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Chargé de recherche au Muséum d'histoire naturelle de Genève

Comité de lecture

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

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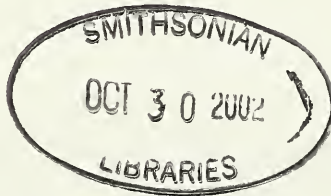
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Three new species of *Scaphoxium* (Coleoptera: Staphylinidae: Scaphidiinae) from New Guinea

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Three new species of *Scaphoxium* (Coleoptera: Staphylinidae: Scaphidiinae) from New Guinea. - Following new species of *Scaphoxium* are described and illustrated: *S. pigneratum*, *S. papuanum*, and *S. impeditum*. A key to the south Pacific *Scaphoxium* is provided.

Key-words: Coleoptera - Staphylinidae - Scaphidiinae - taxonomy - New Guinea.

INTRODUCTION

The genus *Scaphoxium* Löbl, 1979 contains 27 species currently recognised as valid, most of them Oriental in distribution. Only one, *S. biroi* (Pic, 1956), is reported from New Guinea. Three additional species were found ten years ago in Papua New Guinea by G. Cuccodoro (Geneva) and are described in the present paper. *S. biroi* that is known so far only by its holotype, was not represented in recent collections. The new material comes from sieved forest litter samples and was extracted in Winkler/Moczarski devices. It is housed in the collection of the Muséum d'histoire naturelle, Geneva (MHNG).

The Asian species of *Scaphoxium* were keyed in Löbl, 1992. Since, two additional species were described from China and Nepal (Löbl, 2001), both possessing conspicuous aedeagal features. The species that are known from the south Pacific area are keyed in the present paper. *Scaphisoma actuosum* Broun, 1881 from New Zealand, is not included in the key as it was incorrectly assigned to *Scaphoxium* (Klimaszewski & Newton, 1996 and Löbl, 1997) (unpublished).

For methods see Löbl, 1992.

TAXONOMY

Scaphoxium pigneratum sp. n.

Figs 1-3

Holotype ♂: Papua New Guinea, Morobe distr., Wau, at Wau Ecological Institute, 1200 m, litter in a coffee plantation, 26.V.1992, G. Cuccodoro #9B (MHNG).

Paratype: Morobe distr., Mt. Kaindi, 1350 m, 24.V.1992, G. Cuccodoro #7, 1 ♀ (MHNG).

Description. Length 1.35-1.40 mm, dorso-ventral diameter 0.67 mm. Body almost uniformly light ochreous, pronotum, femora and tibiae slightly lighter than

elytra and metasternum, abdominal apex, antennae and tarsi distinctly lighter. Length ration of antennal segments as follows: III 4, IV 4, V 7, VI 7, VII 11, VIII 9, IX 13; X 12, XI 16; segment VIII about 3 times as long as wide, segment XI 4 times as long as wide. Pronotal and elytral punctation dense and very fine, hardly visible at 100 times magnification. Hypomera with median ridge below upper margin. Scutellum concealed. Elytra with sutural striae fine, evanescent 0.20 mm posterior margin of pronotal lobe, lateral striae slightly shortened, not touching basal margin. Mesosternal shield grooved medially. Metasternum shallowly impressed in middle, very finely and sparsely punctate on lateral areas. Submesocoxal lines strongly arcuate, very finely punctate. Submesocoxal areas 0.06-0.07 mm long, slightly longer than smallest interval to metacoxae. Metasternal longitudinal ridges curved, not reaching up to submesocoxal lines. Metepisterna slightly narrowed apically, metasternal sutures entire, reaching apically metepimera. Exposed abdominal sternites with punctulate and transversely striate microsculpture. Abdominal sternites 1 to 4 with distinct pubescence.

Male sexual characters. Segments 1 to 3 of protarsi slightly widened. Aedeagus (Figs 1 to 3) 0.44 mm long. Parameres with conspicuously wide apical portion, subapical apophysis absent. Internal sac with single slender basal rod, moderately sclerotized, arcuate, subapical structure, and membranes very finely spinulate.

Comments. This species resembles *S. biroi* (Pic) by its light body coloration, the comparatively small body size, the large submesocoxal areas, and the distinct metepisterna. The male characters of *S. biroi* are unknown. Nevertheless these two species may be easily distinguished by the mesosternal shield that is only slightly impressed and the metasternal/metepimeral sutures shortened in *S. biroi*. The male characters are unknown also from the Himalayan *S. gibbosum* (Champion) that is characterised by the comparatively coarsely punctate lateral parts of the metasternum. *Scaphoxium pigneratum* differs drastically from the remaining congeners by the wide apical part of the parameres.

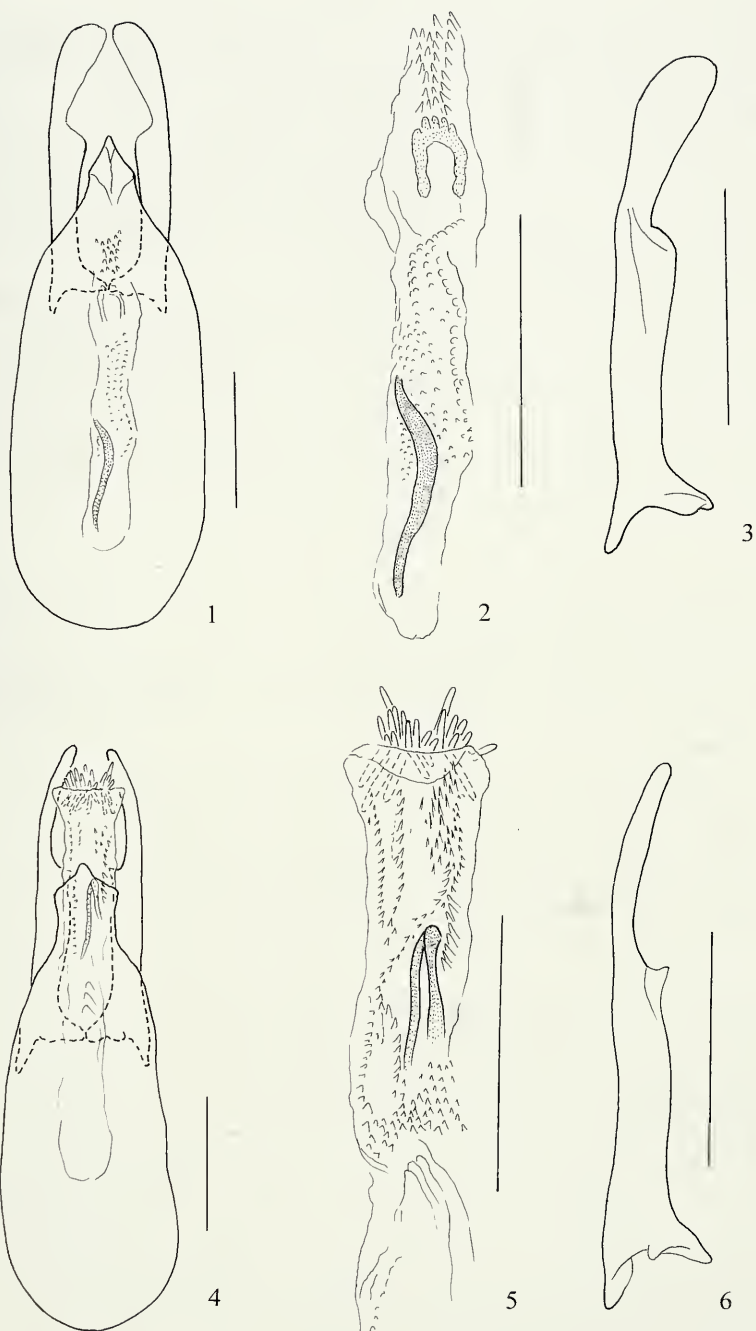
Scaphoxium papuanum sp. n.

Figs 4-6

Holotype ♂: Papua New Guinea, Morobe distr., Biaru Road, Mt. Kolorong, 2000 m, 3.VI.1992, G. Cuccodoro #15C (MHNG).

Paratypes: with same data as holotype but 2200 m, 1.VI.1992, #13C, 2 ♀; same data but 2.VI.1992, #18C, 1 ♀; same data but 2250 m, #14F, 1 ♀. (MHNG).

Description. Length 1.40-1.50 mm, dorso-ventral diameter 0.80-0.95 mm. Body ochreous to dark reddish-brown, apical abdominal segments, femora and tibiae rufous, antennae and tarsi ochreous. Length ration of antennal segments as follows: III 7, IV 8, V 10, VI 10, VII 12, VIII 10, IX 11, X 11, XI 15 (holotype); segment VIII hardly 3 times as long as wide; segment XI about 2.5 times as long as wide. Pronotal and elytral punctation dense and very fine, hardly visible at 100 times magnification. Hypomera with median ridge. Scutellum concealed. Elytra with sutural striae fine, evanescent 0.20-0.30 mm posterior margin of pronotal lobe, lateral striae slightly shortened, reaching anteriorly about to line of mid-length of metasternum. Mesosternal shield grooved medially. Metasternum flattened in middle, very finely and sparsely punctate. Submesocoxal lines strongly arcuate, very finely punctate. Submesocoxal areas 0.04-0.06 mm long, shorter than smallest interval to metacoxae. Metasternal



FIGS 1-6

Aedeagi of *Scaphoxium*, scale bars = 0.1 mm; 1-3, *S. pigneratum* sp. n., 4-6: *S. papuanum* sp. n.

longitudinal ridges oblique, not reaching up to submesocoxal lines. Metepisterna not fused to metasternum, parallel-sided, with fine, almost straight suture. Exposed abdominal sternites with punctulate microsculpture hardly visible on basal sternites (magnification 200 times), distinct on apical sternites.

Male sexual characters. Segments 1 to 3 of protarsi slightly widened. Aedeagus (Figs 4 to 6) 0.42 mm long. Parameres with subapical process small, blunt, subtriangular. Apical part of parameres long, narrow, about as wide as half of width at parameral mid-length. Internal sac with bifid, narrow rod in middle; membranes finely spinulate and with baculiform structures at apex.

Comments. *S. papuanum* shares the parameral characters with following south Pacific species: *S. ventrale* (Löbl), *S. vitianum* (Löbl) and *S. maleculense* (Löbl). Among them only *S. ventrale* and *S. papuanum* have completely fused metepisterna. *S. papuanum* may be readily distinguished from *S. ventrale* by the internal sac of the aedeagus bearing a central rod, very fine squamose and spinulate basal structures, and sclerotized, apical, baculiform structures. The internal sac of the aedeagus in *S. ventrale* has almost even, long spine-like structures and two apical denticles (see Löbl, 1980).

Scaphoxium impeditum sp. n.

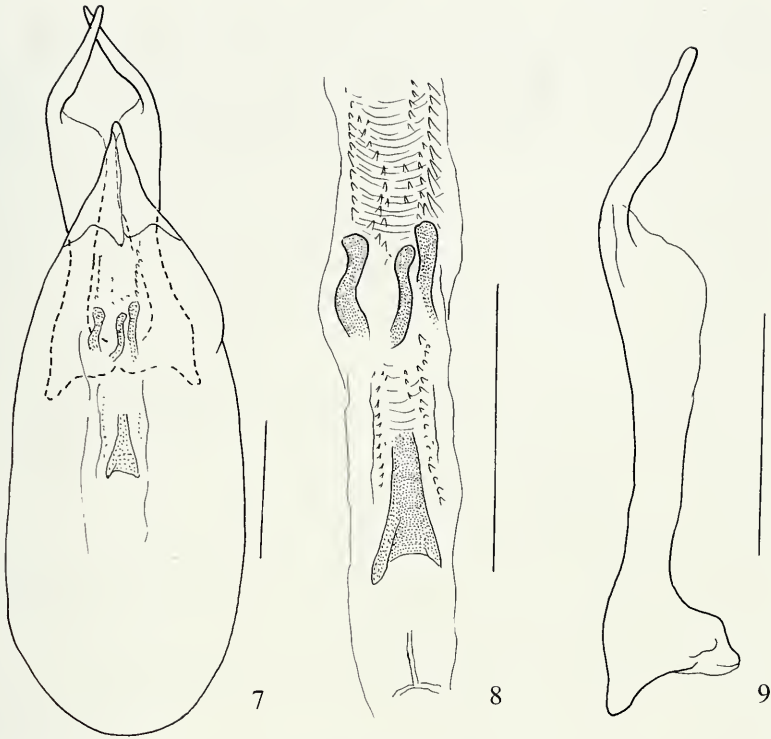
Figs 7-9

Holotype ♂: Papua New Guinea, Morobe distr., Wau region, Mt. Kaindi, 1350 m, 24.V.1992, G. Cuccodoro #7 (MHNG).

Paratypes: same data as holotype, 2 ♂; Morobe distr., Wau region, Bitoi road south Mt. Mission, 1350 m, 22.V.1992, G. Cuccodoro #6B 3 ♂, 8 ♀; Morobe distr., Wau, 1150 m, 19.V.1992, G. Cuccodoro #4A, 1 ♀; Morobe distr., Wau, 1450 m, 21.V.1992, G. Cuccodoro #5B, 1 ♂; 3 ♀ (MHNG).

Description. Length 1.35-1.55 mm, dorso-ventral diameter 0.74-0.83 mm. Body very dark, almost black, elytral apices, apical abdominal segments, femora and tibiae rufous, antennae and tarsi ochreous. Length ration of antennal segments as follows: III 7, IV 7, V 9, VI 7, VII 11, VIII 8, IX 10, X 10, XI 13 (holotype); segment VIII hardly 3 times as long as wide; segment XI about 2.5 times as long as wide. Pronotal and elytral punctation dense and very fine, elytral punctation slightly coarser than pronotal punctation and distinct at 100 times magnification. Hypomera with median ridge. Scutellum completely concealed. Elytra with sutural striae very fine, variable in length, evanescent posterior elytral mid-length or extending more anteriorly, up to anterior third of sutural length. Lateral striae not shortened, almost reaching basal margins. Mesosternal shield flattened medially, with two very shallow, minute apicomedian depressions. Metasternum flattened in middle, punctation very fine, dense in middle, sparse laterally. Submesocoxal lines strongly arcuate, very finely punctate. Submesocoxal areas 0.04-0.06 mm long, shorter than smallest interval to metacoxae. Metasternal longitudinal ridges oblique, not reaching up to submesocoxal lines. Metepisterna fused to metasternum, lacking trace of suture. Exposed abdominal sternites with punctulate microsculpture hardly visible on basal sternites (magnification 200 times), distinct on apical sternites, basal punctures coarser than punctures margining submesocoxal lines.

Male sexual characters. Segments 1 to 3 of protarsi slightly widened. Aedeagus (Figs 7 to 9) 0.50-0.55 mm long. Parameres gradually, strongly widened to form large,



FIGS 7-9

Aedeagus of *Scaphoxium impeditum* sp. n., scale bars = 0.1 mm.

rounded, subapical lobes, lacking processes. Apical part of parameres narrow, with irregular margins. Internal sac bearing one gut-like, subbasal plate narrowed apically, and three narrow, central rods. Membranes of internal sac transversely striate and finely spinulate.

Comments. This species shares the shape of the parameres and the presence sclerotized rods in middle part of the internal sac with *S. lemarei* Löbl from New Ireland. These rods change their position and become perpendicular to the axis in the aedeagus when the internal sac is extruded. *S. lemarei* differs from *S. impeditum* in having only two central rods and by the absence of the basal, gut-like plate. The two species may be also easily distinguished by the metepisterna that are fused in *S. impeditum*, separated by suture in *S. lemarei*.

KEY TO THE SOUTH PACIFIC SPECIES OF SCAPHOXIUM

- 1 Metepisterna fused to metasternum 2
- Metepisterna separated from metasternum by distinct suture 5
- 2 Small species, 1.1 long. Body uniformly light ochreous. Hypomera each with fine median stria. Antennal segment 8 small, 1.5 times as long as wide, segment 11 long, about 4 times as long as wide, about 1.5 times as

- long as segment 10. Mesosternal shield lacking median ridge or impression; with anterior intercoxal ridge grooved. Median metasternal impression shallow. New Guinea *S. biroi* (Pic)
- Larger species 1.35-1.5 mm long. Body very dark reddish-brown to black . . . 3
- 3 Hypomera lacking median stria or ridge. Parameres of aedeagus with small, acute lobe. Internal sac with two apical denticles and fine hair-like structure. Fiji *S. ventrale* (Löbl)
- Hypomera with median ridge. If parameral lobe acute, internal of aedeagus sac with baculiform structures and median rods 4
- 4 Parameres of aedeagus with small, acute lobe. Internal sac of aedeagus with apical, baculiform structures and two median rods joined apically. New Guinea *S. papuanum* sp. n.
- Parameres of aedeagus with large, rounded lobe. Internal sac with denticulate apical structures, three median rods and one proximal, gutter-like sclerite. New Guinea *S. impeditum* sp. n.
- 5 Parameres of aedeagus with broadly rounded lobe 6
- Parameres of aedeagus with acute lobe 9
- 6 Apical part of aedeagal parameres strongly narrowed 7
- Parameres of aedeagus not narrowed apically, near apex about as wide as anterior parameral lobe. New Guinea *S. pigneratum* sp. n.
- 7 Parameres of aedeagus weakly widened toward lobe 8
- Parameres of aedeagus strongly widened toward lobe. New Ireland *S. lemarei* Löbl
- 8 Internal sac of aedeagus with four rods. Queensland *S. oxyurum* (Löbl)
- Internal sac of aedeagus with two basal rods. Queensland *S. cuspidatum* (Löbl)
- 9 Internal sac of aedeagus covered with very fine denticles, lacking baculiform structures. Fiji *S. vitianum* (Löbl)
- Internal sac of aedeagus with apical baculiform structures and a cluster of spine-like structures. Fiji, New Hebrides *S. malekulense* (Löbl)

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My thanks are due to my friend and colleague G. Cuccodoro (Geneva) who collected under difficult field conditions the new species of *Scaphoxium*, and well a large number of other scaphidiines.

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New earthworms of the genus *Drawida* Michaelsen, 1900 (Oligochaeta: Moniligastridae) from Korea

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New earthworms of the genus *Drawida* Michaelsen, 1900 (Oligochaeta: Moniligastridae) from Korea. - Three new species of the genus *Drawida*, *Drawida songae* sp. n., *Drawida jirisanensis* sp. n., *Drawida guryeensis* sp. n. are described from material collected in Mt. Palgong and Mt. Jiri in South Korea. *Drawida songae* sp. n. has no spermathecal atrium, no prostates, and genital markings in vii-xi. *Drawida jirisanensis* sp. n. has a spermathecal atrium and unpaired mid-ventral genital markings in viii-xi. *Drawida guryeensis* sp. n. has a spermathecal atrium and paired genital markings in viii-x between *B* and *C*. Descriptions of the new species are provided, including illustrations of the ventral view and spermathecae.

Key-words: Earthworms - *Drawida* - Moniligastridae - Oligochaeta - Korea - taxonomy.

INTRODUCTION

The *Drawida* were collected from many locations, but they were restricted to small areas or microhabitats within the collection locations. They were also much less abundant than *Amyntas* in the same sites. Moniligastridae were believed to need 'moister conditions than any other family of earthworms', due to their lack of dorsal pores (Stephenson, 1930). Some other earthworm families with many members typically found in wet habitats also lack dorsal pores. At this point it is not clear if a lack of dorsal pores is favorable to life in wet conditions, or if a lack of dorsal pores is an ancient condition retained by families with predominantly semi-aquatic and mud-dwelling species. It is also possible that dorsal pores serve a function that is not required in wet habitats. However, there are worms with dorsal pores living in wet places, and worms without them living in mesic soils. The present three new species lack dorsal pores, and they all come from wet locations. Typical *Drawida* sites are mud, under stones in water, or in saturated soil. Mt. Jiri and Mt. Palgong are long time natural forests. Specimens were collected just after rainy seasons.

The reported Korean Moniligastridae includes the descriptions of 6 species belonging to the genus *Drawida*. These species are *D. nemora* Kobayashi, 1936, *D. an-*

chingiana Chen, 1933, *D. keikiensis* Kobayashi, 1938, *D. koreana* Kobayashi, 1938, *D. gisti* Michaelsen, 1931, and *D. japonica* (Michaelsen, 1892).

In this study, three new species of *Drawida* are described based on material collected from 1996 to 1998 from the litter layer in forests, and on material from Ms. Song Min-Ja, a former Korean oligochaetologist, whose collections were made from 1965 to 1971. Thus a total of nine species of the genus *Drawida* have thus far been recorded in Korea.

The characters of taxonomic importance in this genus are 'pigmentation; position of the male, female and spermathecal pores; genital markings; number and position of the gizzards shape and position of testis sacs; shape of prostate and condition of the ovarian chamber; and the size and shape of the spermathecae (Stephenson, 1923). In this paper, spermathecal pores, genital markings, and description of the atria are seen to provide a set of taxonomically useful characters in Korean *Drawida*. The holotypes and paratypes of the new species are deposited in the collection of the Jeonbuk National University; some paratypes are deposited at the Museum of Natural History of Geneva.

DESCRIPTIONS

MONILIGASTRIDAE Claus, 1880

Drawida Michaelsen, 1900

Drawida songae sp. n.

Figs 1A-B

Material: Holotype and 2 paratypes: Daegu-si, Mt. Palgong, 10 July 1969, A. Gu coll. Other material: Daegu-si, Mt. Palgong, Page-sa, 3 clitellate specimens, 1 acitellate specimen, 26 August 1965, M. J. Song coll.

Etymology: Named after Ms. Min-Ja Song, who has made great contributions to the taxonomy of Korean earthworms.

Diagnosis: Spermathecae in viii, attached to face of septum 7/8 without atrium; ampulla large pouch, round ball shape, ducts very long and thin. Genital markings present in vii-xi, one or two, rarely three markings per segment; paired in some or all of vii-x in *CD*, paired in one or both of xi, xii in *AB*.

Description: Dimensions 70-93 by 2.8-3.0 mm at segment vii, 3.7-3.9 mm at xxx, 3.7-4.0 mm at clitellum (xii); body cylindrical in cross section; preclitellar rather conical shape, segments 149-172. Setae small closely paired, preclitellar $AB=CD$, $AA=BC$, postclitellar $AB=CD$, $AA>BC$. Setae not pointed, slightly curved at ends. Prostomium prolobous separated from groove. Color pinkish throughout, clitellum reddish, formalin preservation. Clitellum annular thick swollen x-xiv, sometimes extends on ix and xv; interrupted 1/2 of x-xi, between *D* and *D* ventrally.

Secondary male pores, one pair transverse slits at *AB* on 10/11, protuberant tubercle without penis externally, pores slightly wider than *AB* size. Spermathecal pores conspicuous longitudinal openings in 7/8 at *AB* line. Nephropores visible on *D*. Genital markings present in vii-xi, numbers irregular, one or two, rarely three markings per segment; paired in some or all of vii-x in *CD*, paired in one or both of xi, xii in *AB*. Each genital marking distinct, large, darkish circular slightly protuberant tubercle. Female pores paired, presetal of xii near *B*, transverse or longitudinal slits, minute, but easily visible. Dorsal pores absent.

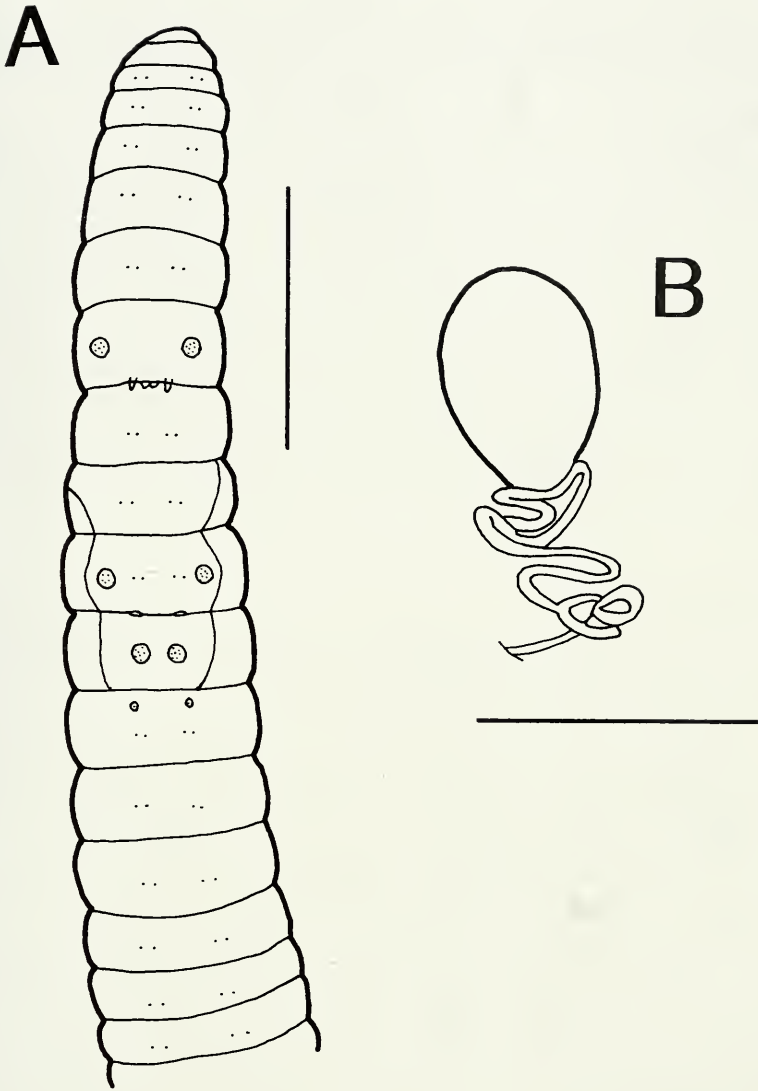


FIG. 1

Drawida songae sp. n. A: ventral view; B: spermathecae. Scale bars = 5 mm (A), 2 mm (B).

Septa 5/6-8/9 thick, muscular, 9/10-12/13 thin. Gizzards four xiv-xvii, brownish, smooth on the surface. Dorsal vessel large in calibre, four pairs lateral hearts vi-ix. Nephridia usually present, nephridial vesicle long, extending to dorsal vessel. One pair of testis sacs suspended in septum 9/10, mostly in x; vas deferens long, coiled, joining body wall. Prostates absent. Ovarian chamber in xi, formed by septa 10/11 and 11/12, brittle. Ovisacs in xii large, flattened, extending to xiii or xiv, almost completely covering gizzards.

Spermathecae in viii, attached to face of septum 7/8 without atrium; ampulla large pouch, round ball shape, ducts very long, thin, irregularly twisted, muscular. Genital markings have muscular areas corresponding to the externally visible circular tubercles.

Remarks: The present species appears to be closely related to *Drawida nemora* Kobayashi, 1936, in body shape and spermathecae but it can be distinguished easily by the position of male pores and genital markings. *Drawida songae* sp. n. has the male pores on *AB* on 10/11, while *D. nemora* has the male pores between *B* and *C*. Genital markings of *D. nemora* are indistinct, small and whitish or pale, but *Drawida songae* sp. n. has large, dark circular markings. Also, the new species has no prostate glands, but *D. nemora* has the disk-like prostates in x, xi. Kobayashi described a conical penis usually not visible externally, but *Drawida songae* sp. n. has no penis at all. Gates (1962) pointed out that a beautiful red color of the clitellum in many *Drawida* “develops” after preservation by formalin. This present species has the same red coloration after 30 years of preservation. *Drawida songae* sp. n. has two characters of systematic importance, absence of both spermathecal atria and prostates. Most *Drawida* species have these two internal organs.

Drawida jirisanensis sp. n.

Figs 2A-C

Material: Holotype and 3 paratypes: Gyung-sangnam-do, Hamyang-gun, Mt. Jiri, Baikmudong (35° 15'-18'N, 127° 33'-35'E), 17 July 1996, Y. Hong coll. Other material: Same data as for holotype, 6 clitellate, 3 acitellate specimens.

Etymology: The species is named after the type locality.

Diagnosis: Spermathecal ducts in viii, attached to face of septum 7/8; atrium in vii, ampulla round, ducts long and thin. Genital markings unpaired mid-ventral in viii-xi, sometimes vii and xii, within *A A* viii, when in xii usually paired.

Description: Dimensions 48-73 by 2.0-2.8 mm at segment vii, 3.3-3.6 mm at xxx, 2.5-3.7 mm at clitellum (xii); body cylindrical in cross section; preclitellar rather conical shape, segments 81-127. Setae small closely paired, $AA < BC$, $AB = CD$ almost equal. Setae blunt, slightly curved at ends. Prostomium probolous separated from groove. Color light pinkish, or bluish throughout, clitellum light reddish, formalin preservation. Clitellum annular, slightly swollen ix-xii, sometimes extends on xiii.

Secondary male pores, paired relatively large slits in intersegmental furrow between *B* and *C* on 10/11, from each slit, short, stout, blade shape penis, as large as 1.0 mm long, 0.5 mm wide at base. Spermathecal pores in 7/8 at *CD* line, sometimes with genital marking. Nephropores minute on *C*. Genital markings unpaired mid-ventral in viii-xi, sometimes vii and xii, within *A A* on viii, when in xii usually paired. Each genital marking distinct, medium, darkish circular tubercle, clearly protuberant, surroundings elevated. Female pores paired in 11/12 close to *B*, minute, but easily visible. Dorsal pores absent.

Septa 5/6-8/9 thick, 9/10-12/13 thin. Gizzard five xii-xvi, smooth on the surface. Dorsal vessel large in calibre, four pairs lateral hearts in vi-ix. Nephridia usually present, nephridial vesicle long, extend to dorsal vessel. One pair of testis sacs suspended in 9/10; vas deferens long thin, coiled, going to ental end of prostate. Prostates ix-x moderately thick, smooth yellowish surface, connected to ventral body wall; lying

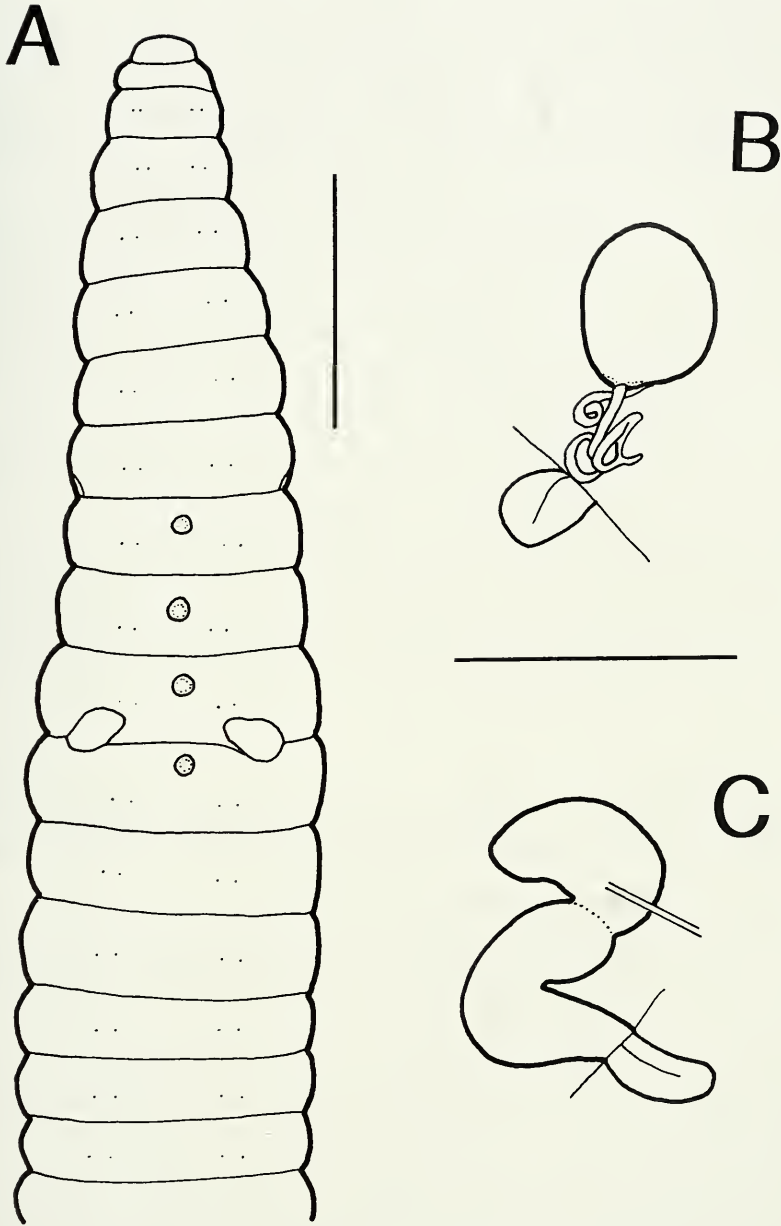


FIG. 2

Drawida jirisanensis sp. n. A: ventral view; B: spermathecae; C: secondary male pores. Scale bars = 3 mm (A), 2 mm (B, C).

curved in ventral part of segment. Ovarian chamber in xi-xii, right, left sides connected. Ovisacs in xii-xiv, sometimes extending to xvi.

Spermathecae, ducts in viii, attached to face of septum 7/8; atrium in vii, ampulla round, ducts long, thin, irregularly twisted, muscular; connected to spermathecal pores through small C-shaped atrium. Genital markings with interior hardened muscular domes corresponding to the externally visible circular tubercles.

Remarks: This species is similar to *Drawida keikiensis* Kobayashi, 1938 and *D. syringa* Chen, 1933, on the shape of spermathecae and male genitalia. It can be distinguished by the genital markings, which *D. keikiensis* and *D. syringa* always lack. Kobayashi described *D. keikiensis* using two semi-mature specimens which lacked genital markings. However, all 3 acitellate *Drawida jirisanensis* sp. n. examined here had genital markings present in A A like mature individuals. The new species also has a different shape of prostate gland than *D. keikiensis*.

Spermathecal atria may be subject to considerable intraspecific modification (Gates, 1962). In this case *Drawida jirisanensis* sp. n. has the atria in vii, spermathecae and ducts in viii, but in *D. keikiensis* all are wholly lying upon the posterior surface of 7/8. The function of the spermathecal atria is unknown but is unlikely to be the same as that of spermathecal diverticula in other megadriles which are used storage of the sperm received in copulation (Gates, 1962). The previous new species *Drawida songae* sp. n. has no spermathecal atria, so *Drawida jirisanensis* sp. n. species differs from it in this important character. *Drawida jirisanensis* sp. n. has different shaped atria from next species, *Drawida guryeensis* sp. n.

Drawida guryeensis sp. n.

Figs 3A-C

Material: Holotype and 3 paratypes: Jeollanam-do, Gurye-gun, Mt. Jiri, Piagol, 26 July 1996, Y. Hong coll. Other material: Same data as for holotype, 3 clitellate, 5 acitellate specimens.

Etymology: The species is named after the type locality.

Diagnosis: Spermathecae in viii, attached to face of septum 7/8; short, round-shaped atrium; ampulla middle-sized pouch, round ball shape and ducts long. Genital markings paired in viii-x, between B and C, circular protuberant with elevated surrounding ring; presetal on vii-ix, postsetal on x.

Description: Dimensions 62-83 by 2.3-2.5 mm at segment vii, 2.8-3.7 mm at xxx, 2.6-3.3 mm at clitellum (xii); body cylindrical in cross section; preclitellar rather conical shape, segments 121-128. Setae small closely paired, preclitellar $AB=CD$, $AA=BC$, postclitellar $AB=CD$, $AA<BC$. Setae not sharp, slightly curved at ends. Prostomium prolobous separated from groove. Color light pinkish or bluish throughout, clitellum pinkish, formalin preservation. Clitellum annular, thick, swollen x-xiii.

Secondary male pores, one pair transverse slits from between B and C, close to B on 10/11, short, blade-shape penis, as large as 1.0 mm long, 0.4 mm wide at base. Spermathecal pores conspicuous longitudinal openings in 7/8 at CD line. Nephropores visible on D. Genital markings paired in viii-x, between B and C, circular protuberant with elevated surrounding ring; presetal on vii-ix, postsetal on x. Female pores paired, anterior of xii or 11/12 or near B on 11/12, unrecognizable. Dorsal pores absent.

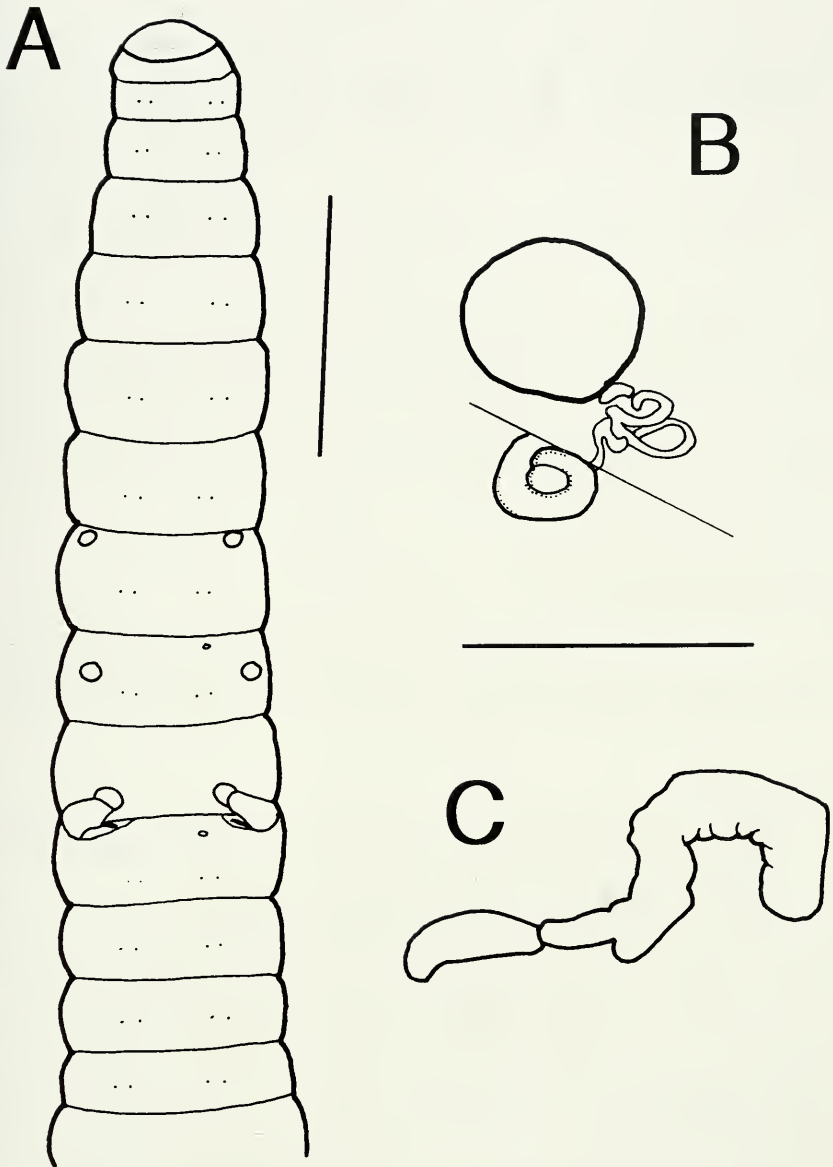


FIG. 3

Drawida guryeensis sp. n. A: ventral view; B: spermathecae; C: secondary male pores. Scale bars = 3 mm (A), 2 mm (B, C).

Septa 5/6, 8/9 thin, 6/7, 7/8 thick, 9/10 very thin. Gizzards four xiii-xvi, brownish, smooth on the surface. Dorsal vessel large in calibre, four pairs lateral hearts vi-ix. Nephridia usually present, nephridial vesicle long, extending to dorsal vessel. One pair of testis sacs suspended in septum 9/10, sperm duct very thin, coiled in large

mass. Prostates one pair, embedded in septum 9/10, Ovarian chamber in xi, formed by septa 10/11 and 11/12, brittle. Ovisacs in xii large, thick, extending to xvi, almost completely covering gizzards.

Spermathecae in viii, attached to face of septum 7/8; short, round-shaped atrium; ampulla middle-sized pouch, round ball shape, ducts long, irregularly twisted, muscular. Genital markings with muscular areas corresponding to the externally visible circular tubercle.

Remarks: The present species appears to be closely related to *Drawida jirisanensis* sp. n., with similar body shape, spermathecal atrium, and shape of prostate, but it is separated easily by the position of genital markings. *Drawida guryeensis* sp. n. has genital markings paired between B and C, which *Drawida jirisanensis* sp. n. has unpaired between A A. Also this species is similar to *D. tairaensis* Ohfuchi, 1938 from Japan, with respect to shape of penis, but it is different in genital markings and spermatheca atrium, since *D. tairaensis* always lacks genital markings. Genital markings are not found as frequently in Indian or Burmese species but are of taxonomic importance (Gates, 1945). Most Korean *Drawida* species have genital markings except for *D. keikensis*.

ACKNOWLEDGEMENTS

The author would like to express sincere thanks to Dr Samuel W. James, Maharishi Univ. of Management, USA, who kindly shared valuable bionomical information and reviewed the taxonomic descriptions in the manuscript.

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Three new earthworms of the genus *Amynthas* (Megascolecidae) from Mt. Gyeryong, Korea

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Three new earthworms of the genus *Amynthas* (Megascolecidae) from Mt. Gyeryong, Korea. - Three new *Amynthas* with two pairs of spermathecae are described from Mt. Gyeryong, Korea: *Amynthas gyeryongensis* sp. n., *Amynthas gongjuensis* sp. n., and *Amynthas yeoi* sp. n. *Amynthas gyeryongensis* sp. n., and *Amynthas gongjuensis* sp. n. have spermathecal pores in 5/6, 6/7, and vi, vii, while *Amynthas yeoi* sp. n. has spermathecal pores in 6/7 and 7/8. The former 2 species have two pairs of spermathecae in vi and vii, and lack genital marking. The latter has paired spermathecae in vii, viii, and genital marking paired in vii and viii. Descriptions of the new species are provided, including illustrations of the ventral view, male pore region, and spermathecae.

Key-words: Earthworms - *Amynthas* - Megascolecidae - Oligochaeta - Mt. Gyeryong - Korea – taxonomy.

INTRODUCTION

This study is one of continuous studies on the earthworm fauna in various regions of Korea. Ms. Song's specimens mentioned in the previous report have been kept in the Department of Biology, Kyungbuk National University. Among them are specimens collected from Mt. Gyeryong, August 28-31, 1971 (E. D. Yeo & J. S. Son coll.). From 31 individuals, we describe herein three new species of *Amynthas*. Additional materials from Mt. Palgong and Mt. Mudeung were used in the description of *Amynthas gongjuensis* sp. n. These three new species are separated easily by the shape of male pore region from other *Amynthas* having two pairs of spermathecae in vi, vii (*Amynthas gyeryongensis* sp. n., *Amynthas gongjuensis* sp. n.) and in vii, viii (*Amynthas yeoi* sp. n.). Mt. Gyeryong reaches an elevation of approximately 845 m, and lies to the west of Daejeon city. Commonly several earthworm species are found in each small locality in Korea. Some examples are instances of new species found in the following locations: one on Jeju Isl. (Song & Paik, 1970a), two on Geoje Isl. (Song & Paik, 1970b), one on Mt. Jiri (Song & Paik, 1971), two on Mt. Sopaik (Song & Paik, 1973), and four on Mt. Palgong (Hong et al., 2001). These are distinguishable species from isolated regions and mountains. These are distinctive by the male pore region and spermathecal shape, especially species with two pairs of spermathecae. The regular

occurrence of endemic species with restricted distributions suggests that more species yet could be expected from other islands and mountain regions including North Korea. The holotypes and paratypes of the new species are deposited in the collection of the Jeonbuk National University; some paratypes are deposited at the Museum of Natural History of Geneva.

DESCRIPTIONS

Amyntas gyeryongensis sp. n.

Figs 1A-C

Material: Holotype and 5 paratypes: Chungcheongnam-do, Gongju-gun, Mt. Gyeryong, 28-31 August 1971, Eup-Dong Yeo coll. Other material: Same data as for holotype, 10 clitellate specimens.

Etymology: The species is named for its type locality.

Diagnosis: Spermathecal pores in 5/6 and 6/7, bright white spots at leading edges of vi and vii. Male pores within small equatorial invagination within approximately circular thickened areas, each with large postsetal, laterally placed circular genital papilla.

Description: Brown dorsal pigment. Dimensions 66-108 by 3.8-5.1 mm at segment x, 3.9-5.0 mm at xxx, 3.9-4.8 mm at clitellum; body cylindrical throughout, segments 53-88. Setae regularly distributed around segmental equators, numbering 50 at vii, 51 at xx; 12-15 between male pores, size and distance regular; setal formula AA:AB:YZ:ZZ = 3:2:2:5 at xiii. Female pore single in xiv, 0.3 mm, round shaped. First dorsal pore 12/13. Clitellum annular xiv-xvi, setae and dorsal pores not visible externally within clitellum.

Male pores within small equatorial invagination within approximately circular thickened areas, each with large postsetal, laterally placed circular genital papilla. Each male pore with 2 small round papillae within the shallow male pore invagination. Spermathecal pores in 5/6 and 6/7, bright white spots at leading edges of vi and vii, just below mid-lateral. Genital markings absent.

Septa 5/6-7/8 thin, 8/9, 9/10 absent, 10/11-13/14 thin. Gizzard globular in viii-x. Intestine begins in xv, lymph glands absent. Typhlosole absent. Intestinal caeca simple, originating from xxvii, extending anteriorly to xxv, each consisting of a finger-shaped sac. Three pairs of esophageal hearts in xi-xiii, ix lateral, x lacking.

Ovaries in xiii. Paired spermathecae in vi and vii; each ampulla large pouch, irregularly shaped, ducts about 1/2 ampulla length, diverticula coiled and kinked with short slender muscular stalk, some longer than ampulla; no nephridia on spermathecal ducts. Male sexual system holandric, testes and funnels in ventral paired sacs in x, xi, testes sacs are joined ventrally. Seminal vesicles large, 2 pairs in xi, xii. Prostates xviii within xvii-xx; ducts thick, medium size, both glandular portions consisting of 2-3 main lobes. Genital papillae within male pore invagination with small sessile glands near prostatic ducts, but lateral genital papillae glands not found.

Remarks: The present species appears to be closely related to *Amyntas piagolensis* Hong & James, 2001 according to the male pore region, but is separated easily by the genital papillae. Genital papillae of *A. piagolensis* are presetal, as opposed to postsetal in *Amyntas gyeryongensis* sp. n. Also, *Amyntas gyeryongensis* sp. n. has one more pair of genital papillae near the male pores.

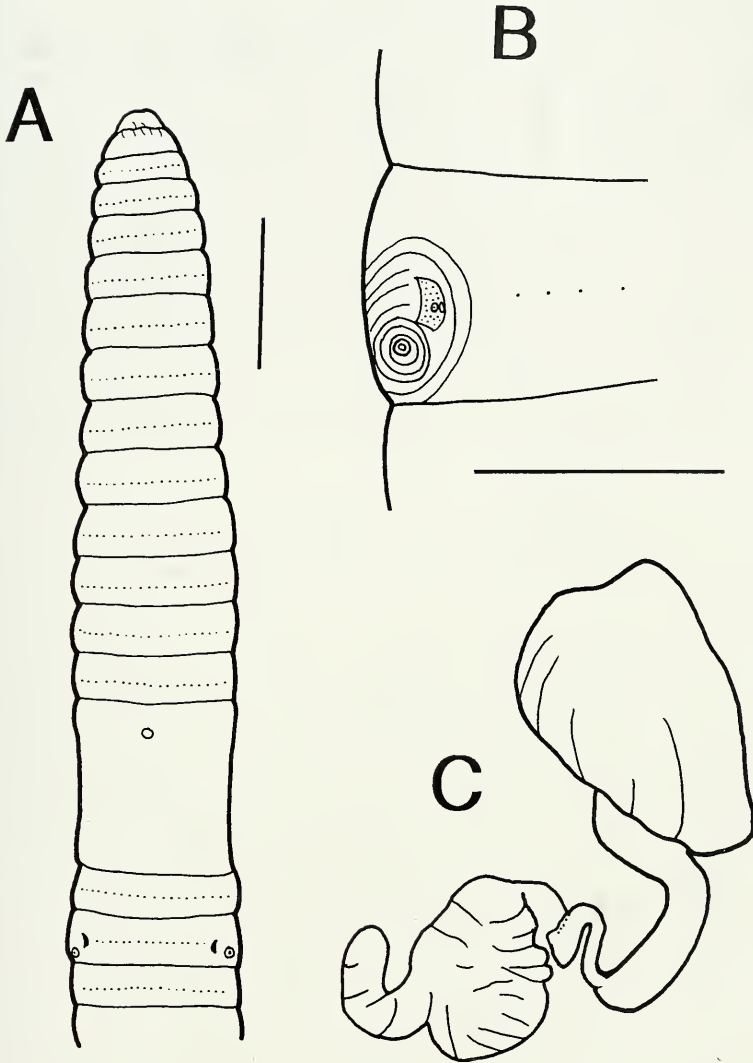


FIG. 1

Amynthus gyeryongensis sp. n. A: ventral view; B: male pore region in xviii; C: spermathecae. Scale bars = 5 mm (A), 2 mm (B, C).

Amynthus gongjuensis sp. n.

Figs 2A-C

Material: Holotype: Chungcheongnam-do, Gongju-gun, Mt. Gyeryong, 28-31 August 1971, Eup-Dong Yeo coll.

Etymology: The species is named for its type locality.

Diagnosis: Spermathecal pores ventro-lateral, equatorial on vi and vii. Male pores xviii in large circular papillae diameter 1.0 mm within rounded triangular thickened area; extending from 17/18-18/19, paired oval genital papillae 18/19 in line with male pore papillae.

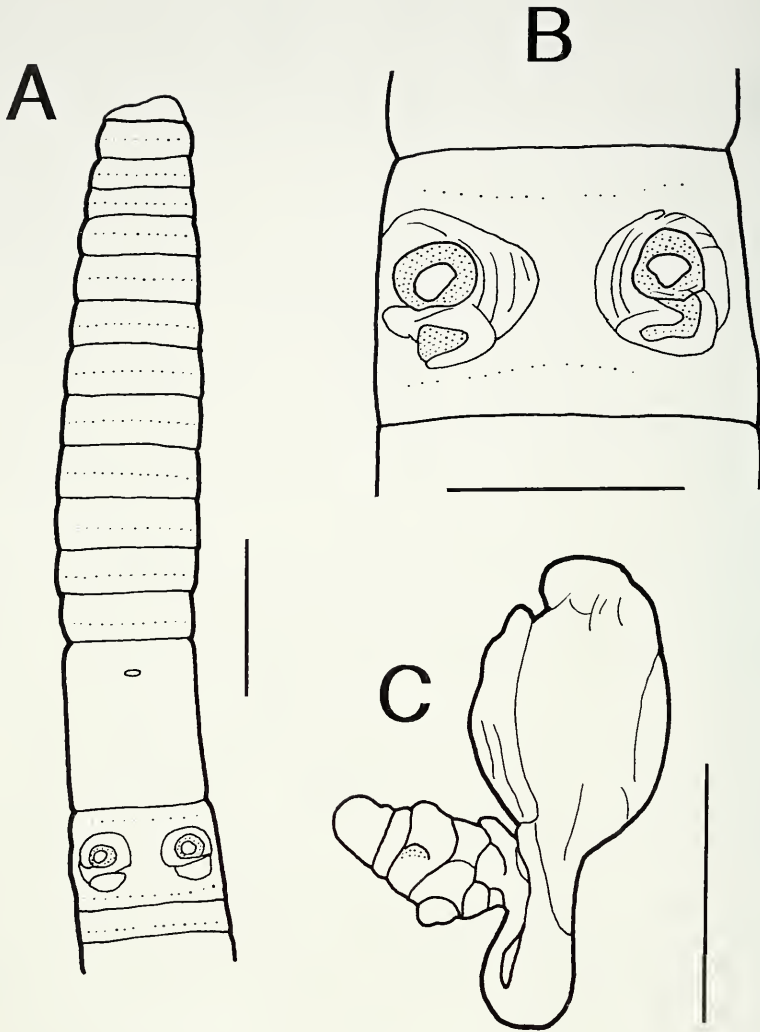


FIG. 2

Amynthus gongjuensis sp. n. A: ventral view; B: male pore region in xviii; C: lateral view. Scale bars = 5 mm (A), 3 mm (B), 2 mm (C).

Description: Brown dorsal pigment. Dimensions 104 by 4.5 mm at segment x, 4.0 mm at xxx, 4.0 mm at clitellum; body cylindrical throughout, segments 106. Setae regularly distributed around segmental equators, numbering 47 at vii, 58 at xx; 3 between male pores, regular distance; setal formula AA:AB:YZ:ZZ = 3:2:2:4 at xiii. Female pore single in xiv, 0.6 mm, oval shape. First dorsal pore 12/13. Clitellum annular xiv-xvi; setae and dorsal pores not visible externally within clitellum.

Male pores xviii in large circular papillae diameter 1.0 mm within rounded triangular thickened area 1.6 x 1.8 mm; extending from 17/18-18/19, paired oval gen-

tal papillae 18/19 in line with male pore papillae. Spermathecal pores ventrolateral, equatorial on vi and vii; very small. Genital markings absent.

Septa 5/6-7/8 thin, 8/9, 9/10 absent, 10/11-13/14 thin. Gizzard globular in viii-x. Intestine begins in xv, lymph glands small from xxx. Typhlosole low simple fold from xxvii. Intestinal caeca simple, originating from xxvii, extending anteriorly to xxiii, each consisting of a large finger-shaped sac. Hearts x-xiii esophageal, ix lateral.

Ovaries in xiii. Paired spermathecae in vi and vii; each ampulla medium sized ovate pouch, thick muscular ducts; diverticula with long slender muscular stalk, ectal tightly coiled section of chamber, ental loosely coiled section of greater diameter; no nephridia on spermathecal ducts. Male sexual system holandric, testes and funnels in paired sacs in x, xi, both sacs joined dorsally and ventrally; enclosing hearts x, xi; enclosing seminal vesicles xi. Seminal vesicles 2 pairs in xi, xii, with dorsal small appendages. Prostates xviii within xvi-xx; ducts short, thick, both glandular portions consisting of 2-3 main lobes, each lobe divided into leaflets. Genital papillae glands absent.

Remarks: *Amynthas gongjuensis* sp. n. has a triangular male pore region, which differs from other Korean *Amynthas*. This species has no genital markings and the spermathecal pores are very small, sometimes not seen easily, externally.

Amynthas yeoi sp. n.

Figs 3A-D

Material: Holotype and 5 paratypes: Chungcheongnam-do, Gongju-gun, Mt. Gyeryong, 28-31 August 1971, Eup-Dong, Yeo coll. Other material: Same data as for holotype, 7 clitellate specimens; 5 clitellate specimens from Gyung-sangbuk-do, Chilgok-gun, Gasan-myon, 12 August 1971, Eup-Dong, Yeo coll.; 7 clitellate specimens from Daegu-si, Mt. Palgong, Page-sa, 6 September 1970, Yong-Tae, An coll.; 2 clitellate and 1 a clitellate specimens from Daegu-si, Mt. Palgong, 19 August 1966, Min-Ja, Song coll.; 1 clitellate specimen from Gwangju-si, Mt. Mudeung, 4 October 1971, Ji-Kug, Park coll.

Etymology: The species is named for its type collector.

Diagnosis: Spermathecal pores 6/7 and 7/8 close to mid-lateral, next to distinctly bounded, lip-shaped genital patches, centered slightly below mid-lateral over 6/7 and 7/8. Male field with large horseshoe-shaped raised pads; male pore towards lateral edge of pad; between pads paired 0.3 mm genital papillae with conspicuous invaginated genital papillae pore, presetal in xviii.

Description: Brown dorsal and light brown ventral pigment. Dimensions 128-160 by 8.2-9.8 mm at segment x, 8.6-10.1 mm at xxx, 8.4-9.5 mm at clitellum; body cylindrical throughout, segments 77-107. Setae regularly distributed around segmental equators, but the setae are very small, numbering 55 at vii, 49 at xx; 19-21 between male pores, irregular distance; setal formula AA:AB:YZ:ZZ = 6:3.5:2:6 at xiii. Female pore single in xiv, 0.6 mm, oval surround. First dorsal pore 12/13. Clitellum annular xiv-xvi; setae and dorsal pores not visible externally within clitellum.

Male field with large horseshoe-shaped raised pads; each pad extending from 17/18-18/19 and within a dark hard flat oval, no seminal groove; anterior portion of pad with curved bar marking, posterior medial portion with shorter bar mark; male pore towards lateral edge of pad; between pads paired 0.3 mm genital papillae with conspicuous invaginated genital papillae pore, presetal in xviii. Spermathecal pores 6/7 and 7/8 close to mid-lateral, inconspicuous, very small; next to distinctly bounded,

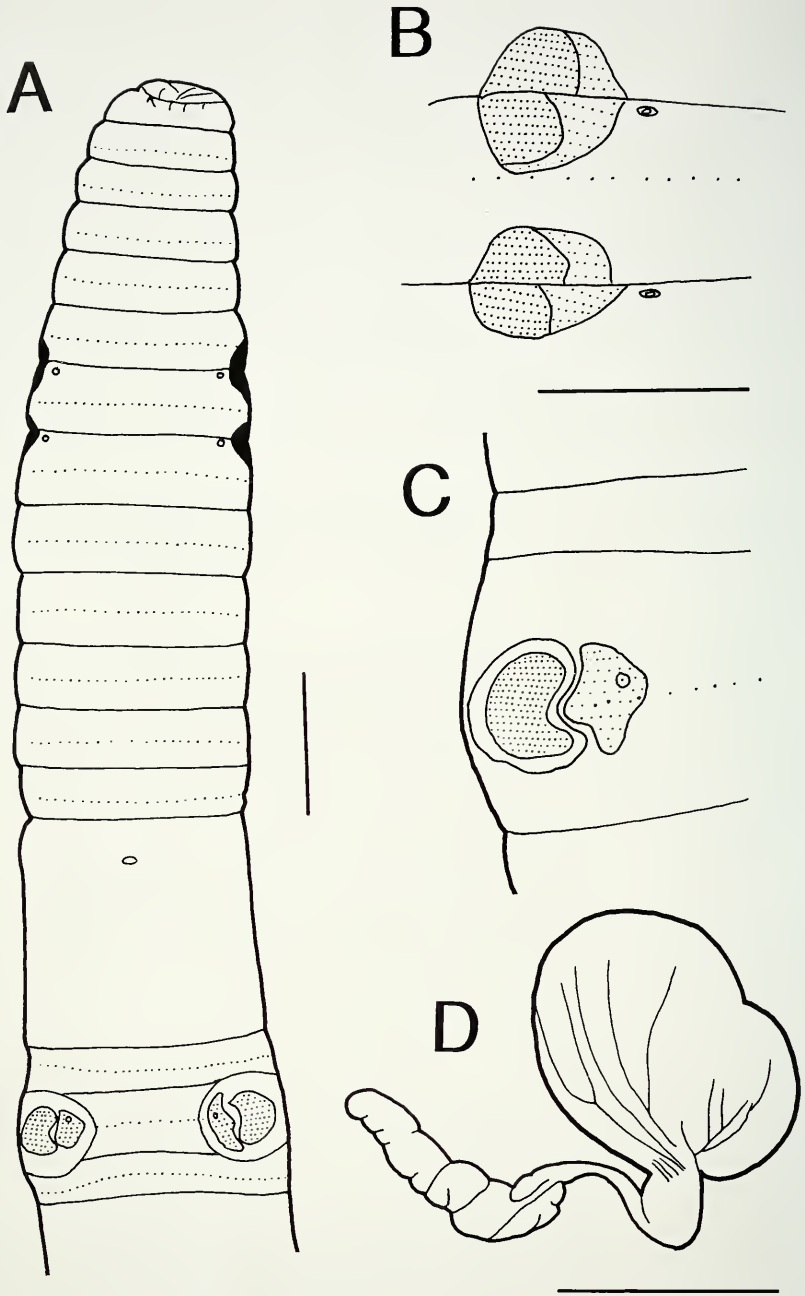


FIG. 3

Amynthus yeoi sp. n. A: ventral view; B: spermathecal pores; C: male pore region in xviii; D: spermathecae. Scale bars = 5 mm (A), 3 mm (B, C), 2 mm (D).

lip-shaped genital patches, centered slightly below mid-lateral over 6/7 and 7/8, ocher color. Genital markings paired in vii and viii, presetal, median to spermathecal pores, slightly indented, dark circle with central white pore opening.

Septa 5/6-7/8 thick, 8/9, 9/10 absent, 10/11-13/14 thick. Gizzard medium size in viii-x. Intestine begins in xv, lymph glands small from xv. Typhlosole not found. Intestinal cecum manicate, originating from xxvii, and extending anteriorly to xxiii, each consisting of 7-8 finger-shaped lobes. Hearts xi-xiii esophageal, ix lateral, esophagous xii, xiii vascularized, with low lamellae.

Ovaries in xiii. Paired spermathecae in vii and viii; each ampulla with a large broad pouch with furrows, ducts short, muscular with 90° bend to ectal narrow portion with muscular stalk, diverticula with straight muscular stalk, longer than ampulla; no nephridia on spermathecal ducts. Genital marking glands of vii and viii single or branched into 2 or 3 lobes. Male sexual system holandric, testes and funnels in ventrally joined paired sacs in x, xi. Seminal vesicles 2 pairs in xi, xii. Prostates xviii very large within xvi-xxiii; ducts thick, short, muscular; both glandular portions consisting of 3-4 main lobes. Genital papillae of xviii each with one large stalked gland.

Remarks: The present species is similar to *Amynthas jiriensis* (Song & Paik, 1971) by the genital markings and genital patches of the spermathecal pore region, but it differs from it in the shape of the genital patches and male discs. This species has genital patches in the posterior regions of vi and vii, while *A. jiriensis* has them only anterior regions of vii and viii.

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We would like to express appreciation to Dr Samuel W. James, Maharishi Univ. of Management, USA, who kindly shared valuable bionomical information and reviewed the taxonomic descriptions in the manuscript.

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Le specie del genere *Brachida* Mulsant & Rey del Monte Kinabalu (Borneo) (Coleoptera, Staphylinidae) *

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The species of the genus *Brachida* Mulsant & Rey from Mount Kinabalu (Borneo) (Coleoptera, Staphylinidae). - A collection of Staphylinidae of the genus *Brachida* Mulsant & Rey, tribe Gyrophaenini, of the subfamily Aleocharinae, preserved in the Geneva Museum, is studied. A new combination is proposed for *Brachida longesetosa* Cameron: *Cypha longesetosa* (Cameron) comb. n. Eleven species are described as new. Every new species is illustrated and compared to the closely related Oriental species. A key of all Bornean species of the genus *Brachida* is provided.

Key-words: Coleoptera - Staphylinidae - Aleocharinae - taxonomy - Borneo.

INTRODUZIONE

Il cosmopolita genere *Brachida* Mulsant & Rey, 1872, della tribù Gyrophaenini, comprende specie muscicole, fitodetriticole e fungicole, la cui area di diffusione non è mai vasta. Il presunto ampio areale di *B. crassiuscula* (Kraatz, 1859), data dagli autori del passato, non è che frutto di insufficienti osservazioni, al tempo in cui non erano esaminati i caratteri dell'edeago e della spermateca. Infatti anche la serie tipica della stessa *B. crassiuscula*, da me esaminata, comprendeva un'altra specie, da me descritta (*B. indica* Pace, 1993).

Del Borneo finora erano descritte tre specie: *B. longesetosa* Cameron, 1943, *B. robusta* Cameron, 1928 e *B. borneensis* Pace, 1986. L'esame dell'holotypus di *B. longesetosa* mi ha permesso di constatare che essa non appartiene al genere *Brachida*, ma al genere *Cypha* Leach, 1819, che fa parte di tribù differente da quella dei Gyrophaenini, cioè appartiene alla tribù Hypocyphini. Pertanto:

Cypha longesetosa (Cameron 1943) comb. n.

Brachida longesetosa Cameron, 1943: 39.

Il presente lavoro è stato portato a termine grazie alle importanti ricerche nel corso delle missioni entomologiche sul Mt. Kinabalu, svolte dal Dr. Ales Smetana di Ottawa e dai Dr. Daniel Burckhardt del Museo di Storia Naturale di Basilea e Ivan Löbl già del Museo di Storia naturale di Ginevra.

* 171° Contributo alla conoscenza delle Aleocharinae.

Manoscritto accettato il 04.01.2002

Gli holotipi e la maggior parte dei paratipi delle nuove specie descritte sono conservati nel Museo di Storia naturale di Ginevra (MHNG). Altri paratipi sono in collezione dell'autore.

METODO

I caratteri distintivi delle specie sotto descritte sono tratti soprattutto dalla forma dell'armatura interna dell'edeago. Per alcune specie, l'uniformità della struttura del lobo mediano dell'edeago, è apparente, tanto che a una superficiale osservazione, si sarebbe indotti a ritenere sinonime alcune specie simili. Altro carattere distintivo dell'edeago è il suo differente sviluppo e la differente curvatura presso il bulbo basale. Ma i caratteri differenziali più netti, per molte specie, risiedono nella forma dell'armatura genitale dell'edeago, che in molte specie del genere *Brachida*, è normalmente, anche in stato di riposo, esterna al lobo mediano dell'edeago. Ad integrazione di questi caratteri, non sono trascurabili i caratteri tratti dalla forma degli antennomeri.

ELENCO DELLE SPECIE DEL GENERE *BRACHIDA* DEL BORNEO

Brachida robusta Cameron, 1928

Brachida borneensis Pace, 1986

Brachida rotula sp. n.

Brachida kinabaluicola sp. n.

Brachida poringicola sp. n.

Brachida poringensis sp. n.

Brachida subadunca sp. n.

Brachida triarcuata sp. n.

Brachida adunca sp. n.

Brachida percurvata sp. n.

Brachida ipercristata sp. n.

Brachida gladius sp. n.

Brachida perdincta sp. n.

DESCRIZIONI

Brachida rotula sp. n.

Figg. 1-4

Holotipus ♂, Sabah, Crocker Range, 1270 m, Km 60 r.te Kota Kinabalu-Tambunan, 17.V.1987, leg. Burckhardt & Löbl (MHNG).

Paratipi: 1 ♀, stessa provenienza; 1 ♀, Sabah, Poring Hot Springs, Langanan Falls, 900-950 m, 11.V.1987, leg. Burckhardt & Löbl; 1 ♀, Sabah, Poring Hot Springs, 500 m, 12.V.1987, leg. Burckhardt & Löbl; 16 es., Sabah, Kibongol V., 700 m, Km 7 N. Tambunan, 20.V.1987, leg. Burckhardt & Löbl; 1 ♀, Sabah, Mt. Kinabalu-Tambunan, 1150 m. r.te Ranau-Kota Kinabalu, 24.V.1987, leg. Burckhardt & Löbl.

DESCRIZIONE. Lungh. 2,7 mm. Corpo lucido e rossiccio; antenne e zampe giallo-rossicce. La punteggiatura del capo e del pronoto è indistinta. La granulosità delle elitre è superficiale, tranne lungo la sutura, nel ♂, dove è saliente e forte, quella degli uroterghi è saliente presso il margine posteriore e gradualmente svanita in avanti di ciascun urotergo. Il tubercolo mediano del quinto urotergo libero del ♂ è largo, poco saliente e piatto. Il sesto urotergo libero del ♂ ha un'area mediana posteriore libera da granulosità. Edeago figg. 2-3, spermateca fig. 4.

COMPARAZIONI. In base alla forma dell'edeago, la nuova specie è simile a *B. brevipennis* Bernhauer, 1939, del Giappone, *B. pseudopapuaana* Pace, 2000, di Papua-Nuova Guinea, *B. anteflava* Pace, 2001, dell'India e *B. vietnamensis* Pace, 1992, del

Vietnam. Se ne distingue per i caratteri dati nella chiave posta nelle note comparative per *B. poringensis* sp. n.

ETIMOLOGIA. Dato che la parte apicale dell'armatura genitale interna dell'edeago è avvolta in spire ordinate che sembrano formare una ruota, è chiamata "Rotellina".

***Brachida kinabaluicola* sp. n.**

Figg. 5-8

Holotypus ♂, Sabah, Mt. Kinabalu N.P., above Poring Hot Springs, 520 m, 9.V.1987, leg. A. Smetana (MHNG).

Paratypi: 4 es., stessa provenienza; 8 es., Sabah, Poring Hot Springs, 550-600 m, 9.V.1987, leg. Burckhardt & Löbl; 1 ♂, Sabah, Poring Hot Springs, 500 m, 6.V.1987, leg. Burckhardt & Löbl; 8 es., Sabah, Poring Hot Springs, 500 m, 7.V.1987, leg. Burckhardt & Löbl; 1 ♂ e 2 ♀, Sabah, Poring Hot Springs, Langanan Falls, 900-950 m, 12.V.1987, leg. Burckhardt & Löbl; 1 ♀, Sabah, Poring Hot Springs, Bat Cave, 600 m, 10.V.1987, leg. Burckhardt & Löbl.

DESCRIZIONE. Lungh. 2,3 mm. Corpo lucido e rossiccio; antenne rossicce con i tre antennumeri basali giallo-rossicci; zampe giallo-rossicce. La punteggiatura del capo è fine, quella del pronoto e delle elitre è superficiale. L'addome è coperto di granulosità allungata. Gli uroterghi liberi quinto e sesto hanno un'area mediana priva di granulosità e liscia. Non è presente reticolazione sul corpo. Edeago figg. 6-7, spermateca fig. 8.

COMPARAZIONI. In base alla forma dell'edeago, la nuova specie è simile a *B. brevipennis* Bernhauer, 1938, del Giappone, *B. pseudopapuana* Pace, 2000, di Papua-Nuova Guinea, *B. anteflava* Pace (2001), dell'India e *B. vietnamensis* Pace, 1992, del Vietnam. Se ne distingue per i caratteri dati nella chiave posta nelle note comparative per *B. poringensis* sp. n.

ETIMOLOGIA. Ovviamente la nuova specie prende nome dal M. Kinabalu.

***Brachida poringicola* sp. n.**

Figg. 9-11

Holotypus ♂, Sabah, Poring Hot Springs, 550-600 m, 9.V.1987, leg. Burckhardt & Löbl (MHNG).

DESCRIZIONE. Lungh. 2,1 mm. Corpo lucido e bruno; antenne brune, zampe giallo-rossicce. Punteggiatura e granulosità sono assenti sul capo e sul pronoto. La granulosità delle elitre è distinta. Gli uroterghi sono coperti di granuli allungati. Il quinto urotergo libero del ♂ presenta un tubercolo mediano posteriore stretto e saliente. Sul corpo non è visibile reticolazione. Edeago figg. 10-11.

COMPARAZIONI. In base alla forma dell'edeago, la nuova specie è simile a *B. brevipennis* Bernhauer, 1938, del Giappone, *B. pseudopapuana* Pace, 2000, di Papua-Nuova Guinea, *B. anteflava* Pace (2001), dell'India e *B. vietnamensis* Pace, 1992, del Vietnam. Se ne distingue per i caratteri dati nella chiave posta nelle note comparative per *B. poringensis* sp. n.

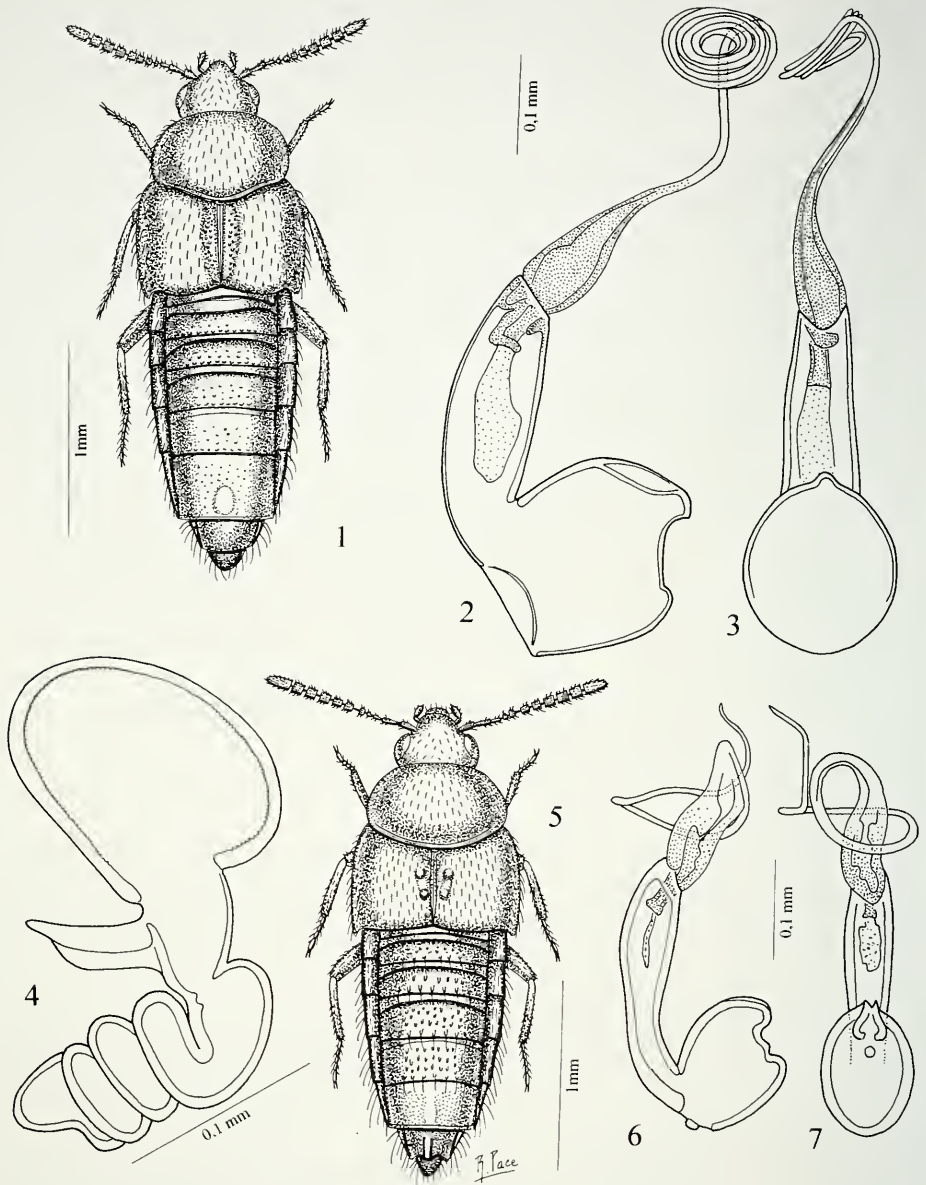
ETIMOLOGIA. La nuova specie prende nome dalla sua località tipica: Poring Hot Springs.

***Brachida poringensis* sp. n.**

Figg. 12-14

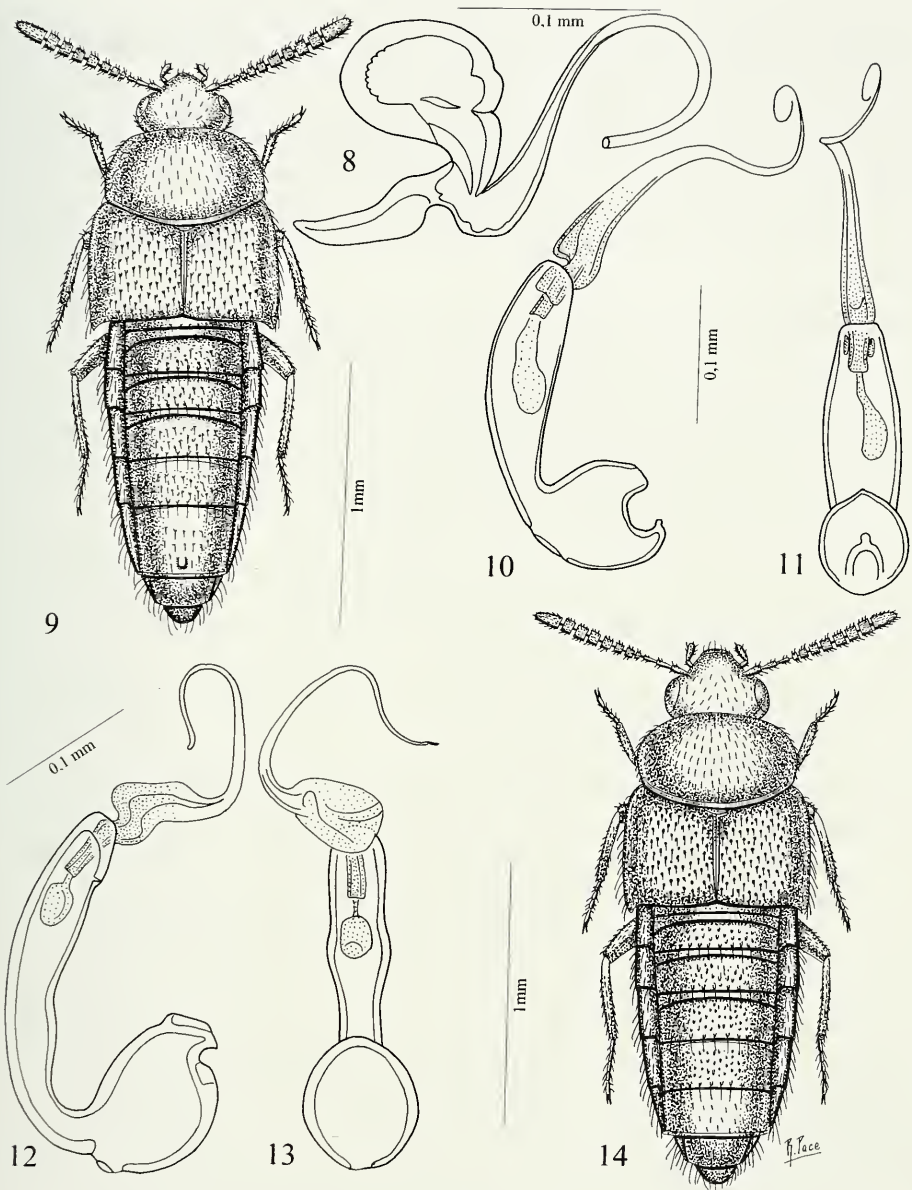
Holotypus ♂, Sabah, Poring Hot Springs, 500 m, 6.V.1987, leg. Burckhardt & Löbl (MHNG).

