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

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

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КЛЮЧЕВЫЕ СЛОВА: Diplopoda, Polydesmida, Paradoxosomatidae, таксономия, новые находки, новые вилы, Вьетнам, Китай.

ABSTRACT. This contribution is devoted to new records of three known, and to descriptions of three new, species from Vietnam and China: *Hedinomorpha barbata* sp.n. from Sichuan, and both *Kronopolites typicus* sp.n. and *Tylopus uncinatus* sp.n. from Yunnan. A key is presented to all 11 species of *Kronopolites* known to date.

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РЕЗЮМЕ. Данное сообщение посвящено новым находкам трех известных и описаниям трех новых видов из Вьетнама и Китая: *Hedinomorpha barbata* sp.n. из Сычуани, а также *Kronopolites typicus* sp.n. и *Tylopus uncinatus* sp.n. из Юннани. Представлен ключ для всех 11 известных сейчас видов *Kronopolites*.

Introduction

This paper is devoted to new records of three known, as well as to descriptions of three new, species of paradoxosomatid millipedes from Vietnam and China.

Material and methods

All material is deposited in the collection of the Zoological Museum, Moscow State University (ZMUM), Russia. Pictures were taken with a Canon EOS 5D digital camera and stacked using Zerene Stacker software.

Taxonomic part

Helicothomorpha holstii (Pocock, 1895)

MATERIAL. 2 ♂♂, 2 ♀♀, 2 juv. (ZMUM Rd 4637), Vietnam, Hanoi City, 13.XII.2018, leg. D. Kasatkin.

REMARKS. This anthropochore species is widespread across Southeast and East Asia and southern China, also introduced to the USA [Nguyen, Sierwald, 2013]; very common in Vietnam.

Hedinomorpha barbata **sp.n.**
Figs 1–12.

Holotype ♂ (ZMUM Rd 4657), China, Sichuan Prov., NW slope of Jiuding Shan, SE of Maoxian, 1.3 km NNW of Mt Jiuding, N31°37′06″, E103°53′58″, 3945 m a.s.l., 28.VI.2019, leg. I. Belousov, G. Davidian & I. Kabak.

DIAGNOSIS. Using the latest available key to *Hedinomorpha* species [Golovatch, 2019a], the new species joins the group of congeners that shows a bulbous and densely hirsute epiproct (Fig. 4), but it differs from all five such species by the midway outgrowth of the solenophore near midway with a prominent, apically pointed, subtriangular lobe **k**, while the solenomere is flagelliform and acuminate (Figs 8–12).

NAME. To emphasize the distally barbed solenophore and epiproct.

DESCRIPTION. Length ca. 17 mm, width of midbody pro- and metazonae 4.2 and 4.9 mm, respectively (♂). Coloration in alcohol uniformly marbled dark brown, with paraterga, venter, epiproct, and gonopods light grey-yellowish, and tips of antennae pallid (Figs 1–4).

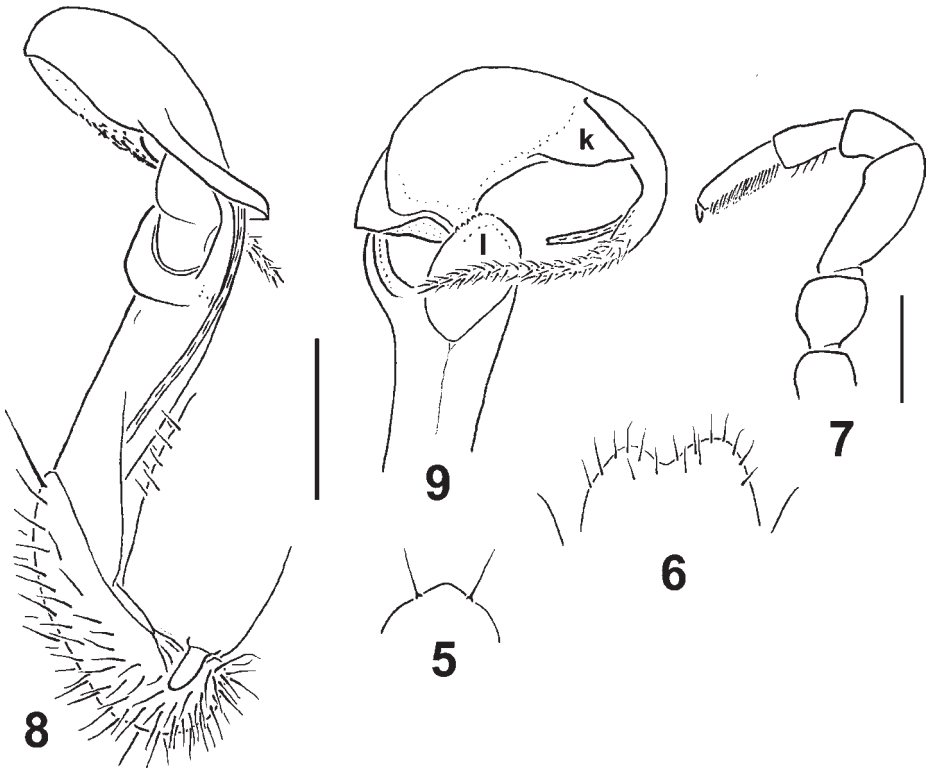
Clypeolabral region moderately setose, region between antennae with only a few setae, thereafter bare; epicranial suture fine, but distinct (Fig. 2). Antennae moderately long and clavate (Figs 1, 2), extending past metatergum 2 when stretched dorsally (♂). In length, antennomere 2=3>6>4>1=5>7. Interantennal isthmus ca. 1.2x diameter of antennal socket (Fig. 2). Tegument generally smooth and shining,

