

A new genus of Petrobiinae (Insecta, Microcoryphia, Machilidae) from Greece

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Bach de Roca C., Gaju-Ricart M., Molero-Baltanás R. & Mendes L. F. 2010. — A new genus of Petrobiinae (Insecta, Microcoryphia, Machilidae) from Greece. *Zoosystema* 32 (2): 259-265.

KEY WORDS

Insecta,
Thysanura,
Machilidae,
Greece,
new genus,
new species.

ABSTRACT

A new genus and species, *Kerkiratrobis rosanae* n. gen., n. sp., is described and figured from males collected in the Corfu Island, Greece. The new genus has a special feature in its genitalia which permits its separation from all previously known genera of the order, and particularly other genera of the subfamily Petrobiinae to which it belongs.

MOTS CLÉS

Insecta,
Thysanura,
Machilidae,
Grèce,
genre nouveau,
espèce nouvelle.

RESUMÉ

Un genre nouveau de Petrobiinae (Insecta, Microcoryphia, Machilidae) de Grèce.
Un genre et une espèce nouveaux, *Kerkiratrobis rosanae* n. gen., n. sp., sont décrits et figurés d'après des mâles récoltés sur l'île de Corfou, Grèce. Le nouveau genre présente un genitalia très caractéristique, qui permet sa séparation d'avec tous les autres genres connus de la sous-famille Petrobiinae, à laquelle il appartient.

INTRODUCTION

Samples of Machilidae are always very scarce despite significant interest of the order Microcoryphia owing the numerous primitive characteristics relative to all other insects. Recently the Museum of Natural Sciences of Bergamo (Italy) sent us material including two male specimens from Corfu Island which have unique genitalia structures for the entire order. Previously, the Corfu Island fauna consisted of only a single species of Machilinae, described by Silvestri (1908) under the name *Praemachilis orientalis*. Later this species was transferred to the genus *Charimachilis* by Wygodzinsky (1939), who established this genus, designating *P. orientalis* as its type species.

MATERIAL AND METHODS

Material discussed herein is deposited in the Museum of Natural Sciences of Bergamo (Italy). For a detailed description the specimens were dissected and the appendages of one side were mounted in Hoyer solution. The specimens were observed using light microscope and drawings were made with a drawing tube.

SYSTEMATICS

Order MICROCORYPHIA Verhoeff, 1904

Family MACHILIDAE Grassi, 1888

Subfamily PETROBIINAE Kaplin, 1985

Genus *Kerkiratrobilus* n. gen.

TYPE SPECIES. — *Kerkiratrobilus rosanae* n. sp.

ETYMOLOGY. — From the Greek noun “Kerkira” meaning Corfu. The termination “trobilus” is after the ending of *Petrobius* Leach, 1809, type genus of the subfamily.

DIAGNOSIS

Machilidae, Petrobiinae of small size (adults 8 mm), body and appendages weakly pigmented. Body with scales but flagellum of antenna without scales.

Head: compound eyes rounded, almost as long as wide, dark in colour. Frons slightly protruded

between paired ocelli; ocelli sole-shaped, slightly sublateral to compound eyes.

Antenna: almost same length, or a little shorter than body; scapus almost twice as long as wide; distal chains of flagellum formed by 8 or 9 units bearing setae, sensillae in rosette and sensory cones.

Mandible: without distinct apical teeth.

Maxillary palps: without specialized setae; last article almost as long as penultimate. Distal three articles with long numerous dorsal hyaline spines.

Labial palp: Strong, third article strongly widened and with numerous sensory cones.

Legs: all legs slender; first pair larger than the others. Legs II and III with coxal stylets; legs lacking spines on ventral surface, only hyaline spiniform setae, particularly on tarsi and tibiae.

Urosternites: coxites I-VII each with one pair of coxal vesicles and with setae, II-IX with stylets, these ending with a spine almost the same length as half of stylet or slightly shorter; sternites II-VII acute to right angled.

Genitalia: surpassing coxite IX. Paramera only on urosternite IX, slightly longer than penis, without subdivisions, distal part covered with setae that occur more or less in apical $\frac{2}{3}$ of their length, and apically incurved, almost embracing distal portion of penis.

