ANNALES

de la
SOCIÉTÉ SUISSE DE ZOOLOGIE
et du
MUSÉUM D'HISTOIRE NATURELLE
de la Ville de Genève

tome 115
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Le comité soumet chaque manuscrit pour évaluation à des experts d'institutions suisses ou étrangères selon le sujet étudié.

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Genus *Elgonidium* Basilewsky, 1954 (Coleoptera: Anthicidae: Tomoderinae) – a preliminary review

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Genus *Elgonidium* Basilewsky, 1954 (Coleoptera: Anthicidae: Tomoderinae) – a preliminary review. - The genus *Elgonidium* Basilewsky, 1954 is distributed in the mountainous areas of Kenya and Uganda. A list of known species of the group, descriptions of three new species, namely *Elgonidium aberdareum* sp. nov., *E. mountkenyanum* sp. nov., and *E. oculatum* sp. nov. (all from Kenya), and an identification key to *Elgonidium* are presented.

Keywords: Coleoptera - Anthicidae - Tomoderinae - Elgonidium - review - new species - identification.

INTRODUCTION

Anthicids of the genus *Elgonidium* Basilewsky, 1954 are among the smallest beetles within the family. All known species occur in the mountainous region at border of Kenya and Uganda (Mt. Elgon and plateau), and in the mountains of central Kenya (Mt. Kenya and plateau). Data on previously described species were summarized by Bonadona (1978), but with some incorrect interpretations (see section "Descriptions of new species"). Three new species are described in the current paper, a new key to species is presented, and a species list with a bibliographical review is prepared.

LEGENDS

All species are listed alphabetically. All label text is reproduced exactly, with no corrections or additions; labels (if more than one for the same specimen) are separated by slashes (/). Author's comments are placed in square brackets [ ].

Acronyms for the type material stores:

CNCI	Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, (Canada);
MHNG	Muséum d'histoire naturelle, Genève (Switzerland).

HISTORICAL REVIEW

The genus *Elgonidium* was originally established by Basilewsky (1954) for a single eyeless species from Mount Elgon on the border between Kenya and Uganda. The generic name *Elgonidium* derives from the name of Mount Elgon. The generic

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characters mentioned in the original description were shape and structure of the body (especially of head and pronotum), structure of meso- and metasternum, and also form of the antennae and maxillary palpi. Basilewsky found some similarities between *Elgonidium* and *Leptaleus* LaFerté-Sénectère, 1849 (Anthicinae) in the shape of pronotum. He also stated that *Elgonidium* is possibly related with *Tomoderus* LaFerté-Sénectère, 1849 (Tomoderinae), because of the presence of the lateral transverse impression on the pronotum. Basilewsky especially noted the reduction of the eyes in *Elgonidium*, and linked this feature with the special habitat of this group – litter and soil of mountain forests.

In his monograph on African Tomoderinae, Paul Bonadona (1961: 68) gave a redescription of *Elgonidium* and *E. leleupi* Basilewsky, the single species known at that time. He was the first to explicitly place this group in Tomoderinae ("les Tomoderini").

Eleven years after the first species was described, Frederick D. Buck (1965) followed with a second species of *Elgonidium* from the Mau Plateau, South from Mount Elgon. A paratype of this species was collected in an open mountain meadow.

Bonadona (1978) published a large paper on different groups of Tomoderinae. He redescribed *Elgonidium* again, compared it with the morphologically similar new Oriental genus *Rimaderus* Bonadona, 1978, described two new species of *Elgonidium* from regions southeast and west of Mount Elgon, and presented an identification key to the species of this group.

Uhmann (1989; 1990) published two short papers giving additional faunal information on the two species of this genus.

Elgonidium is clearly a member of the subfamily Tomoderinae of Anthicidae, and has never been placed into other subfamilies. Now the genus *Elgonidium* is a small group with 7 known species (including three described below) found in the Mt. Elgon and plateau, as also in the mountainous region of central Kenya.

Genus ***Elgonidium*** Basilewsky, 1954

TYPE SPECIES: *Elgonidium leleupi* Basilewsky, 1954 [original designation]

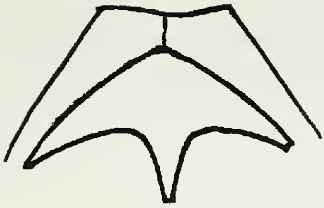
DESCRIPTION: Total body length 1.81 to 3.0 mm. Body elongate, dorsally flattened to slightly convex, non-pigmented or light orange to brown. Upper surface of body clothed with distinct, sparse and suberect setae. Head strongly elongate, narrowly rounded on the base. Eyes completely atrophied, or presented by 1-4 facets, or small but distinctly developed (in single species, *Elgonidium oculatum* sp. nov.). Antennal insertions widely separated. Frontoclypeal suture not visible. Number of antennomeres 11. Antennae short, with distinctly widened and shortened 3-5 terminal antennomeres forming distinct or loose club. Antennomeres 9-10 always distinctly transverse. Mandibles short and broad, with apex moderately strongly curved mesally. Terminal maxillary palpomeres very strongly broadened to apex. Pronotum strongly elongate, flattened from sides, with maximum width anteriorly. Anterior lobe dorsally distinctly more convex than posterior one. With distinct lateral antebasal constriction (very deep in *Elgonidium oculatum* sp. nov.), only very vaguely indicated dorsally. Lacking collar on anterior and basal margins, or with very narrow, indistinct collar on anterior margin. Base of pronotum narrower than elytral bases. Disc of pronotum without median longitudinal groove. Lateral portion of prothorax with deep pit near procoxal cavity.

Procoxal cavity mainly slightly longer than wide. Procoxal cavities contiguous at middle, open externally. Elytra with completely rounded humeri. Elytra irregularly punctuate, without rows of punctures along suture. Sutural striae developed completely or only in apical half of elytra, not deeply impressed near apex. Pygidium mostly or with only apex exposed by elytra. Elytral apices meeting or almost meeting at suture. Epipleurae broad, already reaching elytral apices. Mesocoxal cavities circular, slightly oblique. Mesocoxae separated by much less than minimum diameter of coxal cavity. Mesepimera not visible from above. Mesocoxal cavities open laterally, not closed by metepisterna. Mesoventral process extending to one third of mesocoxal cavities. Metacoxae obliquely oriented, widely separated by nearly maximum metacoxal diameter by broad and truncate metasternal process. Hind wings completely atrophied or partly atrophied, present in a form of narrow and very fine "plates". Legs stout, all femora strongly clavate. Tibial spurs not apparent or very small. Tibiae with keel on outer margin. Metatarsi as long as or slightly shorter than metatibiae. Penultimate tarsomeres small, very indistinctly bilobate. Abdomen with five abdominal ventrites separated by distinct sutures. First ventrite more than twice as long as second one. Anterior edge of sternite 9 in male with median strut (spiculum gastrale). Aedeagus tenebrionoid, symmetrical. Mesepisternal margins curved and meet in front of mesosternum at middle of the frontal margin of mesothorax (Fig. 1).

Ecology and biology: Species of *Elgonidium* occur in mountain forests and mountain meadows at altitudes between 1650 and 3100 m. Specimens inhabit soil and litter, and also have been collected under stones, roots of mountain vegetation, and from soil / litter samples using Berlese funnels. Nothing is known about the biology of the species and their preimaginal stages.

DIAGNOSIS: The genus *Elgonidium* seems to be morphologically very similar to *Rimaderus* Bonadona, 1978, an Oriental genus with 7 species known from the Himalaya (Nepal), India, and Thailand. Bonadona (1978: 646-647) gives a list of characters combined for both *Elgonidium* and *Rimaderus*, and also listed other characters to separate both groups (pp. 649-650 of same publication). The main differences given for *Rimaderus* were the presence of reduced but functional eyes, less clavate femora, structure and shape of the lateral pronotal constriction (distinctly deeper in this genus than in *Elgonidium*), and also differences in structure of the aedeagus. An important correction given here is that the femora are very distinctly clavate in *Rimaderus* also, and that the lateral pronotal constriction varies in deepness from species to species. Presence / complete atrophy of eyes should not be so strongly emphasized as a character for separating genera. Especially since the first oculate *Elgonidium* species has been discovered (see below for description of *E. oculatum* sp. nov.). In this new species the structure of the lateral pronotal constriction is also very similar to those in *Rimaderus* or *Macrotomoderus* Pic, 1901, so this character is also invalid for separating *Rimaderus* from *Elgonidium*. No clear conclusions can be made about validity of *Rimaderus* until this genus is completely revised and re-defined. At this moment, Bonadona's (1978: 650) hypothesis is accepted, that *Elgonidium* and *Rimaderus* represent two separate but similar lines of evolution.

DISTRIBUTION (Fig. 16): Kenya, Uganda: Mount Elgon is a region of an extinct volcano on the border of Kenya and Uganda, known by its high level of local ende-



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Figs 1-2

(1) Scheme of mesothorax of *Elgonidium* Basilewsky. (2) Schematic lateral view of pronotum by *E. aberdareum* sp. nov., *E. mountkenyanum* sp. nov., and *E. oculatum* sp. nov.

mism. The mountain is named after the Elgonyi tribe, who lived in huge caves on the south slope of the mountain. It was known as "Ol Doinyo Ilgoon" (Breast Mountain) by the Masai and as "Masawa" on the Ugandan side. Elevation of Mount Elgon is 4321 m. The Aberdare range, 160 km long, is located in the Central Highlands, Central Province, west of Mount Kenya and north of Nairobi, serving as the Kenyan Rift Valley's east wall. There are two main peaks, "Ol Donyo Lesatima" (3999 m) and "Kinangop" (3906 m) separated by a long saddle of alpine moorland at over 3000 m. The topography is diverse with deep ravines cutting through the forested eastern and western slopes with numerous streams and waterfalls. Soils are red and of volcanic origin, but rich in organic matter.

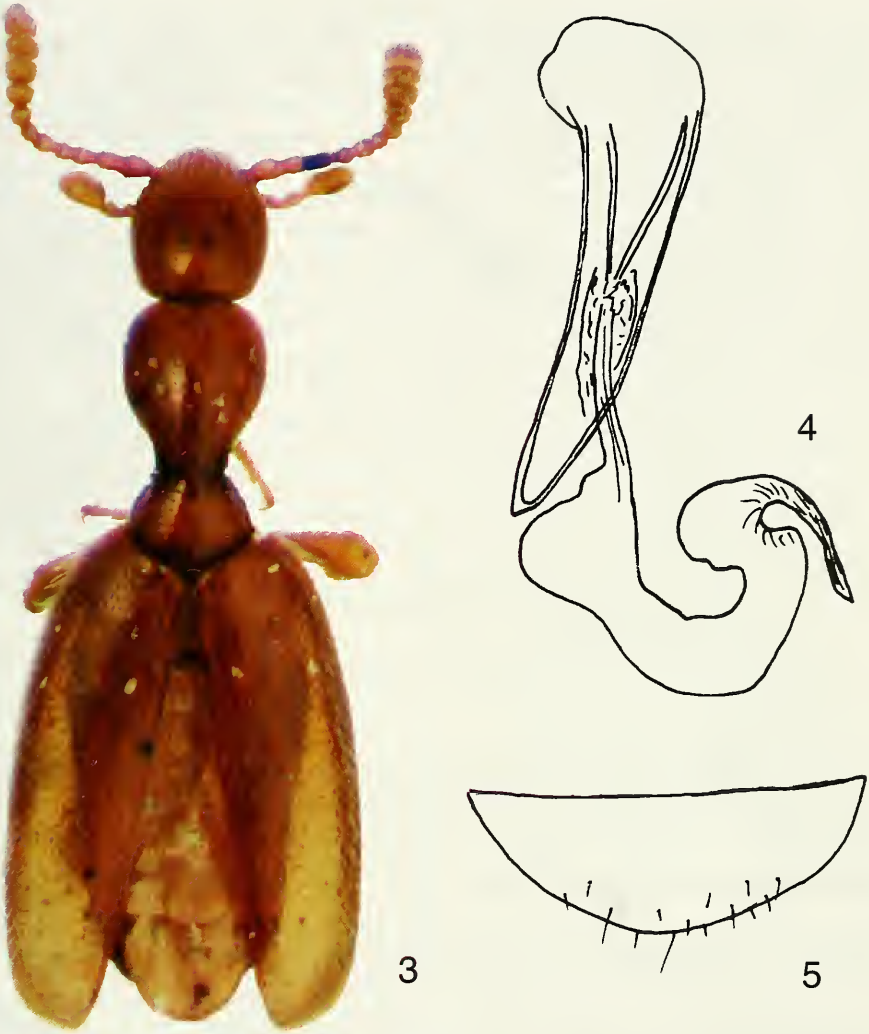
DESCRIPTIONS OF NEW SPECIES

Elgonidium aberdareum sp. nov. Figs 2-5

Holotypus: ♂, CNCI. KENYA: Aberdare N.P., Oct. 30-Nov.03, 2002, H-3100m. Between Kiandogoro and Mutobio gates, Fishing Lodge. V. Grebennikov leg. [printed].

Paratypus: 1♀, same label as for the holotypus [CNCI].

Diagnosis: Very close to *E. mountkenyanum* sp. nov., but differs in structure and form of the aedeagus, having a longer longitudinal carina on the pronotum, and denticulate sides of the lateral constriction of the pronotum.



FIGS 3-5

Elgonidium aberdareum sp. nov. (holotypus ♂): (3) habitus (dorsal). (4) aedeagus. (5) last visible sternite (ventral).

DERIVATIO NOMINIS: Species name derives from the Aberdare mountain range, where this species was collected.

DESCRIPTION: Measurements of the holotype: total body length 2.14 mm, maximum width in the middle of elytra 0.59 mm; head 0.50 mm long, on widest place 0.30 mm broad, pronotum 0.55 mm long, maximum width on anterior lobe 0.33 mm, elytra 1.09 mm long, 0.59 mm together broad.

Colouration: Dorsal and ventral surface of the body orange, antennae, palps, and legs lighter yellow.

Head strongly elongate, shiny, with extremely fine and sparse, but visible punctures. Eyes completely atrophied. Pubescence yellowish, very fine but quite dense. Antennae very short, not reaching the base of pronotum. Antennomeres 4-8 small, of them 4-7 nearly spherical, 8th antennomere slightly transverse; antennomeres 9-10 very broad and short, strongly transverse. Terminal antennomere broad, as broad and 3 times so long as precedent, flattened dorso-ventrally, conical. Pronotum shiny, dorsally very slightly convex on anterior lobe. Anterior margin broadly rounded, sides constricted straightly toward the narrow lateral constriction and widened after that toward the base. Sides of constriction with small dents visible from above. Also dorsally with narrow but quite deep impression in the area of constriction (Fig. 2). On disc, with fine longitudinal carina beginning in posterior third of anterior lobe and ending in the lateral constriction. Punctures on disc small, more large than on the head. Scutellum small, triangular. Elytra shiny, elongate, dorsally flattened. Humeri completely rounded, absent. Punctures fine and dense, distinctly larger than on forebody, intervals as large as punctures. Toward apex punctures become much smaller and finer. Pubescence yellowish, long, suberect to erect, quite dense. Sutural striae developed from second third of elytral length toward apices, very fine. Hind wings completely atrophied. Mesotarsi nearly as long as mesotibiae. Basal metatarsomere shorter than combined length of rest of metatarsomeres. Last visible sternite by males broadly rounded on apical margin (Fig. 5). Aedeagus (Fig. 4).

Variability: Not indicated.

Dimorphism: Female specimen is indistinctly smaller.

REMARKS

During study of the type series of *E. elongatum* Bonadona, 12 paratype specimens were found with characters distinctive from those of the holotype. These specimens had been misidentified and incorrectly placed as *E. elongatum* by Paul Bonadona, as can be seen from the labels. This new species is described below.

Elgonidium mountkenyanum **sp. nov.** Figs 2, 6-8

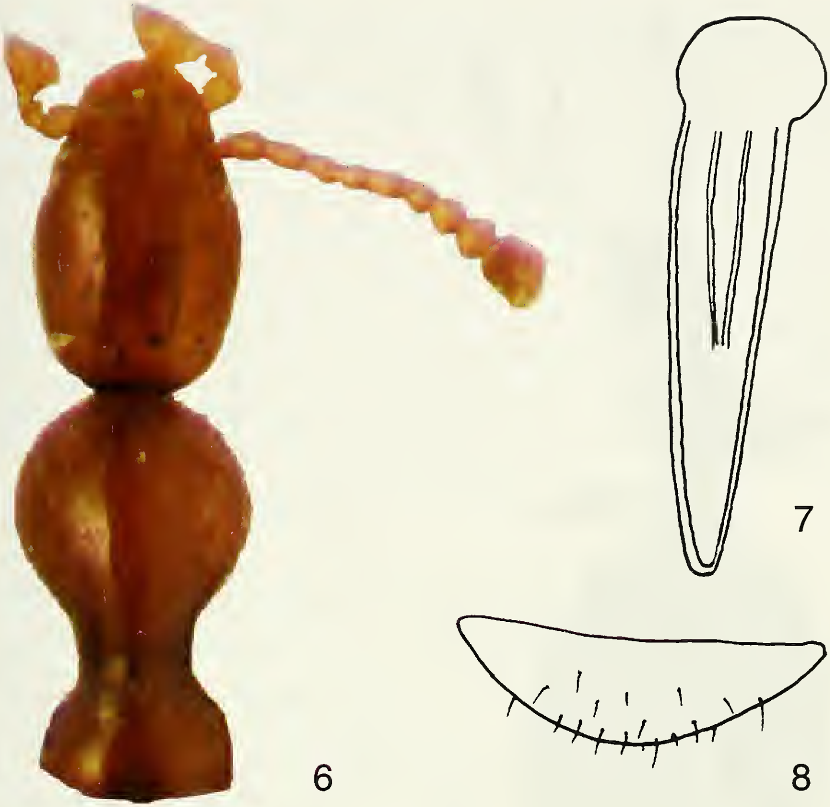
HOLOTYPUS: ♂, MHNG. Nanyuki 1900m Kénya 22.XI.1974 V. Mahnert Leg. [handwritten] / PARATYPE [printed, label red] / Elgonidium elongatum n. sp. P. Bonadona dét. [printed, black border].

PARATYPES: 9 ex., same labels as for the holotypus [MHNG]; 2 ex [MHNG]: Nanyuki 1900m Kénya 22.XI.1974 V. Manhert Leg. [handwritten] / PARATYPE [printed, label red] / Elgonidium elongatum n.sp. P.Bonadona dét. [printed, black border].

DERIVATIO NOMINIS: The species name is derived from Mount Kenya, the second highest mountain in Africa, on whose slopes the new species was collected.

DESCRIPTION: Measurements of the holotype: total body length 2.45 mm, maximum width in the middle of elytra 0.58 mm; head 0.52 mm long, on widest place 0.30 mm broad, pronotum 0.63 mm long, maximum width on anterior lobe 0.33 mm, elytra 1.10 mm long, 0.58 mm together broad.

In general, very similar to *E. aberdareum* sp. nov. and differs primarily in the shape of the aedeagus (Fig. 7), the longitudinal pronotal carina absent or shorter than one-third length of anterior lobe of pronotum, and with sides of lateral constriction of pronotum not dentate. Last visible sternite of males broadly rounded on apical margin (Fig. 8).



FIGS 6-8

Elgonidium mountkenyanum sp. nov. (holotypus ♂): (6) forebody (dorsal). (7) aedeagus. (8) last visible sternite (ventral).

Variability. Paratypes vary in color from yellowish to orange brown.

Dimorphism. Females are not separable from males externally.

REMARKS

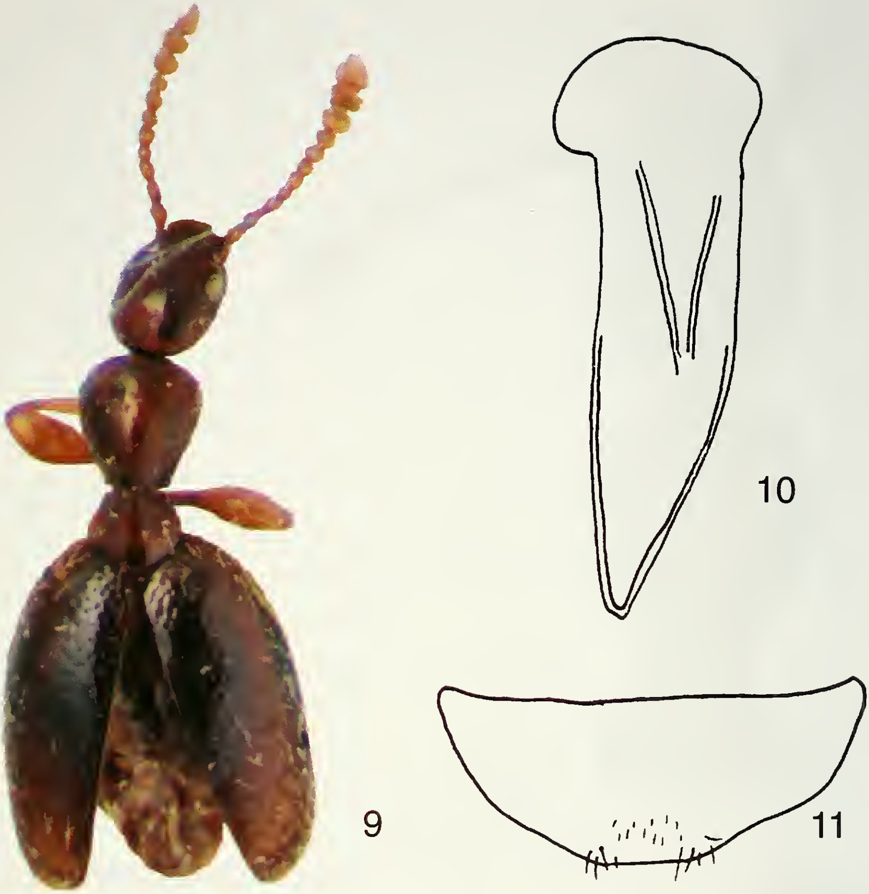
During study of the type series of *E. elongatum* Bonadona, another three paratype specimens were found to be strongly distinctive from the holotype. These were no doubt misidentified and incorrectly placed as *E. elongatum* by Paul Bonadona, as can be seen from labels on these specimens. This very special member of *Elgonidium* is described below.

Elgonidium oculatum **sp. nov.** Figs 2, 9-11

HOLOTYPUS: ♂, MHNG. Nanyuki 1900m Kénya 22.XI.1974 V. Mahnert Leg. [handwritten] / PARATYPE [printed, label red] / Elgonidium elongatum n.sp. P. Bonadona dét. [printed, black border].

PARATYPES: 1♂, 1♀, same labels as for the holotypus [MHNG].

DIAGNOSIS: Very distinctive species in the genus because of the presence of eyes and the deep shape of lateral constriction of pronotum.



FIGS 9-11

Elgonidium oculatum sp. nov. (paratypus ♂): (9) habitus (dorsal). (10) aedeagus (dorsal). (11) last visible sternite (ventral).

DERIVATIO NOMINIS: Named from Latin "oculatus" - oculate, because this is the single species in the genus with functional eyes.

DESCRIPTION: Measurements of the holotype: total body length 1.81 mm, maximum width in the middle of elytra 0.56 mm; head 0.44 mm long, through eyes 0.22 mm broad, pronotum 0.51 mm long, maximum width on anterior lobe 0.29 mm, elytra 0.87 mm long, 0.56 mm together broad.

Colouration: Forebody light brown to yellowish brown, elytra dark brown. Antennae, palps and legs dark yellow. Underside brown, ventrites IV-V yellowish brown.

Head strongly elongate, shiny, without visible punctures. Eyes small, not protruding from lateral outline of head. Insertion of antenna spaced by slightly more than eye diameter from anterior margin of eye. Antennae very short, not reaching base of pronotum. Antennomeres 4-8 small, 4-7 nearly spherical, 8th antennomere distinctly transverse, antennomeres 9-10 very broad and short, strongly transverse. Terminal antennomere broad, as broad as preceding, flattened dorso-ventrally, bluntly conical. Pronotum shiny, dorsally slightly convex on anterior lobe. Anterior margin broadly rounded, sides constricted toward lateral constriction and slightly widened posteriorly toward base. Lateral constriction very deep, with dentate sides, similar to those by representatives of *Macrotomoderus* Pic, 1901. Also, dorsally with narrow but quite deep impression in area of constriction (Fig. 2). Punctures on disc small, very sparse but visible. Scutellum very small, triangular. Elytra shiny, dorsally slightly convex, laterally rounded, of oval shape. Humeri completely rounded, absent. Punctures large and dense in basal half, intervals as large to twice as large as punctures. Toward apex, punctures become much smaller and finer. Pubescence yellowish, long, suberect to erect, quite dense. Sutural striae completely developed, but fine. Hind wings completely atrophied. Basal metatarsomere shorter than combined length of rest metatarsomeres. Last visible sternite of males broadly rounded on apical margin, with very shallow and short impression in the middle (Fig. 11). Aedeagus (Fig. 10).

Variability. One paratype specimen is in general lighter colored.

Dimorphism. Females are not separable from males externally.

Identification key to species of *Elgonidium* Basilewsky, 1954

1a Eyes small but distinct. Lateral constriction of pronotum very deep .... *E. oculatum* sp. nov.

1b Eyes completely atrophied or with only 1-4 facets visible. Lateral constriction of pronotum shallow 2

2a Lateral constriction of pronotum abruptly notched, margins denticulate. Dents are visible from above. Disc of pronotum with fine longitudinal carina occupying posterior third of anterior lobe before lateral constriction .... *E. aberdareum* sp. nov.

2b Lateral constriction of pronotum without dents visible from above. Disc of pronotum without long longitudinal carinae. If present, carina is very short and situated directly before lateral constriction 3

3a Scape of antennae 3 times longer than broad. Posterior lobe of pronotum nearly of same width as anterior lobe .... *E. laevigatum*

3b Scape of antennae 2 times longer than broad. Posterior lobe of pronotum distinctly narrower than anterior lobe 4

4a Punctures on dorsum of pronotum, especially on posterior lobe, fine but distinct. Body larger, 3.00 mm. Eyes with 3-4 facets .... *E. leleupi*

4b Punctures on dorsum of pronotum almost invisible (except for few large punctures sometimes present in area of lateral constriction) and very sparse. Body smaller, 1.90-2.50 mm. Eyes with 1-2 facets or fully atrophied 5

5a Lateral constriction of pronotum deep, anterior lobe of pronotum more than 2 times wider than constriction. Disc of pronotum without or with short longitudinal carina situated directly before lateral constriction .... *E. mountkenyanum* sp. nov.

5b Lateral constriction of pronotum less deep, anterior lobe of pronotum 1.80 times wider than constriction. Disc of pronotum without longitudinal carinae 6

6a Lateral constriction of pronotum continuing dorsally, visible from above as thin transverse carina. Comparatively smaller species, 1.88-1.97 mm. Elytra comparatively shorter . . . . *E. mahnerti*

6b Lateral constriction of pronotum does not continue dorsally in form of transverse carina. Comparatively larger species, 1.90-2.30 mm. Elytra comparatively more elongate . . . . *E. elongatum*

Additional notes on *Elgonidium*

The single paratype from the type series of *E. elongatum* collected in "Nanyuki" does belong to this species. The other paratypes belong to *E. oculatum* sp. nov. (3 ex.) and *E. mountkenyanum* sp. nov. (12 ex.). All specimens from "Thomson's Falls" are correctly placed as *E. elongatum* (Figs. 12-14).

The aedeagus figured by Bonadona (1978: 646, figure 3) for *E. elongatum* is in reality that of *E. mountkenyanum* sp. nov. The aedeagus of *E. elongatum* (Fig. 13) is more elongate and narrower than that of *E. mountkenyanum* sp. nov. The holotype and paratypes from "Thomson's Falls" were not dissected by Bonadona (the type specimens of "*E. elongatum*" were checked by the author), with only specimens from "Nanyuki" dissected, whose all are *E. mountkenyanum* sp. nov.

On the original labels of the type specimens of both *E. elongatum* and *E. mahnerti* (Fig. 15), the name of first collector is interpreted differently: on some specimens as "V. Mahnert Leg.", on other specimens as "V. Manhert Leg."

New locality information for *E. elongatum*. 1 ex., MHNG: Kenya 14 XI 74 env. Endebess près Kirale Mahnert, det. D. Telnov.

New locality information for *E. leleupi*. 1 ex., MHNG: UGANDA: MtElgon Sipi 1650m, 29.V.1993 Cuccodoro&Erne # 15C / Elgonidium mahnerti Bonadona det.G.Uhmann 1994 [misidentification], det. D. Telnov.

Species list of *Elgonidium* Basilewsky, 1954

Elgonidium aberdareum sp. nov.

DISTRIBUTION: Kenya (Aberdare range; altitude: 3100 m).

Elgonidium elongatum Bonadona, 1978

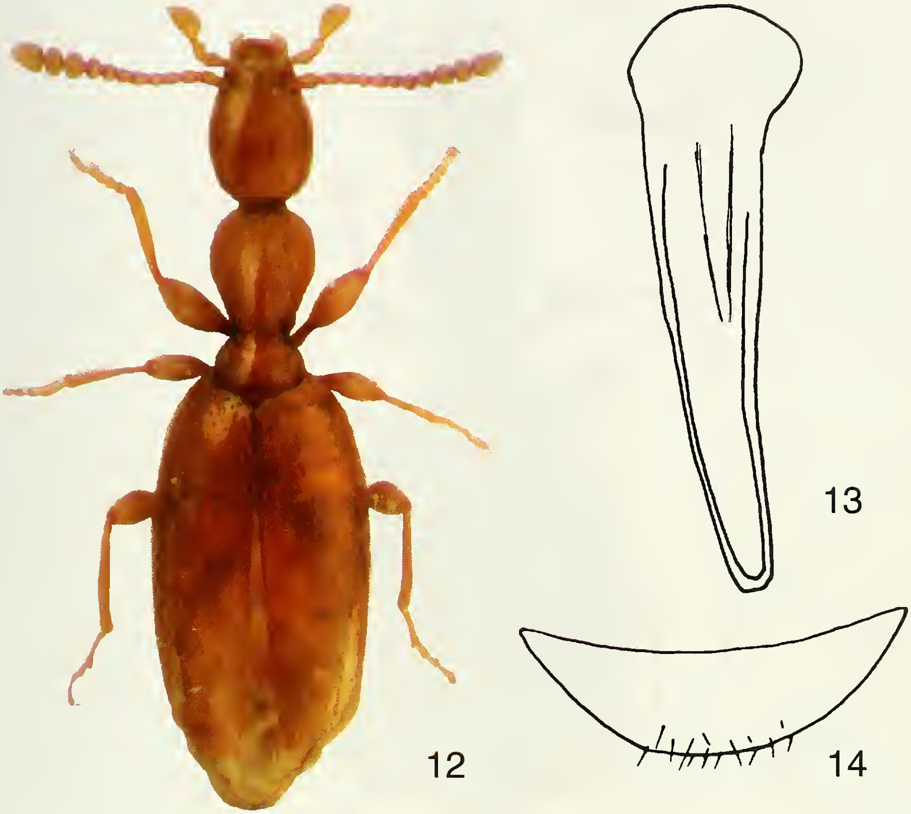
REFERENCES: Bonadona (1978: 648); Uhmann (1990: 888).

DISTRIBUTION: Kenya (Nyahururu (= Thomson's) Falls, Mount Kenya region & Mau escarpment; altitudes: 2350-2700 m).

Elgonidium laevigatum Buck, 1965

REFERENCES: Buck (1965: 288); Bonadona (1978: 645, 647).

DISTRIBUTION: Kenya (Mau escarpment; altitudes: 2150-2800 m).



FIGS 12-14

Elgonidium elongatum Bonadona, 1978 (paratypus ♂): (12) habitus (dorsal). (13) aedeagus. (14) last visible sternite (ventral).

Elgonidium leleupi Basilewsky, 1954

REFERENCES: Basilewsky (1954: 224), as *Elgonidium Leleupi*; Buck (1965: 290); Bonadona (1961: 68); Bonadona (1978: 645, 647); Uhmann (1989: 379).

DISTRIBUTION: Kenya, Uganda (Mount Elgon region; altitudes: 1650-2600 m).

Elgonidium mahnerti Bonadona, 1978

REFERENCES: Bonadona (1978: 647, 649).

DISTRIBUTION: Kenya (Mau escarpment; altitude: 2000 m).

Elgonidium mountkenyanum sp. nov.

REFERENCES: Bonadona (1978: 646 [figure 3], 647, 649), as paratypes of *E. elongatum*.

DISTRIBUTION: Kenya (Mount Kenya region; altitude: 1900 m).

FIG. 15
Elgonidium mahnerti Bonadona, 1978 (paratypus ♂): habitus (dorsal).

Elgonidium oculatum sp. nov.

REFERENCES: Bonadona (1978: 647, 649), as paratypes of *E. elongatum*.

DISTRIBUTION: Kenya (Mount Kenya region; altitude: 1900 m).

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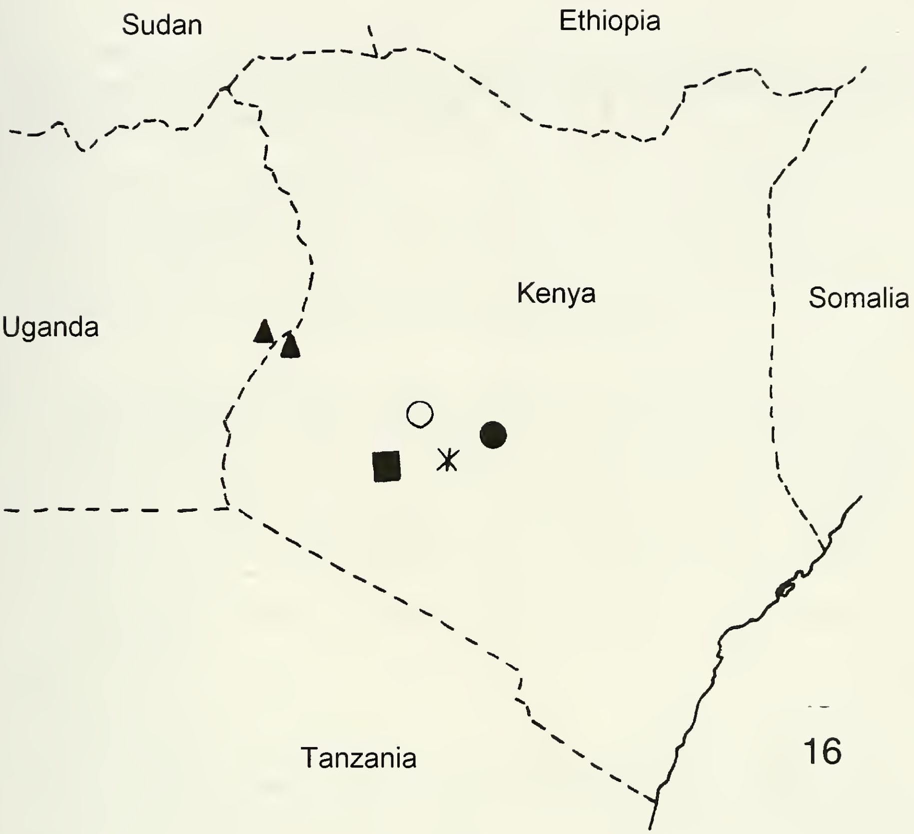

FIG. 16

Geographical distribution of *Elgonidium* Basilewsky. Circles (both – filled and empty) – *Elgonidium elongatum* Bonadona; filled circle – *E. mountkenyanum* sp. nov., *E. oculatum* sp. nov.; asterisk – *E. aberdareum* sp. nov.; filled square – *E. elongatum* Bonadona, *E. laevigatum* Buck; filled triangles – *E. leleupi* Basilewsky.

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REVUE SUISSE DE ZOOLOGIE 115 (3): 447-450; septembre 2008

Contribution à la systématique du genre *Aethiessa* Burmeister, 1842 (Coleoptera: Cetoniidae: Cetoniinae)

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Contribution to the systematics of the genus *Aethiessa* Burmeister, 1842 (Coleoptera: Cetoniidae: Cetoniinae). - Major inconsistencies between the currently used taxonomy and the type material were noticed during the revision of some types of the Cetoniidae family. In this study, we clarify the taxonomic position of *Aethiessa inhumata* and designate a lectotype. Likewise, we also designate a lectotype of *A. floralis*, the type-species of the genus.

Keywords: *Aethiessa floralis* - *Aethiessa inhumata* - new synonymy - Cetoniidae.

INTRODUCTION

Le genre *Aethiessa* Burmeister, 1842, compte un petit nombre d'espèces, sept selon le catalogue de Krajčik (1998), à distribution principalement circumméditerranéenne et moyen-orientale. *Aethiessa floralis* (F., 1787) est l'espèce-type du genre et est représentée par trois exemplaires conservés dans la collection Fabricius au Musée de Zoologie de l'Université de Copenhague (UZMC).

La détermination des espèces est souvent rendue difficile par la grande variabilité individuelle des espèces et de plus, nombre de taxons considérés comme spécifiques sont insuffisamment représentés dans les collections des institutions scientifiques.

Pour ce qui est d'*Aethiessa inhumata*, espèce rare dans les collections, la plus grande confusion règne dans les publications antérieures en l'absence de vérification du matériel typique, considéré comme disparu.

Le présent travail se base sur l'étude des exemplaires considérés comme appartenant à la série typique de *Cetonia inhumata*, présents dans la collection Gory & Percheron conservée au Muséum d'histoire naturelle de Genève (MHNG), sur l'analyse de la description originale (Gory & Percheron, 1833) et des principales références bibliographiques citant *A. inhumata*, et sur l'étude des types de l'espèce-type.

La détermination des espèces s'est faite en suivant les caractères proposés de Baraud (1985, 1992).

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Aethiessa floralis (Fabricius, 1787) : précisions sur l'espèce-type

Avant d'entreprendre une étude de la systématique plutôt complexe du genre, il était fondamental d'étudier la série typique de l'espèce-type, ne serait-ce que pour éviter les confusions faites par les auteurs précédents. *Aethiessa floralis* (F., 1787) est représentée par trois spécimens conservés dans la collection Fabricius (UZMC), où le seul des spécimens portant des indications de localité conformes à la description est catalogué comme « Holotype ».

En fait, il appert clairement dans la description originale de Fabricius et conformément à l'usage alors prévalant qu'aucune désignation officielle d'holotype n'avait été faite à ce moment-là et que cet auteur a pu étudier divers exemplaires. En effet, on y trouve page 31: (page 31) "...*Varietatem minorem fere totam nigram cum reliquis omnisit Dom. Vahl.*"

L'étude de ces exemplaires, par les caractères morphologiques externes et internes, a permis de confirmer la concordance entre ce que les auteurs appellent *floralis* et ceux-ci, même si l'on ne peut pas considérer l'un d'eux comme holotype mais comme syntype comme indiqué par l'article 73 et la recommandation 73 F de l'ICNZ (1999, online). Pour éviter toute confusion ultérieure et stabiliser la nomenclature, nous désignons donc le seul spécimen pourvu des indications de localité conformément à la description comme lectotype, les deux autres comme paralectotypes.

LECTOTYPE: ♂ - Marocco, Vahl, *Cetonia floralis* F. (blanc, manuscrit) / édeage extrait et collé sur un carton / *Aethiessa floralis* (F.), Dutto M. det. 2007, Lectotypus (rouge, manuscrit) (UZMC).

PARALECTOTYPES: ♀ - *floralis* (blanc, manuscrit) / *Aethiessa floralis* (F.), Dutto M. des. 2007 / paralectotypus (rouge, manuscrit); ♂ - floralis (blanc, manuscrit) / édeage extrait et collé sur un carton / *Aethiessa floralis* (F.), Dutto M. des. 2007 / paralectotypus (rouge, manuscrit) (UZMC).

Aethiessa inhumata (GORY & PERCHERON, 1833), un nouveau synonyme de *A. floralis* (F., 1787).

La description de *Aethiessa inhumata* est attribuée par la presque totalité des auteurs (Burmeister, 1842; Winkler, 1927-1932; Gridelli, 1930; Brasavola de Massa, 1939; Mikšić, 1982; Baraud, 1985; Rataj, 1998; Löbl & Smetana, 2006) à Gory & Percheron (1833). D'autres auteurs (Mikšić, 1982 et Baraud, 1992) attribuent erronément ce taxon à Brasavola de Massa (1939), alors que celui-ci se limite à ne donner que des informations morphologiques et mettre en synonymie *Aethiessa mesopotamica* (Burmeister, 1842), qui, selon tous les auteurs, présente les mêmes caractères morphologiques extérieurs et internes que *A. inhumata*. La validité spécifique du taxon *inhumata* est mise en doute par Krajčik (1998).

Dans la *Monographie de Cétoines* de Gory & de Percheron (1833), *A. inhumata* est décrite minutieusement sous le nom de *Cetonia inhumata* aux pages 227 et 228 et représentée planche 42 à la figure 5. Il est cependant important de préciser que ce taxon est attribué par Gory et Percheron eux-mêmes à Drapiez qui aurait publié la description dans les *Annales générales des sciences physiques*.

Dans cette description, il est difficile de trouver des caractères discriminatoires permettant une détermination spécifique car la plupart d'entre eux pourraient s'appliquer tout aussi bien aux autres espèces du genre *Aethiessa* et il n'est fait aucune mention des caractéristiques morphologiques de l'édéage. L'espèce est citée dans la description originale «De l'Arabie et de Bagdad» qui sont donc les localités typiques.

En étudiant les types de Cetoniidae présents dans la collection Gory & Percheron, trois exemplaires de *C. inhumata* étiquetés comme «Gory Type» ont pu être retrouvés.

Ces trois exemplaires correspondent à la description de Gory, mais seuls deux portent une étiquette avec des indications géographiques: (I) un mâle avec le label «Oriens» ce qui est cohérent avec la description, et (II) la femelle avec le label «Syrie Egypte». Par les caractères morphologiques extérieurs et l'examen de l'édéage, ces trois exemplaires, 2 mâles et 1 femelle, se rapportent à *A. floralis*.

Au sens de l'article 73.2 et 73.2.1 de ICNZ (1999), ces spécimens sont à considérer comme des syntypes. En considérant cependant la grande confusion qui régnait jusqu'ici autour de ce taxon et la nécessité d'avoir un exemplaire comme référence pour garantir la stabilité nomenclaturale, nous procédons donc à la désignation du lectotype au sens de l'article 74 (ICNZ, 1999) sur l'unique exemplaire mâle portant des indications de localité comme indiqué dans la recommandation 74F (ICZN, 1999). Les 2 autres exemplaires sont à considérer des paralectotypes au sens de l'article 74.1.3 (ICZN, 1999).

LECTOTYPE: ♂ - édeage extrait et collé sur un carton blanc/Coll. Melly (blanc imprimé)/Gory Type (rouge imprimé)/ *Aethiessa floralis*, G Dahlgren det (blanc manuscrit)/ *inhumata* G. et P., Oriens (blanc manuscrit)/ *Aethiessa inhumata* (G. & P.), Lectotypus, M. Dutto det. 2007 (rouge manuscrit) (MHNG).

PARALECTOTYPES: ♂- édeage extrait et collé sur un carton blanc/Coll. Melly (blanc imprimé)/Gory Type (rouge imprimé)/ *Aethiessa floralis*, G Dahlgren det (blanc manuscrit)/ Aethiessa inhumata (G. & P.), Paralectotypus, M. Dutto det. 2007 (rouge manuscrit) (MHNG).

♀ - coll. Melly (blanc imprimé)/Gory Type (rouge imprimé)/ *Aethiessa floralis*, G Dahlgren det (blanc manuscrit)/*inhumata* G. & P., Syrie Egypt (blanc, manuscrit)/ *Aethiessa inhumata* (G. & P.), Paralectotypus, M. Dutto det. 2007 (rouge manuscrit) (MHNG).

CONCLUSION

En résumé, *A. inhumata* n'est rien d'autre qu'un synonyme supplémentaire d'*Aethiessa floralis* (F. 1787); tous les exemplaires déterminés comme *A. inhumata* et étudiés dans les diverses collections publiques se sont néanmoins avérés comme des *A. mesopotamica* (Burmeister, 1842) avec laquelle *A. inhumata* était confondue jusqu'ici.

Ces considérations remettront au moins partiellement un peu d'ordre dans la complexité du cadre systématique de ce genre, qui présente encore de nombreux points obscurs qu'il conviendra d'éclaircir en trouvant entre autres des caractères constants permettant une détermination exacte des différentes espèces.

CHECKLIST DES ESPÈCES DU GENRE *AETHIESSA*.

- *Aethiessa floralis* (Fabricius, 1787).
    Aethiessa inhumata (Gory & Percheron, 1833). **n. syn.**
- *Aethiessa feralis* (Erichson, 1841).
- *Aethiessa martini* Bedel, 1889.
- *Aethiessa mesopotamica* (Burmeister, 1842).
- *Aethiessa rugipennis* (Burmeister, 1842).
- *Aethiessa szekessyi* Brasavola de Massa, 1939.
- *Aethiessa zarudnyi* Kiseritzkij, 1939.

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Cette étude n'aurait pas été possible sans le concours des Drs. Alexey Solodovnikov (UZMC) et Giulio Cuccodoro (MHNG) : qu'ils trouvent ici l'expression de notre sincère gratitude.

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REVUE SUISSE DE ZOOLOGIE 115 (3): 451-469; septembre 2008

Four *Erigone* species (Araneae: Linyphiidae) from China

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Four *Erigone* species (Araneae: Linyphiidae) from China. - *Erigone* species from China are reviewed and four of them, *E. lata* sp. n., *E. zheduoshanensis* sp. n., *E. atra* Blackwall, 1833 and *E. prominens* Bösenberg & Strand, 1906, are described. The name *E. ourania* Crosby & Bishop, 1928 is placed in the synonymy of *E. prominens*. *E. maculivulva* Strand, 1907, *E. noseki* Strand, 1907 and *E. subprominens* Saito, 1936 are treated as nomina dubia.

Keywords: Taxonomy - variation - type - new synonym - new species - nomina dubia.

INTRODUCTION

The linyphiid spider genus *Erigone* was established by Victor Audouin for *E. vagans* (Audouin, 1826), which was later transferred to the genus *Prinerigone* (Millidge, 1993). In order to conserve the name *Erigone* for the majority of species included in the genus, an application was made to the International Commission on Zoological Nomenclature which then substituted *E. longipalpis* (Sundevall, 1830) for *E. vagans* as the type species of *Erigone* (see Millidge, 1985).

The genus *Erigone* currently comprises 155 species, 11 of which have been reported from China (Platnick, 2008). Our examination of the holotype of *E. ourania* proved that it is a junior synonym of *E. prominens* and we found that the record for *E. longipalpis* from China is incorrect due to misidentification. Based on the fact that *E. maculivulva*, *E. noseki* and *E. subprominens* were described only from females, that no sufficient species diagnoses were provided, that the types of *E. maculivulva* and *E. noseki* were confirmed destroyed during World War II (Renner, 1988), and that the types for *E. subprominens* were also lost (Hirotsugu Ono, personal communication), we treat *E. maculivulva*, *E. noseki* and *E. subprominens* as nomina dubia.

Consequently only six *Erigone* species are confirmed for China. *E. dentipalpis* (Wider, 1834), *E. jägeri* Baehr, 1984, *E. koshiensis* Oi, 1960 and *E. sinensis* Schenkel, 1936 have already been described in detail (Wiehle, 1960; Baehr, 1984; Thaler, 1993; Tu *et al.*, 2005). Descriptions of the remaining two species, *E. atra* and *E. prominens*, as well as two new species are provided in the current paper. At present a total of eight *Erigone* species are known from China.

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MATERIAL AND METHODS

The material used for this study is deposited in the following institutions:

AMNH	American Museum of Natural History, New York, USA;
IZCAS	Institute of Zoology, Chinese Academy of Sciences, Beijing, China;
JLU	Jilin University, Changchun, China;
MHNG	Muséum d'histoire naturelle, Genève, Switzerland.

For each species only the original description and new synonym are listed. Synonyms listed in the spider catalog of Platnick (2008) are not repeated here. Locality names and distribution data are given according to current Chinese standard (Peng *et al.*, 2003).

Specimens were examined using an Olympus-SZ11 stereomicroscope and illustrated using an Olympus-BX41 compound microscope equipped with a drawing tube. Left male palps and female epigyna were illustrated after being separated from the body. Embolic divisions were dissected from the palpal bulb using sharp pins and forceps. Genital organs were immersed in 75% alcohol and examined under a compound microscope; embolic divisions and vulvae were mounted in Hoyer's Solution and examined in strong transmitted light against a white background. In addition, the ventral tegument of epigyna was removed by sharp pins and forceps to study the duct system of the vulvae under a microscope.

Eye diameters were measured at their widest extent. Leg measurements are given as: Total length (femur, patella, tibia, metatarsus, tarsus). All measurements are in millimeters. Terminology of genitalic structures follows Hormiga (2000) and Tanasevitch (2006).

The following abbreviations of somatic morphology and genitalic structures are used in the text and in the figures:

Somatic morphology: ALE, anterior lateral eye; AME, anterior median eye; PLE, posterior lateral eye; PME, posterior median eye; Tm I, position of trichobothrium on metatarsus I; Tm II, position of trichobothrium on metatarsus II; Tm IV, trichobothrium on metatarsus IV.

Male palp: ARP, anterior radical process; AT, anterior tooth; C, column; CTT, central tibial teeth; DSA, distal suprategular apophysis; E, embolus; EM, embolic membrane; MM, median membrane; MT, mesal tooth; PC, paracymbium; PRP, posterior radical process; PT, protegulum; PTA, prolateral tibial apophysis; R, radix; RTA, retrolateral tibial apophysis; SPT, suprategulum; ST, subtegulum; T, tegulum; TP, tailpiece of radix.

Epigynum: CD, copulatory duct; CO, copulatory opening; DP, dorsal plate; FD, fertilization duct; FO, fertilization opening; S, spermatheca; VP, ventral plate; VPD, ventral plate depression.

RESULTS

Erigone atra Blackwall, 1833 Figs 1-2

Erigone atra Blackwall, 1833: 195.

MATERIAL EXAMINED: GERMANY: 1♂1♀ (IZCAS), Baden-Württemberg, Lkr. Ravensburg, Wurzacher Ried, Haidgauer Torfgebiet, coll. S. Li, 15.X.1992; 1♂1♀ (IZCAS), Nordrhein-Westfalen, 20 km SE Köln, NSG Wahner Heide, Munitionsdepot, coll. T. Stumpf,

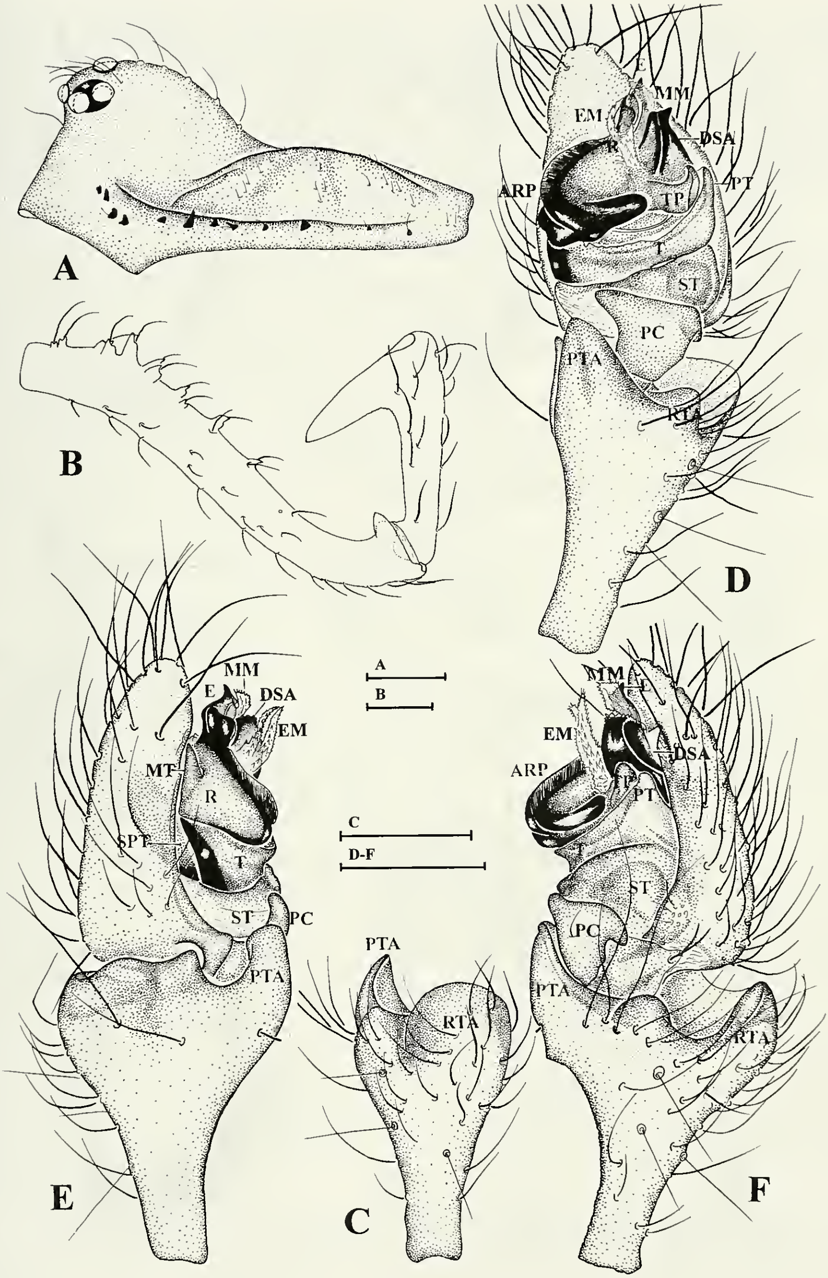

FIG. 1

Erigone atra. (A) Male carapace, lateral view. (B) Patella and femur of left male palp, retrolateral view. (C) Tibia of left male palp, dorsal view. (D) Distal part of left male palp, ventral view. (E) Same, prolateral view. (F) Same, retrolateral view. Drawings based on a specimen from Sichuan, China. Scale lines: 0.2 mm.

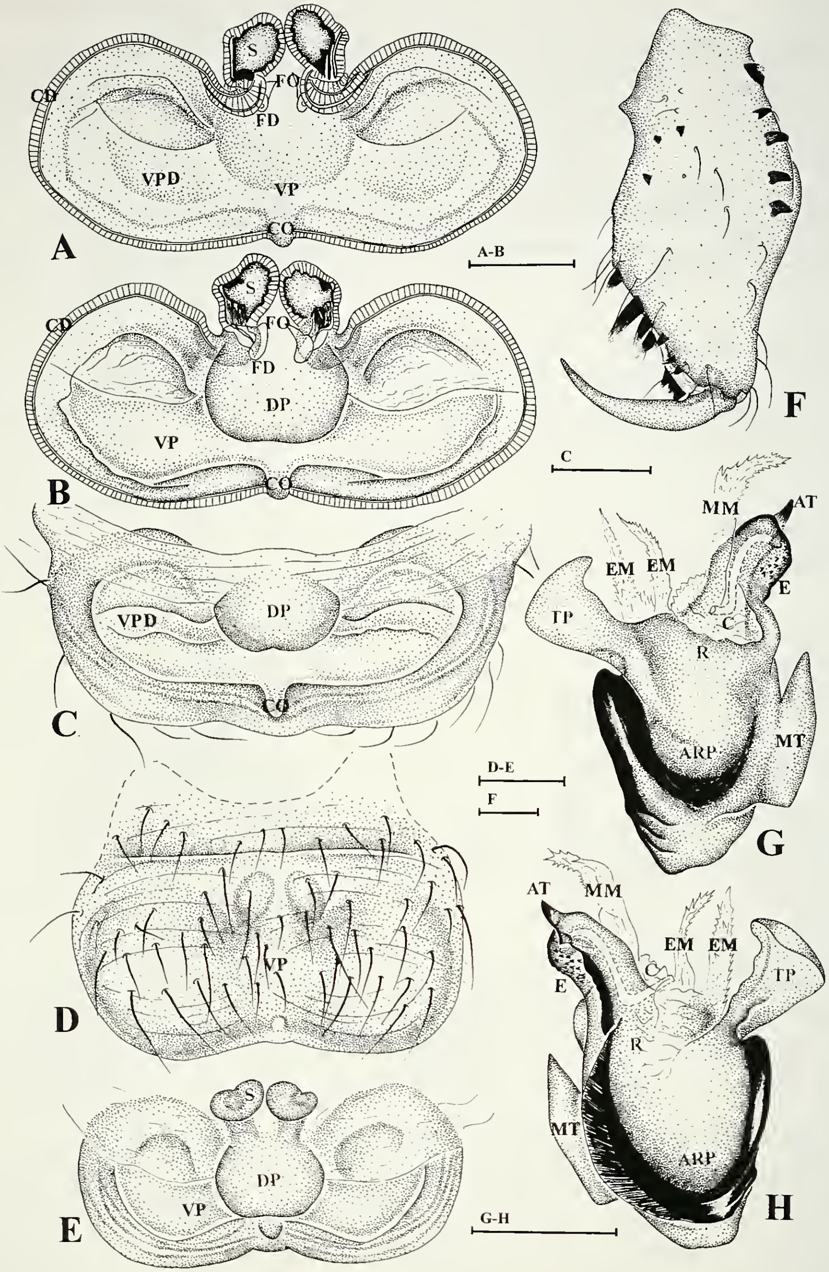

FIG. 2

Erigone atra. (A) Vulva, ventral view. (B) Same, dorsal view. (C) Epigynum, posterior view. (D) Same, ventral view. (E) Same, dorsal view. (F) Left male chelicera, frontal view. (G) Embolic division, dorsal view. (H) Same, ventral view. Drawings based on specimens from Sichuan, China. Scale lines: 0.1 mm.

