

On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda: Polydesmida), IX

О нескольких новых или плохоизученных ориентальных Paradoxosomatidae (Diplopoda: Polydesmida), IX

S.I. Golovatch
С.И. Головач

Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Leninsky prospekt 33, Moscow 119071 Russia.
Институт проблем экологии и эволюции РАН, Ленинский проспект, 33, Москва 119071 Россия.

KEY WORDS: Diplopoda, Polydesmida, Paradoxosomatidae, taxonomy, new species, Vietnam.

КЛЮЧЕВЫЕ СЛОВА: Diplopoda, Polydesmida, Paradoxosomatidae, таксономия, новые виды, Вьетнам.

ABSTRACT. This contribution is devoted to descriptions of *Touranella hirsuta* sp.n. from south-central Vietnam, as well as of *Kronopolites montanus* sp.n. and *Sapamorpha complexa* gen.n., sp.n. (Orthomorhini), both from northern Vietnam. *Sapamorpha* gen.n. differs especially readily in the presence of a large and deeply tripartite lamina medialis of the solenophore, in which one of the parts is a nearly fully separated lobe at its base. A key is provided to all seven currently known species of *Kronopolites* Attems, 1914.

РЕЗЮМЕ. Данное сообщение посвящено описаниям *Touranella hirsuta* sp.n. из Юго-Центрального Вьетнама, а также *Kronopolites montanus* sp.n. и *Sapamorpha complexa* gen.n., sp.n. (Orthomorhini) из Северного Вьетнама. *Sapamorpha* gen.n. особенно четко отличается наличием большой и глубоко трехчленной lamina medialis соленофора, одна из частей которого — почти полностью отделенная пластина у его основания. Приведен ключ для всех семи пока известных видов рода *Kronopolites* Attems, 1914.

Introduction

This paper continues my series devoted to the paradoxosomatid faunas of Oriental countries and partly published in «Arthropoda Selecta» [Golovatch, 1993, 1994b, 1995a, 1995b, 1996, 1997, 2000, 2009]. The present contribution deals with three additional samples deriving from Vietnam, all belonging to the collection of the Zoological Museum, Moscow State University, Russia.

Taxonomic part

Touranella hirsuta sp.n.
Figs 1–8.

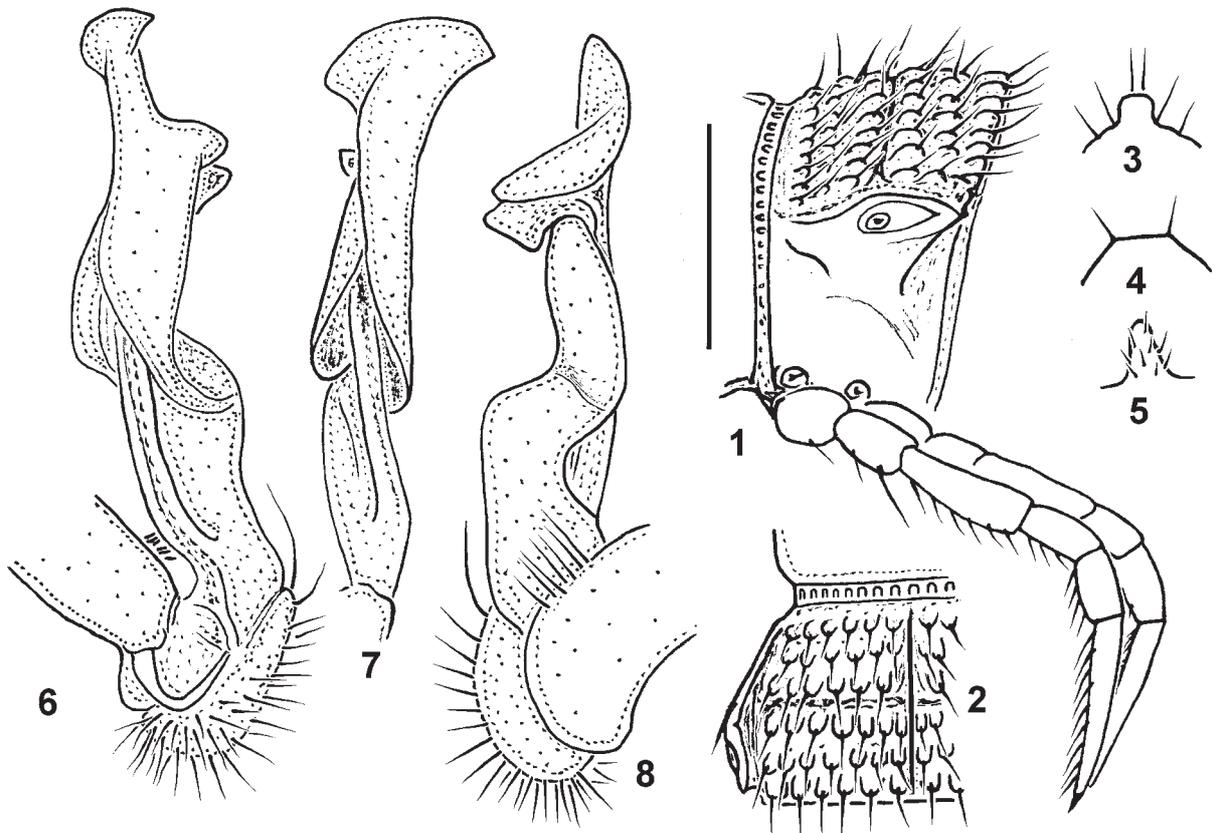
HOLOTYPE ♂, Vietnam, Lam Dong Prov., near Lang Lanh, Bi Doup — Nui Ba Nature Reserve, 12°10'N, 108°40'E, 1.400–1.900 m a.s.l., 1–22.IV.2008, leg. D.N. Fedorenko (Expedition of the Russian–Vietnamese Tropical Center). — **PARATYPES**: 3 ♀♀, same locality and date, together with holotype.