DESCRIZIONE. Lungh. 2,0 mm. Corpo lucido e rossiccio; antenne rossicce con i tre antennumeri basali gialli; zampe gialle. La punteggiatura del capo è superficiale e



FIGG. 1-7

Habitus, edeago in visione laterale e ventrale e spermateca. 1-4: *Brachida rotula* sp. n.; 5-7: *Brachida kinabaluicola* sp. n.



FIGG. 8-14

Habitus, spermateca ed edeago in visione laterale e ventrale. 8: *Brachida kinabaluicola* sp. n.; 9-11: *Brachida poringicola* sp. n.; 12-14: *Brachida poringensis* sp. n.

fitta, quella del pronoto è indistinta e quella delle elitre è distinta. L'addome presenta granuli allungati sui quattro uroterghi basali, il quinto è senza punteggiatura e senza granulosità. Su tutto il corpo non è visibile traccia di reticolazione. Edeago figg. 12-13.

COMPARAZIONI. In base alla forma dell'edeago, la nuova specie è simile a *B. brevipennis* Bernhauer, 1938, del Giappone, *B. pseudopapuana* Pace, 2000, di Papua-Nuova Guinea, *B. anteflava* Pace (2001), dell'India e *B. vietnamensis* Pace, 1992, del Vietnam. Se ne distingue per i caratteri dati nella seguente chiave.

ETIMOLOGIA. La nuova specie prende nome dalla sua località tipica: Poring Hot Springs.

CHIAVE DELLE SPECIE DEL GRUPPO DI *B. BREVIPENNIS* BERNHAUER

- 1 Capo e pronoto fortemente punteggiati; quarto antennumero più lungo che largo; armatura dell'edeago interna, non sporgente dall'orifizio apicale. Lungh. 1,9 mm. Nuova Guinea. *B. pseudopapuana* Pace
- Capo e pronoto non fortemente punteggiati; quarto antennumero trasverso; armatura dell'edeago sporgente dall'orifizio apicale 2
- 2 Elitre più corte del pronoto: specie attera. Lungh. 1,3-1,6 mm. Giappone *B. brevipennis* Bernhauer
- Elitre più lunghe del pronoto, specie alate 3
- 3 Estremità distale dell'armatura genitale sporgente dal lobo mediano dell'edeago, filiforme per lungo tratto 4
- Estremità distale dell'armatura genitale sporgente dal lobo mediano dell'edeago non filiforme 6
- 4 Decimo antennumero lungo quanto largo; estremità distale dell'armatura genitale dell'edeago avvolta in numerose spire. Lungh. 2,7 mm. Borneo. *B. rotula* sp. n.
- Decimo antennumero trasverso; estremità distale dell'armatura genitale dell'edeago avvolta in 1-4 spire 5
- 5 Pronoto con due punti isolati mediani; addome con pubescenza laterale molto lunga; base dell'armatura genitale più stretta dell'orifizio apicale dello stesso edeago e sua estremità distale avvolta in quattro spire. Lungh. 1,9 mm. India. *B. anteflava* Pace
- Pronoto senza punti isolati mediani; addome con pubescenza laterale corta; base dell'armatura genitale più larga dell'orifizio apicale dello stesso edeago e sua estremità distale descrivente una sola spira. Lungh. 2,1 mm. Borneo. *B. poringicola* sp. n.
- 6 *Crista apicalis* molto sviluppata e larga; base dell'armatura genitale, sporgente dal lobo mediano dell'edeago, appena più larga dell'orifizio apicale dello stesso lobo mediano dell'edeago. Lungh. 2,4 mm. Vietnam. *B. vietnamensis* Pace
- *Crista apicalis* poco sviluppata e strettissima; base dell'armatura genitale, sporgente dal lobo mediano dell'edeago, molto più larga dell'orifizio apicale dello stesso lobo mediano dell'edeago. 7
- 7 Decimo antennumero lungo quanto largo; elitre, presso la sutura, ciascuna con due tubercoli molto salienti; vi è un angolo acuto tra il bulbo

basale e il lobo mediano dell'edeago, in visione laterale; parte basale dell'armatura sporgente dal lobo mediano dell'edeago, stretta e lunga. Lugh. 2,3 mm. *B. kinabaluicola* sp. n.

- Decimo antennumero trasverso; elitre, presso la sutura, semplici; vi è un angolo largamente arrotondato tra il bulbo basale e il lobo mediano dell'edeago, in visione laterale; parte basale dell'armatura sporgente dal lobo mediano dell'edeago, larga e corta. Lugh. 2,0 mm. Borneo. *B. poringensis* sp. n.

***Brachida subadunca* sp. n.**

Figg. 15-19

Holotypus ♂, Sabah, Mt. Kinabalu Nat. Pk., Poring Hot Springs, 510 m, 12.V.1987, leg. A. Smetana (MHNG).

Paratypi: 3 es., Sabah, Mt. Kinabalu, Poring Hot Springs, 490 m, 31.VIII.1987, leg. A. Smetana; 1 ♀, Sabah, Crocker Range, 1270 m, Km 60 r.te Kota Kinabalu-Tambunan, 17.V.1987, leg. Burckhardt & Löbl; 1 ♀, Sabah, Poring Hot Springs, 500 m, 11.V.1987, leg. Burckhardt & Löbl; 2 ♀♀, Sabah, Poring Hot Springs, 500 m, 13.V.1987, leg. Burckhardt & Löbl; 1 ♀, Sabah, Kibongol V., 7 Km N. Tambunan, 700 m, 20.V.1987, leg. Burckhardt & Löbl.

DESCRIZIONE. Lugh. 2,5 mm. Corpo lucido e rossiccio; antenne rossicce, con i tre antennumeri basali gialli; zampe giallo-rossicce. La punteggiatura del capo è distinta, ma assente sulla fronte, quella del pronoto è assente. La granulosità delle elitre è superficiale: si trova qualche granulo forte presso la sutura, nel ♂. L'addome è coperto di granuli allungati. Il tubercolo mediano del quinto urotergo libero del ♂ ha superficie concava. Edeago figg. 16-17, spermateca fig. 18, sesto urotergo libero del ♂ fig. 19.

COMPARAZIONI. La nuova specie, in base alla forma dell'edeago, appartiene al gruppo di *B. papuana* Pace, 2000, della Nuova Guinea. Ad esso appartiene anche *B. triarcuata* sp. n., *B. adunca* sp. n., *B. percurvata* sp. n. e *B. ipercristata* sp. n. Per le comparazioni si rimanda alla chiave data per *B. ipercristata* sp. n.

ETIMOLOGIA. La nuova specie, per la forma dell'edeago è vicina a *B. adunca* sp. n., sotto descritta, pertanto è chiamata "Sotto *adunca*".

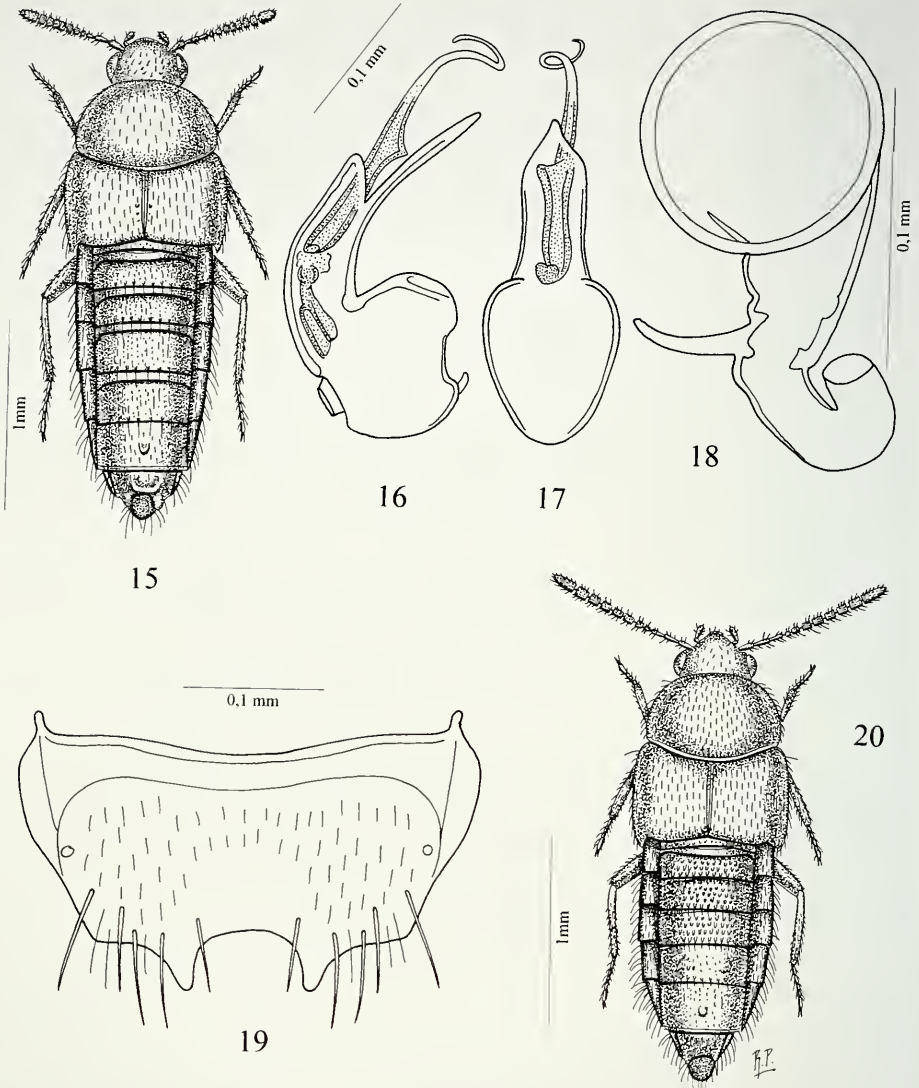
***Brachida triarcuata* sp. n.**

Figg. 20-24

Holotypus ♂, Sabah, Poring Hot Springs, Langanan Falls, 900-950 m, 12.V.1987, leg. Burckhardt & Löbl (MHNG).

Paratypi: 2 ♂♂, Sabah, Poring Hot Springs, 500 m, 11.V.1987, leg. Burckhardt & Löbl; 9 es., Sabah, Poring Hot Springs, 550-600 m, 9.V.1987, leg. Burckhardt & Löbl; 1 es., Sabah, Poring Hot Springs, 500 m, 7.V.1987, leg. Burckhardt & Löbl; 11 es., Sabah, Poring Hot Springs, 500 m, 13.V.1987, leg. Burckhardt & Löbl; 1 ♂, Sabah, Poring Hot Springs, 600 m, nr. Bat Cave, 10.V.1987, leg. Burckhardt & Löbl.

DESCRIZIONE. Lugh. 2,2 mm. Corpo lucido e rossiccio, con elitre brune, tranne la base rossiccia; antenne rossicce, con i tre antennumeri basali dell'undicesimo giallo-rossicci; zampe giallo-rossicce. La punteggiatura del capo è superficiale, quella del pronoto è estremamente fine e poco distinta. La granulosità delle elitre è superficiale, quella dell'addome è composta di granuli allungati. Il quinto urotergo libero del ♂ con tubercolo mediano poco saliente. Non si trova reticolazione sul corpo. Edeago figg. 21-22, spermateca fig. 23, sesto urotergo libero del ♂ fig. 24.

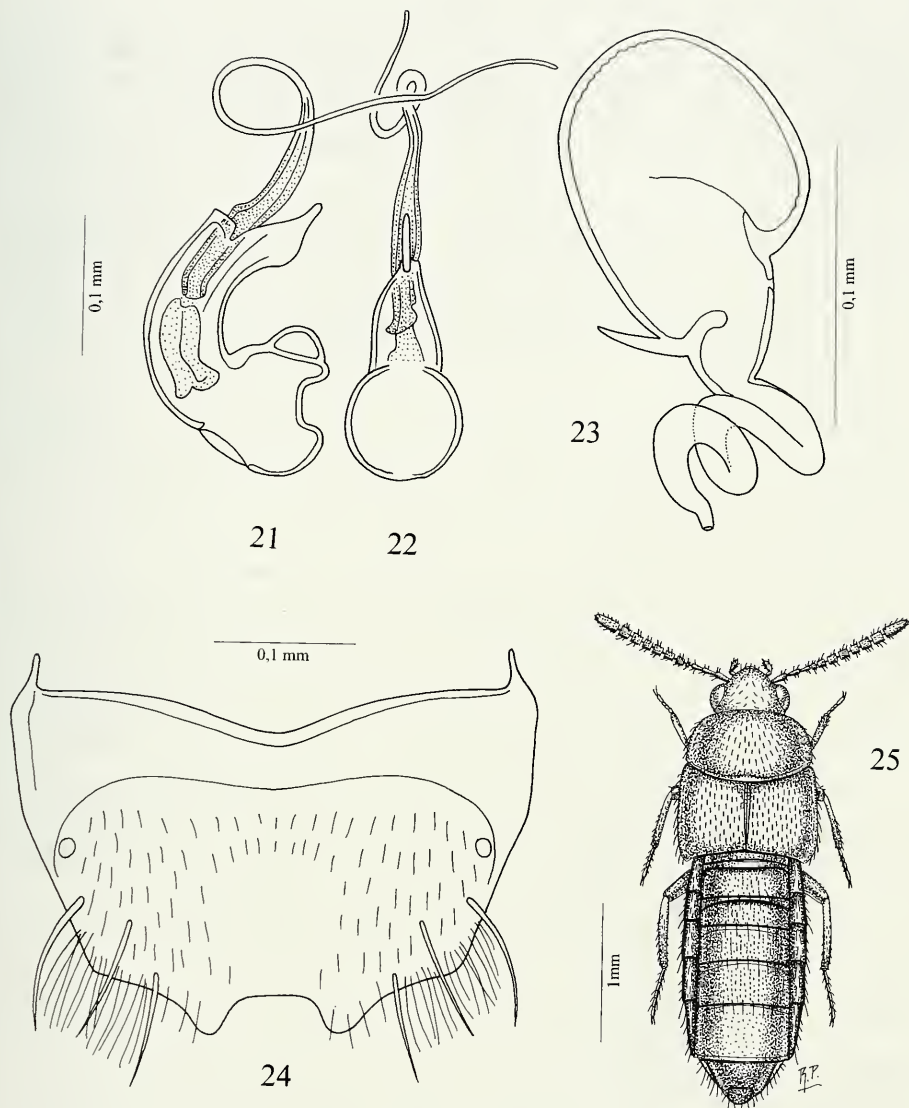


FIGG. 15-20

Habitus, edeago in visione laterale e ventrale, spermateca e sesto urotergo libero del ♂. 15-19: *Brachida subadunca* sp. n.; 20: *Brachida triarcuata* sp. n.

COMPARAZIONI. La nuova specie, in base alla forma dell'edeago, appartiene al gruppo di *B. papuana* Pace, 2000, della Nuova Guinea. Ad esso appartiene anche *B. subadunca* sp. n., *B. adunca* sp. n., *B. percurvata* sp. n. e *B. ipercristata* sp. n. Per le comparazioni si rimanda alla chiave data per *B. ipercristata* sp. n.

ETIMOLOGIA. Poiché il margine posteriore del sesto urotergo libero del ♂ è a tre archi, la nuova specie prende nome da questo suo carattere.



FIGG. 21-25

Edeago in visione laterale e ventrale, spermateca, sesto urotergo libero del δ e habitus. 21-24: *Brachida triarcuata* sp. n.; 25: *Brachida adunca* sp. n.

Brachida adunca sp. n.

Figg. 25-29

Holotypus δ , Sabah, Mt. Kinabalu Nat. Pk., Poring Hot Springs, 485 m, 29.VIII.1987, leg. A. Smetana (MHNG).

Paratypi: 1 δ , Sabah, Poring Hot Springs, Langanan Falls, 900-950 m, 12.V.1987, leg. Burckhardt & Löbl; 1 δ , Sabah, Poring Hot Springs, 500 m, 7.V.1987, leg. Burckhardt & Löbl.

DESCRIZIONE. Lungh. 3,1 mm. Corpo lucido e giallo-rossiccio; elitre brune, tranne la base che è giallo-rossiccia; antenne giallo-rossicce con i tre antenomeri basali gialli; zampe giallo-rossicce. La punteggiatura del capo e del pronoto è poco distinta e fine. La granulosità delle elitre è superficiale. L'addome è coperto di rugosità longitudinale superficiale. Edeago figg. 26-27, sesto urotergo libero del ? fig. 28, spermateca fig. 29.

COMPARAZIONI. La nuova specie, in base alla forma dell'edeago, appartiene al gruppo di *B. papuana* Pace, 2000, della Nuova Guinea. Ad esso appartiene anche *B. subadunca* sp. n., *B. triarcuata* sp. n., *B. percurvata* sp. n. e *B. ipercristata* sp. n. Per le comparazioni si rimanda alla chiave data per *B. ipercristata* sp. n.

ETIMOLOGIA. La nuova specie prende il nome di "Adunca" a motivo dell'edeago fortemente ricurvo.

***Brachida percurvata* sp. n.**

Figg. 30-34

Holotypus ♂, Sabah, Mt. Kinabalu, 1550 m, 28.IV.1987, leg. Burckhardt & Löbl (MHNG).

Paratypi: 2 ♂♂ e 2 ♀♀, stessa provenienza; 2 ♂♂, Sabah, Mt. Kinabalu, 1550-1650 m, 24.IV.1987, leg. Burckhardt & Löbl.

DESCRIZIONE. Lungh. 3,5 mm. Corpo lucido e rossiccio; antenne rossicce con i tre antenomeri basali e l'undicesimo giallo-rossicci; zampe giallo-rossicce. La punteggiatura del capo è distinta, quella del pronoto è assente e quella dell'addome è fitta e confusa. La granulosità delle elitre è superficiale, tranne lungo la sutura, dove è saliente, posta su un rilievo allungato. Il quinto urotergo libero del ♂ ha la metà posteriore senza punteggiatura e un tubercolo mediano saliente e concavo. Edeago figg. 31-32, spermateca fig. 33, sesto urotergo libero del ♂ fig. 34.

COMPARAZIONI. La nuova specie, in base alla forma dell'edeago, appartiene al gruppo di *B. papuana* Pace, 2000, della Nuova Guinea. Ad esso appartiene anche *B. subadunca* sp. n., *B. triarcuata* sp. n., *B. adunca* sp. n. e *B. ipercristata* sp. n. Per le comparazioni si rimanda alla chiave data per *B. ipercristata* sp. n.

ETIMOLOGIA. Poiché il lobo mediano dell'edeago è fortemente ricurvo, la nuova specie prende il nome di "Molto ricurva".

***Brachida ipercristata* sp. n.**

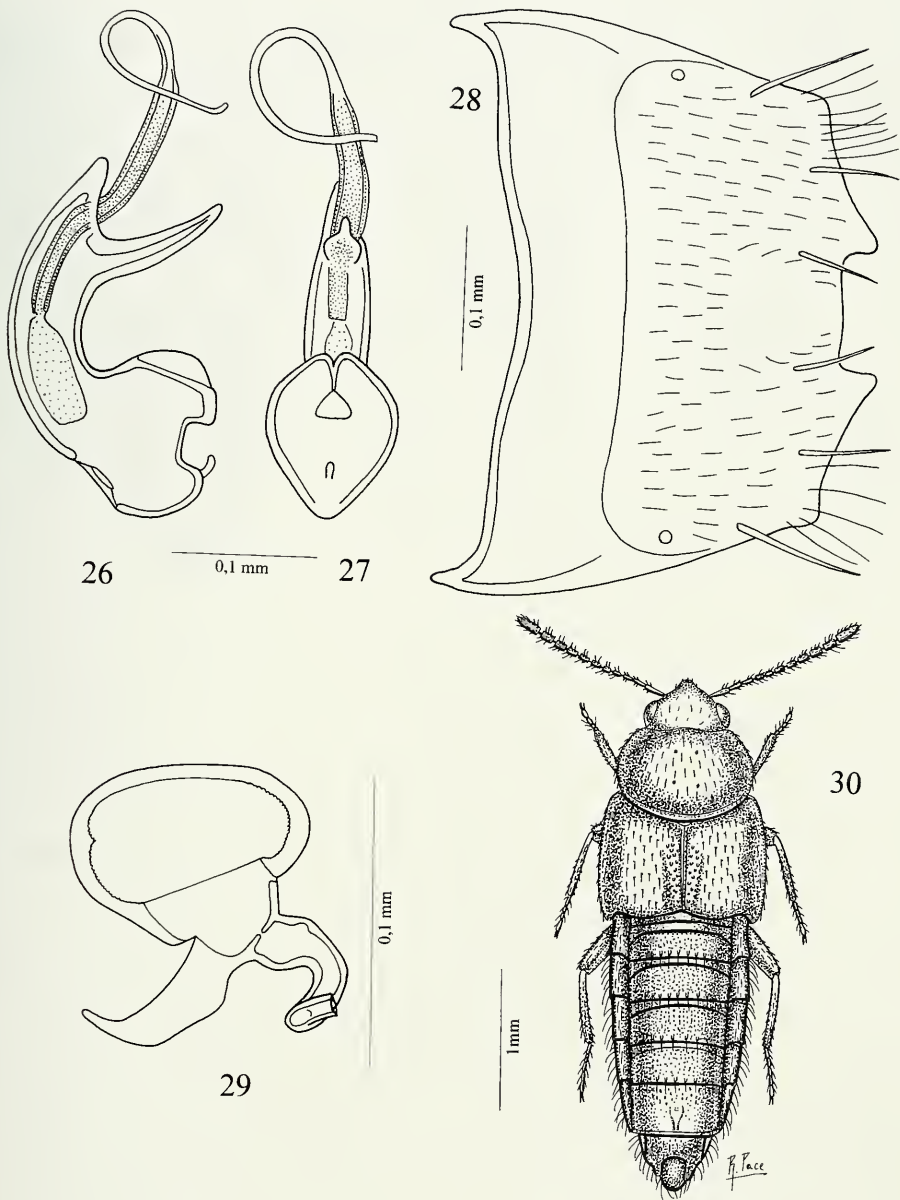
Figg. 35-40

Holotypus ♂, Sabah, Poring Hot Springs, 500 m, 7.V.1987, leg. Burckhardt & Löbl (MHNG).

Paratypi: 1 ♀, Sabah, Kibongol V., 7 Km N. Tambunan, 700 m, 20.V.1987, leg. Burckhardt & Löbl; 1 ♂, Sabah, Poring Hot Springs, 500 m, 13.V.1987, leg. Burckhardt & Löbl.

DESCRIZIONE. Lungh. 3,4 mm. Corpo lucido e rossiccio, con metà posteriore delle elitre bruna; antenne brune, con i tre antenomeri basali e l'undicesimo giallo-rossicci; zampe giallo-rossicce. La punteggiatura del capo è fine e superficiale, quella del pronoto è finissima e poco distinta. La granulosità delle elitre è superficiale, tranne sul rilievo suturale dove è saliente. Il tubercolo mediano del quinto urotergo libero del ♂, è spianato. Edeago figg. 36-37, spermateca fig. 38, sesto urotergo libero del ♂ fig. 39, sesto urotergo libero della ♀ fig. 40.

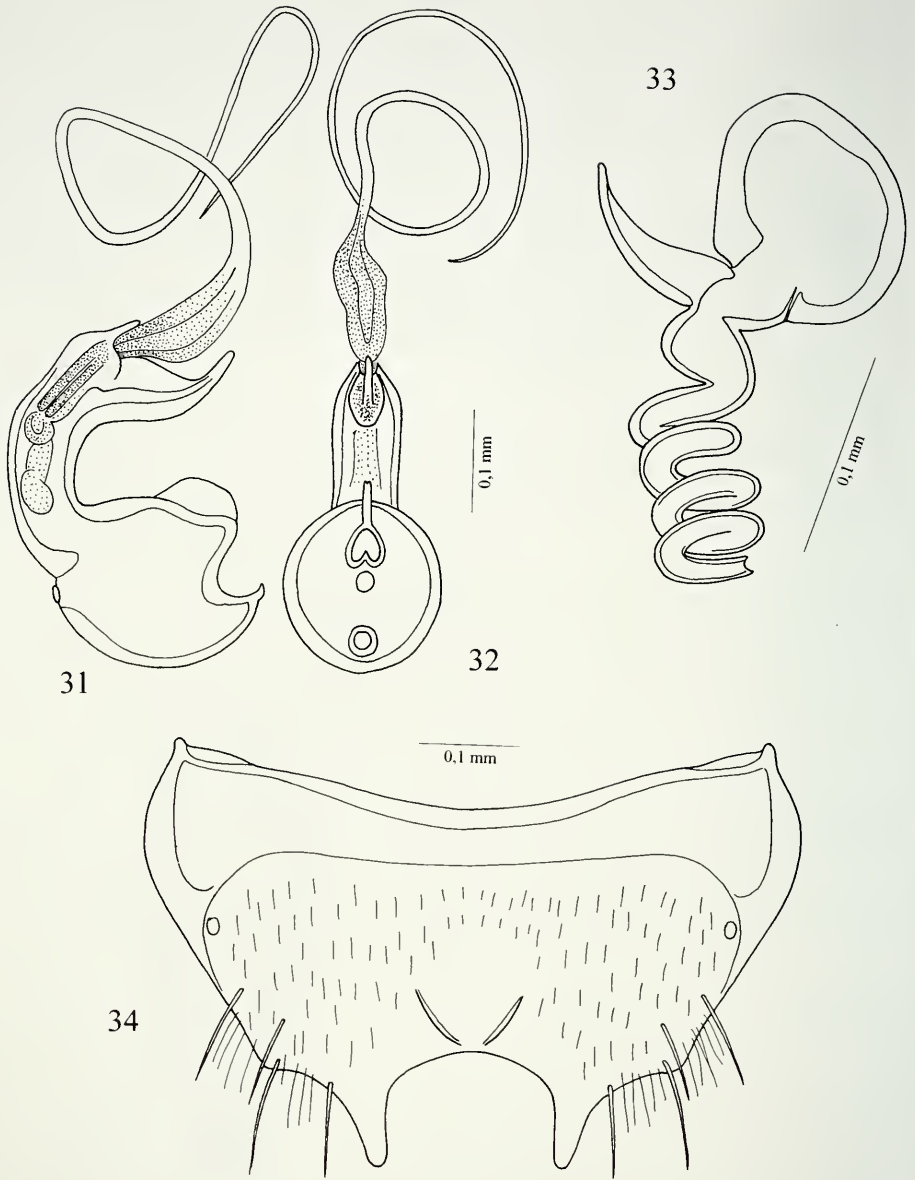
ETIMOLOGIA. L'edeago della nuova specie presenta una *cresta apicalis* eccezionalmente sviluppata, pertanto il nome della specie è "Eccessivamente crestatà".



FIGG. 26-30

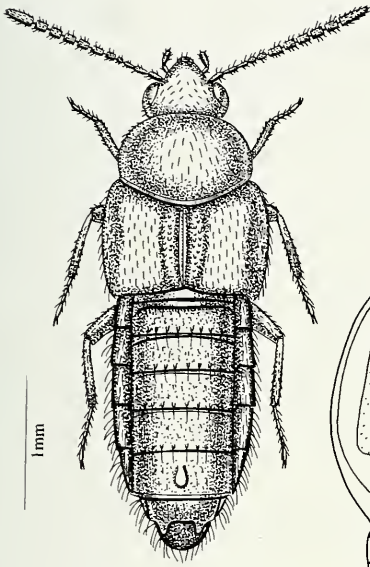
Edeago in visione laterale e ventrale, sesto urotergo libero del ♂, spermateca e habitus. 26-29: *Brachida adunca* sp. n.; 30: *Brachida percurvata* sp. n.

COMPARAZIONI. La nuova specie si distingue da quelle appartenenti al suo gruppo, quello di *B. papuana* Pace, per i caratteri dati nella seguente chiave.

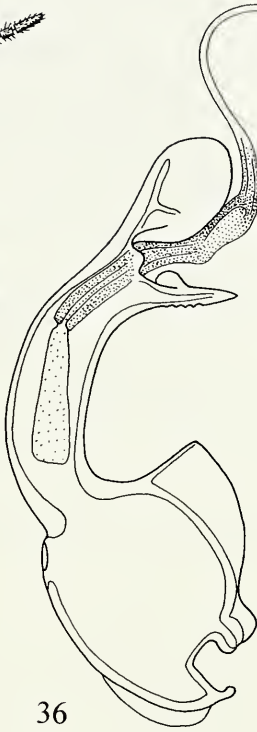


FIGG. 31-34

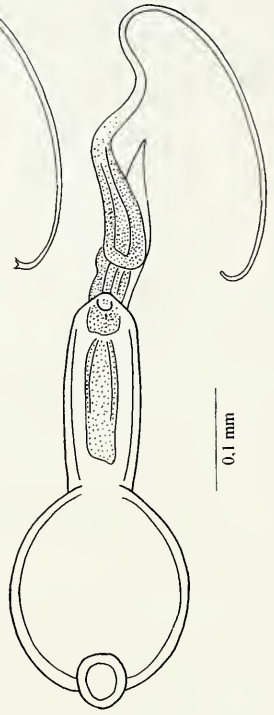
Edeago in visione laterale e ventrale, spermatteca e sesto urotergo libero del ♂. 31-34: *Brachida percurvata* sp. n.



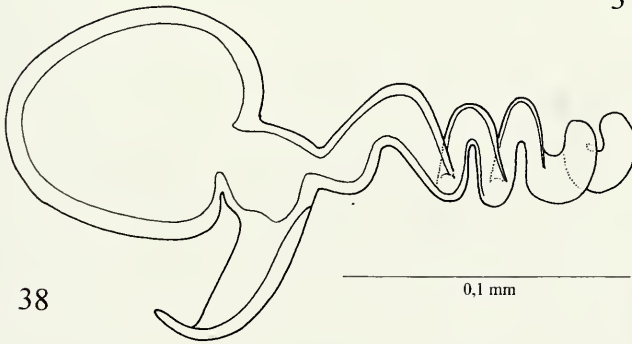
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36



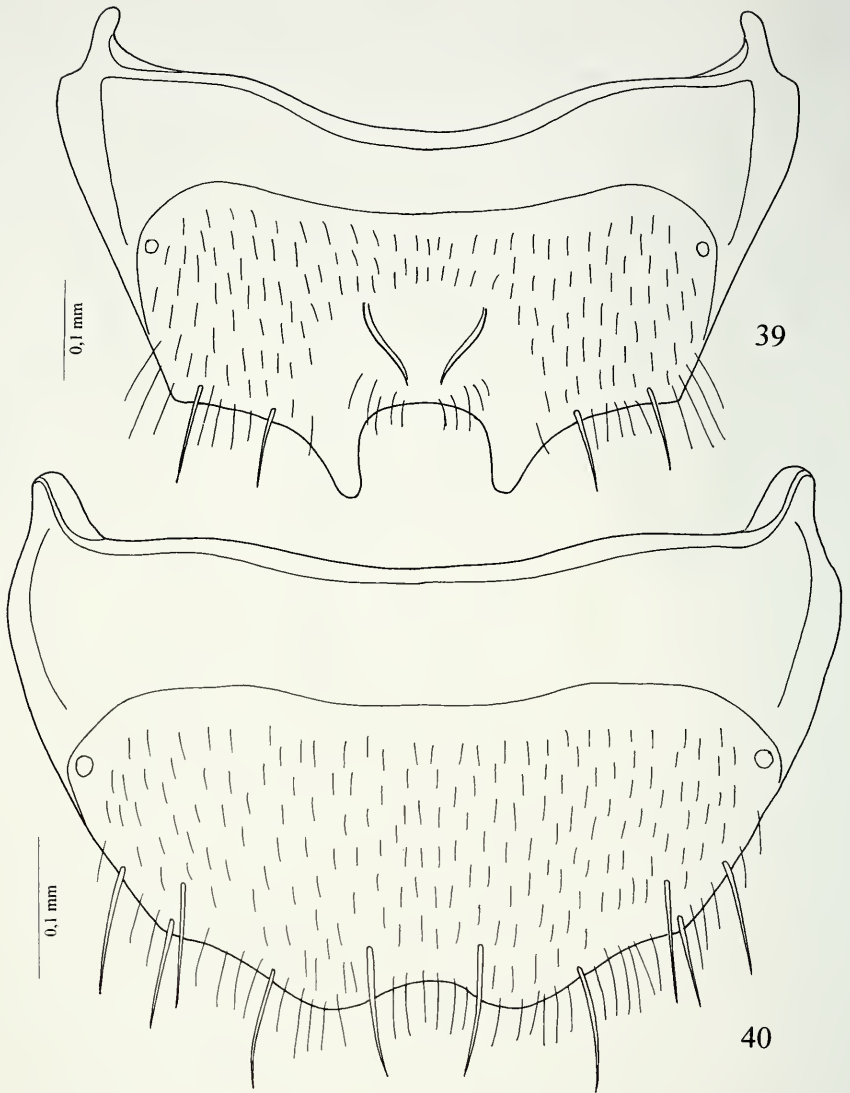
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38

FIGG. 35-38

Habitus, edeago in visione laterale e ventrale e spermateca. 35-38: *Brachida ipercristata* sp. n.



FIGG. 39-40

Sesto urotergo libero del ♂ (39) e della ♀ (40). 39-40: *Brachida ipercristata* sp. n.

CHIAVE DELLE SPECIE DEL GRUPPO DI *B. PAPUANA* PACE

- | | | |
|---|---|---|
| 1 | Quarto antennero più lungo che largo o lungo quanto largo | 2 |
| - | Quarto antennero trasverso | 5 |
| 2 | Quarto antennero lungo quanto largo | 3 |
| - | Quarto antennero più lungo che largo | 4 |

- 3 Decimo antennero trasverso; pronoto con due forti punti mediani basali; uroterghi liberi terzo e quarto nettamente punteggiati; edeago non gibboso, ma rettilineo ventralmente nella regione preapicale ventrale, in visione laterale. Lungh. 2,0 mm. Papua-Nuova Guinea *B. papuana* Pace
- Decimo antennero lungo quanto largo; pronoto senza punti forti; uroterghi liberi terzo e quarto con granulosità allungata distinta; edeago gibboso ventralmente nella regione preapicale ventrale, in visione laterale. Lungh. 2,2 mm. Borneo. *B. triarcuata* sp. n.
- 4 Pronoto con sei distinti punti isolati; incavatura mediana del sesto urotergo libero del ♂, ampia; edeago strettamente ricurvo al lato ventrale, senza dentini preapicali; *crista apicalis* dell'edeago poco sviluppata. Lungh. 3,5 mm Borneo. *B. percurvata* sp. n.
- Pronoto senza punti isolati; incavatura mediana del sesto urotergo libero del ♂, stretta; edeago ampiamente ricurvo al lato ventrale, con dentini preapicali; *crista apicalis* dell'edeago molto sviluppata. Lungh. 3,4 mm Borneo. *B. ipercristata* sp. n.
- 5 Decimo antennero trasverso; incavatura mediana del sesto urotergo libero del ♂, profondamente arcuata; profilo ventrale dell'edeago ad angolo acuto, in visione laterale; apice dell'edeago semplice. Lungh. 2,5 mm. Borneo. *B. subadunca* sp. n.
- Decimo antennero lungo quanto largo; incavatura mediana del sesto urotergo libero del ♂, poco profonda e rettangolare; profilo ventrale dell'edeago ampiamente e profondamente arcuato, in visione laterale; apice dell'edeago con un lobo laterale a ciascun lato. Lungh. 3,1 mm. Borneo. *B. adunca* sp. n.

Brachida gladius sp. n.

Figg. 41-44

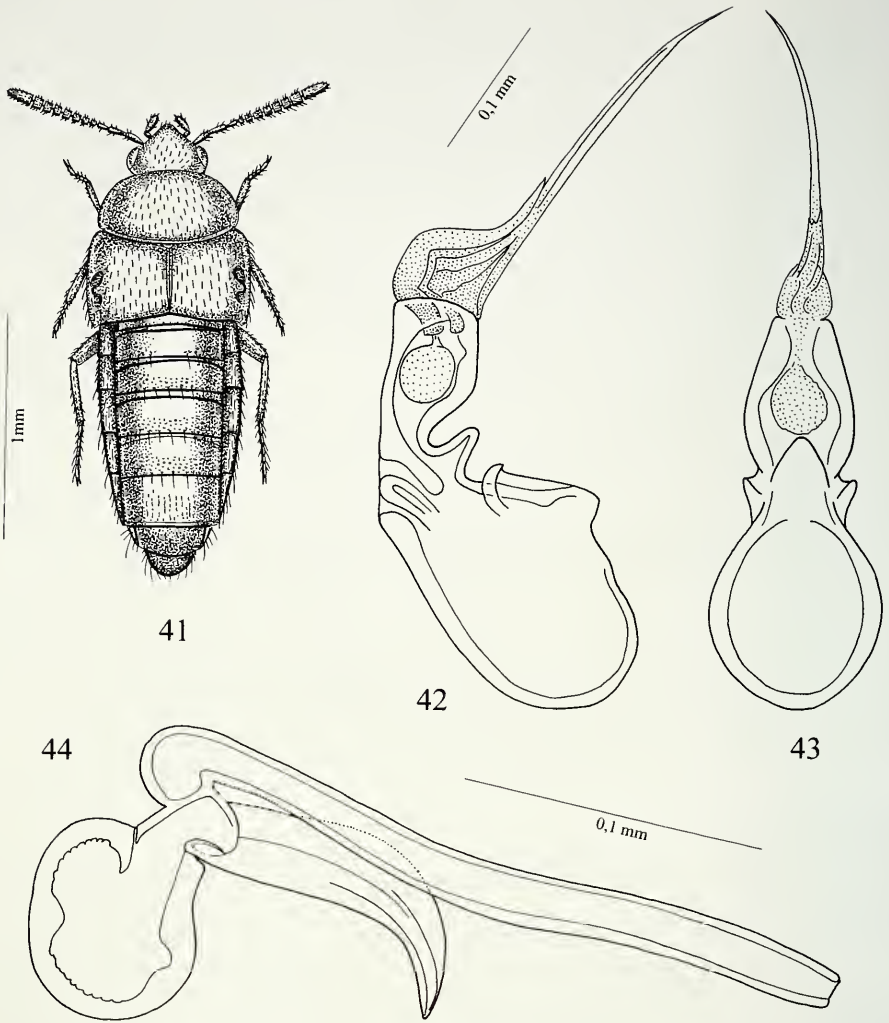
Holotypus ♂, Sabah, Poring Hot Springs, 500 m, 6.V.1987, leg. Burckhardt & Löbl (MHNG).

Paratypi: 2 ♀ ♀, Sabah, Poring Hot Springs, 500 m, 6.V.1987, leg. Burckhardt & Löbl.

DESCRIZIONE. Lungh. 1,9 mm. Corpo lucido e giallo-rossiccio, con elitre giallo-brune; antenne giallo-brune con i tre antenneri basali gialli; zampe gialle. La punteggiatura del capo è poco distinta, quella del pronoto è estremamente superficiale e fine. La granulosità delle elitre è molto svanita. Ciascuna elitra ha una profonda fossetta laterale sormontata da un'appendice. La granulosità degli uroterghi è saliente solo sulla metà posteriore di ciascun urotergo, essendo la base priva di punti e di granulosità. Il quinto urotergo libero del ♂ è coperto di rugosità superficiale. Edeago figg. 42-43, spermateca fig. 44.

COMPARAZIONI. Finora non erano note specie presentanti una fossetta laterale delle elitre, né un tipo di edeago così fortemente modificato.

ETIMOLOGIA. La nuova specie, presentando un'armatura genitale esterna dell'edeago a forma di spada, prende nome da quest'arma.



FIGG. 41-44

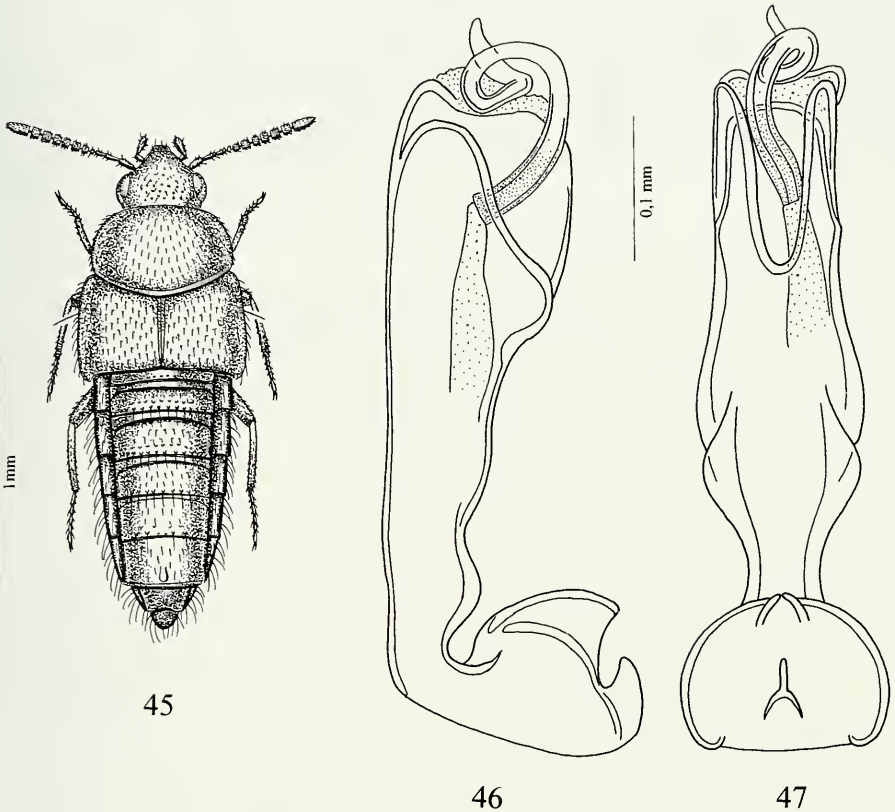
Habitus, edeago in visione laterale e ventrale e spermateca. 41-44: *Brachida gladius* sp. n.

***Brachida perdistincta* sp. n.**

Figg. 45-47

Holotypus ♂, Sabah, Poring Hot Springs, 500 m, 13.V.1987, leg. Burckhardt & Löbl (MHNG).

DESCRIZIONE. Lungh. 2,1 mm. Corpo lucido e giallo-rossiccio, con elitre rossicce; antenne giallo-rossicce, con i tre antennomeri basali gialli; zampe giallo-rossicce. La punteggiatura del capo è distinta, quella del pronoto è fine e poco visibile. La granulosità delle elitre è superficiale. L'addome è coperto di granuli molto salienti solo al margine posteriore di ciascun urotergo, sulla parte restante di essi sono superficiali. Edeago figg. 46-47.



FIGG. 45-47

Habitus ed eedeago in visione laterale e ventrale. 45-47: *Brachida perdistincta* sp. n.

ETIMOLOGIA. Poiché la forma dell'eedeago della nuova specie non è comune nel genere *Brachida* la nuova specie è chiamata "Molto distinta".

COMPARAZIONI. La nuova specie, in base alla forma dell'eedeago, è sicuramente affine a *B. nepalensis* Pace, 1985. Se ne distingue per i caratteri dati nella seguente chiave.

- | | |
|---|---|
| 1 | Decimo antennumero lungo quanto largo; pronoto con lunghe setole laterali isolate; eedeago con denti dorsali e laterali, profondamente incavato presso il bulbo basale, senza <i>crista apicalis</i> e con <i>crista proximalis</i> a base stretta; armatura genitale corta; apice dell'eedeago intero. Lungh. 2,2 mm. Nepal. <i>B. nepalensis</i> Pace |
| - | Decimo antennumero trasverso; pronoto senza lunghe setole laterali isolate; eedeago senza denti dorsali e laterali, poco incavato presso il bulbo basale, con <i>crista apicalis</i> assai sviluppata e con <i>crista proximalis</i> a base larghissima; armatura genitale lunga; apice dell'eedeago diviso. Lungh. 2,1 mm. Borneo. <i>B. perdistincta</i> sp. n. |

CHIAVE DELLE SPECIE DEL GENERE *BRACHIDA* DEL BORNEO

- 1 Quarto antennumero esile e molto trasverso 2
 - Quarto antennumero lungo quanto largo o più lungo che largo 8
- 2 Decimo antennumero molto trasverso 3
 - Decimo antennumero poco trasverso o lungo quanto largo 5
- 3 Occhi lunghi quanto le tempie; elitre coperte di granulosità distinta.
 *B. poringicola* sp. n.
 - Occhi molto più lunghi delle tempie; elitre o punteggiate o coperte di
 granulosità superficiale. 4
- 4 Elitre, misurate dall'omero all'angolo posteriore esterno, lunghe quanto
 il pronoto e coperte di granulosità superficiale; quinto urotergo libero del
 ♂ con un tubercolo mediano a superficie superiore concava. *B. subadunca* n.sp.
 - Elitre, misurate dall'omero all'angolo posteriore esterno, più lunghe del
 pronoto e coperte di distinta punteggiatura; quinto urotergo libero del ♂
 senza tubercolo mediano. *B. poringensis* n. sp.
- 5 Decimo antennumero lungo quanto largo. 6
 - Decimo antennumero trasverso. *B. perdistincta* sp. n.
- 6 Occhi meno sviluppati; sutura delle elitre affiancata da numerosi granuli
 molto salienti, assenti presso lo scutello; armatura genitale interna
 dell'edeago terminante a filo che forma un disco. *B. rotula* sp. n.
 - Occhi più sviluppati; sutura delle elitre affiancata da due tubercoli conici
 a ciascun lato, oppure senza essi; armatura genitale interna dell'edeago
 a forma di frusta alla parte apicale. 7
- 7 Sutura delle elitre del ♂ affiancate da due tubercoli conici a ciascun la-
 to; addome distintamente ristretto all'indietro; edeago non ricurvo.
 *B. kinabaluensis* sp. n.
 - Sutura delle elitre del ♂ senza caratteri sessuali secondari, edeago forte-
 mente ricurvo. *B. adunca* sp. n.
- 8 Quarto antennumero più lungo che largo. 9
 - Quarto antennumero lungo quanto largo. 10
- 9 Pronoto con quattro punti mediani disposti su un rettangolo e un punto
 a ciascun lato; edeago ricurvo e semplice nella parte preapicale ventrale
 *B. percurvata* sp. n.
 - Pronoto senza punti isolati; edeago rettilineo e seghettato alla regione
 preapicale ventrale. *B. ipercristata* sp. n.
- 10 Decimo antennumero fortemente trasverso; elitre del ♂ con fossetta
 laterale. *B. gladius* sp. n.
 - Decimo antennumero lungo quanto largo. 11
- 11 Occhi meno sviluppati; pronoto più trasverso. *B. borneensis* Pace
 - Occhi più sviluppati; pronoto meno trasverso. 12
- 12 Antenne nere, con base e undicesimo antennumero giallo-rossicci; gra-
 nulosità dell'addome poco saliente. *B. robusta* Cameron
 - Antenne rossicce, con base e undicesimo antennumero giallo-rossicci;
 granulosità dell'addome saliente e allungata, tranne sul quinto urotergo
 libero. *B. triarcuata* sp. n.

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Rivolgo i miei più cordiali ringraziamenti a coloro che mi hanno affidato in studio il raro materiale oggetto del presente lavoro: il Dr. Ales Smetana di Ottawa e il Dr. Ivan Löbl già del Museo di Storia Naturale di Ginevra. Per il prestito di tipi e per l'aiuto nella ricerca bibliografica ringrazio il Dr. Brendell del Museo di Storia Naturale di Londra.

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Two new species of *Systole* Walker (Hymenoptera: Eurytomidae) from Bulgaria

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Two new species of *Systole* Walker (Hymenoptera: Eurytomidae) from Bulgaria. - Two new species *Systole marinazerovae* and *Systole besaparrica* are described and illustrated on the basis of specimens from Bulgaria. Specimens were collected by sweeping in the Rhodope Mountains, where the species occur up to 2200 m altitude.

Key-words: Hymenoptera - Eurytomidae - *Systole* - taxonomy - Bulgaria.

INTRODUCTION

Systole is an exclusively phytophagous genus of the predominantly parasitic family Eurytomidae. The larvae of *Systole* are seed-feeders associated with Apiaceae and Lamiaceae. Some species may cause serious damage on cultivated plants (Bouček, 1952; Nikolskaya, 1956; Claridge, 1959; Zerova & Seregina, 1994).

Zerova (1978) separated two subgenera on the basis of morphological and biological differences: *Systole* s. str., associated with Apiaceae, and *Trichosystole*, associated with Lamiaceae.

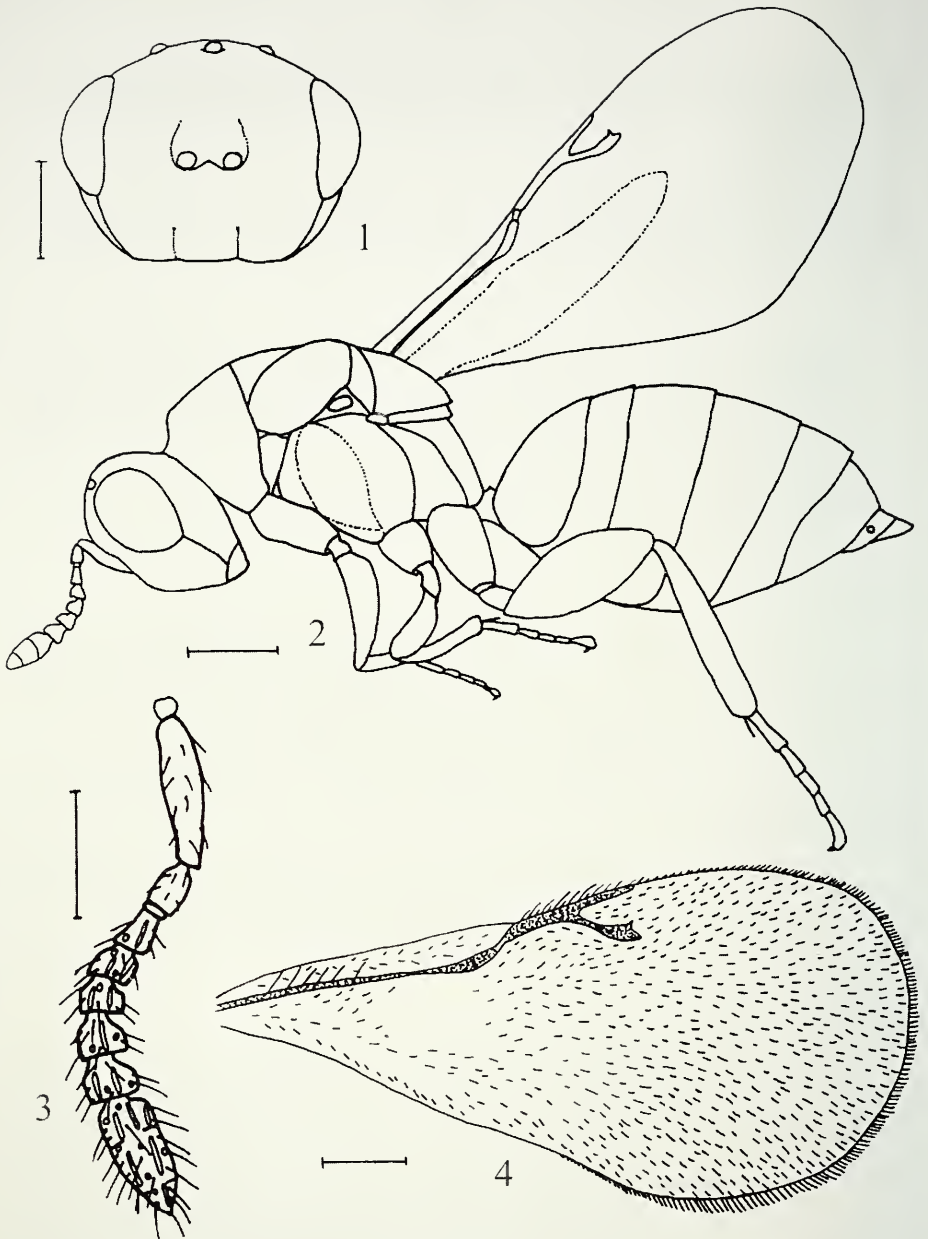
The genus *Systole* was revised for the Palaearctic Region by Zerova (1995), who recognized 20 valid species. Most species occur in the Palaearctic Region, as well as in the Oriental Region (Narendran, 1994) and the Nearctics (Peck, 1963).

Systole marinazerovae sp. n.

Figs 1-4

MATERIAL EXAMINED

Holotype: female, Bulgaria: the Rhodope Mts., Lednitsata Mountain Hostel - 1700 m a. s. l., 41° 39' 6.4" N, 24° 30' 57.1" E, 20.VII.2001. Paratypes: 2 females, the Rhodope Mts., Studenets Mountain Hostel - 1700 m, 41° 38' 28.3" N, 24° 41' 31.6" E, 18.VII.2001; 4 females, the Rhodope Mts., Snezhanka Peak - 1925 m, 41° 38' 26.9" N, 24° 40' 48.4" E, 18.VII.2001; 2 females, the Rhodope Mts., Perelik Mountain Hostel - 1960 m, 41° 36' 41.8" N, 24° 41' 24.9" E, 19.VII.2001; 1 female, the Rhodope Mts., Goljam Perelik Peak - 2191 m, 41° 36' 9.7" N, 24° 34' 36.6" E, 19.VII.2001; 5 females, the Rhodope Mts., Lednitsata Mountain Hostel, 19.VII.2001; 6 females, (same locality), 20.VII.2001; 1 female, the Rhodope Mts., Gela Village - 1400 m, 41° 39' 6.4" N, 24° 34' 1.5" E, 20.VII.2001. Holotype and four paratypes are deposited in the collection of Muséum d'histoire naturelle, Geneva. Eleven paratypes are deposited in the collection of Department of Zoology, University of Plovdiv. Five paratypes are deposited in the collection of Institute of Zoology, Ukrainian Academy of Sciences (Kiev).



FIGS 1-4

Systole marinazerovae sp. n., female. 1: holotype - head, frontal view. 2: holotype - body, side view. 3: paratype, Mountain Hostel Lednitsata - left antenna, inner side. 4: paratype, Mountain Hostel Studenets - right fore wing. Scale bars = 0.2 mm.

DIAGNOSIS

The following combination of features differentiates *Systole marinazerovae* sp. n. from other species of the genus: 1. Body brownish black with yellow spots on the face, bright antennae and legs; 2. Anterior margin of clypeus straight; 3. Funicular segments two to five distinctly transverse; 4. Marginal vein slightly longer than stigmal vein, postmarginal vein is the shortest; 5. Gaster as long as mesosoma and head together.

DESCRIPTION

Holotype female: body brownish black; antennal scape yellow with dorsal brown stripe; pedicel (except yellow apex) and flagellum yellowish brown; clypeus and lower parts of face to malar sulcus honey yellow; mandibles yellow with apices brown; pronotum with a pair of small yellow spots on its anterior surface, hidden by head; fore and mid coxae yellowish brown with apices and inner surface yellow, hind coxae yellowish brown; fore and mid femorae yellow with brown tint, hind femora (except apices yellow) yellowish brown; tibiae and tarsale segments one to four yellow, the fifth brown; ovipositor sheaths yellow; wings hyaline, veins dark yellow; body pubescence silvery white.

Head (Figs 1, 2) with reticulate shining surface, clypeus smooth, pubescence consisting of sparsely scattered hairs. In frontal view head transverse, elliptic, about 1.3x as wide as high; in dorsal view slightly wider than thorax, about twice as wide as long. Frons moderately convex, face slightly protruding medially; anterior margin of clypeus straight; scrobal depression shallow, not reaching median ocellus; toruli situated halfway between front ocellus and clypeal margin; eye height about 1.5x malar space; POL about 2.1x OOL; eyes with sparse hairs; malar sulcus distinct. Antenna (Fig. 3) with scape cylindrical, only slightly expanded medially, length about 4x as the maximum width; pedicel about one fourth the length of the scape; first funicular segment narrowed basally with length about twice as basal width; funicular segments two to five distinctly transverse; clava slightly wider than the last funicular segment; clava and funicle clothed with not very long hairs.

Mesosoma (Fig. 2) with dorsal surface reticulate, shining, with sparsely shallow punctures, pubescence consisting of scattered projecting hairs. Mesosoma short, about 1.5x as long as the maximum width in lateral view; pronotum transverse, width 1.6x its median length including neck. Mesoscutum about twice as wide as long, with notauli complete, moderately deep. Scutellum little wider than long, posterior margin with a carina and a row of pits. Propodeum strongly inclined, sloping at a steep angle of about 100° relative to the dorsal surface of the rest of the mesosoma; sculpture reticulate, with irregular cells laterally and traces of median furrow; callus with long hairs. Fore wing (Fig. 4) with marginal vein slightly longer than stigmal vein; postmarginal vein shorter than stigmal vein; speculum present.

Gaster (Fig. 2) shining with faint alutaceous sculpture and scattered hairs on tergum six. Gaster as long as mesosoma and head together; petiole short, about 3x as wide as long, with small teeth laterally; first tergum about twice as long as the second; terga three to six of equal length and slightly longer than second tergum. Ovipositor sheaths directed posteriorly, not tilted upwards.

Length 2.1 mm.

VARIATION

The variation of paratypes involves the size, brightness and extent of yellow markings, and pubescence. Most of paratypes have coloration as the holotype, but one paratype from Snezhanka Peak and that from Gela Village have more extensive and lighter yellow markings on face, pronotum and legs. Paratypes from Lednitsata Mountain Hostel have pubescence as the holotype, but the rest of paratypes are almost glabrous. Length 1.8 – 2.2 mm.

ETYMOLOGY

The new species is named in honour of the well-known chalcidologist Dr Marina Zerova.

Systole besaparica sp. n.

Figs 5-8

MATERIAL EXAMINED

Holotype: female, Bulgaria: the Rhodope Mts., Besapari hills: 2 km SW Novo selo Village – 350 m a. s. l., 42° 6' 13" N, 24° 27' 46.7" E, 18.VI.2000. Paratypes: 5 females, the Rhodope Mts., Bjala Cherkva Mountain Hostel – 1650 m, 41° 56' 5.5" N, 24° 40' 29.5" E, 26.VI.1996; 7 females, the Rhodope Mts., Zagrazhden Village – 1000 m, 41° 44' 27.9" N, 24° 58' 54.2" E, 4.VII.1996; 5 females, the Rhodope Mts., Zagrazhden Village, 5.VII.1996; 7 females, the Rhodope Mts.: Planinsko Village – 1200 m, 41° 45' 36.1" N, 24° 57' 36.8" E, 4.VII.1997; 5 females, the Rhodope Mts., Besapari hills: 2 km SW Novo selo Village, 18.VI.2000; 1 female, the Rhodope Mts., (same locality), 1.VII.2000; 1 female, the Rhodope Mts., Malko Gradishte Village – 300 m, 41° 45' 56.7" N, 25° 59' 55.6" E, 27.VI.2001. Holotype and four paratypes are deposited in the collection of Muséum d'histoire naturelle, Geneva. Twenty-one paratypes are deposited in the collection of Department of Zoology, University of Plovdiv. Five paratypes are deposited in the collection of Institute of Zoology, Ukrainian Academy of Sciences (Kiev).

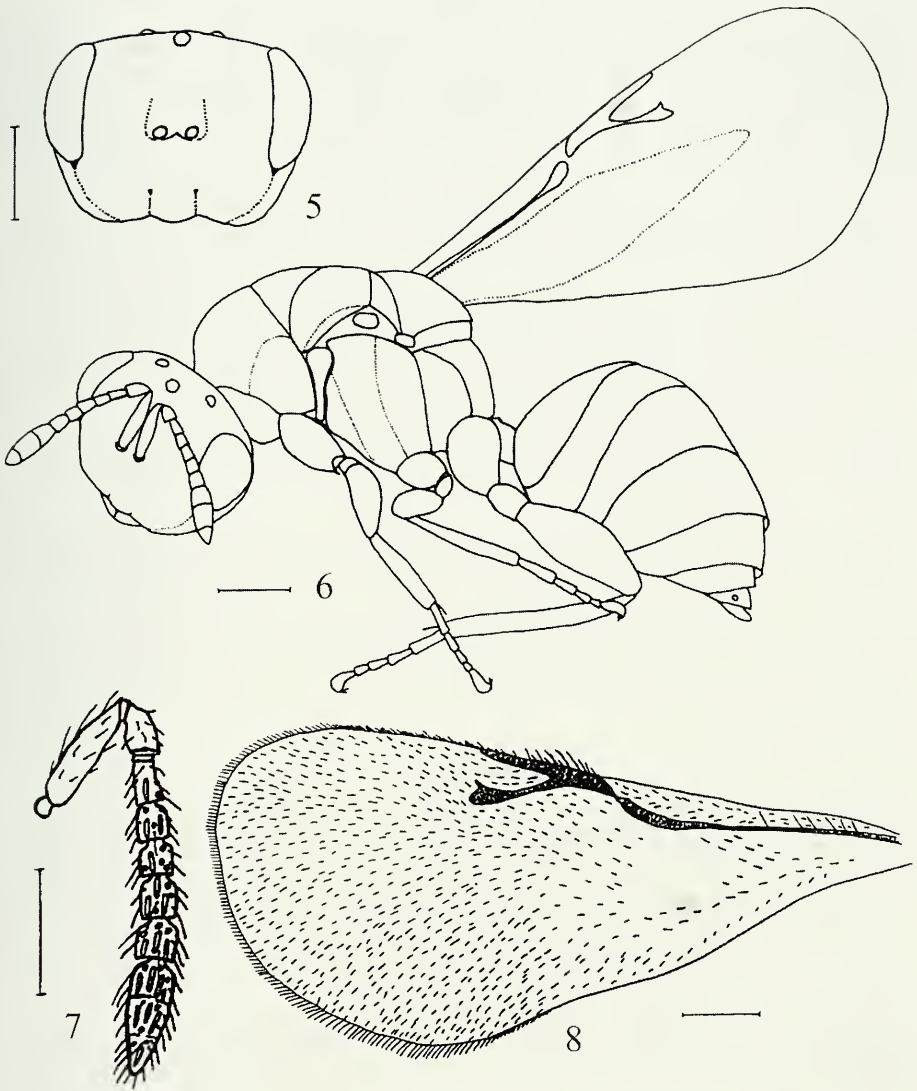
DIAGNOSIS

The following combination of features differentiates *Systole besaparica* sp. n. from other species of the genus: 1. Gaster dark brown with coppery tints, face with dark yellowish brown spots; 2. Anterior margin of clypeus slightly arched; 3. Funicular segments two to four quadrate, the fifth is slightly transverse; 4. Marginal vein slightly shorter than postmarginal vein, which is slightly shorter than stigmal vein; 5. Petiole about 1.5 x as wide as long dorsally; 6. Gaster as long as mesosoma.

DESCRIPTION

Holotype female: head and mesosoma black, gaster dark brown with coppery tints; antennae pale brown, scape with lighter stripe ventrally; anterior clypeal margin and lower areas of face lateral to clypeus dark yellowish brown; pronotum anteriorly with a pair of small yellow spots, hidden by head; coxae brown; fore and mid coxae with lighter apices; fore and mid femorae yellow with brown markings medially, hind femorae except for yellow tips brown; tibiae and tarsal segments one to four yellow, the fifth brown; wings hyaline, veins brown; pubescence silvery white.

Head (Figs 5, 6) with reticulate surface sculpture, clypeus smooth; face slightly protruding medially with slight and faint radiating striae; genae almost without sculpture, with polished pit at lower eye margin; pubescence moderately dense.



FIGS 5-8

Systole besaparica sp. n., female. 5: holotype, head, frontal view. 6: holotype, body, side view. 7: paratype, Besapari hills: 2 km SW Novo selo Village, left antenna, inner side. 8: paratype, Besapari hills: 2 km SW Novo selo Village, left fore wing. Scale bars = 0.2 mm.

Head in frontal view slightly transverse, about 1.3x as wide as high; in dorsal view slightly wider than thorax, about twice as wide as long. Frons moderately convex; anterior margin of clypeus slightly arched, tentorial pits well-defined; genae widened laterally, malar sulcus faint. Scrobal depression shallow, not reaching median ocellus; toruli situated halfway between median ocellus and clypeal margin. Eye height

slightly longer than malar space; POL about 3x OOL; eyes with sparse hairs. Antennal scape (Fig. 7) cylindrical, only slightly expanded medially, with about 4x as long as wide; pedicel about one fourth of scape length; first funicular segment narrowed basally, about 2.3x as long as the basal width; funicular segments two to four quadrate, the fifth is slightly transverse; clava as wide as last funicular segment; clava and funicle clothed with moderately long hairs.

Mesosoma (Fig. 6) with dorsal surface reticulate and sparsely and shiny punctured, pubescence consisting of scattered adpressed hairs. Mesosoma short, about 1.5x as long as the maximum width in lateral view; pronotum transverse, width in dorsal view 1.7x its median length including neck. Mesoscutum about 1.6x as wide as the median length. Scutellum about as wide as long, posterior margin with a carina and a row of pits. Propodeum strongly inclined, in profile sloping at almost 100° to the plane of the rest of the mesosoma; with median area reticulate sculptured, irregular cells laterally and traces of median furrow; callus with long hairs. Fore wing (Fig. 8) with marginal vein slightly shorter than postmarginal vein, which is slightly shorter than stigmal vein; speculum present.

Gaster (Fig. 6) short, about as long as mesosoma, smooth and shining, with finely alutaceous sculpture on last two segments and scattered hairs on segments five to seven. Petiole with reticulate sculpture, about 1.5x as wide as long dorsally, with two teeth laterally; gastral terga one, three and four subequal in length and longer than the other terga; the second and fifth slightly shorter; the sixth is only about one third as long as the fifth; the seventh is slightly longer than the sixth. Ovipositor sheaths directed.

Length 2.3 mm.

VARIATION

The variation of paratypes involves the brightness of yellowish brown markings on the face and coppery tint of the gaster. Paratypes from Bjala Cherkva Mountain Hostel, Zagrazhden Village and Planinsko Village have more distinct markings on the face and tints of the gaster compared with the rest of the paratypes. Length 1.8 – 2.4 mm.

ETYMOLOGY

The name of the new species is derived from the geographic name of locality of the holotype.

DISCUSSION

S. marinazerovae sp. n. is closely related to *S. albipennis* Walker regarding the following structural respects: shape of funicular segments two to five distinctly transverse; shape of anterior margin of clypeus straight; mesosoma short, with propodeum sharply declined; propodeum with traces of a median furrow; wing venation with marginal vein the longest; length of petiole about 3x as wide as long. *S. marinazerovae* sp. n. and *S. albipennis* have different coloration: *albipennis* is predominantly black with fuscous antennae and rufo-testaceous markings on the legs. *S. marinazerovae* sp.n. has brownish black body, yellow spots on the face, and bright antennae and legs. There are

some more differences between both species: *S. albipennis* has distinctly transverse head with widened genae in frontal view; the head of *S. marinazerovae* sp. n. is transverse too, but the genae are not widened, so that the head seems somewhat elliptic; the gaster of *S. albipennis* is short, as long as mesosoma, whereas that of *S. marinazerovae* sp. n. is as long as mesosoma and head together.

On the other hand *S. marinazerovae* sp. n. is related to *S. tuonela* Claridge (after the original description of Claridge, 1959) regarding the shape of head in frontal view, distinctly transverse funicular segments two to five, and short mesosoma. *S. marinazerovae* sp. n. differs from *S. tuonela* in coloration (*S. tuonela* is black with pale markings on the legs), in having marginal vein longer than stigmal vein (in *S. tuonela* marginal vein is shorter than stigmal vein), and in having gaster as long as mesosoma and head together (the gaster of *S. tuonela* is equally as mesosoma).

S. besaparica sp. n. resembles *S. albipennis* in having: shape of the face in frontal view with genae widened laterally, short mesosoma with propodeum sharply declined, propodeum with traces of median furrow, and gaster as long as mesosoma. However, *S. besaparica* sp. n. differs in coloration: *S. albipennis* is black with rufo-testaceous markings on legs and fuscous antennae, whereas *S. besaparica* sp. n. has black head and mesosoma, gaster dark brown with coppery tints, dark yellowish brown spots on the face, pale brown antennae and yellow markings on the legs. *S. besaparica* sp. n. and *S. albipennis* differs each other through the shape of the anterior margin of clypeus (*S. besaparica* sp. n. has slightly arched margin of clypeus; the clypeus of *S. albipennis* is with straight margin), the shape of funicular segments (*S. besaparica* sp. n. has funicular segments two to four quadrate, the fifth is slightly transverse; the funicular segments two to five of *S. albipennis* are distinctly transverse), the wing venation (*S. besaparica* sp. n. has marginal vein slightly shorter than postmarginal vein, which is slightly shorter than stigmal vein; the marginal vein of *S. albipennis* is slightly longer than stigmal vein, postmarginal vein is shorter than stigmal vein), and the length of petiole (*S. besaparica* sp. n. has the petiole about 1.5x as wide as long dorsally, while the petiole of *S. albipennis* is about 3x as wide as long).

The taxonomic position of the two new species in the subgenera of *Systole* is not quite clear. The peculiarities of dorsal sculpture give grounds *S. marinazerovae* sp. n. (with shining, finely reticulate sculpture) to be joined to the subgenus *Systole* and *S. besaparica* sp. n. (with slightly shining, rougher reticulate sculpture) - to the subgenus *Trichosystole*. Perhaps some data about the hosts of both new species in the future could throw light upon that problem.

ACKNOWLEDGEMENTS

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Three new species of *Goniurellia* Hendel from Sokotra Island (Yemen) and Oman, and comments on *Tephritis cosmia* Schiner (Diptera, Tephritidae)

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Three new species of *Goniurellia* Hendel from Sokotra Island (Yemen) and Oman and comments on the status of *Tephritis cosmia* Schiner (Diptera, Tephritidae). - Three new species of *Goniurellia* Hendel, *G. apicalis* sp. n. from Sokotra Island (Yemen), *G. ebejeri* sp. n. and *G. octordiata* sp. n. from Oman, are described, illustrated and compared with similar species, raising the number of species of the genus to ten. Based on a study of the lectotype of *Tephritis cosmia* Schiner (a species superficially similar to some *Goniurellia* species), this species is retained in *Trupanea* Schrank.

Key-words: Tephritidae - *Goniurellia* - new species - Sokotra island - Oman - *Tephritis cosmia*.

INTRODUCTION

Goniurellia Hendel, 1927, is a small genus of seven described species from the southern Palaearctic, Afrotropical, and Oriental regions (Norrbom *et al.*, 1998). The center of distribution is situated in the desert regions of the Near East, and not less than five species are known from Israel (Freidberg & Kugler, 1989). The species with known biology live in flowerheads of species of *Inula*, *Pallenis* and *Pulicaria*, three genera of the tribe Inuleae (Asteraceae) (Freidberg, 1980; Merz, personal observations) without causing galls.

Hendel (1927) erected the subgenus *Goniurellia* for five species of *Trupanea* Schrank with a long proboscis, but he misidentified the type species. A new type species (*Urellia augur tridens* Hendel, 1910) was proposed by Freidberg & Kugler (1977) and approved by the ICZN (1982). The taxon was given generic rank by Freidberg (1980) who revised the genus. The monophyly of the genus was supported by the cladistic study of Merz (2000). Within the *Tephritis* group of genera, *Goniurellia* may be recognized by the presence of a medial postocellar seta, basal scutellar setae only, and capitate proboscis. The terminalia of the males are characterized by a very elongate vesica and a small basal sclerotization of the glans which carries two to three tooth-like projections apically.

While studying a small collection of Tephritidae from the island of Sokotra and some specimens from Oman I found that these populations represent three species new to science. They are described below. In order to clarify the status of *Tephritis cosmia* Schiner, 1868, a species superficially similar to some *Goniurellia*, its type material has been studied.

The material is deposited in the following institutions: Muséum d'histoire naturelle, Genève (MHNG), National Museums & Galleries of Wales, Cardiff (NMW), Staatliches Museum für Naturkunde, Stuttgart (SMNS), Tel Aviv University (TAU) and the private collections of M. Bartak, Praha, Czech Republic (CMB) and M. Ebejer, Balzan, Malta (CME).

The terminology follows White *et al.* (2000), except for terminology of antennae which follows Stuckenberg (1999). Labels of primary types are cited verbatim. The text of each individual label is put in quotation marks, the different lines of one label are separated by slashes.

TAXONOMIC TREATMENT

Goniurellia apicalis sp. n.

Figs 1-9

Urellia cosmia Schiner var.: Becker, 1910: 156.

MATERIAL

Holotype ♂, [Yemen] "Sokotra, Ayhaft / cca 13°N, 54°E / 15.III.2000 / Št'astný K. and Bejček V", "Holotypus", "*Goniurellia / apicalis* sp. n. / det. B. Merz 2002" (MHNG). The holotype is laterally glued on a card point and is in good condition (left anterior orbital seta, left medial vertical seta and left anterior interalar seta absent).

Paratypes: 2♂♂, 1♀, same data as holotype; 2♂♂, 3♀♀, "Sokotra, Noghed / cca. 13°N, 54°E / 27.II.-I.III.2000 / Št'astný K. and Bejček V". (CMB, MHNG, TAU).

ETYMOLOGY

The name reflects the presence of a pattern on the apical half of the wing only.

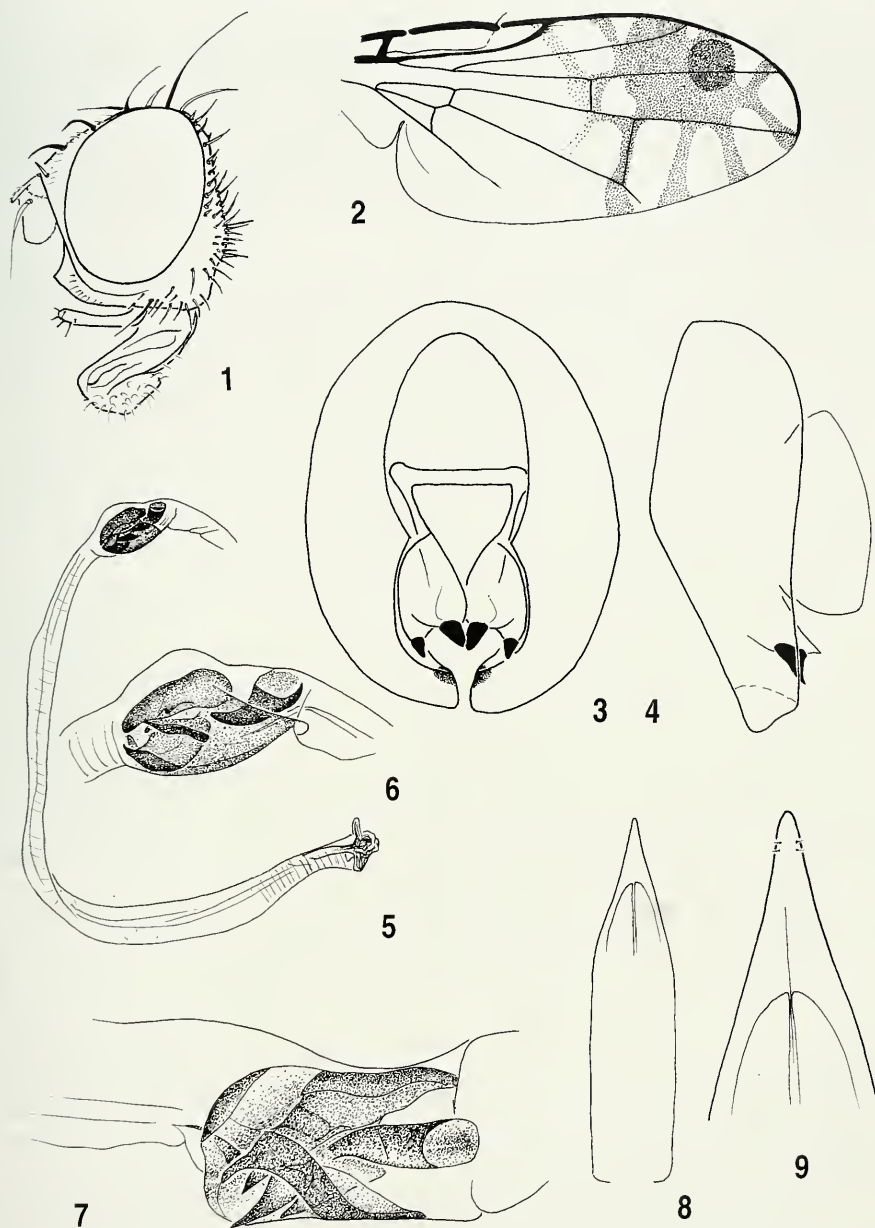
DIAGNOSIS

The species may be recognized by its wing pattern (Fig. 2) with the well-developed apical spot from which eight narrow rays emerge, of which the ray from R-M to the tip of R₁ is faint and narrow. It is separated from *G. octoradiata* sp. n. by the larger bulla, the presence of a yellow-brown to brown spot over br along R-M, and by the relative length of the 3 toothlike projections of the glans (Fig. 7).

DESCRIPTION

Wing length. ♂ 1.95-2.40 mm; ♀ 2.15-2.45 mm.

Head (Fig. 1). In profile only slightly higher than wide (height:width ratio about 1.25-1.35:1); gena low, about one sixth as high as compound eye; frons from lunule to posterior margin of posterior ocelli about as long as maximum distance between compound eyes; fronto-facial angle slightly larger than 90°; general colour mat yellow, only ocellar triangle and butterfly-shaped spot in middle of occiput above occipital foramen grey microtrichose; frontal and orbital plates slightly silvery microtrichose; frons with few fine, whitish, acuminate setulae just posterior of lunule; scape whitish setulose anteriorly; pedicel with black setulae; postpedicel about 1.5 times as long as



FIGS 1-9

Goniurellia apicalis sp. n.: 1, head, lateral view; 2, wing; 3, ♂, epandrium and surstyli, caudal view; 4, ♂ epandrium and surstylus, lateral view; 5, ♂, phallus; 6, ♂, details of base of glans, lateral view; 7, ♂, details of base of glans, ventral view; 8, ♀ aculeus, ventral view; 9, ♀, tip of aculeus, ventral view.

wide; arista virtually bare, yellow in basal thickened part, dark brown distally; palpus apically with few black spinose setulae; proboscis capitate. Chaetotaxy: anteriormost frontal seta small, whitish lanceolate, posterior two frontal and anterior orbital seta dark brown, acuminate; posterior orbital seta shorter, white lanceolate; ocellar seta and medial vertical seta dark brown; all other setae and setulae on vertex and occiput whitish, lanceolate: one lateral vertical seta, one postocellar seta, one medial postocellar seta, and row of postocular setae; longest genal seta brown, all other genal and postgenal setulae whitish.

