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Some new forms of millipedes (*Diplopoda*) from the Caucasus

[With 23 text-figures]

The present paper is devoted to descriptions of 4 new Caucasian millipedes, among which one genus, 3 species, and one subspecies are new to science. The holotypes of the new forms are deposited in the Zoological Museum of the Moscow University, Moscow, USSR, some paratypes are in the collection of the Institute of Zoology of the Polish Academy of Sciences, Warsaw, Poland.

I wish to express my gratitude to Dr. W. JĘDRYCKOWSKI, Warsaw, who encouraged me in producing the present article and to whom I gladly dedicate herein one of the new species.

Julus (Orescoiulus) jedryczkowskii sp. n.

Material. Canyon Tseiss, the Tseidon River valley, North Osetian State Reservation, North Osetia, Caucasus; beech wood: 1 ♂, 4 ♀♀, 3 juv. — 29. VII. 1977; under azalea: 1 ♀ — 31. VII. 1977; 4 ♂♂, 1 ♀, 3 juv., 1 fragment — 4. VIII. 1977; southern slope, ca. 2160 m above sea-level: 1 ♂ — 8. VIII. 1977; northern slope: 1 ♂, 1 ♀, 10 juv. — 12. VIII. 1977; 1 ♂ (holotype ♀ 1519) — 19. VIII. 1977 (leg. M. RUDAKOWSKY).

Females up to 24 mm long and 2.2 mm wide; males up to 20 mm long and 1.8 mm wide. Body segments, not including telson, up to 46 (-2) in females and 45 (-2) in males. The male holotype 18 mm long and 1.7 mm wide, with 45 (-2) segments. The largest juvenile is a male with 43 (-4) body rings. Body dark brown marbled grayish, more intensively pigmented dorsad and lighter sub- and ventrad. Hinder parts of prozona and larger parts of metazona dark, whereas the hinderst parts of body rings transparent, thus the body is annulated

in appearance. Head, collum, anal valves, antennae, legs, dark marble brown. Defensive pores as dark spots in appearance.

Body slender (especially in males), subcylindrical, gently tapering toward the hind body end. The suture between pro- and metazona well developed, with a gentle anterior curve in front of the defensive pore of a mid-body segment. Prozona shagreen, metazona rather densely and irregularly striated; ca. 6 to 7 striae in a square with the length of a mid-body metazonite at its side a little below the pores' level. Hinder parts of metazona narrowly edged; just in front of the edge there is a transverse row of long and thin setae of ca. $\frac{2}{3}$ as long