NAME. To emphasize the hirsute appearance.

DIAGNOSIS. Differs from congeners mainly in gonopod structure, in particular the absence of a basal process on a very short femorite.

DESCRIPTION. Length ca 9 (holotype) to 10–11 mm (paratypes), width of midbody pro- and metazona 0.7 and 0.8 (holotype), and 1.1 and 1.2 mm (paratypes), respectively. General coloration in alcohol uniformly light brown to dark castaneous brown; only tips of antennae and several proximal podomeres light yellowish to grey-white and distal podomeres slightly infusate, light grey-brown; metatergal setation light, whitish.

Head broadest (♂) to as broad as segments 6–16 (♀); collum and segments 2 and 3 subequal, narrowest, body parallel-sided on segments 6–16, thereafter gently and gradually tapering towards telson. Head densely setose, with a peculiar transverse row of long setae on vertex and a group of similar setae medially above antennal sockets. Antennae relatively long and slender, slightly clavate, in situ reaching the end of somite 3 dorsally (♂), slightly shorter in ♀. Paraterga modest (Figs 1 & 2), subhorizontal, mostly lying at about 1/2 midbody height; calluses bordered only dorsally, present already on collum; with a setigerous knob at about midway; caudal corner narrowly rounded only on a few anterior poreless segments, onward evidently pointed, spiniform but not surpassing the rear tergal contour until segment 17, a little surpassing the contour only on segments 18 and 19. Ozopores lateral, lying at bottom of an ovoid groove (Figs 1 & 2). Body surface smooth and shining even below paraterga; collum smooth but following metaterga microtuberculate. Axial line evident on segments 2(3)–(17)18. Transverse metatergal sulcus starting from segment 3 or 4, but fully developed, deep and evident on segments 5–17, faint on



Figs 1–8. *Touranella hirsuta* sp.n., ♂ holotype: 1 — body segment 10, lateral view; 2 — left half of metatergum 10, dorsal view; 3 — epiproct, dorsal view; 4 — hypoproct, ventral view; 5 — lamina between coxae 4, caudal view; 6–8 — left gonopod, mesal, dorsal and lateral views, respectively. Scale bar 0.5 (1–5) and 0.25 mm (6–8).

Рис. 1–8. *Touranella hirsuta* sp.n., ♂ голотип: 1 — туловищный сегмент 10, вид сбоку; 2 — левая половина метатергита 10, вид сверху; 3 — эпипрокт, вид сверху; 4 — гипопрокт, вид снизу; 5 — пластинка между тазиками 4, вид сзади; 6–8 — левый гонопод, соответственно изнутри, сверху и сбоку. Масштаб 0,5 (1–5) и 0,25 мм (6–8).