Penis distinctly shorter than paramera, distal part three times longer than proximal section; flattened, base of distal section with numerous little dark spines in two rows; aperture of penis subapically surrounded by setae which are not distinctly specialized.

Terminal filaments: Paracercus broken, cerci ending with a spine.

REMARKS

The lack of scales on the flagellum of the antenna, the presence of coxal stylets on legs II and III, and the presence of sensory cones of the third article of the labial palp with small lateral setae, permits placement of the new genus in the subfamily Petrobiinae.

Sturm & Machida (2001) distinguished four generic groups within the subfamily. According to the form of the sole-shaped ocelli, the new genus could belong to the *Pedetontus* group or to the *Petrobius*

group. However, the new genus does not fit the former *Pedetontus* group, which has the distinctly articulated paramera and the penis shorter than coxite IX. Relatively to the *Petrobius* group, which is composed of two genera and seven species, the new genus agrees with the two European genera (*Petrobius* and *Parapetrobius* Mendes, 1980) in the non-articulated paramera, but differs from them in the length and form of the paramera, the unique penis, and also the third article of the labial palp that is widened in *Kerkiatrobios* n. gen.

Given the particularities of the new genus which exclude it from existing generic groups of the subfamily, and because of the absence of female specimens, we cannot make more meaningful comparisons with other genera of Petrobiinae and believe it to be most prudent to leave the genus as *incertae sedis* within the subfamily.

Kerkiatrobios rosanae n. sp.

(Figs 1; 2)

TYPE MATERIAL. — Greece. Corfu, Kepkypa, Zona tra Pyrghi e Spartilla, 23.IV.1957, Valle Bianchi leg. (no. 83), 1 ♂ holotype, 8 mm (Museum of Natural Sciences of Bergamo). — Corfu Gravolymini, 25.IV.1957, Valle Bianchi leg. (no. 84), 1 paratype, ♂ 7 mm (Museum of Natural Sciences of Bergamo).

ETYMOLOGY. — The species is named after Dr Rosana Pisoni who sent us the material for study.

DESCRIPTION

Measurements of holotype: body length: 8 mm; antennae length (broken): 6.5 mm; cerci length: 2.5 mm.

Scale pattern unknown. Body covered with scales; appendages and flagellum of antennae without scales (but these ones present on scapus and pedicellus); hypodermal pigment faintly visible on head.

Head (Fig. 1A, B) with pigment around unpaired ocellus and on lateral part of clypeus and labrum. Compound eyes dark, slightly wider than long, contact line/length 0.47; length/width 0.93; lateral ocelli sole-shaped, dark and narrower in the middle; frons somewhat protruding.

Antennae slightly shorter than body, uniform in colour, distal chains of 8 or 9 units with 1 or 2

rings of setae, sensilla in rosette and sensory cones (Fig. 1C).

Molar part of mandible well developed; incisive part without distinct teeth, smooth.

Maxillary palp slightly elongate, generally unmodified (Fig. 1D). Distribution of dorsal hyaline spines on last three articles as follows: 5 = 3; 6 = 10; 7 = 12. Last article conical and almost as long as penultimate: $n/n-1 = 0.99$.

Third article of labial palp widened, subtriangular (Fig. 1E), with relatively long sensory cones, with a few small setae laterally, on its distal part (Fig. 1F).

Legs with coxal stylets on second and third pairs (Fig. 1H). First pair stouter than the followings (Fig. 1G, H). Tibiae and tarsi of all legs with hyaline setae. Length of tibiae (in mm): P I = 0.48; P II = 0.50; P III = 0.56.

Urosternites acute to right angled; coxites without hyaline spines but with scattered setae; I to VII with a pair of coxal vesicles; II to IX with stylets which end with a spine longer than setae that cover stylets (Fig. 1I-K). Length of stylet (without spine)/ length of coxite: V = 0.43; VIII = 0.92; IX = 0.63 in paratype (in the holotype the stylets of IX are lacking). Ratio of spine of stylet to stylet without spine: V = 0.58; VI = 0.47; IX = 0.14 (in paratype).

