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ADDENDA TO THE MILLIPEDE FAUNA OF VIETNAM (DIPLOPODA)*

Z. Korsós and S. I. Golovatch

Zoological Department, Hungarian Natural History Museum
H-1088 Budapest, Baross utca 13, Hungary
A. N. Severtzov Institute of Evolutionary Ecology and Animal Ecology,
Leninsky prospect 33, 117071 Moscow, USSR

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A new genus, *Paratylopus* gen. n., and three new species, *Tylopus tamdaoensis* sp. n., *Paratylopus strongylosomoides* sp. n. and *Vaulogerodesmus mahunkai* sp. n., are described from recent Vietnamese collectings. Records of other species are also included from further samples. With 14 original figures.

The Vietnamese millipede fauna is certainly far from well-known, judging alone from Golovatch's (1983a) catalogue of the Diplopoda of Vietnam. No wonder that practically any representative collection of diplopods from this country contains new and poorly-known taxa. The recent trips of Mahunka & Oláh (1986) and Mészáros, Oláh & Vásárhelyi (1987) have turned out to be no exception. Therefore, with the aim of determining part of their material, as well as several additional samples kept at the Hungarian Natural History Museum, Budapest (HNHM), the Institute of Zoology, Warszawa (IZW), and the Zoological Museum, Copenhagen (ZMUC), we are privileged to put on record not only certain unpublished novelties concerning the millipede fauna of Vietnam, but also a genus and three species new to science.

Material treated herein is shared among the collections of the Zoological Department of the HNHM, ZMUC, Zoological Museum of the Moscow State University, Moscow (ZMMU), IZW, and Senckenberg Museum, Frankfurt/M (SMF).

GLOMERIDA

Peplomeris magna Golovatch, 1983 — Localities: Vietnam, Prov. Ninh binh, Cuc phuong, forest clearing, 18. May 1980, (No. 311), leg. G. Topál, 1 ♂, 1 ♀ (HNHM), 1 ♂ (ZMMU), — Same locality, 2—7. June 1966, leg. R. Bielawski et B. Pisarski, 2 ♂♂, 1 ♀ (IZW 52/66). — Remarks: This species has been described from Cuc phuong Reserve in Vietnam (Golovatch 1983b), the only lowland patch of primary rain forest in the entire northern part of Vietnam preserved up to now. The topotypes at hand agree very well with the original description, though sometimes the background coloration is a bit darker, rusty brown.

* Hungarian zoological studies in Vietnam, No. 12.

POLYDESMIDA

Paradoxosomatidae

Helicorthomorpha holstii (POCOCK, 1895) — Localities: Vietnam, Prov. Ninh binh, Cuc phuong, forest clearing, 5. May 1966, (No. 252), leg. G. TOPÁL, 1 ♂ (HNHM). — Same locality, 18. May 1980, (No. 311), leg. G. TOPÁL, 1 ♂ (HNHM). — Vietnam, Cat ba Island, Ang soi, 2 m a.s.l., 15. May 1987, (No. 152), leg. I. MATSKÁSI, J. OLÁH et G. TOPÁL, 1 ♂, 2 juv. (HNHM). — Remarks: This species is known to be widespread in Southeast Asia, in Vietnam in particular (GOLOVATCH 1983a, 1984), being probably associated with human activities.

Szechuanella grandis GOLOVATCH, 1984 — Localities: Vietnam, Prov. Ninh binh, Cuc phuong, 18. May 1966, (No. 386), leg. G. TOPÁL, 1 ♂ (HNHM). — Same locality, 2. Jun. 1966, leg. R. BIELAWSKI et B. PISARSKI, ♂♂ and ♀♀ (IZW 52/66). — Remarks: This species has been described from Cuc phuong Reserve (GOLOVATCH 1984). New topotypical material agrees well with the original description.