segments 18 and 19, usually reaching an impressed base of paraterga. Collum virtually smooth, with three transverse rows of long and dense setae. Metaterga 2–5 with three transverse, rather regular rows of 6–8 rounded to slightly elongate, setigerous tubercles/knobs, these knobs gradually growing in number (7–9) and arranged in 2–3 rows in front of and another 2–3 rows behind metatergal sulcus on segments 6–19 (Figs 1 & 2). Tergal setae rather long, simple, mostly retained. Segments very clearly constricted, thus body evidently moniliform; stricture dividing pro- and metazona deep, narrow, evidently ribbed at bottom down to about 1/2 body height (Figs 1 & 2). Pleurosternal carinae present as small flaps on segments 2 and 3, in ♂ like a small and arcuated crest also on segment 4, onward retained only as a modest swelling. Epiproct short, flattened dorsoventrally, narrowly truncate, subapical papillae rudimentary (Fig. 3). Hypoproct trapeziform, caudal 1+1 setae virtually without knobs and very evidently separated (Fig. 4).

Sternites without modifications, sparsely setose, cross-impressions modest; a high, narrowly rounded, linguiform and setose lamina only between ♂ coxae 4

(Fig. 5). Legs long and slender (Fig. 1), ca 1.8 (♂) or 1.4 times (♀) as long as midbody height, very slightly incrassate in ♂; prefemora without evident lateral bulge; ventral brushes absent, even though ventral setation on ♂ tarsi rather thick; adenostyles on ♂ leg 1 absent, but each ♂ coxa 2 with an evident ventro-apical process carrying a vas deferens.

Gonopods (Figs 6–8) not quite typical of the genus; coxite long, subcylindrical, setose distally; femorite very short, devoid both of a basal process and torsion; solenophore simple, suberect, sheathing much of a ribbon-shaped solenomere, without a shoulder near base.

REMARKS. The genus *Touranella* Attems, 1937 has hitherto been known to comprise only three species: the type-species *T. gracilis* Attems, 1937, from Danang, southern Vietnam [Attems, 1937, 1938], *T. himalayaensis* Golovatch, 1994, from Nepal, and *T. peculiaris* Golovatch, 2009, from Bi Doup, southern Vietnam [Golovatch, 1994a, 2009]; the latter species is thus not only sympatric, but even syntopic with the new congener. Despite its peculiar gonopod conformation, such as the lack of a femoral process and the presence of a very short femorite, the new species seems to be

closer to both *T. gracilis* and *T. himalayaensis* than to *T. peculiaris*, also sharing a highly hirsute appearance.

Kronopolites montanus sp.n.

Figs 9–16.

HOLOTYPE ♂, Vietnam, Lao Cai Prov., Hoang Lien National Park, W of Sapa, ca 2,000 m a.s.l., subtropical montane forest, 16–30.VII.2007, leg. S. Golovatch.

NAME. Emphasizes the discovery of this species in the mountains.

DIAGNOSIS. Differs from congeners in its overall black-brown coloration, coupled with highly peculiar shapes of the solenophore and postfemoral processes.

DESCRIPTION. Length ca 35 mm, width of pro- and metazona 3.0 and 3.8 mm, respectively. General coloration black-brown; distal half of antennomere 6, most of antennomere 7, clypeolabral region, venter and legs light brown; remaining antennomeres white-yellow.