27.XII.1990-7.I.1991, pitfall traps. – CHINA: 2♀2♂ (IZCAS), Xinyuan County (43.43°N, 83.27°E), Xinjiang Uygur Autonomous Region, coll. J. Chen, 3.VII.1991; 1♀ (IZCAS), Nyingchi County (29.53°N, 94.55°E), Tibet Autonomous Region, coll. M. Wu, 8-9.VII.1997; 18♀27♂ (MHNG), Mt Changbaishan (42.12°N, 128.35°E), Jilin Province, coll. J. Gao, 27.VII.1987; 5♀2♂ (IZCAS), Kouqian Town (43.68°N, 126.30°E), Yongji County, Jinlin Province, coll. Y. Tao, 28.VI.1989; 1♂ (IZCAS), Xining City (36.60°N, 101.70°E), alt. 2250-2330m, Qinghai Province, coll. M. Wu, 3.VI.1997; 14♀24♂ (JLU), 91-141, no detailed information; 1♂5♀ (MHNG), Fengtongzhai Town (30.37°N, 102.85°E), Baoxing County, Sichuan Province, China, coll. S. Li and L. Tu, 2-5.VII.2004.

DIAGNOSIS: Males of this species can be distinguished from those of similar species by the following combination characters: Anterior radical process bowl-shaped (Fig. 1F), mesal tooth robust (Fig. 2G-H), and tip of embolus clothed with numerous papillae (Fig. 2G-H). Females can be recognized by the bowknot-shaped course of their copulatory ducts (Fig. 2A-B).

DESCRIPTION: In addition to the characters given in the description of Crosby & Bishop (1928), two shallow depressions were found on the sclerotized capsule of the epigynum after the ventral tegument was removed (Fig. 2A).

DISTRIBUTION: Holarctic. In China this species was recorded in the provinces of Gansu, Jilin, Qinghai, Sichuan, Tibet and Xinjiang.

HABITAT: Found in wet moss, forest litter, under stones and among grass roots.

Erigone lata sp. n. Figs 3-5

MATERIAL EXAMINED: CHINA: ♂ holotype (IZCAS), Yakou Region (30.10°N, 101.75°E), Mt Zheduoshan, Kangding County, Sichuan Province, coll. S. Li and L. Tu, 17.VII.2004. – 8♂ 25♀ paratypes (IZCAS), same data as for holotype. – 1♂ 3♀ paratypes (IZCAS), Lhakang Town (30.27°N, 101.55°E), Kangding County, Sichuan Province, coll. Y. Song, 29.VII.2004. – 1♂ 4♀ paratypes (MHNG), Lhakang Town (30.27°N, 101.55°E), Kangding County, Sichuan Province, coll. Y. Song, 29.VII.2004.

DIAGNOSIS: The new species is similar to *E. arctica* (Holm, 1956), but the absence of a deep indentation mesally below the retrolateral tibial apophysis (Fig. 5K), the sharply pointed central tibial teeth (Fig. 5J), the broad, short tailpiece of the embolic division (Fig. 5E-F) and the oblate dorsal plate of the epigynum (Fig. 4B, E) of *E. lata* sp. n. show that it is distinct. The new species is also similar to *E. sinensis*, but males can be distinguished by the broad tailpiece and the short and slightly blunter anterior radical process of the embolic division, and by the smooth outer margin of the retrolateral tibial apophysis. Females can be distinguished by the broader posterior part of the ventral plate and rectangular capsule of the vulva (posterior part of the ventral plate narrow and capsule cordate in *E. sinensis*) and by the rounded spermathecae (oblong in *E. sinensis*).

DESCRIPTION OF MALE HOLOTYPE: Total length 2.70. Carapace 1.23 long, 0.97 wide, auburn, distinctly raised in the head region (Fig. 3A). Margins of carapace furnished with several small teeth (Fig. 3A). Clypeus 0.28 high. Abdomen dark brown. AME diameter 0.07, ALE 0.06, PME 0.07, PLE 0.07, AME interdistance 0.27 times their diameter, AME-ALE interdistance 0.68 times ALE diameter, PME interdistance 0.95 times their diameter, PME-PLE interdistance 1.05 times PLE diameter. Sternum 0.70 long, 0.70 wide, auburn. Coxa IV interdistance 0.97 times their width. Chelicera

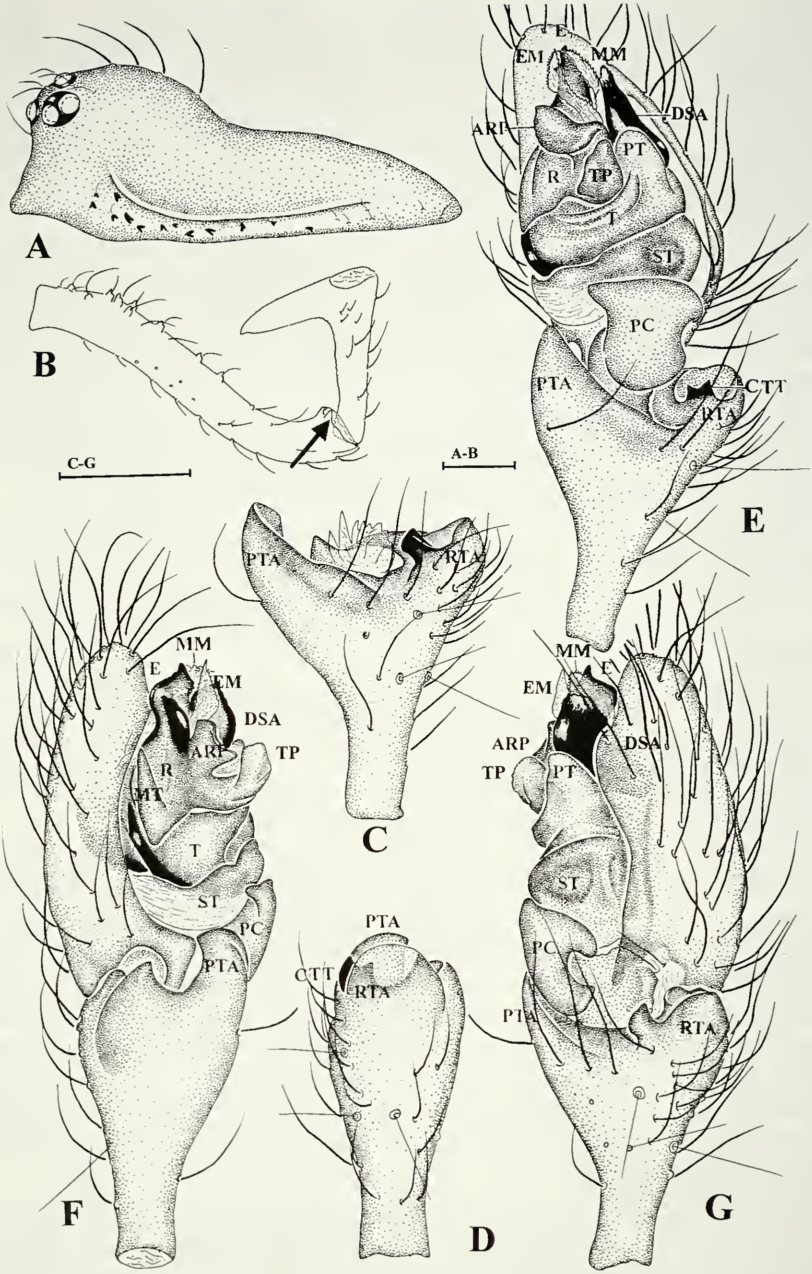

FIG. 3

Erigone lata sp. n. (A) Male carapace, lateral view. (B) Patella and femur of left male palp, retrolateral view (arrow indicates an extra tooth at the distal end). (C) Tibia of left male palp, retrolateral view. (D) Same, dorsal view. (E) Distal part of left male palp, ventral view. (F) Same, prolateral view. (G) Same, retrolateral view. Drawings based on the holotype. Scale lines: 0.2 mm.

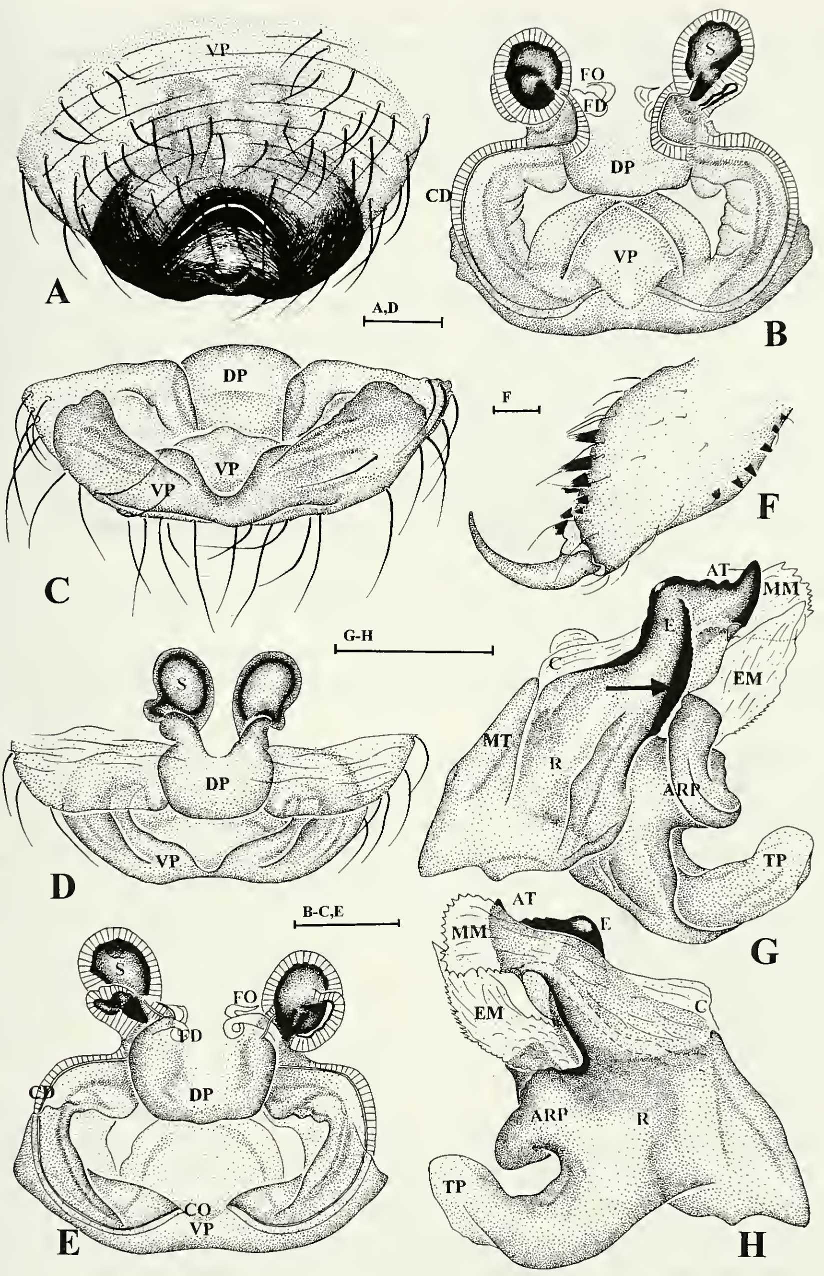

FIG. 4

Erigone lata sp. n. (A) Epigynum, ventral view. (B) Vulva, ventral view. (C) Epigynum, posterior view. (D) Same, dorsal view. (E) Vulva, dorsal view. (F) Left male chelicera, frontal view. (G) Embolic division, ventral view (arrow indicates the longitudinal ridge of the radix). (H) Same, dorsal view. Drawings based on paratype (A-E) and holotype (F-H). Scale lines: 0.1 mm.

grayish brown, anterolaterally furnished with a row of 6 small teeth; fang groove with 5 promarginal and 4 retromarginal teeth (Fig. 4F). Legs dusky yellow. Tibia of leg I 7.39 times longer than deep. Tm I 0.50, Tm IV absent. Dorsal spines on tibia of leg IV: 2-2-2-1; dorsal spine on patella of leg IV: 1-1-1-1. Leg measurements: I 3.17 (0.86, 0.36, 0.83, 0.66, 0.46); II 2.96 (0.81, 0.36, 0.74, 0.62, 0.43); III 2.55 (0.69, 0.35, 0.58, 0.54, 0.39); IV 3.22 (0.89, 0.32, 0.84, 0.71, 0.46).

Palp: Femur long, slightly curved, with 3 rows of small teeth (these usually furnished with weak hairs on top) and an extra tooth at its distal end (Fig. 3B). Patella slender, with tapering ventral apophysis (Fig. 3B). Tibia widened distally (Fig. 3C-G), without tooth on ventral side of widened part; blunt retrolateral apophysis without a deep indentation mesally; prolateral apophysis pointed, obliquely curved; 2 central teeth sharply pointed; 1 prolateral and 2 retrolateral trichobothria present. Paracymbium C-shaped, with hooked terminal part and 2 hairs on basal arm of paracymbium near junction with cymbium (Fig. 3G). Tegulum distal to subtegulum in unexpanded palp (Fig. 3E). Protegulum well-developed, covering base of strongly sclerotized distal suprategulum (Fig. 3E). Tailpiece of embolic division similar to that of *E. arctica* (see Holm, 1956), but a bit broader and shorter (Fig. 5F). Anterior radical process somewhat round when seen from distally (Fig. 5E), with outer margin expanded downwards. Mesal tooth tapering, directed distally (Fig. 3F). Embolus (Figs 3G, 5F) rather short, with distal end curved to form an anterior tooth; accompanied by a long embolic membrane arising from center of radix, and by a median membrane arising from column. Radix furnished with a longitudinal ridge, slightly indented at the outer margin (Fig. 4G).

DESCRIPTION OF FEMALE PARATYPE (collected at Mt Zheduoshan): Carapace unmodified, similar to that of male in coloration. Total length 2.65. Carapace 1.15 long, 0.92 wide. Clypeus 0.13 high. AME diameter 0.07, ALE 0.08, PME 0.06, PLE 0.07, AME interdistance 0.39 times their diameter, AME-ALE interdistance 0.41 times ALE diameter, PME interdistance 1.00 times their diameter, PME-PLE interdistance 1.00 times PLE diameter. Sternum 0.70 long, 0.70 wide. Coxa IV interdistance 0.83 times their width. Chelicera with 5 promarginal and 5 retromarginal teeth. Tibia of leg I 6.14 times longer than deep. Tm I 0.52, Tm IV absent. Dorsal spines on tibia of leg IV: 2-2-2-1; dorsal spine on patella of leg IV: 1-1-1-1. Leg measurements: I 3.25 (0.93, 0.38, 0.81, 0.65, 0.48); II 3.03 (0.86, 0.38, 0.74, 0.59, 0.46); III 2.69 (0.73, 0.33, 0.66, 0.56, 0.41); IV 3.40 (0.96, 0.36, 0.91, 0.71, 0.46).

Epigynum simple, with fine transversal striation (Fig. 4A). Posterior half of epigynum strongly sclerotized, concave in its center to form a crescent-shaped depression (Fig. 4A). Spermathecae rounded, separated by a distance of less than their diameter (Fig. 4D). Dorsal plate oblate (Fig. 4D), almost 1.5 times wider than long. Copulatory ducts enclosed in a strongly sclerotized oblong capsule, forming a 90° turn before entering spermathecae (Fig. 4B). Fertilization ducts short, mesally oriented (Fig. 4E).

ETYMOLOGY: The specific name is taken from the Latin adjective *latus* (=broad), referring to the broad tailpiece of the embolic division.

VARIATION: 11♂ and 32♀ were measured. Total length is 2.66-2.73 in males, 2.94-3.28 in females. Carapace length is 1.22-1.25 in males, 1.14-1.17 in females;

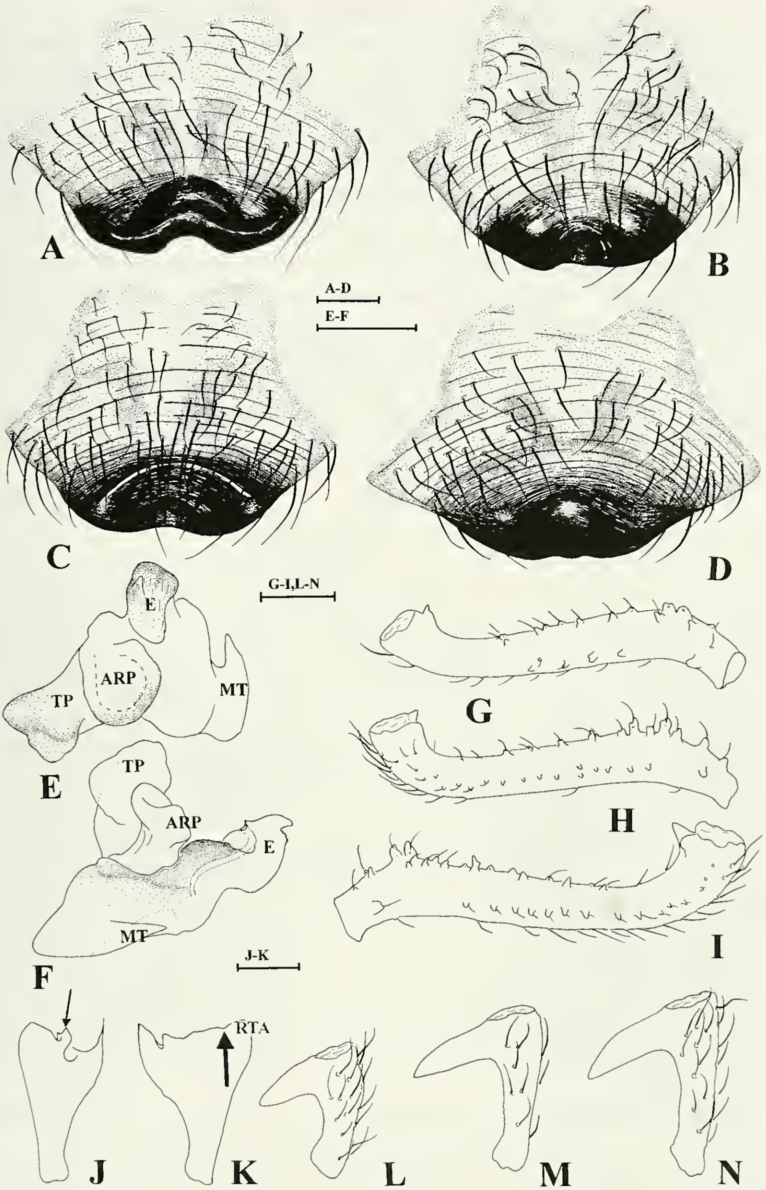

FIG. 5

Erigone lata sp. n. (A-D) Epigyna, ventral view. (E) Embolic division, anterior view. (F) Same, prolateral view. (G-H) Femora of left male palps, prolateral view. (I) Femur of right male palp, prolateral view. (J) Tibia of right male palp, dorsal view (small arrow indicates the sharply pointed central tibial teeth). (K) Same, prolateral view (large arrow points to the extremely shallow indentation mesally below the retrolateral tibial apophysis). (L-N) Patellae of left male palps, retrolateral view. Drawings based on holotype (E, F) and paratypes (A-D, G-N). A-D show variation in the shape of the epigynum; G-I show variation in the shape of palpal femur; L-N show variation in the shape of palpal tibia. Scale lines: A-F=0.1 mm, G-N=0.2 mm.

width 0.97-1.00 in males, 0.86-0.94 in females. The species shows considerable intraspecific variation in the length of male palpal femur and patella (Fig. 5G-I, L-N), number of teeth on the male palpal femur (Fig. 5G-I), shape of posterior margin of the epigynum (Fig. 5A-D), distance between spermathecae and overall size of the epigynum (Fig. 5A-D). The range of length of male palpal patellar apophysis (including the depth of the patella) is 0.31-0.43, average 0.38; the range of length of male palpal patella 0.36-0.51, average 0.46; the ratio of the former to the latter is 0.73-0.89, average 0.83. The range of width of epigynum is 0.33-0.38, average 0.35; the range of width of sternum 0.61-0.68, average 0.63; the ratio of the former to the latter is 0.50-0.64, average 0.55. The epigynum is posteriorly very slightly (Fig. 5C) or conspicuously (Fig. 5A) indented, and sometimes bent a little outward medially (Fig. 5D).

DISTRIBUTION: Mt Zheduoshan and Lhakang Town in Sichuan Province, China.

HABITAT: The spiders were found among grass roots on mountains in between 3700 and 4250 meters altitude.

Erigone prominens Bösenberg & Strand, 1906 Figs 6-8

Erigone prominens Bösenberg & Strand, 1906: 168, pl. 12, fig. 270.
Erigone ourania Crosby & Bishop, 1928: 35, figs 63-65. **Syn. n.**

MATERIAL EXAMINED (all China): 1♂ (AMNH), holotype of *E. ourania*, Yuanmingyuan Park, Beijing (40.00°N, 116.30°E), coll. P. W. Claassen, 11.X.1924. – 13♂ 51♀ (JLU), Erdaopao Village (42.85°N, 130.37°E), Hunchun City, Jilin Province, coll. J. Gao. – 1♂ 4♀ (IZCAS), Yakou Region (30.10°N, 101.75°E), Mt Zheduoshan, Kangding County, Sichuan Province, coll. S. Li and L. Tu, 17.VII.2004. – 4♀ (IZCAS), Yaoji Reservoir (30.37°N, 102.85°E), Baoxing County, Sichuan Province, coll. S. Li and L. Tu, 2.VII.2004. – 6♂ 5♀ (JLU), Yangri Town (31.75°N, 110.82°E), Shennongjia Forest Region, Hubei Province, coll. J. Gao, 11.VI.1986. – 2♂ 6♀ (IZCAS), Mt Wulingshan (40.47°N, 117.43°E), Xinglong County, Hebei Province, coll. S. Li, L. Tu and Y. Song, 23.VIII.2003. – 1♂ 1♀ (IZCAS), Zanhuang County (37.63°N, 114.42°E), Shijiazhuang City, Hebei Province, coll. S. Li, G. Zheng, Q. Wang and Y. Song, 12.IX.2005. – 48♂ 90♀ (IZCAS), 5♂5♀ (MHNG), Kongcun Village (36.70°N, 114.67°E), Yongnian County, Hebei Province, coll. S. Li, 25.VIII.1995. – 23♂ 31♀ (IZCAS), Mt Hengshan (27.22°N, 112.88°E), Hunan Province, coll. S. Li and L. Tu, 6.X.2003. – 1♂ (IZCAS), Mt Dinghushan (21.18°N, 110.38°E), Guangdong Province, coll. C. Liao. – 1♂ (IZCAS), Zhanjiang City (21.18°N, 110.38°E), Guangdong Province, 5.V.1977. – 3♂ (IZCAS), Hailing Island (21.63°N, 111.92°E), Yangjiang City, Guangdong Province, 31.III.1975. – 15♂ 36♀ (IZCAS), Mt Longqishan (26.25°N, 118.42°E), Jiangle County, Fujian Province, coll. S. Li, 20.VIII.1991. – 1♂ (IZCAS), Xiushan County (28.43°N, 108.93°E), Chongqing Municipality, 9.VI.1989. – 1♂ 1♀ (IZCAS), Tungdor District (29.04°N, 94.24°E), Tibet Autonomous Region, coll. Y. Chen, 5.IX.2004.

DIAGNOSIS: See remarks on *E. grandidens* Tu & Li, 2004 (see Tu & Li, 2004).

DESCRIPTION: This species was redescribed in detail by Holm (1977).

REMARKS: After the ventral tegument of the epigynum and tissue surrounding the vulva were removed, two black shallow depressions (in ventral view) disappeared and the vulva became much longer and more complicated (Fig. 7A, G-H). Both copulatory ducts are enclosed in a single slightly sclerotized capsule. In ventral view two broad, filmy, pocket-shaped accessorial structures (Fig. 7G) are visible at the position where the copulatory ducts are strongly curved. In dorsal view two additional small membranous structures (Fig. 7H) are seen at the other side of the pocket-shaped structures.

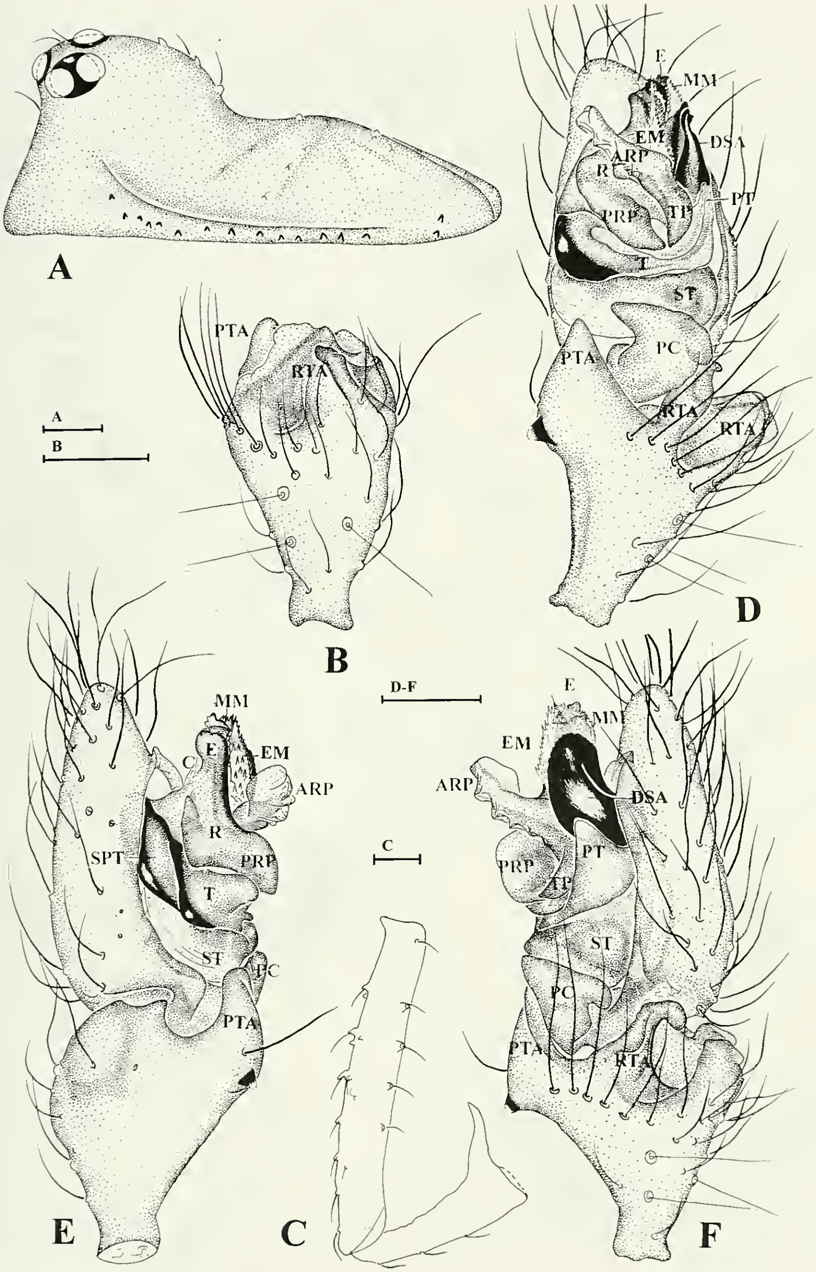

FIG. 6

Erigone prominens. (A) Male carapace, lateral view. (B) Tibia of left male palp, dorsal view. (C) Patella and femur of left male palp, retrolateral view. (D) Distal part of left male palp, ventral view. (E) Same, prolateral view. (F) Same, retrolateral view. Drawings based on a specimen from Hebei, China. Scale lines: 0.1 mm.

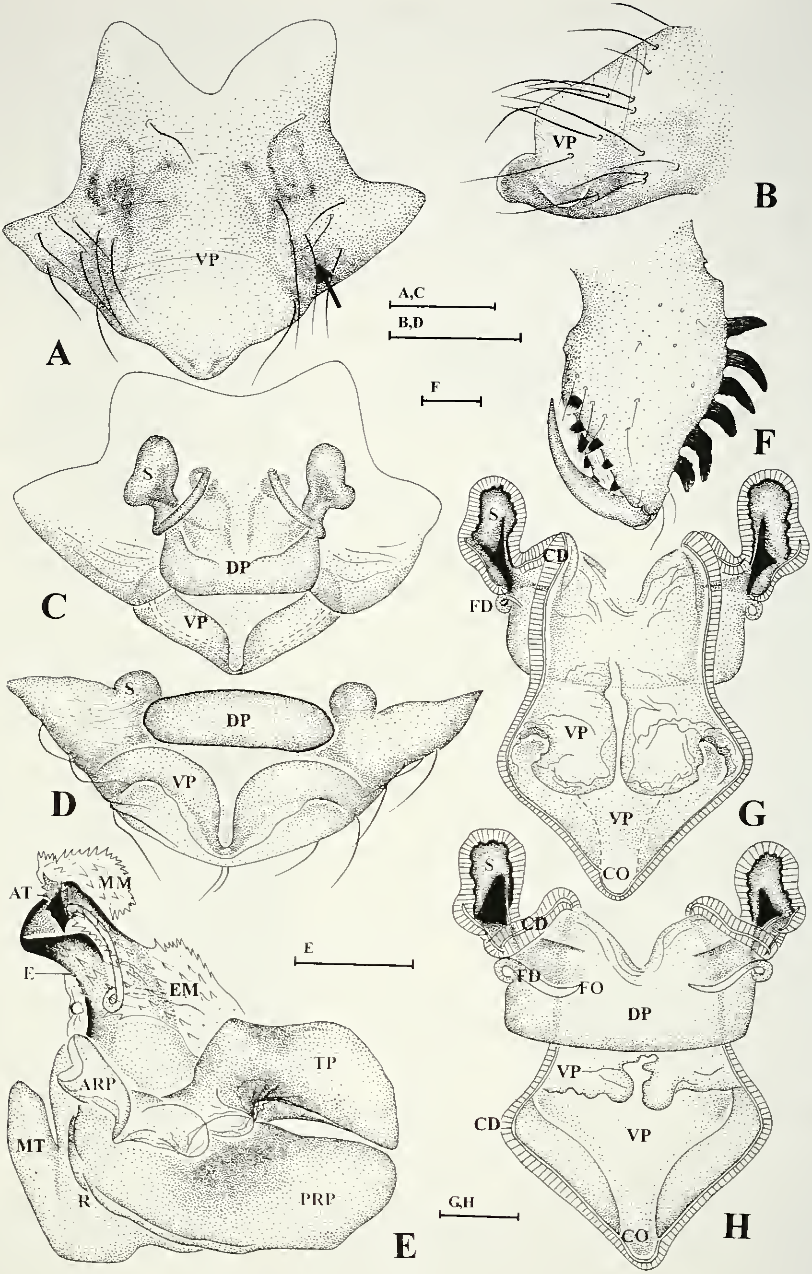

FIG. 7

Erigone prominens. (A) Epigynum, ventral view (arrow points to the shallow black depression). (B) Same, lateral view. (C) Same, dorsal view. (D) Same, posterior view. (E) Embolic division, ventral view. (F) Left male chelicera, frontal view. (G) Vulva, ventral view. (H) Same, dorsal view. Drawings based on specimens from Hebei, China. Scale lines: A-D, F=0.1 mm; E, G-H=0.05 mm.

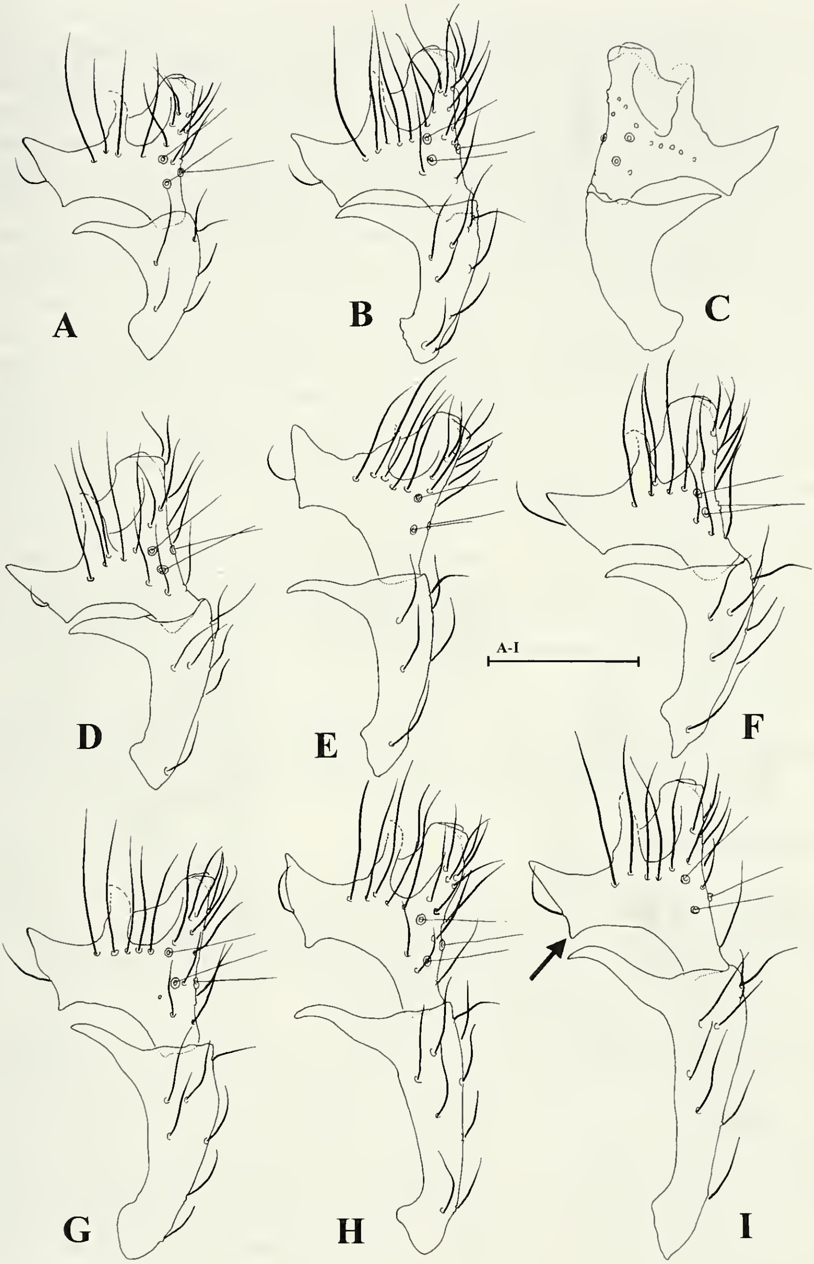

FIG. 8

Erigone prominens. (A-B, D-I) Tibiae and patellae of left male palps, retrolateral view (arrow points to the tooth on the ventral side of the widened part of the male palpal tibia). (C) Tibia and patella of right male palp, retrolateral view. Drawings based on specimens from the same population in Hebei, China (A, B, D-I) and on the holotype of *E. ourania* (C). Scale line: 0.2 mm.

E. prominens is a very widely distributed species. It shows considerable variation in epigynum and male palp. An investigation of palps, Tm I and Tm II of 50 *E. prominens* males collected from a population in a cotton field in Hebei Province, close to the type locality of *E. ourania* (Beijing), shows that length of palpal patella (Fig. 8), shape of palpal patellar apophysis (Fig. 8), development of the tooth on the ventral side of the widened part of the palpal tibia (Fig. 8) and value of Tm I and Tm II are variable. The range of Tm I and Tm II is 0.34-0.44, average 0.39 in males (n=50); 0.41-0.49, average 0.45 in females (n=50, from the same population as males). From our comparison of these 100 specimens we conclude that the species described by Crosby and Bishop (1928) under the name *E. ourania* (female unknown) corresponds to the widespread *E. prominens*. Locket (1973) examined the holotype of *E. ourania* and stated "it is difficult to bring out the differences in the sclerites of the palpal organs since their appearance changes so quickly with position, and dissection is not possible until more material is found". He further stated that "*E. ourania* is distinguished primarily by the short patella of the male palp, the large tooth on the ventral side of the widened part of the male palpal tibia (Locket, 1973: fig. 1C-D; see also Fig. 8C) and by a small value of Tm I and Tm II (Locket, 1973: Tm I and Tm II 0.35)". However, all these characters are of little taxonomical value as they all fall within the variation range of *E. prominens*. Specimens of *E. prominens* and the holotype of *E. ourania* were compared in our study and no differences in the embolic division and the apical margin of the palpal tibia were observed. Therefore we place *E. ourania* in the synonymy of *E. prominens*.

DISTRIBUTION: Cameroon to Japan, China (Anhui, Chongqing, Fujian, Guangdong, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Tibet and Zhejiang), Vietnam and New Zealand.

Erigone zheduoshanensis sp. n. Figs 9-10

MATERIAL EXAMINED: ♂ holotype (MHNG), Yakou Region (30.10°N, 101.75°E), Mt Zheduoshan, Kangding County, Sichuan Province, China, coll. S. Li and L. Tu, 17.VII.2004. – 1♀ paratype (MHNG), same data as for holotype. – 2♀ paratypes (IZCAS), same data as for holotype. – 1♀ paratype (IZCAS), Yushu Village (30.08°N, 101.95°E), Kangding County, Sichuan Province, China, coll. Y. Song, 13.VII.2004.

DIAGNOSIS: The new species belongs to Crosby & Bishop's (1928) *atra*-group of the genus *Erigone*, including *E. atra*, *E. arctica*, *E. arctophylacis* Crosby & Bishop, 1928, *E. alsaida* Crosby & Bishop, 1928, *E. dentigera* O. P.-Cambridge, 1874, *E. longipalpis* and *E. sinensis*. The male palp of all these species has a relatively simple anterior radical process, but the new species has a delicate anterior radical process furnished with conspicuous transversal membranous ridges on the outside. Copulatory ducts of the vulva have larger loops before entering into the spermathecae than in any of the similar species (Fig. 10E). Females can be further distinguished by the two additional extensions of the vulva that are visible in ventral view (Fig. 10D).

DESCRIPTION OF MALE HOLOTYPE: Total length 1.78. Carapace 0.95 long, 0.70 wide. Margins of carapace furnished with a row of small teeth (Fig. 9A). A distinct sulcus almost parallel to these teeth (Fig. 9A). Clypeus 0.16 high. AME diameter 0.05, ALE 0.07, PME 0.04, PLE 0.07, AME interdistance 0.50 times their diameter, AME-

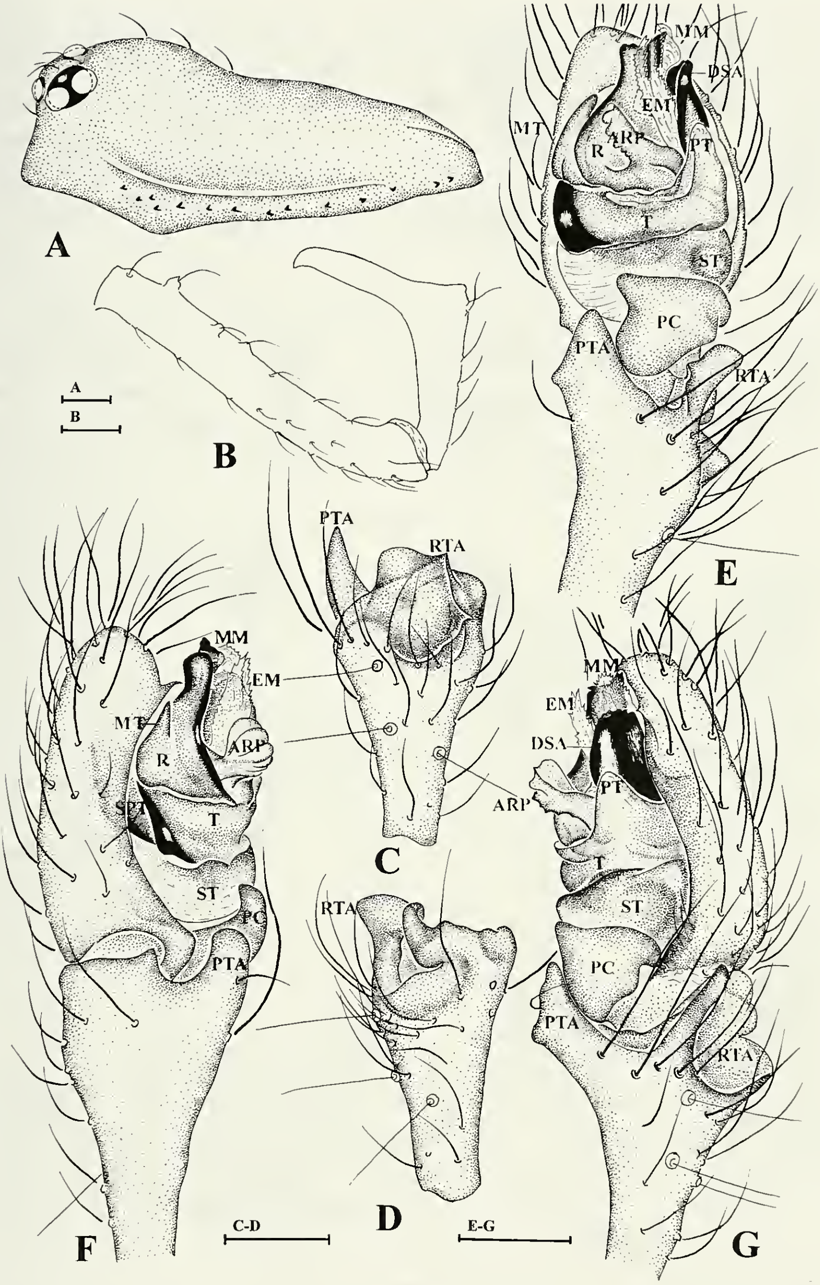

FIG. 9

Erigone zheduoshanensis sp. n. (A) Male carapace, lateral view. (B) Patella and femur of left male palp, retrolateral view. (C) Tibia of left male palp, dorsal view. (D) Same, dorsoectal view. (E) Distal part of left male palp, ventral view. (F) Same, prolateral view. (G) Same, retrolateral view. Drawings based on holotype. Scale lines: 0.1 mm.

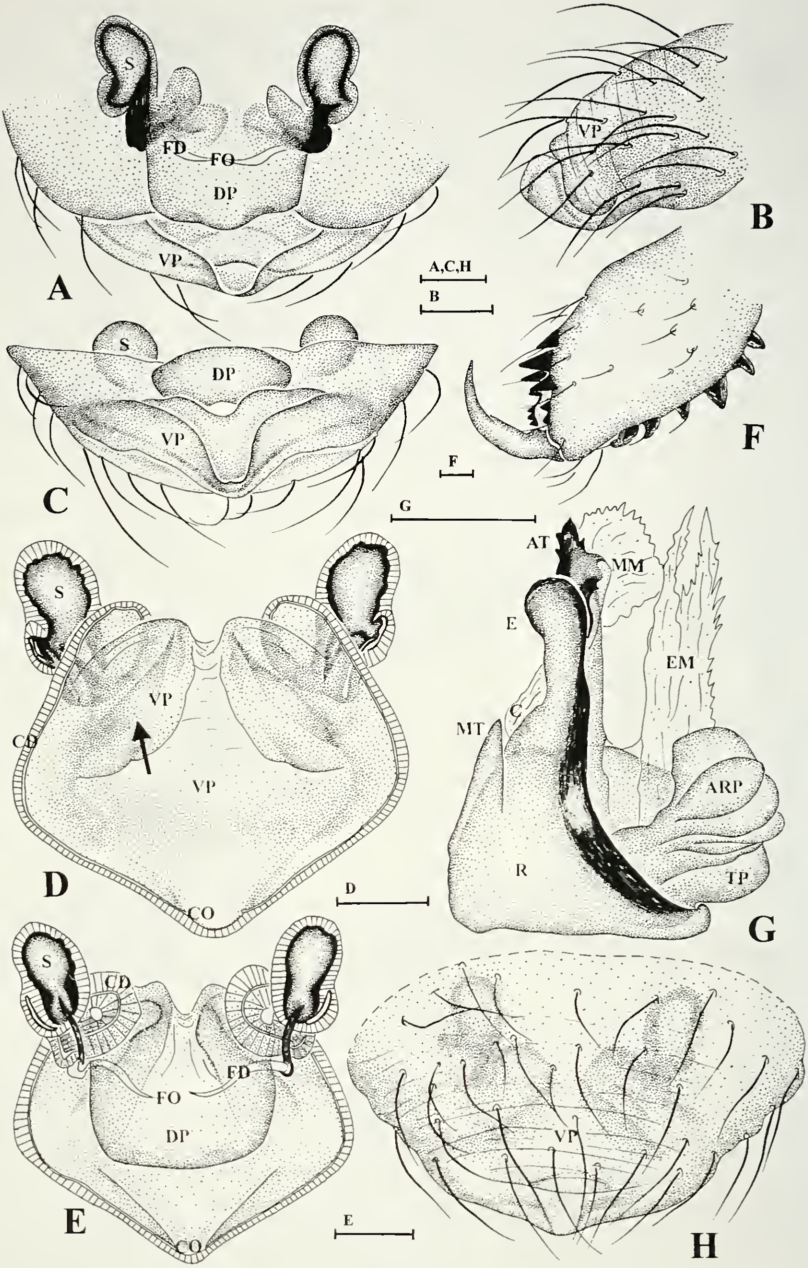

FIG. 10

Erigone zheduoshanensis sp. n. (A) Epigynum, dorsal view. (B) Same, lateral view. (C) Same, posterior view. (D) Vulva, ventral view (arrow points to the additional extension). (E) Same, dorsal view. (F) Left male chelicera, frontal view. (G) Embolic division, ventral view. (H) Epigynum, ventral view. Drawings based on paratype (A-E, H) and holotype (F-G). Scale lines: 0.05 mm.

ALE interdistance 0.48 times ALE diameter, PME interdistance 1.00 times their diameter, PME-PLE interdistance 1.00 times PLE diameter. Sternum 0.53 long, 0.52 wide. Coxa IV interdistance 0.91 times their width. Chelicera grayish brown, anterolaterally furnished with a row of 6 large teeth; fang groove with 5 promarginal and 5 retromarginal teeth (Fig. 10F). Tibia of leg I 6.54 times longer than deep. Tm I 0.49, Tm IV absent. Dorsal spines on tibia of leg IV: 2-2-2-1; dorsal spine on patella of leg IV: 1-1-1-1. Leg measurements: I 2.25 (0.64, 0.26, 0.53, 0.44, 0.38); II 2.06 (0.58, 0.27, 0.44, 0.41, 0.36); III 1.80 (0.54, 0.25, 0.35, 0.36, 0.30); IV 2.22 (0.63, 0.25, 0.53, 0.46, 0.35).

Palp: Femur armed with 3 robust ventral teeth in distal half (Fig. 9B). Patella longer than tibia, with long, evenly downward-curved ventral apophysis (Fig. 9B). Tibia (Fig. 9C-G) slender basally, strongly widened distally; provided with a retrolateral apophysis having an indented apical margin, with a stout prolateral apophysis and 1 prolateral and 2 retrolateral trichobothria. Tegulum distal to subtegulum in unexpanded palp (Fig. 9G). Protegulum well-developed. Distal suprategular apophysis of the usual form (Fig. 9E, G). Embolic division (Fig. 10G) is the most complicated in the atra-group: Anterior radical process with 6 conspicuous transversal membranous ridges on the outside; tailpiece undeveloped, with blunt tip; posterior radical process absent; mesal tooth of the usual form; median membrane arising from the column, meeting with tip of embolus ventrally; embolic membrane bifurcate distally, originating from center of the radix; embolus short, its apex armed with several small teeth.

Description of female paratype (collected at Mt Zheduoshan): Carapace unmodified, similar to that of male in coloration. Total length 2.19. Carapace 0.83 long, 0.64 wide. Clypeus 0.15 high. AME diameter 0.05, ALE 0.08, PME 0.06, PLE 0.07, AME interdistance 0.35 times their diameter, AME-ALE interdistance 0.50 times ALE diameter, PME interdistance 0.94 times their diameter, PME-PLE interdistance 0.57 times PLE diameter. Sternum 0.56 long, 0.50 wide. Coxa IV interdistace 0.96 times their width. Chelicera with 5 promarginal and 4 retromarginal teeth. Tibia of leg I 5 times longer than deep. Tm I 0.45, Tm IV absent. Dorsal spines on tibia of leg IV: 2-2-2-1; dorsal spine on patella of leg IV: 1-1-1-1. Leg measurements: I 2.42 (0.69, 0.28, 0.56, 0.51, 0.38); II 2.27 (0.64, 0.31, 0.48, 0.47, 0.37); III 1.95 (0.54, 0.27, 0.42, 0.41, 0.31); IV 2.48 (0.73, 0.26, 0.63, 0.53, 0.33).

Epigynum pale, with a slight notch on hind margin and a rounded tubercle in its center (Fig. 10B). Dorsal plate large, rectangular (Fig. 10A). Copulatory ducts embedded in outer margin of slightly sclerotized capsule with 2 additional extensions visible in ventral view (Fig. 10D). Copulatory ducts forming large oblong loops before entering into reniform spermathecae (Fig. 10E). Fertilization ducts mesally oriented, comparatively long for an Erigone species (Fig. 10E).

Etymology: The specific name refers to the type locality.

Variation: The total length varies from 2.03 to 2.19, the carapace length from 0.83 to 0.92 and the carapace width from 0.64 to 0.70 in females (n=4).

Distribution: Only known from two localities in Sichuan Province, China.

Habitat: Under stones, in detritus and between roots of grass.

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On linyphiid spiders (Araneae) collected by A. Senglet in Iran in 1973-1975

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On linyphiid spiders (Araneae) collected by A. Senglet in Iran in 1973-1975. - The spider collection of A. Senglet from Iran contains linyphiids that were attributed to 33 species. Among these, the following four species are described as new to science: *Araeoncus mitriformis* sp. n., *Archaraeoncus alticola* sp. n., *Erigonoplus sengleti* sp. n., and *Sengletus longiscapus* gen. n., sp. n. A new combination is proposed: *Megalepthyphantes kuhitangensis* (Tanasevitch, 1989) comb. n. (ex *Lepthyphantes* Menge). The female of *M. camelus* (Tanasevitch, 1990) is described for the first time. Twenty four species are reported for the first time from Iran. For each species the known distributional range is given.

Keywords: Linyphiidae - new genus - new species - new combination - new records - Iran.

INTRODUCTION

According to recent a checklist (Ghavami, 2006) the linyphiid spider fauna of Iran amounts to 12 species. A 13th species *Troglohyphantes paulusi* Thaler, 2002 is missing from that list. Four of them were described from Iran, and non of them was again found inside or outside that country, i.e., *Lepthyphantes iranicus* Saaristo & Tanasevitch, 1996, *L. sbordonii* Brignoli, 1970, *Tenuiphantes perseus* (van Helsdingen, 1977), and *Troglohyphantes paulusi*.

Spiders collected in different parts of Iran and stored in the Muséum d'histoire naturelle, Geneva, allowed to add 24 species to the list of Iranian linyphiids, as well as to describe four species new to science. For one of them a new genus is established. Two species from this collection could only be determined to genus level, and a few females were left without identification.

MATERIAL AND METHODS

This paper is based exclusively on the material collected by A. Senglet in Iran in 1973-1975. The spiders were collected by sifting, sweeping and hand collecting in northern Iran (Ciscaspia, Elburs Mts and the area bordering Turkmenistan), as well as in western Iran along the Zagros Mts.

All holotypes and the majority of paratypes are deposited in the Muséum d'histoire naturelle de Genève. Some paratypes and non-type specimens are in the collection of the Zoological Museum of the Moscow State University, Moscow, Russia (ZMMU).

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Senglet's collection numbers are given in square brackets. Only localities in the mountains are provided with altitudes.

European-Ancient Mediterranean species = European species with a distribution area extending into Central Asia through the southern Palaearctic mountains. Ancient Mediterranean species = Mediterranean species with a distribution area extending into Central Asia.

Chaetotaxy of Erigoninae is given in a formula (e.g., 2.2.1.1) which refers to the number of dorsal spines on tibiae I-IV. In Micronetinae chaetotaxy is given in a different formula, e.g., Ti I: 2-1-1-2(1), which means that tibia I has two dorsal, one pro- and one retrolateral spine, and two or one ventral spine (the apical spines are disregarded). The sequence of leg segment measurements is as follows: Femur + patella + tibia + metatarsus + tarsus. All measurements are given in mm. Scale lines in the figures are 0.1 mm unless indicated otherwise.

The terminology of the Micronetinae genitalic structures follows Saaristo & Tanasevitch (1996). – terminology of the Erigoninae palp partially follows Hormiga (2000). The systematic nomenclature largely follows Platnick (2008), except for the generic concepts of *Agyneta* Hull, 1911 and *Halorates* Hull, 1911.

Abbreviations used in the text and figures: ARP - anterior radical process, BC - bursa copulatrix, DPS - distal part of scape, DSA - distal suprategular apophysis, E - embolus, ED - embolic division, EG - entrance groove, EP - embolus proper, Fe - femur, LL - lateral lobes, MA - membraneous area, Mt - metatarsus, Pc - paracymbium, PH - pit hook, PMP - posterior median plate, Pr - protegulum, R - radix, St - stretcher, StA - stretcher area, Ti - tibia, TmI - position of trichobothrium on tibia I.

RESULTS

Agyneta fuscipalpa (C.L. Koch, 1836)

MATERIAL: IRAN: 1 ♂, 1 ♀ [7403], Khuzestan, N of Andimeshk (32°41'N, 48°15'E), 17.V.1974. – 2 ♂ [7404], Shush (32°02'N, 48°18'E), 18.V.1974. – 4 ♂, 4 ♀ (ZMMU), 2 ♂, 5 ♀ [7405], Masjed Soleyman (31°59'N, 49°16'E), sifted herb tuffs, 20.V.1974. – 1 ♂, 2 ♀ [7407], Kohgiluyeh, Dogonbadan (30°22'N, 50°47'E), 21.V.1974. – 3 ♂ [7409], Charam (30°44'N, 50°44'E), 23.V.1974. – 1 ♂, 6 ♀ [7413], Kohgiluyeh, Yasudj (30°36'N, 51°36'E), 26.V.1974. – 1 ♂ [7422], Fars, Serizjan (called Semargoun on lables) (28°57'N, 52°33'E), 7.VI.1974. – 1 ♂, 4 ♀ [7430], Bakhtiyari, Qafarokh (32°18'N, 51°01'E), 16.VI.1974. – 1 ♂ [7452] Hamedan, NE of Asadabad (34°51'N, 48°12'E), 2.VII.1974. – 1 ♂ [7462], Khorasan, N of Quchan (37°12'N, 58°29'E), 15.VII.1974. – 1 ♂, 3 ♀ [7467], Zavi (36°52'N, 59°53'E), 22.VII.1974.

RANGE: European-Ancient Mediterranean.

REMARKS: This species is here reported for the first time for the Iranian fauna.

Agyneta kopetdaghensis Tanasevitch, 1989

MATERIAL: IRAN: 1 ♂, 2 ♀ [7473], Mazandaran, above Shahpasand (37°02'N, 55°17'E), sifted litter, 29.VII.1974.

RANGE: Turkmenian-Iranian.