Vietnamorpha spiralis GOLOVATCH, 1984 — Locality: Vietnam, Prov. Ninh binh, Cuc phuong, 2—11. Jun. 1966, leg. R. BIELAWSKI et B. PISARSKI, 3 ♂♂ (IZW 52/66). — Remarks: This species has been described from Cuc phuong Reserve (GOLOVATCH 1984). New topotypical material agrees well with the original description.

Tylopus hilaroides GOLOVATCH, 1984 — Locality: Vietnam, Prov. Ninh binh, Cuc phuong, 400 m, 17. Oct. 1986, (No. 66), leg. F. MÉSZÁROS, J. OLÁH et T. VÁSÁRHELYI, 1 ♂ and 2 ♀♀ (HNHM). — Remarks: This species has been described from Cuc phuong Reserve (GOLOVATCH 1984). New topotypical material agrees well with the original description.

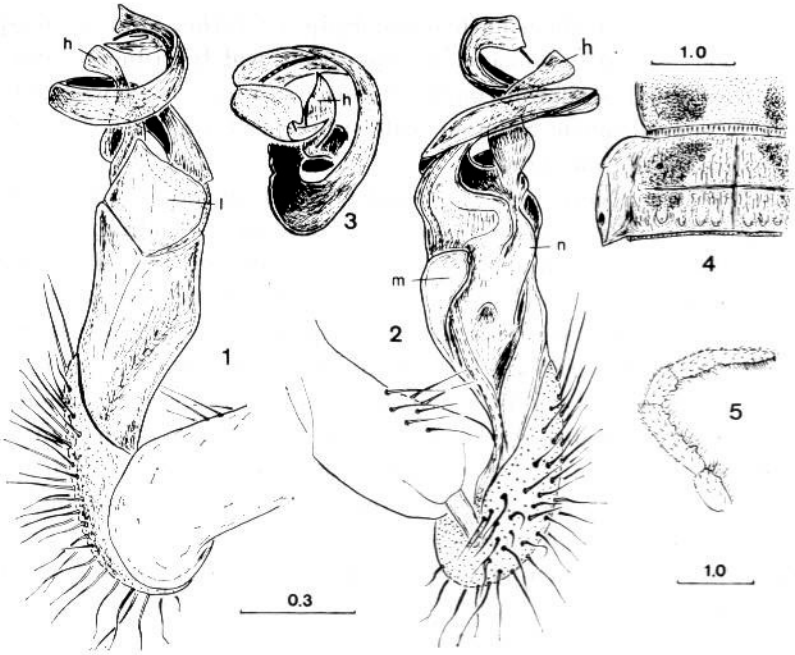
Tylopus tamdaoensis sp. n.
(Figs 1—5)

Localities: Vietnam, Prov. Vinh phu, Tam dao, N from the village, singling from under stones and barks, 21. Jan. 1986. (No. 27), leg. S. MAHUNKA et J. OLÁH, 9 ♂♂ (including holotype), 5 ♀♀. — Same locality, from under stones, 20. Jan. 1986. (No. 19), leg. S. MAHUNKA et J. OLÁH, 3 ♂♂, 1 ♀. — Same locality, ca. 800—1200 m, subtropical rain forest, 12—22 Apr. 1986, leg. S. I. GOLOVATCH et L. MEDVEDEV, 2 ♂♂, 1 ♀. — Material examined: 21 specimens.

Holotype male, 8 male and 5 female paratypes are deposited in the HNHM, 3 ♂♂ and 2 ♀♀ paratypes in ZMMU, 1 ♂ paratype in ZMUC and 1 ♂ paratype in SMF.

Diagnosis — The new species is undoubtedly another member of the *nodulipes*-group of *Tylopus*, recently defined by GOLOVATCH (1984). It seems to be especially closely related to both *T. crassipes* GOLOVATCH, 1984 and *T. nodulipes* (ATTEMS, 1953) also known from Vietnam, but clearly differs from both of them by the peculiar pattern of noduli on the male legs, conspicuous shape of the gonopod tibiotarsus, and some other particulars of gonopod structure (GOLOVATCH 1984).

