this lobe shorter than endite; all palp segments except for distal one with some simple setae along medial and distal margins. Labrum with anterodistal rounded lobes. Gills of pereonites 2-4 elongate-oval. Propodus of gnathopod 1 flattened, 1.2 times longer than wide, palm with row of 9 spines of different size and some short simple setae; dactylus more strongly curved in distal third, not extending beyond proximal compound spine of propodal palm. Propodus of gnathopod 2 roughly elongate-oval; palm with about 12 compound spines of different size in distal half; grasping margins of propodus and dactylus smooth, dactylus robust, strongly curved, its tip not extending beyond proximal compound spines of propodal palm. Fifth pereopod reduced, 2-segmented, terminal segment in form of dactylus. Pereopods 6 and 7 normally developed, carpus and merus being the longest segments; propodus roughly elongate-oval, palm convex, with row of



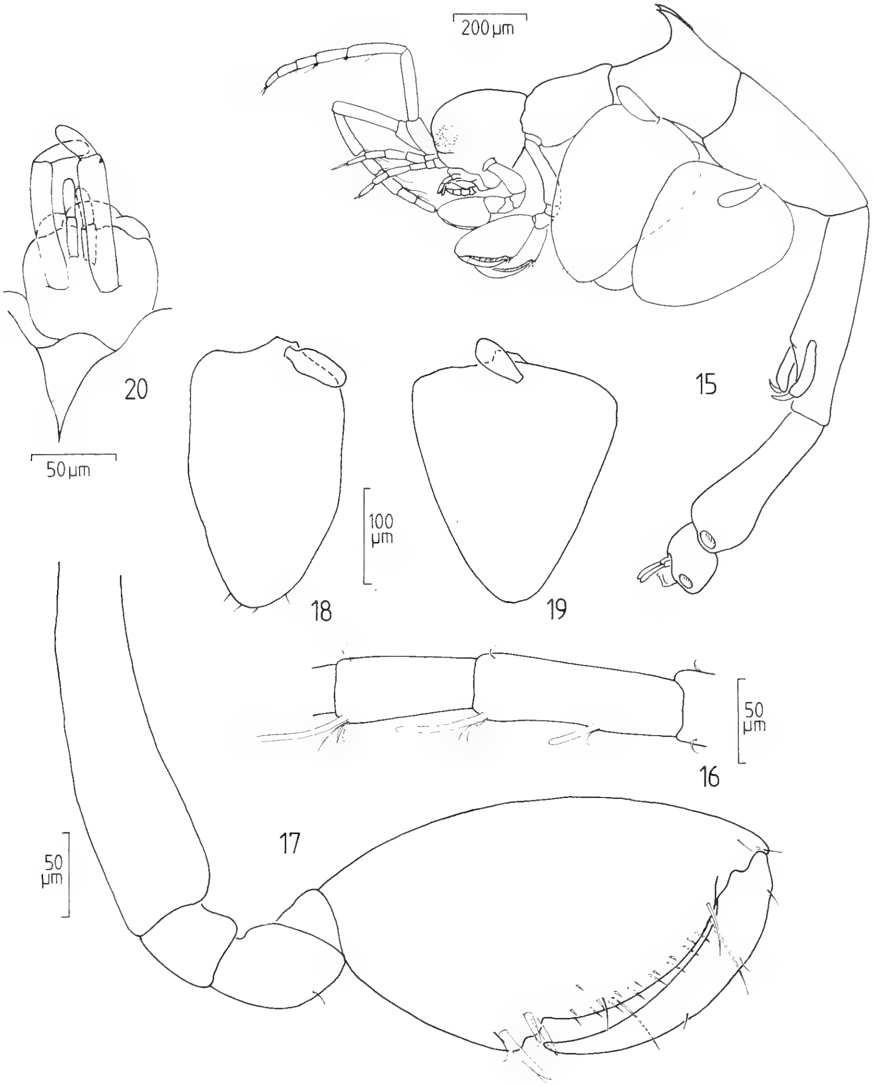
FIGS 10-14.

Caprellina bispinosa n. sp., ♂ holotype: 10) gnathopod 1; 11) gnathopod 2; 12) pereopod 4; 13) dactylus and propodus of pereopod 7; 14) abdomen, ventral view.

about 11 compound spines; dactylus just extending beyond proximal compound spine of propodal palm.

Abdomen with two pairs of 2-segmented appendages; distal segment of proximal lobes about 0.4 times length of proximal segment; segments of distal lobes subequal in length.

♀: Similar in habitus to ♂ with head and pereonites 3-4 more robust. Only two proximal articles of antenna 1 flagellum fused, flagellum with row of about 5 aesthetascs accompanied by one or some short simple setae. Propodus of second gnathopod roughly elongate-oval; palm of propodus convex with distinct rounded heel in proximal half, bearing 3 robust compound spines; palm distally of these spines with about 7 very short spines and several simple setae. Oostegites of pereonites 3 and 4 roughly triangular.



FIGS 15-20.

Caprellina bispinosa n. sp., ♀ paratype: 15) lateral view; 16) proximal articles of antenna 1 flagellum; 17) gnathopod 2; 18) oostegite 1; 19) oostegite 2: 20) abdomen, ventral view.

Abdominal appendages similar to ♂.

Distribution: Moorea, Society Islands.

Remarks: Of the 2 species of *Caprellina* (McCain & Steinberg 1970: 46) the small new species seems to be more closely related to *Caprellina spiniger* Barnard, 1916 from South Africa. It is easily distinguishable from that species through the presence of only one pair of dorsal projections on pereonite 3, unlike *C. spiniger,* which bears a pair of these projections on pereonites 2 and 3 (see Griffiths 1976: 89, Fig. 60 A).

Fallotritella McCain, 1968
Fallotritella polynesica n. sp. (Figs 21-40)

Holotype: ♂ (SMF 18305), Bora Bora; fringing reef near Vaitape, dead corals covered with sponges and algae, 0.5-1 m, near slope, 27 February-6 March 1988.

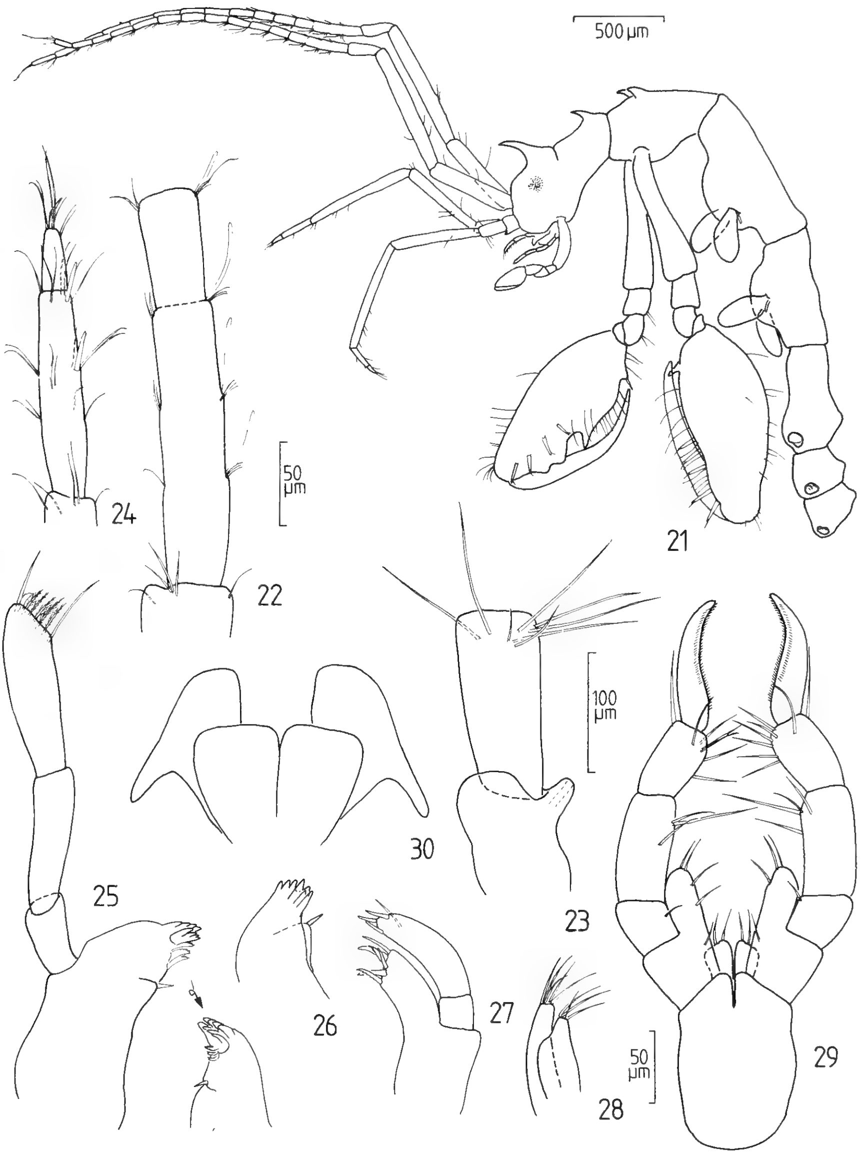
Paratypes: 4♂♂, 12♀♀ (SMF 18306), together with holotype. 1♀, 1 juv. (MHNG), Bora Bora; barrier reef near Motu tapu, dead corals, 1-1.5 m, 7 March 1988. 2♂♂, 2♀♀, 3 juv. (MHNG), Moorea; coral slope of fringing reef near Afareaitu, dead corals, 1-2 m, 26 March 1988. 1♂, 1♀ (MHNG), Moorea; Temae, the Islet Reef, north of airport; crest of barrier reef, on *Sargsassum,* about 0.5 m, 19-20 February 1988. 2♂♂ (MNHN), Moorea; Temae, the Islet Reef, north-east of airport, channel near beach, dead corals, about 2 m, 31 March 1988. 3♂♂, 4♀♀, 1 juv. (MNHN), Moorea; crest of barrier reef near Maharepa, about 2.6 km west of airport, dead corals, about 0.5 m, March 1988. 1♂ (MNHN), Moorea; crest of barrier reef near Maharepa, on *Sargassum,* 0-05 m, 15 March 1988. 4♂♂, 1♀ (MNHN), Moorea; crest of Tiahura barrier reef, dead corals, 0.5-1 m, 25 March 1988.

Diagnosis: *Fallotritella* with acute, anterodorsal projection on cephalon and pereonite one and dorsal pair of these projections on second pereonite.

Derivatio nominis: The specific name is an adjective qualifying the geographic area of the type locality.

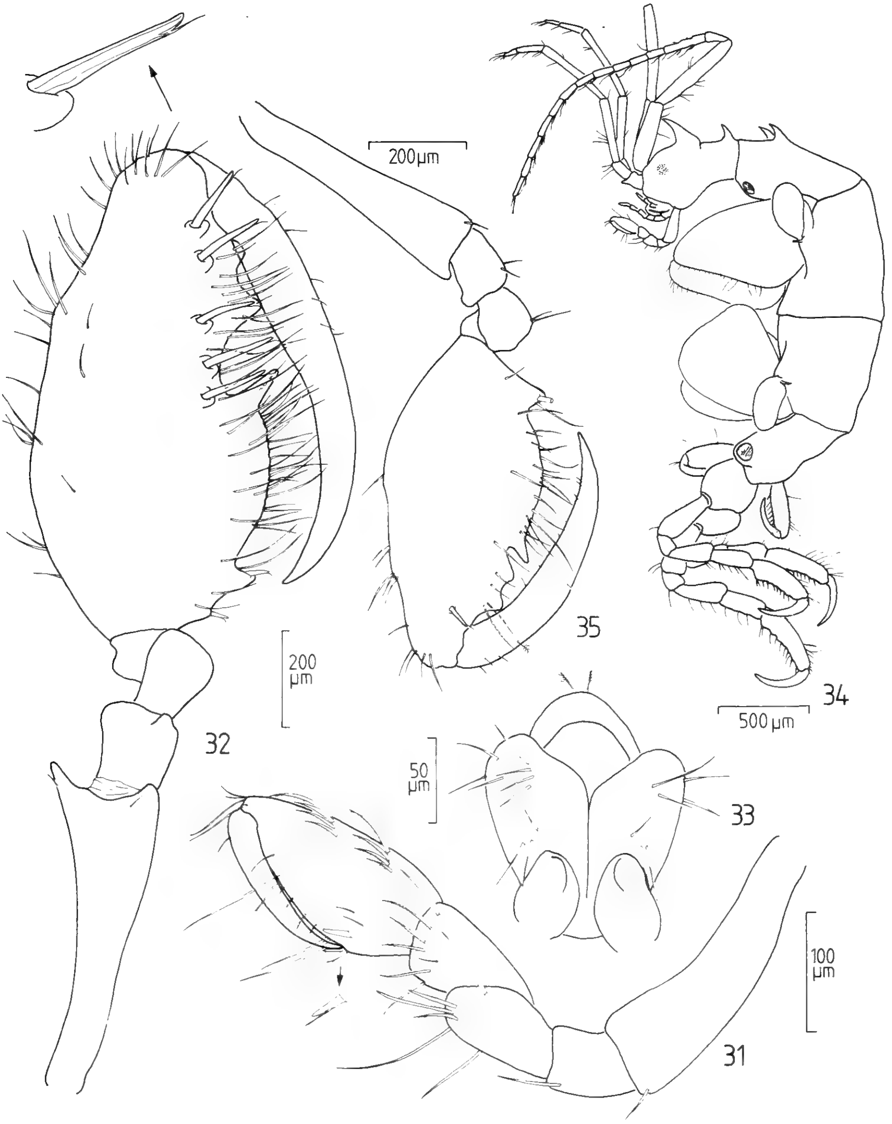
Description, ♂ holotype: Total length (front of cephalon to posterior margin of abdomen) 3.6 mm. Body smooth except for single acute, anteriorly directed projection on cephalon (longest) and pereonite 1; one pair of these dorsal projections on pereonite 2; pereonite 1 incompletely fused with cephalon, distinct suture line visible dorsally.

Antenna 1, about 2 times longer than antenna 2; 2-segmented peduncle with proximal segment of 3/4 length of distal one; flagellum with at least three proximal articles fused, free flagellar articles numbering about 12; flagellum with aesthetasc on each article, accompanied by some short, simple setae. Second antenna 6-segmented with segments 3-4 longest, fourth somewhat longer than third; penultimate segment with 2 compound spines in distal half, beside several short simple setae; terminal segment with some short simple setae, of 1/4 length of penultimate segment. Mandibles with 3-segmented palp, segments increasing in length distally; terminal segment with 2 simple setae, beside short serrate spine and 5 short feathered setae; incisor of mandibles with about 5 cusps, incisor of left mandible with 4 cusps; three accessory plates on both left and right mandible; molar reduced, being a small cone with single distal spine. 2-segmented palp of maxilla 1 with three short apical spines and a simple seta; lobe with 5 short serrate spines. Maxilla 2, outer lobe with 5, inner lobe with 4 distal setae. Short endite of maxilliped with 2 distal setae; inner lobe of 5-segmented palp distally rounded, extending beyond distal margin of second segment, bearing 3-4 setae along medial and distal margin; grasping margins of curved distal segment with two rows of stiff setules. Labium having the lateral lobes with narrow, posteriorly directed process. Propodus of gnathopod 1 roughly elongate-oval, palm bearing 3 proximal compound spines; dactylus well curved, not extending beyond



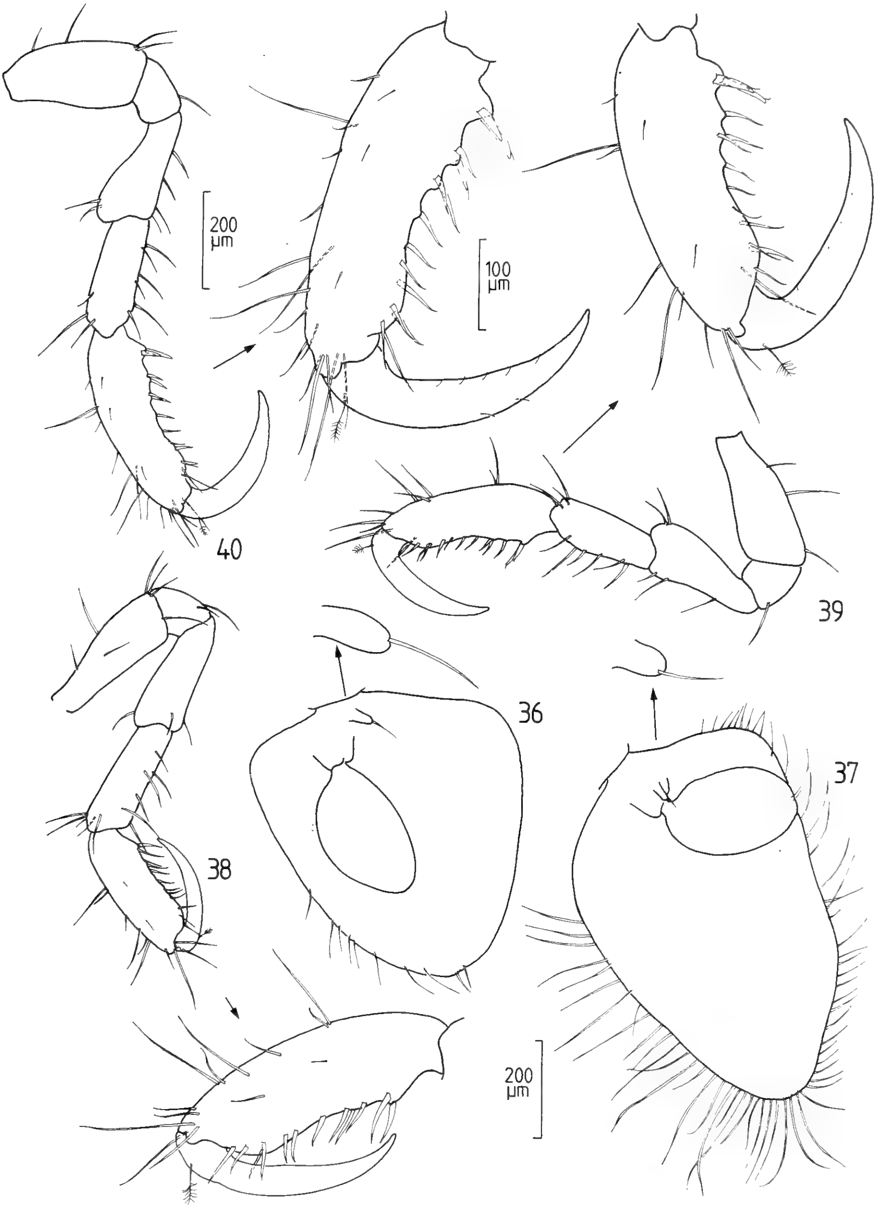
Figs 21-30.

Fallotritella polynesica n. sp., ♂ holotype: 21) lateral view; 22) proximal articles of antenna 1 flagellum; 23) proximal articles of antenna 2 peduncle; 24) flagellum of antenna 2; 25) left mandible; 26) right mandible, palp omitted; 27) maxilla 1; 28) maxilla 2; 29) maxilliped; 30) labium.



FIGS 31-35.

Fallotritella polynesica n. sp., ♂ holotype: 31) gnathopod 1; 32) gnathopod 2; 33) abdomen, ventral view. ♀ paratype: 34) lateral view; 35) gnathopod 2.



FIGS 36-40.

Fallotritella polynesica n. sp., ♀ paratype: 36) oostegite 1; 37) oostegite 2; 38) pereopod 5; 39) pereopod 6; 40) pereopod 7.

compound spines of propodal palm; propodus, carpus and merus bearing some feathered setae. Propodus of gnathopod 2 greatly enlarged; palm with proximal compound spine on triangular heel; in distal half with a deep and a shallow excavation; beside these excavations, propodus bearing row of 5 very strong compound spines on shallow tubercles. Gills on pereonites 3 and 4 oval. Pereopods 3 and 4 unisegmented with single seta at tip. Pereopods 5-7, see description of ♀.

Abdomen with pair of setose, distally rounded lobe; penes robust, less than two times as long as wide.

♀: General habitus similar to ♂ with second gnathopod much smaller and pereonites 3-4 more robust. Propodus of second gnathopod in shape similar to ♂, much smaller and less setose, lacking the distal row of elongate compound spines. Oostegites roughly triangular, distal margin of first oostegite with about 10, margin of second oostegite with about 62 setae. Pereopod 5 inserted posteriorly on pereonite, smaller than pereopods 6-7; palm of faintly curved propodus in pereopods 5-7 with several spines as figured; additionally, pereopods 6-7 with some proximal compound spines beside simple spines.

Distribution: Bora Bora and Moorea, Society Islands.

Remarks: Two species of *Fallotritella* are known up to now, *F. biscayensis* McCain, 1968 from Florida and *F. montoucheti* de Araújo Quitete, 1971 from Brasil. *F. polynesica* seems to be more closely allied with the former, easily distinguishable by the number and arrangement of dorsal projections on cephalon and pereonites 1-2 (see McCain 1968: 58). In disagreement with the generic diagnosis, *F. polynesica* has the molar of the mandibles not totally reduced. It is present as a shallow cone with a distal spine. *F. polynesica* is the more common species of those being new to science and appears to be widely distributed in shallow reef habitats in the area investigated. It was found in almost all samples taken from more or less exposed locations.

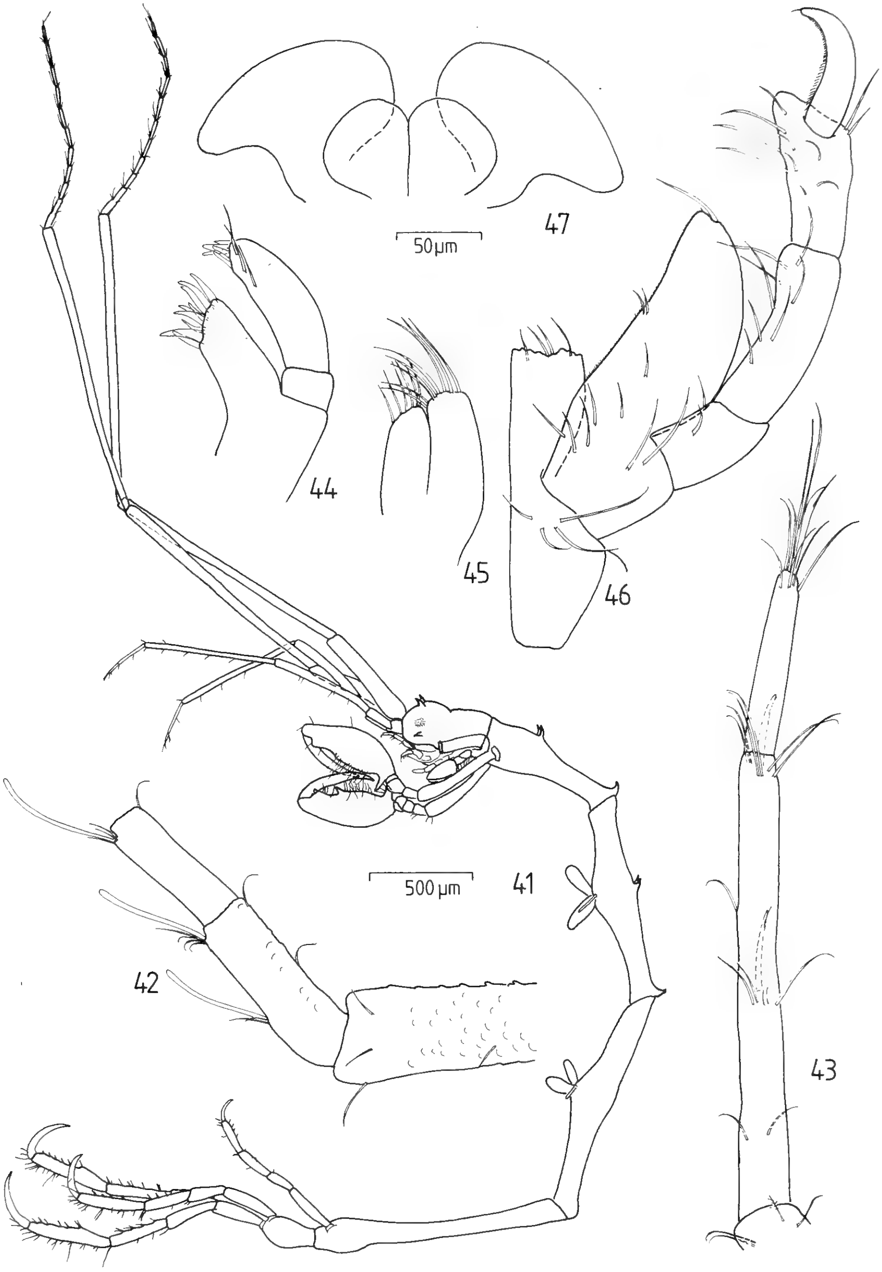
Hemiaegina Mayer, 1890
Hemiaegina minuta Mayer, 1890

Material: 1♂ (SMF 18307), Bora Bora; fringing reef near Vaitape, dead corals covered with sponges and algae, 0.5-1 m, near slope, 27 February-6 March 1988. 1♂ (MHNG), Moorea; coral slope of fringing reef near Afareaitu, dead corals, 1-2 m, 26 March 1988. 5♂♂, 1♀, 2 juv. (MHNG), Moorea; Temae, the Islet Reef, north of airport, crest of barrier reef, on *Sargassum,* about 0.5 m, 19-20 February 1988. 6♂♂, 6♀♀, 2 juv. (SMF 18309), Moorea; crest of barrier reef near Maharepa, about 2.6 km west of airport, dead corals, about 0.5 m, March 1988. 1♂ (SMF 18310), Moorea; barrier reef east of Maharepa, channel near beach, dead corals, 0.5-1 m, March 1988. 1♂, 2♀♀, 2 juv. (SMF 18308), Moorea; crest of Tiahura barrier reef, dead corals, 0.5-1 m, 25 March 1988.

Remarks: *H. minuta* is widely distributed in tropical and temperate waters of the world oceans. At the Society Islands it was already known from Bora Bora (McCain 1968: 62, McCain & Steinberg 1970: 51). As all the other species dealt with in that report, *H. minuta* was found only in more or less exposed reef locations.

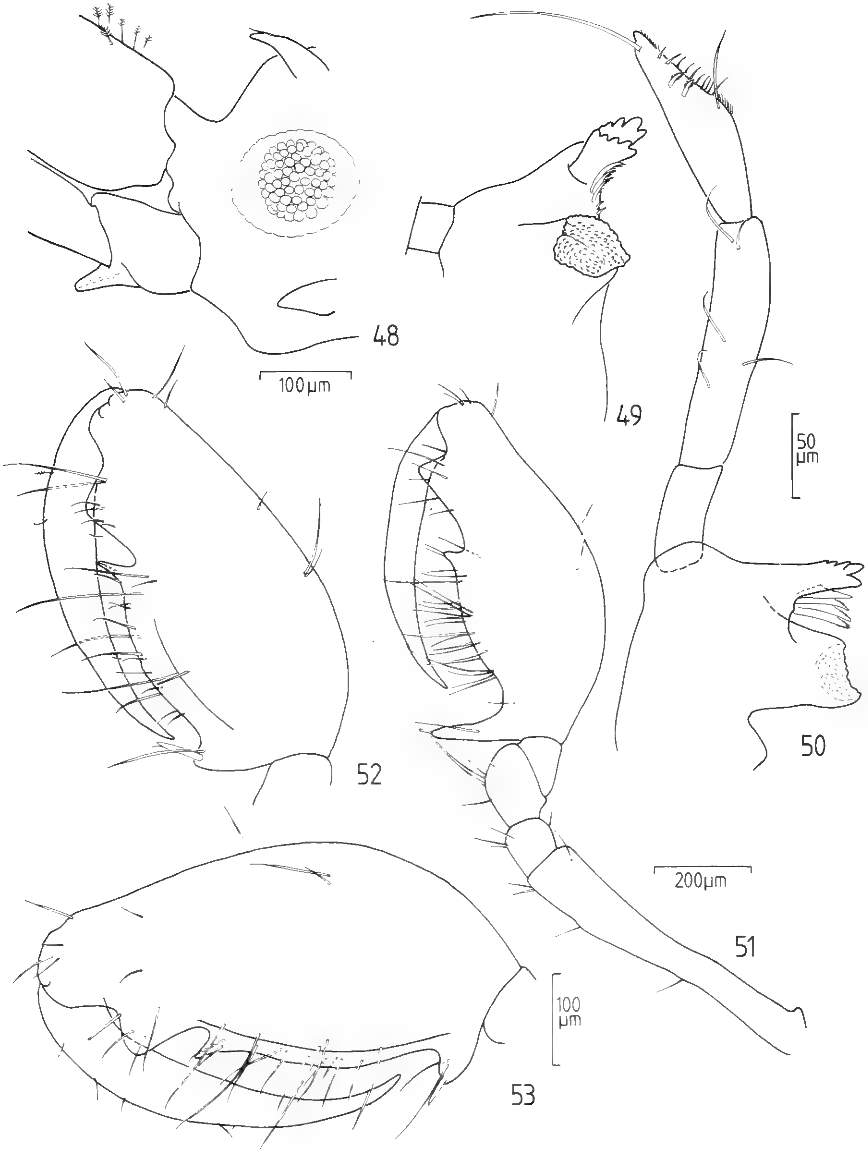
Metaprotella Mayer, 1898
Metaprotella sandalensis Mayer, 1898 (Figs 41-64)

Material: 12♂♂, 9♀♀, 13 juv., deposited as follows. — 8♂♂, 5♀♀, 13 juv. SMF 18303; 2♂♂, 2♀♀ MHNG; 2♂♂, 2♀♀ MNHN; Bora Bora; fringing reef near Vaitape, dead corals covered with sponges and algae, 0.5-1 m, near slope, 27 February-6 March 1988. 2♀♀, 2 juv. (SMF 18302), Bora Bora; barrier reef near Motu tapu, dead corals, 1-1.5 m,) March 1988. 1♂, 1 juv. (SMF 18304), Moorea; coral slope of Tiahura fringing reef, dead corals, about 2 m, 22-23 March 1988.



FIGS 41-47.

Metaprotella sandalensis Mayer, 1898, ♂: 41) lateral view; 42) distal part of terminal antenna 1 peduncle segment and proximal articles of flagellum; 43) antenna 2 flagellum; 44) maxilla 1; 45) maxilla 2; 46) maxilliped; 47) labium.



FIGS 48-53.

Metaprotella sandalensis Mayer, 1898, ♂: 48) lateral view of cephalon with insertion of antennae; 49) left mandible, palp omitted; 50) right mandible; 51) gnathopod 2; 52) dactylus and propodus of gnathopod 2, other ♂; 53) dactylus and propodus of gnathopod 2, other ♂.

Diagnosis: *Metaprotella* with pair of small dorsal, acute projections on cephalon, pereonites 2 and 4 and a single acute projection on the posterior margin of pereonite 2. Another acute, anteriorly directed process is often visible below the eyes.

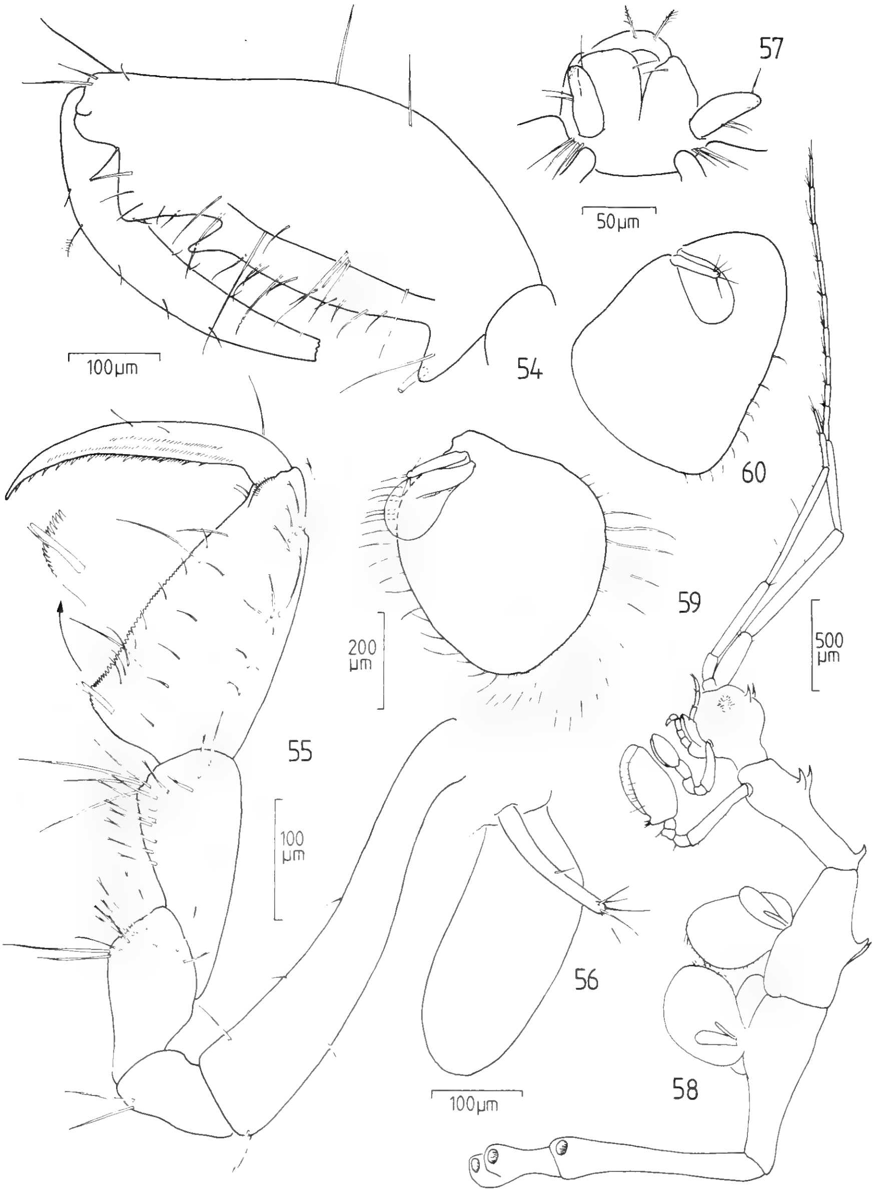
Description, ♂: Total length (front of cephalon to posterior margin of abdomen) about 6.5 mm. Body smooth except for pair of dorsal, acute projections on cephalon, pereonite 2 and 4 and single acute projection on posterior margin of second pereonite; often such a projection can also be found below the eyes. Pereonite 1 incompletely fused with cephalon, suture line faintly visible dorsally.

Antenna 1, about 2.6 times longer than antenna 2; peduncle of 3 segments, proximal one shortest and widest; narrow third peduncle segment about 1.2 times longer than second; flagellum with 2 proximal articles fused and 9 free distal articles, each bearing aesthetasc and some short, simple setae. Second antenna with biarticulate flagellum, proximal article bearing 2 compound spines, distal one with single compound spine near apex; proximal article 2.5 times longer than distal article. Mandible with 3-segmented palp, second segment with about 5 simple setae; terminal segment with two longer simple setae, about 10 short simple setae, two short feathered spines and several setules; incisor with 5 cusps, lacinia mobilis of left mandible with 5 cusps; incisor of right mandible with accessory and 3 fringed spines; incisor of left mandible mandible with 2 longer fringed spines and two minute spines; molar of both mandibles truncate, distal surface with many small tubercles. 2-segmented palp of maxilla 1 with about 5 short, distal spines and 4 simple setae; lobe with about 8 spines. Maxilla 2, outer lobe with 8, inner lobe with 6 distal setae. Distal margin of maxillipedal endite almost straight, with 4 simple setae; palp 5-segmented; inner lobe of proximal segment very large, somewhat extending beyond distal margin of third segment; medial margin of lobe with row of setules increasing in length distally; grasping margin of strongly curved distal segment with row of stiff setules. Lateral lobes of labium with large, broadly rounded and somewhat posteriorly directed projection. Propodus of gnathopod 1 triangular, palm almost straight with numerous denticles in proximal two thirds and a strong proximal compound spine; dactylus more strongly curved in distal third, grasping margin with row of about 12 short spines and many setules. Propodus of gnathopod 2 greatly enlarged; palm with proximal compound spine on heel, the latter being variable in size; distal half of propodal palm with a deep proximal and a shallow distal excavation; dactylus well curved, not extending beyond proximal heel of propodal palm; propodus, carpus and merus with several bifid setae. Gills on pereonites 3 and 4 oval. Pereopods 3 and 4 unisegmented with 4-5 setae near apex. Pereopod 5 inserted posteriorly on pereonite, smaller than pereopods 6-7; propodus of pereopods 5-7 almost straight, palm with several spines in arrangement as figured.

Abdomen with pair of lateral, setose unisegmented lobes.

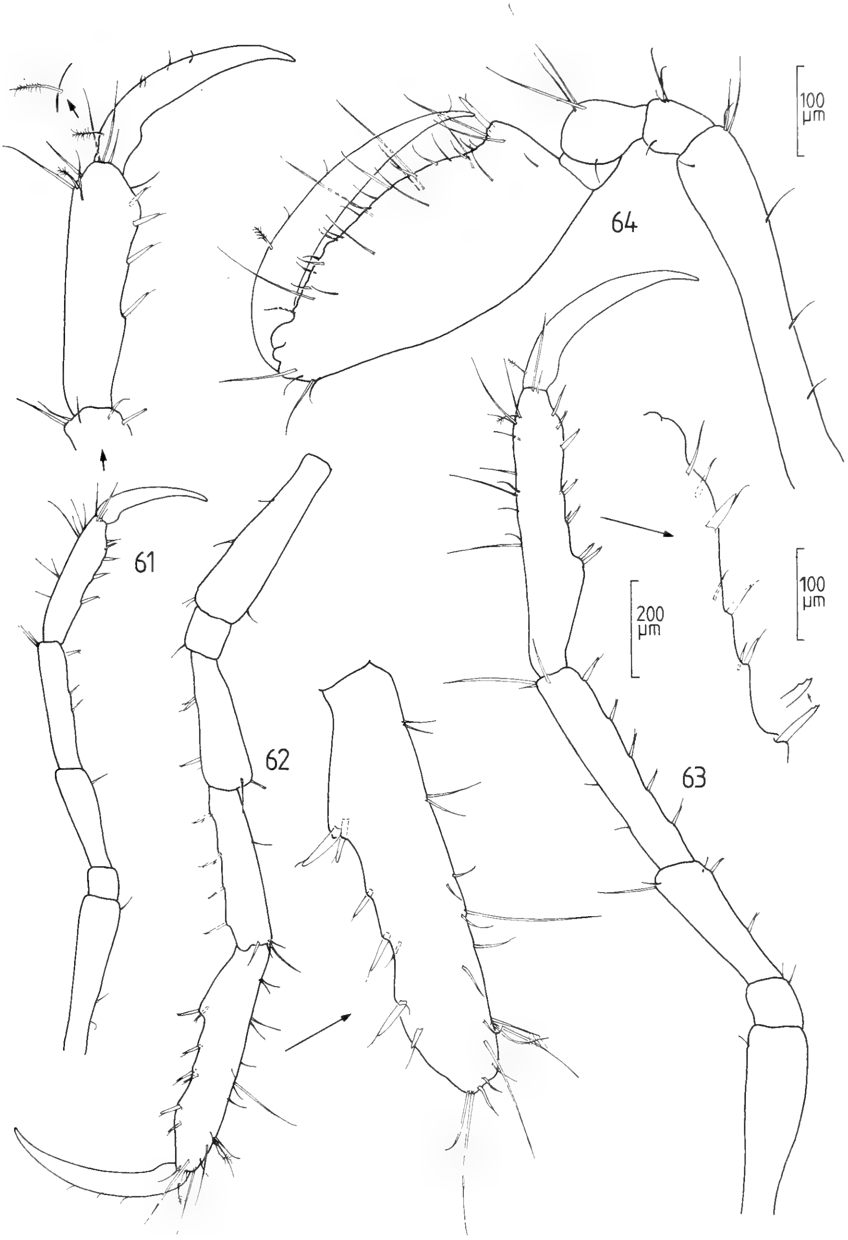
♀: Similar in general habitus to ♂ with pereonites 3-5 much more compact. Second gnathopod much smaller than in ♂, propodal palm with shallow proximal heel bearing strong compound spine; grasping margin of palm with several setae of different lengths. Oostegites roughly circular or triangular with broadly rounded corners. Margin of first oostegite with about 38, of second oostegite with 9 simple setae.

Remarks: *M. sandalensis* is very common in shallow waters of the tropical Indo-Pacific Ocean. Although very often found (see McCain & Steinberg 1970: 55) it has never been described in detail. It seems to be a highly variable species with regard to the arrangement of the number and arrangement of acute projections on head and pereonites 2-3 as well as to the shape of the ♂ propodal palm (Mayer 1903: 40). It has been the largest species of Caprellidae found in reef locations of the Society Islands, from where



FIGS 54-60.

Metaprotella sandalensis Mayer, 1898, ♂: 54) dactylus and propodus of gnathopod 2, other ♂; 55) gnathopod 1; 56) gill and pereopod 3; 57) abdomen, ventral view. ♀: 58) lateral view; 59) oostegite 1; 60) oostegite 2.



FIGS 61-64.

Metaprotella sandalensis Mayer, 1898, ♂: 61) pereopod 5; 62) pereopod 6; 63) pereopod 7; 64) gnathopod 2.

it is reported for the first time. It seems that *M. sandalensis* prefers moderately exposed locations because none of the specimens available is from the strongly exposed sampling stations on the crest of the barrier reefs at Moorea.

ZUSAMMENFASSUNG

Eine Aufsammlung von Korallenriff-bewohnenden Caprelliden (Amphipoda) auf Bora Bora und Moorea, Gesellschaftsinseln, erbrachte neben zwei im Indo-Pazifik weit verbreiteten Formen (*Hemiaegina minuta* Mayer, 1890 und *Metaprotella sandalensis* Mayer, 1898) auch zwei für die Wissenschaft neue Arten (*Caprellina bispinosa* n. sp., *Fallotritella polynesica* n. sp.). Sämtliche Arten fanden sich ausschließlich in mäßig bis stark exponierten Riffabschnitten, wobei *M. sandalensis* vermutlich die mäßig exponierten Bereiche bevorzugt.

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Type specimens of Drosophilidae (Diptera) described by Linnaeus, Fallén, Wahlberg and Zetterstedt

by

Gerhard BÄCHLI *

ABSTRACT

Status and condition of the type specimens of 27 nominal species kept in Swedish collections are listed. Lectotypes are designated for *Drosophila alboguttata* Wahlberg, *Drosophila costata* Zetterstedt, *Drosophila fuscimana* Zetterstedt and *Drosophila marginella* Zetterstedt. *Drosophila cinerella* Fallén is synonymized with the ephydrid *Discocerina obscurella* Fallén (NEW SYNONYMY), and *Drosophila laeta* Zetterstedt with *Drosophila phalerata* Meigen (NEW SYNONYMY).

INTRODUCTION

The genus *Drosophila* was established by FALLÉN (1823) for 12 Swedish species, 11 of them new to science. About 20 years later, ZETTERSTEDT (1840, 1847) described more than 10 new species of *Drosophila* based on flies from Scandinavia. Even though in the meantime some of these species have been transferred to other families, most of the species described by Fallén and Zetterstedt are fundamental to the European drosophilid fauna.

The specimens of Drosophilidae in the old Swedish collections have never been revised except in a few cases (e.g. CAIN *et al.* 1952), but in the years 1954 to 1960 the late E. B. Basden checked more or less all specimens. During this study he numbered the specimens, fixed the type series and labelled many lectotypes. Unfortunately the results

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of this revision have never been published, but Mr Basden entrusted me with his notes, enabling me to designate many lectotypes (BÄCHLI 1982) based on the selections made by him.

For the present revision nearly 500 specimens of the old Swedish collections have been checked. They are supposed to be in the original arrangement in the boxes. Many of them do not have original labels or have colour code labels only. Therefore I decided to consider all extant specimens to be type specimens if there are no arguments against this, e.g. by the labelling, by obvious disagreement in characteristics or by aberrant arrangement in the collection.

In the following list the specimens are marked by Basden's identification number and the following codes: "Fln", "Wahl" and "Boh" for specimens in the Riksmuseum Stockholm and "Ztt" for specimens in the Zoological Museum Lund. For holotypes, lectotypes and syntypes all labels are mentioned, for paralectotypes the data of the labels are abbreviated to the identification code. In the list, the individual labels are separated by strokes (/) and my comments are given in square brackets []. The 27 listed nominal species are represented by 3 holotypes, 21 lectotypes, 60 paralectotypes and 4 syntypes. The content of the old collections seems to be very complete but the type specimens of *Musca cellaris* Linnaeus and the holotype of *Drosophila griseola* Zetterstedt could not be found and those of *Drosophila picta* Zetterstedt and *Drosophila spurca* Zetterstedt are kept in the Zoological Museum Copenhagen (FRYDENBERG 1955). Besides the species described by Fallén and Zetterstedt the type material of a few species described by LINNAEUS (1758, 1767), WAHLBERG (1839) and ROTH in ZETTERSTEDT (1860) is also mentioned.

My cordial thanks are due to Dr. Per Inge Persson, Stockholm, Dr. Lars Wallin, Uppsala, and Dr. Roy Danielsson, Lund, for permission to work on the collections as well as for their help in the interpretation of the status of some specimens. The English text was checked by Mrs B. Andrew.

LIST OF TYPE SPECIMENS

Drosophila albilabris Roth in Zetterstedt, 1860: 6425

Holotype ♂: Bök [= Bökestad] 21/6 / Type selected by E. B. Basden Jany. 1955 Drosophila albilabris Rth. / Dros. albilabris Roth ♂ n. sp. [Zett. handw.]/324/ = Amiota albilabris (Roth) det E. B. Basden / Ztt 324 Drosophila albilabris R. Holotype ♂ G. Bächli det. 1989 / [on separate pin:] pin-mount of abdomen / Drosophila albilabris Roth Holotype.

Comments: The present name is *Amiota albilabris* (Roth).

Drosophila alboguttata Wahlberg, 1839: 22

Lectotype ♂: green diamond [= Östergötland] / pin-mount of abdomen / Wahl 2 Drosophila alboguttata W. Lectotype ♂ G. Bächli det. 1989.

10 paralectotypes ♂ ♀: Wahl 1, Wahl 3 - Wahl 9, Ztt 367, Ztt 369.

Comments: LECTOTYPE by present designation. The present name is *Amiota alboguttata* (Wahlberg). In the lectotype specimen the hind tarsal hairs appear somewhat shorter than in other specimens of the type series.

Drosophila approximata Zetterstedt, 1847: 2557

Lectotype ♀: D. approximata ♀ Smoland. / Lectotype of Drosophila approximata Ztt Selected by E. B. Basden 1960/96/Ztt 96 Drosophila approximata Z. Lectotype ♀ G. Bächli det. 1989.

2 paralectotypes ♀ ♀: Ztt 97, Ztt 98.

Comments: Lectotype designated by BÄCHLI (1982). Type locality according to lectotype: Smolandia. Most characteristics, especially the width of the cheeks, are as in *D. melanogaster;* therefore both species are considered to be conspecific and *D. approximata* Zetterstedt is a synonym of *D. melanogaster* Meigen, as mentioned by BASDEN (1961).

Musca cellaris Linnaeus, 1758: 597

Holotype missing in the collections of London (JACKSON 1912) and Uppsala.

Comments: This species was considered by some authors to be a doubtul synonym of *Drosophila funebris* Fabricius. However, being without type specimen, it seems better to leave it as a nomen dubium.

Drosophila cinerella Fallén, 1823: 7

Holotype: 7 / D. cinerella ♀ e museo Fallén / 68 / Discocerina obscurella Fln. det. Collin 1955 / Drosophila cinerella Fallén Holotype ♀ Ztt 68 G. Bächli det. 1989 / [abdomen missing].

Comments: There is no indication that this is not the holotype specimen. It seems best to me to accept Collin's determination. Therefore *D. cinerella* is a junior synonym of the ephydrid *Discocerina obscurella* Fallén, 1813 (NEW SYNONYMY).

Drosophila congesta Zetterstedt, 1847: 2558

Holotype: yellow square [=Östergötland] / D. congesta ♂ Lärketorp. / Lectotype of Drosophila congesta Ztt. Selected by E. B. Basden 1960/99/Ztt 99 Drosophila congesta Z. Holotype G. Bächli det. 1989 / [on separate pin:] pin-mount of abdomen [genitalia missing].

Comments: The present name is *Microdrosophila congesta* (Zetterstedt). The holotype specimen is probably a female, but the spermatheca being missing, a definitive decision is not possible.

Drosophila costata Zetterstedt, 1840: 776

Lectotype ♂: black square [=Lapland trip 1832] / D. costata Umenäs. ♀./6/Ztt 6 Drosophila costata Z. Lectotype ♂ G. Bächli det. 1989.

14 paralectotypes ♂♀: Ztt 4, Ztt 5, Ztt 7, Ztt 70, Ztt 71, Ztt 74, Ztt 187, Ztt 191, Ztt 374.

Comments: LECTOTYPE by present designation. Type locality according to lectotype: Umenäs, Lapland. The present name is *Chymomyza costata* (Zetterstedt).

Drosophila curvipennis Fallén, 1823: 4

Lectotype ♂: pin-mount of abdomen / 2 / Drosophila curvipennis Fln. ♂ Lectotype Selected by E. B. Basden 1955/369 60/Protostegana furta (L.) ♂ det. Basden 1960 / Fln 2 Drosophila curvipennis F. Lectotype ♂ G. Bächli det. 1989 / [covered with mould].

4 paralectotypes ♀♀: Fln 1, Fln 3-Fln 5.

Comments: Lectotype designated by BÄCHLI (1982). This is a synonym of *Stegana furta* (Linnaeus).

Drosophila fenestrarum Fallén, 1823: 6

Lectotype ♂: 17 / pin-mount of abdomen / Drosophila fenestrarum Fln Lectotype ♂ Selected by E. B. Basden 1956 / [on main pin:] Right wing to slide / 3.44 R. M. prep. 3955 / Fln 17 Drosophila fenestrarum F. Lectotype ♂ G. Bächli det. 1989/[some legs are missing].

6 paralectotypes ♂♀: Fln 16, Fln 19-Fln 23.

Comments: Lectotype designated by BÄCHLI (1982).

Drosophila flava Fallén, 1823: 7

Lectotype: blue square / red square / [=Äsperöd/Tranås] D. flava ♂. Esper. [=Äsperöd]/163/1976 33/Lectotypus Drosophila flava Fallén 1823 Design. by Laštovka & Máca 1978 / Scaptomyza flava (Fall.); ♂ P. Laštovka et Jan Máca det. / [only rest of thorax].

1 paralectotype: Ztt 164.

Comments: Lectotype designated by LAŠTOVKA & MÁCA (1978). The present name of this species is *Scaptomyza flava* (Fallén).

Drosophila flavipennis Zetterstedt, 1840: 777

Lectotype ♂: black square [=Lapland trip 1832]/D. flavipenis ♂. Wilhelm. [=Vilhelmina]/D. graminum var. c. Zett. / Lectotype of Drosophila flavipennis Ztt. Selected by E. B. Basden 1960/23/Ztt 23 Drosophila flavipennis Z. Lectotype ♂ G. Bächli det. 1989 / [somewhat covered with mould] / [on separate pin:] pin-mount of abdomen/Ztt 23.

1 paralectotype ♀: Ztt 24.

Comments: Lectotype designated by BÄCHLI (1982). This is certainly a *Scaptomyza* species, probably conspecific with *Scaptomyza griseola* (Zetterstedt).

Musca furta Linnaeus, 1767: 991

Lectotype ♂: Musca furta L. Lectotype ♂ G. Bächli det. 1989 / Stegana furta L. G. Bächli det. / [on separate label:] furta X / [on separate slide with abdomen and some legs:] Musca furta Type Abdomen Legs (left 2nd & 3rd) E. B. Basden 4 Ap. 1960 / [good condition except halteres and some bristles missing].

1 paralectotype: Musca furta L. Paralectotype G. Bächli det. 1989 / Stegana furta L. G. Bächli det. / [on separate label:] furta?

Comments: Lectotype designated by BÄCHLI (1982). Both specimens are kept in the Thunberg collection of the Zoological Museum Uppsala. The present name of this species is *Stegana furta* (Linnaeus).

Drosophila fuscimana Zetterstedt, 1840: 776

Lectotype ♂: black square [=Lapland trip 1832] / D. fuscimana ♂ Nordanås. 15 / Ztt 15 Drosophila fuscimana Z. Lectotype ♂ G. Bächli det. 1989 / [head missing].

1 paralectotype ♂: Ztt 93.

Comments: LECTOTYPE by present designation. Type locality according to lectotype: Nordanås, Lapland. The present name of this species is *Chymomyza fuscimana* (Zetterstedt).

Drosophila fuscula Fallén, 1823: 7

Lectotype: Drosophila fuscula ♂/34/54 55 / D. (=Drosophila EBB) fuscula Lectotype det Collin '55 / Diastata fuscula Fln det. J. E. Collin 1955.

Comments: Lectotype designated by CHANDLER (1987), kept in the Riksmuseum Stockholm. The present name of this species is *Diastata fuscula* (Fallén).

Drosophila glabra Fallén, 1823: 8

Lectotype ♂: D. glabra ♂/59 55/54/D. glabra Fln. Lectotype det Collin '55 / Camilla glabra Fln ♂ det. J. E. Collin 1955 / Fln 54 Drosophila glabra F. Lectotype ♂ G. Bächli det. 1989 / [somewhat covered with mould].

5 paralectotypes ♂ ♀: Fln 55, Fln 56, Ztt 100, Ztt 105, Ztt 205.

Comments: Lectotype designated by COLLIN (1956). The present name of this species is *Camilla glabra* (Fallén).

Drosophila graminum Fallén, 1823: 8

Lectotype ♀: D. graminum ♂ / 108 54 / Lectotype in accord. with Hardy 1849 [J. E. Collin's label]/57 55/39/Scapt. graminum (Fln) ♀ det Basden 1956 Lectotype of Drosophila graminum Fln. / Fln 39 Drosophila graminum F. Lectotype ♀ G. Bächli det. 1989 / [head missing].

1 paralectotype ♀: Fln 44.

Comments: Lectotype designated by BÄCHLI (1982). The present name of this species is *Scaptomyza graminum* (Fallén).

Drosophila griseola Zetterstedt, 1847: 2562

Holotype missing [only label on short pin]: D. griseola Dalec. [=Dalecarlia] Boh. [=Boheman] ♀.

Comments: There are clear concepts of *Scaptomyza griseola* as being a species distinct from *S. graminum* (e.g. HACKMAN 1955, 1959). For the moment it seems best to me to accept this view, in spite of lack of type material.

Drosophila laeta Zetterstedt, 1847: 2555 (as var. b. *laeta* of *Drosophila transversa*)

Lectotype ♀: red square [=Lund and its neighbourhood] / var. b latea ♀ Paradislyckan / Lectotype of Drosophila laeta Zett Selected by E. B. Basden 1960/89/Ztt 89 Drosophila laeta Z. Lectotype ♀ G. Bächli det. 1989.

1 paralectotype ♀: Ztt 90.

Comments: Lectotype designated by BÄCHLI (1982). Type locality according to lectotype: Paradislyckan, Lund. Both specimens are teneral females. According to the shape of the oviscape *D. laeta* is conspecific with *D. phalerata* Meigen (NEW SYNONYMY).

Drosophila marginella Zetterstedt, 1840: 777

Lectotype ♂: black square [=Lapland trip 1832] / Dros. marginella Ins. Lapp. ♂. Diastata costata Zett. Stensele. / 313 / Drosophila marginella Ztt Lectotype Selected by E. B. Basden 1956 / Diastata costata Mg. det J. E. Collin '56 / Ztt 313 Drosophila marginella Z. Lectotype ♂ G. Bächli det. 1989.

1 paralectotype ♀: Ztt 314.

Comments: LECTOTYPE by present designation. Type locality according to lectotype: Stensele, Lapland. This is a synonym of *Diastata fuscula* (Fallén).

Drosophila nigriventris Zetterstedt, 1847: 2557

Lectotype ♂: D. nigriventris ♂ Smol. [=Smolandia] / Lectotype of nigriventris Ztt Selected by E. B. Basden 1960/94/Ztt 94 Drosophila nigriventris Z. Lectotype ♂ G. Bächli det. 1989 / [on separate pin:] pin-mount of abdomen / [head, body & one leg to card-mount].

1 paralectotype ♀: Ztt 95.

Comments: Lectotype designated by BÄCHLI (1982). *Drosophila nigriventris* being pre-occupied, the valid name of this species is *Microdrosophila zetterstedti* Wheeler. The abdomen of the holotype specimen is uniformly black, but the epandrium is yellow.

Drosophila obscura Fallén, 1823: 6

Lectotype ♂: D. obscura ♀ / 137 51 / Ifr. Ent. Avd. microscop. prep., Specimen No. 31 / Right wing to slide / Dros. obscura Lectotype Selected by E. B. Basden 1956 (v. Cain *et al.* 1952) / 3: 44 R. M. prep. 3958 60 / Fln 31 Drosophila obscura F. Lectotype ♂ G. Bächli det 1989 / [covered with mould; abdomen & front left leg to slides (Cain)].

2 paralectotypes ♂♂: Fln 29, Ztt 65.

Comments: Lectotype designated by BÄCHLI (1982). The status of this species was discussed by CAIN *et al.* (1952).

Drosophila pallida Zetterstedt, 1847: 2571

Lectotype: blue square [=Äsperöd/Mellby] / D. pallida Z graminum Fall var. d. ♂. Esp. [=Äsperöd] / Lectotype of Drosophila pallida Ztt. Selected by E. B. Basden 1960 / 167 / Ztt 167 Drosophila pallida Z. Lectotype G. Bächli det. 1989 / [head, abdomen & some legs missing].

2 paralectotypes: Ztt 168, Ztt 273.

Comments: Lectotype designated by BÄCHLI (1982). The present name of this species is *Scaptomyza pallida* (Zetterstedt). The poor condition of the lectotype does not allow a complete description. However, there is no doubt about the identity of this species.

Drosophila sordida Zetterstedt, 1840: 777

Lectotype ♂: black square [=Lapland trip 1832] / D. sordida ♂. Wilhelmina. / D. graminum var. b. Zett. / Lectotype of Drosophila sordida Zett. Selected by E. B. Basden 1960/21/Ztt 21 Drosophila sordida Z. Lectotype ♂ G. Bächli det. 1989 / [on separate pin:] pin-mount of abdomen / Ztt 21.

1 paralectotype ♀: Ztt 22.

Comments: Lectotype designated by BÄCHLI (1982). Type locality according to lectotype: Vilhelmina, Lapland. This is clearly a *Scaptomyza* species, probably conspecific with *Scaptomyza teinoptera* Hackman.

Drosophila transversa Fallén, 1823: 6

Lectotype ♂: pin-mount of abdomen / 28 / Drosophila transversa Fln Lectotype ♂ Selected by E. B. Basden 1956 / Right wing to slide E. B. Basden '56/3: 44 R. M. prep. 3957 / Fln 28 Drosophila transversa F. Lectotype ♂ G. Bächli det. 1989 / [complete but somewhat covered with mould].

4 paralectotypes ♀♀: Fln 24-Fln 27.

Comments: Lectotype designated by BÄCHLI (1982).

Drosophila tristis Fallén, 1823: 7

Lectotype ♂: blue square [=Äsperöd/Mellby] / 92 / D. tristis. ♀. Esp. [=Äsperöd] Mus. Fall. / pin-mount of abdomen [bad condition] / Dros. tristis Fln Lectotype Selected 1956 by E. B. Basden (v. Cain *et al.* 1952) / Ztt 92 Drosophila tristis F. Lectotype ♂ G. Bächli det. 1989 / [antennae damaged].

Comments: Lectotype designated by BASDEN (1958) who discussed the identity of this species.

Geomyza unipunctum Zetterstedt, 1847: 2533

3 syntypes ♂♂: Dlc. alp. [=Dalecarlia alpes] / Bhn [=Boheman] / Geomyza unipunctum Z. Syntype ♂ G. Bächli det. 1989 / Scaptomyza unipunctum Z. G. Bächli det.