REMARKS: This species was hitherto known only from the type locality, Kopetdagh Mts, Turkmenistan (see Tanasevitch, 1989). It is here reported for the first time for the Iranian fauna.

Agyneta mesasiatica Tanasevitch, 2000

MATERIAL: IRAN: 1 ♂, [7472], Golestan (called Mazandaran on lables), Tang-e-Rah (37°25'N, 55°45'E), 800-1000 m a.s.l., 28.VII.1974. – 1 ♂, 1 ♀ [7473], above Shahpasand (37°02'N, 55°17'E), sifted litter, 29.VII.1974. – 2 ♂, 2 ♀ [7461], Khorasan, E of Chaman Bid (37°26'N, 56°37'E), 14.VII.1974.

RANGE: Irano-Caucasian.

REMARKS: This species was recently described from the Caucasus and the Kopetdagh Mts, Turkmenistan (Tanasevitch, 2000). Shahpasand is the westernmost locality of this species. It is here reported for the first time for the Iranian fauna.

Araeoncus caucasicus Tanasevitch, 1987

MATERIAL: IRAN: 1 ♂, [7325], Tehran, Nesa (36°04'N, 51°19'E), 14.VII.1973. – 1 ♀ [7326], Tehran, Pol-e-Djadjirad (35°45'N, 51°42'E), 16.VII.1973. – 1 ♂ [7403], Khuzestan, N of Andimeshk (32°41'N, 48°15'E), 17.V.1974. – 4 ♀ [7405], Masjed Soleyman (31°59'N, 49°16'E), sifted herb tuffs, 20.V.1974. – 1 ♂, 2 ♀ (ZMMU) [7416], Fars, Bishapoor (29°47'N, 51°35'E), 28.V.1974. – 2 ♂, 1 ♀ [7420], Kavar (Band-e-Bahman) (29°12'N, 52°37'E), 5.VI.1974. – 1 ♂ [7422], Serizjan (called Semargoun on labels) (28°57'N, 52°33'E), 7.VI.1974. – 1 ♂ [7425], environs of Sivand (30°07'N, 52°58'E), sifted Platanus litter, 10.VI.1974. – 1 ♂, 2 ♀ [7429], Esfahan, Pol-e-Kaleh (32°23'N, 51°14'E), 15.VI.1974. – 1 ♂ [7447], Ilam, Ilam (33°37'N, 46°23'E), sifted humus, 27.VI.1974. – 1 ♀ [7490], western part of Azarbayjan, Qareh Zia-od-Din (38°52'N, 45°12'E), 13.VIII.1974.

RANGE: Eastern Ancient-Mediterranean.

REMARKS: This species was hitherto known from the Caucasus (see Tanasevitch, 1987) and Western Kazakhstan (see Eskov & Marusik, 1995). Serizjan is the southmost locality of this species. It is here reported for the first time for the Iranian fauna.

Araeoncus mitriformis sp. n. Figs 1-4

MATERIAL: IRAN: ♂ holotype [7523], Hamadan, near Hamadan (34°44'N, 48°27'E), 2600 m a.s.l., 16.VI.1975.

ETYMOLOGY: The specific name refers to the shape of the palpal tibia.

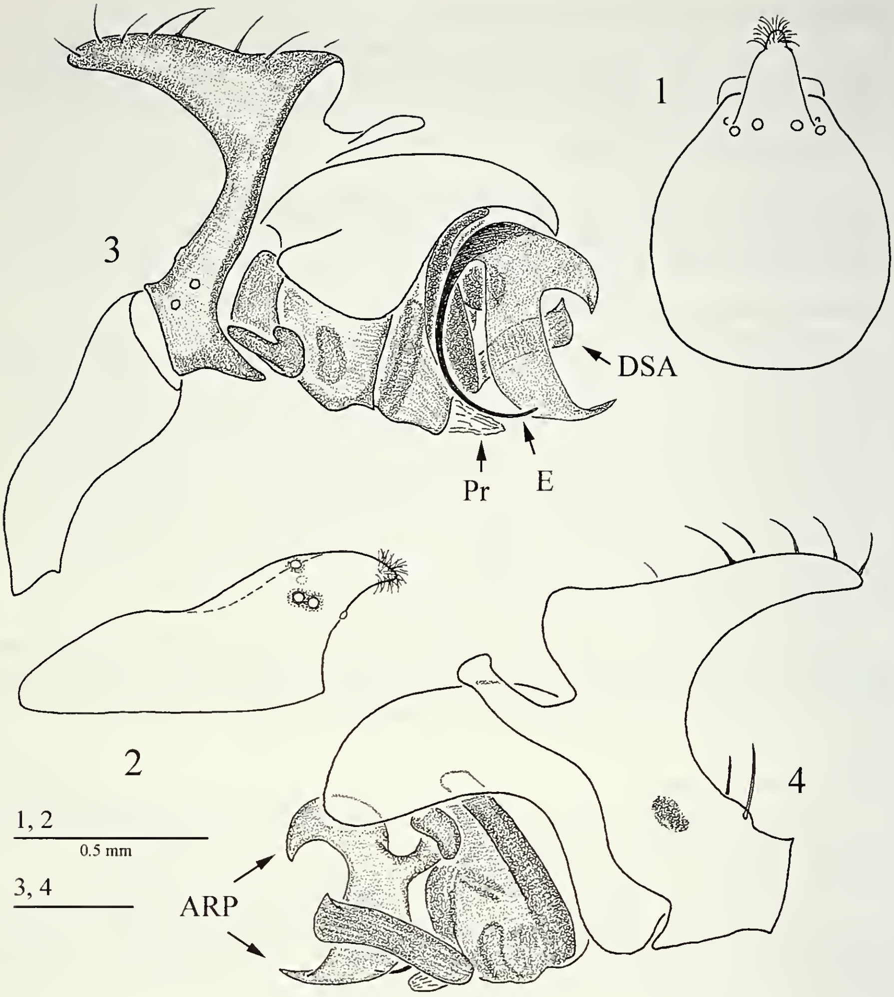
DIAGNOSIS: The new species is characterized by the mitriform palpal tibia and the characteristic shape of two branches of the anterior radical process of the embolic division.

DESCRIPTION: Male. Total length: 2.00. Carapace modified as in Figs 1, 2, 1.00 long, 0.68 wide, reddish brown. Chelicerae: 0.55 long, unmodified. Legs pale reddish brown. Leg I 2.39 long (0.65+0.23+0.60+0.53+0.38), IV 2.48 long (0.70+0.20+0.65+0.60+0.33). Chaetotaxy: 2.2.1.1. Metatarsi I-III with a trichobothrium. TmI 0.45. Palp as in Figs 3, 4: Patella elongated, widened distally. Distal part of tibia mitriform, with narrow process on lateral side. Paracymbium small, narrow, hook-shaped. Protegulum conical. Distal suprategular apophysis very long, ribbon-shaped. Anterior radical process of embolic division with two large flat branches, upper branch shorter than long, distally pointed lower branch. Embolus relatively long and narrow.

Abdomen 1.03 long, 0.68 wide, dark grey.

Female unknown.

TAXONOMIC REMARKS: The new species resembles the Caucasian *A. galeriformis* (Tanasevitch, 1987), which is also a highlander and occurs at high altitudes in the



FIGS 1-4

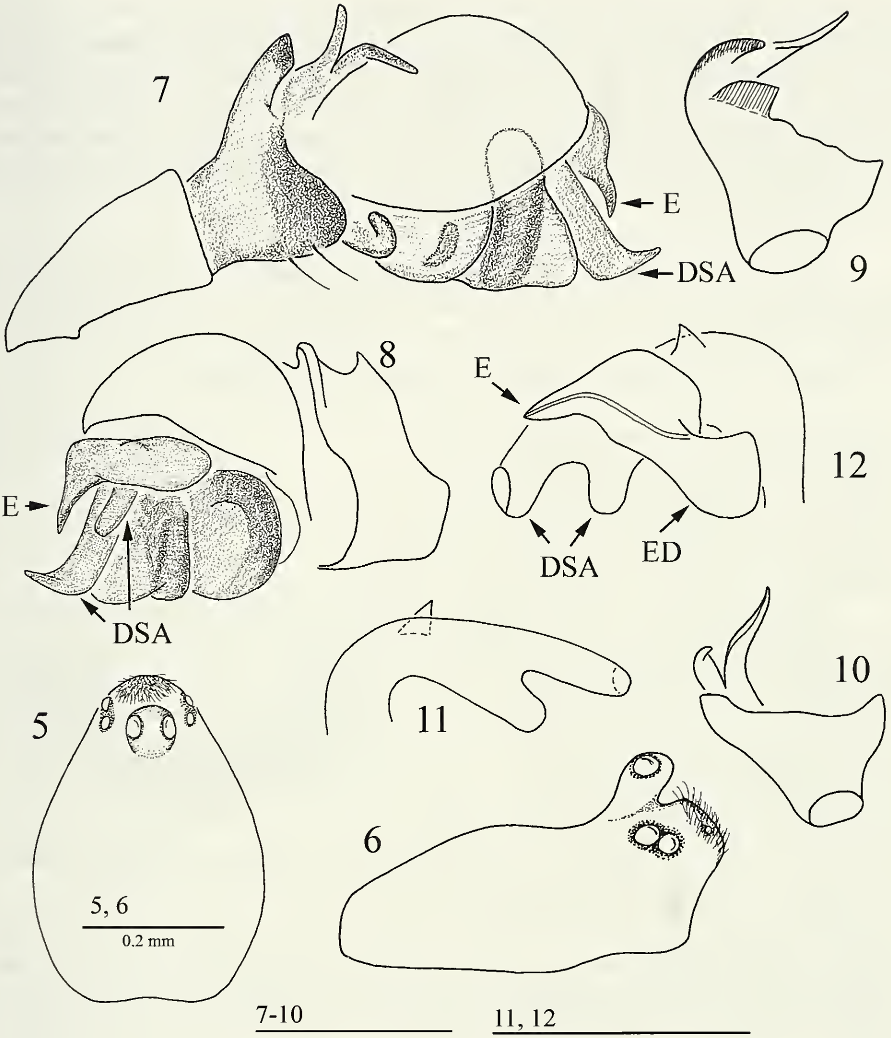
Araeoncus mitriformis sp. n., ♂ holotype. (1, 2) Carapace, dorsal and lateral view. (3, 4) Right palp, prolateral and retrolateral view.

Caucasian Mts from 1900 to 3300 m a.s.l. Both species can be easily distinguished by the shape of the male carapace, as well as by the shape of the branches of the anterior radical process in the embolic division.

DISTRIBUTION: Known from the type locality only.

Archaraeoncus alticola sp. n. Figs 5-12

MATERIAL: IRAN: ♂ holotype [7323], Tehran, Dizine (36°02'N, 51°25'E), 3800 m a.s.l., in snow, 13.VII.1973. – 1 ♂ [7361], Shemshak (36°01'N, 51°29'E), 2600 m a.s.l., 27.VIII.1973.



Figs 5-12

Archaraeoncus alticola sp. n., ♂ paratype. (5, 6) Carapace, dorsal and lateral view. (7, 8) Right palp, prolateral and retrolateral view. (9, 10) Palpal tibia, dorsal and prolateral view. (11) Distal suprategular apophysis. (12) Distal suprategular apophysis and embolic division.

Etymology: The specific name, a noun in apposition, means "highlander".

Diagnosis: The new species is characterized by its small size, its modified carapace, as well as by the specific shape of its palpal tibia.

Description: Male. Total length: 1.15. Carapace modified as in Figs 5, 6, 0.60 long, 0.43 wide, pale brown. Cephalic part with rounded outgrowth (almost globular in dorsal view), carrying large posterior median eyes. Chelicerae: 0.18 long. Legs pale brown. Leg I 1.21 long (0.33+0.13+0.27+0.25+0.23), IV 1.31 long (0.33+0.13+0.35+0.27+0.23). Chaetotaxy: 1.1.1.1, spines very small, scarcely visible. Metatarsi I-III with a trichobothrium. TmI 0.39. Palp as in Figs 7-12. Cymbium without posterodorsal outgrowth. Tibia retrolaterally with long, narrow, medially divided process (Figs 9, 10). Paracymbium small, hook-shaped. Distal suprategular apophysis divided into two long branches of different size. Embolus relatively short. Abdomen 0.63 long, 0.40 wide, grey, dorsal pattern absent.

Female unknown.

Taxonomic remarks: The new species is very similar to *Archaraeoncus prospiciens* (Thorell, 1875), but can be very easily distinguished by the shape of the male carapace (Fig 6, cf. Fig 13) and details of the male palp (Figs 7-12, cf. Figs 14-17).

Distribution: Known only from two localities near Tehran.

Archaraeoncus prospiciens (Thorell, 1875) Figs 13-18

Erigone prospiciens Thorell, 1875: 57, ♂.
Archaraeoncus prospiciens. – Tanasevitch, 1987: 337, ♂ only, not ♀!
Araeoncus tianschanica Hu & Wu, 1989: 164, ♂.
Archaraeoncus tianschanicus. – Zhou & Luo, 1992: 10, ♂ and ♀.
Archaraeoncus prospiciens. – Song, Zhu & Chen, 1999: 156, ♂ and ♀.

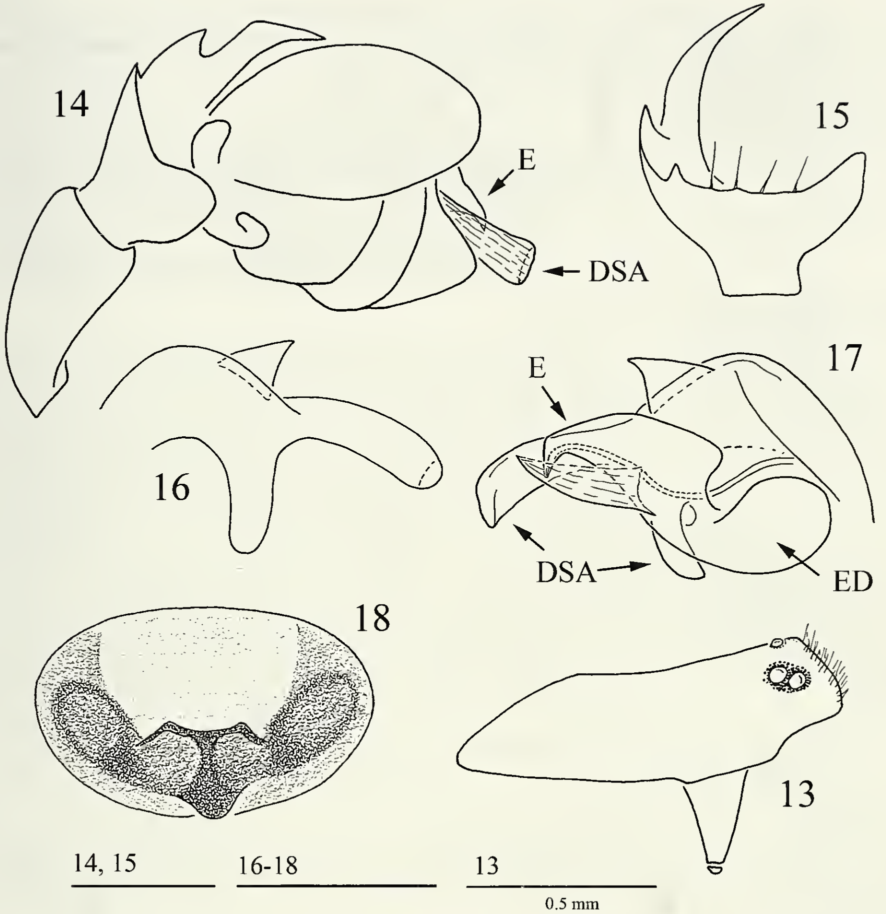
Material: IRAN: 1 ♀ [7347], Esfahan, Nowghan (33°14'N, 49°59'E), 7.VIII.1973. – 3 ♂, 6 ♀ (ZMMU) [7402], Lorestan, Pol-e-Dokhtar (33°10'N, 47°44'E), 17.V.1974. – 1 ♂, 1 ♀ and 2 ♂, 4 ♀ [7404], Khuzestan, Shush (32°02'N, 48°18'E), 18.V.1974. – 5 ♂, 3 ♀ [7409], Kohgiluyeh, Charam (30°44'N, 50°44'E), 23.V.1974. – 4 ♀ [7411], Basht (30°20'N, 51°15'E), 25.V.1974. – 1 ♂, 6 ♀ [7413], Yasudj (30°36'N, 51°36'E), 26.V.1974. – 3 ♂, 13 ♀ [7416], Fars, Bishapoor (29°47'N, 51°35'E), 28.V.1974. – 1 ♀ [7418], Dasht-e-Arjan (29°40'N, 51°59'E), 1650 m a.s.l., dry stream bed, 1.VI.1974. – 1 ♀ [7422], Serizjan (called Semargoun on lables) (28°57'N, 52°33'E), 7.VI.1974. – 2 ♂, 4 ♀ [7424], Allabad (30°01'N, 53°00'E), 9.VI.1974. – 1 ♂, 6 ♀ [7427], Izad Khavast (31°31'N, 52°08'E), 12.VI.1974. – 1 ♂ and 1 ♂, 6 ♀ [7428], Esfahan, Falayarjan (32°34'N, 51°31'E), 14.VI.1974, 1 ♂, 2 ♀ and 1 ♀ [7429], Pol-e-Kaleh (32°23'N, 51°14'E), 15.VI.1974. – 1 ♂ [7444], Lorestan, Dizgaran (33°43'N, 47°00'E), 25.VI.1974. – 3 ♀ [7460], Mazandaran, Tang-e-Rah (37°23'N, 55°50'E), 13.VII.1974. – 1 ♂ [7473], above Shahpasand (37°02'N, 55°17'E), sifted litter, 29.VII.1974. – 1 ♂ [7540], Vallabad (36°16'N, 51°16'E), 1900 m a.s.l., 5.VII.1975. – 3 ♂, 1 ♀ [7461], Khorasan, E of Chaman Bid (37°26'N, 56°37'E), 14.VII.1974. – 1 ♂, 4 ♀ [7462], N of Quchan (37°12'N, 58°29'E), 15.VII.1974. – 2 ♀ [7463], Emamgholi (37°26'N, 58°30'E), 15.VII.1974. – 1 ♂, 5 ♀ [7466], route to Amirabad (36°47'N, 59°49'E), 1400 m a.s.l., 21.VII.1974. – 1 ♂ [7468], same (36°47'N, 59°54'E), 1100 m a.s.l., 23.VII.1974. – 4 ♀ [7469], Shandiz Valley, (36°22'N, 59°15'E), 25.VII.1974. – 9 ♀ [7470], Bojnurd (37°29'N, 57°26'E), 26.VII.1974. – 1 ♀ [7598], eastern part of Azarbayjan, NW of Sofian (38°21'N, 45°51'E), 21.IX.1975. – 1 ♂, 1 ♀ [7501], western part of Azarbayjan, Qarazia-ed-Din (38°56'N, 45°03'E), 28.V.1975.

Range: European-Ancient Mediterranean.

Remarks: A female, described by Tanasevitch (1987) under *A. prospiciens*, actually belongs to another species. *A. prospiciens* is here reported for the first time for the Iranian fauna. A synonymy is given above to show the confusing nomenclatural history of this species.

Dactylopisthes digiticeps (Simon, 1881)

Material: IRAN: 1 ♀ [7402], Lorestan, Pol-e-Dokhtar (33°10'N, 47°44'E), 17.V.1974. – 1 ♀ [7404], Khuzestan, Shush (32°02'N, 48°18'E), 18.V.1974. – 2 ♀ [7404], Shush (32°02'N,



FIGS 13-18

Archaraeoncus prospiciens (Thorell, 1875), ♂ (13-17) and ♀ (18) from Iran, Lorestan. (13) ♂ carapace, lateral, view. (14) Right palp, prolateral view. (15) Palpal tibia, dorsal view. (16) Distal suprategular apophysis. (17) Distal suprategular apophysis and embolic division. (18) Epigyne, ventral view.

48°18'E), 18.V.1974. – 5 ♀ (ZMMU), 6 ♂, 8 ♀ and 4 ♂ [7409], Kohgiluyeh, Charam (30°44'N, 50°44'E), 23.V.1974. – 3 ♂, 1 ♀ [7416], Fars, Bishapoor (29°47'N, 51°35'E), 28.V.1974. – 2 ♀ [7422], Serizjan (called Semargoun on lables) (28°57'N, 52°33'E), 7.VI.1974. – 1 ♀ [7425], environs of Sivand (30°07'N, 52°58'E), sifted *Platanus* litter, 10.VI.1974. – 1 ♀ [7476a], Mazandaran, Mahmoudabad (36°38'N, 52°15'E), dunes, 2.VIII.1974.

RANGE: European-Ancient Mediterranean.

REMARKS: Serizjan is the south-easternmost locality of this species. It is here reported for the first time for the Iranian fauna.

Entelecara sp.

MATERIAL: IRAN: 3 ♀ [7426], Fars, environs of Ghaderabad (30°22'N, 53°18'E), 11.VI.1974.

REMARKS: These females probably belong to *E. erythropus* (Westring, 1851), which has a strongly variable epigyne shape (see Tanasevitch, 2008). An identification to species is impossible without a corresponding male.

Erigone atra Blackwall, 1833

MATERIAL: IRAN: 1 ♂ [7459], Mazandaran, Baladeh (36°13'N, 51°49'E), 2200 m a.s.l., 12.VII.1974.

RANGE: Holarctic.

REMARKS: This species is here reported for the first time for the Iranian fauna.

Erigone dentipalpis (Wider, 1834)

MATERIAL: IRAN: 1 ♂, [7311], Guilan, Galugah/Bandar Pahlevi (37°31'N, 49°19'E), 4.VII.1973. – 1 ♀ [7329a], Mazandaran, Amol (36°18'N, 51°21'E), meadow, 18.VII.1973. – 1 ♂ [7332], Naharkoran / Gorgan (36°44'N, 54°29'E), forest, sifting, moss, 20.VII.1973. – 1 ♂, 4 ♀ [7459], Baladeh (36°13'N, 51°49'E), 2200 m a.s.l., 12.VII.1974. – 1 ♀ [7334], Keyasar (36°22'N, 53°16'E), very dry forest, sifting, 22.VII.1973. – 2 ♂ [7346], Lorestan, Aligudarz (33°21'N, 49°48'E), 7.VIII.1973. – 1 ♂ [7351], Bakhtiyari, Kuhrang (32°29'N, 50°04'E), 2700 m a.s.l., near a spring, 9.VIII.1973. – 4 ♂, 7 ♀ [7402], Pol-e-Dokhtar (33°10'N, 47°44'E), 17.V.1974. – 1 ♀ [7416], Fars, Bishapoor (29°47'N, 51°35'E), 28.V.1974. – 3 ♀ [7418], Dasht-e-Arjan (29°40'N, 51°59'E), 1650 m a.s.l., dry stream bed, 1.VI.1974. – 1 ♂, 3 ♀ [7427], Izad Khavast (31°31'N, 52°08'E), 12.VI.1974. – 2 ♀ [7428], Esfahan, Falayarjan (32°34'N, 51°31'E), 14.VI.1974. – 2 ♂, 1 ♀ [7429], Pol-e-Kaleh (32°23'N, 51°14'E), 15.VI.1974. – 1 ♀ [7463], Khorasan, Emamgholi (37°26'N, 58°30'E), 15.VII.1974. – 1 ♀ [7467], Zavi (36°52'N, 59°53'E), 22.VII.1974. – 1 ♂, 4 ♀ [7468], route from Amirabad (36°47'N, 59°54'E), 1100 m a.s.l., 23.VII.1974. – 1 ♀ [7536], Tehran, Shahrak (36°25'N, 50°30'E), 1500 m a.s.l., 2.VII. 1975.

PREVIOUS RECORD FROM IRAN: Kerman or Gilan, 4000 m a.s.l. (Roewer, 1955).

RANGE: Holarctic.

Erigonoplus nigrocaeruleus (Simon, 1881)

MATERIAL: IRAN: 1 ♂ [7435], Bakhtiyari, NE of Zardeh-Kuh (32°23'N, 50°07'E), 2600-2800 m a.s.l., 20.VI.1974.

RANGE: Ancient-Mediterranean.

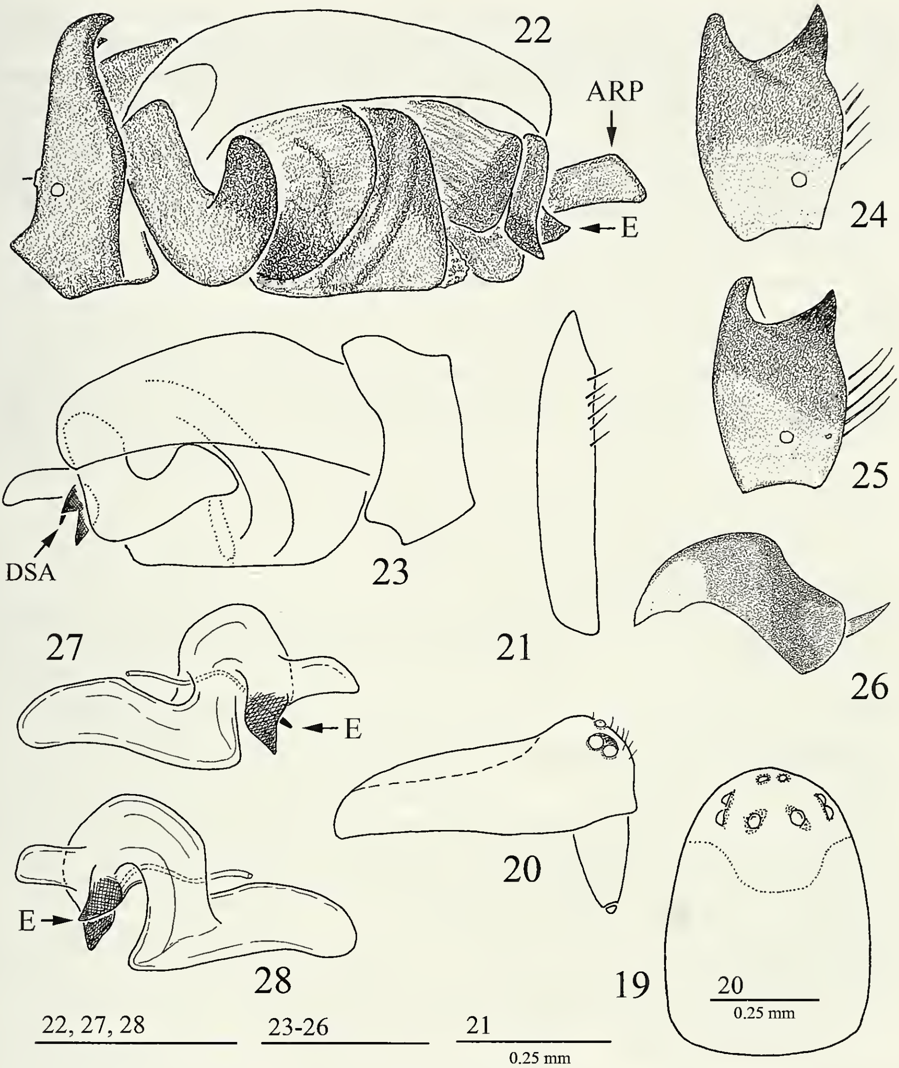
REMARKS: This species was originally described from a male from Corsica (Simon, 1881) and has never been found afterwards. The male from Zardeh-Kuh completely corresponds to Millidge's figures of the holotype given in his revision of the genus *Erigonoplus* Simon, 1884 (see Millidge, 1975). This species is here reported for the first time for the Iranian fauna.

Erigonoplus sengleti sp. n. Figs 19-28

MATERIAL: IRAN: 1 ♂ holotype [7409], Kohgiluyeh, Charam (30°44'N, 50°44'E), 23.V.1974.

ETYMOLOGY: The new species is named in honour of the Swiss arachnologist Antoine Senglet.

DIAGNOSIS: The new species is characterized by a weakly modified male carapace, as well as by the specific shape of the anterior radical process on the embolic division.



FIGS 19-28

Erigonoplus sengleti sp. n., ♂ paratype. (19, 20) Carapace, dorsal and lateral view. (21) Femur I, prolateral view. (22, 23) Right palp, prolateral view. (24, 25) Palpal tibia, dorsal view, slightly different aspects. (26) Distal suprategular apophysis. (27, 28) Embolic division.

DESCRIPTION: Male. Total length: 1.38. Carapace weakly modified (Figs 19, 20), 0.63 long, 0.50 wide, pale brown. Cephalic part slightly elevated (Fig. 19). Chelicerae: 0.23 long. Legs pale brown. Leg I 2.01 long (0.50+0.20+0.50+0.48+0.33), IV 2.01 long (0.55+0.18+0.53+0.45+0.30). Femur I ventrally with several short stout spines in its distal part (Fig. 21). Chaetotaxy: 2.2.1.1, spines equal to diameter of segment, or a little longer. Metatarsi I-III with a trichobothrium. TmI 0.41. Palp as in Figs 22-28:

Cymbium without posterodorsal outgrowth. Tibia with two processes distally. Paracymbium relatively large, hook-shaped. Distal suprategular apophysis flat and wide, with claw-shaped outgrowth apically. Embolic division relatively large, with wide and long anterior process. Abdomen 0.70 long, 0.43 wide, grey, dorsal pattern absent.

Female unknown.

Taxonomic remarks: The species is clearly distinguished from known congeners by the almost unmodified male carapace, as well as by the specific shape of the anterior radical process on the embolic division.

Distribution: Known only from the type locality.

Frontinellina frutetorum (C.L. Koch, 1834)

Material: IRAN: 1 ♀ [7470], Khorasan, Bojnurd (37°29'N, 57°26'E), 26.VII.1974. – 2 ♀ [7474], Mazandaran, Ramiyan (36°59'N, 55°07'E), 29.VII.1974. – 1 ♀ [7475], Allabad (36°53'N, 54°57'E), 30.VII.1974. – 1 ♀ [7477], Now Shahr (36°37'N, 51°31'E), 3.VIII.1974.

Previous records from Iran: Tehran (Goodarzi, 1994), Guilan, Golestan, Zanjan (Ghavami *et al.*, 2004), Mazandaran (Ghavami, 2006).

Range: European-Ancient Mediterranean.

Gnathonarium dentatum (Wider, 1834)

Material: IRAN: 1 ♀ [7318], Mazandaran, Nashtarud (36°43'N, 51°08'E), forest, sifting, 10.VII.1973. – 1 ♂, 1 ♀ [7477], Now Shahr (36°37'N, 51°31'E), 3.VIII.1974. – 1 ♂ and 4 ♂, 2 ♀ [7404], Khuzestan, Shush (32°02'N, 48°18'E), 18.V.1974. – 4 ♂, 21 ♀ [7409], Kohgiluyeh, Charam (30°44'N, 50°44'E), 23.V.1974. – 2 ♂, 2 ♀ [7416], Fars, Bishapoor (29°47'N, 51°35'E), 28.V.1974. – 1 ♀ [7421], Firuzabad, (28°52'N, 52°32'E), 6.VI.1974. – 3 ♀ [7422], Serizjan (called Semargoun on lables) (28°57'N, 52°33'E), 7.VI.1974. – 1 ♂ [7424], Allabad (30°01'N, 53°00'E), 9.VI.1974. – 1 ♀ [7425], environs of Sivand (30°07'N, 52°58'E), sifted *Platanus* litter, 10.VI.1974. – 2 ♀ [7426], environs of Ghaderabad (30°22'N, 53°18'E), 11.VI.1974. – 4 ♂, 2 ♀ [7428], Esfahan, Falayarjan (32°34'N, 51°31'E), 14.VI.1974. – 6 ♂, 12 ♀ [7429], Pol-e-Kaleh (32°23'N, 51°14'E), 15.VI.1974. – 3 ♂, 5 ♀ [7459], Baladeh (36°13'N, 51°49'E), 2200 m a.s.l., 12.VII.1974. – 3 ♂, 13 ♀ [7463], Khorasan, Emamgholi (37°26'N, 58°30'E), 15.VII.1974. – 3 ♀ [7464], Kabkan (37°17'N, 58°51'E), 16.VII.1974. – 5 ♂, 10 ♀ [7470], Bojnurd (37°29'N, 57°26'E), 26.VII.1974. – 2 ♀ [7539], Tehran, Asara (36°02'N, 51°14'E), 1900 m a.s.l., 4.VII.1975. – 9 ♂, 8 ♀ [7476a], Mahmoudabad (36°38'N, 52°15'E), dunes, 2.VIII.1974.

Previous record from Iran: Kerman or Gilan (Roewer, 1955).

Range: Palaearctic.

Halorates inerrans (O. P.-Cambridge, 1885)

Material: IRAN: 4 ♂, 2 ♀ [7459], Mazandaran, Baladeh (36°13'N, 51°49'E), 2200 m a.s.l., 12.VII.1974.

Range: Palaearctic.

Remarks: This species is here reported for the first time for the Iranian fauna.

Maso sundevalli (Westring, 1851)

Material: IRAN: 1 ♂ [7320], Tehran, Pol-e-Zanguleh (36°13'N, 51°19'E), 2300 m a.s.l., 12.VII.1973.

Range: Holarctic.

Remarks: This species is here reported for the first time for the Iranian fauna.

Megalepthyphantes camelus (Tanasevitch, 1990) Figs 29-31

Material: IRAN: 4 ♂, 7 ♀ [7402], Lorestan, Pol-e-Dokhtar (33°10'N, 47°44'E), 17.V. 1974. – 1 ♂ [7403], Khuzestan, N of Andimeshk (32°41'N, 48°15'E), 17.V.1974. – 1 ♀ [7414], Kohgiluyeh, environs of Yasudj (30°34'N, 51°39'E), 2000 m a.s.l., 27.V.1974. – 1 ♀ [7415], same (30°32'N, 51°32'E), 2200 m a.s.l., 27.V.1974; 1 ♂, 2 ♀7 [7418], Fars, Dasht-e-Arjan (29°40'N, 51°59'E), 1650 m a.s.l., dry stream bed, 1.VI.1974. – 1 ♀ [7420], Kavar (29°12'N, 52°37'E), 5.VI.1974. – 3 ♀ [7427], Izad Khavast (31°31'N, 52°08'E), 12.VI.1974, 1 ♂, 2 ♀ [7471b], Mazandaran, environs of Dasht, (37°19'N, 56°04'E), 27.VII.1974.

Description: Female (here described for the first time). Total length: 3.05. Carapace unmodified 1.15 long, 0.88 wide, pale brown, with grey median stripe bifurcated in cephalic part. Chelicerae: 0.50 long, unmodified. Legs pale brown almost yellow without median bands. Leg I 6.82 long (1.83+0.33+1.75+1.73+1.18), IV 5.79 long (1.63+0.28+1.38+1.55+0.95). Chaetotaxy: Fe I: 0-1-0-0. – Ti I and IV: 2-1-1-0. – II-III: 2-0-1-0. – Mt I-IV: 1-0-0-0. TmI 0.12. Abdomen 1.90 long, 1.38 wide, dorsal pattern faded. Epigyne as in Figs 29-31: Proscape rigid, distal part of scape expanded, stretcher area not protruded.

Taxonomic remarks: This species was originally described from males from the Caucasus (Tanasevitch, 1990). *M. camelus* is very similar to *M. kuhitangensis* (Tanasevitch, 1989) **comb. n.** (ex *Lepthyphantes* Menge, 1866), which is known from females from the Kuhitang-Tau Mts in Turkmenistan and Uzbekistan (see Tanasevitch, 1989). Both species can be distinguished by the shape of the posterior median plate of their epigynes (Fig. 30, cf. Fig. 32).

Range: Irano-Caucasian.

Remarks: This species is here reported for the first time for the Iranian fauna.

Megalepthyphantes kronebergi (Tanasevitch, 1989)

Material: IRAN: 1 ♀ [7465], Khorasan, Mesh'ad (36°26'N, 59°38'E), 20.VII.1974.

Range: Central Asian.

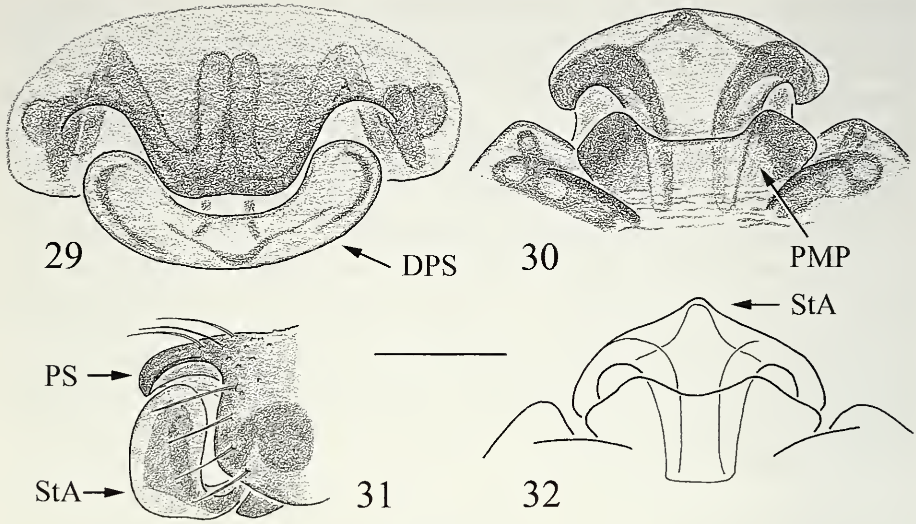
Remarks: This species was hitherto known from Middle Asia (see Tanasevitch, 1989) and Xinjiang, China (see Song *et al.*, 1999). Mesh'ad is the westernmost locality of this species. *M. kronebergi* is here reported for the first time for the Iranian fauna.

Megalepthyphantes nebulosoides (Wunderlich, 1977)

Material: IRAN: 1 ♀ [7416], Fars, Bishapoor (29°47'N, 51°35'E), 28.V.1974. – 1 ♀ [7461], Khorasan, E of Chaman Bid (37°26'N, 56°37'E), 14.VII.1974. – 1 ♂, 3 ♀ [7462], N of Quchan (37°12'N, 58°29'E), 15.VII.1974. – 2 ♂, 5 ♀ [7463], Emamgholi (37°26'N, 58°30'E), 15.VII.1974. – 2 ♀ [7464], Kabkan (37°17'N, 58°51'E), 16.VII.1974. – 2 ♀ [7466], route from Amirabad (36°47'N, 59°49'E), 1400 m a.s.l., 21.VII.1974. – 1 ♂ [7468], same (36°47'N, 59°54'E), 1100 m a.s.l., 23.VII.1974. – 3 ♀ [7469], Shandiz Valley(36°22'N, 59°15'E), 25.VII.1974. – 1 ♀ [7470], Bojnurd (37°29'N, 57°26'E), 26.VII.1974. – 3 ♂, 2 ♀ [7471b], Mazandaran, environs of Dasht (37°19'N, 56°04'E), 27.VII.1974.

Range: Central Asian.

Remarks: *Megalepthyphantes nebulosus* (Sundevall, 1939) was recorded from Iran (Kerman) by Roewer (1955: 753. – under *Lepthyphantes nebulosus*). Most probably this is based on a misidentification, because in the southern mountains of the



Figs 29-32

Epigyne of *Megalepthyphantes camelus* (Tanasevitch, 1990), specimen from Iran, Lorestan (29-31) and epigyne of *M. kuhitangensis* (Tanasevitch, 1989), paratype from Turkmenistan, Kuhitang-Tau Mts (32). (29) Ventral view. (30, 32) Dorsal view. (31) Lateral view.

Asian part of the Palaearctic region *M. nebulosus* is substituted by its vicariant species *M. nebulosoides* (see Tanasevitch, 1989). Bishapoor is the westernmost locality of this species. It is here reported for the first time for the Iranian fauna.

Mesasigone mira Tanasevitch, 1989

Material: IRAN: 1 ♂ [7346], Lorestan, Aligudarz (33°21'N, 49°48'E), 7.VIII.1973. – 2 ♂, 1 ♀ [7429], Esfahan, Pol-e-Kaleh (32°23'N, 51°14'E), 15.VI.1974. – 1 ♀ [7597], western part of Azarbayjan, N of Saghez (36°23'N, 46°12'E), 18.IX.1975.

Range: Eastern Palaearctic.

Remarks: This species is here reported for the first time for the Iranian fauna.

Microlinyphia pusilla (Sundevall, 1830)

Material: IRAN: 1 ♀ [7425], Fars, environs of Sivand (30°07'N, 52°58'E), sifted *Platanus* litter, 10.VI.1974. – 2 ♂, 2 ♀, 1 juv. [7462], Khorasan, N of Quchan (37°12'N, 58°29'E), 15.VII.1974. – 1 ♂, 4 ♀ [7463], Emamgholi (37°26'N, 58°30'E), 15.VII.1974. – 2 ♂, 2 ♀ [7464], Kabkan (37°17'N, 58°51'E), 16.VII.1974. – 2 ♂, 2 ♀ [7468], route from Amirabad (36°47'N, 59°54'E), 1100 m a.s.l., 23.VII.1974. – 1 ♀ [7470], Bojnurd (37°29'N, 57°26'E) 26.VII.1974.

Range: Holarctic.

Remarks: This species is here reported for the first time for the Iranian fauna.

Neriene clathrata (Sundevall, 1830)

Material: IRAN: 4 ♀ [7467], Khorasan, Zavi (36°52'N, 59°53'E), 22.VII.1974. – 3 ♀ [7477], Mazandaran, Now Shahr (36°37'N, 51°31'E), 3.VIII.1974.

RANGE: Holarctic.

REMARKS: This species is here reported for the first time for the Iranian fauna.

Oedothorax apicatus (Blackwall, 1850)

MATERIAL: IRAN: 1 ♂ [7337], Tehran, Delichal (35°40'N, 52°30'E), 24.VII.1973. – 1 ♂ [7344], Kermanshah, Garavand / Shahabad (33°55'N, 46°47'E), 5.VIII.1973. – 1 ♂, 1 ♀ and 3 ♂, 17 ♀ [7459], Mazandaran, Baladeh (36°13'N, 51°49'E), 2200 m a.s.l., 12.VII.1974. – 4 ♂, 12 ♀ [7476a], Mahmoudabad (36°38'N, 52°15'E), dunes, 2.VIII.1974. – 2 ♂, 8 ♀ [7463], Khorasan, Emamgholi (37°26'N, 58°30'E), 15.VII.1974. – 7 ♂, 5 ♀ [7464], Kabkan (37°17'N, 58°51'E), 16.VII.1974. – 2 ♂, 8 ♀ [7465], Mesh'ad (36°26'N, 59°38'E), 20.VII.1974. – 1 ♂, 6 ♀ [7466], route from Amirabad (36°47'N, 59°49'E), 1400 m a.s.l., 21.VII.1974. – 19 ♂, 31 ♀ [7468], route from Amirabad (36°47'N, 59°54'E), 1100 m a.s.l., 23.VII.1974. – 5 ♂, 8 ♀ [7469], Shandiz Valley (36°22'N, 59°15'E), 25.VII.1974. – 1 ♂, 22 ♀ [7470], Bojnurd (37°29'N, 57°26'E), 26.VII.1974.

PREVIOUS RECORD FROM IRAN: Khorasan (Mozaffarian *et al.*, 2004).

RANGE: European-Ancient Mediterranean.

Oedothorax meridionalis Tanasevitch, 1987

MATERIAL: IRAN: 2 ♂, 1 ♀ [7418], Fars, Dasht-e-Arjan (29°40'N, 51°59'E), 1650 m a.s.l., dry stream bed, 1.VI.1974. – 1 ♀ [7422], Fars, Serizjan (called Semargoun on lables) (28°57'N, 52°33'E), 7.VI.1974. – 1 ♂ [7425], environs of Sivand (30°07'N, 52°58'E), sifted *Platanus* litter, 10.VI.1974.

RANGE: Eastern Ancient-Mediterranean.

REMARKS: The species was originally described from the Caucasus (see Tanasevitch, 1987) and later recorded from Middle Asia (see Tanasevitch, 1989). It is here reported for the first time for the Iranian fauna.

Palliduphantes sp.

MATERIAL: IRAN: 1 ♀, [7424], Fars, Allabad (30°01'N, 53°00'E), 9.VI.1974.

REMARKS: In the absence of conspecific males this female cannot be identified to species level.

Pelecopsis laptevi Tanasevitch & Fet, 1986

MATERIAL: IRAN: 1 ♀ [7463], Khorasan, Emamgholi (37°26'N, 58°30'E), 15.VII.1974.

RANGE: Eastern Ancient-Mediterranean.

REMARKS: This species was originally described from Turkmenistan (Tanasevitch & Fet, 1986) and later recorded from southern Ukraine (Polchaninova, 1997). It is here reported for the first time for the Iranian fauna.

Prinerigone vagans (Savigny & Audouin, 1826)

MATERIAL: IRAN: 13 ♂, 12 ♀ [7402], Lorestan, Pol-e-Dokhtar (33°10'N, 47°44'E), 17.V.1974. – 5 ♂ [7403], Khuzestan, N of Andimeshk (32°41'N, 48°15'E), 17.V.1974. – 8 ♂, 18 ♀ [7404], Shush (32°02'N, 48°18'E), 18.V.1974. – 6 ♂, 10 ♀ [7405], Masjed Soleyman (31°59'N, 49°16'E), sifted herb tuffs, 20.V.1974. – 6 ♂, 5 ♀ [7406], environs of Ahvaz (31°08'N, 48°53'E), on *Salicornia* and *Juncus*, 21.V.1974. – 1 ♂, 2 ♀ [7407], Kohgiluyeh, Dogonbadan (30°22'N, 50°47'E), 21.V.1974. – 4 ♂, 2 ♀ [7409], Charam (30°44'N, 50°44'E), 23.V.1974. – 7 ♂, 3 ♀ [7411], Basht (30°20'N, 51°15'E), 25.V.1974. – 5 ♂, 3 ♀ [7416], Fars, Bishapoor (29°47'N, 51°35'E), 28.V.1974. – 1 ♂, 1 ♀ [7418], Dasht-e-Arjan (29°40'N, 51°59'E), 1650 m a.s.l., dry stream bed, 1.VI.1974. – 1 ♂, 1 ♀ [7420], Kavar (29°12'N, 52°37'E), 5.VI.1974. – 9 ♂, 5 ♀ [7421], Firuzabad (28°52'N, 52°32'E), 6.VI.1974. – 12 ♂, 5 ♀ [7422], Serizjan (called Semargoun on lables) (28°57'N, 52°33'E), 7.VI.1974. – 4 ♂, 2 ♀ [7424], Allabad (30°01'N, 53°00'E), 9.VI.1974. – 1 ♀ [7427], Izad Khavast (31°31'N, 52°08'E), 12.VI.1974. – 3 ♂, 4 ♀, same locality. – 1 ♀ [7459], Mazandaran, Baladeh (36°13'N, 51°49'E), 2200 m a.s.l., 12.VII.1974. – 1 ♀ [7473], above Shahpasand (37°02'N, 55°17'E), sifted litter, 29.VII.1974. – 1 ♂, 1 ♀ [7474], Ramiyan (36°59'N, 55°07'E), 29.VII.1974. – 2 ♂ [7476a], Mahmoudabad (36°38'N, 52°15'E), dunes, 2.VIII.1974. – 1 ♀ [7461], Khorasan, E of Chaman Bid (37°26'N, 56°37'E), 14.VII.1974. – 3 ♀ [7462], N of Quchan (37°12'N, 58°29'E), 15.VII.1974. – 2 ♂ [7468], route from Amirabad (36°47'N, 59°54'E), 1100 m a.s.l., 23.VII. 1974. – 5 ♂, 8 ♀ [7469], Shandiz Valley(36°22'N, 59°15'E), 25.VII.1974.

PREVIOUS RECORDS FROM IRAN: Guilan and Mazandaran (Mozaffarian *et al.*, 1998).

RANGE: Southern Palaearctic, Afrotropical, Oriental, Pacific.

Sengletus gen. n.

TYPE SPECIES: *Sengletus longiscapus* sp. n.

ETYMOLOGY: The new genus is named in honour of the Swiss arachnologist Antoine Senglet. The gender of the genus name is masculine.

DIAGNOSIS: The new genus is characterised by a reduction of some parts of the male and female genitalia. In the male palp the median membrane, the terminal apophysis and the lamella characteristica are totally reduced. In the epigyne the proscape and the middle part of the scape are totally reduced, the lateral lobes and the stretcher poorly developed. In addition, the male is characterised by a hypertrophied radix which is complicated in shape, as well as by the absence of the Fickert's gland.

DESCRIPTION: Medium-sized micronetine, total length 2.30-2.50. Carapace unmodified in both sexes. Chaetotaxy: All tibiae with 2 dorsal spines. – pro-, retro-, and ventral spines absent. Metatarsi unarmed. Metatarsi I-III with a trichobothrium. TmI 0.23-0.26. Male palp: Patella lacking specialized spines or projections. Cymbium without posterodorsal outgrowth. Paracymbium relatively large, U-shaped. Radix very large, complex in shape. Fickert's gland absent, median membrane, terminal apophysis and lamella characteristica totally reduced. Embolus relatively large, with two outgrowths. Epigyne large, strongly protruding and curved. Proscape and middle part of scape reduced, lateral lobes and stretcher poorly expressed. Abdomen without dorsal pattern in both sexes.

Sengletus longiscapus sp. n. Figs 33-45

MATERIAL: IRAN: ♂ holotype [7402], Lorestan, Pol-e-Dokhtar (33°10'N, 47°44'E), 17.V.1974. Paratypes 1 ♂, 1 ♀ (ZMMU), 1 ♂, 6 ♀, same date as for holotype. – 1 ♂, 4 ♀ [7404], Khuzestan, Shush (Suze) (32°02'N, 48°18'E), 18.V.1974. – 5 ♀ [7406], environs of Ahvaz (31°08'N, 48°53'E), on *Salicornia* and *Juncus*, 21.V.1974.

DESCRIPTION: Male. Total length: 2.35. Carapace unmodified, 1.05 long, 0.83 wide, pale brown. Chelicerae: 0.50 long. Legs brownish yellow. Leg I 3.89 long (1.00+0.28+1.00+0.98+0.63), IV 3.70 long (1.00+0.25+0.95+0.95+0.55). Chaetotaxy: All tibiae with 2 dorsal spines. – pro- retro- and ventral spines absent. Spines weak, not longer than diameter of segment. Metatarsi unarmed. Metatarsi I-III with a trichobothrium. TmI 0.24. Palp as in Figs 33-41: Patella lacking specialized spines or projections. Cymbium without posterodorsal outgrowth. Paracymbium large, U-shaped, anterior pocket long and deep, posterior pocket transformed into large well-sclerotized projection. Suprategular apophysis wide and straight, pit-hook small. Radix very large, complex in shape: Anterior part divided into two parts, one of it developed as a narrow long process with highly curved middle part and apex entering into membraneous area, other part flat and shell-shaped. Fickert's gland absent. – median membrane, terminal apophysis and lamella characteristica totally reduced. Membraneous area large, its lateral part pyramid-shaped. Embolus large, with two outgrowths. Embolus proper short, pointed. Abdomen 1.25 long, 0.73 wide, grey, dorsal pattern absent.

Female. Total length 2.43. Carapace 0.98 long, 0.70 wide, pale brown. Chelicerae: 0.48 long, anterior margin of groove with 4 teeth, posterior margin with 3 weak teeth. Legs brownish yellow. Leg I 3.83 long (1.00+0.28+1.00+0.95+0.60), IV 3.66 long (1.00+0.25+0.98+0.93+0.50). Chaetotaxy as in male. TmI 0.23-0.26. Abdomen 1.75 long, 1.20 wide, pale grey, dorsal pattern absent. Epigyne as in Figs 42-45: Large, strongly protruded and curved. Proscape and middle part of scape totally reduced. Distal part of scape long, cylindriform. – lateral lobes and stretcher poorly developed.

TAXONOMIC REMARKS: According to the structure of the embolic division (i.e., the large and modified radix, the shape of the embolus, the absence of a terminal apophysis and of a lamella characteristica), *S. longiscapus* gen. n., sp. n. is similar to *Oreonetides* Strand, 1901, especially to *O. quadridentatus* (Wunderlich, 1972), but the basic epigyne conformation of *S. longiscapus* sp. n. is totally different from that of *Oreonetides*.

DISTRIBUTION: known only from three localities in Iran.

Silometopus cf. ***reussi*** (Thorell, 1871) Figs 46-49

MATERIAL: IRAN: 1 ♂ [7358], Esfahan, W of Esfahan, 32°34'N, 51°31'E, 23.VIII.1973. – 1 ♂ [7459], Mazandaran, Baladeh (36°13'N, 51°49'E), 2200 m a.s.l., 12.VII.1974.

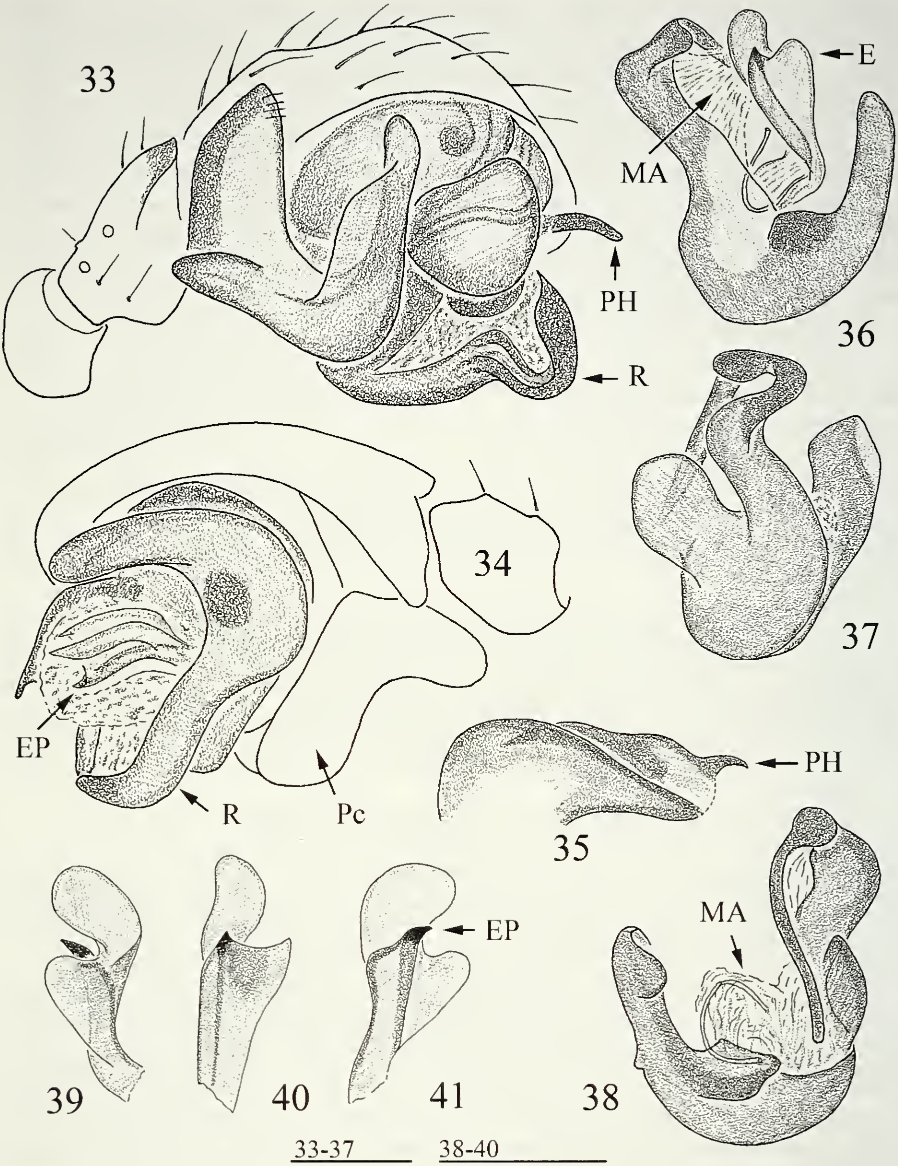
REMARKS: The tibial process on the palps of both males examined differs from that of *S. reussi* males from other parts of the Palaearctic region (Figs 46, 47, cf. Figs 48, 49). It is difficult to decide if the Iranian specimens belong to a new species, because other parts of the male palp and the shape of the carapace are identical to *S. reussi* males from outside the Iranian population. It is necessary to find conspecific females from Iran to solve this problem. This species is here reported for the first time for the Iranian fauna.

Styloctetor romanus (O. P.-Cambridge, 1872)

MATERIAL: IRAN: 1 ♀ [7404], Khuzestan, Shush (32°02'N, 48°18'E), 18.V.1974. – 4 ♀, 1 ♀ (ZMMU) [7406], Khuzestan, environs of Ahvaz (31°08'N, 48°53'E), on *Salicornia* and *Juncus*, 21.V.1974.