Genitalia surpassing length of coxite IX (Fig. 1K). Paramera present only on coxite IX, without divisions, joined each other in their proximal parts (Figs 1K; 2A); their distal parts curved medially, embracing the penis (Figs 1K; 2A, B). The $\frac{2}{3}$ distal parts of paramera are covered with thin setae (Fig. 2A). Penis not surpassing paramera (Figs 1K; 2B). The phallobasis short and the aedeagus long; proximal part/distal one = 0.30. The aedeagus widening in its distal part; its proximal part covered with two rows of minute spines (Fig. 2C); its distal part with numerous short setae; aperture apical (Fig. 2B).

Terminal filament (broken), without hair-like scales and spines. Cerci with numerous strong hyaline spines on internal part, with a strong terminal spine (Fig. 2D).

A key of the genera of Petrobiinae is given in order to differentiate *Kerkiatrobios* n. gen. from the remaining genera and subgenera of the subfamily.

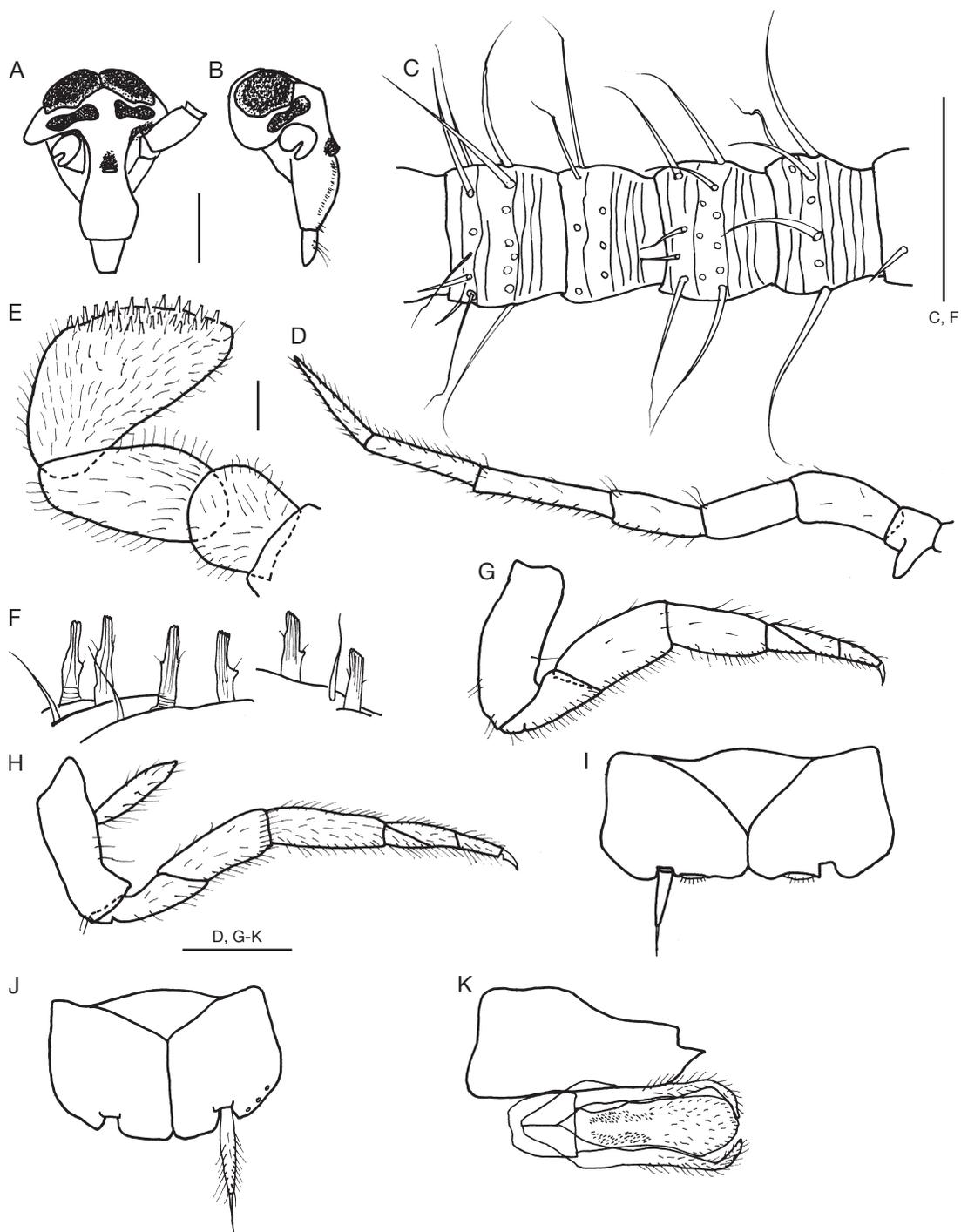


FIG. 1. — *Kerkiratrobius rosanae* n. sp., ♂: **A**, head, frontal view; **B**, same, lateral view; **C**, some units of the antennal flagellum; **D**, maxillary palp; **E**, labial palp; **F**, sensory cones on the third article of labial palp; **G**, first leg; **H**, third leg; **I**, urosternite V; **J**, urosternite VIII; **K**, coxite IX with penis and parameres. Scale bars: A, B, D-K, 0.4 mm; C, 0.1 mm.