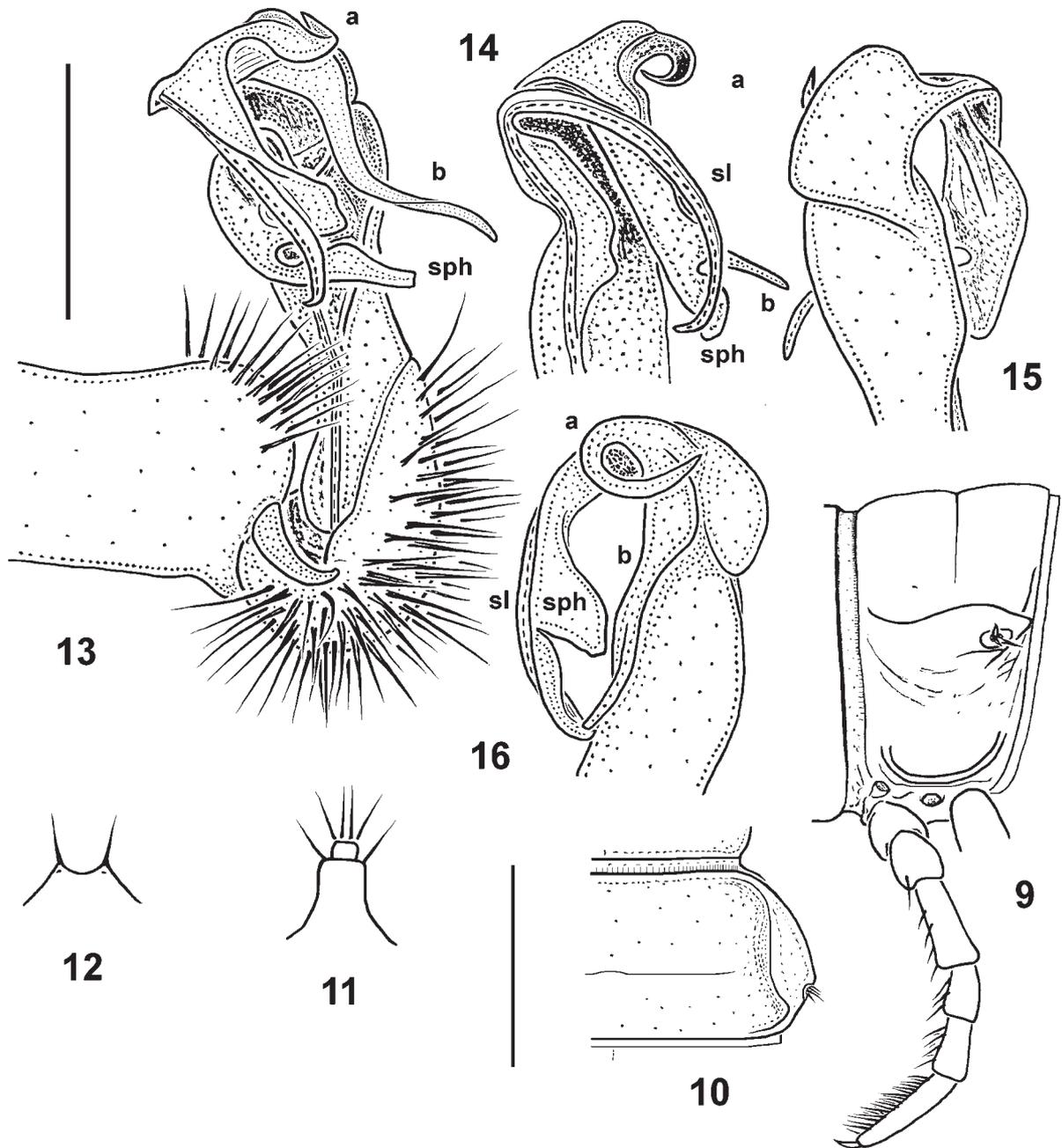
Head width < collum > segments 3 and 4 < segments 2 = 5–16; body thereafter gradually tapering towards telson. Antennae long and slender, slightly clavate, in situ reaching slightly beyond somite 3 dorsally. Paraterga rather poorly developed (Fig. 9), set rather low (at about 1/3–1/2 midbody height) (Fig. 10); beginning already from collum, very slightly inclined ventrad, calluses evidently bordered dorsally, not bordered ventrally on poreless segments, bordered in posterior 1/3–1/4 on pore-bearing segments except 19th; considerably narrower in lateral view on poreless segments compared to pore-bearing ones; caudal corner rather broadly rounded and usually not surpassing rear tergal contour (Figs 9 & 10), surpassing it and very broadly rounded on segment 2, surpassing it and nearly pointed on segments 18 and 19. Ozopores sublateral in position, evident, lying inside an ovoid fovea well in front of caudal corner, each with a conspicuous bunch of setoid filaments. Body surface generally smooth and shining, below paraterga modestly rugulose. Transverse metatergal sulcus present on segments 5–17, line-shaped, thin, not reaching the base of paraterga, slightly arcuate anteriorly near middle (Figs 9–10). Tergal setation missing, pattern untraceable. Segments rather poorly constricted (body non-moniliform), stricture between pro- and metazona moderately deep, relatively narrow, extremely finely, densely and longitudinally striolate dorsally to somewhat below paratergal level. Pleurosternal carinae evident on segments 2–16, arcuate (Fig. 9), with a very small caudal tooth on segments 3–7. Epiproct (Fig. 11) rather long, digitiform, apical disc and subapical papillae very evident. Subanal scale subtrapeziform (Fig. 12), caudal margin emarginate, with a pair of evident, well-separated, setigerous, paramedian knobs at caudal margin.