Figs 1–4. *Hedinomorpha barbata* sp.n., ♂ holotype. 1 — habitus, lateral view; 2 — anterior part of body, ventral view; 3–4 — middle and caudal parts of body, respectively, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 1–4. *Hedinomorpha barbata* sp.n., голотип ♂. 1 — общий вид, сбоку; 2 — передняя часть тела, снизу; 3–4 — соответственно средняя и задняя части тела, сверху. Фотографии К.В. Макарова, сняты без масштаба.

metaterga in places faintly rugulose or vermiculate, below paraterga microgranulate. In width, head < collum < segment 3 = 4 < 2 < 5–16; body gradually tapering thereafter. Paraterga rather well developed, mostly set at ca. upper 1/3 of midbody height, clearly declined; calluses rather thick, in lateral view thicker on pore-bearing segments than on poreless ones due to ozopores, delimited by a complete sulcus dorsally on all segments and by an incomplete sulcus abbreviated in anterior 1/4 ventrally only in pore-bearing segments; paraterga on collum broadly rounded anteriorly and laterally, particularly thin, bordered, with several insertion points of abraded setae along lateral margin, its caudal corner angulate and more narrowly rounded (Fig. 1). Paraterga 2 lower than others, as usual, rounded lappets drawn both anteriad and caudad, also with several insertion points of abraded setae along lateral margin; anterior margin of following paraterga broadly rounded shoulders, lateral edge almost straight, without incisions, but with 2–3 inserion points of mostly abraded setae; caudal corners of almost all paraterga following 2nd lying within rear tergal margin, only 18th a small blunt tooth slightly protruding past tergal margin. Pore-bearing calluses faintly sinuous in caudal 1/3, marking small and dorsally invisible ozopores; each ozopore lying inside an elongate groove near caudal corner of poriferous paraterga. Tergal setae mostly abraded, ca. 1/3 as long as metatergum; setation pattern at least 2(3)+2(3), typically arranged in two transverse rows, one anterior (pre-sulcus), the other near caudal margin, regardless of usually 2–3 lateral setae or inserion points on calluses. Limbus entire. Stricture between pro- and metazonae deep and rather narrow, nearly smooth at bottom. Transverse metatergal sulci deep, simple, slightly arched medially, nearly smooth at bottom, not reaching the bases of paraterga, present on segments 5–18. Axial line missing. Pleurosternal carinae small, but evident, more or less arcuated, granular ridges with a rounded caudal lappet increasingly strong until segments 7 and 8, increasingly reduced thereafter to form only a small bulge on segment 18 (♂). Epiproct (Fig. 4) rather long, bulbous, densely hirsute. Hypoproct (Fig. 5) roundly subtriangular, caudal margin with 1+1 setae not borne on knobs.