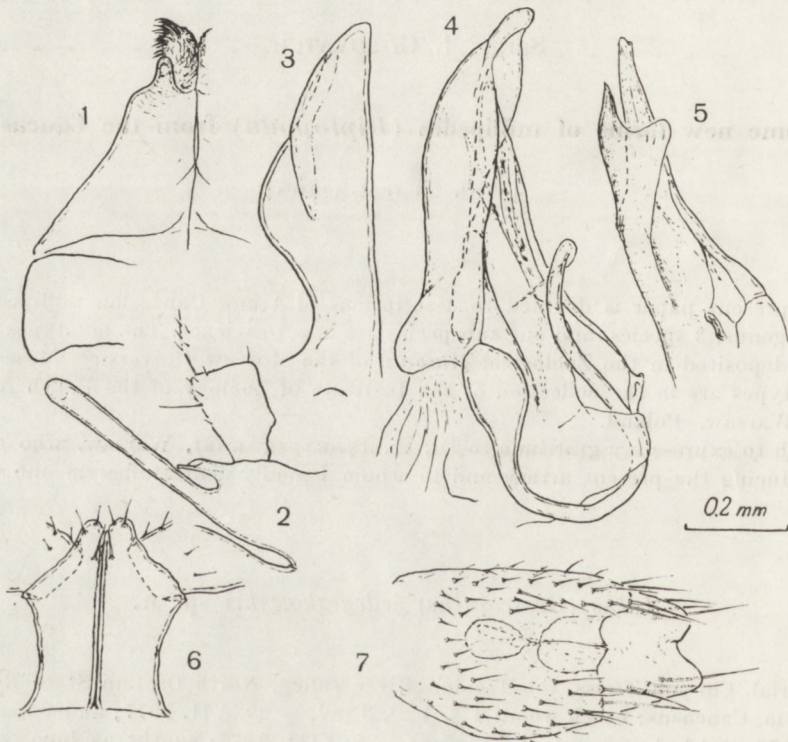


Fig. 1-7. *Julus jedryczkowskii* sp. n. ♂ paratype: 1 - leg-pair 1 (from behind), 2 - base of leg-pair 2 (from behind), 3 - promerite of gonopods (from behind), 4 - gonopods (mesal view), 5 - opisthomerite (lateral view); ♀ paratype: 6 - coxae of leg-pair 2 (from behind), 7 - vulva (from behind).

as the metazonite. The striation does not reach a little the row of setae. Collum with 2+2 setae, 2 to 3 subsequent segments with 2+2 or 3+3 setae; further on, toward the hind body end, the tergal setae become denser up to 8+8 or 9+9. Defensive pores begin from the 6th ring; on the rings 6 to 8 they lie just behind the suture and touch it; further on toward the telson the pores gradually

become more and more away from the suture as far back as $\frac{1}{4}$ to $\frac{1}{3}$ of the mid-body metazonite length. Tail very long, straight, and slender, covered with dense long setae and crowned with a straight or curved a little upwards apical claw; from above the tail is delta-shaped, with gently concave sides and apical angle ca. 30° . Anal valves gently convex, without edging, very densely pubescent. Anal plate semicircular and simple.

1+1 very long and thin occipital setae. About 45 to 50 black ocelli in a kidney-shaped ocular field. Antennae very long and slender; the largest is article 5, a little shorter are articles 2, 3, and 4, respectively. There is a corolla of ca. 11 to 12 rather small slender sensitive skittles on article 5; ca. 6 to 7 dorso-external smaller skittles exist on the 6th article as well. Supralabral setae 4+4; labral ones 8+8. Legs relatively short and slender.

♂. — Mandibular stipes without peculiarities. Body ring 7 ventrally without any sharp prominences, but gently rounded in a triangle. Legs without sole pads. Gnathochilarium with small rounded lateral lamellae on stipes; promentum very small. Lingual laminae with 6 setae each; 4 of the setae being the longest ones are situated in a more or less regular longitudinal row. At the boundary between stipes and mentum there is a pair of relatively pronounced and more or less longitudinal bolsters with a group of ca. 20 setae of different size apiece.

Leg-pair 1 (fig. 1) greatly reduced, apically with a small posterior rounded at the apex coxal process from both sides; telopodite knob-like, a little higher than the coxal process, covered with dense hook-like solid bristles directed mainly outwards. Leg-pair 2 (fig. 2) with a long and slender gently curved backwards internal and a much shorter truncate glandular ventral process on each coxa.

Gonopods (fig. 4) rather simple. Promerite (fig. 3) medially broad, parbasally narrow, with a long thick basal flagellum, laterally with a pronounced lamina; the internal edge straight, apically gently rounded. Mesomerite simple and finger-shaped, more than twice shorter than promerite. Opisthomerite (fig. 5) considerably shorter than promerite, rather simple: with a small, but still quite visible rounded lamina at the gland canal orifice; laterally with a large distally bifid hyaline lamella.

♀. — Coxae of leg-pair 3 (fig. 6) ventrally rather moderately swollen and sparsely setose. Vulvae (fig. 7) densely setose, especially densely internally and posteriorly; operculum with very long setae on the anterior slope, apically round M-shaped.

Julus jedryczkowskii sp. n. is obviously most closely related to *J. subalpinus* LOHMÄNDER, 1936, described from the Krasnodar Province, North Caucasus. Similarities are quite apparent in the body size and shape, gonopod structure and vulvae. The main differences between the two species lie in a different configuration of promerite, presence of a large lateral bifid lamella on opisthomerite, M-shaped apex of operculum as well as in some details of gnathochilarium, male leg-pair 1 and 2, etc., in the new species.