Description — Length (♂) 27—29, (♀) 31—35 mm, width on midbody pro- and metazona 2.0—2.3 (♂), 3.0—3.5 (♀) and 3.1—3.3 (♂), 3.6—4.1 (♀) mm, respectively. — Coloration from dark to pale brownish, cream to dark marble brown with darker brownish-marble head, collum, pairs of paramedian spots on both pro- and metazona declining slightly toward telson, and sides beneath paranota. Isthmus dividing antennal sockets, tip of antennae (distal half of or entire joint 6 and basal half of joint 7) especially dark



Figs 1—5. *Tylopus tamdaoensis* sp. n.: 1—2 = left gonopod of holotype, lateral and medial views, respectively, 3 = end of tibiotarsus, ventral view, 4 = dorsal view of 7th segment, 5 = 26th leg. — Scales in mm

brown. Legs, ventrum and paranota whitish. Femora and tarsi of particularly colored males can be pale marble-brownish.

H e a d considerably narrower than collum or midbody segments, collum a bit narrower than 2nd ring (subequal to 5th), both rings 3 and 4 subequal in width, from ring 6 body parallel-sided until segment 16, from ring 17 gently and gradually tapering toward telson. A n t e n n a e rather long and slender, slightly clavate, in situ almost reaching end of ring 2.

Bases of m e t a t e r g a l s e t a e as paler dots, on collum 4+4 and 2+2 in two arched rows, on rings 2—4 as 2+2 and 2+2 (3+3), on subsequent terga 2+2 and 3+3 (divided by sulcus) until ring 16, with anterior row little by little disappearing and posterior row situated on increasingly oblong knobs, on rings 17—19 already no traces of anterior row and 4+4 or 5+5 oblong knobs of posterior row. Setae rather long and simple, about a quarter to third of metatergal length, mostly missing. Metaterga rather finely rugose. Axial line noticeable already from collum. Proterga and sides finely punctured, suture dividing pro- and metazona deeply longitudinally striate. Pleural keels present from ring 2 (minute there), always with a small caudal beak, onward declining to come to naught until segments 13—14, still onward only as a minute swelling or knob until segment 16.

Claws very small in both sexes. Epiproct rather long, in dorsal view with sides very slightly concave, at tip rather widely truncate and carries a pair of very small, setiferous knobs at corners, in lateral view finger-shaped and slightly curved down. Subanal scale subtrapeziform, with a caudal paramedian pair of setiferous knobs.

♂♂: Paraterga very well-developed (Fig. 4), in lateral view rather thin (even on pore-bearing segments), on ring 2 well below collum, beginning already from collum (as rounded lobes), onward always projecting caudad as a beak beyond hind tergal contour (moderately until segment 13, onward increasingly well as a sharp beak, but again moderately on ring 19). Segments strongly constricted, paraterga lying at about midheight of segments in subhorizontal position, only a little bit higher than those on segments 5—9, laterally each with one distinct incision at rim at about 1/3 of paranotal length, a little flattened at about 2/3 of paranotal length on pore-bearing rings. Transverse sulcus on metaterga starts from ring 5. Defensive pores lying at about 1/3 of paranotal length off caudal angle, lateral in position.

Legs long, not particularly incrassate. Between coxae 4 a paramedian pair of distinct brownish setiferous knobs. Legs from segment 8 onward with bigger parabasal and 2—4 smaller midlength and distal noduli on ventral side of femora, one on postfemora, 1—2 on tibiae, and one parabasal on tarsi. This pattern goes until segment 17, completely declining on 18th. On hindmost noduligerous legs prefemur may also carry one small nodulus. Tarsal brushes present (Fig. 5).

Gonopods (Figs 1—3) rather complex. Coxite rather long, subcylindrical, with a group of setae on ventral side. Telopodite suberect, stout. Prefemoral part densely setose, well-demarcated from acropodite. Femorite with slight evidence of torsion and several depressions, more or less parallel-sided, well-demarcated from postfemoral part by a sulcus, from inner side with a characteristic lobe "m", whereas swelling "n" is highly inconspicuous. Postfemoral part with a distinct lateral lamina "l", a tortiled and high, membranous process "h", and a spiralled, membranous, relatively long, distinctly bifid tibiotarsus sheathing a free solenomerite of subequal length. Seminal groove runs entirely along medial side of telopodite.