Thorax. Dorsum of scutum, scutellum, subscutellum, and major part of anepisternum, anepimeron, katepisternum, and meron bluish grey, densely microtrichose; postpronotum, notopleuron, anterior parts of pleura and prosternum mat yellow; scutum with 3 brown, narrow lines over dorsocentral setae and in middle; setulae on entire thorax whitish, lanceolate; prosternum and anepisternum setulose. Chaetotaxy: one dorsocentral seta almost on line of suture; scutellum only with basal scutellar seta; one prescutellar acrostichal seta; one presutural supraalar seta; one postsutural supraalar seta; one intraalar seta; one postalar seta; one postpronotal seta; two notopleural setae; one anepisternal seta; one anepimeral seta; one katepisternal seta; setae pale brown, only posterior notopleural and anepimeral seta whitish.

Legs. Yellow, without modifications.

Wing (Fig. 2). Veins bare, except R_1 dorsally setulose; "narrow stellate-pattern" (see Merz, 2000) with eight narrow rays emerging from dark-brown central area: one ray from R-M to pterostigma; one ray between two hyaline spots in r_1 ; two rays apically to tip of veins R_{4+5} and M, two rays in m, one ray over DM-Cu and one ray from R-M through dm; large hyaline spot present between R-M and prolongation of DM-Cu in r_{4+5} ; br distally at least pale-brown, brown area also over R-M; conspicuous bulla posterodistal of small hyaline spot at tip of R_{2+3} . Variation: ray from R-M through dm sometimes reduced or only represented by isolated bar; ray from R-M to tip of pterostigma sometimes more yellowish than other rays.

Abdomen. Ground colour mat yellow, but dorsum of all tergites to a variable extent bluish grey microtrichose; setulae whitish lanceolate.

Male terminalia (Figs 3-7). Epandrium oval, tip of lateral surstylus with conspicuous black spot; medial surstylus very broad, with two subequal prenisetae; phallus with very short distiphallus barely longer than hypandrium, entirely bare; glans with small basal sclerotization, which includes in ventral view a sclerotized tube basally and three conspicuous small toothlike projections distally of which one tooth is distinctly longer; remaining sclerotization forming more or less regular sheath; vesica very long, parallel-sided, at least 15 times as long as wide.

Female terminalia (Figs 8-9). Oviscape orange brown, dorsally and ventrally on basal half with whitish lanceolate setulae, about as long as preceding two tergites combined; aculeus evenly pointed at tip; aculeus length: 0.83 mm (1 specimen checked).

BIOLOGY

No hostplants are known for this species. The specimens were collected with Malaise traps (Bartak, pers. comm.)

AFFINITIES

This species undoubtedly forms a monophyletic group with *G. octoradiata* sp. n. (see below). The differences between the two taxa are explained in detail under the latter species. They may be separated easily from the other species of *Goniurellia* by their wing pattern which is more developed than in *G. lacerata* (Becker) (see Freidberg & Kugler, 1989, plate IV, Fig. 2) but does not exhibit the broad basal area that covers the entire pterostigma (e. g. Fig. 11). Superficially, the two new species have a wing pattern similar to *Trupanea cosmia* (Schiner) (Fig. 28) although the latter has a small black spot on Cu_1 and the area around R-M is entirely hyaline (although R-M itself is faintly brown); moreover its oviscapae is entirely black, the medial postocellar seta is absent and the male terminalia are as in other *Trupanea* (Fig. 30). The status of *Trupanea cosmia* is further discussed below. It is quite probable that Becker (1910) had specimens of *G. apicalis* before him when he reported *Urellia cosmia* var. from Sokotra. His comments on the morphology of the specimens correspond very well with the description of the new species. Unfortunately, the specimens studied by Becker could not be found in the NHMW (Contreras-Lichtenberg, *in litt.*). The wing of *Trupanea richteri* Hering (Hering, 1956) is also similar, but the posterior hyaline spot in R_1 is evenly continuing to R_{4+5} . Moreover, the dorsocentral setae are distinctly posterior to the transverse suture, giving evidence that this species may be more closely related to species of *Euaestella* Hendel (a couple of paratypes from Iran, Beluchistan, deposited in SMNS, could be studied).

The structure of the sclerotized part of the glans is rather simple in *G. apicalis* and *G. octoradiata*. The strong, basal sclerotized hook is also present in *G. lacerata* and *G. omissa* Freidberg, but it is less developed in these species. *G. lacerata* shares with both new species the presence of 3 tooth-like projections apically of the sclerotized part of the glans which gives support that these three species form a monophyletic group. On the other hand, the shape of the epandrium and the presence of a black apico-dorsal spot on the lateral surstylus may indicate a relationship of the two new species with *G. munroi* Freidberg from Eastern and Southern Africa. Further studies are required to establish a well supported hypothesis for phylogenetic relationships of these taxa.

Goniurellia ebejeri sp. n.

Figs 10-17

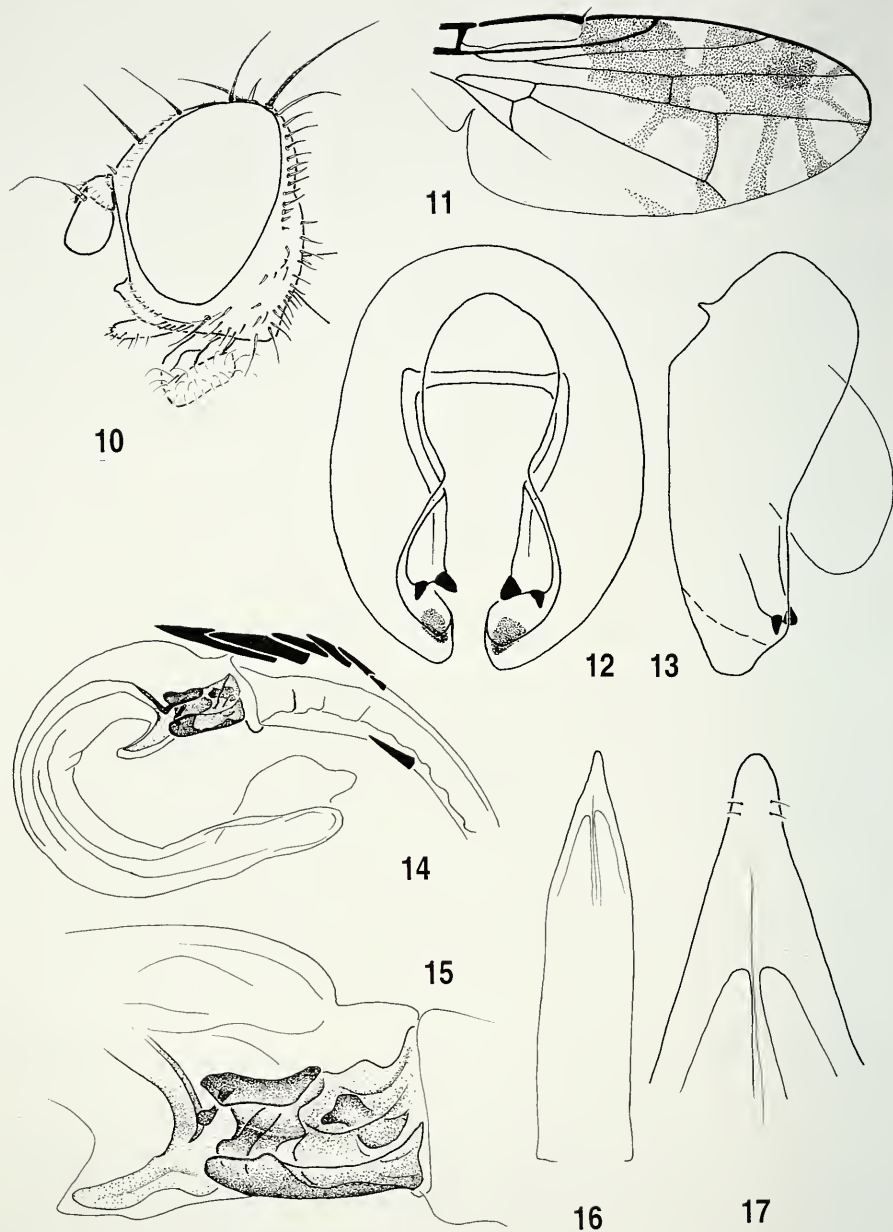
MATERIAL

Holotype ♂, "Oman Muscat / Al Ansab / 6.III.1989 / M. J. Ebejer", "Holotypus", "*Goniurellia ebejeri* sp. n. / det. B. Merz 2002" (MHNG). The holotype is pinned laterally on a minuten pin on a polyporus strip and is in good condition (right arista, left anterior orbital seta, right anterior frontal seta, left dorsocentral seta absent; most of scutal setulae rubbed off).

Paratypes: 5 ♂♂, 1 ♀, same data as holotype (CME, MHNG, NMW, TAU); 1 ♀, same locality, but 23.II.1989, "*Goniurellia ? spinifera* Freidberg, det. M. J. Ebejer 1994" (MHNG); 2 ♂♂, 2 ♀♀, same locality, but 27.XII.1989 (NMW).

ETYMOLOGY

This pretty species is named in honour of the collector of the type series, Martin J. Ebejer.



FIGS 10-17

Goniurellia ebejeri sp. n.: 10, head, lateral view; 11, wing; 12, ♂, epandrium and surstyli, caudal view; 13, ♂, epandrium and surstylus, lateral view; 14, ♂, phallus; 15, ♂, details of base of glans, lateral view; 16, ♀, aculeus, ventral view; 17, ♀, tip of aculeus, ventral view.

DIAGNOSIS

This species differs readily from all congeners by the generally symmetrical brown areas of the wing, separated by a single hyaline spot in r_1 (Fig. 11) and the presence of several strong setae on the preglans area of the phallus (Fig. 14).

DESCRIPTION

Wing length. ♂ 2.45-2.75 mm; ♀ 2.15-2.75 mm.

Head (Fig. 10). In profile distinctly higher than wide (height:width ratio 1.5:1); gena low, less than one sixth as high as compound eye in profile; frons from lunule to posterior margin of posterior ocelli slightly longer than maximum distance between compound eyes (ratio about 10:9); fronto-facial angle about 120°; colouration, antennae, and mouthparts as in *G. apicalis*. Chaetotaxy: as in *G. apicalis*, but acuminate setae (posterior two frontal setae, anterior orbital seta, ocellar seta, medial vertical seta) yellowish brown, only slightly darker than white, lanceolate setae.

Thorax. Uniformly yellow greyish microtrichose, but postpronotum and notopleuron with large yellow areas; scutum with two indistinct dark-gray, narrow, longitudinal stripes on line of dorsocentral setae. Chaetotaxy as in *G. apicalis*, but acuminate setae very pale brown, only indistinctly darker than lanceolate setae; dorsocentral seta almost on line of suture.

Legs. Uniformly yellow.

Wing (Fig. 11). Veins bare, except R_1 dorsally setulose; "elongate stellate-pattern" (see Merz, 2000) with 6 narrow rays emerging from dark center: two rays apically to tips of R_{4+5} and M; ray along R_{4+5} shorter than ray along M; two rays in m; one ray through DM-Cu; one ray from R-M through dm to Cu_1 ; broad dark band present over entire pterostigma to R-M; cell r_1 with one spot just posterior of pterostigma extending into r_{2+3} ; R-M broadly surrounded by dark pattern; hyaline spot between R-M and prolongation of DM-Cu in r_{4+5} about half as wide as cell; cell cu_2 with brown stripe or small spot at margin in continuation of A_1+Cu_2 ; bulla rather weak.

Abdomen. Ground colour yellow, but most of dorsal surface except for posterior margin of tergites yellowish grey microtrichose.

Male terminalia (Figs 12-15). Epandrium oval; lateral surstylus dorsally with a broad plate with a rather large, black spot near apex; medial surstylus rather long, parallel sided; prenisetae subequal; phallus with very long distiphallus, on apical quarter with 6-7 dark-brown spines of increasing size on outer side and with 1-2 spines on inner side; glans long, with parallel sided vesica about 10 times as long as wide; basal sclerotization rather simple, forming tube, distally with a simple, weakly sclerotized fingerlike process.

Female terminalia (Figs 16-17). Oviscape orange brown, blackish brown at base and at apex; basal half dorsally covered by white, lanceolate setulae, otherwise fine brown setulose; oviscape about as long as preceding 2.5 tergites combined; aculeus evenly rounded at tip, broader than in *G. apicalis*; aculeus length: 0.94 mm (1 specimen checked).

BIOLOGY

No hostplants are known for this species.

AFFINITIES

The generic position of this species may be subject to some discussions. However, the capitate mouthparts, the chaetotaxy (2+1 frontal setae, medial postocellar setae present, dorsocentral seta almost on line with transverse suture, only basal scutellar seta present), and the shape of the glans (very elongated, parallel-sided vesica, small basal sclerotization which forms a tube with a distal tooth) are identical or very similar to most other species of *Goniurellia*, including its type, *G. tridens* (Hendel), and justify the placement of the species in this genus.

Within *Goniurellia* the new species can be separated from the other species by the wing pattern, the yellowish grey instead of bluish-grey microtrichose scutum, and the spines on the distiphallus. Whereas all known species with a broad brown area from the pterostigma to R-M ("elongate stellate-pattern") are characterized by a comma like basal hyaline spot in r_1 , this spot has almost the shape of a regular triangle in *G. ebejeri*. Further, the only other *Goniurellia* with only one hyaline spot in r_1 , *G. persignata* Freidberg, has an abbreviated ray through dm, but in the new species this ray reaches vein Cu_1 . The presence of strong spines at the distal end of the distiphallus is a character found in some species of other genera (such as *Capitites* or *Tephritis*), but their structure and arrangement are different in these genera.

Based purely on the wing pattern, *G. ebejeri* may be confused with many species of the *Tephritis* group. In the Near and Middle East, the new species may compare with *Euaestella iphionae* (Eflatoun) but this species has an extensive dark pattern in the apical half of dm. Species of *Capitites* (*C. augur* (Frauenfeld) *C. ramulosa* (Loew)) with a similar wing pattern may be distinguished by the spatulate or geniculate mouthparts and the absence of medial postocellar setae.

Goniurellia octoradiata sp. n.

Figs 18-26

MATERIAL

Holotype ♂, "OMAN: Dhofar / Hagayf / 17°17'54"03'E / 25.IX.1988", "M. J. Ebejer / Coll. NMW / Z. 1985-032", "Holotypus", "*Goniurellia octoradiata* sp. n. / det. B. Merz 2002" (NMW). The holotype is glued to a card point and is in good condition (wings slightly broken, right anterior frontal seta, left anterior orbital seta, left postpronotal seta absent, left anterior notopleural seta and left interalar seta damaged, scutum laterally of prescutellar setae slightly broken).

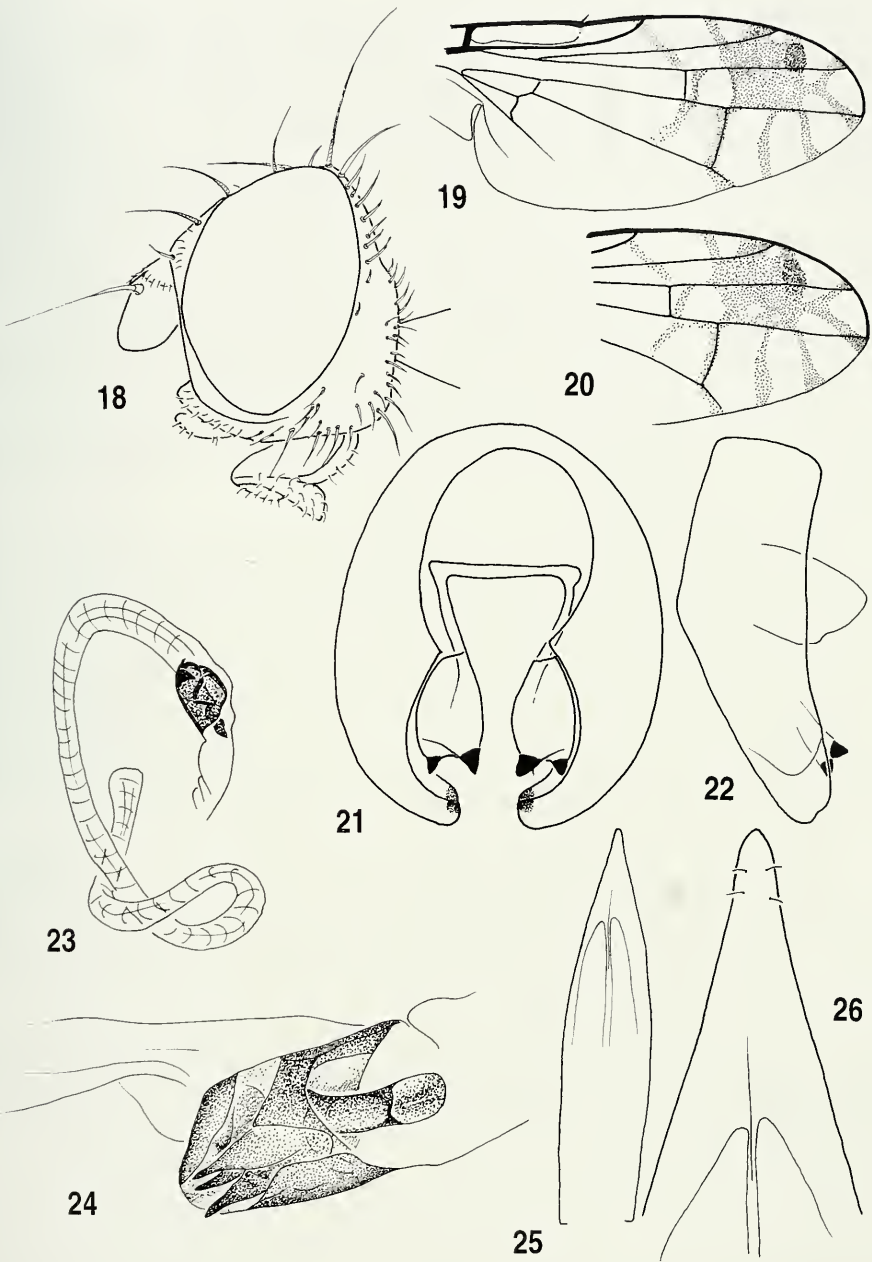
Paratypes: 1♂, 1♀, same data as holotype: 2♂♂, 6♀♀, "OMAN: Dhofar / Hajayf (Euphorbia / zone) 12.X.1990 / J. C. Deeming", "J. C. Deeming / Coll. NMW. / Z. 1981-001"; 1♂, "OMAN: Dhofar / Mughsail Pass / 11.X.1990 / J. C. Deeming / on Castor", "NMW. Z. / 1981-001"; 1♀, "OMAN: Dhofar / Arifr. 1000m / 11.X.1990 / J. C. Deeming" "NMW. Z. / 1981-001" (MHNG, NMW, TAU).

ETYMOLOGY

The name is derived from the eight rays which emerge from the central dark area on the wing.

DIAGNOSIS

This species may be readily separated from *G. apicalis* only by the wing pattern with the distinctly smaller bulla, the absence of a brown pattern in cell br basally of R-M (Fig. 19), and by the subequal length of the 3 toothlike projections of the glans (Fig. 24).



FIGS 18-26

Goniurellia octoradiata sp. n. 18, head, lateral view; 19-20, two wings, showing variation in pattern; 21, ♂, epandrium and surstylus, caudal view; 22, ♂, epandrium and surstylus, lateral view; 23, ♂, phallus; 24, ♂, details of base of glans, ventral view; 25, ♀, aculeus, ventral view; 26, ♀, tip of aculeus, ventral view.

DESCRIPTION

Wing length. ♂ 2.60-2.70 mm; ♀ 2.45-2.75 mm.

Head (Fig. 18). In profile slightly higher than wide (height:width ratio about 1.25: 1); gena very low, about one eighth as high as compound eye; frons almost square, only indistinctly wider at level of ocelli than length from posterior ocelli to lunule; fronto-facial angle slightly larger than 90°; frons bare or with few whitish setulae just posterior of lunule; general colour mat yellow, only ocellar triangle and butterfly-shaped spot on occiput dorsally of occipital foramen dark grey microtrichose; frontal and orbital plates silvery microtrichose; mid-frontal stripe weak, slightly silvery; scape whitish, pedicel brown setulose; postpedicel about 1.5 times as long as wide; arista virtually bare; palpus apically with spiny black setulae, basally whitish setulose; proboscis capitate. Chaetotaxy as in *G. apicalis*, with 2+1 frontal setae, 1+1 orbital setae, 1 white medial postocellar seta and all postocular setae whitish lanceolate.

Thorax. Colour of scutum as in *G. apicalis* mainly bluish grey microtrichose, with 3 dark-grey longitudinal stripes over lines of dorsocentral setae and in middle; dorsocentral seta aligned almost at transverse suture. Chaetotaxy as in *G. apicalis*.

Legs. Uniformly yellow, without modifications.

Wing (Figs 19-20). Veins bare except R₁ dorsally setulose; distance between crossveins 1.5 times longer than length of R-M. Pattern of "narrow-stellate type", similar to *G. apicalis*; eight rays emerge from dark-brown central area: one from pterostigma to R-M, one between two hyaline spots in r₁, two rays apically to tip of veins R₄₊₅ and M, respectively, two rays in m, one ray over DM-Cu, and one ray from R-M through dm; cell r₄₊₅ in addition to large hyaline spot at base between crossveins either uniformly dark (Fig. 19) or with 1-3 small hyaline spots (Fig. 20); cell br entirely hyaline, rarely with an indistinct brown spot distally which never occupies entire width of cell, as in *G. apicalis*; bulla comparatively narrow, clearly higher than wide.

Abdomen. As in *G. apicalis*.

Male terminalia (Figs 21-24). Epandrium and surstyli as in *G. apicalis*; phallus with unusually short, bare distiphallus barely longer than hypandrium; glans with parallel-sided, long vesica at least 15 times as long as wide; basal sclerotization small, at base with a tubelike sclerotization and apically with three toothlike projections of about the same length.

Female terminalia (Figs 25-26). Oviscape predominantly orange brown, dark brown at base and at tip, dorsally and ventrally in basal half with whitish lanceolate setulae, about as long as preceding two tergites combined; aculeus evenly pointed at tip, rather narrow; aculeus length: 0.77 mm (1 specimen checked).

BIOLOGY

No hostplants are known for this species.

AFFINITIES

This species is very similar to *G. apicalis* from Sokotra, differing only in characters indicated in the key below and the description above. The male terminalia (epandrium, glans) are very similar, and the only difference seems to be the relative length of the 3 toothlike projections of the glans (subequal in *G. octoradiata*; one tooth clearly longer in *G. apicalis*). The wing characters, however, are very constant and no

intermediate specimens are known. Therefore, the two populations are considered here to belong to two distinct species. Some remarks about the position of this species within *Goniurellia* are given under *G. apicalis*.

MODIFIED KEY FOR SPECIES OF *GONIURELLIA* HENDEL

The following key incorporates the three new species in the key of Freidberg (1980) which is modified as follows:

- 1 Wing with pterostigma hyaline, at most at distal end with narrow dark area (Fig. 2) 1a
- Pterostigma almost entirely dark coloured, extended in a broad cross-band to R-M (Fig. 11) 1c
- 1a Wing pattern distinctly reticulate, dark spot in distal half interrupted by at least 3 large hyaline spots; hyaline spot just below tip of R_{2+3} large, fused or only indistinctly separated from subapical hyaline spot (Freidberg & Kugler, 1989: plate IV, Fig. 2). Iran to Egypt (Sinai) *G. lacerata* (Becker)
- Wing with a large dark subapical area (Fig. 19) which is at most interrupted by 1-3 small hyaline spots (Fig. 20); small hyaline spot below tip of R_{2+3} separated by at least its width from subapical hyaline spot 1b
- 1b Cell br proximad R-M always with at least a pale-brown spot which is as wide as cell (Fig. 2); bulla large, almost as wide as high (Fig. 2); glans with 3 toothlike projections of which one tooth is distinctly longer (Fig. 7). Sokotra *G. apicalis* sp. n.
- Cell br entirely hyaline, at most with isolated brownish spots in distal half, which never cover the entire proximal border of R-M (Figs 19-20); bulla distinctly higher than wide (Figs 19-20); glans with 3 toothlike projections of subequal length (Fig. 24). Oman (Dhofar) . *G. octoradiata* sp. n.
- 1c Wing (Fig. 10) with only one hyaline spot in r_1 forming almost a regular triangle and reaching at least middle of r_{2+3} ; ray from R-M through dm extended to Cu_1 ; scutum yellowish grey microtrichose with indistinct brown longitudinal stripes; male: preglans area of distiphallus with a row of 6 long, black spines (Fig. 13). Oman (Muscat) . . *G. ebejeri* sp. n.
- Proximal hyaline spot in r_1 comma like, not forming a regular triangle; r_1 either with one hyaline spot restricted to this cell (*G. persignata*, see Freidberg, 1980: Fig. 8) or with small additional hyaline spot distad (other species, see Freidberg, 1980: Figs 4-7 & 9); scutum usually bluish grey microtrichose with distinct brown, longitudinal stripes; male: distiphallus without spines 2
- 2 see key of Freidberg (1980) for remaining species

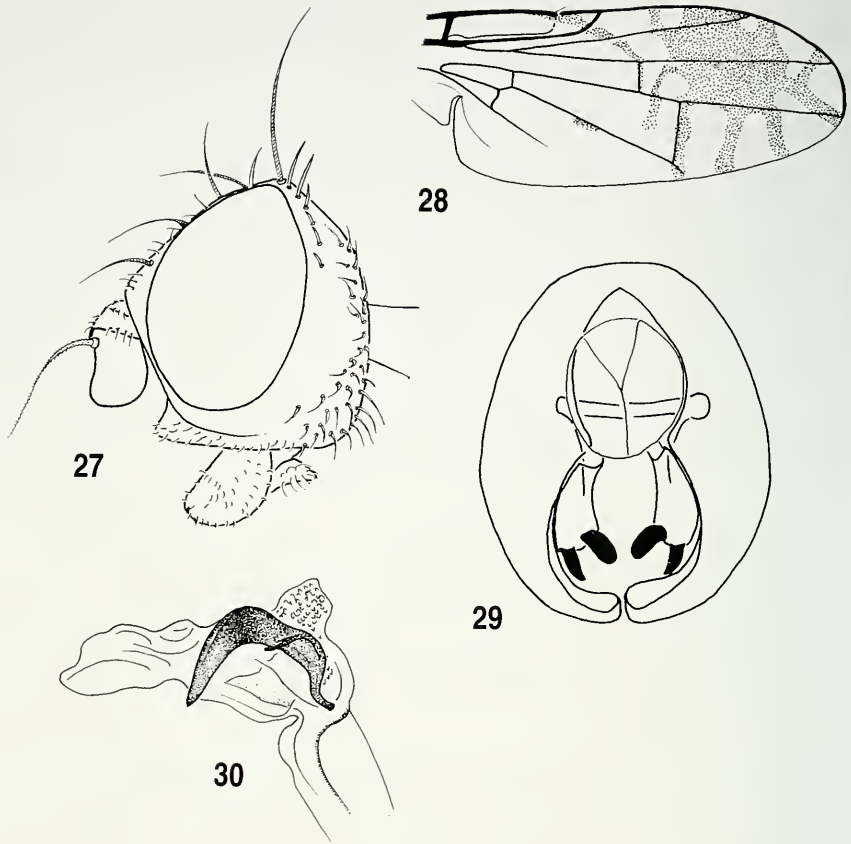
Trupanea cosmia (Schiner, 1868)

Figs 27-30

Tephritis cosmia Schiner, 1868: 269.

MATERIAL

Lectotype ♀ (designated by Hardy, 1968): "Novara-R / Madeira", "*cosmia* / Alte Sammlung", "Lectotype ♀", "Lectotype ♀ / *Tephritis / cosmia* Schiner / selected by / D. E. Hardy,



FIGS 27-30

Trupanea cosmia (Schiner, 1868): 27, head of ♀ lectotype, lateral view; 28, wing; 29, ♂, epanandrium and surstylus, caudal view; 30, ♂, tip of phallus, lateral view.

1961" (NHMW). Paralectotype ♂, "Novara-R / Madeira", "*cosmia* / Alte Sammlung", "252". The paralectotype is accompanied by 2 permanent slides which are labelled "252 / Tel-Aviv University / Dep. of Zoology / *Trupanea / cosmia* Schiner / Madeira / Paralectotype" (NHMW).

ADDITIONAL DESCRIPTION

A detailed description was provided by Schiner (1868) and Hendel (1927) and does not need to be repeated here. However, it can be complemented by the following points: Frons flat, slightly narrower at level of lunula than on level of ocellar triangle; scape with white, pedicel with black setulae; palpus in female strongly spatulate (Fig. 27), but normal in male; 2-3 concolorous frontal setae present, the anteriormost at most half as long as posterior two setae, or missing; medial postocellar seta absent; all post-ocular setae whitish lanceolate; thorax light ash grey, with indistinct dark-grey stripes over lines of dorsocentral setae and in middle; foretarsi in male broken on available specimen, therefore structure of tarsomeres not visible; wing pattern and venation as in

Fig. 28. R_{4+5} bare on both sides; abdomen densely ash grey microtrichose, covered by whitish, lanceolate setulate; male terminalia as in Figs 29-30. Medial surstylus with medial preniseta blunt and larger than acute lateral preniseta; glans of aedeagus with sclerotized hook and short vesica. Female with black oviscape about as long as preceding two tergites combined, dorsally and ventrally covered for at least three quarter by dense white, lanceolate setulae; aculeus not examined.

COMMENTS

Based on the structure of the glans and the head shape this species clearly belongs to *Trupanea* Schrank as defined by Merz (2000). The limited material examined does not allow to conclude whether the number of frontal setae (only two strong frontal setae present, anteriormost seta either weak and short or absent) is a constant character. Within the Western Palaearctic region this species may be easily separated from the congeneric species by the wing pattern with an apical fork and the presence of a narrow ray from the tip of the pterostigma to R-M.

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Über drei Arten der Gattung *Stenus* Latreille vom Balkan (Coleoptera: Staphylinidae) 272. Beitrag zur Kenntnis der Steninen

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On three species of the genus *Stenus* Latreille from the Balcans (Coleoptera: Staphylinidae). - *Stenus heydeni* L. Benick is revised and found to be a complex of 3 species, 1 taxon is revalidated (*S. simonae* Hromádka, 1979), 1 taxon described as new (*S. (Hemistenus) albanicus* sp. n.).

Key-words: Coleoptera - Staphylinidae - *Stenus* - taxonomy - Balcans.

EINLEITUNG

Zu den Balkan-Endemiten gehört die flügellose Art *Stenus heydeni* L. Benick. Nachdem mir in den letzten Jahren umfangreicheres Material dieser Spezies vorgelegt wurde, habe ich dieses genauer untersucht und dabei festgestellt, dass es sich um einen Komplex aus drei nahverwandten Arten handelt. Neben der schon genannten Spezies gehören dazu *Stenus simonae* Hromádka, der hier revalidiert wird, sowie die neue Art *Stenus albanicus* sp. n.. Es hat sich hier auch wieder gezeigt, dass es nicht ausreicht, die äußere Form des Aedoeagus zu untersuchen, stellt man doch fest, dass der Innenbau bei äußerlich gleichförmiger Gestalt artspezifisch verschieden aufgebaut sein kann.

Wie in meinen anderen Arbeiten gelten auch hier die folgenden Abkürzungen: aE = average distance between eyes, mittlerer Augenabstand; HT = Holotypus; lEl = greatest length of elytra, größte Elytrenlänge; lE = length of eyes, Augenlänge; lP = length of pronotum, Pronotumlänge; lS = length of suture, Nahtlänge; PM = proportional measurements; PT = Paratypus; wEl = greatest width of elytra, größte Elytrenbreite; wH = width of head, Kopfbreite; wP = width of pronotum, Halsschildbreite.

cP = coll. Puthz; DEI: Deutsches Entomologisches Institut, Eberswalde; FMCh = Field Museum of Natural History, Chicago; MHNG = Muséum d'histoire naturelle, Genf; MHNP = Muséum National d'Histoire Naturelle, Paris; NHML = The Natural History Museum, London; NHMW = Naturhistorisches Museum, Wien; TMB = Természettudományi Múzeum, Budapest; ZMB = Zoologisches Museum Berlin.

SYSTEMATIK

Stenus heydeni L. Benick

Stenus heydeni L. Benick, 1915: 118 ff. figs.; L. Benick, 1917: 183 f.; L. Benick, 1929: 79; Puthz, 1972: 268 fig.; Puthz, 1980a: 39 falsus; Puthz, 1980b: 365; Boháč, 1980: 85.

Material: BULGARIEN: 9 ♂♂, 10 ♀♀: Rila-Kloster, 1911, M. Hilf (Syntypen; DEI, FMCh, MHNG, NHML, NHMW, ZMB); 1 ♂: Rila 7-See, VII.1927, Fodor (TMB); 3 ♂♂: Mts. Rila, IX.1928, Biró (ZMB, cP); 1 ♂: Rila: Borovec, 17.VII.1962, P. Berou (MHNP); 2 ♂♂, 2 ♀♀: Rila Mt.: pr. Kosteneč, Čepinska Rieka, 1.IX.1966, 1. Löbl (MusBratislava, cP); 1 ♂, 2 ♀♀: Rila, 1300 m, 5.IX.1970, H. Coiffait (MHNG, NHMP); 4 ♂♂, 2 ♀♀: Rila Geb. südl. Borovec, 1800-1900 m, 18.VI.1988, Zerche & Behne (DEI, cP); 5 ♂♂, 16 ♀♀: Rila: Hütte Maljovica, 1800 m, 20.VI.1989, Zerche & Behne (DEI, cP); 5 ♂♂, 2 ♀♀: SO-Rila: Straße Belmeken-Junola, 1670 m, Fichtenwald, 18.VI.1997, Zerche & Behne (DEI, cP); 1 ♂: SW-Rila: Bistriza 780 m, Laubwald, 19.VI.1997, Zerche & Behne (DEI); 2 ♀♀: O-Rila: SW-Seite des Slavov Vrach, N-Lage 1915 m, letzte Schneereste im *Picea*-Wald, 12.V.2000, Behne (DEI); 17 ♂♂, 12 ♀♀: Tschamkorija, 1911, M. Hilf, Rambousek (zum Teil Syntypen; DEI, FMCh, MHNG, NHMW, TMB); 1 ♂, 3 ♀♀: Vitoscha, NO Aleko, 1850 m, Schneefeldrand, 3.VI.1997, Zerche (DEI); 9 ♂♂, 10 ♀♀: Vitoscha, Aleko, 1835 m, Gesiebe am Schneerand in *Picea*-Wald mit *Salix*, 3.V.2000, Zerche & Behne (DEI, cP); 1 ♂: Rodopen: Lepenitza, 8.X.1970, Coiffait (NHMP); 1 ♂: Stara Planina, Weschen, N-Seite, 1780 m, montaner Nadelwald, 6.VI.1997, Zerche & Behne (DEI); 7 ♂♂, 7 ♀♀: Stara Planina, Kom-Massiv, Mali Kom, N-Hang, 1750 m, letzte Schneeflecken zwischen einzelnen *Picea*, 17.V.2000, Zerche & Behne (DEI, cP); 1 E: Stara Planina, Vratschanska Pl., N. Druscheshi, Prochod, 840 m, N Hang, *Fagus*-Wald, 23.V.2000, Zerche & Behne (DEI); 1 ♀ (abweichend): Stara Planina, Berkovska Pl., S. Barzija, 640 m, Laubmischwald, 20.V.2000, Behne (DEI); 2 ♂♂, 2 ♀♀: Maleschavska Planina, oberhalb Gorna Bresniza, 1650 m, Senke, N-Hang, *Fagus*-Wald, Waldrand, Schneewand unter großer Buche, 8.V.2000, Zerche (DEI, cP); SERBIEN: 1 ♂: Majdanpek, F. Tax (FMCh); 1 ♀: Rtanj Planina, Breit (NHMW); 1 ♂: Rjtanj Planina, 600 m, 27.V.1984, Cl. Besuchet (MHNG); MAZEDONIEN: 1 ♀: Galičica sev str. IX.1926, Rambousek (cHromádka); 1 ♂: Galičica, *Fagus*-Gesiebe, VII.1963 (NHMW); 1 E: Galičica Planina, 1400-1600 m, 19.V.1987, Cl. Besuchet (MHNG); ALBANIEN: 1 ♂, 1 ♀: Vermosa [Vermoshi], 1200 m., 3.VI.-5.VII. 1914, Penther (NHMW, cP); 1 ♂, 1 ♀: Merdita Munela [Mirdita, Munella], 1908, Winneguth (MusSarajevo, cP).- Benick erwähnt noch (Syntypen) von Bulgarien: Vršec und Samokov.

Bemerkungen: Diese Art ist vergleichsweise weit verbreitet, sie zeichnet sich durch breiten Kopf und kurze Elytren aus (vgl. Fig. 6), ihre Punktierung ist sehr gleichmäßig, der Aedoeagus (Fig. 1) besitzt einen spatenförmigen Apex des Medianlobus, in Höhe des Ausstülpals ist er etwas weniger als doppelt so breit wie von dort bis zur Spitze lang; die inneren Ausstülpfaken sind vergleichsweise kurz, ihr proximaler Teil etwa 1,5 x so lang wie der distale Teil. Die Spermatheka (Fig. 2) besteht aus einem mehrfach gewundenen Schlauch.

Stenus simonae Hromádka spec. propr.

Stenus simonae Hromádka, 1979: 185 ff. figs.; Puthz, 1980a: 39 falsus.

Material: MAZEDONIEN: ♀-Holotypus: Korab plan. VII.1930, Rambousek (die Angabe „Dr. Jureček“ in der Originalbeschreibung stimmt nicht mit dem Etikett des Holotypus überein) (cHromádka); 1 ♂, 1 ♀: Pelister: B. Molika, Sip., 19.V.1971 (MHNG, MHNP); 2 ♂♂: Pelister: mt. Veternica, 1300-1700 m, 19.VII.1997, P. Moravec (cHromádka); 1 ♀: Pelister: Malovište mt. Široko Stapalo, 1400-1700 m, 18.BVII.1997, P. Moravec (cHromádka); 1 ♀: Jacupica: Čeplez ht mt. Šiljegarnik, 21.VII.1997, P. Moravec (cHromádka).

Beschreibung: Länge: 3,0-4,3 mm (Vorderkörperlänge: 1,6-1,7 mm).

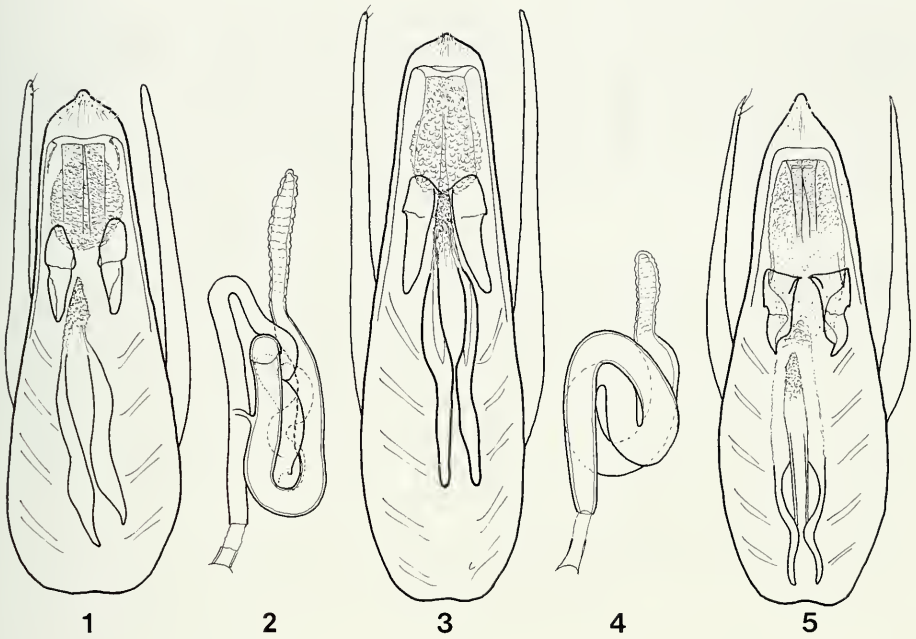


FIG. 1-5

Ventralansicht des Aedeagus (1, 3, 5) und der Spermatheka (2, 4) von *Stenus (Hemistenus) heydeni* L. Benick (Rila; 1, 2), *S. (H.) simonae* Hromádka (Malovište, 3; Jacupica, 4), *S. (H.) albanicus* sp. n. (HT, 5). Maßstab = 0,1 mm.

PM des ♀-Holotypus und des ♂ von B. Molika: wH:32 (31); aE: 18 (18); wP: 26 (26); IP: 25,5 (25,5); wEl: 33,6 (31,5); IEI: 28,5 (26); IS: 22 (22).

Männchen: Schenkel gekault, Beine sonst ohne Auszeichnungen. 8. Sternit mit kleinem, schmalem, rundem Ausschnitt etwa im hinteren Zweiundzwanzigstel. 9. Sternit apikolateral einspitzig. 10. Tergit abgerundet. A e d o e a g u s (Fig. 3), Apikalpartie des Medianlobus erheblich breiter als lang, innere Ausstülpungen ähnlich wie bei *S. heydeni*, Umriss und Proportionen jedoch verschieden (vgl. Fig. 1); Parameren deutlich länger als der Medianlobus, apikal mit zwei kurzen Borsten.

Weibchen: 8. Sternit am Hinterrand leicht stumpfwinklig vorgezogen (Abb. 8, Hromádka, 1979). Valvifer apikolateral spitz. Spermatheka (Fig. 4). 10. Tergit abgerundet.

Bemerkungen: Als ich 1980 *S. simonae* zu *S. heydeni* synonym gestellt habe, wurde der Innenbau des Aedeagus noch nicht so sorgfältig beachtet wie heute. Außerdem verfügte ich damals über ein wesentlich geringeres Material und kannte keine Männchen vom Pelister. Das mir heute vorliegende Material, das immerhin 4 Männchen enthält, hat mich von der Artberechtigung dieses *Stenus* überzeugt. Leider ist die Spermatheka des Holotypus von *S. simonae* bei der Präparation durch ihren Autor verloren gegangen und auch nur ein einziges Weibchen vom Pelister vorhanden, so dass über den auf den Fig. 2 und 4 zu sehenden Unterschied (Größe, Anzahl der Schlauchwindungen) in Bezug auf *S. simonae* nichts Endgültiges festgestellt werden kann.

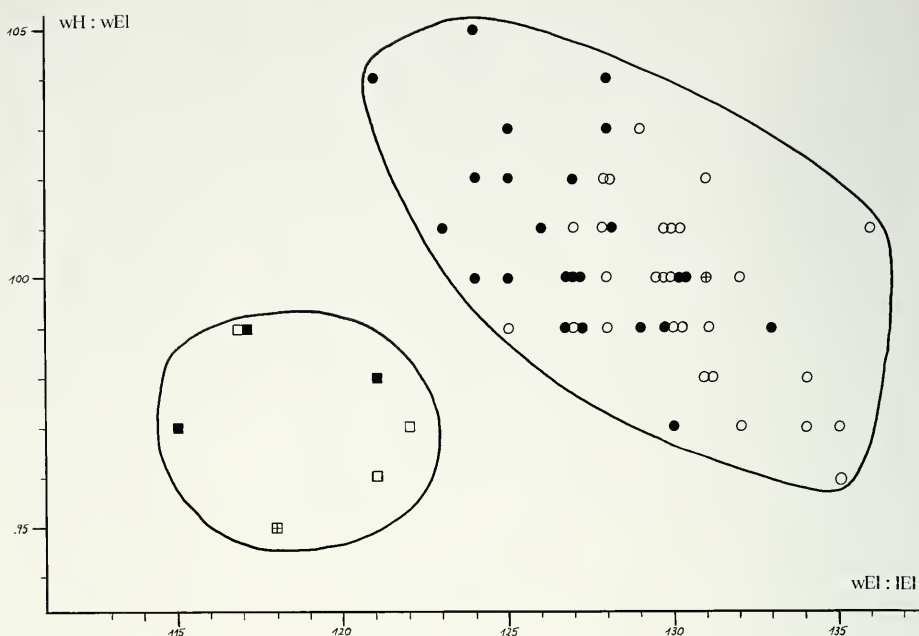


FIG. 6

Variationsbreite der Arten *Stenus heydeni* L. Benick (Kreise) und *S. simonae* Hromádka (Quadrate), offene Kreise/Quadrate = ♀♀, ausgefüllte Kreise/Quadrate = ♂♂; Kreis mit Kreuz: HT von *S. albanicus* sp. n., Quadrat mit Kreuz: HT von *S. simonae* Hromádka. Abkürzungen: s. Einleitung.

Es kann überdies nicht ausgeschlossen werden, dass die vom Korab beschriebene Art nicht möglicherweise von der des Pelister doch noch verschieden ist. Was jedoch ihre Körpergestalt angeht, so zeigen die Proportionen (Fig. 6), dass die Exemplare vom Pelister und der HT vom Korab signifikant von den vielen Stücken des *S. heydeni* aus Bulgarien, Serbien und Albanien getrennt sind.

Äußerlich lässt sich *S. simonae* nur schwer von *S. heydeni* unterscheiden: abgesehen von seiner durchschnittlich bedeutenderen Größe liegen die Differenzen nur in seinen vergleichsweise längeren Elytren und dem etwas schmäleren Kopf; sichere Skulpturunterschiede sehe ich nicht.

Stenus (Hemistenus) albanicus sp. n.

Material: ♂-Holotypus: ALBANIEN: Tumor, Buranj [Tomorica-Tal], Reitter (cP im MHNG).

Beschreibung: Länge: 2,5-3,5 mm (Vorderkörperlänge: 1,5 mm). Brachypter, schwarz mit bräunlichem Anflug, mäßig glänzend, grob und sehr dicht, aber getrennt punktiert; Beborstung deutlich, kurz, anliegend. Fühler braun, die Keule dunkler als die Basalglieder. An den Kiefertastern das 1. Glied und die Basis des 2. Gliedes gelblich, der Rest gebräunt. Beine hellbraun, die Knie wenig dunkler. Clypeus und Oberlippe dunkelbraun, ziemlich dicht beborstet.

PM des HT: wH: 27,5; aE: 16; wP: 21,3; IP: 21,3; wEl: 27,5; IEl: 21; IS: 17,5.

Männchen: Beine ohne Auszeichnungen. 8. Sternit mit schmalem Apikalausschnitt etwa im hinteren Achtzehntel. 9. Sternit apikolateral einspitzig. 10. Tergit abgerundet. A e d o e a g u s (Fig. 5), die Apikalpartie des Medianlobus fast so lang wie am Ausstülpsspalt breit, innere Ausstülpfaken mit eckig-spitzem Umriss; Parameren so lang wie der Medianlobus, apikal verdünnt, mit 2 kurzen apikalen Borsten.

Weibchen: unbekannt.

Bemerkungen: Wie Fig. 6 zeigt, fällt die neue Art mit ihren Proportionen in die Variationsbreite des *S. heydeni*. Sie lässt von ihm auch äußerlich kaum unterscheiden, lediglich ihre Vorderkörperpunktierung ist – wenn man das einzige vorliegende Exemplar berücksichtigt – etwas tiefer eingestochen und etwas dichter als bei den meisten Stücken des *S. heydeni* und des *S. simonae* (bei *S. heydeni* wirkt die Vorderkörperplastik, vor allem die der Elytren, „ordentlicher“, die Punktzwischenräume sind flacher, etwas größer, deutlicher, die Punkte überwiegend rund, während bei der neuen Art die Punkte der Elytrenscheibe lang-ausgezogen/oval erscheinen und ihre hintere Begrenzung undeutlicher als die seitliche erscheint). Der zentrale Artunterschied liegt im Innenbau des Aedoeagus: seine Ausstülpfaken zeigen eine ganz andere Gestalt als die des *S. heydeni* (Fig. 1) und die des *S. simonae* (Fig. 3).

BESTIMMUNGSSCHLÜSSEL

Kleine, wenig glänzende Arten, Vorderkörper durchschnittlich 1,5-1,7 mm lang; Beine hell-bräunlich, Knie nicht auffallend dunkler; Stirn mit deutlichen Längsfurchen und deutlich erhobenen Mittelteil; Fühler kurz, zurückgelegt nicht den Hinterrand des Pronotums erreichend; Pronotum (gut) so breit wie lang; brachypter, Elytren trapezoid, Schultern abgerundet, Seiten stark nach hinten erweitert; Abdomen mit breiter Seitenrandung, diese so breit wie die Hinterschienen an ihrer Basis; 9. Sternum apikolateral mit spitzem Zahn; Pronotum und Elytren höchstens mit flachen Unebenheiten; Punktierung grob, sehr dicht, überall getrennt, Punktzwischenräume genetzt:

- 1 (4) Kopf breiter (wH:wEl = 0,96-1,05), Elytren breiter/kürzer (wEl:IEl = 121-136) (Fig. 6)
- 2 (3) ♂: Aedoeagus (Fig. 5), Ausstülpfaken distal eckig. ♀ unbekannt. 2,5-3,5 mm *albanicus* sp. n.
- 3 (2) ♂: Aedoeagus (Fig. 1), Ausstülpfaken distal rundlich. ♀: Spermatheka (Fig. 2). 2,7-3,4 mm *heydeni* L. Benick
- 4 (1) Kopf schmaler (wH:wEl = 0,95-0,99), Elytren schmaler/länger (wEl:IEl = 115-127) (Fig. 6). ♂: Aedoeagus (Fig. 3), Ausstülpfaken distal rundlich, Parameren deutlich länger als der Medianlobus. ♀: Spermatheka (Fig. 4). 3,0-4,3 mm *simonae* Hromádka

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Descriptions of two new dermestid beetles (Coleoptera: Dermestidae) from Syria and Israel

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Descriptions of two new dermestid beetles (Coleoptera: Dermestidae) from Syria and Israel. - *Dermestes (Dermestinus) loebli* sp. n. from Syria and Israel and *Dermestes (Dermestinus) sardous asiaticus* ssp. n. from Syria are described, illustrated and compared with related taxa.

Key-words: Coleoptera - Dermestidae - *Dermestes* - Taxonomy - Syria - Israel.

INTRODUCTION

The genus *Dermestes* Linnaeus, 1758 is one of the commonly known beetle taxa, because of its synanthropic members which may be important economic pests. The subgenus *Dermestinus* Zhantiev, 1967 includes 33 zoonecrophagous species or subspecies in Mediterranean area. Nevertheless, the knowledge of the group is not yet adequate, as shown in my previous papers (Háva, 1999; Háva & Kalík, 1999). Additional new species and new subspecies from Israel and Syria are described in the present paper.

Following acronyms refer to collections in which the examined material is deposited:

JHAC - Private collection of Jiří Háva, Praha, Czech Republic

MCSN - Museo Civico di Storia Naturale "G. Doria", Genova (R. Poggi), Italy

MHNG - Muséum d'histoire naturelle, Genève (I. Löbl), Switzerland

Dermestes (Dermestinus) loebli sp. n.

Figs 1, 13

Holotype (male): Syria, Dar'á, Balie, 1.iv.1999, Ziani lgt. (MCSN).

Paratypes (1 male, 1 female): same data as holotype (JHAC, MCSN); (2 females): Syria centr., Palmyra, 34°33'N 38°16'E, 250 m., 22-24.vi.1998, P. Kabátek lgt. (MHNG, JHAC); (1 female): Syria bor., Halabiyyeh, 35°41'N, 39°49'E, 160 m., 17-18.vi.1998, P. Kabátek lgt. (JHAC); (1male, 1 female): Israel, Galilée, près de Maghar, 25.v.1973, I. Löbl lgt. (MHNG, JHAC).

Description. Male. Body black, oval, convex. Body length 6.4-8.1 mm. Body width 2.5-3.1 mm. Cuticle black, pubescence coloured. Head with brown and long pubescent, antennae 11 segmented with antennal club consisting of three segments,

brown and with light yellow setae. Maxillary palpi brown. Pronotum with long brown and intermixed black pubescence. Brown pubescence forming two lateral bands; one central and one basal. Scutellum triangular, with long yellow pubescence. Elytra with marble consisting of brown and black pubescence. Legs brown with light brown pubescence. Ventral part of body covered with brown and white pubescence. Abdominal sternites with exception of the last sternite (Fig. 13) white, each with clearly delimited lateral, triangular, black spot. Sternites III and IV each with a median bunch of erect, yellow setae oriented posteriad. Last sternite black, with two sublateral patterns of white pubescence (Fig. 13). Male genitalia as in (Fig. 1).

Female. Similar to male; abdominal sternites III and IV without a bunch of erected yellow setae oriented posteriad.

Differential diagnosis. *Dermestes (Dermestinus) loebli* sp. n. is very similar to *D. (Dermestinus) intermedius intermedius* Kalík, 1951, *D. (Dermestinus) intermedius iranicus* Háva & Kalík, 1999, *D. (Dermestinus) kaszabi* Kalík, 1950 and *D. (Dermestinus) mustelinus* Erichson, 1848. In particular, it shares with them the setal pattern of the pronotum, elytra and abdomen. The main external morphological differences are shown in the table 1.

TABLE 1
External morphological differences of *Dermestes loebli* sp.n. and related species.

	<i>D. intermedius</i> Kalík	<i>D. kaszabi</i> Kalík	<i>D. mustelinus</i> Erichson	<i>D. loebli</i> sp. n.
Pubescence of V visible abdominal sternite	Black, with two sublateral patterns of white pubescence (Fig. 14)	Black, with two small patterns of white pubescence at anterior part (Fig. 15)	Black, with two sublateral patterns of white pubescence (Fig. 16)	Black, with two sublateral patterns of white pubescence (Fig. 13)
Male genitalia	Figs 2-4	Figs 5-8	Figs 9-10	Fig. 1

Distribution. Syria, Israel.

Etymology. Named in honour of my friend Ivan Löbl (MHNG), who was the first to find this species.

Dermestes (Dermestinus) sardous asiaticus ssp. n.

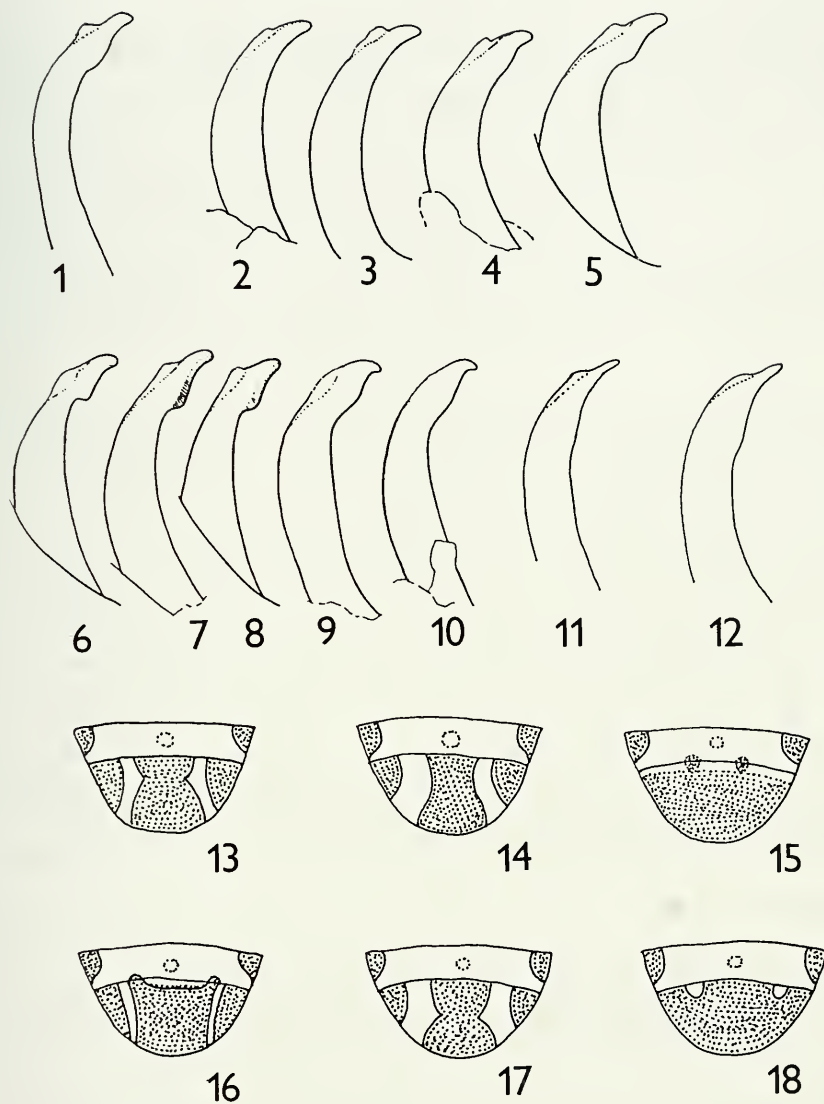
Figs 11, 17

Holotype (male): Syria, Dar'á, Balie, 1.iv.1999, Ziani lgt. (MCSN).

Paratypes (3 males, 4 females): same data as holotype (MCSN, JHAC); (1 female): Syria occ., Al Moshahda, Homs distr., near Qattinah lake, 2.v.2000, P. Kresl lgt. (JHAC).

Description. Male. Body black with intermixed yellow, white and black pubescence; body length 6.1-8.2 mm, body width 2.8-3.5 mm. Is distinguished from the nominotypical subspecies by the pubescence of the last exposed abdominal sternite (Fig. 17). The aedeagus is very narrow (Fig. 11). All other morphological characters are as in the nominotypical subspecies.

Female. Similar to the male; abdominal sternites III and IV without a bunch of erected yellow setae oriented posteriad.



FIGS 1-18

Male genitalia: 1 - *D. (Dermestinus) loebli* sp. n.; 2-3 - *D. (Dermestinus) intermedius intermedius* Kalík, 1951; 4 - *D. (Dermestinus) intermedius iranicus* Háva & Kalík, 1999; 5-8 - *D. (Dermestinus) kaszabi* Kalík, 1950; 9-10 - *D. (Dermestinus) mustelinus* Erichson, 1848; 11 - *D. (Dermestinus) sardous asiaticus* ssp. n.; 12 - *D. (Dermestinus) sardous sardous* Küster, 1846 and *D. (Dermestinus) sardous fulvofasciatus* Ganglbauer, 1904. Pubescence on fourth and fifth visible abdominal sternites: 13 - *D. (Dermestinus) loebli* sp. n.; 14 - *D. (Dermestinus) intermedius intermedius* Kalík, 1951 and *D. (Dermestinus) intermedius iranicus* Háva & Kalík, 1999; 15 - *D. (Dermestinus) kaszabi* Kalík, 1950; 16 - *D. (Dermestinus) mustelinus* Erichson, 1848; 17 - *D. (Dermestinus) sardous asiaticus* ssp. n.; 18 - *D. (Dermestinus) sardous sardous* Küster, 1846 and *D. (Dermestinus) sardous fulvofasciatus* Ganglbauer, 1904. (All figures schematic; dotted area = black pubescence).

Differential diagnosis. *Dermestes (Dermestinus) sardous asiaticus* ssp. n. is similar to the nominotypical subspecies. Main morphological differences are shown in the table 2.

TABLE 2
External morphological differences of subspecies of *Dermestes sardous* Küster.

	<i>D. sardous sardous</i> Küster	<i>D. sardous fulvofasciatus</i> Ganglbauer	<i>D. sardous asiaticus</i> ssp. n.
Pubescence on elytra	Intermixed of yellow, white and black pubescence	Intermixed of yellow, white and black pubescence, with one or two sublateral fascia with yellow pubescence	Intermixed of yellow, white and black pubescence
Pubescence on V visible abdominal sternite	Black, with two small patterns of white pubescence at anterior part (Fig. 18)	Black, with two small patterns of white pubescence at anterior part (Fig. 18)	Black, with two sublateral patterns of white pubescence (Fig. 17)
Distribution	S Europe, N Africa	Egypt, Algeria, Morocco	Syria

Distribution. Syria.

Etymology. The names refers to the distribution of the new subspecies.

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A new subspecies of *Barbastella barbastellus* (Mammalia: Chiroptera: Vespertilionidae) from the Canary islands

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A new subspecies of *Barbastella barbastellus* (Mammalia: Chiroptera: Vespertilionidae) from the Canary islands. - A new subspecies of the Western barbastelle, *Barbastella barbastellus*, is described herein from the Canary islands. This new taxon, found so far only in the islands of Tenerife and La Gomera, is morphologically distinguishable by a blackish chestnut dorsal fur, which is uniformly coloured with no grizzling shades, and by a whitish U-shaped hairy line on the lower border of the ventral side. The new subspecies seems ecologically linked to pine forest habitats and to areas that were originally occupied by the laurel forest. The endemic taxon is considered among the rarest and most endangered bat of the Canary islands and a specific programme to determine precisely population trends and habitat requirements is urgently required to establish an effective conservation strategy of the remaining populations.

Key-words: Bat - Chiroptera - *Barbastella* - new subspecies - Canary islands.

INTRODUCTION

Barbastella is a Palaearctic vespertilionid genus of bat widely distributed in Eurasia from the Atlantic to the Pacific coasts and North Africa (Koopman, 1993). Two allopatric species are at present recognized by most authors: the Western barbastelle, *B. barbastellus*, and the Eastern barbastelle, *B. leucomelas*, that are separated by a fuzzy line running along the Caucasus and Turkey (Koopman, 1993; Rydell & Bogdanowicz, 1997). This taxonomic arrangement is however open to question (Benda & Horáček, 1998; Horáček *et al.*, 2000) since the main morphological difference (a notch in the outer border of the ear) is quite variable, even within each species (Hackethal *et al.*, 1988; Kock, 1969; Qumsiyeh, 1985). On the other hand, some skull differences recently described between the two forms would support a specific distinction between these western and eastern barbastelles (Harrison & Makin, 1988; Harrison & Bates, 1991) but again these characters are variable (Horáček *et al.*, 2000). The western form *B. barbastellus* is considered as monotypic and is distributed mainly in Europe east to

the Caucasus with isolated populations in Morocco and the Canary islands (Rydell & Bogdanowicz, 1997). An old citation from Senegal (Rochebrune, 1883) is doubtful. *Barbastella barbastellus* is known from the Canary islands since Cabrera (1904). This old record was overlooked until recent revisions of the bat fauna of the Canary archipelago (Ibáñez & Fernández, 1985; Trujillo, 1991).

We have had the opportunity to examine a total of 42 specimens of *Barbastella* collected from different localities of the Canary islands during several years, and have consistently found unique external morphological features which distinguishes them from other barbastelles. Reference museum specimens of *B. barbastellus* from different localities from both Africa and Europe have been examined and compared with those from the Canaries. External (forearm) and skull measurements were obtained with dial calliper to a precision of 0.1 mm and compared among populations. Although no significant difference were found in measurements (see Tables 1 and 2), some external characters found in the island populations have not been found in other specimens. Therefore the populations found on the Canary islands are distinct from any continental barbastelle and described herein as a new subspecies of *B. barbastellus*.

The following abbreviations are used: EBD = Estación Biológica de Doñana, Sevilla, Spain; MNCN = Museo Nacional de Ciencias Naturales, Madrid, Spain; MNH = Museo de La Naturaleza y El Hombre, Santa Cruz de Tenerife, Spain; MHNG = Muséum d'histoire naturelle de Genève, Switzerland; ULL = Universidad de La Laguna, Tenerife, Spain; DT = Private collection of Domingo Trujillo, CC = Private collection of Carlos Camacho.

DESCRIPTION

Barbastella barbastellus guanchae ssp. n.

Figs 1-2

Type material: Holotype: (MNH 109), adult ♂ from 'Barranco de La Cantera', La Guancha (Tenerife island) (UTM 28RCS3840, 300 m a.s.l.), collected 1 September 1987 by D. Trujillo. Paratypes: (EBD 16024, 16028 and MNH 111, 110), 3 ♀♀ and 1 ♂ from Agulo, La Gomera island collected between 15 and 20 September 1987 by D. Trujillo, C. Ibáñez and R. Barone.

Diagnosis: Dorsal fur blackish chestnut with individual hairs coloured uniformly. Ventral fur greyish chestnut, also uniformly coloured except for a noticeable whitish U-shaped strip that extends through the flanks and proximal wing and tail membranes (Figs 1 and 2).

Description: Dorsal fur uniform blackish chestnut. Since the individual hairs are uniformly coloured, the fur lacks the grizzling shade typically found in the mainland specimens. Ventrally, the fur is paler brown and hairs show whitish tips. A whitish band stretches along the flanks and the inner hairy parts of the wing and tail membranes (Figs 1 and 2). The colour of the band is distinct from the colour of the central part of the belly and it is an outstanding feature that was clearly noticeable in 40 out of the 42 specimens studied from the Canaries. It was also present in the remaining 2 specimens, although in a more blurry way. Twenty-nine out of 34 individuals studied for ear characters (Hackethal *et al.*, 1988) showed a notch in the outer edge of both ears; this notch was present in only one ear in 4 specimens and only 1 individual had the notch missing in both ears.



FIG. 1

A live specimen of the endemic *Barbastella barbastellus guanchae* ssp. n. from La Gomera (Canary islands), showing its characteristic (and diagnostic) blackish, uniform dorsal colour.

Measurements: Average values for populations from the Canary islands are given by sex in Table 1. Measurements of the holotype (in mm) are: forearm length: 39.0; greatest length of the skull: 14.0; condylobasal length: 13.3; zygomatic breadth: 7.2; C-M³ length: 4.5; M³-M³ breadth: 5.5; interorbital breadth: 3.7.

Etymology: the name refers to the village of La Guancha, up in the north of the island of Tenerife where the holotype was collected.

Distribution: It is known only from the islands of Tenerife and La Gomera (Fig. 3), but its presence is still possible in other western islands (e.g. La Palma).

Habitat: The new *B. b. guanchae* has been found in the islands along a wide altitudinal belt ranging from 20 to 1,380 m a.s.l. Interestingly, 14 out of the 15 known localities are located in the north-facing slopes, which are the wettest and more forested areas of the islands (Fig. 3). Barbastelles have been netted in habitats varying from scattered cultures in wooded areas (4 times) to well preserved pine and laurel forests (4 and 3 times respectively). We postulate that the original forests of the islands would have yielded a suitable habitat for that species, as it corresponds to mainland habitat of *B. barbastellus* (Rydell & Bogdanowicz, 1997; Urbańczyk, 1999).

Comparison with continental Barbastella: When compared externally with other related forms of barbastelles the dorsally uniform colour of *B. b. guanchae* is outstanding. In all detailed descriptions of *B. b. barbastellus* (e.g. Miller, 1912) as well as in all the mainland specimens examined by us, and even in the descriptions of *B. leucomelas* (e.g. Harrison & Makin, 1988; Harrison & Bates, 1991; Bates & Harrison,

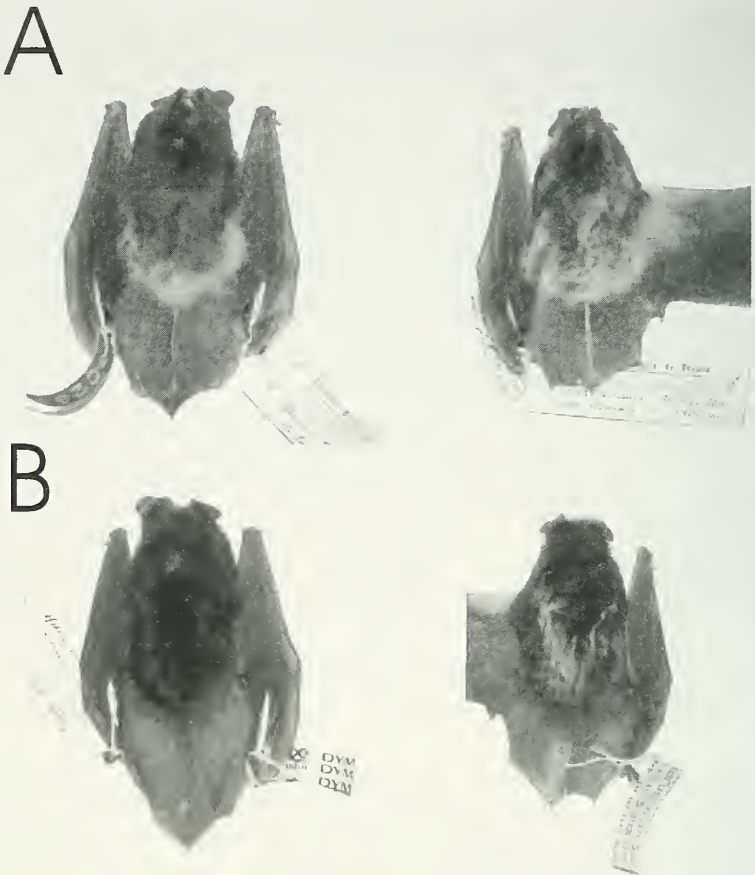


FIG. 2

Comparison of *Barbastella barbastellus guanchae* ssp. n. (left) from the Canary islands and *B. b. barbastellus* (right) from the Iberian Peninsula. A) ventral view B) dorsal view.

1997), the dorsal fur of barbastelles is described as typically having grizzling shades due to the whitish tips of the hairs (Fig. 2). Ventrally, both *B. b. barbastellus* and *B. leucomelas* show a more variable colour with whitish hairs sparse or grouped but never making the U-shaped strip so clearly defined as in *B. b. guanchae* (Fig. 2). A high percentage of individuals showing a notch in one or both ears is also characteristic in the European population of *B. barbastellus*, being much less frequent in the species *B. leucomelas* (Harrison & Makin, 1988; Bates & Harrison, 1997; Benda & Horáček, 1998). All populations show significant sexual dimorphism in forearm length, as it is characteristic in other vespertilionid bats (Myers, 1978). There are no significant differences in forearm length between any island population and continental ones (Table 2) even when they are pooled as a single island population (Table 3). Skulls of *B. b. guanchae* are morphologically more similar to those of *B. b. barbastellus* as

TABLE 1. External and skull measurements of specimens of *Barbastella barbastellus* s. l. Abbreviations: FA = Forearm length; GLS = Greatest length of the skull; CBL = Condylbasal length; ZW = Zygomatic width; CM³ = length from the upper canine to the upper third molar; M³-M³ = Width between upper third molars. SD = Standard deviation; n = sample size; Min = Minimum value; Max = Maximum value.

Mean \pm 1SD n Min - Max	<i>B. b. guanchae</i>		<i>B. b. barbastellus</i>			
	CANARY ISLANDS		MOROCCO		EUROPE	
	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀
FA	39.0 \pm 0.71 21 37.2 - 40.1	40.7 \pm 0.78 16 38.9 - 42.0	38.4	40.1	39.0 \pm 0.83 30 37.2 - 40.9	40.1 \pm 0.96 22 38.3 - 41.8
GLS	14.0 \pm 0.08 3 13.9 - 14.1	14.1 \pm 0.12 5 13.9 - 14.2	13.8	13.9	13.7 \pm 0.29 3 13.4 - 13.9	14.1 \pm 0.17 5 13.9 - 14.4
CBL	13.1 \pm 0.28 3 12.8 - 13.4	13.4 \pm 0.18 5 13.1 - 13.6	12.9	13.1	13.1 \pm 0.46 3 12.8 - 13.6	13.4 \pm 0.09 5 13.3 - 13.5
ZW	7.3 \pm 0.10 3 7.2 - 7.4	7.5 \pm 0.20 5 7.2 - 7.7	7.2	7.5	7.3 \pm 0.11 3 7.2 - 7.4	7.6 \pm 0.11 5 7.4 - 7.7
CM ³	4.5 \pm 0.18 3 4.3 - 4.7	4.6 \pm 0.07 5 4.5 - 4.7	4.6	4.5	4.6 \pm 0.11 3 4.5 - 4.7	4.6 \pm 0.16 7 4.4 - 4.8
M ³ - M ³	5.5 \pm 0.07 3 5.4 - 5.5	5.5 \pm 0.11 5 5.4 - 5.6	5.3	5.3	5.3 \pm 0.17 3 5.1 - 5.4	5.6 \pm 0.08 7 5.4 - 5.7

concerns the well developed supraoccipital flange of the mastoid region, when compared that of *B. leucomelas* (Harrison & Makin, 1988). Skull measurements showed similar average values among populations of *B. b. barbastellus* (Table 1), but the significance of differences could not be tested because of small sample sizes. The new subspecies *B. b. guanchae* shows also similar skull measurements with specimens of *B. leucomelas* from Arabia (Harrison & Bates, 1991), but are slightly smaller than those from the Caucasus/Himalayas area (Bates & Harrison, 1997; Benda & Horáček, 1998).

Specimens examined (type material included): *B. b. guanchae*: The Canary Islands: 1 ♂ (MNCN 542) without locality; 2 ♂♂ (MNH 110, CC without number), 3 ♀♀ (EBD 16024, 16028, MNH 111), 1? (CC without number), La Gomera; 1 ♀?, (ULL without number); 1 ♂, (MNH 109), Tenerife. *B. b. barbastellus*: Morocco: 1 ♂ (EBD 25851), Azrou; 1 ♀ (EDB 8970), Chechaouen. Belgium: 2 ♂♂ (MHNG 1710.5-1710.6), without locality. France: 2 ♂♂ (MHNG 874.55/1-874.55/2), 2 ♀♀ (MHNG 874.55/3-874.55/4), Alsace; 2 ♂♂ (MHNG 1710.26, MHNG 1493.28), 2 ♀♀ (MHNG 975.95, MHNG 1493.27), Haute-Savoie. Germany: 1 ♀ (MNCN 541), Berlin. Iberia: 1 ♂ (EBD 9262), Cantabria; 1 ♀ (EBD 9765), Guadalajara; 1 ♂ 1 ♀ (DT), Huesca; 1 ♂ (MNCN 543) Madrid; 1 ♀ (MNCN 544) Orense; 1 ♂ (MNCN 546), 1 ♀ (MNCN 545), 3 ?? (MNCN 547-549) Salamanca; 2 ♂♂, 1 ♀ (MNCN 550-552) Segovia; 1 ♂ (EDB 15981), 1 ♀ (EBD 18288), La Rioja; 2 ♂♂ (DT), 1 ♀ (DT), Zaragoza. Switzerland:

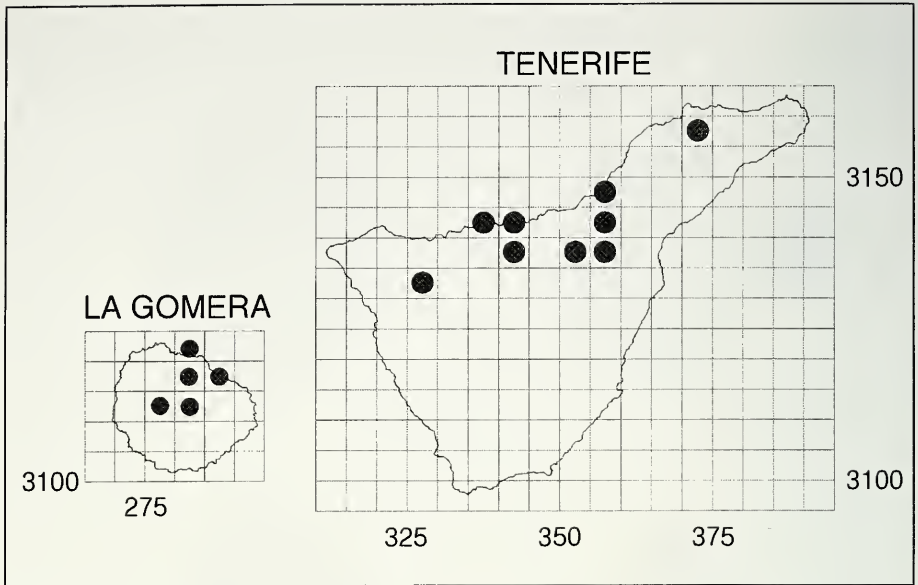


FIG. 3

All known collecting localities of the endemic *Barbastella barbastellus guanchae* in a 5 x 5 km UTM grid map of Tenerife and La Gomera (Canary islands).

TABLE 2. ANOVA test for differences in forearm length between sex and localities of barbastelle populations. Localities were Tenerife and La Gomera (Canary islands), Morocco and Europe.

Source	DF	F value	P
LOCALITY	3	2.339	.0795
SEX	1	21.457	< .0001
LOCAL*SEX	3	1.096	.3557

TABLE 3. ANOVA test for differences in forearm length between sex and localities, but grouping the islands as a single population (Canary islands vs Morocco vs Europe).

Source	DF	F Value	P
LOCALITY	2	1.456	0.2390
SEX	1	13.174	0.0005
LOCAL*SEX	2	1.698	0.1893

2 ♂♂ (MHNG 1043.93-1043.94), 5 ♀♀ (MHNG 1043.88-1043.91, MHNG 1804.094), Valais; 13 ♂♂ (MHNG 986.86-986.89, MHNG 1709.91-1709.96, MHNG 1710.1, MHNG 1710.7, MHNG 1709.89), 8 ♀♀ (EBD 9904-9905, MHNG 986.82-986.83, MHNG 1709.90, MHNG 1710.8, MHNG 1710.2-1710.3), Vaud. Additionally, 24 specimens from the Canary Islands (18 from Tenerife and 6 from La Gomera), and 17 from the Iberian Peninsula (11 from Zaragoza, 4 from Huesca and 2 from La Rioja) were captured, measured, checked for morphological characters (dorsal and ventral fur, and ear notch) and finally released.