1 syntype ♂: light green square [=Jämtland and Norway trip 1840] / [on main pin:] G. Unipunctum ♂ Helsingia / Arbrå Helsingland 24/8 40./268/Ztt 362 Geomyza unipunctum Z. Syntype ♂ G. Bächli det. 1989 / Scaptomyza unipunctum Z. G. Bächli det. / [somewhat covered with mould].

Comments: The present name of this species is *Scaptomyza unipunctum* (Zetterstedt).

Drosophila variegata Fallén, 1823: 5

Lectotype ♀: 8 / Drosophila variegata Fln Lectotype Selected by E. B. Basden 1955 / Phortica variegata (Fln) ♀ det. Basden '55/375 60/51 74/pin-mount of abdomen [Máca] / Fln 8 Drosophila variegata F. Lectotype ♀ G. Bächli det. 1989 / [head missing].

2 paralectotypes ♀♀: Fln 6, Fln 7.

Comments: Lectotype designated by MÁCA (1977). The present name of this species is *Amiota variegata* (Fallén).

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Peuplements lombriciens et activité de surface en relation avec les boues d'épuration et autres fumures *

par

Gérard CUENDET ** et Alain DUCOMMUN ***

Avec 5 figures

ABSTRACT

Earthworm populations and surface activity in relation with sewage sludge and other fertilizers. — This study, that belongs to a more general one dealing mainly with Macroarthropods, aims to better the knowledge of sewage sludge's influence on earthworm populations. In the experimental conditions, the spreading of sewage sludge associated with farmyard manure appears to have a positive effect on earthworm populations. Particularly, *Allolobophora chlorotica* seems to thrive with the sewage sludge. In agreement with other studies, organic fertilizers favor more earthworms than mineral ones. Other land use practices (ploughing, crops rotation, etc.) have also an influence on the populations. On the other hand, surface activity of earthworms was studied with Barber pit falls. All the present species are active at the surface of the soil with the highest activity recorded with the epigeic earthworms and the lowest with the endogeic ones. Rainfall and temperature determine earthworms' surface activity which may be qualified as "hygrophilous" and "thermophobe".

1. INTRODUCTION

Début 1985, la Suisse produisait 3.8 Mio de m^3 de boues d'épuration, soit 230 000 t de matière sèche, dont près de la moitié était utilisée dans l'agriculture pour sa valeur fertilisante (OFPE, 1985).

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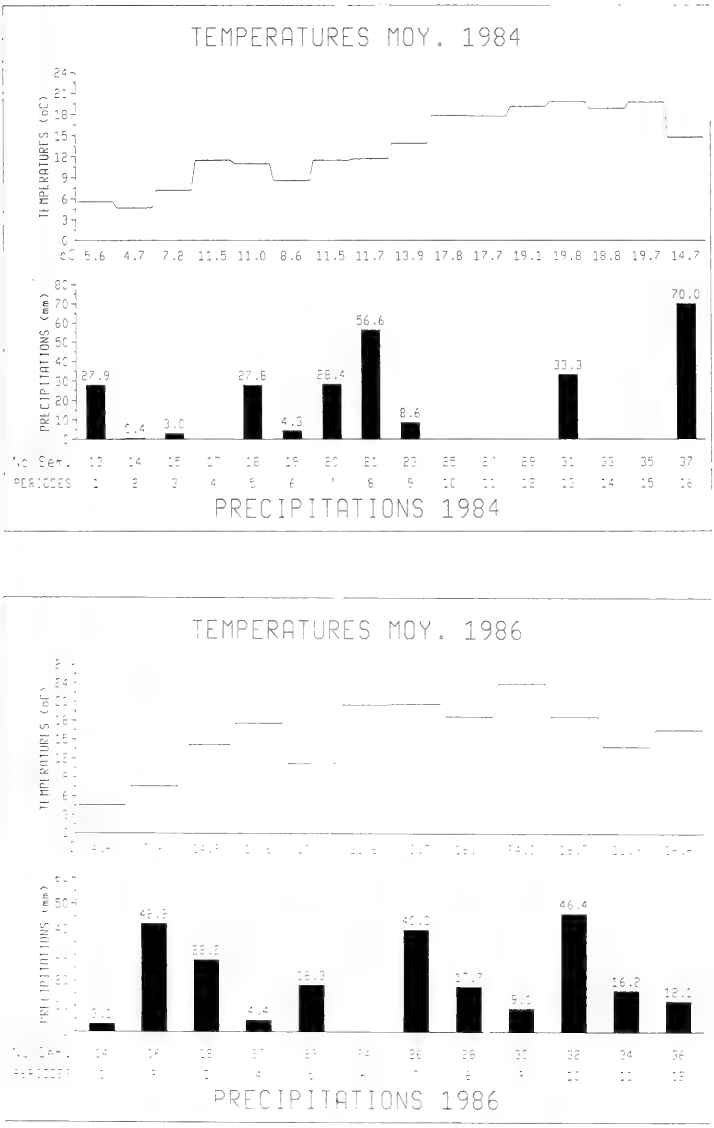

FIG. 1.

Climats locaux 1984 et 1986. Données de l'Observatoire de Neuchâtel.

Pour 1984, les périodes 1 à 16 correspondent aux semaines 13 à 15, 17 à 21 et 23, 25, 27, 29, 31, 33, 35 et 37. Pour 1986, les périodes 1 à 12 correspondent aux semaines paires 14 à 36 du calendrier.

L'utilisation de ces boues pose de multiples problèmes liés aux germes pathogènes, aux métaux lourds et aux micropolluants (CATROUX *et al.,* 1983; COKER, 1983; DIERCXSENS et TARRADELLAS, 1987). Leur usage, l'utilisation d'autres fumures ainsi que les pratiques agricoles se répercutent sur les communautés vivantes du sol (DIERXCENS *et al.,* 1985; GHILAROV, 1978; HELMKE *et al.,* 1979; ZETTEL et KLINGLER, 1983). L'importance de celles-ci pour le maintien à long terme de la fertilité des terrains cultivés est reconnue (BACHELIER, 1978). En particulier, le rôle des peuplements lombriciens dans l'amélioration de la structure et de la porosité des sols, dans l'incorporation de la matière organique et le brassage des horizons pédologiques, ainsi que dans la stimulation de l'activité des microorganismes a bien été mis en évidence (DEBRY *et al.,* 1982; HOOGERKAMP *et al.,* 1983; KRETZSCHMAR, 1978; LOQUET *et al.,* 1977; RAW, 1962). Ainsi l'importance de connaître l'influence des boues d'épuration, épandues seules ou combinées à d'autres fumures, sur les peuplements lombriciens a motivé notre recherche. Ce travail s'intègre dans une étude plus générale axée principalement sur les Macroarthropodes.

2. DESCRIPTION DES MILIEUX

2.1. LOCALISATION DES TERRAINS ET CLIMAT

Les régions d'expérimentation de Cressier/Le Landeron (Petit-Marais et Vieille-Thielle) et de Witzwil (domaine agricole du pénitencier), situées entre les lacs de Neuchâtel et de Bienne (altitude 431 m), appartiennent aux niveaux thermiques «très doux», «doux» et «assez doux» (SCHREIBER, 1977). Les données météorologiques de l'Observatoire de Neuchâtel permettent de caractériser le climat de nos milieux (Fig. 1).

2.2. FUMURES, CULTURES ET TRAVAIL DU SOL

En 1984 (Tabl. 1), cinq parcelles de 100 m^2 chacune (parcelles L4, L5, L6, L7 et L8), situées sur un champ à sol humifère, ont été fumées spécialement. La nature des fumures et leur durée de séjour en surface sont précisées dans la légende du tableau 1. Ce premier champ a été enrichi depuis plus de 10 ans avec 300 q ha^{-1} an^{-1} de fumier bovin et avec 700-800 kg ha^{-1} an^{-1} d'engrais minéraux solubles (NPK). Depuis 1982, il a reçu en complément 50 m^3 ha^{-1} an^{-1} de boues d'épuration liquides. Les teneurs en azote total des boues et du fumier bovin valent respectivement 1,7 et 5,0 kg t^{-1}. Depuis une douzaine d'années, ce champ est toujours cultivé en maïs. Pour comparaison, la parcelle L9 a été choisie sur un sol limoneux qui n'est engraissé qu'avec des engrais minéraux solubles (mêmes proportions que ci-dessus); il n'a subi qu'un seul épandage de boues en 1983. Depuis une douzaine d'années aussi, ce champ est cultivé tantôt en maïs, tantôt en céréale suivie d'une culture dérobée.

Pour l'expérimentation 1986 (Tabl. 2), nous avons repris la parcelle L5. Afin de connaître le peuplement animal de référence d'un champ ni engraissé ni perturbé par les pratiques agricoles depuis une dizaine d'années, nous avons choisi la parcelle VT10, délimitée dans la prairie de fauche permanente de la réserve naturelle de «La Vieille-Thielle». Les terrains expérimentaux situés sur le domaine agricole de Witzwil (parcelles W11, W12, W13, W14, W15 et W16) ont tous été engraissés annuellement au moyen d'engrais minéraux solubles (350 kg ha^{-1} an^{-1} PK) jusqu'en 1985. Cette année-là, les champs supportant les parcelles W11, W13 et W15 ont reçu une fumure organique (boues d'épuration liquides: 30 m^3 ha^{-1}; fumier bovin: 300 q ha^{-1}) (Tabl. 2); les autres ont

TABLE 1.

Parcelles expérimentales 1984.

Le fumier «FL» de L4 et celui de L5 ont été épandus le 1er mars et enfouis le 20 mars 1984; le fumier «FC» de L7 a été épandu et enfoui le 23 mars 1984. Les boues de L5 et L6 sont demeurées en surface du 20 mars au 24 avril 1984. Les engrais minéraux (NPK) ont été épandus sur toute les parcelles à cette dernière date.

			SOL		
NO STATION LOCALISATION	**CULTURES**	**FUMURES**	**TYPOLOGIE**	**TENEUR EN MATIERE ORGANIQUE MO%**	**TENEUR EN EAU CAPACITE AU CHAMP CAC%**
L4 LE LANDERON	MAIS	FUMIER (FL)	Humifère "H"	26.2	77.3 ± 5.2
L5 LE LANDERON	MAIS	FUMIER BOUES	Humifère "H"	23.7	65.3 ± 2.5
L6 LE LANDERON	MAIS	BOUES	Humifère "H"	17.6	61.9 ± 2.6
L7 LE LANDERON	MAIS	FUMIER (FC)	Humifère "H"	20.4	60.1 ± 3.8
L8 LE LANDERON	MAIS	N P K	Humifère "H"	28.9	75.1 ± 9.5
L9 LE LANDERON	MAIS	N P K	Limoneux "L"	5.4	28.6 ± 1.6

continué à recevoir des engrais minéraux. Toutes ces terres sont soumises à une rotation régulière des cultures (colza, betteraves, diverses céréales dont le maïs, prairie artificielle, etc.).

Tous les sols de notre recherche sont labourés annuellement sur une profondeur de 20-25 cm. A Witzwil, pour lutter contre l'affaissement et le tassement, ainsi que pour freiner l'oxydation de la matière organique, plusieurs terrains ont subi un labour profond de 1-2 m depuis 1979 (KAESER, 1983) (Tabl. 2). Cette pratique, en mélangeant les horizons pédologiques, crée une grande hétérogénéité qui disparaît progressivement suite au travail régulier du sol. Elle se répercute ainsi momentanément sur les dosages de la matière organique (MO%) des sols et sur les mesures de leur teneur en eau (CAC%) (Tabl. 2).

TABLE 2.

Parcelles expérimentales 1986.

La typologie des sols est basée sur l'échelle 1979 de classification des sols et sur la terminologie des stations fédérales de recherches agronomiques suisses (ROD, 1980), ainsi que sur la nomenclature admise par la Société suisse de pédologie. La typologie concerne le champ entier; la teneur en matière organique ne concerne que la parcelle de 100 m² («humique»: 5-10% MO; «riche en humus»: 10-20%; «humifère»: plus de 20% MO).

			SOL			
NO STATION LOCALISATION	CULTURES	FUMURES	TYPOLOGIE	TENEUR EN MATIERE ORGANIQUE MO%	TENEUR EN EAU CAPACITE AU CHAMP CAC%	LABOURS PROFONDS
L5 LE LANDERON	MAIS	FUMIER (depuis 1982) BOUES	Humifère "H"	26.8	62.8 ± 4.7	-
VT10 VIEILLE-THIELLE	Prairie de fauche permanente	néant	Argileux "A" riche en humus	18.5	57.5 ± 1.6	-
W11 WITZWIL	Prairie artificielle	BOUES (depuis 1985)	Sable limoneux "Sl" humique	6.9	28.7 ± 1.2	1982
W12 WITZWIL	MAIS	P K	Humifère "H"	34.2	49.5 ± 7.2	-
W13 WITZWIL	MAIS	FUMIER	Limoneux "L" riche en humus	12.9	32.1 ± 3.4	1979
W14 WITZWIL	SEIGLE	P K	Sable limoneux "Sl" humique	3.7	36.1 ± 7.2	1984
W15 WITZWIL	SEIGLE	BOUES (depuis 1985)	Sable limoneux "Sl" humique	34.0	81.1 ± 8.0	1982
W16 WITZWIL	CAROTTES	P K	Limon argileux "La" riche en humus	11.7	32.7 ± 1.2	-

2.3. TYPOLOGIE, PH, TENEURS EN MATIÈRE ORGANIQUE (MO%) ET EN EAU (CAC%) DES TERRAINS ET DES PARCELLES

La typologie, le pH et la teneur moyenne en matière organique (MO%) des terrains expérimentaux 1984 et 1986 ont été déterminées respectivement par SOL-CONSEIL (Nyon) et par la Station fédérale de Liebefeld, à l'exception de la typologie de la parcelle VT10 qui a été définie au Laboratoire d'écologie végétale de l'Université de Neuchâtel (méthode de la pipette de ROBINSON). La teneur moyenne en matière organique des parcelles (100 m²) a été déterminée par nos soins grâce à la méthode de la perte au feu (ALLEN *& al.*, 1974; BALL, 1964).

Les pH des stations étudiées en 1984 ont variés de 7,6 à 7,9; les valeurs obtenues en 1986 étaient comprises entre pH 7,1 et pH 7,7.

La capacité au champ des sols (CAC%) exprime la quantité d'eau qu'ils retiennent lorsque l'eau de gravité a cessé de s'écouler. Cette capacité varie en fonction de leur teneur en éléments fins et en matière organique (SOLTNER, 1983). Elle a été mesurée selon la méthode décrite par AUBERT (1978) et selon les indications de DUCHAUFOUR (1965 et 1984).

Le sous-sol imperméable de nos champs retient bien l'eau de pluie; d'autre part, ils sont influencés par le lac de Neuchâtel et par le canal de la Thielle. Ainsi, ils restent bien humides pendant toute la saison sèche et subissent de fréquentes inondations au printemps. D'ailleurs, la mise en culture de toute la région qui nous intéresse n'a été rendue possible qu'au prix d'imposants drainages réalisés entre 1970 et 1985.

3. MÉTHODES

3.1. PEUPLEMENTS LOMBRICIENS

L'estimation quantitative des peuplements lombriciens des 3 parcelles L5, VT10 et W12 a été réalisée en triant manuellement deux fois 10 carottes de sol de 0,0625 m^2 de surface et 0,3 m de profondeur, prélevées au hasard dans chaque parcelle à l'aide d'un cylindre d'acier enfoncé rapidement dans le sol. Après l'extraction de chaque carotte, 5 litres de formaldéhyde 0,1% ont été versés dans le trou, afin d'extraire les lombriciens qui n'auraient pas été atteints par le carotteur. Les vers de terre, conservés dans une solution de formaldéhyde 4% ont été pesés un certain temps après la récolte et les valeurs observées ont par conséquent été corrigées à l'aide de facteurs de correction (CUENDET, 1985).

La détermination de la diversité des 3 peuplements est basée sur les résultats du double tri manuel, ainsi que sur ceux concernant l'activité de surface.

3.2. ACTIVITÉ DE SURFACE

L'activité de surface des lombriciens a été mise en évidence par l'utilisation de pièges Barber, qui sont des pièges d'activité, neutres, destinés à capturer la faune circulant à la surface du sol.

Une batterie de 16 pièges Barber (gobelets de 70 mm de diamètre et 80 mm de profondeur enfoncés dans le sol et remplis au tiers d'éthylène-glycol à 20%) a été installée dans chaque parcelle. Ils ont été relevés chaque semaine du 27 mars au 28 mai 1984, une semaine sur deux du 4 juin au 18 septembre 1984 et du 7 avril au 15 septembre 1986.

L'éthylène-glycol, liquide conservateur non attractif adapté au prélèvement des arthropodes, ne convient que partiellement aux lombriciens qui deviennent flasques après quelques jours. Cette perte de fermeté des tissus, ainsi qu'une relative disparition des pigments pour les individus du genre *Nicodrilus,* ont rendu la détermination difficile et explique la présence dans les résultats d'une certaine quantité d'«apigmentés indéterminés».

Les poids frais moyens des individus adultes récoltés pour l'estimation quantitative des peuplements et ceux des individus adultes prélevés dans les pièges Barber, mesurés après un certain séjour dans un liquide conservateur, sont apparus comme sensiblement identiques. Les valeurs observées pour les biomasses n'ont donc pas été corrigées et donnent apparemment une bonne idée des biomasses en poids frais prélevées dans les pièges.

TABLE 3.

Les trois peuplements lombriciens.

	LE LANDERON (L5)			VIEILLE-THIELLE (VT10)			WITZWIL (W12)		
TAXON	**DENSITE** ind. m-2	**BIOMASSE** g. m-2	**CONSTANCE** %	**DENSITE** ind. m-2	**BIOMASSE** g. m-2	**CONSTANCE** %	**DENSITE** ind. m-2	**BIOMASSE** g. m-2	**CONSTANCE** %
Lumbricus r. rubellus	9.5	0.39	60			présence	12.6	1.91	60
Nicodrilus l. longus	15.8	8.23	90	138.2	66.36	100	36.2	29.31	80
Nicodrilus l. ripicola				26.8	11.51	80	34.7	6.78	70
Nicodrilus nocturnus	15.8	7.05	90	9.9	5.28	10			
Nicodrilus c. caliginosus	137.1	21.63	100	50.4	10.31	80	189.0	16.51	100
Allolobophora chlorotica	615.9	46.31	100	140.2	15.71	100			présence
Allolobophora icterica	40.6	7.65	50						
Allolobophora rosea	101.4	9.05	90	333.1	23.04	100	96.1	6.55	90
Allolobophora cupulifera	18.7	1.75	30	43.4	3.11	60			
Octolasion cyaneum							1.6	2.53	10
TOTAL	954.6	102.06		742.0	135.32		370.2	63.59	

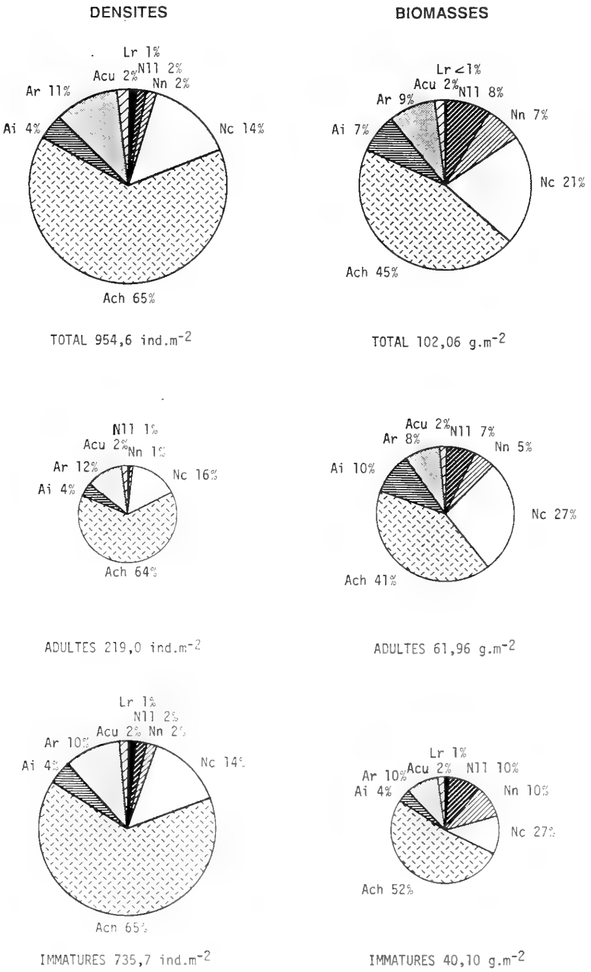

FIG. 2.

Peuplement lombricien du Landeron (L5); densités et biomasses.

Abréviations (sans ponctuation sur les graphiques discoïdaux) et catégories écologiques des espèces et sous-espèces observées (la systématique utilisée est celle de BOUCHÉ 1972 et 1976a):

A.ch.	*Allolobophora chlorotica chlorotica* (Savigny, 1826), forme verte, épiendogée
A.cu.	*Allolobophora cupulifera* Tétry, 1937, épiendogée caractéristique de sols humides
A.i.	*Allolobophora icterica* (Savigny, 1826), endogée
A.r.	*Allolobophora rosea* (Savigny, 1826), épiendogée
E.t.	*Eiseniella tetraedra* (Savigny, 1826), épigée caractéristique de sols humides
L.r.	*Lumbricus rubellus rubellus* Hoffmeister, 1843, épigée à légère tendance anécique
N.c.	*Nicodrilus caliginosus caliginosus* (Savigny, 1826), épiendogée
N.l.l.	*Nicodrilus longus longus* (Ude, 1885), anécique
N.l.r.	*Nicodrilus longus ripicola* var. *viridis* Bouché, 1972, anécique caractéristique de sols humides
N.n.	*Nicodrilus nocturnus* (Evans, 1942), anécique
O.c.	*Octolasion cyaneum* (Savigny, 1826), épiendogée
O.l.	*Octolasion tyrtaeum lacteum* Oerley, 1885, épiendogée

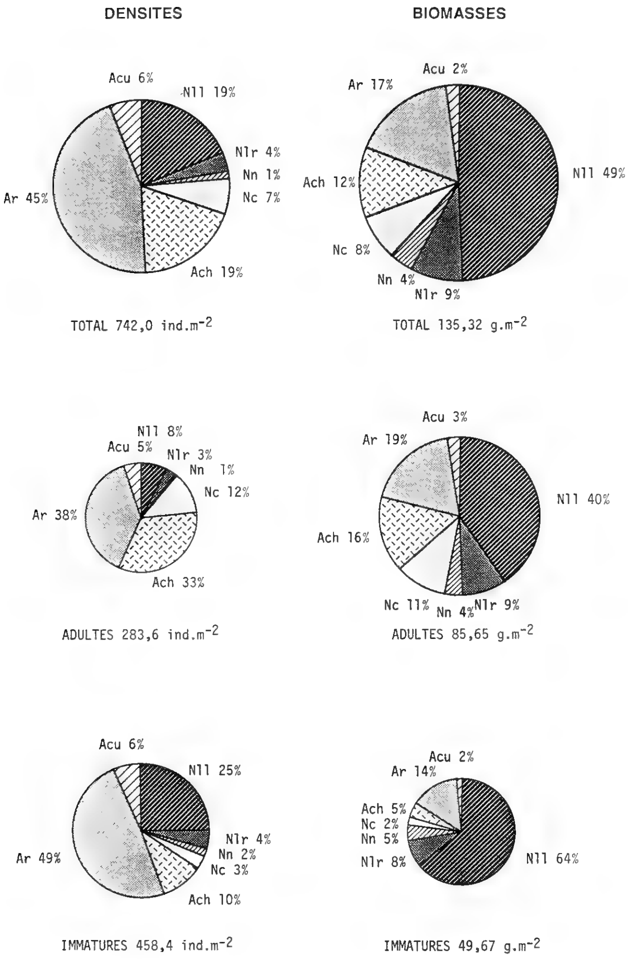

FIG. 3.

Peuplement lombricien de la Vieille-Thielle (VT10).

Abréviations: voir fig. 2.

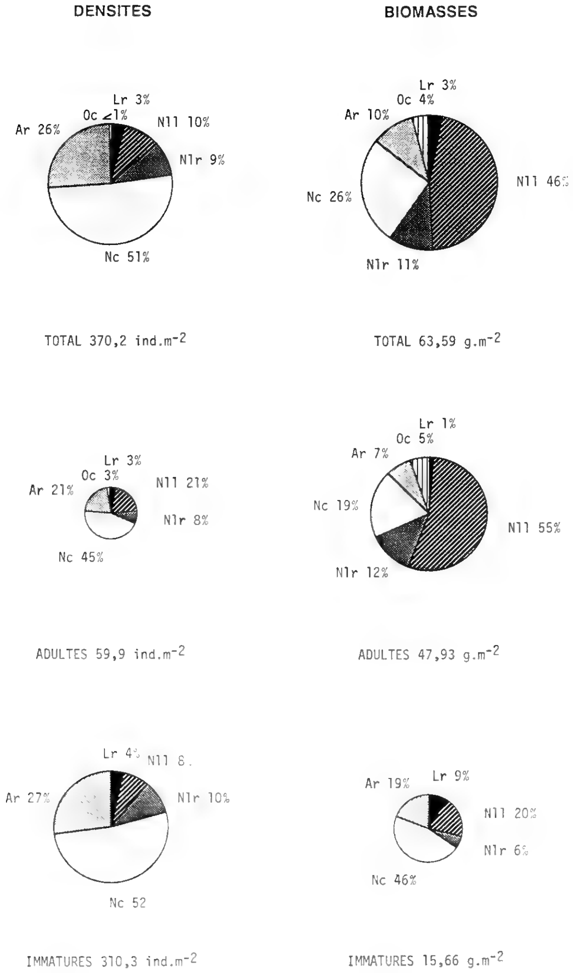

FIG. 4.

Peuplement lombricien de Witzwil (W12).

Abréviations: voir fig. 2.

4. RÉSULTATS

4.1. PEUPLEMENTS LOMBRICIENS

Le tableau 3 et les figures 2, 3 et 4 présentent les 3 peuplements lombriciens tels qu'ils apparaissent à l'étude des prélèvements effectués dans les 3 sols en automne 1986. Deux espèces non observées dans les échantillons de sol sont indiquées comme présentes, car elles ont été récoltées dans des pièges Barber.

4.1.1. *Caractéristiques communes aux trois peuplements*

La présence de *N. l. ripicola viridis* et *A. cupulifera* indique la nature hydromorphe des 3 sols étudiés.

La présence des épigés (*L. r. rubellus*) est très faible, ce qui est compréhensible dans les deux sols labourés (L5 et W12), mais étonne dans le cas de la prairie permanente (VT10). Dans cette dernière, l'existence passée de culture, ainsi que la grande présence des anéciques et donc une forte concurrence alimentaire peuvent expliquer cette très faible présence des épigés.

Composés chacun de 8 espèces et sous-espèces, ces peuplements possèdent une diversité normale pour des sols agricoles du Plateau Suisse (CUENDET, 1979; CUENDET et BIERI, en prép.).

Le grand nombre d'immatures observés correspond à l'éclosion des cocons au début de l'automne.

4.1.2. *Caractéristiques propres à chaque peuplement*

Le peuplement du Landeron montre une très nette dominance des endogés (5 espèces, 96% et 85% de la densité et de la biomasse totales), en fait une dominance très marquée de l'épiendogé *A. chlorotica.* Bien qu'étant cantonnée à proximité de la surface du sol, cette espèce semble bien résister aux pratiques agricoles, grâce à sa petite taille et son taux de reproduction élevé (GERARD, 1967).

Le peuplement de la Vieille-Thielle est apparemment celui dont la densité et la biomasse sont les plus stables, de par la présence importante des anéciques (biomasse adulte élevée, taux de renouvellement relativement faible).

Celui de Witzwil, bien que présentant une diversité normale, est un peuplement lombricien faible autant en densité qu'en biomasse, caractéristique d'un sol cultivé intensivement et avec un faible retour de matière organique végétale (assolement avec peu de prairie, fort emploi d'engrais minéraux solubles et désherbants).

4.2. ACTIVITÉ DE SURFACE

Les résultats de la détermination et de la quantification des lombriciens récoltés dans les pièges Barber sont présentés par les tableaux 4 et 5 et la figure 5, qui permettent de comparer l'activité de surface des différentes espèces.

Il apparaît que toutes les espèces observées lors de l'étude des 3 peuplements ont été récoltées dans des pièges Barber et donc été présentes en surface à une période ou une autre.

Par ailleurs, la comparaison entre les abondances relatives des différentes espèces dans les 3 peuplements et dans les récoltes des pièges Barber (troisième colonne des tableaux 4 et 5) met en évidence 3 types de comportement:

- des lombriciens apparaissent sur-représentés dans les pièges, c'est-à-dire ont une grande activité de surface; c'est le cas de *L. r. rubellus,* qui est bien reconnu comme ayant une forte activité épigée (KOBEL-LAMPARSKY et LAMPARSKY, 1983),
- d'autres n'apparaissent que relativement rarement et en faible quantité dans les pièges; ce sont les espèces *A. rosea* et *N. c. caliginosus*,
- certains apparaissent comme sur-représentés par endroits dans les pièges et sous-représentés dans d'autres; c'est le cas d'*A. chlorotica,* qui montre partout une importante activité de surface, ne correspondant pas cependant dans le peuplement du Landeron à l'importance relative de sa présence; c'est aussi le cas des *N.*sp. anéciques.

TABLE 4.

Activité de surface des lombriciens en 1984.

Parcelles	Espèces déterminées	Abondance en% (1)	Grandes récoltes (2)	Constance en % (3)	Nombre total d'individus	Biomasse totale en mg
L4	*L.r.rubellus*	11	10.9. - 18.9.	62	200	38 717
	N.longus	10				
	N.nocturnus	*(N.sp.an.)*				
	N.c.caliginosus	41				
	A.chlorotica	27				
L5	*L.r.rubellus*	27 (1)	21.5. - 28.5.	44	41	10 848
	N.longus	7 (3)				
	A.chlorotica	44 (65)				
	A.icterica	4 (4)				
L6	*L.sp.*	1	21.5. - 28.5.	44	22	7 230
	N.longus	19				
	N.c.caliginosus	50				
	A.chlorotica	19				
	A.cupulifera	6				
L7	*L.r.rubellus*	11	10.9. - 18.9.	44	28	13 062
	L.castaneus	4				
	N.longus	16				
	N.c.caliginosus	36				
	A.chlorotica	24				
L8	*E.tetraedra*	2	1.5. - 7.5. 21.5. - 28.5.	69	100	18 859
	L.r.rubellus	67				
	N.c.caliginosus	9				
	A.chlorotica	7				
	O.t.lacteum	1				
L9	*L.r.rubellus*	32	1.5. - 7.5.	50	22	8 261
	N.longus	42	10.9. - 18.9.			

TABLE 5.

Activité de surface des lombriciens en 1986.

Parcelles	Espèces déterminées	Abondance en% (1)	Grandes récoltes (2)	Constance en % (3)	Nombre total d'individus (4)	Biomasse totale en mg (4)
L5	*Lr.rubellus*	46 (1)		80	89	25 374
	N.longus	17 (3)				
	N.c.caliginosus	8 (14)	2.6. - 9.6.			
	A.chlorotica	3 (65)	22.8. - 29.8			
	A.rosea	2 (11)				
VT10	*L.r.rubellus*	4 (0)		58	81	15 311
	N.sp.anéciques	10 (24)				
	N.c.caliginosus	2 (7)	21.4. - 28.4.			
	A.chlorotica	43 (19)	5.5. - 12.5.			
	A.cupulifera	39 (6)				
W11	*A.chlorotica*	50		22	4	1 209
	O.cyaneum	50				
W12	*L.r.rubellus*	34 (3)		33	150	26 711
	N.longus	18 (19)				
	N.c.caliginosus	6 (51)	5.5. - 12.5.			
	A.chlorotica	19 (0)	2.6. - 9.6.			
	A.rosea	7 (26)				
W13	*L.r.rubellus*	66		67	98	18 707
	L.terrestris	*(L.sp.)*	21.4. - 28.4.			
	N.sp.anéciques	6	5.5. - 12.5.			
	N.c.caliginosus	10	2.6. - 9.6.			
	A.chlorotica	1				
W14	*L.sp.*	29	22.8. - 29.8.	73	21	6 102
	N.longus	40				
W15	*L.r.rubellus*	13		64	40	5 953
	N.longus	30	22.8. - 29.8.			
	A.chlorotica	20				
W16	*L.r.rubellus*	36	22.8. - 29.8.	56	11	1 949
	A.chlorotica	33				

[1] Abondances relatives, pour *E. tetraedra, L. castaneus, L. r. rubellus* et *L. sp.* en % du nombre total de lombriciens récoltés (apigmentés indéterminés compris), pour les autres espèces en % du nombre de lombriciens déterminables. Entre parenthèses, les abondances relatives observées dans les 3 peuplements.

[2] Les périodes de grandes récoltes, 10.9-18.9 signifiant par exemple la période du 10 au 18 septembre.

[3] Constance de la présence des lombriciens dans l'ensemble des récoltes.

[4] Quantités récoltées pendant 10 périodes sur L5, W11 et W16, pendant 11 périodes sur W14 et W15 et pendant 12 périodes sur VT10, W12 et W13.

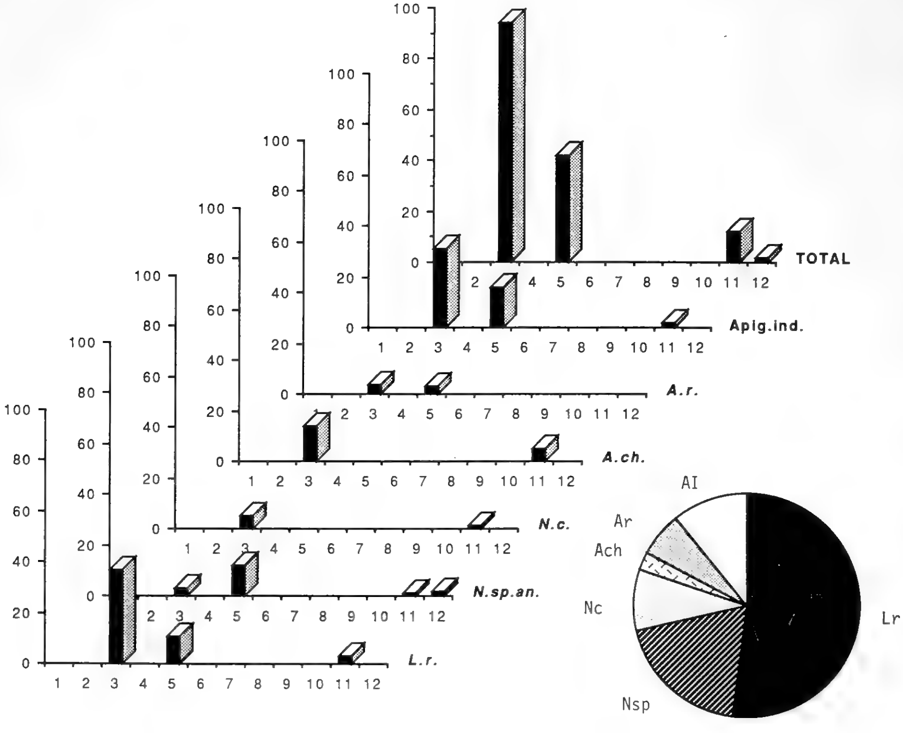

FIG. 5.

Activité de surface des lombriciens observés sur la parcelle W12 en 1986.

Graphes en perspective:
— en abcisse, les 12 périodes de récoltes du 7 avril au 15 septembre,
— en ordonnée, les nombres d'individus récoltés.

Graphe discoïdal: importance relative des différentes espèces dans la biomasse totale récoltée sur cette parcelle.

Abréviations:

Apig.ind. - AI	apigmentés indéterminés
L.sp.	*Lumbricus sp.*
N.sp.an. - Nsp	*Nicrodrilus sp.* anéciques

Autres abréviations: voir fig. 2.

5. DISCUSSION

5.1. LES TROIS PEUPLEMENTS LOMBRICIENS

Bien que situés sur des sols de même type et dans la même région, ces 3 peuplements montrent une hétérogénéité qui n'est manifestement pas le seul fait des pratiques agricoles, mais pourrait correspondre aussi à des compositions initiales différentes.

La comparaison entre les 3 peuplements met en évidence qu'une fumure organique favorise de façon générale plus les lombriciens qu'une fumure uniquement minérale, mais ne suffit pas à compenser les effets de la mise en culture, ce qui a déjà été remarqué ailleurs (EDWARDS et LOFTY, 1977). Ceci pourrait être encore plus évident, si les 3 sols recevaient des fumures identiques en terme de quantité d'azote disponible pour les plantes, ce qui n'est pas le cas, la prairie permanente VT10 ne recevant aucun fertilisant.

Cette comparaison montre donc que l'épandage de boue d'épuration, associé à celui de fumier de bovin, a un effet positif sur les lombriciens. Un même effet positif a été observé pour l'épandage de boue d'épuration par EDWARDS et LOFTY (1982) sur des sols agricoles et par KOBEL-LAMPARSKY (1987) sur un sol forestier. Dans la comparaison présente, *A. chlorotica* paraît particulièrement favorisé par cet apport, ce qui a aussi été remarqué par EDWARDS et LOFTY (1982).

5.2. *Activité de surface*

L'étude des lombriciens récoltés dans les pièges Barber et la comparaison avec ceux récoltés pour estimer les 3 peuplements mettent donc en évidence deux faits confirmés par BOUCHÉ (1976*b*) et KOBEL-LAMPARSKY et LAMPARSKY (1983). Premièrement, toutes les espèces présentes, qu'elles soient épigées, anéciques ou endogées, ont une activité de surface, qui va de pair avec leur aptitude migratoire. Deuxièmement, les épigés (principalement *L. r. rubellus*) sont plus actifs en surface que les anéciques, qui eux-mêmes le sont plus que les endogés. Les premiers ont été récoltés de façon plus constante que les derniers, qui peuvent par contre apparaître en masse lors de conditions météorologiques favorables (par exemple *N. c. caliginosus* sur L1 en 1984 et *A. cupulifera* sur VT10 en 1986).

Par conséquent les récoltes dans les pièges Barber donnent une vision différente des peuplements lombriciens que celles obtenues par les prélèvements de sol associés à l'utilisation de formol 0,1%. Ainsi la parcelle W12 avec peu de récoltes (constance 33%) montre une quantité de lombriciens actifs en surface très nettement supérieure à celle observée sur VT10, où pourtant le peuplement est deux fois plus important. Ceci est peut-être dû en partie à des différences météorologiques locales qui ont provoqué deux grandes sorties à Witzwil.

La comparaison entre les deux années de récoltes sur L5 met en évidence que l'apparition en surface des endogés (*A. icterica, A. rosea* et *N. c. caliginosus*) est très ponctuelle, puisque chacune de ces espèces n'a été récoltée qu'une ou deux fois pendant ces deux années.

5.2.1. *Influence des conditions météorologiques*

D'une façon générale l'activité de surface des lombriciens observée par le biais de leur présence dans les pièges Barber apparaît nettement influencée par les précipitations (Fig. 1). En 1984, deux des trois périodes de grandes récoltes correspondent aux deux maxima de précipitations (fin mai et mi-septembre), alors que celle de début mai correspond à des précipitations moyennement importantes. Au printemps 1986, les deux périodes de grandes récoltes correspondent aux deux maxima de précipitations (fin avril et début mai), alors qu'en été deux périodes de grandes récoltes correspondent à des précipitations moyennement importantes.

Dans le contexte de cette étude, c'est-à-dire durant des périodes ne recouvrant que deux printemps et deux étés, la température ne paraît avoir influencé négativement l'activité de surface des lombriciens que dans la mesure où elle était élevée en été (température moyenne dépassant ou proche de 20°C). Ceci est particulièrement net en été 1986, où durant les deux périodes de fortes précipitations (périodes 7 et 10) très peu de lombriciens ont été récoltés et durant la période la plus chaude (période 9 avec environ 10 mm de précipitations) aucun lombricien n'a été observé dans les pièges. En été 1984, deux périodes seulement furent humides. Durant la première (période 13, température moyenne 20°C), aucun ou très peu de lombriciens ont été récoltés, alors que la seconde correspond à une grande récolte (période 16, nette baisse de la température moyenne qui est de l'ordre de 13°C).

Ces observations concordent avec celles effectuées par BOUCHÉ (1976*b*) dans une prairie permanente, où il a qualifié les lombriciens se déplaçant en surface d'«hygrophiles thermophobes».

5.2.2. *Influence du mode de fertilisation et des autres pratiques agricoles*

La comparaison des récoltes de 1984 et celle des récoltes de 1986 ne permettent pas de mettre en évidence une influence positive plus grande de la fertilisation organique avec ou sans boue d'épuration que celle de la fertilisation purement minérale. Si la récolte totale maximale a été réalisée en 1984 sur la parcelle fertilisée avec du fumier ayant séjourné en surface (L4), il n'en reste pas moins que sur les parcelles n'ayant reçu que des engrais minéraux (L8 et W12), les lombriciens ont aussi été nombreux à être actifs en surface.

Il est probable, par contre, que les labours profonds effectués 2 à 4 ans auparavant aient eu une influence négative sur les vers de terre de W11, W14 et W15, en perturbant drastiquement leur peuplement.

ZUSAMMENFASSUNG

Die vorliegende Arbeit hat zum Ziel, als Teil einer grösseren Untersuchung, den Einfluss von Klärschlamm auf die Regenwürmer im Boden zu untersuchen. Innerhalb der experimentellen Bedingungen (Klärschlamm flüssig, ausgebracht allein oder zusammen mit Stallmist; Mineraldünger; humusreiche Böden; Intensivkulturen und permanente Schnittwiesen) fördert das Ausbringen von Klärschlamm zusammen mit Stallmist die Regenwurmpopulationen am stärksten. Für *A. chlorotica* wurde ein besonders starker Populationszuwachs verzeichnet bei Klärschlamm. Allgemein üben organische Dünger einen günstigeren Einfluss auf die Regenwürmer aus als rein mineralische. Die Art der Bewirtschaftung (Pflügen, Fruchtfolge, etc.) wirkt sich ebenso auf die Regenwürmer aus.

Zusätzlich wurde die Aktivität der Regenwürmer auf der Bodenoberfläche mittels Barberfallen erfasst. Alle gefundenen Arten zeigen eine solche Aktivität: die epigäischen Arten sind die aktivsten gefolgt von den vertikal grabenden, während für die endogäischen Arten die kleinste Aktivität nachgewiesen wurde. In erster Linie beeinflussen Niederschläge und Temperatur die Bodenoberflächen-Aktivität der Regenwürmer, welche als ,,hygrophil-thermophob'' bezeichnet werden können.

RÉSUMÉ

Ce travail, intégré dans une étude plus générale sur les Macroarthropodes, vise à mettre en évidence l'influence des boues d'épuration sur les vers de terre. Dans les conditions expérimentales (boues liquides épandues seules ou combinées au fumier; engrais minéraux; sols riches à très riches en matière organique; cultures intensives et prairie de fauche permanente), les peuplements lombriciens montrent que l'épandage de boues associé à celui du fumier a un effet positif. *A. chlorotica* paraît particulièrement avantagé par les boues. De manière générale, les fumures organiques favorisent plus les vers de terre que les fumures uniquement minérales. Les pratiques agricoles (labours, rotation des cultures, etc.) influencent également ces peuplements.

D'autre part, l'activité de surface des lombriciens a été mise en évidence au moyen de pièges Barber. Toutes les espèces présentes ont une activité de surface: les vers épigés sont plus actifs que les anéciques qui le sont plus que les endogés. Les précipitations et la température déterminent l'activité de surface des lombriciens qui peuvent être qualifiés d'«hygrophiles thermophobes».

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Mikroskopisch-anatomische Untersuchungen am kranialen Integument von *Myotis blythi* (Tomes, 1857) (Mammalia, Chiroptera)[1]

von

Marianne HAFFNER * und Vincent ZISWILER *

Mit einer Abbildung

ABSTRACT

Microscopic-anatomical investigations on the cranial integument of Myotis blythi (Tomes, 1857) (Mammalia, Chiroptera). — The facial integument of the lesser mouse-eared bat *Myotis blythi* was investigated by means of histology and compared with its sibling species *M. myotis* and other species of the genus *Myotis*. This method of investigation showed, that microanatomical characters can also be of diagnostical significance in near-related species.

The results found in *M. blythi* are similar to those in other species of the genus *Myotis*. Therefore *M. myotis* has, with its large number of vibrissae and its differently formed sebaceous glands, a special place within this genus.

There is no reason to suppose, that *M. blythi* specialises in hunting on the ground to the same extent as *M. myotis*. The avoidance of competition between the two sympatric sibling species could therefore be established by the use of different hunting strategies and prey preferences.

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[1] Die vorliegende Arbeit entstand im Rahmen eines Forschungsprogramms des 2. Autors, das vom Schweizerischen Nationalfonds unterstützt wird.

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1. EINLEITUNG

Auf Grund der Anzahl und Anordnung der Gesichtstasthaare konnte für 15 einheimische Arten der Glattnasenfledermäuse (Vespertilionidae) ein Bestimmungsschlüssel erstellt werden (Haffner & Ziswiler 1989). Während einzelne Gattungen bereits makroskopisch voneinander unterschieden werden können, sind vor allem auf Artniveau histologische Untersuchungen nötig, um die kurzen Tasthaare von normalen Gesichtshaaren zu unterscheiden.

Zwillingsarten sind für diese Untersuchungsmethode in zweierlei Hinsicht eine besondere Herausforderung. Einerseits stellt sich die Frage, ob der Anordnung und Anzahl Tasthaare auch bei nahe verwandten Arten diagnostische Signifikanz zukommt und wenn ja, ob sie gegenüber herkömmlichen Methoden gewisse Vorteile mit sich bringt. Andererseits könnten allfällig feststellbare Unterschiede funktionell bedingt sein und dann wäre unsere Methode auch im Hinblick auf eine ökologische Interpretation anwendbar.

In der vorliegenden Arbeit haben wir *Myotis blythi* [1] untersucht und die Befunde mit denjenigen von *Myotis myotis* aus unseren früheren Arbeiten verglichen (Haffner 1987, Haffner & Ziswiler 1989).

2. MATERIAL UND METHODEN

Die Kopfhaut von *M. blythi* wurde entfernt, beide Gesichtshälften und Kinn abpräpariert und nach den herkömmlichen Methoden zu lückenlosen Serien und 10 μ dicken Paraffinschnitten weiterverarbeitet und mit Hämalaun-Eosin (Romeis 1968) gefärbt. Anhand dieser Schnittserien konnte die Anzahl der Tasthaare bestimmt werden. Mittels Serienzeichnungen und unter Berücksichtigung der Schnittdicke konnte die Anordnung der Tasthaare auf dem Gesicht rekonstruiert werden.

Die auf diese Weise erhaltenen Resultate wurden mit den Befunden bei anderen Vertretern der Gattung *Myotis* und im speziellen mit den Verhältnissen bei der Zwillingsart *M. myotis* verglichen (Haffner 1987).

3. RESULTATE

M. blythi hat wie alle bisher untersuchten Vertreter der Gattung *Myotis* auf jeder Gesichtshälfte eine V. superciliares oberhalb der Augen. Mit zwei rostral ausgerichteten V. angulares hinter dem Mundwinkel und sieben in drei Reihen stehenden V. mystaciales auf der Schnauze unterscheidet sich *M. blythi* nicht von *M. bechsteini* und *M. myotis*. Die 13 V. labii superiores stehen bei *M. blythi* in maximal zwei Reihen entlang den Oberlippen, während bei *M. myotis* mehr als 25 solcher Tasthaare auf drei Reihen verteilt sind. Diese Oberlippentasthaare treten in einem spitzen Winkel gegen die Lippen aus der Haut und bilden zusammen mit den benachbarten Gesichtshaaren einen dichten Haarsaum.

In der kaudalen Kinnmitte stehen bei *M. blythi* zwei senkrecht aus der Haut ragende V. interramales wie bei allen bisher untersuchten Vespertilionidae. Die 26 V. submentales am Kinn sind meist in zwei Reihen angeordnet, während die über 36 Kinntasthaare von

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[1] Das Institut de Zoologie et d'Ecologie animale de l'Université de Lausanne, stellte uns in verdankenswerter Weise ein Kleines Mausohr *(Myotis blythi)*, Mb3 IZEA (Ruedi 1987), zur Untersuchung zur Verfügung.

M. myotis hauptsächlich in drei Reihen angeordnet sind. Die Anordnung der Tasthaare bei *M. blythi* ist in Abb. 1 dargestellt.

Auf jeder Gesichtshälfte stehen zwei Haarpinsel (Abb. 1). Im Zentrum jedes Haarpinsels befindet sich ein Haar, dessen Talgdrüsen gegenüber denjenigen bei anderen Gesichtshaaren extrem vergrössert sind. Dieses Drüsenhaar ist von Haaren umgeben, deren Spitzen sich oberhalb des Ausführganges der Talgdrüsen berühren und so einen Pinsel bilden. Die gleichen Verhältnisse wurden bei anderen Vertretern der Gattung *Myotis* gefunden. Die Epidermis um das Drüsenhaar bildet eine behaarte Eisenkung.

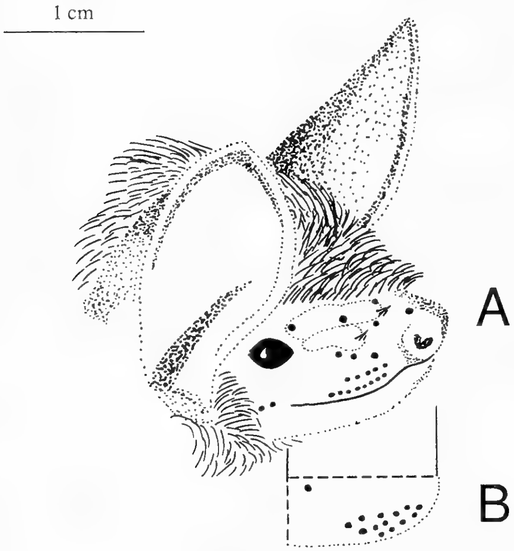

Abb. 1.

Anordnung der Tasthaare am Kopf von *Myotis blythi.* (A) Lateralansicht, (B) Ventralansicht linke Kinnhälfte. Tasthaare als schwarze Punkte dargestellt, Ausdehnung der vergrösserten Talgdrüsen im Integument kaudal der Haarpinsel gepunktet umgrenzt.

Die Talgdrüsen der beiden Drüsenhaare decken zu ähnlich grossen Teilen das gesamte Schnauzenintegument bis zu den Augenpartien ab (Abb. 1). Im rostralen Bereich werden die Talgdrüsen von quergestreiften Muskelfasern der subkutanen Muskulatur an der Basis umfasst und im kaudalen Bereich sind sie sogar in diese versenkt. Bei *M. myotis* ist im Gegensatz zu anderen Vertretern der Gattung *Myotis* die dorsale Talgdrüse im Vergleich zur ventralen ganz klein.

4. DISKUSSION

Auf Grund der Anzahl und Anordnung der Oberlippen- und Kinntasthaare und der gleich grossen Ausbildung der vergrösserten Talgdrüsen ist *M. blythi* den *Myotis*-Arten *M. mystacinus, M. nattereri, M. bechsteini* und *M. daubentoni* ähnlicher, als seiner

Geschwisterart *M. myotis.* Die beiden Zwillingsarten *M. blythi* und *M. myotis* können darum mit dieser histologischen Methode unterschieden werden und bestätigen die Aussage von Ruedi *et al.* (1990), welche mittels biochemischen Methoden nachweisen konnten, dass es sich um zwei valide Arten handelt. Der Vorteil der biochemischen und unserer Methode ist, dass man damit auch Jungtiere, welche noch nicht anhand von Zahnmerkmalen und Körpermassen, den üblichen in der Fledermaustaxonomie verwendeten Merkmalen, den Taxa zuordnen kann (Haffner & Ziswiler 1989, Ruedi 1987).

Die vorliegenden Befunde unterstreichen die Sonderstellung von *M. myotis* innerhalb der Gattung *Myotis.* Für diese Art, welche das ganze Sommerhalbjahr über regelmässig Laufkäfer (Carabidae) frisst (Bauerova 1978, Gebhard & Hirschi 1985, Kolb 1959, Stutz 1985, Graf in Präp.), wurde anhand der grossen Anzahl Tasthaare an der Oberlippe und am Kinn eine strukturgebundene Jagdstrategie postuliert (Haffner 1987). Es wurde auch anhand von Untersuchungen am Fussintegument spekuliert, dass *M. myotis* die teilweise flugunfähigen Laufkäfer sogar am Boden erbeuten könnte (Haffner & Ziswiler 1985).

Über die Ernährung von *M. blythi* liegen bisher keine umfassenden Untersuchungen vor. Unsere Resultate geben aber keinen Anlass zur Vermutung, dass *M. blythi* ein ebenso spezialisierter Bodenjäger sein könnte. Die Vermeidung von Konkurrenz zwischen den beiden sympatrisch vorkommenden Geschwisterarten (Ruedi *et al.* 1990) könnte darum durchaus in einem völlig unterschiedlichen Jagdverhalten und einer unterschiedlichen Beutetierpräferenz begründet sein.

5. ZUSAMMENFASSUNG

Die Gesichtshaut von *Myotis blythi* wurde histologisch untersucht und mit derjenigen der Zwillingsart *M. myotis* und weiterer Vertreter der Gattung *Myotis* verglichen. Mit dieser Untersuchungsmethode konnte gezeigt werden, dass mikroanatomischen Merkmalen auch bei nahe verwandten Arten diagnostische Signifikanz zukommt.

Es zeigte sich, dass die Verhältnisse bei *M. blythi* ähnlich sind wie bei anderen *Myotis*-Arten und somit *M. myotis* mit ihrer grossen Anzahl Tasthaare und den abweichend ausgebildeten Talgdrüsen eine Sonderstellung innerhalb dieser Gattung einnimmt.

Es besteht kein Anlass zur Vermutung, dass *M. blythi* ein ebenso spezialisierter Bodenjäger wie *M. myotis* sein könnte. Die Vermeidung von Konkurrenz zwischen den beiden sympatrisch vorkommenden Geschwisterarten könnte darum in einem unterschiedlichen Jagdverhalten und einer unterschiedlichen Beutetierpräferenz begründet sein.

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Systematic remarks on a rare Crotalid snake from Ecuador, *Bothriechis albocarinata* (Shreve), with some comments on the generic arrangement of arboreal Neotropical pitvipers

by

Beat SCHÄTTI *, EUGEN KRAMER ** & Jean-Marc TOUZET ***

With 3 figures

Abstract

The examination of the type material of *Bothrops albocarinata* Shreve and *B. alticola* Parker revealed some deviations vis-à-vis the original descriptions (e.g. number of interoculars; number of ventrals and contact of subocular with labials). These nominal forms are considered to be conspecific (*Bothriechis albocarinata*). Four specimens of this apparently rare pitviper exhibit variation in some morphological characters (i.e. condition of subcaudals, midbody dorsal scale rows, circumocular scales, internasals etc.). The systematic arrangement of Neotropical pitvipers does not appear to be based on sound evidence for the time being. At least some groupings seem to be artificial.

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INTRODUCTION

During the past years the Natural History Museum of Geneva (MHNG) received a considerable number of amphibians and reptiles from different parts of Ecuador. Among this material there are several species of arboreal pitvipers. Three specimens from the provinces of Morona Santiago and Zamora Chinchipe show a mixture of features which are considered to be characteristic for *Bothriechis albocarinata* (Shreve) and *B. alticola* (Parker). Because our material does not unequivocally fit the description of neither of these forms, we take an examination of the type material to be opportune. At the same time, some critical comments on the currently accepted arrangement of Neotropical pitvipers (BURGER 1971, CAMPBELL & LAMAR 1989) seem to be necessary.

The type material is deposited in the British Museum (Nat. Hist.) at London (BM) and the Museum of Comparative Zoology in Cambridge, Massachusetts (MCZ). A specimen without precise locality data housed in the collection of the Escuela Politécnica Nacional (EPN) at Quito is also included in this study. We are grateful to A. Almendariz (Quito), Colin McCarthy (London) and José P. Rosado (Cambridge) for the loan of these specimens. Corinne Charvet typed the manuscript. The authors are also indebted to James R. Dixon (College Station, Texas) for a critical review of the manuscript and to Rosario Agosti-Gonzalez (Zürich) for the Spanish summary.

MORPHOLOGY AND DISTRIBUTION

The type of *Bothrops albocarinata* (♀, MCZ 36989: Río Pastaza) has 181 ventrals (DOWLING-method, 1951), 59 mostly single subcaudals (except 1, 4 and 56-58), 21 dorsal scale rows around midbody, 9/8 supralabials (right/left, 3rd forming lacunolabial) and 10 sublabials. The internasals are separated from each other by a small scale behind the rostral; there are 6 to 9 interoculars (counted along a straight line between half the length of the supraoculars) and nine scales around the eye (3 preoculars, 2 suboculars and 4 postoculars); the suboculars are separated from the supralabials by a complete row of small scales. In the type of *Bothrops alticola* (♂, BM 1946.1.19.26: "Loja", Ecuador) there are 173 ventrals, 64 + n subcaudals (incomplete; 1-20 single, the remainder divided), 19 midbody scale rows, 7 supralabials (2nd forming lacunolabial) and 9 sublabials. This specimen has the internasals in contact, 5 interoculars, 3 preoculars, a very long and narrow subocular and two granular postoculars. There is an extremely small additional scale between the subocular and the border of the third and fourth supralabial, but otherwise these scales are in contact.

In a juvenile (♂, MHNG 2226.34) from Morona Santiago province, there are 161 ventrals (28 and 39 only developed at the left hand side), 60 subcaudals (single, with exception of 1, 58 and the last one), 21 midbody scale rows, 7 supralabials and 10 sublabials; internasals in contact, 7 interoculars (circumocular area damaged). MHNG 2444.18, a ♀ from Macas (Morona Santiago, 1500 m) has 171 ventrals, 57 subcaudals (mostly divided, except 2-3, 7, 14-16 and 35-36), 19 midbody scale rows, 7 upper and 8 lower labials; internasals separated by an additional scale behind the rostral, 7 interoculars, 3 preoculars, a long and narrow subocular and one postocular; there is a complete row of scales separating the subocular from the labials. MHNG 2464.31, a ♀ from Nambija (Zamora Chinchipe, ca. 1800 m) has 175 ventrals, 54 divided subcaudals, 21 midbody scale rows, 7 supralabials and 10 lower labials; on the right hand side, the anterior part of the *canthus rostralis* is made up of two scales which are separated from the left internasal by a small scale behind the apical shield; there are 7 to 8 interoculars, 3 preoculars, a very long and narrow subocular, and 2/1 postoculars; a complete row of small scales separates the subocular from the upper labials. A ♂ from Cotundo (Napo, EPN RM 309) has 176 ventrals, 66 subcaudals (1-3 and 30-66 divided), 21 midbody scale rows, 7 upper and 8 lower labials; the internasals are in contact and there are 6-7 interoculars, 3 preoculars, a narrow subocular and 4/3 postoculars. The subocular is at least partly in contact with the supralabials; on the left hand side, the subocular reaches to the postocular region and there are four scales (two on the right) of variable size laying between the subocular and the labials.

Tab. 1.

Morphological characters in *Bothriechis albocarinata*. For further explanations see text.