♀♀: Paranota less developed, sloping down as if continuing the convex outline of dorsum. Paranota lying within tergal contour on collum and segments 5—14, onwards only very modestly projecting caudad beak-like beyond the contour.

Legs more slender, pleural keels less developed, on 8—9th segments already hardly traceable, as a minute beak only on rings 3—5. Legs and sterna without modifications.

Paratylopus gen. n.

Sulciferini of medium size (about 2 cm long), with relatively poorly developed paranota and pleural keels (even in male). Body highly moniliform. Paranota 2 well below collum. Legs long, in male noduligerous, first leg-pair without adenostyles.

Gonopods relatively simple, suberect, rather stout. Coxite relatively short; prefemur setose and well-demarcated from acropodite by an oblique suture. Femorite almost parallel-sided, carrying several depressions and seminal groove entirely mesally; sat apart from postfemoral portion by a good, oblique cingulum. Postfemur with a lateral lamina "l" and large, spiralled tibiotarsus subequal in length to free solenomerite and distally provided with a lobule.

Type-species: *Paratylopus strongylosomoides* sp. n.

R e m a r k s — *Paratylopus* gen. n. is doubtlessly particularly close to the sympatric *Tylopus* JEEKEL (GOLOVATCH 1984 and above), judging from both external (arrangement of tergal setae, pleural keels present, paranota distinct, male legs noduligerous, etc.) and gonopodal characters (general shape, presence of lamina "l", spiralled tibiotarsus subequal in length to free solenomerite, etc.), but differs sharply from the latter genus in the considerably less developed paranota and pleural keels, complete absence of any distinct gonopostfemoral processes, and underdeveloped inner gonofemoral lamina "m".

Paratylopus strongylosomoides sp. n.

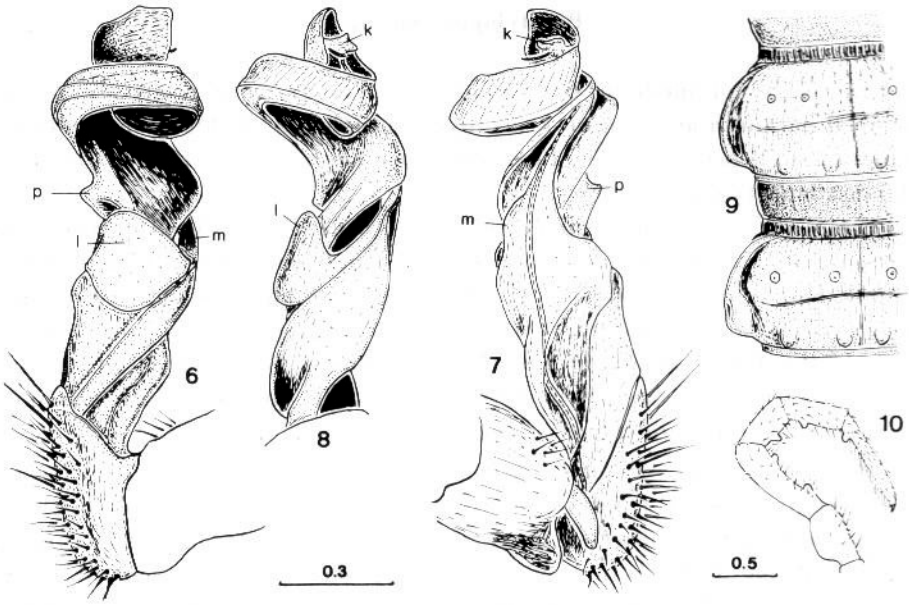
(Figs 6—10)

L o c a l i t y: Vietnam, Prov. Vinh phu, Tam dao, N of the village, singling from under stones and barks, 21. Jan. 1986. (No. 27), leg. S. MAHUNKA et J. OLÁH, 1 ♂ (holotype). Material examined: 1 specimen. — H o l o t y p e: the above specimen, deposited in the Zool. Dept. of the HNHM.