COMMENTS

B. barbastellus is one of the rarest bat in Europe (Urbańczyk, 1999). It becomes even scarcer in the southern half of the Iberian Peninsula, being at present known only from three localities (Ibáñez *et al.*, 1992). This trend is also found in Morocco, where it has been cited only from three localities, all from mountains of the Rif (Ibáñez, 1988), the Middle Atlas (Panouse, 1956) and the southern Grand Atlas (Fonderflick *et al.*, 1998). Therefore, it seems that the distribution in both Iberia and Morocco is highly fragmented. We suspect that the populations from the Canary islands are also highly isolated from continental populations. Moreover the species has not been found in the eastern islands of the Canary archipelago, which are closer to the mainland. Ongoing molecular analyses on these populations will help clarify this point. The bat fauna of the Canary islands shows clear Mediterranean affinities, although it supports endemic components like *Plecotus teneriffae* and *Pipistrellus maderensis*, the last is shared with the Madeira archipelago (Ibáñez & Fernández 1985). The remaining species (*Pipistrellus kuhlii*, *Hypsugo savii*, *Nyctalus leisleri* and *Tadarida teniotis*) have not yet been examined carefully and some of them may need taxonomic revision. In fact, Ellerman & Morrison-Scott (1966) have already considered the populations of *H. savii* as to be differentiated at the subspecific level (*H. s. darwini*).

Conservation status: According to the small number of known observations and localities, *B. b. guanchae* can be considered the rarest species of the bat fauna of the Canary islands at present (Trujillo unpubl. data). This situation could be in part due to the loss of suitable habitats since the original forests have been fragmented and reduced due to agricultural and other human activities. Its historical status could have been worsened by the intense usage of DDT in the islands during the fifties to fight against the African locust (*Schistocerca gregaria*). Studies on size of populations and ecological requirements of this new taxon are urgently required to allow the design of effective short- and long-term measures to assure its conservation.

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**A note on *Acanthodactylus guineensis* (Boulenger, 1887)
(Sauria: Lacertidae)**

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A note on *Acanthodactylus guineensis* (Boulenger, 1887) (Sauria: Lacertidae). - Despite the recently considerably increased knowledge of the distribution range of *Acanthodactylus guineensis*, scalation characters of all available specimens (67 specimens) of this rare lacertid lizard reveal no geographically correlated variation. *A. guineensis*, ranging from Mali to Cameroon, has to be regarded as monotypic. A lectotype is designated for *Eremias benuensis* Monard, 1949, a synonym of *A. guineensis*.

Key-words: Lacertilia - Lacertidae - *Acanthodactylus guineensis* - distribution - morphology - West Africa.

INTRODUCTION

In a recent paper, Böhme *et al.* (1996) recorded the West African subsaharan lacertid *Acanthodactylus guineensis* (Boulenger, 1887) for the first time from Burkina Faso and Mali (Fig. 1). This was a considerable extension of the known distribution range, as this species was formerly known only from Ghana, Nigeria (Salvador, 1982), Cameroon (Monard, 1949, 1951), and from Niger (Papenfuss, 1969) (see also Szczerbak, 1975). Its nomenclatural history (synonyms and main chresonyms) can be summarized as follows:

- 1887 *Eremias guineensis* Boulenger, Ann. Mag. nat. Hist. (5) 20, p. 51. Type locality: Brass, mouth of the Niger.
- 1918 *Eremias* ("Section" *Taenieremias*) *guineensis* - Boulenger, J. zool. Res. 3, p. 4.
- 1921 *Eremias* ("Section" *Taenieremias*) *guineensis* - Boulenger, Monogr. Lacertidae, II, p. 256, 257.
- 1949 *Eremias* (*Taenieremias*) *benuensis* Monard, Revue suisse Zool. 56 (38), p. 737. Type locality: Ngaouyanga and Bangouvé, Northern Cameroon (syn. after Szczerbak, 1975: 41).
- 1951 *Eremias* (*Taenieremias*) *benueensis* (sic) - Monard, Mém. Inst. franç. Afr. Noire, (Sci. nat.) 1, p. 135.
- 1967 *Eremias guineensis* - Dunger, Niger. Field 32 (3), p. 122.
- 1969 *Eremias guineensis* - Papenfuss, Wasmann J. Biol. 27, p. 296.
- 1975 *Taenieremias guineensis* - Szczerbak, Katal. afrik. jaszczurok, p. 41 (new combination).

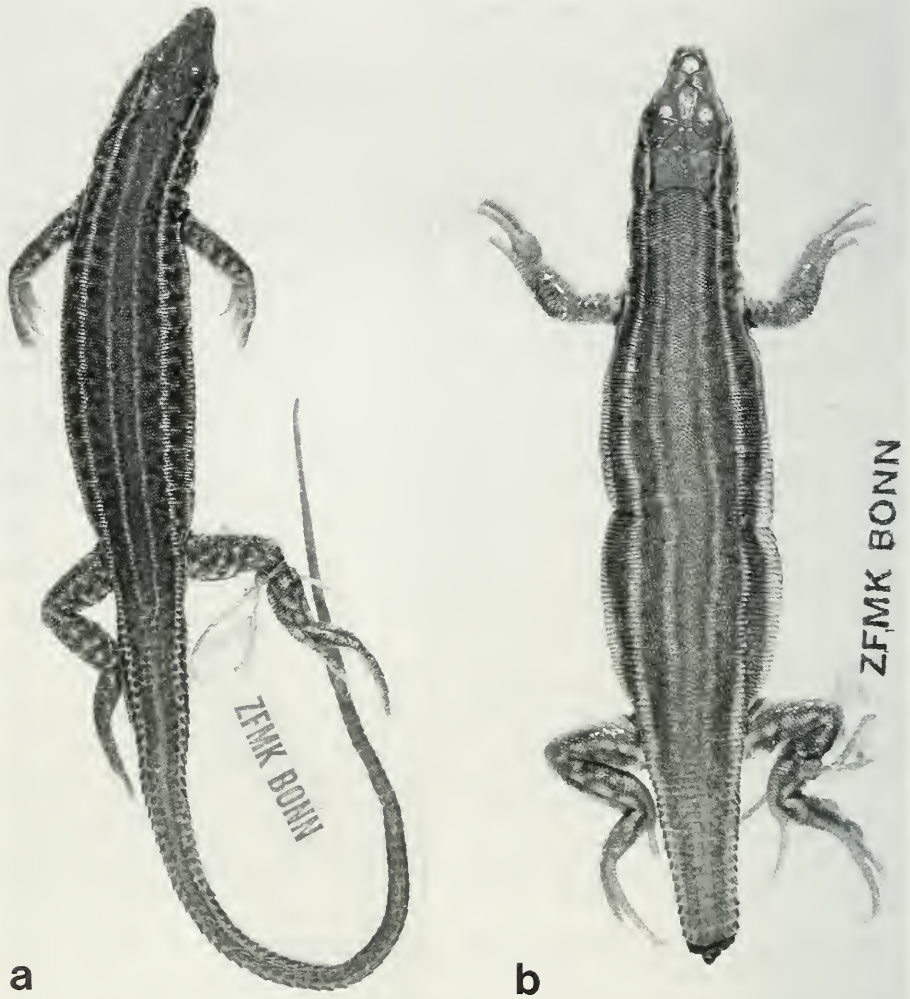


FIG. 1

The voucher specimens for the occurrence of *Acanthodactylus guineensis* in Burkina Faso (a: Daroha, ZFMK 38720) and Mali (b: Bandiagara, ZFMK 51176).

1982 *Acanthodactylus guineensis* - Salvador, Bonn. zool. Monogr. 16, p. 77 (new combination).

Two comments have to be made on this brief synonymy/chresonymy list:

1. The original spelling of the synonymous (fide Szczerbak, 1975) nominal taxon from Cameroon is (though linguistically incorrect) *benuensis* (see Monard, 1949: 737). The linguistically correct spelling *benueensis* was used by Monard (1949) in the subsequent pages, and constantly also in his second Cameroon paper (Monard, 1951: 135).

2. The type locality of *E. (T.) benuensis* is not, as stated by Papenfuss (1969), Ngaouyanga only, but (implicitly) Ngaouyanga and Bangouvé. This is due to the fact that a holotype had not been designated by Monard (1949). Hence, his series has to be considered as syntypic. As one specimen (his no. 998, female) has been described in detail, it is here designated as the lectotype. Originally deposited in the Musée d'histoire naturelle in La Chaux-de-Fonds (Switzerland), it is currently kept at the Muséum d'histoire naturelle in Geneva under MHNG 1055.62. Four remaining syntypes (currently paralectotypes), all from Ngaouyanga, are deposited at the Musée d'histoire naturelle in La Chaux-de-Fonds (MHNC 91.1005-8). Two remaining syntypes (currently paralectotypes) of the original series are missing and apparently lost.

The present note aims to summarize the distributional information on this species and to compare the available specimens from museum collections in regard to the variability of their morphological characters.

MATERIAL AND METHODS

A total of 67 specimens, deposited in the following collections, was examined:

- Zoologisk Museum, University of Copenhagen (ZMUC): 36 specimens (all from Nigeria);
- The Natural History Museum, London (BM): 22 specimens (17 from Nigeria, 5 from Ghana);
- Muséum d'histoire naturelle, Geneva (MHNG): 1 specimen (Cameroon);
- Zoologisches Forschungsinstitut und Museum A. Koenig, Bonn (ZFMK): 4 specimens (3 from Burkina Faso, 1 from Mali);
- Musée d'histoire naturelle, La Chaux-de-Fonds (MHNC): 4 specimens (all from Cameroon).

These specimens were checked with regard to 10 scale characters that have proven to be relevant in *Acanthodactylus* taxonomy (cf. Salvador, 1982): (1) ventral scales at midbody, (2) ventral scales from collar to anal shield, (3) dorsal scales at midbody, (4) scales under the 4th toe, (5) scales around finger, (6) femoral scales, (7) supraocular shields, (8) prefrontal shields, (9) nasal scales, and (10) supralabial scales anterior to subocular. Moreover, the locality data of these specimens, together with literature data or catalogue numbers of the museums where they are deposited, have been plotted into a map.

RESULTS AND DISCUSSION

DISTRIBUTION

Currently, *A. guineensis* is known from Burkina Faso, Mali, Niger, Ghana, Nigeria and Cameroon (Boulenger, 1887, 1921; Monard, 1949, 1951; Papenfuss, 1969; Böhme *et al.*, 1996, and this paper). The single locality records, numbered correspondingly on the map (Fig. 2), are:

- 1 Bandiagara, Mali (14.20N, 03.36W, Böhme *et al.*, 1996)
- 2 Daroha, near Bobo Dioulasso, Burkina Faso (12.03N, 00.21W, Böhme *et al.*, 1996)
- 3 Fada N'Gourma, Burkina Faso (11.10N, 04.17W, Böhme *et al.*, 1996)
- 4 10 miles NW of Tapoa on road to Tamou, Niger (12.29N, 02.24W, Papenfuss, 1969)

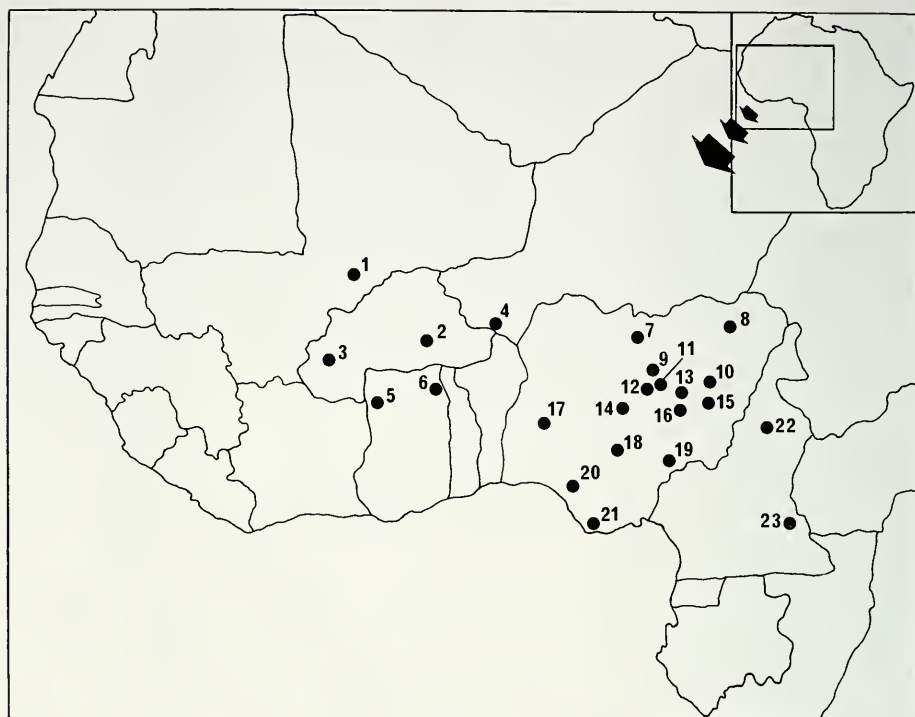


FIG. 2

Currently known distribution of *Acanthodactylus guineensis*; numbers correspond to localities mentioned in the text.

- 5 Wa, Ghana (10.03N, 02.30W, BM record, this paper)
- 6 Nakpanduri, S of Bowku, NE Ghana (10.37N, 00.10W, BM record, this paper)
- 7 Kano, near Jos, Nigeria (12.00N, 08.30W, BM record, this paper)
- 8 Maiduguri, Nigeria (11.51N, 13.09W, Dunger, 1967)
- 9 Zaria, Nigeria (11.05N, 07.42W, Dunger, 1967)
- 10 Bauchi, Nigeria (10.18N, 09.50W, BM record, this paper)
- 11 Jos, Nigeria (09.55N, 08.53W, Dunger, 1967)
- 12 Zonkwa S'Zaria, Nigeria (09.47N, 08.16W, Dunger, 1967)
- 13 Riyom near Jos, Nigeria (09.38N, 08.45W, ZMUC record, this paper)
- 14 Idah, Nigeria (09.26N, 07.22W, ZMUC record, this paper)
- 15 Bampur, Nigeria (09.21N, 11.02W, BM record, this paper)
- 16 Amper, Nigeria (09.21N, 09.40W, BM record, this paper)
- 17 Igbetti, Nigeria (08.44' N, 04.08W, ZMUC record, this paper)
- 18 Lokpe, Nigeria (07.31N, 07.01W, ZMUC record, this paper)
- 19 Tokum NNW of Lupwe, Nigeria (07.15N, 09.59W, ZMUC record, this paper)
- 20 Kwale, Nigeria (06.18N, 05.27W, BM record, this paper)
- 21 Brass, mouth of Niger, Nigeria (04.18N, 06.15W, Boulenger, 1887)
- 22 Ngaouyanga, Kamerun (07.54N, 13.35W, Monard, 1949)
- 23 Bangué, Kamerun (04.05N, 14.30W, Monard, 1949)

Two additional localities, viz. Kigawa river, and N'Shenfuri, both in "northern Nigeria" (BM 1930.10.6.9) could not be identified with our maps.

The currently known distribution of *A. guineensis* as summarized by Salvador (1982) must be extended by the material examined to the North-West (Mali, Burkina Faso) and to the East (Cameroon) (Böhme *et al.*, 1996; Szczerbak, 1975). Future investigations may discover this species also in Togo, Benin and possibly also in south-western Chad. The material from Cameroon formerly described as *Eremias benuensis* Monard, 1949, is clearly *A. guineensis* (see also Szczerbak, 1975), because the diagnostic character of *Acanthodactylus* (supralabials in contact with nasals) as compared with *Eremias* (supralabials not in contact with nasals) fits the Cameroon specimens. The synonymization of *Eremias benuensis* Monard, 1947 with *Acanthodactylus guineensis* Boulenger, 1887 is therefore doubtlessly correct.

Salvador (1982) casted doubt on the type locality "Brass, mouth of the river Niger", because a river delta seemed to conflict with the general ecological requirements of *Acanthodactylus*. However, river deltas in West Africa may well contain dry and sandy places. Some currently known localities, particularly Idah, Nigeria (on the river Niger, approximately 320 km river upwards), or Bandiagara, Mali (on the banks of the river Yamé), are such sandy places. This type of habitat seems to be characteristic for *A. guineensis*, even if only rather small areas are available: data from labels of BM specimens are available for Zonkwa, Zaria Province, Nigeria (on a sandy path next to a well), and for Maiduguri, Nigeria (small sandy patches in peanut plantations). In general, the very southern distribution pattern of this species of an otherwise Saharo-Sindian genus argues for an origin that took place already during one of the multiple former extension phases of the Sahara, when it was even considerably larger than today (Böhme, 2000).

MORPHOLOGY

A. guineensis has (1) constantly ten longitudinal ventral rows at midbody; (2) the number of ventrals from head to tail ranges from 27 to 30; (3) the dorsal midbody scale count lies between 46 and 63; (4) there are between 17 and 20 scales under the 4th toe; (5) there are 3 rows of scales around finger; (6) the number of femoral pores ranges between 17 and 21; (7) the number of supraoculars is two (deviations discussed below); (8) there are two prefrontals, (9) three nasals, and (10) three to five supralabials anterior to subocular. The individual data have been summarized in Tab. 1.

Salvador (1982) stated correctly that *A. guineensis* has three nasals, but the accompanying drawing in his paper shows a different situation. The correct nasal pattern is figured here, drawn from the lectotype (BM 1962.1666) (Fig. 3). This specimen also has four supralabials anterior to the subocular. However, this character state is not constant, as Salvador (1982) had assumed, because also specimens with only three supralabials occur (e.g. ZFMK 57176). Six out of the 67 specimens examined have three sublabials on one side of the head and four on the other. Two specimens show a very small fifth scale inserted in front of the subocular on one side of their heads only.

Despite the considerably enlarged distribution range from where *A. guineensis* is now known, no recognizable trends that would allow recognition of subspecies can

TABLE 1: Scalation characteristics of the 67 specimens of *Acanthodactylus guineensis* examined. For the numbering of characters see "Material and Methods"

coll. no.	1	2	3	4	5	6	7	8	9	10
Mali										
ZFMK 57176	10	29	50	18	3	20	2	2	3	3
Burkina Faso										
ZFMK 38720	10	28	51	18	3	20	2	2	3	3
ZFMK 39028	10	30	50	18	3	19	2	2	3	3
ZFMK 59511	10	27	54	19	3	19	3,5/2	2	3	4
Ghana										
BM 1966.286	10	29	46	18	3	18	2	2	3	4
BM 1979.611	10	28	48	18	3	17	2	2	3	4
BM 1979.612	10	28	49	18	3	17	2	2	3	4
BM 1980.1009	10	30	-	18	3	-	2	2/3	3	4
BM 1980.1010	10	-	49	17	3	18	2	2	3	4
Nigeria										
BM 1930.10.6.9	10	28	50	20	3	18	2	2	3	4
BM 1946.8.6.31 type	10	-	-	18	3	19	2	2	3	4
BM 1961.952	10	28	51	18	3	18	2	2	3	3
BM 1961.1998	10	30	48	20	3	19	2	2	3	4
BM 1961.1999	10	28	56	19	3	19	2	2/3	3	4
BM 1961.2000	10	28	49	20	3	18	2	2	3	4
BM 1962.572	10	29	48	20	3	19	2	2	3	4
BM 1962.575	10	29	49	18	3	18	2	3	3	4
BM 1962.1661	10	-	-	20	3	18	2	2	3	4
BM 1962.1662	10	28	-	18	3	18	2	2	3	4
BM 1962.1663	10	28	49	18	3	20	2	2	3	4
BM 1962.1665	10	28	-	18	3	20	2	2	3	4
BM 1962.1666	10	28	48	18	3	20	2	2	3	4
BM 1962.1667	10	29	48	18	3	18	2	2	3	4
BM 1962.1668	10	29	49	18	3	18	2	2	3	4
BM 1962.1669	10	28	48	20	3	17	2	2	3	4
BM 1973.660	10	28	49	-	3	18	2	2	3	4
ZMUC R45167	10	30	48	18	3	18	2	2	3	4
ZMUC R45168	10	27	55	18	3	19	2	2	3	4
ZMUC R45169	10	28	49	20	3	18	2	2	3	4
ZMUC R45170	10	28	56	18	3	19	2	2	3	4
ZMUC R45171	10	28	54	20	3	18	2	2	3	4
ZMUC R45173	10	29	54	18	3	18	2	2	3	3
ZMUC R45175	10	27	58	20	3	18	2	2	3	4
ZMUC R45176	10	28	54	20	3	18	2	2	3	4
ZMUC R45177	10	28	63	20	3	17	2	2	3	4/3
ZMUC R45178	10	27	59	18	3	20	2	2	2	3
ZMUC R45179	10	28	59	18	3	19	2	2	3	4
ZMUC R45184	10	28	56	19	3	21	2	2	3	3/4
ZMUC R45185	10	29	50	18	3	19	2	2	3	4
ZMUC R45185	10	29	50	18	3	19	2	2	3	4
ZMUC R45186	10	29	59	17	3	19	2	2	3	4
ZMUC R45187	10	28	56	18	3	20	2	2	3	4
ZMUC R45188	10	26	52	19	3	19	2	2	3	4/5
ZMUC R45189	10	30	-	18	3	19	2	2	3	3
ZMUC R45190	10	30	55	20	3	17	2	2	3	5/4
ZMUC R45191	10	28	51	18	3	18	2	2	3	3/4
ZMUC R45193	10	28	54	20	3	20	2	2	3	4
ZMUC R45194	10	28	53	19	3	21	2	2	3	4
ZMUC R45195	10	27	50	19	3	19	2	2	3	4

coll. no.	1	2	3	4	5	6	7	8	9	10
Nigeria										
ZMUC R45196	10	26	56	20	3	20	2	2	3	4
ZMUC R45199	10	-	52	20	3	19	2	2	3	3/4
ZMUC R45200	10	27	60	20	3	18	2	2	3	4
ZMUC R45201	10	27	58	19	3	18	2	2	3	3
ZMUC 45202	10	28	59	20	3	20	2	2	3	4
ZMUC 45203	10	29	60	18	3	20	2	2	3	4
ZMUC R45204	10	27	60	18	3	17	2	2	3	3/4
ZMUC R45205	10	27	60	20	3	18	2	2	3	3
ZMUC R45206	10	27	57	19	3	19	2	2	3	3
ZMUC R45207	10	31	56	19	3	20	2	2	3	4
ZMUC R45222	10	28	56	18	3	19	2	2	3	4
ZMUC R45223	10	26	55	19	3	19	2	2	3	3/4
ZMUC V678	10	28	57	19	3	18	2	2	3	4
ZMUC V735	10	28	59	19	3	19	2	2	3	4
Cameroon										
MHNG 105562	10	29	54	19	3	19	2	2	3	4
MHNC 91.1005	10	29	51	18	3	21	2	2	3	4
MHNC 91.1006	10	29	56	19	3	20	2	2	3	4
MHNC 91.1007	10	29	54	19	3	18	2	2	3	4
MHNC 91.1008	10	28	57	19	3	18	2	2	3	4

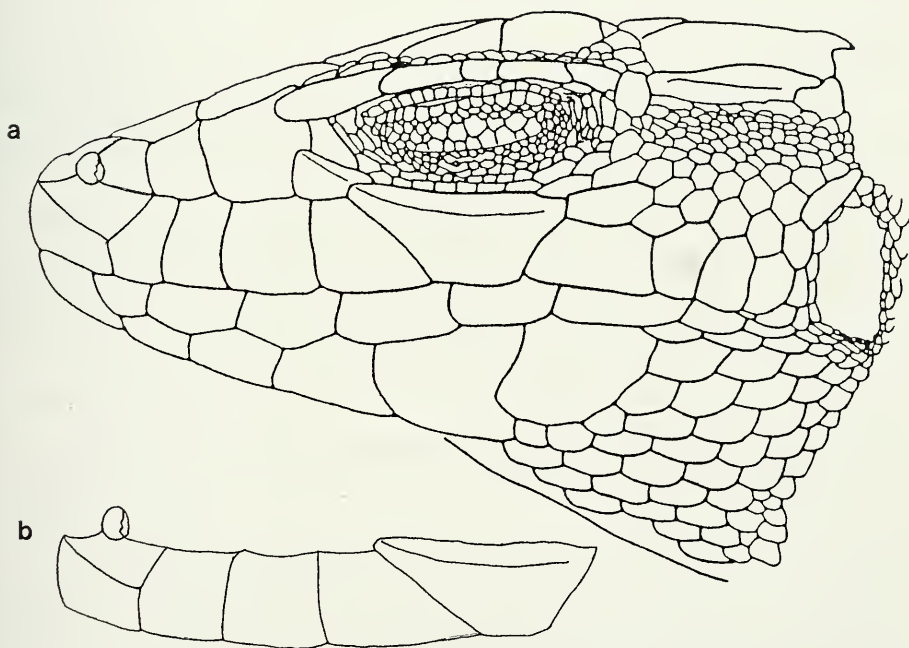


FIG. 3

Lateral head scales of *Acanthodactylus guineensis* (BM 1962.1666) from Nigeria as compared with the configuration of supralabials in ZFMK 57176 from Mali.

be found. Some scalation features investigated are rather variable (characters 2, 3, 4, 6, 10), while others (characters 1, 5, 7, 8, 9) are not. The only geographical correlation is an increasing number of the dorsal midbody scale count (3) from the Northeast towards Southwest, but this seems to be clinal and therefore taxonomically irrelevant. Another variable character is the number of supralabials (four vs. three) anterior to the subocular (10). But this character seems to vary individually rather than geographically, not only within populations, but even within the same individual (left/right asymmetry). Differences in colour pattern (Böhme *et al.*, 1996) seem to be correlated with the substrate the lizards are living on.

In conclusion, the analysis of the scale characters examined does not allow delimitations of populations or population groups in *A. guineensis* that might have evolved in geographic separation and genetic isolation from each other. This reflects the rather uniform shape of landscape in this part of arid West Africa where geographical barriers (mountain ranges, forests) are largely lacking.

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Ground spiders (Gnaphosidae; Araneae) of Crete (Greece). Taxonomy and distribution. I.

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Ground spiders (Gnaphosidae; Araneae) of Crete (Greece). Taxonomy and distribution. I.

The taxonomy and distribution of 22 species, belonging to the genera *Anagraphis*, *Poecilochroa*, *Berinda*, *Callilepis*, *Micaria*, *Pterotricha*, *Gnaphosa*, *Nomisia*, *Haplodrassus* and *Leptodrassus* of the family Gnaphosidae, are analyzed. In total, 5287 adult spiders were collected from 73 sites on Crete and the surrounding islands of Gavdos, Gavdopoula and Dia. Sites cover the main axis of each island and altitudes up to 2450m. Five species are recorded for the first time in Europe (*Anagraphis pallens*, *Berinda ensigera*, *Gnaphosa bithynica*, *Nomisia excerpta* and *Leptodrassus pupa*), four are recorded for the first time in Greece (*Poecilochroa senilis*, *Haplodrassus minor*, *Leptodrassus albidus*, *L. femineus*) and five are recorded for the first time in Crete (the previous species plus *Micaria albovittata*, previously reported from other parts of Greece). Two new species, *Leptodrassus hadjissaranti* sp. n. and *L. manolisi* sp. n., and the females of *Berinda amabilis* and *Haplodrassus creticus* are described, while some redescriptions, two new combinations (*Berinda ensigera* [from *Drassodes*] and *Haplodrassus creticus* [from *Drassodes*]) and four new synonymizations (*Drassodes flavomaculatus* = *Poecilochroa senilis*, *Talanites aculeatus* = *Berinda amabilis*, *Drassodes reimoseri* = *Berinda ensigera* and *Drassodes lithobius* = *Haplodrassus dalmatensis*) are also included.

Key-words: Araneae - Gnaphosidae - Crete - taxonomy - distribution.

INTRODUCTION

From a zoogeographical point of view, Greece is an important area, because its fauna is composed of the mixture of three different elements: namely, the European, the Asiatic and the African. These three elements have a different intensity, depending on the exact location. In Crete, an isolated island formation since the Pliocene

(5 m.y.a.) (Schule, 1993; Meulenkamp *et al.*, 1994) the last two elements have a greater importance than in the rest of Greece. Endemism is another component that has affected the Greek fauna greatly.

However, the knowledge of the arachnofauna of Greece is limited. Data have been based mainly on temporary visits of earlier researchers, such as Brulle (1832), Lucas (1853), Kulczynski (1903 a, b), Roewer (1928; 1959), Bristowe (1935), as well as contemporary ones: Brignoli (1981, 1984 and references therein, 1986), Deeleman-Reinhold (1971, 1985, 1989, 1993), Deeleman-Reinhold & Deeleman (1988); Wunderlich (1973 a, b; 1977; 1980 a, b; 1994 a, b, c, d, e, f), Thaler (1996, 1997), Thaler & Knoflach (1993, 1995), Thaler *et al.* (2000), Deltsev (1979), Metzner (1999). Apart from the first author (Chatzaki, 1998; Chatzaki *et al.*, 1998), two other Greek scientists have contributed to the study of spiders of Greece (Hadjissarantos, 1940; Paraschi, 1988). Species catalogues on a national or regional level are still unavailable for Greece.

Deltsev (1999) reports 642 species from Greece and 59 from Crete, out of which 156 (24%) and 42 (71%), respectively, are endemics. For Crete, the total number of species must be much higher, since on Gavdos (a small satellite island of Crete, covering 32 km²) alone we found 128 species (Chatzaki, 1998), out of which only 1% are Cretan endemics and 7% are Greek endemics (unpublished data). The total number of species reported from Crete is 204, but many of them are dubious and need to be revised. These great differences in numbers indicate the gaps that exist in our knowledge, not only on the spiders of Crete, but also the surrounding area in the eastern Mediterranean.

In this paper we present the taxonomy and distribution of the species, belonging to 10 genera of the family Gnaphosidae, on Crete. Gnaphosidae is the most abundant and one of the most diverse of all spider families on Crete. However, this family is not well represented in the spider literature of Crete, partly because of the nocturnal activity of many species and also because most of the researchers have focused on cave-dwelling spiders, rather than on epigeic ones. Several contributions have dealt with Gnaphosidae in the adjacent areas, i.e. Italy (Di Franco, 1986, 1993, 1994, 1996, 1997 a, 1997 b, 1998, 2000), Israel (Levy, 1995, 1998, 1999 a, b), North Africa (Dalmás, 1919; Denis, 1952; Di Franco, 1992 a, b; Bosmans & Janssen, 1999; Bosmans & Blick, 2000). These papers have revealed the importance of this family as far as abundance and diversity are concerned.

MATERIALS AND METHODS

In total, 59 sites were selected along the island of Crete, 11 sites on the island group Gavdos – Gavdopoula and 3 on the islet Dia (Fig. 1). In the results, the sites of these islands are included in the districts to which they belong, i.e. Sites 13-23 belonging to Gavdos, are included in the district of Chania, and Sites 52-54, belonging to Dia, are included in the district of Irakleio. Sites were selected in order to cover Crete from north to south, west to east and along the altitudinal gradients of the three mountain massifs of the island, Lefka Ori Mts., Psiloreitis Mts. and Lasithiotika Ori Mts. Apart from Gavdos-Gavdopoula (where all types of habitats were included),

most of the habitats selected on Crete are phrygana (plant communities that include dwarf, aromatic, thorny shrubs) and maquis. Few of them are situated close to permanent or temporary water reservoirs.

The spider material was collected by pitfall traps (12cm height, 9.5cm in diameter). The killing preservative was ethylene glycole. At each site, 15-20 traps were set and changed in two-month intervals. In most cases, only material from the period of high activity of Gnaphosidae, e.g., late spring to early autumn (Chatzaki *et al.*, 1998; Chatzaki, 1998), has been analyzed and presented here.

Identifications were carried out at the Natural History Museum of Crete (NHMC) and at the Zoological Institute of Innsbruck, Austria. All material presented here is part of the Ph.D. thesis of the first author and is deposited at the Natural History Museum of Crete. Material from the collection of Dr Hadjissarantos, deposited at the Zoological Museum of the Biological Department of Athens (ZMUA), and from the collection of Roewer, deposited at the Senckenberg Museum of Natural History, Frankfurt am Main (SMF), has also been examined. Voucher specimens of new and other species have been deposited in the Natural History Museum of Geneva (MHNG) and are indicated in brackets [MHNG].

The following abbreviations are used in the text: Identification: reference(s) used for the identification, TL: total length, PL: prosoma length, PW: prosoma width, OL: opisthosoma length, AME: anterior median eyes, ALE: anterior lateral eyes, PME: posterior median eyes, PLE: posterior lateral eyes, Ta: tarsus, Me: metatarsus, Ti: tibia, Pa: patella, Fe: femur, Co: coxa, d: dorsal, v: ventral, p: prolateral, r: retrolateral. All measurements are given in mm. All drawings presented here are by the first author.

SITE DESCRIPTIONS

CHANIA

Site 1 : Gramvousa peninsula, 350m, above the highest point of the road: phrygana (*Coridothymus capitatus*, *Calycotome villosa*, *Sarcopoterium spinosum* and sparse *Quercus coccifera*, *Pistacea lentiscus* and *Ceratonia siliqua*). Capture dates: a: 25/4/1996 - 26/6/1996; b: 26/6/1996 - 23/8/1996; c: 23/8/1996 - 29/10/1996.

Site 2: Gramvousa peninsula: phrygana on a small plateau, beneath Agios Sozos church, almost at sea level. Capture dates: a: 25/4/1996 - 26/6/1996; b: 26/6/1996 - 23/8/1996; c: 23/8/1996 - 29/10/1996; d: 29/10/1996 - 30/12/1996; e: 30/12/1996 - 14/3/1997; f: 15/3/1997 - 12/5/1997.

Site 3: Elafonisi: phrygana - maquis (*Juniperus oxycedrus*, *Pistacea lentiscus*, *Coridothymus capitatus* and *Ceratonia siliqua*) at the west side of the beach. Degradation is mainly due to touristic activities. Capture dates: a: 25/4/1996 - 26/6/1996; b: 26/6/1996 - 25/8/1996; c: 25/8/1996 - 29/10/1996; d: 29/10/1996 - 30/12/1996; e: 30/12/1996 - 13/3/1997; f: 13/3/1997 - 7/5/1997.

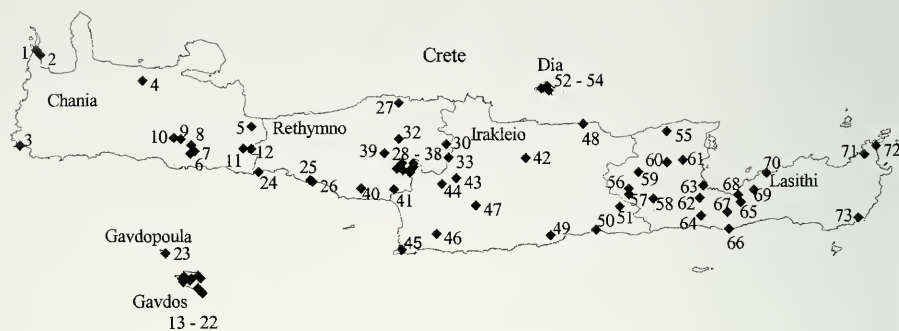


FIG. 1
Map of sampling sites.

- Site 4:** Agia lake: an overgrazed and intensively cultivated area. Pitfalls were set under *Platanus orientalis* and *Rubus* sp. Capture dates: a: 25/4/1996 - 26/6/1996; b: 26/6/1996 - 22/8/1996; c: 22/8/1996 - 30/10/1996.
- Site 5:** Kournas lake: south side of the lake, with *Phlomis fruticosa* and sparse *Quercus coccifera* along the site. Capture dates: a: 25/4/1996 - 25/6/1996; b: 25/6/1996 - 20/8/1996; c: 20/8/1996 - 30/10/1996.
- Site 6:** Lefka Ori Mts., 800m: an old mature forest of *Pinus brutia*, with very little undergrowth consisting mainly of *Quercus coccifera*. Capture dates: a: 18/10/1990 - 23/11/1990; b: 1/3/1991 - 28/3/1991; c: 28/3/1991 - 5/5/1991; d: 5/5/1991 - 8/6/1991; e: 8/6/1991 - 6/7/1991; f: 6/7/1991 - 4/8/1991; g: 4/8/1991 - 8/9/1991; h: 8/9/1991 - 5/10/1991; i: 5/10/1991 - 6/11/1991; j: 6/11/1991 - 7/12/1991; k: 7/12/1991 - 11/1/1992; l: 11/1/1992 - 8/3/1992; m: 9/3/1992 - 5/4/1992.
- Site 7:** Lefka Ori Mts., 1200m: a forest of *Cupressus sempervirens*, also containing *Quercus coccifera* and *Acer sempervirens*. Capture dates: a: 18/10/1990 - 23/11/1990; b: 1/3/1991 - 28/3/1991; c: 28/3/1991 - 5/5/1991; d: 5/5/1991 - 8/6/1991; e: 8/6/1991 - 6/7/1991; f: 6/7/1991 - 4/8/1991; g: 4/8/1991 - 8/9/1991; h: 8/9/1991 - 5/10/1991; i: 5/10/1991 - 6/11/1991; j: 7/11/1991 - 4/5/1992.
- Site 8:** Lefka Ori Mts., 1650m: plateau above the timberline, consisting of prostrate shrubs, mainly *Juniperus oxycedrus oxycedrus* and *Berberis cretica*, *Prunus prostrata*, *Satureja spinosa*. Vegetation is restricted to the wind shields and to small accumulations of the soil. Capture dates: a: 29/7/1990 - 1/9/1990; b: 1/9/1990 - 17/10/1990; c: 18/10/1990 - 23/11/1990; d: 28/3/1991 - 5/5/1991; e: 5/5/1991 - 8/6/1991; f: 8/6/1991 - 6/7/1991; g: 6/7/1991 - 4/8/1991; h: 4/8/1991 - 7/9/1991; i: 7/9/1991 - 5/10/1991; j: 5/10/1991 - 6/11/1991; k: 6/11/1991 - 6/6/1992.
- Site 9:** Lefka Ori Mts., 2000m: valley with very sparse vegetation, composed of *Berberis cretica*, *Prunus prostrata*, *Astragalus angustifolius* and *Satureja spinosa*. Capture dates: a: 29/7/1990 - 1/9/1990; b: 1/9/1990 - 16/10/1990; c:

8/6/1991 - 6/7/1991; d: 6/7/1991 - 4/8/1991; e: 4/8/1991 - 7/9/1991; f: 7/9/1991 - 6/10/1991; g: 6/10/1991 - 7/8/1992.

- Site 10:** Lefka Ori Mts., Pachnes, 2450m: sparse vegetation composed of alpine phrygana. Capture dates: a: 29/7/1990 - 1/9/1990.
- Site 11:** Kallikratis, plateau above Kallikratis village, 950m : vegetation composed of alpine phrygana (*Berberis cretica*, *Genista acanthoclada*, *Sarcopoterium spinosum*, *Phlomis* sp.) and some *Quercus coccifera* and *Acer sempervirens*. a: 18/11/2000 - 6/2/2001; b: 6/2/2001 - 29/5/2001.
- Site 12:** Asi Gonia, 6 km SE of Kallikratis, 716m: meadow dominated by ferns and *Platanus orientalis*. Water is present the whole year. The area is surrounded by phrygana. Capture dates: a: 6/2/2001 - 29/5/2001.
- Site 13:** Gavdos isl., Alyki at Trypiti: salt marsh at the southernmost part of the island. Pitfalls were placed from the beach to the phrygana and maquis of the surrounding area (*Corydorthymus capitatus*, *Pistacia lentiscus*, *Pinus brutia*, *Juniperus macrocarpa*). Capture dates: a: 28/7/1996 - 11/11/1996; b: 11/11/1996 - 16/3/1997; c: 16/3/1997 - 14/6/1997; d: 14/6/1997 - 28/8/1997.
- Site 14:** Gavdos isl., Fanari: phrygana dominated by *Corydorthymus capitatus* and sparse maquis (*Pistacia lentiscus*, *Pinus brutia*, *Juniperus phoenicea*, *Juniperus macrocarpa*). Abandoned cultivated field, full of terraces. Capture dates: a: 27/7/1996 - 10/11/1996; b: 10/11/1996 - 16/3/1997; c: 16/3/1997 - 12/6/1997; d: 12/6/1997 - 29/8/1997.
- Site 15:** Gavdos isl., Vatsiana: phrygana dominated by *Sarcopoterium spinosum*, *Corydorthymus capitatus* and sparse maquis (*Pistacia lentiscus*, *Pinus brutia*, *Juniperus phoenicea*, *Juniperus macrocarpa*). Capture dates: a: 28/7/1996 - 11/11/1996; b: 11/11/1996 - 16/3/1997; c: 16/3/1997 - 14/6/1997; d: 14/6/1997 - 24/8/1997.
- Site 16:** Gavdos isl., Kastri to Sarakiniko, 600m before the crossroad to Sarakiniko: pine forest with *Cistus* spp. dominating at the understory. Abandoned cultivations at the edge of a torrent. Capture dates: a: 26/7/1996 - 9/11/1996; b: 9/11/1996 - 16/3/1997; c: 16/3/1997 - 12/6/1997; d: 12/6/1997 - 29/8/1997.
- Site 17:** Gavdos isl., Kastri to Sarakiniko, below the water reservoir: pine forest with *Pistacia lentiscus*, *Corydorthymus capitatus* and *Nerium oleander* in the understory. Capture dates: a: 26/7/1996 - 9/11/1996; b: 9/11/1996 - 16/3/1997; c: 16/3/1997 - 12/6/1997; d: 12/6/1997 - 29/8/1997.
- Site 18:** Gavdos isl., Kedres to Lavrakas: sand dunes dominated by *Juniperus macrocarpa*, sparse *Pistacia lentiscus*, *Corydorthymus capitatus* and *Pinus brutia*. Capture dates: a: 26/7/1996 - 10/11/1996; b: 10/11/1996 - 16/3/1997; c: 16/3/1997 - 13/6/1997; d: 13/6/1997 - 26/8/1997.
- Site 19:** Gavdos isl., Kedres: wetland next to Ai-Giorgis church of Kedres. The water is permanently present and the dominating plant is *Nerium oleander*. Capture dates: a: 27/7/1996 - 10/11/1996; b: 10/11/1996 - 16/3/1997; c: 16/3/1997 - 13/6/1997; d: 13/6/1997 - 27/8/1997.

- Site 20:** Gavdos isl., Karaves - Korfos, 400m SW: pine forest with dense understory, composed of thorny shrubs. Capture dates: a: 16/3/1997 - 14/6/1997; b: 14/6/1997 - 29/8/1997.
- Site 21:** Gavdos isl., Metochi, between Vatsiana and Alyki: old terraces with *Pinus brutia*, *Juniperus macrocarpa*, *J. phoenicea*, *Corydthymus capitatus*, *Sarcopoterium spinosum*. Capture dates: a: 28/7/1996 - 11/11/1996; b: 11/11/1996 - 16/3/1997; c: 16/3/1997 - 14/6/1997; d: 14/6/1997 - 27/8/1997.
- Site 22:** Gavdos isl., Sarakiniko: sand dunes dominated by *Juniperus macrocarpa* along with sparse *Pistacia lentiscus* and *Corydthymus capitatus*. Capture dates: a: 15/3/1997 - 15/6/1997; b: 15/6/1997 - 28/8/1997.
- Site 23:** Gavdopoula isl., phrygana on the small islet NW of Gavdos. Capture dates: a: 26/7/1996 - 10/11/1996; b: 10/11/1996 - 16/3/1997; c: 16/3/1997 - 14/6/1997.

RETHYMNO

- Site 24:** Korakas bay, close to Rodakino village, 35m: maquis dominated by *Quercus coccifera*, *Calycotome vilosa* and *Ceratonia siliqua*. Capture dates: a: 8/2/2001 - 29/5/2001.
- Site 25:** Moni Preveli: degraded phrygana dominated by *Sarcopoterium spinosum*, *Corydthymus capitatus* and *Calycotome villosa*. Capture dates: a: 25/4/1996 - 25/6/1996; b: 25/6/1996 - 26/8/1996; c: 26/8/1996 - 31/10/1996.
- Site 26:** Moni Preveli: riverbank in the Kourtaliotis gorge, dominated by *Phoenix theophrastii*, *Ceratonia siliqua* and *Pistacia lentiscus*. Capture dates: a: 25/4/1996 - 25/6/1996; b: 25/6/1996 - 26/8/1996; c: 26/8/1996 - 31/10/1996.
- Site 27:** Eksantis, Agios Kyprianos church, Irakleio - Rethymno, about 60 km W, 2 km S of the national road: dense phrygana - maquis dominated by *Quercus coccifera*, *Sarcopoterium spinosum*, *Corydthymus capitatus* and *Calycotome villosa*. Capture dates: a: 22/4/2000 - 6/7/2000; b: 6/7/2000 - 14/9/2000; c: 14/9/2000 - 7/11/2000; d: 7/11/2000 - 13/1/2001; e: 13/1/2001 - 12/3/2001; f: 12/3/2001 - 8/5/2001.
- Site 28:** Psiloreitis Mt., Kouroutes, 650m, on the way to "Rethymnioton" Refuge: sparse phrygana. Part of the site was burned during the sampling period. Capture dates: a: 19/4/1999 - 10/6/1999; b: 10/6/1999 - 18/8/1999.
- Site 29:** Psiloreitis Mt., Kouroutes, 1000m, on the way to "Rethymnioton" Refuge: *Quercus coccifera* forest. Grazing by goats is the main disturbance. Capture dates: a: 19/4/1999 - 10/6/1999; b: 10/6/1999 - 18/8/1999.
- Site 30:** Psiloreitis Mt., ruins of ancient Zominthos, 1100m: phrygana. Capture dates: a: 2/4/1989 - 13/7/1989.
- Site 31:** Psiloreitis Mt., Lochria, 1200m: *Quercus coccifera* forest on the road to the top. Capture dates: a: 20/3/1990 - 13/1/1991.
- Site 32:** Psiloreitis Mt., Agios Mamas, Tigania plateau, 1200m: overgrazed sparse phrygana, dominated by *Phlomis* sp. Capture dates: a: 22/4/1999 - 20/7/1999; b: 20/7/1999 - 29/9/1999.

- Site 33:** Psiloreitis Mt., Idaion Antron, 1400m: subalpine phrygana. Capture dates: a: 13/7/1989 - 2/5/1990.
- Site 34:** Psiloreitis Mt., Kouroutes, 1650m, next to "Rethymnion" Refuge: alpine phrygana. Capture dates: a: 14/4/2000 - 2/7/2000; b: 2/7/2000 - 14/9/2000; c: 14/9/2000 - 30/10/2000; d: 30/10/2000 - 24/3/2001; e: 24/3/2001 - 12/6/2001.
- Site 35:** Psiloreitis Mt., Lochria, 1700m: alpine phrygana. Capture dates: a: 15/7/1989 - 6/5/1990.
- Site 36:** Psiloreitis Mt., Lochria, 1800m, by the "mitata" (= the shepherds shelters at the mountains): alpine phrygana. Capture dates: a: 6/5/1990 - 13/1/1991.
- Site 37:** Psiloreitis Mt., Lochria, 1950m: alpine phrygana. Capture dates: a: 14/4/2000 - 2/7/2000; b: 2/7/2000 - 15/9/2000; c: 15/9/2000 - 30/10/2000; d: 30/10/2000 - 24/3/2001; e: 24/3/2001 - 12/6/2001.
- Site 38:** Psiloreitis Mt., Lochria, 2250m: sparse alpine phrygana. Capture dates: a: 15/9/2000 - 31/10/2000; b: 31/10/2000 - 13/6/2001.
- Site 39:** Vistagi - Platania, 750m, on a path next to Afentis Christos church: degraded phrygana, dominated by *Sarcopoterium spinosum* and *Phlomis* sp. Capture dates: a: 19/4/1999 - 10/6/1999; b: 10/6/1999 - 18/8/1999.
- Site 40:** Saktouria, 300m: phrygana by the riverbank. Capture dates: a: 24/2/1999 - 20/4/1999; b: 20/4/1999 - 30/6/1999; c: 30/6/1999 - 1/9/1999; d: 1/9/1999 - 4/11/1999; e: 4/11/1999 - 4/2/2000.
- Site 41:** Rizikas: phrygana dominated by *Corydothymus capitatus* and *Phlomis* sp. Part of the site was burned during the sampling period. Capture dates: a: 20/4/1999 - 30/6/1999; b: 30/6/1999 - 1/9/1999.

IRAKLEIO

- Site 42:** Youchtas Mt., 200m after the junction to Stavros church: phrygana dominated by *Quercus coccifera*, *Genista acanthoclada*, *Corydothymus capitatus*, *Ebenus creticus* and *Salvia fruticosa*. Capture dates: a: 16/12/1995 - 15/1/1996; b: 15/1/1996 - 18/2/1996; c: 18/2/1996 - 2/4/1996; d: 2/4/1996 - 28/4/1996; e: 28/4/1996 - 6/6/1996; f: 6/6/1996 - 2/7/1996; g: 2/7/1996 - 8/8/1996; h: 8/8/1996 - 16/9/1996; i: 16/9/1996 - 10/10/1996; j: 10/10/1996 - 14/11/1996 k: 14/11/1996 - 11/12/1996.
- Site 43:** Rouvas: *Quercus coccifera* forest. Capture dates: a: 16/4/1999 - 9/6/1999; b: 9/6/1999 - 17/8/1999; c: 17/8/1999 - 19/10/1999.
- Site 44:** Moni Vrondisiou: phrygana dominated by *Sarcopoterium spinosum*, *Calycotome villosa*, *Corydothymus capitatus* and *Phlomis* sp. and sparse pine trees. Capture dates: a: 16/4/1999 - 9/6/1999; b: 9/6/1999 - 17/8/1999; c: 17/8/1999 - 19/10/1999.
- Site 45:** Martsalos: phrygana dominated by *Pistacia lentiscus*, *Calycotome villosa*, surrounded by maquis, mainly olive and pine trees. Capture dates: a: 20/4/1999 - 30/6/1999; b: 30/6/1999 - 1/9/1999.
- Site 46:** Pigaidakia, 400m: phrygana, dominated by *Calycotome villosa* and *Sarcopoterium spinosum*. Capture dates: a: 1/6/1999 - 30/7/1999; b: 30/7/1999 - 17/9/1999.

- Site 47:** Panagia Almyri: phrygana and alophytes at the riversides, dominated by *Calycotome villosa*, *Sarcopoterium spinosum*, *Phlomis* sp. and *Nerium oleander*. Capture dates: a: 16/3/1999 - 20/5/1999; b: 20/5/1999 - 26/7/1999; c: 26/7/1999 - 30/9/1999; d: 30/9/1999 - 26/1/2000; e: 26/1/2000 - 2/7/2000.
- Site 48:** Aposelemis river: sand dunes at the riverbank. Capture dates: a: 2/4/2000 - 2/8/2000.
- Site 49:** Achendrias, 700m: degraded phrygana in abandoned cultivations. Capture dates: a: 15/4/1999 - 8/6/1999; b: 8/6/1999 - 4/8/1999; c: 4/8/1999 - 28/9/1999.
- Site 50:** Keratokampos: phrygana - maquis close to the beach. Abandoned cultivated fields, close to the village. Capture dates: a: 27/11/1998 - 26/1/1999; b: 26/3/1999 - 26/5/1999; c: 26/5/1999 - 28/7/1999; d: 28/7/1999 - 28/9/1999; e: 28/9/1999 - 26/1/2000.
- Site 51:** Omalos Viannou, 1200m: sparse phrygana at the edge of the plateau. Capture dates: a: 26/5/1999 - 28/7/1999; b: 28/7/1999 - 28/9/1999.
- Site 52:** Dia isl., harbour: sparse phrygana (dominated by *Sarcopoterium spinosum*) near the forest rangers houses. Capture dates: a: 11/3/1999 - 2/5/1999; b: 2/5/1999 - 3/8/1999; c: 3/8/1999 - 13/4/2000.
- Site 53:** Dia isl., harbour - Ormos Panagias: phrygana at the higher water reservoir. Capture dates: a: 11/3/1999 - 2/5/1999; b: 2/5/1999 - 3/8/1999; c: 3/8/1999 - 13/4/2000.
- Site 54:** Dia isl., Ormos Panagias, SE part of the island: very close to the beach and towards the entrance of the gorge. Capture dates: a: 11/3/1999 - 2/5/1999; b: 2/5/1999 - 3/8/1999; c: 3/8/1999 - 13/4/2000.

LASITHI

- Site 55:** Milatos, 6 km E of Milatos cave, 300m: degraded phrygana. Capture dates: a: 21/4/2000 - 12/7/2000; b: 12/7/2000 - 11/10/2000; c: 11/10/2000 - 23/1/2001; d: 23/1/2001 - 9/3/2001; e: 9/3/2001 - 6/5/2001.
- Site 56:** Dikti Mt., Limnakaro plateau, 1450m, SE of "St' Anastasi" Refuge: sub-alpine phrygana. Capture dates: a: 11/5/2000 - 5/8/2000; b: 5/8/2000 - 2/10/2000; d: 9/1/2001 - 10/5/2001.
- Site 57:** Dikti Mt., Limnakaro plateau, 1750m, SE of "St' Anastasi" Refuge: alpine phrygana. Capture dates: a: 12/5/2000 - 5/8/2000; b: 5/8/2000 - 2/10/2000; c: 2/10/2000 - 9/1/2001; d: 9/1/2001 - 10/5/2001.
- Site 58:** Selakano, 800m: old terraces with sparse phrygana (burned earlier) and surrounded by *Pinus bruti*. Capture dates: a: 5/5/1999 - 23/7/1999; b: 23/7/1999 - 23/9/1999.
- Site 59:** Agios Konstantinos, 800m: dense maquis with high *Quercus coccifera*. Capture dates: a: 9/10/1989-30/1/1990; c: 25/4/1990 - 11/12/1990.
- Site 60:** Amygdaloi village, W of Neapoli, on a steep slope: dense maquis dominated by *Calycotome villosa*, *Pistacia lentiscus*, *Genista acanthoclada* and *Euphorbia dendroides*. Capture dates: a: 9/4/1997 - 6/8/1997.

- Site 61:** Agios Nikolaos, 200m: phrygana - maquis, dominated by *Quercus coccifera*. Capture dates: a: ? - 9/10/1989; b: 25/4/1990 - 20/2/1991.
- Site 62:** Prina - Messeleroi, 350m, 1.5 km E: phrygana - maquis, dominated by *Pistacia lentiscus*, *Phlomis* sp., *Calycotome villosa* and sparse *Pinus brutia*. Capture dates: a: 4/5/1999 - 23/7/1999; b: 23/7/1999 - 23/9/1999.
- Site 63:** Istro, on the national road, 2 km W: scarce maquis, dominated by *Pistacia lentiscus* and sparse olive and pine trees. Capture dates: a: 6/4/1997 - 2/6/1997; b: 2/6/1997 - 7/8/1997; c: 7/8/1997 - 10/10/1997.
- Site 64:** Bramiana lake: lake reservoir. The site is divided into a temporary pond and a steppe-like area resulting from desiccation. Capture dates: a: 30/10/1998 - 4/1/1999; b: 4/1/1999 - 3/3/1999; c: 3/3/1999 - 4/5/1999; d: 4/5/1999 - 22/7/1999; e: 22/7/1999 - 22/9/1999; f: 22/9/1999 - 1/2/2000.
- Site 65:** Ha gorge: phrygana in old terraces, with *Phlomis* sp., *Corydorthymus capitatus* and *Calycotome villosa* and sparse *Euphorbia* sp. Capture dates: a: 4/5/1999 - 22/7/1999; b: 22/7/1999 - 22/9/1999.
- Site 66:** Ierapetra, 3 km E: beach with halophytes, *Pinus brutia*, *Cetonia siliqua* and *Pistacia lentiscus*. Capture dates: a: 25/1/1990-27/6/1990.
- Site 67:** Kato Chorio, Ierapetra, 800m: pine forest. Capture dates: a: 14/3/1990-26/9/1990.
- Site 68:** Kavousi, phrygana-maquis, dominated by *Pistacia lentiscus* and *Juniperus* sp. Capture dates: a: 17/5/1999 - 22/7/1999; b: 22/7/1999 - 22/9/1999.
- Site 69:** Kavousi – Thrypti (no further details available). Capture dates: a: 26/9/1990.
- Site 70:** Mochlos, Siteia: sand dunes near the beach, dominated by *Tamarix* sp., near the riverbank. Capture dates: a: 24/1/1990 - 27/6/1990; b: 27/6/1990 - 10/3/1991.
- Site 71:** Moni Toplou - Vai, 2 km NE: phrygana. Capture dates: a: 6/4/1997-2/6/1997; b: 2/6/1997-7/8/1997; c: 7/8/1997-11/10/1997; d: 11/10/1997 - 14/12/1997; e: 14/12/1997 - 24/1/1998.
- Site 72:** Itanos, Vai: sand dunes with *Pistacia lentiscus*, *Phoenix theophrastii* and *Juncus* sp. Capture dates: a: 24/1/1990-27/6/1990; b: 27/6/1990-10/3/1991.
- Site 73:** Chamaitoulo - Xirokampos, 280m, 7.5 km SE: phrygana N of Ampelos bay. Capture dates: a: 28/5/2000-6/8/2000; b: 6/8/2000 - 12/10/2000; c: 12/10/2000 - 23/1/2001; d: 23/1/2001 - 16/3/2001; e: 16/3/2001 - 6/5/2001.

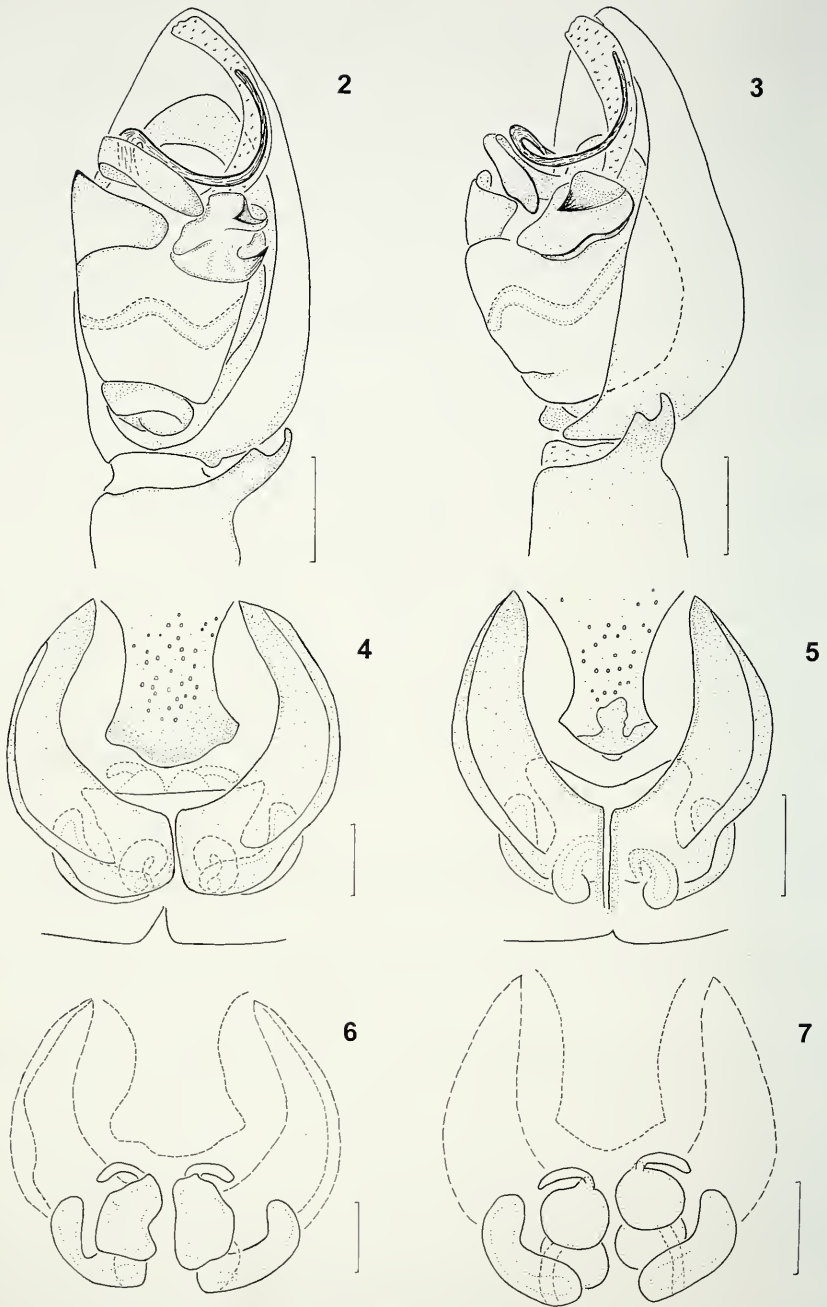
RESULTS

Anagraphis pallens Simon, 1893

Figs 2-7, 78

Identification: Levy (1999a).

Material. CRETE: CHANIA: Site 1 (b 1 ♀); Site 2 (b 1 ♂); Site 3 (b 1 ♀; c 1 ♂); Site 4 (b 1 ♂); Site 5 (a 2 ♀♀; b 2 ♂♂; c 1 ♂) (all leg. Lymberakis); Site 13 (a 1 ♂; d 2 ♂♂); Site 14 (d 2 ♂♂); Site 15 (d 1 ♂); Site 16 (c 1 ♂; d 3); Site 17 (a 1 ♂; d 1 ♂); Site 18 (a 1 ♂); Site 19 (a 2 ♂♂; d 2 ♂♂); Site 20 (a 1 ♂); Site 21 (a 1 ♂); Site 23 (c 1 ♂) (all leg. Paragamian); RETHYMNO: Site 25 (a 2 ♂♂ 2 ♀♀; b 3 ♀♀; c 1 ♂); Site 26 (b 3 ♂♂; c 1 ♂) (all leg.



FIGS 2-7

Anagraphis pallens: 2, palp of ♂, ventral view; 3, palp of ♂, retrolateral view; 4, epigyne; 5, vulva. *A. pallens* var.: 6, epigyne; 7, vulva. Scale lines 0.1mm (4-7), 0.2mm (2-3).

Lymberakis); Site 27 (a 3 ♂♂; b 2 ♂♂; c 2 ♂♂); Site 34 (a 1 ♀); Site 37 (b 4 ♂♂) (all leg. Chatzaki); Site 28 (a 1 ♀; b 2 ♂♂); Site 32 (b 1 ♂); Site 39 (b 1 ♂ 1 ♀); Site 40 (b 1 ♂ 5 ♀♀; c 4 ♂♂ 4 ♀♀ [MHNG]; d 4 ♂♂ 1 ♀); Site 41 (a 1 ♂; b 3 ♂♂) (all leg. Nikolakakis); IRAKLEIO: Site 44 (a 1 ♀; b 6 ♂♂; c 2 ♂♂); Site 47 (b 3 ♂♂ 2 ♀♀; d 2 ♂♂ 1 ♀; e 1 ♂); Site 52 (b 3 ♂♂ 1 ♀) (all leg. Nikolakakis); Site 49 (a 1 ♀; b 1 ♀; c 3 ♂♂); Site 50 (c 4 ♂♂ 3 ♀♀; d 4 ♀♀); Site 51 (b 1 ♂) (all leg. Papadimitrakis); LASITHI: Site 55 (a 3 ♂♂; b 7 ♂♂ 1 ♀); Site 73 (b 1 ♂) (all leg. Chatzaki); Site 64 (a 1 ♀; f 1 ♂ 1 ♀) (all leg. Nikolakakis); Site 58 (a 1 ♂; b 1 ♂); Site 62 (a 1 ♀ *A. pallens* variation; b 6 ♂♂); Site 64 (d 1 ♀, 1 ♀ *A. pallens* variation; e 1 ♀); Site 65 (a 1 ♂ 1 ♀; b 2 ♀♀) (all leg. Papadimitrakis); Site 63 (b 3 ♂♂); Site 71 (b 6 ♂♂; c 5 ♂♂) (all leg. Stathi); Site 59 (a 1 ♂); Site 61 (a 1 ♂); Site 70 (b 3 ♂♂ 1 ♀) (all leg. Trichas).

Taxonomy. Taxonomic characters of male and female (Figs 2-7) correspond well with the description of Levy (1999a). Variation is slight: in two females from Sites 62 and 64 the median section (sensu Levy, 1999a) of the epigyne is more narrow and the receptacles are rather globular (Figs 5 and 7). At Site 64 also a “normal” female was caught.

Ecology. *A. pallens* is a common species on Crete and the surrounding islands (Fig. 78). It reaches high altitudes of the Cretan mountains, having been found up to 1950m. However, its abundance declines with increasing in altitude. Adults are present from spring to autumn.

Distribution. East Mediterranean; (first record for Europe).

Poecilochroa senilis (O.P.- Cambridge, 1872)

Figs 8-11, 79

Drassus flavomaculatus L. Koch, 1878: p.40 fig. 2, 2a, Turkmenistan, Krasnowodsk (Type locality). **Syn. n.**

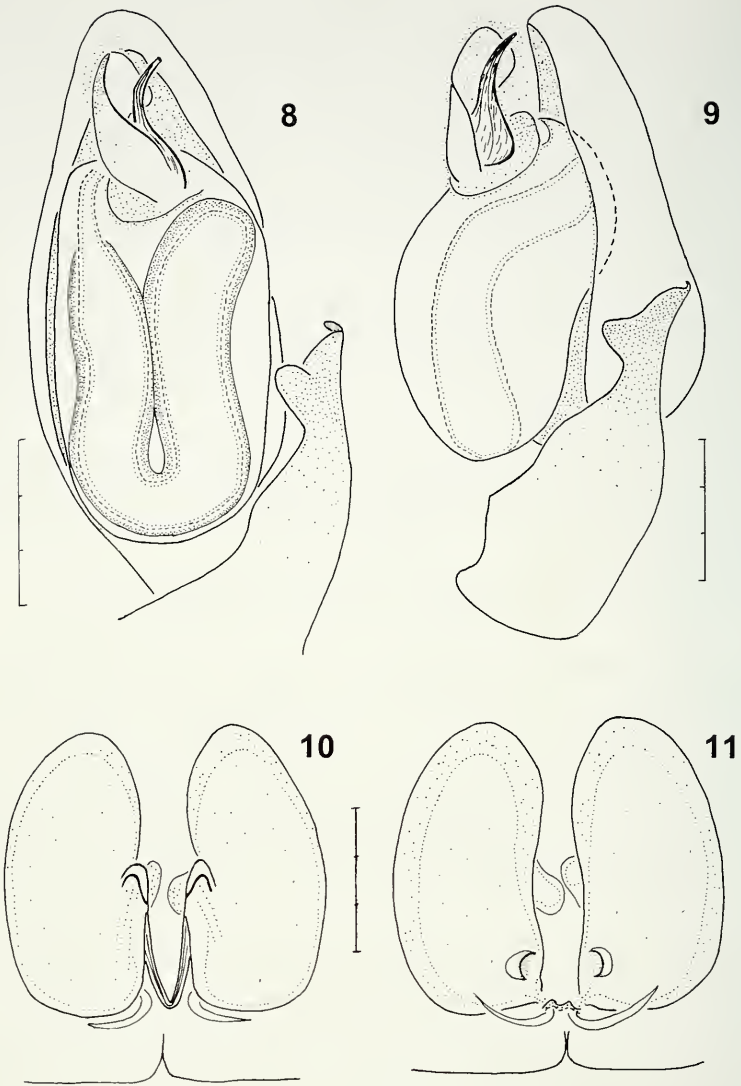
Identification: Levy (1999b).

Material. CRETE: CHANIA: Site 13 (a 1 ♀; c 8 ♂♂ 8 ♀♀; d 2 ♂♂ 15 ♀♀); Site 14 (a 3 ♀♀; d 4 ♀♀); Site 15 (d 4 ♀♀); Site 18 (d 1 ♀); Site 19 (a 1 ♀; c 1 ♂; d 1 ♀); Site 23 (c 2 ♂♂) (all leg. Paragamian); RETHYMNO: Site 28 (a 1 ♂) (leg. Nikolakakis); IRAKLEIO: Site 52 (b 1 ♀) (leg. Nikolakakis); LASITHI: Site 70 (b 1 ♀) (leg. Trichas); Site 71 (b 1 ♂ 2 ♀♀ [MHNG]) (all leg. Stathi).

Taxonomy. Taxonomic characters (Figs 8-11) apparently correspond with the description of Levy (1999b). Males are characterized by the bifid tibial apophysis, the membranous conductor and the bulging spermophore. The same characters of the male palpal organ are detected in *Drassodes flavomaculatus* (L. Koch, 1878) (see Fig. 2, 2a), therefore a new synonymy is proposed. In all females examined, copulatory orifices are located at midlevel of the spermathecae (Fig. 10).

Ecology. This is an uncommon species on Crete (Fig. 79). Apart from Kouroutes at the base of Mt. Psiloreitis (Site 28), all the other localities where *P. senilis* was found are close to beaches, which is indicative of a recent colonization. However, the species is quite widespread on Gavdos. Adults are present from spring to late summer, with a peak of activity in early summer.

Distribution. East Mediterranean, Corsica, Turkmenistan; (first record for Greece).



FIGS 8-11

Poecilochroa senilis: 8, palp of ♂, ventral view; 9, palp of ♂, retrolateral view; 10, epigyne; 11, vulva. Scale lines 0.3mm.

Berinda amabilis Roewer, 1928

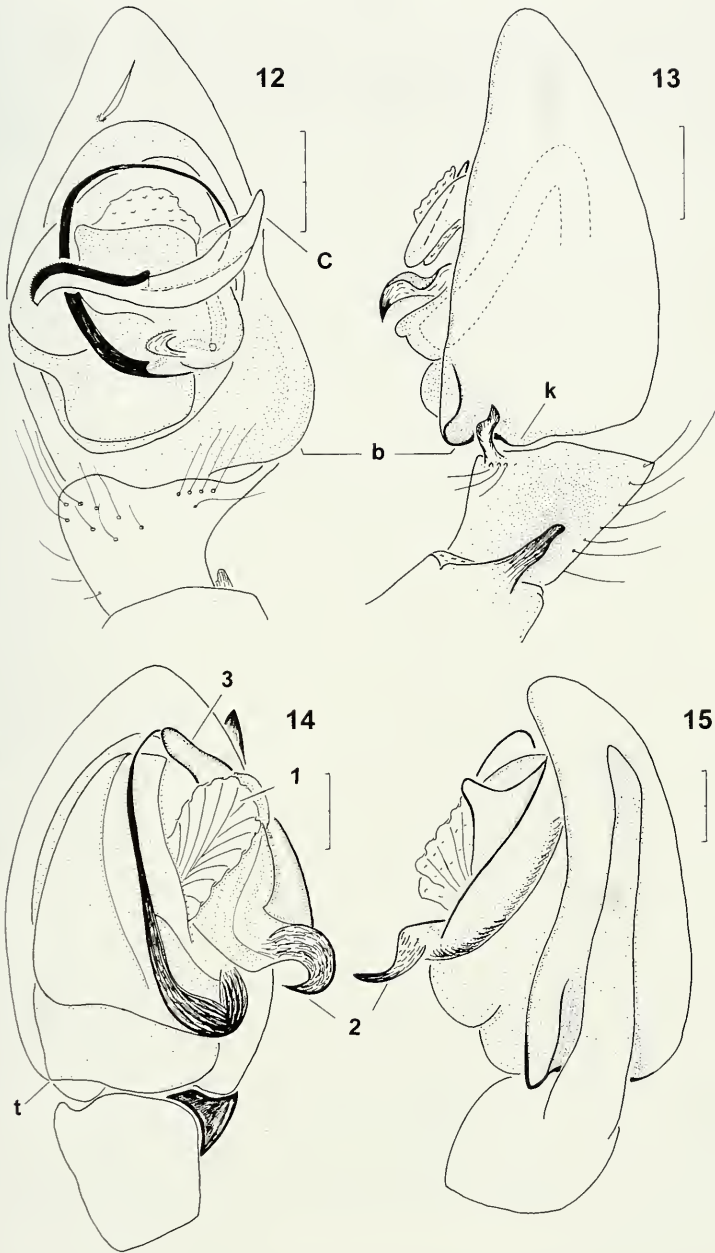
Figs 12-13, 16-17, 80

Berinda amabilis Roewer, 1928 (p. 106, Figs 11-13), CRETE: Chania: Akrotiri, Governeto monastery (type locality).

Talanites aculeatus Charitonov, 1946: p. 26, fig. 43, Uzbekistan, Yakkabagh (Type locality).

Syn. n.

Identification: Roewer (1928, descr. of ♂).



FIGS 12-15

Berinda amabilis: 12,13. *Berinda ensigera*: 14, 15. Palp of ♂, ventral view (12, 14), palp of ♂, retrolateral view (13, 15). Scale lines 0.2mm.

Material. Comparative material examined: *B. a.*: 1 ♂ holotype, SMF: CR 595/45.

CRETE: CHANIA: Site 1 (a 1 ♂); Site 3 (a 8 ♂ ♂ 1 ♀; c 1 ♀); Site 5 (a 1 ♂; b 2 ♀ ♀); Site 6 (e 1 ♂ 2 ♀ ♀; f 4 ♀ ♀) (all leg. Lymberakis); Site 15 (a 2 ♀ ♀; c 1 ♂; d 3 ♀ ♀); Site 17 (d 1 ♂ 1 ♀) (all leg. Paragamian); RETHYMNO: Site 24 (a 1 ♂ 1 ♀) (leg. Stathi); Site 25 (a 2 ♀ ♀); Site 26 (a 1 ♂ 1 ♀; b 3 ♀ ♀) (all leg. Lymberakis); Site 41 (a 1 ♂) (leg. Nikolakakis); IRAKLEIO: Site 50 (b 2 ♂ ♂ 3 ♀ ♀, [MHNG]; c 3 ♂ ♂ 6 ♀ ♀) (all leg. Papadimitrakis); LASITHI: Site 63 (b 1 ♂) (leg. Stathi); Site 68 (a 1 ♂ 1 ♀) (leg. Papadimitrakis); Site 70 (a 1 ♂; b 3 ♂ ♂) (all leg. Trichas); Site 73 (a 1 ♂ 1 ♀) (leg. Chatzaki).

Taxonomy. *Berinda amabilis* was first described by Roewer (1928) and has not been recorded again until now. The species stood as a Cretan endemic. However, based on the similarity of the tibial apophysis and the embolus of the palpal organ of *Talanites aculeatus* Charitonov, 1946 (Fig. 43), we are inclined to propose this species as a new synonym of *B. amabilis*. Therefore the biogeographical characterisation of *B. amabilis* as a Cretan endemic is no longer valid. *Berinda ensigera* is here proposed as a congener.

Measurements ♂ (♀), n = 7 (5): TL: 5.3-6.9 (5.7-8.5), PL: 2.6-3.2 (2.7-3.4), PW: 2-2.2 (1.9-2.5), OL: 2.5-3.4 (2.8-4.9), PL/PW: 1.28-1.5 (1.36-1.45), AME: 0.07-0.1 (0.07-0.11), ALE: 0.07-0.15 (0.08-0.15), PME: 0.1-0.12 (0.1-0.15), PLE: 0.07-0.11 (0.1-0.15), AME-AME: 0.02-0.07 (0.07-0.1), AME-ALE: 0.02-0.04 (0.02-0.03), PME-PME: 0.04-0.07 (0.05-0.08), PME-PLE: 0.07-0.12 (0.1).

♂ ♀: Yellow to red-brown spiders of medium size. Prosoma oval, with small, black hairs, narrow at cephalic part and widening at thoracic part. Sternum oval. Maxillae as in *Zelotes*. Labium longer than wide. Chelicerae with 2 anterior and 3 posterior teeth and with lateral condyles. Anterior row of eyes slightly recurved, posterior row slightly procurved or straight. PME circular to oval. Opisthosoma yellow-grey. Males with an orange scutum covered with strong bristles. Anterior spinnerets long and cylindrical, posterior ones much smaller.

Legs: Ta and Me I-II with scopula. Ta III-IV with dense stripe of small spines. Me III-IV with apical preening comb as in *Zelotes*. Spination: Fe: I-II d 2; III-IV d 5-7. Pa: I-II, IV -; III p 1, r 1. Ti: I-II ♂ v 3-4; ♀ -; III-IV spinose. Me: ♂ I-II v 3-4; ♀ I -, II 3-4; III-IV spinose.

♂ Pedipalp (Figs 12-13): Fe with 3 spines, Pa with fingerlike retrolateral apophysis, Ti with retrolateral side hairless, slightly excavated, retrolateral apophysis slender. Cymbium oval, with proximal extension divided into a ventral bulge (b) and a lateral knob (k). Tegulum sclerotized, ventrally membranous, with a distinct conductor (C); embolus filiform, rising from proximal part of tegulum. Conductor basally membranous, ending as a S-shaped sclerotized band.

Epigyne (Fig. 16): Anteriorolateral margins widely curved to the sides, at midline elevated to a small conical hood. Introductory orifices situated laterally.

Vulva (Fig. 17): Fertilisation ducts short, with small glandular heads, leading to globular spermathecae.

Ecology. *B. amabilis* is a rather rare species, occurring across the island (Fig. 80). Apparently it prefers phryganic habitats situated near the coast. Only once it has been collected on mainland Crete, on Lefka Ori, at 800m altitude. Adults occur from early spring to autumn, with a male peak of activity in spring.

Distribution. Crete, Gavdos, Uzbekistan.

Berinda ensigera (Cambridge, 1874) comb. n.

Figs 14-15, 18-19, 80

Drassodes ensigera (Cambridge, 1874), p. 389, Fig. 14, SMYRNE (type locality).

Drassodes reimoseri Bristowe, 1935 (p. 779, Figs 4-6), RODOS (type locality). **Syn. n.** - Hadjissarantos (1940), ATTIKI: Parnitha, Agia Triada; Rafina; Nea Philadelphia; Salamina, Selinia; Podoniftis; Pikermi; Pendeli-Monastiri; Hymittos-Kareas; Toyrokolimano; Psychiko.

Identification: Cambridge (1874, p. 389, Fig.14), Bristowe (1935, p. 779, Figs 4-6), Hadjissarantos (1940, p. 77, Fig.22).