Chromatoiulus implicitus ritsensis subsp. n.

Material. Environs of the Lake Ritsa, Abkhasia, Caucasus: 3 ♂♂ (holotype) ♀ 1520), 7 ♀♀ — 24. X. 1978 (leg. S. I. GOLOVATCH).

Females up to 21 mm long and 1.7 mm wide; males up to 19 mm long and 1.3 mm wide (holotype). Body segments, not including telson, up to 50 (-3) in females and 51 (-2) in males (holotype). Body colour reddish marble brown, shot with grayish, lighter sub- and ventrad, darker dorsad. Head and 5 to 7 subsequent body segments pigmented more intensively (especially in males), violet brown. Telson grayish. Antennae and legs brown. Prozona marble reddish, metazona transparent, thus the body is annulated in appearance. A dark narrow axial dorsal stripe.

Body rather slender (especially in males), subcylindrical, gently tapering toward telson. The suture between pro- and metazona well marked, with a gentle anterior curve in front of the pore. The pores lie just behind the suture on mid-body rings. Prozona very gently punctured, metazona rather clearly, regularly, and densely striated; ca. 5 to 6 striae in a square with the length of a mid-body metazonite as its side a little below the pores' level (i.e. 13 to 15 striae on a metazonite dorsal quarter). Hinder edges of metazona with short thin setae becoming somewhat denser and longer toward telson; the anterior body rings bear sparse, but long tergal setae. The striation does not reach the row of setae. Collum with narrow gently rounded lateral laminae; 5 to 6 more or less unclear striae apiece. Telson covered with rather sparse, but thin and long setae; tail long, from above spine-shaped and sharp, side-view slender and straight, only subapically bent just a little upwards. Anal valves gently convex, without edging, setose (about 5 long and thin setae along the hind edge not far from it). Subanal plate semicircular, simple, with 1+1 setae.

1+1 very long and thin occipital setae. About 33 to 35 black ocelli in a trapezium-shaped ocular field; the base of the trapezium is from behind. Antennae relatively short, without skittles on articles 5 and 6. Supralabral setae 2+2; labral ones 8+8. Legs rather short and slender, a little longer toward telson; there is a seta at the base of the claw much longer than the claw proper.

♂. — Mandibular stipes with a quite developed ventrad rounded lateral lamella each; anteriorly the stipes straight, but the anterior corner narrowly rounded. Tibial sole pads very well developed on the legs of the anterior body end, less pronounced on mid-body legs and completely reduced on the legs of the posterior body end. Leg-pair 1 hook-like as usual, without apical spines. Gnathochilarium without lateral lamellae on stipes, with 4 bristles in a longitudinal row on each lingual lamina; 2 basal bristles are shortest and nearest at the same time. Promentum exceeds a little a half of the length of the laminae. At the boundary between stipes and mentum there are 2 symmetric groups of 3 to 5 short setae.

Gonopods (fig. 9) rather high, promerite and opisthomerite subequally high. Promerite (fig. 8) with a large distal and a less hyaline parbasal oblique lamellae; both internal and external edges uneven, apex rounded. Flagella long, slender, and bare. Opisthomerite (fig. 10) with small and sparse setae along the edge of the flagellar canal, distally plicate, with protruding apical processes of solenomerite rounded by a hyaline rough membranous lamella.