Sternites modestly setose, cross-impressions moderate; sternal cones and setose lamina between coxae 4 missing. Legs relatively long (Fig. 9), rather slender (only prefemora slightly swollen dorsally), ca 1.3–1.4 times longer than body height, without adenostyles, two last leg-pairs slightly shorter; ventral brushes absent.

Gonopods (Figs 13–16) relatively complex; coxite long, subcylindrical, densely setose distoventrally; prefemur relatively large, as usual densely setose; femorite about as long as prefemur, slightly enlarged distad but devoid of torsion, on medial face with an evident excavation carrying seminal groove at bottom, demarcated from postfemoral region by a distinct lateral sulcus; postfemoral part well-developed, curved mesad, somewhat longer than femorite or prefemur, with a very conspicuous, bipartite, complex, lateral process in which apical branch (**a**) shorter and coiled, and basal branch (**b**) long, straight, digitiform and subhelicoid; solenophore proper (**sph**) consisting mainly of a large, conspicuous, complex, bipartite lamina medialis supporting a long and flagelliform solenomere (**sl**).

REMARKS. The genus *Kronopolites* Attems, 1914 has hitherto been known to comprise six accepted species: *K. swinhoei* (Pocock, 1895), the type-species, widespread in central and southern China (Gansu, Shandong, Zhejiang, Sichuan, Guizhou and Yunnan provinces), *K. acuminatus* Attems, 1937 from northern Vietnam, *K. biagrilectus* Hoffman, 1963 from Jiangxi Province, China, *K. formosanus* (Verhoeff, 1939) from Taiwan, *K. fuscocingulatus* Jeekel, 1983 from Thailand, and *K. occidentalis* Golovatch, 1983 from the Kashmir Himalaya [Attems, 1937, 1938; Hoffman, 1963; Jeekel, 1968, 1983; Golovatch, 1983; Chen et al., 2006]. The new congener seems to be especially similar to *K. formosanus*, but can readily be distinguished using the following key.

1. Coloration of adults with a contrasting pattern, some parts of body segments being much paler, some others much darker 2
- Coloration of adults rather uniformly brown to brown-blackish, only venter and legs largely yellowish 6
2. Paraterga usually relatively well developed, mostly set high, caudal corner on most segments behind 2nd surpassing rear tergal contour and acuminate 3
- Paraterga relatively poorly developed, set lower (mostly at about 1/3 height of segments), caudal corners usually not surpassing rear tergal contours, at most narrowly rounded 5
3. Coloration dark brown with yellow paraterga; latter in ♂ mostly higher than dorsum; ♂ sternal cones absent; processes **a** and **b** of gonopod small, sharing a very distinct common stem; Kashmir Himalaya *K. occidentalis*
- Colour pattern different, rear half of prozona and fore half of metazona usually being black-brown, remaining parts yellowish; paraterga even in ♂ set lower, lying below dorsum; ♂ sternal cones present; processes **a** and **b** of solenophore much longer and slenderer, their common base far less conspicuous 4
4. Process **a** of gonopod somewhat shorter than **b**; northern Vietnam *K. acuminatus*
- Process **a** of gonopod somewhat longer than **b**; Jiangxi Province, China *K. biagrilectus*
5. ♂ sternal cones missing; processes **a** and **b** of gonopod nearly independent, slender and long; northern Thailand *K. fuscocingulatus*
- ♂ sternal cones present; processes **a** and **b** of gonopod on a broad common stem, neither slender nor long; central and southern China *K. swinhoei*



Figs 9–16. *Kronopolites montanus* sp.n., ♂ holotype: 9 — body segment 10, lateral view; 10 — right half of metatergum 10, dorsal view; 11 — epiproct, dorsal view; 12 — subanal scale, ventral view; 13–16 — left gonopod, mesal, dorsal, lateral and subventral views, respectively. Scale bars 2.0 (9–12) and 0.5 mm (13–16).