RANGE: Palaearctic.

REMARKS: This species is here reported for the first time for the Iranian fauna.

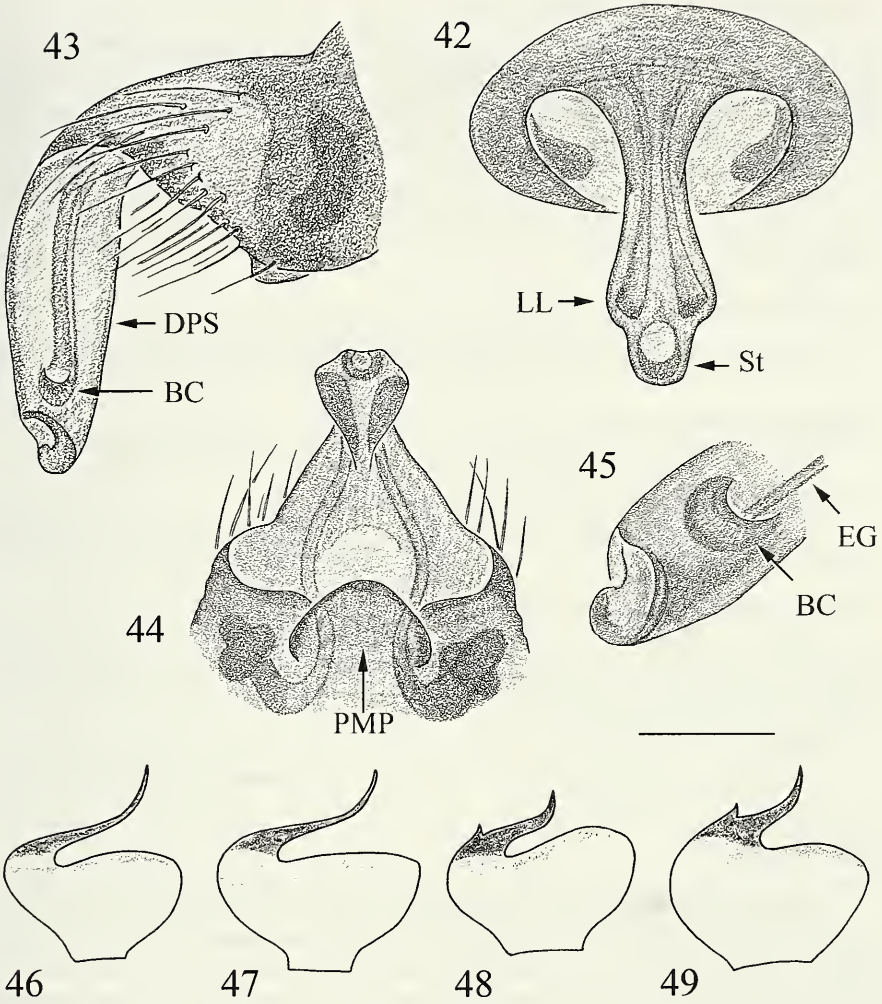


Figs 33-41

Sengletus longiscapus gen. n., sp. n., ♂ paratype. (33, 34) Right palp, prolateral and retrolateral view. (35) Suprategulum. (36) Embolic division. (37, 38) Radix (embolus removed), opposite views. (39-41) Embolus, different views.

Tenuiphantes mengei (Kulczyński, 1887)

Material: IRAN: 1 ♀ [7460], Mazandaran, Tang-e-Rah (37°23'N, 55°50'E), 13.VII. 1974. – 4 ♀ [7475], Allabad (36°53'N, 54°57'E), 30.VII.1974. – 1 ♀ [7486], Guilan, route from



FIGS 42-49

Sengletus longiscapus gen. n., sp. n., ♀ paratype (42-45). – *Silometopus* cf. *reussi* (THORELL, 1871), 2 ♂ from Iran (46, 47), ♂ from Russia, Tatarstan, Naberezhnye Chelny (48), and ♂ from Russia, near Irkutsk (49). (42-44) Epigyne, ventral, lateral and dorsal view. (45) Apex of distal part of scape, lateral view. (46-49) Palpal tibia, dorsal view.

Djirandeh (36°49'N, 49°39'E), 1000 m a.s.l., forest, 9.VIII. 1974. – 1 ♀ [7515], eastern part of Azarbayjan, SE of Hero-Abad (37°35'N, 48°39'E), pasture, under stones, 2000 m a.s.l., 9.VI.1975.

RANGE: Palaearctic.

REMARKS: This species is here reported for the first time for the Iranian fauna.

Tenuiphantes tenuis (Blackwall, 1852)

Material: IRAN: 11 ♂, 8 ♀ [7409], Kohgiluyeh, Charam (30°44'N, 50°44'E), 23.V.1974. – 1 ♀ [7416], Fars, Bishapoor (29°47'N, 51°35'E), 28.V.1974. – 1 ♀ [7424], Allabad (30°01'N, 53°00'E), 9.VI.1974. – 3 ♀ [7426], environs of Ghaderabad (30°22'N, 53°18'E), 11.VI.1974. – 2 ♂, 5 ♀ [7459], Mazandaran, Baladeh (36°13'N, 51°49'E), 2200 m a.s.l., 12.VII.1974. – 3 ♂, 3 ♀ [7472], Tang-e-Rah (37°25'N, 55°45'E), 800-1000 m a.s.l., 28.VII. 1974. – 2 ♂ [7540], Vallabad (36°16'N, 51°16'E), 1900 m a.s.l., 5.VII.1975. – 1 ♀ and 3 ♂, 2 ♀ [7461], Khorasan, E of Chaman Bid (37°26'N, 56°37'E), 14.VII.1974. – 1 ♀ [7466], Khorasan, route from Amirabad (36°47'N, 59°49'E), 1400 m a.s.l., 21.VII.1974. – 15 ♂, 41 ♀ [7469], Shandiz Valley (36°22'N, 59°15'E), 25.VII.1974. – 2 ♀ and 5 ♂, 1 ♀ [7470], Bojnurd (37°29'N, 57°26'E), 26.VII.1974.

Range: Holarctic.

Remarks: This species is here reported for the first time for the Iranian fauna.

Trichoncoides piscator (Simon, 1884)

Material: IRAN: 1 ♀ [7467], Khorasan, Zavi (36°52'N, 59°53'E), 22.VII.1974.

Range: European-Ancient Mediterranean.

Remarks: This species is here reported for the first time for the Iranian fauna.

Walckenaeria alticeps (Denis, 1952)

Material: IRAN: 1 ♀ [7326], Tehran, Pol-e-Djadjirad (35°45'N, 51°42'E), 16.VII. 1973. – 3 ♀ [7426], Fars, environs of Ghaderabad (30°22'N, 53°18'E), 11.VI.1974. – 1 ♀ [7430], Bakhtiyari, Qafarokh (32°18'N, 51°01'E), 16.VI.1974.

Range: West Palaearctic.

Remarks: This species is here reported for the first time for the Iranian fauna.

CONCLUSION

Currently the Iranian fauna is known to contain 44 linyphiid species. Not yet enough data are available for a detailed zoogeographical analysis, nevertheless it is already possible to say that the linyphiid fauna of Iran is quite particular: Almost a quarter of the species have not yet been found outside the country. The percentage (40%) of widespread species is nevertheless quite high. New finds of some species show relations between the Iranian and the Caucasian fauna (*Agyneta mesasiatica*, *Araeoncus mitriformis* sp. n. and *Megalepthyphantes camelus*), as well as between the Iranian and the Central Asian fauna (*M. kronebergi* and *M. nebulosoides*). The ranges of some taxa that were earlier considered as Mediterranean are now shown to extend to the Ancient Mediterranean region (*Dactylopisthes digiticeps*, *Erigonoplus nigrocaeruleus* and *Trichoncoides piscator*). On the other hand, the distribution of other species (*M. kronebergi* and *M. nebulosoides*) was found to extend further to the west than previously known. New finds of Araeoncus caucasicus and *Oedothorax meridionalis* have connected disjunctions in their distribution areas. It is surprising to see that the relations between the Iranian and Turkish faunas are based on widespread species only. This is possibly due to our poor knowledge of the spider fauna of both territories.

ACKNOWLEDGEMENTS

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A second specimen of *Trapelus schmitzi* Wagner & Böhme 2007 (Sauria: Agamidae) and the first record from Algeria

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A second specimen of *Trapelus schmitzi* Wagner & Böhme 2007 (Sauria: Agamidae) and the first record from Algeria. - *Trapelus schmitzi* Wagner & Böhme, 2007 was described on the basis of a single specimen from the Ennedi Mountains, Chad. Herein the second known voucher is described and the first record of the species from Algeria is documented. A presumed distribution of the taxon is discussed according to the known distribution pattern of other reptile species, which occur in these regions.

Keywords: Agamidae - *Trapelus schmitzi* - Africa - Ennedi Mountains - Algeria - Tassili Mountains - Range extension - first record.

INTRODUCTION

The genus *Trapelus* was revalidated by Moody (1980) and since then a lot of work was done on the Asian taxa of the genus (e.g. Macey & Ananjeva, 2004; Rastegar-Pouyani, 1997; 1999; 2000; 2005) but studies on the African taxa are lacking. There is evidence that the North African taxa of the genus are partly not close related to Asian species (Wagner *et al*., unpubl. data) and further work on this group will give insights in colonization events of northern Africa.

Recently, Wagner & Böhme (2007) described *Trapelus schmitzi* based on a single specimen. However, this new taxon differs clearly from the close related *Trapelus mutabilis* (Merrem, 1820) and *Trapelus pallidus* (Reuss, 1833) in having a homogenous dorsal scalation, lacking the typical intermixed larger scales on body and upper hind limb and in having a relatively short tail. All taxa of the genus are characterized by short and bulky heads and a small, deeply sunk tympanum with spiny scales above the ear opening.

T. mutabilis is widespread in northern Africa and probably represents the taxonomically most complicated taxon of the genus, comprising several cryptic species, which are currently studied by the senior author (Wagner & Böhme, 2007; Wagner, unpubl. data). As a first result of this study *Trapelus schmitzi* was described. The

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apparent high variability of *T. mutabilis* is also reflected in the large number of synonyms (see Wermuth, 1967; Ulber & Barts, 2002). Its close related taxa, *T. schmitzi* and *T. pallidus* are both currently thought to have only a relatively small distribution area in Africa. The latter probably only occurs east of the Nile and is most probably the direct sister taxon of *T. mutabilis*, whereas *T. schmitzi* was so far only known from its type locality, the Ennedi Mountains in Chad.

While working on the agamid lizards in the collection of the Muséum d'histoire naturelle de la Ville de Genève (MHNG) a single voucher, labelled as *T. mutabilis*, was identified as the second known specimen of *Trapelus schmitzi* and the aim of this short note is to extend and discuss the distribution range of the species and to present more information on its morphological characteristics.

The herein presented voucher (MHNG 901.70) was collected by J. Juge in 1952 in the Tassili Mountains, Algeria.

The voucher was compared with the holotypes of *T. schmitzi* and *T. pallidus*, with the neotype of *T. mutabilis* (designated by Wagner *et al.*, subm.) and with the material listed in Wagner & Böhme (2007). Measurements and scale counts were done according to Grandison (1968) and Moody & Böhme (1984) and were taken with a dial calliper.

DESCRIPTION

Trapelus schmitzi (second known specimen; MHNG 901.70) Fig. 1

Female; snout-vent length: 71 mm; tail length: 72 mm; head height: 13 mm; head length: 20 mm; head width: 17 mm.

Nostril on canthus rostralis, pierced in the posterior part of a large, flat nasal scale, directed obliquely upwards. Irregularly arranged smooth scales between nostrils. Supraoculars smooth. Parietal scale destroyed.

Scales on the head sometimes with sensory pits on their free anterior margins; scales originating on both sides of the head with imbrications anteriorly directed. Ear-opening small, tympanum sunk, not visible, about one third of the size of eye, its superior margin with three spiny, mucronate scales, one of them on each side with two spines. Rudimentary nuchal crest of three spiny, mucronate scales. Gular scales flat, smooth, slightly imbricate at their posterior margins, becoming somewhat smaller towards the gular fold. No gular pouch. Dorsal scales homogenous, in 91 scale rows around midbody, smooth to feebly keeled, partly mucronate, intermixed with few larger and feebly keeled, mucronate scales. Scales on tail keeled, not arranged in whorls. Tail cylindrical, only marginally longer than the snout-vent length. Ventral scales smooth. No preanal pores. Upper forelimbs with strongly keeled scales becoming feebly keeled beneath, homogenous in size. 4th finger longest, digital length decreasing 3-2-5-1, plantar scales and subdigital lamellae strongly keeled. Scales on hindlimbs feebly keeled and homogenous, becoming smooth beneath, on the femora as large as the dorsals, becoming slightly larger on the tibiae. 4th toe longest, digital length decreasing 3-2-5-1, hindlimb long, reaching the ear with the tip of the longest digit.

Colouration in alcohol: Dirty white above with a single dark band between the forelimbs, interrupted ventrally. Tail annulated by at least ten dark grey bands. Throat, belly and under parts of the tail whitish-grey.

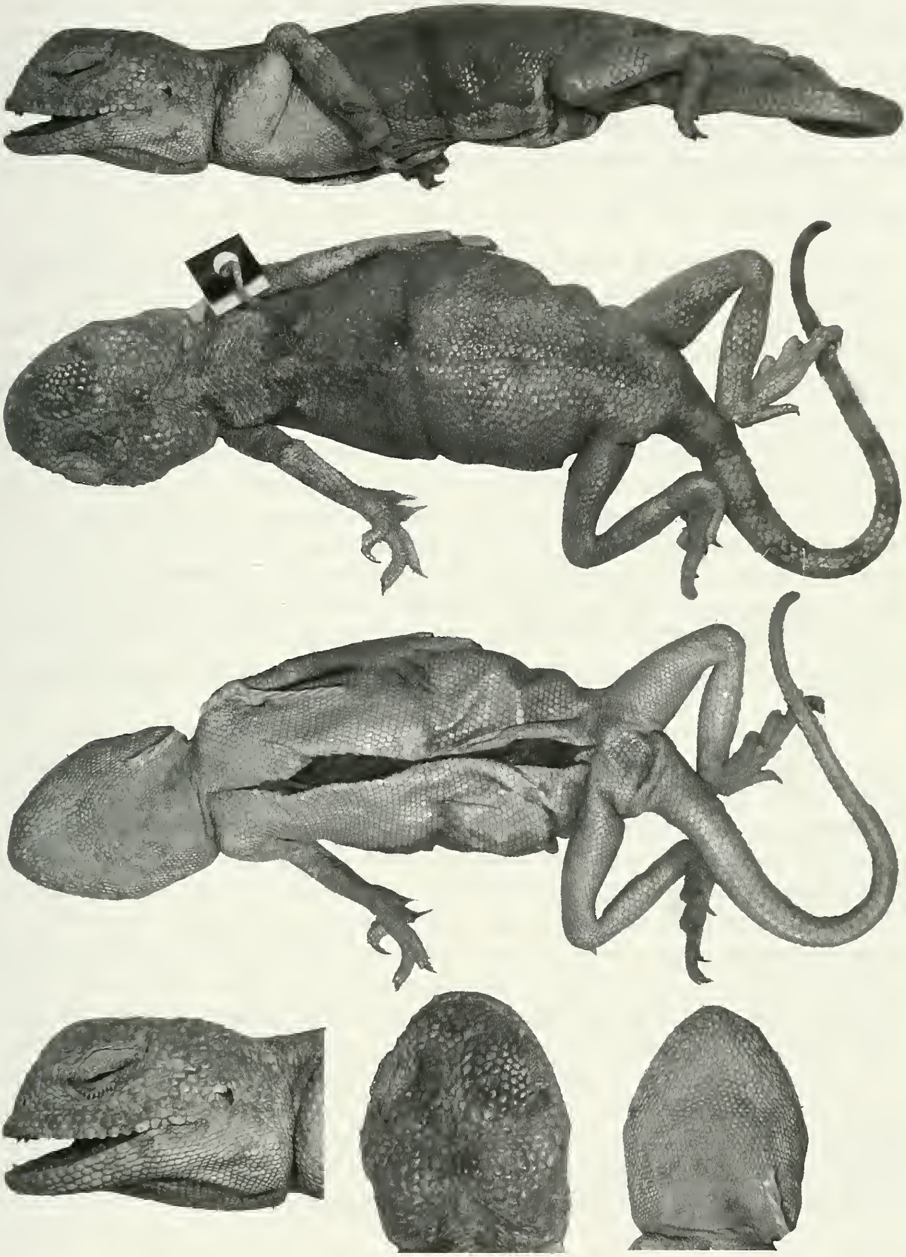

FIG. 1
MHNG 901.70: second known voucher of *Trapelus schmitzi* Böhme & Wagner, 2007

The voucher differs from the holotype in having three spiny scales above the ear instead of four in the holotype, but one scale on each side of the MHNG specimen shows two spines, so that four spines are visible, and it is obvious that two scales are fused. The colouration differs significantly from the holotype but already Wagner & Böhme (2007) mentioned that the original colouration of the holotype has been altered by the storage in alcohol or formalin.

DISTRIBUTION

This new record of *Trapelus schmitzi* was collected at Tassili (Tassili n'Ajjer), a 500 km long mountain chain in south eastern Algeria from 26° 20' N, 5° 00' E to 24° 00' N, 10° 00' O , near the Hoggar Mountains. The highest point is Djebel Afao with 2,158 m. The mountains consist of sandstone and thereby, because of the good water storing abilities of this stone, as well as the somewhat milder climate, the mountains have much more vegetation than the surrounding desert. Also *Cupressus dupreziana* (Cupressaceae) endemic to the Tassili, and *Myrtus nivellei* (Myrtaceae), endemic to the Tassili and Tibesti Mountains are present in higher elevations. The latter shows the strong biogeographical relationships between these mountain complexes. The Tassili Mountains are the westernmost part of the Ennedi-Tibesti-Tassili mountain complex which connects south-eastern Algeria with north-eastern Chad. Wagner & Böhme (2007) mentioned the type locality of *T. schmitzi* as the southern parts of the Ennedi Mountains near Guelta Archei. The Tibesti-Ennedi Mountain chain is connected by the Djado-Plateau with the Tassili Mountains, resulting in a continuous central Saharan highland.

Only little is known about distribution patterns of North African reptiles, especially the herpetofaunal relationships between the three mountainous areas Ennedi, Tibesti and Tassili are largely unknown. It is well established, that *Uromastyx dispar dispar* Heyden, 1827 (Sauria: Agamidae) occurs in Sudan as well as in the Ennedi and Tibesti Mountains (Wilms, 2005). *Uromastyx alfredschmidti* inhabits the Tassili Mountains. Although this species is not the direct sister taxon of *U. dispar* it belongs to the same phylogenetic group within the genus (*U. acanthinura* group) and therefore reflects a zoogeographical relation between both areas (Wilms, 2005). Another example is *Telescopus dhara obtusus* (Reuss, 1834) (Serpentes: Colubridae), which is distributed in Africa in the north-east and along the central-Saharan mountains (Tibesti, Ennedi, Air) and which is replaced in the lowlands by *Telescopus tripolitanus* (Werner, 1909).

This new record of *Trapelus schmitzi* and second known voucher documents the occurrence of the taxon in the mountainous area of Tassili n'Ajjer and extents the distribution of the species to an area ranging from eastern Chad to eastern Algeria. Because of distribution similarities mentioned above we predict an occurrence also in the Tibesti Mountains, in Niger and eastwards probably to Sudan.

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Two unusual new psocids from Vietnam (Psocodea: 'Psocoptera': Caeciliusidae and Psocidae)

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Two unusual new psocids from Vietnam (Psocodea: 'Psocoptera': Caeciliusidae and Psocidae). - *Paracaecilius anareolatus* sp. n. (Caeciliusidae: Paracaeciliinae) is described and illustrated (female only). Due to the absence of the cubital loop in the forewing, delimiting the areola postica in the typical Caeciliusidae venation, this species resembles the distantly related genus *Pericaecilius* Mockford (Caeciliusidae: Caeciliusinae). These are the only caeciliusids lacking the areola postica. *Kaindipsocus splendidus* sp. n. (Psocidae: Amphigerontiinae: Kaindipsocini) is described and illustrated (both sexes). It is the first Oriental representative of this otherwise Australian genus (Australia, New Guinea). A detailed morphological analysis supports the recently published molecular-based but tentative assignment of *Kaindipsocus* to the monotypic tribe Kaindipsocini within the subfamily Amphigerontiinae.

Keywords: Psocomorpha - Paracaeciliinae - Amphigerontiinae - Kaindipsocini - new species.

INTRODUCTION

The Psocoptera fauna of Vietnam is very poorly known; 25 species are listed by Lienhard (2004, data extracted from the world catalogue published by Lienhard & Smithers, 2002) whereas 725 species are known from the whole of tropical South-east Asia (see New & Lienhard, 2007).

Two morphologically interesting new species are descibed in the following. They belong to two genera not yet recorded from Vietnam: *Paracaecilius* Badonnel, 1931 (Caeciliusidae: Paracaeciliinae) and *Kaindipsocus* Smithers & Thornton, 1981 (Psocidae: Amphigerontiinae: Kaindipsocini).

The new *Paracaecilius* species is characterized by a simple CuA vein in the forewing, which means that the areola postica is absent. This apomorphic character stage is rarely observed in Psocoptera outside the families Ectopsocidae and Peripsocidae. Absence of areola postica is one of the autapomorphies defining each of these families which, however, belong to two different superfamilies within the infraorder Homilopsocidea of the suborder Psocomorpha (see Yoshizawa, 2002). Thus, the areola postica was lost independently in Ectopsocidae and Peripsocidae. In the Caeciliusidae (Psocomorpha: infraorder Caeciliusetae) the absence of the areola postica was previously only known from the genus *Pericaecilius* Mockford, 2000,

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which belongs to the subfamily Caeciliusinae (see Mockford, 2000, 2001). Within Caeciliusidae this vein reduction was therefore diagnostic for *Pericaecilius*, which at present comprises three species from Taiwan, Indonesia and the Philippines (see Lienhard & Smithers, 2002). However, the new caeciliusid species, described below, clearly does not belong to the Caeciliusinae but to the Paracaeciliinae as defined by Mockford (2000). On the basis of female genitalia the new species can be assigned to the widely distributed genus *Paracaecilius*. At present that genus contains about 40 species, all of which have at least a small areola postica.

The new *Kaindipsocus* species, described below, is the first Oriental representative of this rather enigmatic genus, known before only from New Guinea (one species) and Australia (two species). The phylogenetic position of *Kaindipsocus* within the Psocidae has been discussed by Yoshizawa & Johnson (2008) on the basis of a molecular analysis of a paratype of the species described here. The assignment of *Kaindipsocus* to the subfamily Amphigerontiinae by Mockford (in Lienhard & Smithers, 2002), tentatively confirmed by Yoshizawa & Johnson (2008), is here discussed on the basis of morphological characters. The monotypic tribe Kaindipsocini proposed by Yoshizawa & Johnson (2008) is supported by several morphological autapomorphies.

MATERIAL AND METHODS

Dissection and slide-mounting followed the methods described by Lienhard (1998). The material examined has been deposited in the following institutions: HNHM = Hungarian Natural History Museum, Budapest, Hungary; MHNG = Muséum d'histoire naturelle, Geneva, Switzerland; SEHU = Systematic Entomology, Hokkaido University, Sapporo, Japan.

The following abbreviations are used in the descriptions: A = antenna (length); BL = body length (in alcohol); F = hindfemur (length); f1-f4 = basal antennal flagellar segments (length); FW = forewing (length); IO/D = shortest distance between compound eyes divided by anteroposterior diameter of compound eye in dorsal view of head; P1-P4 = articles of maxillary palp; T = hindtibia (length); t1, t2 = tarsomeres of hindtarsus (length measured from condyle to condyle). Abbreviations of wing veins and cells are used according to Yoshizawa (2005).

Bibliographical references of original taxa descriptions not given in the following can be found in Lienhard & Smithers (2002).

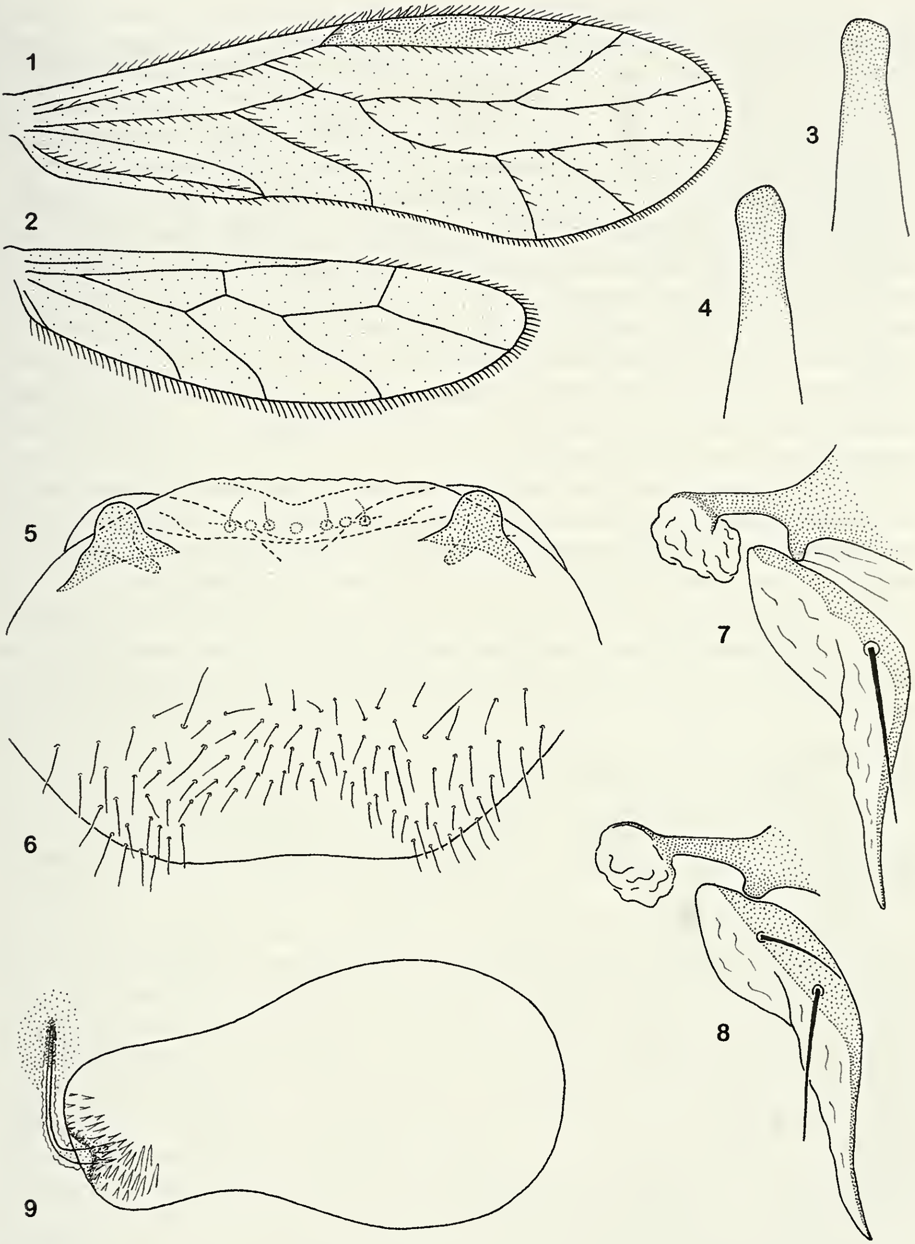
TAXONOMIC TREATMENT

CAECILIUSIDAE

Paracaecilius anareolatus sp. n. Figs 1-9

TYPE MATERIAL: HNHM, holotype ♀ (on 2 microscopical slides), Vietnam, Lam Dong Prov., Da Lat, Thac Prenn (= Prenn Waterfall), 1120 m, beating branches of *Pinus* trees and a bamboo-thicket, 10.xii.1994, leg. S. Mahunka, G. Sziraki & L. Zombori (sample no. 759).

DESCRIPTION: *Female* (male unknown): Body generally yellowish white, terminalia almost colourless, antenna and tibiae light brown, compound eyes black, wings almost hyaline, their membranes very slightly yellowish, pterostigma opaque but colourless.



FIGS 1-9

Paracaecilius anareolatus sp. n., female holotype: (1) Forewing. (2) Hindwing. (3) Lacinial tip (right lacinia). (4) Ditto (left lacinia). (5) Anterior margin of labrum, external pilosity not figured (the knob-like protuberances are glabrous!). (6) Posterior margin of subgenital plate. (7) Right gonapophyses (in reversed view). (8) Left gonapophyses. (9) Spermatheca.

Median epicranial suture distinct, lateral arms not visible. Compound eyes relatively large (IO/D = 1.05), 3 ocelli present but inconspicuous (close together on a small tubercle). Clypeal shelf broad. All antennal flagellar segments slender and straight. Lacinial tip slender, variably rounded but not bicuspid (Figs 3, 4). Maxillary palp with P4 shorter than P2 (P2 : P4 = 1.2). Distal margin of labrum (Fig. 5) with 7 inner marginal sensilla (corresponding to type 3 of Mockford, 2000), labral stylets not differentiated but external face of labrum near distal margin on each side with a conspicuous knob-like glabrous protuberance. Forewing as in Fig. 1, general shape elongate and slender, pterostigma shallow, R1 mostly parallel to wing margin, Rs-M junction about equal in length to basal segment of Rs, stem of radial fork straight, CuA simple, slightly curved distally to reach wing margin (identical in both forewings), i. e. areola postica absent. Wing margin setose, veins with one row of setae, except glabrous CuP and rudimentary basal part of Sc. Hindwing as in Fig. 2, veins lacking setae, wing margin setose except for basal 2/3 of anterior margin. Abdomen with 3 ventral vesicles, the anterior one smaller than the others.

Terminalia: Epiproct and paraproct simple, the latter with 11 trichobothria. Posterior margin of subgenital plate glabrous in middle, lacking lateral apophyses (Fig. 6). Gonapophyses (Figs 7, 8) with strongly reduced ventral valvula, second gonapophysis (i. e. completely fused dorsal and external valvulae) slightly sclerotized along dorsal margin, with 1-2 setae in this zone. Spermatheca (Fig. 9) with a thick-walled pear-shaped bulb, its neck short and stout, bearing villiform internal projections in the region of junction with duct; spermathecal duct relatively short, lacking conspicuous sheath.

MEASUREMENTS: Female: BL = 2.0 mm; FW = 2.56 mm; A = 2.10 mm; F = 420 μm; T = 730 μm; t1= 255 μm; t2 = 95 μm.

ETYMOLOGY: The specific epithet refers to the absence of the areola postica in the forewing (Latin: an-, privative prefix indicating a negation; areolatus, having an areola).

DISCUSSION: See also Introduction. According to the definition of Paracaeciliinae genera by Mockford (2000, 2001) the new species can be assigned to the genus *Paracaecilius*. *P. anareolatus* differs from all known members of this genus, and also from all other paracaeciliines, by the absence of the areola postica in the forewing. In several species of the paracaeciliine genera *Paracaecilius* and *Enderleinella* Badonnel, 1932 the areola postica is of somewhat reduced size, but it is always present. Examples for species with a very small areola postica in these genera are: *P. parviareola* (Enderlein, 1926) (Indonesia), *P. cardaleae* Smithers, 1995 (Christmas Island), *P. lingnanensis* Li Fasheng, 2002 (China), *E. sphenoidalis* Li Fasheng, 2002 (China), *E. emeishanana* Li Fasheng, 2002 (China).

P. anareolatus is relatively close to *P. cardaleae* Smithers, which clearly differs from the new species not only by the presence of an areola postica but also by the shorter second gonapophysis (i. e. fused dorsal and external valvulae), the slightly bicuspid and finely ridged lacinial tip, the spherical spermathecal bulb and the presence of a pair of block-like lateral labral apophyses (see description by Smithers, 1995).

PSOCIDAE

Kaindipsocus splendidus sp. n. Figs 10-26

Kaindipsocus sp.; Yoshizawa & Johnson, 2008: 550.
Kaindipsocus sp. KY283: GenBank.

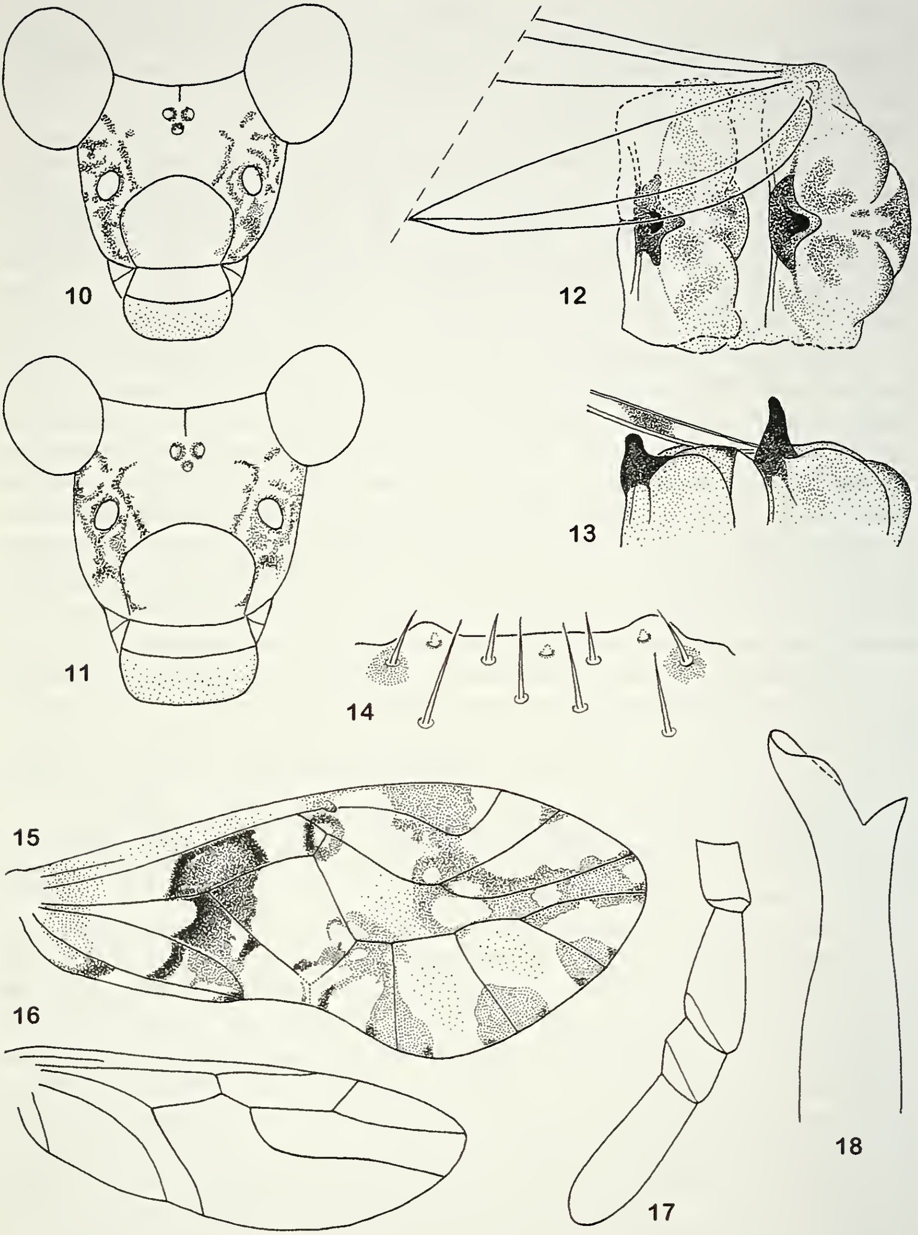
TYPE MATERIAL: MHNG, holotype ♂, Vietnam, Tay Ninh Prov., Tay Ninh, Nui Ba Den (= Black Lady Mountain), 11°22'28.6"N, 106°10'40.9"E, 300 m, evergreen gallery forest along small stream, on big stone near stream, 20./21.viii.2003, leg. P. Schwendinger (sample SV-03/12) (MHNG7631, on two microscopical slides, remaining parts in alcohol). – MHNG, paratypes: 2♂, 2♀ (one of them allotype: MHNG7632, on two microscopical slides, remaining parts in alcohol), same data as for holotype. – SEHU, 1♂ paratype, same data as for holotype (specimen used for molecular analysis: *Kaindipsocus* sp. in Yoshizawa & Johnson, 2008).

DESCRIPTION: *Colouration*: Body mostly yellowish white to light brown. Some brown patches of hypodermal pigment laterally on head (Figs 10, 11), compound eyes uniformly light grey to greenish, lacking pattern (observed in alcohol on relatively fresh material, i. e. some months after capture). Antenna medium brown, apical region of flagellar segments almost colourless. Prothorax yellowish, pterothorax medium brown, laterally with some dark brown hypodermal pigment, meso- and metascutellum and their processes dark brown, legs yellowish to light brown. Forewing membrane hyaline, with characteristical medium brown to dark brown color pattern (Fig. 15). Hindwing hyaline (Fig. 16). Abdomen with some brown hypodermal pigment, in particular latero-ventrally in basal half, terminalia light to medium brown.

Morphology: Glandular setae absent in adult (nymph not known). Compound eyes large, subglobular, strongly protruding, almost slightly stalked (IO/D male 1.0, female 1.4); vertex slightly concave in frontal view, median epicranial suture distinct, lateral arms not visible; ocelli relatively small, close together on a small tubercle (Figs 10, 11). Antenna apparently very long (damaged in all specimens examined, but the 4 basal flagellar segments together surpassing body length in male and female, see Measurements). Lacinial tip distinctly bicuspid, outer tine slightly curved and much longer than inner one (Fig. 18). Maxillary palp as in Fig. 17. Distal labral sensilla (Fig. 14): 6 external chaetal sensilla and 5 median marginal sensilla (3 of them placoids).

Wing venation as in Figs 15 and 16, Rs and M in forewing joined by a long crossvein, pterostigma with a small spurvein (not figured) or lacking spurvein (Fig. 15), segment of M forming distal closure of discoidal cell straight (Fig. 15) or slightly concave toward wing base, cell r5 very narrow between R4+5 and M1, areola postica tall, first segment of CuA1 longer than length of fusion with M. Sclerotized dorsal processes of meso- and metascutellum (Figs 12, 13; i. e. presumed stridulatory organ described by Smithers & Thornton, 1981) conspicuous in both sexes, vertically cone-shaped, mesoscutellar process slightly curved backward at tip (in some specimens more curved than shown in Fig. 13). Pearman's organ of hindcoxa well developed. Claws with a preapical tooth, an apically pointed basal appendix and a slender setiform pulvillus tapering to an acumniate or very weakly enlarged tip.

Male terminalia: Epiproct (Figs 19, 20) conical, distinctly dorsally directed, bearing relatively short setae, basally somewhat enlarged on each side, medio-basally adjacent to a slightly prominent median lobe of clunial hindmargin (Fig. 20); ventral membranous region at base of epiproct with a field of short setae (Fig. 20). Distal



FIGS 10-18

Kaindipsocus splendidus sp. n., male holotype (10, 17), female allotype (11-16, 18): (10) Head capsule, frontal view, male. (11) Ditto, female. (12) Pterothorax and basal part of left forewing, dorsal view, colour pattern of wing not figured. (13) Ditto, lateral view. (14) Distal margin of labrum. (15) Forewing. (16) Hindwing. (17) Maxillary palp, pilosity not figured. (18) Lacinial tip.

process of paraproct tapering to a slightly rounded tip; lateral margin of paraproct distally of trichobothrial field with a small rounded membranous lobe bearing minute tubercles (Fig. 20). Hypandrium (Figs 19, 22) bilaterally symmetrical, comprising two weakly sclerotized sternal plates, corresponding to 9th and 8th sternites (the spiracles of the 8th abdominal segment can be observed near the anterior margin of the lateral lobe of the sclerotized part of this segment, sp8 in Fig. 22). On each side of hypandrium a rounded shallow pit and some minute tubercles between weakly visible fusion line of sternites 8 and 9 and broad zone of fusion with clunium (Fig. 22); elongate sclerotized lateral lobe of 8th segment posteriorly not fused to clunium, but separated from it by a narrow membranous zone (Figs 19, 22). Distal lobe of hypandrium simple, apically truncate, with a subapical longitudinal swelling in the middle, this median region covered by minute tubercles (Figs 19, 22); distal lobe somewhat protruding laterobasally (see Fig. 19, protrusions dorsally folded in Fig. 22). Phallosome (Fig. 21) open apically, parameres fused basally to form a V-shaped phallobase, apical hooks of parameres articulated by membranous structures to phallobase, strongly curved outward and tapering to an acuminate point.

Female terminalia: Epiproct (Fig. 26) elongate, posteriorly directed, with a sclerotized oval zone on each side in basal half, apex broadly rounded and bearing some long setae, ventral side of epiproct with a field of short setae about in middle. Paraproct (Fig. 26) with a relatively long setose apical lobe and a slender bare ventrobasal process. Subgenital plate (Fig. 24) with a long bare almost parallel-sided egg guide; basal part of plate with complex dorsal membranous structures (dashed lines in Fig. 24) and with a rounded and ventrally slightly prominent lobe posterolaterally on each side near base of egg guide; basal sclerotization nearly circular on each side, fused in the middle and separated anteriorly by a V-shaped incision. Gonapophyses as in Fig. 23, ventral valvula slender, with a long pointed apical process, dorsal valvula almost gradually tapering to a well-developed broad distal process, external valvula transversally oval, setose, with a well-differentiated bare posterior lobe. 9th sternum (Fig. 25) with a sclerotized zone around spermapore and a small longitudinal accessory sclerite behind it.

MEASUREMENTS: Male holotype (female allotype): BL = 2.1 (2.6) mm; FW = 2.84 (3.12) mm; f1 = 680 (730) μm; f2 = 675 (750) μm; f3 = 600 (610) μm; f4 = 560 (600) μm; F = 680 (730) μm; T = 1326 (1375) μm; t1= 455 (460) μm; t2 = 165 (175) μm.

ETYMOLOGY: The species epithet refers to the splendid colour pattern of the forewing.

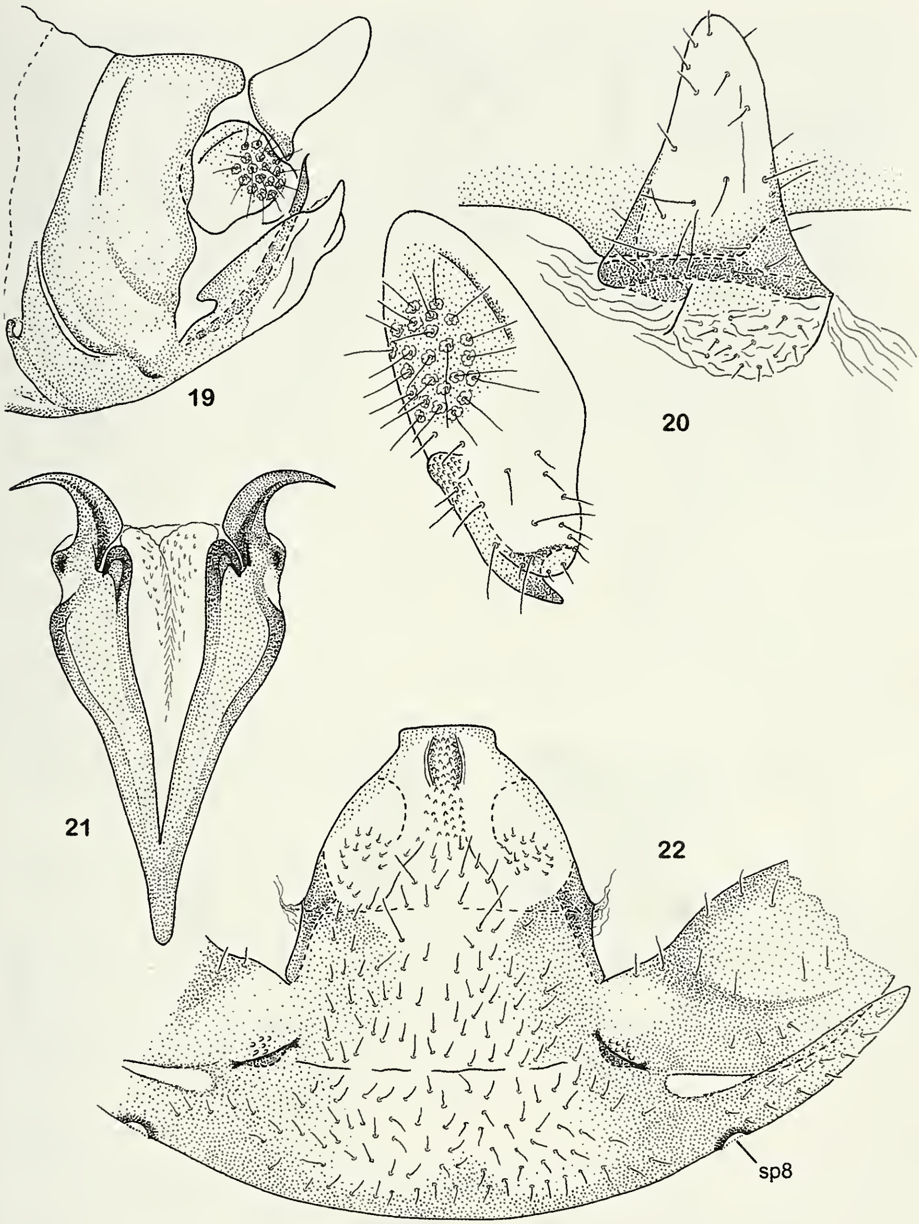
DISCUSSION: Eight poorly known species of Psocidae have been described from Vietnam by Navas (listed by Lienhard, 2004), five of which are provisionally placed in the holding genus *Psocidus* s. l. Pearman, 1934 (see Lienhard & Smithers, 2002). *K. splendidus* differs from all these species by its very characteristical wing pattern.

This unusual member of the family Psocidae belongs without any doubt to the genus *Kaindipsocus*, previously known only by three species from the Australian realm (see Smithers & Thornton, 1981 and Smithers, 1997): *K. mixtus* Smithers & Thornton, 1981 (type species, New Guinea, both sexes known), *K. emarginatus* Smithers, 1997 (Australia: New South Wales, only female known), *K. marksae* Smithers, 1997

(Australia: New South Wales, only female known). *K. splendidus* clearly differs from these species by its much more extensive wing pattern and by the mesoscutellar process being developed as a conspicuous vertical cone (Fig. 13). In *K. mixtus* the mesoscutellum "is raised into a tall median longitudinal ridge-like apophysis which extends forward beyond the scuto-scutellar suture, over the usually somewhat depressed area between the hind parts of the lateral lobes" (Smithers & Thornton, 1981: p. 959 and figs 97-99). In *K. emarginatus* and *K. marksae* the meso- and metascutellum are "only slightly raised into a suggestion of an apically rounded apophysis" (Smithers, 1997: 117). The question if these structures, in combination with the basal wing margins or certain basal wing veins, really form a stridulatory apparatus as postulated by Smithers & Thornton (1981) remains open. The male of *K. splendidus* also clearly differs from the male of *K. mixtus* by several genitalic characters (hyandrium and phallosome). Female genitalic characters are similar in all four species; however, based on the figures published, there seem to be some diagnostic differences in the shape of the subgenital plate and the sclerotizations of the 9th sternum.

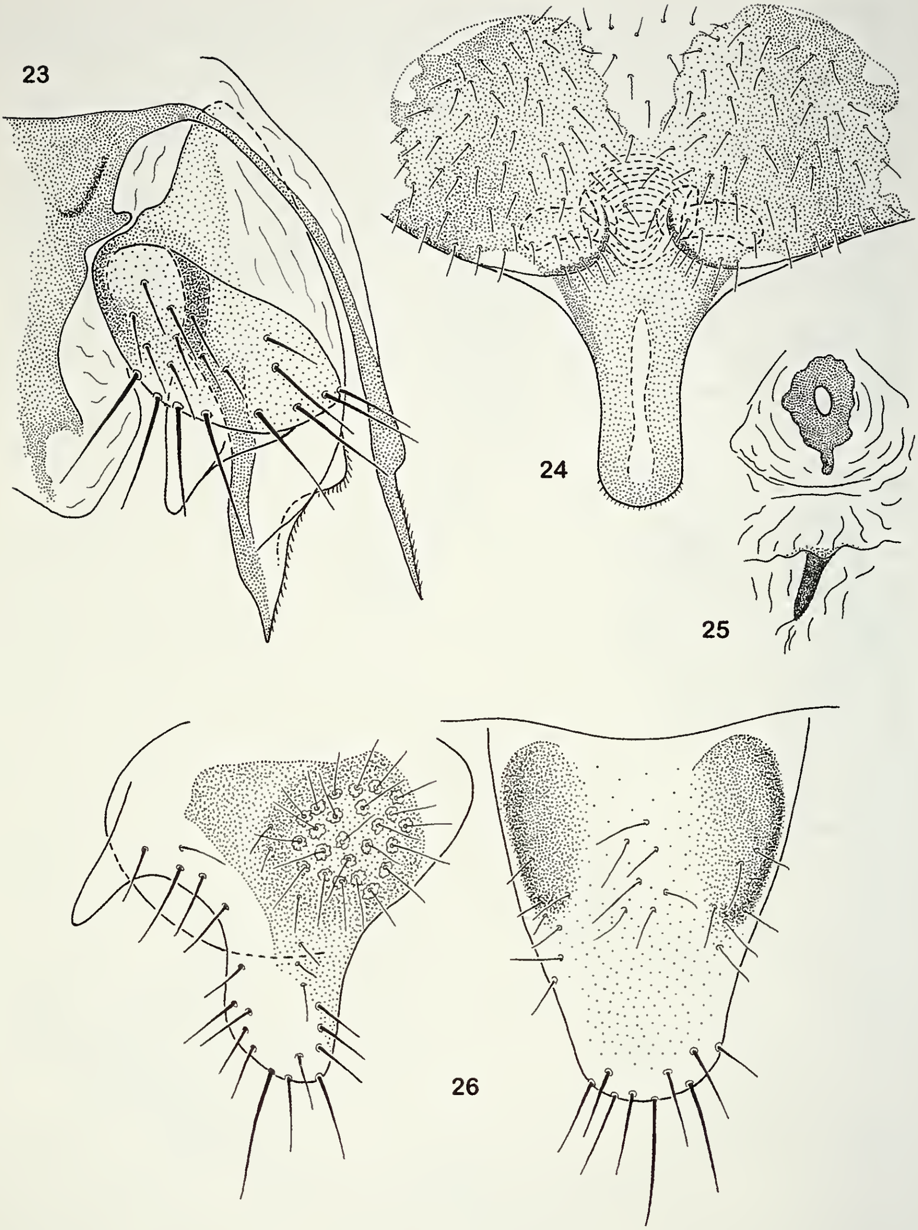
When described, the genus *Kaindipsocus* was placed in the subfamily Psocinae and explicitly excluded from Amphigerontiinae (Smithers & Thornton, 1981: p. 955). This classification was also used by New (in New & Lienhard, 2007) who assigns the genus to the psocine tribe Ptyctini. However, some years ago, Mockford (in litt. 2001, to C. Lienhard) suggested that *Kaindipsocus* would better be placed in the subfamily Amphigerontiinae. Lienhard & Smithers (2002) adopted Mockford's opinion in their catalogue without discussing it. The present material offered the possibility to test Mockford's hypothesis by morphological and molecular analyses. One paratype specimen was molecularly analysed by Yoshizawa & Johnson (2008). According to these authors *Kaindipsocus* is probably one of the most basal genera of Psocidae. None of their analyses supported its placement in Amphigerontiinae, but it could not be completely rejected by the confidence test they used (AU test, see Yoshizawa & Johnson, 2008: 549, 554, 558). They wrote: "The deep divergence of the genus from the other members of Amphigerontiinae is apparent" (loc. cit., p. 558). Thus, in their revised taxonomic system of Psocidae they finally assign *Kaindipsocus* to a new tribe of its own, Kaindipsocini, which they tentatively place in Amphigerontiinae (loc. cit., table 1 and p. 557) and not in Psocinae, the only other subfamily recognized by these authors. Within their subfamily Amphigerontiinae they recognize two other tribes (Amphigerontiini and Blastini) which form a undoubtedly monophyletic group corresponding to the traditional Amphigerontiinae (e. g. sensu Lienhard, 1998).

The present description illustrates for the first time the male terminalia of *K. splendidus*, which were already briefly mentioned by Yoshizawa & Johnson (2008: 554). The manner of fusion of the 8th and 9th sternites, which form the hypandrium, is very similar in *Kaindipsocus* and the Amphigerontiini and Blastini, but these parts are rather weakly sclerotized in *Kaindipsocus* in comparison to the latter tribes. Smithers & Thornton (1981: fig. 101) illustrated a very long hypandrium for the type species *K. mixtus*, corresponding in length to the hypandrium of *K. splendidus*. They state that the "terminal structures [of this male are] pale and soft (teneral specimen?)" (loc. cit., p. 958). This indicates that they probably did not pay attention to the fact that the hypandrium comprises the fused 9th and 8th sternites, which is characteristic for the Amphigerontiinae, thus clearly excluding *Kaindipsocus* from the Psocinae.



FIGS 19-22

Kaindipsocus splendidus sp. n., male holotype: (19) Abdominal apex, lateral view (pilosity not figured, except trichobothria). (20) Epiproct and left paraproct (epiproct in ventro-lateral view, slightly deformed basally due to slide mounting). (21) Phallosome. (22) Hypandrium, ventral view, and ventro-lateral parts of clunium; sp8 = spiracle of the 8th segment.



FIGS 23-26

Kaindipsocus splendidus sp. n., female allotype: (23) Right gonapophyses. (24) Subgenital plate. (25) 9th sternum with spermapore and accessory sclerite. (26) Epiproct and left paraproct.

Yoshizawa & Johnson (2008: 554) suggest that the presence of a sclerotized 8th sternum in *Kaindipsocus* could be interpreted as a convergence between this genus and the other Amphigerontiinae. However, according to these authors it is also possible that "the character states observed in Amphigerontiinae represent the plesiomorphic condition of the family Psocidae" (loc. cit., p. 554). Some other similarities or differences between *Kaindipsocus* and the Amphigerontiini + Blastini are difficult to interpret (for figures, see Lienhard, 1998): Presence of only 5 median marginal labral sensilla, 3 of them placoids, in *Kaindipsocus* and the Amphigerontiini + Blastini (9 such sensilla, 3 of them placoids, in Psocinae); phallosome distally open in *Kaindipsocus* and the Amphigerontiini + Blastini (usually distally closed in Psocinae); phallosome basally closed in *Kaindipsocus* (open in the Amphigerontiini + Blastini, mostly closed in Psocinae); distal process of the male paraproct relatively slender in *Kaindipsocus* (broadly rounded in the Amphigerontiini + Blastini, slender in Psocinae).

The most striking differences between *Kaindipsocus* and the other members of Psocidae are due to some generic autapomorphies: Presence of sclerotized processes on meso- and metascutellum (Figs 12 , 13), lacinial tip with a large curved outer tine (Fig. 18), female paraproct with a conspicuous ventrobasal process (Fig. 26). Even if the molecular results by Yoshizawa & Johnson (2008) tend to suggest a sister-group relationship between *Kaindipsocus* and the remaining Psocidae, it seems premature to erect a subfamily Kaindipsocinae based on the above mentioned autapomorphies of the genus *Kaindipsocus*. In particular, no convincing morphological synapomorphy is known for the remaining Psocidae. The tentative placement of *Kaindipsocus* in the subfamily Amphigerontiinae, as a tribe of its own, proposed by Yoshizawa & Johnson (2008), seems at present the best solution. It simultaneously takes into account its morphological peculiarity and its similarity to the Amphigerontiini and Blastini.

ACKNOWLEDGEMENTS

I am very grateful to György Sziraki (HNHM) for the loan of the *Paracaecilius* specimen and to Peter Schwendinger (MHNG) for collecting the *Kaindipsocus* specimens and for reading the manuscript and making valuable suggestions. I thank Kazunori Yoshizawa (SEHU) for interesting discussions about the morphology of *Kaindipsocus* and for reviewing the manuscript. Florence Marteau (MHNG) is acknowledged for technical assistance.