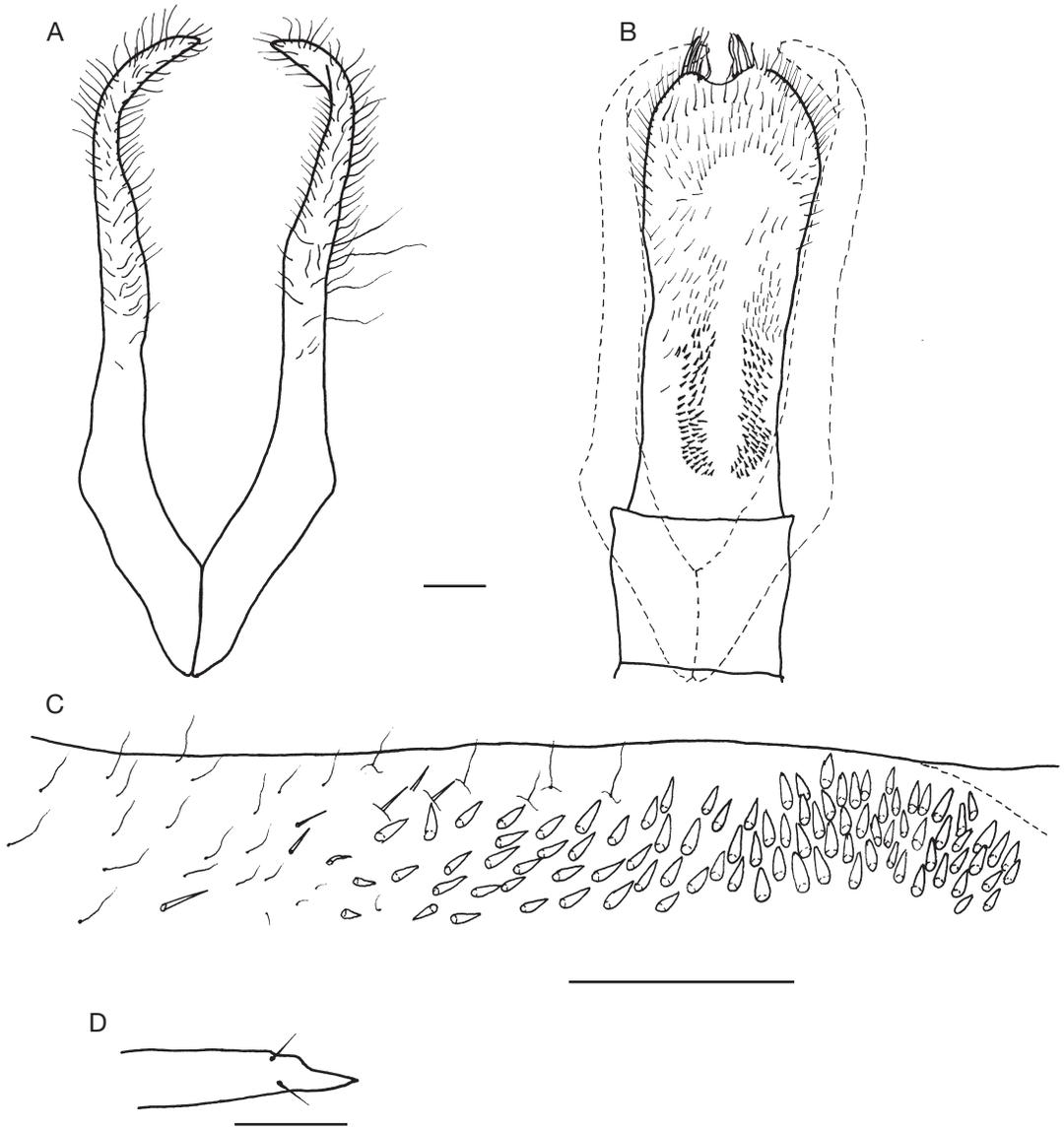


FIG. 2. — *Kerkiratrobium rosanae* n. sp., ♂: **A**, parameres IX; **B**, penis and parameres; **C**, detail of the spines in the proximal part of penis; **D**, apex of cercus with terminal spine. Scale bars: 0.1 mm

We consider that the new genus enters in the identification keys of genera of Machilidae proposed by Mendes (1990), after point 4. After 1990, a few genera and subgenera (*Leptomachilis* Sturm, 1991, *Neomachilis* (*Nesochilis*) Sturm, 1993 and *Petridobius* (*Pacltiobius*) Kaplin, 1995) were described

and included in the simplified keys presented by Kaplin (1995).

We propose the following key to an easier identification of the genera and subgenera of the subfamily known at present, the newly described one included.

KEY TO THE EXTANT SUBFAMILIES OF MICROCORYPHIA AND GENERA OF PETROBIINAE

1. Abdominal sternites II-VII small; second article of the maxillary palp of male with a hook-like process on its dorsal distal end; penis shorter or almost half of length of coxites IX; without paramera family Meinertellidae
- Abdominal sternites II-VII well developed; second article of the maxillary palp of male without a hook-like process; penis longer than half of length of coxites IX; parameres present at least on abdominal segment IX family Machilidae. 2
2. Scapus, pedicellus and flagellum of antennae, maxillary and labial palps, legs and abdominal stily with scales subfamily Machilinae
- Scales absent of flagellum of antennae, maxillary and labial palps, legs and abdominal stily 3
3. Scales absent on scapus, pedicellus and flagellum of antennae. Penis longer than abdominal coxite IX. Parameres VIII absent, IX annulated subfamily Petrobiellinae
- Scales absent of flagellum of antennae, but present on scapus and pedicellus. Penis variable in length. Parameres present only on the IX abdominal segment or on the VIII and IX subfamily Petrobiinae. 4
4. 1+1 eversible vesicles present along abdominal segments I-VII 5