	MCZ 36989	BM 1946. 1.19.26	MHNG 2226.34	MHNG 2444.18	MHNG 2464.31	EPN RM 0309
origin	Río Pastaza	"Loja"	M. Santiago	Macas	Nambija	Cotundo
sex	♀	♂	♂	♀	♀	♂
ventrals	181	173	161	171	175	176
subcaudals	59	64 + n	60	57	54	66
condition of subcaudals	mostly single	variable	mostly single	mostly divided	divided	variable
dorsals	21	19	21	19	21	21
internasals	separated	in contact	in contact	separated	separated	in contact
supralabials	9/8	7	7	7	7	7
contact of subocular/labials	separated	partly in contact	?	separated	separated	partly in contact
interoculars	6-9	5	7	7	7-8	6-7

Apart from the number of ventral and subcaudal scales, the types of *Bothriechis albocarinata* and *B. alticola* differ in midbody dorsal scale rows, the number of upper and lower labials (including lacunolabial), in the snout region (internasals separated by a small scale behind the rostral in *albocarinata,* touching each other in *alticola*), the number of interoculars and circumocular scales, the condition of the subcaudals (predominantly single or divided, respectively), the contact of the subocular with respect to the supralabials (tab. 1) as well as in colouration (greyish green versus greenish yellow) and pattern. In *albocarinata,* the first row of dorsals is coloured alternating black and greenish white, and the lower surface is marked with black squarish spots. The type of *alticola* has a series of transverse black spots partly forming regular bars along the back, and the venter is uniformly yellow on the anterior part but with black mottlings increasing in amount posteriorly.

The condition of the subcaudals, number of midbody dorsal scale rows, the arrangement of the circumocular scales and internasals as well as the suborbital area are also found to be variable in the remaining material at hand. In our specimens, there are always seven supralabials (2^{nd} forming lacunolabial). It seems that the type of *albocarinata* represents aberrant states in these features.

The colouration of the juvenile viper (MHNG 2226.34) corresponds to the pattern found in the type of *albocarinata,* i.e. greyish above (in alcohol) with a distinct postocular stripe, the ventral surface mostly light (creamish) and the tip of the tail uniform, probably yellow or orange in life. These specimens also agree with regard to the condition of the subcaudals and number of dorsal scale rows but differ as to the number of supralabials and the condition of the internasals. Colouration and pattern of MHNG 2444.18 are virtually identical with the type of *alticola.* These two specimens agree with each other in the number of dorsal scale rows and supralabials (tab. 1). MHNG 2464.31 and RM 309 are identical in pattern and colouration (figs 1 and 2).

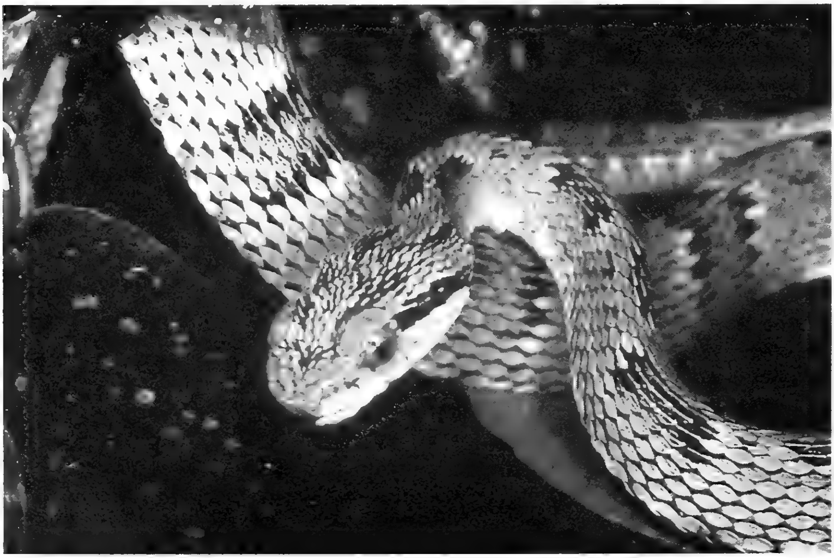

FIG. 1.

A female of *Bothriechis albocarinata* from Zamora Chinchipe (MHNG 2464.31).

The number of midbody dorsal scale rows, supralabials, interocular and circumocular scales are variable in many species of Neotropical pitvipers (see tabs 28 and 29 in CAMPBELL & LAMAR 1989). PETERS (1960) and PETERS & OREJAS-MIRANDA (1970) thought that *albocarinata* and *alticola* represent valid species whereas BURGER (1971) considered them to be identical. Likewise, CAMPBELL & LAMAR (1989) demonstrated problems with the distinction of these forms and they "suspect strongly that only a single species is represented". This judgement is confirmed by the material in question. The original descriptions of these nominal forms were published at almost the same time, i.e. in May (SHREVE 1934) and August (PARKER 1934), respectively. Therefore, *albocarinata* has priority over *alticola.*

FIG. 2.

Another specimen of *B. albocarinata* (EPN RM309, ♂) from Ecuador.

Certainly, the type locality of *Bothrops alticola* ("5 km east of Loja, 9200 ft") is incorrect (fig. 3). Although Parker had been at Loja himself, this specimen was obtained from Carrion who in turn had received this and other snakes from a local dealer. We have hardly any doubt that the type of *alticola* has most probably been collected on the eastern slopes of the Andes somewhere near the highway from Loja to Zamora (Province of Zamora Chinchipe).

The specimen from Nambija [1] comes from an area which is situated 30 km NE of Zamora. This snake has 21 midbody scale rows at midbody, the internasals are separated and there is no contact between the subocular and the supralabials. On the other hand, it differs from the type of *albocarinata* in the condition of the subcaudals and the number of supralabials.

Bothriechis albocarinata is an arboreal species known from the Amazonian drainage of Ecuador and Perú. It lives in cloud forest and upper rainforest habitats and has been

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[1] This snake lived several months in captivity and fed on frogs (*Eleutherodactylus* sp., *Gastrotheca* and *Ololygon*) and lizards (*Anolis fuscoauratus*) but refused to accept mice and birds. It died evidently by envenomation after having taken *Hyla variegata* and *H. triangulum.*

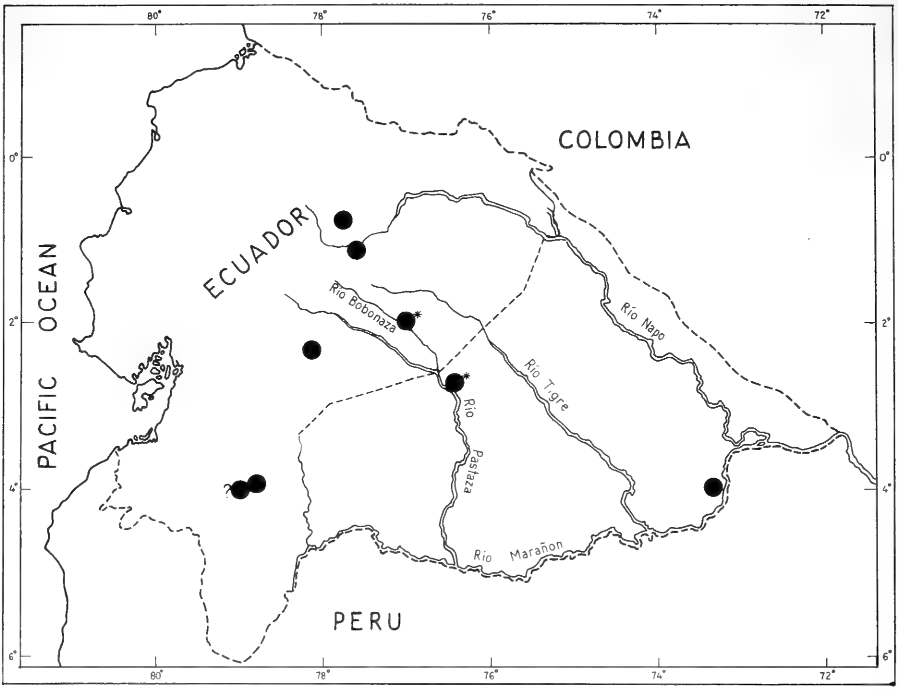

FIG. 3.

Known distribution of *B. albocarinata*. Inexact records are marked with an asterisk; the question mark refers to "Loja". The broken line corresponds to the border as declared by the Conference of Rio de Janeiro in 1942.

taken at altitudes up to approx. 2000 m (500 to over 3000 according to CAMPBELL & LAMAR 1989, who may take into account the alleged type locality of *B. alticola*). So far, this species is known on the basis of a limited number of specimens from Ecuador (provinces of Napo, Pastaza, Morona Santiago and Zamora Chinchipe) and the Iquitos area in Perú (MENESES 1974). The type locality ("Río Pastaza, between Canelos and Río Marañon") might well be situated on Peruvian territory (fig. 3).

B. albocarinata has a rounded snout and a moderately elevated *canthus rostralis*; the internasals, canthals and supraoculars are enlarged and rugose, the dorsal head scales and temporals are keeled. The nasals are divided and there are 7-9 supralabials (2^{nd} or 3^{rd} forming lacunolabial), 8-10 lower labial scales and 5-9 interoculars. There are 19-21 dorsal scale rows at midbody; with the exception of the lowermost row all scales are strongly keeled. This species has 161-181 ventrals (♂♂ 161-176, ♀♀ 171-181), an undivided anal plate, and a prehensile tail with 53-66 subcaudals (60-66 and 54-59, resp.). The maximum total length is 750 + 100 mm (MHNG 2444.18). The longest male is the type of *alticola* with a body length of 552 mm (tail uncomplete). The head pattern of all specimens exhibits a diagonal black stripe from behind the eye to the angle of the mouth, and a parallel stripe on the occiput from above each supraocular. Differences in body pattern results from the fact that in some specimens (type of *alticola* and MHNG 2444.18) the blotches are entirely black (with some yellow on the keels and towards the tip of some scales) whereas this markings have a light center similar to the body ground colour. The number of dorsal bands on the body ranges from 20 to 30. There seems to be no sexual dimorphism in pattern and colouration.

RELATED SPECIES

Four additional species of pitvipers with prehensile tails are known from Ecuador, i.e. *Bothriechis schlegelii* (Berthold), *B. bilineata smaragdina* (Hoge), *B. punctata* (Garciá) and *B. taeniata* (Wagler). Only *smaragdina* and *taeniata,* both inhabiting the Amazonian Basin from Colombia to Bolivia and Brasil occur within the range occupied by *albocarinata.* These forms are easily separable on the basis of colour pattern and scale counts: *smaragdina* is uniformly green above with small black dots on the scales (''pepper pattern''), lacks a distinct postocular stripe, has more than 190 ventrals and 23-25 midbody scale rows; still higher scale counts (25-29 dorsal rows, 203-254 ventrals) are found in *taeniata. B. schlegelii* ranges from S Mexico to E Venezuela and W Ecuador (Manabí, Cotopaxi); this is a highly variable form which differs from *albocarinata* by the presence of supraciliary scales which are normally considerably raised to form ''eyelashes'', and more (23-25) midbody scale rows.

Parker (1934) supposed a relationship of *alticola* with a number of Central and South American forms (*medusa, nigroviridis, oligolepis* and *peruviana*). *B. medusa* is endemic to the coastal mountains in Venezuela, lacks a prehensile tail and has a characteristic dorsal pattern; *nigroviridis* ranges from Costa Rica to Panama and differs from *albocarinata* in more supralabials (8-11) and less ventrals (up to 158); *peruviana* lives in a comparatively small area in the borderland between Perú and Bolivia (Puno province) and is likewise distinguishable from *albocarinata* in the number of ventral counts (188-196, fide Campbell & Lamar 1989) and more dorsal scale rows at midbody (23 instead of 19-21). *B. oligolepis* is known from the central parts of S Perú and adjoining areas in Bolivia. This form has 23-25 dorsal scale rows; general appearance and colouration are similar to the type of *alticola* and MHNG 2444.18. On the other hand, MHNG 2464.31 (fig. 1) has a colour pattern which resembles the one found in *peruviana* (Campbell and Lamar 1989, fig. 155). In fact, Shreve (1934) considered *Bothrops chloromelas* (= *Bothriechis oligolepis*) to be closely allied with *albocarinata,* an opinion which is also shared by us. There is a striking similarity in the head pattern of these two forms (see figs 153-154 and 167-168 in Campbell & Lamar 1989).

REMARKS TO THE GENERIC CONCEPT

Burger (1971) presented a new systematic arrangement for Oriental and New World pitvipers. Following this author, the Neotropical terrestrial forms belong to *Bothrops* Wagler; species with a prehensile tail are attached either to *Bothriechis* (''palm-pitvipers'', with *schlegelii* and six additional forms from Central America) or with *Bothriopsis* (''forest-pitvipers'', including *albocarinata, bilineata, medusa, oligolepis, peruviana,* *punctata* and *taeniata*). This point of view has also been adopted by CAMPBELL & LAMAR (1989) [2].

We do not oppose the idea that *Bothrops* (sensu BURGER 1971) probably represents a monophyletic group which differs from other Neotropical crotalids (except *Crotalus, Lachesis*) in deeply divided hemipenes. The statement that "the hemipenis is less valuable than many external features" to distinguish phylogenetic groups among New World pitvipers (BURGER 1971: 265) is questionable, and likely to be due to a limited number of preparations in a few species. Following CAMPBELL & LAMAR (1989), the lobes are subcylindrical or tapered with papillate calyces in *Bothriechis* and attenuated with a calyculate distal half in *Bothriopsis*; in the former taxon there are 10-24 large spines on the proximal portion of the hemipenis, whereas the number ranges from 30-40 (including some enlarged basal hooks) in the latter.

Although there might be some differences in the shape of the ectopterygoid and palatine in the type species of *Bothriechis* (*B. nigroviridis* Peters) and *Bothriopsis* (*B. quadriscutata* Peters, =*B. taeniata*), there seem to be transitional states in other arboreal species. Certainly the condition of the subcaudals (mostly entire in *Bothriechis,* divided in *Bothriopsis*) is a poor character, and the modified tail ("first and second row of dorsal scales on terminal one third of tail heavily keeled" in *Bothriechis*) is in our opinion not a useful character to subdivide the arboreal Neotropical pitvipers as proposed by BURGER (1971). As a matter of fact, the alleged differences between *Bothriechis* and *Bothriopsis* are at best gradual and we do not consider them to warrant a separation of these nominal genera prior to a detailed evaluation of features which are considered to be of phylogenetic significance.

RESUMEN

El examen de los tipos de *Bothrops albocarinata* Shreve y *B. alticola* Parker revelan algunas diferencias con respecto a las descripciones originales (por ejemplo número de los interoculares, número de los ventrales y contacto de subocular con labiales). Estas formas nominales son consideradas conspecificas (*Bothriechis albocarinatus*). Cuatro especimenes de este crotálido aparentemente poco común muestran una variación en algunos caracteres morfológicos (subcaudales dobles o simple, número de hileras de escamas dorsales en el parte central del cuerpo, escamas circumoculares, internasales, etc.). El órden sistemático de los crotálidos neotropicales no parece ser basado en una evidencia bien fundada por el momento. Al menos algunos grupos parecen ser artificiales.

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[2] Like in the case of *Bothriechis* (meaning pitviper), and contrary to the opinion of PETERS & OREJAS-MIRANDA (1970), CAMPBELL & LAMAR (1989) and others, *Bothrops* (βοθρος: pit; οψις (η): appearance, face) is of feminine gender as used for instance by PARKER (1934), SHREVE (1934) and BURGER (1971).

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— 1861. Beschreibung von zwei neuen Schlangen, *Mizodon* (sic) *variegatus* aus Westafrika und *Bothriopsis quadriscutata. Ibid.* 1861: 358-360.

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Anthiciden aus dem Naturhistorischen Museum in Genf II (34. Beitrag) (Coleoptera, Anthicidae)

von

Gerhard UHMANN *

Mit einer Abbildung

ABSTRACT

Anthicids from the Natural History Museum in Geneva II (34th contribution) (Coleoptera, Anthicidae). — Some Anthicidae are recorded mainly from the Afrotropical region, and a few from Arabia and Polynesia. *Tomoderus minutus* sp. n. is described from the Ivory Coast. Many of these are first records for the respective country.

EINLEITUNG

Herr Dr. Ivan Löbl vom Naturhistorischen Museum in Genf sandte mir weitere 628 Käfer zur Bestimmung, die grösstenteils aus der afrotropischen Region stammen. Aber auch einige Tiere aus Arabien und aus Polynesien sind darunter. Eine Art von der Elfenbeinküste wird erstmalig beschrieben: *Tomoderus minutus* sp. n. Der Holotypus befindet sich im Naturhistorischen Museum in Genf. Herr Dr. Löbl überliess mir einige der Doubletten für meine Sammlung, wofür ich mich herzlich bedanke. Viele der Meldungen sind Erstnachweise für die jeweiligen Länder: *Notoxus hirtipennis* Pic für Kenia, *Notoxus jeanneli* Pic für Somalia, *Tomoderus alluaudi* Pic für Gabun, *Tomoderus cantaloubei* Bonadona für Ghana, *Tomoderus kolbei* Pic für Gabun, *Cyclodinus basilewskyi* Buck und *Cyclodinus mimodromius* (Fairmaire) für die Insel Mauritius, *Omonadus bottegoi* (Pic) für Gabun, *Anthicus aramburgi* Pic für die Elfenbeinküste, *Anthicus crinitus* Laferté, *Anthicus pavitus* Bonadona und *Sapintus creberrimus* (Laferté) für Obervolta, *Sapintus mediodilatatus* (Pic) und *Sapintus oceanicus* (Laferté) für die Komoren, *Sapintus opaciceps* (Pic) für Togo, *Sapintus tavetanus* (Pic) für die Elfenbeinküste, *Aulacoderus canthariphilus* (van Hille) für Rhodesien und *Endomia impressiceps* Pic für Reunion.

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* Tannenhofstrasse 10, D-8487 Pressath, Deutschland.

ARTENLISTE

Notoxus hirtipennis Pic, 1914

Verbreitung: Tansania.

Kenia: «Nakuru Lac, Naivasha près de Mundui Estate, 1950 m, 8.XI.1977, leg. Mahnert & Perret», 1 ex. — «Narok, près de Narok, 2000 m, 3.XI.1977, leg. Mahnert & Perret» 1 ex. — «Tana Rivers, Lac Shakababo près de Ngao, leg. Mahnert & Perret», 1 ex.

Notoxus jeanneli Pic, 1914

Verbreitung: Kenia, Kongo.

Somalia: «Mogadiscio, Afgoi, 22.IV.-V.1984, leg. Mourglia», 1 ex.

Notoxus lateniger Bonadona, 1969

Verbreitung: Elfenbeinküste.

Elfenbeinküste: «Adiopodoumé, 10.-14.II.1977, leg. I. Löbl», 2 ex. — gleiche Angaben aber 18.-23.III.1977, 5 ex.

Mecynotarsus subangulicollis Pic, 1914

Verbreitung: Guinea, Elfenbeinküste, Tschad, Ghana.

Elfenbeinküste: «Adiopodoumé, 3.-9.IV.1977, leg. I. Löbl», 2 ex.

Elgonidium elongatum Bonadona, 1978

Verbreitung: Kenia.

Kenia: «Nakuru, Mau Escarp., près Enangiperi, 2700 m, 6.XI.1977, leg. Mahnert & Perret», 2 ex.

Tomoderus alluaudi Pic, 1914

Verbreitung: Kilimandscharo.

Gabun: «Makakou, à la lumière, IV.1971, leg. J. Mateu», 1 ex.

Tomoderus cantaloubei Bonadona, 1959

Verbreitung: Kamerun, Kenia, Gambia, Elfenbeinküste, Ghana.

Ghana: «Kumasi, 1.-7.III.1967, leg. S. Endrödy-Younga», 2 ex.

Tomoderus congoanus Pic, 1951

Verbreitung: Kongo, Tansania, Ghana, Gambia, Nigeria, Elfenbeinküste, Senegal.

Elfenbeinküste: «Daloa env. Grebeu, tamisage bambou et bois mort, 6.X.1980, leg Mahnert & Perret», 1 ex. — «Abidjan env. Bingerville, tamisage de forêt, 29.X.1980, leg. Mahnert & Perret», 1 ex.

Tomoderus kolbei Pic, 1913

Verbreitung: Tansania, Uganda, Senegal, Kongo, Sudan, Ghana, Nigeria, Sambia, Gambia, Kamerun.

Gabun: «Makakou, IV.-V.1971, à la lumière, leg. J. Mateu», 3 ex.

Tomoderus minutus sp. n. (Abb. 1)

Holotypus: Elfenbeinküste: «Taï, forêt de Taï, tamisage de forêt, 17.X.1980, leg. Mahnert & Perret».

Derivatio nominis: Um auf die geringe Körpergrösse hinzuweisen, benenne ich diese Art *minutus.*

Masse (in mm): Länge 1,6, grösste Breite 0,6, Kopf 0,35 lang, über die Augen gemessen 0,3 breit. Halsschild 0,35 lang, 0,25 breit, Flügeldecken 0,8 lang, 0,6 gemeinsam breit.

Färbung: Dunkelbraun, Fühler (besonders die 5 Spitzen-Glieder), Taster und Beine etwas heller.

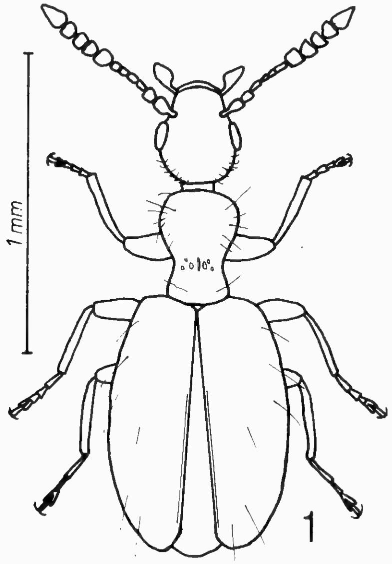

Abb. 1.

Tomoderus minutus sp. n.

Kopf; Glänzend. Sehr fein und sehr verstreut punktiert. Behaarung braun, fein, quer liegend. Behaarung der Fühler kräftig und ziemlich dicht. Ausserdem mit abstehenden Borsten besetzt.

Halsschild: Glänzend. Sehr fein und sehr verstreut punktiert. Behaarung braun, fein, grösstenteil zum Schildchen gerichtet. Dazwischen stehen einige lange Borsten. Einschnürung auch oben deutlich, aber nicht sehr tief. In der Mitte mit feinem Längskiel, daneben runzelig.

Flügeldecken: Glänzend. Punktierung mittelkräftig, aber sehr flach. Zur Spitze wird die Punktierung nicht feiner, die Punkte stehen aber in grösseren Abständen. Behaarung braun, mittelkräftig, abstehend, gebogen, nach hinten gerichtet. Dazwischen stehen wenige, nicht sehr lange Borsten.

Beine unscheinbar behaart.

Hautflügel voll ausgebildet.

Beziehungen: Die neue Art ist der kleinste bisher bekannte *Tomoderus* aus dem afrikanischen Raum. Aus der Orientalis sind Arten von ähnlicher Grösse bekannt. Dem *T. manzeris* Bonadona aus Zaire wohl am nächsten verwandt und in vielen Merkmalen ähnlich (die Grösse ist bei *T. manzeris* 2 mm, Kopf- und Fühlerform sind ähnlich). Aber die Form des Halsschildes ist anders (die Einschnürung ist bei *T. minutus* sp. n. weiter hinten, die Struktur in der Mitte der Einschnürung ist anders).

Tomoderus tschoffeni Pic, 1900

Verbreitung: Mozambik, Elfenbeinküste, Guinea, Ghana, Tansania, Kongo, Kenia, Senegal.

Elfenbeinküste: «Daloa env. Gregbu, tamisage bambou et bois mort, 6.X.1980, leg. Mahnert & Perret», 4 ex. — «Danané, Dropleu, 10.X.1980, tamisage sous tronc mort, leg. Mahnert & Perret», 1 ex. — «Man-Centre Bethanie, feuilles mortes, bois mort, 7.X.1980, leg. Mahnert & Perret», 1 ex.

Pseudotomoderus compressicollis Motschulsky, 1839

Verbreitung: Südeuropa, Balkan, UdSSR, Türkei, Iran, Irak, Kongo, Madagaskar, Tansania, Ghana, Sierra Leone, Gambia, Senegal, Elfenbeinküste, Obervolta, Kamerun, Mozambik.

R. P. Kongo: «Djoumouna, 24.I.1979, leg. G. Onore», 1 ex.

Formicomus albolineatus Pic, 1893

Verbreitung: Guinea, Sudan, Kongo, Elfenbeinküste, Ghana, Nigeria, Gabun, Senegal, Gambia, Kamerun, Obervolta, Togo, Mali.

Nigeria: «Ife, III.1978, leg. J. du Chêne», 1 ex.

Formicomus bechynei van Hille, 1979

Verbreitung: Sierra Leone, Guinea.

Sierra Leone: «Mokanji, 250 km de la Côte, 130 m, XII.1971-I.1972, leg. P. Pfanner», 1 ex.

Formicomus bergrothi Fairmaire, 1897

Verbreitung: Madagascar.

Madagascar: «Betroka, s/excrément, 1.VII.1969, leg. Y Gomy», 2 ex.

Formicomus griseofaciatus Pic, 1920

Verbreitung, Ghana, Nigeria, Guinea, Liberia, Rhodesien, Sierra Leone, Kenia, Obervolta, Elfenbeinküste, Kamerun, Gabun.

Gabun: «Makakou, à la lumière, IV.-V.1971, leg. J. Mateu», 5 ex. — Sierra Leone: «Mokanji, 250 km de la Côte, 130 m, XII.1971-I.1972, leg. P. Pfanner», 1 ex.

Formicomus kraatzi Pic, 1899

Verbreitung: Kamerun, Guinea, Ghana.

Ghana: «Pretsea, 30.V.1967, leg. S. Endrödy-Younga», 1 ex.

Formicomus linnavuorii van Hille, 1977

Verbreitung: Sudan, Tansania, Ghana, Nigeria, Obervolta.

Obervolta: «Ougadougou, VI.-VII.1974, leg. A. Rollero», 3 ex.

Formicomus raffrayi Pic, 1895

Verbreitung: Äthiopien, Kenia, Tansania.

Kenia: «Tana Rivers, lac Shakababo, près de Ngao, 28.X.1977, leg. Mahnert & Perret», 1 ex.

Anthelephilus atripennis (Pic, 1921)

Verbreitung: Kenia.

Kenia: «Namanga, 14.II.1958, leg. P. Strinati & V. Aellen», 1 ex.

Pseudoleptaleus inflatipes (Pic, 1894)

Verbreitung: Elfenbeinküste, Ghana, Sierra Leone, Kamerun.

Ghana: «Bobiri forest res., 6.III.1967, leg. S. Endrödy-Younga», 2 ex.

Cyclodinus basilewskyi (Buck, 1965)

Verbreitung: Tansania.

Mauritius: Mt le Pouce, 510 m, 20.XII.1974, leg. P. Schauenberg», 1 ex.

Cyclodinus bremei (Laferté, 1842)

Verbreitung: Mediterran-Gebiet, Mauretanien, Senegal, Madagaskar, Irak, Iran, UdSSR, Jordanien, Gambia, Ghana, Tansania.

Ghana: «Keta, 31.XII.1966, leg. S. Endrödy-Younga», 1 ex.

Cyclodinus margelanicus (Pic, 1893)

Verbreitung: Turkestan, UdSSR, Türkei, Irak, Afghanistan.

Türkei: «Izmir, Narlidese, s/*Citrus,* V.72, C.I.L.B., leg. Kaskaloghlu», 2 ex.

Cyclodinus mimodromius (Fairmaire, 1898)

Verbreitung: Madagascar, Elfenbeinküste, Südafrika, Ostafrika, Kongo, Guinea.

Mauritius: «Albion, s/écorces, 21.I.1970, leg. Y. Gomy», 1 ex.

Cyclodinus obconiceps (Pic, 1902)

Verbreitung; Madagascar, Äthiopien, Tansania.

Madagascar: «N. W. Majunga, village touristique, plage s/débris, 27.VII.1968, leg. Y Gomy», 1 ex.

Omonadus bottegoi (Pic, 1895)

Verbreitung: Kongo, Tansania, Somalia, Uganda, Kamerun, Kenia, Guinea, Elfenbeinküste, Benin, Obervolta, Gambia, Ghana, Togo, Sierra Leone, Nigeria, Sambia, Südafrika.

Gabun: «Makakou, à la lumière, IV.-V.1971, leg. J. Mateu», 404 ex. — Elfenbeinküste: «Près Zaidon, 15.III.1977, leg. I. Löbl, 7 ex. — «Adiopodoumé, 10.-23.III.1977, leg. I. Löbl», 19 ex. — Ghana: «Kumasi, 25.V.-6.VII.1967, leg. S. Endrödy-Younga», 22 ex. — Togo: «Palime, forêt de Kloute, 20.-24.IV.1974, leg. S. Vit», 1 ex. — Komoren: «Moheli Wassani, lac Dziani, s/bouses et écorces, 27.VIII.1969, leg. Y. Gomy», 2 ex.

Omonadus floralis (Linné, 1758)

Verbreitung: Kosmopolit.

Madagaskar: «Moramanga, s/écorces, 5.VIII.1969, leg. Y. Gomy», 4 ex. — Kenia: «Tana River, 10 km N Ctarsen, 23.X.1977, leg. Mahnert & Perret», 1 ex.

Omonadus formicarius (Goeze, 1777)

Verbreitung: Kosmopolit.

Ghana: «Kwadaso, 2.III.1967, leg. S. Endrödy-Younga», 3 ex. — «Kumasi, 28.V.1967, leg. Endrödy-Younga», 1 ex. — Elfenbeinküste: «Adiopodoumé, 10.-18.III.1977, leg. I. Löbl», 3 ex.

Cordicomus velatus (Marseul, 1879)

Verbreitung: Arabien, Ägypten, Sudan, Algerien, Mauretanien, Tschad, Mali, Yemen, Iran, Pakistan.

Saudi Arabien: «Taif, 21.V.1969, leg. Martin», 1 ex.

Stricticomus tobias (Marseul, 1879)

Verbreitung: Kosmopolit.

La Réunion: «Ravine 3 Bassine, s/bouse, 30.XII.1968, leg. Y Gomy», 1 ex.

Hirticomus biplagiatus (Laferté, 1848)

Verbreitung: Kongo, Senegal, Südafrika, Mozambik, Madagascar, Ruanda, Elfenbeinküste, Tansania, Ägypten, Sudan, Äthiopien, Namibia, Kamerun, Gambia, Simbabwe.

Elfenbeinküste: «Adiopodoumé, 3.-23.III.1977, leg. I. Löbl», 12 ex. — Ghana: «Kwadoso, 2.III.1967, leg. S. Endrödy-Younga», 5 ex. — «Kumasi, 15.-28.II.1967, leg. S. Endrödy-Younga», 2 ex. — Sierra Leone: «Mokanji, 250 km de la Côte, 130 m, XII.1971-I.1972, leg. P. Pfanner», 1 ex. — Kamerun: «Etoudi Assok b. Mbalmayo, 14.III.1982, leg. F. Notari», 1 ex. — Gabun: «Makakou, à la lumière, V.1971, leg. J. Mateu», 5 ex. — Madagascar: «Rahohira, à la lumière, 4.II.1967, leg. Y. Gomy», 1 ex.

Anthicus anceyi Pic, 1895

Verbreitung: Äthiopien, Tschad, Senegal, Kenia, Sudan, Burundi, Gambia.

Senegal: «Sebikotane, 22.X.1968, leg. Español», 1 ex. — Kenya: «Taita, Tsavo East Nat. Park, 30.X.1977, leg. Mahnert & Perret», 6 ex.

Anthicus aramburgi Pic, 1939

Verbreitung: Äthiopien.

Elfenbeinküste: «Forêt de Yapo, 21.-22.III.1977, leg. I. Löbl, 4 ex.

Anthicus conjunctus Pic, 1902 var. *mahatsinjensis* Pic, 1914

Verbreitung: Madagaskar.

Madagaskar: «Rahohira, à la lumière, 4.II.1967, leg. Y. Gomy», 1 ex.

Anthicus crinitus Laferté, 1848

Verbreitung: Zentralafrika, Nordafrika, Türkei, Asien, Iran, Irak, UdSSR, Indien, Nepal, Afghanistan, Arabien.

Obervolta: «Ouagadougou, V.-VII.1974, leg. A. Rollero», 6 ex.

Anthicus pavitus Bonadona, 1962

Verbreitung: Tschad, Senegal, Sudan.

Obervolta: «Ouagadougou, V.-VII.1974, leg. A. Rollero», 1 ex.

Anthicus stygius Laverté, 1848

Verbreitung: Südafrika, Mozambik, Kongo, Ghana, Kenia, Tansania.

Natal: «Himeville, s/bouse, IX.1970, leg. R. Manthot», 1 ex.

Sapintus creberrimus (Laverté, 1848)

Verbreitung: Madagaskar, Kenia, Südafrika, Namibia.

Obervolta: «Ouagadougou, V.-VII.1974, leg. A. Rollero», 1 ex.

Sapintus mediodilatatus (Pic, 1937)

Verbreitung: Madagaskar.

Komoren: «Mayotte env. de Sada, plage, s/débris, 14.VIII.1969, leg. Y. Gomy», 1 ex.

Sapintus oceanicus (Laferté, 1848)

Verbreitung: Marquesas -Inseln, Neue Hebriden, Sri Lanka, Madagaskar, Seychellen, Australien, Borneo, Mikronesien, Ostküste von Afrika, Fidschi-Inseln.

Kenia: «Malindi, Hotel Delphin, XI.1972, leg. E. & C. Supper», 2 ex. — Komoren: «Moheli, Niommacava, plage sur crottin, 25.VIII.1960, leg. Y. Gomy, 1 ex. — Französisch Polynesien: «Bora-Bora, 10.-15.IV.1979, leg. A. de Chambrier», 3 ex.

Sapintus opaciceps (Pic, 1900)

Verbreitung: Kongo, Tansania, Kamerun, Tschad, Ghana, Äthiopien, Sierra Leone, Gabun.

Gabun: «Makakou, à la lumière IV.-V.1971, leg. J. Mateu», 4 ex. — Togo: «Tchekpo, 16.IV.1974, leg. S. Vit», 1 ex.

Sapintus tavetanus (Pic, 1914)

Verbreitung: Kongo, Benin, Kamerun, Kenia, Ghana, Tansania.

Elfenbeinkünste: «Adiopodoumé, 3.-9.III.1977, leg. I. Löbl, 1 ex. — «Man-Centre Bethanie, s/végétation, 7.X.1980, leg. Mahnert & Perret», 1 ex.

Aulacoderus canthariphilus (van Hille, 1984)

Verbreitung: Südafrika.

Rhodesien: «Umtali, Melsetter, 1700 m, II.1969, leg. R. Mussard», 1 ex.

Endomia impressiceps (Pic, 1902)

Verbreitung: Madagaskar.

La Réunion: «Ste Luis, lumière, III.1968, leg. A. Morinet», 1 ex.

Endomia minuta (Pic, 1895)

Verbreitung: Tschad, Elfenbeinküste, Ghana, Mozambik, Mauretanien, Guinea, Kamerun, Obervolta.

Elfenbeinküste: «Adiopoudoumé, 3.-23.III.1977, leg. I. Löbl», 40 ex. — Ghana: «Kumasi, 1.-7.III.1967, leg. S. Endrödy-Younga», 1 ex.

Macratria alluaudi Pic, 1902

Verbreitung: Madagaskar.

Madagaskar: «Moramanga, route Anosita, 6.VIII.1969, leg. Y. Gomy», 1 ex.

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New synonymies and notes on some Aphodiinae (Coleoptera: Scarabaeidae)

by

Z. STEBNICKA *

With 8 figures

ABSTRACT

Four *Aphodius* spp. and two *Ataenius* spp. are synonymized, the status of the subgenus *Ataeniomorphus* is discussed. *Aphodius australasiae* Boh. is transferred to *Ataenius, Aphodius kuatunensis* Balth. is found to be a separate species close to *A. nigrotessellatus* Motsch.

In revising the Aphodiinae collection of the Muséum d'Histoire naturelle, Geneva (MHNG), the Zoological Museum, University of Moscow (ZMUM), the National Museum, Prague (NMP), and the Institute of Systematic and Experimental Zoology, Kraków (ISEZ), I have examined nomenclatory relevant material including types of Petrovitz, Balthasar, and Motschulsky. The comparison revealed several synonymies and misinterpretations which are discussed below. This paper does not, however, provide a complete list of all mistakes recently noticed. Further contributions will be presented after examining respective material from additional sources.

Aphodius (Aphodaulacus) variabilis Waterhouse (figs 1-2)

Distribution. Japan, Korea, North China, USSR (Far East). Remarks. The species tends to form local populations with notable variability in the plotting of darker spots, in the pilosity of elytra and in the punctation of pronotum. See remarks under the following species.

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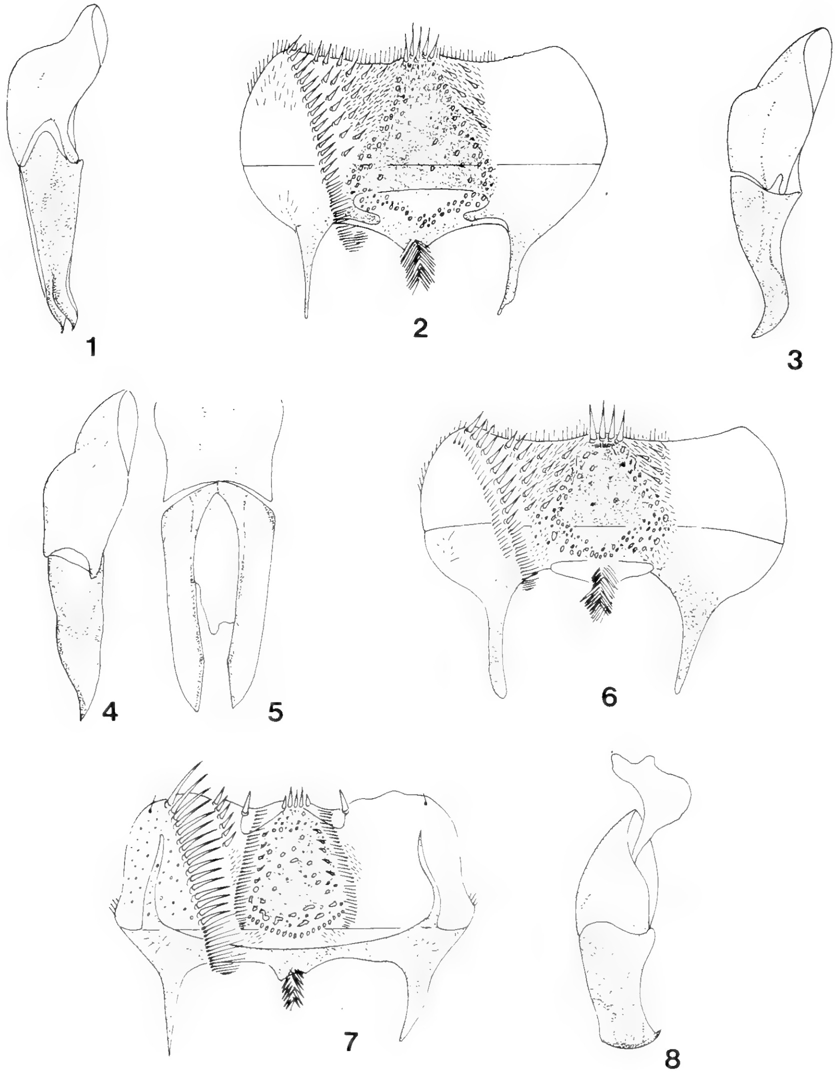

FIGS 1-8.

1-2. *Aphodius (Aphodaulacus) variabilis* Waterh.: 1. aedeagus laterally; 2. epipharynx. 3. *A. (Chilothorax) nigrotessellatus* (Motsch.) aedeagus laterally. 4-6. *A. (Ch.) kuatunensis* Balth.: 4. aedeagus laterally; 5. paramerae dorsally; 6. epipharynx. 7-8. *Ataenius (australasiae) australasiae* (Boh.): 7. epipharynx; 8. aedeagus laterally.

Aphodius (Aphodaulacus) nigrotessellatus Motschulsky (fig. 3)

Material examined. Syntype of nigrotessellatus (ZMUM); specimens from Japan: Kanagawa Pref., Mt. Ooyama, 25.XII.1966, leg. Shibata (ISEZ). China: Fukien, Kuatun, 20-21.III.1946, leg. Tschung-Sen (MHNG).

Distribution. Japan, Korea, China, USSR (Far East).

Remarks. The two species listed above were hitherto misidentified in the collections and generally quoted in literature under incorrect names. NAKANE (1972) rightly considered *A. obsoleteguttatus* Waterh. synonymous with *A. nigrotessellatus* and regarded *A. variabilis* as a valid species. The syntype of "*Melinopterus nigrotessellatus*" in Motschulsky's collection differs from *A. variabilis* in the characters separating the subgenera *Chilothorax* Motsch. (= *Volinus* Muls. et Rey) and *Aphodaulacus* W. Kosh.

Aphodius (Chilothorax) kuatunensis Balthasar (figs 4-6)

Material examined. Paratypes (3): China, Fukien, Kuatun, 2300 m, 27.III.1938, leg. Klapperich (NMP, MHNG); four specimens collected together with *A. nigrotessellatus* in Kuatun, Fukien, 20-21.III.1946, leg. Tschung-Sen (MHNG, ISEZ).

Remarks. The species is very close to *A. nigrotessellatus* Motsch. but is distinguishable by the shape of the male genitalia and by following external characters: frontal tubercles and punctures of head more pronounced than in *nigrotessellatus,* disc of pronotum more convex; the punctures of inner elytral intervals coarser and denser, lateral part and apex of elytra rugose.

Aphodius (Liothorax) plagiatus (Linnaeus)

Aphodius (Ataeniomorphus) isikdagensis BALTHASAR, 1952, syn. nov.
Aphodius (Ataeniomorphus) ressli PETROVITZ, 1962, syn. nov.

Remarks. *A. isikdagensis* was described by BALTHASAR (1952) in a new subgenus *Ataeniomorphus* on the base of peculiar features of the head. In his monograph BALTHASAR (1964: 446) mentions, that the species is characterized by the large and convex head similarly shaped as in some *Nialus* species. I have seen three type specimens of *isikdagensis* (Turkey, Anatolia), (NMP), and the unique holotype of *A. ressli* (Turkey, Iskenderun), (MHNG), a female specimen in poor condition. Fortunately enough additional material was available to indicate that the differences between the two can all be attributed to infraspecific variation. The unicolorous and bicolorous forms of *A. plagiatus* (L.) are considered conspecific owing to their sympatric distribution and the absence of other significant characters. The specimens seen from Turkey and Iran vary from bicolored to entirely black, and exhibit a pronounced variability in the shape and size of the head as well as in the sculpture of the body. It is hard to understand, indeed, why this species has become the object of such taxonomic operations.

The third and last name in *Ataeniomorphus, A. cypricola* described by BALTHASAR (1971, Beitr. Ent., 21: 57) from the vicinity of Larnaka is most likely a representative of the subgenus *Nobius* Muls.

Aphodius (Balthasarianus) babori Balthasar

Aphodius (Balthasarianus) taiwanicus PETROVITZ, 1976, syn. nov.

Material examined. Paratypes (2) of *babori*: China, Szechwan (MHNG, NMP); paratype of *taiwanicus*: Formosa, Duisharyo (MHNG).

Remarks. The species is known so far from South China and Taiwan.

Aphodius (Calamosternus) uniplagiatus Waterhouse

Aphodius (Calamosternus) desuetus Balthasar, 1933, syn. nov.

Material examined. Paratypes (2) of *desuetus*: China, Yunan (NMP, MHNG); numerous specimens from Japan, China and Korea (ISEZ).

Remarks. The species is distributed in Japan, China, Korea, the USSR (Far East), and occurs commonly in the northern part of the Korean Peninsula.

Ataenius (australasiae) australasiae (Bohemann), comb. nov., figs 7-8)

Ataenius fukiensis Balthasar, 1942, syn. nov.
Ataenius malayanus Petrovitz, 1961, syn. nov.

Material examined. Holotype of *fukiensis*: China, Fukien (NMP); paratypes (3) of *malayanus*: Sumatra (MHNG); numerous specimens from Indochina and Malaysia (MHNG, ISEZ).

Complementary description. Length 3.8-5.5 mm, colour black, reddish black or castaneous. Head moderately large, strongly convex medially, frontal suture absent. Elytra convex, subparallel-sided, humeri distinctly dentate, base margined. Mesosternum shagreened as usual in *Ataenius* species, without noticeable carina between the coxae. Metasternal plate with two small concavities near meso and metacoxae, metasternal triangle distinct. First visible abdominal sternum with fine posterior marginal line, pygidium with wide, smooth apical lip and transverse ridge medially, eroded area deep and rough. Metafemora with complete posterior marginal line; transverse ridges of meso and metatibiae weakly marked, often vanishing; apical edge of metatibia with 6-7 thick setae and 2-3 thin, intervening setae, the latter not easily seen; apical spurs slender, first segment of metatarsus a trifle shorter than the upper tibial spur and somewhat longer than the next three segments combined. Epipharynx and male genitalia are of the *Ataenius* type.

Remarks. *A. australasiae* is one of the most common and most widely distributed species, known from South China, Vietnam, Burma, Thailand, Malaysia, Borneo, Java, Sumatra, Sulawesi, Bali and the Australian Region. It was listed by Bohemann in the Aphodiini where it has remained ever since. Previous authors attached particular importance to the presence of transverse ridges of meso and metatibiae as in *Aphodius* Illig. This feature, however, is present in some representatives of Eupariini and it lacks in some typical members of Aphodiini. The characters presented in the complementary description show that the species has an isolated position within the genus *Ataenius* Har., and may be referred to a species group of its own.

I have not seen a type material of *Ataenius nigricans* Paulian described from Tonkin. According to the original description (Bull. Soc. Ent. France, 1933: 136), the species seems to be conspecific with *A. australasiae*.

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Aleocharinae nepalesi del Museo di Ginevra Parte III. Revisione delle specie himalayane del sottogenere *Microdota* Mulsant & Rey (Coleoptera, Staphylinidae)

(106° Contributo alla conoscenza delle Aleocharinae)

di

Roberto PACE *

Con 312 figure

ABSTRACT

Aleocharinae from Nepal in the Geneva Museum. Part III. Review of the Himalayan species of the subgenus *Microdota* Mulsant & Rey (Coleoptera, Staphylinidae). (106th Contribution to the knowledge of the Aleocharinae). — A review of the 83 species and subspecies of the subgenus *Microdota* Mulsant & Rey, of *Atheta* Thomson, from Himalaya is presented, including a discussion of diagnostic characters of the subgenus, keys to allied subgenera and species, and some conclusive remarks on the zoogeography of this subgenus in Himalaya. Two new subgenera of *Atheta* Thomson and 27 new species are described, and 8 species names are synonymized. The species are briefly described and illustrated. All available bionomic and distributional data are presented.

SOMMARIO

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INTRODUZIONE

Il sottogenere *Microdota* MULSANT & REY, 1873, comprende i rappresentanti di minore taglia del genere *Atheta* THOMSON, 1858, aventi punteggiatura molto sparsa sul quinto urotergo libero ed altri caratteri esterni, che, spesso nella presente revisione, non sono presi in considerazione perché il sottogenere è qui interpretato prevalentemente in base alla morfologia della spermateca, come è in dettaglio esposto qui di seguito (v. «Caratteri diagnostici del sottogenere *Microdota*»).

Il motivo principale che mi ha indotto a compiere la presente revisione, è stato lo studio del copioso materiale conservato nel Museo di Storia Naturale di Ginevra, raccolto dal Dr. I. Löbl di detto Museo e del Dr. A. Smetana dell'Istituto di Ricerche Biosistematiche di Ottawa, durante alcune missioni entomologiche in Nepal. Inoltre, dato che avevo esaminato tutti i tipi di *Microdota* e di sottogeneri affini della sottoregione indiana, mi è parso utile comprendere, illustrandole, le specie già note, in aggiunta a quelle nuove rinvenute nel materiale del Museo di Ginevra e a quelle da me descritte in brevi note negli anni precedenti (PACE, 1982, 1985, 1986, 1987, 1988).

Il materiale studiato del Museo di Ginevra, completato da una piccola raccolta di esemplari appartenente al British Museum e proveniente da missioni in Nepal, oltre che permettere la scoperta di 27 nuove specie, ha dato la possibilità di rinvenire il maschio o la femmina sconosciuti di specie precedentemente descritte, di correggere l'attribuzione di una determinata femmina a un determinato maschio, allorché le differenze esoscheletriche inavvertibili hanno reso erronea l'attribuzione e di confermare che non vi è motivo di chiamare con un nome sottogenerico differente le specie attere, dato che si verificano tutti i passaggi intermedi tra specie alate e attere e la forma della spermateca è dello stesso tipo.

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Ringrazio molto cordialmente il Dr. C. Besuchet e il Dr. I. Löbl del Museo di Storia Naturale di Ginevra per avermi affidato in studio il materiale raccolto nelle missioni entomologiche nel Nepal, materiale che mi ha dato la possibilità di scrivere la presente revisione.

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I tipi di Cameron sono stati messi a mia disposizione grazie alla cortesia del Dr. P. M. Hammond e dei suoi collaboratori del British Museum (Natural History). I tipi di Kraatz mi sono stati affidati in studio dal Dr. L. Zerche dell'Institut f. Pflanzenschutzforschung Kleinmachnow di Eberswalde e quelli di Scheerpeltz dal Prof. W. Schedl dell'Istituto di Zoologia dell'Università di Innsbruck. Ad essi rivolgo i miei più sentiti ringraziamenti.

Gli Istituti e le collezioni private che conservano materiale servito alla presente revisione sono:

Muséum d'Histoire naturelle, Genève (MHNG)
British Museum (Natural History) (BMNH)
Institut für Pflanzenschutzforschung Kleinmachnow, Eberswalde (DEI)
Muséum National d'Histoire naturelle, Paris (MNP)
Institut für Zoologie der Universität, Innsbruck (IZUI)
Senckenberg-Museum, Frankfurt (SM)
Museo Civico di Storia Naturale, Verona (MV)
Collezione Prof. Dr. H. Franz, Mödling (CFR)
Collezione dell'autore (CPA)

Il tipo del sottogenere *Microdota*

Quando Mulsant e Rey descrissero *Microdota* come genere a sé stante, avevano una sua idea più onnicomprensiva che non gli autori successivi (Ganglbauer, 1895, Brundin, 1948). Infatti per Mulsant e Rey, *Microdota* comprendeva quattro sottogeneri: *Philhygra* Mulsant & Rey, 1873, *Microdota* s. str., *Datomicra* Mulsant & Rey, 1874 e *Pycnota* Mulsant & Rey, 1874.

Ganglbauer (1895) per primo considera *Microdota* sottogenere di *Atheta* Thomson, 1858. Fenyes (1918) designa come tipo di *Microdota, A. amicula* (Stephens, 1832) (olim *Homalota amicula* Stephens, 1832). Questa specie è stata compresa in *Microdota* s. str. da Mulsant & Rey (1873), ma con il nome di *Microdota sericea* (Mulsant & Rey, 1852) (olim *Homalota sericea* Mulsant & Rey, 1852), riconosciuta sinonimo di *amicula* da Fauvel (1873).

Blackwelder (1952) fissa più esattamente come tipo del sottogenere *Microdota, Homalota sericea* Mulsant & Rey, 1852, per una questione di data.

La specie tipo di *Microdota* Mulsant & Rey è pertanto *amicula* Stephens, 1832.

Caratteri diagnostici del sottogenere *Microdota*

Nel corso dell'esame della spermateca di specie della sottofamiglia Aleocharinae, appartenenti a svariati generi e provenienti dalle varie regioni zoogeografiche del Globo, ho osservato che a ogni singolo genere o sottogenere, per lo più corrisponde una forma tipica di spermateca. Nel sottogenere *Atheta* s. str., la parte prossimale della spermateca è avvolta a matassa, con sinuosità e spire confusamente disposte. Nel sottogenere *Microdota* la parte prossimale della spermateca è piegata a U e il bulbo distale non è fortemente asimmetrico come in *Datomicra.* Il genere *Diestota* Mulsant & Rey, 1870, presenta di norma, la parte prossimale della spermateca avvolta a spire su un solo asse. Il genere *Leptusa* Kraatz, 1856, di norma è caratterizzato da spermateca con bulbo distale molto sviluppato e bulbo prossimale assai ridotto. Gli esempi potrebbero essere moltiplicati.

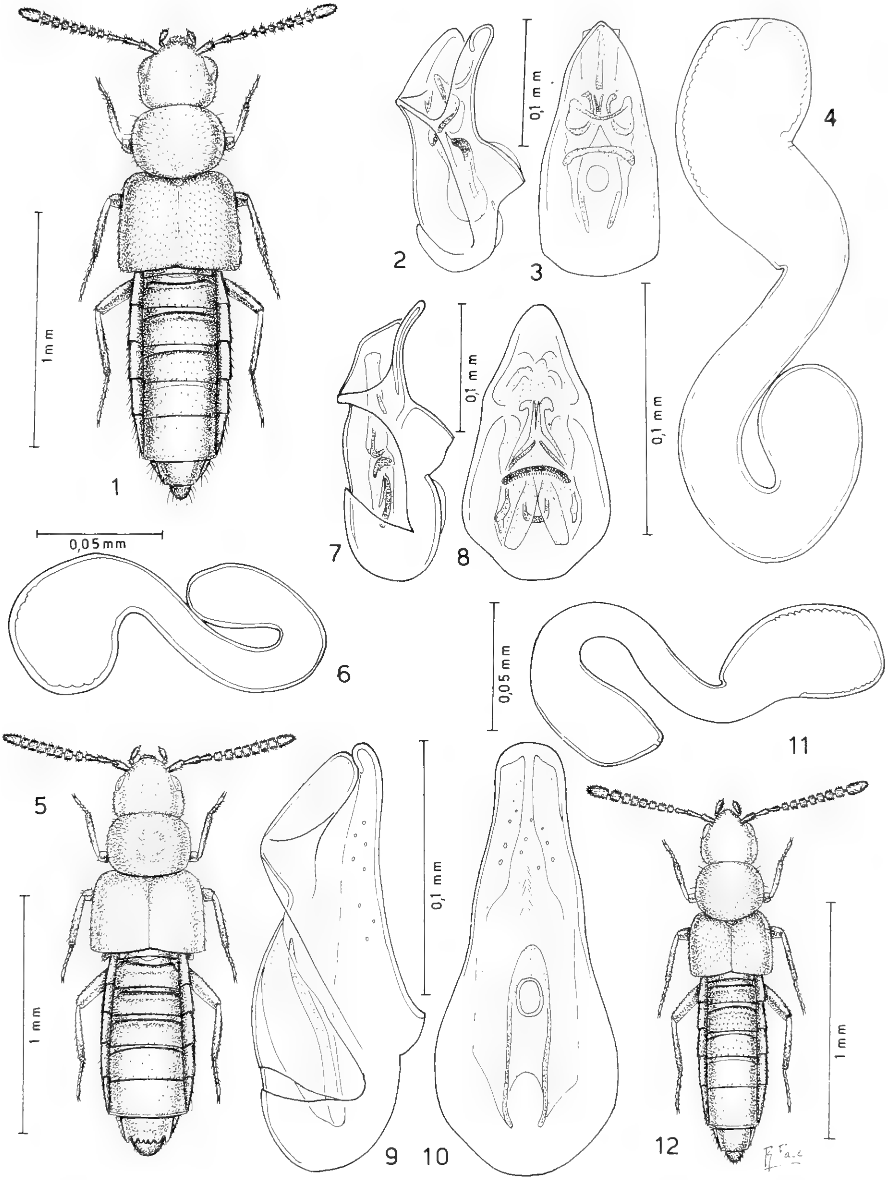
La forma della spermateca per essere un valido elemento unificante, deve avere una conferma dalla forma delle parti boccali e dalla formula tarsale che devono rispettare i caratteri propri del genere o sottogenere di appartenenza. Spermateche che come forma esulano con vistosità dalla tipologia generica o sottogenerica, probabilmente indicano una radiazione evolutiva, perciò appartenenza ad altri generi o sottogeneri. Osservando la tipologia della spermateca di *amicula* (fig. 4), specie tipo di *Microdota,* rispetto quella di altre specie, nel lavoro di Brundin (1948), molte specie appartengono sicuramente a *Microdota,* mentre altre, come *A. nitella* Brundin, 1948 o *A. minor* (Aubé, 1863), pongono il dubbio sulla loro effettiva appartenenza a *Microdota,* dato che la forma della loro spermateca si discosta molto da quella tipica di *amicula,* nonostante i caratteri esoscheletrici scelti da Brundin per diagnosticare le specie di *Microdota* inducano ad attribuire a *Microdota* anche queste specie a spermateca anomala.

In questa sede, al fine di evitare simili incongruenze, do prevalente valore ai caratteri della spermateca rispetto quelli esoscheletrici, quali l'accorciamento del terzo articolo delle antenne rispetto il secondo, la presenza di maglie di reticolazione isodiametriche sugli uroterghi o la pubescenza assai rada sul quinto urotergo libero. In tal modo è possibile accostare sistematicamente specie che invece dovrebbero essere tra loro allontanate se si seguisse il criterio diagnostico di Brundin.

Specie himalayane escluse dal sottogenere *Microdata*

In base ai suesposti caratteri scelti per diagnosticare le specie appartenenti al sottogenere *Microdota,* nella presente revisione alcune specie dell'Himalaya vanno trasferite ad altri generi o sottogeneri. Esse sono:

Atheta (Dimetrota) ocularis Cameron, 1939
    Atheta (Microdota) ocularis Cameron, 1939: 327
Atheta (Dimetrota) subatricolor Cameron, 1939
    Atheta (Microdota) subatricolor Cameron, 1939: 332
Atheta (Dimetrota) scabrella Cameron, 1935
    Atheta (Microdota) scabrella Cameron, 1939: 335
Atheta (Dimetrota) subatomaria Cameron, 1939
    Atheta (Microdota) subatomaria Cameron, 1939: 333
Atheta (Datomicra) zoiai Pace, 1985
    Atheta (Microdota) zoiai Pace, 1985: 159
Amischa phallosetigera (Pace, 1986)
    Atheta (Microdata) phallosetigera Pace, 1986: 92
Atheta (subgen.?) *disparilior* Pace, 1987
    Atheta (Microdota) disparilior Pace, 1987: 418
Atheta (Poromicrodota n.) *subluctuosa* Cameron, 1939
    Atheta (Microdota) subluctuosa Cameron, 1939: 323
Atheta (*Physadota* n.) *scabriventris* Cameron, 1939
    Atheta (Microdota) scabriventris Cameron, 1939: 332
Atheta (*Physadota* n.) *praelata* Pace, 1985
    Atheta (Microdota) praelata Pace, 1985: 159



FIGG. 1-12.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 1-4: *Atheta (Microdota) amicula* (Stephens). Figg. 5-8: *Atheta (Microdota) scrobicollis* (Kraatz). Figg. 9-12: *Atheta (Microdota) nana* (Kraatz).

Atheta (Microdota) amicula (Stephens), SPECIE ESCLUSA DALLA FAUNA HIMALAYANA

Atheta (Microdota) amicula (Stephens, 1832), figg. 1-4, è specie diffusa in tutta Europa (Brundin, 1948). Secondo Cameron (1939), la specie è presente anche nell'India settentrionale: è stata perciò da lui compresa nel volume «Aleocharinae» della «Fauna of British India».

L'esame degli esemplari visti da Cameron e da lui determinati come *amicula,* mi permette di escludere questa specie dalla fauna in oggetto, tanto più che né nelle raccolte del Museo di Ginevra, né in quelle del prof. Franz ho veduto esemplari di *amicula.*

Gli esemplari determinati come *amicula* da Cameron, prevalentemente appartengono ad *A. kathmanduensis* Pace, 1988. Alcuni esemplari appartengono ad *A. amiculoides* Cameron, 1939, *A. gahanensis* sp. n., *A. arniensis* sp. n. e *A. notatella* sp. n. qui di seguito descritte.

Descrizioni e illustrazioni

Le descrizioni date in questa revisione sono brevi perché ciò che non è esposto può essere osservato nella parte illustrativa. L'habitus essendo stato disegnato mediante micrometro oculare si presenta nei rapporti lunghezza-larghezza delle singole parti come è risultato dall'osservazione sulla scala del micrometro oculare. L'edeago e la spermateca sono stati disegnati mediante reticolo oculare. Tutti i disegni sono stati da me eseguiti in ogni fase, fino a quella definitiva sulle tavole.