D e s c r i p t i o n — Length ca. 21 mm, width of midbody pro- and metazona 1.9 and 2.2 mm, respectively. — C o l o r a t i o n uniformly brownish, darker brown sutures dividing pro- and metazona, and joints 5—6 of antennae, paler legs (whitish, except for tarsi which are very pale brownish). Antennae in situ reaching to end of segment 3, long, slender, slightly clavate.

H e a d subequal to collum, both a bit narrower than segment 2 and subequal to segments 3—4, but again a bit narrower than segment 5, from where the highly moniliform body becoming parallel-sided until segment 17, onward very moderately and gently tapering.

P a r a t e r g a very moderately developed (Fig. 9), beginning already from collum, generally subhorizontal except for segments 2—4, on 2nd segment especially well oblique and situated far below collum, set rather low (at about midheight of metasoma), thinly rimmed on poreless segments, much more



Figs 6—10. *Paratylopus strongylosomoides* gen. et sp. n.: 6—8 = left gonopod of holotype, lateral, medial and dorsal views, respectively, 9 = dorsal view of 6th and 7th segments, 10 = 10th leg. — Scales in mm

thickly rimmed on pore-bearing rings, without any lateral incisions, roundly outlined in dorsal view, lying always within hind tergal contour, never projecting beak-like beyond it except for segments 18—19, where projecting a bit in the form of poor knobs; caudal angle usually rounded, obtuse. Pores large, lying dorso-laterally, situated at 1/4 to 1/5 of paranotal length off caudal angle. Transverse sulcus on metaterga traceable already on ring 2, particularly well-developed from ring 5. Tergal setae missing, traceable only as poor knobs arranged in two usual rows of 2+2 and 2+2 at least from tergum 3 (possibly even from tergum 2) until segment 8, onward until 16th ring as 2+2 and 3+3, with knobs of anterior row gradually reducing almost to naught, and knobs of posterior row becoming increasingly evident and oblong, on segments 17—18 already 4+4 knobs in posterior row. Tergal surface relatively smooth (except for the setiferous knobs), finely shagreened, rather shining. Axial line evident on collum and subsequent metazona. Pleural keels very poorly developed, starting from ring 4, never beak-shaped, gradually coming to naught until segment 7, onward almost (on segment 8) or entirely (on subsequent rings) missing even as swellings. Epiproct relatively short, in dorsal view conical, with straight sides, apically rather broadly truncate, devoid of any knobs, in lateral view finger-shaped and straight. Subanal scale subtrapeziform, rounded.

Between leg-pair 4 a high, subquadrate, setose lamina with a paramedian pair of tooth-shaped noduli behind it. — Legs very long, distinctly incrassate, gradually growing in length and slendering toward telson, claws rather short, tarsal brushes present, from leg-pair 5 with distinct noduli: one bigger parabasal and one smaller distal on femur, one paramedial on postfemur, from leg-pair 6 same pattern but also one parabasal nodulus on tibia and tarsus each until leg-pairs of segment 14; from 15th ring noduli decrease so that on 17th and particularly on 18th almost entirely missing (Fig. 10).

Gonopods (Figs 6—8) not too complicated. Coxite relatively short, subcylindrical, with a ventral group of setae and inner cannula. Telopodite suberect, rather stout. Prefemoral portion heavily setose, well-demarcated from acropodite. Femorite with slight evidence of torsion and several oblique depressions, more or less parallel-sided, well-demarcated by an oblique sulcus from postfemoral portion, from inner side with vestigial "m". Postfemoral part with a distinct lateral lobe "l", without any processes. Tibiotarsus very well spiralled, membranous, parabasally with a ventral projection "p", sheathing entirely free solenomerite with lamina medialis and lamina lateralis, both (especially 1.1.) well-developed. Lamina lateralis subequal in length to solenomerite, distally carrying a conspicuous lobule "k".