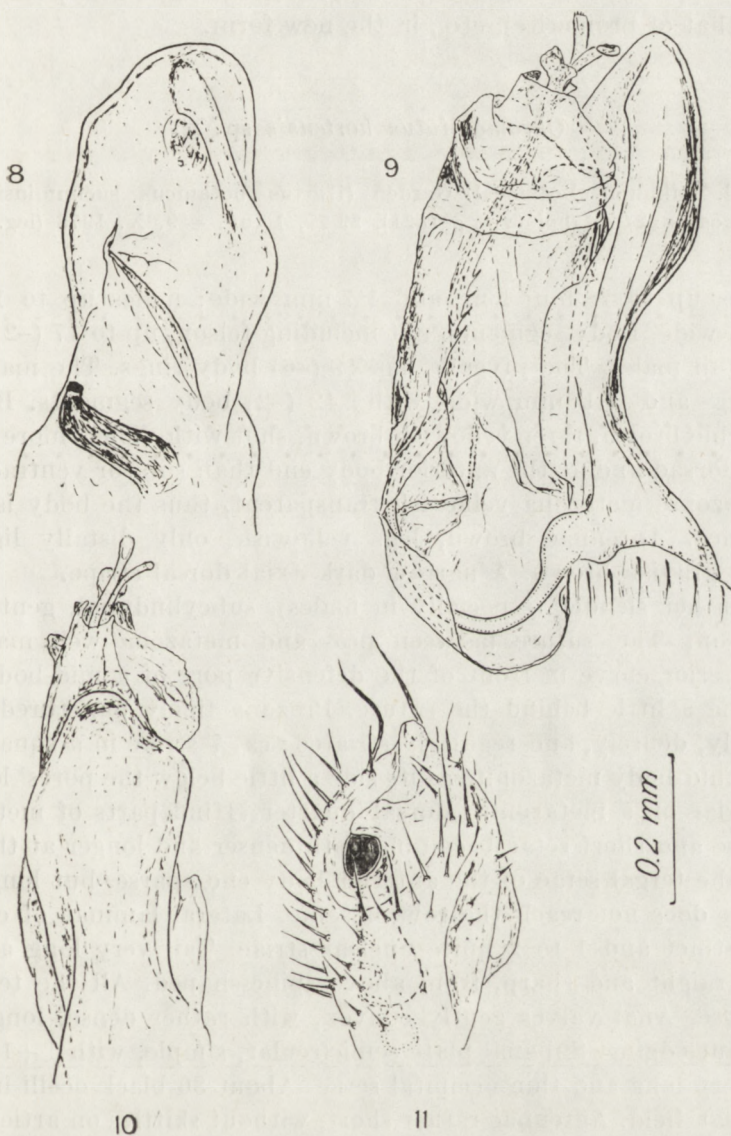


Fig. 8-11. *Chromatoiulus implicitus ritsensis* subsp. n. ♂ paratype: 8 - promerite of gonopods (from behind), 9 - gonopods (mesal view), 10 - posterior gonopods (anterior view); ♀ paratype: 11 - vulva (from behind).

♀. — Body segment 3 ventrally with 2 paramedial processes, both spine-shaped and rounded at the apex. Vulvae (fig. 11) densely setose, with especially long setae distally; operculum lower than coxite.

Chromatoiulus implicitus ritsensis subsp. n. is distinguishable from the nominative subspecies *Ch. implicitus implicitus* LOHMÄNDER, 1936, from Gagry, Abkhasia, by a little sparser striation of metazona, tail very gently curved upwards subapically, somewhat different configuration of gonopods and vulvae (especially that of promerite), etc., in the new form.

Chromatoiulus hortensis sp. n.

Material. Sukhumi Botanical Garden (Hortus botanicus suchuminsis, Sukhumi, Abkhasia, Caucasus: 24 ♂♂ (holotype ρ 1521), 29 ♀♀, 1 juv. — 9. X. 1978 (leg. S. I. GOLOVATCH).

Females up to 18 mm long and 1.7 mm wide; males up to 15 mm long and 1.2 mm wide. Body segments, not including telson, up to 47 (–2) in females and 45 (–2) in males. The juvenile has 41 (–6) body rings. The male holotype 14 mm long and 1.1 mm wide with 42 (–2) body segments. Body colour grayish marble brown, rarer yellowish brown, shot with violet, more intensively pigmented dorsad and at the anterior body end than sub- or ventrad. The darkest are prozona, metazona yellowish transparent, thus the body is annulated in appearance. Antennae brown, legs yellowish, only distally light brown. Anal valves grayish brown. A narrow dark axial dorsal stripe.