Nelle descrizioni, quando non sono indicate le figure o dell'edeago o della spermateca, significa che maschio o femmina sono sconosciuti.

L'apparato illustrativo rende superflue le note comparative.

Chiave dei sottogeneri affini a *Microdota*

1 — Parte prossimale della spermateca descrivente uno o più archi di cerchio o spire 2
— Parte prossimale della spermateca mai descrivente più di un arco di cerchio o sinuosità 4

2 — Taglia di norma non superiore ai 2,2 mm; bulbo distale della spermateca subovale o claviforme; parte prossimale della spermateca arcuata, ma senza brusche deviazioni o strette curvature; parte mediana tra i due bulbi più o meno lunga e a lati più o meno paralleli (Fig. 4) . . . . Subgen. *Microdota* Mulsant & Rey (tipo: *amicula* Stephens)
— Taglia talvolta superiore ai 2,2 mm; bulbo distale della spermateca subovale; parte prossimale della spermateca corta o con bulbo eccezionalmente sviluppato o descrivente deboli spire 3

3 — Parte prossimale della spermateca descrivente due o più deboli spire; bulbo distale non deviato . . . . Subgen. *Dimetrota* Mulsant & Rey (tipo: *cadaverina* Brisout)
— Parte prossimale della spermateca semplicemente arcuata; bulbo distale bruscamente deviato quasi ad angolo . . . . Subgen. *Datomicra* Mulsant & Rey (tipo: *celata* Erichson)

4 — Parte prossimale della spermateca priva di distinto bulbo (fig. 294) .... Subgen. *Poromicrodota* n. (tipo: *subamicula* Cameron)
— Parte prossimale della spermateca con bulbo molto sviluppato (fig. 308) .... Subgen. *Physadota* n. (tipo: *subscabra* Cameron)

Il nome del nuovo sottogenere *Poromicrodota* significa: «*Microdota* che cammina». Quello di *Physadota* significa: «Dono rigonfio» a motivo della forma del bulbo prossimale della spermateca.

CHIAVE DELLE SPECIE DEL SOTTOGENERE *Microdota*

Le specie himalaiane del sottogenere *Microdota* si riuniscono in sei gruppi, secondo i caratteri della spermateca e in parte dell'edeago. Nella chiave sono incluse tre specie non pertinenti alla fauna dell'Himalaya, ma potrebbero essere rinvenute in futuro. Il loro nome è posto tra parentesi.

1 — Bulbo prossimale della spermateca molto sviluppato, largo quasi quanto il bulbo distale della stessa, nettamente protratto in linea pressoché retta verso la porzione mediana della spermateca stessa, figg. 4 e 11 2
— La totalità dei caratteri della spermateca non si verificano 3
2 — Taglia meno ridotta: 1,9-2,1 mm, fig. 5; bulbo basale dell'edeago, in visione ventrale, presentante all'interno un distinto pezzo sclerificato arcuato, figg. 3 e 8; bulbo prossimale della spermateca meno protratto e meno sviluppato, figg. 4 e 6. Gruppo di *amicula* 7
— Taglia più ridotta: 1,4-1,7 mm, fig. 12; bulbo basale dell'edeago, in visione ventrale, privo all'interno di un pezzo sclerificato arcuato, fig. 10; bulbo prossimale della spermateca più protratto verso il bulbo distale della spermateca stessa, fig. 11. Gruppo di *nana* 8
3 — Porzione mediana della spermateca poco lunga, fig. 120 4
— Porzione mediana della spermateca assai lunga, fig. 181 6
4 — Bulbo distale della spermateca ipertrofico, fig. 29 5
— Bulbo distale della spermateca poco sviluppato, fig. 120. Gruppo di *placita* 27
5 — Parte prossimale della spermateca arcuata o descrivente parte di una spira, fig. 29. Gruppo di *amiculoides* 11
— Parte prossimale della spermateca non arcuata, fig. 73. Gruppo di *yakorum* 24
6 — Porzione mediana della spermateca meno allungata, fig. 181; specie prevalentemente alate o microttere. Gruppo di *antiqua* 52
— Porzione mediana della spermateca molto allungata, fig. 241; specie prevalentemente attere, fig. 276. Gruppo di *seclusa* 67

Gruppo di *A. amicula*

7 — Occhi più sviluppati; pronoto privo di largo solco mediano, fig. 1; reticolazione del capo e del pronoto nette; edeago, figg. 2-3, spermateca fig. 4; lungh. 1,7-1,9 mm. Europa .... (*amicula* (Stephens))

— Occhi meno sviluppati; pronoto con largo solco mediano, fig. 5; reticolazione del capo e del pronoto poco distinta; edeago figg. 7-8, spermateca fig. 6; lungh. 1,8 mm. India, La Réunion, Europa meridionale .... 1. *scrobicollis* (Kraatz)

Gruppo di *A. nana*

8 — Elitre lunghe quanto il pronoto, fig. 12 9

— Elitre più lunghe del pronoto, fig. 16 10

9 — Elitre più larghe del pronoto; solo due sono i solchi trasversali basali dell'addome, fig. 12; edeago figg. 9-10, spermateca fig. 11; lungh. 1,4-1,5 mm. India meridionale, Cina meridionale, Hong Kong, Taiwan, Sri Lanka .... (*nana* (Kraatz))

— Elitre larghe quanto il pronoto; addome con tre solchi trasversali basali, fig. 13; edeago figg. 14-15; lungh. 1,6 mm. Nepal .... 3. *sikhaensis* sp. n.

10 — Pronoto più trasverso; elitre meno lunghe; quinto urotergo libero fittamente pubescente, fig. 16; edeago figg. 17-18; lungh. 1,7 mm. India settentrionale .... 4. *inconspicua* Cameron

— Pronoto meno trasverso; elitre più lunghe; quinto urotergo libero sparsamente pubescente, fig. 19; edeago figg. 20-21; lungh. 1,8 mm. India settentrionale .... 5. *dehraensis* sp. n.

Gruppo di *A. amiculoides*

11 — Elitre più lunghe del pronoto, fig. 38 12

— Elitre lunghe quanto il pronoto, fig. 57; spermateca fig. 56; lungh. 2,0 mm. Nepal .... 15. *languens* sp. n.

12 — Elitre non straordinariamente più lunghe del pronoto; occhi per lo più ben sviluppati, fig. 38 13

— Elitre straordinariamente lunghe e occhi assai ridotti, fig. 68; spermateca fig. 68; lungh. 2,3 mm. Nepal .... 19. *himalayica* Scheerpeltz

13 — Corpo nero, compresi gli articoli basali delle antenne; zampe nero-brune; uroterghi coperti di robusti tubercoli, fig. 38; edeago figg. 39-40; lungh. 1,7 mm. Kashmir .... 10. *pergrata* Pace

— Corpo diversamente colorato 14

14 — Pronoto giallo, giallo-rossiccio o giallo sporco 15

— Pronoto diversamente colorato 18

15 — Pronoto giallo, con un distinto solco mediano, fig. 53 16

— Pronoto giallo-rossiccio o giallo sporco, senza distinto solco mediano, fig. 62, al massimo vi è un'impressione mediana posteriore, fig. 22 17

16 — Corpo esile; elitre nettamente più lunghe del pronoto, fig. 53; edeago figg. 54-55; lungh. 1,8 mm. Nepal .... 14. *festa* Pace

— Corpo robusto; elitre di poco più lunghe del pronoto, fig. 41; edeago figg. 42-43, spermateca fig. 44; lungh. 2,0 mm. Nepal .... 11. *ivani* sp. n.

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1 — Elitre lunghe, fig. 309; spermateca fig. 310; lungh. 2,1 mm. Tibet .... 1. *scabriventris* Cameron
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DESCRIZIONE DELLE SPECIE DEL SOTTOGENERE *Microdota*

1. **Atheta (Microdota) scrobicollis** (KRAATZ, 1859)
(Figg. 5-8)

Homalota scrobicollis KRAATZ, 1859: 31
Homalota inutilis KRAATZ, 1859: 35; *Atheta* (s. str.) *inutilis,* BERNHAUER & SCHEERPELTZ, 1926: 644; *Atheta (Microdota) inutilis,* CAMERON, 1939: 330, **syn. n.**

Phloeopora indica KRAATZ, 1859: 42; Cameron, 1939: 306
Homalota cava FAUVEL, 1872: 738; BERNHAUER & SCHEERPELTZ, 1926: 619
Atheta (Dralica) scrobicollis, BERNHAUER & SCHEERPELTZ, 1926: 619; CAMERON, 1939: 306
nec *Amischa (Metamischa) scrobicollis* (KRAATZ, 1859), sensu PEYERIMHOFF (1938)

NOTA. PEYERIMHOFF (1938) attribuisce *scrobicollis* Kraatz al genere *Amischa* THOMSON, 1858, e per questa specie crea il sottogenere *Metamischa* PEYERIMHOFF, 1938. L'autore francese non ha esaminato esemplari tipici, ma solo esemplari di *Atheta cava* (Fauvel) specie sud-europea ritenuta sinonimo di *A. scrobicollis.* È certo che l'esemplare su cui ha creato il sottogenere *Metamischa* non appartiene alla specie *scrobicollis,* in base alle mie constatazioni fatte sugli esemplari tipici di *scrobicollis.* La ligula di questa specie non è larga e indivisa come ha osservato Peyerimhoff, ma stretta e divisa come nelle *Atheta* s.l.

TIPO. Lectotypus ♂, Ind. Port. (DEI).

DESCRIZIONE. Lungh. 1,8 mm. Avancorpo quasi opaco, addome lucido. Corpo rossiccio; base ed estremità addominali giallo-rossicci; uriti liberi 3, 4 e 5 bruni; antenne bruno-rossicce con i due articoli basali e le zampe gialli. L'avancorpo è coperto di pubescenza fitta e ha punteggiatura e reticolazione svanite. Gli uroterghi presentano reticolazione appena trasversa e lievemente svanita. Edeago figg. 7-8, spermateca fig. 6.

DISTRIBUZIONE. India: NNW Uttar Pradesh, Goa, Mascarene, Corsica.

1 ♂, Ind. Port. (DEI); 1 ♀, Ind. Port. (Helfer leg. DEI), tipo di *Phloeopora indica* Kraatz; 1 ♂, India, Dehra Dun, 4.III.1922 (Cameron leg., BMNH); 1 ♀, La Réunion, Plaine des Cafres (V.1965, Gomy leg. MHNG); 1 ♀, Corsica, Cavafol (DEI).

ECOLOGIA. Specie sublapidicola e fimicola (Fauvel, 1872).

2. **Atheta (Microdota) nana** (KRAATZ, 1959)
(figg. 9-12)

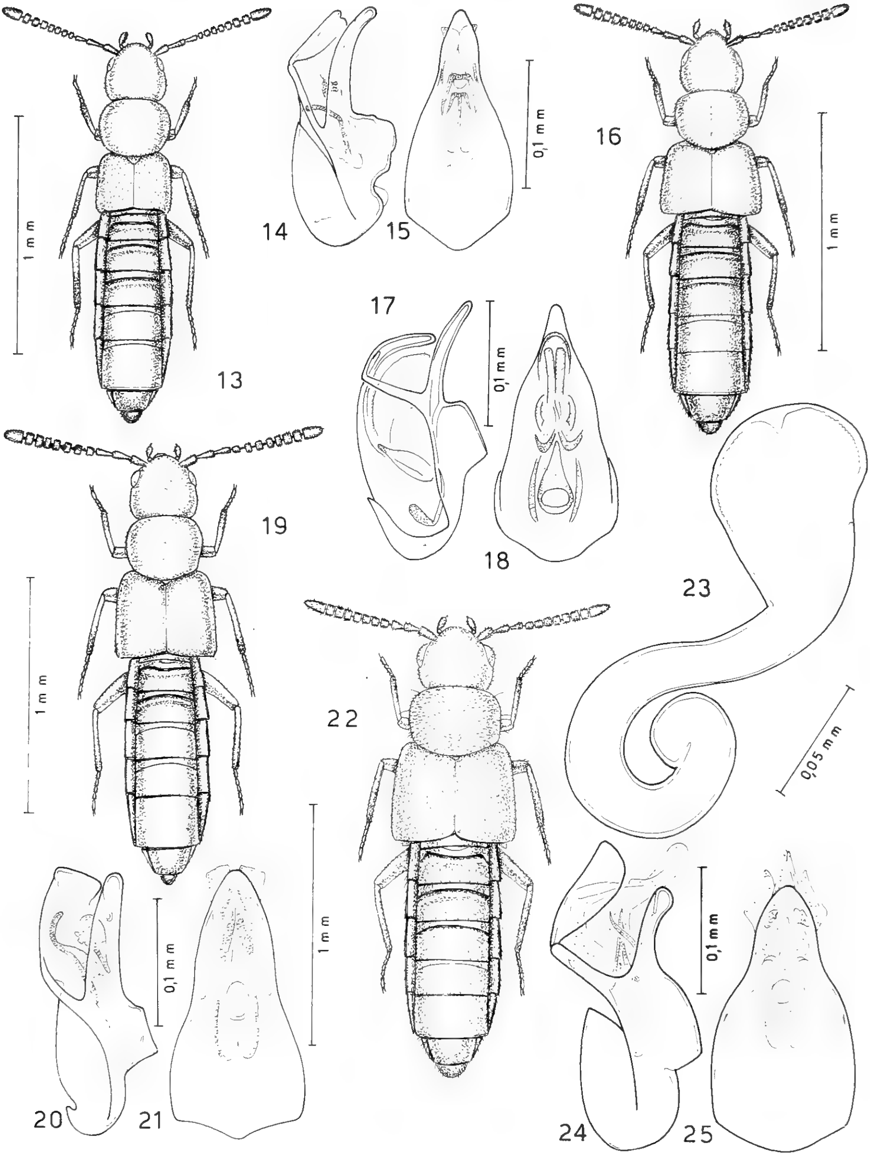
Homalota nana KRAATZ, 1859: 36
Atheta (s. str.) *nana,* BERNHAUER & SCHEERPELTZ, 1926: 646
Atheta (Datomicra) nana, CAMERON, 1939: 387
Atheta (Datomica) pseudosordidula CAMERON, 1944: 106; PACE, 1987: 434
Atheta (Microdota) vulgaris CAMERON, 1920: 259; PACE, 1987: 434
Atheta (Datomicra) kanagawana BERNHAUER, 1907: 399; YOSII & SAWADA, 1976: 37, **syn. n.**

TIPI. Lectotypus ♀, Ceylon (Nietner leg. DEI); paralectotypi: 3 ♀♀, stessa provenienza. Presente designazione.

DESCRIZIONE. Lungh. 1,4-1,5 mm. Corpo poco lucido e bruno; uriti liberi 3 e 4 neri; antenne brune, zampe gialle. L'avancorpo è coperto di tubercoletti assai poco salienti. Gli uroterghi basali mostrano tubercoletti ben salienti; la reticolazione degli uroterghi è trasversa e poco distinta. Edeago figg. 9-10, spermateca fig. 11.

DISTRIBUZIONE. NNW Uttar Pradesh, Sri Lanka, Singapore, Taiwan, Hong Kong, China, Japan.

4 ♀♀, Sri Lanka (Nietner leg. DEI); 1 ♀, India, Dehra Dun, Lachiwala (Cameron leg. 1944, BMNH); 13 es., India Dehra Dun, 22.X.1921 (Cameron leg. BMNH); 2 es., India, Mussoorie, Keyarkuli, 12.XI.1921 (Cameron leg. BMNH); 7 es., India, Dehra Dun, Lachiwala Siwaliks, 14.III.1922 e 10.III.1922 (Cameron leg., BMNH); 6 es. Dehra Dun, 18.II.1922 (Cameron leg., BMNH); 1 ♀, Formosa, Taihòrin, VII.1911 (DEI); 16 es., Singapore, Pasir Panjang (BMNH); 4 es., Singapore, Labrador Ville (Cameron leg., BMNH); 1 es., Singapore (Cameron leg. BMNH); 2 es., Singapore, Bukit



FIGG. 13-25.

Habitus, edeago in visione laterale e ventrale e spermateca.

Figg. 13-15: *Atheta (Microdota) sikhaensis* sp. n. Figg. 16-18: *Atheta (Microdota) inconspicua* Cameron. Figg. 19-21: *Atheta (Microdota) dehraensis* sp. n. Figg. 22-25: *Atheta (Microdota) maiensis* Pace.

Panjang (Cameron leg., BMNH); 7 es., Pulo Condore (BMNH); 2♀♀, Hong Kong (BMNH); 1♀, S China, Sheung Shui (Cameron leg. BMNH).

ECOLOGIA. Specie stercoricola e coprofila, ma anche in frutta marcia.

3. **Atheta (Microdota) sikhaensis** sp. n.

(Figg. 13-15)

TIPI. Holotypus ♂, Nepal, Sikha, 83°40'E, 28°26'N, 8000 ft, 24-28.V.1954 (K. H. Hyett leg., BMNH), B. M. Nepal Exped.; paratypus: 1♂, stessa provenienza (BMNH).

DESCRIZIONE. Lungh. 1,6 mm. Corpo lucido e bruno-rossiccio, margini posteriori degli uroterghi rossiccio; antenne giallo-brune, con i due articoli basali giallicci; zampe gialle. La reticolazione sul disco del capo è netta e a larghe maglie, sul pronoto è distinta e sulle elitre e sull'addome assai superficiale. Il capo e il pronoto sono coperti di distinti tubercoletti, essi sono salienti sulle elitre e svaniti sugli uroterghi. Edeago figg. 14.-15. Specie attera.

DISTRIBUZIONE. Nepal occidentale.

ECOLOGIA. Specie humicola e fitodetriticola, in foresta di *Quercus.*

4. **Atheta (Microdota) inconspicua** CAMERON, 1939

(Figg. 16-18)

Atheta (Microdota) inconspicua CAMERON, 1939: 334

TIPO. Lectotypus ♂, India, Dehra Dun, 8.II.1922 (Cameron leg., BMNH). Presente designazione.

DESCRIZIONE. Lungh. 1,7 mm. Corpo lucido e bruno-rossiccio; elitre brune; base dell'addome bruno-gialliccia; antenne brune con i due articoli basali giallo-brunicci; zampe gialle. La punteggiatura o i tubercoletti dell'avancorpo sono indistinti. La reticolazione del capo e delle elitre è ben visibile, quella del pronoto assai svanita. Edeago figg. 17-18.

DISTRIBUZIONE. NNW Uttar Pradesh.

ECOLOGIA. Fitodetriticola submontana.

5. **Atheta (Microdota) dehraensis** sp. n.

(Figg. 19-21)

TIPO. Holotypus ♂, India, Dehra Dun, 30.II.1922 (Cameron leg., BMNH), sintipo di *Atheta (Microdota) inconspicua* Cameron.

DESCRIZIONE. Lungh. 1,8 mm. Corpo lucido e giallo-bruniccio con articoli basali 1, 2 e base del 3 gialli come le zampe. L'avancorpo è coperto di tubercoletti e di reticolazione svaniti. La reticolazione degli uroterghi è distinta. Edeago figg. 20-21.

DISTRIBUZIONE. NNW Uttar Pradesh.

ECOLOGIA. Specie fitodetriticola.

6. **Atheta (Microdota) maiensis** PACE, 1987
(Figg. 22-25)

Atheta (Microdota) maiensis PACE, 1987: 417

TIPI. Holotypus ♂, Nepal, Ilam distr., Mai Pokhari, 2100-2200 m, 25-27.III.1980 (Martens & Ausobsky leg., SM); paratypus: 1 ♀, stessa provenienza (CPA).

DESCRIZIONE. Lungh. 1,8 mm. Avancorpo poco lucido, addome lucido. Capo bruno, pronoto ed elitre di un gialliccio sporco, addome bruno-rossiccio, con uriti quarto e quinto bruni; margine posteriore degli uroterghi basali, rossiccio; antenne brune con aticolo basale giallo come le zampe. Sul pronoto e sulle elitre i tubercoletti sono fini e poco distinti. La reticolazione del capo è ben visibile, quella del pronoto quasi vigorosa e quella delle elitre quasi netta. Una distinta reticolazione copre gli uroterghi. Edeago figg. 24-25, spermateca fig. 23.

DISTRIBUZIONE. Nepal centro-settentrionale.

ECOLOGIA. Specie fitodetriticola o humicola.

7. **Atheta (Microdota) amiculoides** CAMERON, 1939
(Figg. 26-29)

Atheta (Microdota) amiculoides CAMERON, 1939: 329
Atheta (Microdota) eruta PACE, 1986: 89, **syn. n.**

TIPI. Lectotypus ♂, Kashmir, Gulmarg, VI-VII.1931 (Cameron leg., BMNH); paralectotypi: 6 es., stessa provenienza. Presente designazione.

DESCRIZIONE. Lungh. 1,8 mm. Corpo lucido e bruno-rossiccio; antenne brune con i tre articoli basali di un giallo-rossiccio sporco; zampe gialle. Tubercoletti fini e poco salienti coprono l'avancorpo. Una reticolazione distinta si nota su tutto il corpo. Edeago figg. 27-28, spermateca fig. 29.

DISTRIBUZIONE. Kashmir, NNW Uttar Pradesh, Himachal Pradesh, Nepal.

5 es., Simla Hills, 7000-8000 ft, IX.1921 (Cameron leg., BMNH); 58 es. Himachal Pradesh, Rohtang Pass, 2500-3500 m (Franz leg., CFR, CPA); 5 ♀ ♀, Kashmir, Aru (Franz leg., CFR); 1 ♀, Nepal, Fulung (Franz leg., CFR).

ECOLOGIA. Specie fitodetriticola.

8. **Atheta (Microdota) sericella** CAMERON, 1939
(Figg. 30-33)

Atheta (Microdota) sericella CAMERON, 1939: 327; PACE, 1986: 89

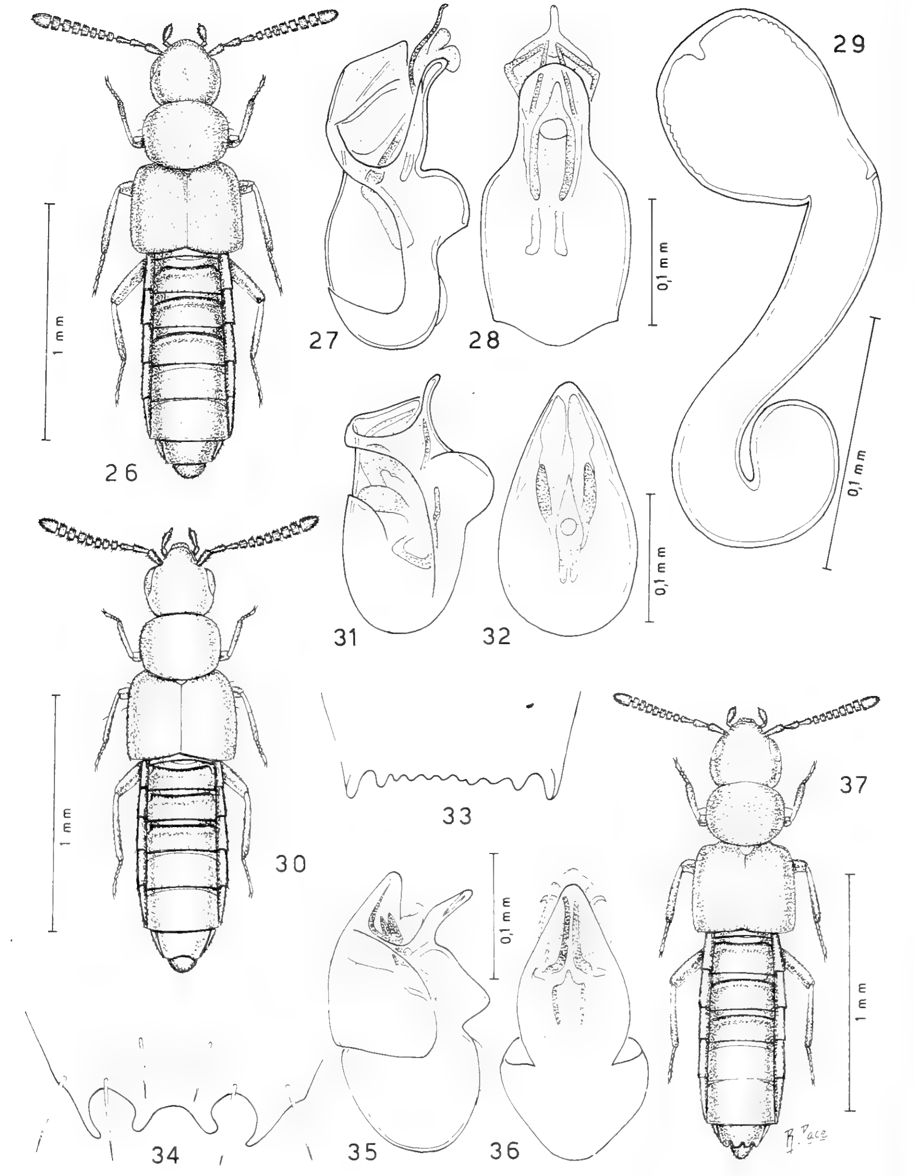
TIPO. Lectotypus ♂, Chakrata distr., Bodyar, 8300 ft, 3-12.V.1922 (Cameron leg., BMNH). Presente designazione.

DESCRIZIONE. Lungh. 1,8 mm. Corpo bruno, con elitre oscurate; addome con una fascia nera; antenne brune con i due articoli basali rossicci; zampe gialle. La reticolazione del capo e delle elitre è distinta, quella del pronoto e dell'addome non visibile. Una punteggiatura fine e poco distinta copre il corpo. Edeago figg. 31-32.

DISTRIBUZIONE. Himachal Pradesh, NNW Uttar Pradesh, NNE Bihar.

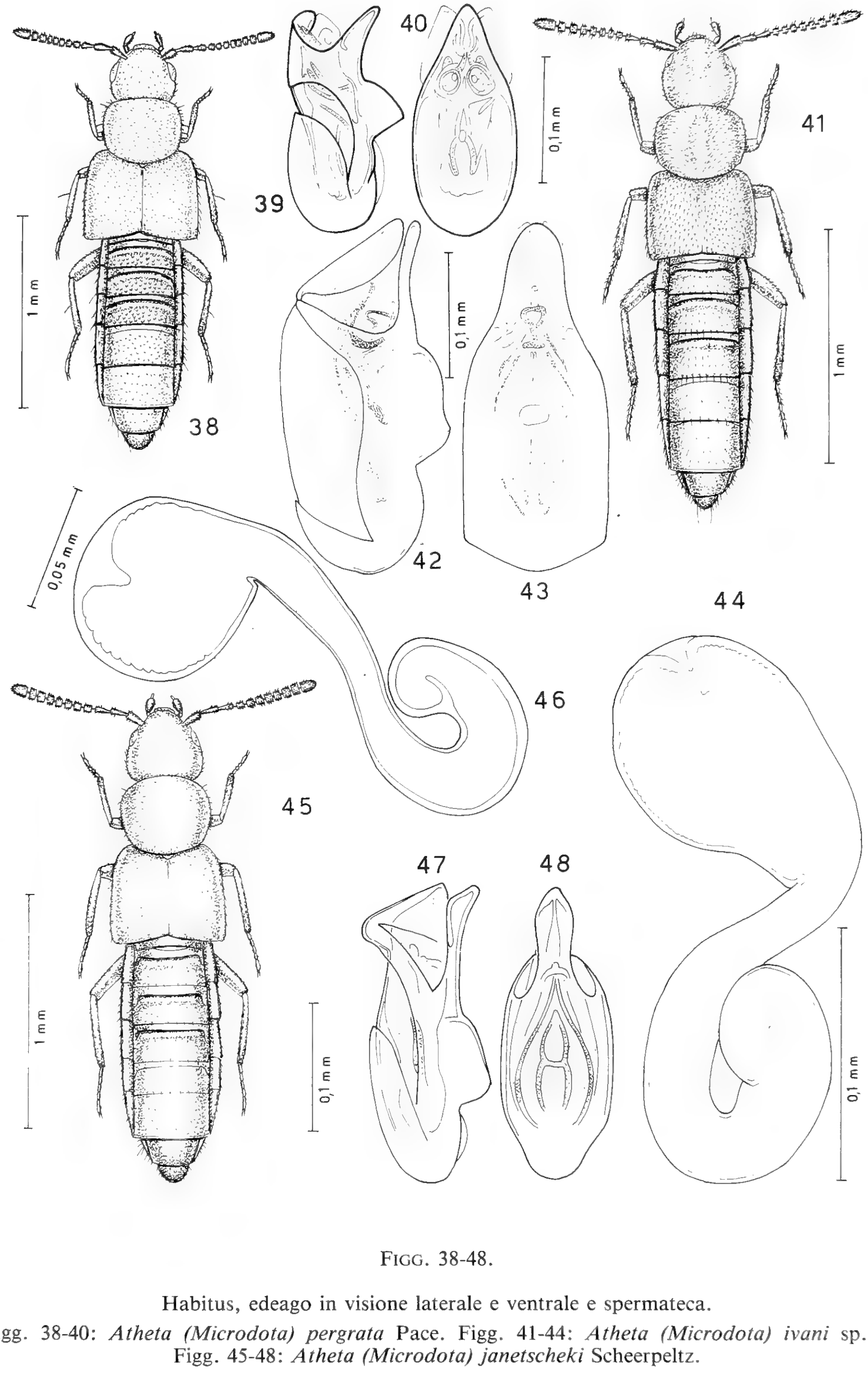
1 ♂, Himachal Pradesh, Katrain (Franz leg., CFR); 1 ♂, Ghum distr., Mangpo, V.1931 (Cameron leg., BMNH).

ECOLOGIA. Specie stercoricola.



FIGG. 26-37.

Habitus, edeago in visione laterale e ventrale, spermateca e sesto urotergo libero del maschio. Figg. 26-29: *Atheta (Microdota) amiculoides* Cameron. Figg. 30-33: *Atheta (Microdota) sericella* Cameron. Figg. 34-37: *Atheta (Microdota) subscabra* Cameron.



FIGG. 38-48.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 38-40: *Atheta (Microdota) pergrata* Pace. Figg. 41-44: *Atheta (Microdota) ivani* sp. n. Figg. 45-48: *Atheta (Microdota) janetscheki* Scheerpeltz.

9. **Atheta (Microdota) subscabra** CAMERON, 1939
(Figg. 34-37)

Atheta (Microdota) subscabra CAMERON, 1939: 333

TIPO. Holotypus ♂, Siwaliks, Lachiwala, 11.III.1923 (Cameron leg., BMNH), esaminato.

DESCRIZIONE. Lungh. 1,8 mm. Corpo lucido e bruno; elitre ed estremità addominale bruno-giallicce; antenne brune con i due articoli basali giallo-rossicci; zampe gialle. Tutto il corpo è coperto di tubercoletti distinti e di reticolazione ben visibile. Edeago figg. 35-36.

DISTRIBUZIONE. NNW Uttar Pradesh.

ECOLOGIA. Specie stercoricola.

10. **Atheta (Microdota) pergrata** PACE, 1985
(Figg. 38-40)

Atheta (Dralica) pergrata PACE, 1985: 175

TIPO. Holotypus ♂, Kashmir, Hemis, VI.1981 (De Rougemont leg., MV).

DESCRIZIONE. Lungh. 2,0 mm. Corpo lievemente opaco e nero; antenne nero-brune; estremità distale delle tibie, rossiccia. Tubercoletti distinti coprono il corpo. La reticolazione è vigorosa o distinta su tutta la superficie del corpo. Edeago figg. 39-40.

DISTRIBUZIONE. Kashmir.

ECOLOGIA. Specie fitodetriticola e humicola.

11. **Atheta (Microdota) ivani** sp. n.
(Figg. 41-44)

TIPI. Holotypus ♂, Nepal, Lalitpur Distr., Phulcoki, 2700 m, 16.X.1983 (Smetana & Löbl leg., MHNG).

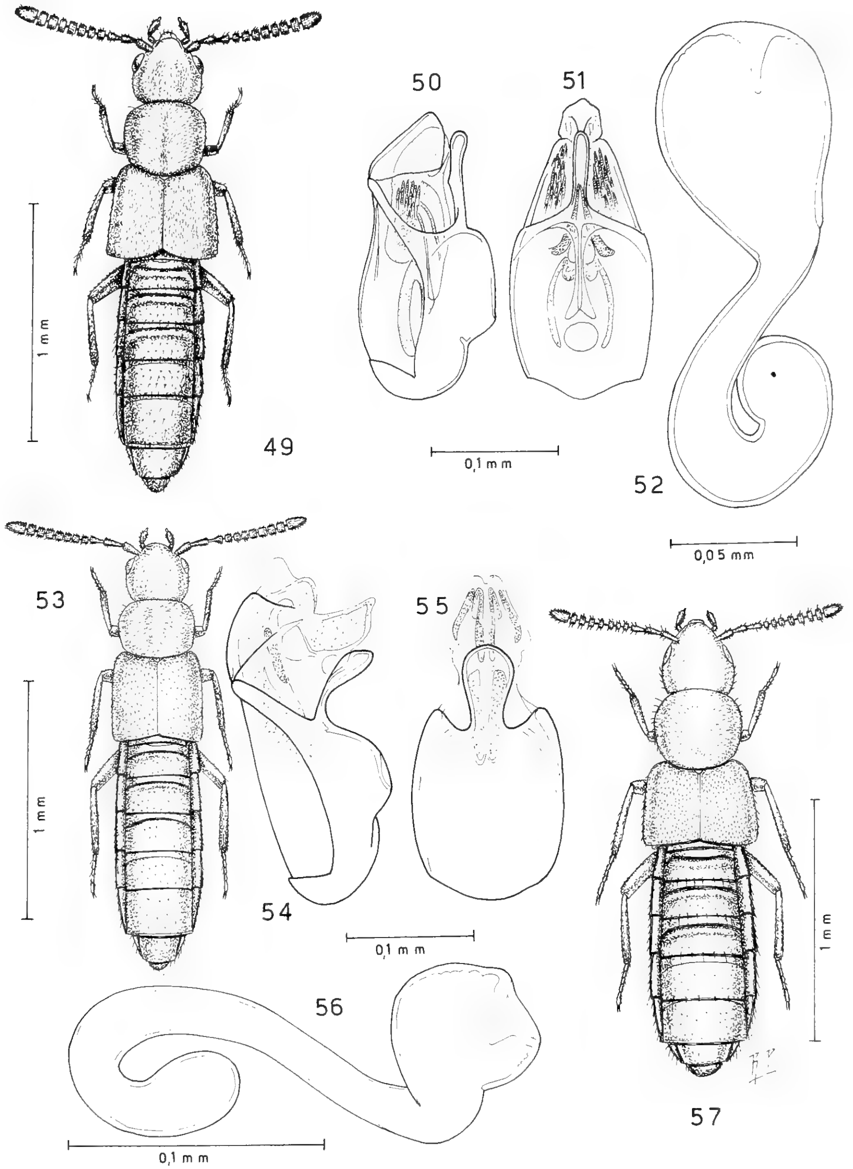
Paratypi: 47 es., stessa provenienza, 20.IV.1982 (A. & Z. Smetana leg., MHNG, CPA); 12 es., stessa provenienza, 2550 m (Smetana & Löbl leg., MHNG, CPA); 1 ♀, stessa provenienza, 7.VI.1986 (Orousset leg., MNP); 7 es., Nepal, Prov. Bagmati, Malemchi, 2800 m, 14-16-17.IV.1981 (Smetana & Löbl leg., MHNG, CPA); 1 ♂ e 1 ♀, stessa provenienza, above Shermathang, 2900 m, 26.IV.1981 (Löbl & Smetana leg., MHNG); 2 ♀♀, Prov. Bagmati, Nagarjun for. nr. Kathmandu, 1650 m, 2.IV.1981 (Löbl & Smetana leg., MHNG); 1 ♀, Nepal, Manang Distr., for. W Bagarchhap, 2200 m, 21.IX.1983 (Smetana & Löbl leg., MHNG).

DESCRIZIONE. Lungh. 2,0 mm. Corpo lucido e giallo-rossiccio; capo bruno, elitre bruno-giallicce, uriti liberi 3, 4 e 5 bruno-rossicci; antenne brune con i due articoli basali giallo-rossicci, come le zampe. La reticolazione del capo è netta e ad ampie maglie, quella del pronoto e delle elitre è distinta e quella degli uroterghi è composta di maglie appena transverse nette. Il capo e il pronoto sono privi di distinti tubercoletti che invece sono chiaramente visibili sulle elitre. Edeago, figg. 42-43, spermateca fig. 44.

DISTRIBUZIONE. Nepal centrale.

ETIMOLOGIA. Specie dedicata a uno dei raccoglitori, il Dr. Ivan Löbl del Museo di Storia Naturale di Ginevra, noto studioso di Scaphidiidae.

ECOLOGIA. Specie fitodetriticola forestale.



FIGG. 49-57.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 49-52: *Atheta (Microdota) kathmanduensis* Pace. Figg. 53-55: *Atheta (Microdota) festa* Pace.
Figg. 56-57: *Atheta (Microdota) languens* sp. n.

12. **Atheta (Microdota) janetscheki** SCHEERPELTZ, 1976
(Figg. 45-48)

TIPI. Holotypus ♂, Nepal, Yaral, Pangpoche, 3900 m, 3.III.1961 (Janetschek leg., IZUI), esaminato. Parattypus: 1♀, stessa provenienza (Janetschek leg., IZUI).

DESCRIZIONE. Lungh. 2,0 mm. Corpo poco lucido e bruno; antenne brune con i tre articoli basali gialli, come le zampe. Su tutto il corpo è visibile una vigorosa reticolazione. Il capo e il pronoto sono coperti di tubercoletti poco distinti, le elitre e l'addome di tubercoletti salienti. Edeago figg. 47-48, spermateca fig. 46.

DISTRIBUZIONE. Nepal centro-orientale.

ECOLOGIA. Specie fitodetriticola in boschi di *Rhododendron* sp., *Betula utilis* e *Abies* sp.

13. **Atheta (Microdota) kathmanduensis** PACE, 1988
(Figg. 49-52)

Atheta (Philhygra) kathmanduensis PACE, 1988: 193
Atheta (Microdota) amicula (STEPHENS, 1832: 132), *sensu* CAMERON, 1939: 326, *partim.*

TIPI. Holotypus ♂, Nepal, Phulcoki, Kathmandu (Franz leg. CFR). Paratypi: 3♂♂, stessa provenienza (Franz leg. CFR, CPA); 1♂, Nepal, Godawari, Kathmandu (Franz leg., CFR).

DESCRIZIONE. Lungh. 1,9 mm. Corpo bruno-rossiccio, capo appena oscurato; uriti liberi 4 e 5 bruno-rossicci; antenne giallo-brunicce con i due articoli basali appena più chiari; zampe gialle. La punteggiatura del capo e del pronoto è finissima e poco distinta per la superficie reticolata. Tubercoletti delle elitre confusi nelle maglie di reticolazione del fondo. Edeago figg. 50-51, spermateca fig. 52.

DISTRIBUZIONE. Nepal centrale, NNW Uttar Pradesh e Himachal Pradesh.

53 es., Simla Hills, Narkanda, IX.1921 (Cameron leg., BMNH); 3 es., Simla Hills, Fagu, 8000 ft., IX.1921 (Cameron leg., BMNH); 6 es., Simla Hills, Kotgarh, 7000 ft., 17.IX.1921 (Cameron leg., BMNH); 8 es., Simla Hills, Gahan, 7000 ft., IX.1921 (Cameron leg. BMNH); 2 es., Mussoorie, Arni Gad, 16.X.1921 (Cameron leg., BMNH); 2 es., Siwaliks, Malhan Range, 24.IX.1921 (Cameron leg., BMNH); 9 es., Nepal, Lalitpur distr., Phulcoki, 2650 m, 20-22.IV.1982 (A. & Z. Smetana leg., MHNG, CPA); 3♂♂, stessa provenienza, 22.IV.1982 (A. & Z. Smetana leg., MHNG); 1♂, Phulcoki, 2550 m, 15.X.1983 (Smetana 8 Löbl leg., MHNG).

ECOLOGIA. Specie fitodetriticola.

14. **Atheta (Microdota) festa** PACE, 1987
(Figg. 53-55)

Atheta (Microdota) festa PACE, 1987: 418

TIPI. Holotypus ♂, Nepal, Gorkha Distr., Chuling Khola, 2800 m, 2-3.VIII.1983 (Martens & Schawaller leg., SM). Paratypus: 1♂, stessa provenienza (CPA).

DESCRIZIONE. Lungh. 1,8 mm. Corpo lucido; capo nero-bruno, pronoto giallo-rossiccio chiaro, elitre brunicce con omeri giallo-rossicci; urite libero 1 e 2 giallo-rossicci, uriti 3, 4 e metà basale del 5 bruno-rossicci, estremità addominale giallo-rossiccia; antenne rossicce con articoli basali giallo-rossicci; zampe gialle. La reticolazione dell'avancorpo è netta o appena svanita. Il capo e il pronoto hanno punteggiatura poco distinta, le elitre presentano tubercoletti distinti poco salienti. Edeago figg. 54-55.

DISTRIBUZIONE. Nepal centrale.

ECOLOGIA. Specie fitodetriticola in boschi di *Quercus semicarpifolia.*

15. **Atheta (Microdota) languens** sp. n.
(Figg. 56-57)

TIPO. Holotypus ♀, Nepal, Prov. Bagmati, above Shermathang, 2900 m, 26.IV.1981 (Löbl & Smetana leg., MHNG).

DESCRIZIONE. Lungh. 2,0 mm. Corpo lucido e bruno; estremità addominale rossiccia scura; antenne brune con i due articoli basali giallo-rossicci; zampe gialle. Il capo e le elitre presentano reticolazione distinta, il pronoto l'ha netta; tubercoletti fini e distinti coprono l'avancorpo. Spermateca fig. 56.

DISTRIBUZIONE. Nepal centrale.

ECOLOGIA. Specie fitodetriticola.

16. **Atheta (Microdota) ventorum** PACE, 1988
(Figg. 58-61)

Atheta (Badura) ventorum PACE, 1988: 189

TIPI. Holotypus ♂, Nepal, Phulchoki, Kathmandu (Franz leg., CFR). Paratypus: 1 ♀, stessa provenienza (CPA).

DESCRIZIONE. Lungh. 2,2-2,4 mm. Corpo bruno-rossiccio, capo appena oscurato, estremità addominale rossiccia, addome esternamente nero-bruno; zampe giallo-rossicce. La reticolazione dell'avancorpo è evidente e i tubercoletti salienti. Edeago figg. 59-60, spermateca fig. 61.

DISTRIBUZIONE. Nepal centrale.

9 es., Nepal, Lalitpur distr., Phulcoki, 2550 m, 15.X.1983; 1♂ e 1♀, Kathmandu Distr., Phulcoki, 27-31.V.1983 (Brendell leg., BMNH).

ECOLOGIA. Specie fitodetriticola in lettiera.

17. **Atheta (Microdota) masuriensis** CAMERON, 1939
(Figg. 62-65)

Atheta (Microdota) masuriensis CAMERON, 1939: 329

TIPI. Lectotypus ♂, Mussoorie, 7.VIII.1922 (Cameron leg., BMNH), presente designazione.

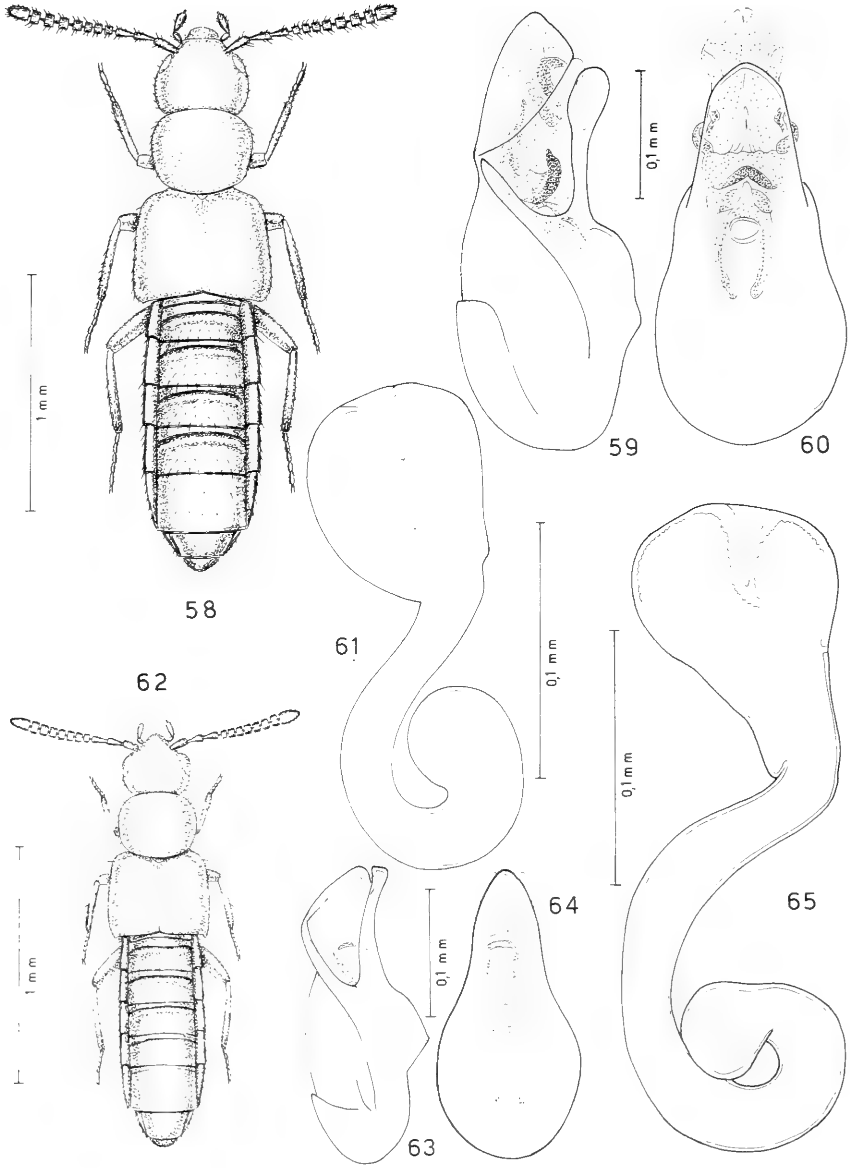
Paralectotypi: 9 es. stessa provenienza (Cameron leg., BMNH); 2 es., Ghum Distr., Rondong Valley, V-VI.1931 (Cameron leg., BMNH); 1 es., Ghum Distr., Tiger Hill, 8500 ft., V-VI.1931 (Cameron leg., BMNH); 3 es., Simla Hills, Kotgarh (Cameron leg., BMNH); 1 es., Chakrata Distr., Kanasar (Cameron leg., BMNH); 4 es., Chakrata Distr., Chulli Khud (Cameron leg., BMNH).

DESCRIZIONE. Lungh. 1,8 mm. Corpo debolmente lucido e bruno-rossiccio, pronoto, omeri, base ed estremità dell'addome giallo-rossicci; antenne brune con i due articoli basali gialli come le zampe. L'avancorpo è coperto di reticolazione netta. I tubercoletti del capo sono poco distinti, sulla parte restante del corpo sono salienti. Edeago figg. 63-64, spermateca fig. 65.

DISTRIBUZIONE. NNW Uttar Pradesh, NNE Bihar, Nepal centrale.

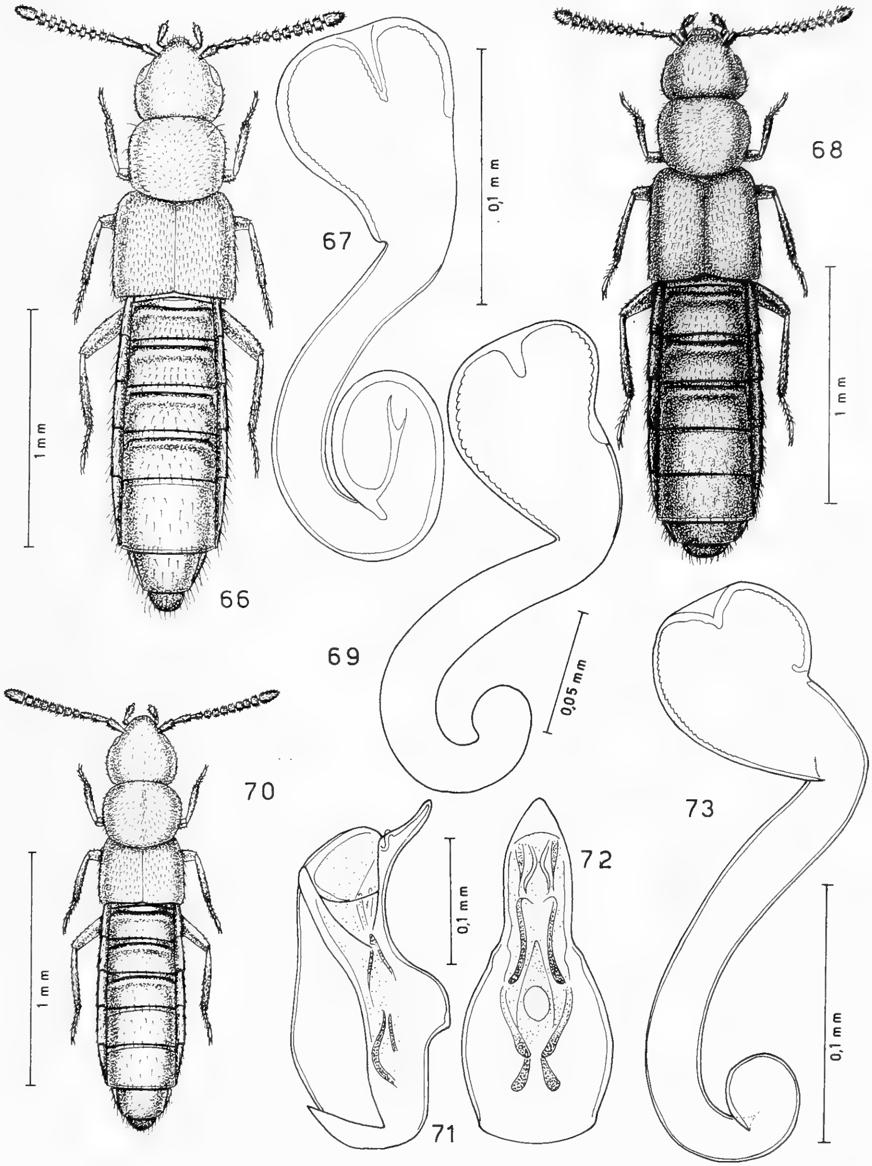
1♂, Nepal, Prov. Bagmati, Chaubas, 2600 m, 5.IV.1981 (Löbl & Smetana leg., MHNG); 2♀♀, Nepal, Khandbari Distr., Arun River at Num, 1500-1600 m, 10.IV.1982 (A. & Z. Smetana leg., MHNG); 1♂ e 4♀♀, Nepal, Phulcoki, 7.VI.1986 (Orousset leg., MNP, CPA); 1♂ et 1♀, Chakrata Distr., Khedar Khud, 7500 ft., 11.V.1922 (Cameron leg., BMNH).

ECOLOGIA. Specie fungicola, muscicola e subcorticicola.



FIGG. 58-65.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 58-61: *Atheta (Microdota) ventorum* Pace. Figg. 62-65: *Atheta (Microdota) masuriensis* Cameron.



FIGG. 66-73.

Habitus, spermateca ed edeago in visione laterale e ventrale.
Figg. 66-67: *Atheta (Microdota) lophophori* Pace. Figg. 68-69: *Atheta (Microdota) himalayica* Scheerpeltz. Figg. 70-73: *Atheta (Microdota) yakorum* Pace.

18. **Atheta (Microdota) lophophori** PACE, 1984
(Figg. 66-67)

Atheta (Parameotica) lophophori PACE, 1984: 324

TIPI. Holotypus ♀, Nepal, Taunja, 4000 m, 6.X.1976 (MNP). Paratypus: 1♀, stessa provenienza (CPA).

DESCRIZIONE. Lungh. 2,3 mm. Corpo lucido e bruno-rossiccio; capo e addome oscurati; antenne brune con i due articoli basali gialli come le zampe. Corpo coperto di reticolazione svanita e di tubercoletti svaniti, tranne che sulle elitre e sugli uroterghi dove sono salienti. Spermateca fig. 67.

DISTRIBUZIONE. Nepal centro-orientale.

ECOLOGIA. Specie fitodetriticola.

19. **Atheta (Microdota) himalayica** (SCHEERPELTZ, 1976)
(Figg. 68-69)

Leptusa (Anatelloleptusa) himalayica SCHEERPELTZ, 1976: 50
Atheta (Microdota) himalayica, PACE, 1982: 81

TIPO. Lectotypus ♀, Nepal, Yaral, Pangpoche, 3900 m, 3.III.1969 (Janetschek leg., IZUI), presente designazione.

DESCRIZIONE. Lungh. 2,3 mm. Corpo rossiccio scuro con fascia addominale bruna poco distinta; antenne brune, zampe gielle. L'avancorpo è coperto di reticolazione netta e da punteggiatura distinta. Spermateca fig. 69.

DISTRIBUZIONE. Nepal centro-orientale.

ECOLOGIA. Specie fitodtriticola in boschi di *Rhododendron* sp., *Betula utilis* e *Abies* sp.

20. **Atheta (Microdota) yakorum** PACE, 1984
(Figg. 70-73)

Atheta (Microdota) yakorum PACE, 1984: 321

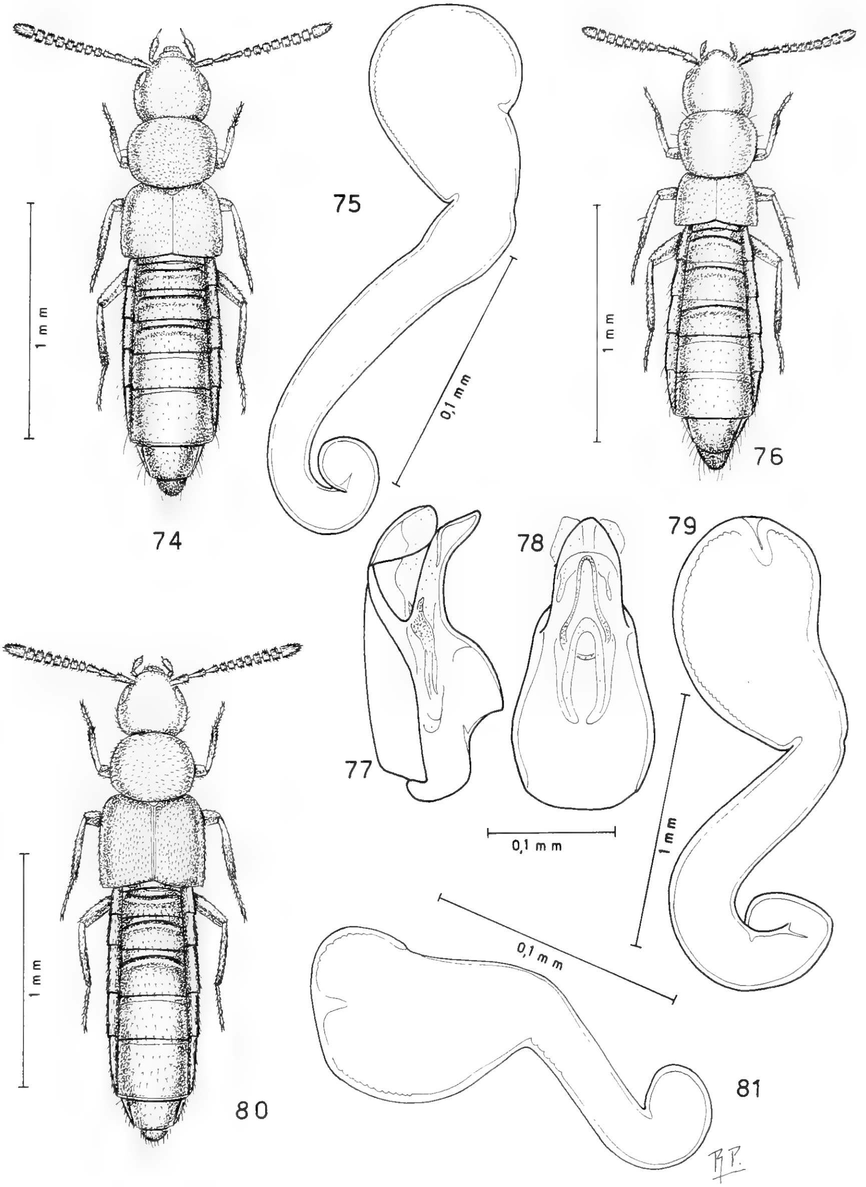
TIPI. Holotypus ♂, Nepal, Kalingkot, 3100 m, X.1981 (MNP). Paratypi: 1♂ e 1♀, stessa provenienza (MNP, CPA).

DESCRIZIONE. Lungh. 1,7-1,8 mm. Corpo piuttosto lucido e rossiccio scuro; addome fasciato di bruno; antenne rossicce scure con i tre articoli basali gialli come le zampe. La reticolazione del capo è distinta, quella del pronoto e delle elitre svanita. Una punteggiatura poco distinta copre il capo e il pronoto; le elitre mostrano tubercoletti fini e poco salienti. Edeago figg. 71-72, spermateca fig. 73.

DISTRIBUZIONE. Nepal centro-settentrionale.

1♂, Nepal, Manang Distr., Maryandi, Bagarchhap, 2200 m (Martens & Ausobsky leg., SM); 1♂, Manang Distr., for W Bagarchhap, 2200 m, 21.IX.1983 (Smetana & Löbl leg., MHNG).

ECOLOGIA. Specie humicola in boschi di *Acer* sp. e *Quercus* sp., tra i 2200 e i 3100 m d'altitudine.



FIGG. 74-81.

Habitus, spermateca ed edeago in visione laterale e ventrale.
Figg. 74-75: *Atheta (Microdota) granulithoracica granulithoracica* Pace. Figg. 76-79: *Atheta (Microdota) martensiella* Pace. Figg. 80-81: *Atheta (Microdota) praecipua* sp. n.

21. **Atheta (Microdota) granulithoracica granulithoracica** Pace, 1984
(Figg. 74-75)

Atheta (Microdota) granulithoracica Pace, 1984: 323

Tipi. Holotypus ♀, Nepal, Jaljale Himal, 2680-2950 m, XI.1978 (MNP). Paratypi: 13 ♀♀, stessa provenienza.

Descrizione. Lungh. 1,9-2,0 mm. Avancorpo lucido e granuloso, addome lucido. Corpo rossiccio scuro con addome fasciato di bruno; antenne rossicce scure con i tre articoli basali gialli come le zampe. La reticolazione della superficie dell'avancorpo è più o meno svanita. Tubercoletti netti e fini stanno sul pronoto e le elitre. Spermateca fig. 75.

Distribuzione. Nepal centro-orientale.

Ecologia. Specie fitodetriticola.

22. **Atheta (Microdota) granulithoracica subgranulithoracica** Pace, 1987, st. n.

Atheta (Microdota) subgranulithoracica Pace, 1987: 415

Tipo. Holotypus ♀, Nepal, Ilam Distr., Gitang Khola, 2550 m, 28-31.III.1980 (Martens & Ausobsky leg., SM).

Descrizione. Lungh. 1,8 mm. Corpo giallo bruniccio, estremità addominale distale giallo-rossiccia; antenne brunicce con i due articoli basali giallo-rossicci; zampe gialle. I tubercoletti del capo sono salienti e quelli del pronoto e delle elitre molto salienti. Il capo e le elitre mostrano una reticolazione svanita, quella del pronoto è distinta.

Distribuzione. Nepal orientale.

Ecologia. Specie humicola o fitodetriticola.

23. **Atheta (Microdota) martensiella** Pace, 1987
(Figg. 76-79)

Atheta (Microdota) martensiella Pace, 1987: 415

Tipi. Holotypus ♂, Nepal, Mustang Distr., Purano Marpha, 3200-3600 m, 22-25.IV.1980 (Martens & Ausobsky leg. SM). Paratypi: 2♂♂ e 1♀, stessa provenienza (SM, CPA).