Vaulogerodesmus mahunkai sp. n.

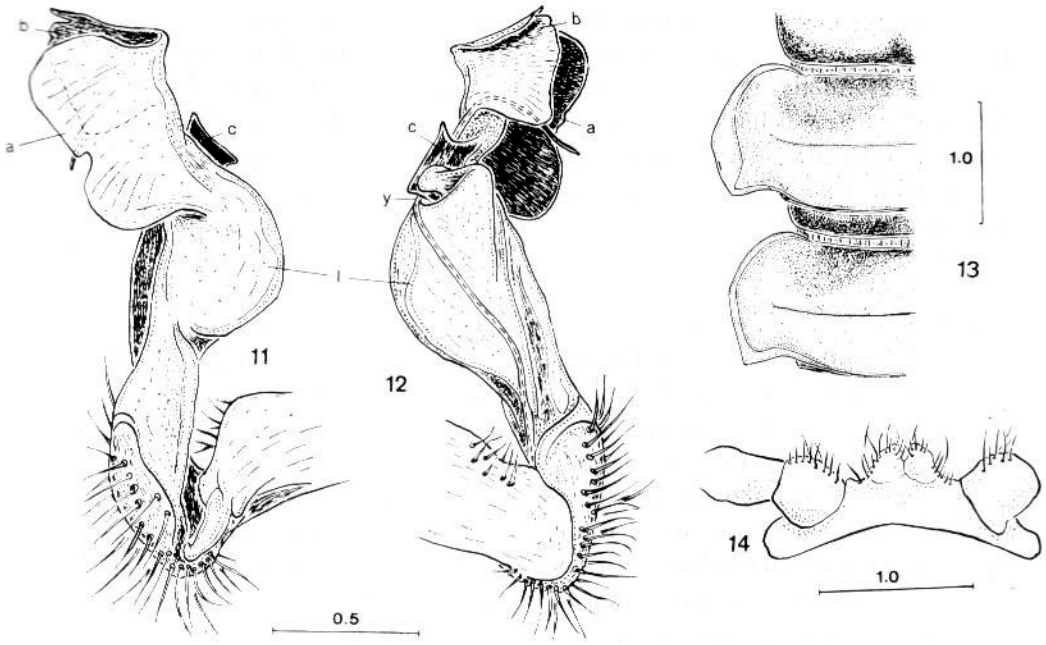
(Figs 11—14)

Localities: Vietnam, Prov. Vinh phu, Tam dao, singling from under stones, 20. Jan. 1986. (No. 19), leg. S. MAHUNKA et J. OLÁH, 3 ♂♂ (including holotype) and 4 ♀♀. — Same locality, N of the village, singling from under stones and barks, 21. Jan. 1986. (No. 27), leg. S. MAHUNKA et J. OLÁH, 1 ♀. — Same locality, 800—1200 m. subtropical rain forest, 12—22. Apr. 1986., leg. S. I. GOLOVATCH, 5 ♂♂ and 2 ♀♀. — Vietnam, Prov. Ninh binh, Cuc phuong, 400 m, 18. Oct. 1986. (No. 71), leg. F. MÉSZÁROS, J. OLÁH et T. VÁSÁRHELYI, 1 ♂ and 1 ♀. — Material examined: 17 specimens.

Holotype male, 3 male and 5 female paratypes are deposited in the HNHM, 3 ♂♂ and 2 ♀♀ in ZMMU, 1 ♂ and 1 ♀ paratypes in ZMUC, and 1 ♂ paratype in SMF.