Material. CRETE: CHANIA: Site 4 (a 2 ♂♂; b 1 ♀; c 2 ♀♀); Site 5 (b 2 ♂♂) (all leg. Lymberakis); LASITHI: Site 64 (d 4 ♂♂); Site 65 (a 2 ♂♂ 1 ♀ [MHNG]) (all leg. Papadimitrakis); Site 66 (a 3 ♂♂ 4 ♀♀) (leg. Trichas). Material from further localities (vidit M. Chatzaki, 2000, all in collection Hadjissarantos, ZMUA): CRETE: Moralion (?); PELOPONNISOS: Isthmia; POROS: Galatas; SAMOS: Koumaradaios.

Taxonomy. Cambridge (1874) described *Drassodes ensigera* from male and female specimens, collected in Smyrne. On the other hand, Bristowe described in 1935 the female of *D. reimoseri* and later Hadjissarantos (1940) found the corresponding male. Characters of both sexes of these two species provide strong evidence that none of them belongs to *Drassodes*, and that they are in fact the same, as will be discussed later. Therefore, a new synonym and a new combination are proposed here.

Measurements ♂ (♀), n = 6 (4): TL: 6.2-7 (6.4-9), PL: 2.7-3.1 (3-3.4), PW: 2.2-2.5 (2.2-2.5), OL: 3.1-3.4 (3.2-5.7), PL/PW: 1.22-1.29 (1.36-1.45).

♂ ♀: Red-brown spiders. Maxillae as in *Zelotes*. Labium longer than wide. Chelicerae with 2 anterior and 4 posterior teeth and with lateral condyles. Eyes round except for oblique PME. Anterior row of eyes recurved, posterior one procurved. Opisthosoma light brown, in ♂ with scutum, covered with a thick fringe of bristles. Spinnerets long and cylindrical, anterior ones longer than posteriors.

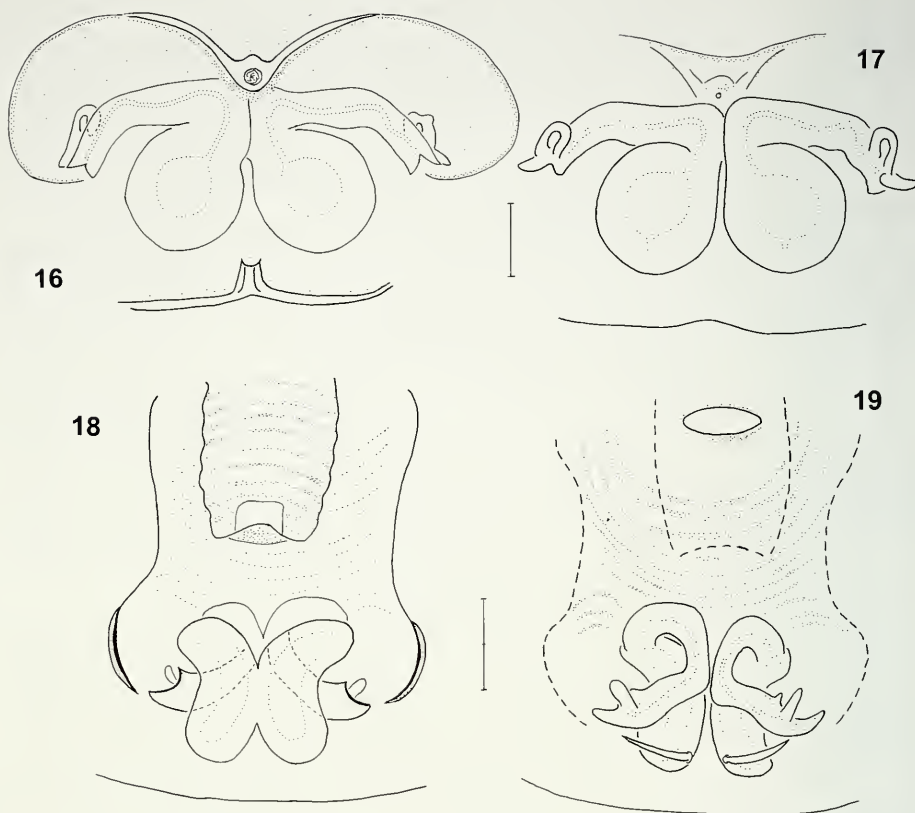
Legs: Ta and Me I-II with scopula, Me III-IV with apical preening comb, as in *Zelotes*. Spination: Fe: I d 3; ♂ II d 3-4; ♀ II d 3; III-IV d 6-7. Pa: I-II, IV -; III p 1 r 1. Ti: I -; II v 3-4; III-IV spinose. Me: ♂ I v 2; ♀ I v 1; II v 4; III-IV spinose.

♂ Pedipalp (Figs 14-15): Fe with 3 spines, Pa short, without apophysis. Tibial apophysis straight and very long, almost as long as the cymbium, closely attached to the lateral margin of the cymbium, as in *B. amabilis*. Cymbium oval with retrolateral furrow, its retrolateral proximal angle slightly extended. Subtegulum with a triangular projection at its base (t). Tegulum robust, ventrally membranous, with distinct conductor. Embolus long and filiform, rising from proximal base of tegulum. Conductor strongly developed, with three elements: a membranous anterior sac (1), a sclerotized posterior hook (2) and a sickle-shaped guiding structure (3).

Epigyne (Fig. 18): with an anterior hood as in *Gnaphosa*. Lateral margins parallel and widening posteriorly, leading to the copulatory orifices.

Vulva (Fig. 19): Introductory ducts with glandular heads, forming one coil leading to the oval spermathecae.

Comments. "*Drassodes*" *ensigera* shows a puzzling combination of characters. The epigyne has a hood, like in many *Gnaphosa* species, but there is no keel on the chelicerae. It therefore, cannot belong to the Gnaphosinae. The genital characters of both sexes do not fit those of the genus *Drassodes* at all. There are preening combs on Me III & IV, as in *Zelotes* and allied species. Distinct features of the male are:



FIGS 16-19

Berinda amabilis: 16, 17. *Berinda ensigera*: 18, 19. Epigyne (16, 18), vulva (17, 19). Scale lines 0.1mm (16-17), 0.2mm (18-19).

tibial apophysis and conductor. It is apparent that this species does not belong to *Drassodes*. In our opinion, it also cannot be assigned to any other well-established genus. As it shows a conductor like *Berinda*, we tentatively place it into this genus. A conductor is uncommon in Gnaphosidae, but also present in *Callilepis* (Platnick, 1975). The description and figures of Cambridge (1874) concerning *Drassodes ensigera*, belong to the same species without any doubt (see tibial apophysis, conductor, and *Gnaphosa*-like shape of epigyne, Fig. 14), therefore the older name must be kept as valid.

Ecology. This species shows a preference for humid places, such as lakes and water reservoirs or even gorges (Fig. 80). Adult males are present during spring and summer, while females have a longer period of maturity.

Distribution. GREECE: Attiki; Peloponnisos; Isls.: Crete; Rodos; Samos; Poros; Turkey.

Callilepis cretica (Roewer, 1928)

Figs 20-23, 80

Minosia cretica Roewer, 1928, CRETE: Chania: Akrotiri, under a stone outside Arkalo cave (type locality); Omalos; Rethymno: Topolia; Irakleio: Knossos.

Callilepis wiehlei Bristowe, 1935, RODOS (type locality) (Wunderlich, 1977), not *Callilepis concolor* Simon, 1914 contra Platnick (1975: 17, Figs 36-38).

Crosbyellum creticum: Roewer (1954: 359).

Identification: Roewer (1928, p. 113, Figs 23-25), Bristowe (1935, p. 780, Figs 7-12), Wunderlich (1977, p. 292).

Material. Comparative material examined: *M. cretica*: CRETE Akrotiri (1 ♂ holotype, 2 ♀ Paratypes, SMF: CR 592/42-43); Knossos (1 ♀, SMF: CR 613/63).

CRETE: CHANIA: Site 3 (a 5 ♂♂; c 1 ♀; f 1 ♂); Site 7 (e 1 ♂; f 2 ♂♂ 1 ♀; g 1 ♀); Site 8 (a 35 ♀♀; b 2 ♀♀; f 1 ♂; g 31 ♂♂ 11 ♀♀; h 1 ♂ 15 ♀♀; i 8 ♀♀; j 1 ♀) (all leg. Lymberakis); RETHYMNO: Site 25 (a 3 ♂♂ 2 ♀♀; c 1 ♂); Site 26 (b 2 ♀♀) (all leg. Lymberakis); Site 33 (a 7 ♂♂ 1 ♀) (leg. Trichas); Site 27 (a 8 ♂♂ 1 ♀; b 2 ♂♂); Site 34 (a 2 ♂♂; b 51 ♂♂ 43 ♀♀; c 1 ♀); Site 37 (b 1 ♂ 1 ♀; c 1 ♂) (all leg. Chatzaki); Site 28 (a 6 ♂♂ 2 ♀♀; b 2 ♀♀); Site 29 (b 1 ♀); Site 32 (a 5 ♂♂ 4 ♀♀; b 3 ♀♀); Site 39 (a 6 ♂♂; b 11 ♂♂ 10 ♀♀); Site 40 (b 1 ♂ 2 ♀♀; c 2 ♀♀; d 2 ♂♂ 1 ♀); Site 41 (b 2 ♂♂) (all leg. Nikolakakis); IRAKLEIO: Site 43 (a 10 ♂♂ 5 ♀♀; b 1 ♀); Site 44 (b 1 ♂) (all leg. Nikolakakis); Site 49 (b 1 ♂ 4 ♀♀; c 3 ♀♀); Site 51 (a 7 ♂♂ 2 ♀♀ [MHNG]) (all leg. Papadimitrakis); LASITHI: Site 56 (a 37 ♂♂ 1 ♀; b 1 ♀) (all leg. Chatzaki); Site 58 (a 15 ♂♂ 6 ♀♀; b 1 ♂ 4 ♀♀); Site 64 (d 2 ♂♂; e 1 ♂) (all leg. Papadimitrakis); Site 63 (b 2 ♂♂ 1 ♀; c 1 ♂) (all leg. Stathi); Site 59 (a 2 ♂♂; c 9 ♂♂ 3 ♀♀); Site 66 (a 1 ♂ 2 ♀♀); Site 69 (a 1 ♂ 1 ♀) (all leg. Trichas).

Taxonomy. According to Platnick (1975), *Callilepis wiehlei* is a synonym of *Callilepis concolor* from SW Europe. However, Wunderlich (1977) synonymized *C. wiehlei* with *Minosia cretica*, and placed this species in *Callilepis*. The specimens recently collected in Crete (Figs 20-23) fully confirm the interpretation of Wunderlich. They differ from *C. concolor* in the median sclerotization of the epigyne and in details of vulva and conductor. In *C. cretica* the coil of the introductory duct is separated from the spermathecae by a distinct angle (Fig. 22), while in *C. concolor* both parts are connected in a straight line [for *C. concolor*, see Platnick (1975), Machado (1941)].

Ecology. *C. cretica* is well adapted on the Cretan mainland and reaches altitudes of about 2000m (Fig. 80). Although present in the lowlands, it seems to prefer comparatively moist and shady habitats and is therefore more abundant at moderate altitudes (about 1600m) and in woodlands. In the lowlands the peak of activity is in the spring and early summer months, while at higher altitudes the peak shifts towards late summer and autumn.

Distribution. GREECE: Attiki: Vouliagmeni; Ekali (Hadjissarantos, 1940: 74, sub *Minosia cretica*); Crete: Lasithi: Ierapetra (Wunderlich, 1977: 292); Rodos.

Micaria pygmaea Kroneberg, 1875

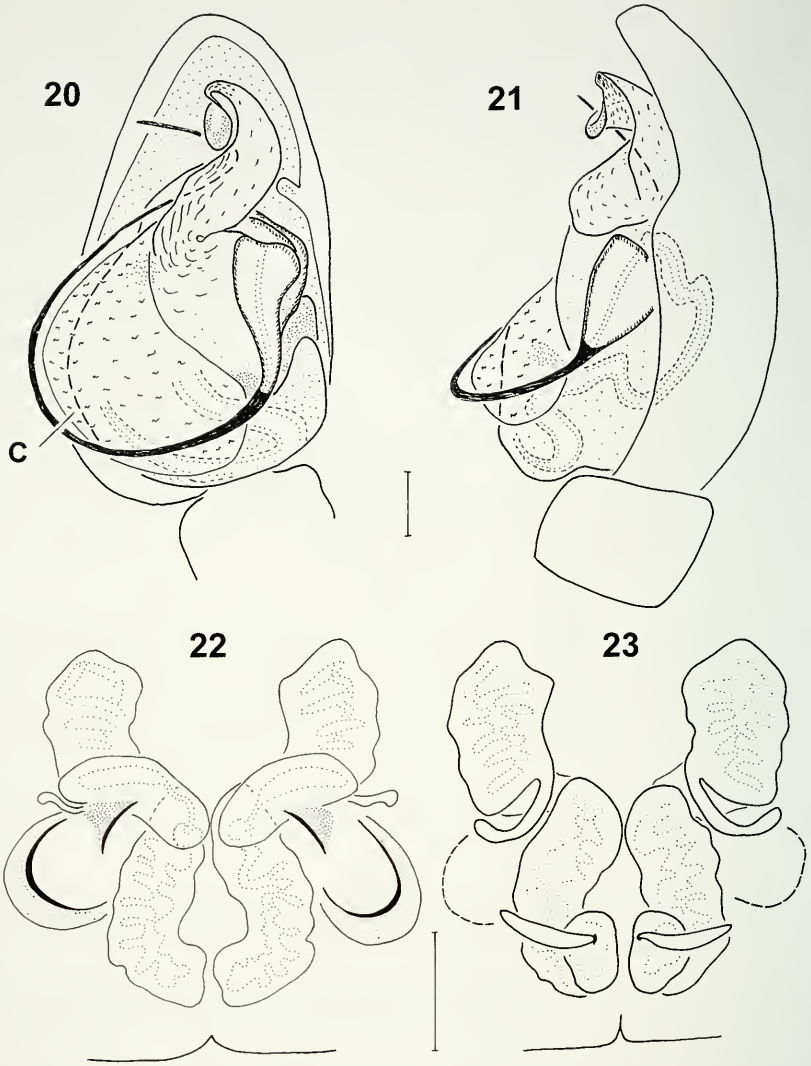
Figs 28-29, 35-36, 81

Micaria harmsi Wunderlich, 1979, SPAIN; Bosmans & Blick (2000).

Identification: Wunderlich (1979, p. 283, Figs 32 a-d), Bosmans & Blick (2000, p. 447, Figs 5-8).

Material. CRETE: CHANIA: Site 13 (a 3 ♂♂ 2 ♀♀; d 2 ♂♂ 1 ♀; d 1 ♂ 1 ♀ [MHNG]) (all leg. Paragamian); LASITHI: Site 64 (c 1 ♂) (leg. Nikolakakis).

Taxonomy. This is a poorly known species, which was only recently recorded from Crete and was synonymized with *M. harmsi* by Bosmans & Blick (2000).



FIGS 20-23

Callilepis cretica: 20, palp of ♂, ventral view; 21, palp of ♂, retrolateral view; 22, epigyne; 23, vulva. Scale lines 0.1mm.

Measurements ♀(♂), n = 5 (4): TL: 2.2-5 (-2-2.1), PL: 0.9-2.2 (0.8-1), PW: 0.6-2.2 (0.5-0.6), OL: 1.1-2.8 (0.9-1), PL/PW: 0.86-1.83 (1.6-1.8), TaI: 0.3-0.4 (0.4), MeI: 0.3-0.4 (0.3), TiI: 0.4-0.5 (0.35).

♂ Pedipalp (Figs 28-29): Tibia shorter than cymbium. Tibial apophysis absent, embolus straight and prominent.

Epigyne (Fig. 35): Lateral margins curved, forming triangular pouches and closing posteriorly as a w-shaped ridge. Anterior margin absent, in contrast to the other *Micaria* species.

Vulva (Fig. 36): Introductory ducts small, with a glandular head at their base.

Ecology. This species is the only *Micaria* found on Gavdos (Fig. 81). It is noteworthy that both on Gavdos, as well as on Crete, it is scarce and found only in sandy localities, close to water (see also Bosmans & Blick 2000). This makes us suspect that an anthropogenic way of dispersal to the islands has occurred, probably by ships.

Distribution. Circum-mediterranean. GREECE: Crete: Lasithi: Myrtos (Bosmans & Blick, 2000: 447).

Micaria coarctata (Lucas, 1846)

Figs 24-25, 31-32, 81

Micaria praesignis L. Koch, 1867: Hadjissarantos (1940: 99), SYROS; ATTIKI: Parnis-Mola; Parnis-Palaochori; Kato Souli; Podoniftis; Bosmans & Blick (2000).

Micaria albimana O.P. Cambridge, 1872: Wunderlich (1979), CRETE: Chania: Xyloskalo; Bosmans & Blick (2000).

Identification: Wunderlich (1979, p. 264, Figs 22 a-f, 44 a-e), Bosmans & Blick (2000, p. 452, Figs 17-20).

Material. CRETE: CHANIA: Site 2 (a 1 ♂; b 1 ♀); Site 3 (b 3 ♂♂; c 1 ♂); Site 5 (a 3 ♂♂; b 4 ♀♀); Site 8 (g 1 ♀) (all leg. Lymberakis); RETHYMNO: Site 25 (a 5 ♂♂ 1 ♀; b 1 ♀); Site 26 (b 1 ♂ 4 ♀♀) (all leg. Lymberakis); Site 27 (a 1 ♂); (leg. Chatzaki); Site 33 (a 1 ♂ 1 ♀) (leg. Trichas); Site 28 (b 2 ♂♂ 3 ♀♀); Site 40 (b 1 ♂); Site 41 (a 2 ♂♂) (all leg. Nikolakakis); IRAKLEIO: Site 42 (f 1 ♀; g 1 ♂ 3 ♀♀) (all leg. Chatzaki); Site 43 (b 3 ♂♂); Site 44 (b 1 ♀); Site 45 (a 2 ♂♂ 1 ♀ [MHNG]); Site 47 (b 7 ♂♂ 9 ♀♀; e 3 ♂♂); Site 50 (b 2 ♂♂); Site 52 (b 1 ♂); Site 54 (b 4 ♂♂ 1 ♀) (all leg. Nikolakakis); Site 46 (a 9 ♂♂ 4 ♀♀); Site 49 (b 1 ♂); Site 51 (a 1 ♀) (all leg. Papadimitrakis); LASITHI: Site 55 (a 1 ♀; b 1 ♀); Site 57 (a 2 ♀♀) (all leg. Chatzaki); Site 58 (a 2 ♂♂); Site 62 (b ♂ 1 ♀); Site 64 (d 1 ♂); Site 65 (a 1 ♀; b ♂ 1 ♀) (all leg. Papadimitrakis); Site 63 (b 1 ♀); Site 71 (b 1 ♂ 1 ♀) (all leg. Stathi); Site 59 (a 3 ♀♀); Site 66 (a 1 ♂); Site 67 (a 1 ♂ 1 ♀); Site 70 (b 1 ♀); Site 72(a 1 ♀) (all leg. Trichas).

Taxonomy. Males are easily distinguished by the two apophyses at the tibia of the pedipalp (Figs 24-25). The epigyne of the females is broader than in other *Micaria* species and its anterior margin is very close to the spermathecae (Figs 31-32). They are medium sized spiders.

Ecology. This is the commonest species of the genus *Micaria* found on Crete (Fig. 81). It has a wide habitat preference, reaching an altitudinal limit of 1750m on Crete and 2260m in Morocco (Bosmans & Blick, 2000). Adults are present from spring to mid autumn, as it is the case in all *Micaria* presented in this paper.

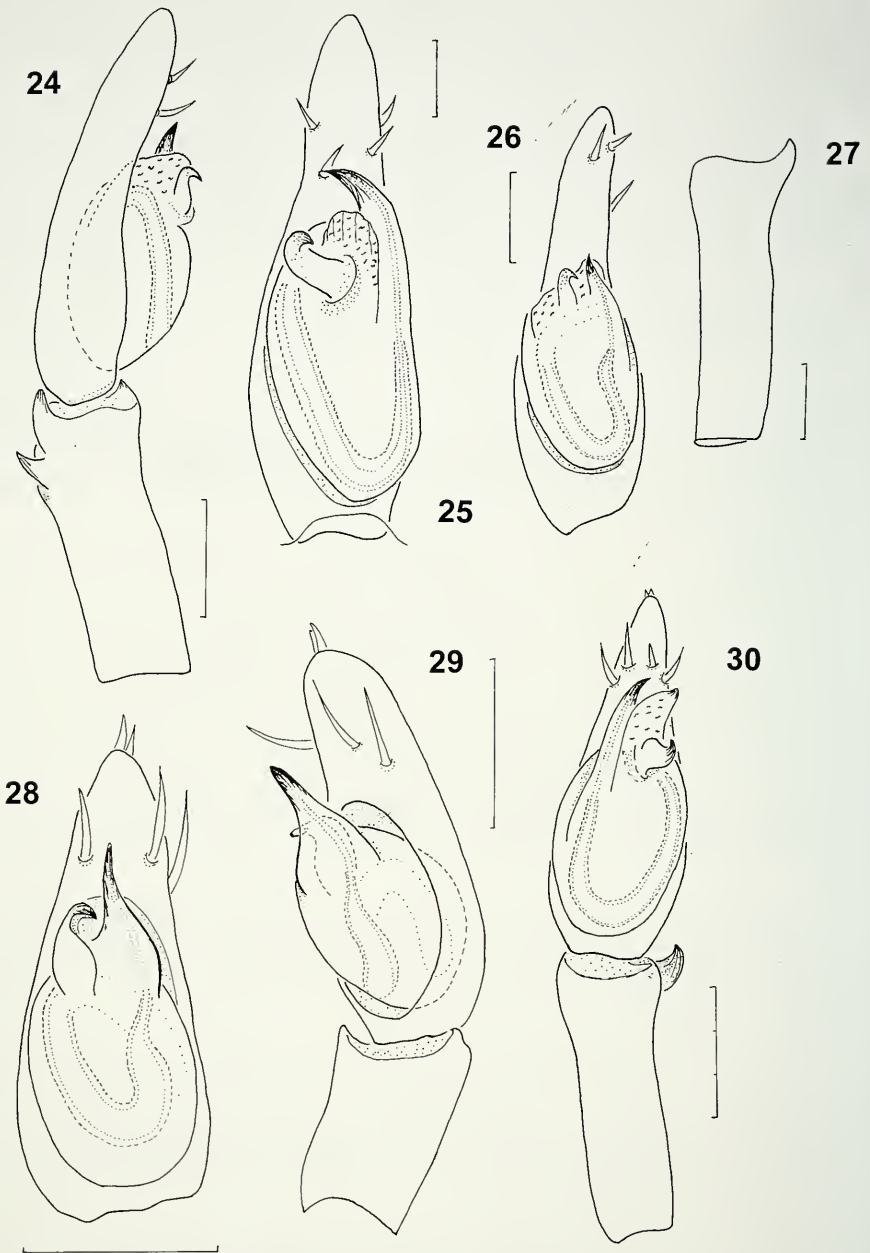
Distribution. Europe to Central Asia. GREECE: Crete: Irakleio: Lendas (Bosmans & Blick, 2000: 452).

Micaria dives (Lucas, 1846)

Figs 26-27, 33-34, 81

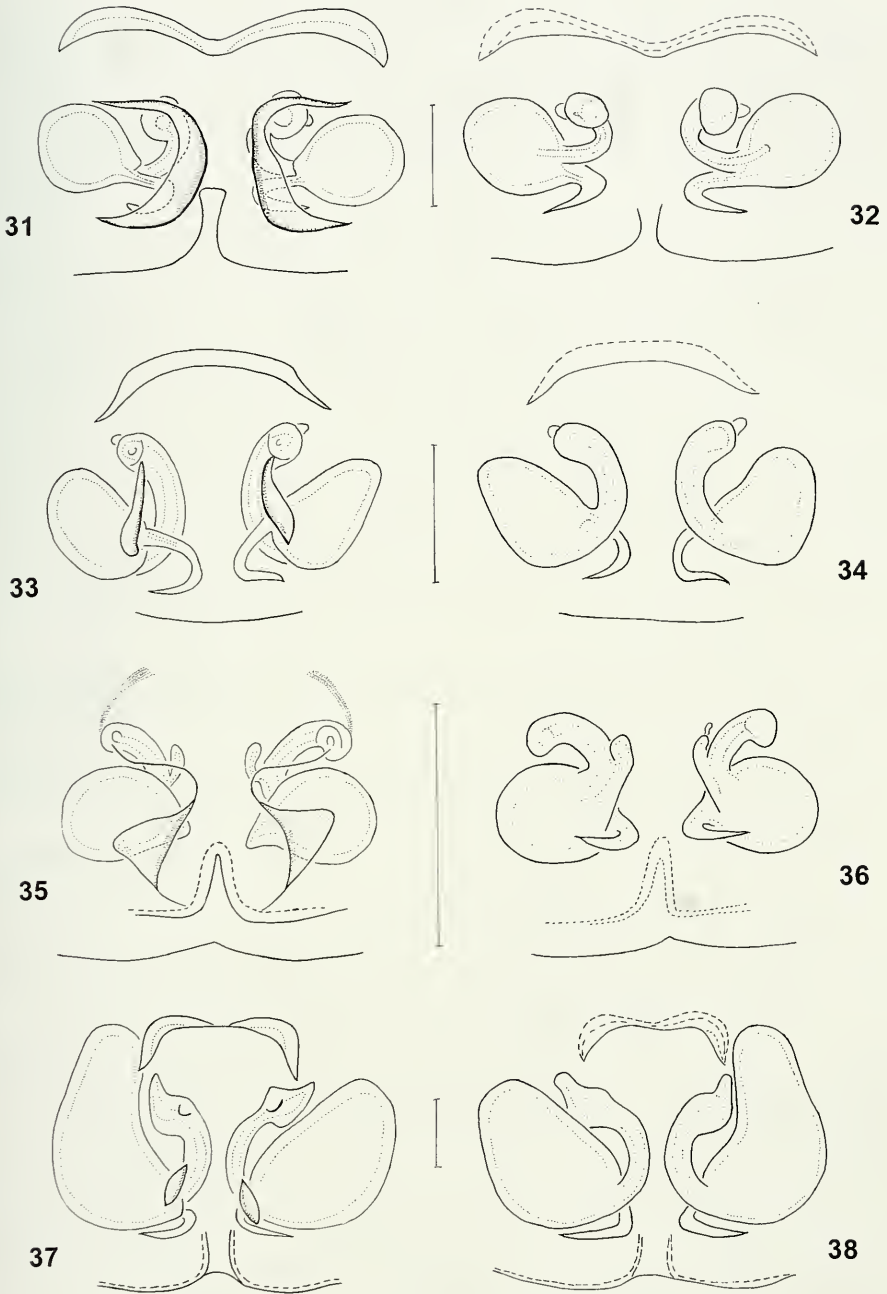
Identification: Wunderlich (1979, p. 287, Figs 34 a-d, 58 a-c), Bosmans & Blick (2000, p. 446, Figs 1-4).

Material. CRETE: RETHYMNO: Site 39 (a 2 ♂♂) (leg. Nikolakakis); IRAKLEIO: Site 43 (b 1 ♂); Site 44 (a 2 ♂♂) (all leg. Nikolakakis); Site 49 (a 1 ♂) (leg. Papadimitrakis); LASITHI: Site 56 (a 6 ♂♂ 1 ♀; b 2 ♀♀) (all leg. Chatzaki).



FIGS 24-30

Micaria coarctata: 24, palp of ♂, retrolateral view; 25, palp of ♂, ventral view. *M. dives*: 26, palp of ♂, ventral view; 27, pedipalp of ♂, tibia. *M. pygmaea*: 28, palp of ♂, ventral view; 29, palp of ♂, retrolateral view. *M. albovittata*: 30, palp of ♂, ventral view. Scale lines 0.1mm (24-29), 0.3mm (30).



FIGS 31-38

Micaria coarctata: 31, 32. *M. dives*: 33, 34. *M. pygmaea*: 35, 36. *M. albovittata*: 37, 38.
Epigyne (31, 33, 35, 37), vulva (32, 34, 36, 38). Scale lines 0.1mm.

Ecology. *M. dives* is the second small-sized *Micaria* on Crete. It is rather uncommon, being found at middle altitudes of Psiloreitis Mt. and Dikti Mt., but only at one locality in the lowlands (Fig. 81).

Distribution. Palearctic. GREECE: Peloponnisos: Arkadia: Leonidio, Palaiochori (Bosmans & Blick, 2000: 446); Crete: Wunderlich (1979: 287).

***Micaria albovittata* (Lucas, 1846)**

Figs 30, 37-38, 81

Micaria romana L. Koch, 1866: Wunderlich (1979); Bosmans & Blick (2000).

Identification: Wunderlich (1979, p. 260, Figs 9 a-c, 42 a-f), Bosmans & Blick (2000, p. 451, Figs 13-16).

Material. CRETE: RETHYMNO: Site 25 (a 1 ♂) (leg. Lymberakis); Site 32 (a 1 ♂); Site 39 (a 2 ♀♀); Site 40 (b 2 ♂♂ 1 ♀) (all leg. Nikolakakis); IRAKLEIO: Site 47 (a 1 ♂ 1 ♀ [MHNG]; e 1 ♂) (all leg. Nikolakakis); LASITHI: Site 59 (c 1 ♂) (leg. Trichas).

Taxonomy. *M. albovittata* is the largest *Micaria* on Crete. Males are characterized by a robust tibial apophysis of the pedipalp and by their relatively long palpal tibia, compared to the cymbium (Fig. 30). Females are distinguished by the thick and narrow anterior epigynal margin (Fig. 37) and the large spermathecae (Fig. 38). The distinctive character given by Bosmans & Blick (2000), i.e. the position of the spermathecae in relation to the anterior margin, does not seem to be constant; see drawings of Bosmans & Blick (2000, Figs 15-16), Wunderlich (1979, Figs 42 c-f) and of us (Figs 37-38).

Ecology. This is another uncommon species on Crete (Fig. 81). It occurs along with *M. coarctata* as well as with *M. dives*, but has a more restricted distribution on the island.

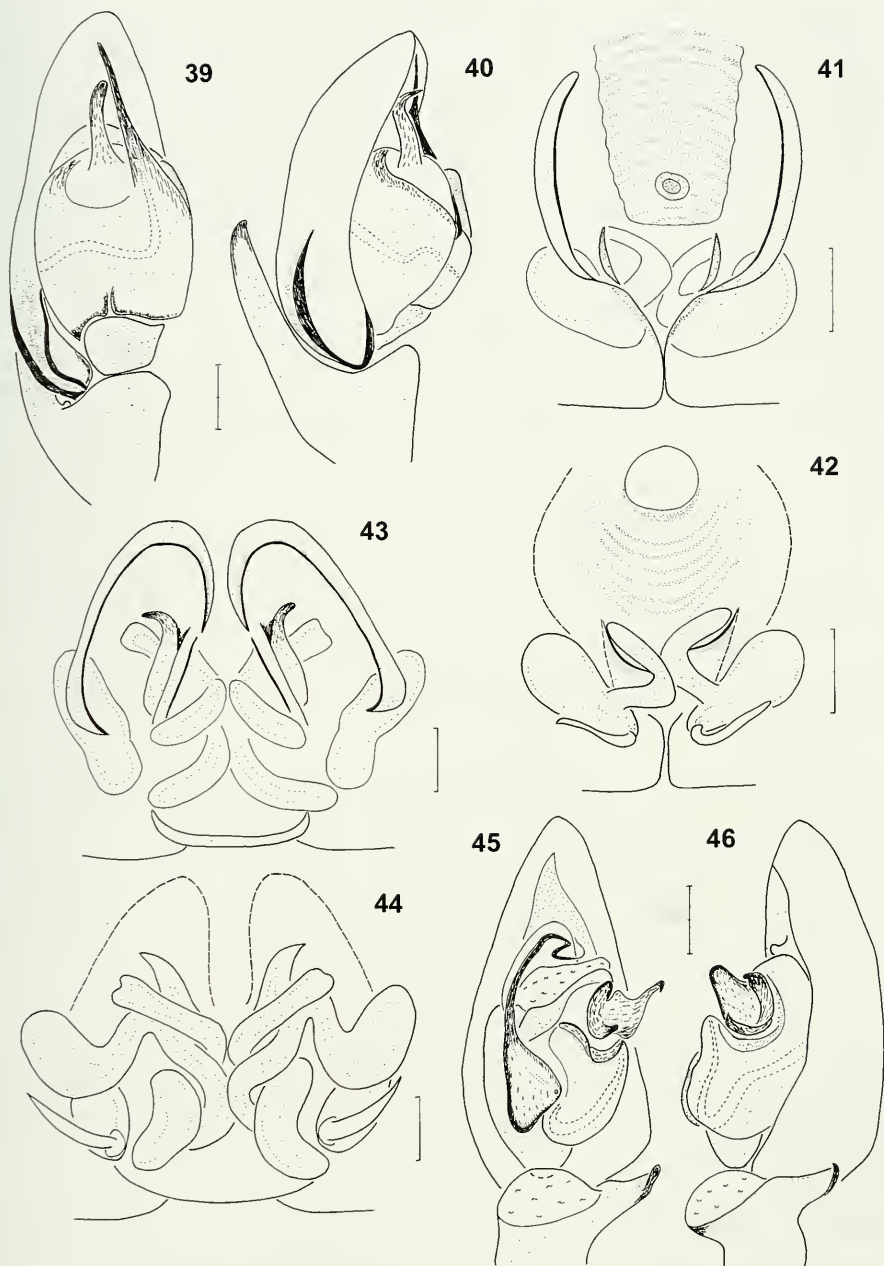
Distribution. Palearctic. GREECE: Peloponnisos: Argolida: Oros Didymo; Arkadia: Magalopolis, Thersileion (Bosmans & Blick, 2000: 451).

***Pterotricha lentiginosa* (C. L. Koch, 1837)**

Figs 43-46, 82

Identification: Levy (1995), Dalmas (1921).

Material. CRETE: CHANIA: Site 1 (a 24 ♂♂ 21 ♀♀; b 6 ♀♀; c 3 ♂♂ 1 ♀); Site 2 (a 33 ♂♂ 39 ♀♀; b 6 ♀♀; c 10 ♂♂ 1 ♀; d 1 ♂; f 20 ♂♂ 1 ♀); Site 3 (a 8 ♂♂ 7 ♀♀; c 5 ♂♂; d 2 ♂♂ 1 ♀; e 1 ♂ 1 ♀; f 12 ♂♂ 2 ♀♀); Site 4 (a 1 ♀; b 1 ♀); Site 5 (a 1 ♂ 1 ♀); Site 6 (a 1 ♂; e 1 ♀; h 1 ♂); Site 7 (b 1 ♀; d 1 ♂ 5 ♀♀; e 13 ♀♀; f 1 ♂ 3 ♀♀; g 59 ♂♂ 3 ♀♀; h 32 ♂♂ 5 ♀♀; i 1 ♂ 1 ♀; j 1 ♂); Site 8 (a 50 ♂♂ 5 ♀♀; b 24 ♂♂ 9 ♀♀; c 1 ♀; d 4 ♀♀; e 6 ♀♀; g 18 ♀♀; h 18 ♂♂ 2 ♀♀; i 21 ♂♂ 3 ♀♀; j 7 ♂♂ 2 ♀♀; k 2 ♀♀) (all leg. Lymberakis); Site 11 (b 9 ♂♂ 1 ♀) (leg. Stathi); RETHYMNO: Site 24 (a 2 ♂♂) (leg. Stathi); Site 25 (a 9 ♂♂ 26 ♀♀; c 1 ♂) (all leg. Lymberakis); Site 30 (a 2 ♀♀); Site 33 (a 5 ♂♂ 1 ♀); Site 35 (a 6 ♂♂ 6 ♀♀); Site 36 (a 4 ♀♀) (all leg. Trichas); Site 27 (a 51 ♂♂ 77 ♀♀; b 5 ♂♂ 11 ♀♀; c 25 ♂♂ 1 ♀; d 2 ♂♂ 1 ♀; e 4 ♂♂ 1 ♀; f 18 ♂♂ 2 ♀♀); Site 34 (a 3 ♂♂ 44 ♀♀; b 69 ♂♂ 24 ♀♀; c 14 ♂♂ 3 ♀♀; d 1 ♂ 4 ♀♀; e 11 ♀♀); Site 37 (a 12 ♀♀; b 54 ♂♂ 20 ♀♀; c 24 ♂♂ 10 ♀♀; e 4 ♀♀) (all leg. Chatzaki); Site 28 (a 8 ♂♂ 26 ♀♀; b 23 ♀♀); Site 29 (a 2 ♀♀); Site 32 (a 23 ♂♂ 81 ♀); Site 39 (a 4 ♂♂ 22 ♀♀; b 9 ♂♂ 24 ♀♀); Site 40 (d 1 ♀); Site 41 (a 20 ♂♂ 27 ♀♀; b 8 ♀♀) (all leg. Nikolakakis); Site 32 (b 61 ♂♂ 13 ♀♀) (leg. Papadimitrakis); IRAKLEIO: Site 42 (e 56 ♂♂ 40 ♀♀; f 31 ♂♂ 41 ♀♀; g 6 ♂♂ 25 ♀♀; h 30 ♂♂ 3 ♀♀; i 37 ♂♂ 4 ♀♀; j 6 ♂♂; k 3 ♂♂) (all leg. Chatzaki); Site 43 (a 5 ♂♂ 39 ♀♀; b 1 ♂ 35 ♀♀; c 6 ♂♂ 3 ♀♀); Site 44 (a 12 ♂♂ 26 ♀♀; b 5 ♂♂ 10 ♀♀; c 4 ♂♂ 1 ♀); Site 45 (a 12 ♀♀); Site 47 (a 1 ♂ 9 ♀♀; b 3 ♂♂ 16 ♀♀; c 1 ♂; d 1 ♂; e 1 ♂ 2 ♀♀); Site 50 (b 1 ♀; e 1 ♂); Site 52 (a 9 ♂♂ 5 ♀♀; b 8 ♂♂ 22 ♀♀; c 17 ♂♂ 4 ♀♀); Site 53 (a 8 ♂♂ 6



FIGS 39-46

Gnaphosa bithynica: 39, palp of ♂, ventral view; 40, palp of ♂, retrolateral view; 41, epigyne; 42, vulva. *Pterotricha lentiginosa*: 43, epigyne; 44, vulva; 45, palp of ♂, ventral view; 46, palp of ♂, retrolateral view. Scale lines 0.1mm (43, 44), 0.2mm (39-42, 45-46).

♀♀; b 11 ♂♂ 23 ♀♀; c 3 ♂♂ 2 ♀♀); Site 54 (a 2 ♂♂ 2 ♀♀; b 5 ♂♂ 16 ♀♀) (all leg. Nikolakakis); Site 46 (a 2 ♀♀); Site 49 (a 3 ♀♀; b 1 ♂ 2 ♀♀; c 32 ♂♂ 2 ♀♀); Site 50 (c 1 ♂ 2 ♀♀); Site 51 (a 6 ♂♂ 43 ♀♀; b 68 ♂♂ 23 ♀♀) (all leg. Papadimitrakis); LASITHI: Site 55 (a 4 ♂♂ 9 ♀♀ [MHNG]; b 16 ♂♂ 15 ♀♀; c 1 ♂; e 5 ♂♂); Site 56 (a 13 ♂♂ 30 ♀♀; b 96 ♂♂ 17 ♀♀; c 7 ♂♂ 1 ♀; d 1 ♂ 4 ♀♀); Site 57 (a 3 ♂♂ 54 ♀♀; b 79 ♂♂ 8 ♀♀; c 3 ♂♂ 3 ♀♀; d 6 ♀♀); Site 73 (a 2 ♀♀; c 1 ♂; e 2 ♂♂ 1 ♀) (all leg. Chatzaki); Site 58 (a 1 ♀); Site 62 (a 2 ♂♂); Site 65 (a 1 ♀); Site 68 (a 8 ♀♀) (all leg. Papadimitrakis); Site 63 (a 1 ♂; b 1 ♀; c 7 ♂♂); Site 71 (a 10 ♂♂ 7 ♀♀; b 5 ♂♂ 9 ♀♀; c 7 ♂♂ 4 ♀♀) (all leg. Stathi); Site 59 (a 7 ♂♂; b 2 ♂♂; c 8 ♂♂); Site 61 (a 1 ♂; b 5 ♂♂ 1 ♀); Site 70 (a 2 ♂♂ 1 ♀; b 2 ♂♂) (all leg. Trichas). Material from further localities (vidit M. Chatzaki 2000, all in collection Hadjissarantos, ZMUA): CRETE: Vrachasi; Messara. PELOPONNISOS: Nafploio. ATTIKI: Koumoudouras lake; Penteli; Dionysos; Parnitha; Dafni; Kato Souli; Vari; Kiourka; Kareas; Ekali; Kokkinos Mylos; Kaissariani; Lavrio; Podonyftis.

Ecology. *P. lentiginosa* is the only *Pterotricha* found on Crete. It is the commonest and most abundant species of all spiders on Crete, dominating in all kinds of environments (Fig. 82), from the coast to the interior/mainland and reaching an altitudinal limit at 1950m. Adult specimens are found on the island during the whole year, with high activity in May-June (males and females) and in September (males) (Chatzaki *et al.*, 1998). Interestingly, however, it was not found on Gavdos island, where *Berlandina plumalis* (O.P.-Cambridge, 1872) is dominant. Regarding the distribution of *B. plumalis* (North Africa and south mediterranean countries to China, see Platnick, 2001), we believe that it has been imported into Gavdos by ships or by other anthropogenic means, thus excluding *P. lentiginosa* from the island, as they seem to share the same type of ecological niche. *B. plumalis* has never been recorded anywhere else in Greece and it has only been recently found on Crete, on the estuaries of Aposelemis river (Site 48).

Distribution. Mediterranean, Ukraine. GREECE: ATTIKI: Hymittos [6]; Elefsina [7]; Athina; Elefsina [8]; Hymittos, close to Liondari cave [9]. THESSALIA [8]. PELOPONNISOS [8]. EUBOIA [8]. IONIAN Isls.: Kerkyra [1, 8]. AEGEAN Isls.: Karystos; Stoura; Samos; Marathokampos; Ikaria [3]; Naxos [1]; Syros [7]; Santorini [7]; Dodekanisa [8]. CRETE: Chania: Askifou [2]; Chania; Lasithi [3]; Chania: Akrotiri; Governeto; Irakleio: Knossos [4]; Guripas-Panagia (?); Chania: Omalos, 1000m; Omalos, 1150m; Lasithi: Kastelli (NE of Neapoli) [5, 8]; Chania, Arkoudas cave (outside); Marathospilios cave (outside); Peristera cave [9].

Numbers in square brackets [] correspond to the following references: [1] Simon (1884, sub *Pythonissa lentiginosa*), [2] Kulczynski (1903b), [3] Strand (1916, sub *Pythonissa lentiginosa*), [4] Roewer (1928), [5] Giltay (1932), [6] Werner (1934), [7] Drensky (1935 sub *Pterotricha (Nomisia) lentiginosa*), [8] Hadjissarantos (1940), [9] Roewer (1959).

Gnaphosa bithynica (Kulczynski, 1903)

Figs 39-42, 82

Identification: Kulczynski (1903a, p. 641, Figs 6-7, 9-10).

Material. CRETE: CHANIA: Site 8 (a 9 ♀♀; b 1 ♀; c 1 ♀; d 2 ♂♂; e 14 ♂♂ 2 ♀♀; f 6 ♂♂ 33 ♀♀; g 9 ♀♀; h 8 ♀♀; i 3 ♀♀; k 3 ♀♀); Site 9 (a 5 ♂♂ [MHNG] 17 ♀♀; b 11 ♂♂ 10 ♀♀; c 3 ♂♂ 12 ♀♀; d 3 ♂♂ 19 ♀♀; e 12 ♂♂ 4 ♀♀; f 22 ♂♂ 10 ♀♀; g 15 ♂♂ 21 ♀♀); Site 10 (a 1 ♂) (all leg. Lymberakis); RETHYMNO: Site 35 (a 2 ♀♀); Site 36 (a 4 ♂♂) (all leg. Trichas); Site 37 (a 19 ♂♂ 17 ♀♀; b 1 ♂ 33 ♀♀; c 2 ♀♀; e 19 ♂♂ 7 ♀♀) Site 38 (a

2 ♂♂ 1 ♀; b 1 ♂ 2 ♀♀) (all leg. Chatzaki); LASITHI: Site 57 (a 7 ♂♂ 13 ♀♀; b 3 ♀♀ [MHNG]; c ♂ 1 ♀; d 1 ♂) (all leg. Chatzaki).

Taxonomy. The taxonomic characters of both male and female correspond well with the drawings of Kulczynski (1903a). Further studies will probably enable to place *G. bithynica* in synonymy with *G. rufula* (L. Koch, 1866). Ovtsharenko *et al.* (1992) recorded *G. rufula* from Kazakhstan (1 ♀) and Russia (1 ♂). Levy (1995) diagnosed this species on the base of two females from Lebanon and Israel, albeit questioning the correct matching of male and female by Ovtsharenko *et al.* (1992). The drawings of both authors (Figs 95-98 and 143-144 respectively) are very similar to those of *G. bithynica* reported here (Figs 39-42).

Ecology. *G. bithynica* is one of the few Gnaphosidae which reaches high altitudes on Crete (Fig. 82). Its distribution on Crete is confined to the main mountain massifs of the island, namely, Lefka Ori, Psiloreitis and Lasithiotika Ori. The species does not occur in the lowlands, its lowest record being from 1650m. Adults are present during summer.

Distribution. Turkey: Olympus Bithynicus, 2000-2500m (Kulczynski, 1903a); (first record for Europe).

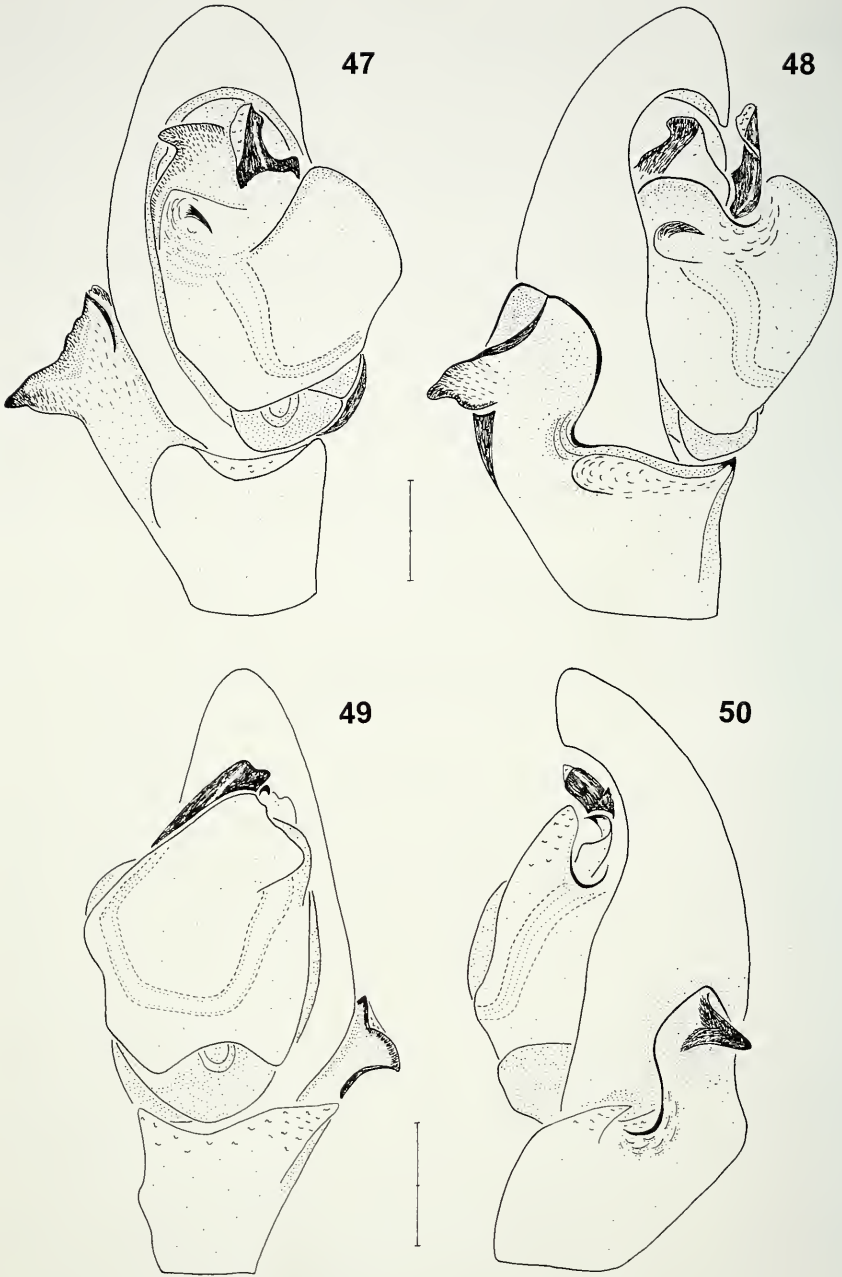
Nomisia excerpta (O.P.-Cambridge, 1872)

Figs 49-50, 53-54, 83

Identification: Levy (1995).

Material. CRETE: CHANIA: Site 1 (a 6 ♂♂ 1 ♀; b 1 ♀; c 1 ♀); Site 2 (a 11 ♂♂ 3 ♀♀; b 3 ♀♀; f 1 ♂); Site 3 (a 24 ♂♂ 20 ♀♀; b 5 ♀♀; e 1 ♂; f 15 ♂♂ 3 ♀♀); Site 5 (a 12 ♂♂ 7 ♀♀; b 12 ♀♀); Site 6 (c 5 ♂♂; d 16 ♂♂ 2 ♀♀; e 15 ♂♂ 2 ♀♀; f 2 ♂♂ 3 ♀♀; g 3 ♀♀; h 2 ♀♀); Site 7 (c 1 ♂; d 4 ♂♂; e 1 ♂ 1 ♀; f 2 ♀♀); Site 8 (e 3 ♂♂; f 1 ♂; g 1 ♀; i 1 ♀) (all leg. Lymberakis); Site 11 (b 2 ♂♂) (leg. Stathi); Site 13 (c 2 ♂♂; d 1 ♀); Site 14 (c 6 ♂♂ 1 ♀; d 2 ♂♂ 1 ♀); Site 15 (a 5 ♀♀; c 11 ♂♂ 2 ♀♀; d 4 ♂♂ 14 ♀♀); Site 16 (a 2 ♀♀; c 29 ♂♂ 6 ♀♀; d 4 ♂♂ 7 ♀♀); Site 17 (a 1 ♀; b 2 ♀♀; c 7 ♂♂ 2 ♀♀; d 2 ♂♂ 1 ♀); Site 18 (c 3 ♂♂ 1 ♀; d 1 ♂ 2 ♀♀); Site 19 (a 1 ♀; c 20 ♂♂ 3 ♀♀; d 3 ♀♀); Site 20 (a 21 ♂♂ 3 ♀♀; b 3 ♂♂ 1 ♀); Site 21 (c 1 ♀; d 1 ♂ 2 ♀♀); Site 22 (a 2 ♂♂ 1 ♀; b 1 ♀); Site 23 (c 14 ♂♂ 5 ♀♀) (all leg. Paragamian); RETHYMNO: Site 25 (a 15 ♂♂ 2 ♀♀); Site 26 (a 1 ♂; b 1 ♀) (all leg. Lymberakis); Site 27 (a 10 ♂♂ 2 ♀♀; f 2 ♂♂); Site 34 (a 5 ♂♂ 6 ♀♀; b 4 ♀♀; e 13 ♂♂) (all leg. Chatzaki); Site 30 (a 2 ♂♂); Site 33 (a 2 ♀♀) (all leg. Trichas); Site 28 (a 7 ♂♂ 3 ♀♀; b 10 ♀♀); Site 29 (a 2 ♂♂ 2 ♀♀); Site 32 (a 11 ♂♂ 17 ♀♀); Site 39 (a 5 ♀♀; b 3 ♂♂ 2 ♀♀); Site 40 (b 1 ♂ 1 ♀); Site 41 (a 8 ♂♂ 1 ♀; b 1 ♀) (all leg. Nikolakakis); IRAKLEIO: Site 42 (e 46 ♂♂ 1 ♀; g 5 ♀♀; f 6 ♂♂ 6 ♀♀) (all leg. Chatzaki); Site 43 (a 7 ♂♂; b 3 ♀♀); Site 44 (a 1 ♂; b 2 ♂♂ 4 ♀♀; c 1 ♀); Site 45 (a 2 ♂♂); Site 47 (a 3 ♂♂; b 2 ♂♂ 4 ♀♀; e 2 ♂♂); Site 50 (b 6 ♂♂); Site 52 (a 1 ♂; b 25 ♂♂ 6 ♀♀); Site 54 (b 3 ♂♂) (all leg. Nikolakakis); Site 46 (a 2 ♀♀); Site 49 (a 3 ♂♂ 1 ♀; b 2 ♂♂ 2 ♀♀; c 2 ♀♀); Site 50 (c 2 ♀♀); Site 51 (a 3 ♀♀; b 1 ♀) (all leg. Papadimitrakis); Site 48 (a 5 ♂♂) (leg. Trichas); LASITHI: Site 55 (a 5 ♂♂; b 2 ♂♂ 4 ♀♀ [MHNG]); Site 56 (a 3 ♂♂ 1 ♀; b 1 ♂); Site 73 (a 1 ♀; e 1 ♂) (all leg. Chatzaki); Site 58 (b 1 ♀); Site 62 (a 2 ♂♂ 1 ♀; b 4 ♀♀); Site 65 (a 1 ♂ 4 ♀♀); Site 68 (a 2 ♂♂ 7 ♀♀) (all leg. Papadimitrakis); Site 63 (b 1 ♂ 4 ♀♀); Site 71 (a 5 ♂♂; b 14 ♂♂ 21 ♀♀; c 1 ♀) (all leg. Stathi); Site 59 (c 6 ♂♂); Site 61 (b 2 ♂♂); Site 66 (a 7 ♂♂ 4 ♀♀); Site 67 (a 6 ♂♂ 6 ♀♀); Site 70 (a 21 ♂♂ 5 ♀♀; b 7 ♀♀); Site 72 (a 1 ♂; b 2 ♀♀) (all leg. Trichas).

Taxonomy. There is some confusion in the literature concerning this species, since the male palpal organs of *N. excerpta* and *N. recepta* (Pavesi, 1880) are very much alike. Dalmás (1921) and Levy (1995) have already reported on the problem; the latter also indicated earlier misidentifications. The comparison between *N. recepta*



FIGS 47-50

Nomisia ripariensis: 47, 48. *Nomisia excerpta*: 49, 50. Palp of ♂, ventral view (47, 49), palp of ♂, retrolateral view (48, 50). Scale lines 0.2mm.

and *N. excerpta* (Levy, 1995, Figs 36-40 and 31-35 respectively and Di Franco, 1986, Figs 2-5) and our drawings (Figs 49-50, 53-54) leaves no doubt that specimens from Crete belong to *N. excerpta* (see tibial apophysis and epigyne).

Ecology. *N. excerpta* is the commonest *Nomisia* on Crete, with a wide distribution all over the island, except for high altitudes over 1650m (Fig. 83). It occurs along with *P. lentiginosa* and with its congeners. *N. excerpta* has a long period of maturity (spring to autumn). In contrast to *P. lentiginosa* and *Berlandina plumalis*, it has a single peak of activity during late spring.

Distribution. Canary IIs., Tunisia, Israel; (first record for Europe).

Nomisia ripariensis (O.P.- Cambridge, 1872)

Figs 47-48, 51-52, 83

Identification: Levy (1995, p. 931, Figs 26-30).

Material. CRETE: RETHYMNO: Site 25 (a 3 ♂♂); Site 26 (a 1 ♂) (all leg. Lymberakis); Site 39 (a 1 ♀); Site 40 (b 1 ♀); Site 41 (a 1 ♂) (all leg. Nikolakakis); LASITHI: Site 64 (d 2 ♂♂ 2 ♀♀) (leg. Papadimitrakis); Site 66 (a 1 ♂) (leg. Trichas). Material from further localities (vidit M. Chatzaki 2000, all in collection Hadjissarantos, ZMUA): CRETE: Kapsaliana; PELOPONNISOS: Isthmia; Melas Tryma; STEREA ELLADA: Amfilochia, Chani Katsouli; Agrinio; Agios Vlassis; Agios Sotiras; Agios Christophoros.

Taxonomy. *N. ripariensis* is a well defined species. Our drawings (Figs 47-48, 51-52) fit well those of Levy (1995). The tibial apophysis of this species is very similar to that of *Nomisia conigera* (Spassky, 1941) (p.22, Fig. 12). This similarity has been already stressed by Ovtsharenko & Fet (1980). The examination of the type of *N. conigera* might prove that it is in fact a synonym of *N. ripariensis*.

Ecology. This species is not as common as *N. excerpta*. It is much less abundant, but very often it occurs along with *N. excerpta* (Fig. 83). This is consistent with the fact that Greece is at the western limit of its range of distribution. Matur spiders occur from spring to early summer.

Distribution. Greece to Azerbaijan. GREECE: Attiki: Pendeliko (Roewer, 1928: 114); Pendeli; Podoniftis; Parnitha - Mola; Parnitha - Palaiochori; Parnitha, 1000m; Kato Souli; Hymittos-Kareas (Hadjissarantos, 1940: 76); Makedonia: Thessaloniki (Simon, 1917: 274); Rodos: Bristowe (1935: 746); Crete: Chania: Governeto monastery; Katholiko cave (entrance); Arkalo cave (entrance) (Roewer, 1928: 114).

Haplodrassus creticus (Roewer, 1928) comb. n.

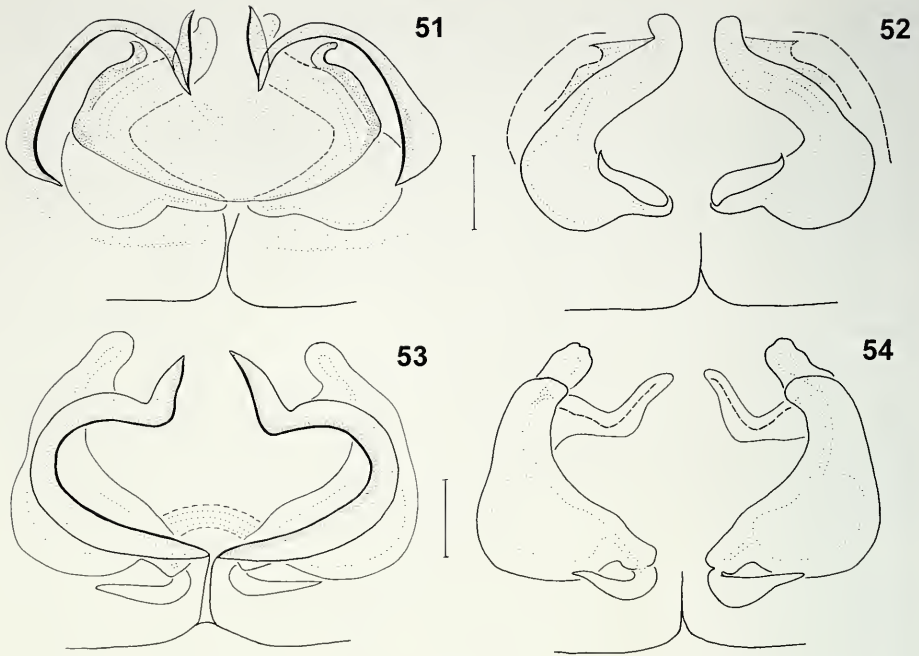
Figs 55-60, 84

Drassodes creticus Roewer, 1928, CRETE: Irakleio: Knossos (type locality).

Identification: Roewer (1928, p. 104, Fig. 9).

Material. Comparative material examined: *D. creticus*: 1 ♂ holotype, 1 ♂ Paratype, SMF: CR 577/27.

CRETE: CHANIA: Site 2 (e 3 ♂♂; e 3 ♂♂; f 6 ♂♂ 1 ♀); Site 3 (e 17 ♂♂ 6 ♀♀; f 1 ♀); Site 6 (m 2 ♀♀); Site 7 (c 1 ♂); Site 8 (d 7 ♂♂ 2 ♀♀) (all leg. Lymberakis); Site 11 (b 1 ♂) (leg. Stathi); RETHYMNO: Site 25 (a 1 ♂) (leg. Lymberakis); Site 30 (a 1 ♀); Site 33 (a 1 ♂) (all leg. Trichas); Site 34 (a 5 ♂♂ 15 ♀♀; b 1 ♀; d 2 ♂♂; e 7 ♂♂ 9 ♀♀) (all leg. Chatzaki); Site 28 (a 1 ♀); Site 40 (a 1 ♂) (all leg. Nikolakakis); IRAKLEIO: Site 43 (a 7 ♂♂ 11 ♀♀); Site 45 (a 2 ♂♂) (all leg. Nikolakakis); Site 49 (a 3 ♂♂ 2 ♀♀ [MHNG]); Site 51 (a 1 ♀) (all leg. Papadimitrakis); LASITHI: Site 55 (e 1 ♀); Site 56 (a 1 ♂; d 6 ♂♂ 6 ♀♀); Site 73 (d 1 ♂) (all leg. Chatzaki); Site 64 (b 1 ♂; c 1 ♀) (all leg. Nikolakakis); Site 66 (a 11 ♂♂ 4 ♀♀); Site 70 (a 4 ♂♂ 4 ♀♀) (all leg. Trichas); Site 71 (a 1 ♂; e 2 ♂♂) (all leg. Stathi).



Figs 51-54

Nomisia ripariensis: 51, 52. *Nomisia excerpta*: 53, 54. Epigyne (51, 53), vulva (52, 54). Scale lines 0.1mm.

Taxonomy. Roewer's description (1928) was based on two males found in the ruins of the archaeological site of Knossos, Irakleio. It surely belongs to the genus *Haplodrassus* and not to *Drassodes*, since the characteristic notch of the trochanters is missing and the genital organs conform to those of *Haplodrassus*. Here, the female is described for the first time.

Measurements ♀ (♂), n = 7(6) : TL: 4.3-6.5 (3.5-4.8), PL: 1.8-2.2 (1.5-2), PW: 1.5-1.9 (1.1-2), OL: 2.2-3.6 (1.9-2.5), PL/PW: 1-1.33 (0.9-1.36), AME: 0.05 (0.1), ALE: 0.06 (0.1), PME: 0.1 (0.12), PLE: 0.06 (0.1), AME-AME: 0.05 (0.08), AME-ALE: 0.05 (0.02), PME-PME: 0.03 (0.05), PME-PLE: 0.1 (0.1).

♂ ♀ Yellow-brown, medium-sized spiders. Carapace brown in cephalic part, widening and yellowish in thoracic part. Fovea small, dark. Sternum oval, labium and maxillae longer than wide. Chelicerae brown, with 2 posterior and 1 anterior teeth, the latter much larger, forming a keel. Eyes circular, PME oval, posterior row slightly procurved. Opisthosoma greyish yellow with a light pattern (probably more distinct in fresh specimens).

Legs: Spination: Fe: I-II, IV d 1-3; III d 4. Pa: - . Ti: I-II - ; III v 6 p 3 r 2; IV v 6 p 2 r 3 (variable). Me: I-II v 2; III-IV spinose.

♂ Pedipalp (Figs 55-58): Tibial apophysis short, truncate. Tegular apophysis characteristic, embolus long, dorsally broadened and truncate. Dorsal view, see Fig. 56.

Epigyne (Fig. 59): Anterior margin wider than areola. Lateral margins hiding the genital orifices, with almost parallel sclerotizations. Introductory pouches often covered by a mating plug.

Vulva (Fig. 60): Receptacles globular, with bulging introductory ducts and small glands at their lateral margins.

Ecology: *H. creticus* is the most common *Haplodrassus* species on Crete and has no specific habitat preference (Fig. 84). It reaches altitudes of 1650m, but also occurs near the beaches. Adults occur from spring to early summer.

Distribution. Crete (Cretan endemic ?).

***Haplodrassus signifer* (C. L. Koch, 1839)**

Figs 61, 84

Identification: Grimm (1985, p. 146, Figs 146, 170-171).

Material. CRETE: RETHYMNO: Site 32 (a 2 ♂♂ 2 ♀♀) (leg. Nikolakakis); LASITHI: Site 56 (a 1 ♂ 1 ♀; d 2 ♂♂) (all leg. Chatzaki). Material from further locations (vidit M. Chatzaki 2000, all in collection Hadjissarantos, ZMUA): PELOPONNISOS: Argos; Korinthia, Perigiali; Tegea; Pyrgos; Isthmia; EUBOIA: Kymi.

Ecology. This species is not very common on Crete (Fig. 84), although it is very common in Italy, even in Sicily (Di Franco 1994; 1996; 1997a; 1997b; 1998). It is restricted to higher elevations, appearing to be adapted to cooler climates. Like in *H. creticus*, adults are present during spring.

Distribution. Holarctic. GREECE: Attiki: Athens; Faliro; Lavrio; Voula; Parnitha - Agia Triada; Ekali; Kopanas; Melissia; Kaisariani; Parnitha - Fyli; Liopesi; Aigina; Vouliagmeni; Kato Souli (Hadjissarantos, 1940: 78); Crete: Chania: Topolia; Lakkos (Roewer, 1928: 103).

***Haplodrassus dalmatensis* (L. Koch, 1866)**

Figs 62, 62a-b, 84

Drassodes lithobius Roewer, 1928 (p. 101, Fig. 7), CRETE: Chania, Akrotiri (type locality).

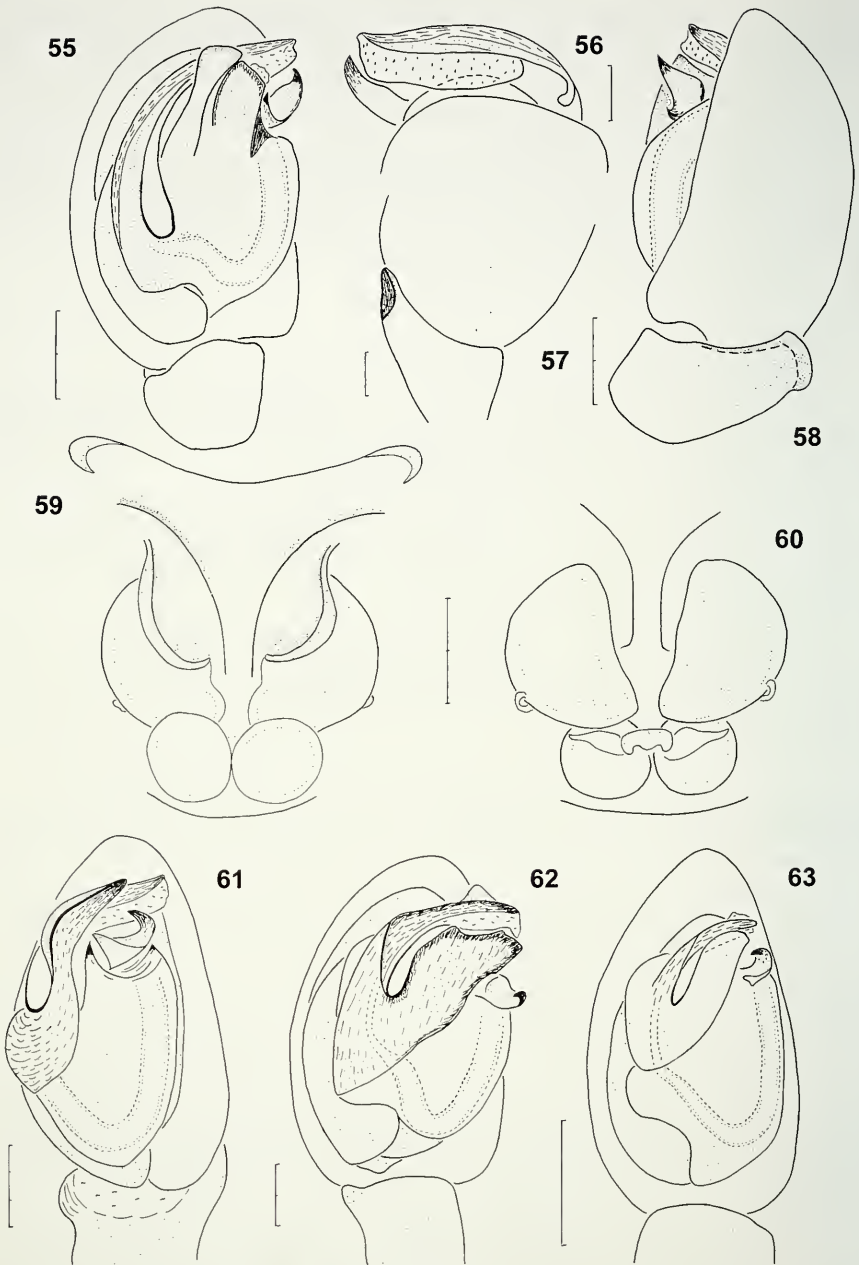
Syn. n.

Identification: Grimm (1985, p. 138, Figs 156, 164-165).

Material. Comparative material examined: *Drassodes lithobius*: 1 ♀ holotype, SMF: CR 583/33.

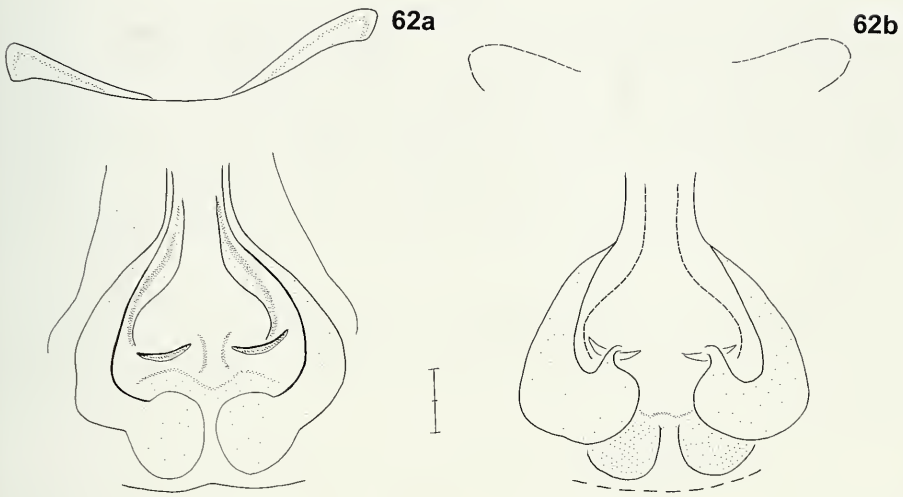
CRETE: CHANIA: Site 3 (f 1 ♂ 2 ♀♀); Site 4 (a 1 ♂ 2 ♀♀) (all leg. Lymberakis); Site 13 (c 7 ♂♂ 11 ♀♀); Site 14 (c 16 ♂♂ 5 ♀♀); Site 15 (c 1 ♂ 4 ♀♀); Site 19 (c 10 ♂♂ 2 ♀♀); Site 21 (b 1 ♀; c 1 ♂); Site 22 (a 1 ♀) (all leg. Paragamian); RETHYMNO: Site 26 (a 1 ♀) (leg. Lymberakis); Site 32 (a 14 ♂♂ 4 ♀♀; b 1 ♀) (all leg. Nikolakakis); Site 36 (a 1 ♂ 2 ♀♀) (leg. Trichas); Site 37 (a 15 ♂♂; e 2 ♂♂ 1 ♀ [MHNG]) (all leg. Chatzaki); IRAKLEIO: Site 51 (a 1 ♀) (leg. Papadimitrakis); LASITHI: Site 56 (a 2 ♂♂; b 1 ♂) (all leg. Chatzaki); Site 58 (a 1 ♀); Site 64 (d 6 ♂♂ 2 ♀♀) (all leg. Papadimitrakis); Site 64 (c 2 ♂♂) (leg. Nikolakakis). Material from further localities (vidit M. Chatzaki 2000, all in collection Hadjissarantos, ZMUA): ATTIKI: Loutsas; PELOPONNISOS: Pyrgos; IPEIROS: Konitsa; Ioannina lake.

Taxonomy. Roewer (1928) described a new species, *Drassodes lithobius*, based on a female from Crete. The type specimen has been examined and was found to be conspecific with *H. dalmatensis*. Also the type of *Drassodes acrotirius* Roewer, 1928 has been examined; it is very close to *H. dalmatensis*, although larger in size and with some difference in the shape of spermathecae (Fig. 62a-b, see also Grimm 1985, Figs 164-165).



FIGS 55-63

Haplodrassus creticus: 55, palp of ♂, ventral view; 56, distal part of ♂ palp, dorsal view; 57, palp of ♂, tibial apophysis, dorsal view; 58, palp of ♂, retrolateral view; 59, epigyne; 60, vulva. *H. signifer*: 61. *H. dalmatensis*: 62. *H. minor*: 63. Palp of ♂, ventral view (61-63). Scale lines 0.1mm (56-57, 63), 0.2mm (55, 58-60, 62), 0.3mm (61).



FIGS 62 a, b

Drassodes acrotirius: 62a, epigyne; 62b, vulva.

Ecology. This species is common on Crete, occupying all kinds of habitats and altitudes (Fig. 84). It is equally distributed in sandy and dry habitats, as well as in wetlands and at high altitudes. It is the only *Haplodrassus* found on Gavdos. This record is in contrast to the specific ecological preferences of this species towards grasslands, as reported by Di Franco (1996), but it accords with her comment about the preference of *H. dalmatensis* for dry, sunny and open habitats with sparse vegetation (Di Franco, 1992b). The peak of its activity is in late spring, but adults occur during the whole summer and at the beginning of autumn.

Distribution. Palearctic. GREECE: Attiki: Psychiko (Hadjissarantos, 1940: 76); Crete: Rethymno (Roewer, 1928: 103).

Haplodrassus minor (O.P.-Cambridge, 1879)

Figs 63, 84

Identification: Grimm (1985, p. 144, Figs 176-178).

Material. CRETE: IRAKLEIO: Site 49 (a 1 ♂; b 1 ♂) (all leg. Papadimitrakis).

Ecology. This small species is the rarest *Haplodrassus* on Crete (Fig. 84), which is not surprising, as it is distributed mainly at higher latitudes. Adult specimens occur in late spring to summer.

Distribution. Europe to Russia; (first record for Greece).

Leptodrassus albidus Simon, 1914

Figs 64-65, 72, 85

Identification: Dalmas (1919, p. 244, Figs 3-4), Di Franco (2000, p. 479, Figs 1-2).

Material. CRETE: CHANIA: Site 13 (a 1 ♂; c 6 ♂♂; d 10 ♂♂ 15 ♀♀; d 2 ♂♂ 2 ♀♀ [MHNG]) (all leg. Paragamian); RETHYMNO: Site 39 (b 1 ♂) (leg. Nikolakakis); IRAKLEIO: Site 49 (b 1 ♀) (leg. Papadimitrakis); LASITHI: Site 64 (d 1 ♂) (leg. Papadimitrakis).

Taxonomy. This species is easily identified by the two-lobed tibial apophysis of males and by the long hood that covers the median cavity of the epigyne.

♂ Pedipalp (Figs 64-65): Tibial apophysis with a broad base, a round ventral and a dorsal blade-like process. Bulbus complicated as in other species of the genus, being “apically armed with closely grouped laminae and often pointed, nearly indistinguishable sclerites”, as reported by Levy (1999b). Tegulum with a pointed retrolateral (r) and a complex ventral (v) apophysis. Embolus filiform, its base rising from proximal end of tegulum, running along its prolateral side, mostly hidden by a membrane.

Epigyne (Fig. 72): Median cavity covered by a long hood, with a setose base connected to the lateral margins, and with a sclerotized free part that covers almost three quarters of the cavity. Introductory orifices opening in the posterior half of the cavity, covered by the hood. Some female specimens from Gavdos probably with a mating plug.

Vulva: Introductory ducts curved, spermathecae globular.

Ecology. It seems that *L. albidus* does not form dense populations on Crete, as is the case for all its congeners. It occurs close to the coast and in degraded phrygana and abandoned cultivations (Fig. 85).

Distribution. Spain, France, Italy, Malta; (first record for Greece).

Leptodrassus femineus Simon, 1873

Figs 66-67, 73, 85

Identification: Dalmas (1919, p. 243, Figs 1-2), Di Franco (1986, p. 144, Figs 6-7).

Material. CRETE: CHANIA: Site 2 (a 1 ♂ [MHNG]); Site 3 (c 1 ♂) (all leg. Lymberakis); RETHYMNO: Site 28 (b 1 ♀ [MHNG]); Site 39 (b 7 ♂♂) (all leg. Nikolakakis); IRAKLEIO: Site 42 (g 1 ♀) (leg. Chatzaki); Site 44 (a 1 ♂; b 1 ♀) (all leg. Nikolakakis); Site 49 (b 1 ♂ 1 ♀) (leg. Papadimitrakis); LASITHI: Site 58 (a 1 ♂); Site 65 (a 1 ♂) (all leg. Papadimitrakis); Site 73 (e 2 ♂♂) (leg. Chatzaki).

Taxonomy. This is the type species of the genus. Tibial apophysis very characteristic (Figs 66-67), its outline changing with the position. Ventral lobe more rounded than in *L. albidus* and dorsal lobe shorter. In females, the setose part of the hood is extended and the median cavity is more rounded than in *L. albidus* (Fig. 73).

Ecology. This species is the most widespread *Leptodrassus* on Crete (Fig. 85). It occurs along with *L. albidus*. Maturity lasts from late spring to late summer as in many *Leptodrassus* species. Adult males occur more frequently in spring and adult females in summer.

Distribution. France, Italy, Corsica, Algeria, Portugal; (first record for Greece).

Leptodrassus hadjissaranti Chatzaki sp. n.