Body rather slender (especially in males), subcylindrical, gently tapering toward telson. The suture between pro- and metazona well marked, with a gentle anterior curve in front of the defensive pore of a mid-body segment. The pores lie a little behind the suture. Prozona finely punctured, metazona rather clearly, densely, and regularly striated; ca. 7 striae in a square with the length of a mid-body metazonite as its side a little below the pores' level. About 13 to 14 striae on a metazonite dorsal quarter. Hind parts of metazona bear rather sparse and short setae becoming both denser and longer at the posterior body end; the tergal setae of the anterior body end sparse, but long. Striation of metazona does not reach the row of setae. Lateral laminae of collum with 5 rather distinct and 1 to 2 quite unclear striae. Tail very long and slender, side-view straight and sharp, from above spine-shaped. All the telson rather densely setose. Anal valves gently convex, with rather dense, long, and thin setae, without edging. Subanal plate semicircular, simple, with 1 + 1 long setae.

1 + 1 very long and thin occipital setae. About 30 black ocelli in a kidney-shaped ocular field. Antennae rather short, without skittles on articles 5 and 6. Supralabral setae 2 + 2; labral ones 8 + 8. Legs relatively short and slender, a little longer toward telson; there is a seta at the base of the claw much longer than the claw proper.

♂. — Mandibular stipes with prominent lateral lamellae, ventrally gently rounded, with a straight anterior edge and narrowly rounded anterior apex each. Legs of the very anterior body end only bear moderately developed tibial sole pads; further on the mid-body legs they gradually disappear. Gnathochila-

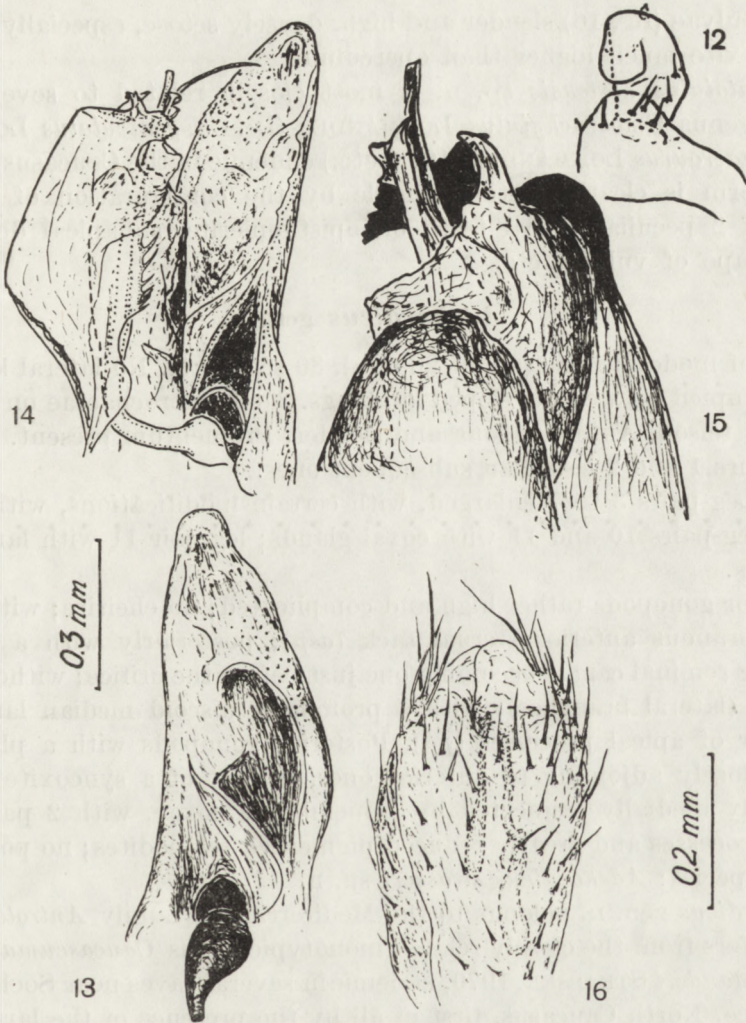


Fig. 12-16. *Chromatoiulus hortensis* sp. n. ♂ paratype: 12 — leg-pair 1 (anterior view), 13 — promerite of gonopods (from behind), 14 — gonopods (mesal view), 15 — distal part of posterior gonopods (lateral view); ♀ paratype: 16 — vulva (from behind).

rium similar to that of *Ch. implicitus ritsensis* subsp. n. Leg-pair 1 (fig. 12) hook-shaped, with a small apical spine.