Descrizione. Lungh. 1,8 mm. Capo e pronoto opachi, resto del corpo lucido. Corpo giallo-rossiccio sporco, capo lievemente oscurato; uriti liberi 4 e base del 5 bruno-rossicci; antenne di un giallo sporco con i due articoli basali gialli come le zampe. La reticolazione della superficie del capo e del pronoto è quasi vigorosa, quella delle elitre è svanita. Edeago figg. 77-78, spermateca fig. 79.

Distribuzione. Nepal centrale.

Ecologia. Specie humicola in boschi di *Pinus* sp., *Cupressus* sp. e *Abies* sp.

24. **Atheta (Microdota) praecipua** sp. n.
(Figg. 80-81)

Tipo. Holotypus ♀, Nepal, Khandbari Distr., Arun River at Num, 1500-1600 m (A. & Z. Smetana leg., MHNG).

Descrizione. Lungh. 2,0 mm. Corpo lucido e giallo-rossiccio; capo, metà posteriore delle elitre e uriti liberi 3, 4 e 5 bruni; antenne brune con i due articoli basali giallo-rossicci; zampe gialle. La reticolazione dell'avancorpo è netta o distinta. Sul capo i tubercoletti sono indistinti sul resto del corpo sono fini e svaniti. Spermateca fig. 81.

DISTRIBUZIONE. Nepal centrale.

ECOLOGIA. Specie fitodetriticola, forse ripicola.

25. **Atheta (Microdota) puerilis** CAMERON, 1939
(Figg. 82-85)

Atheta (Microdota) puerilis CAMERON, 1939: 334

TIPI. Lectotypus ♂, Ghum Distr., Mangpu, V.1931 (Cameron leg., BMNH). Paralectotypus: 1 ♀, stessa provenienza (BMNH).

DESCRIZIONE. Lungh. 1,5 mm. Corpo lucido e bruno-rossiccio; antenne bruno-rossicce con i due articoli basali bruno-giallicci; zampe gialle. Sull'avancorpo la reticolazione è svanita, sull'addome è distinta, a grandi maglie. I tubercoletti della superficie del corpo sono distinti solo sul pronoto. Edeago figg. 83-84, spermateca fig. 85.

DISTRIBUZIONE. NNE Bihar.

ECOLOGIA. Sconosciuta.

26. **Atheta (Microdota) pauxilla** CAMERON, 1944
(Figg. 86-88)

Atheta (Datomicra) pauxilla CAMERON, 1944: 105

TIPO. Holotypus ♂, Chakrata Distr., Bodyar, 8300 ft., 3.XII.1922 (Cameron leg., BMNH).

DESCRIZIONE. Lungh. 1,6 mm. Corpo lucido e bruno; pronoto base ed estremità dell'addome, bruno-rossicci; antenne brune con i due articoli basali bruno-rossicci; zampe gialle. Solo sul capo la reticolazione è distinta. I tubercoletti del capo sono poco salienti, quelli del resto della superficie del corpo sono distinti. Edeago figg. 87-88.

DISTRIBUZIONE. NNW Uttar Pradesh.

ECOLOGIA. Sconosciuta.

27. **Atheta (Microdota) hum** sp. n.
(Figg. 89-92)

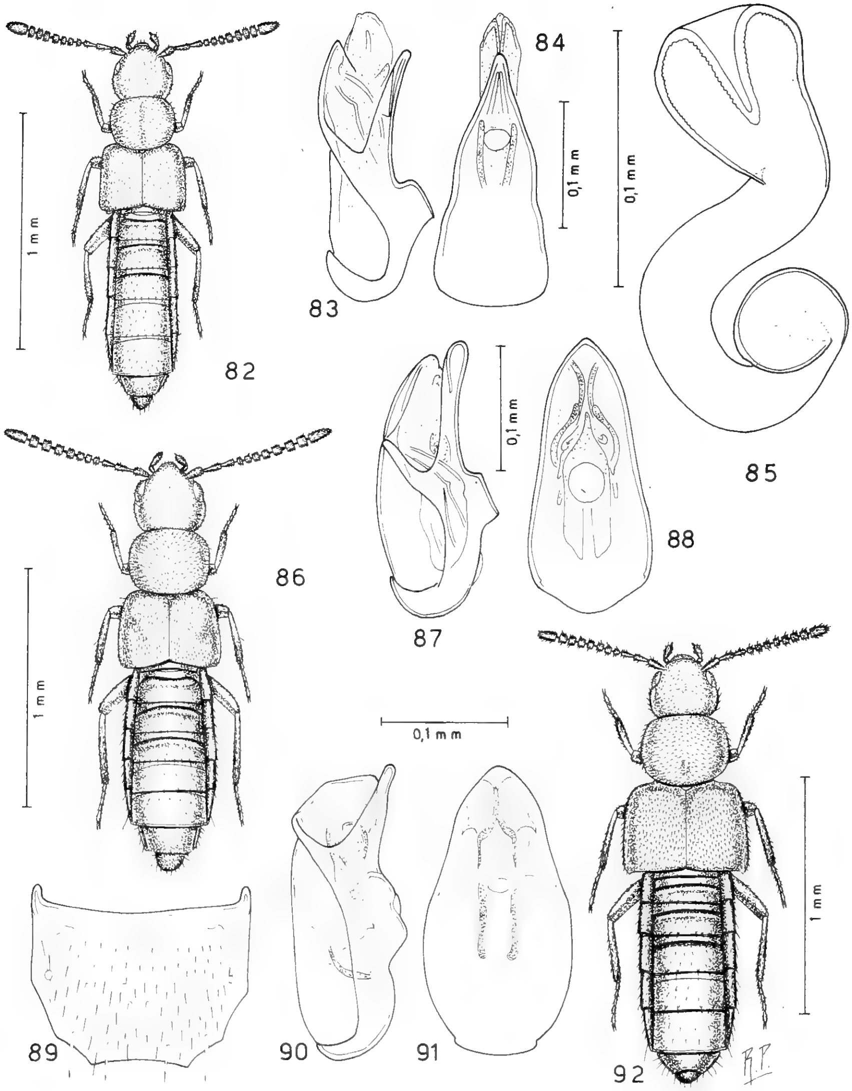
TIPO. Holotypus ♂, Nepal, Prov. Bagmati, Pokhare NE Barahbise, 2700 m, 2.V.1981 (Löbl & Smetana leg., MHNG).

DESCRIZIONE: Lungh. 2,0 mm. Corpo lucido e bruno; elitre bruno-rossicce; antenne nero-brune; zampe giallo-brune con tarsi gialli. La reticolazione del corpo è netta tranne che sul pronoto dove è svanita. La superficie dell'avancorpo è coperta di tubercoletti molto salienti. Edeago figg. 90-91.

DISTRIBUZIONE. Nepal centrale.

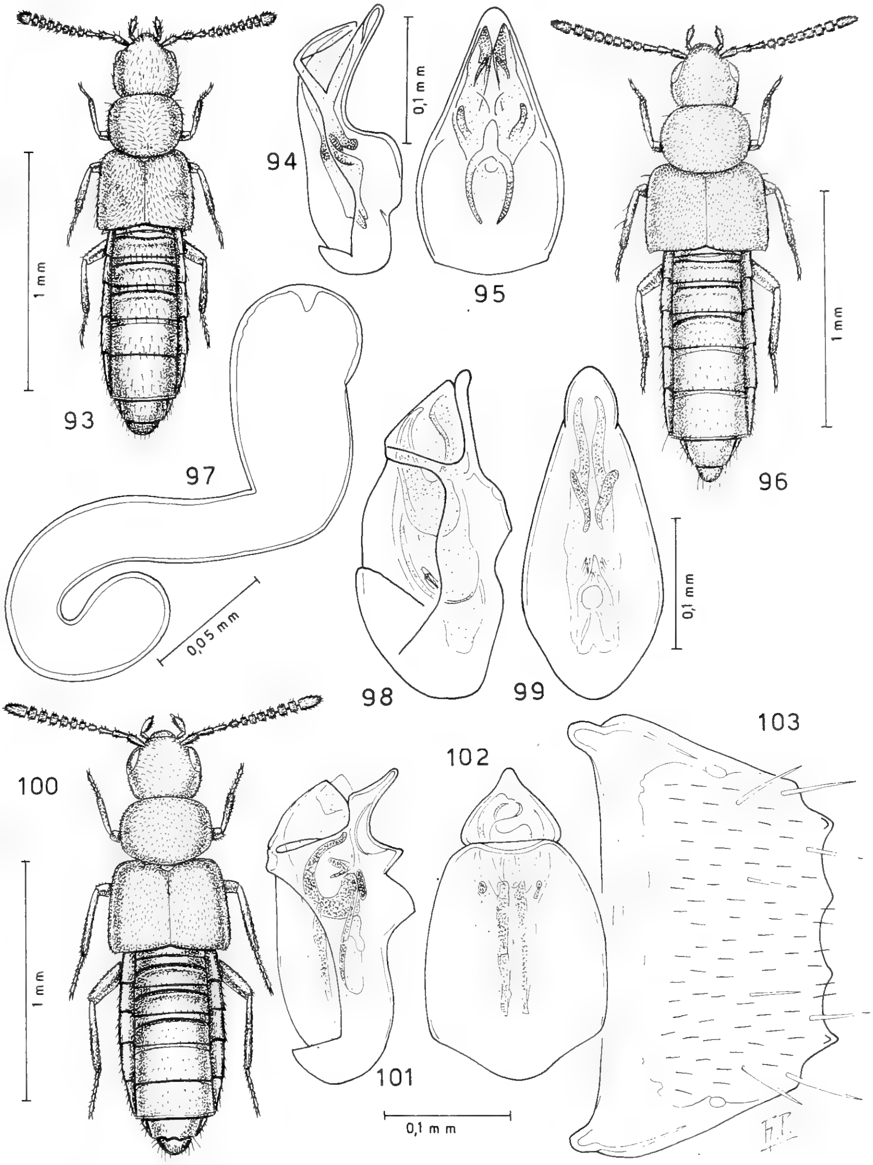
ECOLOGIA. Specie fitodetriticola.

ETIMOLOGIA. Dal termine nepalese «Hum», l'«Amen» della preghiera nepalese.



FIGG. 82-92.

Habitus, edeago in visione laterale e ventrale, spermateca e sesto urotergo libero del maschio. Figg. 82-85: *Atheta (Microdota) puerilis* Cameron. Figg. 86-88: *Atheta (Microdota) pauxilla* Cameron. Figg. 89-92: *Atheta (Microdota) hum* sp. n.



FIGG. 93-103.

Habitus, edeago in visione laterale e ventrale, spermateca e sesto urotergo libero del maschio. Figg. 93-95: *Atheta (Microdota) intercursa* Pace. Figg. 96-99: *Atheta (Microdota) contaminata* Pace. Figg. 100-103: *Atheta (Microdota) ahalensis* sp. n.

28. **Atheta (Microdota) intercursa** PACE, 1986
(Figg. 93-95)

Atheta (Microdota) intercursa PACE, 1986: 89

TIPI. Holotypus ♂, Kashmir, Aru, X.1977 (Franz leg., CFR). Paratypus: 1♂, stessa provenienza (CPA).

DESCRIZIONE. Lungh. 1,6 mm. Corpo debolmente lucido e bruno-rossiccio, addome rossiccio con uriti liberi 3, 4 e 5 bruno-rossicci; antenne e zampe rossicce. I tubercoletti sparsi sul corpo sono netti. La reticolazione del capo è svanita, quella del pronoto e delle elitre è netta. Edeago figg. 94-95.

DISTRIBUZIONE. Kashmir.

ECOLOGIA. Specie fitodetriticola.

29. **Atheta (Microdota) contaminata** PACE, 1987
(Figg. 96-99)

Atheta (Microdota) contaminata PACE, 1987: 418

TIPO. Holotypus ♂, India, Arni Gad, Mussoorie, X.1921 (Cameron leg., BMNH).

DESCRIZIONE. Lungh. 1,8-1,9 mm. Corpo debolmente lucido. Avancorpo e uriti 4 e 5 di un rossiccio scuro; uriti liberi 1 e 2 ed estremità distale dell'addome giallo-rossicci; antenne brune con i due articoli basali gialli come le zampe. La reticolazione della superficie dell'avancorpo è poco distinta o assente e i tubercoletti della stessa salienti. Edeago figg. 98-99, spermateca fig. 97.

DISTRIBUZIONE. NNW Uttar Pradesh e Nepal centrale.

2♂♂, Lalitpur Distr., Phulcoki, 2650 m, 20.IV.1982 (A. & Z. Smetana leg., MHNG); 2♂♂, Prov. Bagmati, Gokarna, for. nr. Kathmandu, 1400 m, 31.III.1981 (Löbl & Smetana leg., MHNG); 52 es., Phulcoki, 7.VI.1986, 2500 m (Orousset leg., MNP, CPA); 1♂, Kathmandu, Raniban, 5.VI.1986, 1450 m (Orousset leg., MNP); 1♀, Prov. Bagmati, Tarke Ghyang, 2650 m, 19.IV.1981 (Löbl & Smetana leg., MHNG); 8 es., Prov. Bagmati, Pokhare, NE Barahbise, 2700 m, 7.V.1981 (Löbl & Smetana leg., MHNG); 12 es., Khandbari Distr., for. NE Kuwapani, 2450-2500 m, 11-13-14.IV.1982 (A. & Z. Smetana leg., MHNG, CPA); 2♂♂, Khandbari Distr., for. above Ahale, 2300 m, 26.III.1982 (A. & Z. Smetana leg., MHNG); 1♂ e 1♀, Manang Distr., for. W Bagarchhap, 2200 m, 21.IX.1983 (Smetana & Löbl leg., MHNG).

ECOLOGIA. Specie fitodetriticola, xilodetriticola, muscicola e subcorticicola (dati di J. Orousset e J. Minet).

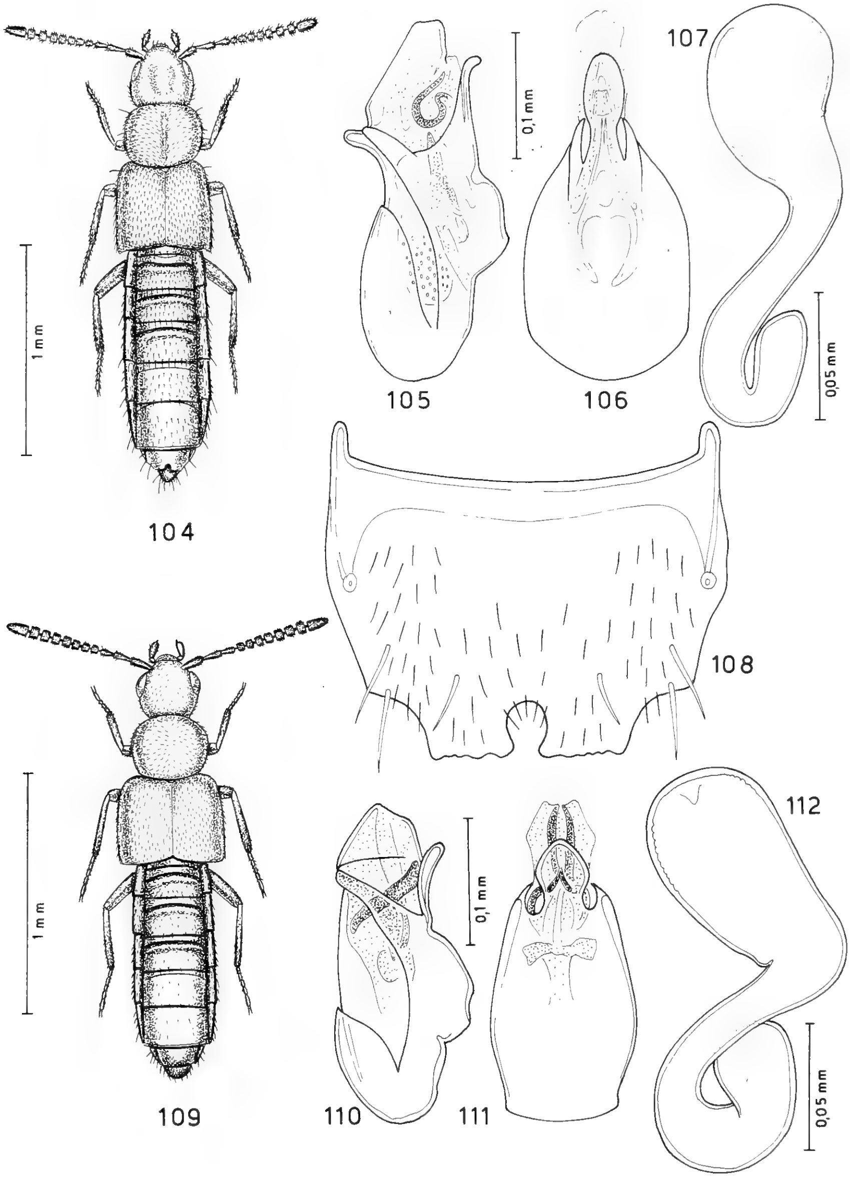
30. **Atheta (Microdota) ahalensis** sp. n.
(Figg. 100-103)

TIPO. Holotypus ♂, Nepal, Khandbari Distr., for. above Ahale, 2400 m, 25.III.1982 (A. & Z. Smetana leg., MHNG).

DESCRIZIONE. Lungh. 1,8 mm. Corpo lucido e bruno, comprese le antenne; zampe giallo-brune con tarsi giallo-rossicci. Tutto il corpo è coperto di reticolazione distinta. I tubercoletti sul pronoto sono distinti, sulle elitre svaniti. Edeago figg. 101-102.

DISTRIBUZIONE. Nepal centrale.

ECOLOGIA. Specie fitodetriticola.



FIGG. 104-112.

Habitus, edeago in visione laterale e ventrale, spermateca e sesto urotergo libero del maschio. Figg. 104-108: *Atheta (Microdota) bitruncata* sp. n. Figg. 109-112: *Atheta (Microdota) mahadevia* sp. n.

31. **Atheta (Microdota) bitruncata** sp. n.
(Figg. 104-108)

Tipi. Holotypus ♂, Nepal, Manang Distr., for. W Bagarchhap, 2200 m, 24.IX.1983 (Smetana & Löbl leg., MHNG), Paratypi: 2 ♀ ♀, stessa provenienza (MHNG, CPA); 1 ♀, Khandbari Distr., for. NE Kuwapani, 2500 m, 12.IV.1982 (A. & Z. Smetana leg., MHNG).

Descrizione. Lungh. 1,8 mm. Corpo lucido e bruno gialliccio; capo e uriti liberi 3 e 4 bruni; antenne brune con i tre articoli basali giallo-rossicci; zampe gialle. Sul capo e sul pronoto la reticolazione è netta, sul resto del corpo è distinta. I tubercoletti delle elitre sono poco salienti. Edeago figg. 105-106, spermateca fig. 107.

Distribuzione. Nepal centrale.

Ecologia. Specie fitodetriticola forestale.

32. **Atheta (Microdota) mahadevia** sp. n.
(Figg. 109-112)

Tipi. Holotypus ♂, Nepal, Lalitpur Distr., Phulcoki, 20-22.IV.1982 (A. & Z. Smetana leg., MHNG).

Paratypi: 20 es., stessa provenienza (MHNG, CPA); 1 ♀, Phulcoki, 27-31.V.1983 (Brendell leg., BMNH); 1♂, Nepal, Phulcoki, 7.VI.1986 (Orousset leg., MNP); 2♂♂, Phulcoki nr. Kathmandu, 2500 m, 10.V.1981 (Löbl leg., MHNG); 1♀, Prov. Bagmati, Pokhare, NE Barahbise, 2800 m, 2.V.1981 (Löbl & Smetana leg., MHNG); 1♂ e 1♀, Manang Distr., Latha Manang, W Bagarchhap, 2400 m, 23.IX.1983 (Smetana & Löbl leg., MHNG, CPA).

Descrizione. Lungh. 1,8 mm. Corpo lucido e giallo-rossiccio; capo, elitre e uriti liberi 4 e 5 bruno-rossicci; antenne di un rossiccio scuro con i due articoli basali giallo-rossicci; zampe gialle. La reticolazione sul capo e sul pronoto è netta, sul resto del corpo è svanita. Sul pronoto i tubercoletti sono indistinti, mentre sulle elitre sono svaniti. Edeago figg. 110-111, spermateca fig. 112.

Distribuzione. Nepal centrale.

Ecologia. Specie fitodetriticola.

Etimologia. Da «Mahadev», signore del sapere, una delle rappresentazioni di Shiva.

33. **Atheta (Microdota) patiorum** sp. n.
(Figg. 113-116)

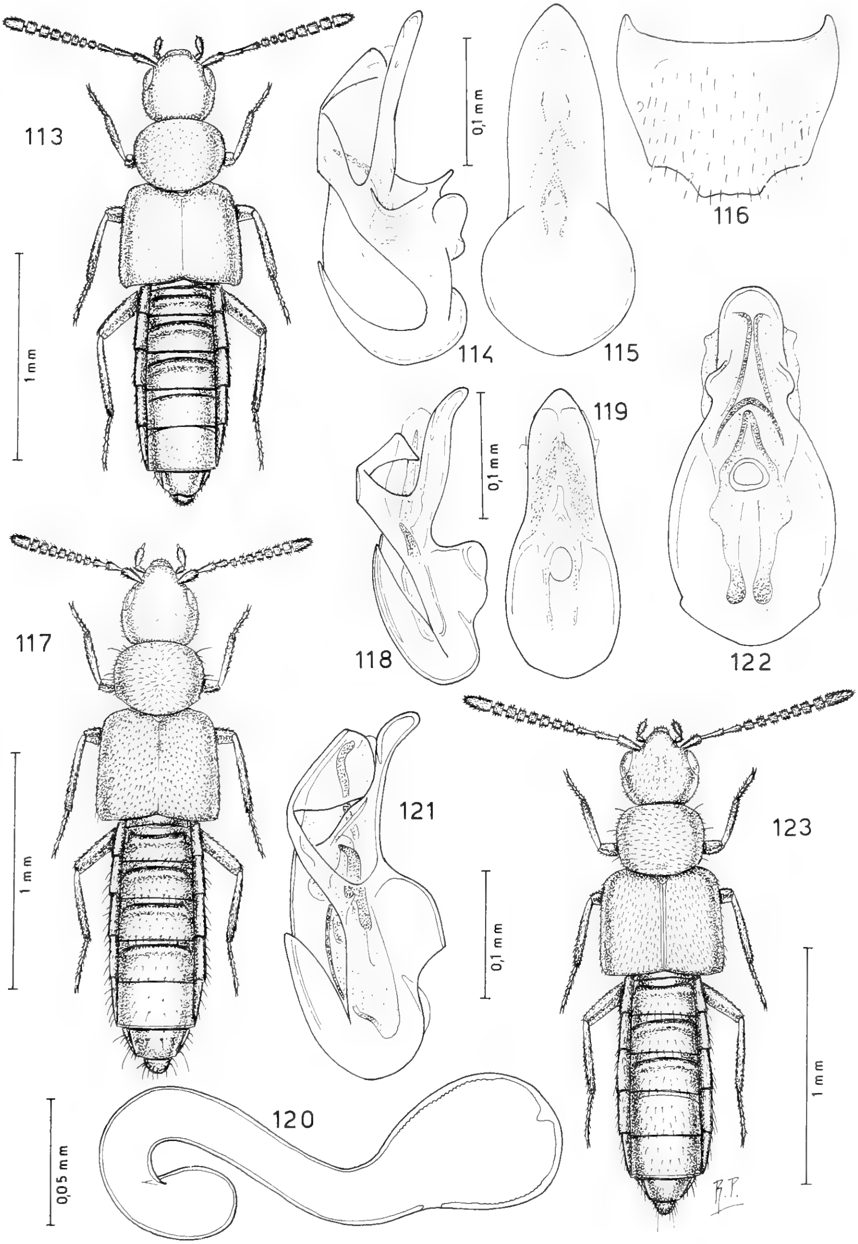
Tipi. Holotypus ♂, Nepal, Prov. Bagmati, Pokhare, NE Barahbise, 3000 m, 7.V.1981 (Löbl & Smetana leg., MHNG). Paratypus: 1♂, Nepal, Prov. Bagmati, Malemchi, 2800 m, 17.IV.1981 (Löbl & Smetana leg., CPA).

Descrizione. Lungh. 1,8 mm. Corpo lucido e bruno; antenne brune con i due articoli basali bruno-rossicci; zampe giallo-rossicce. La reticolazione del corpo è netta o distinta. Tubercoletti distinti stanno sul pronoto e la punteggiatura delle elitre è assai svanita. Edeago figg. 114-115.

Distribuzione. Nepal centrale.

Ecologia. Specie fitodetriticola.

Etimologia. Da «Pati», termine nepalese per indicare il rifugio per il riposo dei viaggiatori.



FIGG. 113-123.

Habitus, edeago in visione laterale e ventrale, spermateca e sesto urotergo libero del maschio. Figg. 113-116: *Atheta (Microdota) patiorum* sp. n. Figg. 117-119: *Atheta (Microdota) smetanai* sp. n. Figg. 120-123: *Atheta (Microdota) placita* Cameron.

34. **Atheta (Microdota) smetanai** sp. n.
(Figg. 117-119)

Tipi. Holotypus ♂, Nepal, Parbat Distr., Ridge E Ghoropani Pass, 3150 m, 7.X.1983 (Smetana & Löbl leg., MHNG).

Paratypus: 1♂, Nepal, Lalitpur Distr., Phulcoki, 2650 m, 14.X.1983 (Smetana & Löbl leg., CPA).

Descrizione. Lungh. 2,1 mm. Corpo lucido e nero-bruno, comprese le antenne; zampe giallo-brune, con femori bruni e tarsi giallicci. La reticolazione è netta su tutta la superficie del corpo. Tubercoletti fini stanno su capo, pronoto ed elitre. Edeago figg. 118-119.

Distribuzione. Nepal centrale e centro-occidentale.

Ecologia. Specie fitodetriticola.

Etimologia. Specie dedicata al Dr. Aleš Smetana, noto studioso di Staphylinidae, che l'ha raccolta insieme al Dr. I. Löbl.

35. **Atheta (Microdota) placita** Cameron, 1939, comb. n.
(Figg. 120-123)

Atheta (Traumoecia) placita Cameron, 1939: 318
Atheta (Microdota) ausobskyi Pace, 1987: 417, **syn. n.**
Atheta (Microdota) segregata Pace, 1987: 417, **syn. n.**

Tipi. Lectotypus ♂, Ghum Distr., Tiger Hill, 8500 ft., V-VI.1931 (Cameron leg., BMNH). Paralectotypi: 2♂♂, stessa provenienza (BMNH).

Descrizione. Lungh. 1,9-2,0 mm. Corpo lucido e giallo-rossiccio; capo, elitre e uriti liberi 3 e 4 bruni; base delle elitre bruno-gialliccia; antenne brune con i due articoli basali gialli come le zampe. Sul capo e sul pronoto la reticolazione è netta, sulle elitre è svanita. Tubercoletti distinti coprono l'avancorpo. Edeago figg. 121-122, spermateca fig. 120.

Distribuzione. NNE Bihar, Nepal orientale e centrale, NNW Uttar Pradesh.

5 es., Nepal, Lalitpur Distr., Phulcoki, 2550 m, 15.III.1983 (Smetana & Löbl leg., MHNG, CPA); 1♀, Phulcoki b. Kathmandu (Franz leg., CFR); 3 es., Nepal, Prov. Bagmati, above Shermathang, 2900 m, 26.IV.1981 (Löbl & Smetana leg., MHNG); 2♂♂, Nepal, Khandbari Distr., for. above Ahale, 2300 m, 26.III.1982 (A. & Z. Smetana leg., MHNG); 1♂ e 3♀♀, Manang Distr., for. W. Bagarchhap, 220 m, 21.IX.1983 (Smetana & Löbl leg., MHNG); 1♂ e 1♀, Manang Distr., Latha Manang, W Bagarchhap, 2400 m, 23.IX.1983 (Smetana & Löbl leg., MHNG); 1♂, Mustang Distr. Thaksang, 3150 m, 26-29.IV.1980 (Martens & Ausobsky leg., SM); 15 es., Lalithur distr., Phulcoki, 2650 m, 22.IV.1982 (A. & Z. Smetana leg., MHNG, CPA); 2♀♀, Parbat Distr., Ghoropani Pass, N slope, 2800 m, 5.V.1983 (Smetana & Löbl leg., MHNG); 1♀, Simla Hills, 7000-8000 ft., IX.1921 (Cameron leg., BMNH).

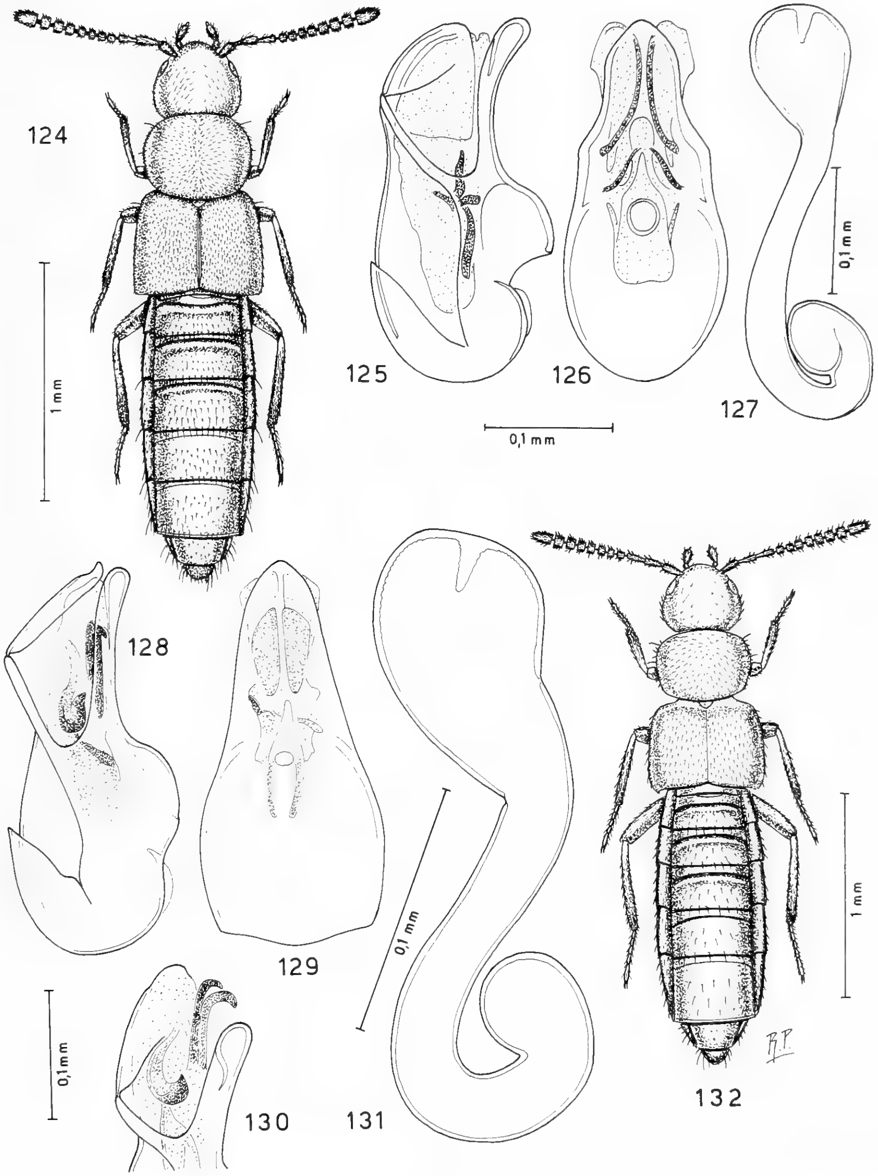
Ecologia. Specie fitodetriticola in boschi di *Pinus excelsa* e *Abies* sp.

36. **Atheta (Microdota) lamaorum** Pace, 1986
(Figg. 124-127)

Atheta (Microdota) lamaorum Pace, 1986: 87

Tipi. Holotypus ♂, Nepal, Shermatang, Helambu (Franz leg., CFR). Paratypus: 1♀, stessa provenienza (CPA).

Descrizione. Lungh. 2,2 mm. Capo nero-bruno, pronoto bruno-rossiccio, elitre nero-brune con omeri rossicci; addome bruno-rossiccio; antenne brune con i tre articoli



FIGG. 124-132.

Habitus, edeago in visione ventrale e laterale (fig. 130: sacco interno sporgente dall'orifizio apicale per mettere in evidenza i pezzi copulatori interni) e spermateca.

Figg. 124-127: *Atheta (Microdota) lamaorum* Pace. Figg. 128-132: *Atheta (Microdota) kirantorum* sp. n.

basali gialli come le zampe. Sul capo e sul pronoto la reticolazione è netta, sulle elitre è svanita. Tutto il corpo è coperto di tubercoletti più o meno salienti. Edeago figg. 125-126, spermateca fig. 127.

DISTRIBUZIONE. Nepal centrale.

11 es., Nepal, Lalitpur Distr., Phulcoki, 2650 m, 14-15.X.1983 (Smetana & Löbl leg., MHNG, CPA); 1 ♀, Phulcoki (BMNH); 8 es., Prov. Bagmati, Malemchi, 2800 m, 14.IV.1981 (Smetana & Löbl leg., MHNG); 16 es., Prov. Bagmati, below Thare Pati, 3300 m, 9-10-11-12.IV.1981 (Löbl & Smetana leg., MHNG, CPA); 8 es., Prov. Bagmati, Gul Banjyang, 2600 m, 6.IV.1981 (Löbl & Smetana leg., MHNG); 5 es., Parbat Distr., Ridge E Ghoropani Pass, 3150 m, 7.X.1983 (Smetana & Löbl leg., MHNG); 1 ♂, Manang Distr., for. W Bagarchhap, 2200 m, 21.IX.1983 (Smetana & Löbl leg., MHNG).

ECOLOGIA. Specie fitodetriticola.

37. **Atheta (Microdota) kirantorum** sp. n.

(Figg. 128-132)

TIPI. Holotypus ♂, Nepal, Lalitpur Distr., Phulcoki, 2600 m, 20.IV.1982 (A. & Z. Smetana leg., MHNG). Paratypi: 6 es., stessa provenienza (MHNG, CPA); 3 ♂ ♂ e 1 ♀, Phulcoki, 2600 m, 7.VI.1986 (Orousset leg., MNP); 3 ♀ ♀, Prov. Bagmati, Pokhare, NE Barahbise, 3000 m, 7.V.1981 (Löbl & Smetana leg., MHNG).

DESCRIZIONE. Lungh. 2,3 mm. Corpo lucido e bruno-rossiccio; pronoto e base delle elitre di un rossiccio scuro; estremità distale dell'addome rossiccia; antenne brune con i due articoli basali giallo-rossicci come le zampe. L'avancorpo è coperto di reticolazione netta o distinta, l'addome di reticolazione svanita. I tubercoletti del pronoto sono netti, quelli delle elitre svaniti. Edeago figg. 128-130, spermateca fig. 131.

DISTRIBUZIONE. Nepal centrale.

ECOLOGIA. Specie fitodetriticola.

ETIMOLOGIA. Da «Kiranti», primi abitatori della Valle di Kathmandu.

38. **Atheta (Microdota) franziana** PACE, 1982

(Figg. 133-136)

Atheta (Microdota) franziana PACE, 1982: 157

TIPI. Holotypus ♂, Nepal, Jumla, Dampa Pass, Chauta (Franz leg., CFR). Paratypi: 2 ♂ ♂ e 2 ♀ ♀, stessa provenienza (CFR, CPA); 2 ♂ ♂ e 1 ♀, Nepal, Jumla, Valle Dzunda Khola, Talphi, 3000-3500 m (Franz leg., CFR, CPA).

DESCRIZIONE. Lungh. 1,9-2,1 mm. Corpo bruno chiaro, addome bruno con estremità distale bruno-rossiccia; antenne brune con i tre articoli basali giallicci; zampe gialle. Edeago figg. 134-135, spermateca fig. 136.

DISTRIBUZIONE. Nepal occidentale.

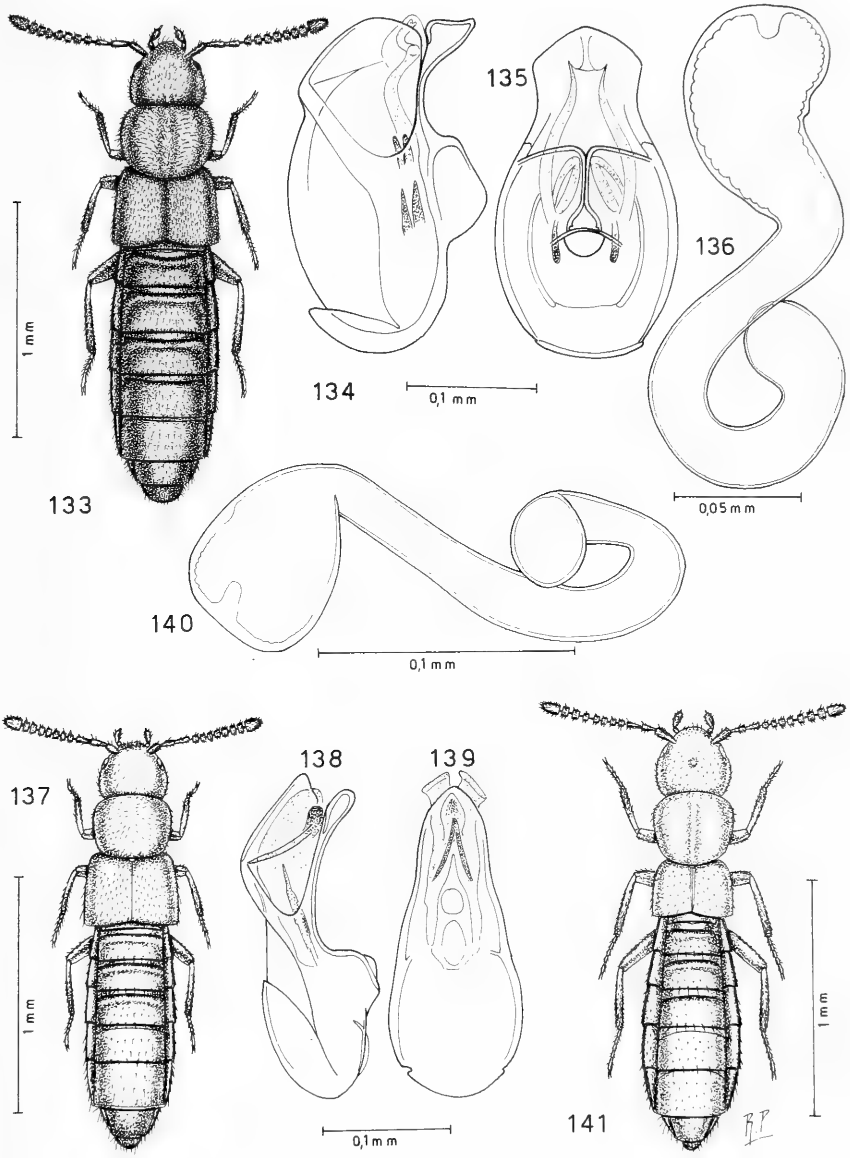
ECOLOGIA. Specie humicola o fitodetriticola.

39. **Atheta (Microdota) larjungensis** PACE, 1986

(Figg. 137-139)

Atheta (Microdota) larjungensis PACE, 1986: 85

TIPI. Holotypus ♂, Nepal; Nawronkot, Larjung, 2900-3000 m (Franz leg., CFR). Paratypus: 1 ♂, stessa provenienza (CPA).



FIGG. 133-141.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 133-136: *Atheta (Microdota) franziana* Pace. Figg. 137-139: *Atheta (Microdota) larjungensis* Pace. Figg. 140-141: *Atheta (Microdota) sagarmanthica* sp. n.

Descrizione. Lungh. 1,8 mm. Corpo bruno, elitre schiarite; antenne bruno-rossicce con i due articoli basali rossicci; zampe gialle. Il capo e le elitre sono coperti di reticolazione netta, il pronoto l'ha fine e robusta. I tubercoletti del pronoto sono finissimi e netti, quelli delle elitre ben sviluppati. Edeago figg. 138-139.

Distribuzione. Nepal centro-occidentale.

Ecologia. Specie fitodetriticola.

40. **Atheta (Microdota) sagarmanthica** sp. n.
(Figg. 140-141)

Tipo. Holotypus ♀, Nepal, Prov. Bagmati, Yangri Ridge, 4300 m, 23.IV.1981 (Löbl & Smetana leg., MHNG).

Descrizione. Lungh. 1,8 mm. Corpo lucido e giallo-rossiccio; antenne giallo-rossicce con i due articoli basali gialli; zampe giallo-rossicce. Sull'avancorpo la reticolazione è distinta solo sul pronoto; l'addome mostra una reticolazione netta. Tubercoletti salienti stanno sulle elitre. Spermateca fig. 140.

Distribuzione. Nepal centrale.

Ecologia. Specie fitodetriticola montana.

Etimologia. Da «Sagarmanth», in lingua sherpa il M.te Everest.

41. **Atheta (Microdota) benickiana** Pace, 1986
(Figg. 142-145)

Atheta (Microdota) benickiana Pace, 1986: 81

Tipi. Holotypus ♂, Nepal. Lago Rara, Dampelek, Jumla (Franz leg., Coll. Benick, Lübek). Paratypi: 3 ♀ ♀, stessa provenienza (Coll. Benick, CPA).

Descrizione. Lungh. 1,9-2,0 mm. Corpo lievemente opaco e giallo-rossiccio scuro; uriti liberi 3, 4 e 5 bruni; antenne di un giallo sporco con articoli basali gialli come le zampe. Il capo e il pronoto sono coperti di reticolazione quasi vigorosa. I tubercoletti delle elitre sono eccezionalmente robusti. Edeago figg. 143-144, spermateca fig. 145.

Distribuzione. Nepal occidentale.

Ecologia. Specie humicola.

42. **Atheta (Microdota) cassagnaui** Pace, 1984
(Figg. 146-149)

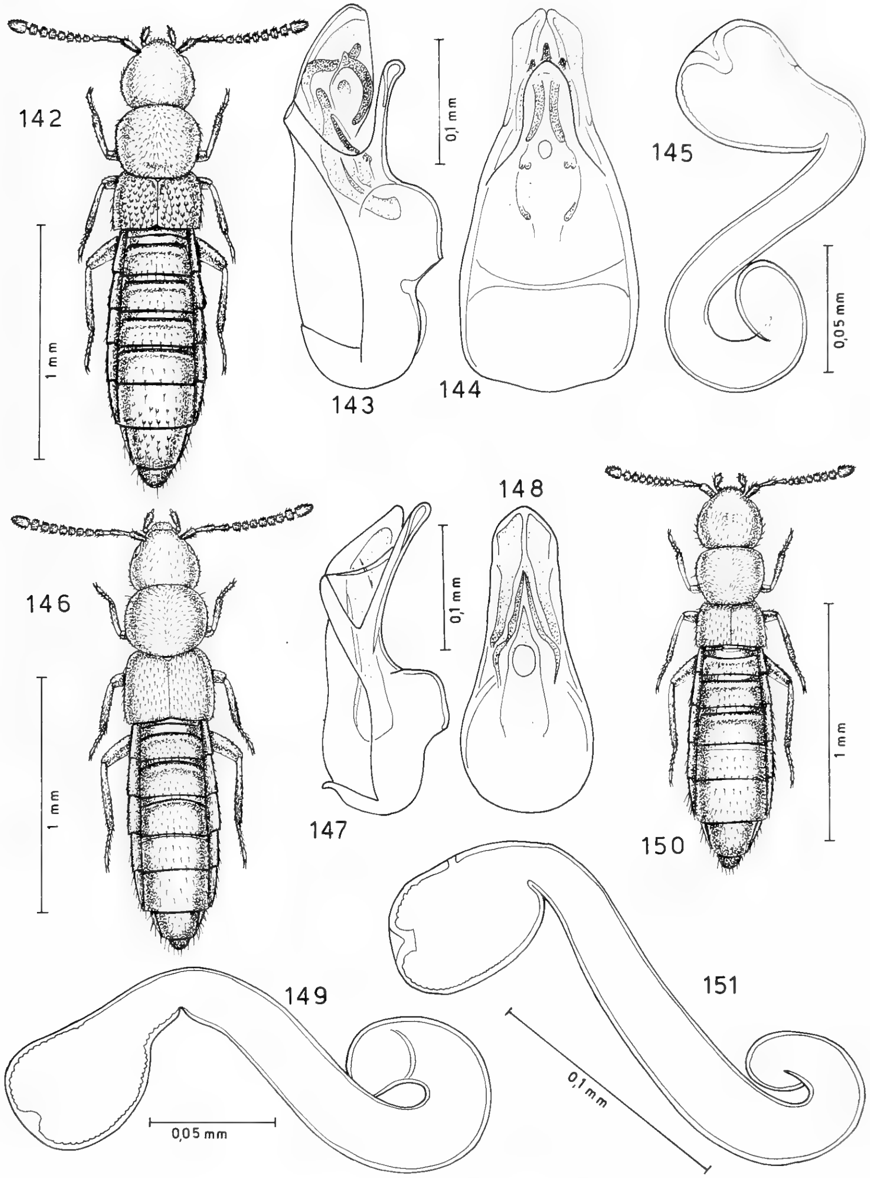
Atheta (Microdota) cassagnaui Pace, 1984: 321

Tipi. Holotypus ♂, Nepal, Pokhara, 2700 m, 26.X.1976 (MNP). Paratypi: 3 ♀ ♀, stessa provenienza (MNP, CPA).

Descrizione. Lungh. 1,8 mm. Corpo rossiccio; antenne di un rossiccio scuro con i due articoli basali e il terminale gialli come le zampe. Sul capo la reticolazione è distinta, sul pronoto e sulle elitre è svanita. Tubercoletti fini e poco salienti coprono le elitre. Edeago figg. 147-148, spermateca fig. 149.

Distribuzione. Nepal centrale.

Ecologia. Specie humicola.



FIGG. 142-151.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 142-145: *Atheta (Microdota) benickiana* Pace. Figg. 146-149: *Atheta (Microdota) cassagnaui* Pace. Figg. 150-151: *Atheta (Microdota) kaliensis* Pace.

43. **Atheta (Microdota) kaliensis** Pace, 1986
(Figg. 150-151)

Atheta (Microdota) kaliensis Pace, 1986: 83

Tipi. Holotypus ♀, Nepal, Valle Kali Gandaki, Schlucht (Franz leg., CFR). Paratypus: 1 ♀, stessa provenienza (CPA).

Descrizione. Lungh. 1,7 mm. Corpo lievemente opaco e giallo-rossiccio; uriti liberi 2, 3 e 4 di un rossiccio oscurato; antenne rossicce con i due articoli basali gialli come le zampe. Sul capo e sul pronoto la reticolazione è distinta, sulle elitre è appena svanita. Tubercoletti poco distinti coprono il pronoto e sulle elitre i tubercoletti sono ben salienti. Spermateca fig. 151.

Distribuzione. Nepal centrale.

Ecologia. Specie humicola.

44. **Atheta (Microdota) maharigaonensis** Pace, 1982
(Figg. 152-155)

Atheta (Microdota) maharigaonensis Pace, 1982: 151

Tipi. Holotypus ♂, Nepal, Jumla, Alm Darghari, Maharigaon (Franz leg., CFR). Paratypi: 9 es., stessa provenienza (CFR, CPA).

Descrizione. Lungh. 1,7-1,8 mm. Corpo giallo-rossiccio; capo ed elitre appena oscurati; uriti liberi 4 e 5 di un rossiccio scuro; antenne oscurate dal terzo articolo; zampe gialle. La reticolazione è distinta su tutto il corpo. Edeago figg. 153-154, spermateca fig. 155.

Distribuzione. Nepal occidentale.

Ecologia. Specie humicola.

45. **Atheta (Microdota) pontis** Pace, 1986
(Figg. 156-157)

Atheta (Microdota) pontis Pace, 1986: 87

Tipi. Holotypus ♀, Nepal; Shermatang, Malemchi Bridge (Franz leg., CFR). Paratypus: 1 ♀, stessa provenienza (CPA).

Descrizione. Lungh. 1,8-2,0 mm. Corpo lucido e bruno; capo più scuro, quasi nero; estremità distale dell'addome rossiccia; antenne giallo-brunicce con i due articoli basali gialli come le zampe. Sul capo e sul pronoto la reticolazione è distinta, sulle elitre è svanita. Spermateca fig. 156.

Distribuzione. Nepal centrale.

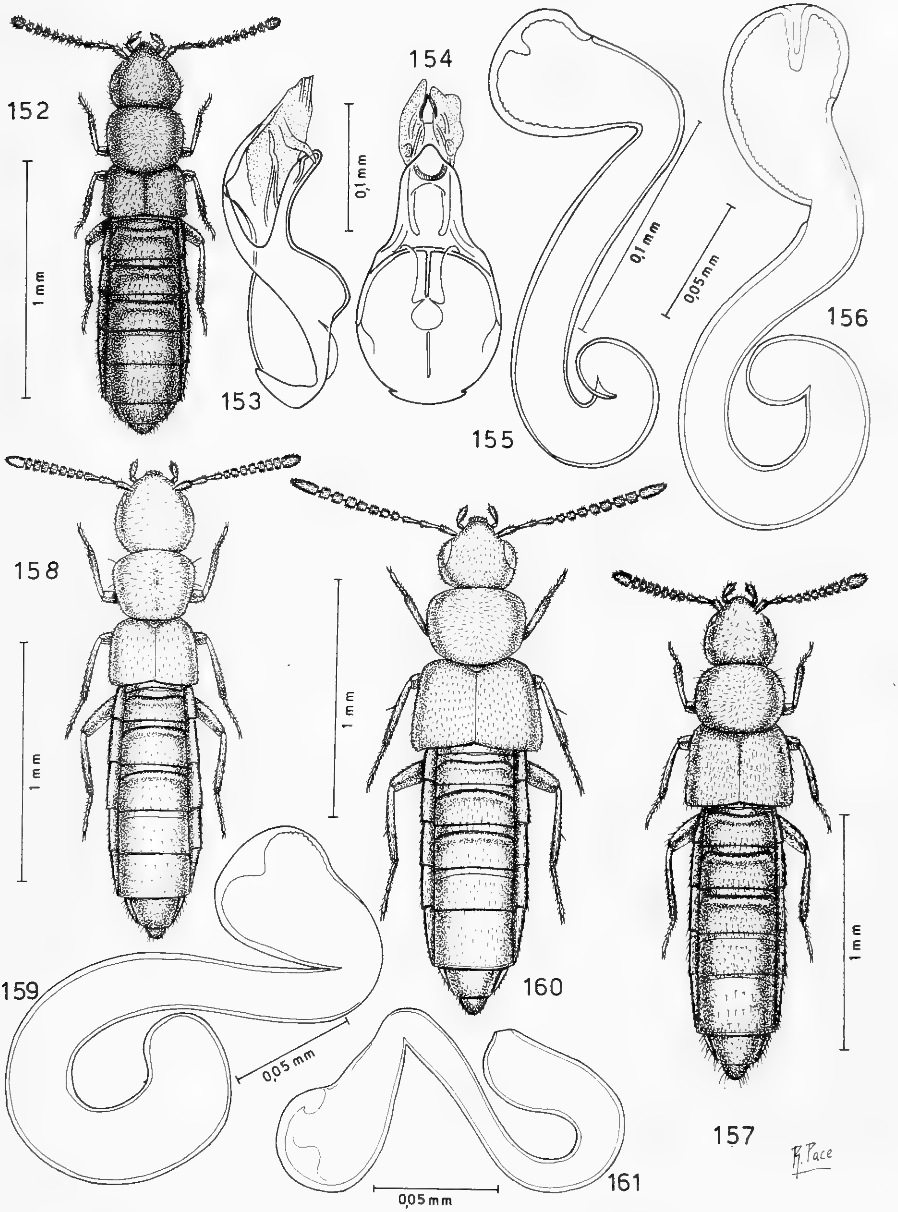
Ecologia. Specie fitodetriticola.

46. **Atheta (Microdota) tarda** Cameron, 1939
(Figg. 158-159)

Atheta (Ousipalia) tarda Cameron, 1939: 309

Tipi. Lectotypus ♀, Kashmir, Gulmarg, 8000-9000 ft., VI-VII.1931 (Cameron leg., BMNH); Paralectotypus: 1 ♀, stessa provenienza (BMNH).

Descrizione. Lungh. 1,9 mm. Corpo lucido e rossiccio scuro; capo e uriti liberi 3, 4 e 5 bruno-rossicci; antenne bruno-rossicce con i due articoli basali di un giallo sporco;



FIGG. 152-161.

Habitus, edeago in visione laterale e ventrale e spermateca.

Figg. 152-155: *Atheta (Microdota) maharigaonensis* Pace. Figg. 156-157: *Atheta (Microdota) pontis* Pace. Figg. 158-159: *Atheta (Microdota) tarda* Cameron. Figg. 160-161: *Atheta (Microdota) rupicola* sp. n.

zampe gialle con femori brunicci. Tutto il corpo è coperto di reticolazione distinta o netta. I tubercoletti del capo e del pronoto sono poco distinti, quelli delle elitre nettamente salienti. Spermateca fig. 159.

DISTRIBUZIONE. Kashmir.

ECOLOGIA. Specie humicola.

47. **Atheta (Microdota) rupicola** sp. n.
(Figg. 160-161)

TIPI. Holotypus ♀, Nepal, Gurjakhani, 83°14'E-28°37'N, 8500 ft., 30.VI.1954 (Hyatt leg., BMNH). Paratypus: 1♀, stessa provenienza (BMNH).

DESCRIZIONE. Lungh. 2,1 mm. Corpo lucido e bruno; uriti liberi 1 e 2 e apice dell'addome bruno-rossicci; antenne brune; zampe rossicce. Sul corpo la reticolazione è estremamente svanita o assente come sul pronoto. Tubercoletti ben salienti stanno sul capo e sul pronoto, sulle elitre sono svaniti. Spermateca fig. 161.

DISTRIBUZIONE. Nepal occidentale.

ECOLOGIA. Specie muscicola, su rocce verticali umide.

48. **Atheta (Microdota) arborum** sp. n.
(Figg. 162-163)

TIPO. Holotypus ♀, Nepal, Guryakhani, 83°14'E-28°37'N, 8500 ft., 30.VII.1954 (Hyatt leg., BMNH).

DESCRIZIONE. Lungh. 2,0 mm. Corpo lucidissimo e bruno-rossiccio; capo bruno; addome giallo-bruno con uriti liberi 4 e 5 bruni; antenne brune, zampe gialle. Tutto il corpo è coperto di reticolazione svanita. Tubercoletti distinti stanno solo sugli uroterghi. Spermateca fig. 163.

DISTRIBUZIONE. Nepal occidentale.

ECOLOGIA. Specie fitodetriticola, in lettiera sotto alberi.

49. **Atheta (Microdota) alia** CAMERON, 1939
(Figg. 164-165)

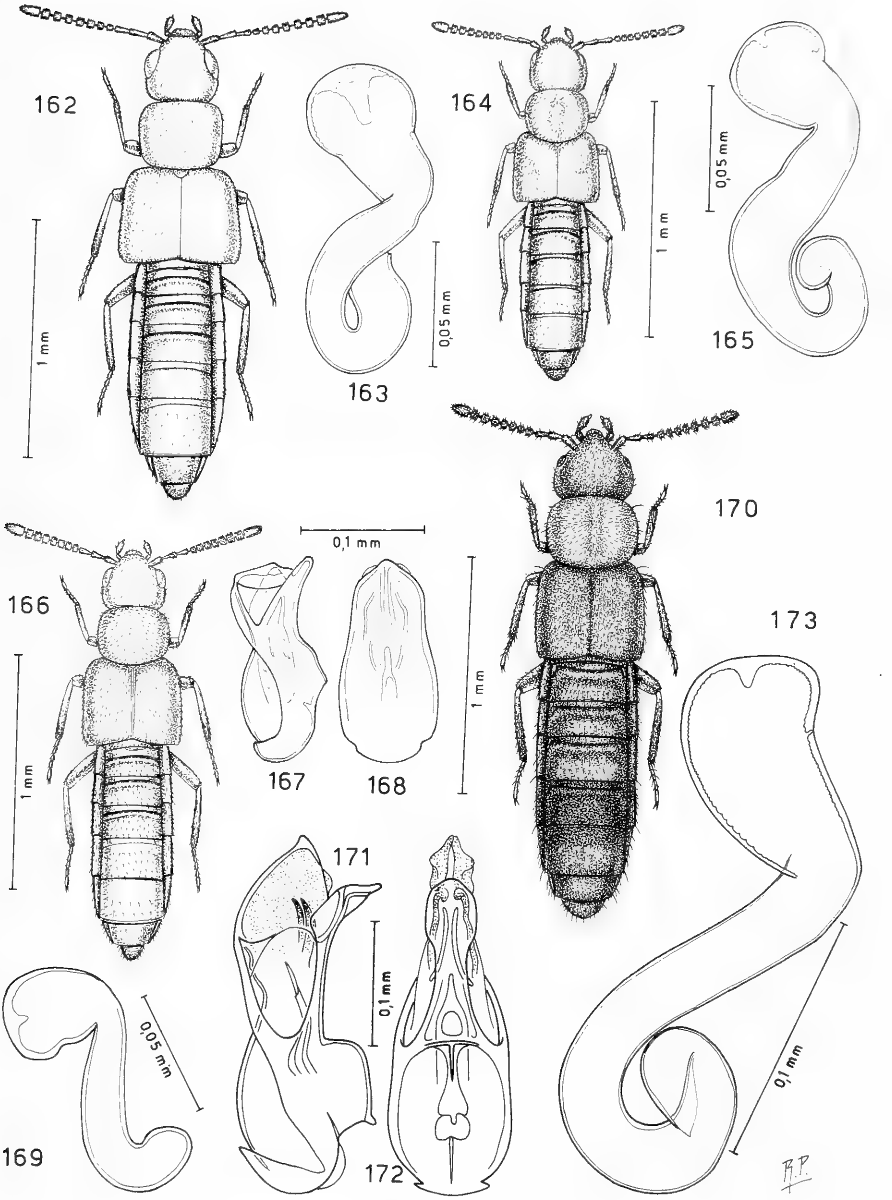
Atheta (Microdota) alia CAMERON, 1939: 324

TIPO. Lectotypus ♀, Chakrata Distr., Bodyar, 8300 ft., 3-12.V.1922 (Cameron leg., BMNH). Un altro esemplare tipico di Bindal Gadh citato da Cameron (1939), non appartiene a questa specie, ma ad *A. subamicula* Cameron.

DESCRIZIONE. Lungh. 1,5 mm. Corpo lucido e giallo-bruno; urite libero 4 bruno; antenne brune con i due articoli basali di un giallo sporco; zampe gialle. Il capo e il pronoto presentano tubercoletti fini e distinti, le elitre li hanno svaniti. Spermateca fig. 165.

DISTRIBUZIONE. NNW Uttar Pradesh.

ECOLOGIA. Sconosciuta.



Figg. 162-173.

Habitus, spermateca ed edeago in visione laterale e ventrale.
Figg. 162-163: *Atheta (Microdota) arborum* sp. n. Figg. 164-165: *Atheta (Microdota) alia* Cameron. Figg. 166-169: *Atheta (Microdota) perconfusa* sp. n. Figg. 170-173: *Atheta (Microdota) jumlensis* Pace.

50. **Atheta (Microdota) perconfusa** sp. n.
(Figg. 166-169)

Tipi. Holotypus ♂, Kashmir, Gulmarg, VI-VII.1931 (Cameron leg., BMNH). Paratypi: 4♂♂ e 2♀♀, stessa provenienza (BMNH, CPA). Esemplari facenti parte della serie tipica di *Atheta subluctuosa* Cameron.