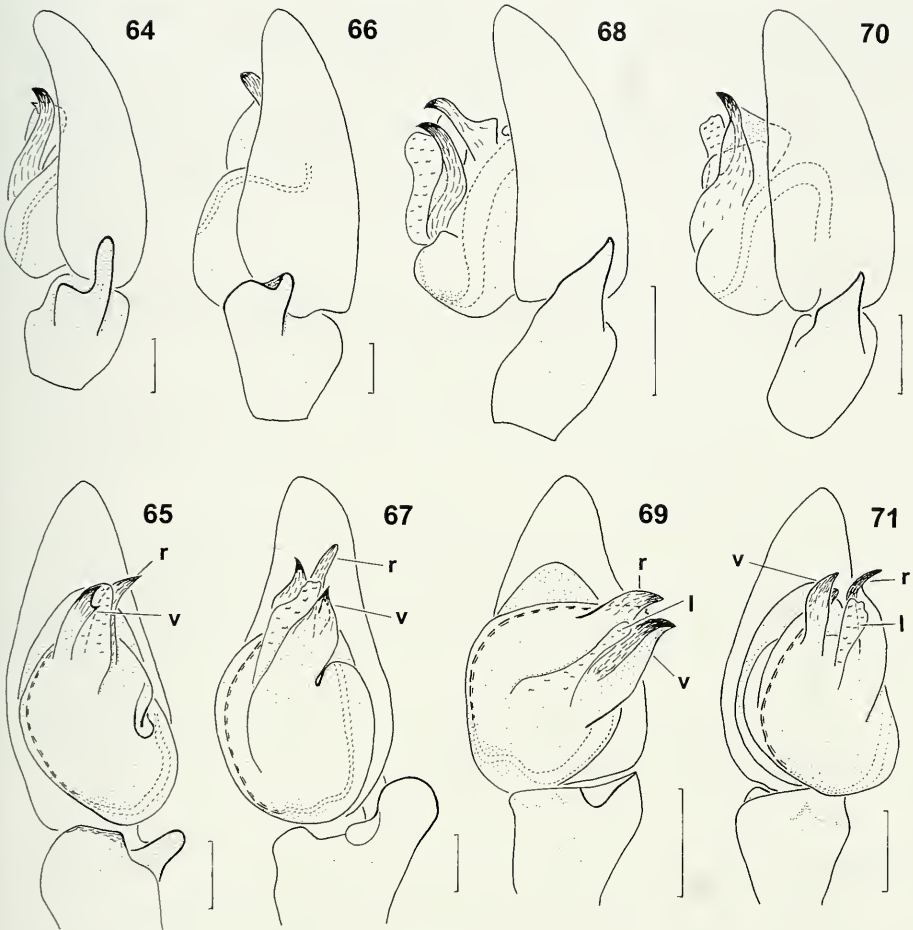
Figs 68-69, 76-77, 85

Etymology: This species is dedicated to Dr Haralambos Hadjissarantos, the first Greek arachnologist who worked mainly with the spiders of Attiki and of mainland Greece.

Material. Type material: Site 64e (Bramiana Lake, leg. Papadimitrakis, 1 ♂ holotype 1 ♀ Paratype [NHMC]); Site 41b (Rizikas, leg. Nikolakakis, 1 ♀ paratype [MHNG]).

CRETE: RETHYMNO: IRAKLEIO: Site 47 (b 1 ♀) (leg. Nikolakakis); LASITHI: Site 64 (d 1 ♀) (leg. Papadimitrakis).

Taxonomy. Measurements ♂ (♀), n = 1 (4): TL: 2 (2.7-3.3), PL: 0.7 (1.1-1.3), PW: 0.5 (0.7-0.8), OL: 1 (1.5-1.8), PL/PW: 1.4 (1.37-1.62), Legs: I: 2 (2.9-3.2), II:



FIGS 64-71

Leptodrassus albidus: 64, 65. *L. femineus*: 66, 67. *L. hadjissaranti* sp. n.: 68, 69. *L. manolisi* sp. n.: 70, 71. Palp of ♂, retrolateral view (64, 66, 68, 70), palp of ♂, ventral view (65, 67, 69, 71). Scale lines 0.1mm.

2.1 (2.5-3), III: 1.5 (2.1-2.5), IV: 2.4 (3.1-3.7), Pa/Ti: I:0.4 (0.5), II:0.5 (0.4), III:0.5 (0.75), IV:0.4 (0.57).

♂ ♀: Very small, yellowish spiders, with general appearance similar to the other species of the genus.

♂ Pedipalp (Figs 68-69): Tibial apophysis single-lobed, ending in a pointed tip. Ventral apophysis (v) of bulbus distinct, with adjacent transparent lamella (l), retrolateral apophysis (r) large. Embolus long, covered by a membrane.

Epigyne (Fig. 76): Anterior hood broad, cap-like, its basal half setose, distal half sclerotized, often interspersed with a mating plug. Epigyne with an exceptional character not found in the other species of the genus, i.e. a pair of membranous

fingers close to the epigastric furrow, originating from the lateral margins of the epigyne. Apparently these structures inflate during copulation.

Vulva (Fig. 77): As in *L. albidus*, introductory ducts almost at the same level as the globular spermathecae.

Ecology. *L. hadjissaranti* sp. n. has been found mostly in humid places, but also in phrygana at low elevations on the mainland of Crete (Fig. 85).

Distribution. Crete.

***Leptodrassus manolisi* Chatzaki sp. n.**

Figs 70-71, 85

Etymology. This species is dedicated to its collector, Mr Manolis Nikolakakis.

Material. Type material: Site 40b (Saktouria, leg. Nikolakakis, 1 ♂ holotype [NHMC]); Site 47c (Panagia Almyri, leg. Nikolakakis, 1 ♂ paratype [MHNG]).

Taxonomy. Measurements ♂ (♀), n = 2: TL: 2, PL: 1, PW: 0.7, OL: 1, PL/PW: 1.42, Legs: I:2.6, II:2.3, III:2.2, IV:3.2, Pa/Ti: I:0.5, II:0.5, III:0.44, IV:0.35.

♂ ♀: General appearance same as in the rest of *Leptodrassus* species. Very small yellowish spiders.

♂ Pedipalp (Figs 70-71): Tibial apophysis single-lobed, very similar to that of *L. hadjissaranti* sp. n., its anterior angle more prominent and its end more pointed. Retrolateral apophysis (r) of bulbus long, with a S-shaped, pointing end, well separated from the ventral apophysis (v). The shape of the membranous lamella (l) differs from that of *L. hadjissaranti* sp. n. (Fig. 71, compare with Fig. 69). Embolus hidden by a membrane.

The female is still unknown.

Ecology. This species seems to prefer sandy substrates in wet places (Fig. 85). Adults have been found in spring and summer.

Distribution. Crete.

***Leptodrassus pupa* Dalmas, 1919**

Figs 74-75, 85

Identification: Levy (1999b, p. 447, Fig. 40), Dalmas (1919, p. 248, Fig. 9).

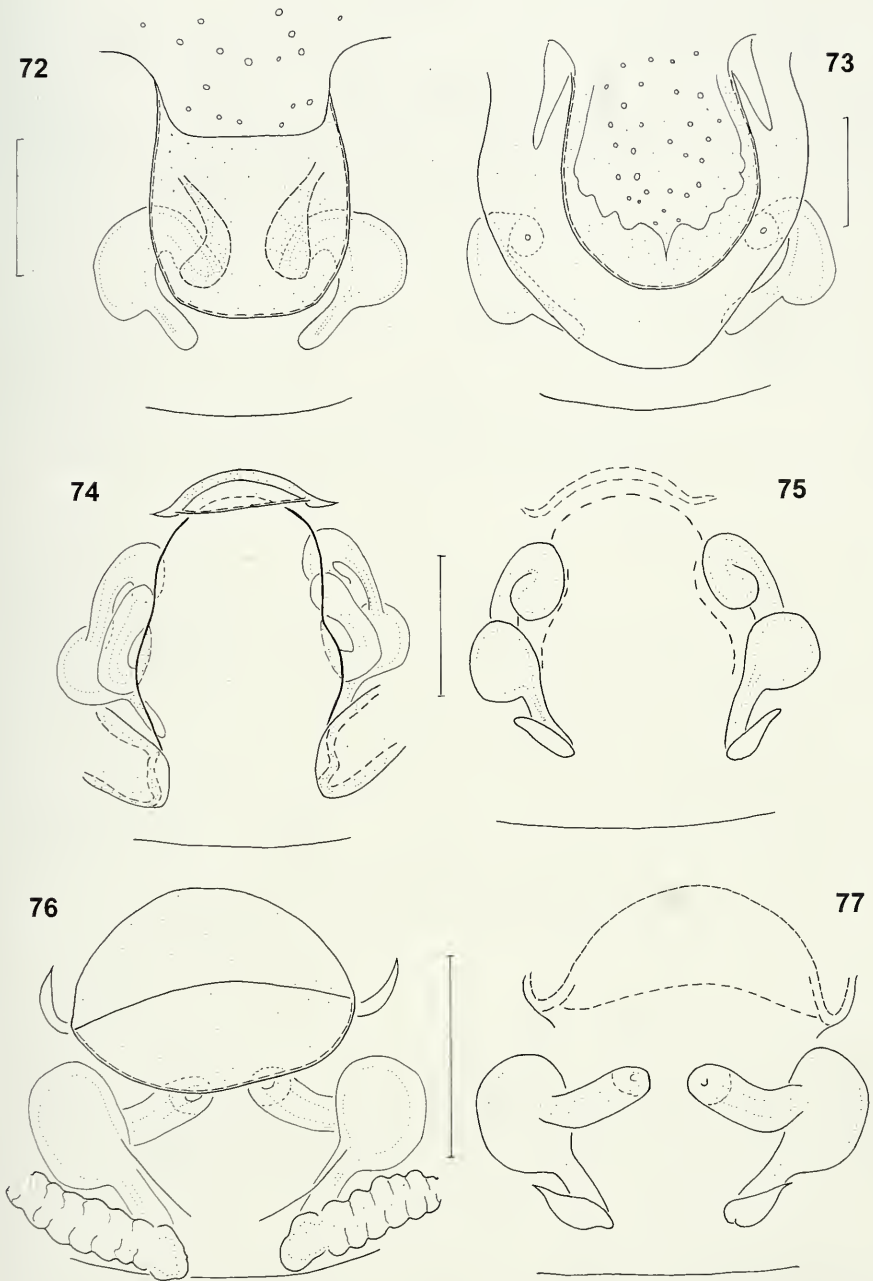
Material. CRETE: RETHYMNO: Site 39 (a 1 ♀ [MHNG]) (leg. Nikolakakis); IRAKLEIO: Site 45 (b 1 ♀) (leg. Nikolakakis); Site 50 (d 2 ♀ ♀) (leg. Papadimitrakis); LASITHI: Site 72 (b 1 ♀) (leg. Trichas).

Taxonomy. This species has been identified only from females collected from three localities on Crete. Epigyne characterized by a long central cavity, encircled by a slightly sclerotized rim (Fig. 74). Anterior hood tiny, not covering the cavity. The arrangement of spermathecae differs from those of other *Leptodrassus* (Fig. 75).

Distribution. Egypt; (first record for Europe).

CONCLUDING REMARKS

In this paper we present the taxonomy and distribution of 22 species of the family Gnaphosidae, which represents about 32% of the total number of gnaphosids on the island of Crete (based on unpublished data). Two of them are new to science (*Leptodrassus hadjissaranti* sp. n. and *L. manolisi* sp. n.), five are new records for Europe (*Anagraphis pallens*, *Berinda ensigera*, *Gnaphosa bithynica*, *Nomisia excer-*



FIGS 72-77

Leptodrassus albidus: 72. *L. femineus*: 73. *L. pupa*: 74-75. *L. hadjissaranti* sp. n.: 76-77. Epigyne (72-74, 76), vulva (75, 77). Scale lines 0.1mm.



FIG. 78
Anagraphis pallens, distribution on Crete.



FIG. 79
Poecilochroa senilis, distribution on Crete.

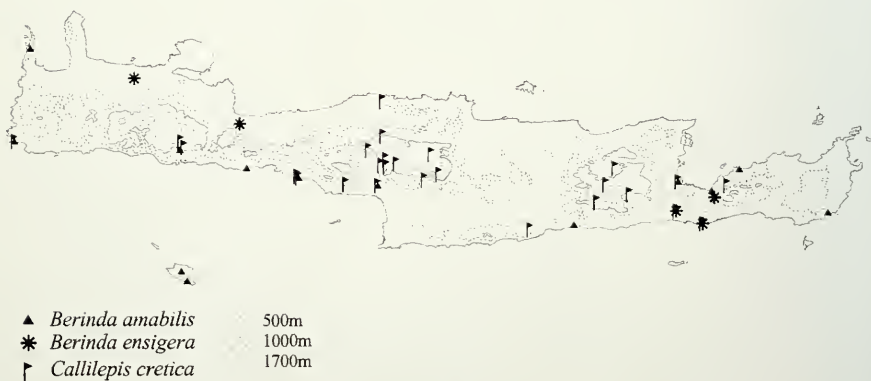


FIG. 80
Berinda amabilis, *B. ensigera*, *Callilepis cretica*, distribution on Crete.



FIG. 81

M. albovittata, *Micaria coarctata*, *M. dives*, *M. pygmaea*, distribution on Crete.

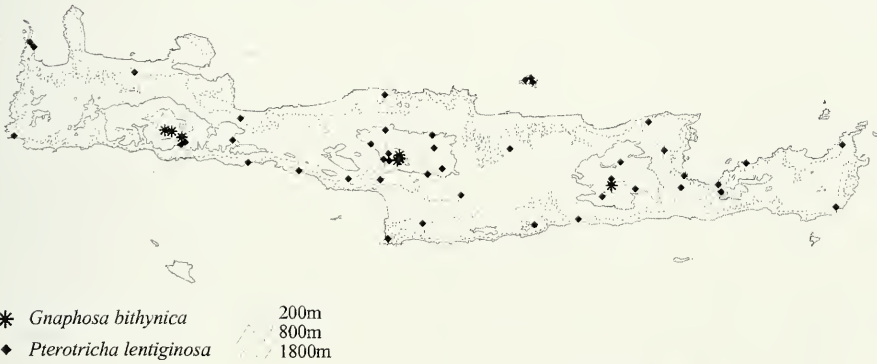


FIG. 82

Pterotricha lentiginosa, *Gnaphosa bithynica*, distribution on Crete.



FIG. 83

Nomisia excerpta, *N. ripariensis*, distribution on Crete.



FIG. 84

Haplodrassus creticus, *H. dalmatensis*, *H. minor*, *H. signifer*, distribution on Crete.

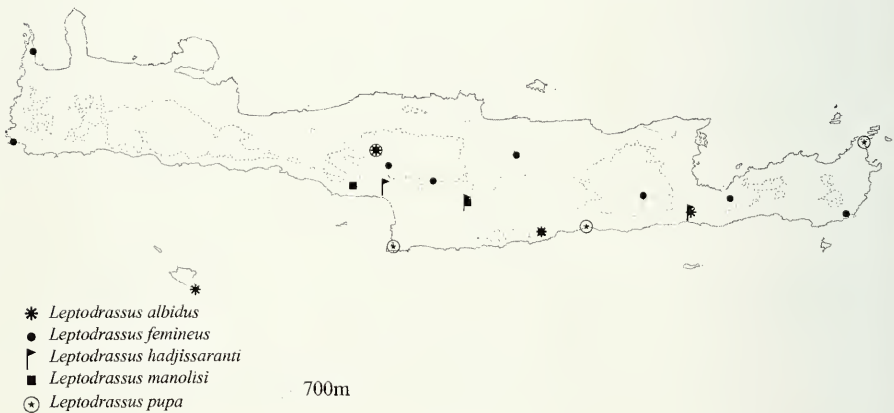


FIG. 85

Leptodrassus albidus, *L. femineus*, *L. hadjissaranti* sp. n., *L. manolisi* sp. n., distribution on Crete.

pta and *Leptodrassus pupa*), four are new records for Greece (*Poecilochroa senilis*, *Haplodrassus minor*, *Leptodrassus albidus* and *L. femineus*) and *Micaria albovitata* is a new record for Crete, but was already known from other parts of Greece. Two new combinations (*Berinda ensigera* [from *Drassodes*] and *Haplodrassus creticus* [from *Drassodes*]) and four new synonymizations (*Drassodes flavomaculatus* with *Poecilochroa senilis*, *Talanites aculeatus* with *Berinda amabilis*, *Drassodes reimoseri* with *Berinda ensigera* and *Drassodes lithobius* with *Haplodrassus dalmatensis*) are proposed.

Most of these species have an east Mediterranean (6 spp.) or Mediterranean (3 spp.) distribution, while 9 have a wider range of distribution. One species is Greek

endemic (*Callilepis cretica*) and three still stand as Cretan endemics (*Haplodrassus creticus*, *Leptodrassus hadjissaranti* sp. n. and *L. manolisi* sp. n.), since they have not yet been found anywhere else. These results coincide with the data on spiders of Sicily (Di Franco, 1993), where 50% of the 54 gnaphosids recorded are mediterranean (14.8% of them are local endemics) and the rest have a wider range of distribution (European or more widespread).

Most of the Gnaphosidae of Crete are distributed along the low and middle altitudes of the island. Only a few show a preference for more specialized ecotopes. *Gnaphosa bithynica* is distributed only at higher altitudes of all mountainous regions and *Berinda ensigera* seems to prefer wet habitats.

Only 7 out of the 22 species presented here were found on Gavdos-Gavdopoula. In some cases, species that are present on both islands have considerable differences in their abundance (*Micaria pygmaea*, *Poecilochroa senilis*, *Berlandina plumalis*), being more abundant on Gavdos. On Dia, 5 species out of the 22 are present, all of which are very common on Crete. This is to be expected, since Dia is much closer to Crete than to the other islands and therefore its arachnofauna more closely resembles the arachnofauna of Crete.

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Ground spiders (Gnaphosidae, Araneae) of Crete and adjacent areas of Greece. Taxonomy and distribution. II.

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Ground spiders (Gnaphosidae, Araneae) of Crete and adjacent areas of Greece. Taxonomy and distribution. II.

- Further results of a comprehensive study of ground spiders (Gnaphosidae) from Crete and the surrounding islands Gavdos, Gavdopoula and Dia, the islands Antikithyra, Kos and Karpathos, and from Attiki and Peloponnisos on the Greek mainland, are presented. The taxonomy and distribution of 17 species, belonging to the genera *Anagraphis*, *Berinda*, *Berlandina*, *Gnaphosa*, *Nomisia*, *Drassodes*, *Leptodrassus*, *Scotophaeus*, *Synaphosus*, *Cryptodrassus* and *Cesonia* are analyzed. Two species, *Nomisia palaestina* and *Synaphosus palearcticus*, and the genus *Cesonia* are recorded for the first time in Europe. Four new species, *Berinda aegilia*, *Drassodes oreinos*, *Cryptodrassus creticus* and *Cesonia aspida* are described and three new combinations (*Anagraphis pallida* [transferred from *Talanites*], *Drassodes serratichelis* [from *Mesklia*] and *Synaphosus trichopus* [from *Zelotes*]) are proposed. *Drassodes volidis* and *Scotophaeus subcorticis* are recognised as new synonyms of *D. lutescens* and *S. peninsularis*, respectively. The genus *Mesklia* Roewer is placed in the synonymy of *Drassodes*.

Key-words: Araneae - Gnaphosidae - Crete - Greece - taxonomy - distribution.

INTRODUCTION

Several authors in the past have pointed out the inadequate state of knowledge of the spiders of Greece and the adjacent areas of the East Mediterranean. Brignoli (1986), in his biogeographical analysis of the area, reported about 700 species and Deltsev (1999) mentioned 642 species for Greece. In his list, the latter also added 59 species for Crete. Bristowe (1935) and Hadjissarantos (1940) reported 30 and 32 gnaphosid species, respectively, from Greece. Until recently, 34 gnaphosid species were recorded from Crete. Most of these records have never been revised again. As far as spider diversity of Greece is concerned, this family has been severely underestimated in the literature and, no doubt, many species will be discovered in the future.

This paper is second in a series on the Gnaphosidae of Crete (see Chatzaki *et al.*, 2001), and it deals with some little known, as well as problematic, genera of the family. Seventeen species belonging to eleven genera (*Anagraphis*, *Berinda*, *Berlandina*, *Gnaphosa*, *Nomisia*, *Drassodes*, *Leptodrassus*, *Scotophaeus*, *Synaphosus*, *Cryptodrassus* and *Cesonia*) are analyzed taxonomically and presented here. This study also includes a revision of the collections of Roewer (1928) and Hadjissarantos (1940).

MATERIALS AND METHODS

The sampling strategy, exact localities and habitat type of each site are given in Chatzaki *et al.* (2002). In total, 59 sites were selected along the length of the island of Crete, 11 on the island group Gavdos – Gavdopoula and 3 on the island Dia (Fig. 1). Sampling sites cover Crete from north to south, west to east and along the altitudinal gradients of the three mountain massifs of the island, namely, Lefka Ori Mts., Psiloreitis Mts. and Lasithiotika Ori Mts. Most of the habitats selected on Crete are phrygana (plant communities that include dwarf, aromatic, thorny shrubs) and maquis. Few of the sites are pine forests or are situated close to permanent or temporary water reservoirs. New records from material collected from other areas of Greece and the Aegean islands (Fig. 2) have been added here, but are not shown on the distribution maps given for the species.

Material was collected using pitfall traps (12cm height, 9.5cm diameter). The killing preservative was ethylene glycole. At each site, 15-20 traps were set and changed in two-months intervals. In most cases, only material from the period of high activity of Gnaphosidae, e.g., late spring to early autumn (Chatzaki *et al.*, 1998; Chatzaki, 1998), has been analyzed and presented here.

The collection of material was financially supported by scientific projects of the EEC concerning biodiversity, i.e. TERRA, INTEREG II (ARCHIMED), or by the Ministry of Environment, Physical Planning and Public Works (“Gavdos, an island on the edge of Crete”), undertaken by the Natural History Museum of Crete (NHMC), and by the Biological Department of the University of Crete.

Identifications took place at the Natural History Museum of Crete and at the Zoological Institute of Innsbruck, Austria. Most of the material presented here is part of the Ph.D. thesis of the first author and is deposited at the NHMC. Material from the collection of Dr Hadjissarantos, deposited at the Zoological Museum of the Biological Department of Athens (ZMUA) and from the collection of Roewer, deposited at the Senckenberg Museum of Natural History, Frankfurt am Main, as well as the collection of the second author (KTh), has also been examined. Voucher specimens have been deposited at the Natural History Museum of Geneva (MHNG).

The following abbreviations are used in the text: Identification: reference used for the identification, TL: total length, PL: prosoma length, PW: prosoma width, OL: opisthosoma length, Cy: cymbium, Ta: tarsus, Me: metatarsus, Ti: tibia, Pa: patella, Fe: femur, d: dorsal, v: ventral, AME: anterior median eyes, ALE: anterior lateral eyes, PME: posterior median eyes, PLE: posterior lateral eyes. All measurements are given in mm. All drawings presented here are by the first author.

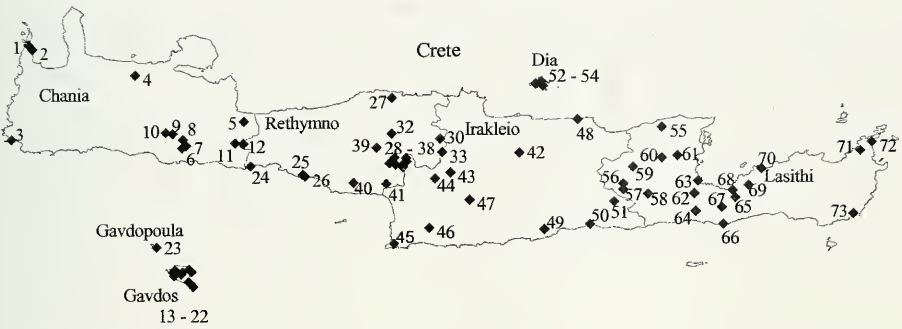


FIG. 1

Map of sampling sites on Crete and the surrounding islands Gavdos, Gavdopoula and Dia.



FIG. 2

Map of sampling sites on Attiki, Peloponnisos and Aegean islands.

RESULTS

Anagraphis pallida (Hadjissarantos, 1940) comb. n.

Figs 3-8

Talanites pallidus Hadjissarantos, 1940 (p. 79, Figs 23-25), ATTIKI: Pendeli – Dyonisos (type locality); Parnis – Phyli.

Material. ATTIKI: Pendeli – Dyonisos (1♂ holotype 1♀ paratype, 11/4/1937); Parnis – Phyli (1♂, 24/1/1937) (all in coll. Hadjissarantos, ZMUA). ANTIKYTHIRA: Potamos, 700m W: sparse phrygana on sandy soil close to the village, (1♀ *A. pallida* var.?, pitfall traps 27/3/2001 – 5/8/2001, leg. Chatzaki).

Taxonomy. This species was described by Hadjissarantos (1940) and, until now, has never been collected again. In general appearance it resembles *Talanites*. However, examination of the type revealed that the distinct characters of *Talanites* are absent: long and arched tibia, wide embolus and elongated median apophysis of the pedipalp, small hood of the epigyne. The revision of *Talanites* by Platnick & Ovtsharenko (1991) has revealed further misplacements of Eurasian gnaphosids in this genus. The distinct characters of both male and female genital organs of the Hadjissarantos specimen leave no doubt that this species belongs to *Anagraphis*. The similarity between the habitus of *Talanites* and *Anagraphis* was also stressed by Levy (1999a): „the two genera resemble each other in the proportional sizes and in the arrangement of their eyes,in the shape of the wide labium and cheliceral dentition, but differ distinctly in the shape of their genital characters“.

♂ ♀ Medium-sized, yellow spiders. Eyes round, posterior and anterior row almost straight. Labium wider than long. Chelicerae with 3 prolateral and 2 retrolateral teeth. Trochanters with a tiny notch. Opisthosoma oval, scutum absent in males.

♂ Pedipalp (Figs 3-4): Tibial apophysis short, filiform. Bulbus almost identical to that of *A. pallens* Simon, 1893. Retrolateral process (r) distinct. Sperm duct transverse, embolus long, filiform. Conductor long, transparent (C).

Epigyne (Figs 5, 7): Median depression V-shaped. Median part setose, with a sclerotized transverse rim. Epigyne of the female from Antikythira slightly different; the shape of the median depression (Fig. 7) is wider, and the median part is closer to the orifices. A dark mark, probably a mating plug, covers the lateral sides of this part, changing its appearance. Nevertheless we are inclined to place this female in *A. pallida*.

Vulva (Figs 6, 8): Receptacles globular with two chambers, like in *A. pallens* var. (see Chatzaki *et al.*, 2002, Fig. 7). The vulva of the specimen from Antikythira reveals that, in fact, the receptacles consist of a continuous coiled chamber (Fig. 8).

Comments. *A. pallida* is very much alike *A. pallens* Simon, 1893, already recorded from Crete (Chatzaki *et al.*, 2002). The two species are distinguished by the tibial apophysis of the male pedipalp and by the shape of the median part of the epigyne (for comparison see Chatzaki *et al.* 2002, Figs 2-5). This new combination adds a fifth species to the genus *Anagraphis*, in the wide region from the eastern Mediterranean to Afghanistan (other species are *A. pallens* and *A. pori* Levy, 1999 from Israel *A. pluridentata* Simon, 1897 from Syria and *A. maculosa* Denis, 1958 from Afghanistan) and is the second species to be reported from Greece.

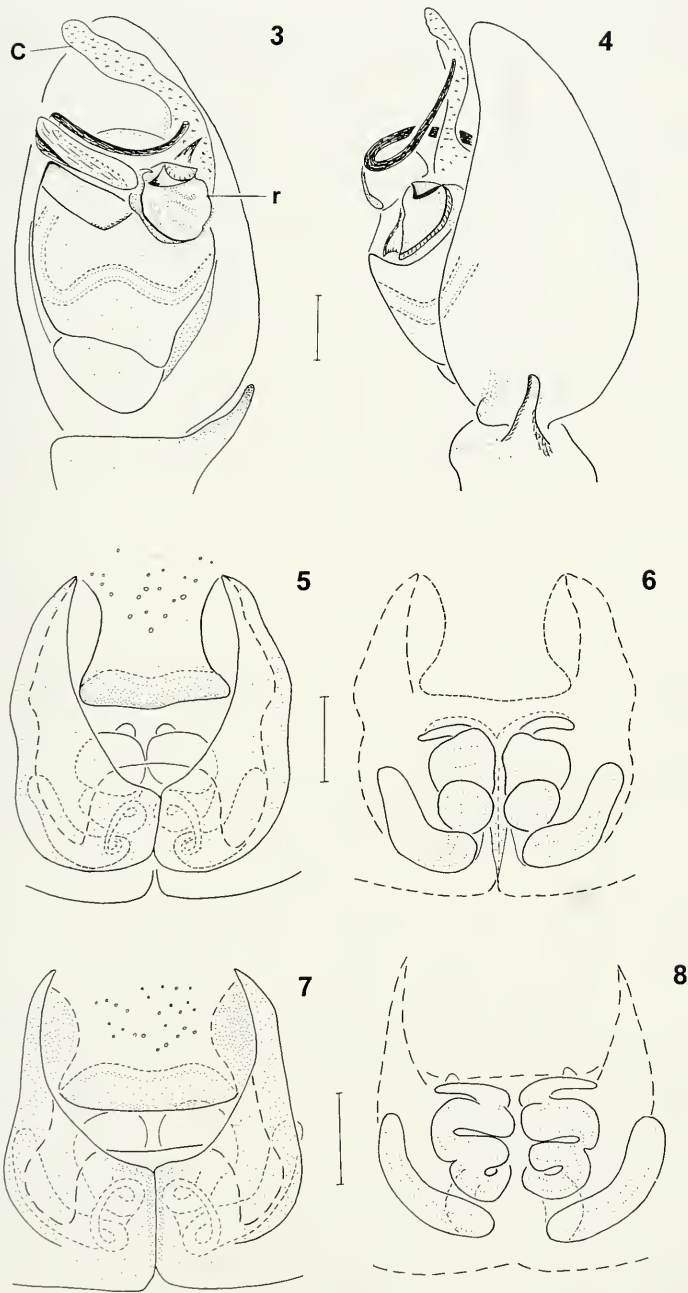
Distribution. Attiki, Antikythira (Greek endemic?). Considering our lack of arachnological knowledge on the surrounding area and the wide distribution of other species of this genus, we presume that *A. pallida* may well have a wider range of distribution.

***Berinda aegilia* Chatzaki sp. n.**

Figs 9-12

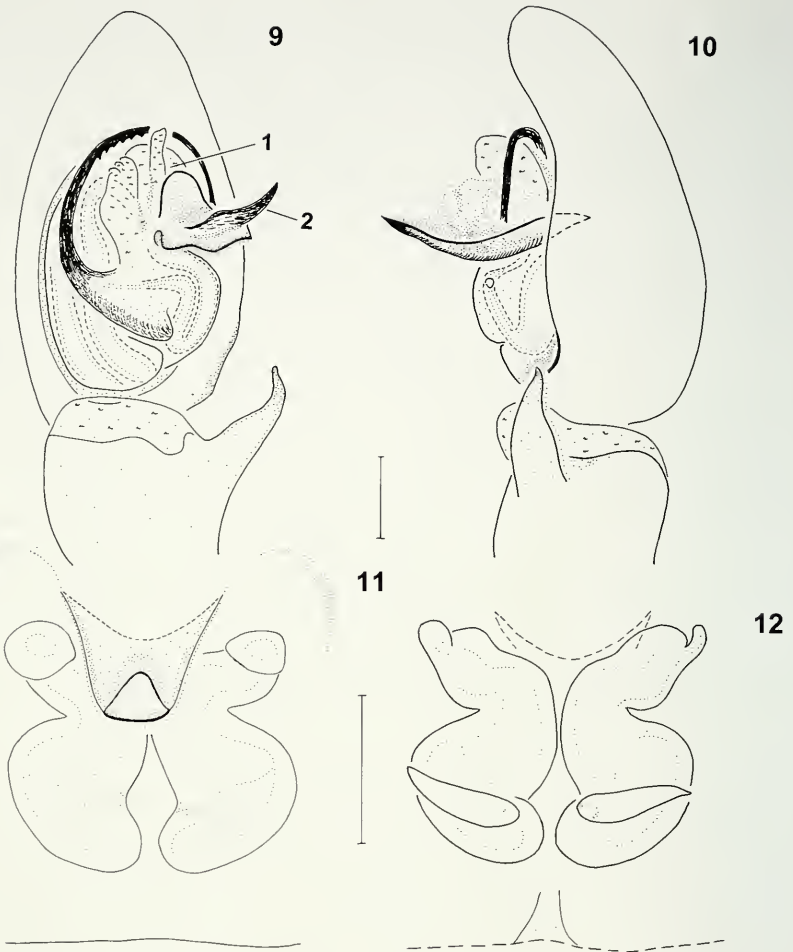
Etymology. The species name refers to the ancient name of the island Antikythira “Aegilia”: noun in apposition, hence invariable.

Material. Type material: ANTIKYTHIRA: Potamos, 700m W: sparse phrygana on sandy soil close to the village (pitfall traps 27/3/2001 – 5/8/2001, leg. Chatzaki, 1 ♂ holotype, 3 ♂♂ 1 ♀ paratypes [NHMC]; 2 ♂♂ 1 ♀ paratypes [MHNG]).



FIGS 3-8

Anagraphis pallida: 3, palp of ♂, ventral view; 4, palp of ♂, retrolateral view; 5, epigyne; 6, vulva; 7, *A. pallida* var.? epigyne; 8, *A. pallida* var.? vulva. Scale lines 0.1mm.



FIGS 9-12

Berinda aegilia sp. n.: 9, palp of ♂, ventral view; 10, palp of ♂, retrolateral view; 11, epigyne; 12, vulva. Scale lines 0.1mm.

Taxonomy. This is the third species to be placed in the genus *Berinda*, a genus established by Roewer (1928). The species shares a mixture of characters with the other species known in this peculiar genus. The general appearances of the pedipalp and the epigyne are close to those of *B. amabilis* Roewer, 1928, although details in the structures of the male genital organ resemble those of *B. ensigera* (O.P.-Cambridge, 1874) (see Chatzaki *et al.*, 2002).

Measurements ♂ (♀), n = 6(2): TL: 3.8-4.8 (4.2-5.1), PL: 1.8-2.3 (1.9-2.1), PW: 1.2-1.7 (1.3-1.5), PL/PW: 1.3-1.5 (1.4), OL: 1.7-2.2 (1.9-2.6).

♂ ♀ Medium-sized, brown spiders, habitus similar to that of *Zelotes*. Eyes round, with anterior row slightly recurved, posterior row slightly procurved or straight. Preening combs present on Me III and IV, like in its congeners.

Legs: Ta I-II and Me I-II with scopula. Ta III-IV with dense stripe of small spines. Me III-IV with apical preening comb as in *Zelotes*. Spination: Fe: I-II d 3 ; III d 7; IV d 4. Pa: I-II, IV - ; III p 1, r 1. Ti: I-II - ; III-IV spinose. Me: I v 2; II v 4; III-IV spinose.

♂ Pedipalp (Figs 9-10): Fe with 3 dorsal spines. Pa without an apophysis. Tibial apophysis relatively small, with a curved tip, set well apart from the cymbium. Cymbium oval, without proximal extensions (found in both *B. amabilis* and in *B. ensigera*), but with a hairless, slightly excavated retrolateral edge. Tegulum sclerotized, with distinct conductor originating from a membranous anterior bladder (1) and projecting ventrally into a strongly sclerotized claw (2). Embolus long, filiform, starting at proximal base of the tegulum and bearing some denticles at midlength.

Epigyne (Fig. 11): Anterior margins slightly sclerotized at the sides, continuing to a rectangular anterior hood similar to that of *B. amabilis*. Introductory orifices situated laterally.

Vulva (Fig. 12): Introductory ducts short, with glandular heads in front, leading to coiled, oval spermathecae.

Distribution. Antikythira.

Berlandina plumalis (O.P.- Cambridge, 1872)

Figs 13-16, 69

Identification: Levy (1995).

Material. CRETE: CHANIA: Site 13 (a 25 ♂♂ 10 ♀♀; b 2 ♂♂; c 28 ♂♂ 3 ♀♀; d 15 ♂♂ 11 ♀♀); Site 14 (a 6 ♂♂ 16 ♀♀; b 1 ♀; c 63 ♂♂ 13 ♀♀; d 20 ♂♂ 14 ♀♀); Site 15 (a 1 ♂ 1 ♀; c 8 ♂♂; d 1 ♂ 1 ♀); Site 16 (c 1 ♂; d 2 ♀♀); Site 18 (a 1 ♀; c 24 ♂♂ 10 ♀♀; d 4 ♀♀); Site 19 (a 3 ♂♂ 7 ♀♀; c 42 ♂♂ 5 ♀♀; d 19 ♂♂ 3 ♀♀); Site 20 (a 7 ♂♂; b 7 ♂♂ 4 ♀♀ [MHNG]); Site 21 (a 2 ♀♀; b 1 ♂); Site 22 (a 9 ♂♂ 1 ♀; b 4 ♀♀) (all leg. Paragamian). IRAKLEIO: Site 48 (a 6 ♂♂ 1 ♀) (leg. Trichas).

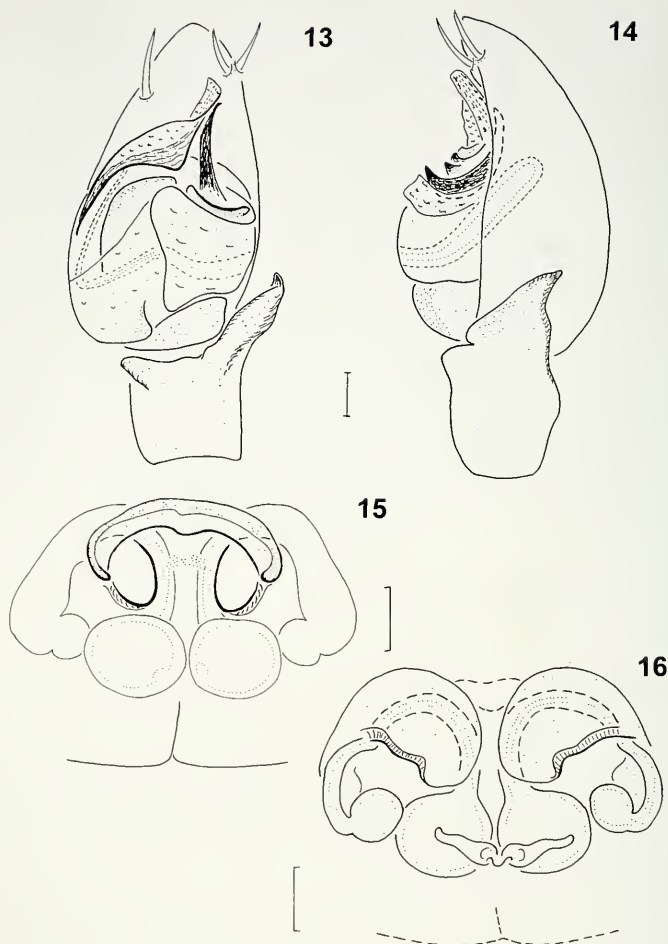
Taxonomy. ♂ ♀: Large, yellow spiders with brown markings along prosoma and opisthosoma, very similar to *Pterotricha lentiginosa* (C. L. Koch, 1837), making them almost indistinguishable in the field. The species can be easily recognised from species of other genera and from its congeners by the genital organs.

♂ Pedipalp (Figs 13-14): Tibial apophysis with broad base, curling and tapering towards its end. Tegulum voluminous, with long and slender retrolateral apophysis, ending in a curved tip (probably corresponding to the retinaculum of *Haplodrassus*). Embolus prolateral, strong, with sclerotized rims and a distal curl.

Epigyne (Fig. 15): Central depression oval, deep, divided by a median septum with sclerotized rims separating the wide, introductory orifices.

Vulva (Fig. 16): Introductory ducts funnel-like, first running to lateral/posterior side, then turning and leading to the spermathecae. At the turning point, a globular gland is attached, while at the level of the introductory orifices the two channels apparently overlap. Spermathecae globular.

Ecology. *B. plumalis* apparently prefers dry habitats, such as sand dunes and phrygana, as previously reported by Levy (1995). The only exception occurs at Site



FIGS 13-16

Berlandina plumalis: 13, palp of ♂, ventral view; 14, palp of ♂, retrolateral view; 15, epigyne; 16, vulva. Scale lines 0.1mm.

19, which stays damp throughout the year. *B. plumalis* has been collected at many sites on Gavdos (Fig. 69), where it is the dominant ground spider, but it has been collected at only one locality on Crete (Site 48). This observation is in contrast to its known, wide range of distribution, which suggests a high dispersal capacity. The scarcity of *B. plumalis* on Crete is probably due to competitive interaction with *P. lentiginosa*, which is widespread on Crete and adjacent islands, but absent on Gavdos. *P. lentiginosa* is also absent at the only locality on Crete, where *B. plumalis* was collected, see Chatzaki *et al.* (2002). Adult males and females are present during the whole year, with a peak of activity in late spring and summer.

Distribution. West Africa to China.

Gnaphosa dolosa Herman, 1879

Figs 17-18, 69

Identification: Ovtsharenko *et al.* (1992), ? Levy (1995).*Material*. CRETE: CHANIA: Site 13 (b 1 ♀) (leg. Paragamian).

Taxonomy. Only one female of this species was collected on Gavdos (Fig. 69). It is the only *Gnaphosa* collected on the island, and has not been found on Crete. Distinctive characters are the shape of the median hood and the sclerotized pouches of the epigyne, forming in their median part the introductory orifices. Spermathecae globular with simple, curved introductory ducts, laterally directed.

The taxonomy of this species is not yet clear. Levy (1995) maintains *G. barroisi* Simon, 1892 as a distinct species, whilst earlier it was placed in synonymy with *G. dolosa* by Ovtsharenko *et al.* (1992). The female genitalia of the Gavdos specimen (Figs 17-18) strongly resemble the drawings of both articles (Levy, 1995 vs. Ovtsharenko *et al.*, 1992). When males become available, eventual differences in the embolus and the retrolateral apophysis of the male palp should be investigated.

Distribution. Palearctic, mediterranean zone.***Nomisia palaestina*** (O.P.-Cambridge, 1872)

Figs 19-20

Identification: Levy (1995).

Material. KOS: Kefalos – Ag.Ioannis, 1 km S, phrygana and adjacent pine forest, (1 ♀, pitfall traps 26/6/2001 – 9/9/2001, leg. Chatzaki). PELOPONNISOS: Mainalo Mt., alpine phrygana, (2 ♀ ♀, pitfall traps 9/7/1997 – 12/10/1997, leg. Anastasiou).

Taxonomy. Only two females of this species were collected in pitfall traps on the island of Kos and on Peloponnisos. The epigynal median depression of this species widens laterally, exposing the parallel channels of the introductory ducts (Fig. 19). Spermathecae oval and robust (Fig. 20).

Distribution. Syria, Palestine; (first record for Europe).***Nomisia* sp. n. ?**

Figs 21-22, 69

Material. CRETE: CHANIA: Site 3 (a 1 ♀).*Taxonomy*. Measurements ♀: TL: 5.8, PL: 2.3, PW: 1.8, OL: 3, PL/PW: 1.27.

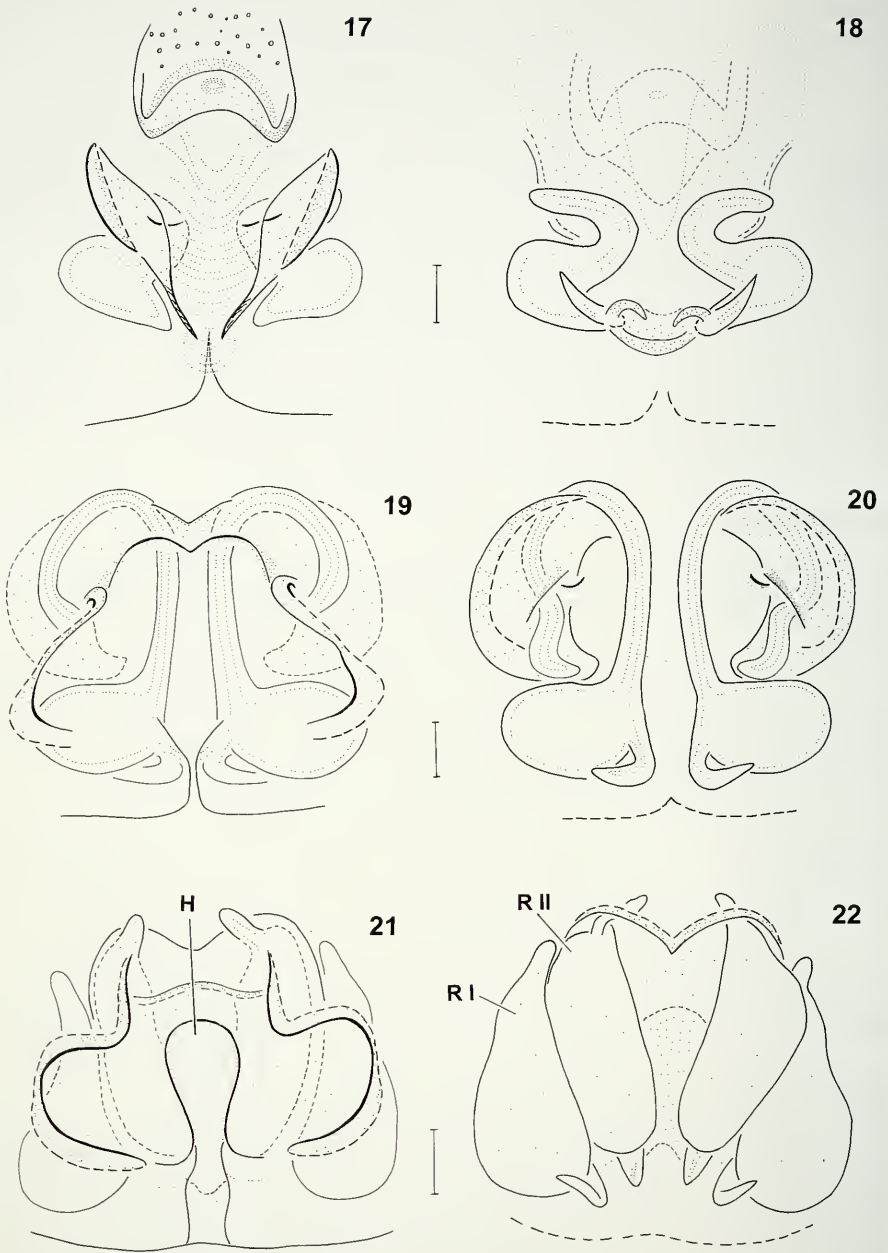
♀ Small-sized, brown spider with habitus similar to those of its congeners.

Epigyne (Fig. 21): Median depression with widely expanded, sclerotized lateral rims, centre with characteristic median cleft (H), leading to a central cavity.

Vulva (Fig. 22): Receptacles strongly sclerotized, divided into two large oval chambers (RI and RII), each with a glandular head anteriorly.

Comments. Following keys to the genera of Gnaphosinae (Simon, 1914 and Levy, 1995), this species keys out to *Nomisia*. However the genital characters (the central cleft and the duplicated receptacles) are very distinct and differ from those of any other species of the genus (see Levy, 1995; Denis, 1937; Dalmas, 1921; Roewer, 1961). Several males have been described from the adjacent areas (see Platnick, 2001), the females of which are unknown. This female could therefore belong to one of them. Unfortunately no male has been found which could clarify the taxonomic status of this singular female. Until further material is collected, we are reluctant to establish a new *Nomisia* species.

Distribution. Crete (known only from one locality, Fig. 69).



FIGS 17-22

Gnaphosa dolosa: 17-18. *Nomisia palaestina*: 19-20. *Nomisia* sp.n. ? : 21-22. Epigyne (17, 19, 21), vulva (18, 20, 22). Scale lines 0.1mm.

Drassodes lutescens (L. Koch, 1839)

Figs 23-26, 70

Drassodes validis Roewer, 1928 (p. 99, Fig. 3), ATTIKI: Athens, Akropolis (type locality); Pendeliko. **Syn. n.**

Identification: Simon (1914), Kulczynski (1911).

Material. CRETE: CHANIA: Site 1 (a 1 ♂ 1 ♀); Site 2 (a 2 ♂♂ 2 ♀♀; f 8 ♂♂); Site 3 (a 2 ♂♂ 3 ♀♀ [MHNG]; e 3 ♂♂ 2 ♀♀; f 1 ♀); Site 5 (a 3 ♂♂ 6 ♀♀; b 1 ♂ 4 ♀♀; c 1 ♀); Site 6 (i 1 ♂; j 1 ♂ 1 ♀) (all leg. Lymberakis); Site 13 (b 6 ♂♂ 2 ♀♀; c 4 ♂♂); Site 14 (a 7 ♂♂; b 13 ♂♂ 4 ♀♀; c 7 ♀♀; d 2 ♀♀); Site 15 (b 1 ♀; c 1 ♂ 1 ♀; d 4 ♀♀); Site 18 (a 2 ♂♂; b 12 ♂♂ 7 ♀♀; c 14 ♀♀; d 1 ♀); Site 19 (d 1 ♀); Site 20 (a 2 ♀♀); Site 21 (b 2 ♂♂ 2 ♀♀; c 1 ♀); Site 22 (a 3 ♀♀); Site 23 (a 3 ♂♂; b 17 ♂♂ 1 ♀; c 18 ♀♀) (all leg. Paragamian); RETHYMNO: Site 25 (a 1 ♂) (leg. Lymberakis); Site 27 (a 2 ♂♂ 1 ♀; b 1 ♀; f 8 ♂♂); Site 34 (e 2 ♀♀) (all leg. Chatzaki); Site 30 (a 1 ♂) (leg. Trichas); Site 28 (a 2 ♂♂; b 1 ♀); Site 29 (a 6 ♂♂ 2 ♀♀; b 8 ♀♀); Site 32 (a 1 ♂ 3 ♀♀); Site 40 (b 2 ♂♂); Site 41 (a 1 ♂; b 1 ♀) (all leg. Nikolakakis); IRAKLEIO: Site 42 (e 13 ♂♂ 1 ♀; f 10 ♂♂ 4 ♀♀; g 13 ♀♀) (all leg. Chatzaki); Site 44 (a 2 ♂♂ 1 ♀); Site 45 (a 1 ♂; b 1 ♀); Site 47 (a 1 ♂; b 1 ♀; e 1 ♂); Site 52 (c 1 ♂); Site 53 (a 1 ♀) (all leg. Nikolakakis); Site 46 (a 1 ♂ 1 ♀); Site 49 (a 28 ♂♂ 1 ♀; b 1 ♂ 4 ♀♀); Site 50 (c 2 ♀♀); Site 51 (a 7 ♂♂ 6 ♀♀; b 1 ♀) (all leg. Papadimitrakis); Site 48 (a 2 ♂♂ 4 ♀♀) (leg. Trichas); LASITHI: Site 56 (d 1 ♂ 1 ♀); Site 73 (a 1 ♀) (all leg. Chatzaki); Site 58 (a 2 ♂♂ 2 ♀♀; b 1 ♀); Site 62 (b 1 ♀); Site 64 (d 1 ♂; a 1 ♂) (all leg. Papadimitrakis); Site 63 (a 1 ♂); Site 71 (a 18 ♂♂ 7 ♀♀; b 3 ♀♀) (all leg. Stathi); Site 66 (a 1 ♂ 1 ♀); Site 67 (a 1 ♂ 5 ♀♀); Site 70 (a 13 ♂♂ 9 ♀♀; b 1 ♀); Site 72 (b 1 ♀) (all leg. Trichas).

Comparative material examined: *D. validis*: 1 ♀ holotype, SMF: CR 579/29; Pendeliko (1 ♀, SMF: CR 580/30).

Taxonomy. Yellow spiders of medium size. They are characterized by the absence of a tibial apophysis and by a relatively long embolus, situated at the pro-lateral side of the palpal organ (Figs 23-24). Epigyne narrow, ca. 2.3 times broader than long, with a tongue-like median structure, almost straight and lateral pouches hardly curved (Figs 25-26).

In our view, the female holotype of *D. validis* Roewer, 1928 corresponds fully to *D. lutescens*, and therefore, the new synonymy is proposed.

Ecology. *D. lutescens* is the most widespread species of this genus on Crete. It is the only large *Drassodes* found on Dia and Gavdos – Gavdopoula. Apparently it prefers phryganic habitats of low elevations (Fig. 70), whereas other species of the genus seem to become more numerous at altitudes higher than 800m. The highest point where *D. lutescens* has been found is at 1450m (Lasithi, Limnakaro plateau, Site 56). Adults may be found through the whole year, but the peak of activity is in spring.

Distribution. Mediterranean to central Asia.

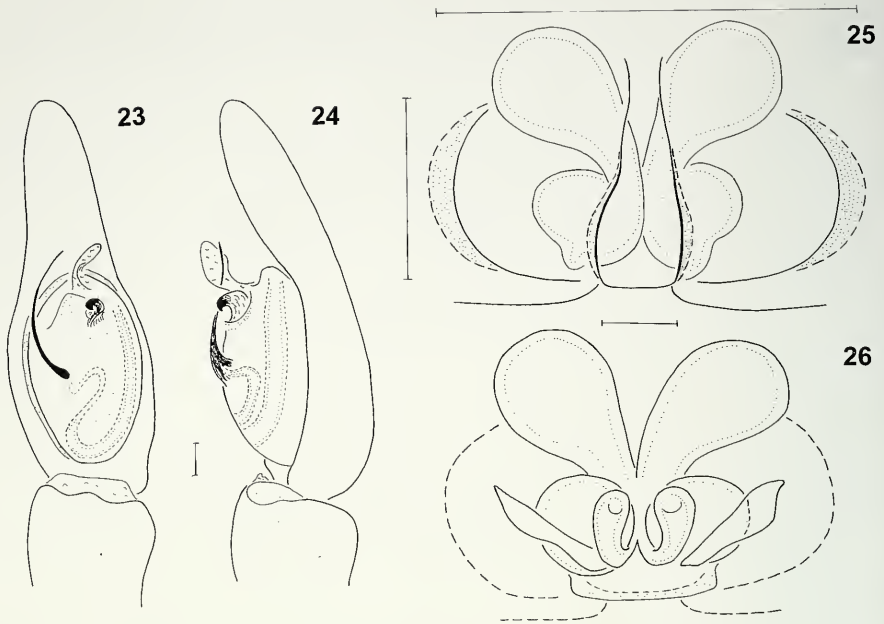
Drassodes lapidosus (Walckenaer, 1802)

Figs 27-28, 34-35, 70

Identification: Grimm (1985, p. 116, Figs. 115-117, 134-135).

Material. CRETE: CHANIA: Site 4 (a 1 ♂; b 1 ♀); Site 5 (a 2 ♂♂); Site 6 (e 2 ♂♂ 1 ♀) (all leg. Lymberakis); RETHYMNO: Site 29 (b 1 ♀); Site 32 (a 1 ♂ 3 ♀♀); Site 39 (a 1 ♀; b 1 ♂ 1 ♀) (all leg. Nikolakakis); IRAKLEIO: Site 42 (e 3 ♂♂ 2 ♀♀; f 1 ♀; g 2 ♀♀) (all leg. Chatzaki); Site 43 (a 22 ♂♂ 6 ♀♀; b 23 ♂♂ 44 ♀♀; b 4 ♂♂ 4 ♀♀ [MHNG]); Site 49 (a 3 ♂♂; b 3 ♂♂ 1 ♀); Site 51 (a 31 ♂♂ 33 ♀♀; b 9 ♀♀) (all leg. Papadimitrakis); LASITHI: Site 56 (a 3 ♂♂ 2 ♀♀) (leg. Chatzaki); Site 58 (a 1 ♂ 2 ♀♀; b 1 ♀) (all leg. Papadimitrakis); Site 59 (a 4 ♀♀; c 1 ♂ 1 ♀); Site 61 (b 1 ♂ 1 ♀); Site 67 (a 2 ♂♂ 3 ♀♀) (all leg. Trichas).

Taxonomy. The size, colour and cheliceral dentition of males of *D. lapidosus* vary greatly in mid-Europe, as reported by Grimm (1985, Figs 138 a-e). Based on this



FIGS 23-26

Drassodes lutescens: 23, palp of ♂, ventral view; 24, palp of ♂, retrolateral view; 25, epigyne; 26, vulva. Scale lines 0.1mm.

variation and a difference in the length of the tip of the cymbium, Roberts (1985) separates two species, *D. lapidosus* and *D. cupreus* (Blackwall, 1834), while Grimm considers these differences as intraspecific variation of a single species, *D. lapidosus*. Nevertheless there are further arguments, based on ecological surveys, for regarding these two forms as different species (Thaler, 1981).

Also in Crete, the cheliceral dentition of males is variable (Table 1), as well as their size (variation from 0.7cm to 1.5cm total length) and colour (from dark brown in large specimens to yellow in smaller ones). The *lapidosus* type outnumbers that of *cupreus*, while the majority of individuals are intermediate, irrespective of body size. Moreover, the tip of the cymbium is constantly long, as in *D. lapidosus* (sensu Roberts). It seems rather improbable that a further large *Drassodes* occurs at these sites. Therefore we are inclined to accept these morphological differences as intraspecific variation of *D. lapidosus* within Cretan populations.

♂ Pedipalp (Figs 27-28): Genital characters constant. Tibial apophysis short, with tapering tip. Retinaculum small. Embolus short and thin.

Epigyne (Fig. 34): Epigyne with wide lateral pouches, touching the epigastric furrow. Introductory orifices in the median part of the epigyne, developed as semi-circular, retrolaterally directed, sclerotizations.

Vulva (Fig. 35): Spermathecae reaching beyond lateral pouches.

Ecology. *D. lapidosus* is not very common on Crete (Fig. 70). It is mostly confined to the mountainous zone (from 800m to about 1500m), its highest record is at 1450m. It has been found only scarcely at lower elevations, where it occurs along with *D. lutescens*. The largest populations have been found on the mainland, on the southeastern slopes of Mt. Psiloreitis and on the southwestern slopes of Lasithiotika Mts. Adults are found from April to late summer.

Distribution. Palaearctic.

Drassodes oreinos Chatzaki sp. n.

Figs 29-31, 38-39, 71

Etymology. The name of this species is derived from the altitudinal zone in which it has been collected on Crete, from 1200m to 2400m, hence „*oreinos*“ (= mountainous in modern Greek). The ending of the species name is invariable.

Material. Type material: Site 37d (Psiloreitis Mt., Lochria, 1950m) (1 ♂ holotype, 15 ♀♀ paratypes [NHMC]; 2 ♂♂ 2 ♀♀ paratypes [MHNG]).

CRETE: CHANIA: Site 7 (g 3 ♀♀); Site 8 (a 1 ♂ 1 ♀; b 1 ♀; c 1 ♂; f 1 ♀; h 5 ♂♂ 1 ♀; i 2 ♂♂; j 2 ♂♂ 2 ♀♀; k 2 ♀♀); Site 9 (a 5 ♂♂ 24 ♀♀; b 15 ♂♂ 24 ♀♀; c 10 ♀♀; d 3 ♂♂ 49 ♀♀; e 9 ♂♂ 16 ♀♀; f 34 ♂♂ 10 ♀♀; g 11 ♀♀); Site 10 (a 1 ♂ 1 ♀) (all leg. Lymberakis); RETHYMNO: Site 34 (a 5 ♀♀; b 14 ♂♂; c 8 ♂♂ 3 ♀♀; d 1 ♂ 4 ♀♀); Site 37 (a 1 ♂ 18 ♀♀; b 14 ♂♂ 7 ♀♀; c 27 ♂♂ 22 ♀♀; e 17 ♀♀); Site 38 (a 10 ♂♂ 11 ♀♀; b 1 ♂ 4 ♀♀) (all leg. Chatzaki); Site 35 (a 9 ♂♂ 1 ♀); Site 36 (a 1 ♀) (all leg. Trichas); IRAKLEIO: Site 51 (a 2 ♀♀; b 10 ♂♂) (leg. Papadimitrakis); LASITHI: Site 56 (b 3 ♂♂ 3 ♀♀; c 1 ♂); Site 57 (a 1 ♂ 10 ♀♀; b 28 ♂♂; c 5 ♂♂ 2 ♀♀; d 7 ♀♀) (all leg. Chatzaki).

Taxonomy. Measurements ♂ (♀), n = 7 (7): TL: 5.5-13.5 (10-13.5), PL: 3.7-5.6 (4-4.9), PW: 2.6-3.8 (2.5-3.7), OL: 4-6.5 (5.4-8.3), PL/PW: 1.42-1.47 (1.32-1.6) Cy: 1-1.5.

♂♀ : Large, brown spiders with habitus similar to that of *D. lapidosus*. Eye pattern as in other *Drassodes*. Chelicerae not elongated, dentition constant, with posterior teeth placed close together (Fig. 30).

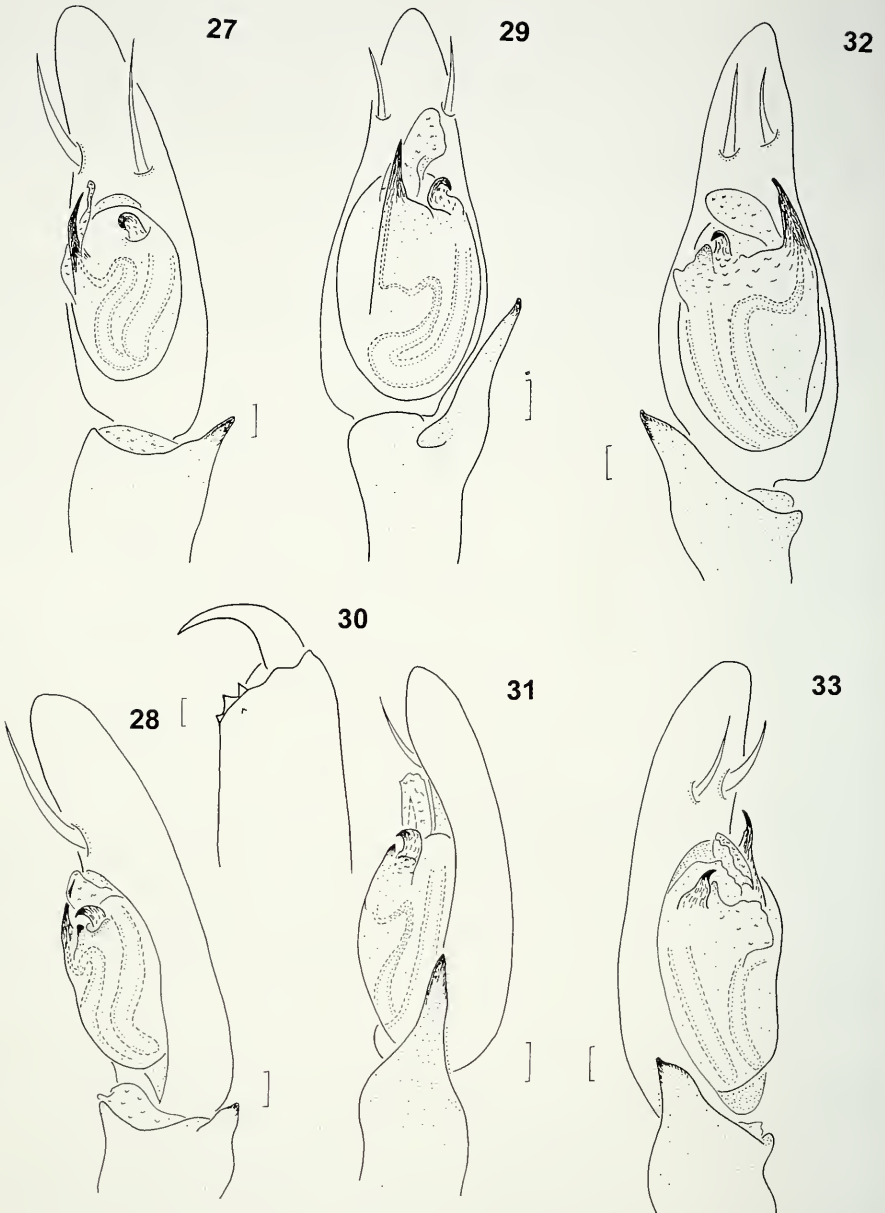
Legs: Ta I-IV and Me I-II with scopula hairs ventrally. Spination: Fe : I-II d 3-4; III-IV d 7. Pa : - . Ti : I-II v 4-5; III-IV spinose. Me : I v 2; II v 2-3; III-IV spinose.

♂ Pedipalp (Figs 29, 31): Tibial apophysis robust, straight and tapering, reaching almost 1/3 length of the palpal organ. Sperm duct going from retrolateral side of tegulum towards the prolateral side, there turning to the centre and entering the strong, straight and spine-shaped embolus. Retinaculum at retrolateral edge of tegulum.

Epigyne (Fig. 38): Lateral pouches narrower than in *D. lapidosus*, usually placed in the anterior half of the epigyne and not reaching the epigastric furrow. Median sclerotized rims almost parallel and wider apart than in *D. lutescens*.

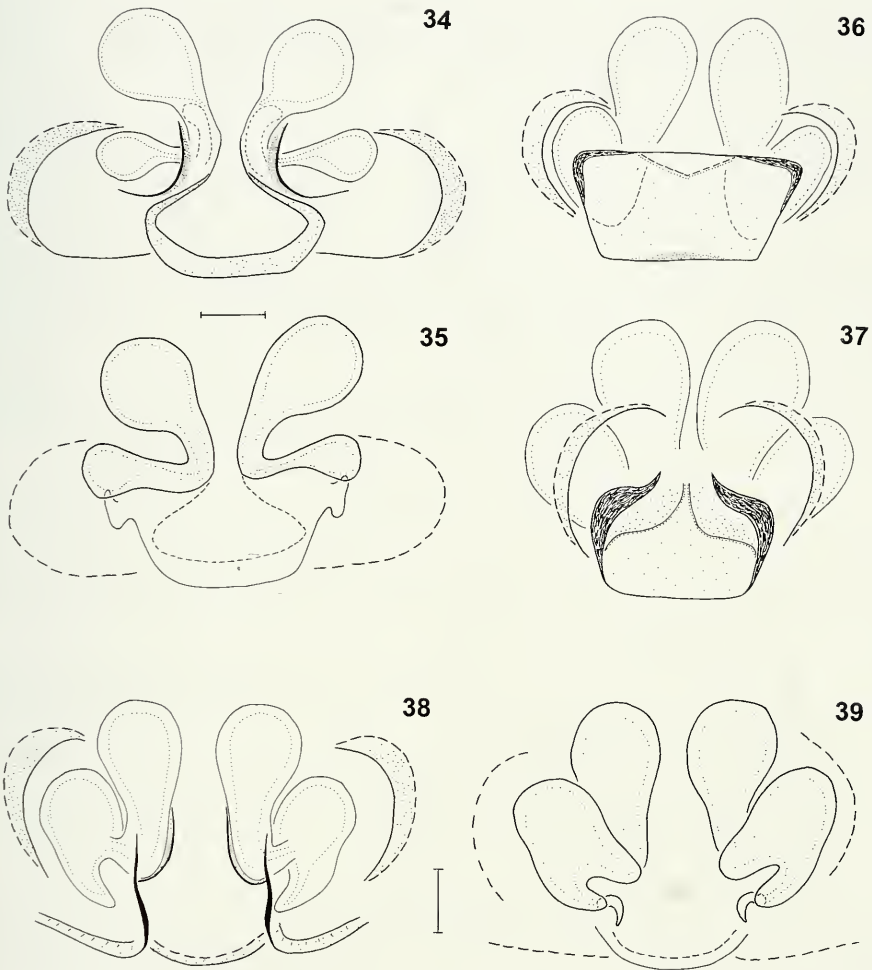
Vulva (Fig. 39): Spermathecae almost straight, not curved as in *D. lapidosus*.

Comments. We failed to identify this species, despite a thorough search of the literature. It is therefore established as new. As recognised from the revision of the types, *D. omalosis* Roewer, 1928 (SMF: CR 578/28, 1 ♂ 1 ♀) is clearly different from the new species. Differences are found in the size and shape of the tibial apophysis, in a retrolateral angle of the tegulum, which is present in *D. omalosis* but absent in *D. oreinos* sp. n., and in the embolus, which is less pointed in *D. omalosis* (Figs 32-33). Females differ clearly, mainly because of a median plate, present in *D. omalosis* (Fig. 36), which makes the new species resemble more closely *D. pubescens* (Thorell,



FIGS 27-33

Drassodes lapidosus: 27-28. *D. oreinos* sp. n.: 29-31. *D. omalosis*: 32-33. Palp of ♂ ventral view (27, 29, 32) and retrolateral view (28, 31, 33); ♂ chelicerae (30). Scale lines 0.1mm.



FIGS 34-39

Drassodes lapidosus: 34-35. *D. omalosis*: 36. *D. pubescens*: 37. *D. oreinos* sp. n.: 38-39. Epigyne (34, 36, 37, 38), vulva (35, 39). Scale lines 0.1mm.

1856). We compared females of *D. oreinos* sp. n. with *D. pubescens* females from central-Europe (Fig. 37) and concluded that they are different too. Male and female types of *D. omalosis* are assumed to belong to the same species, since they were collected from the same retreat. Also, specimens recently collected from Mt. Mainalo, Peloponnisos, confirm this opinion.

Ecology. This species is found only at high altitudes of the Cretan mountains (Fig.71). The lowest record is at 1200m and its abundance increases considerably from 1650m upwards, where it remains the only representative of the genus. In the spider communities present at the high mountains of Crete, two species are highly

dominant, *D. oreinos* sp. n. and *Gnaphosa bithynica* (Kulczynski, 1903). Adults are present throughout the whole year, with a peak of activity in late summer.

Distribution. Crete (endemic?).

***Drassodes serratichelis* (Roewer, 1928) comb. n.**

Figs 40-43, 72

Mesklia serratichelis Roewer, 1928 (p. 112, Figs 19-21), CRETE: Meskla, under a *Platanus*, (type locality).

Material. CRETE: CHANIA: Site 2 (a 1 ♀); Site 8 (f 1 ♂) (all leg. Lymberakis); Site 15 (d 2 ♂♂); Site 18 (a 1 ♀; c 1 ♀; d 2 ♀♀); Site 20 (b 1 ♂); Site 23 (c 3 ♂♂ 2 ♀♀) (all leg. Paragamian); RETHYMNO: Site 25 (a 1 ♀ [MHNG]) (leg. Lymberakis); Site 29 (a 1 ♀); Site 32 (a 2 ♂♂); Site 41 (a 1 ♂ [MHNG]) (all leg. Nikolakakis); IRAKLEIO: Site 52 (b 1 ♀); Site 54 (b 1 ♂) (all leg. Nikolakakis); LASITHI: Site 63 (b 1 ♀) (leg. Stathi); Site 68 (a 1 ♀) (leg. Papadimitrakis); Site 70 (a 1 ♀) (leg. Trichas).

KOS: Kefalos – Ag. Ioannis, 1 km S, phrygana and adjacent pine forest, (1 ♀, pitfall traps 26/6/2001 – 9/9/2001, leg. Chatzaki). KARPATOS: Pyles – Volada, 1km E, phrygana on an earlier burnt field, (1 ♂, pitfall traps 12/5/2001 – 23/8/2001, leg. Chatzaki).

Comparative material examined: *M. serratichelis*: 1 ♀ holotype, SMF: CR 613/63.

Taxonomy. Very small yellow spiders of about 3-5mm total length. The notch on the trochanter, the eye pattern and the characters of the genital organs of this species conform to those of the genus *Drassodes*. Therefore a new combination is proposed here. As *D. serratichelis* is the type species of *Mesklia*, this genus is placed in the synonymy of *Drassodes*.

♂ Pedipalp (Figs 40-41): Tibial apophysis absent. Sperm duct following the walls of the tegulum from the retro- to the prolateral side. Embolus slender, guided by a transparent lamella (l). Retinaculum tiny.

Epigyne (Fig. 42): Lateral margins small, forming retrolateral pouches. Median rims almost straight, retrolaterally directed.

Vulva (Fig. 43): Receptacles two-lobed, with an oval and a globular chamber, as in other *Drassodes*.

Ecology. *D. serratichelis* is not very common on Crete (Fig. 72). However, it is widespread on the island and on the surrounding islands examined (Gavdos, Gavdopoula, Dia, Karpathos, Kos). It reaches altitudes of 1650m, but occurs also on phrygana of the lowlands. Adults are found mainly in the summer.

Distribution. Crete, Kos, Karpathos (Greek endemic?).

***Leptodrassus pupa* Dalmas, 1919**

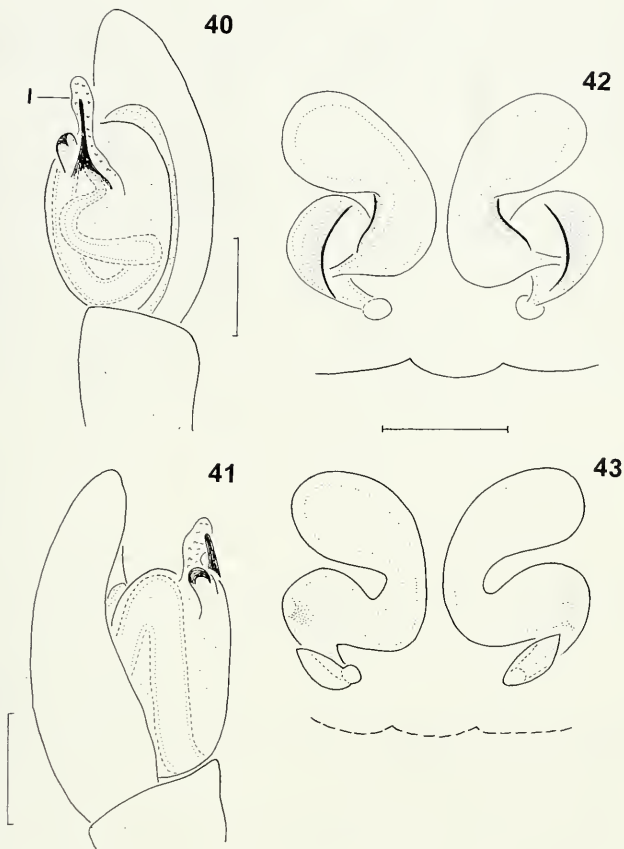
Figs 44-45, 72

Identification: Levy 1999b (p. 447, Figs 38-39).

Material. CRETE: IRAKLEIO: Site 47 (b 1 ♂) (leg. Nikolakakis).

Taxonomy. The identity of this species is not without doubt. Females collected at other localities on Crete (Chatzaki *et al.*, 2002) fit well the drawing of *L. pupa* given in Levy (1999b, Fig. 40). However it is difficult to fully match the characters of the male. The tibial apophysis (Figs 44-45) seems to be the same as in *L. pupa*, but the apophyses of the tegulum apparently differ. As we hesitate to accept the presence of a fifth *Leptodrassus* on Crete, we reluctantly place this male in *L. pupa*.

Distribution. Egypt, Crete.



FIGS 40-43

Drassodes serratichelis: 40, palp of ♂, ventral view; 41, palp of ♂, retrolateral view; 42, epigyne; 43, vulva. Scale lines 0.1mm.

Scotophaeus scutulatus (L. Koch, 1866)

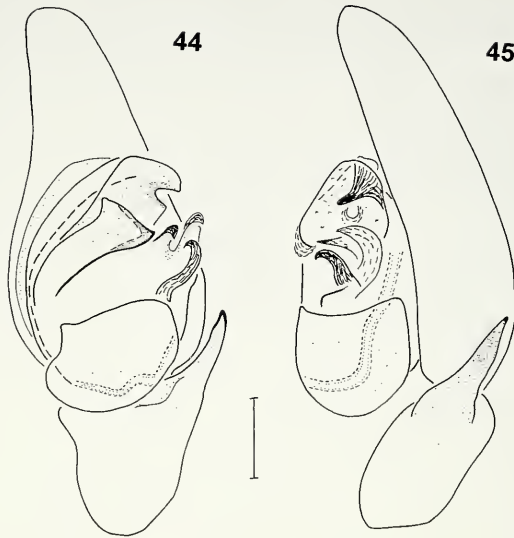
Figs 46-47, 73

Identification: Grimm (1985, p. 179, Figs 201 & 210-212).

Material. CRETE: CHANIA: Site 22 (b 1 ♀) (leg. Paragamian); LASITHI: Site 58 (a 1 ♀) (leg. Papadimitrakis).

Comparative material examined: *S. scutulatus*: AUSTRIA: Innsbruck (1♂ 1♀, Aug. 1963, Col. KTh); GREECE: Attiki, Kato Souli (1♂ 1♀, Col. Hadjissarantos, ZMUA). *S. blackwalli*: ITALY: Bezzecca (1♂, Sept. 1963, Col. KTh); Zaran (1♀, Aug. 1966, Col. KTh); GREECE: Ipeiros, Ioannina lake (1♂, Col. Hadjissarantos, ZMUA).

Taxonomy. The characters of the epigyne of our specimens (Figs 46-47) fit well the description of Grimm (1985) and with comparative material from other localities in Greece and from Austria. The species probably occurs also in Israel. The figures given by Levy (1999b, p. 439, Figs 22-23) for a *S. blackwalli* female, closely resemble the epigyne and vulva of *S. scutulatus* (see Grimm, 1985, p. 181, Figs 211-



FIGS 44-45

Leptodrassus pupa: 44, palp of ♂, ventral view; 45, palp of ♂, retrolateral view. Scale lines 0.1mm.

212). On the other hand, the male characterized by him as *S. blackwalli*, clearly resembles this species (see embolus and tibial apophysis in Levy, 1999b, Figs 20-21 and Grimm, 1985, p. 173, Figs 199 a-b).

Distribution. Cosmopolitan. GREECE: Attiki: Kato Souli; Pikermi; Vouliagmeni; Parnitha-Palaiochori (Hadjissarantos, 1940); Makedonia (Fage, 1921). Thraki (Drensky, 1928); Sporades (Werner, 1934); Crete: Chania, Omalos (Roewer, 1928).

***Scotophaeus peninsularis* Roewer, 1928**

Figs 48-49, 73

Scotophaeus subcorticis Levy, 1999b (p. 440, Figs 24-25), Ben Zakkay, Israel (type locality).