Gonopods (fig. 14) rather high, promerite a little higher than opisthomerite. Promerite (fig. 13) gently narrowing toward the apex, with a large hyaline basal

lamina. From behind the distal part of promerite is covered with small sharp papillae. Flagella long and slender, subapically with very small spines. Opisthomerite (fig. 15) distally with 2 solid teeth, the internal one bearing 2 additional very small teeth from each side. Apical processes of solenomerite high. Edge of the flagellar canal with several setae.

♀. — Vulvae (fig. 16) slender and high, densely setose, especially long setae distally; coxite much higher than operculum.

Chromatoiulus hortensis sp. n. is most closely related to several species of the subgenus *Omobrachyiulus* LOHMANDER (i.e. *Ch. geniculatus* LOHMANDER, 1928; *Ch. macrourus* LOHMANDER, 1928, etc.) endemic in the Caucasus. However, the new form is clearly distinguishable by the configuration of promerite, presence of 2 peculiar apical teeth on opisthomerite, subapical dentation of flagella, shape of vulvae, etc.

***Adshardicus* gen. n.**

Body of moderate size (about 20 mm). 30 segments. No lateral keels; their place is occupied by well developed swellings. 3 + 3 macrochaetae on each body ring except telson. Antennae long and slender. Promentum present. Legs long; only leg-pairs 1 and 2 less than subsequent ones.

♂. — Leg-pairs 3 to 7 enlarged, with certain modifications, without tarsal papillae. Leg-pairs 10 and 11 with coxal glands; leg-pair 11 with large ventral coxal hooks.

Anterior gonopods rather high and complicated; no cheirite; with a prominent membranous anterior sternal sack (*asp*); posteriorly with a basal pair of very long seminal canals becoming one just before the orifice; without evident telopodites (lateral branches); with a prominent discoid median lamina (*ml*); with a pair of apical processes (*pd*). Posterior gonopods with a plate-shaped sternum, closely adjoining to anterior ones, consist of a syncoxite with only very slightly medially connected by a membrane coxae, with 2 pairs of long posterior processes and greatly reduced pigmented telopodites; no podosternite.

Type-species: *Adshardicus strasseri* sp. n.

Adshardicus gen. n. belongs to the Mediterranean family *Antroleucosomatidae* and differs from the closely related monotypic genus *Caucaseuma* STRASSER with *C. lohmanderi* STRASSER, 1970, endemic in several caves near Sochi, Krasnodar Province, North Caucasus, first of all by the presence of the large anterior sternal sack (*asp*), absence of telopodites, configuration and armament of anterior gonopods, slight median connection of posterior gonopods' coxae, presence of coxal hooks of leg-pair 11 in males, etc., in the new genus. Thus *Adshardicus* gen. n. is the 2nd antroleucosomatid genus after *Bulgardicus* STRASSER, 1960 absolutely lacking telopodites of anterior gonopods, but it is still easily distinguishable from the latter genus by the structure of posterior gonopods and presence of a large sternal sack (*asp*) of anterior gonopods (see STRASSER, 1960; TABACARU, 1967).

Adshardicus strasseri sp. n.

Material. Batumi Botanical Garden (Hortus botanicus batumiensis), Zeleny Mys (Green Cape), Batumi, Adjaria, Caucasus: 3 ♂♂ (holotype ♀ 1522), 3 ♀♀ — 13. X. 1978 (leg. S. I. GOLOVATCH).