Descrizione. Lungh. 1,6 mm. Corpo lucido e bruno scuro, comprese le antenne; zampe bruno-rossicce. L'intero corpo è coperto di reticolazione netta. I tubercoletti del pronoto sono distinti, quelli delle elitre svaniti. Edeago figg. 167-168, spermateca fig. 169.

Distribuzione. Kashmir.

Ecologia. Specie cadavericola.

51. **Atheta (Microdota) jumlensis** Pace, 1982
(Figg. 170-173)

Atheta (Microdota) jumlensis Pace, 1982: 155

Tipi. Holotypus ♂, Jumla, Alm Darghari, Maharigaon (Franz leg., CFR). Paratypi: 9 es., stessa provenienza (CFR, CPA); 3 es., Jumla; Valle Dzunda Khola, Talphi, 3000-3500 m (Franz leg., CFR, CPA).

Descrizione. Lungh. 2,0 mm. Corpo debolmente lucido; capo ed elitre nero-bruni; pronoto rossiccio scuro come l'addome che ha gli uriti liberi 4 e base del 5, bruni; antenne brune con i due articoli basali gialli come le zampe. Il capo e le elitre sono coperti di reticolazione evidente. I tubercoletti delle elitre sono poco salienti. Edeago figg. 171-172, spermateca fig. 173.

Distribuzione. Nepal occidentale e centrale.

Ecologia. Specie fitodetriticola.

52. **Atheta (Microdota) disputanda** Pace, 1984
(Figg. 174-177)

Atheta (Microdota) disputanda Pace, 1984: 323

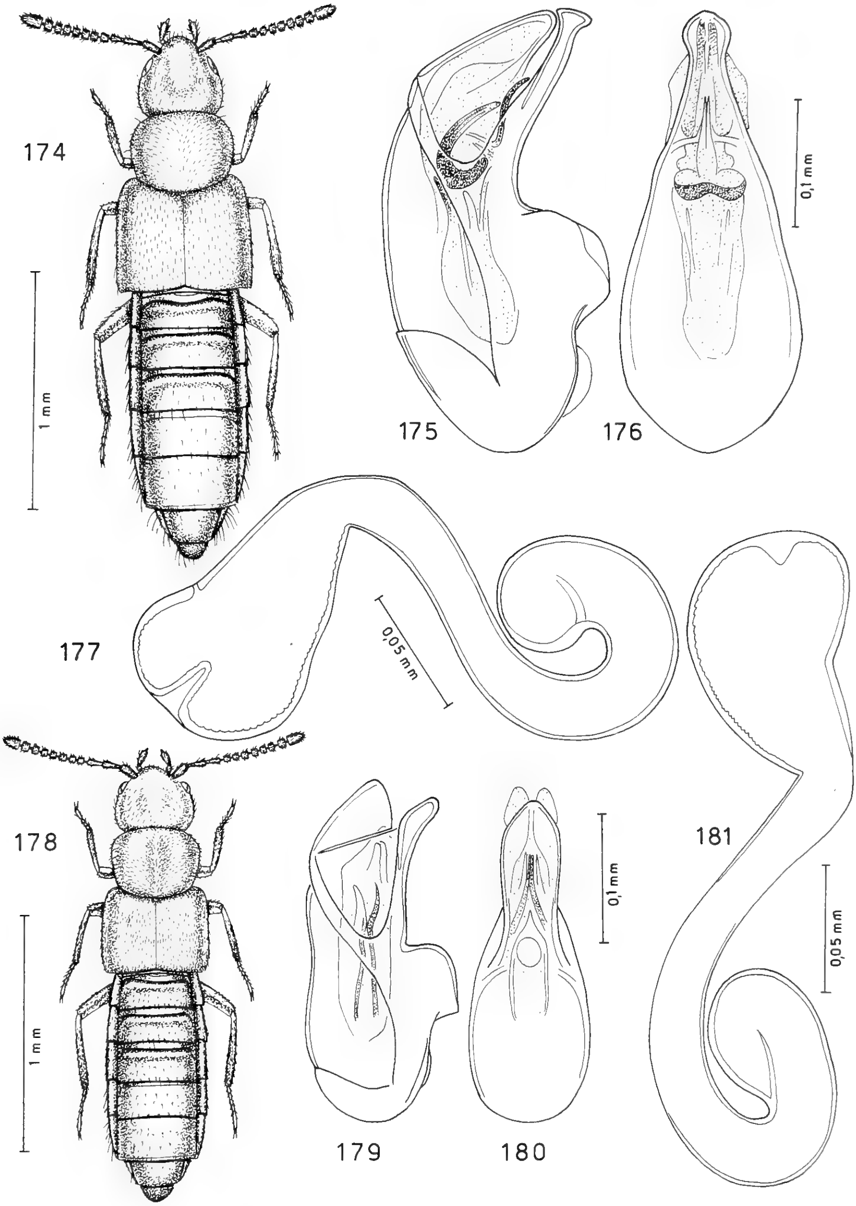
Tipi. Holotypus ♀, Nepal, Trisuli, XI.1978 (MNP). Paratypi: 8♀♀, Nepal, Kalingchok, 3000-3100 m, 14.X.1981 (MNP, CPA).

Descrizione. Lungh. 2,3-2,4 mm. Corpo debolmente opaco e bruno-rossiccio; base ed estremità dell'addome di un rossiccio scuro; antenne bruno-rossicce con i due articoli basali gialli come le zampe. Tutto il corpo è coperto di reticolazione netta e di tubercoletti fini. Edeago figg. 175-176, spermateca fig. 177.

Distribuzione. Nepal centrale.

1♂ e 7♀♀, Nepal, Lalitpur Distr., Phulcoki, 2550-2650 m, 14-15.X.1983 (Smetana & Löbl leg., MHNG); 2♂♂ e 1♀, Nepal, Manang Distr., for. W Bagarchhap, 2200 m, 21-22.IX.1983 (Smetana & Löbl leg., MHNG, CPA); 1♀, Nepal, Panchthar Distr., Deorali Puspati, Sheldoti, 28.VIII.1983, 2500-2600 m (Martens & Daams leg., SM).

Ecologia. Specie fitodetriticola.



FIGG. 174-181.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 174-177: *Atheta (Microdota) disputanda* Pace. Figg. 178-181: *Atheta (Microdota) antiqua* Pace.

53. **Atheta (Microdota) antiqua** PACE, 1986
(Figg. 178-181)

Atheta (Microdota) antiqua PACE, 1986: 87

TIPI. Holotypus ♂, Nepal, Valle Kali Gandaki, Schlucht (Franz leg., CFR). Paratypus: 1 ♀, stessa provenienza (CPA).

DESCRIZIONE. Lungh. 1,8 mm. Avancorpo bruno-rossiccio, addome nero-bruno; antenne giallo-brunicce con i due articoli basali gialli come le zampe. Tutto il corpo è coperto di reticolazione netta. Edeago figg. 179-180, spermateca fig. 181.

DISTRIBUZIONE. Nepal centrale.

4 ♂♂ e 1 ♀, Nepal, Lalitpur Distr., Phulcoki, 2550-2650 m, 14-15.X.1983 (Smetana & Löbl leg., MHNG); 3 ♀♀, Kathmandu Distr., Phulcoki, 27-31.V.1983 (Brendell leg., BMNH); 11 es. Prov. Bagmati, Malemchi, 2800 m, 14.IV.1981 (Löbl & Smetana leg., MHNG); 1 ♀ Prov. Bagmati, Phulcoki, nr. Kathmandu, 2500 m, 10.V.1981 (Löbl leg., MHNG); 1 ♀, Khandbari Distr., «Bakan» W of Tashigaon, 3200 m, 3.IV.1982 (A. & Z. Smetana leg., MHNG).

ECOLOGIA. Specie fitodetriticola, in lettiera di foglie.

54. **Atheta (Microdota) yetii** PACE, 1986
(Figg. 182-185)

Atheta (Microdota) yetii PACE, 1986: 87

TIPI. Holotypus ♀, Valle di Naltar, Karakorumexpedition 1974 (Linzbichler leg., CFR). Paratypi: 1 ♀, stessa provenienza (CPA); 3 ♀♀, Nepal, Valle Dzunda Khola, Talphi, 3000 m (Franz leg., CFR); 1 ♀, Nepal, Maharigaon, 3000-3500 m (Franz leg., CFR).

DESCRIZIONE. Lungh. 2,0-2,2 mm. Corpo bruno-rossiccio; capo oscurato; base delle elitre gialliccia; addome nero con base ed estremità rossicce; antenne giallo-brunicce con i due articoli basali giallo-rossicci come le zampe. La reticolazione del corpo è netta, tranne sulle elitre done è svanita. Il pronoto e le elitre sono coperti di tubercoletti nettamente salienti. Edeago figg. 183-184, spermateca fig. 185.

DISTRIBUZIONE. Nepal centrale e occidentale.

5 es., Nepal, Khandbari Distr., «Bakan» W of Tashigaon, 3250 m, 4.IV.1982 (A. & Z. Smetana leg., MHNG, CPA); 1 ♀, Khandbari Distr., for. NE Kuwapani, 2500 m, 12.IV.1982 (A. & Z. Smetana leg., MHNG); 1 ♀, Parbat Distr., Ghoropani Pass, N slope, 2700 m, 6.V.1983 (Smetana & Löbl leg., MHNG); 1 ♀, Maharigaon, 3000-3500 m (Franz leg., MNP).

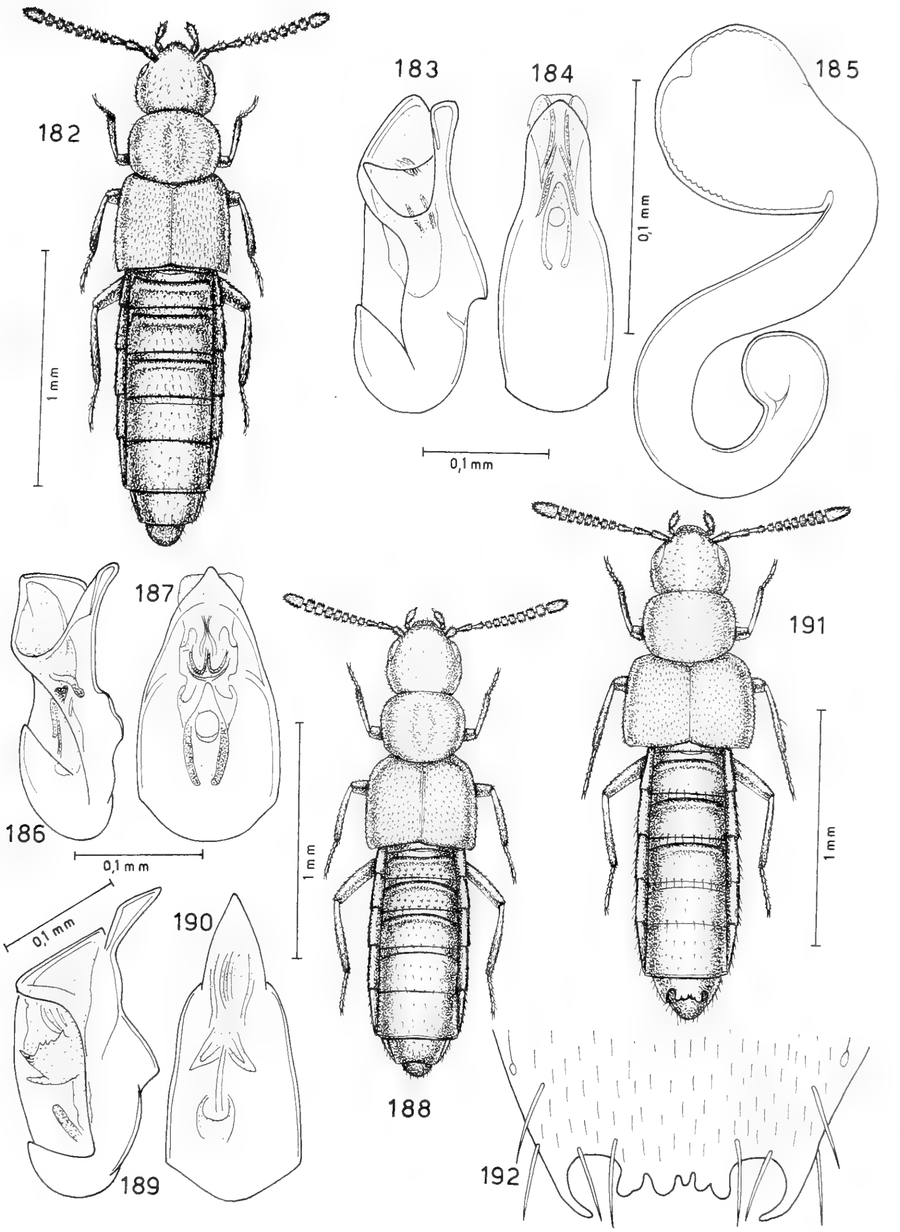
ECOLOGIA. Specie fitodetriticola.

55. **Atheta (Microdota) tuberculata** (KRAATZ, 1859)
(Figg. 186-188)

Homalota tuberculata KRAATZ, 1859: 32
Atheta (Microdota) tuberculata, CAMERON, 1939: 325

TIPO. Holotypus ♂, Ind. Port. (Helfer leg., DEI), esaminato.

DESCRIZIONE. Lungh. 1,8 mm. Avancorpo lievemente opaco, addome lucido. Corpo bruno scuro; elitre di un giallo sporco; addome bruno con estremità distale bruno-rossiccia; antenne nere con articolo basale bruno-rossiccio come le zampe. L'avancorpo è coperto di reticolazione netta, quasi vigorosa. Tubercoletti distinti coprono le elitre. Edeago figg. 186-187.



Figg. 182-192.

Habitus, edeago in visione laterale e ventrale, spermateca e sesto urotergo libero del maschio. Figg. 182-185: *Atheta (Microdota) yetii* Pace. Figg. 186-188: *Atheta (Microdota) tuberculata* (Kraatz). Figg. 189-192: *Atheta (Microdota) rufonigra* Cameron.

DISTRIBUZIONE. Goa.

ECOLOGIA. Sconosciuta.

56. **Atheta (Microdota) rufonigra** CAMERON, 1939
(Figg. 189-192)

Atheta (Microdota) rufonigra CAMERON, 1939: 330

TIPO. Lectotypus ♂, Simla Hills, Gahan, 7000 ft., IX.1921 (Cameron leg., BMNH).

DESCRIZIONE. Lungh. 2,0 mm. Corpo debolmente lucido. Capo bruno, pronoto rossiccio, elitre giallo-brune; addome nero-bruno con i due uriti basali bruno-rossicci; antenne brune con i tre articoli basali e le zampe giallo-rossicci. Il capo e le elitre sono coperti di reticolazione distinta; sul pronoto la reticolazione è svanita. Edeago figg. 189-190.

DISTRIBUZIONE. Himachal Pradesh.

ECOLOGIA. Sconosciuta.

57. **Atheta (Microdota) optica** CAMERON, 1939
(Figg. 193-195)

Atheta (Microdota) optica CAMERON, 1939: 328

TIPO. Holotypus ♂, Mussoorie, 7.VIII.1922 (Cameron leg., BMNH), esaminato.

DESCRIZIONE. Lungh. 1,7 mm. Corpo lucido e bruno-rossiccio; elitre e uriti liberi 3 e 4 bruni; antenne brune con i due articoli basali di un giallo sporco; zampe gialle. Il capo e le elitre presentano reticolazione svanita; il pronoto è coperto di reticolazione distinta. Tutto il corpo è coperto di tubercoletti più o meno distinti. Edeago figg. 194-195.

DISTRIBUZIONE. NNW Uttar Pradesh.

ECOLOGIA. Specie fungicola.

58. **Atheta (Microdota) alternans** PACE, 1984
(Figg. 196-199)

Atheta (Microdota) alternans PACE, 1984: 322
Atheta (Microdota) patientiae PACE, 1986: 85, **syn. n.**

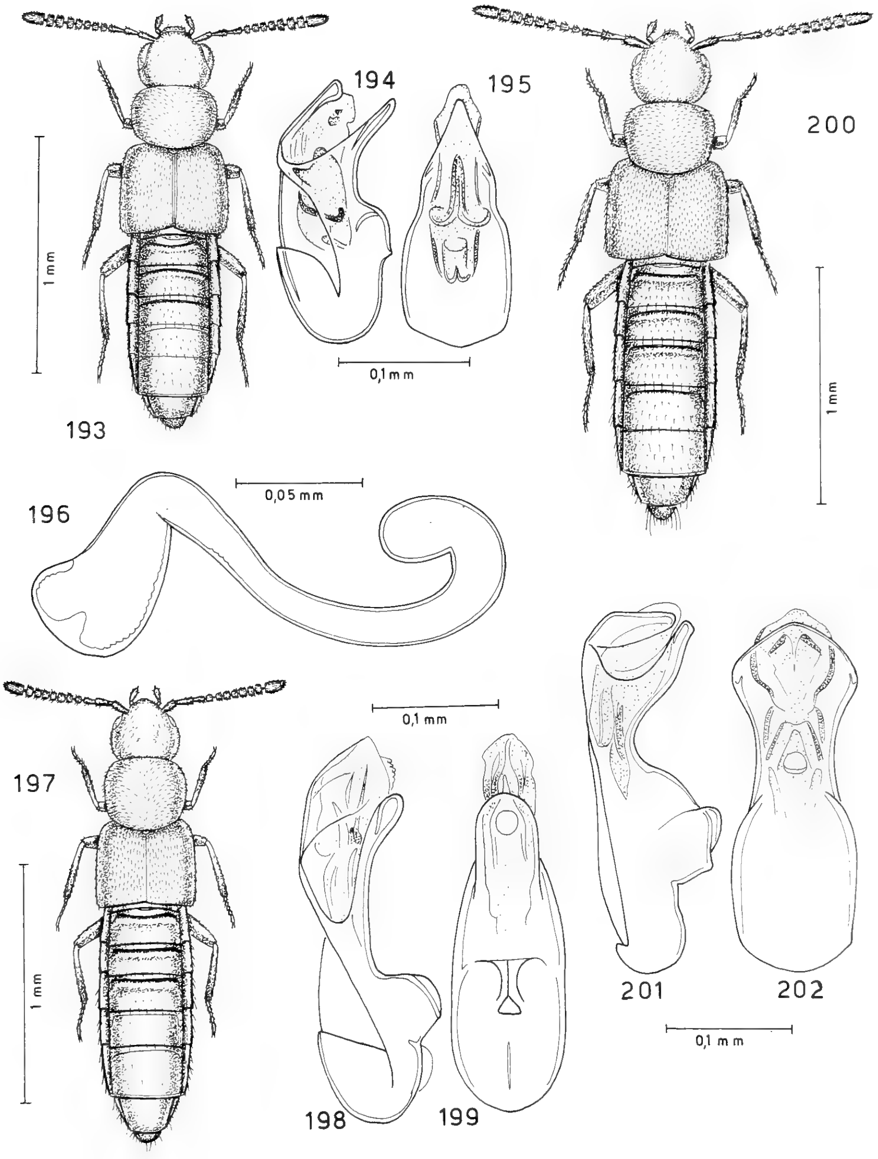
NOTA. *A. patientiae* è stata descritta su un esemplare immaturo, perciò con edeago e spermateca deformati.

TIPI. Holotypus ♂, Nepal, Phulcoki, 2600 m, 26.X.1977 (MNP). Paratypus: 1♀, stessa provenienza (CPA).

DESCRIZIONE. Lungh. 2,0 mm. Corpo bruno-rossiccio; pronoto e addome di un rossiccio scuro; urite libero 4 bruno-rossiccio; antenne bruno-rossicce con articoli basali e terminale gialli come le zampe. L'avancorpo è coperto di reticolazione evidente. Edeago figg. 198-199, spermateca fig. 196.

DISTRIBUZIONE. Nepal centrale.

1♂, Lalitpur Distr., Phulcoki, 2700 m, 15.X.1983 (Smetana & Löbl leg., MHNG); 2♀♀, Prov. Bagmati, Phulcoki, nr. Kathmandu, 2500 m, 10.V.1981 (Löbl leg., MHNG); 2♂♂ e 2♀♀, Phulcoki



FIGG. 193-202.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 193-195: *Atheta (Microdota) optica* Cameron. Figg. 196-199: *Atheta (Microdota) alternans* Pace. Figg. 200-202: *Atheta (Microdota) inconsueta* sp. n.

b. Kathmandu (Franz leg., CFR, CPA); 1 ♀, Prov. Bagmati, Burlang Banjyang, 2600 m, 5.IX.1981 (Löbl & Smetana leg., MHNG); 1♂, Prov. Bagmati, Gul Bhanjiang, 2600 m, 6.IV.1981 (Löbl & Smetana leg., MHNG).

ECOLOGIA. Specie fitodetriticola.

59. **Atheta (Microdota) inconsueta** sp. n.
(Figg. 200-202)

TIPO. Holotypus ♂, Nepal, Khandbari Distr., « Bakan» W of Tashigaon, 3250 m (A. & Z. Smetana leg., MHNG).

DESCRIZIONE. Lungh. 2,0 mm. Corpo lucido e bruno; elitre di un rossiccio sporco; antenne bruno-rossicce con i quattro articoli basali giallo-rossicci; zampe gialle. Sul capo la reticolazione è netta, sul pronoto e sulle elitre è svanita. Sull'avancorpo i tubercoletti sono assai poco distinti. Edeago figg. 201-202.

DISTRIBUZIONE. Nepal centrale.

ECOLOGIA. Specie fitodetriticola.

60. **Atheta (Microdota) mediocris** CAMERON, 1939
(Figg. 203-205)

Atheta (Microdota) mediocris CAMERON, 1939: 328

TIPO. Holotypus ♂, Ringal Gad, Mussoorie, 29.V.1921 (Cameron leg., BMNH), esaminato.

DESCRIZIONE. Lungh. 1,6 mm. Corpo lucidissimo e bruno; elitre bruno-giallicce; estremità distale dell'addome bruno-rossiccia; antenne nere con i due articoli basali giallo-bruni; zampe gialle. Solo sul disco del capo la reticolazione è netta sul resto del corpo è svanita o assente. Sull'avancorpo i tubercoletti sono superficiali, sull'addome sono salienti. Edeago figg. 204-205.

DISTRIBUZIONE. NNW Uttar Pradesh.

ECOLOGIA. Sconosciuta.

61. **Atheta (Microdota) velata** sp. n.
(Figg. 206-208)

TIPO. Holotypus ♂, Nepal, Sikha, 83°40'E-28°26'N, 8500 ft., 21.V.1954 (Hyatt leg., British Museum Nepal Expedition 1954-540, BMNH).

DESCRIZIONE. Lungh. 1,7 mm. Corpo lucido e bruno-rossiccio; addome rossiccio scuro con urite libero 4 bruno; antenne bruno-rossicce con i due articoli basali e l'undicesimo rossicci; zampe giallo-rossicce. Sul capo la reticolazione è netta, sul resto del corpo è svanita. Sul pronoto i tubercoletti sono distinti, sulle elitre e sul pronoto sono svaniti. Edeago figg. 207-208.

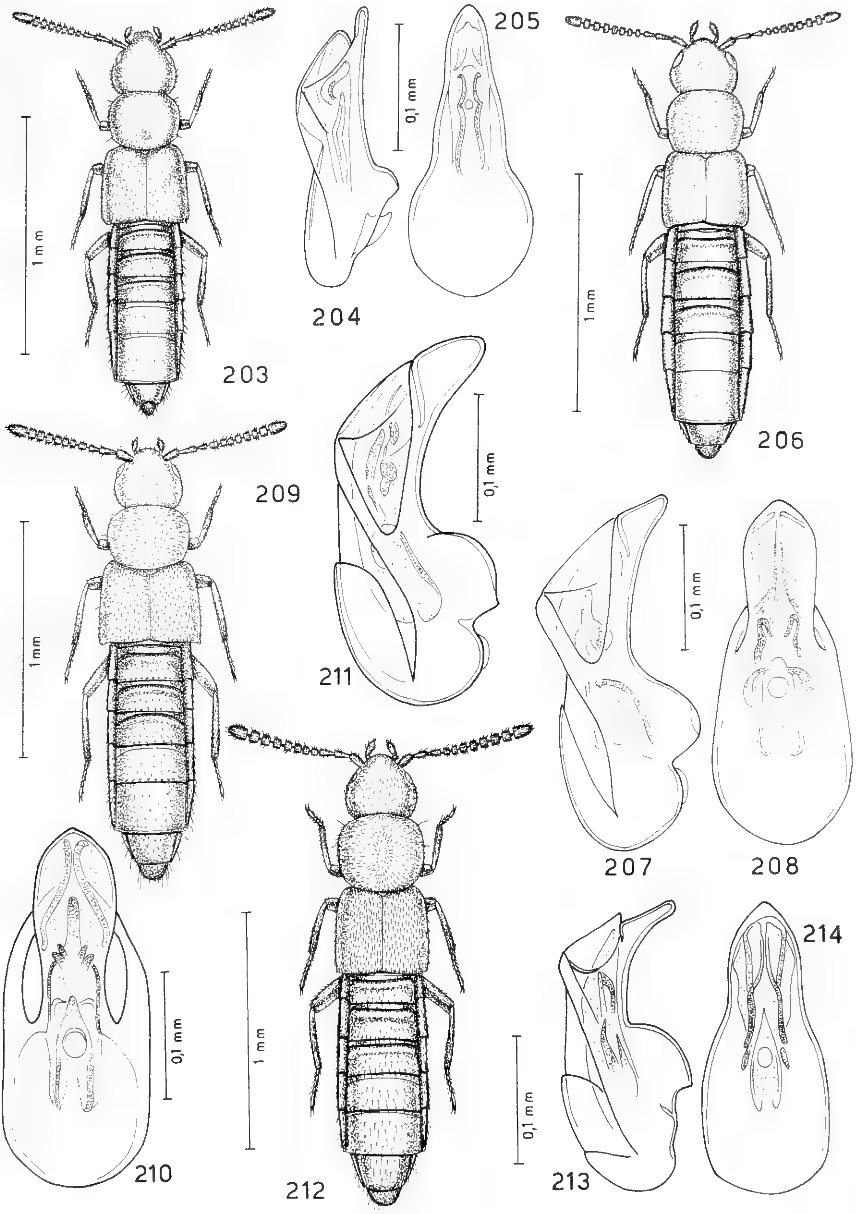
DISTRIBUZIONE. Nepal occidentale.

ECOLOGIA. Specie muscicola o xilodetriticola.

62. **Atheta (Microdota) makarai** PACE, 1987
(Figg. 209-211)

Atheta (Microdota) makarai PACE, 1987: 417

TIPO. Holotypus ♂, Nepal, Manang Diatr., Marsyandi, Thimang, 2550 m, 14-17.IV.1980 (Martens & Ausobsky leg. SM).



FIGG. 203-214.

Habitus ed edeago in visione laterale e ventrale.
Figg. 203-204: *Atheta (Microdota) mediocris* Cameron. Figg. 205-208: *Atheta (Microdota) velata* sp. n. Figg. 209-211: *Atheta (Microdota) makarai* Pace. Figg. 212-214: *Atheta (Microdota) gandakiensis* Pace.

Descrizione. Lungh. 1,8 mm. Avancorpo lievemente opaco, addome lucido. Corpo bruno; antenne brune con i due articoli basali e l'undicesimo di un giallo-rossiccio sporco; zampe gialle. Il capo e il pronoto presentano reticolazione netta, le elitre una reticolazione distinta. Il pronoto e le elitre sono coperti di tubercoletti ben salienti. Edeago figg. 210-211.

Distribuzione. Nepal centrale.

Ecologia. Specie fitodetriticola in boschi di *Tsuga* sp. *Acer* sp. e *Rhododendron* sp.

63. **Atheta (Microdota) gandakiensis** Pace, 1986

(Figg. 212-214)

Atheta (Microdota) gandakiensis Pace, 1986: 85

Tipi. Holotypus ♂, Nepal, Valle Kali-Gandaki, Schucht (Franz leg. CFR). Paratypus: 1♂, stessa provenienza (CPA).

Descrizione. Lungh. 1,9-2,0 mm. Corpo giallo-rossiccio, capo e uriti liberi 3 e 4 oscurati; antenne di un rossiccio scuro con i due articoli basali gialli come le zampe. La reticolazione è netta su tutto il corpo. Distinti sono i tubercoletti del pronoto e delle elitre. Edeago figg. 213-214.

Distribuzione. Nepal centrale.

Ecologia. Specie fitodetriticola.

64. **Atheta (Microdota) loebliella** sp. n.

(Figg. 215-219)

Tipi. Holotypus ♂, Nepal, Lalitpur Distr., Phulcoki, 2550 m, 15.X.1983 (Smetana & Löbl leg., MHNG). Paratypi: 1♂ e 3♀♀, stessa provenienza (MHNG, CPA); 1♂ e 1♀, Lalitpur Distr., Phulcoki, 2650 m, 13.X.1983 (Smetana & Löbl leg., MHNG); 4♂♂, Phulcoki, 2500 m, 7.VI.1986 (Orousset leg., MNP, CPA).

Descrizione. Lungh. 2,0-2,1 mm. Corpo lucido e bruno, comprese le antenne; zampe giallo-rossicce. Tutto il corpo è coperto di reticolazione netta. Il pronoto è coperto di tubercoletti distinti; le elitre mostrano tubercoletti lievemente svaniti. Edeago figg. 216-217, spermateca fig. 218.

Distribuzione. Nepal centrale.

Ecologia. Specie, fitodetriticola, muscicola e xilodetriticola.

Etimologia. Specie dedicata a uno dei raccoglitori, il Dr. Ivan Löbl del Museo di Storia Naturale di Ginevra.

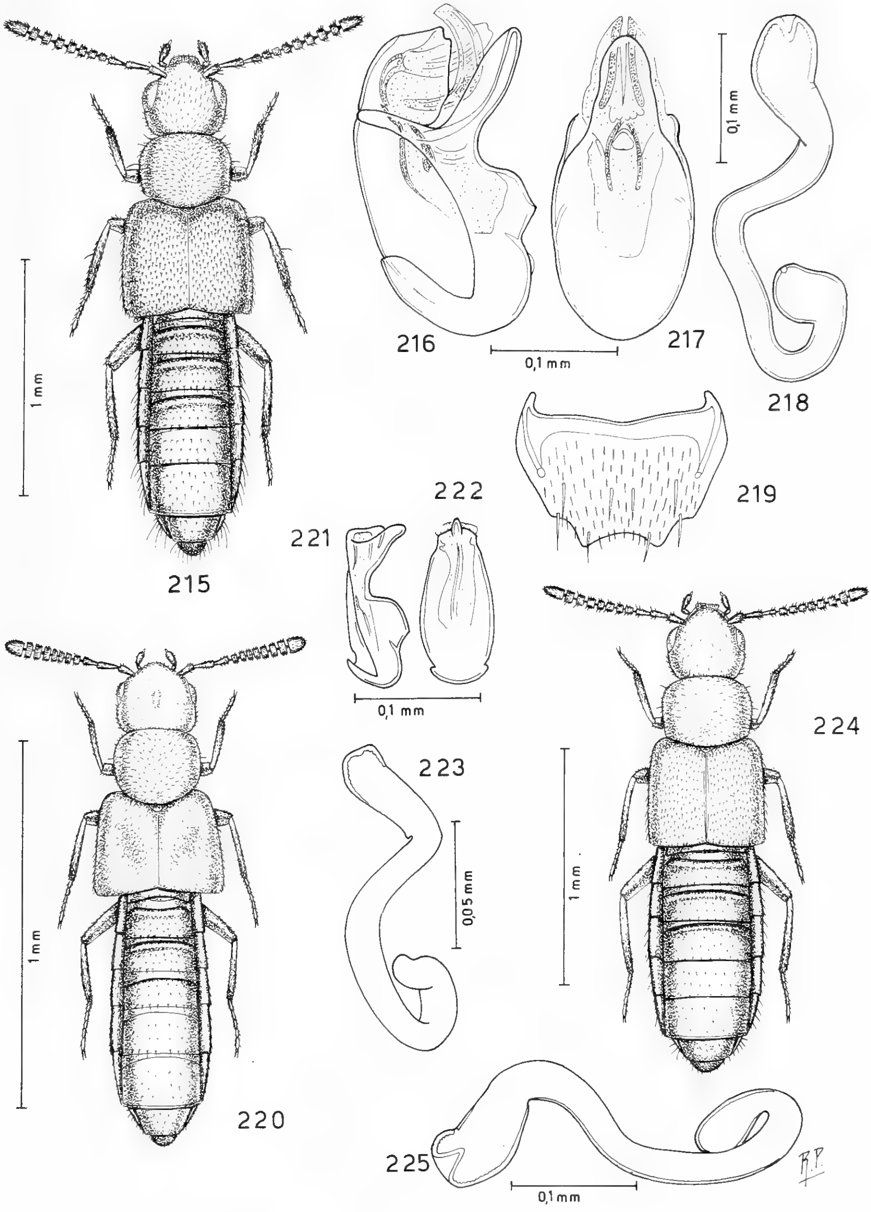
65. **Atheta (Microdota) gracillima** Cameron, 1939

(Figg. 220-223)

Atheta (Microdota) gracillima Cameron, 1939: 334

Tipi. Lectotypus ♂, Kashmir, Gulmarg, VI-VII.1931 (Cameron leg., BMNH). Paralectotypi: 1♂ e 1♀, stessa provenienza (BMNH).

Descrizione. Lungh. 1,3 mm. Corpo lucido e bruno; antenne brune con i due articoli basali giallo-bruni; zampe gialle. La reticolazione delle elitre è più svanita di quella



FIGG. 215-225.

Habitus, edeago in visione laterale e ventrale, spermateca e sesto urotergo libero del maschio. Figg. 215-219: *Atheta (Microdota) loebliella* sp. n. Figg. 220-223: *Atheta (Microdota) gracillima* Cameron. Figg. 224-225: *Atheta (Microdota) contingens* Cameron.

del capo e del pronoto, quella dell'addome è netta. Tutto il copro è coperto di tubercoletti svaniti. Edeago figg. 221-222, spermateca fig. 223.

Distribuzione. Kashmir.

Ecologia. Specie cadavericola.

66. **Atheta (Microdota) contingens** Cameron, 1939
(Figg. 224-225)

Atheta (Philhygra) contingens Cameron, 1939: 319

Tipo. Holotypus ♀, Chakrata Distr., Chuli Khud, 6500 ft., 20.V.1922 (Cameron leg., BMNH).

Descrizione. Lungh. 1,9 mm. Corpo lucido e rossiccio scuro; capo e uriti liberi 3, 4 e 5 bruni; antenne nero-brune con i due articoli basali giallo-rossicci; zampe gialle. Tutto il corpo è coperto di reticolazione distinta. Evidenti tubercoletti coprono il pronoto e le elitre. Spermateca fig. 225.

Distribuzione. NNW Uttar Pradesh.

Ecologia. Sconosciuta.

67. **Atheta (Microdota) habilis** sp. n.
(Figg. 226-229)

Tipi. Holotypus ♂, Nepal, Khandbari Distr., «Bakan» W of Tashigaon, 3250 m, 4.IV.1982 (A. & Z. Smetana leg., MHNG). Paratypi: 2♀♀, stessa provenienza (MHNG, CPA).

Descrizione. Lungh. 1,9 mm. Corpo lucido e bruno; estremità addominale rossiccia; antenne brune con i due articoli basali giallo-rossicci; zampe di un giallo sporco. Il capo e il pronoto presentano reticolazione netta; addome ed elitre con reticolazione distinta. Il capo ha punteggiatura ombelicata distinta; il pronoto e le elitre sono coperti di tubercoletti fini e distinti. Edeagi figg. 227-228, spermateca fig. 229.

Distribuzione. Nepal centrale.

Ecologia. Specie fitodetriticola.

68. **Atheta (Microdota) deharvengi** Pace, 1984
(Figg. 230-232)

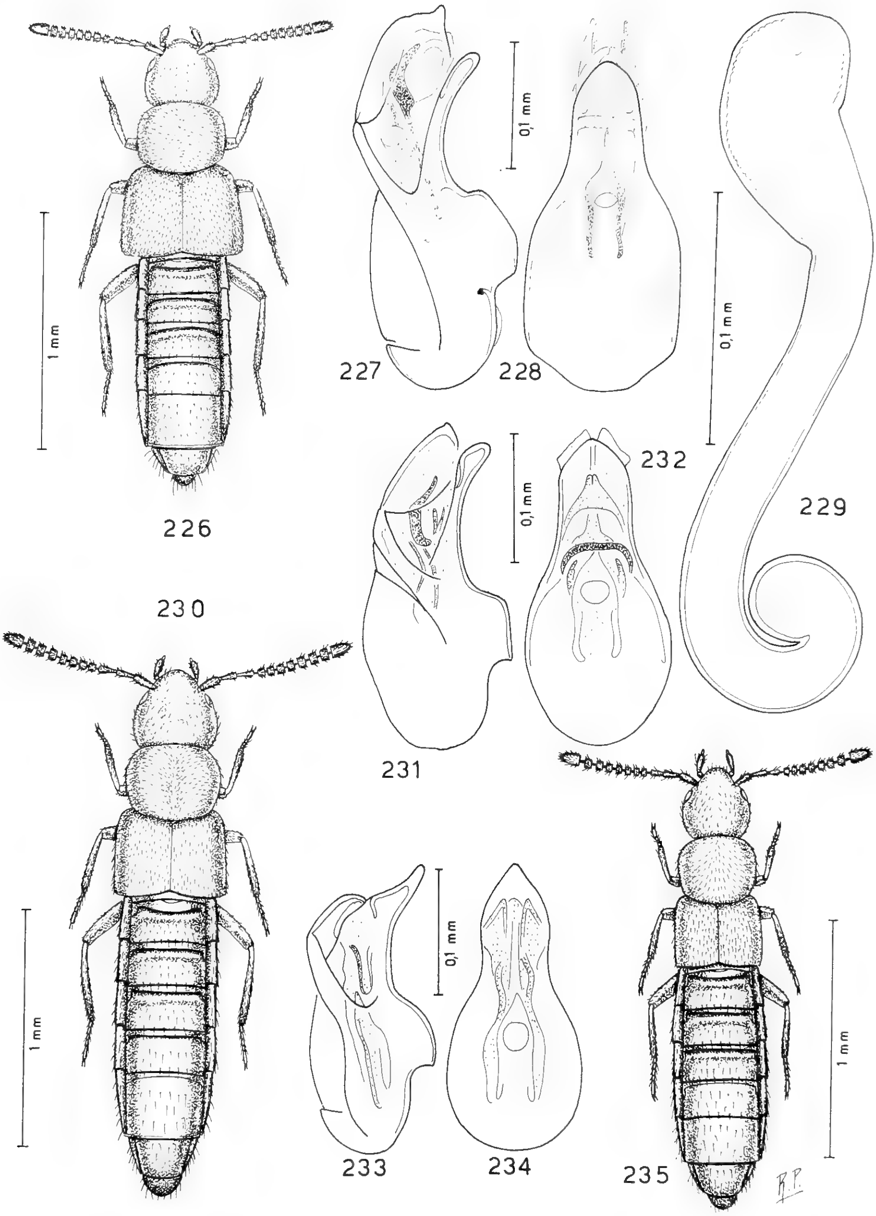
Atheta (Microdota) deharvengi Pace, 1984: 323

Tipo. Holotypus ♂, Nepal, Trisuli, 2100 m, XI.1978 (MNP).

Descrizione. Lungh. 2,1 mm. Corpo di un rossiccio scuro; omeri rossicci come gli uriti liberi 1 e 2 e l'estremità dell'addome; antenne di un rossiccio scuro con i due articoli basali giallo-rossicci; zampe gialle. La reticolazione sul capo è netta, sul pronoto distinta e sulle elitre svanita. Edeago figg. 231-232.

Distribuzione. Nepal centro-settentrionale.

Ecologia. Specie fitodetriticola.



FIGG. 226-235.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 226-229: *Atheta (Microdota) habilis* sp. n. Figg. 230-232: *Atheta (Microdota) deharvengi* Pace.
Figg. 233-235: *Atheta (Microdota) dargharensis* sp. n.

69. **Atheta (Microdota) dargharensis** PACE, 1986
(Figg. 233-235)

Atheta (Microdota) dargharensis PACE, 1986: 85

TIPI. Holotypus ♂, Nepal, Jumla, Alm Darghari, Maharigaon, 4000 m (Franz leg., CFR). Paratypus: 1♂, stessa provenienza (CPA).

DESCRIZIONE. Lungh. 1,9 mm. Corpo giallo-bruno; uriti liberi 3 e 4 bruni; antenne giallo-brune con i due articoli basali gialli come le zampe. La reticolazione sul capo è svanita, sul pronoto e sulle elitre è distinta e sugli uroterghi è evidente. Edeago figg. 233-234.

DISTRIBUZIONE. Nepal centro-settentrionale.

ECOLOGIA. Specie fitodetriticola.

70. **Atheta (Microdota) aptera** PACE, 1984
(Figg. 236-239)

Atheta (Microdota) aptera PACE, 1984: 320
Atheta (Microdota) annapurnensis PACE, 1986: 83, **syn. n.**
Atheta (Microdota) fulungensis PACE, 1983: 83, **syn. n.**

TIPI. Holotypus ♂, Nepal, Trisuli, 2680 m, XI.1978 (MNP). Paratypi: 1♂ e 3♀♀, stessa provenienza (MNP, CPA).

DESCRIZIONE. Lungh. 1,9-2,0 mm. Corpo rossiccio; antenne rossicce con i tre articoli basali gialli come le zampe. La reticolazione del corpo è distinta o più o meno svanita. Edeago figg. 237-238, spermateca fig. 239.

DISTRIBUZIONE. Nepal centro-settentrionale.

6 es., Goropani, Pokhara (Franz leg., Coll. Benick, CPA); 7 es., Fulung (Franz leg. Coll. Benock, CPA); 1♀, Ilam Distr., Mai Pokhari, 25-27.V.1980 (Martens & Ausobsky leg., SM).

ECOLOGIA. Specie humicola-fitodetriticola.

71. **Atheta (Microdota) seclusa** CAMERON, 1939
(Figg. 240-241)

Atheta (Ousipalia) seclusa CAMERON, 1939: 309
Atheta (Microdota) seclusa, PACE, 1984: 319

TIPO. Holotypus ♀, Chakrata Distr., Dodora Khud, 8000 ft., 13.V.1922 (Cameron leg., BMNH).

DESCRIZIONE. Lungh. 1,8 mm. Corpo debolmente lucido e giallo rossiccio; zampe gialle. Sul capo e sul pronoto la reticolazione è assai svanita, sulle elitre è distinta. Spermateca fig. 241.

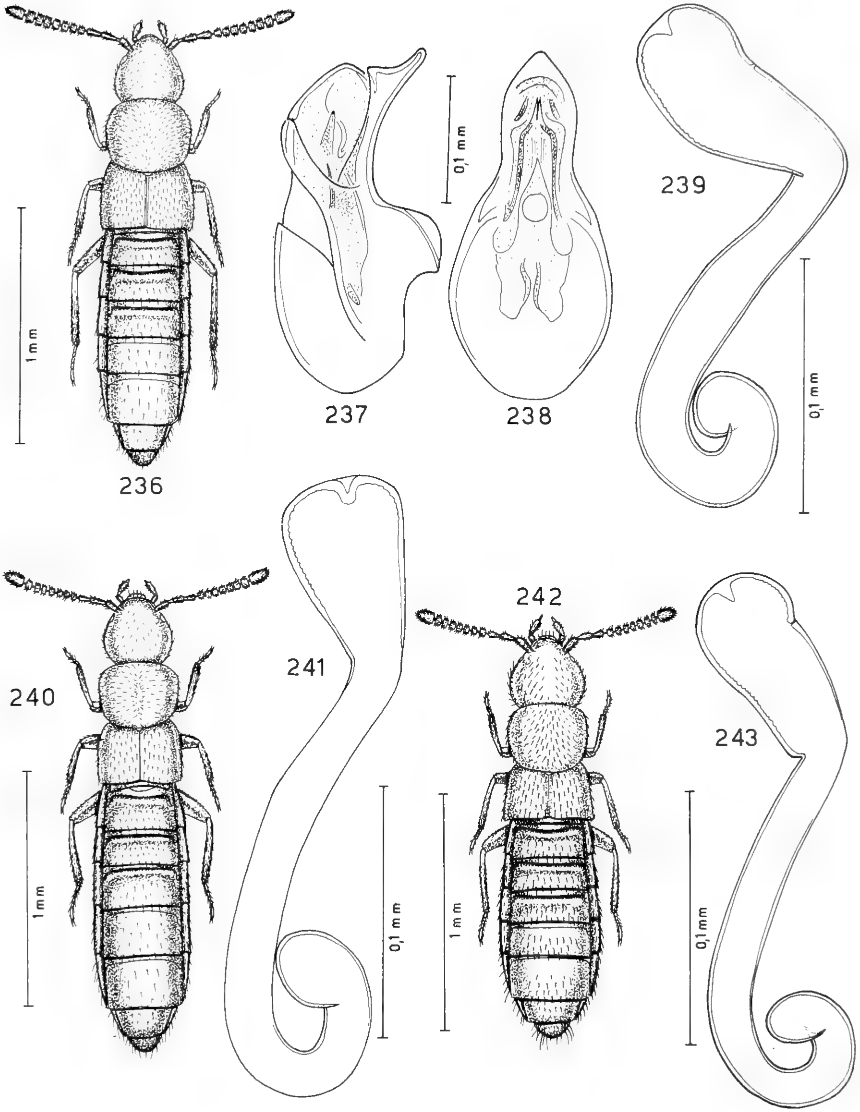
DISTRIBUZIONE. NNW Uttar Pradesh.

ECOLOGIA. Specie humicola.

72. **Atheta (Microdota) zagipalensis** PACE, 1986, st. n.
(Figg. 242-243)

Atheta (Microdota) seclusa zagipalensis PACE, 1986: 83

TIPI. Holotypus ♀, Kashmir, Zagipal, Fahlgam, 3500-3600 m, X.1977 (Franz leg., CFR). Paratypi: 2♀♀, stessa provenienza (CFR, CPA).



FIGG. 236-243.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 236-239: *Atheta (Microdota) aptera* Pace. Figg. 240-241: *Atheta (Microdota) seclusa* Cameron.
Figg. 242-243: *Atheta (Microdota) zagipalensis* Pace.

Descrizione. Lungh. 1,8 mm. Corpo giallo-rossiccio; uriti liberi 4 e base del 5 appena oscurati; antenne rossicce con i tre articoli basali gialli come le zampe. Tutto il corpo è coperto di reticolazione assai distinta. Spermateca fig. 243.

Distribuzione. Kashmir.

Ecologia. Specie humicola.

73. **Atheta (Microdota) chitrensis** Pace, 1987
(Figg. 244-245)

Atheta (Microdota) chitrensis Pace, 1987: 415

Tipo. Holotypus ♀, Nepal, Parbat Distr., Chitre, 2950-3050 m, 5.V.1980 (Martens & Ausobsky leg., SM).

Descrizione. Lungh. 1,9 mm. Corpo lucido e bruno-rossiccio; estremità distale dell'addome rossiccia. L'avancorpo è coperto di reticolazione svanita. Spermateca fig. 245.

Distribuzione. Nepal centro-settentrionale.

Ecologia. Specie humicola in boschi di *Abies* sp. e *Rhododendron* sp.

74. **Atheta (Microdota) yardangensis** sp. n.
(Figg. 246-247)

Tipo. Nepal, Prov. Bagmati, Yardang Ridge, NE Barahbise, 3250 m, 5.V.1981 (Löbl & Smetana leg., MHNG).

Descrizione. Lungh. 1,8 mm. Corpo lucido e bruno; estremità distale dell'addome bruno-rossiccia; antenne brune con i due articoli basali gialli; zampe giallo-rossicce. Tutto il corpo è coperto di reticolazione netta. Tubercoletti salienti coprono le elitre. Spermateca fig. 247.

Distribuzione. Nepal centro-settentrionale.

Ecologia. Specie humicola-fitodetriticola.

75. **Atheta (Microdota) lentula** Cameron, 1939
(Figg. 248-251)

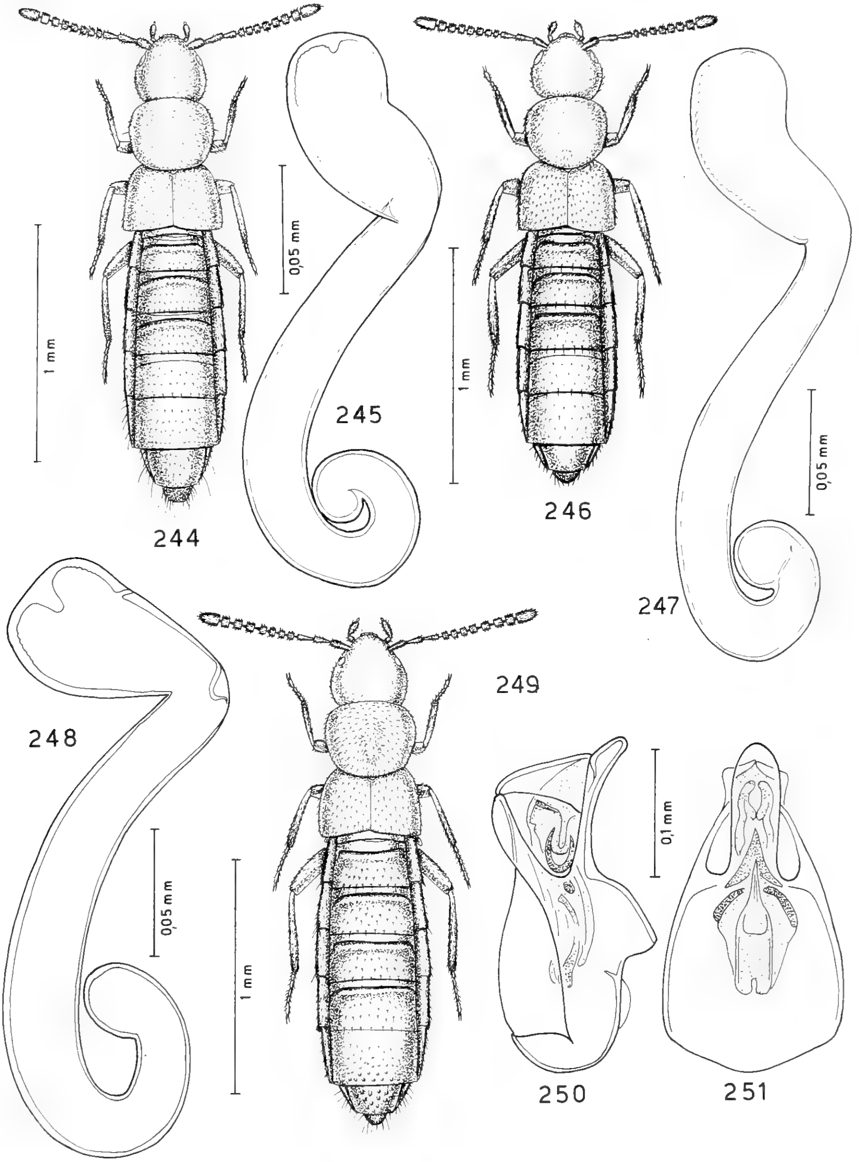
Atheta (Ousipalia) lentula Cameron, 1939: 308

Tipi. Lectotypus ♂, Kashmir, Gulmarg, VI-VII.1931 (Cameron leg., BMNH). Paralectotypi: 14 es., stessa provenienza (BMNH).

Descrizione. Lungh. 2,0 mm. Pronoto debolmente opaco su un corpo lucido e rossiccio scuro; antenne bruno-rossicce con i tre articoli basali giallo-rossicci; zampe gialle. L'avancorpo è coperto di netta reticolazione a maglie ampie. Tutto il corpo è coperto di tubercoletti salienti. Edeago figg. 250-251, spermateca fig. 248.

Distribuzione. Kashmir.

Ecologia. Sconosciuta.



FIGG. 244-251.

Habitus, spermateca ed edeago in visione laterale e ventrale.
Figg. 244-245: *Atheta (Microdota) chitrensis* Pace. Figg. 246-247: *Atheta (Microdota) yardangensis* sp. n. Figg. 248-251: *Atheta (Microdota) lentula* Cameron.

76. **Atheta (Microdota) janetschekiella** Pace, 1987
(Figg. 252-253)

Meoticamorpha janetscheki Scheerpeltz 1976: 67
Atheta (Microdata) janetschekiella Pace, 1987: 415
(nom. per *Atheta janetscheki* Scheerpeltz, 1976: 67, nec *Atheta janetscheki* Scheerpeltz, 1976: 62)

Tipo. Lectotypus ♀, Nepal, Mingbo-Tal beim Airstrip der Hillary-Makalu-Expedition, 4800 m, 28.V.1961 (Janetschek leg., IZUI).

Descrizione. Lungh. 1,8 mm. Corpo lucido e giallo-rossiccio; antenne e zampe gialle. Tutto il corpo è coperto di reticolazione netta. Tubercoletti assai salienti coprono le elitre. Spermateca fig. 253.

Distribuzione. Nepal centro-orientale.

Ecologia. Specie muscicola.

77. **Atheta (Microdota) yangriensis** sp. n.
(Figg. 254-257)

Tipi. Holotypus ♂, Nepal, Prov. Bagmati, Yangri Ridge, 4700-4800 m, 22.IV.1981 (Löbl & Smetana leg.; MHNG). Paratypi: 8 es. stessa provenienza, 22-23.IV.1981 (MHNG, CPA).

Descrizione. Lungh. 1,8 mm. Corpo lucido e giallo-rossiccio; antenne bruno-rossicce con i due articoli basali gialli come le zampe. Il capo e il pronoto sono coperti di reticolazione quasi vigorosa, le elitre mostrano tubercoletti e reticolazione svaniti. Edeago figg. 256-257, spermateca fig. 255.

Distribuzione. Nepal centro-settentrionale.

Ecologia. Specie humicola-fitodetriticola.

78. **Atheta (Microdota) meredarensis** sp. n.
(Figg. 258-261)

Tipi. Holotypus ♂, Nepal, Prov. Bagmati, Mere Dare, 3200 m, 8.IV.1981 (Löbl & Smetana leg. MHNG). Paratypi: 3♀♀, stessa provenienza (MHNG, CPA); 1♂, Prov. Bagmati, Malemchi, 2800 m, 14.IV.1981 (Löbl & Smetana leg., MHNG).

Descrizione. Lungh. 1,9 mm. Corpo lucido e giallo-rossiccio; capo e uriti liberi 3 e 4 di un rossiccio scuro; antenne rossicce con i tre articoli basali gialli; zampe giallo-rossicce. Il capo e il pronoto sono coperti di reticolazione netta; le elitre da reticolazione svanita e tubercoletti poco salienti. Edeago figg. 259-260, spermateca fig. 258.

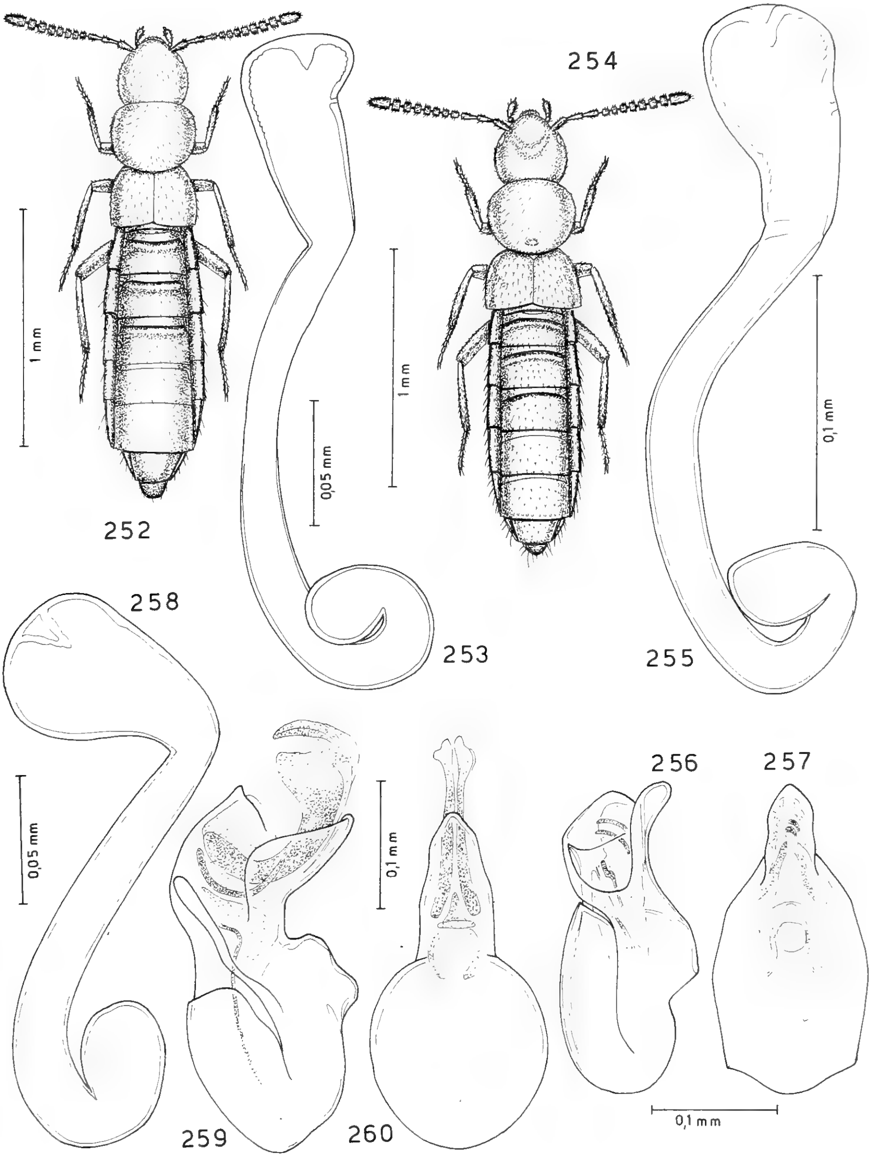
Distribuzione. Nepal centro-settentrionale.

Ecologia. Specie humicola-fitodetriticola.

79. **Atheta (Microdota) rizanf** Pace, 1982
(Figg. 262-265)

Atheta (Microdota) rizanf Pace, 1982: 153

Tipi. Holotypus ♂, Nepal, Jumla, Valle Dzunda Khola, Talphi, 3000-3500 m (Franz leg., CFR). Paratypi: 3♀♀, stessa provenienza (CFR, CPA).



FIGG. 252-260.

Habitus, spermateca ed edeago in visione laterale e ventrale.
Figg. 252-253: *Atheta (Microdota) janetschekiella* Pace. Figg. 254-257: *Atheta (Microdota) yangriensis* sp. n. Figg. 258-260: *Atheta (Microdota) meredarensis* sp. n.

Descrizione. Lungh. 1,7-1,8 mm. Corpo bruno-rossiccio; capo e uriti liberi 3 e 4 bruni; antenne e zampe gialle. Il capo e il pronoto sono coperti di reticolazione evidente. Edeago figg. 263-264, spermateca fig. 265.

Distribuzione. Nepal occidentale.

Ecologia. Specie humicola.

80. **Atheta (Microdota) micropisalioides** Pace, 1982
(Figg. 266-268)

Atheta (Microdota) micropisalioides Pace, 1982: 149

Tipi. Holotypus ♂, Nepal, Jumla, Dampa (Franz leg. CFR). Paratypi: 15 es., stessa provenienza (CFR, CPA).

Descrizione. Lungh. 1,5-1,6 mm. Corpo giallo-rossiccio; urite libero 4 bruno-rossiccio; antenne brunicce con i tre articoli basali gialli come le zampe. Tutto il corpo è coperto di reticolazione distinta. Edeago figg. 267-268, spermateca fig. 265.

Distribuzione. Nepal occidentale.

Ecologia. Specie humicola.

81. **Atheta (Microdota) microphallica** Pace, 1986
(Figg. 269-271)

Atheta (Microdota) microphallica Pace, 1986: 92

Tipo. Holotypus ♂, Kashmir, Pahlgam, X.1977 (Franz leg., CFR).