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Bilobella carpatica, a new species of Neanurinae (Collembola: Neanuridae) from the Carpathians

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***Bilobella carpatica*, a new species of Neanurinae (Collembola: Neanuridae) from the Carpathians.** - A new species of the genus *Bilobella* Caroli, 1912 from the Ukrainian Carpathians is described, disscused and fully illustrated. *Bilobella carpatica* sp. n. is characterised by the presence of very small eyes, the absence of the chaeta O on head, the presence of 7 chaetae on tubercle (Di+De+Dl) of abdomen V and the absence of inner denticle on claw. It is related to *B. subaurantiaca* Cassagnau et Péja, 1979 and *B. massoudi* Cassagnau, 1968 from Albania and former Yougoslavia respectively.

Keywords: Collembola - Paleonurini - taxonomy - Ukraine.

INTRODUCTION

The genus *Bilobella* was established by Caroli (1912), with *Neanura aurantiaca* Caroli, 1910 described from Italy, as its type species. At present, the genus is classified within Paleonurini, one of the six tribes erected in the subfamily Neanurinae (Cassagnau, 1989). The most distinguishing and striking characters of *Bilobella* are the absence of chaetae and tubercles Di on thoracic tergum I and chaetae A on head. As presently defined (Deharveng, 1982) the genus comprises 12 species, most of which were described and reported from Europe, especially from the Mediterranean part of the continent (Cassagnau, 1968; Cassagnau & Péja 1979; Deharveng, 1979, 1981; Jordana *et al.*, 1997). Morphologically, *Bilobella* strongly resembles *Adbiloba* Stach, 1951 (Europe, Africa, Asia) in several respects including the colour of body, the fusion of lateral tubercles (Dl, L, So) on head, and tubercles Di, De and Dl on abdominal tergum V.

During the research on the Collembola fauna of the Ukrainian Carpathians, the second author found an unknown species of the genus very similar to two European species, *B. subaurantiaca* Cassagnau et Péja, 1979 and *B. massoudi* Cassagnau, 1968 described from Albania and former Yougoslavia, respectively. In adition, the examination of Stach's material of "*Bilobella aurantiaca*" from different localities in Europe (Stach, 1951), made possible thanks to the kindness of Prof. Wanda M. Weiner from

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Manuscrit accepté le 16.06.2008

the Institute of Systematics and Evolution of Animals PAS (Cracow, Poland), revelaed two further specimens of the undescribed species. The present paper contains its description and taxonomic remarks. The holotype of *Bilobella carpatica* sp. n. is housed in the collection of Muséum d'histoire naturelle in Geneva.

TERMINOLOGY

Terminology in the description follows that given in Deharveng (1983), Deharveng & Weiner (1984) and Greenslade & Deharveng (1990).

Abbreviations used; General morphology: abd.–abdomen, ant.–antenna, Cx–coxa, Fe–femur, Scx2–subcoxa 2, T–tibiotarsus, th.–thorax, Tr–trochanter, VT–ventral tube; Groups of chaetae: Ag–antegenital, Fu–furcal, Ve–ventroexternal, Vi–ventrointernal, Vl–ventrolateral; Tubercles: Af–antenno–frontal, Cl–clypeal, De–dorsoexternal, Di–dorsointernal, Dl–dorsolateral, L–lateral, Oc–ocular, So–subocular; Types of chaetae: Ml–long macrochaeta, Mc–short macrochaeta, me–mesochaeta, mi–microchaeta, ms–s–microchaeta, S– or s–chaeta sensualis or sensillum, or–organite of antenna IV, i–ordinary chaeta on antenna IV, mou–thin cylindrical sensilla on ant. IV („soies mousses"), x–labial papilla x.

DESCRIPTION OF THE NEW SPECIES

Bilobella carpatica sp. n. Figs 1-14

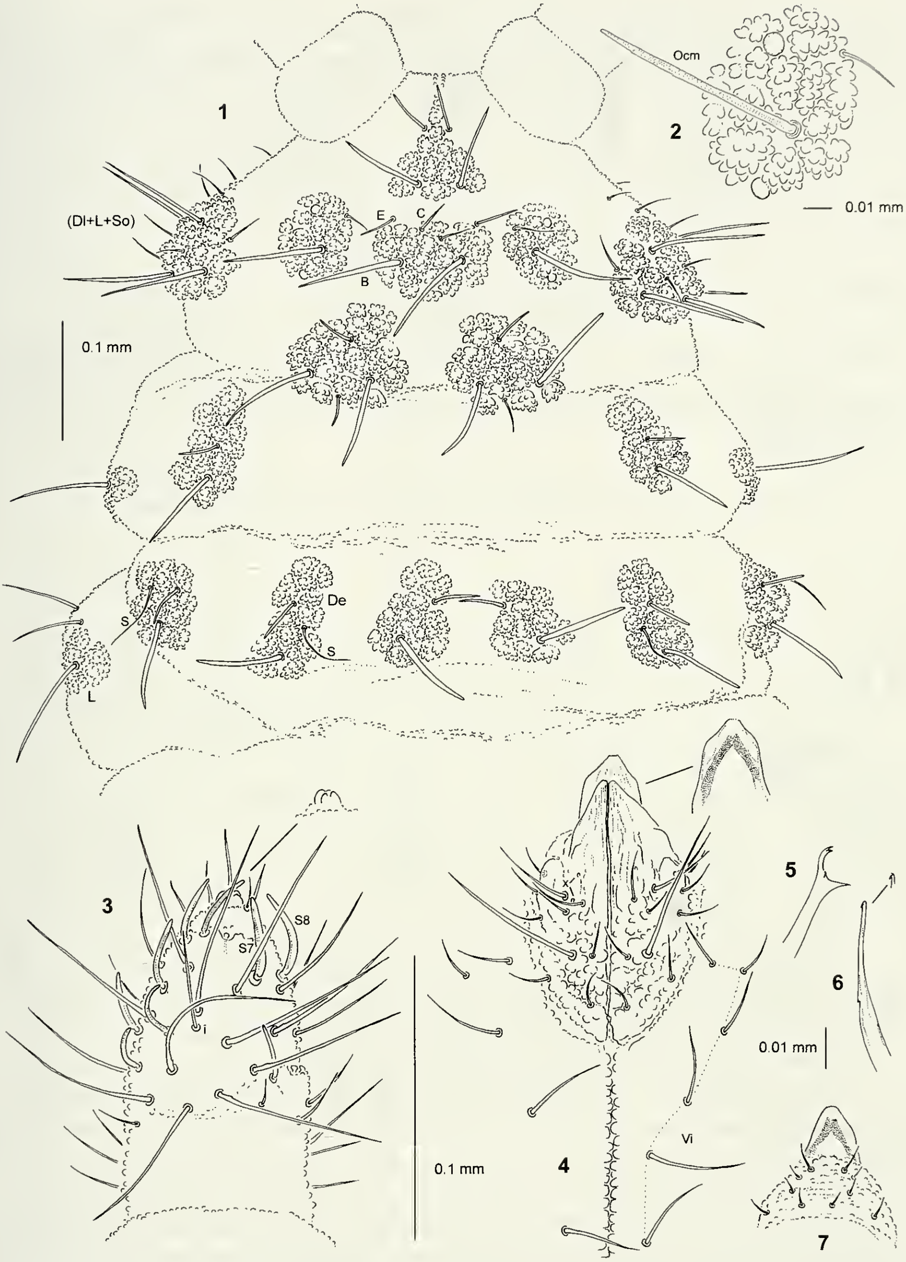
TYPE MATERIAL: Holotype, adult female on slide, Ukraine, East Carpathians, Gorgany Range, Maniava village, larch forest, litter, 23.V.1990, leg. I. Kaprus'(in the collection of the Muséum d'histoire naturelle in Geneva).

OTHER MATERIAL EXAMINED (no types): adult female on slide, Ukraine, East Carpathians, Chyvchyny Range, village, spruce forest, litter, 14.VIII.1990, leg. I. Kaprus'; juvenile on slide, Ukraine, East Carpathians, Chornohora Range, Mt. Danchev, spruce forest, liiter and soil, 24.VIII.1993, leg. I. Kaprus'; juvenile on slide, Ukraine, East Carpathians, Chyvchyny Range, Velykyi Kamin' Mt, near Perkalab village, spruce forest, litter, 1.VIII.1991, leg. I. Kaprus'; male and juvenile on slides, Ukraine, East Carpathians, Chornohora Range, 1935, leg. J. Stach. The other material, except specimens from the Stach's collection (Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland), is preserved at the Department of Biodiversity and Evolutionary Taxonomy, Wrocław University, Poland and the State Museum of Natural History, Ukrainian National Academy of Sciences, L'viv.

ETYMOLOGY: The new species is named after its terrra typica, the Carpathians.

DIAGNOSIS: Among known species *Bilobella carpatica* sp. n. can be easily recognised by the following combination of characters: white body, very small eyes (diameter of ocellus equal or sligthly larger than diameter of chaetopor Ocm), absence of chaetae O and D on head, presence of 4 chaetae on tubercle (Di+De) of head, presence of 3 chaetae on tubercle De of thoracic terga II–III, presence of 4 chaetae on tubercle (De+Dl) of abdominal tergum IV, presence of 7 chaetae on tubercle (Di+De+Dl) of abdominal tergum V and claws without denticle.

DESCRIPTION: Habitus typical of the genus *Bilobella*. Body length (without antennae) 0.80–1.60 mmm (holotype–1.45 mm). Tertiary granulation well developed. Colour of the body white. 2+2 very small, unpigmented eyes (Figs 1, 2).



FIGS 1-7

Bilobella carpatica sp. n. (1) Dorsal chaetotaxy of head and th. I–II, holotype. (2) Tubercle Oc on head. (3) Dorsal chaetotaxy of ant. III–IV, right antenna. (4) Chaetotaxy of labium and group Vi. (5) Mandible. (6) Maxilla. (7) Labrum.

TABLE 1. Chaetotaxy of *Bilobella carpatica* sp. n.. Cephalic chaetotaxy

Tubercle	Number of chaetae	Types of chaetae	Names of chaetae
Cl	4	Ml	F
		Mc	G
Af	6	Ml	B
		Mc	C, E
Oc	2	Ml	Ocm
		Mc or me	Oca
(Di+De)	4	Ml	Di1, De1
		Mc	Di2, De2
(Dl+L+So)	11–12	Ml, Mc, me	impossible to recognise

Number of other cephalic chaetae: Vi, 6; Ve, 7–9; labrum, 4/2, 4; labium, 11, 2x; ant. I, 7; ant. II, 11; ant. III, 16-17 + 5s; ant. IV, 8S + i + or + 12mou.

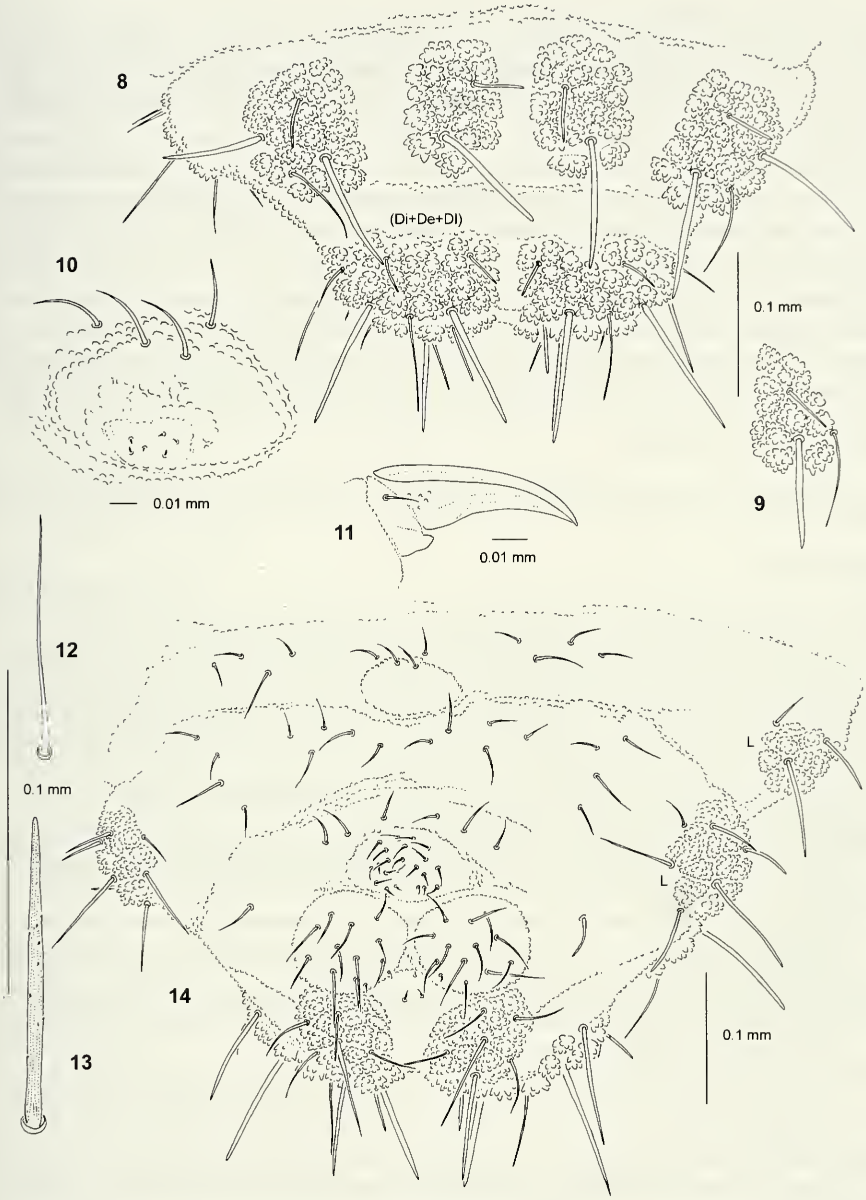
TABLE 2. Chaetotaxy of *Bilobella carpatica* sp. n.. Postcephalic chaetotaxy

	Terga				Legs				
	Di	De	Dl	L	Scx2	Cx	Tr	Fe	T
th. I	–	2	1	–	0	3	6	13	19
th. II	2	2+s	2+s+ms	3	2	7	6	12	19
Th. III	2	2+s	2+s	3	2	8	6	11	18
							Sterna		
Abd. I	2	2+s	2	3	VT: 4				
abd. II	2	2+s	2	3	Ve: 4	Vel–absent			
abd. III	2	2+s	2	3	Ve: 4			Fu:4 me	6 mi
abd. IV	2	3+s		6	Ve: 5			Vl: 4–5	
abd. V		6+s			Ag: 3			Vl: 1	
abd. VI		7			Ve:11–12			An:2–3 mi	

Types of dorsal ordinary chaetae: macrochaetae Ml thickened, moderately long, narrowly sheathed, feebly serrated and apically arc–like (Figs 1–2, 8–9, 13); macrochaetae Mc with similar morphology, mesochaetae thin and pointed.

Head. Buccal cone slightly elongate. Ventral sclerifications of labrum as in Figs 4, 7. Labral chaetotaxy 4/2, 4 (Fig. 7). Chaetotaxy of labium as in Fig. 4 and Tab. 1. 2+2 small papillae x present. Maxilla styliform (Fig. 6). Mandible thin with four teeth, middle tooth small and slightly curved (Fig. 5). Antennal segments I and II with 7 and 11 chaetae respectively. Antennal segments III and IV fused dorsally. Dorsal chaetotaxy of ant. III–IV as in Fig. 3 and Tab. 1. Apical bulb distinct, trilobed. S–chaetae long and moderately thickened, S7–8 distinctly longer than other sensilla (Fig. 3). Chaetotaxy of head as in Figs 1–2 and in Tab. 1. Chaetae O and D absent.

Thorax, abdomen, legs. Chaetotaxy of th. and abd. as in Figs 1, 8–10, 12–14, and in Tab. 2. Body sensilla apically not knobbed (Fig. 12). Tubercles De of th. II–III and abd. I–III with 3 chaetae (Figs 1, 9). Tubercles L on th. II–III with 3 chaetae (Fig. 1). Tubercles L on abd. III and IV with 3 and 6 chaetae (Fig. 14). 4 mesochaetae



Figs 8-14

Bilobella carpatica sp. n. (8) Dorsal chaetotaxy of abd. IV–VI, holotype. (9) Tubercle De of abd. III. (10) Furca rudimentary. (11) Claw of legs III. (12) Body sensillum of abd. V. (13) Chaeta Di1 of abd. V. (14) Ventral chaetotaxy of abd. III–VI, holotype.

and 6 very small microchaetae on furca rudimentary (Fig. 10). Tubercle (Di+De+Dl) on abd. V with 7 chaetae. Cryptopygy present, strongly developed (Fig. 8). Chaetotaxy of legs as in Tab. 2. M chaeta present. Claw without inner tooth (Fig. 11).

REMARKS. Because of the absence of the chaeta O on head, the presence of 4 chaetae on tubercle (Di+De) of head and 3 chaetae on tubercle De of thoracic terga II–III the new species appears to be the closest to *B. subaurantiaca* Cassagnau et Péja, 1979 and *B. massoudi* Cassagnau, 1968. However, it can be easily distnguished from them by the following features: colour of the body in alive specimens (in *carpatica*: white, in *subaurantiaca* and *massoudi*: orange), number of chaetae on tubercle Dl of th. II–III (in *carpatica* and *subaurantiaca*: 3 chaetae, in *massoudi*: 5 chaetae), number of chaetae on tubercle Dl and L of abd. I–III (in *carpatica* and *subaurantiaca*: 2 and 3 chaetae respectively, in *massoudi*: 3 and 4 chaetae respectively), number of chaetae on tubercle (De+Dl) of abd. IV (in *carpatica* and *massoudi*: 4 chaetae, in *subaurantiaca*: 6 chaetae), number of chaetae on tubercle (Di+De+Dl) of abd. V (in *carpatica*: 7 chaetae, in *subaurantiaca*: 8 chaetae, in *massoudi*: 8–9 chaetae), presence/absence of inner denticle on claw (in *carpatica* and *massoudi*: absent, in *subaurantiaca*: present).

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REVUE SUISSE DE ZOOLOGIE 115 (3): 515-526; septembre 2008

Three new *Pseudopoda* species from northern India (Araneae: Sparassidae: Heteropodinae)

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Three new *Pseudopoda* species from northern India (Araneae: Sparassidae: Heteropodinae). - Three new *Pseudopoda* species are described: *P. fabularis* sp. n. (♂, ♀), *P. sicca* sp. n. (♂), and *P. perplexa* sp. n. (♂, ♀). One ♂ of *Pseudopoda* cf. *casaria* (Simon 1897) is recorded from Himachal Pradesh. The systematic position of the new species within the genus is discussed.

Keywords: Taxonomy - systematics - species groups - *prompta*-group - *martensi*-group.

INTRODUCTION

After the genus *Pseudopoda* was established by Jäger (2000), a major revision on Himalayan representatives (Jäger 2001) and several papers with reviews or single descriptions of species from Japan, Taiwan, China, Vietnam and Laos were published (Jäger & Ono, 2001, 2002; Jäger *et al.*, 2002, 2006; Jäger, 2002, 2007, 2008; Jäger & Vedel, 2005). Recently the *Pseudopoda* species of Yunnan Province in China were also reviewed (Jäger & Vedel, 2007). The diversity of *Pseudopoda* seems to be much higher than currently known and is comparable to some Coelotinae genera in Asia (Platnick 2008 and papers of Wang and Wang *et al.* listed therein). During a visit of the author to the Muséum d'histoire naturelle de Genève, three new species of the genus *Pseuodpoda* were recognised in its spider collection. One male specimen recognised as close to the species *Pseudopoda casaria* (Simon, 1897) is also recorded herein. One single female of the genus *Pseudopoda* was found but could not be identified, because copulatory organs of *Pseudopoda* females possess only low significance for differentiating species.

MATERIAL AND METHODS

For diagnoses and descriptions of family, subfamiliy and genus see Jäger (2001, 2002). All measurements are in millimetres. Measurements of limbs are listed as: Total length (femur, patella, tibia, metatarsus, tarsus). Arising points of tegular appendices (i.e. embolus, conductor) are given as 'clock positions' on the left palp in ventral view. Hairs are omitted in all illustrations; spines on the palps are illustrated. Spination formula lists the number of spines in the following order: Prolateral, dorsal, retrolateral and ventral. For a definition and description of the median field of the epigyne in

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Pseudopoda females, see Jäger (2001: 13, fig. 12c). This field is outlined by the anterior margins of the lateral lobes.

Abbreviations. ALE - anterior lateral eyes, AME - anterior median eyes, AW - anterior width of dorsal shield of prosoma, CC - chelicerae, CH - clypeus height, CX - coxa, FE - femur, GC - gnathocoxae, LA - labium, MT - metatarsus, OL - opisthosoma length, OS - opisthosoma, OW - opisthosoma width, PA - patella, PH - height of dorsal shield of prosoma, PJ - consecutive number for specimens of Sparassidae examined by Peter Jäger, PL - length of dorsal shield of prosoma, PLE - posterior lateral eyes, PME - posterior median eyes, PP - palpus, PS - dorsal shield of prosoma, PW - width of dorsal shield of prosoma, RTA - retrolateral tibial apophysis, ST - sternum, TA - tarsus, TI - tibia, TR - trochanter; I, II, III, IV - first to fourth leg.

Depository (with curator). MHNG - Muséum d'histoire naturelle de Genève (P. Schwendinger).

TAXONOMY

Sparassidae Bertkau, 1872
Heteropodinae Thorell, 1873
Pseudopoda Jäger, 2000
Pseudopoda prompta**-group** (Jäger, 2001)

Representatives of this species group are small to large spiders (7-28 millimetres body length). Nine species were described so far from the Himalayas (Pakistan, India, Nepal and Tibet). These spiders are generally darker (reddish brown) than other *Pseudopoda* spp. and do not exhibit a distinct dorsal pattern, but a dark median band on their ventral opisthosoma instead (Jäger, 2001: fig. 3 k-l). The tip of the embolus is bent and of a characteristic shape (Jäger, 2001: 34, figs 22g, i-j). The lateral lobes of the epigyne clearly extend beyond the epigastric furrow. The first winding of the internal duct system is directed towards the longitudinal axis of the body. Some exceptional character states are present in the small-sized *P. cuneata* Jäger, 2001 (colouration, ♀ genitalia, see Jäger, 2001: figs 21a-c).

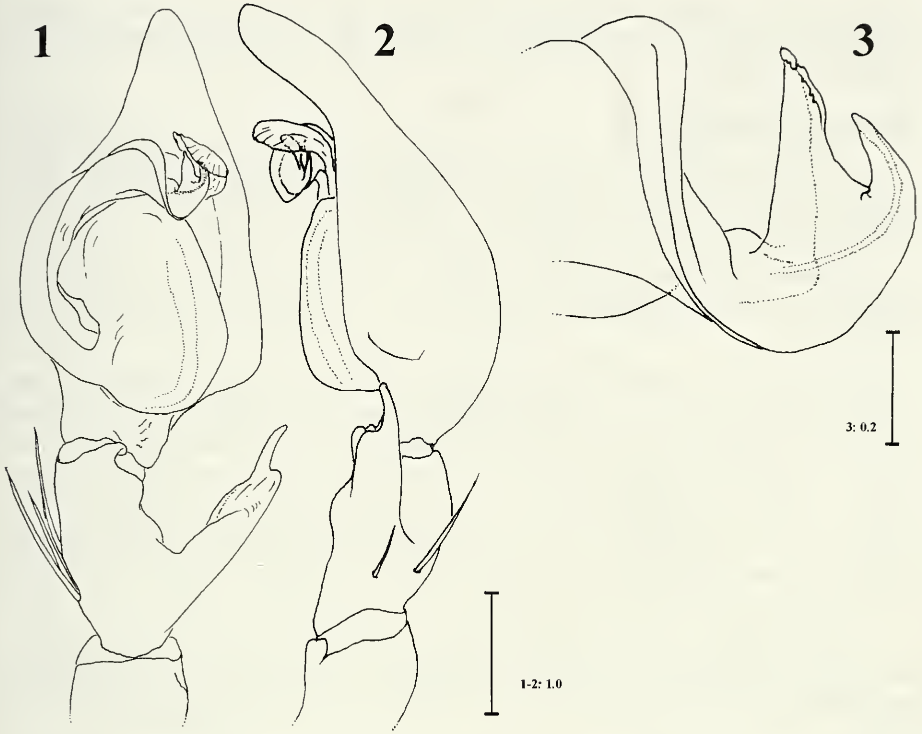
Pseudopoda cf. ***casaria*** (Simon, 1897) Figs 1-3

Material examined: 1 ♂ (PJ 2840): India, Himachal Pradesh: Khajiar, E-Dalhousie [32°32'20.12"N, 75°56'54.68"E], 1950 m, pied creux et écorce pourrie (?*Fraxinus*); 21.X.1988, sample n° 31, leg. S. Vit, MHNG.

Diagnosis: ♂: Tip of embolus with distinct subapical distad apophysis, the latter extending beyond tip of embolus and possessing a slightly serrated distal margin (Figs 1, 3).

Description: ♂. PL 7.6, PW 7.0, AW 3.8, OL 8.6, OW 5.5. Leg and palp spination: PP 131, 101, 2111; FE I-III 323, IV 331; PA I 1(0)01, II 101, III 1(0)01, IV 001; TI I-III 2226, IV 2126; MT I-II 1014, III 3024, IV 3036.

Palp as in diagnosis. Otherwise as described and illustrated by Jäger (2001: figs 23e-h) except for distal loop of embolus in retrolateral view directed proximally in the present specimen (Fig. 2; directed ventrally in specimens illustrated by Jäger, 2001: figs 23c, g).



FIGS 1-3

Pseudopoda cf. *casaria*, ♂. (1) Left palp, ventral view. (2) Same, retrolateral view. (3) Tip of embolus, ventral view.

Colour: Light reddish brown to brown. Dorsal PS without pattern. Legs light reddish brown, ventral FE yellowish brown, distal leg segments darker. ST, LA and GC dark reddish brown, the latter ones with a light yellowish brown tip. Ventral CX dark reddish brown, partly mottled. Dorsal OS velvety, light brown, without pattern. Ventral OS with distinct dark longitudinal median band and 2 light lateral stripes (see Jäger, 2001: fig. 31).

♀. unknown.

RELATIONSHIPS: The specimen is clearly closely related to *Pseudopoda casaria* (Simon, 1897) and *P. prompta* (O. Pickard-Cambridge, 1885), but differs by the unique subdistal apophysis on its embolic tip. Jäger (2001) illustrated 1 male and 2 females under *Pseudopoda* cf. *casaria*, noting that more conspecific males and females need to be examined to recognise the status of these forms. The present specimen falls into the same category: Judging from the unique differences in embolus morphology it could be a new species, but the lack of further material makes it impossible to make a final statement. Moreover, it has to be considered that the Himachal Pradesh and the areas west of it represent the western margin of the distribution range of the genus *Pseudopoda*. Jäger (2005) revealed a high degree of variation in the copulatory organs of *Heteropoda afghana* Roewer, 1962 and allied forms in the same region (Afghanistan, Pakistan, NW India) and attributed this to geographical isolation of marginal populations.

Pseudopoda fabularis sp. n. Figs 4-8

TYPES: ♂ holotype (PJ 1744), 1♀ paratype (PJ 1745): Indes orientales, H. de Saussure, *Heteropoda ?cervina* L. Koch, [Eugène] Sim[on] det., Muséum Genève, ancienne collection générale, MHNG.

ETYMOLOGY: The specific name refers to the embolus (Figs 4, 6), which resembles a fabulous creature. Latin: fabularis, -e, meaning legendary, mythical; adjective.

DIAGNOSIS: ♂: Embolus distally divided into 2 parts; one part longer and bent at 180° distally containing the sperm duct (Figs 4, 6). RTA distally straight (in lateral view; Fig. 5). Dorsal margin of RTA with small tooth (in ventral view, Fig. 1 see arrow). ♀: Median epigyneal field with rounded dark patch at posterior margin. Anterior margins of lateral lobes close to the median line running transversally (Fig. 7; mostly „v"- or „U"-shaped in other members of this species group). Distal parts of fertilisation ducts separated from each other by at least half of vulva width. First windings running parallel to longitudinal axis of body (Fig. 8).

DESCRIPTION: ♂. PL 8.6, PW 8.1, AW 4.5, PH 2.0, OL 9.2, OW 6.0. Eyes: AME 0.43, ALE 0.57, PME 0.42, PLE 0.51, AME-AME 0.26, AME-ALE 0.15, PME-PME 0.46, PME-PLE 0.70, AME-PME 0.49, ALE-PLE 0.50 CH at AME 0.56, CH at ALE 0.42.

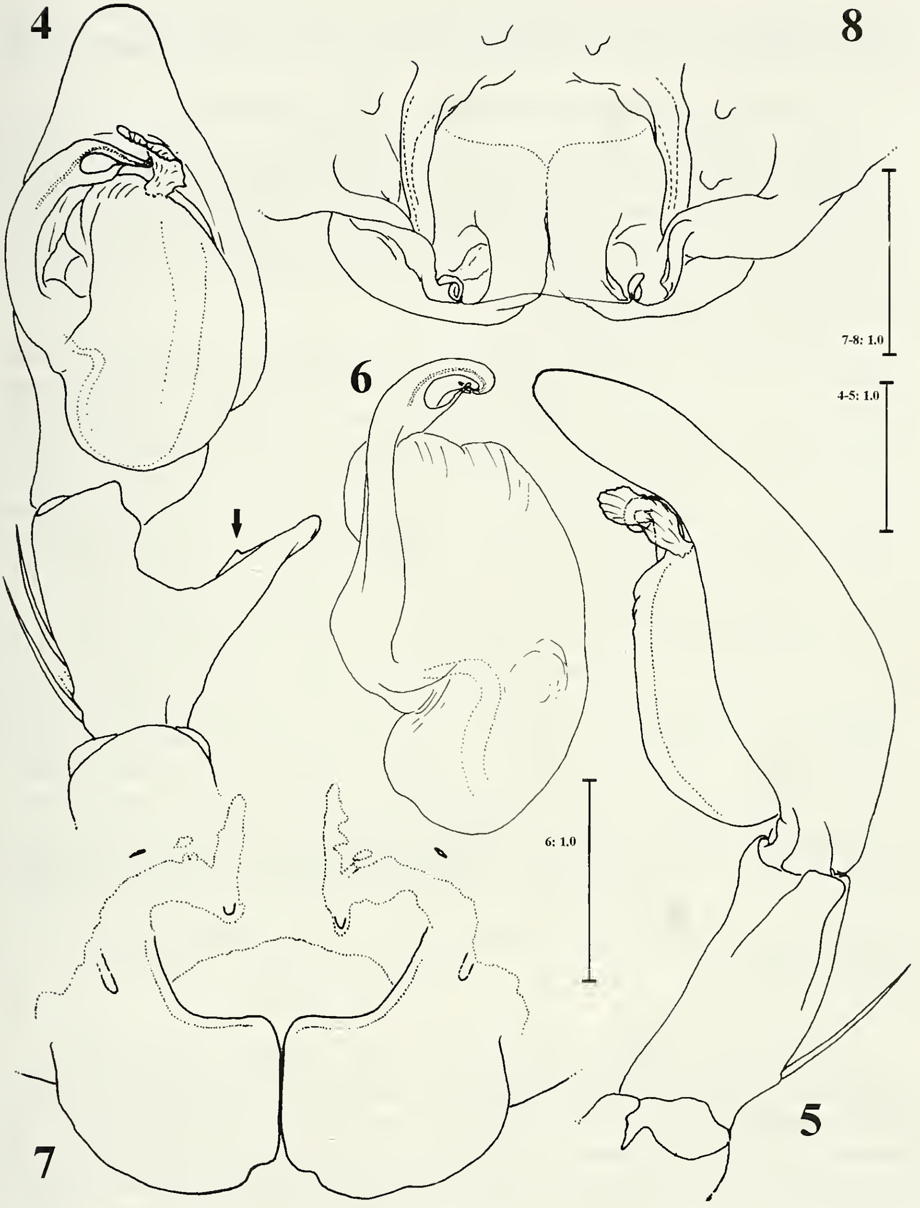
Leg formula: 2143. Leg and palp spination: PP 131, 001, 2111; FE I-III 323, IV 321; PA I-III 101, IV 100; TI I-II 2226, III-IV 2126; MT I 2024, II 2014, III 3024, IV 3036. Leg and palp measurements: PP 10.9 (3.6, 1.7, 1.9, -, 3.7), I 39.8 (10.4, 4.1, 11.6, 10.5, 3.2), II ? (11.6,4.3,12.7, ?, ?), III 33.8 (9.6, 3.8, 9.5, 8.3, 2.6), IV 36.2 (10.2, 3.3, 9.8, 9.9, 3.0).

Embolus arising in a 9-o'clock-position, conductor in a 1-o'clock-position on the tegulum. Sperm duct almost straight, running close to retrolateral margin of tegulum. RTA with broad base, arising medially to basally on the tibia (Fig. 4).

Colour: Light reddish brown. PS with some dark radial lines. CC dark red-brown. Legs almost without pattern, distal segments darker. ST, LA and GC red-brown, the latter ones with a light yellowish brown tip. Ventral CX light reddish brown. Dorsal OS with dark region above heart and 3 dark transversal bars behind it. Ventral OS with distinct dark longitudinal median band.

♀. PL 9.8, PW 9.3, AW 5.6, PH 3.0, OL 13.5, OW 10.0. Eyes: AME 0.43, ALE 0.63, PME 0.45, PLE 0.56, AME-AME 0.33, AME-ALE 0.17, PME-PME 0.51, PME-PLE 0.84, AME-PME 0.57, ALE-PLE 0.62, CH at AME 0.64, CH at ALE 0.63.

Leg formula: 2143. Leg and palp spination: PP 131, 001, 2121, 1013; FE I-III 323, IV 331; PA I-III 101, IV 100; TI I-II 22(1)26, III-IV 2126; MT I 2014, II 2024, III 3024, IV 3036. Leg and palp measurements: PP 12.7 (4.0, 2.0, 2.6, -, 4.1), I 35.7 (9.7, 4.6, 9.8, 8.9, 2.7), II 37.8 (10.7, 4.7, 10.7, 9.0, 2.7), III 30.2 (9.1, 4.0, 8.0, 7.0, 2.1), IV 32.3 (9.6, 3.9, 8.0, 8.3, 2.5). Palpal claw with 7 teeth.



FIGS 4-8

Pseudopoda fabularis sp. n., ♂ holotype (4-6), ♀ paratype (7-8). (4) Left palp, ventral view. (5) Same, retrolateral view. (6) Tegulum, prolateral view. (7) Epigyne, ventral view. (8) Vulva dorsal view. Arrow pointing to tooth on dorsal margin of RTA.

Lateral lobes extending beyond epigastric furrow, the length of the part extending intermediate between that of *P. cuneata* Jäger, 2001 and other representatives of the *P. prompta*-group. Epigynal field with anterior bands. Posterior margin of lateral lobes with slight median indentation (Fig. 7). Windings of internal duct system not extending laterally beyond the first winding (Fig. 8; see *P. cuneata*; Jäger, 2001: fig. 35 b)

Colour: As in ♂, but dorsal OS without distinct markings.

DISTRIBUTION: Only known from the type locality. The term „Indes orientales“ on the label of the types could mean any locality from India to Indonesia. Since the *Pseudopoda prompta*-group is distributed in a restricted region of the central and western Himalayas (Jäger, 2001: figs 65, 68) in altitudes between 1650 and 2400 metres, it is most likely that the present specimen was collected in this region. An exact type locality cannot be given at present.

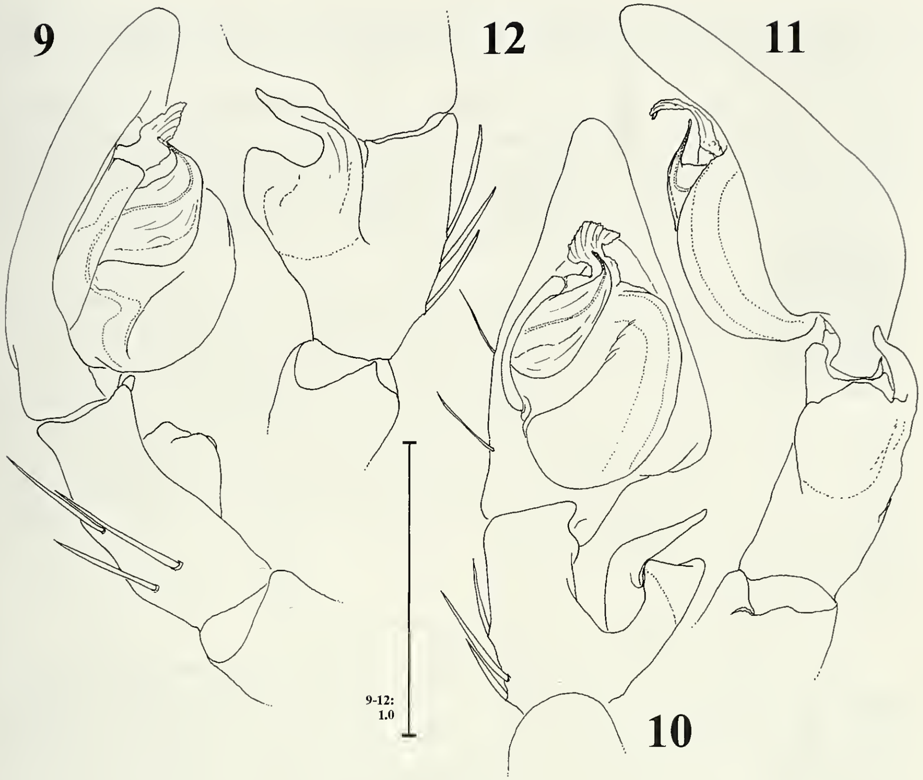
RELATIONSHIPS: Judging from size (ca 17-23 millimetres), colouration and most characters of ♂ and ♀ genitalia *P. fabularis* sp. n. clearly belongs to the *prompta*-group. Its systematic position within the species group is not clearly recognizable. The short embolus, the intermediate position of lateral epigynal lobes and the course of the first winding of the internal duct system indicate that it occupies a systematic position between *P. cuneata* Jäger, 2001 and other species of the group (especially those without a tegular apophysis in ♂♂, i.e. *P. marmorea* Jäger, 2001 and *P. huberti* Jäger, 2001). Jäger (2001: fig. 82) showed that in ♀ copulatory organs an evolutionary transformation especially of the first winding took place. Accordingly, the plesiomorphic state represents a first winding which runs from the median line to the lateral side, whereas the loops and glandular structures are situated dorsally, as it is the case in most *Heteropoda* spp. or in a few *Pseudopoda* spp. (e.g., *P. diversipunctata* Jäger, 2001). In most *Pseudopoda* spp. the first winding runs from laterally to the median line and the loop (including the glandular structure) is situated ventrally (e.g., *P. martensi* Jäger, 2001), which represents the apomorphic state. The transition between these two states is partially visible within the *P. prompta*-group: The first winding in *P. cuneata* is running in a plane, which is parallel to the longitudinal axis of the body. Moreover, loop and glandular structure are situated laterally. According to this evolutionary trend *P. fabularis* sp. n. forms a link between *P. cuneata* and the remaining species in the *prompta*-group.

***Pseudopoda martensi*-group**

♂♂ of this species group are characterized by a strongly flattened and sickle-shaped embolus. It arises in a prolateral position on the tegulum, first bending in a retrolateral direction and then running in a distal direction. Within this species group one lineage of species is recognisable, in which the emboli possess a subapical tooth (*martensi*-group s. str.). *Pseudopoda sicca* sp. n. seems to be closely related to this group. ♀♀ are difficult to distinguish and have only limited taxonomic value (Jäger, 2001).

Pseudopoda sicca sp. n. Figs 9-12

TYPES: ♂ holotype (PJ 1779): India (West-Bengal), Distr. Darjeeling, Tonglu [ca. 27° 7'4.97"N, 88° 2'1.14"E], sommet et près du sommet, 3100 m, tamissage dans une petite forêt et au pied d'arbustes dans la pâturage; 16.X.1978, sample n° 16b, leg. C. Besuchet & I. Löbl, MHNG.



FIGS 9-12

Pseudopoda sicca sp. n., ♂ holotype. (9) Left palp, prolateral view. (10) Same, ventral view. (11) Same, retrolateral view. (12) Palpal tibia, dorsal view.

ETYMOLOGY: The specific name refers to the embolus (Fig. 10), which does not bear a subapical tooth as in other members of the *martensi*-group s. str. Latin: siccus, -a, -um, meaning simple; adjective.

DIAGNOSIS: ♂: Embolus flattened, sickle-shaped (Figs 9-10), without teeth (as in some other representatives of the *martensi*-group; see Jäger, 2001). Distinguished from *P. platembola* Jäger, 2001 by the distinctly narrower tip of the embolus and by the shape of the RTA, from *P. gogona* Jäger, 2001 and *P. tinjura* Jäger, 2001 by the angle between the embolus tip and the broad part of the embolus (ca 90° in *P. sicca* sp. n., ca 180° in *P. gogona* and *P. tinjura*) (Fig. 10).

DESCRIPTION: ♂. PL 3.3, PW 2.8, AW 1.5, PH 1.1, OL 3.3, OW 2.2. Eyes: AME 0.15, ALE 0.24, PME 0.18, PLE 0.27, AME-AME 0.09, AME-ALE 0.04, PME-PME 0.18, PME-PLE 0.22, AME-PME 0.24, ALE-PLE 0.21, CH at AME 0.25, CH at ALE 0.21.

Leg formula: 2413. Leg and palp spination: PP 131, 100, 2101, 2000; FE I 323, II-III 322, IV 321; PA 000; TI I-II 2024, III 20(1)24, IV 2124; MT I-II 1014, III 3016, IV 3036. Leg and palp measurements: PP 4.3 (1.5, 0.6, 0.8, -, 1.4), I 11.6 (3.2, 1.4, 3.0, 2.9, 1.1), II 12.6 (3.5, 1.5, 3.2, 3.3, 1.1), III 10.8 (3.1, 1.3, 2.8, 2.7, 0.9), IV 12.2. (3.3, 1.2, 3.0, 3.5, 1.2).

CC with 3 anterior and 4 and 5 posterior teeth. Embolus arising in a 10-o'clock-position, conductor in a 12-o'clock-position on the tegulum. Sperm duct running close to the margin in the retrolateral half of the tegulum. Tip of embolus well differentiated from flattended part, bent at a right angle. Narrow part of subtegulum visible in ventral or prolateral view. RTA with long, finger-shaped dorsal part and broad, massive ventral part (Figs 9-12).

Colour: Yellowish brown with red-brown markings. PS with darker eye region and fovea, with 2 broad longitudinal bands. Between these bands and the dark margin a light and partly interrupted band. CC only with indistinct markings and darker base. ST with small spots near the coxae of legs. GC and LA without pattern. Ventral part of CX and entire FE covered with small spots. FE and TI with spine patches, TI with additional proximal patch prolaterally. Distal leg segments (MT, TA) darker (reddish brown). Dorsal side of OS with dark markings above heart area and sigilla. Posterior half of OS marked with transversal bar and dark apex. Ventral side of OS with some spots, and a patch in front of spinnerets.

♀. Unknown.

DISTRIBUTION: Only known from the type locality.

RELATIONSHIPS: *Pseudopoda sicca* sp. n. belongs to the *martensi*-group s.l. (Jäger, 2001). It may be most closely related to *P. gogona*, *P. tinjura* and *P. platembola*. The fact that the embolus of these species possesses no subapical tooth, but the shape of embolus strictly corresponds to the ground pattern of the *martensi*-group s. str., indicates that they are basally to the other representatives of the *martensi*-group s. str. This is supported by their geographical distribution. According to Jäger (2001: 124, fig. 84), ancestors of this species group migrated in a westward direction along the Himalayan chain. Extant species with more apomorphic characters in their genitalia are found in the west, those with more plesiomorphic character states in the east. All seven species of the *martensi*-group s. str. were found in Nepal, *Pseudopoda sicca* sp. n. in Darjeeling, *P. gogona* in W-Butan, *P. platembola* in Burma and *P. tinjura* in E-Nepal. This supports the hypothesis of Jäger (2001).

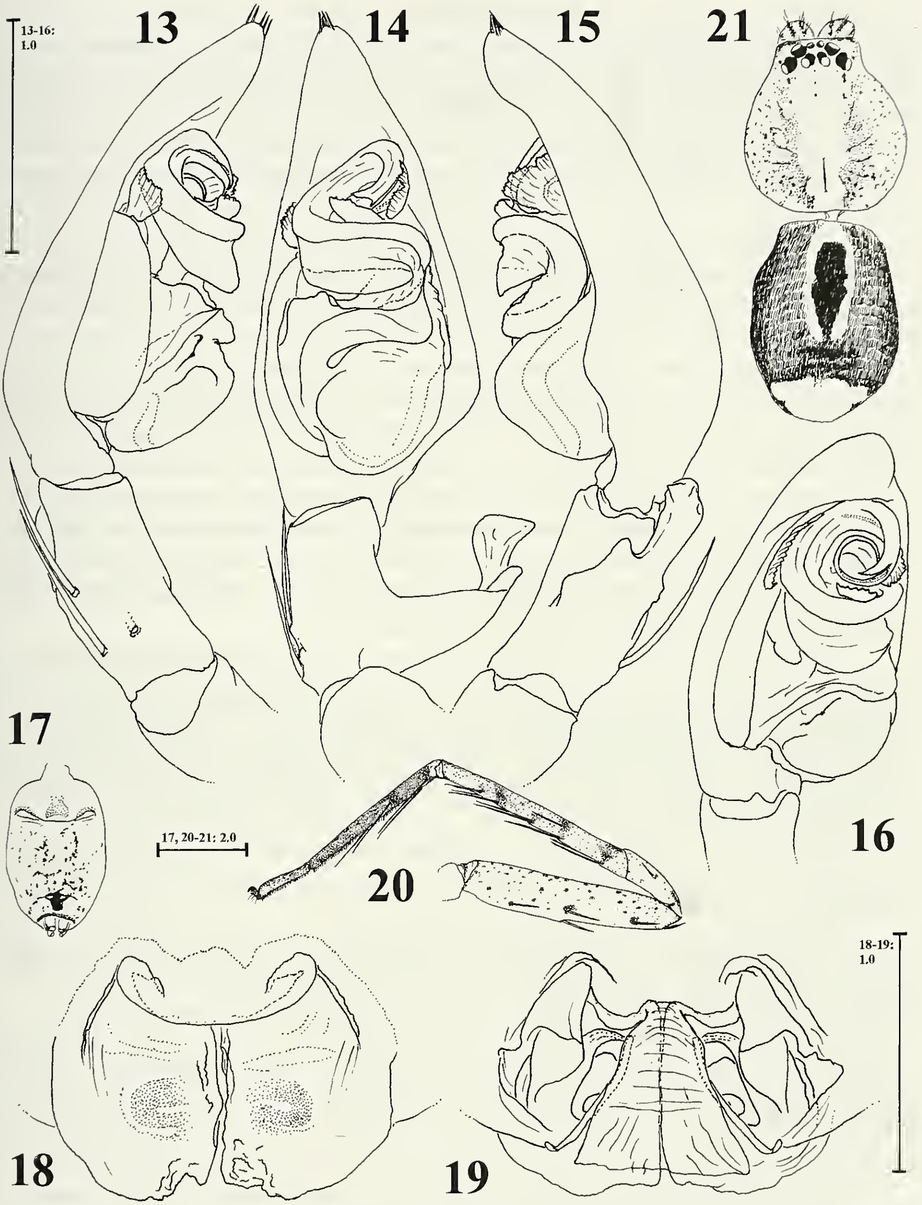
The following species cannot be assigned to a species group:

Pseudopoda perplexa sp. n. Figs 13-21

TYPES: ♂ holotype (PJ 1769), 1 ♀ paratype (PJ 1770): India, Meghalaya, Khasi Hills, en-dessous de Cherrapunjee [25°16'43.23"N, 91°43'25.59"E], 1200 m, sous des écorces et des bûches de bois; 26.X.1978, sample n° 28a, leg. C. Besuchet & I. Löbl, MHNG.

ETYMOLOGY: The specific name refers to the complex structure of the embolus (Figs 13-15). Latin: perplexus, -a, -um, meaning intricate; adjective.

DIAGNOSIS: ♂: Embolus tortuous, bent 2 times in different directions (Fig. 14), with subdistal tooth (Fig. 16). ♀: Lateral epigynal lobes delimited anteriorly by a pro-



Figs 13-21

Pseudopoda perplexa sp. n., ♂ holotype (13-17), ♀ paratype (18-21). (13) Left palp, prolateral view. (14) Same, ventral view. (15) Same, retrolateral view. (16) Same, distal view. (17) Opisthosoma, ventral view. (18) Epigyne, ventral view. (19) Vulva dorsal view. (20) Right leg II, prolateral view. (21) Prosoma and opisthosoma, dorsal view.

curved rim, lateral endings of the latter distinctly bent (ca 180°) (Fig. 18). ♀♀ are distinguished from those of *P. kullmanni* Jäger, 2001 by the absence of a semicircular appendage anterior to the lateral epigynal lobes and the shape of the internal duct system visible through the cuticle in ventral view, and from those of *P. recta* Jäger & Ono, 2001 by the curved anterior rim of the lateral epigynal lobes (straight in *P. recta*) and the median indentation on the posterior margin of the lateral epigynal lobes (absent in *P. recta*).

DESCRIPTION: ♂. PL 3.3, PW 3.0, AW 1.4, PH 1.1, OL 3.7, OW 2.1. Eyes: AME 0.17, ALE 0.29, PME 0.24, PLE 0.29, AME-AME 0.08, AME-ALE 0.06, PME-PME 0.13, PME-PLE 0.28, AME-PME 0.25, ALE-PLE 0.27, CH at AME 0.40, CH at ALE 0.29.

Leg formula: 2143. Leg and palp spination: PP 131, 101, 2101; FE I-III 323, IV 321; PA 101; TI I-III 212 10, IV 2126; MT I-II 1014, III 2024, IV 3036. Leg and palp measurements: PP 5.7 (1.8, 0.8, 1.0, -, 2.1), I 18.6 (5.1, 1.8, 5.8, 4.5, 1.4), II 19.7 (5.6, 1.8, 6.1, 4.7, 1.5), III 14.7 (4.2, 1.5, 4.2, 3.6, 1.2), IV 18.0 (5.4, 1.4, 4.8, 5.0, 1.4).

Embolus arising in a 9-o'clock-position on the tegulum, running broadly 'S'-shaped in a distal direction (Fig. 14). Distal spiral of embolus surrounded by strongly developed membranous conductor (Figs 13-16). Basal part of RTA arising on the tibia at a right angle. Dorsal RTA distally widened, with an apical tooth (Fig. 14). RTA with an additional tooth between dorsal and ventral part (Fig. 15).

Colour: Yellowish brown with reddish brown markings. PS with 2 longitudinal bands, these turning into irregular spots at margins of PS. Clypeus with distinct white median patch below AME. 2 pairs of dark spots behind PLE. CC with indistinct longitudinal stripes and bristles. ST, LA, GC and CX without pattern. Legs with small spots on FE and spine patches on FE and TI. Proximal part of TI with additional prolateral patch. Distal segments of legs darker (Fig. 20). Dorsal side of OS with distinctly pointed and lightly bordered patch above heart. A broad white patch in posterior half of OS (Fig. 21). Ventral side of OS with irregular small spots, and a patch in front of the spinnerets (Fig. 17).

♀. PL 3.9, PW 3.6, AW 1.9, PH 1.3, OL 4.5, OW 3.2. Eyes: AME 0.16, ALE 0.34, PME 0.24, PLE 0.28, AME-AME 0.11, AME-ALE 0.07, PME-PME 0.15, PME-PLE 0.33, AME-PME 0.27, ALE-PLE 0.31, CH at AME 0.49, CH at ALE 0.35.

Leg formula: 2143. Leg and palp spination: PP 131, 1(0)01, 2121, 1014; FE I-III 323, IV 321; PA 101; TI I-III 212 10, IV 2126; MT I-II 1014, III 2024, IV 3036. Leg and palp measurements: PP 5.9 (1.8, 0.9, 1.3, -, 1.9), I 15.7 (4.5, 1.8, 4.6, 3.6, 1.2), II 16.5 (4.9, 1.9, 4.8, 3.7, 1.2), III 12.9 (3.8, 1.5, 3.5, 3.0, 1.1), IV 15.2 (4.7, 1.5, 3.8, 4.0, 1.2).

Palpal claw with 5 to 6 teeth. Epigyneal field wider than long, without anterior bands. Its lateral rims running transversally from lateral sides of the anterior rim. One loop of internal duct system in ventral view recognisable as a dark structure in a posterior position of the narrow fertilisation duct (Fig. 18). Internal duct system seemingly consisting of coils (dissecting the genitalia was avoided due to the type status of the specimen) (Fig. 19).

Colour: As in ♂, but generally more distinct. OS with hairs still present (lost in ♂). Marginal spots on PS much more distinct than in ♂ (Fig. 21).

Distribution: Only known from the type locality.

Relationships: Phylogenetic relationships with other *Pseudopoda* species are not clear. Judging from the similar ♀ genitalia, *Pseudopoda perplexa* sp. n. might be closely related to *P. kullmanni* from Burma and *P. recta* from Taiwan. All 3 species have their lateral epigynal lobes delimited by a long transversal anterior rim. These lateral lobes are weakly sclerotized at the posterior margin, i.e. show distinct wrinkles. In ventral view the relatively long fertilisation ducts are visible in the anterior half of the epigyne as a transversal structure. In both sexes of *P. perplexa* sp. n. and in ♀♀ of *P. kullmanni* 8 to 10 ventral tibial spines are present on the first 3 pairs of legs. In most *Pseudopoda* spp., including *P. recta*, 6 ventral tibial spines are present. The latter case is considered the plesiomorphic state, because this kind of spination also occurs in other Heteropodinae (*Heteropoda, Sinopoda, Bhutaniella, Barylestis* etc.) and other genera of Sparassidae (e.g., *Rhitymna, Streptaedoea*). ♂♂ of *P. perplexa* sp. n. resemble in general species of the genus *Bhutaniella* Jäger, 2000. In fact males of both taxa can hardly be separated from each other, as both have a divided embolic tip and their tegulum is delimited to the basal half of the cymbium. In *P. perplexa* sp. n. the conductor is more strongly developed than in *Bhutaniella* spp. As the ♀ of *P. perplexa* sp. n. lacks the typical epigyneal pockets and the typical shape of the vulva of *Bhutaniella* spp., this species is here placed in the genus *Pseudopoda*.

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New records of jumping plant-lice from Slovenia with description of *Bactericera lyrata* sp. n. (Hemiptera: Psylloidea)

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New records of jumping plant-lice from Slovenia with description of *Bactericera lyrata* sp. n. (Hemiptera: Psylloidea). - *Bactericera lyrata* sp. n. (Triozidae) is described from Slovenia based on the morphology of adults. The new species is closely related to *Bactericera reuteri* (Šulc) and *B. modesta* (Foerster) from which it differs mainly in the coloration of body and antenna, the fore wing shape, venation and spinulation, the size of genal cones, and the structure of male paramere and female terminalia. Host plant and larvae are so far unknown. Records of following jumping plant-louse species, new to the fauna of Slovenia, are shortly discussed: *Cacopsylla nigrita* (Zetterstedt), *Craspedolepta bulgarica* Klimaszewski, *Megagonoscena gallicola* Burckhardt & Lauterer, *Trioza abdominalis* Flor, *T. laserpitii* Burckhardt & Lauterer, and *T. megacerca* Burckhardt. *Megagonoscena gallicola* is also reported for the first time from Croatia and Italy. The presence of *Trioza ilicina* (De Stefani Perez) in Slovenia is confirmed based on recent records of larvae. Currently, 107 species of Psylloidea are known to occur in Slovenia.

Keywords: *Bactericera* - Triozidae - Psyllidae - taxonomy - new species - distribution - Slovenia - Croatia - Italy.

INTRODUCTION

Jumping plant-lice or psyllids are a relatively small group of phytophagous insects with the greatest diversity in the tropical and southern temperate zones. From central Europe, ca. 190 species are known most of which have very restricted host-plant ranges (Burckhardt, 2002) and approximately 350 species occur in the Mediterranean area and eastern Europe (Burckhardt, 2004).

Although the knowledge of the taxonomy of central European Psylloidea can probably be considered as fairly complete, several recent revisions revealed the existence of cryptic species and demonstrated the need of a detailed approach in critical groups (e.g. Burckhardt & Lauterer, 2002a, b; Lauterer & Burckhardt, 2004). One of the taxonomically most problematic groups within the European Psylloidea is the triozid genus *Bactericera* Puton, 1876 where morphological differences between closely related species are often subtle (e.g. Hodkinson, 1981). *Bactericera* was rede-

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fined by Burckhardt & Lauterer (1997) who also provided a list of the 121 species known worldwide, 23 of which occur in central Europe. They are associated with several plant families, particularly Salicaceae, Rosaceae, Asteraceae, Apiaceae and Liliaceae.