- 2+2 eversible vesicles present on some abdominal segments (at least II-V) 10
5. Paired ocelli round-triangular, ovoid or wide sub-rectangular, scattered from the sagittal line, their distance always much greater than their width 6
- Paired ocelli shoe-shaped, attaining the frontal ante-ocular area 8
6. Distal article of labial palp distinctly widened, sub-triangular, in males and females. Without paramera VIII *Leptomachilis*
- Distal article of labial palp not widened, sub-cylindrical in both sexes. With paramera VIII and IX 7
7. Frons clearly protruded between paired ocelli. Antennae shorter than or as long as body. Males: apical article of maxillary palp sub-cylindrical and with ventral setulae; median article of labial palp strongly convex *Neomachilis* s.s.
- Frons slightly protruded between the paired ocelli. Antennae longer than body. Males: apical article of maxillary palp modified or not, without ventral setulae; median article of labial palp not modified *Neomachilis* (*Nesochilis*)
8. Distal area of mandible with four well-developed apical teeth. Paramera annulated, slightly shorter than penis. Male genitalia completely covered by the IXth coxites. Coxites with setae or spines *Pedetontinus*
- Distal area of mandible with 1-3 inconspicuous teeth, or blunt. Paramera not annulated; the penis long and stout. Male genitalia partially exposed. Coxites devoid of spines, the setae, if present, scarce 9
9. Pigment dark, on head and appendages. Apical article of labial palp somewhat widened, sub-triangular. Paramera shorter than penis, more or less cylindrical. Basal part of penis glabrous *Parapetrobius*
- Pigment faint, on the head only. Apical article of labial palp cylindrical, thin. Paramera long, distally curved and embracing the penis. Basal part of penis with two rows of small spines *Kerkiratrobilus* n. gen.
10. Paired ocelli transverse, pear-shaped to sub-elliptical, their medials distance at least as long as their width. Only paramera IX 11