Descrizione. Lungh. 1,9 mm. Corpo lucido e bruno-rossiccio; zampe, estremità distale dell'addome e mergine posteriore degli uroterghi, rossicci; antenne bruno-rossicce. La reticolazione sul capo è appena svanita, sul pronoto è distinta e sulle elitre è evidente. Edeago figg. 270-271.

Distribuzione. Kashmir.

Ecologia. Specie fitodetriticola.

82. **Atheta (Microdota) goropanensis** Pace, 1982
(Figg. 272-275)

Atheta (Microdota) goropanensis Pace, 1982: 155

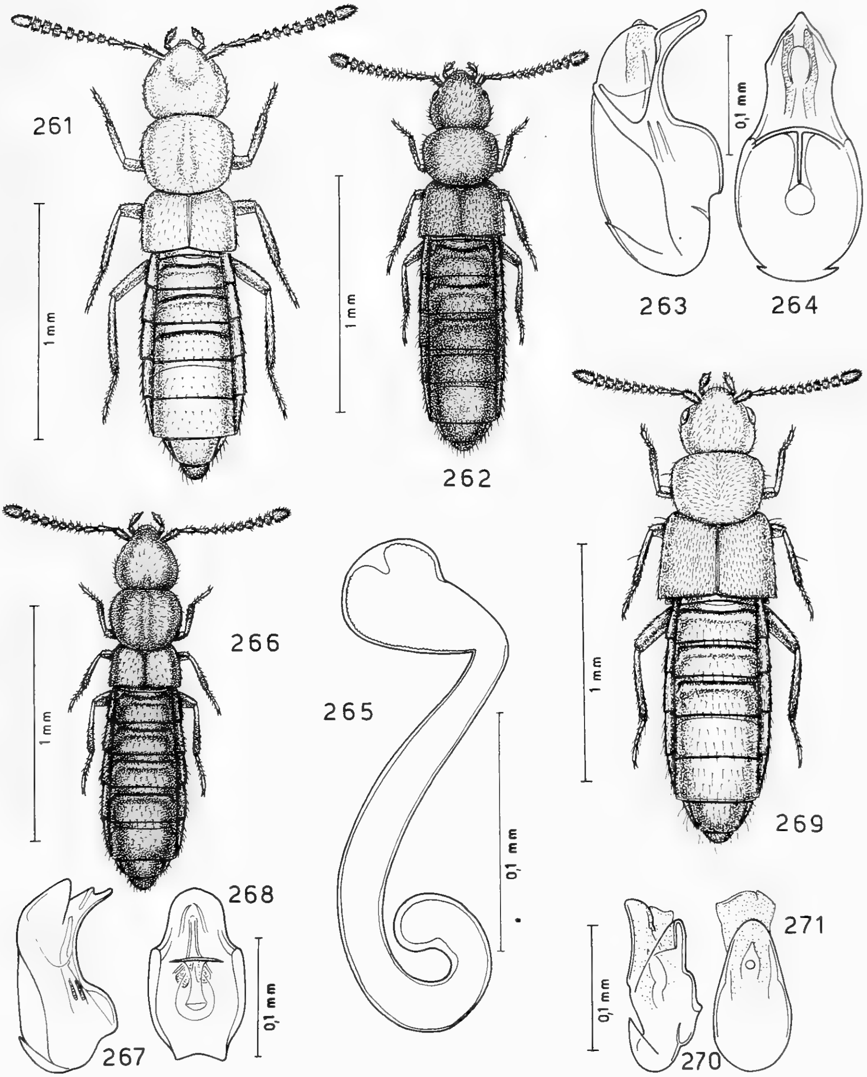
Tipi. Holotypus ♂, Goropani, Pokhara (Franz leg., CFR). Paratypi: 5 ♀ ♀, stessa provenienza (CFR, CPA).

Descrizione. Lungh. 1,8 mm. Corpo giallo bruniccio sporco; urite libero 4 bruniccio scuro; antenne bruno-giallicce con i quattro articoli basali gialli come le zampe. Sull'avancorpo la reticolazione è svanita, sull'addome è evidente. Edeago figg. 273-274, spermateca fig. 275.

Distribuzione. Nepal centro-settentrionale.

1 ♀, Goropani Pass, 3150 m, 7.X.1983 (Smetana & Löbl leg., MHNG).

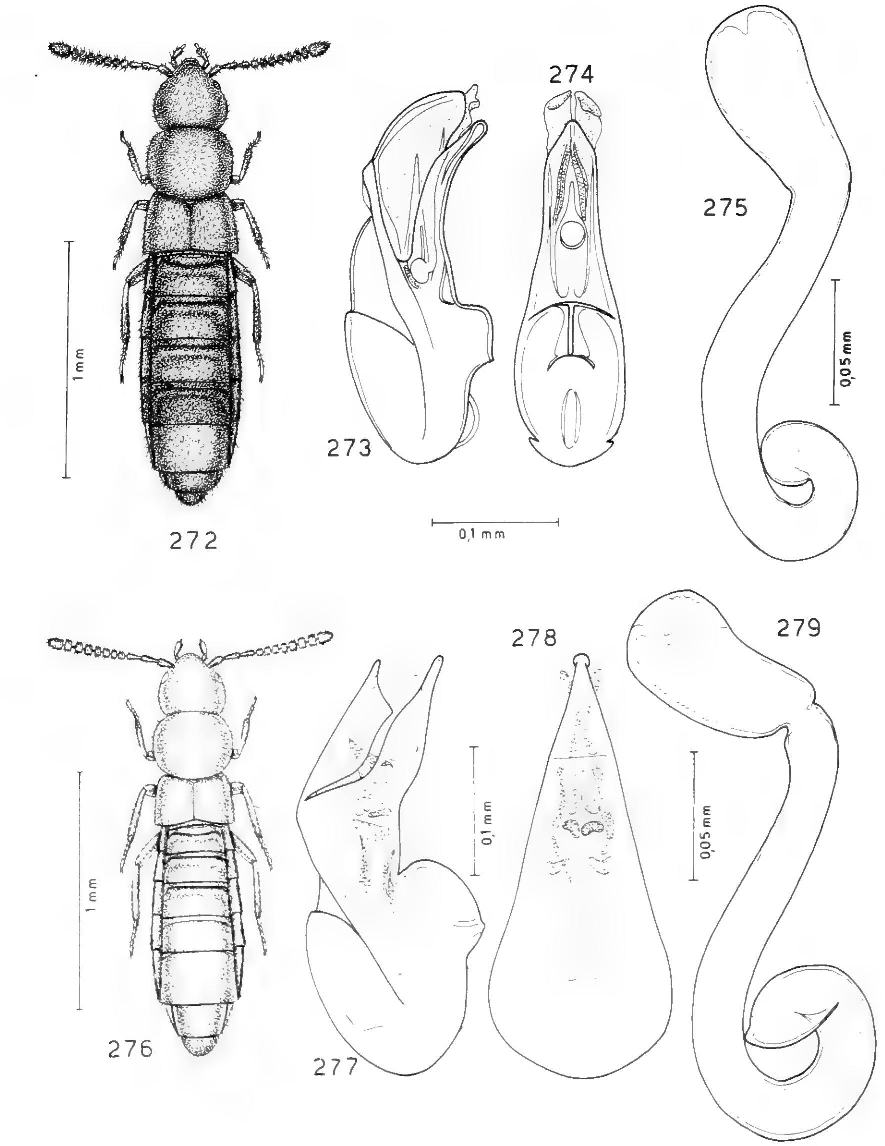
Ecologia. Specie fitodetriticola.



FIGG. 261-271.

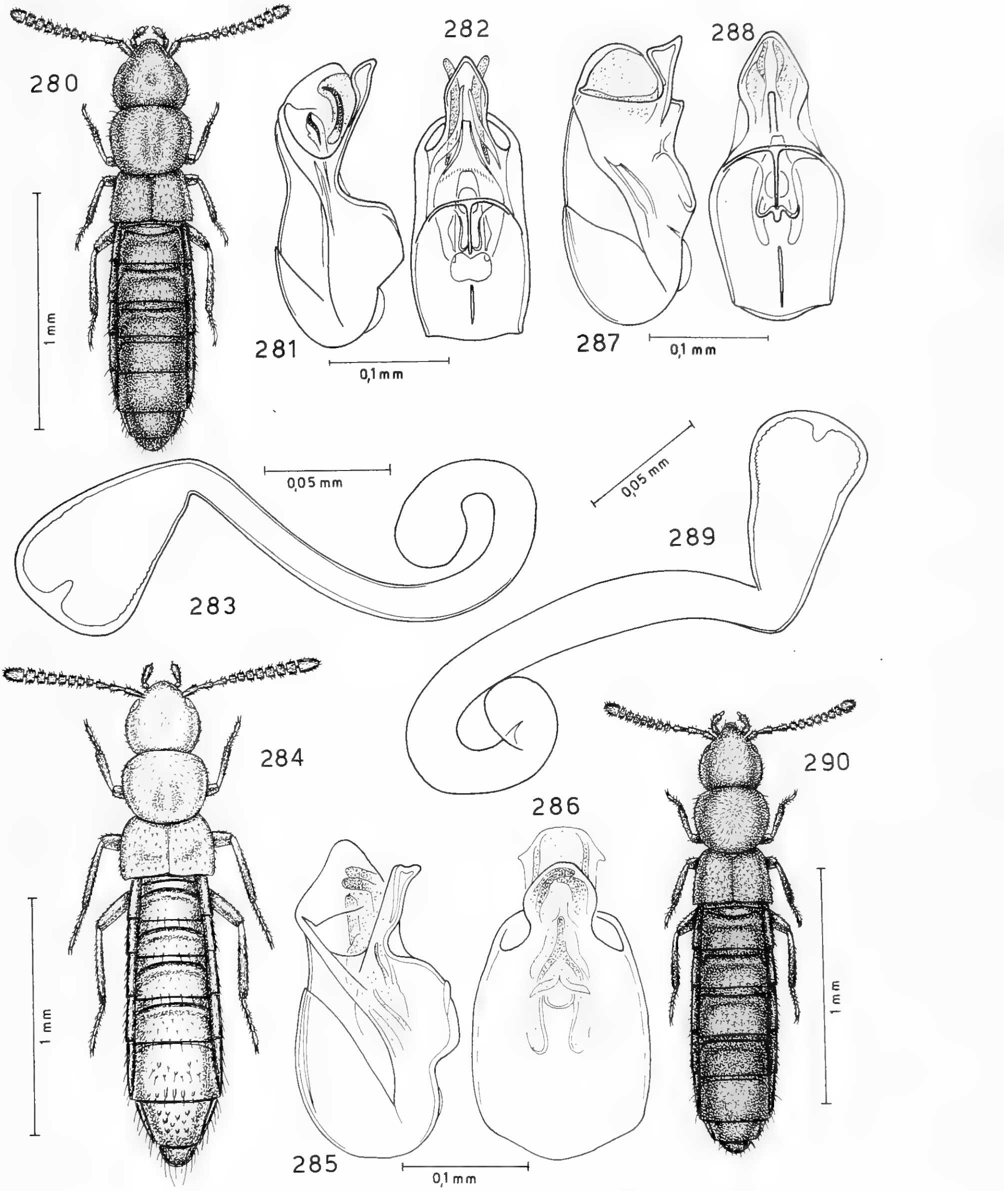
Habitus, edeago in visione laterale e ventrale e spermateca.

Fig 261: *Atheta (Microdota) meredarensis* sp. n. Figg. 262-265: *Atheta (Microdota) rizanf* Pace. Figg. 266-268: *Atheta (Microdota) micropisalioides* Pace. Figg. 269-271: *Atheta (Microdota) microphallica* Pace.



FIGG. 272-279.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 272-275: *Atheta (Microdota) goropanensis* Pace. Figg. 276-279: *Atheta (Microdota) pokhariensis* Pace.



FIGG. 280-290.

Habitus, edeago in visione laterale e ventrale e spermateca.
Figg. 280-283: *Atheta (Microdota) spinigera* Pace. Figg. 284-286: *Atheta (Microdota) phulcokiensis* sp. n. Figg. 287-290: *Atheta (Microdota) khumbuensis* Pace.

83. **Atheta (Microdota) pokhariensis** Pace, 1987
(Figg. 276-279)

Atheta (Microdota) pokhariensis Pace, 1987: 415

Tipi. Holotypus ♂, Nepal, Ilam Distr., Mai Pokhari, 2100-2200 m, 25-27.III.1980 (Martens & Ausobsky leg., SM). Paratypi: 1♂ e 1♀, stessa provenienza (SM, CPA).

Descrizione. Lungh. 1,7 mm. Corpo lucido e giallo-rossiccio, coperto di reticolazione distinta. Edeago figg. 277, spermateca fig. 279.

Distribuzione. Nepal centro-settentrionale.

Ecologia. Specie fitodetriticola.

84. **Atheta (Microdota) spinigera** Pace, 1982
(Figg. 280-283)

Atheta (Microdota) spinigera Pace, 1982: 153

Tipi. Holotypus ♂, Nepal, Pate Pati, Gosaikunde (Franz. leg., CFR). Paratypi: 3♀♀, stessa provenienza; 1♂ e 1♀, Nepal, Muikharka, Tare Pati (Franz leg., CFR, CPA).

Descrizione. Lungh. 1,8-1,9 mm. Corpo giallo-rossiccio; urite libero 4 rossiccio; antenne giallo-rossicce. La superficie del corpo è coperta di reticolazione distinta. Edeago figg. 281-282, spermateca fig. 283.

Distribuzione. Nepal centro-settentrionale.

Ecologia. Specie humicola.

85. **Atheta (Microdota) phulcokiensis** sp. n.
(Figg. 284-286)

Tipo. Kathmandu Distr., Phulcoki, 2600 m, 20.IV.1982 (A. & Z. Smetana leg., MHNG).

Descrizione. Lungh. 2,1 mm. Corpo giallo-rossiccio; antenne di un giallo-rossiccio sporco con i due articoli basali giallo-rossicci come le zampe. La reticolazione del capo e del pronoto è netta, quella delle elitre svanita. Tubercoletti poco salienti sono visibili sulle elitre. Edeago figg. 285-286.

Distribuzione. Nepal centrale.

Ecologia. Specie fitodetriticola.

86. **Atheta (Microdota) khumbuensis** Pace, 1982
(Figg. 287-290)

Atheta (Microdota) khumbuensis Pace, 1982: 153

Tipi. Holotypus ♂, Nepal, Khumbu, Alm Dugdimna (Lughla), 3000-4000 m (Franz leg., CFR). Paratypi: 4♂♂ e 6♀♀, stessa provenienza (CFR, CPA); 1♂, Nepal, Therai, 10.X.1972 (Franz leg., CFR).

Descrizione. Lungh. 1,8-1,9 mm. Corpo giallo-rossiccio; urite libero 4 rossiccio; antenne bruno-rossicce con i quattro articoli basali giallo-rossicci; zampe gialle. L'avancorpo è coperto di reticolazione distinta. Edeago figg. 287-288, spermateca fig. 289.

Distribuzione. Nepal nord-occidentale.

Ecologia. Specie humicola.

DESCRIZIONE DELLE SPECIE DEL SOTTOGENERE *Poromicrodota* N.

1. **Atheta (Poromicrodota) subamicula** CAMERON, 1939
(Figg. 291-294)

Atheta (Microdota) subamicula CAMERON, 1939: 327

TIPI. Lectotypus ♂, Chakrata Distr., Chulli Khud, 8000 ft., 14.V.1922 (Cameron leg., BMNH). Paralectotypi: 3 es., stessa provenienza (BMNH).

DESCRIZIONE. Lungh. 1,7-1,8 mm. Corpo bruno con elitre bruno-rossicce; antenne brune; zampe gialle. Il pronoto e il capo sono coperti di reticolazione netta. Edeago figg. 292-293, spermateca fig. 294.

DISTRIBUZIONE. NNE Bihar, NNW Uttar Pradesh, Nepal centrale.

1♂, Nepal, Lalitpur Distr., Phulcoki, 2650 m, 14.X.1983 (Smetana & Löbl leg., MHNG); 1♂, Kathmandu Distr., Phulcoki, 2600 m, 20.IV.1982 (A. & Z. Smetana leg., MHNG); 1♀, Prov. Bagmati, NE Barahbise, 2700 m, 2.V.1981 (Löbl & Smetana leg., MHNG); 1♂ e 1♀, Prov. Bagmati, Dobate Ridge, NE Barahbise, 2700 m, 2.V.1981 (Löbl & Smetana leg., MHNG, CPA); 1♂, Prov. Bagmati, Yardang Ridge, NE Barahbise, 3250 m, 5.V.1981 (Löbl & Smetana leg., MHNG); 3 es., Khandbari Distr., for. above Ahale, 2300 m, 25-26.III.1982 (A. & Z. Smetana leg., MHNG, CPA); 1♂, Ilam Distr., Mai Pokhari, 2100-2200 m, 25-27.III.1980 (Martens & Ausobsky leg., SM); 1♀, Bindal Gadh., Konain, 5.V.1921 (Cameron leg., BMNH), sintipo di *Atheta alia* Cameron, 1939.

ECOLOGIA. Specie fitodetriticola.

2. **Atheta (Poromicrodota) sororcula** CAMERON, 1939
(Figg. 295-298)

Atheta (Microdota) sororcula CAMERON, 1939: 324
Atheta (Ousipalia) pseudocaesula CAMERON, 1944: 105, **syn. n.**

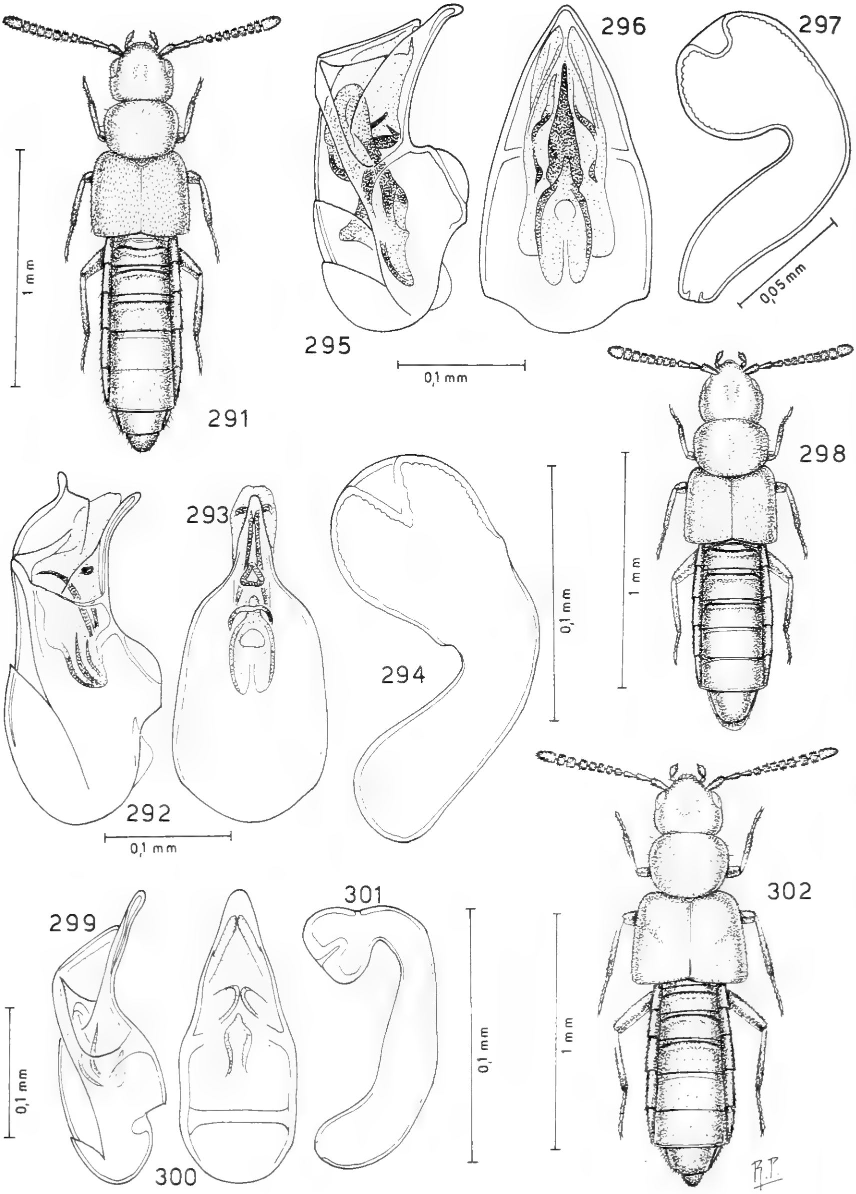
TIPI. Lectotypus ♂, Chakrata Distr., Kanasar, 7050 ft., 14-22.V.1922 (Cameron leg., BMNH). Paralectotypus: 1♂, stessa provenienza (BMNH).

DESCRIZIONE. Lungh. 1,6-1,7 mm. Corpo lucido e giallo-bruniccio scuro; urite libero 4 bruno; estremità distale dell'addome rossiccia; antenne brune con i tre articoli basali giallo-rossicci; zampe gialle. La reticolazione del capo è netta, quella del pronoto e dell'addome distinta e quella delle elitre assai svanita. Tubercoletti ben salienti stanno sul pronoto e sulle elitre. Edeago figg. 295-296, spermateca fig. 297.

DISTRIBUZIONE. Himachal Pradesh, NNW Uttar Pradesh e Nepal centrale.

15 es., Kathmandu Distr., Phulcoki, 2600 m, 20-21.IV.1982 (A. & Z. Smetana leg., MHNG, CPA); 1♂ e 4♀♀, Godawaro b. Kathmandu (Franz leg. CFR, CPA); 6 es., Nepal, Khandbari Distr., «Bakan» W of Tashigaon, 3250 m, 4.IV.1982 (A. & Z. Smetana leg., MHNG); 3 es., Khandbari Distr., above Sheduwa, 3000 m, 31.III.1982 (A. & Z. Smetana leg., MHNG); 3♀♀, Parbat Distr., Ghoropani Pass, N slope, 2700 m, 6.V.1983 (Smetana & Löbl leg., MHNG); 1♂ e 2♀♀, Nepal, Mahabarat, 2350 m (MNP); 14 es., Rohtangpass, S-Hang, 2500-3500 m, Himachal Pradesh (Franz leg., CFR, CPA); 1♂ e 1♀, Nepal, Mustang Distr., Purano Marpha, 3200-3600 m, 22-25.IV.1980 (Martens & Ausobsky leg., SM); 4♂♂, Simla Hills, Gahan, 7000 ft., IX.1921 (Cameron leg., BMNH), determinati da Cameron come *Atheta amicula* (Steph.).

ECOLOGIA. Specie fitodetriticola.



FIGG. 291-302.

Habitus, edeago in visione laterale e ventrale e spermateca.

Figg. 291-294: *Atheta (Poromicrodota) subamicula* Cameron. Figg. 295-298: *Atheta (Poromicrodota) sororcula* Cameron. Figg. 299-302: *Atheta (Poromicrodota) subluctuosa* Cameron.

3. **Atheta (Poromicrodota) subluctuosa** CAMERON, 1939
(Figg. 299-302)

Atheta (Microdota) subluctuosa CAMERON, 1939: 323

TIPI. Lectotypus ♂, Kashmir, Gulmarg, VI-VII.1931 (Cameron leg., BMNH). Paralectotypi: 1♂ e 1♀, stessa provenienza (BMNH).

DESCRIZIONE. Lungh. 1,8 mm. Corpo lucido e bruno; uriti liberi 3, 4 e 5 neri; antenne nere con i due articoli basali bruni; zampe giallo-brune. Il capo e le elitre presentano reticolazione netta; pronoto e addome l'hanno svanita. Tubercoletti distinti stanno sulle elitre. Edeago figg. 299-300, spermateca fig. 301.

DISTRIBUZIONE. Kashmir.

ECOLOGIA. Specie cadavericola.

4. **Atheta (Poromicrodota) yamana** sp. n.
(Figg. 303-304)

TIPO. Holotypus ♀, Nepal, Prov. Bagmati, Pokhare, NE Barahbise, 2700 m, 2.V.1981 (Löbl & Smetana leg., MHNG).

DESCRIZIONE. Lungh. 1,5 mm. Corpo lucido e bruno; base ed estremità addominale bruno-rossicce; antenne brune con i due articoli basali bruno-rossicci; zampe gialle. L'intero corpo è coperto di reticolazione svanita e di tubercoletti superficiali. Spermateca fig. 304.

DISTRIBUZIONE. Nepal centrale.

ECOLOGIA. Sconosciuta.

ETIMOLOGIA. Da Yama, dio della morte.

5. **Atheta (Poromicrodota) paria** sp. n.
(Figg. 305-306)

TIPO. Holotypus ♀, Nepal, Kathmandu Distr., Phulcoki, 2600 m, 20.IV.1982 (A. & Z. Smetana leg., MHNG).

DESCRIZIONE. Lungh. 1,5 mm. Corpo lucidissimo e bruno; pronoto e base dell'addome bruno-rossicci; antenne brune con i due articoli basali di un rossiccio scuro; zampe gialle. I tubercoletti e la reticolazione dell'intera superficie del corpo, sono svaniti. Spermateca fig. 306.

DISTRIBUZIONE. Nepal centrale.

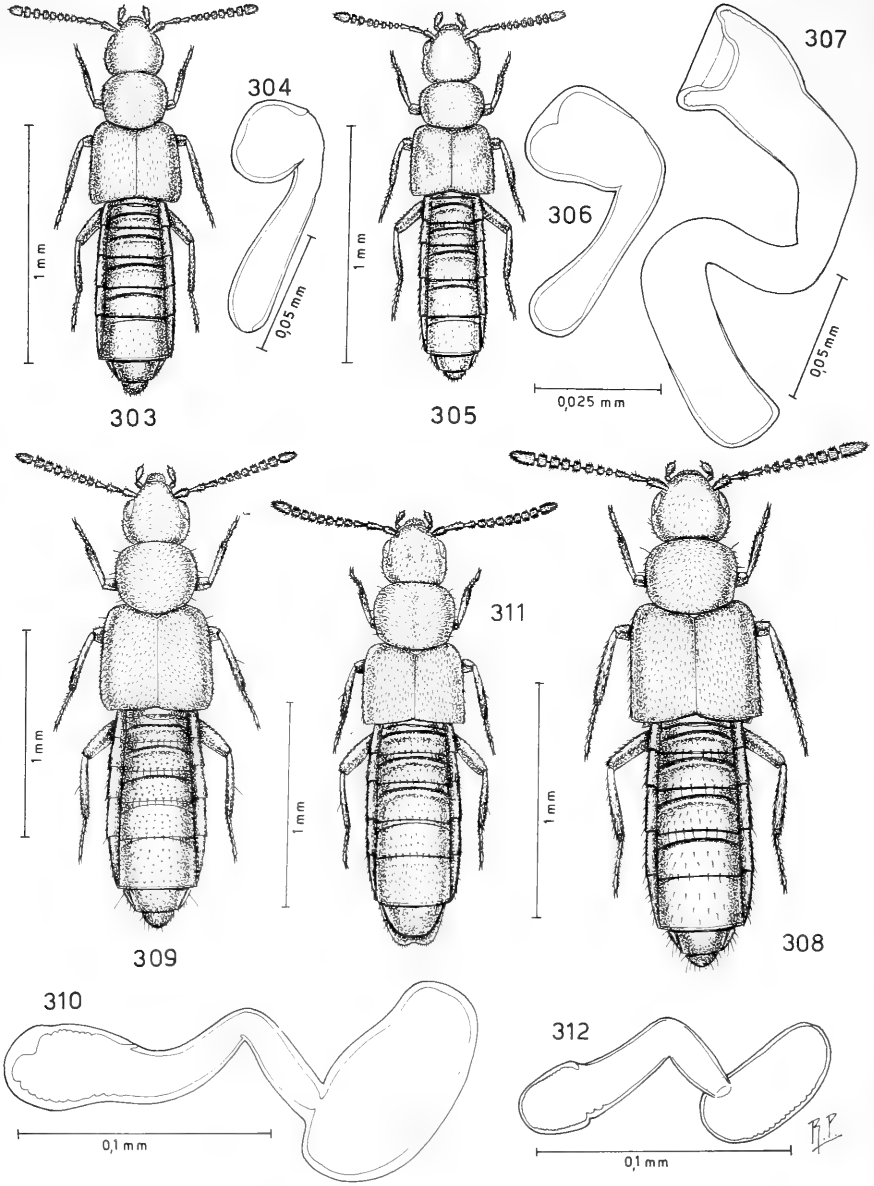
ECOLOGIA. Specie probabilmente fitodetriticola.

ETIMOLOGIA. Da «Paria», categoria di coloro che in India non appartengono ad alcuna casta sociale.

6. **Atheta (Poromicrodota) longelytrata** sp. n.
(Figg. 307-308)

TIPO. Holotypus ♀, Nepal, Prov. Bagmati, Chaubas, 2600 m, 5.IV.1981 (Löbl & Smetana leg., MHNG).

DESCRIZIONE. Lungh. 2,1 mm. Corpo debolmente lucido e bruno-rossiccio; uriti liberi 4 e 5 bruni; Antenne brune con i due articoli basali rossicci; zampe giallo-rossicce.



FIGG. 303-312.

Habitus e spermateca.

Figg. 303-304: *Atheta (Poromicrodota) yamana* sp. n. Figg. 305-306: *Atheta (Poromicrodota) paria* sp. n. Figg. 307-308: *Atheta (Poromicrodota) longelytrata* sp. n. Figg. 309-310: *Atheta (Physadota) scabriventris* Cameron. Figg. 311-312: *Atheta (Physadota) praelata* Pace.

La reticolazione dell'avancorpo è netta o vigorosa, quella dell'addome è distinta. I tubercoletti dell'avancorpo sono poco salienti. Spermateca fig. 307.

DISTRIBUZIONE. Nepal centrale.

ECOLOGIA. Specie fitodetriticola.

DESCRIZIONE DELLE SPECIE DEL SOTTOGENERE *Physadota* N.

1. **Atheta (Physadota) scabriventris** CAMERON, 1939
(Figg. 309-310)

Atheta (Microdota) scabriventris CAMERON, 1939: 332

TIPI. Lectotypus ♀, Tibet, Supi River, 15000 ft. (Champion leg., BMNH). Paralectotypus: 1 ♀, stessa provenienza (BMNH).

DESCRIZIONE. Lungh. 2,1 mm. Avancorpo debolmente lucido, addome lucido. Corpo bruno; antenne nere; zampe brune con femori neri e tarsi rossicci. La reticolazione del capo e del pronoto è vigorosa, quella delle elitre è distinta e quella dell'addome netta. L'avancorpo è coperto di tubercoletti salienti, l'addome da tubercoletti molto salienti. Spermateca fig. 310.

DISTRIBUZIONE. Tibet.

ECOLOGIA. Sconosciuta.

2. **Atheta (Physadota) praelata** PACE, 1985
(Figg. 311-312)

Atheta (Microdota) praelata PACE, 1985: 159

TIPO. Holotypus ♀, Pakistan, Jhusi, Allahabad S. N. Chatterjee, 29.XII.1922 (BMNH).

DESCRIZIONE. Lungh. 2,0 mm. Corpo debolmente opaco. Capo, pronoto e addome (tranne la sua estremità distale), bruno-rossicci; elitre giallo-brunicce; estremità distale dell'addome rossiccia; antenne nero-brune; zampe gialle. La reticolazione del capo è vigorosa; quella del resto del corpo è distinta. L'avancorpo è coperto di tubercoletti salienti, l'addome presenta tubercoletti molto salienti soprattutto sugli uroterghi basali. Spermateca fig. 312.

DISTRIBUZIONE. Pakistan.

ECOLOGIA. Sconosciuta.

NOTE DI ZOOGEOGRAFIA

Nonostante il notevole contributo di nuove conoscenze sul sottogenere *Microdota* della regione himalaiana, determinato grazie alle recenti ricerche del Dr. I. Löbl, del Dr. A. Smetana e di altri, non è ancora possibile trarre conclusioni attendibili sulla faunistica e sulla zoogeografia di questo gruppo di Insetti. Ciò per i seguenti principali motivi:

1) — Le ricerche si sono concentrate su determinate aree geografiche, le più accessibili dell'Himalaya e in particolare del Nepal.

2) — Le ricerche nell'arco dell'anno, sono state svolte prevalentemente in periodi primaverili o autunnali.

3) — Le nostre conoscenze sul sottogenere *Microdota* delle catene montuose del Sud-Est asiatico sono estremamente limitate per scarsità di ricerche, sia per numero di specie che per studio tassonomico moderno.

4) — La nuova sistematica delle *Microdota* qui proposta, nonostante gli innegabili progressi grazie allo studio dell'edeago e della spermateca e grazie agli apporti di nuovo materiale di studio, ha ancora carattere provvisorio sia perché basata su criteri soggettivi, sia perché manca la conoscenza del maschio o della femmina di alcune specie; ciò rende largamente ipotetico l'accostamento sistematico naturale di queste specie ad altre.

Per ora risulta che la maggior parte delle specie di *Microdota* dell'Himalaya sono endemiche: un gruppo maggiore, formato da specie alate, con areale più ampio; un gruppo minore, formato da specie attere o microttere, ciascuna con areale più o meno ristretto.

La proporzione delle specie di origine paleartica è dominante. Il considerevole numero di specie o sottospecie, 83, può essere spiegato sia perché l'Himalaya offre microambienti favorevoli all'insediamento e alla riproduzione delle specie di *Microdota,* quali la lettiera o la frequente presenza di fitodetriti negli ambienti forestali in clima temperato umido, sia per l'orografia dell'Himalaya stessa, solcata da numerose e profonde valli che costituiscono una potenziale barriera alla dispersione delle popolazioni locali, tanto da favorire l'isolamento genetico.

RÉSUMÉ

L'auteur présente une révision des 83 espèces ou sous-espèces du sous-genre *Microdota* Muls. & Rey de *Atheta* Thom. de l'Himalaya, ainsi qu'une discussion des caractères diagnostiques du sous-genre, de clefs d'identification des genres voisins et des espèces et quelques observations sur la zoogéographie de ce sous-genre en Himalaya. Deux nouveaux sous-genres de *Atheta* et 27 nouvelles espèces sont décrits, 19 espèces sont transférées au niveau de sous-genres et 8 espèces sont placées en synonymie. Les espèces de *Microdota* et des deux nouveaux sous-genres sont brièvement décrites et illustrées. Toutes les données bionomiques et distributives disponibles sont présentées.

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INDICE

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Tridentopsis cahuali n. sp. (Siluriformes, Trichomycteridae), a new miniature tridentine from Paraguay System, in Argentina

by

María de las Mercedes AZPELICUETA *

With 4 figures

ABSTRACT

A new species of *Tridentopsis* is described from a small pond and a shallow stream connected to rivers of Paraguay System, in Formosa Province, Argentina. A high number (11-13) of opercular odontodes distinguishes *T. cahuali* n. sp. from all other known species of the subfamily Tridentinae. Length of maxillary barbels and pectoral fin, number of anal and dorsal-fin rays and the presence of nasal barbel differentiate the new species from *T. tocantinsi* La Monte, 1939. Chromatophore distribution pattern, more slender body with a straight dorsal profile and different morphometrics separate *T. pearsoni* Myers, 1925 from the new species described herein.

RESUMEN

Se describe una nueva especie de *Tridentopsis* colectada en pequeños cuerpos de agua pertenecientes a la cuenca del río Paraguay, en la provincia de Formosa, Argentina. El alto número de odontodes operculares distingue a *T. cahuali* n. sp. de todas las especies conocidas de la subfamilia Tridentinae. La longitud de las barbillas maxilares y de la aleta pectoral, el número de radios dorsales y anales y la presencia de barbillas nasales diferencian a la nueva especie de *T. tocantinsi* La Monte, 1939. El patrón de distribución de los cromatóforos, el cuerpo más estilizado con perfil dorsal plano y algunas diferencias morfométricas separan a *T. pearsoni* Myers, 1925 de la nueva especie aquí descripta.

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INTRODUCTION

Several species of the Neotropical catfish family Trichomycteridae have small body size as adults. Few species reaching a little more than twenty millimeters in standard length are included in the subfamily Tridentinae. All known tridentine species have been described from rivers of Amazon Basin or Maracaibo Basin. The examination of a collection of freshwater fishes from small shallow ponds and streams in Formosa Province, Argentina, reveals the presence of a miniature tridentine which has been assigned herein to *Tridentopsis* MYERS, 1925. The description of the new species is the purpose of the present paper.

METHODS

All measurements are expressed as percentages of standard length or head length, as indicated. Predorsal, preventral and preanal-fin lengths are measured point-to-point with caliper under stereomicroscope. The rest of the measurements are taken as straight lines with ocular micrometer. Distance between snout tip and eye is obtained from anterior middle snout point to the intersection of eye and head margin. Head width is measured at opercular level, between outermost point of odontodes. Last two dorsal and anal fin rays are counted as one ray.

Specimens examined in this study are deposited in the Collections of the following Institutions: Museo de La Plata (MLP); American Museum of Natural History (AMNH); California Academy of Sciences (CAS); Muséum d'Histoire naturelle de Genève (MHNG) and National Museum of Natural History (USNM).

Tridentopsis cahuali n. sp.

(Figs 1, 2, 3 and 4)

Holotype: MLP 5-IX-89-1, female, standard length 20.8 mm; shallow small artificial pond in the private protected area Estancia El Bagual, Formosa Province, Argentina, 26°10'53" S and 58°56'39" W. Collectors: Claudia and Alberto Yanosky, May 1987.

Paratypes: 25 specimens collected with the holotype: MLP 5-IX-89-2, 15 specimens, standard length (SL) 18.5 mm-22.2 mm (two individuals cleared and counterstained). AMNH 89300, 2 specimens, 19-20 mm SL. CAS 67699, 4 specimens, 20-22.8 mm SL. MHNG 2479.08, 4 specimens, 20.3-21.86 mm SL. MLP 27-XII-89-1, 3 specimens, 22.15-24 mm SL; arroyo Mbiguá, the same protected area in the province of Formosa, Argentina; collectors C. and A. Yanosky, November 1989.

Additional material examined: Five specimens of *Tridentopsis pearsoni* MYERS, 1925, CAS 28259, Lake Rogoagua, Bolivia. Four specimens of *Tridensimilis venezuelae* SCHULTZ, 1944, USNM 121291, río Negro below mouth of río Yasa, Maracaibo Basin, Venezuela.

DIAGNOSIS

A *Tridentopsis* with a higher number of opercular odontodes than those previously known. *T. cahuali* n. sp. has 11 to 13 opercular odontodes while both *T. pearsoni* and *T. tocantinsi* have ten. Other counts and morphometrics also help to differenciate the new species.

DESCRIPTION

Morphometrics of holotype and 19 paratypes are presented in table 1. Dorsal profile of body slightly or markedly convex from snout tip to occipital region, concave after

TABLE 1.

Morphometrics of *Tridentopsis cahuali* n. sp. and *T. pearsoni*. Standard length is expressed in mm. Other values are expressed as percentages of indicated body length

	Tridentopsis cahuali n. sp. N = 20			*Tridentopsis pearsoni* N = 5	
	holotype	range	average	range	average
Standard length	20.80	18.5 - 22.2		19-20	
ratios in percentage of standard length					
predorsal fin length	72.11	67.56- 72.38	70.62	71.07- 76.31	72.72
preventral fin length	46.73	46.05- 51.77	48.76	52.25- 55.17	53.59
preanal fin length	69.71	64.56- 70.00	68.06	71.07- 72.15	71.62
body depth at anal fin origin	21.63	18.88- 22.30	20.23	16.70- 21.35	18.67
caudal peduncle length	9.23	7.20- 10.54	8.19	8.42- 9.87	8.94
dorsal fin base	8.65	7.65- 10.36	8.72	7.50- 9.54	8.36
anal fin base	20.67	20.05- 25.00	21.45	18.50- 22.05	20.31
distance between dorsal fin origin and middle caudal fin base	32.30	29.40- 35.36	32.37	30.08- 34.37	33.22
distance between anal fin origin and middle caudal fin base	33.46	32.07- 37.53	34.44	31.12- 34.32	33.86
head length	18.99	18.01- 21.57	19.42	16.08- 18.50	17.27
greatest head depth	11.53	9.67- 12.38	11.24	8.79- 9.75	9.39
ratios in percentage of head length					
outer maxillary barbel	72.15	61.95- 76.31	69.60	68.11- 75.31	71.43
inner maxillary barbel	50.12	45.52- 55.64	48.21	N = 3 43.43- 45.58	44.50
distance between snout tip and eye margin	50.12	47.25- 54.24	49.62	49.27- 56.25	53.13
head depth	60.75	54.32- 61.53	58.34	52.17- 56.52	54.40
head width	113.92	96.38-123.28	112.06	115.94-126.56	122.48
interorbital width	62.78	57.50- 69.90	62.39	63.82- 68.75	66.32
horizontal orbital length	28.10	23.17- 28.53	26.12	27.35- 30.93	28.33
nasal barbel length	16.45	11.50- 21.70	16.42	26.08- 30.00	28.53

occipital area, gently arched from that point to dorsal fin origin, slanted along dorsal fin and straight between last dorsal ray insertion and caudal fin. Ventral profile of body convex, maximum depth just anterior to pelvic fin insertion, straight from that point to anal fin origin; anal fin base postero-dorsally oriented; ventral profile of caudal peduncle almost straight.

Body robust, laterally compressed in posterior half. Head straight between eyes; at opercular level, wider than long; anterior head margin semicircular. Nasal barbel present, its length shorter than eye and slightly longer than space between nares. Posterior nares transversely opened, placed nearer than anterior ones. Eyes lateral, covered by translucent skin. Cranial fontanelle enormous. Mouth wide, inferior, with two pairs of maxillary barbels; outer barbel reaching opercular margin or pectoral fin base. Dentary with four rows of conical teeth, their tips posteriorly recurved; four of five depressible teeth in inner

FIG. 1.

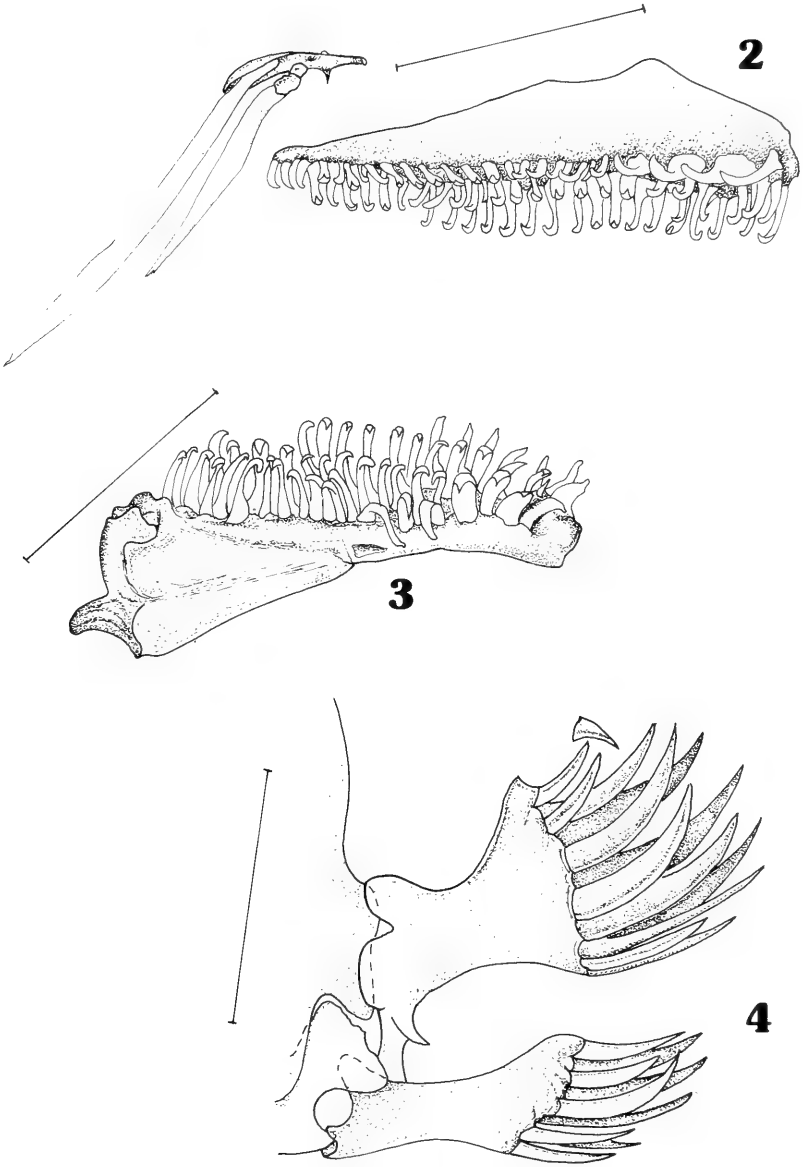
Tridentopsis cahuali n. sp., holotype, MLP 5-IX-89-1, 20.80 mm standard length, 26°10'53'' S and 58°56'39'' W, Formosa Province, Argentina.

row, larger than the rest (Fig. 3). Three rows of conical premaxillary teeth; inner row also with four teeth large and depressible. Small maxillary tooth (Fig. 2).

Eleven to thirteen slightly recurved opercular odontodes, forming a bunch completely separated from interopercular one; eight or nine interopercular odontodes, twelve in one specimen; all odontodes conical and posteriorly directed (Fig. 4).

Axillary organ well developed. Droplets appear just posterior to opercle. Pores of lateral line apparently not developed. Only two large pores in flanks, being apertures of postemporal sensory canal. Lipid drops in different areas of body. Miniature epidermal papillae on body.

Ray-less cutaneous fold in dorsal and anal fins. Small dorsal fin, strongly convex anteriorly; dorsal origin slightly behind vertical through anal fin insertion; dorsal fin rays ii,5 (13 specimens) or ii,6 (4 specimens including holotype) or iii,4 (3 specimens). Caudal fin slightly forked, upper lobe larger than lower. Triangular pectoral fin with i,4,i; flattened first ray longest, its length twice or more that of last ray. Pelvic fin small; i,3,i; its origin nearer snout tip than base of caudal fin rays, except in two specimens; pelvic fin tip falling far from anal fin insertion. Anal fin base long; iii,14 (14 individuals including holotype) or iii,15 (4 specimens) or iii,16 (2 specimens); anal fin margin straight; fin ray lengths decreasing from first to last branched ray. Fin rays divided only once.



FIGS 2-4.

Tridentopsis cahuali n. sp., cleared and stained specimen 19.8 mm standard length. Scale bar represents 0.5 mm. 2: internal view of left premaxilla and maxilla. 3: internal view of left lower jaw. 4: lateral view of left opercular and interopercular odontodes.

COLORATION

Specimens preserved in alcohol: ground color pale yellowish; translucent caudal peduncle; belly translucent in females. All chromatophores dark black, rounded or star-like, except some deep hyphen-shaped chromatophores along flanks. Superficial chromatophores scattered on head, sometimes concentrated on snout or forming dots between anterior and posterior nares, anterior to dorsal fontanelle or over dorsal eye margin. Dense chromatophores beneath skin, covering brain. Small black spot under opercular and interopercular odontodes. Broad middorsal stripe crossing along back, between supraoccipital margin and dorsal fin; stripe narrow from last dorsal fin ray insertion to end of caudal peduncle. Some chromatophores spread on flanks, near mid-dorsal line. Dark pigmentation over five or six posterior vertebrae. Large chromatophores in dorsal wall of body cavity, appearing as a broad lateral band, posteroventrally oriented. Chromatophores forming an anal fin base line and two extremely narrow lines above the former. Caudal peduncle bounded by many chromatophores. All fins, excluded hyaline pelvics, with elongate chromatophores around ray surfaces; only four specimens with pigmented membranes. Dark spot in pectoral fin base of some specimens.

ETYMOLOGY

The specific name from Cahual, an aboriginal araucanian word that is the name of an araucanian chief and the name of the private protected area in which the specimens were collected.

DISTRIBUTION

The species is known from a small artificial pond with clear water and a shallow stream (depth about 60 centimeters); both habitats are connected to tributaries of Paraguay River.

DISCUSSION

The subfamily Tridentinae currently consists of four genera and a few miniature species. The monotypic *Miuroglanis* EIGENMANN & EIGENMANN, 1889, based on a single specimen, is recognized by the presence of confluent opercular and interopercular odontodes and the possession of gill membranes joined to the isthmus. The remainder three genera comprise six species with gill membranes free from the isthmus and distinct opercular and interopercular odontodes.

KEY TO THE GENERA OF TRIDENTINAE

1. Gill membranes united to isthmus, opercular and interopercular odontodes confluent .... *Miuroglanis* Eig. & Eig.
   Gill membranes free from isthmus, opercular and interopercular odontodes distinct 2
2. Body extremely slender, body depth 13; barbels minute; 3 opercular and 3 interopercular odontodes, pelvic fin small................. *Tridens* Eig. & Eig.
   Body more compact, body depth 4.5-8; greater number of opercular and interopercular odontodes; greater development of maxillary barbels; pelvic fin well developed 3

3. 6 or 7 opercular odontodes; 4-6 interopercular odontodes; body depth 8; 22-23 anal-fin rays .... *Tridensimilis* Schultz
   9-13 opercular odontodes; 8-12 interopercular odontodes; body depth 4.5-6.1; 17-21 anal-fin rays .... *Tridentopsis* Myers

Key to the species of *Tridentopsis*

1. 10 dorsal-fin rays; 21 anal-fin rays; nasal barbel absent; outer maxillary barbel reaching anterior eye margin .... *T. tocantinsi* La Monte, 1939
   7-8 dorsal-fin rays; 17-20 anal-fin rays; nasal barbel present; outer maxillary barbel reaching opercular flap or pectoral-fin base 2
2. 9-10 opercular odontodes; head length 5.58-6.21; head depth 10.25-11.37; ventral-fin origin midway between snout and caudal-fin base or nearer caudal-fin base .... *T. pearsoni* Myers, 1925, type species
   11-13 opercular odontodes; head length 4.63-5.50; head depth 8.07-9.98; ventral-fin origin nearer snout than caudal-fin base............. *T. cahuali* n. sp.

The genus *Tridens* as first described by Eigenmann & Eigenmann 1889 comprised two species, *T. melanops* and *T. brevis,* although the authors suggested that both species would belong to different genera.

Myers (1925) described the genus *Tridentopsis* on the basis of the much more compact body, the greater number of opercular and interopercular odontodes, the larger development of maxillary barbels and the presence of nasal barbels. None the less, Myers commented later in the same paper that this feature should be probably removed from the generic diagnosis. He placed *T. brevis* Eigenmann & Eigenmann and his new species *T. pearsoni* within *Tridentopsis. Tridens* was restricted to the genotype *T. melanops.*

In 1944 Schultz described the genus *Tridensimilis* which is distinguished from *Tridentopsis* by the possession of six opercular and four to six interopercular odontodes, 22-23 anal-fin rays and five branchiostegal rays. Schultz preferred to include *T. brevis* Eigenmann & Eigenmann in his new genus together with the new species *Tridensimilis venezuelae.* The absence of osteological information on some species does not allow a discussion about the validity of both genera *Tridentopsis* and *Tridensimilis.*

The new species described in the present paper has a compact body form, depth of body 4.6-5.6, greater number of opercular (11-13) and interopercular (8-12) odontodes, a nasal barbel and 17-19 anal-fin rays. For these reasons *T. cahuali* n. sp. is placed in the genus *Tridentopsis* Myers, 1925.

Tridentopsis cahuali n. sp. differs from the previously described species of *Tridentopsis* in the number of opercular odontodes. The possession of longer maxillary barbel and pectoral fin, the presence of nasal barbel and a low number of anal (17-19 versus 21) and dorsal (7-8 versus 10) fin rays distinguish *T. cahuali* n. sp. from *T. tocantinsi* La Monte, 1939. *T. pearsoni* has more slender body compared with *T. cahuali* n. sp. and the dorsal profile very straight as Myers (*op. cit.*) pointed out. In the former, chromatophores on flanks are regularly distributed between middorsal line and lateral line area. Furthermore, the latter has shorter nasal barbel, deeper, shorter and narrower head and deeper body at dorsal fin origin. In addition, pelvic fin is inserted nearer the snout than the base of caudal (except two specimens) while in *T. pearsoni* that fin is placed midway between snout tip and caudal base or nearer caudal base than tip of snout. The dorsal fin origin of *T. cahuali* n. sp. is always behind the vertical through anal fin origin whereas the females of *T. pearsoni* have both fin origins at the same level (Table 1).

A previous record of *T. pearsoni* from Paraná Basin, in Chaco Province, Argentina, was reported by CASTELLO *et al.* (1978). Unfortunately, the specimens were not found in the Collection of Museo Argentino de Ciencias Naturales Bernardino Rivadavia. However, the features described and figured show that the specimens do not belong to *T. pearsoni.* The number of opercular odontodes resembles that of *T. cahuali* n. sp., although the presence of trifid opercular odontodes does not agree with those known in the latter.

Trophic specializations have been reported in some trichomycterid species. Some of them are blood-feeding parasites while other species are scale-feeders or mucus-feeders. No evidence of food items were found in six stomachs of *T. cahuali* n. sp. examined, notwithstanding, the presence of some features as the depressible teeth in both jaws and the maxillary tooth suggest the possibility of parasitic behaviour, at least in part of its life.

ACKNOWLEDGMENTS

Claudia and Alberto Yanosky collected the specimens; Carl Ferraris Jr. and Arturo Kehr made available some literature; David Catania and William Eschmeyer and Richard Vari and Susan Jewett sent the specimens from CAS and USNM respectively; the paper benefitted from the comments and suggestions of Heraldo Britski and Carl Ferraris Jr. My thanks to all of them.

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Nuovi Cossoninae (Coleoptera, Curculionidae) d'India e Sri Lanka

di

G. OSELLA * e L. BARTOLOZZI **

Con 26 figure

ABSTRACT

New Cossoninae (Coleoptera, Curculionidae) from India and Sri Lanka. — Two new genera, *Neoproconus* (three species) and *Hemigleodema* (two species), are described and illustrated. *Neoproconus* n. gen. is related to *Proconus* Broun (New Zealand); it differs in the apically enlarged rostrum (instead spatulated), the faint cephalic punctuation, the distance between eyes and post-ocular narrowing which is superior or equal to diameter of eyes. The genus includes: *N. taprobanicus* n. sp. (type species) (Sri Lanka), *N. lewisi* n. sp. (Sri Lanka) and *N. indicus* n. sp. (Kerala, India). *Hemigleodema* n. gen. is related to *Gleodema* Woll. (New Guinea); it differs in a marked sexual dimorphism, smaller size, dull elytra and normal third tarsal article (enlarged in *Gleodema*). The genus includes: *H. thompsoni* n. sp. (type species) (Sri Lanka) and *H. transiens* n. sp. (Sri Lanka).

Alcuni anni fa uno di noi (G. Osella) ricevette in studio dal collega Dr. Cl. Besuchet (Muséum d'Histoire Naturelle de Genève) i Cossoninae e gli Stromboscerini raccolti nell'India meridionale e nello Sri Lanka dalle spedizioni Mussard-Besuchet-Löbl; a questo materiale si aggiunse, successivamente, quello affidatoci in esame dal Dr. R. T. Thompson del British Museum (Natural History), relativo alle raccolte effettuate da G. Lewis negli anni 1881/82 nello Sri Lanka. In questo contributo (il primo della serie), basato sullo studio di queste interessanti collezioni, vengono descritti due nuovi generi con cinque nuove specie.

Desideriamo ringraziare vivamente i colleghi Dr. Cl. Besuchet e il Dr. R. T. Thompson per averci permesso lo studio di questi importanti materiali; al Dr. R. T. Thompson va

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altresí la più viva riconoscenza per l'ospitalità concessa a uno di noi (G. Osella) presso il British Museum al fine di agevolare la realizzazione del presente lavoro.

Neoproconus nov. gen.

Specie tipo: *N. taprobanicus* n. sp.

DESCRIZIONE. Facies di *Proconus* BROUN, 1883, *Microcossonus* WOLLASTON, 1873, *Promicrocossonus* VOSS, 1971 e *Tytthoxydema* ZIMMERMAN, 1942. Corpo appiattito, di colore rosso bruno; rostro leggermente allargato all'apice o subparallelo; scapo che, all'indietro, raggiunge l'occhio; funicolo di cinque articoli; occhi rotondi; capo cilindrico, molto allungato, con strozzatura post-oculare posta a una distanza dall'occhio superiore al diametro dell'occhio stesso. Protorace cordiforme o sub-cordiforme. Scutello rotondo. Alato; ali più lunghe delle elitre, provviste delle sole nervature Ra e Cu. Elitre rettilinee con omeri sporgenti, con 9 strie di punti; di queste, raggiungono l'apice delle elitre le interstrie 1°-3° e 7°, ma solo le interstrie 3°-7° si saldano all'estremità. Le strie sono nette; le interstrie sono piane, lisce. Zampe robuste, con femori molto larghi e piatti; profemori talora incavati e provvisti all'apice di 1 o 2 processi dentiformi; tibie corte e gracili; terzo articolo tarsale intero. Coxe poco rilevate, ampiamente separate; metacoxe appena più largamente separate delle mesocoxe, che sono allineate con le procoxe; urosterniti 1°-2° molto larghi con sutura appena visibile (Figg. 1-2).

OSSERVAZIONI. Il nuovo genere differisce da *Proconus* per il rostro allargato all'apice o sub-parallelo (Figg. 1, 9, 13) anziché spatolato, per la punteggiatura del capo finissima e sparsa (forte in *Proconus*), per la distanza dall'occhio della strozzatura post-oculare che è superiore o uguale al diametro dell'occhio (inferiore in *Proconus*). Le coxe nei due generi sono similmente distanziate, ma in *Neoproconus* le coxe anteriori sono inserite in una cavità da cui sporgono di poco rispetto al livello del prosterno (invece normalmente rilevate in *Proconus*); in quest'ultimo genere, infine, la punteggiatura degli urosterniti è più forte. *Neoproconus* si caratterizza anche per la conformazione anomala dei profemori.

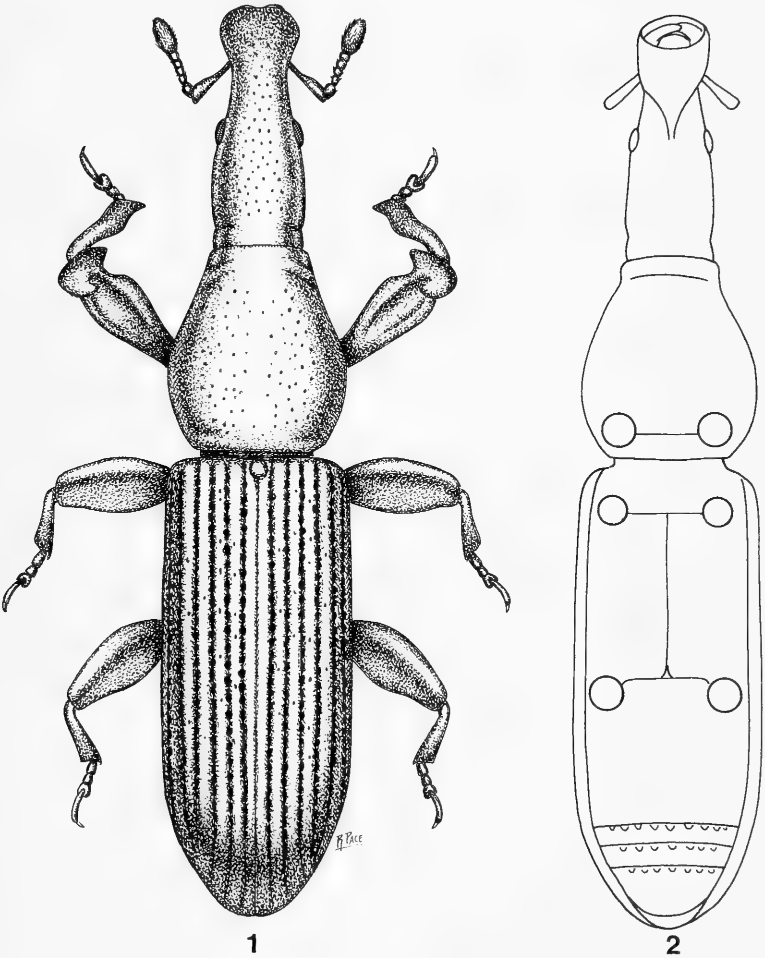
Neoproconus differisce da *Microcossonus* per le dimensioni superiori (circa doppie), per il corpo appiattito, per le metacoxe appena più distanziate rispetto alle mesocoxe (in *Microcossonus,* invece, le metacoxe sono più ravvicinate fra loro delle pro- e mesocoxe), per l'inserzione antennale collocata a metà rostro (poco prima degli occhi in *Microcossonus*), per lo scutello sud-quadrato o rotondo (anziché triangolare), per i femori anteriori anomali (normali in *Microcossonus*).