Diagnosis — The new species is generally similar to both hitherto known species of *Vaulogerodesmus*, *pictus* BRÖLEMANN, 1916 and *dawydoffiae* (ATTEMS, 1953). It differs from both of them in the particularly well-developed gonopod tibiotarsus, especially the proximal and distal lobes of lamina medialis. The shape of lamina lateralis is very similar to the other two species. *Vaulogerodesmus pictus* has been described from North Vietnam but its size is considerably smaller; *V. dawydoffiae* is known from the central part of South Vietnam, but its gonopod femur is parallel-sided and the sternum of the 5th segment is provided with two apically notched processes (ATTEMS 1953 and HOFFMAN 1973).

Description — Length (♂) 37—40, (♀) 41—48 mm, width on midbody pro- and metazona 2.7—3.0 (♂), 3.7—4.1 (♀) and 3.9—4.1 (♂), 4.7—5.0



Figs 11—14. *Vaulogerodesmus mahunkai* sp. n.: 11—12 = right gonopod of holotype, medial and lateral views, 13 = dorsal view of 7th and 8th segments of a paratype male from Tam dao, 14 = sternite of holotype between leg-pair 4, anterior view. — Scales in mm

(♀) mm, respectively. — Coloration cream to dark brown with blackish-brown head, pairs of paramedian spots on each metazonite from 4th or 5th onwards, and sides of prozonite. Anterior half of collum, tip of antennae (distal half of joint 6 and proximal half of joint 7), posterior half of each prozonite and anterior half of each metazonite from 4th or 5th onwards especially dark brown. Median spots on metazona, legs, ventrum and paranota light yellowish or whitish.

Head considerably narrower than collum or midbody segments, 2nd ring a bit broader than collum and subequal to ring 5, both rings 3 and 4 subequal in width, from ring 6 body parallel-sided until segment 16, from ring 17 gradually tapering toward telson. — Antennae long and strong, slightly clavate.

Metaterga without setae, smooth and dull (Fig. 13); longitudinal axial line noticeable already from collum, clearly visible from ring 4 onwards on both pro- and metazona; metaterga with deep transversal sulcus starting from ring 4 but strong only from ring 5; suture dividing pro- and metazona deeply longitudinally striate. Paraterga well-developed, on ring 2 well below collum, gradually rising on rings 3 to 5, onwards lying in horizontal position at about midheight of segments in lateral view, projecting caudad as a weak

beak only, usually not surpassing hind tergal contour, always lacking any lateral incision. On pore-bearing segments paraterga laterally flattened, defensive pores at about 1/3 of paranotal length off caudal angle.

Legs long, strong tarsal brushes present, claws very small in both sexes. Epiproct relatively short, in dorsal view with sides slightly concave, at tip rather widely truncate with two setae, carrying a pair of very small and usually setiferous knobs at corners, in lateral view slightly curved down, with a weak concavity ventrally. Anal valves with 2+2 setae, subanal plate subtriangular, with 2 setae.

♂♂: Antennae long, in situ reaching to metazonite of ring 3. Pleural keels very small, visible on segments 2—7, with small caudal beak, coming to naught onwards. Sternite of ring 5 with two small paramedian setiferous knobs (Fig. 14).

Gonopods not too complicated (Figs 11—12). Coxite rather thick and short, with several setae on ventral side. Prefemur densely setose, well-demarcated from acropodite. Femorite stout, flattened, with a clear torsion and with broad dorsal lobe (1). Postfemoral part well-demarcated from the femur on lateral side by a strong sulcus ("y", following BRÖLEMANN's [1916] designations), with a distinct and characteristic lamina lateralis (c). Solenomerite free, sheathed from one side by a large, broad, slightly divided proximal lobe (a) of lamina medialis, from the other side by a smaller distal lobe (b) of lamina medialis, this latter with a small additional pointed lamella, laterally leaning out. Seminal groove starts on mesal side, immediately at the base of femorite turning laterally, then going entirely on lateral side, obliquely to anterior face of tibiotarsus.

♀♀: Antennae shorter than those of males, in situ just reaching to ring 3. Paraterga a little but not markedly less developed, pleural keels hardly traceable, only on rings 2 and 3, as a very small swelling or naught on ring 4 and onwards. Sternite of 5th segment without any modification.

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