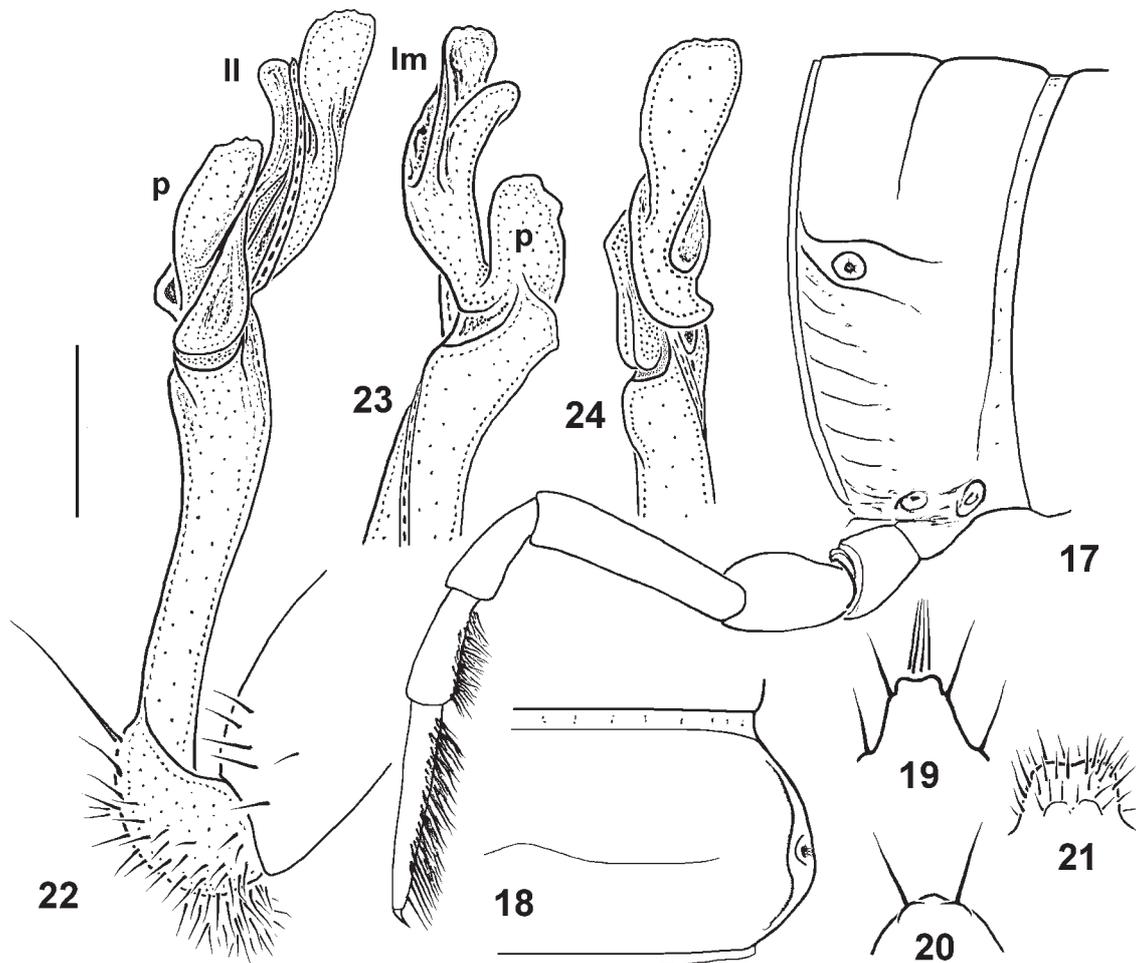
Рис. 9–16. *Kronopolites montanus* sp.n., ♂ голотип: 9 — туловищный сегмент 10, вид сбоку; 10 — правая половина метатергита 10, вид сверху; 11 — эпипрокт, вид сверху; 12 — субанальная чешуйка, вид снизу; 13–16 — левый гонопод, соответственно изнутри, сверху, сбоку и почти снизу. Масштаб 2,0 (9–12) и 0,5 мм (13–16).

6. Pleurosternal carinae evident on ♂ segments 2–16 (Fig. 9); in ♂, both a setose lamina between coxae 4 and tarsal brushes missing; process **b** of gonopod considerably longer than both process **a** and a complex solenophore proper (**sph**) (Figs 13–16); northern Vietnam
 *K. montanus* sp.n.
 — Pleurosternal carinae present only on segments 2–10; in ♂, both a setose lamina between coxae 4 and tarsal brushes present; processes **a** and **b** of gonopod subequal

in length, shape of solenophore proper simpler; Taiwan
 *K. formosanus*

Sapamorpha gen.n.

Large-sized Orthomorphini (ca 3–3.5 cm long) with poorly developed and uncised paraterga, a sternal lamina only between ♂ coxae 4, ventral brushes present



Figs 17–24. *Sapamorpha complexa* gen.n., sp.n., ♂ holotype: 17 — segment 10, lateral view; 18 — right half of metatergum 10, dorsal view; 19 — epiproct, dorsal view; 20 — hypoproct, ventral view; 21 — lamina between coxae 4, subcaudal view; 22–24 — left gonopod, lateral, submesal and subdorsal views, respectively. Scale bars 1.0 (17–21) and 0.5 mm (22–24).