Both females and males up to 18 mm long and 2.0 mm wide. 30 body segments. Body colour marble brown; prozona pigmented more intensively than metazona. Antennae and legs light marble brown.

Longitudinal occipital suture well developed. Axial dorsal suture well marked. Labrum with usual 3 anterior teeth. About 20 black ocelli in a triangular ocular field. Cheeks very convex and pubescent. Gnathochilarium (fig. 17) with a triangular promentum; stipes densely setose; lingual laminae with 6 setae each.

3+3 macrochaetae on every body segment except telson; the chaetae very long and sharp. No lateral keels; their place is occupied by well developed swellings gradually disappearing toward the 26th or 27th body rings. The chaetotaxy formula is as follows:

$$\frac{a-p}{p-m} = \frac{1}{1.4} = \frac{m-p}{M-m}; \text{ angle ca. } 115^\circ,$$

where a is the antero-lateral macrochaeta, p is the postero-lateral one, m is the median one, M is the axial dorsal suture.

Legs long and slender; a nearly straight claw with a ventro-basal seta much longer than the claw proper; a tiny additional claw dorsally.

♂. — Frons flat, pubescent, with a small, but quite visible median tubercle between antennal sockets. Leg-pairs 3 to 7 considerably enlarged. No tarsal papillae. Leg-pair 6 (fig. 18) without additional peculiarities leg-pair 7 (fig. 19) is the largest one, with small characteristic dentate processes on internal coxal swellings, prefemora, and femora. Leg-pairs 10 and 11 with coxal glands; pair 10 (fig. 20) with the same dentate processes on coxae and prefemora; pair 11 (fig. 21) with prominent coxal hooks and 2 dentate processes on each prefemur. Even pair 12 with a greatly reduced distal prefemoral dentate process on each leg.

Anterior gonopods (fig. 23, 24) massive, but more or less high; with a prominent dentate anterior sternal sack (*asp*); with a pair of ear-shaped distal lateral laminae provided with a basal hind spine (*ld*) each; with a pair of large distal paramedial hinder finger-shaped processes (*pd*); with a very large discoid median hyaline lamina (*ml*) pubescent along the hinder edge; with a pair of spiny distal complicated lamellae (*pl*); with large membranous symmetric pubescent fields (*f*); with a pair of parabasal laminae provided with a spiny ventral edge each; at last, with a pair of very long seminal canals (*sg*) becoming one just before the orifice.

Posterior gonopods (fig. 22) with a plate-shaped sternum, closely adjoining anterior gonopods; consist of a syncoxite only anteriorly and very slightly basally connected by a membrane; with sack-like membranous coxites and