Until recently, Slovenia was poorly explored with respect to the fauna of Psylloidea. The available information on the distribution of psyllids in Slovenia has been summarized and completed with additional data by Seljak (2006). Despite this effort, much faunistic and systematic work on the group is still needed. This has been confirmed also by recent field collections which resulted in several interesting findings, including a previously unknown species of *Bactericera*. The aim of this paper is to describe the new species, as well as to report six other species of Psylloidea for the first time from Slovenia. With this, the number of psylloid species recorded from Slovenia increases to 107.

MATERIAL AND METHODS

All the material has been collected by the first author during field trips in Slovenia in 2005-2007. The location of each collecting site is indicated in the list of examined material by the code of a corresponding 10x10 km quadrant in the Universal Transverse Mercator coordinate system (UTM, Fig. 22) which is given in parentheses.

The examined specimens are dry- and slide-mounted and they are deposited in the following collections:

GSNG	private collection of Gabrijel Seljak, Nova Gorica, Slovenia;
MHNG	Muséum d'histoire naturelle, Genève, Switzerland;
MMBC	Moravian Museum, Brno, Czech Republic;
PMSL	Slovenian Museum of Natural History, Ljubljana, Slovenia.

The morphological terminology follows Hollis (1984) and Ossiannilsson (1992). The following abbreviations are used in the descriptions and tabs. 1-2:

AL	antenna length;
BL	total body length (including fore wings);
CuH	height of the cell cu_1 on fore wing;
CuW	width of the cell cu_1 on fore wing;
FL	female proctiger length;
GL	genal cone length;
HW	head width;
ML	length of the vein M on fore wing (line between trifurcation of $R+M+Cu_1$ stem and bifurcation of M);
$M_{1+2}L$	length of the vein M_{1+2} on fore wing;
$M_{3+4}L$	length of the vein M_{3+4} on fore wing;
PL	male paramere length;
RsL	length of the vein Rs on fore wing;
SL	female subgenital plate length;
VL	vertex length;
WL	fore wing length;
WW	fore wing width.

TABLE 1. Measurements (in mm) of fore wing characters in *Bactericera lyrata* and related species. Mean values are given in parantheses, M and R indicate differences statistically significant at $P<0.001$ between *B. lyrata* and *B. modesta*, and *B. lyrata* and *B. reuteri*, respectively (t-test for independent samples). Differences between males and females were not significant in any character ($P>0.05$).

Species	*N*	WL	WW	RsL	ML	$M_{1+2}L$	$M_{3+4}L$	CuW	CuH
B. lyrata	7♂, 13♀	2.66-2.91 $(2.77)^{MR}$	0.93-1.15 (1.04)	1.35-1.60 $(1.47)^{M}$	1.60-1.80 $(1.71)^{MR}$	0.34-0.46 $(0.42)^{MR}$	0.21-0.30 $(0.27)^{MR}$	0.35-0.46 $(0.41)^{M}$	0.21-0.28 $(0.24)^{R}$
B. modesta	8♂, 13♀	2.27-2.99 (2.54)	0.89-1.21 (1.01)	1.09-1.61 (1.01)	1.21-1.63 (1.42)	0.38-0.65 (0.50)	0.25-0.47 (0.35)	0.38-0.59 (0.46)	0.20-0.38 (0.26)
B. reuteri	8♂, 7♀	2.40-2.84 (2.58)	0.99-1.18 (1.08)	1.31-1.72 (1.45)	1.31-1.64 (1.43)	0.44-0.62 (0.53)	0.33-0.49 (0.41)	0.35-0.48 (0.41)	0.22-0.38 (0.29)

TABLE 2. Ratios of fore wing characters in *Bactericera lyrata* and related species. Mean values are given in parantheses, M and R indicate differences significant at $P<0.001$ between *B. lyrata* and *B. modesta*, and *B. lyrata* and *B. reuteri*, respectively (t-test for independent samples).

Species	WL/WW	RsL/WL	ML/WL	RsL/ML	$M_{1+2}L/WL$	$M_{3+4}L/WL$	$M_{1+2}L/M_{3+4}L$	CuW/CuH
B. lyrata	2.41-2.87 $(2.67)^{MR}$	0.49-0.58 (0.53)	0.58-0.65 $(0.62)^{MR}$	0.80-0.99 $(0.86)^{R}$	0.13-0.17 $(0.15)^{MR}$	0.08-0.11 $(0.10)^{MR}$	1.41-1.73 $(1.55)^{R}$	1.46-1.92 $(1.71)^{R}$
B. modesta	2.40-2.73 (2.54)	0.45-0.57 (0.51)	0.52-0.61 (0.55)	0.88-1.06 (0.93)	0.16-0.22 (0.20)	0.10-0.16 (0.13)	1.32-1.62 (1.46)	1.45-2.10 (1.76)
B. reuteri	2.26-2.47 (2.39)	0.50-0.61 (0.56)	0.51-0.60 (0.55)	0.93-1.14 (1.01)	0.17-0.24 (0.20)	0.13-0.19 (0.16)	1.22-1.37 (1.29)	1.06-2.09 (1.40)

Measurements were made from fresh or dry-mounted (AL, BL, GL, HW) and temporarily or permanently slide-mounted specimens (all measurements on fore wings and male and female terminalia).

RESULTS

***Bactericera lyrata* sp. n.** Figs 1,4,7-11,14,17-19

MATERIAL EXAMINED. Holotype ♂, **Slovenia:** Vogrsko (Dombrava), 50 m, 13°42'E, 45°54'N, UTM: UL98, 7 October 2007, G. Seljak leg. Dry-mounted (PMSL).

Paratypes. **Slovenia:** same data as holotype but 13 September 2005 (1♂), 10 June 2006 (2♂, 2♀), 8 August 2007 (2♂, 7♀), and 7 October 2007 (7♂, 6♀); Prvačko polje (UL98), 5 August 2005 (1♂); Nova Gorica (UL99), 11 July 2001 (2♂); Poreče pri Podnanosu (VL27), 17 July 2005 (2♂, 3♀) and 20 June 2006 (1♀); Škocjanski zatok (VL04), 24 September 2005 (2♂, 1♀); Velike Žablje (VL18), 8 August 2007 (1♀). Dry- and slide-mounted (GSNG, MHNG, MMBC, PMSL).

DESCRIPTION: *Adult. Colour*: In summer specimens, head, thorax, abdominal sternites and terminalia almost uniformly reddish to orange brown, abdominal tergites dark brown. In overwintering specimens, body dark brown with paler longitudinal streaks on thoracic dorsum. Genal cones reddish to black. Antenna with segments 1–2 ochreous to black, segments 3–5 white to bright yellow, segment 6 usually white basally and dark brown to black in apical half or third (rarely entirely dark brown), segments 7–10 entirely black (Fig. 9). Fore and mid legs dark brown to black, femora lighter ventrally; metafemur entirely reddish to partly dark brown or black dorsally, metatibia light ochreous to dark brown, metatarsus infuscated. Fore wing membrane transparent, clear or with a slight honey-yellow tinge. Hind wing membrane clear, narrowly dark brown basally along the anal vein.

Morphology: Head as broad as mesoscutum; posterior margin slightly concave. Genal cones relatively small, about three fifths length of vertex, blunt apically, inner margins slightly diverging (Fig. 4). Antenna with a single rhinarium in subapical position on each of segments 4, 6, 8 and 9; antennal segment 3 narrow, not thickened; antennal segment 10 with terminal setae markedly differing in length (Fig. 10). Metatibia with 1+2 apical spurs, meracanthus strongly protruding, ca. 0.1 mm long. Fore wing (Fig. 1) widest in the middle, costal margin regularly arched throughout, apex clearly angular; vein Rs relatively short, slightly sinuous, reaching costal margin proximally of or at the line of branching of vein M; veins M_{1+2} and M_{3+4} short, cell m_1 small. Surface spinulation of fore wing membrane in females usually distinct, with spinules present in all fields leaving spinule-free bands; spinulation in males very fine and indistinct or absent. Male and female terminalia as in figs. 7-8 and 11-13. Male proctiger with long, narrow and apically pointed posterior lobes, directed slightly upwards (Fig. 7). Paramere covered with long setae, especially on inner and posterior surfaces; in lateral view, narrowing to apex, anterior margin sinuate, strongly concave in apical third, apex narrow, acute, oriented forwards (Fig. 11); in posterior view, slightly S-shaped and apically tapering, apical fourth inflated on inner side, apex acute and strongly diverging outwards (Fig. 14). Distal segment of aedeagus short, with apical dilation straight and narrow, slightly inflated on dorsal side; sclerotised end tube of ductus ejaculatorius short, slightly sinuous (Fig. 8). Female proctiger blunt apically, circumanal pore ring composed of two rows of uneven pores (Fig. 17). Female subgenital plate covered with long setae; in lateral view, with an apical tooth directed slightly upwards; in ventral view subacute. Apex of ventral valvulae with two distinct lateral teeth (Fig. 18).

Measurements and ratios (7♂ and 13♀): BL 3.3-3.6 mm; WL 2.66-2.91 mm; HW 0.59-0.66 mm; AL 1.14-1.26 mm; AL/HW 1.81-2.07; WL/HW 4.36-4.65; VL 0.20 -0.22 mm, GL 0.13-0.15 mm; PL 0.19-0.22 mm; FL 0.35-0.40 mm, SL 0.24-0.26 mm. Spinules on fore wing membrane 17.5 μm apart (mean of 50 measurements, min-max: 12.5-22.5 μm) in the middle of fore wing and more densely arranged in cell cu_2 (12.6 μm; 9.5-16.2 μm). See tabs. 1-2 for additional measurements and ratios.

Larva: unknown.

Egg (Fig. 19): Oblong oval with long pedicel (dissected from female abdomen).

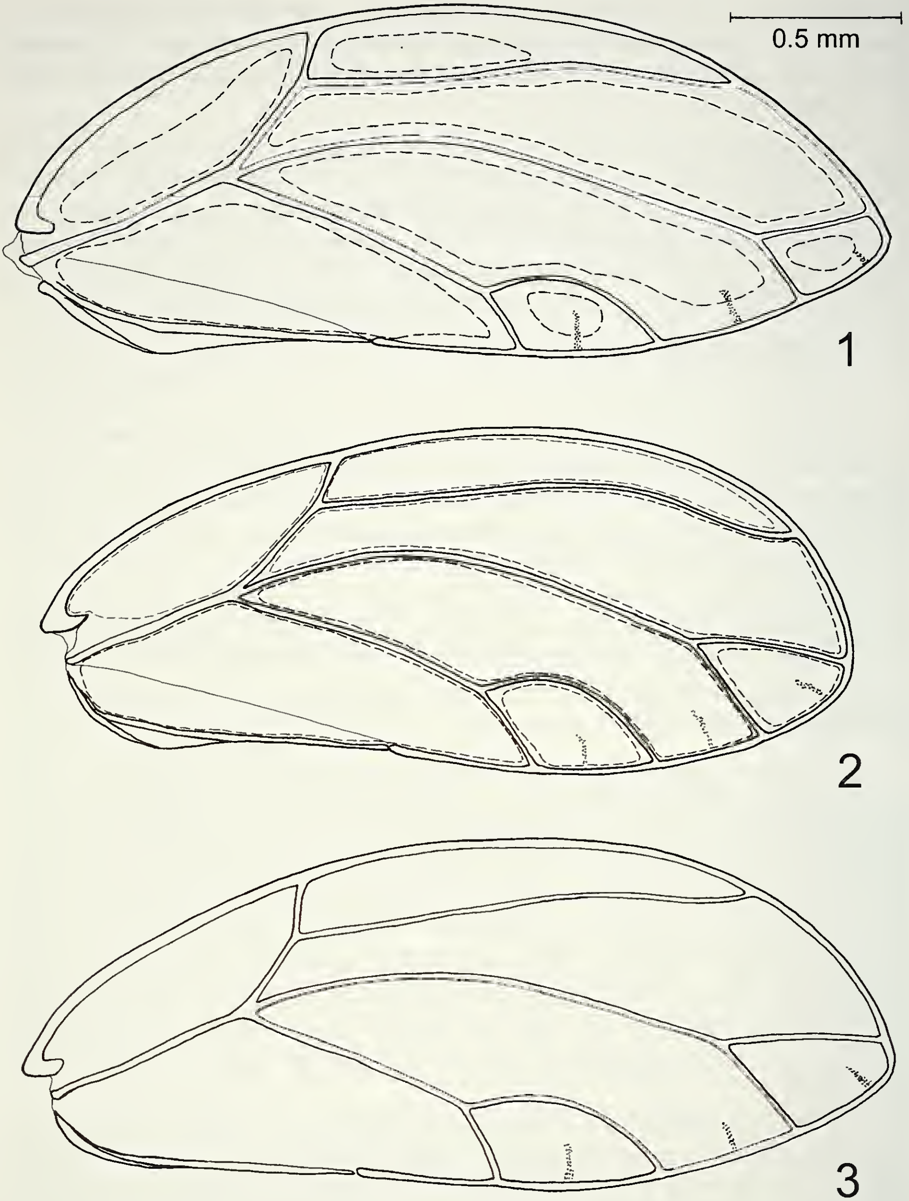
HOST PLANT AND BIOLOGY: Unknown, but based on phylogenetic considerations possibly living on Rosaceae (closest relatives are associated with various rosaceous genera). *B. lyrata* appears to be a meso- to hygrophilous species. Adults have always been collected along drainage channels rich in *Potentilla reptans* and *Sanguisorba officinalis*. There are at least two generations a year.

DISTRIBUTION: *B. lyrata* is known only from a few localities in the submediterranean part of Slovenia (Fig. 22), confined to the lowland between 0 and 150 m a. s. l.

ETYMOLOGY: From the Latin *lyratus* = lyre-shaped, referring to the lyre-shaped parameres in posterior view.

COMMENTS: Although no synapomorphies clearly defining monophyletic groups within the genus *Bactericera* have been recognised so far and the phylogenetic significance of many characters is difficult to asses (Burckhardt & Lauterer, 1997), we suggest that *B. lyrata* belongs to a group of *Bactericera* species distributed in the Palaearctic region and associated with plants of the family Rosaceae. The group includes also *B. acutipennis* (Zetterstedt, 1828), *B. bohemica* (Šulc, 1913), *B. femoralis* (Foerster, 1848), *B. harrisoni* (Wagner, 1955), *B. modesta* (Foerster, 1848) and *B. reuteri* (Šulc, 1913). *B. lyrata* shares with these species the light colour of a large part of the antennal flagellum and long and apically narrow posterior lobes of male proctiger. A detailed phylogenetic analysis is, however, needed to confirm these relationships.

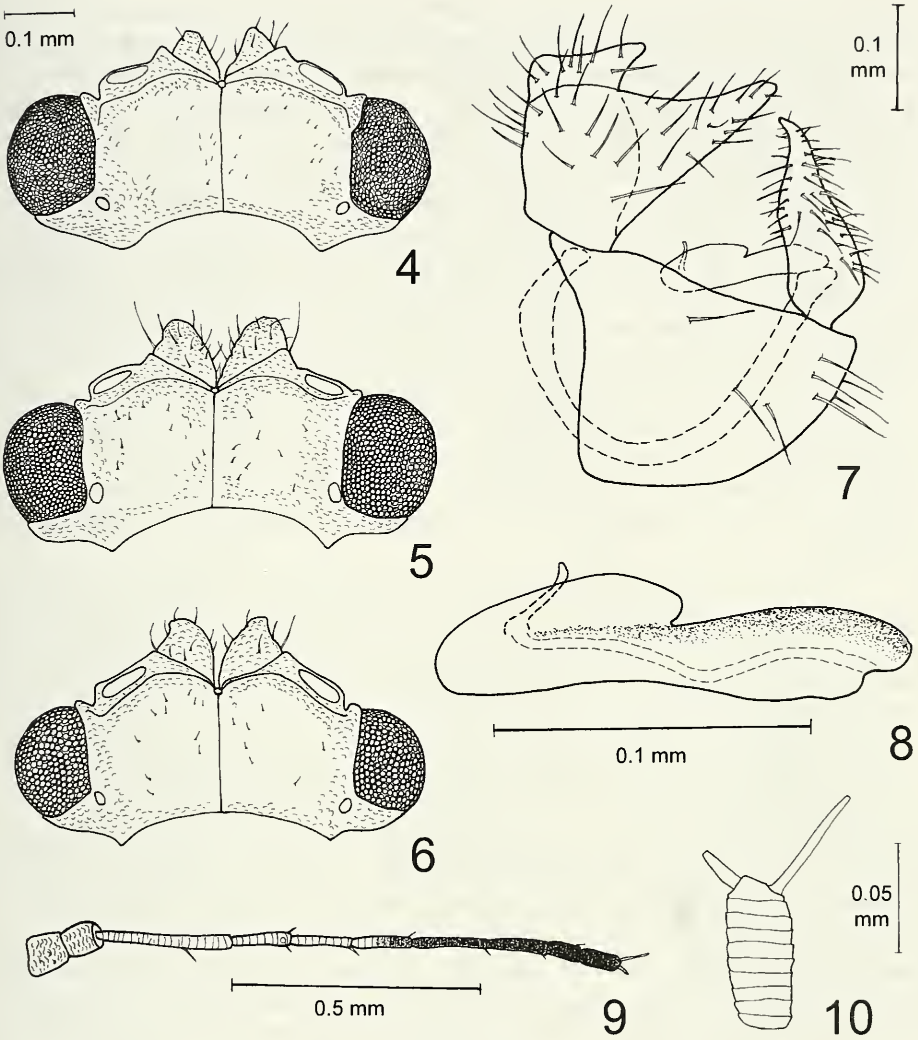
B. lyrata is similar to *B. reuteri* and *B. modesta* to which it might be closely related. *B. lyrata* shares with *B. reuteri* similarly shaped male and female terminalia (Figs 12, 15) but differs in the coloration of body and antenna, the shape, venation and spinulation of fore wing, the size of genal cones, and the details of male paramere. In *B. reuteri*, the body of summer generation is orange brown with extensive dark brown markings on head, thorax and abdomen to almost uniformly dark brown to black in overwintering specimens. Although there is some variation in the coloration of the antenna in both *B. reuteri* and *B. lyrata*, most specimens of *B. reuteri* have the antennal segments 3 to 7 white and the segments 8 to 10 dark brown to black (in some specimens, also the segment 7 is partly or entirely infuscated), compared to *B. lyrata*



Figs 1-3

Bactericera spp.: fore wing (females distribution of surface spinules delimited by dashed lines). (1) *B. lyrata* sp. n. (2) *B. reuteri* (Šulc). (3) *B. modesta* (Foerster).

in which usually only the segments 3 to 6 are white and also the segment 6 is partly or entirely infuscated. Both species can be distinguished by the fore wing shape and venation. In *B. reuteri*, the fore wing is more rounded apically, relatively broader, the

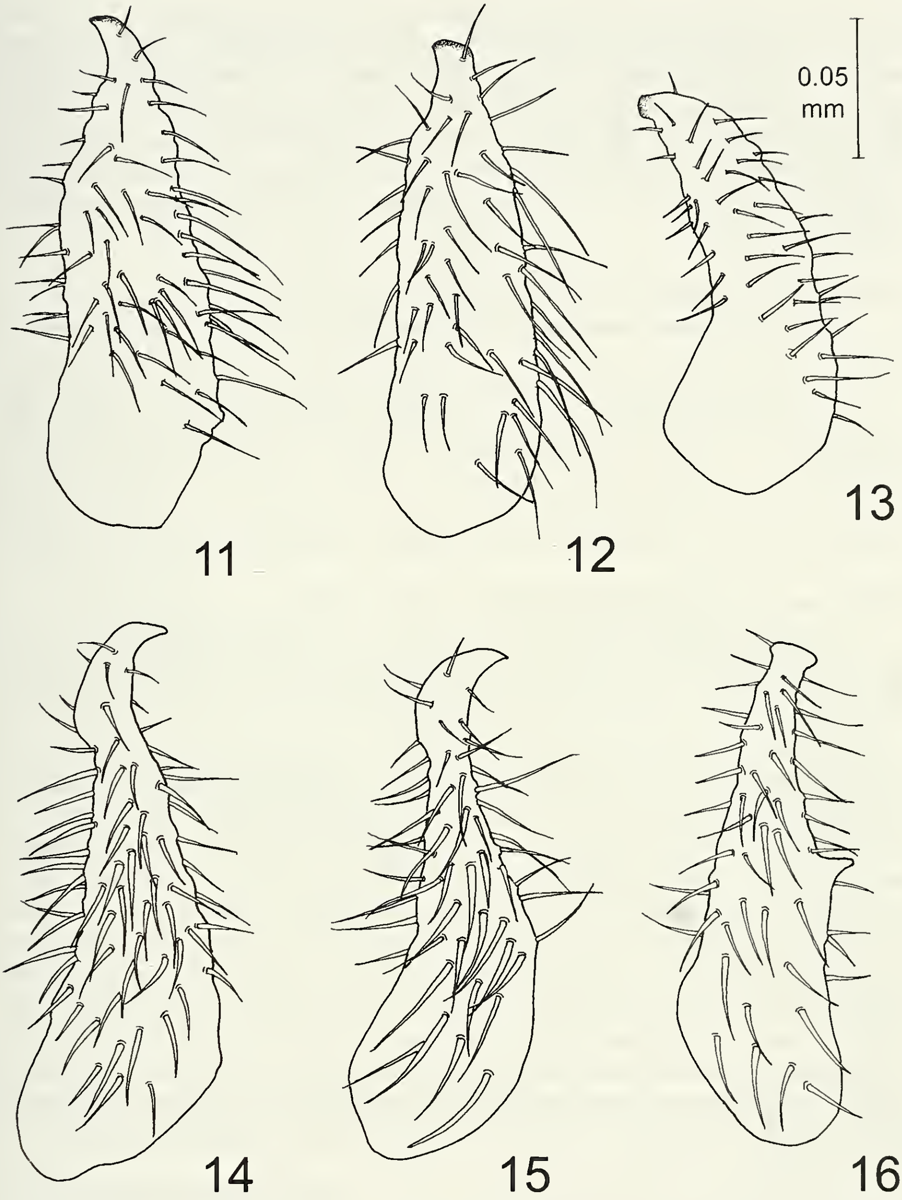


FIGS 4-10

Bactericera spp. (4-6) head in dorsal view (slide-mounted specimens). (7) male terminalia, in lateral view. (8) distal segment of aedeagus. (9) antenna. (10) antennal segment 10. (4, 7-10) *B. lyrata* sp. n. (5) *B. reuteri* (Šulc). (6) *B. modesta* (Foerster).

vein M is shorter, and the veins M_{1+2} and M_{3+4} are longer and subequal ($M_{1+2}L/WL \geq 0.17$; $M_{3+4}L/WL > 0.12$; $M_{1+2}L/M_{3+4}L < 1.4$; tabs. 1–2). Consequently, the vein Rs reaches the costal margin distinctly distally of the line of branching of the vein M and the cell m_1 is larger in *B. reuteri* compared to *B. lyrata* (Fig. 2). Surface spinulation on fore wing membrane is well distinct in the both sexes of *B. reuteri*. The distribution of surface spinules in the males of *B. reuteri* usually resembles the condition in the females of *B. lyrata* with spinule-free bands along veins (as figured by Ossiannilsson, 1992, Fig. 997), whereas surface spinules extend over the entire membrane of cells without leaving spinule-free bands along veins in females of *B. reuteri* (Fig. 2). The fore wing shape and spinulation seem to be independent on season as the same differences were observed in the both summer and overwintering generations of *B. reuteri* and *B. lyrata* (as well as *B. modesta* which is compared below). Furthermore, *B. reuteri* has larger genal cones (GL=0.16–0.17 mm, Fig. 5). Finally, the anterior margin of paramere, in lateral view, is less concave subapically in *B. reuteri* than in *B. lyrata* (Fig. 12). Further descriptions and illustrations of *B. reuteri* were provided by Šulc (1913), Klimaszewski (1975) and Ossiannilsson (1992). As already noted by Lauterer (1963), the description of *B. reuteri* by Dobreanu & Manolache (1962) refers to *B. harrisoni*. *B. reuteri* is a Palaearctic species known from central and northern Europe, Russia and Mongolia (Gegechkori & Loginova, 1990). It is monophagous on *Potentilla anserina* (Lauterer, 1963; Ossiannilsson, 1992). *B. reuteri* has not been found in Slovenia so far. Our comparison is based on the following material of *B. reuteri*: syntypes (ex coll. Šulc, MMBC), Finland: 2♂, 1♀, Pargas, Reuter (1♂ dry-mounted, bodies of 1♂ and 1♀ on 1 slide, wings mounted separately on 3 slides); 1♂, 1♀, Kyrkslätt, Reuter (dry-mounted on 2 pins, terminalia of the female mounted on a slide); ca. 170 additional specimens collected in the Czech Republic and Slovakia (all in MMBC).

Both *B. modesta* and *B. lyrata* share a similar body coloration (seasonally dimorphic, with summer specimens vivid red or orange without distinct dark markings on head and thorax and overwintering generation dark brown to nearly black) and antenna (in *B. modesta*, the antennal segments 3–5 are white and segments 6–10 mostly entirely dark brown), and a similar fore wing shape (with acute apex and the vein Rs reaching costal margin more or less at the line of branching of the vein M). *B. modesta* can be differentiated from *B. lyrata* by the length of the vein M and the size of the cell m_1 on fore wings, the fore wing spinulation, the size of genal cones, and the shape of male and female terminalia. Despite some overlap in corresponding ratios (ML/WL, M_{1+2}L/WL and M_{3+4}L/WL) between *B. lyrata* and *B. modesta*, the vein M is shorter, the veins M_{1+2} and M_{3+4} are longer and thus the cell m_1 is larger in *B. modesta* than in *B. lyrata* (tabs. 1–2, Fig. 3). The surface spinulation of the fore wing membrane is indistinct in the both sexes of *B. modesta*. The genal cones of *B. modesta* are larger than in *B. lyrata* (GL=0.16–0.17 mm, Fig. 6). The paramere of *B. modesta* is, in lateral view, strongly curved forwards (Fig. 13); in posterior view, it has a strong tooth in the middle of inner side and the apex is not tapering and is directed inwards, not outwards as in *B. lyrata* and *B. reuteri* (Fig. 16). The female terminalia of *B. modesta* are shorter than in *B. lyrata* and *B. reuteri* (Fig. 21). Detailed descriptions and additional illustrations of *B. modesta* were published by Šulc (1912), Conci & Tamanini (1986), and Burckhardt & Lauterer (1997). *B. modesta* is widely distributed in Europe, Russia, Kazakhstan, Central Asia and Mongolia (Gegechkori & Loginova, 1990) and has been recorded also from Slovenia (Seljak, 2006) where it has so far been found on more xerothermic habitats than *B. lyrata*. In the Czech Republic, however, *B. modesta* lives both in dry grassland where it develops on *Sanguisorba minor* and wet meadows where it is associated with *S. officinalis* as the host species (Lauterer, 1991; Burckhardt & Lauterer, 1997). We examined ca. 300 specimens of *B. modesta* from Bulgaria, Czech Republic, France, Germany, Slovakia and Slovenia (MMBC, GSNG).



FIGS 11-16

Bactericera spp. (11-13) paramere, in lateral view. (14-16) paramere, in posterior view. (11, 14) *B. lyrata* sp. n. (12, 15) *B. reuteri* (Šulc); 13, 16: *B. modesta* (Foerster).

Cacopsylla nigrita (Zetterstedt, 1828)

MATERIAL EXAMINED. **Slovenia:** Mangart, 2050 m (UM94), 15 July 2006, on *Salix serpyllifolia* (1♂, 2♀).

This record in the extreme northwestern part of Slovenia is the first one for the country. The specimens were swept from a turf of dwarf willows at relatively high altitude. *C. nigrita* is known to feed on different species of willows and has so far been collected on *Salix caprea*, *S. lapponum*, *S. myrsinifolia* and *S. phylicifolia* (Lauterer & Burckhardt, 1997). *Salix serpyllifolia* thus might be an additional host species. An accidental drift of adults from lower altitudes, however, cannot be excluded. *C. nigrita* is widely distributed in central and northern Europe, Ukraine and Georgia (Lauterer & Burckhardt, 1997).

Craspedolepta bulgarica Klimaszewski, 1961

MATERIAL EXAMINED. **Slovenia:** Branik-Golec (VL07), 8 June 2006, on *Achillea roseoalba* (1♂, 2♀).

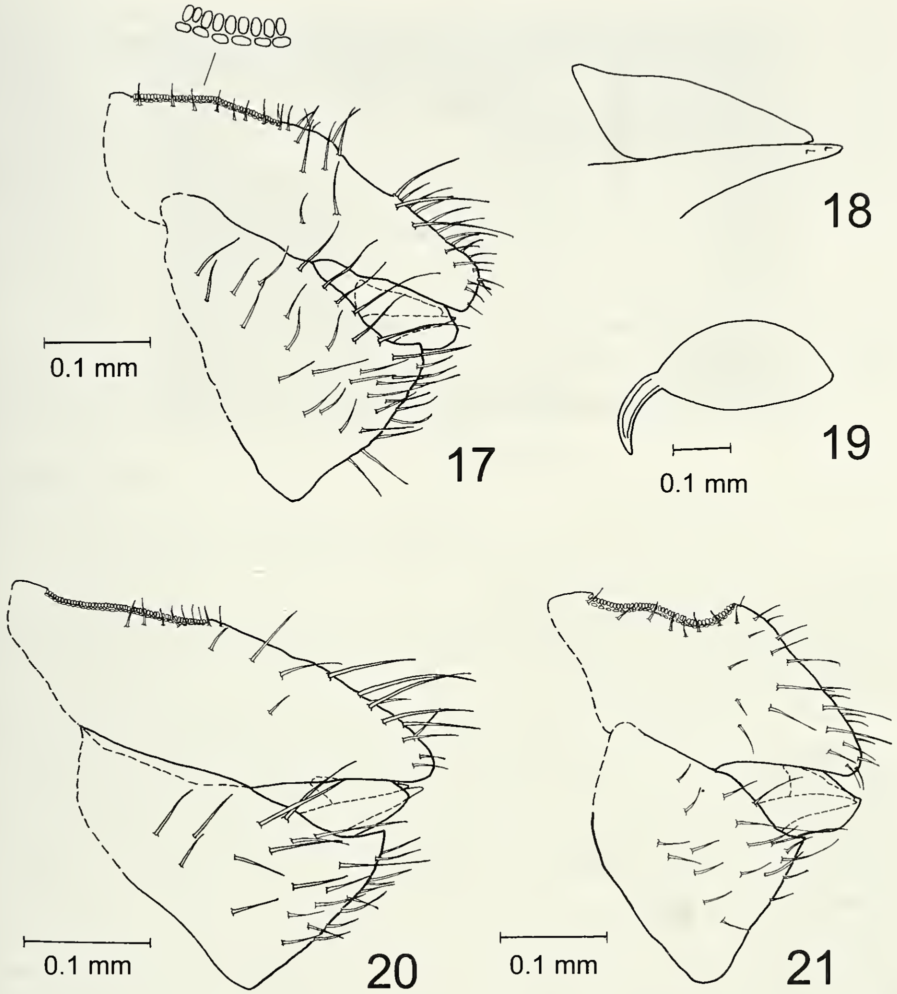
New species to the fauna of Slovenia. It has a Ponto-Mediterranean distribution, in Europe reaching the northernmost limit in the Czech Republic (Lauterer, 1993). The new finding in western Slovenia links the hitherto known distributional areas in Montenegro and central Italy (Lauterer, 1993; Conci *et al.*, 1993). A few specimens were collected in a floristically rich pasture with a lot of *Achillea roseoalba*. According to the literature the larvae live on roots of various *Achillea* spp. (Conci *et al.*, 1993).

Megagonoscena gallicola Burckhardt & Lauterer, 1989

MATERIAL EXAMINED. **Slovenia:** Vale pri Brestovici (UL97), 19 May 2006 (2♂, 2♀); Lijak (VL09), 20 May 2006 (1♀) and 13 April 2007 (4 larvae); Solkan (UL99), 21 May 2006 (12♂, 21♀). **Croatia:** Červar-Porat (UL91), 30 April 2007 (5♂, 4♀, 6 larvae). **Italy:** Friuli-Venezia Giulia, S. Giovani al Timavo (UL97), 19 May 2006 (28♂, 57♀).

M. gallicola has so far been known to occur in Bulgaria, Greece, Montenegro, Lebanon, Israel and Jordan (Burckhardt & Lauterer, 1989; Al Khawaldeeh *et al.*, 1997; Zeidan-Gèze & Burckhardt, 1998; Souliotis & Tsourgianni, 2000). Our recent investigation has revealed that it is fairly frequent on *Pistacia terebinthus* also on temperate carstic slopes in south-western part of Slovenia. It was also collected above Monfalcone on the Italian side, as well as in Istria (Croatia). Thus the species is new for the fauna of Slovenia as well as Italy and Croatia. Its distribution extends almost certainly along the whole eastern Adriatic coast and most probably reaches here the northern- and westernmost limits. The records of *Agonoscena targionii* (Lichtenstein, 1874) by Janežič (1989) probably refer to *M. gallicola* for the following reasons: 1) Janežič mostly based his identifications on galls only, 2) *Agonoscena targionii* (as far as it is known) does not induce galls, 3) the description of *M. gallicola* was probably published only after Janežič finished his manuscript (Burckhardt & Lauterer, 1989; Seljak, 2006).

M. gallicola is associated with the genus *Pistacia* (*P. terebinthus, P. vera, P. palaestina*) and causes strong curling and deformations of leaves. Heavy infestations may seriously affect the foliage and shoot growth. It overwinters in the egg stage. According to Lauterer *et al.* (1998), *M. gallicola* has a single generation per year, with adults occurring from late April to early June. In Istria we could observe the fourth and fifth instar larvae on curled shoots of *Pistacia terebinthus*, many egg-laying adults on young leaves and freshly hatched larvae all together in late April and early May. Larvae produce abundant honeydew which attracts ants.



FIGS 17-21

Bactericera spp. (17, 20, 21) female terminalia, in lateral view. (18) dorsal valvula and apex of ventral valvula, in lateral view. (19) egg (dissected from female abdomen). (17-19) *B. lyrata* sp. n. (20) *B. reuteri* (Šulc). (21) *B. modesta* (Foerster).

Trioza abdominalis Flor, 1861

MATERIAL EXAMINED. **Slovenia:** Črni vrh nad Cerknem, 1270 m (VM21), 5 August 2007, on *Picea excelsa* (1♂, 1♀).

According to Conci *et al.* (1996), this is a common orophilous species, widely distributed from East Asia to North and Central Europe. In southern Europe its distribution is limited to higher altitudes. Its main host plant *Achillea millefolium* is not rare in Slovenia. Nevertheless, the above mentioned record is the first and so far the only known from the country.

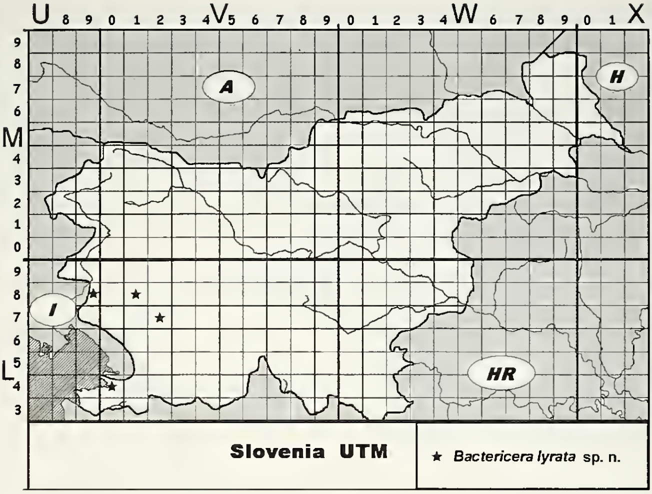


FIG. 22
Currently known distribution of *Bactericera lyrata* sp. n. in Slovenia.

Trioza ilicina (De Stefani Perez, 1901)

MATERIAL EXAMINED. **Slovenia:** Solkan, 200 m (UL99), 4 February 2007 (5 larvae) and 8 February 2008 (1 larva); Lijak, 290 m (VL09), 11 February 2007 (1 larva); Nova Gorica (UL98), 25 February 2007 (1 larva).

In the earlier overview of psyllids of Slovenia (Seljak, 2006) only the records made by Janežič could be cited (Janežič, 1989). Recently, several specimens of fifth instar larvae have been collected on leaves of *Quercus ilex* which allows an unambiguous confirmation of the presence of *T. ilicina* in Slovenia. A reliable differentiation from the closely related *T. remota* is much easier in the fifth instar larvae than in the adults (Conci & Tamanini, 1985). Further, *T. ilicina* has a different life history. It overwinters in the larval stage and adults appear in April and May, while *T. remota* overwinters as adults (Conci & Tamanini, 1985). In 2007, fifth instar larvae of *T. ilicina* were collected in Slovenia as early as in February. They cause pit galls on the lower leaf surface of *Quercus ilex*. *T. ilicina* is a Mediterranean species so far recorded from the Balearic Islands, France (including Corsica), Italy (including Sicily and Sardinia), and Turkey (Conci & Tamanini, 1985; Burckhardt & Önuçar, 1993; Conci *et al.*, 1996).

Trioza laserpitii Burckhardt & Lauterer, 1982

MATERIAL EXAMINED. **Slovenia:** Cimprovka, 1258 m (VM21), 24 June 2006, on *Laserpitium siler* (2♀).

First record in Slovenia. Despite an extensive population of the host plant, only a few specimens could be collected so far. *T. laserpitii* is distributed in the Alps, the Carpathians and Fennoscandia (Burckhardt, 1986; Ossiannilsson, 1992).

Trioza megacerca Burckhardt, 1983

MATERIAL EXAMINED. **Slovenia:** Mlinarjevo sedlo, 1300 m (VM63), 15 August 2007, on *Picea excelsa* (2♀); Rebrnice, 520 m (VL26), 20 September 2007, on *Juniperus communis* (12♂, 13♀); Baske, 600 m (UL99), 20 October 2007, on *Juniperus communis* (2♀).

The type locality of *T. megacerca* is near Rovinj in Istria (Croatia) (Burckhardt, 1983). Obviously it is a South European species having been recorded also from Bulgaria, Italy, Slovakia and Switzerland (Burckhardt, 1983; Conci *et al.*, 1996; Lauterer & Malenovský, 2002), and newly also from Slovenia. As in the case of the type population, also here the specimens were mostly swept before overwintering from isolated bushes of *Juniperus communis* scattered over meadows. *T. megacerca* belongs to a triozid species group closely associated with plants of the tribe Lactuceae (Asteraceae) but its exact host plant remains unknown.

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Ophiotaenia gilberti sp. n. (Eucestoda: Proteocephalidea), a parasite of *Thamnodynastes pallidus* (Serpentes: Colubridae) from Paraguay

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Ophiotaenia gilberti sp. n. (Eucestoda: Proteocephalidea), a parasite of Thamnodynastes pallidus (Serpentes: Colubridae) from Paraguay. - *Ophiotaenia gilberti* sp. n. is described from the intestine of the colubrid snake, *Thamnodynastes pallidus* (Linnaeus, 1758) (Serpentes: Xenodontinae), from Paraguay. The new species differs from most species of New World members of *Ophiotaenia* in possessing an apical organ. It differs from the six species possessing an apical organ by a smaller scolex diameter (140-145 versus more than 480) and by a smaller number of testes (57-91 versus more than 107). In all *Ophiotaenia* with two separate testes fields parasites of New World snakes, the ovary is small, occupying a surface five times smaller (in relation to the proglottis surface) than in most *Proteocephalus* parasites of Palaearctic fishes. This new character may become important in Proteocephalidea systematics. Because of the presence of two separate testicular field, preformed uterus and smaller ovary surface/proglottis surface ratio, we transfer the following *Proteocephalus* species parasite of snakes to *Ophiotaenia*: *Proteocephalus arandasi* Santos & Rolas, 1973 becomes *Ophiotaenia arandasi* new combination; *P. azevedoi* de Chambrier & Vaucher, 1992 becomes *O. azevedoi* new combination; *P catzeflisi* de Chambrier & Vaucher, 1992 becomes *O. catzeflisi* new combination; *P. euzeti* de Chambrier & Vaucher, 1992 becomes *O. euzeti* new combination; *P. joanae* de Chambrier & Paulino, 1997 becomes *O. joanae* new combination; *P. micruricola* Shoop & Corkum, 1982 becomes *O. micruricola* new combination and *P. variabilis* Brooks, 1978 becomes *O. variabilis* new combination.

Keywords: Cestoda - Proteocephalidae - taxonomy - morphology - snakes - Paraguay.

INTRODUCTION

Two snakes *Thamnodynastes pallidus* (Linnaeus, 1758) (Colubridae, Xenodontinae) collected in Paraguay in 1982 and 1987 harboured proteocephalidean cestodes of the genus *Ophiotaenia* La Rue, 1911. Since these worms cannot be accommodated in any hitherto known species of the genus, they are described as new taxon.

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MATERIALS AND METHODS

Ten specimens of *Thamnodynastes pallidus* (Linnaeus, 1758) were examined. They were killed by injection of MS 222 solution (Methanesulfonate salt, Sigma, No A-5040) and immediately dissected. The digestive tract was fixed with hot 4% neutral formalin and subsequently stored in 75% ethanol. The worms were stained with Mayer's hydrochloric carmine, dehydrated in an ethanol series, cleared with eugenol (clove oil), and mounted as permanent preparations in Canada balsam. For histology, pieces of strobila were embedded in paraffin, transversely sectioned at 12-15 μm intervals, stained with Weigert's hematoxylin, and counterstained with 1% eosin B (see de Chambrier, 2001). Eggs were studied in distilled water. No specimens were available for SEM studies. Material has been deposited in the helminthological collection of the Natural History Museum, Geneva, Switzerland (INVE). All measurements are given in micrometers unless otherwise indicated. Abbreviations used in descriptions are as follows: x = mean; n = number of measurements; CV = coefficient of variation, tn = testes number; sd = scolex diameter.

RESULTS

Ophiotaenia gilberti sp. n. Figs 1-7

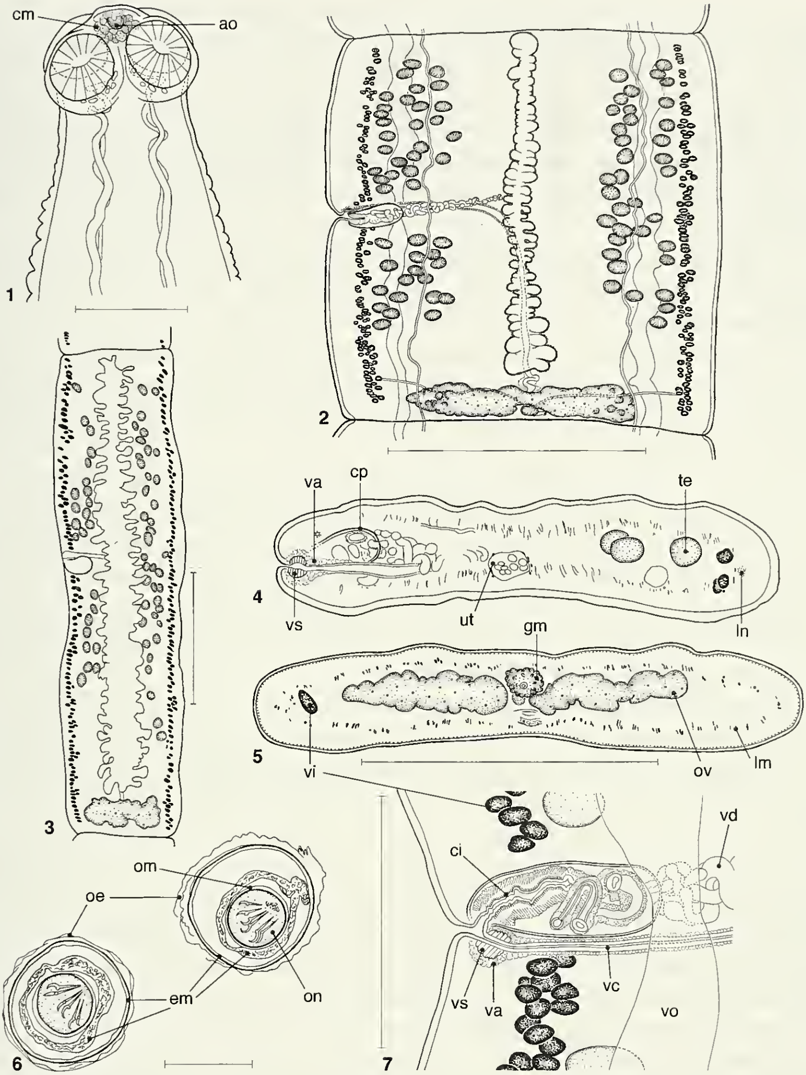
TYPE MATERIAL: Holotype MHNG INVE 18242 (1 slide), Estancia General Diaz, Alto Paraguay, 26.11.1987 and 2 paratypes MHNG INVE 54914 (1 slide) and 54915 (1 slide whole mount specimen and 8 slides serial sections), all with field number Py 5288.

OTHER MATERIAL: MHNG INVE 18193, San Benito Pastoreo, Itapua, Paraguay, 30.10. 1982, 1 specimen without scolex, 3 slides, field number Py 2723.

DESCRIPTION (based on 4 specimens): Proteocephalidae, Proteocephalinae. Large-sized worms, 60-170 mm long, up to 1.5 mm wide, flattened dorsoventrally, with last proglottides very elongated, and almost spherical in transverse section. Strobila acraspedote, anapolytic. About 173-182 immature proglottides (up to appearance of spermatozoa in vas deferens), about 5-7 mature proglottides (up to appearance of eggs in uterus), about 15-16 pregravid proglottides (up to appearance of hooks in oncospheres), about 193-205 proglottides in total. Unsegmented zone posterior to scolex very long. Immature and mature proglottides wider than long to longer than wide; pregravid and gravid proglottides longer than wide. Last proglottides much longer than wide (Fig. 3), length: width ratio being up to 3.7: 1. Tegument 10 thick.

Scolex spherical, aspinose, 140-145 in diameter and 95-100 long (Fig. 1), with four small uniloculate suckers, 65-75 in diameter. Small glandular apical organ present, about 15 in diameter, composed of small cells, probably of exocrine type, with lumen and canal opening on apical surface, surrounded with small cells of finely granular cytoplasm (Fig. 1). The apical organ diameter represents about 10% of scolex diameter.

Internal longitudinal musculature developed (Figs 4, 5), forming anastomosed fine bundles of muscular fibres. Osmoregulatory canals overlapping testes (Fig. 2). Ventral canals, 45-65 in diameter (Figs 2, 7) situated at 16-22% of the proglottis width from the lateral margin, with a tendency to separating longitudinally the testicular field. Dorsal canals situated at 19-27% of the proglottis width, 2.5-5 in diameter, more medially than the ventral one.



FIGS 1-7

Ophiotaenia gilberti sp. n. (1) Scolex, holotype No. MHNG INVE 18242. (2) Mature proglottis, holotype: No. MHNG INVE 18242, dorsal view. (3) Gravid proglottis, paratype No. MHNG INVE 54914: ventral view. (4) Transverse section of median part of segment, pregravid proglottis, paratype No. MHNG INVE 54915. (5) Transverse section of posterior part of pregravid proglottis, paratype No. MHNG INVE 54915. (6) Eggs (from the paratype No. MHNG INVE 54915) drawn in distilled water. (7) Cirrus pouch and vagina, holotype No. MHNG INVE 18242, ventral view. Abbreviations: ao = apical organ; cm = glandular cells; ci = cirrus; cp = cirrus sac; do = dorsal osmoregulatory canal; em = embryophore; gm = Mehlis' glands; lm = internal longitudinal musculature; ln = longitudinal lateral nerves; oe = outer envelope; om = oncospheric membrane; on = oncosphere; ov = ovary; te = testes; ut = uterus; va = vagina; vc = vaginal canal; vd = vas deferens; vi = vitelline follicles; vo = ventral osmoregulatory canal; vs = vaginal sphincter. Scale bars: 1= 100 μm; 2, 3 = 1000 μm; 4, 5 = 500 μm; 6 = 20 μm; 7 = 250 μm.

Testes medullary, spherical to oval, in one layer, in two distinct lateral fields (Figs 2, 3). Testes numbering 57-91 (x = 72, n = 19, CV = 14), situated on the two-thirds to three-quarter anterior of the proglottis, never reaching anterior margin of ovary. Testes 50-95 in diameter, degenerated in gravid proglottides. Vas deferens coiled, elongated, very thin, not reaching to midline of proglottis, never crossing it (Fig. 2). Cirrus sac elongate, thin-walled, 220-265 long, representing 15-23% (x = 19%, n = 21, CV = 9%) of proglottis width. Cirrus occupying up to 55% of cirrus sac length (Fig. 7).

Genital ducts passing between osmoregulatory canals. Genital atrium present. Genital pores irregularly alternating, situated in 42-50% (x= 46%, n = 22, CV = 4%) of proglottis length.

Vagina posterior (37%) or anterior (63%, n = 23) to cirrus pouch, its proximal part lined with some intensely staining cells. Muscular terminal sphincter present, 35 in diameter (Figs 4, 7). Mehlis' glands 80-115 in diameter, representing 6-10% of proglottis width (Fig. 5).

Ovary medullary, bilobed, small, 555-795 wide, occupying 56-69% (x = 63%, n = 22, CV = 6%) of proglottis width (Figs 2, 3, 5) and 3.7% of the proglottis surface.

Vitelline follicles medullary, oval, very small (13-20 wide by 20-32 long), arranged in two lateral rows, interrupted porally by vagina and cirrus pouch, not reaching anterior and posterior margins of segments, occupying porally 85-96 % and aporally 90-94 % of proglottis length, respectively. A few follicles penetrating the cortex (Figs 2-4).

Anlage of uterus medullary, already present in immature proglottides. Uterus with 28-41 (n = 14) medullary, latero-dorsal branches on each side (Figs 2, 3).

Formation of uterus of type 1 according to de Chambrier *et al.* (2004): in last immature proglottides and first mature proglottides, uterine stem with tubular concentration of numerous intensely staining cells and with lumen. In mature proglottides, thin-walled lateral diverticula growing (Fig. 3). Distal part of diverticula composed of some intensely staining cells. At this stage, uterus occupying about 5% of proglottis width. In pregravid proglottides, eggs completely filling uterine stem and diverticula, occupying about 13% of proglottis width. In gravid proglottides, thin-walled digitate diverticula growing laterally, occupying up to 48% of proglottis width. Uterus with some longitudinal apertures in gravid proglottides.

Early appearance of embryonic hooks in oncospheres (about 15-16 proglottides after appearance of eggs in uterus). Eggs spherical, with thin, hyaline collapsed outer envelope; inner envelope consisting of two-layered embryophore, with external thick layer, 27-28 in diameter and nucleate irregular envelope, 19-23 in diameter; oncospheres 12-15 in diameter, with 3 pairs of embryonic hooks 10-11 long (Fig. 6).

TYPE LOCALITY: Estancia General Diaz, Alto Paraguay, Paraguay, 21° 09'S 57° 32'W.

TYPE HOST: *Thamnodynastes pallidus* (Linnaeus, 1758) (Colubridae, Xenodontinae), MHNG 2434.017.

SITE OF INFECTION: anterior part of intestine.

PREVALENCE: 2/10 (20%).

INTENSITY: 1-3 specimens.

ETYMOLOGY: The new species is named in honour of Gilbert Ammann, father of the first author.

DIFFERENTIAL DIAGNOSIS: The present species is placed in the genus *Ophiotaenia* La Rue, 1911 (Proteocephalinae), because of the medullary position of vitellaria, unarmed scolex, shape of uniloculate suckers, and testes forming two separate fields (Schmidt 1986). Up to now, 89 *Ophiotaenia* species has been described (Freze, 1965b; Schmidt 1986; Scholz & de Chambrier, 2003), most of them are considered to be valid (Schmidt 1986). In the New World, 26 *Ophiotaenia* species are known to parasitize snakes (Rudolphi, 1819; Leidy, 1885; Barrois, 1898; Parona, 1901; La Rue, 1911; Rudin, 1917; MacCallum, 1921; Fuhrmann, 1927; Harwood, 1933; Vigueras, 1934; Lopez-Neyra & Diaz-Ungria, 1958; Dos Santos & Tayt-Son Rolas, 1973; Freze & Ryšavy, 1976; Brooks, 1978; Shoop & Corkum, 1982; de Chambrier, 1990; de Chambrier *et al.*, 1991, 1992; de Chambrier & Paulino, 1997).

Ophiotaenia gilberti n. sp. differs from 20 out of those 26 species (see Table 2) in the possession of an apical organ. The present material differs from the remaining six species by a much smaller scolex (sd =140-145), and by a lower number of testes (tn = 57-91). Those following six species have distinct measurements for the two characters cited above: *O. faranciae* Mac Callum, 1921 (sd = 500, tn = 390-420); *O. grandis* (La Rue, 1911) Harwood, 1933 (sd = 1000-1200, tn = 200-250); *O. marenzelleri* (Barrois, 1898) Railliet, 1899 (sd = 1200-2000, tn = 230-240); *O. jarara* (Fuhrmann, 1927) (sd = 1220, tn = 150-187); *O. catzeflisi* (de Chambrier, Vaucher et Renaud, 1992) (sd = 990-1220, tn = 107-158) and *O. joanae* (de Chambrier & Paulino, 1997) (sd = 480-790, tn = 147-210). Furthermore, neither *O. faranciae*, *O. grandis* nor *O. marenzelleri* possess a vaginal sphincter.