Рис. 17–24. *Sapamorpha complexa* gen.n., sp.n., ♂ голотип: 17 — сегмент 10, вид сбоку; 18 — правая половина метатергита 10, вид сверху; 19 — эпипрокт, вид сверху; 20 — гипопрокт, вид снизу; 21 — пластинка между тазиками 4, почти сзади; 22–24 — левый гонопод, соответственно сбоку, почти изнутри и почти сверху. Масштабы 1,0 (17–21) и 0,5 мм (22–24).

at least on some anterior ♂ tibiae and tarsi, but sternal cones and adenostyles missing.

Gonopods relatively complex; coxite subcylindrical, elongate, setose distoventrally; prefemur normal, rather small, as usual densely setose; femorite long and slender, longer than acropodite, only slightly enlarged distad where modestly torsate laterad, with neither a sulcus nor a cingulum demarcating a postfemoral portion; solenophore clearly demarcated from femorite by a distinct cingulum both laterally and mesally, consisting of a well-developed and tripartite lamina medialis and a simpler lamina lateralis, both laminae supporting a lateral flagelliform solenomere in between.

Type-species: *Sapamorpha complexa* sp.n.

REMARKS. The new genus seems to belong in the large, basically Oriental tribe Orthomorphi which has hitherto been known to include 18 genera (see review and key in Golovatch [1996], additional notes in Golovatch [2000]). *Sapamorpha* gen.n. differs especially

readily in the presence of a large and deeply tripartite lamina medialis of the solenophore, in which one of the parts is a nearly fully separated lobe at its base.

Sapamorpha complexa sp.n.

Figs 17–22.

HOLOTYPE ♂, Vietnam, Lao Cai Prov., Hoang Lien National Park, W of Sapa, ca 2,000 m a.s.l., subtropical montane forest, 16–30.VII.2007, leg. S. Golovatch. — PARATYPES: 2 ♂♂, 3 ♀♀, same place and date, taken together with holotype.

NAME. Emphasizing the terra typica (Sapa) of the new genus and the complex gonopod structure in this species.

DESCRIPTION. Length ca 30–35 mm, width of pro- and metazona 2.5–2.7 and 3.0–3.3 mm (♂), 3.5–3.7 and 4.0–4.1 mm (♀), respectively. Holotype ca 35 mm long and 2.7 and 3.3 mm wide on pro- and metazona, respectively. General coloration black-brown to castaneous brown; distal half to most of antennomeres

6 and 7 dark brown to blackish, clypeolabral region, remaining antennomeres, paraterga of collum and segment 2, venter and legs light yellow-brown to yellowish.

Head width < collum > segments 3 and 4 < segments 2 = 5–16; body thereafter gradually tapering towards telson. Antennae moderately long to short, slightly clavate, in situ nearly reaching end of somite 3 (♂) or 2 (♀) dorsally. Paraterga poorly developed (Figs 17 & 18), even more poorly so in ♀, set low (at about 1/2 midbody height) (Fig. 17); beginning already from collum as thin calluses; calluses evidently bordered dorsally, not bordered ventrally on poreless segments, bordered in posterior 1/3–1/4 on pore-bearing segments except 19th; considerably narrower in lateral view on poreless segments compared to pore-bearing ones (Fig. 17); both front and caudal corners broadly rounded, caudal ones surpassing rear tergal contour only on segment 2. Ozopores sublateral in position, evident, lying inside an ovoid fovea well in front of caudal corner, each with a conspicuous bunch of setoid filaments. Body surface generally smooth and shining, below paraterga 2 and 3 finely granular, onward rugulose. Transverse metatergal sulcus present on segments 5–18, line-shaped, thin, not reaching the base of paraterga, slightly arcuate anteriorly near middle (Fig. 18). Tergal setae nearly missing, present only as a few setae in front row on collum, pattern untraceable. Segments rather poorly constricted (body non-moniliform), stricture between pro- and metazona moderately deep, relatively narrow, extremely finely, densely and longitudinally striolate dorsally to somewhat below paratergal level. Pleurosternal carinae very small, present only on segments 2 and 3, wanting thereafter. Epiproct (Fig. 19) rather long, digitiform, apical disc and subapical papillae evident, tip slightly concave. Caudal margin of subanal scale rounded (Fig. 20), with a pair of evident, separated, setigerous, paramedian knobs.