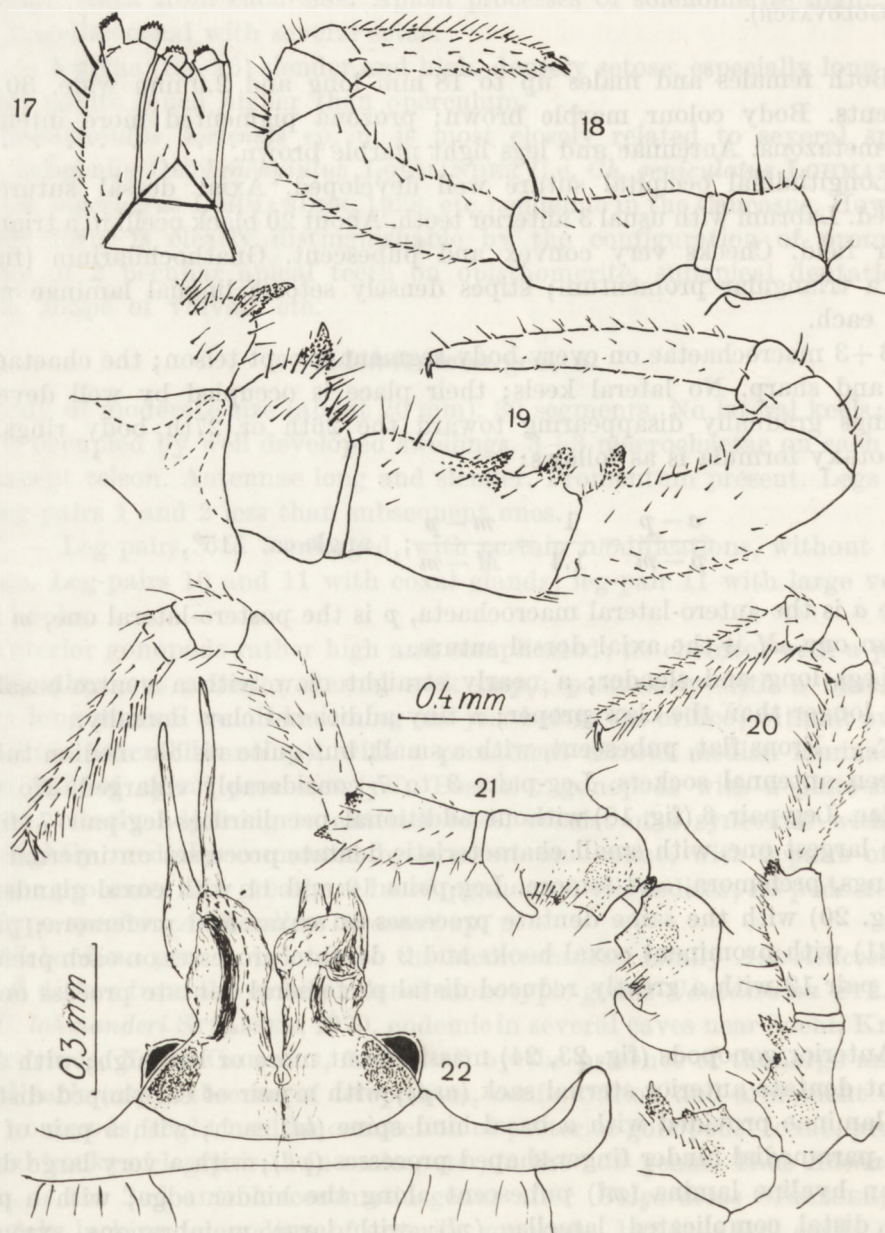


Fig. 17-22. *Adshardicus strasseri* gen. et sp. n. ♂ paratype: 17 - gnathochilarium (from behind), 18 - leg-pair 6, 19 - leg-pair 7, 20 - leg-pair 10 (from behind), 21 - leg-pair 11 (from behind), 22 - posterior gonopods (anterior view).

2 pairs of long and slender sabre-shaped posterior processes; telopodites greatly reduced to 1 or rarer 2 articles, darkly pigmented; no podosternite.

♀. — Frons gently convex, without any tubercles between antennae. Legs unmodified.

The species is dedicated to the well known diplopodologist Dr. Karl STRASSER, Trieste, Italy.



Fig. 23, 24. *Adshardicus strasseri* gen. et sp. n. ♂ paratype: 23, 24 — posterior gonopods (lateral view and from behind, respectively).

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STRESZCZENIE

[Tytuł: Kilka nowych form dwuparców (*Diplopoda*) z Kaukazu]

Opisano 4 nowe dwuparce (*Diplopoda*) z Kaukazu: *Julus jedryczkowskii* sp. n., *Chromatoiulus implicitus ritsensis* ssp. n., *Ch. hortensis* sp. n. (*Julidae*) i *Adshardicus strasseri* gen. et sp. n. (*Antroleucosomatidae*).

РЕЗЮМЕ

[Заглавие: Некоторые новые формы двупарноногих многоножек (*Diplopoda*) с Кавказа]

Описываются четыре новые многоножки (*Diplopoda*) с Кавказа: *Julus jedryczkowskii* sp. n., *Chromatoiulus implicitus ritsensis* subsp. n., *Ch. hortensis* sp. n. (*Julidae*) и *Adshardicus strasseri* gen. et sp. n. (*Antroleucosomatidae*).

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