DISCUSSION

The prevalence of the Proteocephalidea in amphibians in the Neotropical region is usually very low (see de Chambrier *et al.*, 2006). Furthermore, when comparing the number of amphibians species infected with Proteocephalidean cestodes with the total number of species examined, we observed that only 5 hosts species out of 91 were infected (5.5%) in Ecuador, 5 out of 64 (7.8%) in Paraguay, 1 out of 47 (2%) in Costa Rica (de Chambrier *et al.*, 2006). In reptiles from Central and South American, the percentage of infected taxa is considerably higher (Table 1); 9 out of 36 (23%) snake species examined between 1988 and 1992 in Brazil by A. de Chambrier, were infected with proteocephalidean cestodes, 14 out of 57 (24.5%) between 1984 and 1990 in Ecuador by J.-M. Touzet, 8 out of 44 (18%) between 1979 and 1993 in Paraguay by members of the Geneva Natural History Museum, 12 out of 44 (27%) between 2001 and 2005 in Costa Rica by D.R. Brooks and collaborators. It is interesting to point out that the global percentage of species infected with Proteocephalidea in Neotropical amphibian hosts is of 2 to 7.8% and in Neotropical reptiles of 18 to 27% and is at reverse of what we may expect: even if no *Ophiotaenia* life-cycles have been described from the Neotropical region, the known life-cycles of Proteocephalidea are closely linked with water, with a large majority of life-cycles using planktonic copepods as

TABLE 1. Proteocephalidean tapeworms collected from reptilian hosts in South America and Central America countries between 1979 and 2005.
* New hosts for proteocephalidean cestodes

Country/parasite species	Total member of hosts species examined / Host species	No. hosts examined	No. hosts infected	Prevalence (%)	Hosts species infected with Proteocephalidean /total number of hosts species examined
Ecuador	**57 species**	**294**	**27**	**9.2%**	**14/57 (24.5%)**
Ophiotaenia sp.	*Bothrops atrox**	4	2	50	
Ophiotaenia sp.	*Bothrops atrox**	4	2	50	
Ophiotaenia sp. *immature*	*Bothrops pulcher**	1	1	100	
Ophiotaenia sp.	*Clelia clelia**	2	1	50	
Ophiotaenia sp.	*Dendrophidion dendrophis**	3	1	33.3	
Ophiotaenia sp.	*Drymoluber dichrous**	3	2	66.6	
Ophiotaenia sp.	*Drymobius rhombifer**	1	1	100	
Ophiotaenia sp.	*Imantodes cenchoa**	77	5	6.5	
Ophiotaenia sp.	*Liophis epinephelus**	2	2	100	
Ophiotaenia sp.	*Oxyrhopus formosus**	1	1	100	
Ophiotaenia sp.	*Oxyrhopus petola**	9	5	55.5	
Ophiotaenia sp.	*Pseudoboa coronata**	1	1	100	
Ophiotaenia sp.	*Pseustes poecilonotus**	1	1	100	
Ophiotaenia sp.	*Tripanurgus compressus**	2	1	50	
Vaucheriella bicheti	*Tropidophis taczanowskyi*	1	1	100	
Paraguay	**44 species**	**124**	**32**	**25.8%**	**8/44 (18%)**
Ophiotaenia sp.	*Erythrolamprus aesculapii**	3	2	66.6	
Ophiotaenia sanbernardinensis	*Helicops leopardinus*	3	3	100	
Ophiotaenia paraguayensis	*Hydrodynastes gigas*	7	6	85.7	
Ophiotaenia sp.	*Liophis jaegeri**	2	2	100	
Ophiotaenia sp. 1	*Liophis poecilogyrus**	6	3	50	
Ophiotaenia sp. 2	*Liophis poecilogyrus**	6	1	16.6	
Ophiotaenia sp.	*Mastigodryas bifossatus**	8	7	87.5	
Ophiotaenia sp.	*Philodryas patagonensis**	10	5	50	
Ophiotaenia gilberti *n. sp.*	*Thamnodynastes pallidus**	10	2	20	

Brazil	**36 species**	**450**	**46**	**10.2%**	**9/36 (23%)**
Ophiotaenia sp.	*Liophis poecilogyrus**	12	1	8.3	
Ophiotaenia sp.	*Erythrolamprus aesculapii**	7	2	28.6	
Ophiotaenia sp.	*Phylodryas patagonensis**	18	1	5.6	
Ophiotaenia sp.	*Bothrops moojeni**	9	1	11.1	
Ophiotaenia sp.	*Helicops modestus**	3	1	33.3	
Ophiotaenia sp.	*Oxyrhopus rhombifer**	1	1	100	
Ophiotaenia sp.	*Xenodon neuwiedi**	20	2	10	
Ophiotaenia joanae	*Xenodon neuwiedi*	20	4	20	
Ophiotaenia sp.	*Liophis miliaris*	16	1	6.3	
Ophiotaenia cf *hyalina*	*Liophis miliaris*	16	5	31.2	
Ophiotaenia jarara	*Bothrops jararaca*	87	11	12.6	
Ophiotaenia azevedoi	*Bothrops jararaca*	87	5	5.7	
Ophiotaenia catzeflis	*Bothrops jararaca*	87	8	9.2	
Ophiotaenia euzeti	*Bothrops jararaca*	87	3	3.4	
Costa Rica	**33 species**	**71**	**17**	**24%**	**12/33 (36%)**
Ophiotaenia sp.	*Urotheca eurozonus**	1	1	100	
Ophiotaenia sp.	*Liophis epinephelus**	1	1	100	
Ophiotaenia sp.	*Leptophis nebulosus**	2	1	50	
Ophiotaenia sp.	*Leptophis depressirostris**	6	1	17	
Ophiotaenia sp.	*Leptodeira annulata**	-	3	-	
Ophiotaenia sp.	*Imantodes cenchoa**	3	2	67	
Ophiotaenia sp.	*Dendrophidion vinitor**	2	1	50	
Ophiotaenia sp.	*Erythrolamprus minus**	2	2	100	
Ophiotaenia sp.	*Coluber mentovarius**	1	1	100	
Ophiotaenia sp.	*Porthridium nasutum**	2 ?	2	100	
Crepidobothrium cf *gerrardii*	*Boa constrictor*	5	1	20	
Ophiotaenia sp.	*Bothrops asper**	2	1	50	

TABLE 2. *Ophiotaenia* species known as parasites of reptilian hosts in the New World. (**In bold**, species possessing an apical organ)

Parasite species	Host species	Locality	% surface ovary/% surface proglottis
Ophiotaenia agkistrodontis (Harwood, 1933)	*Agkistrodon piscivorus*	USA	5.1
Ophiotaenia arandasi (Santos & Rolas, 1973)*	*Liophis miliaris*	Brazil	5.1
Ophiotaenia azevedoi de Chambrier & Vaucher, 1992	*Bothrops jararaca*	Brazil	1.9
Ophiotaenia barbouri Vigueras, 1934	*Tretanorhinus variabilis*	Cuba	2.9
Ophiotaenia calmettei (Barrois, 1898)	*Bothrops lanceolatus*	Martinique	2.2
Ophiotaenia catzeflisi (de Chambrier &Vaucher, 1992)*	*Bothrops jararaca*	Brazil	2.1
Ophiotaenia crotali Lopez-Neyra & Diaz-Ungria, 1958	*Crotalus durissus terrificus*	Venezuela	2.8
Ophiotaenia elongata Fuhrmann, 1927	“small snake”	Brazil	2.5
Ophiotaenia euzeti (de Chambrier & Vaucher, 1992)*	*Bothrops jararaca*	Brazil	2.2
Ophiotaenia faranciae (MacCallum, 1921)	*Farancia abacura*	USA	2.1
Ophiotaenia flava Rudin, 1917	*Coluber* sp.	Brazil	3.6
Ophiotaenia grandis La Rue, 1911	*Agkistrodon piscivorus*	USA	2.1
Ophiotaenia habanensis Freze & Ryšavy, 1976	*Tropidophis pardalis*	Cuba	2.7
Ophiotaenia hyalina Rudin, 1917	*Coluber* sp.	Brazil	5.5
Ophiotaenia jarara Fuhrmann, 1927	*Bothrops jararaca*	Brazil	2.4
Ophiotaenia joanae (de Chambrier & Paulino, 1997)*	*Xenodon neuwiedii*	Brazil	3.1
Ophiotaenia lactea (Leidy, 1855)	*Natrix sipedon*	USA	?
Ophiotaenia macrobothria Rudin, 1917	*Elaps corallinus*	Brazil	4.4
Ophiotaenia marenzelleri (Barrois, 1898)	*Agkistrodon piscivorus*	USA	2.6
Ophiotaenia micruricola (Shoop & Corkum, 1982)*	*Micrurus diastema*	Mexico	3.2
Ophiotaenia nattereri (Parona, 1901)	*Coluber* sp.	Brazil	?
Ophiotaenia paraguayensis Rudin, 1917	*Hydrodynastes gigas*	Paraguay	3.3
Ophiotaenia perspicua La Rue, 1911	*Natrix rhombifer*	USA	2.3
Ophiotaenia racemosa (Rudolphi, 1819)	*Coluber* sp.	Brazil	4.3
Ophiotaenia sanbernardinensis Rudin, 1917	*Helicops leopardinus*	Paraguay	5.0
Ophiotaenia variabilis (Brooks, 1978)*	*Natrix cyclopion*	N. America	2.8
Proteocephalus aggregate:			
Proteocephalus ambiguus (Dujardin, 1845)	*Pungitius pungitius*	Palaearctic	16.7
Proteocephalus cernuae (Gmelin, 1790)	*Gymnocephalus cernuus*	Palaearctic	13
Proteocephalus filicollis (Rudolphi, 1802)	*Gasterosteus aculeatus*	Palaearctic	16.3
Proteocephalus gobiorum Dogiel et Bychowsky, 1939	*Gobius niger*	Palaearctic	19.7
Proteocephalus longicollis (Zeder, 1800)	*Osmerus eperlanus*	Palaearctic	13.3
Proteocephalus macrocephalus (Creplin, 1825)	*Anguilla anguilla*	Palaearctic	18.3
Proteocephalus percae (Müller, 1780)	*Perca fluviatilis*	Palaearctic	13.8
Proteocephalus torulosus (Batsch, 1786)	*Leuciscus cephalus*	Palaearctic	14.6

* New combination

intermediate hosts (Freze, 1965b; Békési *et al.*, 1992; Scholz & de Chambrier, 2003). Therefore, we would expect a higher percentage of infected hosts species for the amphibians, which are more closely linked with water than the reptiles. The life-cycles of *Ophiotaenia* of amphibians and reptiles may include an additional intermediate host (Freeman, 1973), even if the exact role of paratenic hosts in the parasite transmission is not yet elucidated (Scholz & de Chambrier, 2003). The difference in the global percentage may be explained at the level of the paratenic host, but remain hypothetical because no Neotropical life-cycle is known for any *Ophiotaenia* species, and the amount of information on trophic behaviour for each potential definitive host is extremely limited.

We have to stress that most of the listed hosts (Table 1, noted with*) are new hosts for Proteocephalidean cestodes. The *Ophiotaenia* sp. cited in Table 1 are considered as new species, study of which is in progress. As already observed for the *Ophiotaenia* of amphibian hosts (de Chambrier *et al.*, 2006), each snake species (Table 1) harbours a particular species of *Ophiotaenia*. So, these *Ophiotaenia* appear to be oioxenous (*sensu* Euzet & Combes, 1980).

Freze (1963) erected a new family, Ophiotaeniidae and subfamily Ophiotaeniinae for the Proteocephalidea parasites of reptiles and amphibians, but both family and subfamily were rarely used or accepted. Freze (1965a, b) confirmed and justified his decision by the presence of subquadrate or longer than wide mature and gravid proglottides, by the preformed uterus in the first mature proglottis and by the presence of testes scattered in two lateral fields. This opinion was questioned by Brooks (1978), who argued that until a consistent character other than the host is documented, he would consider *Ophiotaenia* as junior synonym of *Proteocephalus*. de Chambrier & Vaucher (1984), described a Proteocephalidea, *Proteocephalus gaspari*, possessing a preformed uterus with two lateral testes fields but from a fish host, and attributed this worm to the genus *Proteocephalus*. It is now known that both *Proteocephalus* and *Ophiotaenia* are polyphyletic, or at least paraphyletic (Zehnder & Mariaux, 1999; Scholz & de Chambrier, 2003; de Chambrier *et al.*, 2004, Hypša *et al.*, 2005), but no *Ophiotaenia* parasitic in amphibians and only three from Neotropical snakes were analysed (de Chambrier *et al.*, 2004). So, waiting for a better understanding of the systematics of the group, we consider that the presence of two separate testes fields linked with preformed uterus are good discriminant characters to isolate *Ophiotaenia* from *Proteocephalus*.

Furthermore, we observed that, in all *Ophiotaenia* with two separate testes fields parasites of New World snakes, the ovary is small, occupying a surface notably smaller (in relation to the proglottis surface) than in most *Proteocephalus* parasites of Palaearctic fishes (Table 2). In 25 of 27 *Ophiotaenia* observed, the ratio ovary surface/proglottis surface is 1.9-5.5% (x = 3.2%) and in 8 members of *Proteocephalus* aggregate (*sensu* de Chambrier *et al.*, 2004), the ratio ovary surface/proglottis surface is 13-19.7% (x = 15.7%) (Table 2). This new character needs to be studied in both genera from other geographical areas and may become important in Proteocephalidea systematics.

Seven *Proteocephalus* species parasites of snakes have two separate testicular fields and a small ovary surface/proglottis surface ratio. Consequently, we transfer the following species to *Ophiotaenia*: *Proteocephalus arandasi* Santos & Rolas, 1973 becomes *Ophiotaenia arandasi* new combination; *P. azevedoi* de Chambrier. & Vaucher, 1992 becomes *O. azevedoi* new combination; *P catzeflisi* de Chambrier & Vaucher, 1992 becomes *O. catzeflisi* new combination; *P. euzeti* de Chambrier & Vaucher, 1992 becomes *O. euzeti* new combination; *P. joanae* de Chambrier & Paulino, 1997 becomes *O. joanae* new combination; *P. micruricola* (Shoop & Corkum, 1982) becomes *O. micruricola* new combination; *P. variabilis* Brooks, 1978 becomes *O. variabilis* new combination.

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Ophiotaenia alessandrae sp. n. (Eucestoda: Proteocephalidea), a parasite of *Hyla boans* (Anura: Hylidae) from Amazonia in Ecuador

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Ophiotaenia alessandrae sp. n. (Eucestoda: Proteocephalidea), a parasite of _Hyla boans_ (Anura: Hylidae) from Amazonia in Ecuador. - *Ophiotaenia alessandrae* sp. n., is described from the intestine of the hylid frog, *Hyla boans* (Linnaeus, 1758) (Anura: Hylidae), from Amazonia in Ecuador. The new species differs from the 24 known species of the genus *Ophiotaenia* La Rue, 1911, parasitic in amphibians by the presence of an additional layer egg envelope forming a three layers embryophore. Furthermore, it differs from these species by one to several other morphological characters such as absence of apical organ, anterior and posterior position of the vagina, number of testes and the cirrus-sac length/proglottis width ratio. The presence of two kinds of secondary canals in proteocephalideans is discussed. This is the first observation of a three-layered embryophore in New World amphibians.

Keywords: Taxonomy - morphology - Amphibia - South America.

INTRODUCTION

A proteocephalidean tapeworm belonging to *Ophiotaenia* La Rue, 1911, was found in a hylid frog *Hyla boans*, during a survey of amphibians and reptiles parasites in Ecuador between 1983 and 1990 conducted by Jean-Marc Touzet. Since this cestode differs from all 24 species of the genus described from amphibians in the world, it is described a new taxon herein.

MATERIALS AND METHODS

Nine specimens of *Hyla boans* (Linnaeus, 1758) from San Pablo de Kantesiya, and Hacienda Primavera, Napo Province; and from Zapallo Grande, Rio Cayapa, Esmeraldas Province, Ecuador, were examined. They were killed by immersion in a 1% MS 222 solution (Methanesulfonate salt, Sigma, No A-5040) and immediately dissected. The digestive tract was fixed with hot 4% neutral formalin and subsequently stored in 75% ethanol. Strobila was stained with Mayer's hydrochloric carmine, dehydrated in a grades series of ethanol, cleared in eugenol (clove oil), and mounted as permanent preparations in Canada balsam. For histology, pieces of strobila were

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embedded in paraffin wax, transversely sectioned at 12-15 μm intervals, stained with Weigert's hematoxylin and counterstained with 1% eosin B (see de Chambrier, 2001). Eggs were studied in distilled water. The specimen has been deposited in the helminthological collection of the Natural History Museum, Geneva, Switzerland (INVE). All measurements are given in micrometers unless otherwise indicated. Abbreviations used in descriptions are as follows: x = mean; n = number of measurements; CV = coefficient of variation.

RESULTS

Ophiotaenia alessandrae sp. n. Figs 1-10

Type material: Holotype MHNG INVE 22093, 3 whole mounted slides, 5 transverse sections series slides.

Type locality: Hacienda Primavera, Río Napo, Napo Province, Ecuador, 22.07.1987. 0°26'S, 76°46'W; Field number Ec 3590, Jean-Marc Touzet leg.

Description (based on one entire specimen): Proteocephalidae, Proteocephalinae. Large-sized worm, 138 mm long, up to 1.6 mm wide, flattened dorsoventrally, with last proglottides elongated. Strobila acraspedote, anapolytic. About 62-65 immature proglottides (up to appearance of spermatozoa in vas deferens), 9 mature proglottides (up to appearance of eggs in uterus), 10 pregravid proglottides (up to appearance of hooks in oncospheres); about 134 proglottides in total. Proliferation zone posterior to scolex short, 450 long. Immature, mature, pregravid proglottides wider than long; and gravid proglottides longer than wide. Last gravid proglottides elongated (length: wide ratio 2.3: 1).

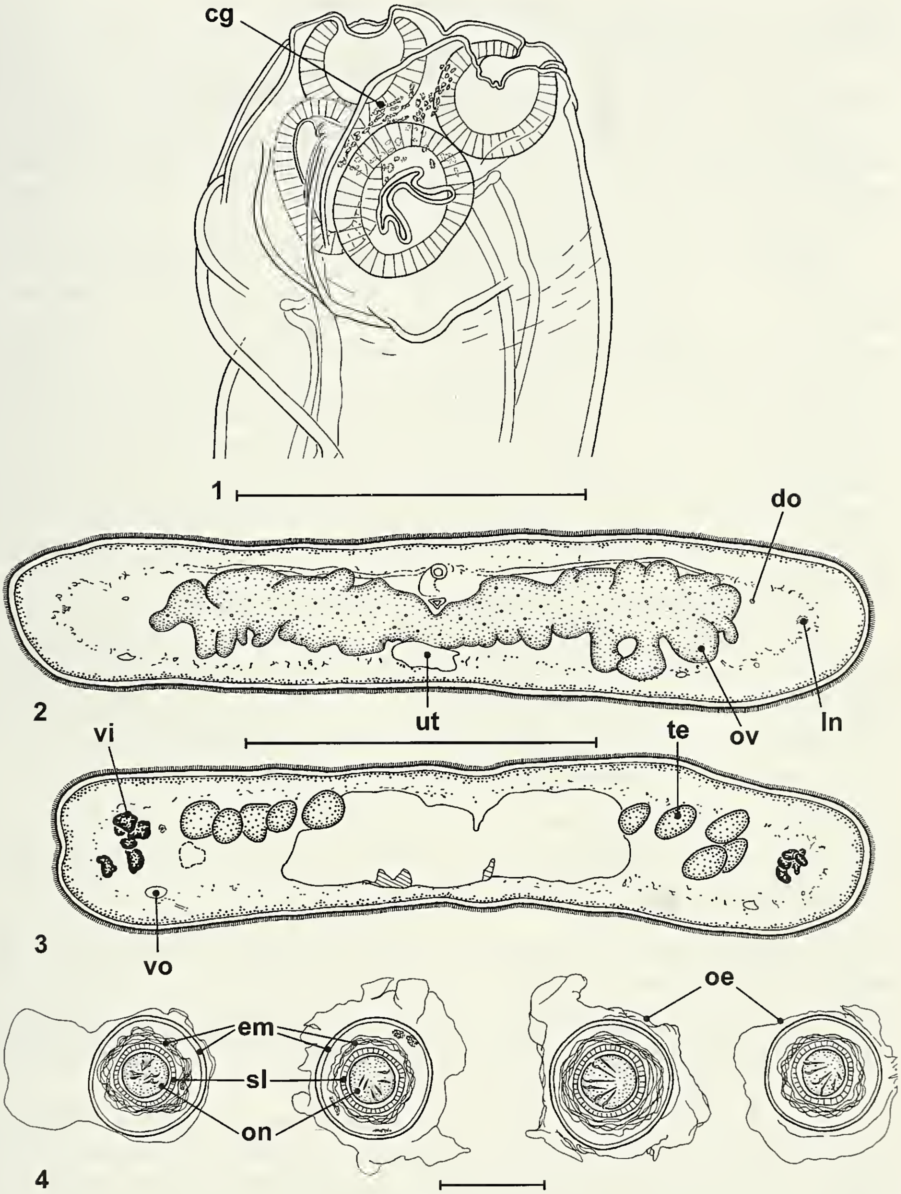
Scolex round, containing numerous cells with granular inclusions (Fig. 1). Scolex 475 in diameter (Fig. 1). Four small uniloculate suckers, 185-215 in diameter. Apical organ absent.

Internal longitudinal musculature weakly developed (Figs 2, 3), forming small anastomosed bundles of muscular fibres. Osmoregulatory canals usually situated between vitellaria and testes. Ventral canal often overlapping vitellaria (Figs 5, 6), more rarely testes, sometimes in cortex (Fig. 3). Ventral canals anastomosed, (sometimes forming a lengthy tube stretching parallel to the ventral canal itself) 20-35 in diameter, with numerous secondary canals, ending beneath the tegument; dorsal canals 3-7 in diameter (Figs 5-7).

Testes medullary, spherical to oval, 55-80 in diameter, numbering 86-128 (x = 111, n = 18, CV = 11), in one or two layers, in two lateral fields between anterior margin and preovarian space, never reaching to ovary (Figs 5-6), degenerated in last gravid proglottides. Vas deferens coiled, very thin-walled, not reaching to midline of proglottis (Figs 5-7). Cirrus-sac elongate, thick-walled in its distal part, 180-235 long, representing 11-17% (x = 15%, n = 18, CV = 10%) of proglottis width. Cirrus occupying up to 75% of cirrus-sac length (Fig. 7).

Genital ducts passing between osmoregulatory canals. Genital atrium present. Genital pores irregularly alternating, situated at 35-53% (x= 43%, n = 18, CV = 13%) of proglottis length.

Vagina posterior (in 55% of the proglottides) or anterior (in 45% of the proglottides, n = 20) to cirrus-sac, in proximal part lined with intensely staining cells.



Figs 1-4

Ophiotaenia alessandrae sp. n. Holotype, from *Hyla boans*, Ecuador (MHNG INVE 22093). (1) Scolex, dorsoventral view. (2) Cross section at level of ovary. (3) Cross section at level of uterus. (4) Eggs drawn in distilled water; note the supplementary layer. (7) Terminal genitalia, ventral view. Abbreviations: cg = glandular cells; do = dorsal osmoregulatory canal; em = embryophore; lm = internal longitudinal musculature; ln = longitudinal lateral nerves; oe = outer envelope; on = oncosphere; ov = ovary; sl = supplementary layer; te = testes; ut = uterus; vi = vitellaria; vo = ventral osmoregulatory canal. Scale bars: 1-3 = 500 μm; 4 = 20 μm.

Discrete muscular terminal sphincter present (Figs 6-7). Mehlis' glands 80-105 in diameter, 7-8% of proglottis width.

Ovary medullary, bilobed, small, folliculate ventrally, 830-1150 wide, occupying 66-77% (x = 70%, n = 19, CV = 4%) of proglottis width (Figs 2, 5, 6).

Vitelline follicles medullary, oval to elongate, small, in two lateral fields, interrupted porally by vagina and cirrus-sac, not reaching to anterior and posterior margins of proglottides, occupying porally 81-90 % and aporally 74-92 % of proglottis length, respectively (Figs 5-7).

Anlage of uterus medullary, already present in immature proglottides. Uterus with 18-25 (n = 13) latero-dorsal diverticula on each side (Figs 5-6). Formation of uterus of type 1 according to de Chambrier et al. (2004a): uterine stem with tubular concentration of numerous intensely staining cells and with lumen in last immature and first mature proglottides (Fig. 5). In mature proglottides, thin-walled lateral diverticula appear, with distal part lined with some intensely staining cells. At this stage, uterus occupying up to 11% of proglottis width. In pregravid proglottides, eggs completely filling uterine stem and diverticula, that occupy up to 42% of proglottis width (Fig. 6). In gravid proglottides, thin-walled digitate diverticula growing laterally, occupying up to 83% of proglottis width, opening ventrally by several longitudinal apertures in gravid proglottides.

Eggs spherical, with thin, hyaline outer envelope, up to 50 in diameter; inner envelope consisting in two-layered embryophore, with external thick layer, 22-24 in diameter and nucleate irregular envelope, 17-20 in diameter; thick additional spherical layer, 12-13 in diameter between embryophore and oncosphere; oncospheres 9-10 in diameter, with 3 pairs of embryonic hooks, 5-6 long (n = 7) (Figs 4, 10).

TYPE-HOST: *Hyla boans* (Linnaeus, 1758) (Hylidae).

SITE OF INFECTION: Intestine.

PREVALENCE: 1/9 (11%).

INTENSITY: 1 specimen.

ETYMOLOGY: The new species is named in honour of Alessandra Marsella, mother of the first author.

DIFFERENTIAL DIAGNOSIS: The new species belongs to the genus *Ophiotaenia* because of the medullary position of gonads, the presence of four simple unilocular suckers and two testes fields (Freze, 1965; Schmidt, 1986).

Out of approximately 75 currently recognized species of *Ophiotaenia* parasitizing reptiles and amphibians, 24 species are found in amphibians (Fuhrmann, 1895; La Rue, 1909; 1914a, b; Hungenbühler, 1910; Johnston, 1912; Parodi and Widakowich, 1916; Hannum, 1925; Woodland, 1925; Osler, 1931; Zeliff, 1932; Ingles, 1936; Yamaguti, 1938; Riser, 1942; Wolffhügel, 1948; Szidat and Soria, 1954; Flores-Barroeta, 1955; Jones *et al.*, 1958; Dyer and Altig, 1977; Gupta and Arora, 1979; Sharpilo *et al.*, 1979; Srivastav and Capoor, 1980; Dyer, 1986; de Chambrier, 2004; Puga and Formas, 2005; de Chambrier *et al.*, 2006) (Table 1).

Ophiotaenia alessandrae n. sp. differs from all *Ophiotaenia* species, parasites of amphibians, in the possession of a third layer in the eggs embryophore (Fig. 4, 10).

TABLE 1. *Ophiotaenia* species in amphibian hosts.

Species	Host	Locality
Ophiotaenia alternans Riser, 1942	*Amphiuma tridactylum*	U.S.A.
O. amphiumae (Zeliff, 1932)	*Amphiuma tridactylum*	U.S.A.
O. bonariensis Szidat & Soria, 1954	*Leptodactylus ocellatus*	Argentina
O. bonneti de Chambrier, Coquille & Brooks, 2006	*Rana vaillanti*	Costa Rica
O. bufonis Vigueras, 1942	*Bufo peltacephalus*	Cuba
O. calamensis Pugas & Formas, 2005	*Telmatobius dankoi*	Chile
O. carpathica (Sharpilo, Kornyushin et Lisitsina, 1979)	*Triturus cristatus*	Ukraine
O. ceratophryos (Parodi et Widakowich, 1916)	*Ceratophrys ornata*	Argentina
O. cryptobranchi La Rue, 1914	*Cryptobranchus alleganiensis*	U.S.A.
O. ecuadorensis Dyer, 1986	*Hyla geographica*	Ecuador
O. filaroides (La Rue, 1909)	*Amblystoma tigrinum*	U.S.A.
O. gracilis Jones, Cheng et Gillespie, 1958	*Rana catesbeiana*	U.S.A.
O. hernandezi (Flores-Barroeta, 1955)	*Rana* sp.	Mexico
O. junglensis (Srivastav et Capoor, 1980)	*Hoplobatrachus tigerinus*	India
O. hylae Johnston, 1912	*Litoria aurea*	Australia
O. loennbergii (Fuhrmann, 1895)	*Necturus maculosus*	U.S.A.
O. magna Hannum, 1925	*Rana catesbeiana*	U.S.A.
O. noei Wolffhügel, 1948	*Caudiverbera caudiverbera*	Chile
O. olor (Ingles, 1936)	*Rana aurora*	U.S.A.
O. olseni Dyer et Altig, 1977	*Hyla geographica*	Ecuador
O. ranae Yamaguti, 1938	*Rana nigromaculata*	Japan
O. saphena Osler, 1931	*Rana clamitans*	U.S.A.
O. schultzei (Hungerbühler, 1910)	*Pyxicephalus adspersus*	South Africa
O. tigrina (Woodland, 1925)	*Hoplobatrachus tigerinus*	India

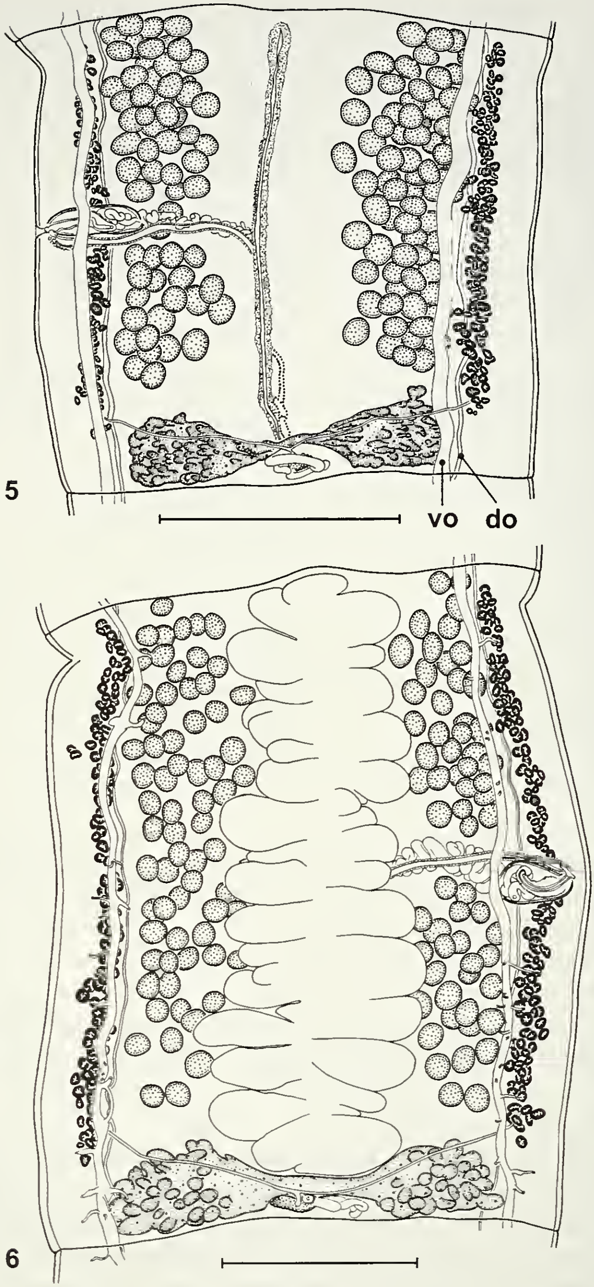
It can also be distinguished from the majority of these *Ophiotaenia* species by one or more of the following characters: anterior and posterior position of vagina (in relation to cirrus-sac); absence of apical organ; number of testes; cirrus-sac length/proglottis width ratio; and position of the genital pore.

O. ceratophyros and *O. loennbergi* are most similar to *O. alessandrae*, but they can nevertheless be unambiguously distinguished from the new species: *O. ceratophyros* shows a bigger scolex (700 in diameter), testes in one field, and is larger (380 mm); while *O. loennbergi* presents a higher number of uterine diverticles (25-40).

DISCUSSION

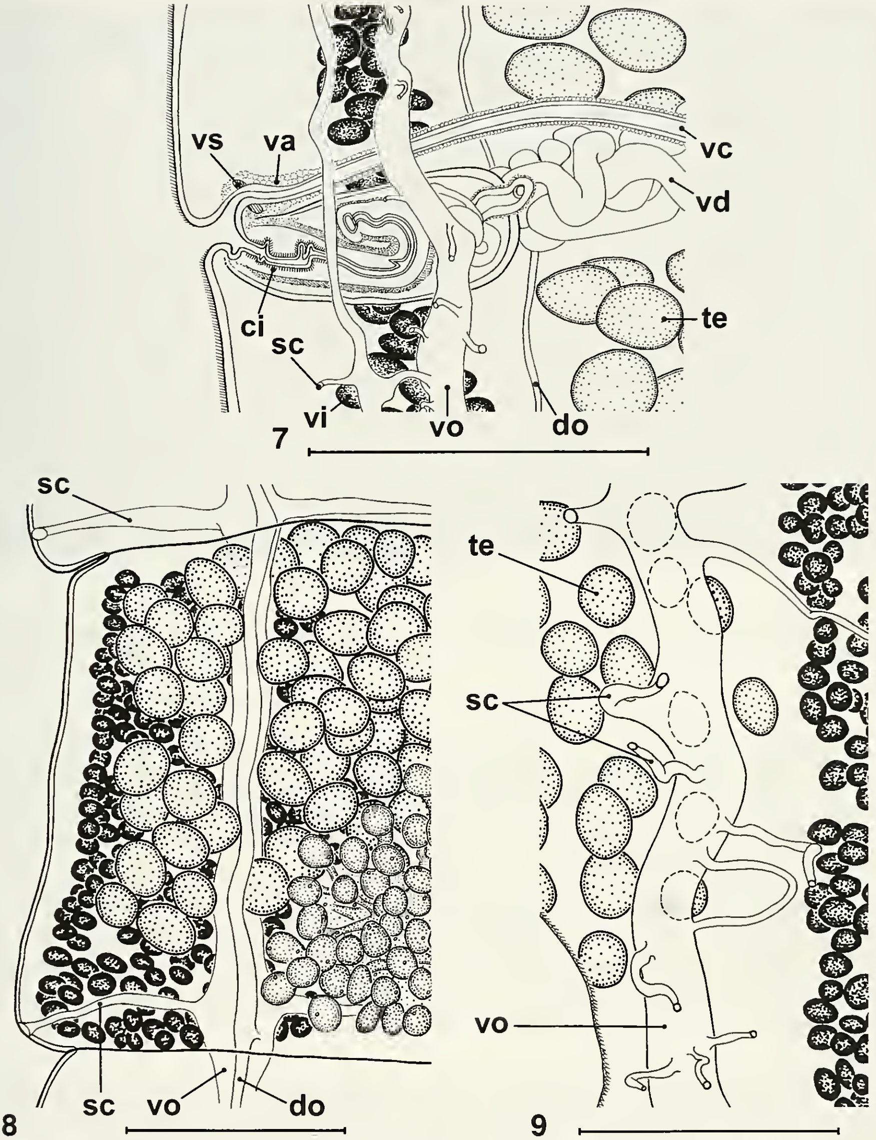
We observed an additional layer of the embryophore in the eggs of *O. alessandrae*. This third layer is situated between the oncosphere and the bilayered embryophore, and so represents, in our opinion, a three-layered embryophore. This structure was first observed in some eggs of proteocephalideans parasitizing reptiles from Indonesia (*Kapsulotaenia sandgroundi*) and Australia (*Ophiotaenia* spp, see de Chambrier, 2006).

This is the first observation of this feature within an *Ophiotaenia* species in South American amphibian host. The only other South American proteocephalidean possessing similar embryophore is *Proteocephalus hobergi* de Chambrier & Vaucher,



FIGS 5-6

Ophiotaenia alessandrae sp. n. Holotype, from *Hyla boans*, Ecuador (MHNG INVE 22093). (5) Mature proglottis, ventral view. (6) Gravid proglottis, ventral view; note the presence of secondary canals of the ventral osmoregulatory canals. Abbreviations: do = dorsal osmoregulatory canal; vo = ventral osmoregulatory canal. Scale bars: 5-6 = 500 μm.



Figs 7-9

(7) *Ophiotaenia alessandrae* sp. n. Holotype, from *Hyla boans*, Ecuador (MHNG INVE 22093), terminal genitalia, ventral view. (8) *Brooksiella praeputialis* (Rego, Santos & Silva, 1974), detail of a mature proglottis, dorsal view, showing the secondary canals situated posteriorly and ending laterally beneath the tegument. (9) *Thaumasioscolex didelphidis* Cañeda-Guzman, de Chambrier & Scholz, 2001, detail of ventral osmoregulatory canal with numerous secondary canals directed to the ventral surface. Abbreviations: ci = cirrus; do = dorsal osmoregulatory canal; lm = internal longitudinal musculature; sc = secondary canal; te = testes; va = vagina; vc = vaginal canal; vd = vas deferens; vi = vitellaria; vo = ventral osmoregulatory canal; vs = vaginal sphincter. Scale bars: 7-9 = 250 μm.

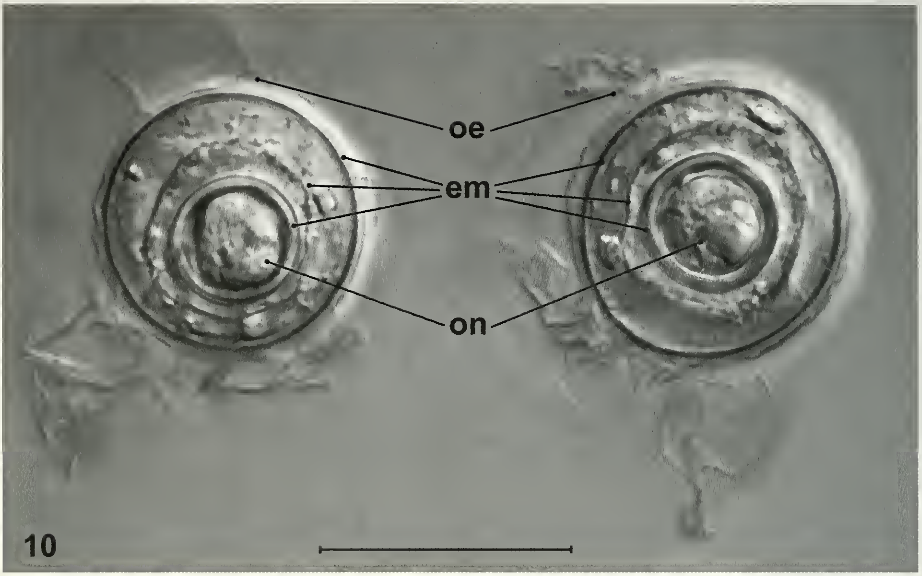


FIG. 10

Eggs in distilled water, captured with Nikon Eclipse 80i, showing the three-layered embryophore. Abbreviations: em = embryophore; oe = outer envelope; on = oncospheres. Scale-bar: 20 μm.

1999 (parasite in fish) (see de Chambrier & Vaucher 1999, Fig. 8). But, the third layer in *P. hobergi* is lime-shaped. Furthermore, those eggs are very peculiar in shape, size and development. The *P. hobergi* embryophores diameter (80-93 x 40-44) is twice to three times the size of that encountered in most proteocephalidean, which usually reach not more than 30 in diameter.

The presence of secondary osmoregulatory canals is a known feature of Proteocephalidea, where two kinds of such structures have been described: the first one is always situated in the posterior part of the proglottis at the level of the ovary and ending at the tegument surface (Fig. 8); the second one is distributed irregularly all along the ventral osmoregulatory canals (Fig. 9). Both are connected with the ventral surface.

The first kind of a secondary canal was that described by Riggenbach (1896, Fig. 41) in *Corallobothrium lobosum* Riggenbach, 1896 (= *Rudolphiella lobosa*). Later, numerous species were signalled possessing this feature in several subfamilies, such as Gangesiinae (*Gangesia parasiluri* Yamaguti, 1934, Fig. 15 in de Chambrier *et al.*, 2003), Proteocephalinae (*Proteocephalus vladimirae* de Chambrier & Vaucher, 1999, Fig. 17), Peltidocotylinae (*Mariauxiella pimelodi* de Chambrier & Rego, 1995, Fig. 3, *Amazotaenia yvettae* de Chambrier, 2003, Figs. 2, 6), Endorchiinae (*Endorchis auchenipteri* de Chambrier & Vaucher, 1999, Fig. 61), Monticelliinae (*Monticellia ventrei* de Chambrier & Vaucher, 1999, Fig. 46), Zygobothriinae (*Brooksiella praeputialis* (Rego, Santos & Silva, 1974) (see de Chambrier *et al.*, 2004b), Rudolphiellinae, (*Rudolphiella szidati* Gil de Pertierra & de Chambrier, 2000, Fig. 1) (Rego, Santos &

Silva 1974; de Chambrier & Rego, 1995; de Chambrier & Vaucher, 1999; Gil de Pertierra & de Chambrier, 2000; de Chambrier, 2003; de Chambrier *et al.*, 2003).

The second kind, with numerous secondary canals all along the ventral osmoregulatory canals, was observed in several species of the Proteocephalinae (i.e. *Proteocephalus renaudi* de Chambrier & Vaucher, 1994, Fig. 2; *Thaumasioscolex didelphidis* Cañeda-Guzman, de Chambrier & Scholz, 2001, but also in several subfamilies such as Zygobothriinae (*Nomimoscolex matogrossensis* Rego & Pavanelli, 1990, in de Chambrier *et al.*, 1996, Fig. 10; Figs. 12, 14-16), Acanthotaeniinae (*Kapsulotaenia sandgroundi* (Carter, 1943), de Chambrier, 2006, Fig. 14), Corallobothriinae (*Corallobotrium solidum* Fritsch, 1886 in Janicki, 1928, Fig. 25), (Janicki, 1928; de Chambrier & Vaucher, 1994; de Chambrier *et al.*, 1996; Cañeda-Guzman *et al.*, 2001; de Chambrier, 2006).

The prevalence of the Proteocephalidea is known to be very low in amphibians, as detailed by de Chambrier *et al.* (2006, p. 130), and such is the case for the new species described here. A single specimen was found out of nine dissected *Hyla boans*, which represent a prevalence of 11%.

When we compare the number of the amphibians species infected with Proteocephalidean with the total number of amphibian species examined, we observed that in Ecuador, only 5 hosts species out of 91 were infected (5,5%), in Paraguay, 5 out of 64 species were infected (7,8%), in Costa Rica, 1 out of 47 hosts species was infected (2%).

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REVUE SUISSE DE ZOOLOGIE 115 (3): 565-573; septembre 2008

The morphology of preimaginal stages of *Agoliinus satyrus* (Reitter, 1892) (Coleoptera: Aphodiidae: Aphodiini), with notes on reproductive biology

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The morphology of preimaginal stages of *Agoliinus satyrus* (Reitter, 1892) (Coleoptera: Aphodiidae: Aphodiini), with notes on reproductive biology. - *Agoliinus satyrus* (Reitter, 1892), a rare mountain species with a Central-Southern and Eastern European distribution, is examined under laboratory conditions. Descriptions of the morphology of egg and 3rd instar larva of *A. satyrus* are presented here, and data on biological cycle are discussed.

Keywords: Dung beetles - Valle d'Aosta - Italy - morphology - reproductive aspects - egg - larva.

INTRODUCTION

During the last decades, preimaginal stages of Aphodiini were widely studied (Barbero & Palestrini, 1995; Frolov, 1996; Krell, 1997; Palestrini *et al.*, 1999; Frolov & Ivanov, 2001), nevertheless knowledge of larval morphology remains still poor, due chiefly to the great number of genera – more than 170 – assigned to the tribe (Dellacasa *et al.*, 2001).

Aim of the present paper is to furnish information on larval morphology in the holoarctic genus *Agoliinus* (Schmidt, 1913), which comprises about twenty species (Dellacasa, 1987).

Three *Agoliinus* species are surely known from Italy [*A. piceus* (Gyllenhal, 1808), *A. ragusai* (Reitter, 1892) and *A. satyrus* (Reitter, 1892)], while records of presence of a fourth one [*A. nemoralis* (Erichson, 1848)] must be verified (Dellacasa *et al.*, 2001; Dellacasa & Dellacasa, 2006).

A. satyrus is an uncommon coprophagous (quite euryphagous) species, characterized by a Central-Southern and Eastern European distribution. It spreads mainly from 1,500 to 2,500 m, and rarefies to higher quote (Dellacasa & Dellacasa, 2006). This stenotopic species is typical of exposed pastures, but can be found also in sheltered xeric pastures (as oligotopic species). It has late spring, summer and fall phenology (Dellacasa & Dellacasa, 2006).

We observed some phases of reproductive biology of *A. satyrus*, and here provided description and illustrations of its egg and 3rd instar larva.

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MATERIAL AND METHODS

During the years 2005-06, within the Community Project *Interreg IIIA "Cogeva-Vahsa"*, we collected 183 adults specimens of *A. satyrus* in various localities (Tab. I) of Val Ferret (Courmayeur ZPS IT 1204030) and Val Veny (SIC IT 1204010 Monte Bianco) in Valle d'Aosta, Italy along the whole summer (Fig. 1).

On August 19th 2007, 30 adults of *A. satyrus* were collected on from Lac Malatrà (Val Ferret, Valle d'Aosta, Italy) and reared in plastic cointainers (22 cm diameter) for 25 days at least, feeding them with cow dung. The rearing follows methods already employed in our laboratory (Palestrini *et al.*, 1992). Eggs (N = 15) and larvae (N = 8) were then killed, fixed and preserved in ethanol 95°.

After soaking the larvae in 5% KOH solution, the relevant parts were dissected, mounted on slides and observed through a stereoscopic microscope Leica MZ8 (Leica Microsystems AG, Wetzler, Germany) for the study of the minute morphological structures.

Measures of each anatomical piece were obtained from images captured by a digital camera Leica DFC320 connected to a stereoscopic system Leica Z16Apo (Leica Microsystems AG, Wetzler, Germany). All the measurements were made with the software LAS (Leica Application Suite) v2.5.0, and were chosen according to Barbero *et al.* (2001).

TABLE 1

		Locality	**N**	**Quote (m)**
Val Ferret	*June*	Pont Pailler	4	1507
	July	Lavachey	1	1642
		Greuvettaz	12	1760
		Arp-Nouva	26	1790
	August	Greuvettaz	11	1760
		Secheron	8	1873
		Pré-de-Bard	10	2050
		Armina	74	2245
	September	Plan Pincieux	2	1610
		Greuvettaz	5	2097
		Bonatti	18	2111
		Malatrà	6	2274
Val Veny	*August*	Gabba	2	1592
	September	Lex-Blanche	1	1965
		Rifugio Elisabetta	3	2160

RESULTS AND DISCUSSION

DESCRIPTION OF EGG: (Fig. 2). Length 0.88 - 1.92 [2.64] mm, width 0.87 - 1.80 [2.37] mm (N = 15).

Egg whitish, regularly ovalar at deposition, then irregular close to the hatching of the 1st instar larva.

DESCRIPTION OF THIRD INSTAR LARVA: (Figs 3-5). Body outer length 6.64-4.02; body inner length 1.82-3.16; head side length 0.68-1.07; head side width 0.44-0.55;

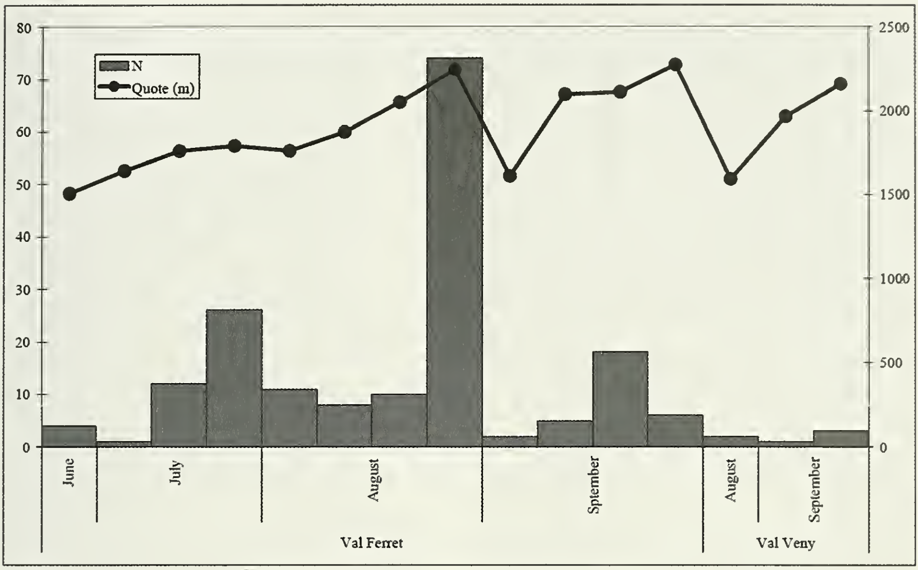

FIG. 1. Histogram of the number of individuals of *A. satyrus* (Ntot = 183) collected in Val Ferret and Val Veny in the years 2005-06. Left Y-axis: N = number of individuals collected in each locality. Right Y-axis: Quote values. Each locality in Tab. 1 is reported in the present graph.

thorax I 0.60-0.96; thorax II 0.62-1.06; abdomen 0.73-1.11; IX abdominal segment width 0.37-0.76; X abdominal segment length I 0.24-0.55; X abdominal segment length II 0.19-0.34; X abdominal segment length III 0.23-0.46 (N = 8).

Melolonthoid larva (3A), greatly bent, whitish, the three thoracic segments all of equal size, while VI, VII and VIII abdominal segments are larger. Pubescence of abdomen yellowish-ochreous, dorsally minute setae mixed up with far longer ones, medially arranged along transversal bands; ventral side, pubescence usually scattered. Spiracles clearly visible, carrying little sclerotized and small cribrose plate.

Head (Fig. 4B). Length 0.78 mm, width 1.07 mm; clypeus base 0.57 mm, apex 0.34 mm, length 0.15 mm. Cephalic capsule well-sclerotized, ochreous, transversal, with a short, very deep and sclerotized epicranial suture. Two not-sclerotized diverging frontal sutures lead off the epicranial suture, sinuate at two thirds, and extended to insertion of antenna. Distinct separation between cranial capsule and clypeus. Two pairs of fore long setae, the inner one is behind the margin; three long antero-lateral setae around the antennal base, and minute, irregular pubescence along the capsule surface. Clypeus transversal and subtrapezoidal, with distinct less-sclerotized and reduced anteclypeus and well-sclerotized, yellowish postclypeus. Two pairs of clypeal setae, one lateral, long, placed near the line between ante and post-clypeus, the smaller other placed innerly.

Epipharynx (Fig. 4A). Length 0.25 mm; width 0.32 mm and 0.23 mm. Cordiform, slightly trilobate, little notched, bearing evident, well-sclerotized and deep clithra. Ventral side: haptomerum carrying two placoid sensilla, acropariae 4+4;

FIG. 2
(A) Beginning egg. (B) Mature egg. (C) Adult. Scale bar length = 1 mm.

acanthopariae 2+1, the basal one smaller; large gymnopariae; curvilinear dexiophobae and laeophobae; circularly arranged marked prophobae, with small series of phobae on left pedial area; hind epitorma merged at center, fore epitorma elongate, longitudinal, slightly expanded at apex; not much developed and asymmetrical laeotorma and dexiotorma, the former one a little more pronounced. Transversal and very thick mesophobae.

Labrum (Fig. 4A). Length 0.19 mm; width 0.32 mm and 0.28 mm. Anterior margin trilobate, with little developed lobes. Pubescence: four fore central setae, two antero-lateral setae, four large setae on a median line, and – basally – two small setae.

Mandibles (Fig. 4C). Length 0.42; width 0.45; space between mandibles: 0.21 mm. Sickle-shaped, asymmetrical. Scissorial area of left mandible with distal teeth little pronounced, molar area concave in the middle, constituted by an anterior part projecting ahead, and two lateral areas, the left one more developed and extended. Tuft of setae on side of molar area. Right mandible with little scissure surrounding a small tooth-like process in scissorial area; protrunding molar area with a line of setae superiorly and laterally, and two setae on ventral side.

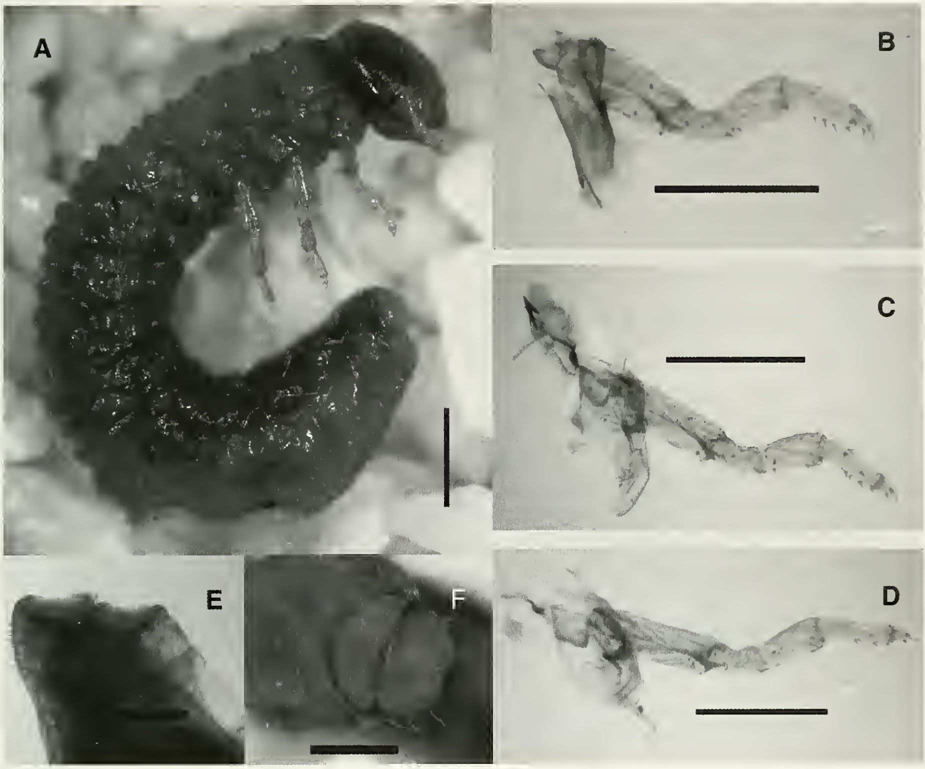

FIG. 3

(A) Larva, habitus, side view. (B) Right fore leg. (C) Right middle leg. (D) Right hind leg. (E) Raster, side view. (F) X Abdominal segment. Scale bar length = 0.5 mm.

Maxillae (Fig. 4D). Galea length 0.19; Lacinia length 0.26; Palpifer length 0.05, width 0.08; Palpus length 0.27. Palpifer clearly evident, little sclerotized, carrying 4-segmented maxillary palpi, segment 1 transversal and shorter than segment 2, with a single seta; segment 2 scarcely more sclerotized, with two setae, and shorter than segment 3, that is elongate, subcylindrical, carrying two setae; segment 4 elongate and tapered at apex; apex truncated, with microsensilla and 2 setae at least (one large and one smaller). At base of palpifer there are two long setae fixed up to 11 minute teeth, some arranged along an oblique line. Lacinia elongate, not much sclerotized, mucronated at apex, with 9-10 setae; galea mucronated with 5 setae.

Hypopharynx (Fig. 4E). Length 0.26 mm; width 0.17 mm and 0.27 mm. Palpus length 0.08 mm. Labial palpi with two poorly sclerotized segments, segment 1 expanded, segment 2 wholly not-sclerotized, truncated, tapered at apex, with sensilla; stipes evident; ligula large; elongate maxillulae. Maxillae: glossa carrying 4 macrosensilla, transversal line of setae; asymmetrical oncily, the right one horizontal, Y-shaped, more expanded and bilobed, the left one H-shaped, reduced and longitudinal.

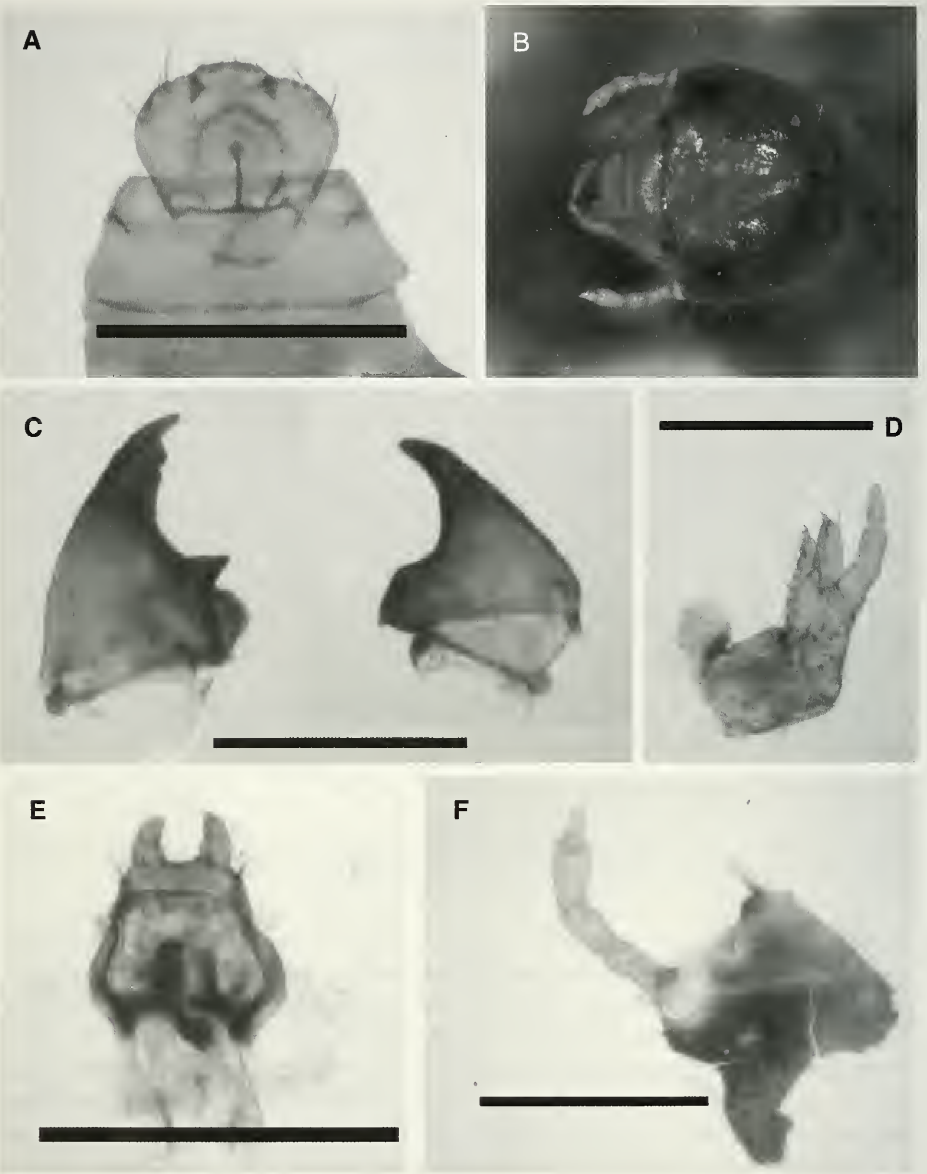

FIG. 4

(A) Epipharynx. (B) Head. (C) Left and right mandibles. (D) Right maxilla. (F) Hypopharynx. (G) Left antenna. Scale bar length = 0.5 mm.