Syn. n.

Identification: Roewer (1928, p. 108, Fig. 14).

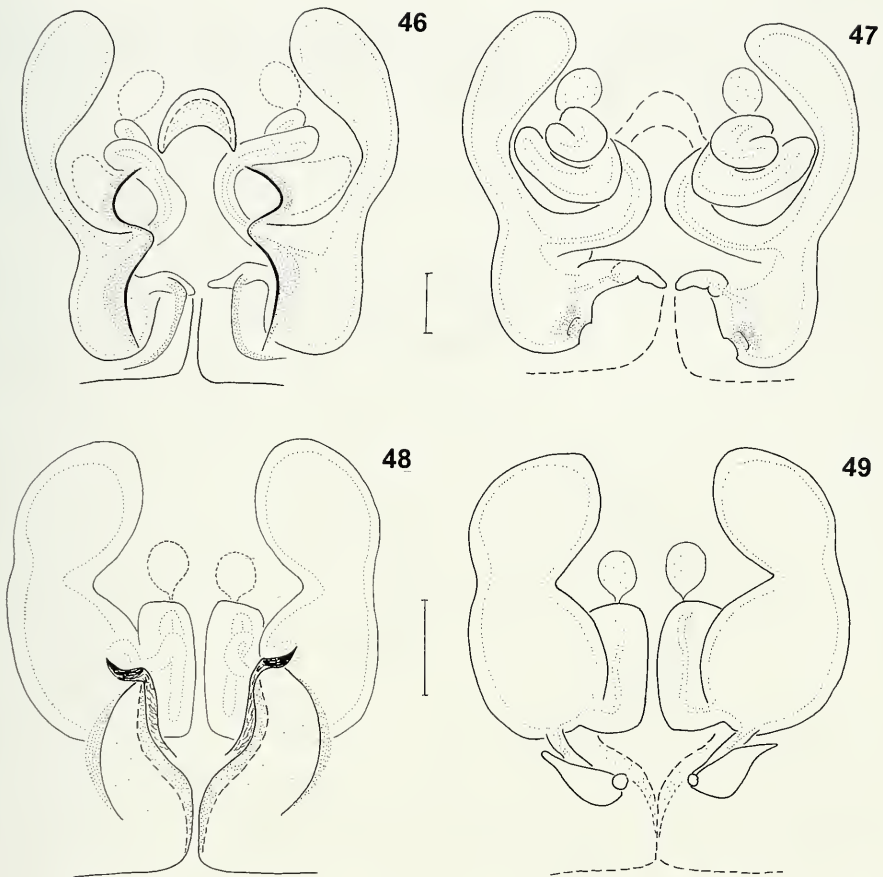
Material. CRETE: CHANIA: Site 3 (a 1 ♀) (leg. Lymberakis).

Comparative material examined: *S. peninsularis*: PELOPONNISOS: Vityna, under a stone in a woodland, 1600m (1 ♀ holotype, SMF: CR 584/34).

Taxonomy. Levy (1999b) described *S. subcorticis* from one female collected in Israel. The characters of our specimen (Figs 48-49) fit very well with his excellent description. Having examined the type of *S. peninsularis*, however, we have no doubt that these two species are identical. This cannot be recognised from Roewer's (1928) drawing.

Ecology. This species is known to occur under the bark of *Eucalyptus* and pine trees (Levy, 1999b).

Distribution. Israel, Greece.



FIGS 46-49

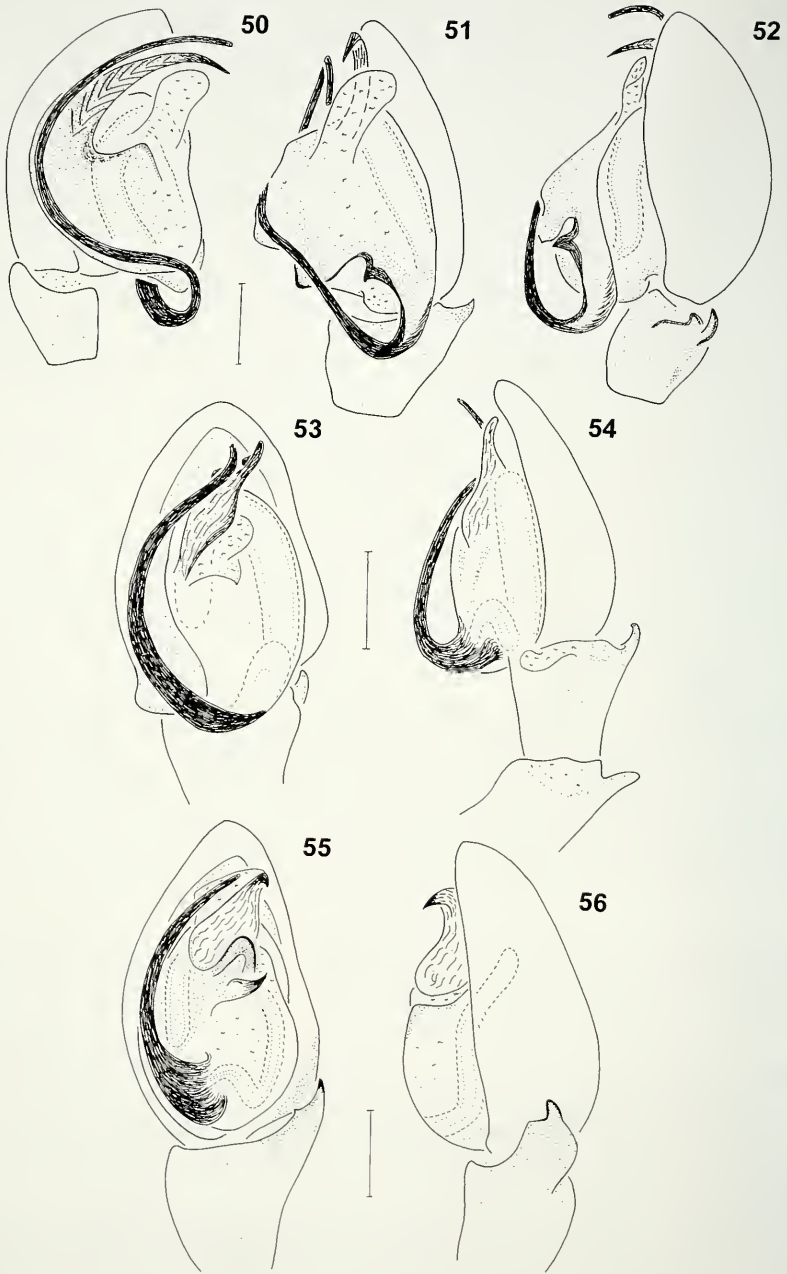
Scotophaeus scutulatus: 46, epigyne; 47, vulva. *S. peninsularis*: 48, epigyne; 49, vulva. Scale lines 0.1mm.

Synphosus palearcticus Ovtsharenko, Levy & Platnick, 1994 Figs 50-52, 57-58, 73

Identification: Ovtsharenko *et al.* (1994, p. 6, Figs 21-25).

Material. CRETE: RETHYMNO: Site 32 (a 1 ♀) (leg. Nikolakakis). ANTIKYTHIRA: Potamos, 700m W: sparse phrygana on sandy soil close to the village, (3 ♂♂ 3 ♀♀, pitfall traps 27/3/2001 – 5/8/2001, leg. Chatzaki).

Taxonomy. Taxonomic characters fit the description of Ovtsharenko *et al.* (1994). The main characters of this species are: retrolateral tibial apophysis hooked, embolus long, filiform, with a pointed process at its retrolateral base (Figs 50-52), epigyne with anterior pouches (Fig. 57), receptacles strongly coiled (Fig. 58). In our specimens (Figs 50-51), the shape of the median, translucent flange differs from those illustrated by Ovtsharenko *et al.* (1994, Fig. 22).



FIGS 50-56

Synphosus palearcticus: 50-52. *S. trichopus*: 53, 54. *Cryptodrassus creticus* sp. n.: 55, 56. Palp of ♂ prolateral view (50), ventral view (51, 53, 55), retrolateral view (52, 54, 56). Scale lines 0.1mm.

Ecology. This species has been found in degraded phrygana on Crete and Antikythira. On Crete it was collected at 1200m.

Distribution. Central Palaearctic (new record for Europe).

Synaphosus trichopus (Roewer, 1928) comb. n.

Figs 53-54, 59-60, 73

Zelotes trichopus Roewer, 1928 (p. 110, Fig. 15): Crete, Chania, Governeto Monastery in Akrotiri (type locality).

Material. CRETE: RETHYMNO: Site 40 (b 7 ♂♂ 6 ♀♀; c 1 ♀) (all leg. Nikolakakis); IRAKLEIO: Site 44 (a 4 ♂♂; b 5 ♀♀); Site 45 (a 1 ♂ 1 ♀); Site 47 (a 13 ♂♂ 2 ♀♀; b 6 ♂♂ 15 ♀♀; c 2 ♂♂ 3 ♀♀ [MHNG]) (all leg. Nikolakakis); Site 46 (a 1 ♀) (leg. Papadimitrakis). PELOPONNISOS: Mainalo Mt., alpine phrygana, (2 ♂♂, 22 ♀♀, pitfall traps 9/7/1997 – 12/10/1997, leg. Anastasiou). KARPATHOS: Pyles – Volada, 1km E, phrygana on a field, which had been burnt earlier (3 ♂♂ 1 ♀, pitfall traps 12/5/2001 – 23/8/2001, leg. Chatzaki).

Comparative material examined: *Zelotes trichopus*: 1 ♀ holotype, SMF: CR 597/47.

Taxonomy. Roewer described this species on the basis of one female and placed it into the genus *Zelotes*, owing to the presence of a preening brush on Me III, as it is the case in many species of the genus *Synaphosus*. However, all the distinctive characters of *Synaphosus* are present in the type material here examined: small size, preening brush on Me III, elongated superior claws on Ta IV, anterior pouches on the epigyne, and highly coiled receptacles. The male of this species is presented here for the first time.

Measurements ♂ (♀), n = 4 (1): TL: 2.8-3.5 (3), PL: 1.3-1.8 (1.4), PW: 0.9-1.3 (1), PL/PW: 1.3-1.4 (1.4), OL: 1.4-1.8 (1.5).

♂ ♀: Yellow spiders of small size. Habitus same as in *Zelotes*. Abdomen with grey marks dorsally.

Legs: Ta I-II with scopula hairs. Ta III-IV with dense stripe of small spines. The claw of Ta IV elongated. Spination: Fe: I d 1-2; II d 2-3; III d 7; IV d 3-4. Pa: I-II, IV -; III r 1. Ti: I v 0-2; II v 1-3; III-IV spinose. Me: I v 0-3; II v 3-4; III-IV spinose.

♂ Pedipalp (Figs 53-54): Fe with 2 dorsal spines. Pa with retrolateral apophysis (Fig. 54), as in the *gracillimus* - group (see Ovtsharenko *et al.*, 1994). Tibial apophysis small, with hooked tip. Cymbium oval, with a projecting angle on its prolateral base. Embolus long, filiform, starting from the retrolateral base of the tegulum, its end freely pointed, guided by a conductor-like process, which starts from the centre of the tegulum. Almost half of the tegular wall ventrally membranous, without free projection.

Epigyne (Fig. 59): Median anterior margin as in *Zelotes*. Introductory orifices formed by the sclerotized posterior rims of the two large anterior pouches that lead to the introductory ducts.

Vulva (Fig. 60): Receptacles asymmetrical and less coiled than in *S. palearcticus*. A glandular head present on the lateral sides of the introductory ducts.

Ecology. *S. trichopus* occurs at phryganic sites of the islands Crete and Karpathos, but it has also been found on alpine phrygana in Peloponnisos.

Distribution. Greece: Peloponnisos, Isls.: Crete, Karpathos. (Greek endemic?).

In Crete, this species is not very common, occurring only at sites in the southern parts of the districts of Rethymno and Irakleio (Fig. 72). Considering the wide distributions of other species in this genus, we presume that this species will turn out not to be endemic to our region.

***Cryptodrassus creticus* Chatzaki sp. n.**

Figs 55-56, 61-62, 73

Material. Type material: Site 64d (Bramiana lake, leg. Papadimitrakis) (1 ♂ holotype [NHMC]); Site 64e (1 ♀ paratype [NHMC]).

CRETE: RETHYMNO: Site 39 (b 1 ♀) (leg. Nikolakakis); LASITHI: Site 55 (a 1 ♀ [MHNG]) (leg. Chatzaki).

Taxonomy. The general appearance of these spiders is very close to that of *Synaphosus*. However the characters of the genital organs correspond with those of its related genus *Cryptodrassus*, namely: the absence of a translucent flange on the tegulum, smaller embolus and less coiled epigyne (see Ovtsharenko *et al.*, 1994, Figs 7-11 and Weiss *et al.*, 1998, Figs 1-4). Until now, this genus was represented only by a single species, *C. pulchellus* Miller, 1943, which was later synonymised with *C. hungaricus* (Balogh, 1935) by Weiss *et al.* (1998). Here, the male and female of a new *Cryptodrassus* species are presented.

Measurements ♂ (♀), n = 1 (3): TL: 3.1 (4.2-4.8), PL: 1.5 (1.9-2), PW: 1.1 (1.4), PL/PW: 1.36 (1.3-1.4), OL: 1.5 (2-2.4).

♂ ♀: Small-sized, yellow spiders. Habitus like in *Zelotes*. Eyes round, PME oval.

Legs: Ta I-II with scopula hairs. Ta III-IV with dense stripe of small spines. Claws of Ta IV elongated. Spination: Fe: I-II d 1-2 p1; III-IV d 6-7. Pa: I-II, IV - ; III p 1 r 1. Ti: ♂ I v 4, II v 4 p 1, ♀ I-II v 1; III-IV spinose. Me: ♂ I v 4, ♀ I v 2; II v 3; III-IV spinose.

♂ Pedipalp (Figs 55-56): Fe with 3 dorsal spines. Tibial apophysis with wide base and bifid end. Embolus filiform and long, though relatively smaller than in *Synaphosus* (see also Figs 50-54). Conductor strong, with sclerotized claw at base.

Epigyne (Fig. 61): Anterior median hood small, bell-shaped. Margin of atrium U-shaped.

Vulva (Fig. 62): Lateral glandular heads attached to dorsal pouches of atrium. Spermathecae with two chambers: a ventral oval one (1) and a dorsal globular one (2).

Ecology. This species has been found in degraded phrygana up to 750m (Fig. 73).

Distribution. Crete.

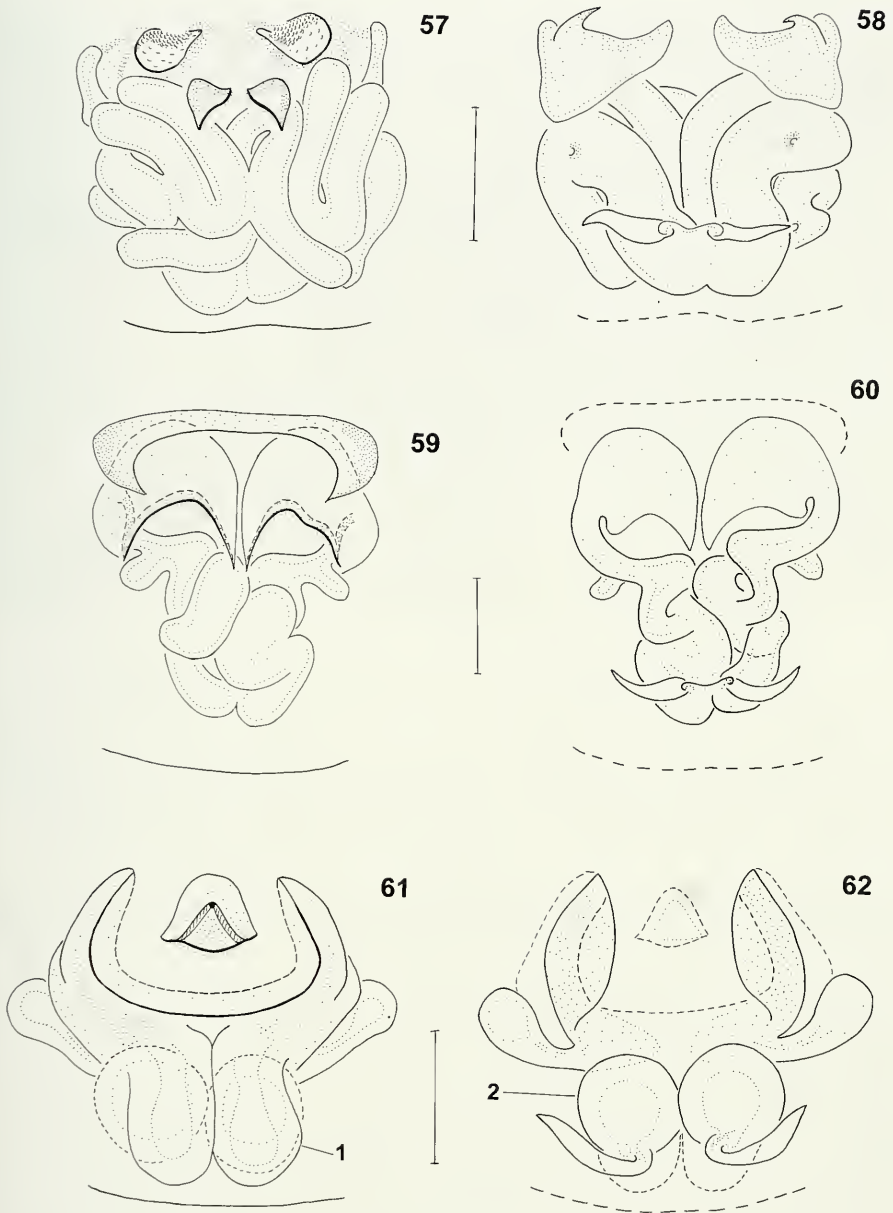
***Cesonia aspida* Chatzaki sp. n.**

Figs 63-68, 74

Etymology. The species name refers to the characteristic pattern of the opisthosoma (Fig. 68), *aspida* meaning shield in Greek; noun in apposition, hence invariable.

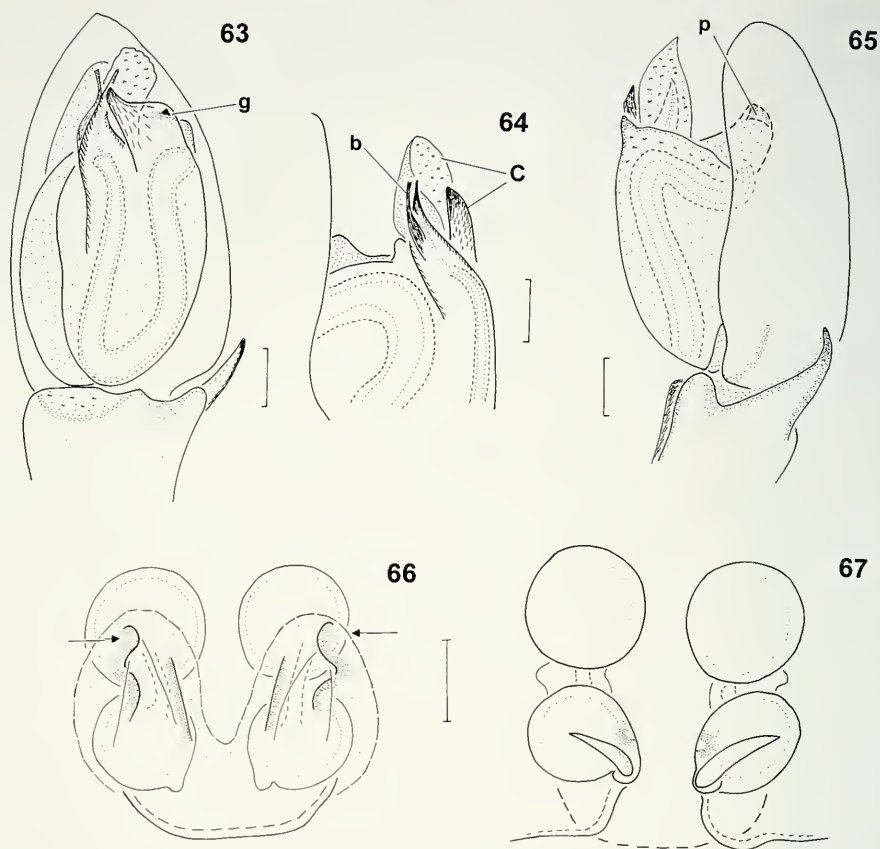
Material. Type material: Site 3a (Chania. Elaфонisi) (1 ♂ holotype, 1 ♀ paratype [NHMC]); 1 ♂ 1 ♀ paratypes [MHNG]).

CRETE: CHANIA: Site 1 (a 6 ♂ ♂); Site 2 (a 4 ♂ ♂); Site 3 (b 1 ♀); Site 6 (e 2 ♂ ♂ 1 ♀; f 1 ♂; g 1 ♂); Site 7 (g 2 ♀ ♀) (all leg. Lymberakis); Site 14 (c 1 ♂); Site 21 (a 1 ♂) (all leg. Paragamian); RETHYMNO: Site 26 (a 1 ♂; b 10 ♀ ♀; c 5 ♀ ♀) (all leg. Lymberakis); Site 33 (a 1 ♀) (leg. Trichas); IRAKLEIO: Site 52 (b 1 ♂) (leg. Nikolakakis); LASITHI: Site 55 (a



FIGS 57-62

Synaphosus palearcticus: 57-58. *S. trichopus*: 59-60. *Cryptodrassus creticus* sp. n.: 61-62. Epigyne (57, 59, 61), vulva (58, 60, 62). Scale lines 0.1mm.



Figs 63-67

Cesonia aspida sp. n.: 63, palp of ♂, ventral view; 64, palp of ♂, prolateral view; 65, palp of ♂, retrolateral view; 66, epigyne; 67, vulva. Scale lines 0.1mm.

1 ♂); Site 73 (a 1 ♂ 1 ♀) (all leg. Chatzaki); Site 63 (a 1 ♂ 1 ♀; b 1 ♂) (all leg. Stathi); Site 65 (a 1 ♀; b 1 ♀); Site 68 (a 1 ♀) (all leg. Papadimitrakis); Site 59 (c 1 ♂); Site 70 (a 2 ♂ ♂) (all leg. Trichas).

Taxonomy. The genus *Cesonia* Simon has been revised by Platnick & Shadab (1980). Its status and its monophyly are not yet fully clarified, because of its close relationship with the genera *Herpyllus* and *Eilicina* (the latter presently considered as a synonym of *Cesonia*). The diagnostic characters of *Cesonia* are: pattern with two to four dark longitudinal bands, either covering the entire length, or part of the body dorsally and part of the length of the abdomen laterally, and being separated by intervening light bands; PME closer to PLE than to each other; embolus close to median apophysis (which may be fused to the conductor), protruding beyond the tegulum and frequently with a membranous conductor. There are 30 *Cesonia* species diagnosed and described from the American continent, which belong to four species groups.



FIG. 68

Cesonia aspida sp. n. Habitus of ♂, dorsal view. Photo: B. Knoflach.

Until now, none has yet been recorded from Europe. Here we present the male and female of a new species from Crete, which we tentatively place in this genus.

Measurements ♂ (♀) n = 7 (1): TL: 4.3-5.6 (7.8), PL: 2.1-2.7 (3), PW: 1.8-2.1 (2.4), PL/PW: 0.95-1.23 (1.25), OL: 2.1-2.8 (4.5).

♂ ♀: Medium-sized spiders. Colour variable, from dark brown to greyish black. Prosoma dorsally with three light and two dark, longitudinal bands. No scales present, neither on the dark nor on the light bands. Labium longer than wide, maxillae almost parallel to each other. Chelicerae with small fangs and three denticles on posterior rim of cheliceral furrow. PME closer to PLE than to each other. Opisthosoma with two light dorsal bands connected at the posterior end, leaving a characteristic dark mark in the middle, forming a pattern resembling a Minoan shield (Fig. 68). Longitudinal lateral dark bands also present, one at each side. Males with anterior scutum. Because of the abdominal pattern of this species („...pair of paramedian light stripes, reaching beyond the middle of the abdomen“) and the structure of the epigyne („...with lateral guides“), we are inclined to place it in the *lugubris* group (see Platnick & Shadab, 1980).

Legs: Ta I-IV and Me I-II, scopulated. Spination: Fe: I-II d 3 p 1; III d 7; IV d 5-6. Pa: I-II - ; III-IV r 1. Ti: I - ; II v 2; III-IV spinose. Me: I - ; II v 1; III-IV spinose.

♂ Pedipalp (Figs 63-65): Fe and Pa spinose. Tibial apophysis slender, claw-like. Tegulum robust, with strong process on its dorsal side (p). Sperm duct bulging, covering almost the whole surface of the tegulum. Embolus small, tapering, starting at

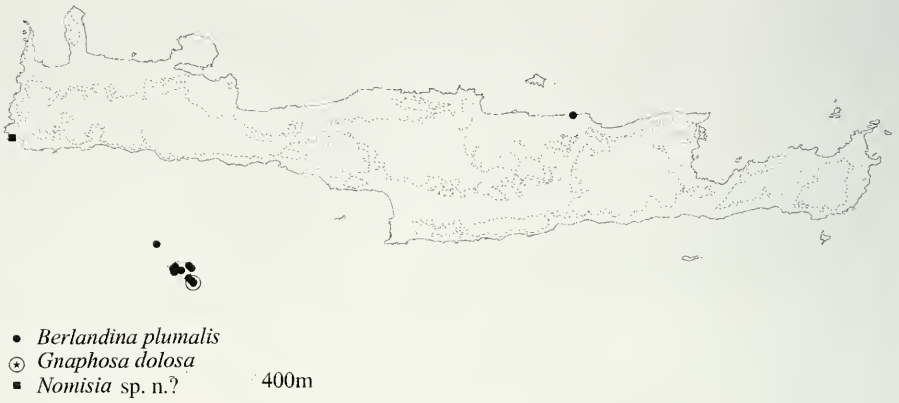


FIG. 69

Berlandina plumalis, *Gnaphosa dolosa*, *Nomisia* sp.n.?, distribution on Crete.



FIG. 70

Drassodes lutescens, *Drassodes lapidosus*, distribution on Crete.



FIG. 71

Drassodes oreinos sp. n., distribution on Crete.



FIG. 72

Drassodes serraticHELIS, *Leptodrassus pupa*, distribution on Crete.

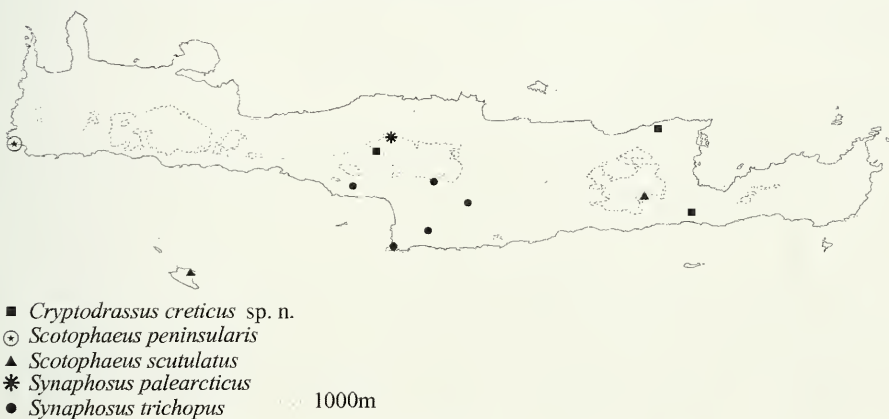


FIG. 73

Scotophaeus scutulatus, *S. peninsularis*, *Synaphosus palearcticus*, *S. trichopus*, *Cryptodrassus creticus* sp. n., distribution on Crete.



FIG. 74

Cesoniaspida sp. n., distribution on Crete.

the prolateral side of the anterior part of the tegulum. Slender side branch of embolus with a bifid tip (b). Conductor (C) with a membranous lobe and a sclerotized ventral tip; a large glandular pore opening at its retrolateral edge (g).

Epigyne (Fig. 66): Lateral margins faintly sclerotized, leading to the epigastric furrow. Introductory orifices situated laterally.

Vulva (Fig. 67): Spermathecae with two globular lobes, connected with a wide ventral zone with lateral heads. Fertilisation ducts originating from posterior lobes, close to a large glandular pore.

Ecology. *Cesonia aspida* sp. n. is widespread on Crete (Fig. 74). It occurs in sandy habitats and in phryganic sites close to the sea. This new species was collected up to 1400m on Mt. Psiloreitis and up to 1200m on the Lefka Ori Mts. It has also been found on the two islands close to Crete, i.e. Gavdos and Dia. Adults are present from late spring to autumn.

Distribution. Crete (endemic?). First European representative of this "American" genus.

CONCLUDING REMARKS

In this paper we present the taxonomy and distribution of 17 species belonging to eleven genera. *Berinda aegilia*, *Drassodes oreinos*, recorded only from the high elevations of the Cretan mountains, *Cryptodrassus creticus* and *Cesonia aspida* are species new to science. *Anagraphis pallida*, recorded from Attiki, *Drassodes serraticHELIS* and *Synaphosus trichopus* are new combinations of the earlier described species *Talanites pallidus* Hadjissarantos, 1940, *Mesklia serraticHELIS* Roewer, 1928 and *Zelotes trichopus* Roewer, 1928. The new combination of *D. serraticHELIS* brings the genus *Mesklia* into the synonymy of *Drassodes*. Based on the comparison of type specimens examined, *Drassodes volidis* and *Scotophaeus subcorticis* are synonymised with *D. lutescens* and *S. peninsularis*, respectively. *Nomisia palaestina* and *Synaphosus palearticus* are recorded for the first time in Europe and the genus *Cesonia* is for the first time reported from Europe with a new species. Also, an enigmatic species belonging to the genus *Nomisia*, is presented.

The geographical distributions of these species are not always clear. Six of them are widespread; namely, either Palaearctic with a Mediterranean centre of distribution (*Berlandina plumalis*, *Gnaphosa dolosa*, *Drassodes lapidosus*), or synanthropic, which has led to a wide distribution (*Drassodes lutescens*, *Scotophaeus scutulatus*, *Synaphosus palearticus*). Three species have an eastern Mediterranean distribution (*Nomisia palaestina*, *Leptodrassus pupa*, *Scotophaeus peninsularis*), and three are Greek endemics (*Anagraphis pallida*, *Berinda aegilia* sp. n., *Drassodes serraticHELIS*). Another five species are recorded only from Crete (*Drassodes oreinos* sp. n., *Nomisia* sp.n.?, *Synaphosus trichopus*, *Cryptodrassus creticus* sp. n. and *Cesonia aspida* sp. n.). *Gnaphosa dolosa* is recorded only from Gavdos, *Nomisia palaestina* only from Kos and *Anagraphis pallida* only from Attiki. Our lack of knowledge of the Gnaphosidae of our area does not allow to be sure about the endemisms indicated here, until a more detailed study of the surrounding areas has been carried out.

TABLE 1. Variation of ♂ *Drassodes lapidosus* on Crete. For each site, the number of males corresponding to the *lapidosus* and *cupreus* types of dentition (see Grimm, 1985, p. 120) and of intermediates are given, and also numbers of large L (total length ≥ 10 mm) and small specimens s (total length < 10 mm). L/s indicate the number of large versus small individuals belonging to each of the above types.

	" <i>lapidosus</i> "	" <i>cupreus</i> "	intermediate	small size	large size
	L / s	L / s	L / s	< 10mm	< 10mm
Site 4	1 /				1
Site 5	1 /		/ 1	1	1
Site 6		/ 1		1	
Site 32	1 /				1
Site 39	/ 1			1	
Site 42	2 /	1 /			3
Site 43	9 / 2	4 / 7	24 / 3	12	37
Site 49	1 / 4		1 /	5	1
Site 51	6 /	8 / 1	13 / 3	4	27
Site 56	1 / 2			2	1
Site 58	/ 1			1	
Site 59			1 /		1
Site 61		1 /			1
Site 67		/ 2		2	
Total	22 / 10	14 / 11	39 / 7	29	74

Many of the records reported here are based on a single or on a few individuals. *Drassodes lutescens*, and to a lesser extent *D. lapidosus*, *D. oreinos* sp. n. and *Cesonia aspida* sp. n., are the only widespread species on Crete. The first three show a clear zonation in their distribution along the altitudinal gradient of Cretan mountains, with little overlap (*D. lutescens* is distributed in the lowlands, *D. lapidosus* in the zone 800-1500m and *D. oreinos* sp. n. from 1600m upwards). *Berlandina plumalis* is the dominant spider species on the island of Gavdos but not on Crete, which is probably due to the dominance of *Pterotricha lentiginosa* (C.L. Koch, 1837) on Crete.

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Description of a new species of *Leiurus* Ehrenberg, 1828 (Scorpiones, Buthidae) from the South of Jordan

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Description of a new species of *Leiurus* Ehrenberg, 1828 (Scorpiones, Buthidae) from the South of Jordan. - A new species of buthid scorpion from the south of Jordan, belonging to the genus *Leiurus* Ehrenberg, is described on the basis of a female collected NW of Al-Mudawwarah. The new species, *Leiurus jordanensis* sp. n., can be readily distinguished from the only other known species in the genus, *Leiurus quinquestriatus* (Ehrenberg, 1828), which is yellowish, by its generally blackish brown coloration.

Key-words: Scorpion - new species - *Leiurus jordanensis* sp. n. - Buthidae - Al-Mudawwarah - Jordan.

INTRODUCTION

The genus *Leiurus* was established by Ehrenberg 1828 (in Hemprich & Ehrenberg, 1828) as a subgenus of *Androctonus* for *Androctonus (Leiurus) quinquestriatus* Ehrenberg. For many years, most taxonomists have attributed the authorship of both genus and species to Hemprich & Ehrenberg (1829) (e.g., Kraepelin, 1891; Vachon, 1949, 1952; Levy & Amitai, 1980; Francke, 1985; Sissom, 1990). This error was finally clarified by Braunwalder & Fet (1998) (see also Fet, 1997 and Fet & Lowe, 2000 for details).

At the time of its description, *Leiurus* was considered to be a subgenus of *Androctonus* (Ehrenberg, 1828). Several authors (e.g., Kraepelin, 1891) regarded *Leiurus* as a synonym of the genus *Buthus* Leach. Finally Vachon (1949) raised *Leiurus* to generic rank, containing, at that time, only one species, *Leiurus quinquestriatus* Ehrenberg.

Vachon (1949) was confident that the genus *Leiurus* was monotypic and he restrained himself from revising its intraspecific structure. Two subspecies were, however, considered by Vachon (1949) to be valid: *Leiurus quinquestriatus quinquestria-*



FIGS 1-2

1. The natural habitat of *Leirus jordanensis* sp. n. 2. *Leirus jordanensis* sp. n., female holotype in the natural habitat.

tus (Ehrenberg, 1828) and *Leiurus quinquestriatus hebraeus* (Birula, 1908). The systematic position of *Leiurus quinquestriatus hebraeus* was discussed by Levy *et al.* (1970), who presented tables which differentiate this subspecies from *L. q. quinquestriatus*. The position of the two subspecies was again discussed by Levy and Amitai (1980) in their monographic work *Fauna Palaestina (Scorpiones)*. The genus and species *Leiurus quinquestriatus* has also been the subject of more regional studies. In his treatment of the scorpions of Saudi Arabia, Vachon (1979) made reference to *Leiurus quinquestriatus*, without, however, commenting on its rank as a subspecies. He made a few remarks concerning the 'variety' *Androctonus quinquestriatus brachycentrus* (Ehrenberg, 1828) and suggested that more material would be necessary to precisely define the variability of the coloration of metasomal segment five. More recently, in a study on the scorpions of Yemen, Sissom (1994) also made reference to *Leiurus quinquestriatus*, but he decided to not assign the Yemen population to any particular subspecies.

Very few records are available regarding the presence of *Leiurus quinquestriatus quinquestriatus* or *Leiurus quinquestriatus hebraeus* in Jordan (Vachon, 1966; Levy & Amitai, 1980; Fet & Lowe, 2000), and the species *L. quinquestriatus* apparently is not present in the south of that country.

During recent field work in the south of Jordan, one of us (DM), collected an unusual specimen of scorpion. The study of this specimen, revealed that it is a new species of *Leiurus*, which is described below.

TAXONOMY

Leiurus jordanensis sp. n.

Figs 2-8

Type material: 1 female holotype, Jordan, NW of Al-Mudawwarah, alt. ca. 700 m (29° 19' 22.3" N, 35° 59' 24.3" E), VII-2000 (D. Modry coll.). Deposited in the Muséum d'histoire naturelle, Genève.

Etymology: The specific name refers to the country in which the new species was found.

DIAGNOSIS

The new species can clearly be placed in the genus *Leiurus* Ehrenberg on account of the presence of 5 carinae on tergites I and II. It is distinguished from *Leiurus quinquestriatus* (Ehrenberg, 1828), the only previously known species of the genus, by the following characters: The new species is generally blackish brown, whereas *L. quinquestriatus* is yellowish, in some cases with brown spots on the carapace, tergites and, in particular, on metasomal segments V. The ventrolateral carinae of metasomal segment V are armed with spinoid granules, and the anal arch is composed of 3 spinoid lobes, whereas in *L. quinquestriatus* the ventrolateral carinae are armed with 3-4 rounded lobes and the anal arch is composed of 3 rounded lobes. The metasomal carinae are strongly marked and intercarinal spaces are smooth to shagreened, whereas in *L. quinquestriatus* the carinae are moderately marked and less regular, and the intercarinal spaces show a moderate to weak granulation. Morphometrical values of the female holotype of *L. jordanensis* sp. n. are different from those of a female of *L. quinquestriatus* with the same total length (see Table I).

TABLE I. Comparative morphometric values (in mm) of the female holotype of *Leiurus jordanensis* sp. n. and of a female of *L. quinquestriatus* from Saudi Arabia.

	<i>L. jordanensis</i> sp. n.	<i>L. quinquestriatus</i>
Total length	74.0	74.0
Carapace:		
- length	8.5	8.3
- anterior width	6.4	6.0
- posterior width	10.5	10.4
Metasomal segment I:		
- length	6.0	5.2
- width	4.6	5.6
Metasomal segment V:		
- length	10.6	9.8
- width	3.0	3.8
- depth	2.8	3.7
Vesicle:		
- width	3.4	3.6
- depth	3.2	3.4
Pedipalp:		
- Femur length	10.1	8.1
- Femur width	2.3	2.4
- Patella length	11.2	9.4
- Patella width	2.8	3.3
- Tibia length	19.5	16.5
- Tibia width	2.3	2.7
- Tibia depth	2.6	3.0
Movable finger:		
- length	13.6	11.2

DESCRIPTION (based on female holotype)

Coloration. Generally blackish brown with some diffuse pale spots on prosoma and mesosoma. Prosoma: carapace mostly blackish brown, darker anteriorly; lateral margins with some narrow lighter zones. Mesosoma: blackish brown, with some lighter zones on each side of the median carinae on segments I and II. Metasoma: all segments blackish brown. Vesicle pale yellow; aculeus yellowish at the base and reddish at its extremity. Venter reddish yellow; sternite VII with brown spots. Chelicerae yellowish with dense reticulated dark spots; teeth blackish. Pedipalps: blackish brown overall except for yellowish fingers of tibia; rows of granules on dentate margins of fingers dark reddish. Legs with the four proximal segments brownish and the three distal ones yellowish.

Morphology. Prosoma: Anterior margin of carapace weakly emarginate. Carapace carinae strongly developed; central median, posterior median, anterior median, central lateral and central median carinae strong; posterior median carinae terminating distally in a small spinoid process extending very slightly beyond the posterior margin of the carapace. Intercarinal spaces with some irregular granules, the rest of the surface rather smooth, especially laterally and distally. Median ocular tubercle only slightly anterior to the center of the carapace, almost central in position; median eyes separated



FIGS 3-8

3-7. *Leirus jordanensis* sp. n., female holotype. 3. Carapace and mesosomal tergite I, dorsal aspect. 4. Chelicera, dorsal aspect. 5. Right pedipalp, dorsal aspect showing arrangement of trichobothria. 6. Granulations on the dentate margin of the movable finger of the pedipalp-tibia. 7. Metasomal segment V and telson, lateral aspect. 8. *Leirus quinquestriatus* female. Metasomal segment V and telson, lateral aspect. Scales: figures 3-6 = 3 mm; figures 7-8 = 5 mm.

by more than two times their diameter. Four pairs of lateral eyes; the fourth eye only half the size of the others three. Mesosoma: Tergites I-II pentacarinata; III-IV tricarinata. All carinae strong, granular; each carina terminating distally in a spinoid process extending slightly beyond the posterior margin of the tergite. Median carinae on tergite I moderate to strong; on II-VI strong, crenulate and terminating distally in a spinoid process extending very slightly beyond the posterior margin of the tergite. Tergite VII pentacarinata, with lateral pairs of carinae strong and fused; median carinae present in the proximal half, moderate to strong. Intercarinal spaces weakly granular, almost smooth, except for the strongly granulated lateral margins of tergites III-VI. Sternites: Lateral carinae absent from sternite III, moderate to weak on sternites IV-VI, strong, crenulate on VII. Submedian carinae absent on sternites III-V, moderate to weak on VI, strong and crenulate on VII. Pectines moderately long; pectinal teeth count 30-30. Metasoma: Segments I-III with 10 carinae, crenulate; lateral inframedian carinae on I moderate to strong, crenulate; on II present only in posterior half, crenulate; on III limited to posterior third; segment IV with 8 keels. Dorsolateral carinae on all metasomal segments moderate to strong, without any enlarged denticles distally. All the other carinae on segments I-IV moderate to strong. Segment V with 5 keels; ventro-medial carinae strong, with several strongly spinoid granules distally; anal arch with 3 spinoid lobes. Dorsal furrows of all metasomal segments moderately to weakly developed, smooth; intercarinal spaces practically smooth, with only a few strong granules on the ventral surface of segment V. Telson smooth, subaculear tubercle absent. Chelicerae with two reduced denticles at the base of the movable finger, the distal denticle double the size of the basal one (cf. Vachon, 1963). Pedipalps: Trichobothrial pattern orthobothriotaxic, type A (cf. Vachon, 1974); dorsal trichobothria of femur in beta configuration (Vachon, 1975). Femur pentacarinata; all carinae strongly crenulate. Patella with 7 keels; all carinae moderate to strong; internal carinae with one spinoid granule distally. Tibia slender, with elongated fingers; all carinae weakly granular, almost vestigial. Dentate margin of movable and fixed fingers composed of 12 almost linear rows of granules. Legs: Ventral side of tarsi with numerous setae not arranged in straight rows. Strong patellar spurs present on legs III and IV, strong pedal spurs present on all legs. Measurements. See Table I.

ECOLOGY AND BIOGEOGRAPHY

Habitat: The area in which *Leiurus jordanensis* sp. n. was collected is composed of sandstone cliffs surrounded by flat sand fields, small sand dunes and xeric hammada with scattered *Haloxylon persicum* and *Anabasis* sp. bushes. The specimen was collected during the night (22:10h) sitting at the entrance of a very deep crevice in the zone between the vertical sandstone cliff and the surrounding sand dune. The habitat lies at the margin of extensive sand dunes, which penetrate from Saudi Arabia into Jordanian territory. Some psammophilous Arabian faunal elements, such as *Acanthodactylus tilburyi* (Reptilia, Lacertidae), reach at this place the NW boundary of their distribution (Modry *et al.*, 1999).

The habitat of *L. jordanensis* sp. n. seems to differ from the ecological requirements described for *L. quinquestriatus hebraeus* by Levy & Amitai (1980). In their

ecological notes these authors stated: "It is found on various types of soil: terra rossa, basalt, rendzina, loess and stony desert. It does not occur in the Coastal Plain, on Mount Carmel or in plains and valleys with sand dunes or heavy soil".

Geographical distribution: According to Fet & Lowe (2000), *Leiurus quinquestriatus* is distributed throughout Algeria, Chad, Egypt, Ethiopia, Libya, Mali, Niger, Somalia, Sudan, and Tunisia in Africa, and the Sinai Peninsula, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates and Yemen in Asia. The African populations correspond largely with the nominal subspecies, *L. quinquestriatus quinquestriatus*, whereas those in Asia belong to the nominal subspecies *L. quinquestriatus hebraeus*. According to Levy *et al.* (1970), the Isthmus of Suez is apparently the border between the two subspecies, but no intermediate population has been clearly defined. Moreover, in a map Levy & Amitai (1980: fig. 3) indicate the records for *Leiurus* in Israel and the Sinai Peninsula. Only a few localities are indicated in Jordan, all of which are situated very close to the border with Israel. In his studies on Saudi Arabian scorpions, Vachon (1979) merely indicated a number of localities for *L. quinquestriatus* in the central and western regions of the country. No localities were cited in the region closer to the Jordanian border.

The distribution of the new species therefore appears to be limited to an enclave within the area in which *Leiurus quinquestriatus* is distributed. In this enclave, other endemic elements are present. One example is the monotypic genus *Birulatus* Vachon, described on the basis of a single female specimen collected in the south of Tafila, close to Shauback, 30° 31' 60" N, 35° 34' 0" E (see Lourenço, 1999).

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DNA reveals the existence of *Myotis alcaethoe* in France (Chiroptera: Vespertilionidae)

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DNA reveals the existence of *Myotis alcaethoe* in France (Chiroptera: Vespertilionidae). - A strange little *Myotis* species resembling *M. mystacinus* has been caught repeatedly in France, but its small dimensions and external characteristics didn't match the description of any traditionally recognized species. It was informally known as the "Murin cantalou". We report here a comparative analysis based on an extensive database of mitochondrial DNA sequences to infer the correct name of that species. The partial *ND1* sequences were obtained from biopsy samples of two individuals from Charente-Maritime, and proved to be identical to Hungarian haplotypes of the recently described *Myotis alcaethoe* Helversen & Heller, 2001. Preliminary but concordant morphological and ecological data between French and Balkanic bats support this surprising finding. The discovery of *M. alcaethoe* in France extends considerably the known range for this species, and poses a number of interesting questions about its taxonomic and conservation status. These questions will be answered only when further morphological investigations will allow reliable identification of that species in the field.

Key-words: *Myotis* - Chiroptera - ND1 - mtDNA - phylogeny - cryptic species.

INTRODUCTION

The last ten years have seen a little revolution among European chiropterologists, as not fewer than 6 cryptic species have been discovered in this much studied part of the World. The first case was the discovery that two phonic types of the "common" pipistrelle (Jones & van Parijs, 1993) were in fact composed of two distinct biological species (Barratt *et al.*, 1997), the "true" *Pipistrellus pipistrellus* and a

second species calling at about 55 kHz. There is current controversy about the appropriate name to use for this species (Jones & Barratt, 1999; Helversen *et al.*, 2001b), but it is now known either as *P. pygmaeus* Leach, 1825 or as *P. mediterraneus* Cabrera, 1904. More importantly, its distinctive echolocation calls and DNA sequence data show that this cryptic species is in fact very widespread and often sympatric with *P. pipistrellus* over most of Europe (Barratt *et al.*, 1997; Hanák *et al.*, 2001; Mayer & Helversen, 2001a).

The existence of another cryptic species was suggested by unexpected large genetic distances (at both nuclear and mitochondrial DNA) found among supposedly conspecific populations of *Myotis myotis* (Castella *et al.*, 2000). In this case, the new taxon, *M. punicus* Felten, 1977, is found so far only in North Africa, Corsica, Sardinia and Malta, where it lives in strict allopatry with either *M. myotis* or *M. blythii* (Castella *et al.*, 2000; Topál & Ruedi, 2001).

A third cryptic species, *Myotis aurascens* Kuszajkin, 1935, was diagnosed to science in the course of a broad taxonomic revision of species of the *M. mystacinus* group (Benda & Tsytulina, 2000). It is distinguished from *M. mystacinus* by some morphological characters (essentially size, dental and bacular characters, cf. Benda & Tsytulina, 2000), and by different chromosomal characteristics (Volleth, 1987), but sequences of mitochondrial DNA (mtDNA) failed to support these differences (Ruedi, pers.obs and Mayer & Helversen, 2001b). *Myotis aurascens* is supposed to live from the Balkans east to the Caucasus, and thus probably overlaps broadly with the distribution of its sibling species, *M. mystacinus* (Benda & Tsytulina, 2000; Hanák *et al.*, 2001).

Remarkably, a combination of molecular, chromosomal and echolocation data (Helversen *et al.*, 2001a; Volleth, 1987) revealed the existence of a second cryptic, independent biological species among the *M. mystacinus* complex in the Balkans. The new species, christened *Myotis alcahoe* Helversen & Heller, 2001, averages smaller than both *M. mystacinus* and *M. aurascens*. It is supposed to be endemic to a few mountain ranges in the southern Balkans (the Pindus and the Rhodopi in Greece), but its presence is also evidenced further north in Hungary, as revealed by sequence data (Helversen *et al.*, 2001a). It is at least caught in sympatry with *M. mystacinus* (Mayer & Helversen, 2001b), but its current range suggests that it might be living together with other species of the *mystacinus* group as well.

The existence of the fifth cryptic species in the European bat fauna was again revealed to the scientific community by using a combination of molecular and morphological characters. Indeed, Spitzenberger *et al.* (2001) demonstrated that intermediate morphotypes between *Plecotus auritus* and *P. austriacus* represented in fact a cryptic species which differed from either known species by consistent genetic differences. Nearly simultaneously, another team of researchers studying molecular variation among vespertilionid bats published similar results about the existence of a cryptic, morphologically intermediate species among European *Plecotus* (Mayer & Helversen, 2001b). Both research teams suggested to call this intermediate species *Plecotus kolombatovici* Dulic, 1980. This species would be distributed from the Alps east to the Balkans. However, Kiefer & Veith (2002) revealed that both teams found contradicting molecular results (different sister-group relationships for their "intermediate" taxon).

They explained this apparent contradiction by the existence of a fourth biological species among the European *Plecotus*! The highland sister species to *P. auritus* would be called *Plecotus alpinus* Kiefer & Veith, 2002, while the lowland, sister species to *P. austriacus* would correspond to *P. kolombatovici*. Before more clear evidences for species separation are given, it will be difficult to assess whether one or two distinct species should be added to the known *Plecotus* species from Europe.

In fact, all of these recently discovered species have in common the great difficulties to be distinguished from their sibling relatives by external morphology, and of course this is the main reason why they have remained unperceived for so long. Yet morphological differentiation is not a necessary prerequisite for two taxa to evolve independently as two biological species (Jones, 1997). This poses, however, serious problems to get a better understanding of the distribution and abundance of these cryptic species. Yet we need such information to assess their current status for conservation purposes.

In this study, we use sequences of mtDNA to identify a population of problematic *Myotis* found in France and which was informally known as "Murin cantalou" (Jourde, 2000). Indeed, for several years, chiropterologists captured repeatedly a small *Myotis* looking more or less like a *M. mystacinus*, but with unusually small dimensions (see Table 1) and with several other qualitative differences in external morphology. Both adult males and adult females were caught in various parts of France (Jourde, 2000), but to date, these bats could not be identified to any known *Myotis* species. By using a non-destructive method based on biopsy samples, we compared sequences of these strange *Myotis* to a comprehensive database of sequences of all European vespertilionid species (Mayer & Helversen, 2001b; Ruedi & Mayer, 2001), and identified it as to be identical to the recently described *Myotis alcathoe* (Helversen *et al.*, 2001a).

MATERIAL AND METHODS

CAPTURE AREA

The two unknown *Myotis* analyzed here were captured on the 12 June 2001, with mist nets set at Port-d'Euvaux, a commune located in the Charente-Maritime department in western France (45°50'37" N, 0°41'24"W). Both individuals were pregnant females and were caught in the late evening, presumably during their initial hunting bout. The environment surrounding the capture area consisted of a humid, mixed forest dominated mainly by large trees of *Quercus robur* and *Platanus spp*, and with abundant undergrowth of *Acer*, *Fraxinus* and *Salix* species. Close to the capture area, a mesotrophic stream meanders through the small valley, which also comprises some more open habitat patches (pastures). The local climate is typical of the humid temperate Atlantic belt. Other bats recorded in the same forest included *Myotis daubentonii*, *Pipistrellus pipistrellus*, *Nyctalus leisleri*, *Nyctalus noctula*, *Eptesicus serotinus*, and *Plecotus* sp.

GENETIC ANALYSIS

Before releasing them, the two females were weighted and measured (see Table 1), and small biopsy samples of wing membrane was taken with a sterile biopsy punch

(Worthington Wilmer & Barratt, 1996). The biopsies were stored at room temperature in leak-proof plastic tubes containing 80% ethanol. Total genomic DNA was extracted from these ethanol-preserved tissues with a commercial kit (DNeasy Tissue kit of QIAGEN, Inc.). In short, samples were first washed in sterile water to remove ethanol, then digested with proteinase K for 4-8 hours at 55 °C. The lysate was bound to a silica-gel membrane, washed, and finally eluted with 100 µl of low TE buffer. The complete gene nicotinamide-dehydrogenase subunit 1 (ND1) was obtained by PCR with specific primer pairs ER65 and ER66 following protocols described in Petit *et al.* (1999) and Mayer & Helversen (2001b). Basically the PCR cocktail (25 µl reaction volumes) included 3 µl of DNA extract with 0.5 µl of each primer (10 µM), 2 µl of MgCl₂ (25 mM), 0.5 µl dNTP (40 mM), 0.75 unit of Taq polymerase with appropriate buffer (QIAGEN, Inc.) and ddH₂O. Amplifications included 3' initial denaturation at 94°C, followed by 37 cycles at 94°C (45''), 50°C (45'') and 72°C (1'), with a final extension at 72°C (1'30''). The 500 initial bases of *ND1* were sequenced directly from the purified PCR product, using ER70 primer (Petit *et al.*, 1999; Mayer & Helversen, 2001b), and followed by BigDye sequencing protocols (Applied Biosystems).

The partial *ND1* sequences were aligned and edited using the program Sequencher 4.1 (Gene Codes Corp.). Our main focus here was to identify the unknown samples with the closest sequence match of any known *Myotis*. So we didn't perform sophisticated phylogenetic analyses of World *Myotis* (see Ruedi & Mayer, 2001 for a comprehensive study), but did simple comparisons as follows. The *ND1* sequences of *Myotis* A and B were compared to homologous sequences including all 10 traditionally recognized species of European *Myotis* (Mitchell-Jones *et al.*, 1999), plus sequences of *M. auraszens*, and of *M. punicus* (Benda & Tsytulina, 2000; Mayer & Helversen, 2001b; Ruedi & Mayer, 2001). We also compared them to other Palaearctic species such as *M. schaubi*, and *M. ikonnikovi* (Mayer & Helversen, 2001b) and to several Asian, African and American *Myotis* available in Genbank (Ruedi & Mayer, 2001). We compared these sequences by performing a simple maximum parsimony analysis of the DNA data, using PAUP* 4.0 (Swofford, 1998).

TABLE 1: Some external measurements (in mm) of *M. alcaethoe* from France. We give measurements taken on the two females analyzed here, and the means of a sample of 20 other French individuals described in Jourde (2000). For comparison, we also give the original mean measurements of Greek samples of *M. alcaethoe* given by Helversen *et al.* (2001a).

	<i>Myotis</i> A	<i>Myotis</i> B	Other females	Other males	<i>M. alcaethoe</i>
Forearm length	31.6	30.1	31.67	31.67	31.4
Third digit	52	51	51.3	51.21	51.4
Fifth digit	40	40	42.36	40.80	40.3
Thumb length	4.1	3.8	-	-	4.6
Claw length	1.6	1.8	-	-	-
Weight (in g)	5.8	5.5	5.23	4.32	4.2

RESULTS AND DISCUSSION

External measurements of the French animals are very similar to those given in the original description of *M. alcaethoe* (Table 1 and Helversen *et al.*, 2001). In particular, these animals have diagnostically smaller dimensions than *M. mystacinus* (see e.g. Tupinier & Aellen, 2001), with proportionately longer feet (Jourde, 2000), shorter thumbs (< 5 mm) and shorter claws (< 1.8 mm). Other striking similarities between external morphology of the unknown *Myotis* and the description of *alcaethoe* include: brownish (not blackish) ears becoming lighter at the inner basis and a pointed tragus hardly projecting beyond the ear notch. Compared to the larger *M. daubentonii*, the unknown *Myotis* has a similar brownish (not blackish as in *M. mystacinus*), hairy face, with a bare zone around the eyes. This combination of characteristics would differentiate them from any other European species of small *Myotis*. As no French specimen of the unknown taxon have been preserved so far, no meaningful comparison of dental or cranial characters can be made. Helversen *et al.* (2001) indicates that *Myotis alcaethoe* “prefers dense stands of deciduous trees near body of water, and in Greece, it is found in dense groves of plane trees or the alder woods in ravines bordering small streams”. This description thus corresponds to the habitat where the unknown *Myotis* was caught in Charente-Maritime (see Material & Methods), although it has been found elsewhere hunting in forest canopy far away from any watercourse.

The genetic analysis was even more conclusive about the identity of *Myotis* A and B. The initial 500 base pairs of the *ND1* gene were obtained from both unknown individuals from France and they proved to be identical to each other (see alignment in the Annex). Furthermore comparisons with the complete *ND1* database revealed that *Myotis* A and B have actually exactly the same 500 base pairs as those of the two Hungarian *M. alcaethoe* (GeneBank # AY027835 and AY027836) sequenced by Mayer & Helversen (2001b). The alignment in the Annex suggests that French and Hungarian bats share a common sequence which differs by only 5 transition mutations (1% sequence divergence) from the Greek haplotypes of the type-series of *M. alcaethoe*. By contrast, they differ by at least 60 transitions and 7 transversions (>13%) from a selection of other members of the *mystacinus* species complex (see Annex). As our sequences of French animals happen to be identical to the Hungarian *M. alcaethoe* presented in the comprehensive surveys of Helversen and colleagues (Helversen *et al.*, 2001a; Mayer & Helversen, 2001b), we don't show our results of phylogenetic analyses which are, of course, very similar to theirs. In particular, we found a general lack of resolution of phylogenetic relationships above the species level. A denser taxon sampling and longer sequences of DNA (preferably from different genes) would be needed to establish the possible sister-group relationships of *M. alcaethoe*.

Owing to the concordant morphological, ecological and genetic similarities between the recently described *M. alcaethoe* and the unknown *Myotis* from France, we conclude that these two taxa are identical. Thus, this discovery extends considerably the presumed range of *M. alcaethoe*, which was initially believed to be restricted to southeastern Europe (Helversen *et al.*, 2001a). In addition to Charente-Maritime, this species has been suspected in at least six other departments of France (Cantal, Haute-Loire, Puy-de-Dôme, Allier, Aube and Calvados; see Jourde, 2000), which suggests that it might be much more widespread than previously thought. In the original des-

cription, Helversen *et al.* (2001a) stated that "The possibility that an older name for *M. alcaethoe* n. sp. could be unearthed among various forms synonymized with *M. mystacinus* (...) is extremely unlikely, because all these forms were described from western and central Europe, where the new species does not occur to the best of our current knowledge." With the discovery of *M. alcaethoe* in France, this statement should be reconsidered and it will be necessary to revise available type material of European forms such as *Vespertilio collaris* Schinz, 1821 or *Vespertilio humeralis* Baillon, 1834 (see e. g. Benda & Tsytsulina, 2000; Ellerman & Morrison-Scott, 1966), which are all possible candidates for older names of *M. alcaethoe*.

Currently, DNA sequences issued from biopsy samples (Worthington Wilmer & Barratt, 1996) provides the better discriminating characters to identify live animals (Helversen *et al.*, 2001a), but this requires heavy and expensive laboratory set-up, and is not appropriate for a quick diagnostic. We still need a more comprehensive appraisal of morphological variations to provide reliable characters to identify them directly in the field. Before that, it will be difficult to define the precise conservation status of this recently described species.

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APPENDIX

Alignment of the first 500 base pairs of the mitochondrial ND1 gene in a selection of bats from the *Myotis mystacinus* group. Genbank accession numbers of these bats are AY027835 (*M. alcaethoe* Hungary), AF401437 (*M. alcaethoe* Greece), AF401438 (*M. aurascens* Greece), AY027848 (*M. mystacinus* Germany), AY027850 (*M. ikonnikovi* Russia), AY027851 (*M. brandti* Germany), as published by Helversen *et al.* (2001a) and Mayer & Helversen (2001b).

Position	1	10	20	30	40	50
<i>M. alcaethoe</i> Hungary	ATGTATTTTATTAACCTGTTGACGATGATTATTC	CCATTC	TACTAG	CGCGT		
<i>Myotis</i> A					
<i>Myotis</i> B					
<i>M. alcaethoe</i> Greece			A.....		
<i>M. aurascens</i> Greece	C..C..C..	A..A..A..A..	A.....	A..C.....	T..
<i>M. mystacinus</i> Germany	C..C..C..	A..A..A..A..	A.....	A..C.....	T..
<i>M. ikonnikovi</i> Russia	C..G..C..	T..A..A..TA..	A.....	C..A.....	T..G..T..
<i>M. brandti</i> Germany	C.....	C.....	A..AG..A..A.....	AG..C..TT.....	
	51	60	70	80	90	100
<i>M. alcaethoe</i> Hungary	AGCATTCTTAACCC	TACTAGA	ACGAAA	AGTATT	AGGCTAC	ATACAA7890
<i>Myotis</i> A					CTCC
<i>Myotis</i> B					
<i>M. alcaethoe</i> Greece					G.....
<i>M. aurascens</i> Greece	G.....	G.....	C.....	T..G.....	
<i>M. mystacinus</i> Germany	G.....	G.....	C..G.....	T..G.....	T..
<i>M. ikonnikovi</i> Russia	C.....	C.....		T..T.....	T..
<i>M. brandti</i> Germany	C.....		G.....	C.....	
	101	110	120	130	140	150
<i>M. alcaethoe</i> Hungary	GAAAAGGACCTAAC	ATTGTGGG	CCCCCTAC	GGCTTACTACA	ACCAAT	TCGCT
<i>Myotis</i> A					
<i>Myotis</i> B					
<i>M. alcaethoe</i> Greece		A.....			
<i>M. aurascens</i> Greece		T..T..A..T..	C.....		C
<i>M. mystacinus</i> Germany		T..T..A..T..	C.....		C
<i>M. ikonnikovi</i> Russia	G..C..T.....	T.....	T..T..C.....		
<i>M. brandti</i> Germany	T..C..A.....	T..T.....			T..C

	151	160	170	180	190	200
<i>M. alcathoe</i> Hungary	GACGCAGTTAAATTTATTCACCAAAGAACC	CATACAACC	CACTAAC	ATCATCATC		
<i>Myotis</i> A	.....	.....	.....	.....	.....	.....
<i>Myotis</i> B	.....	.....	.....	.....	.....	.....
<i>M. alcathoe</i> Greece	..T.....	.....	.....	.....	.....	.....
<i>M. aurascens</i> Greece	..T....C.....	..T..T....	..G..T.C.....	.....	.....	..G..
<i>M. mystacinus</i> Germany	..T.....	..T..T....	..G..T.C.....	.....	.....	..G..
<i>M. ikonnikovi</i> Russia	..T.....	..T..T....	.....	.....	.....	.....
<i>M. brandti</i> Germany	.....C..C.....	.....	.....C.C.....	.....	.....	.....
	201	210	220	230	240	250
<i>M. alcathoe</i> Hungary	TCTCACCC	TATTCATT	TATTCACCC	ACTCTAG	CCCTAAC	CTTGGCTCTCA
<i>Myotis</i> A	.....	.....	.....	.....	.....	.....
<i>Myotis</i> B	.....	.....	.....	.....	.....	.....
<i>M. alcathoe</i> Greece	.....	.....	.....	.....	.....	.....
<i>M. aurascens</i> Greece	C.....T..T.....	..T.....	..T.....	..TC.A..C..A.	.....	.....
<i>M. mystacinus</i> Germany	.....T..T.....	..T.....	..T.....	..C.A..C..A.	.....	.....
<i>M. ikonnikovi</i> Russia	C.....TT.....	..G..T.....	..TC.A..C..A.	.....	.....	.....
<i>M. brandti</i> Germany	C...GT.T...T...C...T..T.....	.....	.....C..A..	.....	.....	.....
	251	260	270	280	290	300
<i>M. alcathoe</i> Hungary	TAATATGAAT	TCCCCTGCC	CATACCAC	CCCCATTA	ATCAATATA	AAACTTA
<i>Myotis</i> A	.....	.....	.....	.....	.....	.....
<i>Myotis</i> B	.....	.....	.....	.....	.....	.....
<i>M. alcathoe</i> Greece	.....	.....	.....	.....	.....	.....
<i>M. aurascens</i> Greece	C.....A...A..G.....	..T..C.....	..TC..	.....	.....	.....
<i>M. mystacinus</i> Germany	C.....A...A..G.....	..T..C.....	..TC..	.....	.....	.....
<i>M. ikonnikovi</i> Russia	.....C..A..A..T.....	..T..C.....	..T.....	.....	.....	.....
<i>M. brandti</i> Germany	.....G.C..A..A..A.....	..CC.....	.....C..	.....	.....	.....
	301	310	320	330	340	350
<i>M. alcathoe</i> Hungary	AGCATACTCT	CATACTAG	CCCTATCA	AGTCTAG	CCGTATAC	GTATCTT
<i>Myotis</i> A	.....	.....	.....	.....	.....	.....
<i>Myotis</i> B	.....	.....	.....	.....	.....	.....
<i>M. alcathoe</i> Greece	.....	.....	.....	.....	.....	.....
<i>M. aurascens</i> Greece	..TG.....T.....	..C..G..T..C.....	..TC..	.....	.....	.....
<i>M. mystacinus</i> Germany	..TG.....T.....	..C..G..T..C.....	..TC..	.....	.....	.....
<i>M. ikonnikovi</i> Russia	..T.....T.....	..T.....	..G...C..T..TC..	.....	.....	.....
<i>M. brandti</i> Germany	.....G.....T.....	..C...T..C..T.....	.....C..	.....	.....	.....

	351	360	370	380	390	400
<i>M. alcathoe</i> Hungary	ATGGTCAGGCTGAGCCTCAA	ACTCAA	AATATG	CACTAAT	CGGGGCCCTAC	
<i>Myotis</i> A	.....	.....	.....	.....	.....	.....
<i>Myotis</i> B	.....	.....	.....	.....	.....	.....
<i>M. alcathoe</i> Greece	.....	.....	.....	.....	.....	.....
<i>M. aurascens</i> Greece	..A.....	.....	T.....	C.....	T..A..T..G.	
<i>M. mystacinus</i> Germany	..A.....	.....	T.....	C.....	T..A..T..G.	
<i>M. ikonnikovi</i> Russia	..A.....	.....	T.....	T.....	T..A..T..G.	
<i>M. brandti</i> Germany	..A.....	.....	T.....	T.....	C.....	T..A..T..
	401	410	420	430	440	450
<i>M. alcathoe</i> Hungary	GAGCAGTAGCTCAGACAAT	CTCCTATGAAGTAACCC	TGGCTATTATTATC			
<i>Myotis</i> A	.....	.....	.....	.....	.....	.....
<i>Myotis</i> B	.....	.....	.....	.....	.....	.....
<i>M. alcathoe</i> Greece	.....	.....	.....	.....	.....	.....
<i>M. aurascens</i> Greece	.....	C..A.....	C.....	G.....	A.....	C..T
<i>M. mystacinus</i> Germany	.....	C..A.....	C.....	G.....	A.....	C..T
<i>M. ikonnikovi</i> Russia	.....	C..A.....	T.....	TT..A.....	.....	T
<i>M. brandti</i> Germany	.....	C..A.....	T..T..C.....	.....	C..C..C..	
	451	460	470	480	490	500
<i>M. alcathoe</i> Hungary	TTATCTATTTTACTTATA	AAATGGCTCCTTTACACTA	ACCACACTAATCAC			
<i>Myotis</i> A	.....	.....	.....	.....	.....	.....
<i>Myotis</i> B	.....	.....	.....	.....	.....	.....
<i>M. alcathoe</i> Greece	.....	.....	.....	.....	.....	.....
<i>M. aurascens</i> Greece	.....	C.....	C.....	A.....	T..T..T..	
<i>M. mystacinus</i> Germany	.....	C.....	C.....	A.....	T..T..T..	
<i>M. ikonnikovi</i> Russia	.....	C..CC..T.....	.....	.....	.....	T..
<i>M. brandti</i> Germany	C.C..C..C.....	C.....	.....	.....	T.....	.....

Japygidés (Diplura) du Sud-Est asiatique n°10 *Dicellurata Genavensia* XXVI

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51, rue du Faubourg Saint-Martin, F-21121 Fontaine-lès-Dijon, France.

Japygidae (Diplura) from South-East Asia n°10 – *Dicellurata Genavensia* XXVI. - Descriptions of six new species of *Indjapyx* Silv. nec Paclt (1957): *I. bogorensis* sp. n. from Java, *I. agathis* sp. n. from Brunei, *I. pinicola* sp. n., *I. samosir* sp. n. and *I. simalungun* sp. n. from Sumatra, *I. singapura* sp. n. from Singapore. They are characterized by their tergal chaetotaxy and cerci.

Key-words: Diplura - Japygidae - Indonesia - Singapore - Brunei - new species.

INTRODUCTION

Dans cette note sont décrites six nouvelles espèces d'*Indjapyx* Silv. nec Paclt (1957), provenant d'une partie des récoltes effectuées lors des missions organisées sous la direction du Dr B. Hauser, alors Conservateur du Département des Arthropodes et d'Entomologie I, pour le compte du Muséum d'histoire naturelle de Genève; j'y ajoute les spécimens récoltés par T. Jaccoud (taxidermiste au Muséum) et P. Marcuard dans l'île de Samosir du lac Toba à Sumatra et déposés dans les collections du Muséum. Trois sont localisées à Sumatra: *I. pinicola* sp. n., *I. samosir* sp. n. et *I. simalungun* sp. n.; une à Singapour: *I. singapura* sp. n.; une à Java: *I. bogorensis* sp. n. et une à Brunei: *I. agathis* sp. n.

Elles se distinguent entre autre l'une de l'autre par le nombre d'articles antennaires, la chétotaxie abdominale tergale, l'armature et l'allure de leurs cerques; les valeurs typiques de ces caractères et leurs variations possibles ont été exposées et/ou discutées par Silvestri (1930, 1948) et Pagés (1984).

Bien que nos connaissances soient encore très fragmentaires, on compte actuellement dans ce genre, tel qu'il a été défini par Silvestri (1930), 30 espèces décrites ou signalées, 1 sous-espèce et les 7 "var." établies par Silvestri (l.cit.)² dont 6 d'*Indjapyx indicus* (Oudemans) et 1 d'*Indjapyx annandalei* Silvestri.

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² Voir ce que j'écrivais en 1978 (p. 601) et 1984 (p. 335) au sujet de ces "var." et, en général, de la valeur taxonomique des sous-espèces de Japygidae compte tenu des lacunes de nos connaissances actuelles.

Ces différents taxa sont répartis des îles bordant la côte orientale de l'Afrique à l'archipel d'Hawaï, mais ne semblent exister ni en Chine, ni au Japon, non plus qu'en Australie ou Nouvelle-Zélande.

Tous les spécimens étudiés dans ce travail sont conservés dans les collections du Muséum d'histoire naturelle de la Ville de Genève.

ÉTUDE TAXONOMIQUE³

Indjapyx bogorensis sp. n.

Figs 1-9

Matériel étudié: **Holotype:** 1 ♂ ad. de 4,48 mm: INDONÉSIE: JAVA: Bogor, Jardin Botanique, dans la partie "Nursery" sous des pots à fleurs et surtout sous les dalles du chemin entre les serres du fond, 260m; 28.XI.1987; leg. B. Hauser (Sar-87/30); **paratypes:** 1 st.III A de 3,12mm: JAVA: Bogor, Jardin Botanique, prélèvement de sol dans les angles formés par les contreforts de grands arbres près du "Guest House", env. 250m; 24.XI.1987; leg. B. Hauser – extraction par appareil Berlese à Bogor (Sar-87/8); 1 ♂₁ de 3,04 mm: JAVA: Bogor, Jardin Botanique, prélèvement de sol dans les angles formés par les contreforts de grands arbres près des deux lacs, env. 260m; 24.XI.1987; leg. B. Hauser – extraction par appareil Berlese à Bogor (Sar-87/11); 1 ♀ ad. de 7,4 mm: JAVA: Bogor, Jardin Botanique, dans la partie "Nursery" sous des pots à fleurs et surtout sous les dalles du chemin entre les serres du fond, 260m; 28.XI.1987; leg. C. Lienhard (Sar-87/31).

TÊTE

Vertex (Fig.1): chétotaxie typique du genre; chez le ♂ holotype l'aire pileuse correspond presque parfaitement avec la fig. 3 d'*I. uvaianus* Pgs de Ceylan; chez la ♀ ad. l'aire pileuse de soies très courtes est limitée extérieurement par S5-V4-M4-M5-P2 comme sur la fig. 6 d'*I. uvaianus*.

Antennes: de 36 articles à pilosité typique du genre; aires pileuses peu développées sur les articles (16)-17-22-(23); les 13 trichobothries typiques, *a* proximale, *p* = 0,20-0,26 chez le ♂ ad. et la ♀ ad., 0,40 chez le ♂₁; 6 sensilles placoïdes de petite taille sur l'article apical.

Pièces buccales: typiques du genre; palpes labiaux 2 fois 2/3 aussi longs que larges à la base chez le st.III A, 2 fois 1/4 environ chez les adultes; les soies subapicales sont, par rapport au palpe qui les porte, relativement plus longues chez le st.III A que chez les adultes, $L_{sap}/L_{plb} = 1,45$ et 1,38 respectivement.

THORAX

Pronotum: les 5+5 *M* typiques, *M*₃ les plus longs; la longueur des *M*₁ égale entre 1 fois 1/3 et 1 fois 1/2 l'écartement de leurs embases, 1,39 chez le ♂ holotype; une douzaine de soies assez longues à assez courtes.

Méso- et métanotum. Préscutum: 1+1 *M* longs, de nombreuses soies très courtes ou extrêmement courtes (= sensilles sétiformes?). Scutum: les 5+5 *M* typiques, les *M*₁ et *M*₅ les plus courts, les *M*₃ les plus longs; environ 6-7+6-7 soies assez longues, la plupart sur le pourtour du sclérite.

Pattes: assez longues, les PIII atteignant le milieu de l'urosternite 3; 4+4 à 6+6 soies spiniformes aux tarsi; calcars très développés; chez les adultes, aux PIII le

³ On trouvera la liste des abréviations et des rapports utilisés dans Pagés (1954, 1984) et Pagés & Schowing (1958).



FIGS 1-6

Indjapyx bogorensis sp. n., ♂ ad. holotype de Sar-87/30. — 1. Vertex, e = 229 μ m. — 2. Tergite 2, e = 229 μ m. — 3. Tergites 6 à 10 et les cerques, e = 229 μ m. — 4. Angle postérieur gauche du tergite 7, e = 105 μ m. — 5. Sternite 1, e = 181 μ m. — 6. Soie glandulaire d'un organe subcoxal latéral, e = 42 μ m.

tibia égale 1,80 fois la longueur du tarse, celui-ci égale 1,7 fois celle du prétarse; griffes aiguës, la postérieure égalant 1,4 fois l'antérieure et 4,30 fois l'unguiculus.

ABDOMEN

Tergite 1. Préscutum: 1+1 *M* submédiants assez longs. Scutum: les 2+2 *M* typiques; seuls les *mp* sont bien développés; environ 10+10 soies assez courtes ou courtes.

Tergite 2 (Fig. 2): 4+4 *M* assez longs à longs (*ma* = *M*, M_1 , M_{4-5}); m_3 et *mp* assez longs, *msa*, m_1 et m_2 assez courts.

Tergites 3 à 7 (Figs 3, 7): 6+6 *M* (*ma* = *M*, M_{1-5}), assez longs à longs, M_4 et M_5 les plus longs, les *ma* = *M* assez longs au tergite 3, diminuent régulièrement de taille et ne sont plus qu'assez courts au 7ème; m_2 , m_3 et *mp* assez longs, ainsi que 1+1 soies insérées près des m_2 ; *msa*, m_1 courts comme une vingtaine de soies réparties plus ou moins par paires sur tous les tergites.

Tergite 8 (Figs 3, 7): pratiquement 2 fois aussi large que long chez les adultes et le δ_1 ; 5+5 *M* assez longs, dont 4+4 homologues aux M_{2-5} et 1+1 insérés entre les M_4 et M_5 ; 1+1 soies longues homologues aux m_3 ; m_1 nuls; *mp* très courts comme un vingtaine de soies réparties sans ordre bien apparent sur le tergite.

Tergite 9 (Figs 3, 7): un peu plus de 3 fois aussi large que long ($l/L = 3,10$); pas de *M*, mais une rangée postérieure de soies courtes ou très courtes; de nombreuses sensilles sétiformes minuscules réparties sur tout le tergite.

Tergite 10 (Figs 3, 7): à bords subparallèles, sensiblement 1,30 fois aussi long que large chez les adultes et le δ_1 ; chez le st.III A légèrement trapézoïdal et pratiquement aussi long que large ($L/l = 1,11$); carènes bien développées chez les adultes, absentes chez le st.III A et le δ_1 ; 2+2 *M* longs, latéraux antérieurs et intermédiaires; 1+1 longues soies discales postérieures; 2 soies longues, antérieure et postérieure, à l'emplacement des carènes; 1+1 soies latérales subpostérieures assez longues; d'assez nombreuses soies courtes, dont une série longitudinale médiane.