Sternites modestly setose, cross-impressions moderate; sternal cones missing; a densely setose sternal lamina between ♂ coxae 4 subquadrate and slightly emarginate (Fig. 21). Legs relatively long (Fig. 17), rather slender (only ♂ prefemora slightly swollen dorsally), ca 1.4–1.5 (♂) or 1.1–1.2 (♀) times longer than body height, without adenostyles, two last leg-pairs slightly shorter; ventral brushes present on tibiae until leg 7, on tarsi until leg 12, thereafter gradually thinning out.

Gonopods (Figs 22–24) relatively complex; coxite long, large, subcylindrical, modestly setose distoventrally; prefemur relatively short, as usual densely setose; femorite slender and long, somewhat longer than acropodite, distally very slightly enlarged and with traces of torsion, on most of medial face with seminal groove, latter shifted distoventrad before entering a free, flagelliform solenomere; solenophore clearly de-

marcated from femorite by a distinct cingulum both laterally and mesally; solenophore consisting of a well-developed, tripartite and longer lamina medialis (**Im**) and a simpler, somewhat shorter lamina lateralis (**Il**), both laminae supporting a lateral and subequally long solenomere in between; lobe **p** of **Im** nearly fully separated, evidently shorter and broader than both other lobes of **Im**.

ACKNOWLEDGEMENTS. I am most grateful to D. Fedorenko (Moscow), who provided some of the material for the present study. This work has been supported in part through travel grants by the Russian-Vietnamese Tropical Center.

References

- Attems C. 1937. Myriopoda 3. Polydesmoidea I. Fam. Strongylosomidae // *Das Tierreich*. Lfg. 68. S.I–XXII, 1–300.
- Attems C. 1938. Die von Dr. C. Dawydoff in Französisch Indochina gesammelten Myriopoden // *Mém. Mus. natn. Hist. nat.*, N.S. T.6. Fasc.2. P.187–353.
- Chen C.-C., Golovatch S.I., Chang H.-W. 2006. The millipede tribe Sulciferini in Taiwan (Diplopoda: Polydesmida: Paradoxosomatidae) // *Norw. J. Entomol.* Vol.53. P.249–270.
- Golovatch S.I. 1983. Two Paradoxosomatidae from the Kashmir Himalayas (Diplopoda) // *Senckenberg. biol.* Bd.63. H.3/4. S.297–302 (for 1982).
- Golovatch S.I. 1993. On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda Polydesmida) // *Arthropoda Selecta*. Vol.2. No.1. P.3–14.
- Golovatch S.I. 1994a. Diplopoda from the Nepal Himalayas. Two new Alogolykini (Polydesmida: Paradoxosomatidae) // *Senckenberg. biol.* Vol.73. No.1–2. P.183–187.
- Golovatch S.I. 1994b. On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda Polydesmida), II // *Arthropoda Selecta*. Vol.3. No.3–4. P.127–137.
- Golovatch S.I. 1995a. On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda Polydesmida), III // *Ibid.* Vol.4. No.2. P.89–97.
- Golovatch S.I. 1995b. On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda Polydesmida), IV // *Ibid.* Vol.4. No.3–4. P.71–78.
- Golovatch S.I. 1996. On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda Polydesmida), V // *Ibid.* Vol.5. No.3–4. P.131–141.
- Golovatch S.I. 1997. On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda Polydesmida), VI // *Ibid.* Vol.6. No.3–4. P.35–46.
- Golovatch S.I. 2000. On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda Polydesmida), VII // *Ibid.* Vol.8. No.4. P.223–228 (for 1999).
- Golovatch S.I. 2009. On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda Polydesmida), VIII // *Ibid.* Vol.18. No.1. P.1–7.
- Hoffman R.L. 1963. A contribution to the knowledge of Asiatic strongylosomoid Diplopoda (Polydesmida: Strongylosomatidae) // *Ann. Mag. Nat. Hist.*, Ser.13. Vol.5. P.577–593.
- Jeekel C.A.W. 1968. On the classification and geographical distribution of the family Paradoxosomatidae (Diplopoda, Polydesmida). Rotterdam: Acad. Proefschrift. 162 p.
- Jeekel C.A.W. 1983. New records and descriptions of Southeast Asian Paradoxosomatidae (Diplopoda, Polydesmida) // *Boll. Mus. Civ. Stor. Nat. Verona*. Vol.9. P.225–253.