Antennae (Fig. 4F). Length 0.47 mm; antennal base length 0.05 mm; I antennomere length 0.14 mm; II antennomere length 0.10 mm; III antennomere length 0.15 mm, width 0.07 mm; IV antennomere length 0.08 mm. Antennal segments 1-2 of equal length, segment 3 expanded carrying 5-6 subapical setae, the obliquely inserted

FIG. 5
Larva in dung pad.

segment 4 and a thick, conical, little sclerotized sensillum. The antennal segment 4 is truncated at apex, with not-sclerotized area, microsensilla and narrow seta.

Legs (Fig. 3B, C, D). Foreleg: length coxa 0.30 mm, trochanter 0.16 mm, femur 0.20 mm, tibia 0.21 mm, claw 0.09 mm. Middleleg: length coxa 0.42 mm, trochanter 0.24 mm, femur 0.25 mm, tibia 0.25 mm, claw 0.09 mm. Hindleg: length coxa 0.44 mm, trochanter 0.21 mm, femur 0.26 mm, tibia 0.26 mm, claw 0.09 mm. All the legs nearly the same in length, well-developed. Fore coxa thick, shorter than the others. Fore trochanter curved, with placoid sensilla, and at least 6 setae, one very elongate near femur. Femora almost same in length, enlarged at apex, carrying subapically a crown of 6 setae, and 4 setae scattered. Tibia-tarsus complex subcylindrical, with a crown of 6 setae circum-apically, and 7 longer and scattered setae. Claws elongate, with two thick, close, short setae ventrally near the base. Pubescence yellowish ochreous, for the most mixed up, scattered on the whole surface except for the apical areas.

Raster (Fig. 3E). Length 0.57, width 0.76. Recumbent and curved 60-70 setae, caudally directed. Ventral side of X abdominal segment carrying basally and laterally more elongate barbula.

X abdominal segment (Fig. 3F). Width 1.56 mm; Total length 1.60 mm; Lobe I length 0.62 mm; Lobe II length 0.77 mm. Transversal, slightly curvilinear anal fissure, between two flat lobes, the dorsal one transversal and curvilinear, the ventral one deeply notched in the middle.

Conclusive Remarks

The species was collected in fifteen localities of altitude between 1,500 and 2,000 m, and in 2005-6 was very abundant in August in Val Ferret (Tab. 1). Observations on the 30 adults reared in laboratory evinced that they make use of the dung mass both for feeding and egg deposition. They lay eggs directly in the dung, without any parental care, as the majority of Aphodiini (Bornemisszа, 1976, Barbero *et al.*, 2001, Borghesio & Palestrini 2002a, 2002b).

The larvae were collected in dung intermediate-endocoprid zone (dwellers) in small, subspheric, not-organized niches, characterized by unsteady dimensions fitting larval size (Fig. 5). The niches were generate and maintained by the incessant movement of the same larvae, that are active in 1st and 2nd instar and slow more and more in 3rd instar approaching the pupal stage. As reported by Dellacasa & Dellacasa (2006), the species winters as 3rd instar larva.

Since this is the first *Agoliinus* species on which observations of reproductive behaviour and description of preimaginal stages were made, we cannot compare at present the larval morphology variation within the genus. Besides, we noticed that the *A. satyrus* larvae do not show peculiar characters in respect to the other known aphodiinae larvae. The described pattern falls within a very conservative model, as can be found in larval stages of a number of species of other genera (Palestrini & Barbero, 1992, Barbero & Palestrini, 1995, Barbero *et al.*, 2001).

Notably, once the aphodioid larval pattern is adopted it did not greatly differ in distinct species. It seems that – from an evolutionary biology point of view – diversification in larval stage was not the chosen strategy, but it is maintained a pattern that reveal itself effective for a rapid development.

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REVUE SUISSE DE ZOOLOGIE 115 (3): 575-583; septembre 2008

A striking new endemic species of *Galagete* Landry (Lepidoptera, Autostichidae) from the Galapagos Islands, Ecuador

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A striking new species of *Galagete* Landry (Lepidoptera, Autostichidae) from the Galapagos Islands, Ecuador. - *Galagete krameri* sp. n. is described and illustrated as an endemic from the island of San Cristobal, Galapagos Province, Ecuador. The species is unlike any other in the genus in having a striped forewing pattern, but otherwise it possesses all the morphological synapomorphies of adult *Galagete*. Its phylogenetic relationships are analysed on the basis of morphological characters and the species is found to be most closely related to *G. darwini* Landry, and *G. consimilis* Landry + *G. cinerea* Landry. *Galagete espanolaensis* Landry is transferred as a subspecies of *G. turritella* Landry.

Keywords: Autostichidae - *Galagete* - new species - phylogeny - *Galagete turritella* Landry - *Galagete espanolaensis* Landry.

INTRODUCTION

Galagete Landry (2002), now comprising 12 species and two subspecies, represents by far the most diverse endemic radiation of Lepidoptera in the Galapagos Islands. The moths of the 13 previously described taxa show forewing patterns of paler spots or fasciae on a dark background, or the reverse (see Landry, 2002), except for *G. griseonana* Schmitz & Landry (2005) for which the forewing is uniformly grey. The forewing pattern of the new species described here diverges markedly from that of the other species in being simply striated. Because of this singular feature of its appearance, the species remained unnoticed in undetermined material of Gelechiidae until a male was dissected in 2008. Thus, it was not included in the phylogenetic work conducted by the second author (PS) (Schmitz *et al.*, 2007).

The new species is described and illustrated and its phylogenetic affinities are analyzed on the basis of morphological characters. A discussion to transfer *Galagete espanolaensis* Landry as a subspecies of *G. turritella* Landry is also provided.

MATERIALS AND METHODS

The label data style for types is presented in Landry (2006) as are the methods used for specimen collecting. Paratypes of the new species are deposited in the Charles Darwin Research Station, Santa Cruz Islands, Galapagos (CDRS) and the Muséum d'histoire naturelle, Geneva (MHNG).

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A cladistic analysis of all *Galagete* species was performed with PAUP* (Swofford, 2003) using the character matrix shown on Table 1. *Taygete sphecophila* (Meyrick) (Autostichidae) was used as the outgroup following results obtained by Schmitz *et al.* (2007). All characters were unordered and given equal weight. Character state descriptions and coding are given in Table 2.

TABLE 1. Matrix of character states and *Galagete* taxa used in the cladistic analysis (see Table 2 for character definitions). A question mark is used when the state of the character is unknown in the species (as for the first three characters in the unknown female of *G. griseonana* Landry).

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Taxa																		
T. sphecophila	0	1	0	0	0	0	0	1	0	2	?	?	0	0	0	1	?	0
G. seymourensis	1	1	1	0	1	1	0	0	0	1	?	0	0	0	0	1	0	1
G. protozona	1	1	1	0	1	1	0	0	0	1	1	0	0	1	1	0	0	1
G. gnathodoxa	1	1	1	0	1	1	0	0	0	1	1	0	0	0	1	0	0	1
G. t. turritella	1	0	0	0	1	1	1	0	1	0	0	1	1	0	0	1	0	1
G. turritella espanolaensis	1	?	?	?	1	1	1	0	1	0	0	1	1	0	0	?	0	1
G. consimilis	1	0	0	1	1	1	0	0	0	0	1	2	0	1	0	1	1	0
G. darwini	1	0	0	1	1	1	0	0	0	0	0	2	0	0	0	1	1	0
G. levequei	1	0	0	1	1	1	0	0	0	0	1	0	0	0	2	1	1	1
G. cristobalensis	1	0	0	0	1	1	0	0	0	0	0	1	0	0	2	1	1	0
G. pecki	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	1	0
G. cinerea	1	0	0	1	1	1	0	0	0	0	1	2	0	1	0	1	1	0
G. griseonana	1	?	?	?	1	1	0	0	0	0	1	0	0	1	3	?	1	0
G. krameri	1	0	0	1	1	1	0	0	0	0	1	2	0	0	4	1	1	0

TABLE 2. Characters used in cladistic analysis with scores attributed to character states.

1. Female sternum VIII simple (0); bilobed (1).
2. Apical margin of female tergum VIII simple (0); bilobed (1).
3. Corpus bursa with signum (0); without signum (1).
4. Dorsal base of papillae anales separated in the middle (0); joined by sclerotized band (1).
5. Transtilla absent (0); well developed and tripartite (1).
6. Uncus with pair of setose arms medially situated, barely separated, and pointing posteriorly (0); setose arms laterally situated, pointing anteriorly and downward (1).
7. Apical half of uncus not projected mediodorsally (0); projected mediodorsally (1).
8. Sacculus with a simple small projection (0); large and with two projections (1).
9. Vesica with small cornuti only (0); with large cornuti (1).
10. Phallus with at most a small crest medioventrally on coecum penis (0); with a large crest medioventrally on coecum penis (1); with a pair of small crests laterally on coecum penis (2). This character is unordered.
11. Median process of transtilla narrowly terminated (0); enlarged apically (1).
12. Lateral projections of transtilla short and rounded (0); rather short and narrow (1); long and narrow (2). This character is ordered.
13. Juxta a symmetric plate with a rounded, median concavity at apical margin (0); asymmetrical and forming sclerotized ring around phallus (1).
14. Valva simple on costal margin (0); costal margin with process(es) (1).
15. Colour of forewing of various shades of brown with darker markings (0); dark brown with white markings (1); whitish to cream coloured with dark brown markings (2); grey, without markings (3); brown, longitudinally striated (4).
16. Presence (1) or absence (0) of spicules on corpus bursae.
17. Scale-like setae on median process of transtilla small (0) or large (1).
18. Modified scales on abdomen present (1) or absent (0).

DESCRIPTION

Galagete krameri sp. n. Figs 1-6

Material examined: Holotype male: 'ECU[ADOR], Galápagos, San Cristobal | antiguo botadero, ca. 4 km SE | Pto Baquerizo, G[lobal]P[ositioning]S[ystem]: 169 m elev[ation]. | S 00°54.800', W 089°34.574' | 25.ii.2005, u[ltra]v[iolet]l[ight], *leg*. B. Landry' [white, printed]; 'HOLOTYPE | Galagete | krameri Landry & Schmitz' [red card stock, hand written]. Deposited in the MHNG.

Paratypes: 4 ♂, 2 ♀, from the Galapagos Islands, Ecuador: – *San Cristobal*: 1 ♀ (dissected, Slide MHNG ENTO 4932, same data as holotype except '17.iii.2004 (B. Landry, P. Schmitz)'; 4 ♂ (one dissected, Slide MHNG ENTO 4922), 1 ♀ (dissected, Slide MHNG ENTO 4928), same data as holotype. Deposited in the CDRS and MHNG.

Etymology: The species name honours Dr Peter Kramer, current president of the Charles Darwin Foundation for the Galapagos. Having dedicated most of his professional career to conservation, Dr Kramer has fostered and implemented numerous measures for the betterment of the Galapagos biota and species. Through the creation of this patronym we also wish to commemorate the 50th anniversary of the C. Darwin Foundation in 2009.

Diagnosis: *Galagete krameri* is the only species of the genus with a forewing pattern made of longitudinal lines (Figs 1, 2); the lines are cream coloured on a brown background. Among other Gelechioidea of the Galapagos, none have a similar, distinctly lined pattern. The male and female genitalia of *G. krameri* are very similar to those of several other species of *Galagete*. Based on the shape of the median and lateral arms of the transtilla, saccus, juxta, sacculus, and phallus, this species is most similar to *G. consimilis* Landry and *G. darwini* Landry. From *G. consimilis* it differs most noticeably in having no projections on the dorsal margin of the costa of the valva and from *G. darwini* it differs in the less compact shape of the uncus and in the median arm of the transtilla being apically modified, i.e. flattened dorsoventrally, enlarged, rounded, and slightly upturned. In female genitalia it is most similar again to *G. consimilis* although the latter has the basal third of the corpus bursae less conspicuously spiculate.

Description: *MALE* (n=5) (Fig. 1). Head cream coloured, medially with scales dark brown on occiput and greyish brown on vertex; also with dark brown scales along ocular margin below eye. Haustellum, maxillary palpus, and labial palpus cream coloured; latter sometimes with brown medially as line toward apex of third palpomere and grey dorsally on second palpomere toward apex. Antenna blackish brown to greyish brown toward apex, with cream coloured below on scape and pedicel. Thorax striped cream coloured and dark brown with narrow dark brown stripe medially, wider cream coloured stripe on each side, and dark brown on tegula along both sides and base with cream coloured in middle; metascutellum grey, shining. Foreleg blackish brown laterally, cream coloured medially. Midleg mostly cream coloured with white at base of coxa, black-brown on distal half of coxa, on trochanter, as lateral stripe on femur, and as traces at apex or dorsally on tibia and sometimes at bases of first four tarsomeres. Hindleg mostly cream coloured with greyish to blackish brown on coxa except

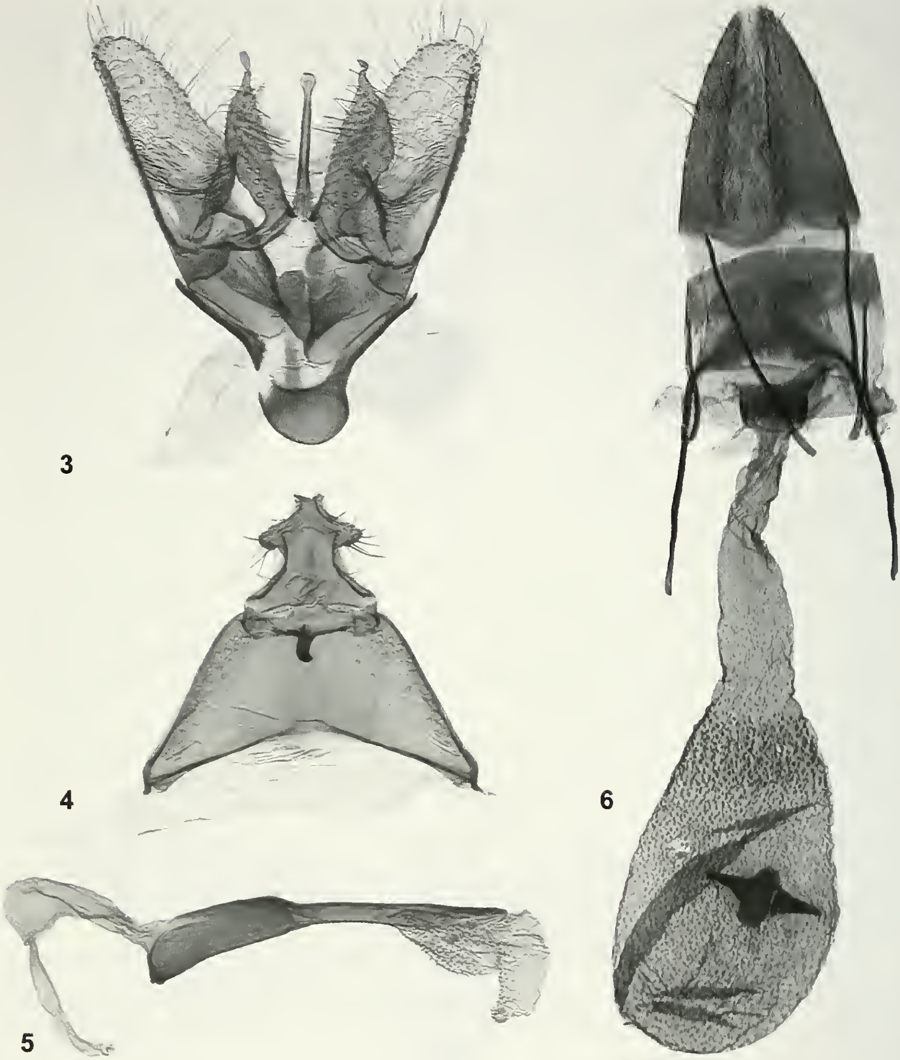
FIGS 1-2
Galagete krameri sp. n. 1. Holotype (MHNG); 2. Female paratype (MHNG).

base, along lateral margin of femur, on half of trochanter, along dorsal edge of tibia, and as traces at base of first tarsomere, or latter mostly grey except apex, with traces of grey on next three tarsomeres; tibia with greyish cream coloured tuft of long, thin scales along dorsal edge. Wingspan 7.81–9.46 mm (holotype 9.19 mm, forewing length 4.19 mm). Forewing with cream coloured lines on brown background as shown; fringe greyish brown. Hindwing grey; fringe greyish brown to mostly cream coloured along anal margin. Abdomen greyish brown, without modified spiny scales on first tergites, with whitish cream coloured scales on genitalia.

Male genitalia (n=1) (Figs 3-5). Uncus in lateral view weakly angled, only slightly convex, with pair of low, rounded, lateral crests; apex slightly concave; lateral arms flat, relatively long and narrow. Median hook of gnathos thick, almost bent at 180 degrees and parallel with basal arms, apically narrowly rounded, not compressed, and very shortly curved. Dorsal connection of tegumen and pedunculi broad. Lateral arms of transtilla elongate, broad medially (half as wide as long), evenly sclerotized, median margin straight, lateral margin broadly convex, dorsal surface with fan-shaped scales imbricating along midline above median arm of transtilla, with larger scales basally and gradually smaller ones towards apex, lateral surface and dorsal edge setose, apex narrow, adorned with one scale. Median arm of transtilla narrow, about as long as lateral arms, apex dorsoventrally flattened, rounded, and slightly upturned. Valva of medium length and width, roughly quadrangular in side view, with rounded apex; dorsal margin straight, more thickly sclerotized at base, without projections; ventral margin with low concavity at level of sacculus; sacculus a roughly square blade of medium length, projecting mediodorsally, dorsally with low buttress dorsad from middle. Juxta roughly as stylized heart with rounded apical notch. Vinculum with arms narrow; median section slightly extended and bulbous, with broadly rounded margin. Phallus long, slightly arched; basal 2/5 with girth about twice that of distal 3/5, with left lateral margin slightly sinuate; basal 1/5 slightly broader in dorsal view with lateral margins rounded; short coecum penis adorned with short medioventral crest; apical 1/3 slightly curved to left, ventrally open, with dorsal wall slightly enlarged and with parallel margins; vesica with spicules, without cornuti.

FEMALE (n=2) (Fig. 2). Antenna of smaller girth than in male; scape dorsally black-brown, ventrally cream coloured, contrasting with dirty cream coloured basal third of flagellum, distal two-thirds of flagellum grey-brown. Wingspan 8.78 mm. Frenulum with two acanthae.

Female genitalia (n=2) (Fig. 6). Papillae anales about 2.2 times longer than basal width in side view (in situ), narrowing towards apex to about one sixth of basal width in side view, apically rounded, dorsally at base with light sclerotized connection between papillae. Posterior apophyses narrow, about as long as papillae, slightly curved inward. Dorsal and free branches of anterior apophyses straight, together slightly longer than papillae; ventral branches widening and diffusing towards middle, not forming clear margin of sternite. Apical margin of sternum VIII with wide rounded lobes, with emargination about half as wide as lobes, reaching about 2/5 length of sternum medially. Apical margin of tergum VIII straight. Ostium bursae wide, about 2/5 width of base of sternum VIII; with ventral sclerotized plate about half as long as wide, with lateral margins slightly rounded, not forming sclerotized ring around base of



Figs 3-6

Male genitalia of *Galagete krameri* sp. n. from genitalia slide MHNG ENTO 4922. 3. Valvae, transtilla, juxta, vinculum (broken); 4. Tegumen, uncus, gnathos; 5. Phallus in side view. 6. Female genitalia of *Galagete krameri* sp. n. from genitalia slide MHNG ENTO 4932.

ductus bursae. Ductus bursae slightly constricted at base, then gently widening to equal width of sclerotized plate of ostium; slightly spiculate on distal half. Corpus bursae elongate, about 1.7 times longer than wide; spiculate, more strongly so on basal third; with one large signum with 1-2 lateral spine-like projections from rounded to slightly elongate plate, projections and plate sometimes with small spines.

REMARKS: Despite its divergent forewing pattern, this species is clearly a member of *Galagete* as it possesses the two recognized synapomorphies for the genus, i.e. the tripartite male transtilla and the bilobed apical margin of the female's sternum VIII (Landry, 2002). The male also has the thickened antenna and the ventral corematal organ of the base of the abdomen found in all *Galagete* species, although these characters are also present in some other Autostichidae taxa.

The biology of *G. krameri* is unknown, except that the moth is attracted to light and flies in February and March at the type locality, which is an old garbage disposal site, at 169 m in elevation, close to the main road leading to the summit of the island of San Cristobal. This island, the oldest of the archipelago is the only one to harbour two single-island endemics of *Galagete*, *G. cristobalensis* Landry being the other one.

PHYLOGENETIC RESULTS AND TAXONOMIC STATUS OF *GALAGETE ESPANOLAENSIS* LANDRY

The maximum parsimony analysis produced 16 equally parsimonious trees of 31 steps (consistency index: 0.74; retention index: 0.79; rescaled consistency index: 0.59), one of which is presented as Fig. 7. The bootstrap analysis (nrep=2000) found more than 86% support for the clade made of the three larger species (*G. seymourensis* Landry, *G. protozona* (Meyrick), and *G. gnathodoxa* (Meyrick)) and 98% support for the pair formed by *G. t. turritella* Landry and *G. turritella espanolaensis*, but only 35.8% support for the relationship between *G. krameri* and its three most closely related taxa (*G. darwini* Landry, and *G. consimilis* Landry + *G. cinerea* Landry). The molecular phylogenetic work of Schmitz et al. (2007) showed the latter three taxa at the base of the tree of *Galagete* and the association of *G. krameri* with them is consistent with the evolution of the genus on the archipelago as *G. krameri* occurs only on the oldest island, i.e. San Cristobal.

The molecular work of Schmitz *et al.* (2007) also showed that *G. espanolaensis* (2002), described from two males collected on Española, was related most closely to *G. turritella*, a widespread species yet unknown on San Cristobal at the time of its description, in 2002. The data available currently are from three males identified as *G. espanolaensis* and collected on Española (one collected in 2005 was used in the molecular work of Schmitz *et al.* (2007)) and one female collected on San Cristobal in 2004 (identified as *G. turritella* by Schmitz & Landry (2005: 512), used in the above-mentioned molecular work, and identified as *G. turritella* in that work). Schmitz *et al.* (2007) showed that *G. espanolaensis* and the specimen of *G. turritella* from San Cristobal were most closely related, that these two specimens were most closely related to the rest of the *G. turritella* specimens, which came from other islands, and that these two clades were very well supported (bayesian posterior probability ≥ 95%, maximum likelihood bootstrap value ≥ 75%). The percentage of divergence for a 555 bp segment of the beginning of the mitochondrial cytochrome oxydase I gene between the pair from Española and San Cristobal and the clade of *G. turritella* from the other islands was 4.7% on average compared to 7.0% for the sister-species pair of *G. consimilis* Landry and *G. cinerea* Landry, for example, and to 3.2% for the two subspecies of *G. pecki* Landry. Schmitz *et al.* (2007: 188) mentioned that *G. espanolaensis* represented either a geographical variant of *G. turritella*, or a distinct species occurring on both the

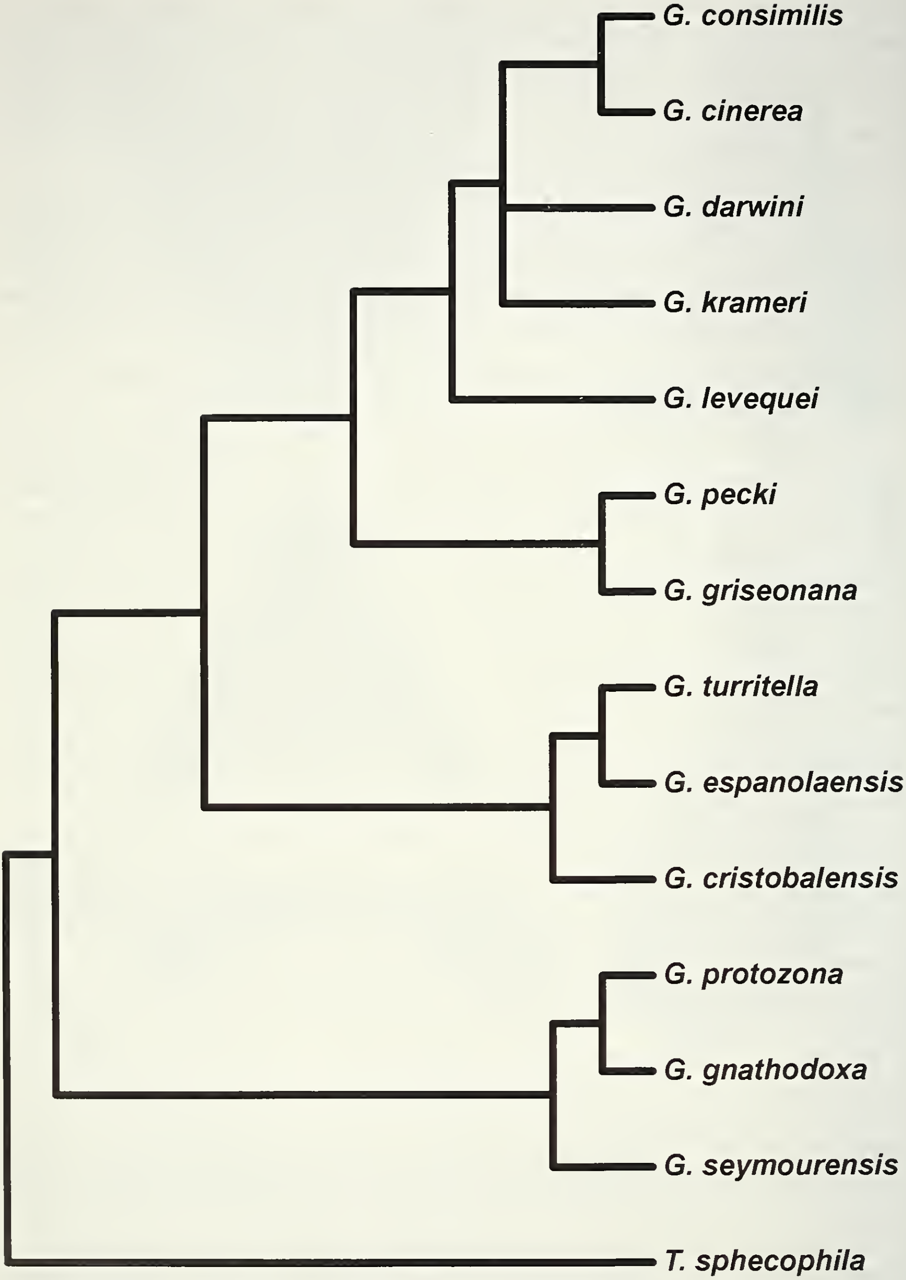


FIG. 7

One of 16 equally parsimonious trees resulting from the maximum parsimony analysis based on 18 morphological characters of *Galagete* (details are mentioned above in the Material and Methods and the Phylogenetic results chapter).

islands of Española and San Cristobal. The results of the present morphological phylogenetic analysis, those of the molecular phylogenetic analysis of Schmitz *et al.* (2007), the intermediate percentage of divergence of the above-mentioned 555 bp fragment, as well as similarities and differences in habitus and male genitalia as mentioned in the original descriptions lead us to propose to down-rank *G. espanolaensis* Landry as a subspecies of *G. turritella* Landry occurring on both San Cristobal and Española. The female of *G. turritella espanolaensis* remains undescribed and the female genitalia, based on a preparation of the unique San Cristobal specimen, are very similar to those of *G. t. turritella*. More specimens of *G. turritella espanolaensis* are needed to clarify morphological similarities and differences between it and the nominotypical subspecies, especially males from San Cristobal and females from Española.

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We thank the authorities of Parque Nacional Galapagos and CDRS for allowing and facilitating field work and for permits to export specimens. We are particularly grateful to Dr Lazaro Roque-Albelo for incorporating us into his work plans, for his generous hospitality, and for his help in numerous ways. This work was carried out with the financial support of a "Bourse Augustin Lombard," the MHNG, and the University of Geneva to P. Schmitz, and the MHNG to B. Landry. We are also grateful to José Loaiza and SICGAL people on San Cristobal for their help in the field and to two anonymous reviewers for their useful comments.

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Prima segnalazione del genere *Aesalus*, Fabricius, 1801 in Sicilia con descrizione di *Aesalus scarabaeoides siculus* n. ssp. (Coleoptera Lucanidae: Aesalinae)

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First record of *Aesalus*, Fabricius, 1801 in Sicily with description of *Aesalus scarabaeoides siculus* n. ssp. (Coleoptera Lucanidae: Aesalinae). - During a research project deal with Coleoptera in Peloritani Mountains (North-oriental Sicily), some speciments of a Lucanid beetle belonging to *Aesalus* Fabricius, 1801 genus, never recorded before for Sicily, were collected. The new taxon, similar to *Aesalus scarabaeoides meridionalis* Bartolozzi, 1989, differ from it for some characteristics that resemble the Caucasian species *Aesalus ulanowskii* Ganglbauer, 1886.

Keywords: *Aesalus* - New subspecies - Taxonomy - Sicily.

INTRODUZIONE

Nell'ambito di un progetto di ricerca dell'Università degli Studi di Messina sulla coleotterofauna delle aree protette della Sicilia nord orientale, si è impostato uno studio basato su campionamenti periodici in diverse località dei Monti Peloritani (Sicilia Nord-Orientale). In una trappola a caduta proveniente dal Bosco di Malabotta nei dintorni di Montalbano Elicona (Messina), sono stati rinvenuti degli esemplari di un coleottero Lucanide del genere *Aesalus* Fabricius, 1801, mai segnalato in precedenza per la fauna siciliana.

Per la Sicilia erano fino ad oggi noti solo tre generi di Lucanidae, tutti rappresentati da un'unica specie: *Lucanus tetraodon* Thumberg, 1806, *Dorcus parallelipipedus* (Linnaeus, 1758) e *Sinodendron cylindricum* (Linnaeus, 1758) (Bartolozzi & Maggini, 2005). L'antica segnalazione di *Lucanus cervus* (Linnaeus, 1758) per l'Isola (Siracusa), riportata da Bartolozzi e Maggini (2005) è, a mio avviso, da ritenersi dubbia.

Il genere *Aesalus* è rappresentato in Italia da una sola specie, *Aesalus scarabaeoides* (Panzer, 1794), entità centro-europea che trova i limiti del suo areale a Est nel sud della Russia, a Nord in Svezia, ad Ovest in Spagna e a Sud in Italia (Bartolozzi, 2004; Bartolozzi & Sprecher-Uebersax, 2006). La specie appare rarissima in Italia ed è presente, con la sottospecie nominale, in Trentino Alto Adige (Luigioni, 1929; Porta, 1932), con un'unica stazione in Lazio (Carpaneto *et al.*, 1998), con tre località in Piemonte e due in Friuli Venezia Giulia (Bartolozzi, 1986; Franciscolo, 1997; Dutto, 2005). La sottospecie *Aesalus scarabaeoides meridionalis* Bartolozzi, 1989, descritta del Bosco di Policoro in Basilicata, è fino ad oggi nota per la sola coppia tipica.

Manoscritto accettato il 15.05.2008

Il genere *Aesalus*, Fabricius, 1801 è presente nella Regione Paleartica con sette specie e quattro sottospecie: *Aesalus asiaticus asiaticus* Lewis, 1883 diffuso in Giappone e Taiwan; *Aesalus asiaticus sawaii* Fujita & Ichikawa, 1985 presente in Giappone; *Aesalus himalayicus* Kurosawa, 1985 di Nepal e India; *Aesalus imanishii* Inahara & Ratti, 1981 della Tailandia; *Aesalus saburoi* Araya, Tanaka & Bartolozzi, 1998 del Nepal; *Aesalus sichuanensis* Araya, Tanaka & Tanikado, 1995 della Cina; *Aesalus ulanowskii* Ganglbauer, 1886 presente in Georgia, sud della Russia ed Iran; *A. scarabaeoides scarabaeoides* che è la specie a più ampia diffusione, segnalato di Arzebaijan, Armenia, Austria, Bosnia Herzegovina, Bulgaria, Croazia, Repubblica Ceca, Francia, Germania, Georgia, Ungheria, Irlanda, Italia, Polonia, Romania, Russia, Slovacchia, Spagna, Svezia, Svizzera, Yugoslavia, Turkmenistan; *A. scarabaeoides meridionalis* è sottospecie endemica italiana (Bartolozzi & Sprecher-Uebersax, 2006).

MATERIALI E METODI

Le trappole a caduta con le quali sono stati raccolti gli esemplari sono state posizionate al suolo e all'interno di tronchi cariati e attivate con una miscela di aceto e sale. Il contenuto delle trappole, portato in laboratorio, è stato lavato e smistato. Gli esemplari raccolti sono stati quindi incollati su catellini entomologici. Nel caso di estrazione dei pezzi genitali, questi sono stati incollati su un altro cartellino posto sul medesimo spillo dell'esemplare di provenienza. Le foto sono state fatte utilizzando una fotocamera digitale Nikon 5700 montata su uno stereomicroscopio Zeiss Stemi 2000-C. Per le foto al SEM si è utilizzato un microscopio Jeol JSM-5610LV.

Per lo studio si sono confrontati esemplari di *A. scarabaeoides scarabaeoides*, *A. scarabaeoides meridionalis* ed *A. ulanowskii* delle seguenti località:

A. scarabaeoides scarabaeoides: FRANCIA - 1 ♂: Grésigne, Tera, 12.VII.1971, Leg. J. L. Nicolas; 1 ♂: Habsheim, 3.06.1963; ITALIA - 1 ♂ e 1 ♀: Carnia, Mt. Ciaurlec, V.1968, Leg. Gobbi; 1 ♀: Piemonte, (TO) Bobbio Pellice Zona Podio, F. Cerutti, 28.IV.1985. YUGOSLAVIA: 1 ♀: Bosnia Sarajevo, V. M. Duchon; REPUBBLICA CECA - 3 ♀♀: Trusnov, B. or., 13.06.1962, K. Poláček leg.;

A. scarabaeoides meridionalis: 1 ♀ holotypus: Lucania, Policoro (MT), 24.V.1981, Leg. Montemurro

A. ulanowskii: IRAN - 1 ♂ 1 ♀: Mazandaran Rudbar, Leg. Curti

Collezioni presso le quali saranno conservati l'holotipo ed i paratipi. CBAV: Coll. C. Baviera (Messina); CBAR: Coll. L. Bartolozzi (Firenze); MSNM: Coll. Museo civico di Storia naturale, Milano; MHNG: Coll. Museo di Storia Naturale di Ginevra, Svizzera.

Aesalus scarabaeoides siculus ssp. n. Figs 1-2

Località tipica: Italia, Sicilia, Messina, Montalbano Elicona, Monti Peloritani, Bosco di Malabotta, m 1300 s.l.m.

Serie tipica: Holotypus: 1 maschio, etichettato "Sicilia, Messina, Monti Peloritani, Montalbano Elicona, Bosco di Malabotta, 1300 m s.l.m., pitt-fall trap, in *Quercus cerris* L. 25.V-25.VII.2006, C. Baviera leg." (MSNM). Paratipi: 1 femmina e 3 maschi stessi dati dell'holotypus (CBAV, CBAR, MHNG).

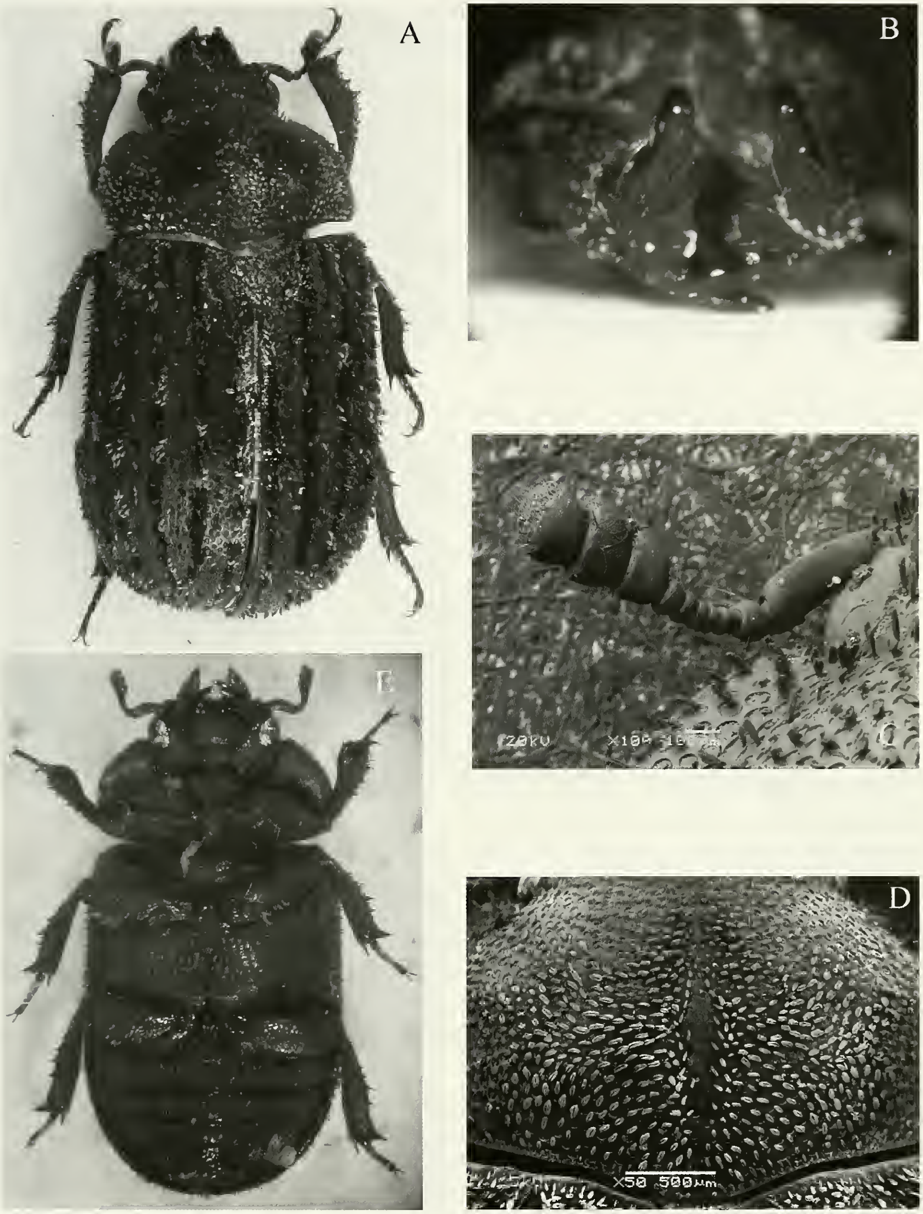

FIG.1

Aesalus scarabaeoides siculus n. spp., *holotypus*. (A) habitus. (B) mandibole in visione frontale. (C) antenna destra. (D) pronoto. (E) visione ventrale.

Diagnosi: Forma del corpo ovale, un po' allungata, fortemente convessa; pronoto ampio, molto convesso e punteggiato, con una sottile linea mediana liscia appena dopo il vertice; callo omerale pronunciato; elitre con larghe squame foliacee, nettamente più strette e corte sui lati; apofisi mandibolare nel maschio, in visione frontale, convessa; meso e metatibie leggermente ma distintamente incavate nel terzo distale.

Diagnosis: Body slightly elongated, strongly convex; pronotum wide, strongly convex and densely punctate with a median line smooth and thin behind the vertex; each shoulder with a protuberance; elytra with wide leaf-like scales clearly shorter and narrowed on sides; mandibular apophysis in the male, convex, in frontal view; meso and metatibiae slightly depressed in the distal third.

Descrizione dell'holotypus maschio: Massima lunghezza 7,20 mm; massima larghezza 3,6 mm. Forma del corpo ovale, un po' allungata, fortemente convessa (Fig. 1A).

Colore rosso mattone, con lati nerastri in virtù di una maggiore chitinizzazione. Si presentano in particolare rosso scuro il pronoto (che presenta però i margini nerastri), le elitre (a esclusione dei margini e della sutura), le zampe (a eccezione delle spine e dei bordi), le antenne ed i palpi mascellari. Questa stessa colorazione interessa per intero le parti ventrali. Completamente nere appaiono le mandibole, così come lo scutello e la sutura elitrale.

Capo, pronoto ed elitre con punti circolari o ovali di dimensioni variabili, nei quali sono impiantate eccentricamente setole. Le setole presenti sul capo sono di colore chiaro, corte e strettamente lanceolate, mentre si presentano per la maggior parte nere quelle della zona centrale. La loro forma, lanceolata e sottile in quasi tutta la superficie, diviene via via più allargata e foliacea passando da quelle centrali a quelle situate presso gli angoli posteriori.

Labium robusto e trapezoidale, cosparso di setole claviformi. Mandibole falciformi, con apofisi eretta, subtriangolare, mostrante, in visione frontale, il margine interno convesso nel terzo basale (Fig. 1B). Ultimo articolo dei palpi mascellari lesiniforme. Labrum corto, cosparso di grossi punti e di sottili setole giallastre rivolte ventralmente. Clipeo separato dalla fronte da un'ampia depressione a "V", cosparso di radi punti con piccole setole giallastre. Fronte larga, con punteggiatura meno densa al di sopra dei toruli antennali che si presentano ampi, poco sollevati e a margine sinuoso. Il capo presenta sul vertex una piccola areola sollevata e lucida tra i punti. Antenne di dieci articoli, scapo cilindrico, gradatamente arcuato e debolmente allargato al centro (Fig. 1C). Pedicello subsferico, primi due articoli del flagello subquadrati, gli altri tre nettamente più larghi che lunghi.

Torace molto convesso, ampio, trasverso, depresso ai lati, con punteggiatura piuttosto densa (la distanza tra i punti è, sul disco, inferiore al diametro di questi); ai punti più grandi sono frammisti radi punti più piccoli che si addensano particolarmente sul margine prossimale. Nei punti sono eccentricamente impiantate setole di differente larghezza e lunghezza, la cui colorazione è variabile dal giallastro al nero; più chiare quelle presenti ai lati e agli angoli posteriori, più scure quelle presenti sul disco. I punti mancano in due areole tondeggianti presenti ai lati appena dopo la metà e in una sottile linea mediana appena dopo il vertice (Fig. 1D). Margini laterali con larga crenulatura appena percettibile, convessi, con la maggiore larghezza appena prima della metà ed angoli posteriori stondati. Margine anteriore ampiamente convesso, margine posteriore debolmente ribordato.

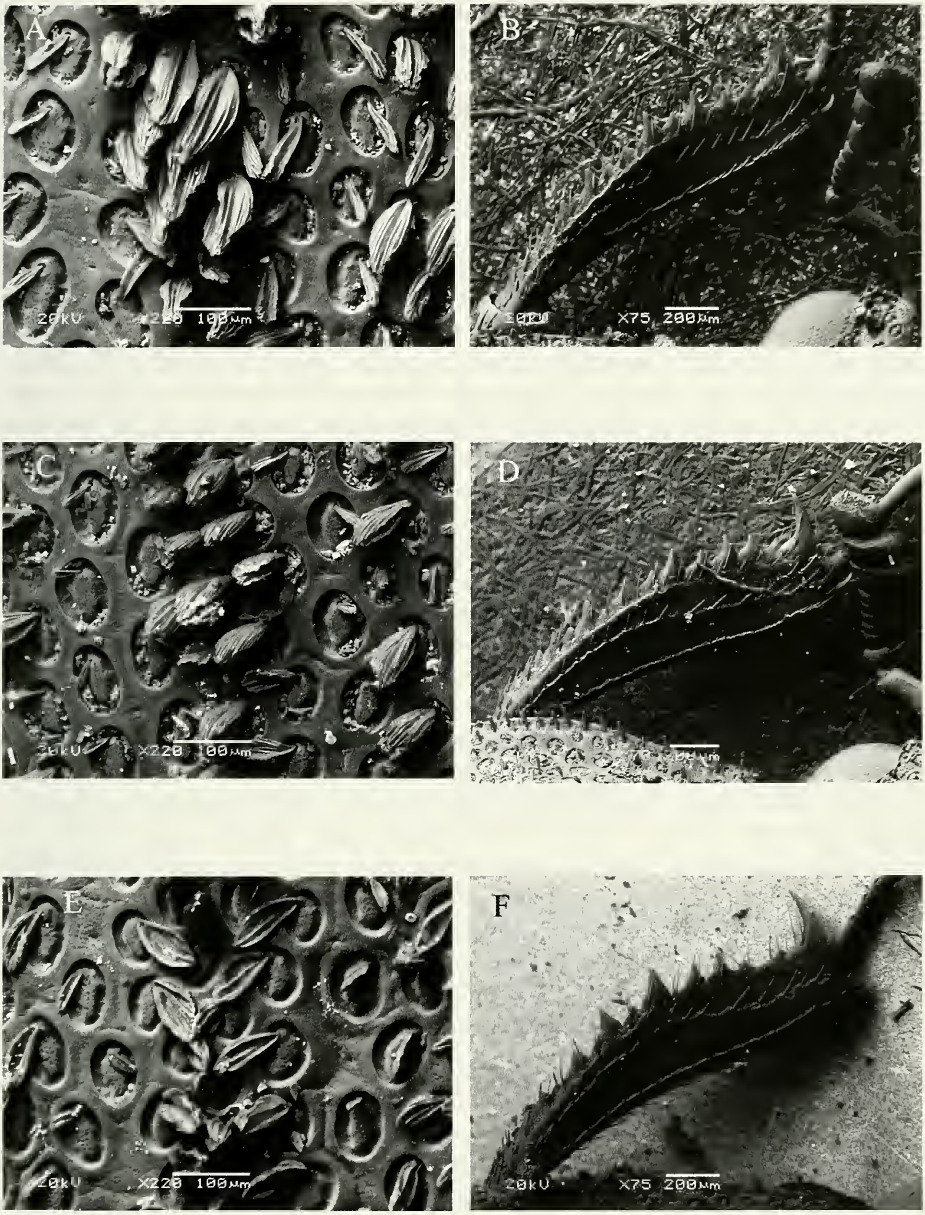

FIG. 2

Squame e punteggiatura elitrale e tibia anteriore destra di. (A) *Aesalus scarabaeoides siculus* n. spp., *holotypus*. (B) *Aesalus scarabaeoides scarabaeoides* (Panzer, 1794). (C) *Aesalus ulanowskii* Ganglbauer, 1886 .

Scutello largo, arrotondato all'apice e ribordato ai margini, con punteggiatura sottile e rada, recante setole reclinate giallastre, spatolate, con margine seghettato.

Ali mesotoraciche ben sviluppate. Elitre brevemente allungate, convesse, con punti ovali nei quali sono eccentricamente impiantate setole che da clavate (in particolare lungo i margini laterali) divengono foliacee e allungate, a costituire sei strie composte da gruppi di due-quattro setole nere e giallastre antero-posteriormente alternate (le porzioni di setole giallastre solitamente più strette di quelle nere). Nelle interstrie sono presenti punti privi di setole o con setole corte e strette, isolate e rivolte posteriormente. Presso la base elitrale le strie appaiono indistinte e confuse. Callo omerale saliente, ricoperto da setole foliacee nere. Margini elitrali ribordati. Sutura elitrale saliente, bordata da due file di setole, nere fino oltre la metà, poi alternate a setole giallastre.

Episterni leggermente carenati; superficie con lievi rugosità e sottili brevi impressioni. Appendice prosternale ampia, a profilo fungiforme, ribordata anteriormente, dove forma un arco interrotto al centro da un avvallamento, stretta fra le anche, dove si presenta sollevata a formare un'ampia carena, poi allargata a triangolo presso l'apice (Fig. 1E). La sua punteggiatura è simile a quella elitrale, ma qui le setole giallastre divengono sempre più larghe andando verso la parte posteriore. Mesosterno ribordato fra le anche mediane, appena sollevato posteriormente, con grossi punti fra loro equidistanti, recanti setole spatoliformi molto reclinate (Fig. 2A). Primo segmento addominale ribordato fra le coxe posteriori; secondo, terzo e quarto segmento larghi, con margine posteriore sclerificato e profondamente inciso, percorsi da profonde scanalature ad andamento ondulato, dotate di setole spatoliformi; quinto segmento addominale (VII morfologico) prossimalmente scanalato come i precedenti e distalmente cosparso da una fitta punteggiatura.

Zampe anteriori forti, con femori allargati, a margine interno fortemente acuto, cosparse di punti grossi, equidistanti, recanti corte setole. Tibie anteriori debolmente curvate, con un robusto dente appena arcuato presso l'angolo esterno e una serie di dentelli lassi sul margine esterno, dotati di ampia base, fino a un dente di maggiori dimensioni presente circa ad 1/3 della lunghezza, a partire dal quale si osserva un aumento del numero di dentelli e un progressivo restringimento degli stessi (Fig. 2B). Meso e metatibie leggermente, ma distintamente, incavate nel terzo distale; primi quattro articoli tarsali subeguali. Unghie semplici.

Edeago tubolare arcuato, ben sclerificato, sinuoso, non fessurato alla base, con pezzo basale ridotto e parameri strettissimi, allungati, addossati ad esso.

Descrizione della femmina e dei paratipi maschi: Massima lunghezza 6,5 mm; massima larghezza 3,5 mm. La femmina è facilmente distinguibile dal maschio, oltre che per l'assenza dell'apofisi mandibolare verticale, per le squame leggermente meno ampie, per i lati del pronoto meno espansi anteriormente, per l'aspetto generale nettamente più convesso, e per le protibie mostranti una leggera angolosità sul margine esterno. Le mandibole presentano il margine esterno medialmente ottuso. L'apparato copulatore presenta stili di forma stretta e allungata, dotati di setole sulla sommità, con emisterniti non incavati sul lato esterno.

Dimensioni degli altri tre paratipi maschi lunghezza: media = 7,0; (max = 7,5; min = 6,2 mm); larghezza: media = 3,7; (max = 4,0 mm; min = 3,4 mm). Questi variano leggermente per quanto riguarda l'estensione della colorazione di fondo rossastra o nerastra sia del pronoto (nel quale varia anche il rapporto numerico tra setole nere e giallastre) che delle elitre, per la dimensione e disposizione delle strie di squame nere e giallastre, per le dimensioni della sottile areola mediana presente appena dopo il vertice e per la forma del margine anteriore della carena prosternale, che presenta però sempre l'avvallamento osservabile nell'olotipo e nella femmina. Le tibie anteriori mostrano una certa variabilità nel numero e nella disposizione delle spine e nelle dimensioni degli spazi presenti tra esse.

Note di comparazione: Pur trattandosi di un taxon affine ad *A. scarabaeoides scarabaeoides*, le differenze che separano *A. scarabaeoides siculus* n. ssp. dalla sottospecie nominale sono molteplici. Molti caratteri avvicinano la nuova sottospecie ad *A. scarabaeoides meridionalis*, come le setole elitrali che presentano forma e dimensioni molto diverse (Fig. 2A) sia rispetto a quelle presenti in *A. scarabaeoides scarabaeoides* (Fig. 2C) che in *A. ulanowskii* (Fig. 2E), o la forma dello scapo antennale. Il pronoto mostra due interessanti caratteristiche che avvicinano il nuovo taxon ad *A. ulanowskii*, specie diffusa nel Caucaso (Bartolozzi & Sprecher-Uebersax, 2006); come in quest'ultima specie, infatti, i lati di questo presentano la massima ampiezza in corrispondenza circa della metà, anche se in *A. ulanowskii* questi mostrano un andamento nettamente più convesso, mentre nelle due sottospecie di *A. scarabaeoides* la massima larghezza è raggiunta appena dopo la metà, inoltre mancano i punti lungo una sottile linea mediana appena dietro alla sommità del pronoto (Fig. 1D), carattere che ricorda la linea mediana liscia che percorre l'intera lunghezza del pronoto in *A. ulanowskii*, mai osservabile in entrambe le sottospecie di *A. scarabaeoides*.

La forma delle mandibole di *A. scarabaeoides siculus* n. ssp., appare piuttosto caratteristica rispetto a quella delle due sottospecie di *A. scarabaeoides* note, sia nella femmina, con il margine esterno arrotondato, e non ad angolo ampiamente ottuso e neppure pressoché retto come in *A. ulanowskii*, sia nel maschio, in cui l'apofisi mandibolare presenta margini interni convessi (Fig. 1E) e non dritti come nelle due sottospecie di *A. scarabaeoides*, né concava internamente come in *A. ulanowskii* (cfr. Bartolozzi, 1991).

Un'altra differenza che può rilevarsi nella nuova sottospecie è data dalla struttura dell'apofisi prosternale che mostra anteriormente il margine con un avvallamento in posizione centrale, mai osservabile negli altri taxa presi in esame.

Riguardo alle zampe, una caratteristica che avvicina *A. scarabaeoides siculus* n. ssp. ad *A. scarabaeoides meridionalis* la si può rilevare nella forma arcuata della parte distale delle tibie medie e posteriori, che appaiono molto esili.

Le tibie anteriori (Fig. 2B) nella nuova sottospecie appaiono, inoltre, leggermente più esili che in *A. scarabaeoides scarabaeoides* (Fig. 2D) e si presentano appena angolose sul margine esterno, accennando la forma riscontrabile in *A. ulanowskii* (Fig. 2F) (cfr. Bartolozzi, 1991) e discostandosi dalla curva regolare osservabile in *A. scarabaeoides scarabaeoides*. L'ornamentazione delle tibie anteriori, recanti poche spine a base larga, più o meno intervallate, sembra caratteristica della specie. L'edeago non presenta differenze significative e appare solo leggermente più arcuato che in *A. scarabaeoides scarabaeoides*.

Seppure alcuni caratteri avvicinino la nuova sottospecie ad *A. ulanowskii*, si è deciso di attribuire il nuovo taxon a *A. scarabaeoides*, sulla base dei caratteri comuni sia con la sottospecie nominale che soprattutto con la sottospecie *A. scarabaeoides meridionalis*.

NOTE ECOLOGICHE E BIOGEOGRAFICHE

Il rinvenimento di un taxon legato ad ambienti relitti e così peculiari, mostrante caratteristiche morfologiche che lo pongono in relazione con la specie caucasica *A. ulanowskii*, oltre che con *A. scarabaeoides meridionalis*, porta a ritenere *A. scarabaeoides siculus* n. ssp. un interessante paleoendemismo. Si tratta di un Lucanide certamente molto localizzato, poiché sopravvissuto solo in quei lembi di bosco primario a *Quercus* spp., sempre meno ampi in Sicilia, vestigia delle foreste che ammantavano l'Isola in passato. Tale ipotesi appare suffragata anche dalla necessità per la specie di condizioni ecologiche peculiari (Klausnitzer, 1995), certamente poco diffuse nel resto della Sicilia, dove i boschi primari con elevata umidità e piante secolari di *Quercus cerris* L. stanno sempre più scomparendo. Il ritrovamento nella stessa località di altri rari endemismi siculi a costumi saproxilici, come i Cetoniidae *Osmoderma cristine* Sparacio, 1994 e *Gnorimus decempunctatus* Helfer, 1833, o l'Alleculidae *Gerandryus aetnensis* (Rottenberg, 1870) (Baviera, in preparazione), pone in sempre maggiore rilievo la necessità di tutelare le aree boschive autoctone di Sicilia dalla costante minaccia di incendi, dall'introduzione di specie di provenienza esotica e da errate pratiche selvicolturali, che attraverso la rimozione di piante deperienti o morte o anche solo di parti di esse, impoveriscono la fauna lignicola.

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Revue suisse de Zoologie 115 (3): 593; septembre 2008

Erratum

Landry, B. & L. Roque-Albelo 2008. Additions to the Cosmopterigidae (Lepidoptera) of the Galapagos Islands, Ecuador, with description of a new species of *Stilbosis* Clemens. Revue suisse de zoologie 115 (2): 303–309.

The first figure of this paper was printed too dark, thus misrepresenting the colours of the specimen, so this figure is reprinted here.

Fig. 1. *Stilbosis schmitzi* Landry, sp. n., Holotype (MHNG).

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MERTENS, R. & WERMUTH, H. 1960. Die Amphibien und Reptilien Europas. *Kramer, Frankfurt am Main*, XI + 264 pp.

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