- Paired ocelli shoe-shaped, their medial distance smaller than their width (sometimes touching). Paramera variable 12
- 11. 2+2 eversible vesicles on abdominal segments II-V *Petridiobius* s.s.
- 2+2 eversible vesicles on abdominal segments II-VI *Petridiobius* (*Pactiobius*)
- 12. Paramera annulated, on segments VIII and IX 13
- Paramera annulated or entire, restricted to segment IX 14
- 13. Abdominal sternites wide, obtuse-angled. Apical spine of abdominal stylets short and stout. P I of male modified *Meximachilis*
- Abdominal sternites small to medium-sized, acute-angled. Apical spine of abdominal stylets long and stout. P I of male not modified *Pedetontoides*
- 14. Distal area of mandible smooth or with 1 or 2 inconspicuous teeth. Paramera short and entire, penis long and robust. Male genitalia partially exposed *Petrobius*
- Distal area of mandible with four well-developed teeth. Paramera annulated, penis typical. Male genitalia covered by the IXth coxites 15
- 15. Median urosternites obtuse-angled. 2+2 eversible vesicles on the abdominal segments II-VI *Pedetontus* s.s.
- Abdominal sternites acute-angled to rectangular. 2+2 eversible vesicles on abdominal segments II-V. *Pedetontus* (*Verhoeffilis*)

DISCUSSION

Kerkiratrobium rosanae n. gen., n. sp. belongs to the subfamily Petrobiinae that shows a great diversity in morphology and ecology (Sturm & Machida 2001). Considering the undivided paramera IX this species could be assigned to the *Petrobius* group (which includes the genera *Petrobius* and *Parapetrobius*), but it is clearly distinguishable from the *Petrobius* group constituents because in both genera the paramera are shorter than the penis; besides *Petrobius* has 2+2 eversible vesicles in the urosternites II-V and the third article of the labial palp is not widened.

For all these reasons and taking into account all the morphological characteristics we cannot assign this species to any groups hitherto described inside the Petrobiinae.

Acknowledgements

We are very grateful to Dr Rosana Pisoni from the Museum of Natural Sciences of Bergamo (Italy) for the loan of this interesting material. We also thank

Dr Larson (University of Kansas) for his valuable comments.

REFERENCES

- KAPLIN V. G. 1995. — [On the systematics and phylogeny of the subfamily Petrobiinae (Thysanura, Machilidae)]. *Zoologicheskii Zhurnal* 74 (3): 54-65 (in Russian).
- MENDES L. F. 1990. — An annotated list of generic and specific names of Machilidae (Microcoryphia, Insecta) with identification keys for the genera and geographical notes. *Estudos, Ensaios e Documentos*, Lisboa 155: 1-127.
- SILVESTRI F. 1908. — Materiali per lo studio dei Tisanuri. X: Su alcuni Tisanuri di Corfù. *Bollettino del Laboratorio de Entomologia generale e agraria delle Reale Scuola superiore d'Agricoltura in Portici* 2: 381-396.
- STURM H. & MACHIDA R. 2001. — *Archaeognatha*, in KRISTENSEN N. P. & BEUTEL R. G. (eds.), *Handbuch der Zoologie. V. 4 Arthropoda: Insecta*. Part 37. De Gruyter, Berlin, 213 p.
- WYGODZINSKY P. W. 1939. — Beitrag zur Kenntnis der Thysanuren Palaestinas. *Bulletin de la Société Fouad 1^{er} d'Entomologie* 23: 73-85.

Submitted on 13 February 2009;
accepted on 4 December 2009.