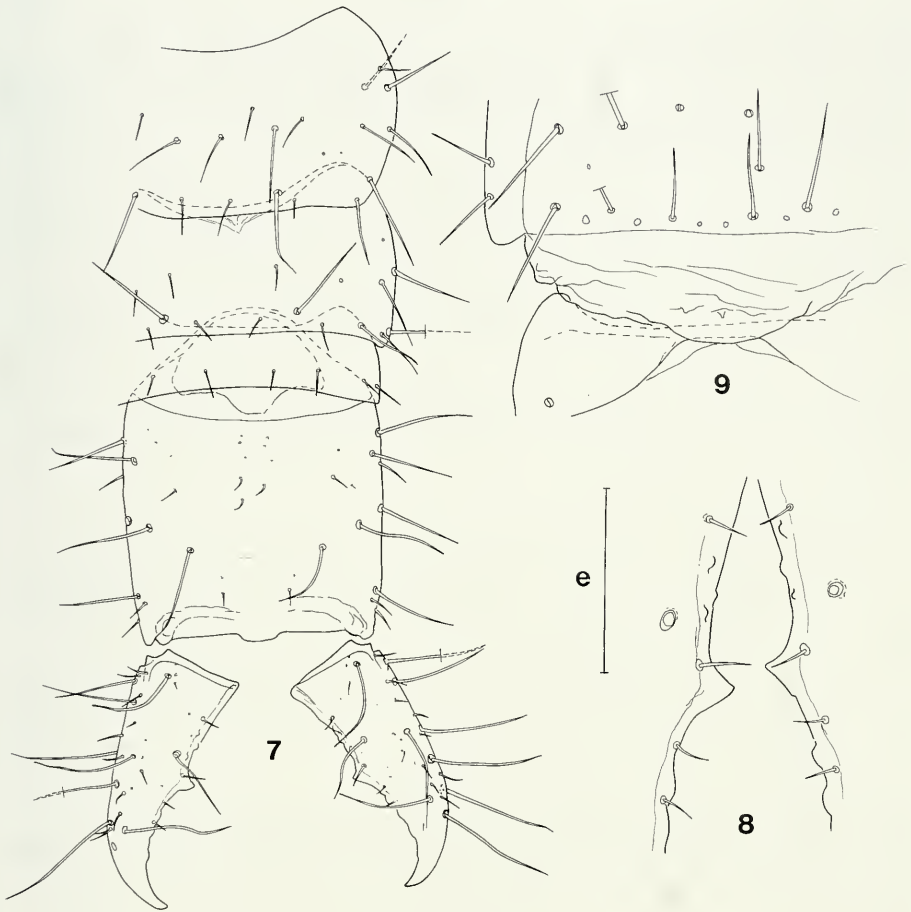
Angles latéraux postérieurs des tergites: nuls aux tergites 1 à 6, en pointe triangulaire obtuse au 7ème (Fig. 4), larges et arrondis au 8ème, droits au 9ème; tous nuls chez le st.III A; chez le δ_1 , le 7ème est obtus et le 8ème est légèrement saillant, obtus, les autres nuls ou arrondis.

Acropyge: net, transverse à angles arrondis.

Longueurs relatives des segments 7 à 10: 50-51-25-100 en moyenne.

Sternite 1 (Fig. 5). Préscutum: 5+5 *M* longs et 3-4+1+3-4 soies assez longues, la médiane instable. Scutum: 12+12 *M*, C_1 absents, B_1 et B_5 assez longs, les autres longs; environ 20-25+20-25 assez longues soies à embase circulaire caractéristique dont environ une douzaine forment une rangée assez régulière en avant de chaque organe subcoxal latéral; environ 12+1-2+12 soies assez courtes ou courtes sur le reste du scutum.

Organes subcoxaux latéraux: chacun occupe le 1/3 de la largeur interstylière, assez peu saillants; chez le st.III A, 5 soies glandulaires subégales et le même nombre de soies sensorielles, chez le δ_1 ces organes sont difficiles à observer, ils ont approximativement 6-7 soies glandulaires subégales et le même nombre de soies sensorielles, $SG/st_1 = 1,23$ (v. ex. = 1,15-1,35), $SS/st_1 = 0,50$ (v. ex. = 0,46-0,54), $SG/SS = 2,45$



FIGS 7-9

Indjapyx bogorensis sp. n., ♂₁ de Sar-87/11. — 7. Tergites 7 à 10 et les cerques, e = 158 µm. — 8. Détails des marges internes des cerques, e = 63 µm. — 9. Papille génitale, e = 105 µm.

(v.ex. = 2,30-2,70); chez le ♂ holotype 7 soies glandulaires dont 3-4 longues (Fig. 6) et 8 soies sensorielles, $SG/st_1 = 1,14$ (v. ex. = 0,80-1,25), $SS/st_1 = 0,42$ (v. ex. = 0,36-0,46), $SG/SS = 2,71$ (v. ex. = 2,22-2,72); chez la ♀ ad. 14-15 soies glandulaires dont 4-5 plus longues que les autres et 14-15 soies sensorielles subégales, $SG/st_1 = 0,72$ (v. ex. = 0,48-0,90), $SS/st_1 = 0,38$ (v. ex. = 0,34-0,43), $SG/SS = 1,89$ (v. ex. = 1,41-2,07).

Organe glandulaire médian: saillant avec les 1+1 soies extrêmement courtes typiques sur la ligne d'articulation de l'opercule; 2 minuscules sensilles sétiformes sur le bord de l'opercule chez les individus les plus jeunes, 4-5 chez les adultes.

Sternites 2 à 7: 16+16 *M* longs, *B*₄ et les *C* de rangs pairs assez longs ou courts, non différenciés en *M*, environ 12+3+12 soies courtes.

Sternite 8: les 7+7 *M* typiques disposés par demi-tergite sur 3 rangées longitudinales de 2, 2 et 3 *M* en partant de l'extérieur.

Paratergites 8: avec 1 *M* long dans la moitié distale et 2 soies courtes latérales, submédiane et subpostérieure.

Sternopleurites 9: ils se rejoignent sur la ligne médiane par une assez large courbe, avec 1 *M* long au niveau de l'angle postérieur et 2-3 soies courtes ou très courtes le long du bord postérieur.

Vésicules exsertiles: typiques aux urites 1-7.

Styles: allongés, aigus, à pore énigmatique petit, peu visible, cône secondaire peu développé à sommet aigu; $s_1/st_1 = 0,42$ chez le ♂ ad., 0,26 chez la ♀ ad., $st_1/st_7 = 0,80$ (v. ex. = 0,77-0,81), $s_1/s_7 = 0,87$, $s_1/st_7 = 0,26$ (v. ex. = 0,21-0,32).

Papilles génitales: typiques du genre. Appendices génitaux du ♂ ad. coniques, une fois 1/3 aussi longs que larges à la base. La ♀ ad. présente 7 soies "glandulaires" de part et d'autre de la base. Chez le ♂₁ (Fig. 9) on n'observe aucun phanère; j'ai considéré que l'orifice génital observable était du type ♂, en fente transversale, flanqué de 2 minuscules mamelons représentant les ébauches des appendices génitaux.

CERQUES (Figs 3, 7, 8)

Recourbés et aigus, à peine plus courts que la partie normalement découverte du tergite 10, $L_{cq}/L_{10déc} = 0,98$ (♂ holotype), 0,92 (♀ ad.); chez le ♂₁ et le st.III A ils sont un peu plus longs, $L_{cq}/L_{10déc} = 1,08$ (♂₁), 1,12 (st.III A); pour les 2 cerques et quelque soit le stade, la largeur au niveau de la dent égale 0,80 en moyenne [v. ex. = 0,71 (st.III A) -0,85 (♂ holotype)] celle de la base.

Cerque droit: à dent prémédiane, $r_d = 0,86$ en moyenne, saillante, à sommet dirigé vers la base du cerque.

Cerque gauche: à dent submédiane, semblable à celle du cerque droit, $r_g = 0,91$ en moyenne [v. ex. = 0,82 (♀ ad.) -1,00 (st.III A)].

Marges prédentales: elles sont subrectilignes. Chez les adultes, 2/2 à 2/4 tubercules arrondis subégaux; chez le ♂₁ elles sont identiques à celles du st.III A d'*I. kraepelini* Silv. (Pagés, 1995) avec 2/1 tubercules; chez le st.III A de *I. bogorensis* sp. n. on ne remarque que 2 minuscules tubercules arrondis au cerque droit et 1 seul, identique, au gauche.

Marges postdentales: régulièrement concaves avec chez les adultes des denticules arrondis, peu saillants, à bases contiguës; chez les plus jeunes individus ces marges ne montrent que 2-3 ondulations peu élevées.

Chétotaxie: typique, toutes les soies longues présentes; *M* latéral antérieur absent ou indifférencié.

AFFINITÉS

Voisine des "var." *javana* et "var." *divisa* d'*I. indicus* (Oudemans) décrites par Silvestri (1930), *I. bogorensis* sp. n. s'en différencie par les longueurs relatives des *M* des tergites abdominaux et, chez les adultes, par le nombre et la disposition des tubercules des marges internes des cerques ainsi que par les valeurs relatives de r_d et r_g .

DERIVATIO NOMINIS

Tous les spécimens proviennent du célèbre Jardin Botanique de Bogor à Java, d'où le nom spécifique.

Indjapyx agathis sp. n.

Figs 10-17

Matériel étudié: **Holotype:** 1 ♂ ad. de 7,08 mm: BRUNEI: (Belait District): "Badas Forest Reserve", à env. 10 km sur la route secondaire qui bifurque, à 32 km de Kuala Belait, vers le sud, forêt "Kerangas" (= "Tropical heath forest") formée presque exclusivement par *Agathis dammara* Rich. (Araucariaceae), prélèvement de sol au pied d'*Agathis dammara*, 10m; 23.XI.1988; leg. B. Hauser – extraction par appareil Berlese à Hongkong (Bru-88/35); **paratypes:** 1 sexe ? de 4,24 mm, 1 ♂₁ de 4,34 mm, 1 ♂ juv. de 5,42 mm, 1 ♀ ad. de 10,50 mm: même station (Bru-88/35); 1 ♂₁ de 3,76 mm: Sungai Liang, "Arboretum Forest Reserve", forêt primaire ("Mixed dipterocarp forest"), 20m; 25.XI.1988; leg. B. Hauser (Bru-88/40); 1 ♀ ad. de 6,28 mm: Sungai Liang, "Arboretum Forest Reserve", forêt primaire ("Mixed dipterocarp forest"), prélèvement de sol dans les angles formés par les contreforts d'arbres appelés "Kempas" (= *Koompassia malaccensis* Maing. & Benth. [Fabaceae]), 20m; 25.XI.1988; leg. B. Hauser – extraction par appareil Berlese à Hongkong (Bru-88/41).

TÊTE

Vertex (Fig. 10): chétotaxie typique du genre, mais on notera que les "grands" phanères sont ici relativement courts; chez le ♂ holotype on n'observe qu'une S3 en position médiane et l'aire pileuse postérieure est réduite et correspond à la fig. 4 d'*I. uvaianus* Pgs; chez la ♀ ad. de 10,50mm l'aire pileuse est à peine moins étendue que sur la fig. 6 d'*I. uvaianus* Pgs; les autres exemplaires sont dépourvus d'aire pileuse.

Antennes: de 38 articles à pilosité typique du genre; aires pileuses occupant au maximum les articles 18 à 25; les 13 trichobothries typiques, *a* proximale, *p* = 0,24 (v. ex. = 0,20-0,30); 6 sensilles placoides en position typique sur l'article apical.

Pièces buccales: typiques du genre; palpes labiaux environ 2 fois 1/3 aussi longs que larges à la base chez les adultes, entre 1,6 et 1,9 fois chez le sexe ? et les ♂₁; les soies subapicales, subégales, sont sensiblement 1 fois 1/4 aussi longues que le palpe qui les porte.

THORAX

Pronotum: les 5+5 *M* typiques assez longs, *M*₃ les plus longs; la longueur des *M*₁ égale en moyenne 0,83 fois l'écartement de leurs embases; 5-6+5-6 soies assez courtes.

Méso- et métanotum. Préscutum: 1+1 *M* courts, très rapprochés et un grand nombre de minuscules sensilles sétiformes. Scutum: les 5+5 *M* typiques, leurs tailles relatives typiques des *Indjapyx*; 5+5 soies assez longues et quelques-unes courtes ou très courtes.

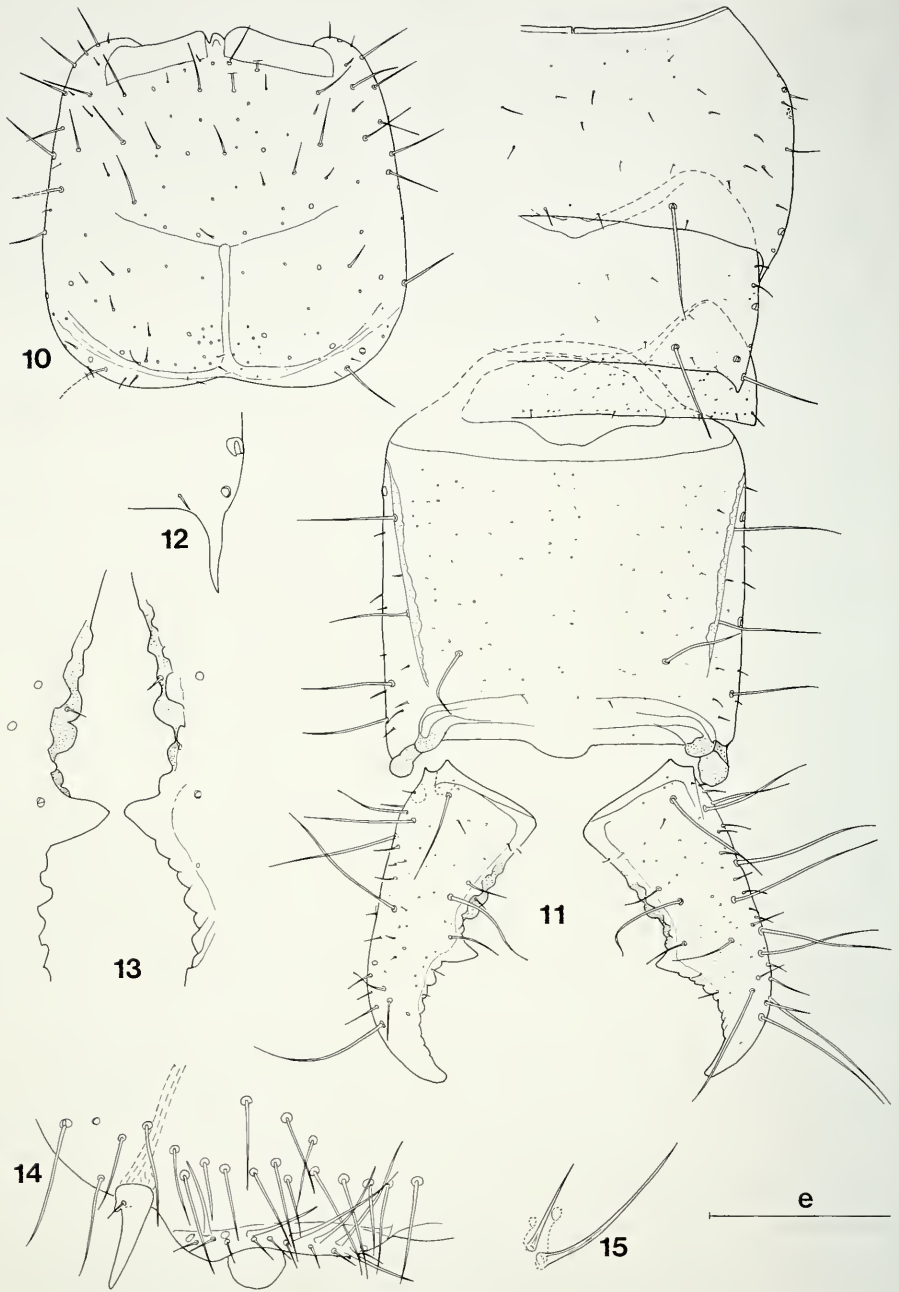
Pattes: assez longues, atteignant à peine le milieu de l'urosternite 3; 4-5+4-5 soies spiniformes aux tarsi des PI, 5-6+5-6 aux PIII; calcars bien développés chez les adultes; aux PIII le tibia égale 1,85 fois la longueur du tarse, celui-ci est environ 2 fois plus long que le pré-tarse; griffes aiguës, la postérieure égalant 1,5 fois l'antérieure et plus de 4 fois l'unguiculus.

ABDOMEN

Tergite 1. Préscutum: 1+1 *M* assez longs. Scutum: les 2+2 *M* typiques, longs, seuls les *mp* sont présents, courts; environ 10+10 soies courtes ou très courtes.

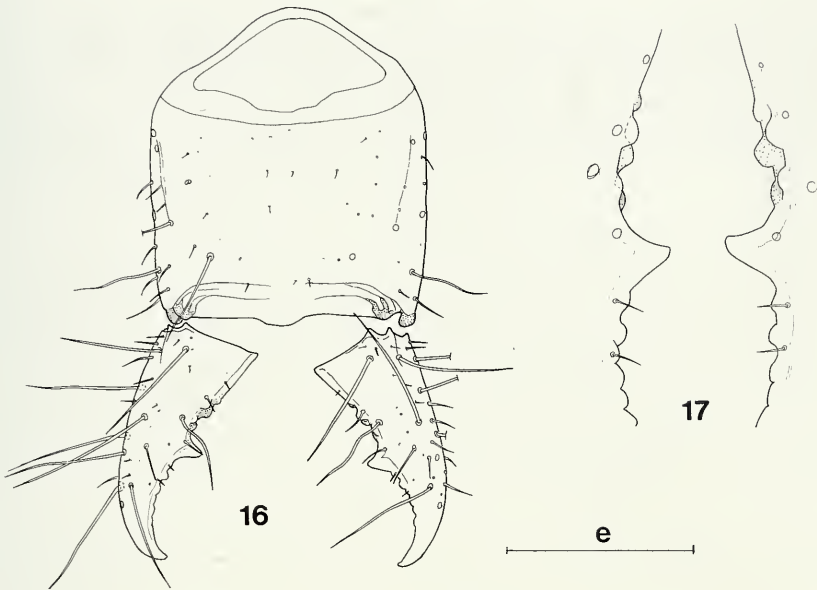
Tergite 2: 4+4 *M* (*ma* = *M*, *M*₁, *M*_{4,5}); *mp* et *m*₃ assez développés, les *m*₁ et *m*₂ présents mais à peine discernables des soies très courtes parsemant le tergite.

Tergites 3 à 5: 6+6 *M* (*ma* = *M*, *M*₁₋₅) longs ou assez longs; on remarque plusieurs anomalies: au tergite 3 de l'holotype, seul le *ma* = *M* droit est différencié, le



FIGS 10-15

Indjapyx agathis sp. n., ♂ holotype de Bru-88/35. — 10. Vertex, e = 322 μ m. — 11. Tergites 7 à 10 et les cerques, e = 316 μ m. — 12. Angle postérieur droit du tergite 7, e = 126 μ m. — 13. Détails des marges internes des cerques, e = 158 μ m. — 14. Organe subcoxal latéral droit, e = 105 μ m. — 15. Détails de 2 soies glandulaires, e = 70 μ m.



FIGS 16-17

Indjapyx agathis sp. n., sexe ? de Bru-88/35. — 16. Tergite 10 et les cerques, e = 257 μ m. — 17. Détails des marges internes des cerques, e = 105 μ m.

gauche est un *sm* court; chez la ♀ ad. de 6,28 mm de Bru-88/41, au tergite 5 les *ma* sont absents ou tout au moins indiscernables des autres soies très courtes.

Tergites 6 et 7 (Fig. 11): chez les adultes, ♂ et ♀, il n'y a que 4+4 *M* (*M*₁ nuls), seuls les *mp*, *m*₂ et *m*₃ sont reconnaissables, les autres, dont les *ma*, indifférenciés ou nuls; la ♀ de 6,28 mm montre cependant un *m*₁ à gauche; il semble que chez cette espèce, comme c'est souvent le cas, la chétotaxie se simplifie du stade le plus jeune au plus âgé; le ♂ de 4,34 mm présente sur le tergite 6 les *ma* = *M* et les *M*₁ différenciés, celui de 3,76 mm n'a que le *ma* = *M* gauche et le *M*₁ droit, quant au ♂ juv. de 5,42 mm, toujours sur le même tergite, il n'a que le *ma* = *M* droit et les *M*₁ sont nuls; chez ces stades jeunes le tergite 7 est dépourvu des *ma* = *M* et des *M*₁, comme chez les adultes.

Tergite 8 (Fig. 11): près de 2 fois aussi large que long; 3+3 *M* longs, latéraux intermédiaires, latéraux subpostérieurs (= *M*₄) et submédiens subpostérieurs (= *M*₅); 1+1 longues soies homologues aux *m*₃ et environ 10+10 soies courtes ou très courtes.

Tergite 9 (Fig. 11): plus de 2,5 fois aussi large que long; pas de *M*, mais une rangée postérieure de soies très courtes, les 1 ou 2 les plus latérales un peu plus longues que les autres; de très nombreuses sensilles sétiformes minuscules réparties sur tout le tergite.

Tergite 10 (Figs 11, 16): à bords parallèles; près de 1,20 fois aussi long que large; carènes bien développées, convergentes, s'étendant sur les 3/4 de la longueur du tergite, fortement colorées chez les spécimens adultes, peu marquées, simples lignes colorées, ne dépassant pas la moitié du tergite chez le sexe ? et les ♂₁; 2+2 *M* latéraux, antérieurs et intermédiaires, longs, l'individu de sexe indéterminé possède un *M* discal

subantérieur à gauche; 1+1 longues soies discales subpostérieures; 2 longues soies carénales antérieure et postérieure; 1+1 longues soies latérales postérieures; de nombreuses soies courtes entre les carènes et les bords latéraux, plus longues chez les immatures, une multitude de soies et/ou de sensilles sétiformes sur le disque.

Angles latéraux postérieurs des tergites: nuls ou obtus du 1^{er} au 5^{ème}, droits aux 6^{ème} et 9^{ème}, en pointe étroite et longue au 7^{ème} (Fig. 12), en pointe courte et large au 8^{ème}.

Acropyge: peu saillant, en arc de cercle.

Longueurs relatives des segments 7 à 10: 40-45-25-100 en moyenne.

Sternite 1. Préscutum: 4+4 *M* longs et 4+1+4 soies courtes, chez les immatures ces soies sont assez longues. Scutum: 13+13 *M*, les 12+12 typiques, ceux de la rangée *A* les plus longs et 1+1 supplémentaires entre les *C*₂ et les apodèmes stylaires; environ 15+15 soies courtes à très courtes; en avant des organes subcoxaux latéraux et de l'organe glandulaire médian une rangée continue d'une trentaine d'assez longues soies à embase circulaire caractéristique et, de chaque côté, au niveau des organes subcoxaux latéraux, 3-5 de ces soies précèdent celles de la rangée continue.

Organes subcoxaux latéraux (Figs 14, 15): ils occupent entre le quart et le tiers de l'espace interstylière, saillants; chez le sexe ? et les ♂₁ il y a 4-5 soies glandulaires et 5 soies sensorielles par organe, chez le ♂ juv. il y a 8 de chacune de ces soies aux 2 organes, chez le ♂ holotype on en compte 9 de chaque sorte, alors que la ♀ ad. de 6,28 mm en possède déjà 10 glandulaires et 10 sensorielles et la ♀ ad. de 10,50 mm a 14 soies glandulaires aux deux organes et 12-13 soies sensorielles; les soies glandulaires sont de 2 tailles: $SG/st_1 = 0,80$ en moyenne pour les plus courtes et 1,2 pour les plus longues; $SS/st_1 = 0,35$ en moyenne (v. ex. = 0,21-0,38); $SG/SS = 2,43$ et 3,85 en moyenne; canal glandulaire très court, égalant entre le 1/3 et le 1/4 de la longueur de la soie glandulaire correspondante, terminé par un réservoir ovoïde à goulot différencié.

Organe glandulaire médian: saillant avec les 1+1 soies extrêmement courtes typiques sur la ligne d'articulation de l'opercule et 5 à 6 minuscules sensilles sétiformes près du bord libre de l'opercule, formant le plus souvent des groupes de 3 sensilles, par exemple 3+3 chez le ♂ holotype, 1+3+1 chez le ♂₁ de 3,76 mm.

Sternites 2 à 7: 15+15 *M* longs, *B*_{4,5} et les *C* de rangs pairs indifférenciés, très courts; environ 12-15+2-3+12-15 soies courtes ou très courtes.

Sternite 8: les 7+7 *M* longs, sauf les plus postérieurs des rangées intermédiaires et submédianes, qui sont plus courts.

Paratergites 8: avec le *M* typique, long, et les 3-4 soies courtes typiques.

Sternopleurites 9: ils se rejoignent par une large courbe sur la ligne médiane, avec le *M* typique, assez long, et les 3-4 soies postérieures courtes.

Vésicules exsertiles: typiques aux urites 1 à 7.

Styles: allongés; à cône secondaire petit à sommet arrondi; pore énigmatique obsolète; $s_1/st_1 = 0,20$, $st_1/st_7 = 0,75$ en moyenne (v. ex. = 0,71-0,78), $s_1/s_7 = 0,80$ en moyenne (v. ex. = 0,78-0,83). $s_1/st_7 = 0,15$.

Papilles génitales: typiques du genre; les appendices génitaux des ♂ sont coniques, 1,5 fois aussi longs que larges à la base; les ♀ ad. ont de 5 à 9 soies "glandulaires" de part et d'autre de la base.

CERQUES (Figs 11, 13, 16, 17)

Assez allongés, sensiblement aussi longs que la partie normalement découverte du tergite 10 chez les immatures, un peu plus courts ($L_{cq}/L_{10d\acute{e}c} = 0,85$ environ) chez les adultes, recourbés à l'apex, plus chez les adultes que chez les δ_1 , aigus; aux deux cerques quelque soit le stade, leur largeur au niveau de la dent est en moyenne de 0,82 (v. ex. = 0,76-0,88) celle de la base.

Cerque droit: à dent triangulaire large à la base, à sommet dirigé vers la base du cerque, légèrement postmédiane chez les adultes, $r_d = 1,20$ environ, submédiane ou à peine prémédiane chez les immatures, $r_d = 0,96-1,05$. Marge prédentale subrectiligne; chez l'holotype 4/5 tubercules arrondis, les 3èmes supérieur et inférieur beaucoup plus forts que les autres, les 2 proximaux supérieurs très petits, les autres de taille intermédiaire; chez les immatures 2/3 tubercules arrondis, le premier supérieur et le second inférieur un peu plus forts que les autres. Marge postdentale en arc de cercle régulier; chez le δ holotype 8 denticules peu élevés, arrondis, les 4-5 premiers à base contiguës, le 4ème le plus fort, les suivants se recouvrant les uns les autres; chez les immatures les denticules sont nettement séparés, le second le plus important, les autres devenant de simples ondulations de la marge.

Cerque gauche: semblable au cerque droit, à dent submédiane, $r_g = 1,06$ (v. ex. = 0,94-1,18). Marge prédentale avec 4/6 tubercules arrondis, le 2ème supérieur et les 3ème et 4ème inférieurs les plus forts, le premier supérieur très petit. Marge postdentale en arc de cercle régulier avec au début 4 forts denticules arrondis, le second et le 4ème un peu plus développés, suivis de quelques ondulations peu élevées, s'atténuant graduellement vers l'apex du cerque; chez les immatures le cerque gauche est identique au droit.

Chétotaxie: typique, le *M* latéral antérieur absent.

AFFINITÉS

Cette espèce est bien caractérisée par la chétotaxie tergale des adultes, ses organes subcoxaux latéraux à soies glandulaires relativement peu nombreuses et l'armature de ses cerques.

Parmi les cinq espèces d'*Indjapyx* à 38 articles antennaires décrites, seules 2, *I. bakeri* Silv. des Philippines et *I. pertubator* Pgs de Nouvelle-Calédonie sont dépourvues de *ma* = *M* et de *M*₁ chez les adultes, elles se distinguent d'*I. agathis* surtout par leurs cerques, à armature postdentale très particulière chez *I. pertubator*; plus élancés, subsymétriques, à dents nettement proximales chez *I. bakeri*.

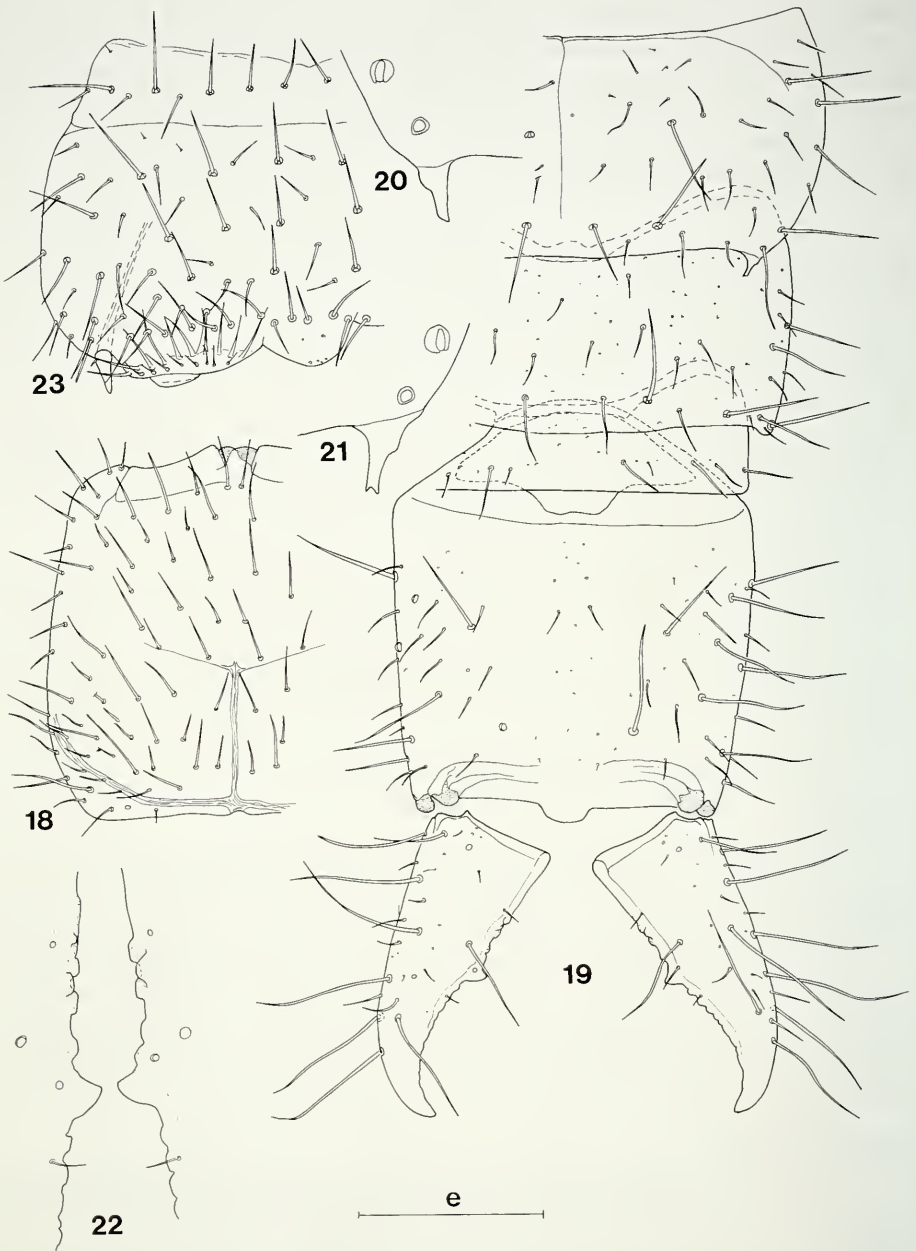
DERIVATIO NOMINIS

Du nom du genre *Agathis*, mis en apposition. Ce genre d'Araucariacées comprend plusieurs espèces dont *A. dammara* (Lambert) L.G. Rich, endémique au Brunei.

Indjapyx pinicola sp. n.

Figs 18-23

Matériel étudié: **Holotype**: 1 ♀ de 3,72 mm: INDONÉSIE: SUMATRA: (Sumatera Utara: Deli Serdang): forêt de *Pinus merkusii* Jungh. & De Vriese (Pineaceae) près de la route de Brastagi à Sibolangit, prélèvement de sol sous *Pinus merkusii*, 1400m; 19.XI.1985; leg. B. Hauser – extraction par appareil Berlese à Pematangsiantar (Sum-85/47).



FIGS 18-23

Indjapyx pinicola sp. n., ♀ holotype de Sar-85/47. — 18. Vertex, e = 211 μ m. — 19. Tergites 7 à 10 et les cerques, e = 187 μ m. — 20. Angle postérieur gauche du tergite 7, e = 62 μ m. — 21. Angle postérieur droit du tergite 7, e = 62 μ m. — 22. Détails des marges internes des cerques, e = 84 μ m. — 23. Sternite 1, e = 142 μ m.

TÊTE

Vertex (Fig. 18): chétotaxie complète, correspondant à la fig. 3 d'*I. uvaianus* Pgs.

Antennes: de 34 articles à pilosité typique du genre; aires pileuses peu développées sur les articles 14 à 20; les 13 trichobothries typiques, *a* basale, $p = 0,22$; 6 sensilles placoides en position typique.

Pièces buccales: typiques du genre; palpes labiaux 1,7 fois aussi longs que larges, les soies subapicales 1,5 fois aussi longues que le palpe qui les porte.

THORAX

Pronotum: les 5+5 *M* typiques, M_3 les plus longs; $e = 0,90$.

Méso- et métanotum: préscutums et scutums avec les *M* typiques, longs.

Pattes: longues, atteignant la limite présternite-sternite de l'urite 4; trace des PI avec 4+4 soies spiniformes, PII et PIII avec 5+5 de ces soies, celles de la paire la plus proximale plus faibles que les autres; calcars inégaux, le plus postérieur dépasse la 1/2 de la longueur du tibia aux PI, à peine le 1/3 aux autres; aux PIII le tibia égale 1,5 fois la longueur du tarse, celui-ci 2,5 fois celle du pré-tarse, la griffe postérieure égalant 1,5 fois l'antérieure et 4 fois l'unguiculus.

ABDOMEN

Tergite 1. Préscutum: 1+1 *M* longs. Scutum: 2+2 *M* ($ma = M, M_5$), tous les *sm* présents, m_2 et m_3 aussi longs que les *M*.

Tergite 2: 4+4 *M* ($ma = M, M_1, M_{4-5}$) longs.

Tergites 3 à 7 (Fig. 19): 6+6 *M* ($ma = M, M_{1-5}$) longs; tous les *sm* présents, m_2, m_3 et *mp* aussi longs que les *M*, comme aux tergites précédents; entre $ma = M$ et M_1 , une soie assez courte homologue au *msa*.

Tergite 8 (Fig. 19): 1,8 fois aussi large que long; 4+4 *M* dont 1+1 latéraux intermédiaires, 3+3 postérieurs submédiens, sublatéraux et latéraux.

Tergite 9 (Fig. 19): près de 3 fois aussi large que long, $l/L = 2,85$; chétotaxie typique.

Tergite 10 (Fig. 19): à côtés légèrement convergents vers l'arrière, environ 1 fois 1/5 aussi long que large; pas de carènes; 2+2 *M* longs, latéraux antérieurs et latéraux intermédiaires; 2+2 longues soies discales et 2-3 soies longues à l'emplacement des carènes.

Angles latéraux postérieurs des tergites: nuls et arrondis aux tergites 1 à 6, en pointe à sommet tronqué au 7ème (Figs 20, 21), peu saillants et arrondis au 8ème, droits au 9ème.

Acropygé: saillant, en arc de cercle.

Longueurs relatives des segments 7 à 10: 52-57-31-100.

Sternite 1 (Fig. 23). Préscutum: 5+5 *M*. Scutum: les 13+13 *M* typiques, B_3 et C_3 assez courts, les autres longs; 2+2 *M* supplémentaires entre les C_3 et les apodèmes stylaires.

Organes subcoxaux latéraux: saillants, occupant chacun le 1/3 de la largeur interstylaire; 10 soies glandulaires dont 3-4 plus longues, $SG/st_1 = 1,10$ et 1,43 en moyenne; 10 soies sensorielles, $SS/st_1 = 0,43$; $SG/SS = 2,6$ et 3,33.

Organe glandulaire médian: très saillant, typique, avec 2+2 minuscules sensilles sétiformes le long du bord de l'opercule.

Sternites 2 à 7: 16+16 *M* longs, B_4 et les *C* de rang pair indifférenciés, mais assez longs sauf les C_{10} qui sont longs.

Sternite 8, paratergites 8 et sternopleurites 9: typiques du genre.

Vésicules exsertiles: typiques aux urites 1 à 7.

Styles: assez allongés, peu aigus, à pore énigmatique très petit, bien net, à cône secondaire peu développé, aigu; $s_1/st_1 = 0,35$, $st_1/st_7 = 0,80$, $s_1/s_7 = 0,92$, $s_1/st_7 = 0,28$.

Papille génitale ♀: typique du genre, avec 4 soies "glandulaires" de chaque côté de la base.

CERQUES (Figs 19, 22)

Pratiquement symétriques, aussi longs que la partie normalement découverte du tergite 10, $L_{cq}/L_{10déc.} = 0,96$; plus de 2 fois aussi longs que larges, $L/l = 2,20$; la largeur au niveau de la dent de peu inférieure à celle à la base, peu arqués et peu aigus, $l_d/l_b = 0,92$.

Cerque droit: dent submédiane, $r_d = 0,96$, en triangle équilatéral à sommet légèrement tourné vers la base du cerque.

Cerque gauche: dent un peu plus prémédiane, $r_g = 0,92$, identique à celle du cerque droit.

Marges prédentales: pratiquement rectilignes, avec 2/3 tubercules arrondis à droite, le premier supérieur minuscule, et 1/4 à gauche, le supérieur et le premier inférieur plus forts que les autres.

Marges postdentales: très faiblement concaves; seuls les 4-5 denticules situés après la dent sont bien nets, arrondis, simples ondulations de la marge ensuite.

Chétotaxie: typique; pas de *M* latéral antérieur.

AFFINITÉS

À ma connaissance 3 autres *Indjapyx*, sensu Silvestri, 1930 possèdent des antennes de 34 articles: *I. besucheti* Pgs, de Ceylan, *I. harrisoni* Silv. du Nord de l'Inde et *I. novaecaledoniae* Silv. de Nouvelle-Calédonie. Par la chétotaxie du tergite 10, dépourvu de carène, c'est d'*I. besucheti* qu'*I. pinicola* se rapprocherait le plus, mais l'ensemble de la chétotaxie abdominale et les cerques permettront de distinguer ces espèces.

DERIVATIO NOMINIS

L'holotype et seul spécimen a été récolté au pied d'un *Pinus merkusii*, d'où le qualificatif de *pinicola*.

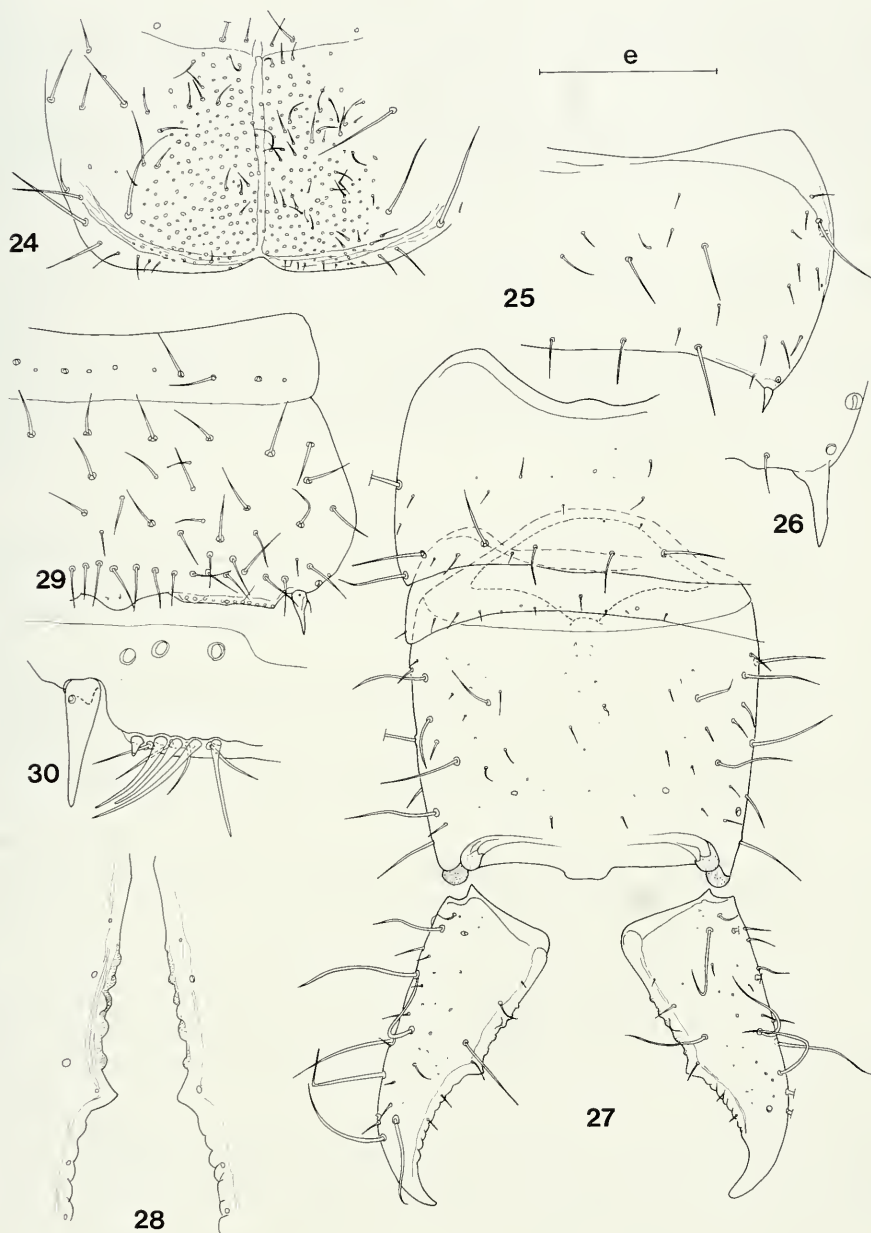
Indjapyx samosir sp. n.

Figs 24-30

Matériel étudié: **Holotype**: 1 ♂ de 4 mm: INDONÉSIE: SUMATRA: Lac Toba: île de Samosir: Ambarita, près du débarcadère: 19.IV.1977; leg. T. Jaccoud et P. Marcuard (r 114); **paratypes**: même localité: 1 ♀ de 3,88 mm (r 114); 1 ♂ de 4,16 mm (20.IV.1977: r 31); 1 ♀ de 3,6 mm (21.IV.1977: m 5); 3 ♂ de 3,00 mm, 3,32 mm, 3,96 mm, 2 ♀ de 4,16 mm et 4,24 mm (23.IV.1977: m 61); 2 ♂ de 3,8 mm et 4,12 mm, 1 ♀ de 3,2 mm (23.IV.1977: m 71).

TÊTE

Vertex: chétotaxie typique du genre; aire pileuse (Fig. 24): nulle chez la ♀ de 3,88 mm, elle s'étend au maximum sur un territoire limité extérieurement par S4-M4-M5-s9, comme chez l'holotype, ce qui correspond à la fig. 6 d'*I. uvaianus* Pgs.



FIGS 24-30

Indjapyx samosir sp. n., ♂ holotype de r 114. — 24. Aire pileuse du vertex, e = 158 µm. — 25. Tergite 7, moitié droite, e = 187 µm. — 26. Angle latéral postérieur droit du tergite 7, e = 70 µm. — 27. Tergites 8 à 10 et les cerques, e = 187 µm. — 28. Détails des marges internes des cerques, e = 105 µm. — 29. Sternite 1, moitié gauche, les soies glandulaires et sensorielles de l'organe subcoxal latéral n'ont pas été représentées, e = 158 µm. — 30. Angle latéral droit de l'organe subcoxal, e = 63 µm.

Antennes: de 34 articles à pilosité typique du genre; aires pileuses indistinctes; les 13 trichobothries typiques, *a* proximale, $p = 0,20-0,30$; 6 sensilles placoides sur l'article apical.

Pièces buccales: typiques du genre; palpes labiaux 2 fois 1/3 aussi longs que larges en moyenne (v.ex. = 2,14-2,80), les soies subapicales sont en moyenne 1 fois 1/2 aussi longues que le palpe qui les porte (v.ex. = 1,20-1,70).

THORAX

Pro-, méso- et métanotum: chétotaxies des préscutums et scutums typiques, $e = 1,22$ (v.ex. = 1,05-1,35).

Pattes: assez longues, les PIII atteignant le milieu de l'urosternite 3; 4+4 soies spiniformes aux tarses, calcars longs et fins aux PI, le plus postérieur égale environ la moitié de la longueur du tibia; aux PIII le tibia égale 1 fois 2/3 la longueur du tarse, celui-ci en moyenne 1,8 fois celle du prétarse; la griffe postérieure égale 1,5 fois l'antérieure et 4,5 fois l'unguiculus.

ABDOMEN

Tergite 1. Préscutum: 1+1 *M* longs. Scutum: 2+2 *M* longs ($ma = M, M_5$), seuls m_3 et mp différenciés, assez longs.

Tergite 2: 4+4 *M* ($ma = M, M_1, M_{4,5}$) assez longs ou longs; *sm* typiques, m_1 et *msa* courts, les autres assez courts.

Tergites 3 à 7 (Fig. 25): 6+6 *M* ($ma = M, M_{1,5}$); comme chez la majorité des *Indjapyx*, les $ma = M$, assez longs, sont insérés, au tergite 3 en avant de la ligne joignant les M_1 , puis passent progressivement en arrière de cette ligne à partir du 5ème; tous les *sm* présents, mais seuls les m_3 et mp sont assez longs, les autres, courts, peu différents des soies ordinaires.

Tergite 8 (Fig. 27): en moyenne 1,67 fois aussi large que long (v.ex. = 1,40-1,85), 4+4 *M* assez longs dont 1+1 latéraux intermédiaires et 3+3 postérieurs, latéraux, sublatéraux et submédians, 1+1 *mp* assez courts.

Tergite 9 (Fig. 27): environ 3,22 fois aussi large que long (v.ex. = 2,64-3,2); pas de *M*, mais la rangée postérieure de soies courtes.

Tergite 10 (Fig. 27): légèrement trapèzoïdal à petite base postérieure; un peu plus long que large, $L/l = 1,13$ (v.ex. = 1,08-1,21), pas de carènes; 3+3 *M* assez longs dont 1+1 discaux antérieurs et 2+2 latéraux antérieurs et intermédiaires; 1+1 soies discales postérieures assez longues, 2+2 autres à l'emplacement des carènes, les antérieures plus courtes que les postérieures, 1+1 longues soies latérales subpostérieures.

Angles latéraux postérieurs des tergites: nuls et arrondis aux tergites 1 à 6, en longue pointe étroite au 7ème (Fig. 26), droits aux 8ème et 9ème.

Acropyge: saillant, trapèzoïdal.

Longueurs relatives des segments 7 à 10: 49-60-30-100 en moyenne.

Sternite 1 (Figs 29, 30). Préscutum: 4-5+4-5 *M* assez longs. Scutum: les 13+13 *M* typiques bien différenciés; au maximum une trentaine de soies à embase circulaire caractéristique, formant une rangée régulière entre les 2 styles.

Organes subcoxaux latéraux (Fig. 30): de 8 à 16 soies glandulaires de 2 tailles assez régulièrement intercalées, $SG/st_1 = 0,98$ (v.ex. = 0,95-1,10) et 0,75 (v.ex. = 0,68-

0,78): de 9 à 17 soies sensorielles, $SS/st_1 = 0,50$ en moyenne; $SG/SS = 1,96$ et $1,50$ en moyenne.

Organe glandulaire médian: saillant, typique, avec de 4 à 8 minuscules sensilles sétiformes disposés par paires plus ou moins régulières.

Sternites 2 à 7: les $16+16 M$ habituels longs, B_4 assez longs, les C de rang pair indifférenciés.

Sternite 8, paratergites 8 et sternopleurites 9: chétotaxie typique du genre.

Vésicules exsertiles: typiques, petites, aux urites 1 à 7.

Styles: allongés, aigus, cône secondaire petit aigu; pore énigmatique bien différencié; $s_1/st_1 = 0,28$ (v.ex. = 0,25-0,32), $st_1/st_7 = 0,86$ (v.ex. = 0,77-0,92), $s_1/s_7 = 0,84$ (v.ex. = 0,70-1,04), $s_1/st_7 = 0,24$ (v.ex. = 0,20-0,30).

Papilles génitales ♂ et ♀: typiques du genre; chez le ♂ de 4,16 mm j'ai pu compter sur le bord antérieur de l'orifice génital $8+8$ longues soies sans embase; chez les ♀ on compte de 3 à 6 soies "glandulaires" de chaque côté de la base.

CERQUES (Figs 27, 28)

Pratiquement symétriques, nettement plus longs que la partie normalement découverte du tergite 10, $L_{cq}/L_{10déc} = 1,14$ (v.ex. = 1,06-1,18); environ 2 fois $1/3$ aussi longs que larges à la base (v.ex. = 2,25-2,45); la largeur au niveau de la dent égale en moyenne les $4/5$ de la largeur à la base, $l_d/l_{cq} = 0,79$ (v.ex. = 0,71-0,83); peu arqués et aigus.

Cerque droit: dent pratiquement médiane, $r_d = 1,06$ (v.ex. = 0,94-1,20), en triangle équilatéral à sommet arrondi ou aigu et dans ce cas dirigé vers la base du cerque.

Cerque gauche: dent elle aussi pratiquement médiane, $r_g = 1,02$ (v.ex. = 0,92-1,11), identique à celle du cerque droit, mais toujours aiguë et à sommet dirigé vers la base du cerque.

Marges prédentales: rectilignes avec au cerque droit $1/3$ à $1/5$ tubercules arrondis, le plus souvent $1/4$ dont l'avant-dernier de la rangée inférieure est légèrement plus fort que les autres; au cerque gauche $1/3$ à $2/5$ tubercules arrondis, le plus souvent $1/5$, pratiquement tous de même taille.

Marges postdentales: régulièrement concaves; denticules arrondis, peu saillants, se recouvrant plus ou moins les uns les autres, surtout au cerque droit.

Chétotaxie: typique; pas de M latéral antérieur.

AFFINITÉS

Cette espèce est bien caractérisée par sa chétotaxie à phanères peu développés et peu nombreux, ses organes subcoxaux latéraux, ainsi que par l'allure et l'armature de ses cerques. Parmi les *Indjapyx* à 34 articles antennaires elle se rapprocherait d'*I. besucheti* Pgs de Ceylan et d'*I. pinicola* sp. n., eux aussi dépourvus de carènes.

DERIVATIO NOMINIS

Du nom de l'île de Samosir, mis en apposition. Cette très grande île au centre du lac Toba est le coeur du pays Batak.

Indjapyx simalungun sp. n.

Figs 31-38

Matériel étudié (Toutes les récoltes ont été traitées par extraction par appareil Berlese à Pematangsiantar, Sumatra): **Holotype**: 1 ♀ de 4,52 mm: INDONÉSIE: SUMATRA (Sumatera Utara: Deli Serdang): forêt de *Pinus merkusii* Jungh. & De Vriese (Pineaceae) près de la route de Brastagi à Sibolangit, prélèvement de sol sous *Pinus merkusii*; 1400 m; 19.XI.1985; leg. B. Hauser (Sum-85/47); **paratypes**: 1 ♀ de 4,2 mm: même station (Sum-85/47); 1 st.III A de 2,76 mm: SUMATRA: (Sumatera Utara: Deli Serdang): sur la route en provenance de Pematangsiantar, 18 km avant Prapat, lieu-dit "Ainuli", forêt dans la chaîne montagneuse Bukit Parasat, derrière la station "Holzweg Nr.2 du Dr Diehl", forêt primaire autour de l'école forestière, prélèvement de sol dans les angles formés par les contreforts de grands arbres, 1000m; 14.XI.1985; leg. B. Hauser (Sum-85/30); 1 st.III A de 3,6 mm: SUMATRA (Sumatera Utara: Deli Serdang): Réserve naturelle de Tinggi Raja, près de Negridelok, dans la région de Tebingtinggi, forêt primaire; prélèvement de sol dans les angles formés par les contreforts d'un très grand arbre, 420 m; 15.XI.1985; leg. B. Hauser (Sum-85/33); 4 ♀ de 3,48 mm, 4,48 mm, 5,44 mm et 5,56 mm: SUMATRA (Sumatera Utara: Deli Serdang): Sibolangit, sur la route de Medan à Brastagi, Jardin botanique; prélèvement de sol dans les angles formés par les contreforts de grands arbres, 520 m; 18.XI.1985; leg. B. Hauser (Sum-85/39); 1 ♀ de 5,04 mm: SUMATRA (Sumatera Utara: Langkat): Réserve naturelle de Bukit Lawang, près de Bohorok, forêt primaire le long de la rivière, prélèvement de sol dans les angles formés par les contreforts d'un grand arbre, 180 m; 20.XI.1985; leg. B. Hauser (Sum-85/49).

TÊTE

Vertex (Fig. 31): chétotaxie complète; tous ces individus dépourvus d'aire pileuse postérieure différenciée.

Antennes: de 36 articles à pilosité normale; aires pileuses sur les articles (16)-17-22-(23); *a* proximale, $p = 0,34$ (v.ex. = 0,25-0,42); 6 sensilles placoides en position typique sur l'article apical.

Pièces buccales: typiques du genre; palpes labiaux près de 2 fois aussi longs que larges à la base, les soies subapicales entre 1 fois 1/4 et 1 fois 1/3 aussi longues que le palpe qui les porte.

THORAX

Pronotum: les 5+5 *M* typiques, les *M*₃ les plus longs, les *M*₁ un peu moins longs que l'écartement de leurs embases, $e = 0,90$ en moyenne; 3-4+3-4 soies assez courtes.

Méso- et métanotum: préscutum et scutum typiques du genre.

Pattes: longues, les PIII atteignant le bord postérieur du 3ème urite; 4-5+4-5 soies spiniformes aux tarsi; calcars assez épais, assez courts, ceux des PI égalent environ le 1/3 de la longueur du tibia; aux PIII la longueur du tibia égale environ 1,6 fois celle du tarse qui mesure en moyenne 2,25 fois celle du prétarse, la griffe postérieure égale environ 1 fois 1/3 l'antérieure et 3,5 fois l'unguiculus.

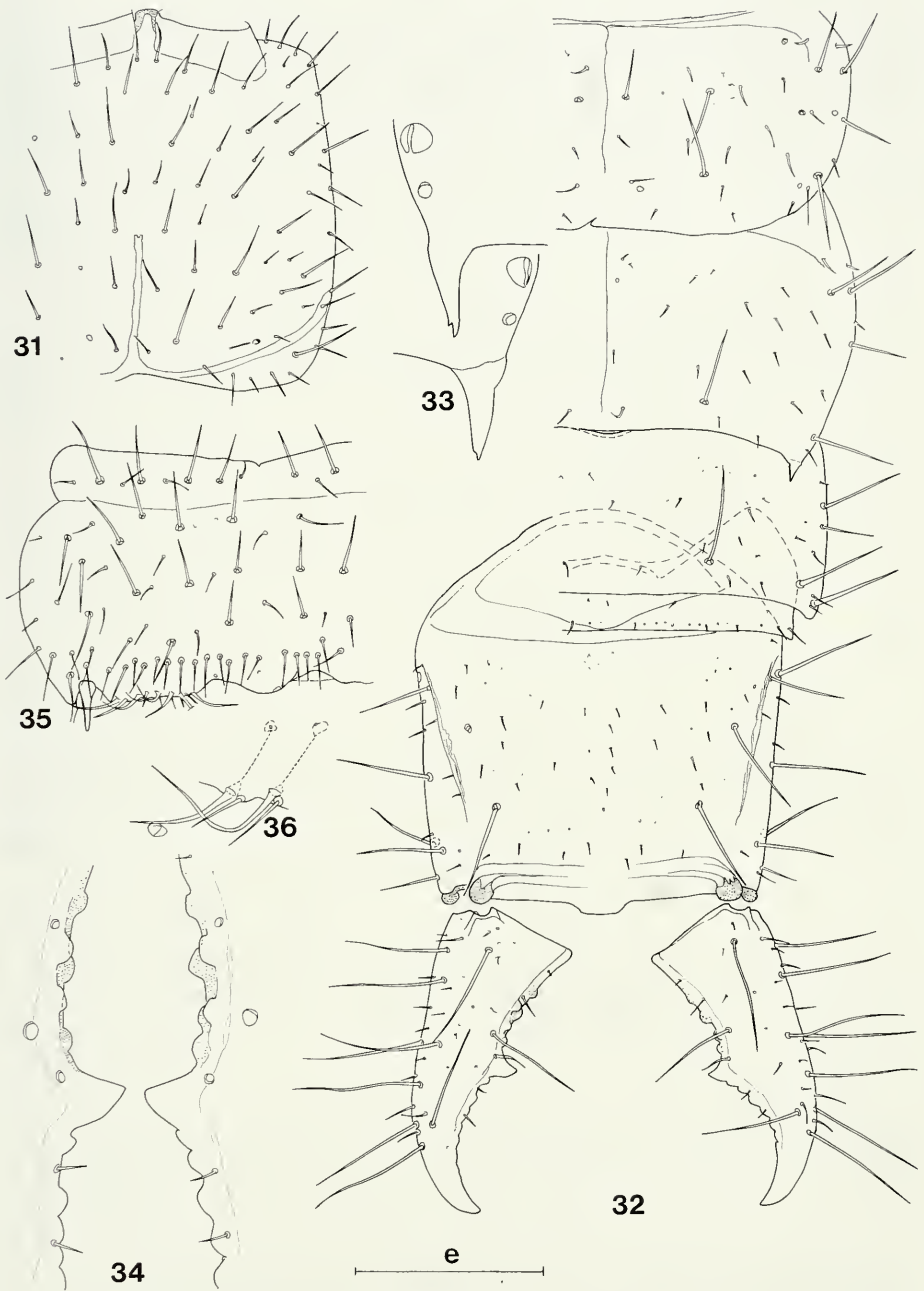
ABDOMEN

Tergite 1. Préscutum: 1+1 *M* longs. Scutum: 1+1 *M* (*M*₅) longs, *mp* seuls *sm* bien différenciés.

Tergite 2: 4+4 *M* (*ma* = *M*, *M*₁, *M*₄₋₅) longs, *m*₂, *m*₃ et *mp* assez longs.

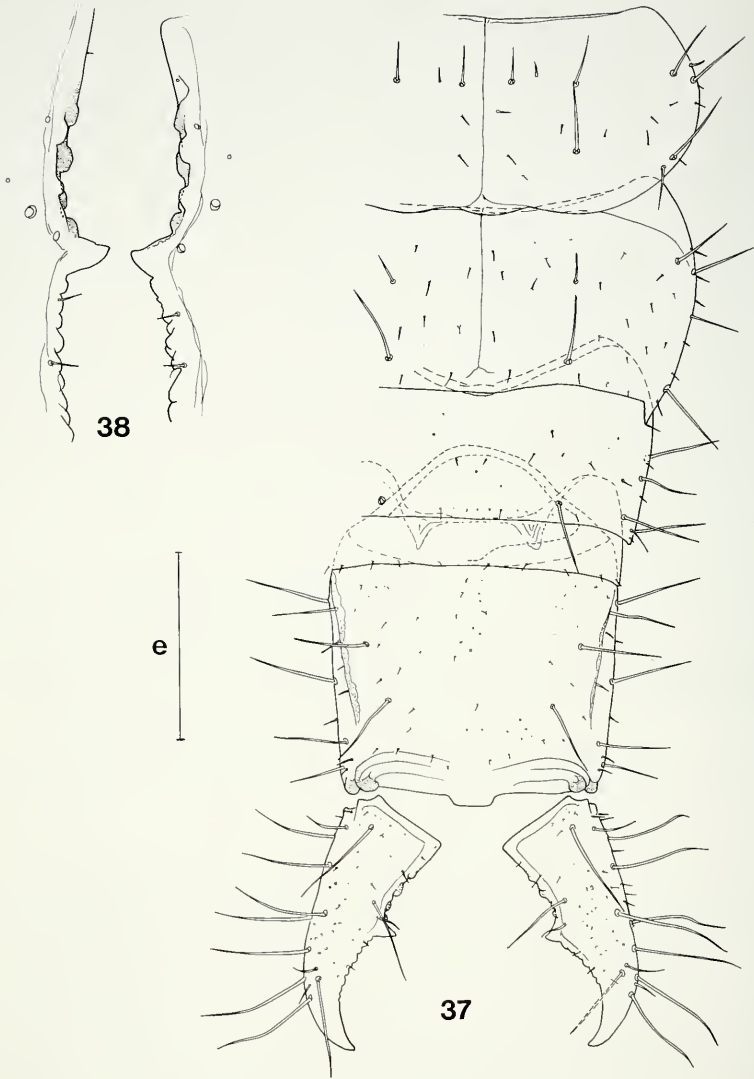
Tergites 3 à 6 (Figs 32, 37): 6+6 *M* assez longs ou longs, (*ma* = *M*, *M*₁₋₅), *msa* et *m*₁ très courts, *m*₂, *m*₃ et *mp* assez longs.

Tergite 7 (Figs 32, 37): typiquement 4+4 *M* (*M*₁ nuls) longs, les *ma*, *msa*, *m*₁ et *mp* très courts, *m*₂ et *m*₃ assez longs. On note chez la ♀ de 5,56 mm (Sum-85/39) la présence de *M*₁ différenciés, mais courts.



FIGS 31-36

Indjapyx simalungun sp. n., ♀ holotype de Sum-85/47. — 31. Vertex, e = 267 μ m. — 32. Tergites 6 à 10 et les cerques, e = 253 μ m. — 33. Angles postérieurs du tergite 7, e = 70 μ m. — 34. Détails des marges internes des cerques, e = 105 μ m. — 35. Sternite 1, moitié droite, e = 205 μ m. — 36. Détails des soies glandulaires et sensorielles d'un organe subcoxal latéral, e = 63 μ m.



FIGS 37-38

Indjapyx simalungun sp. n., ♀ de 5.56 mm de Sum-85/39. — 37. Tergites 6 à 10 et les cerques, e = 352 μ m. — 38. Détails des marges internes des cerques, e = 105 μ m.

Tergite 8 (Figs 32, 37): près de 2 fois aussi large que long (v.ex. = 1,75-1,97); 4+4 *M* longs dont 3+3 homologues aux *M*₂, *M*₄, *M*₅ et 1+1 entre *M*₄ et *M*₅.

Tergite 9 (Figs 32, 37): 3 fois aussi large que long; pas de *M*, mais la rangée postérieure de soies très courtes.

Tergite 10 (Figs 32, 37): à côtés pratiquement parallèles, très légèrement convergents vers l'arrière; un peu plus long que large, L/l = 1,22 en moyenne (v.ex. = 1,11-

1,33); carènes bien développées, occupant les 2/3 de la longueur de la partie découverte du tergite; 4+4 *M* dont les 2+2 discaux antérieurs et postérieurs et 2+2 latéraux antérieurs et intermédiaires; chez la ♀ de 5,56 mm citée plus haut, le phanère discal postérieur droit a une embase de soie ordinaire, mais est aussi long que le *M* discal postérieur gauche; seule la soie carénale antérieure est présente, longue.

Angles latéraux postérieurs des tergites: nuls ou arrondis aux tergites 1 à 6, en pointe dirigée vers l'arrière au tergite 7 (Fig. 33), son sommet souvent légèrement échancré, en pointe mousse au 8ème, droit au 9ème.

Acropyge: large, trapézoïdal, peu saillant.

Longueurs relatives des segments 7 à 10: 47-54-28-100 en moyenne.

Sternite 1 (Figs 35, 36). Préscutum: 4+4 *M* longs. Scutum: 13+13 *M* dont 12+12 typiques (B_5 indifférenciés) et 1+1 *M* supplémentaires entre A_2 et A_3 ; une trentaine de soies à embase circulaire caractéristique forment une rangée assez régulière entre les C_3 .

Organes subcoxaux latéraux (Fig. 36): assez saillants, occupant chacun le 1/4 de la largeur interstyloïde; de 8 à 13 soies glandulaires de 2 tailles, $SG/st_1 = 1,15$ (v.ex. = 1,05-1,25) et 0,64 (v.ex. = 0,55-0,72); de 9 à 10 soies sensorielles courtes, $SS/st_1 = 0,42$; $SG/SS = 2,74$ et 1, 52.

Organe glandulaire médian: typique du genre, saillant, de 4 à 11 minuscules sensilles sétiformes.

Sternites 2 à 7: 16+16 *M* typiques longs, les B_4 et les *C* de rang pair indifférenciés.

Sternite 8, paratergites 8 et sternopleurites 9: à chétotaxie typique du genre.

Vésicules exsertiles: typiques aux urites 1 à 7.

Styles: allongés, peu aigus; cône secondaire petit, aigu, pore énigmatique très petit, mais bien net; $s_1/st_1 = 0,33$, $st_1/st_7 = 0,85$, $s_1/s_7 = 0,87$, $s_1/st_7 = 0,27$, les valeurs de ces rapports varient très peu d'un individu à l'autre.

Papille génitale ♀: typique du genre.

CERQUES (Figs 32, 34, 37, 38)

Pratiquement symétriques, aussi longs que la partie normalement découverte du tergite 10; en moyenne 2,18 fois aussi longs que larges à la base, (v.ex. = 2,06-2,40); leur largeur au niveau de la dent égale 0,85 fois celle à la base, (v.ex. = 0,84-0,90); peu arqués, aigus.

Cerque droit: dent prémédiane $r_d = 0,93$ (v.ex. = 0,84-0,98), saillante, en triangle équilatéral à sommet légèrement dirigé vers la base du cerque.

Cerque gauche: à dent un peu plus proximale, $r_g = 0,90$ (v.ex. = 0,82-0,98), identique à celle du cerque droit.

Marges prédentales: peu concaves avec 2/4 tubercules sur chaque cerque, le 1er supérieur et le 2ème inférieur nettement plus forts que les autres.

Marges postdentales: nettement concaves; les 3 à 5 denticules les plus proches de la dent sont arrondis, nettement séparés les uns des autres, le 2ème ou 4ème est légèrement plus développé que les autres; ensuite de simples ondulations s'atténuant progressivement vers l'apex du cerque.

Chétotaxie: typique; pas de *M* latéral antérieur.

AFFINITÉS

Cette espèce est bien caractérisée par sa chétotaxie tergale, notamment celle du tergite 10, et l'armature de ses cerques. On la séparera facilement des "var." *borneensis* Silv. et "var." *bidicola* Silv. d'*I. indicus* (Oudemans), toutes deux de Bornéo, par l'allure et l'armature des cerques, ainsi que par les organes subcoxaux latéraux.

DERIVATIO NOMINIS

Simalungun est le nom, mis en apposition, d'une ethnie de Batak occupant un vaste territoire à l'est du Lac Toba.

Indjapyx singapura sp. n.

Figs 39-42

Matériel étudié: **Holotype**: 1 ♀ de 3,76 mm: SINGAPOUR: "Island Country Club", situé entre "Lower Peirce Reservoir" et "Windsor Park Estate", accessible par Upper Thomson Road, restes de forêt primaire entourés de forêt secondaire, prélèvement de sol dans les angles formés par les contreforts d'un grand arbre mort, env. 60 m; 12.XI.1988; leg. B. Hauser - extraction par appareil Berlese à Bogor (Java) (Bru-88/4); **paratypes**: 1 ♀ de 4,88 mm: même station (Bru-88/4); 1 st.III A de 2,8 mm, 1 ♂₁ de 3,40 mm, 1 ♂ juv. de 4,96 mm, 2 ♀ de 3,72 mm et 4,32 mm: "Island Country Club", situé entre "Lower Peirce Reservoir" et "Windsor Park Estate", accessible par Upper Thomson Road, restes de forêt primaire entourés de forêt secondaire, prélèvement de sol dans les angles formés par les contreforts d'un grand arbre vivant, env. 60 m; 12.XI.1988; leg. B. Hauser - extraction par appareil Berlese à Bogor (Java) (Bru-88/5).

TÊTE

Vertex (Fig. 39): chétotaxie complète; lorsqu'il y a une aire pileuse, celle-ci est à peine plus étendue que sur la fig. 5 d'*I. uvaiianus* Pgs.

Antennes: de 36 articles à pilosité normale; aires pileuses assez fournies sur les articles 16 à 28 au maximum chez les individus les plus âgés; trichobothries typiques, *a* basale, *p* = 0, 13 en moyenne (v.ex. = 0,11-0,15); 6 sensilles placoides en position typique.

Pièces buccales: typiques du genre; palpes labiaux 2 fois aussi longs que larges, les soies subapicales environ 1,33 fois aussi longues que le palpe qui les porte.

THORAX

Pronotum: les 5+5 *M* typiques, *M*₃ les plus longs, *e* = 0,90 (v.ex. = 0,85-1,00); 5-6 + 5-6 soies assez longues.

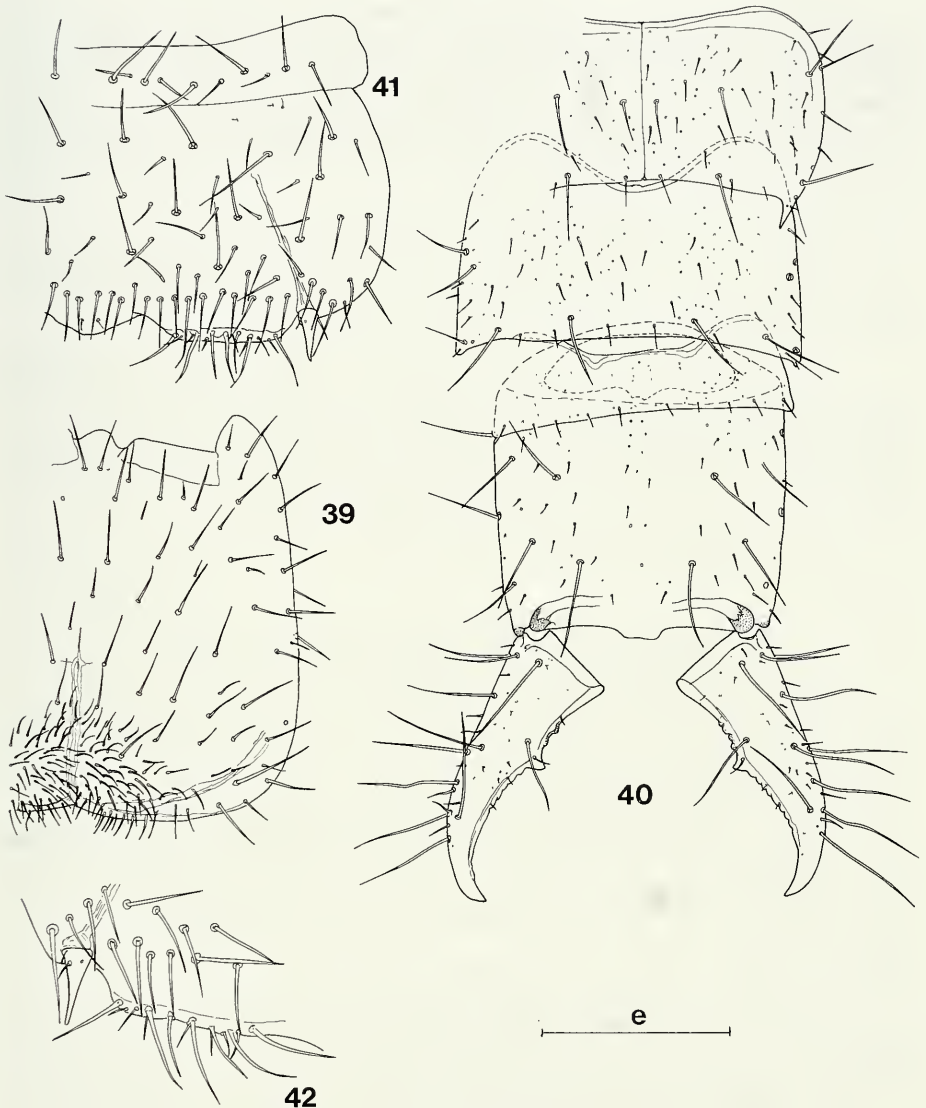
Méso- et métanotum. Préscutum: 1+1 *M* assez longs. Scutum avec les 5+5 *M* longs en position typique.

Pattes: longues, atteignant la limite présternite-sternite de l'urite 4; 4+4 soies spiniformes à tous les tarses; calcars inégaux, le plus postérieur égale le 1/3 de la longueur du tibia aux PI, le 1/5 aux PIII; aux PIII le tibia égale 1,75-1,90 fois la longueur du tarse et celui-ci près de 2,25 fois celle du préterse; la griffe postérieure égale 1,33 fois l'antérieure et 3,25 fois l'unguiculus.

ABDOMEN

Tergite 1. Préscutum: 1+1 *M* longs. Scutum: 2+2 *M* longs (*ma* = *M*, *M*₅); *m*₃ et *mp* assez longs, les autres *sm* absents ou peu différenciés.

Tergite 2: 4+4 *M* (*ma* = *M*, *M*₁, *M*_{4.5}), *ma* = *M* assez longs, les autres longs; *m*₁ courts, les autres *sm* assez longs.



FIGS 39-42

Indjapyx singapore sp. n., ♀ holotype de Bru-88/4. — 39. Vertex, $e = 235 \mu\text{m}$. — 40. Tergites 7 à 10 et les cerques, $e = 285 \mu\text{m}$. — 41. Sternite 1, moitié gauche, $e = 176 \mu\text{m}$. — 42. Détail de l'angle externe de l'organe subcoxal latéral droit, $e = 242 \mu\text{m}$.

Tergites 3 à 7 (Fig. 40): 6+6 M ($ma = M, M_{1-5}$), $ma = M$ assez longs, les autres longs; tous les autres sm présents assez courts.

Tergite 8 (Fig. 40): 1,70 fois aussi large que long; 5+5 M longs, donc 4+4 homologues aux $M_{2,5}$ et 1+1 entre M_4 et M_5 .

Tergite 9 (Fig. 40): environ 3,25 fois aussi large que long; pas de M , mais la rangée postérieure de soies très courtes.

Tergite 10 (Fig. 40): à côtés pratiquement parallèles; légèrement plus long que large, $L/l = 1,1$ en moyenne; pas de carènes; 3+3 *M* longs dont 1+1 discaux antérieurs et 2+2 latéraux antérieurs et intermédiaires; 1+1 longues soies discales postérieures, 2+2 autres à l'emplacement des carènes et 1+1 sublatérales subpostérieures.

Angles latéraux postérieurs des tergites: nuls aux tergites 1 à 6, en pointe aiguë au 7ème (Fig. 40), droits aux 8ème et 9ème.

Acropyge: saillant, trapézoïdal.

Longueurs relatives des segments 7 à 10: 51-64-29-100.

Sternite 1 (Figs 41, 42). Préscutum: 4-5+4-5 *M* longs. Scutum: les 13+13 *M* typiques, B_5 et C_3 assez longs, les autres longs; entre 30 et 50 soies à embase circulaire caractéristique dont la majorité forme une rangée régulière entre les 2 styles.

Organes subcoxaux latéraux (Fig. 42): saillants, occupant chacun le quart de la largeur interstyliare; par organe 5 soies glandulaires subégales et 5 soies sensorielles chez le st.III A et le δ_1 ; chez les autres individus il y a de 7 à 9 soies glandulaires de 2 tailles, $SG/st_1 = 1,08$ (v.ex. = 0,98-1,20) pour les longues, $SG/st_1 = 0,73$ (v.ex. = 0,62-0,87) pour les courtes; de 6 à 10 soies sensorielles courtes, $SS/st_1 = 0,30$ (v.ex. = 0,29-0,33); $SG/SS = 3,57$ (v.ex. = 3,23-3,95) et 2,40 (v.ex. = 2,07-2,87).

Organe glandulaire médian: saillant; typique avec 3 à 6 minuscules sensilles sétiformes.

Sternites 2 à 7: 16+16 *M* longs, B_4 et les *C* de rang pairs indifférenciés.

Sternite 8, paratergites 8 et sternopleurites 9: typiques du genre.

Vésicules exsertiles: typiques aux urites 1 à 7.

Styles: assez allongés, aigus, cône secondaire petit, aigu, pore énigmatique présent; $s_1/st_1 = 0,30$ (v.ex. = 0,25-0,33), $st_1/st_7 = 0,77$ (v.ex. = 0,70-0,81), $s_1/s_7 = 0,83$ (v.ex. = 0,70-0,90), $s_1/st_7 = 0,23$ (v.ex. = 0,20-0,25).

Papille génitale δ : typique du genre; celle du δ_1 typique (cf. Pagés, 1967), le δ juv. montre 11 soies sans embase sur le bord antérieur de l'orifice génital et 4-5 sur le bord postérieur.

Papille génitale φ : typique du genre avec 3 à 5 soies "glandulaires" de chaque côté de la base.

CERQUES (Fig. 40)

Pratiquement symétriques, aussi longs que la partie normalement découverte du tergite 10; environ 2 fois $1/3$ aussi longs que larges; la largeur au niveau de la dent égale en moyenne les $3/4$ de celle à la base; arqués et aigus.

Cerque droit: dent prémédiane, $r_d = 0,75$ en moyenne, en triangle équilatéral, peu élevée, à sommet légèrement dirigé vers la base du cerque.

Cerque gauche: à dent à peine plus prémédiane, $r_g = 0,65-0,70$; identique à celle du cerque droit mais plus saillante et à sommet nettement dirigé vers la base du cerque.

Marges prédentales: concaves avec 1-2/2-3 tubercules assez peu saillants, arrondis, le plus proximal supérieur ou inférieur un peu plus fort que les suivants.

Marges postdentales: régulièrement concaves; denticules arrondis très peu saillants, plus nombreux au cerque droit qu'au gauche.

Chétotaxie: typique; pas de *M* latéral antérieur.

AFFINITÉS

Cette espèce est bien caractérisée par sa chétotaxie abdominale, l'absence de carènes sur le tergite 10, ses organes subcoxaux latéraux et ses cerques d'allure allongée. Ce dernier caractère la rapprocherait d'*I. duporti* (Silv.) du Vietnam (Annam) mais les organes subcoxaux bien différents et la présence de carènes chez *duporti*, ainsi que les chétotaxies thoraciques permettent de séparer facilement ces espèces.

DERIVATIO NOMINIS

Singapura est le nom malais, mis en apposition, de Singapour d'où proviennent tous les exemplaires étudiés.

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