Da *Promicrocossonus* (che, forse, potrebbe essere riunito a *Microcossonus*) si differenzia per i caratteri sopra riportati, fatta eccezione per le metacoxe che sono distanziate quanto le pro- e le mesocoxe.

Neoproconus ricorda infine anche *Tytthoxydema,* ma quest'ultimo genere si distingue per avere lo scapo che supera, all'indietro, il margine posteriore dell'occhio, per la strozzatura post-oculare collocata a una distanza dall'occhio minore del diametro di quest'ultimo (maggiore o uguale in *Neoproconus*), per il corpo convesso anziché piatto e per i profemori normali. *Neoproconus* e *Tytthoxydema* hanno in comune il fatto di avere il margine esterno del 5° urosternite provvisto di una piccola frangia di setole.

Per la particolare conformazione del capo, infine, e per la distanza degli occhi dalla strozzatura post-oculare, il n. gen., nelle chiavi dicotomiche di MORIMOTO (1973), trova collocazione accanto a *Stenotrupis* Woll.; se ne differenzia tuttavia agevolmente in quanto *Stenotrupis* presenta un rostro cilindrico almeno due volte più lungo del capo, il corpo molto più stretto e cilindrico, le tempie rigonfie, le coxe più ravvicinate, lo scapo nettamente più lungo, superante gli occhi, ecc.

Per quel che riguarda la *derivatio nominis,* si è voluta sottolineare l'affinità sistematica evidente del nuovo genere con *Proconus* Broun.



FIGG. 1-2.

Neoproconus taprobanicus n. gen. n. sp., Bogalantalawa (Sri Lanka), paratypus ♀: habitus (1); visione ventrale (schematica) (2).

Neoproconus taprobanicus n. sp. (Figg. 1-6)

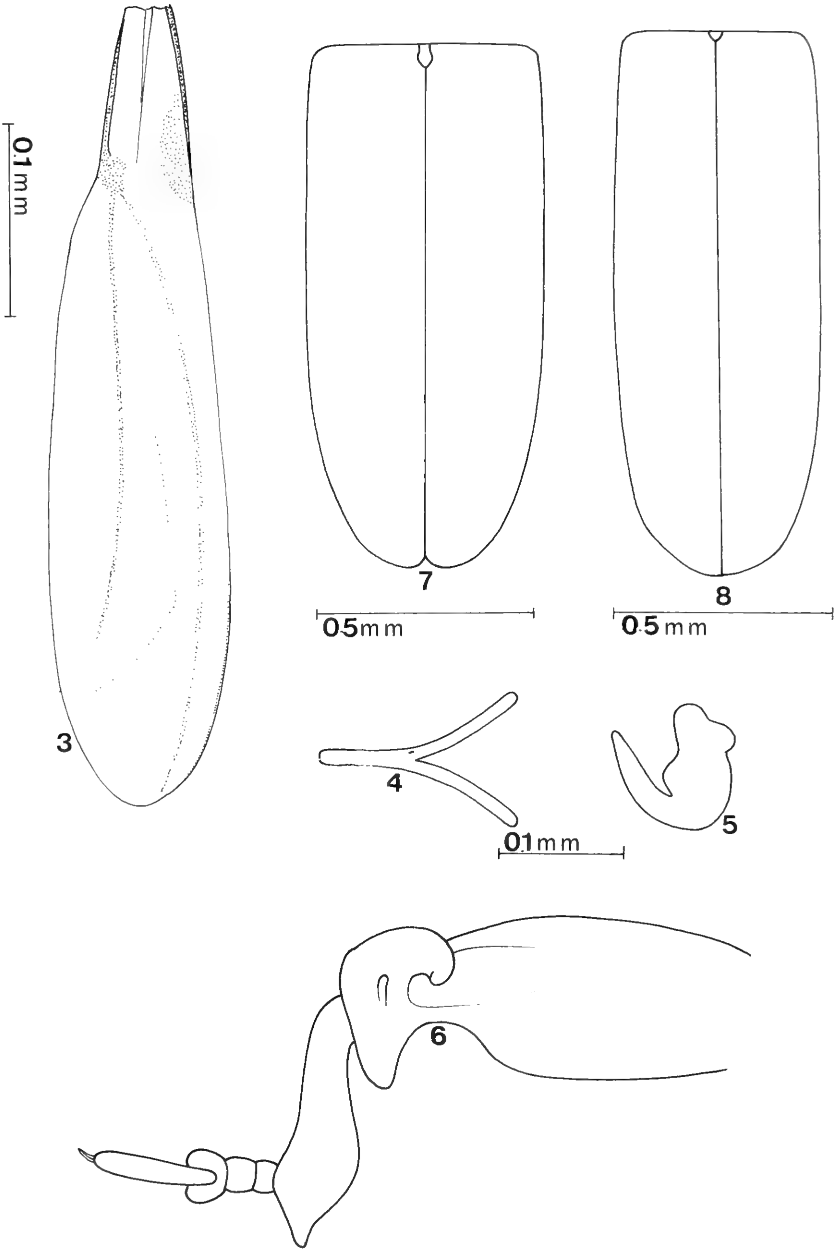
Loc. tip.: Dikoya (Sri Lanka).

MATERIALE ESAMINATO. 6 ♀ ♀, etichettate «Ceylon, G. Lewis, 1910-320, Dikoya, 3800-4200 ft., 6.XII.1881-16.I.1882»; 2 ♀ ♀, stessa località, 21.I-7.II.1882; 1 ♀, etichettata «Ceylon, G. Lewis, 1910-320, Nuwara Eliya, 6234-8000 ft., 8.XI-II.1882; 8 ♀ ♀, etichettate «Ceylon, G. Lewis, 1910-320, Bogalantalawa, 4500-5200 ft., 22.II-12.III.1883; 2 ♀ ♀, stessa località, 21.III-4.IV.1882»; 1 ♀ etichettata «Ceylon, North Western, Rajakadaluwa, 31.I.1970, Mussard, Besuchet, Löbl». L'holotypus è stato scelto tra gli esemplari di Dikoya ed è depositato nelle collezioni del British Museum (Nat. Hist.) insieme a 15 paratypi; 2 paratypi nelle collezioni del Muséum d'Histoire naturelle di Genève e nella collezione Osella.

DIAGNOSI. Specie caratterizzata da un rostro leggermente spatolato; dalla strozzatura post-oculare collocata ad una distanza 2,5 volte superiore al diametro oculare; dal pronoto cordiforme, ma soprattutto dai profemori anomalmente incavati e terminanti, apicalmente, con due rilievi dentiformi.

MISURE DELL'HOLOTYPE. Lunghezza complessiva (con il rostro): mm 4,1. Pronoto + elitre: mm 2,96. Pronoto: lunghezza alla linea mediana: mm 0,96; larghezza massima: mm 0,72. Elitre: lunghezza alla sutura: mm 2,00; larghezza massima: mm 0,82. Antenne: scapo: mm 0,24; funicolo: mm 0,20; clava: mm 0,14.

DESCRIZIONE DELL'HOLOTYPUS. Rosso bruno, con apice delle elitre e del rostro nonché zampe e antenne di colore più chiaro. Capo allungato, appena rigonfio alle tempie, finemente e sparsamente punteggiato, largo quanto il rostro; questo all'apice leggermente spatolato, di colore rossiccio dopo l'inserzione delle antenne. Strozzatura post-oculare liscia e netta, collocata a una distanza dagli occhi pari a circa 2,5 volte il diametro oculare. Occhi quasi perfettamente sferici, discretamente sporgenti. Scrobe dirette sotto il rostro, molto allargate all'indietro, rigonfie, separate, nella parte terminale, da una leggera carena mediana. Antenne brevi, poco robuste, con scapo corto poco ingrossato all'apice; lo scapo raggiunge appena, all'indietro, la metà degli occhi; funicolo di grossezza leggermente crescente verso l'apice, primi due articoli allungati, subeguali, più lunghi che larghi, 1° articolo cilindrico, 2° conico, 3°-5° leggermente trasversi; clava ellittica, ingrossata nella parte mediana, poco più lunga degli ultimi due articoli del funicolo. Pronoto sub-cordiforme, appiattito, finemente e sparsamente punteggiato, largo quanto il capo anteriormente, più stretto invece delle elitre alla base, con massima ampiezza nel terzo basale. Scutello liscio, brillante, rotondo, collocato allo stesso livello delle elitre. Elitre sporgenti, a lati paralleli, appiattite sul dorso, con strie nette, parallele, finemente punteggiate, più strette delle interstrie; queste lisce, non punteggiate. Ali lunghe quanto le elitre con le sole nervature Ra e Cu (Fig. 3). Zampe con profemori larghissimi, robusti, molto più lunghi delle tibie; queste ultime gracili, sinuose. Profemori lunghi almeno 2,5 volte di più delle protobie, incavati sul lato interno, con due rilievi dentiformi (Figg. 1, 6), rigonfi invece esternamente; meso- e metafemori circa due volte soltanto più lunghi delle rispettive tibie, allargati e appiattiti, privi di rilievi dentiformi apicali; tarsi gracili con 3° articolo intero, articolo ungueale assai largo, a margini laterali paralleli, lungo quasi quanto i primi tre articoli assieme; unghie piccolissime. Pro- e metasterno perfettamente piatti, lisci, non punteggiati; sul metatorace è presente una sottile linea mediana longitudinale, simile a una sutura (Fig. 2). Coxe poco rilevate, pro- e mesocoxe allineate, distanziate da uno spazio pari a due volte almeno il diametro di una coxa; metacoxe più ridotte. Urosterniti lisci con finissima e sparsa punteggiatura, 1° e 2° urosternite



FIGG. 3-8.

Neoproconus taprobanicus n. gen. n. sp., Bogalantalawa, paratypus ♀: ala metatoracica (3); spiculum ventrale (4); spermateca (5); profemore (6). *N. lewisi* n. sp., Dikoya (Sri Lanka), holotypus ♀ (7) e *N. indicus* n. sp., Cardamon (Kerala), holotypus ♀ (8): sagoma schematica delle elitre.

molto larghi con sutura obliterata, 3° e 4° stretti, 5° semicircolare, separato da sutura ben marcata con punti superficiali (Fig. 2). Spermateca e spiculum ventrale: cfr. Figg. 4, 5.

DESCRIZIONE DEI PARATYPI. I paratypi di Dikoya, come quelli delle altre località, sono praticamente identici al tipo, salvo per i profemori che possono essere più o meno incavati, la punteggiatura del capo (talvolta un po' più fitta) e le dimensioni (comprese fra 4 e 5 mm). L'esemplare di Rajakadaluwa, infine, è di color giallo citrino (immaturo).

DERIVATIO NOMINIS. Questa specie prende nome dall'antico nome dello Sri Lanka, Taprobane, con cui quest'isola era nota agli antichi greci (dal sanscrito Tàmraparni; Tambapanni in pàli).

NOTE ECOLOGICHE. Non abbiamo purtroppo indicazioni di carattere eco-biologico relative alle raccolte di G. Lewis, ma è possibile che gli esemplari siano stati raccolti sotto cortecce di alberi morti. L'esemplare di Rajakadaluwa è stato invece raccolto vagliando terriccio di foresta. Si tratta di una specie montana, a giudicare dalle quote indicate dai raccoglitori.

DISTRIBUZIONE GEOGRAFICA. Sembra un'entità ampiamente distribuita nello Sri Lanka, di cui è sicuramente endemica.

Neoproconus indicus n. sp. (Figg. 8-12)

Loc. tip.: Cardamon H. (Kerala, India)

MATERIALE ESAMINATO. Una ♀, etichettata «India, Kerala, Cardamon H., 28.XI.1972, Mussard, Besuchet, Löbl» (holotypus, conservato nel Muséum d'Histoire naturelle di Ginevra).

DIAGNOSI. Specie vicina a *N. taprobanicus* per dimensioni e forma del rostro, ne differisce per le dimensioni inferiori, per i profemori larghi e piatti (anziché incavati) con un solo dentino sul lato apicale interno (Fig. 10), per il pronoto appena più lungo che largo, per le strie elitrali con punteggiatura più fine e superficiale. Spermateca e spiculum ventrale: Figg. 11, 12.

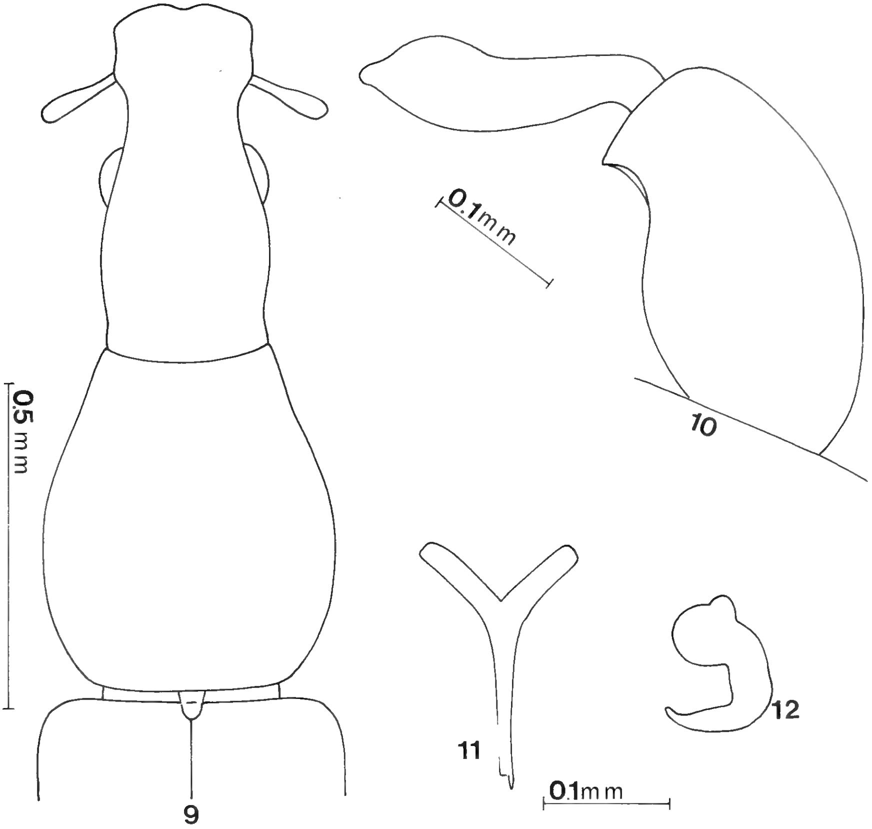
MISURE DELL'HOLOTYPUS. Lunghezza complessiva (con il rostro): mm 2,7. Pronoto + elitre: mm 2,3. Pronoto: lunghezza alla linea mediana: mm 0,55; larghezza massima: mm 0,50. Antenne: non misurabili con sufficente approssimazione.

DESCRIZIONE DELL'HOLOTYPUS. A quanto detto nella diagnosi, poco rimane da aggiungere. I tegumenti sono di color giallo pallido (l'esemplare è leggermente immaturo), ma gli occhi e il capo sono bruni; il capo presenta inoltre lati rigonfi appena dietro gli occhi, strozzatura post-oculare posta a distanza superiore al diametro dell'occhio (Fig. 9), pronoto finemente punteggiato, appena meno cordiforme rispetto a *N. taprobanicus*.

DERIVATIO NOMINIS. Fa riferimento alla patria di questa specie.

NOTE ECOLOGICHE. Raccolta al vaglio, in foresta.

DISTRIBUZIONE GEOGRAFICA. Molto probabilmente si tratta di endemita indiano. É comunque molto interessante dal punto di vista zoogeografico la presenza di uno stesso genere (seppur con specie diverse) in Sri Lanka e nella parte più meridionale del subcontinente indiano, a conferma delle strette affinità nel popolamento faunistico di questi due territori, già sottolineata dagli autori.



FIGG. 9-12.

Neoproconus indicus n. gen. n. sp., Cardamon (Kerala), holotypus ♀ : capo e pronoto (schematici) (9); profemore (10); spiculum ventrale (11); spermateca (12).

Neoproconus lewisi n. sp. (Figg. 13-16)

Loc. tip.: Dikoya (Sri Lanka).

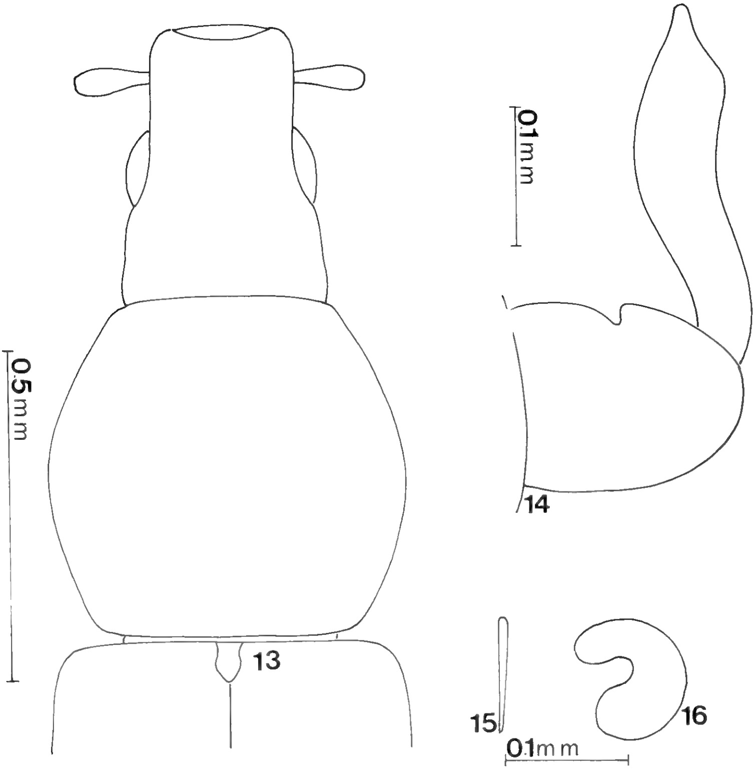
MATERIALE ESAMINATO. 1♀, etichettata «Ceylon, G. Lewis, 1910-320, 3800-4200 ft., 6.XII.1881-16.I.1882» (holotypus, conservato nelle collezioni del British Museum, Nat. Hist.).

DIAGNOSI. Questa specie è distinguibile da *N. taprobanicus* e *N. indicus* per il rostro più breve, a lati paralleli; per il capo sub-quadrato (anziché conico-allungato), con strozzatura post-oculare appena accennata e collocata a un distanza dagli occhi pari al diametro dell'occhio; per il pronoto a punteggiatura più fitta; per le protibie più sinuose; per i profemori meno incavati, provvisti di un solo dente anteriormente (Fig. 14); per la conformazione della spermateca (Fig. 16).

MISURE DELL'HOLOTYPUS. Lunghezza complessiva: mm 2,6. Pronoto + elitre: mm 2,3. Pronoto: lunghezza alla linea mediana: mm 0,5; larghezza massima: mm 0,45.

Elitre; lunghezza alla sutura: mm 1,6; larghezza massima: mm 0,45. Antenne: non misurabili con sufficiente precisione.

DESCRIZIONE DELL'HOLOTYPUS. Oltre ai caratteri elencati nella diagnosi, possiamo aggiungere: corpo di colore bruno, con antenne, zampe e apice del rostro rossicci; 1° articolo del funicolo stretto; protorace meno cordiforme e più arrotondato; punti delle strie più netti; 3° articolo tarsale molto stretto; articolo unguale più sottile.



FIGG. 13-16.

N. lewisi n. gen. n. sp., Dikoya (Sri Lanka), holotypus ♀: capo e pronoto (schematici) (13); profemore (14); spiculum ventrale (15); spermateca (16).

DERIVATIO NOMINIS. La nuova specie è dedicata al suo raccoglitore, l'entomologo inglese G. Lewis.

NOTE ECOLOGICHE. Vedi *N. taprobanicus*.

DISTRIBUZIONE GEOGRAFICA. Quasi certamente si tratta di specie endemica di Sri Lanka.

Tavola dicotomica di *Neoproconus* n. gen.

1 — Capo sub-quadrato; rostro corto, a lati paralleli (Fig. 13); profemori poco incavati, con un solo rilievo dentiforme apicale (Fig. 14); spermateca: Fig. 16. Lunghezza mm 2,6 (Sri Lanka) .... *lewisi* n. sp.

— Capo allungato, più lungo che largo; rostro più o meno ampliato all'apice . 2

2 — Profemori larghi e piatti con un solo dentino apicale interno (Fig. 10); elitre più finemente striato-punteggiate; spermateca: Fig. 12. Lunghezza mm 2,7 (Kerala, India) .... *indicus* n. sp.

— Profemori più stretti, incavati e contorti, con due dentini apicali (Fig. 6); spermateca: Fig. 5. Lunghezza mm 4-5 (Sri Lanka) .... *taprobanicus* n. sp.

Hemigleodema nov. gen.

Specie tipo: *H. thompsoni* n. sp.

Descrizione. Facies di *Gleodema* Wollaston, 1873 (limitatamente al ♂), di *Stenotrupis* Wollaston, 1873 e di *Proeces* Schönherr, 1838.

Corpo stretto, allungato, rosso bruno, glabro, dorsalmente piano; capo rettangolare, scrobe dirette sotto il rostro, ma largamente separate anche distalmente (Fig. 18); antenne mediocri, con scapo che raggiunge, all'indietro, la parte mediana inferiore dell'occhio, funicolo di 7 articoli, clava stretta; occhi rotondi. Pronoto strozzato anteriormente. Scutello rotondo. Alato. Elitre allungate, quasi perfettamente parallele, omeri leggermente sporgenti, strie nettamente marcate, parallele, in numero di 10; raggiungono l'apice le strie 1°, 2°, 9°; la 3° si salda all'8°, mentre si fermano all'altezza della declività posteriore le strie 4°-8°. Zampe robuste con femori molto larghi, tibie corte terminanti con un doppio uncino apicale, terzo articolo bilobo, articolo ungueale normale, alla base largo quanto all'estremità. Procoxe poco rilevate, separate da uno spazio pari al diametro di una coxa; mesocoxe separate da un spazio pari a circa due volte il diametro di una di esse. Urosterniti 1° e 2° di larghezza subeguale, con sutura obsoleta. Maschio: rostro molto robusto, fortemente spatolato; capo sub-rettangolare. Femmina: rostro cilindrico, molto più lungo che nel ♂; capo leggermente conico (Figg. 17-19).

Osservazioni. A motivo del rostro nettamente spatolato nel maschio, il nuovo genere si avvicina a *Gleodema* Woll. (Nuova Guinea); se ne differenzia nettamente per lo spiccato dimorfismo rostrale (la femmina di *Hemigleodema* è caratterizzata infatti da un rostro cilindrico, sottile, nettamente più lungo di quello del maschio, mentre nelle femmine di *Gleodema* il rostro è di lunghezza comparabile nei due sessi e solo l'apice è un po' più spatolato nel ♂), per le elitre rosso-brune (nere e brillantissime in *Gleodema*), per le dimensioni inferiori, per la punteggiatura fine (praticamente assente in *Gleodema*), per le strie elitrali ben marcate (evanescenti in *Gleodema* ad eccezione delle due prime suturali: cfr. Morimoto, 1973), per l'articolo ungueale dei tarsi normale (stretto alla base e ampliato all'estremità in *Gleodema*).

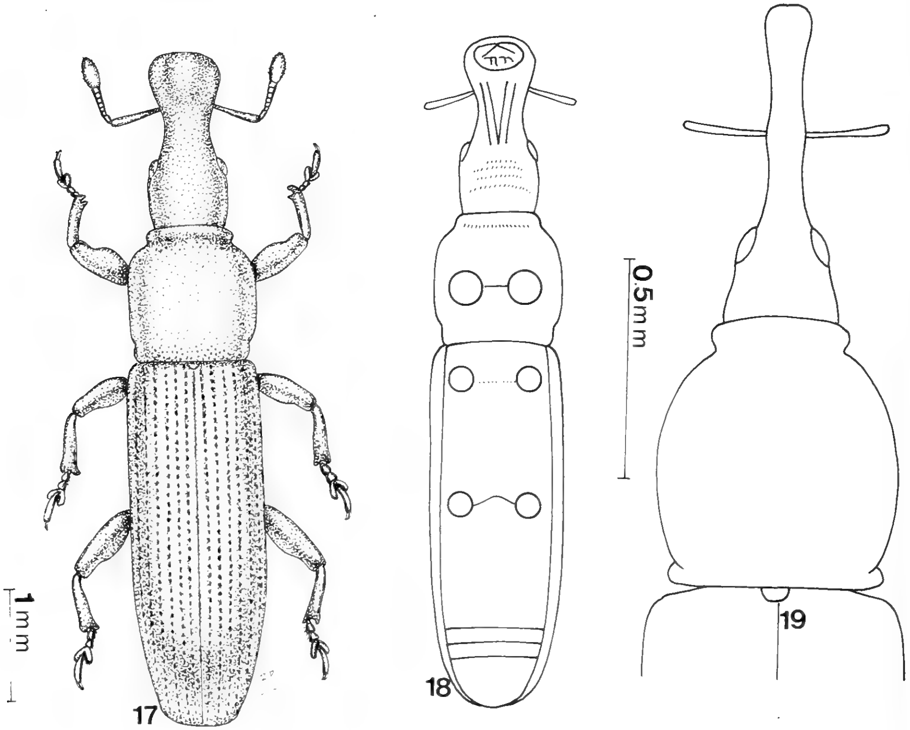
Per la sagoma del corpo, la conformazione rettangolare del capo e le dimensioni, *Hemigleodema,* nel sesso femminile, ricorda alquanto anche il genere *Stenotrupis*; quest'ultimo si differenzia facilmente per l'assenza di dimorfismo, per le scrobe più corte, il funicolo più allungato, ecc. Tuttavia *Stenotrupis wollastoni* Sharp, 1878 (Nuovo Zelanda) presenta nel maschio l'apice del rostro alquanto dilatato.

Anche *Proeces* si avvicina a *Hemigleodema,* sia per le dimensioni, sia per il colore dei tegumenti, la punteggiatura delle elitre e del pronoto, il funicolo di 7 articoli; *Hemi-*

gleodema si differenzia per le dimensioni superiori (di norma), il capo rettangolare (anziché quadrato) e per il forte dimorfismo sessuale.

Hemigleodema n. gen. è pertanto uno dei Cossoninae a forte dimorfismo sessuale a carico del rostro, dimorfismo più forte ancora che in *Mesites* SCHOENHERR, 1838, *Rhopalomesites* WOLLASTON, 1873, *Odontomesites* WOLLASTON, 1873, *Catolethrus* CHAMPION, 1909.

Per quando riguarda l'etimologia, con il nome *Hemigleodema* si è voluto alludere al fatto che i soli maschi assomigliano a *Gleodema*.



FIGG. 17-19.

Hemigleodema thompsoni n. gen. n. sp., Dikoya (Sri Lanka), paratypus ♂: habitus (17); visione ventrale (schematica) (18). Idem, paratypus ♀: capo e pronoto (19).

Hemigleodema thompsoni n. sp. (Figg. 17-23)

Loc. tip.: Bogalantalawa (Sri Lanka).

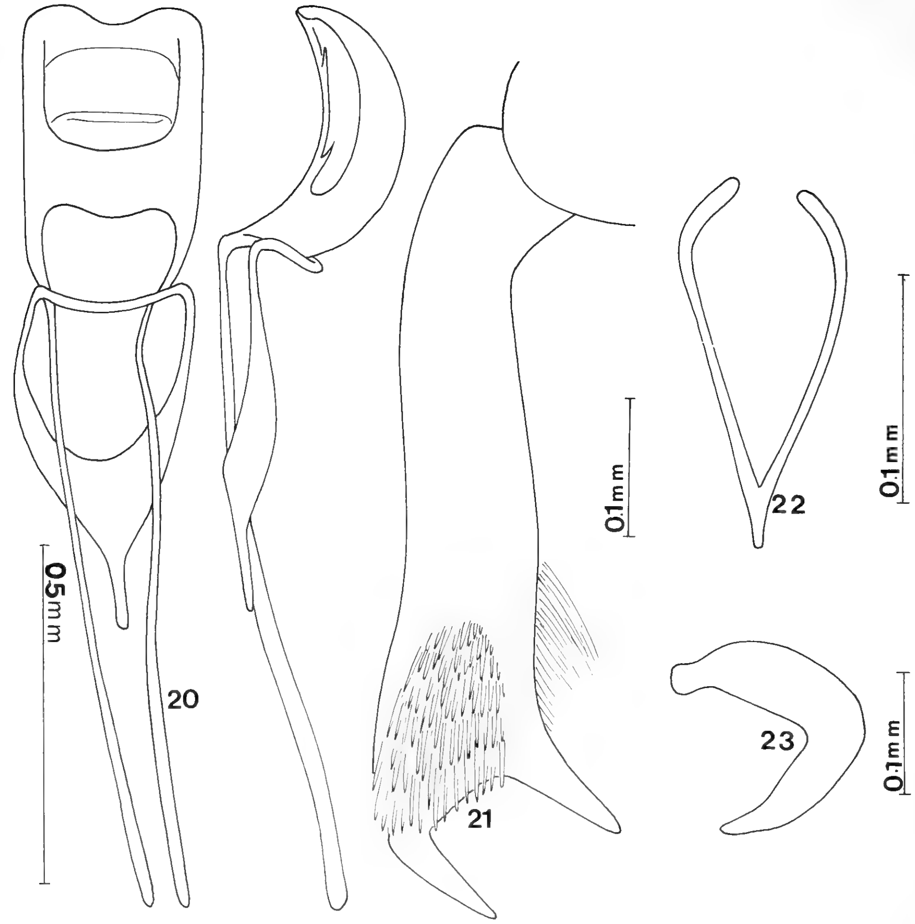
MATERIALE ESAMINATO. 3♂♂, 10♀♀, etichettate «Ceylon, G. Lewis, 1910-320, Bogalantalawa, 4900-4200 ft., 28.II.-12.III.1882» (serie tipica). 1♀, etichettata «Ceylon, G. Lewis, 1910-320, Dikoya, 3800-4200 ft., 6.XII.1881-16.I.1882» (non paratipica). Holotypus ♂, allotypus, 6 paratypi ♀♀ e l'esemplare di Dikoya nelle collezioni del British Museum (Nat. Hist.); 1♂, 1♀, paratypi in collezione Osella; 1♂, 2♀♀, paratypi, nelle collezioni del Muséum d'Hist. Nat. di Ginevra.

DIAGNOSI. Specie caratterizzata da netto dimorfismo sessuale, con rostro, nel maschio, decisamente più breve che nella femmina e nettamente spatolato; punteggiatura del capo estesa sino alla base e quella del pronoto fine e uniformemente distribuita; edeago robusto.

MISURE DELL'HOLOTYPUS. Lunghezza complessiva: mm 6,0. Pronoto + elitre: mm 4,4. Pronoto: lunghezza alla sutura: mm 1,2; larghezza massima: mm 1,1. Elitre: lunghezza alla sutura: mm 3,2; larghezza massima: mm 1,16. Antenne: scapo: mm 0,40; funicolo: mm 0,32; clava: mm 0,24.

DESCRIZIONE DELL'HOLOTYPUS. Rosso bruno con elitre e antenne più chiare; rostro più scuro, stretto, allungato; elitre sub-parallele. Capo rettangolare, finemente e fittamente punteggiato; occhi rotondi, appena rilevati, separati dalla strozzatura basale da uno spazio pari ad almeno due volte il loro diametro; rostro finemente punteggiato, cilindrico fra gli occhi e l'inserzione antennale, successivamente fortemente spatolato con rilievo mediano arrotondato. Scapo cilindrico, che raggiunge all'indietro l'occhio; funicolo compatto, 1° articolo cilindrico, più lungo che largo, i restanti convessi, di grossezza uniforme; clava ellittica, lunga circa quanto gli ultimi quattro articoli del funicolo, con 1° articolo lungo quanto i 2/3 dell'intera clava. Scrobe dirette sotto il rostro, triangolarmente allargate distalmente. Protorace sub-quadrato, liscio, leggermente ristretto all'indietro, fortemente strozzato anteriormente. Scutello rotondo, leggemente infossato. Elitre sub-parallele, rossicce (tranne la sutura e la prima stria imbrunite), leggermente espanse lateralmente, con strie visibili e punti ben marcati. Partono dalla base delle elitre le interstrie 1°-5° e la 9°, mentre si fermano all'altezza del callo omerale le strie 6° e 8°; la 7° è alquanto più arretrata. La 10° è visibile solo limitatamente alla parte terminale; si fermano infine all'altezza della declività posteriore le interstrie 4°-8°. Zampe robuste; femori larghi, appiattiti, variolosamente punteggiati (benché superficialmente); tibie corte, sottili, terminanti con due forti uncini apicali (le protibie sono provviste apicalmente anche di una frangia di setole gialle) (Fig. 21); tarsi normali, con terzo articolo fortemente bilobo e articolo ungueale allungato, normale, appena percettibilmente più largo all'estremità. Inferiormente il capo presenta forti striature trasversali. Gli sterniti toracici sono brillanti, lisci, finissimamente punteggiati; mesosterno stretto, collocato appena più in basso rispetto al piano di pro- e metasterno; metasterno molto lungo, medialmente e longitudinalmente appena solcato (è lungo quasi quanto il 1° e 2° urosternite sommati insieme), compresso lateralmente, con robusta punteggiatura. Urosterniti 1° e 2° brillanti, finemente incavati nel mezzo, con sutura percettibile solo ai lati; coxe poco rilevate; procoxe separate da uno spazio pari all'incirca al diametro di una coxa; mesocoxe separate da uno spazio pari a circa due volte il diametro di una di esse; metacoxe separate da uno spazio pari a circa 1,5 volte il diametro di una di esse (Fig. 18); urosterniti 3° e 4° stretti, piani, non punteggiati, 5° finemente punteggiato e setoloso. Edeago: Fig. 20.

DESCRIZIONE DELL'ALLOTYPUS E DEI PARATYPI. La femmina allotipica differisce nettamente dal maschio per il rostro cilindrico, allungato, appena dilatato all'apice (Fig. 19), per il 1° e 2° urosternite non incavati medialmente e per le strie trasversali sotto il rostro meno marcate. Spermateca e spiculum ventrale: Figg. 22, 23. I restanti paratypi sono praticamente indistinguibili rispetto a holotypus e allotypus. L'esemplare di Dikoya differisce invece per le dimensioni leggermente inferiori e per la punteggiatura del capo non estesa fino alla base.



Figg. 20-23.

Hemigleodema thompsoni n. gen. n. sp., Dikoya (Sri Lanka), paratypus ♂: edeago (20); protibia (21). Idem, paratypus ♀: spiculum ventrale (22); spermateca (23).

Derivatio nominis. Dedichiamo questa bellissima specie al Dr. R. T. Thompson, responsabile per i Curculionoidea presso il British Museum (Nat. Hist.), per aver permesso a uno di noi (G. Osella) di studiare i Cossoninae indeterminati dello Sri Lanka ed essere sempre stato cortesemente disponibile per ogni necessità relativa allo studio di questi e di altri Curculionidi.

Note ecologiche. É probabile che questa specie sia stata raccolta sotto cortecce di alberi morti e nel legno.

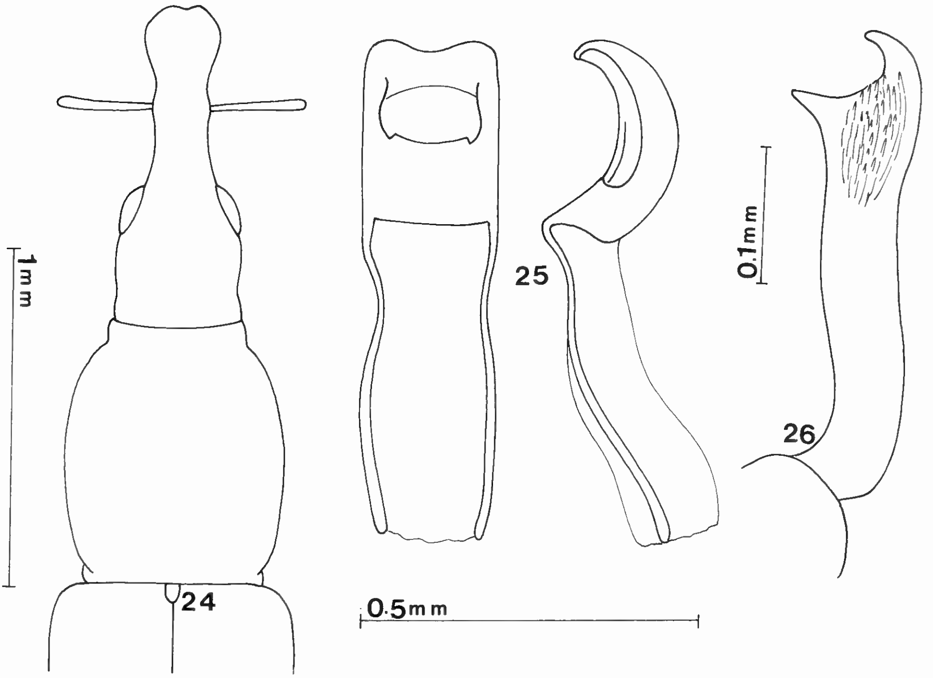
Distribuzione geografica. Verosimilmente si tratta di un endemita di Sri Lanka.

Hemigleodema transiens n. sp. (Figg. 24-26)

Loc. tip.: Kanoy (Sri Lanka).

MATERIALE ESAMINATO. 1 ♀, etichettata «Kanoy, Ceylon, G. E. Briant, VII.1908, G. Briant coll., 1919-147» (holotypus, conservato nelle collezioni del British Museum, Nat. Hist.).

DIAGNOSI. Specie facilmente differenziabile da *H. thompsoni* per le dimensioni inferiori, per il rostro allungato-ampliato (anziché spatolato), più lungo (è lungo infatti quanto il rostro della femmina di *H. thompsoni*), per il capo più piccolo, con distanza fra occhio e strozzatura posteriore pari al diametro di un occhio, per l'edeago più piccolo.



FIGG. 24-26.

Hemigleodema transiens n. gen. n. sp., Kanoy (Sri Lanka), holotypus ♂: capo e pronoto (schematici) (24); edeago (25); protibia (26).

MISURE DELL'HOLOTYPUS. Lunghezza complessiva: mm 4,5. Pronoto + elitre: mm 3,5. Pronoto: lunghezza alla linea mediana: mm 0,71; larghezza massima: mm 0,58. Elitre: lunghezza alla sutura: mm 2,80; larghezza massima: mm 0,78. Antenne: scapo: mm 0,33; funicolo: mm 0,27; clava: mm 0,20.

DESCRIZIONE DELL'HOLOTYPUS. A quanto detto nella diagnosi, poco si può aggiungere: il colore dei tegumenti è uniformemente rosso bruno, ma sutura e prima interstria sono di colore bruno, il pronoto è provvisto di una sottile linea longitudinale mediana non punteggiata, le tibie sono meno ampliato-arrotondate, i femori sono proporzionalmente più brevi, il 1° e 2° urosternite pressoché impunteggiati, con sutura obsoleta. Edeago: Fig. 25.

DERIVATIO NOMINIS. Con il nome «*transiens*» si è voluto alludere alla caratteristica conformazione del rostro, che fa sembrare questa specie di passaggio fra *Gleodema* e *Proeces.*

NOTE ECOLOGICHE. Nessuna.

DISTRIBUZIONE GEOGRAFICA. Vedasi quanto riportato per *H. thompsoni.*

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Allocolenisia n. gen. mit zwei neuen Arten aus Indien und Thailand (Coleoptera, Leiodidae, Pseudoliodini)

von

Hermann DAFFNER *

Mit 14 Abbildungen

ABSTRACT

Allocolenisia **n. gen. with two new species from India and Thailand (Coleoptera, Leiodidae, Pseudoliodini).** — *Allocolenisia* n. gen. is erected for the two new species *A. multistriata* and *A. semistriata* which are described and figured.

EINLEITUNG

Aus der reichen Leiodidae-Sammlung des Naturhistorischen Museum Genf stammt auch das nachfolgend behandelte Material. Es handelt sich um eine kleine Serie von Tieren, die zwei neuen Arten angehören. Systematisch sind diese der *Colenis*-Verwandtschaft (Pseudoliodini) zugehörig, ließen sich aber keiner der bisher bekannten Gattungen zuordnen. Eine genaue Untersuchung ergab, daß sie einer neuen, gut charakterisierten Gattung angehören — *Allocolenisia* n. gen.: sie wird anschließend mit den ihr zugehörigen Arten beschrieben und abgebildet. Vorher sei aber noch den Kollegen Dr. Claude BESUCHET und Dr. Ivan LÖBL (Genf) für ihre Hilfsbereitschaft gedankt.

Institute und Kollektionen, in denen das besprochene Material aufbewahrt ist, werden im Text durch folgende Abkürzungen bezeichnet:

CHDE: Collection Hermann DAFFNER, Eching.
MHNG: Muséum d'Histoire naturelle, Genf.

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* Fuchsbergstr. 19, Günzenhausen, D-8057 Eching (BRD).

SYSTEMATIK

Allocolenisia n. gen.

Typus-Art: *Allocolenisia multistriata* n. sp.

Bei den Vertretern der Gattung handelt es sich um kleine Arten (1,6-2,5 mm) von ovaler, hochgewölbter Körperform. Die Oberseite des Körpers ist nur an den Seiten fein behaart. Weiter ist die Gattung durch die Kombination folgender Merkmale ausgezeichnet: 1. — Tarsenzahl beider Geschlechter 5-4-4; 2. — Fühler dünn, 11-gliedrig mit unterbrochener 5-gliedriger Keule, 7. Fühlerglied deutlich länger als breit (Abb. 6); 3. — Mandibeln zusammen einen Halbkreis bildend, linke Mandibel in der Mitte tief ausgehöhlt, rechte Mandibel im Vorderen Drittel mit einem spitzen, nach vorne gerichteten Zahn (Abb. 1);

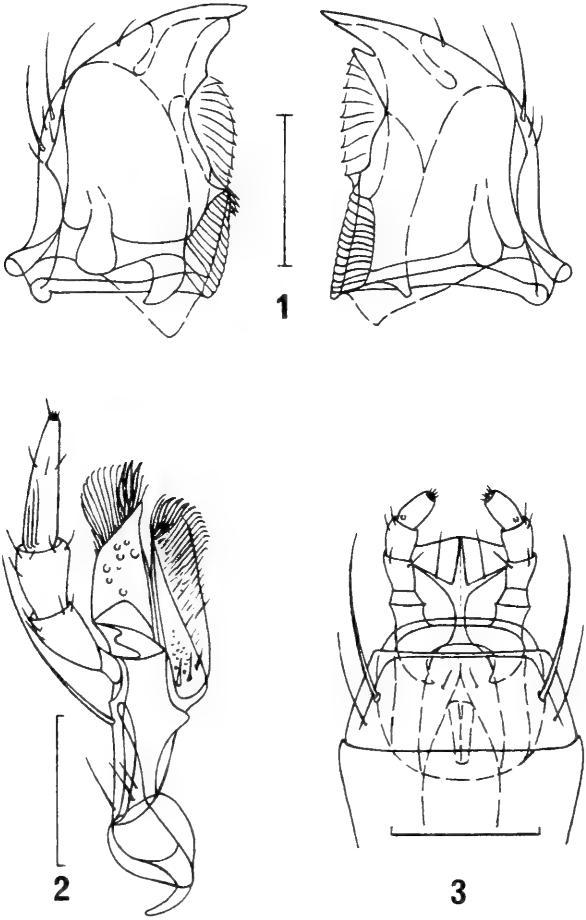

Abb. 1-3.

Allocolenisia multistriata n. sp.; 1: Mandibeln; 2: Maxilla mit Palpus; 3: Labium mit Palpi; Skala, 0,10 mm.

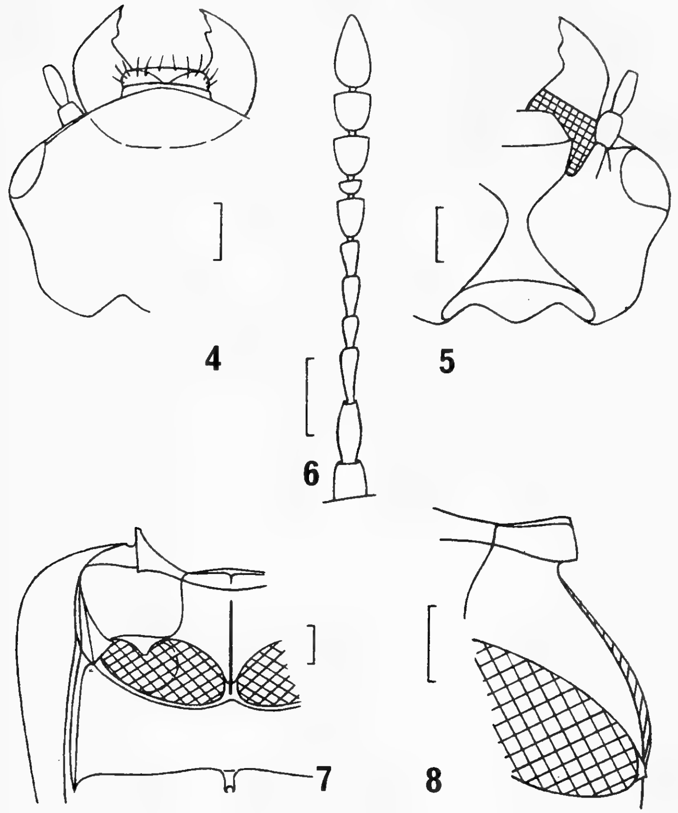

ABB. 4-8.

Allocolenisia multistriata n. sp.;4: Kopfoberseite; 5: Kopfunterseite; 6: Fühler; 7-8: Meso- und Metasternum, Ventral- und Lateralansicht; Skala 0,10 mm.

4. — Maxilla und Labium mit Palpi wie auf Abb. 2 und 3; 5. — Kopf bis zu den Augen in den Halsschild eingezogen, von normaler Größe, etwa halb so breit wie der Halsschild (Abb. 4); 6. — Clypeus in flachem Bogen nach vorne gezogen und am Vorderrand durch ein kleines Häutchen verlängert, keine deutliche Bogenlinie vorhanden die den Clypeus von der Stirn trennt (Abb. 4); 7. — Labrum am Vorderrand nicht eingebuchtet (Abb. 4); 8. — Augen nicht aus der Kopfwölbung hervortretend (Abb. 4 und 5); 9. — Hinter den Augen mit deutlich verengten Schläfen (Abb. 4); 10. — Unterseite des Kopfes ohne Fühlerfurchen neben den Augen (Abb. 5); 11. — Mesosternum- Ventralansicht (Abb. 7) in der Mitte fein gekielt; Lateralansicht (Abb. 8) sehr flach bis zu den Gelenkhöhlen nach oben gezogen; Gelenkhöhlen der Mittelbeine groß, schräg nach vorne gezogen und in der Mitte schmal getrennt; Meso- und Metasternum sonst wie auf Abb. 7 und 8; 12. — Beide Geschlechter mit sechs freiliegenden Sterniten (einschließlich Analsternit); 13. — Beine grazil gebaut, Schienen ohne Tarsenfurchen. Nur die Unterseite und Spitze der schmalen Vorderschienen fein bedornt, ihre Außenkanten nicht bedornt. Die Außenkanten der Mittel- und Hinterschienen mit langen, spitzen Dornen besetzt. Klauen einfach zugespitzt.

Die Männchen sind durch leicht erweiterte Vordertarsen ausgezeichnet.

Diskussion: Die neue Gattung ist innerhalb der Tribus Pseudoliodini vor allem durch die fein gekielte Mittelbrust ausgezeichnet, die sehr flach bis zu den Gelenkhöhlen der Mittelbeine verläuft. Bei allen bisher bekannten Gattungen der Tribus, ist zwischen den Gelenkhöhlen der Mittelbeine ein mehr oder weniger ausgeprägter Höcker eingelagert, oder die Mittelbrust ist weit nach vorne gezogen und am Vorderrand steil abfallend.

BESTIMMUNGSTABELLE DER ARTEN VON ALLOCOLENISIA:

1 Kleine Art, 1,6-1,85 mm. Punktreihen auf den Flügeldecken überall deutlich ausgebildet und kräftig punktiert (der Punktabstand ist so groß wie der Punktdurchmesser). Thailand .... *multistriata* n. sp.

— Größere Art, 2-2,5 mm. Punktreihen auf den Flügeldecken nur auf der Scheibe deutlich ausgebildet und fein punktiert (der Punktabstand ist doppelt so groß wie der Punktdurchmesser). Indien, Thailand .... *semistriata* n. sp.

Allocolenisia multistriata n. sp.

Holotypus ♂: Thailand, Prov. Chiang Mai, Doi Chiang Dao, 760 m, 16.X.1986, leg. P. SCHWENDINGER (MHNG).

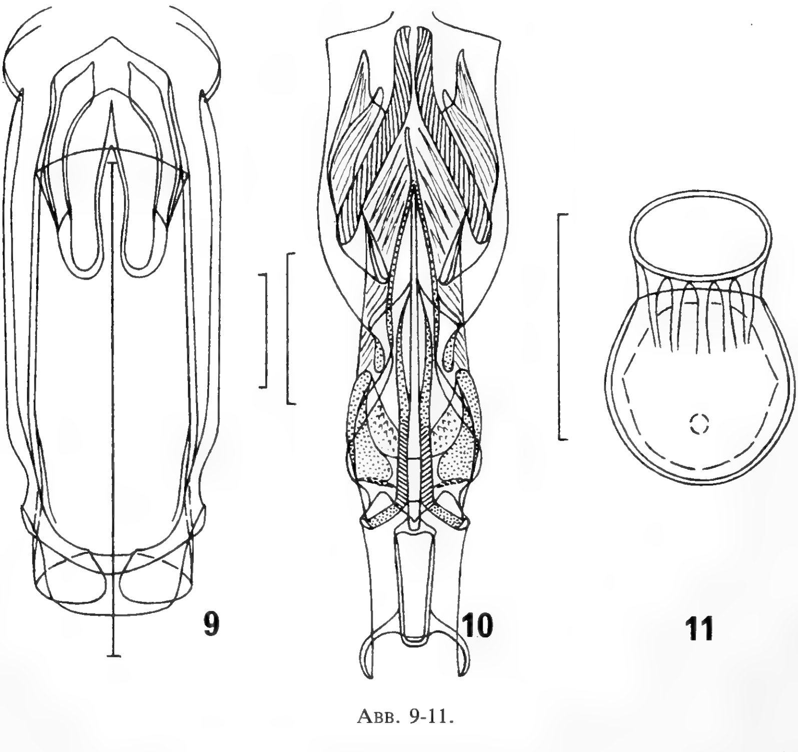

ABB. 9-11.

Allocolenisia multistriata n. sp.; 9-10: Aedoeagus und Innensack ♂; 11: Spermatheca ♀; Skala 0,10 mm.

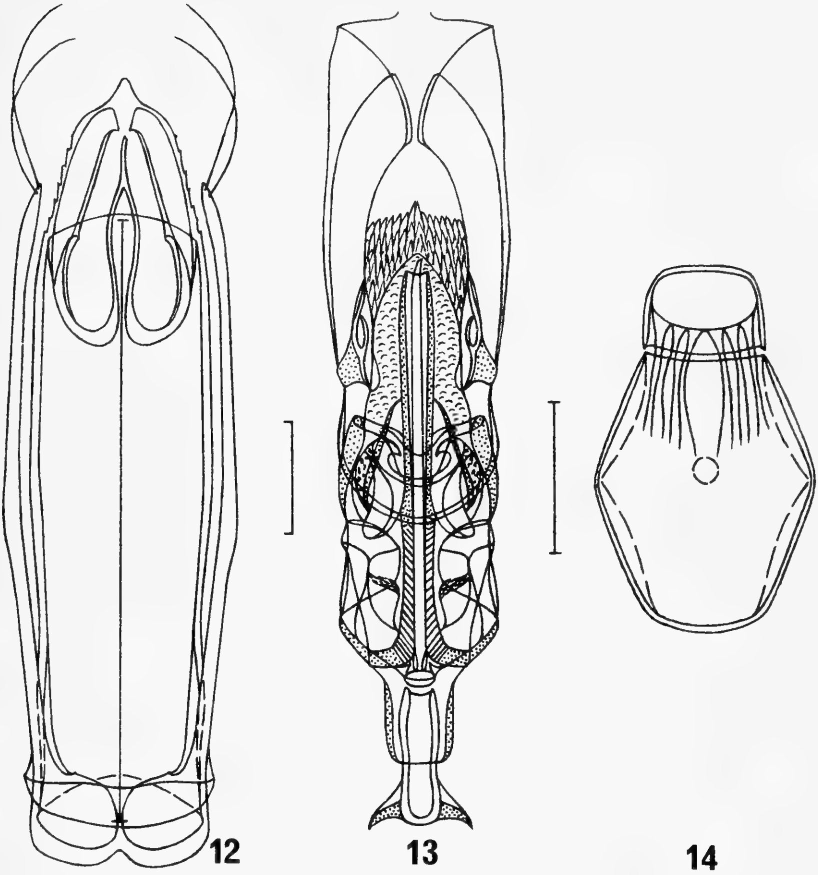

Abb. 12-14.

Allocolenisia semistriata n. sp.; 12-13: Aedoeagus und Innensack ♂; 14: Spermatheca ♀; Skala 0,10 mm.

Paratypen: Thailand, Chiang Mai-Doi Chiang Dao, 760 m, 16.X.1986, leg. P. Schwendinger, 1♀ (MHNG); Doi Suthep, 1450-1550 m, 4.XI.1985, leg. Burckhardt & Löbl, 1♂, 5♀♀ (MHNG) 2♂♂, 2♀♀ (CHDE); Doi Inthanon, 1720 m, 7.XI.1985, leg. Burckhardt & Löbl, 1♂ (CHDE); Doi Inthanon, 1780 m, 3.III.1987, leg. P. Schwendinger, 1♂ (MHNG).

Länge 1,6-1,85 mm. Körper oval, hochgewölbt, gelbbraun-rotbraun, Tarsen und Fühler gelb; nur Seiten der Flügeldecken fein und weitläufig behaart. Fühler gestreckt mit zarter Keule, zurückgelegt bis zum Hinterrand des Halsschildes reichend. Kopf sehr fein und dicht quergestrichelt und sehr fein und weitläufig punktiert. Halsschild sehr fein und dicht quergestrichelt und sehr fein und weitläufig punktiert; die kurz verrundeten Hinterecken zur Basis leicht nach hinten gezogen. Flügeldecken so lang wie breit, hochgewölbt, Seitenrand nach hinten breit abgesetzt und kräftig quergestrichelt; Querstrichelung auf der Oberseite kräftig und locker; Punktierung fein und locker (der Punktabstand ist drei mal so groß wie der Punktdurchmesser), mit kräftigen Punktreihen die überall deutlich ausgebildet sind (der Punktabstand ist so groß wie der Punktdurchmesser).

Männchen: Aedoeagus (Abb. 9 und 10) 0,48-0,54 mm.

Weibchen: Spermatheca (Abb. 11) 0,11-0,14 mm.

Allocolenisia semistriata n. sp.

Holotypus ♂: India, Meghalaya, Garo Hills, Tura Peak, 700-900 m, 1.XI.1978, leg. BESUCHET & LÖBL (MHNG).

Paratypen: India, Daten wie Holotypus, 1 ♀ (CHDE). Thailand, Chiang Mai, Doi Inthanon, 1650 m, 7.XI.1985, leg. BURCKHARDT & LÖBL, 1 ♂, 1 ♀ (MHNG) 1 ♂ (CHDE).

Länge 2-2,5 mm. Körper oval, hochgewölbt, gelbbraun-rotbraun, Tarsen und Fühler gelbbraun; nur Seiten der Flügeldecken fein und weitläufig behaart. Fühler gestreckt mit zarter Keule, zurückgelegt bis zum Hinterrand des Halsschildes reichend. Kopf sehr fein und dicht quergestrichelt und sehr fein und weitläufig punktiert. Halsschild sehr fein und dicht quergestrichelt und sehr fein und weitläufig punktiert; die kurz verrundeten Hinterecken zur Basis leicht nach hinten gezogen. Flügeldecken so lang wie breit, hochgewölbt, Seitenrand nach hinten breit abgesetzt und fein quergestrichelt; Querstrichelung auf der Oberseite fein und locker; Punktierung fein und locker (der Punktabstand ist drei mal so groß wie der Punktdurchmesser), mit feinen Punktreihen die nur auf der Scheibe deutlich ausgebildet sind (der Punktabstand ist doppelt so groß wie der Punktdurchmesser).

Männchen: Aedoeagus (Abb. 12 und 13) 0,68-0,81 mm.

Weibchen: Spermatheca (Abb. 14) 0,16-0,24 mm.

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EMILE DOTTRENS

(1900-1990)

Emile DOTTRENS (né le 21 juillet 1900) entre au Muséum d'Histoire naturelle de Genève en 1942 en qualité d'assistant de zoologie. Il devient directeur en 1953 au moment où P. Revilliod prend sa retraite. Il continue l'œuvre de celui-ci dans le domaine de la protection de la nature. Il contribue à l'étude biologique du Parc National suisse en étudiant sa faune de petits vertébrés. Ses publications concernent aussi des études biométriques de mammifères des stations lacustres; puis il applique ces mêmes méthodes d'investigation systématique aux poissons du genre difficile des *Coregonus.* Recherchant lui-même le matériel en Europe centrale et septentrionale, il publie une série de travaux qui le consacrent rapidement comme le spécialiste du groupe. Son expérience personnelle, ses connaissances étendues et son esprit de synthèse lui permettent d'écrire un livre d'excellente vulgarisation scientifique, *Poissons d'eau douce,* dans la série fort estimée «Les Beautés de la Nature» (2 volumes, 1951-1952). En 1963, toujours dans la même série, il publie les *Batraciens et Reptiles d'Europe.* Dès avant sa retraite, en mars 1969, et après celle-ci, il consacre beaucoup de temps à la cause de la protection de la nature, à l'échelon cantonal (Commission des Monuments et des Sites), national (Ligue suisse pour la Protection de la Nature) et international (Commission internationale pour la Protection des Régions alpines; Comité européen pour la Conservation de la Nature, Conseil de l'Europe; Union internationale pour la Conservation de la Nature).

C'est à E. Dottrens que l'on doit, en grande partie, notre musée actuel. Rappelons que lorsqu'il a été nommé directeur, en 1953, le mandat d'exécution de la construction d'un nouveau musée n'avait pas encore été voté. Il ne le sera qu'en 1960 après des démarches pressantes et inlassables du directeur auprès des Autorités. Avant sa retraite, M. Dottrens aura la satisfaction d'inaugurer la réouverture du Muséum dans ses nouveaux locaux, à la fin de 1966, et de constater le grand succès qu'il remporte auprès du public et des nombreux naturalistes venant travailler chez nous. Peu après sa retraite, E. Dottrens est nommé directeur honoraire du Muséum d'Histoire naturelle de Genève.

Il est décédé le 29 septembre 1990.

Directeur du Muséum de Genève de 1953 à 1969, il a aussi été directeur de la *Revue suisse de Zoologie* de 1954 à 1969.

V. AELLEN

REVUE SUISSE DE ZOOLOGIE

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1889*b*. Note sur quelques Héliozoaires. *Archs. Scl. phys. nat. Genève* (3) 22: 524-539.

Mertens, R. und H. Wermuth. 1960. Die Amphibien und Reptilien Europas. *Kramer, Frankfurt am Main,* XI+264 pp.

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