Sterna densely setose, cross-impressions shallow, axial impressions especially weak, without modifications except for a large, paramedian, setose, bimodal lobe between ♂

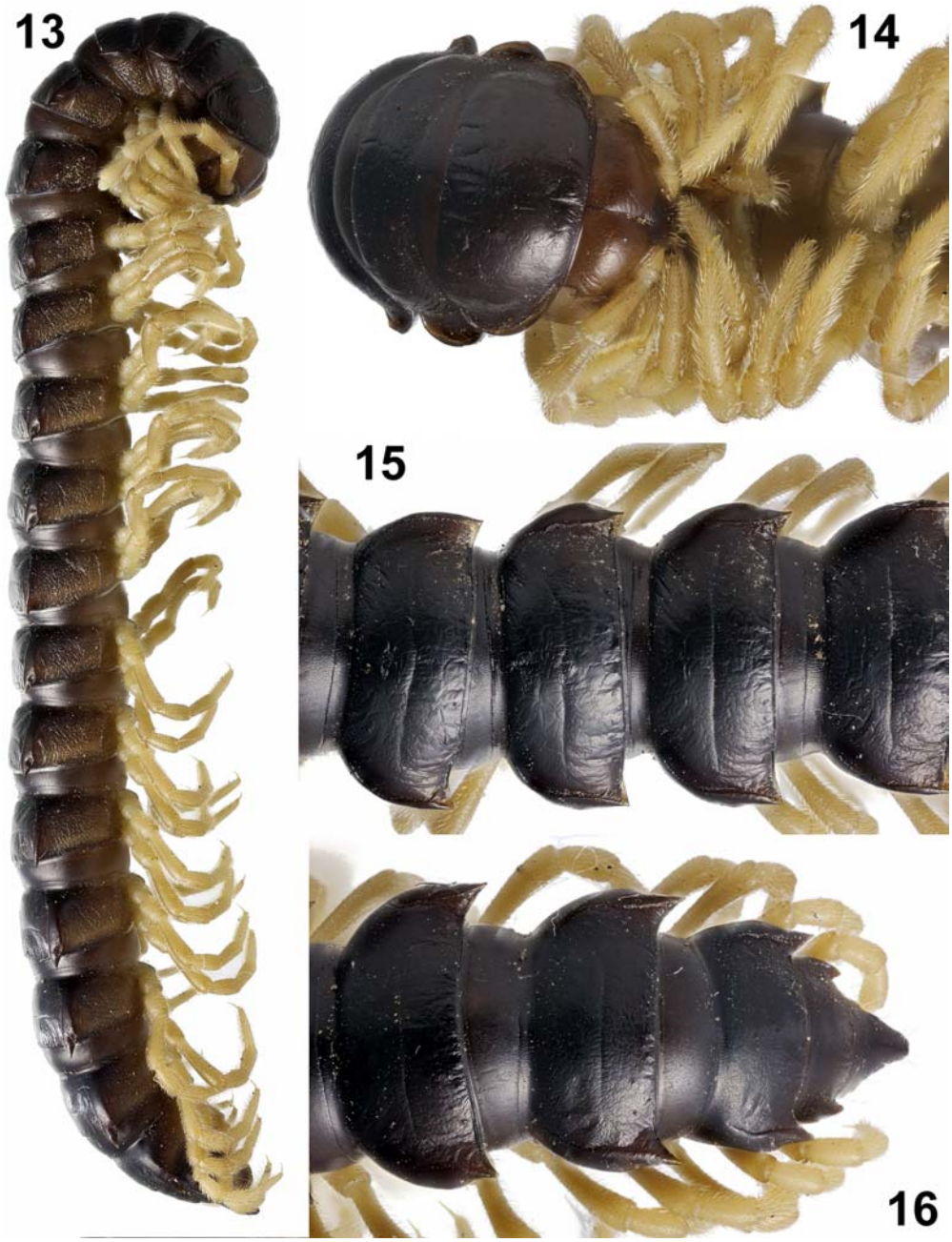


Figs 5–9. *Hedinomorpha barbata* sp.n., ♂ holotype. 5 — hypoproct, ventral view; 6 — sternal lobe between ♂ coxae 4, caudal view; 7 — leg 9, caudal view; 8–9 — right gonopod, mesal and ventral views, respectively. Scale bars: 0.2 (5–7) and 0.3 mm (8–9). Designations explained in text.

Рис. 5–9. *Hedinomorpha barbata* sp.n., голотип ♂. 5 — гипопрокт, снизу; 6 — стернальная пластинка между тазиками, сзади; 7 — нога 9, сзади; 8–9 — правый гонопод, соответственно изнутри и снизу. Масштаб: 0,2 (5–7) и 0,3 мм (8–9). Объяснения обозначений в тексте.

Figs 10–12. *Hedinomorpha barbata* sp.n., ♂ holotype, right gonopod, mesal, dorsal and lateral views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 10–12. *Hedinomorpha barbata* sp.n., голотип ♂, правый гонопод, соответственно изнутри, сверху и сбоку. Фотографии К.В. Макарова, сняты без масштаба.

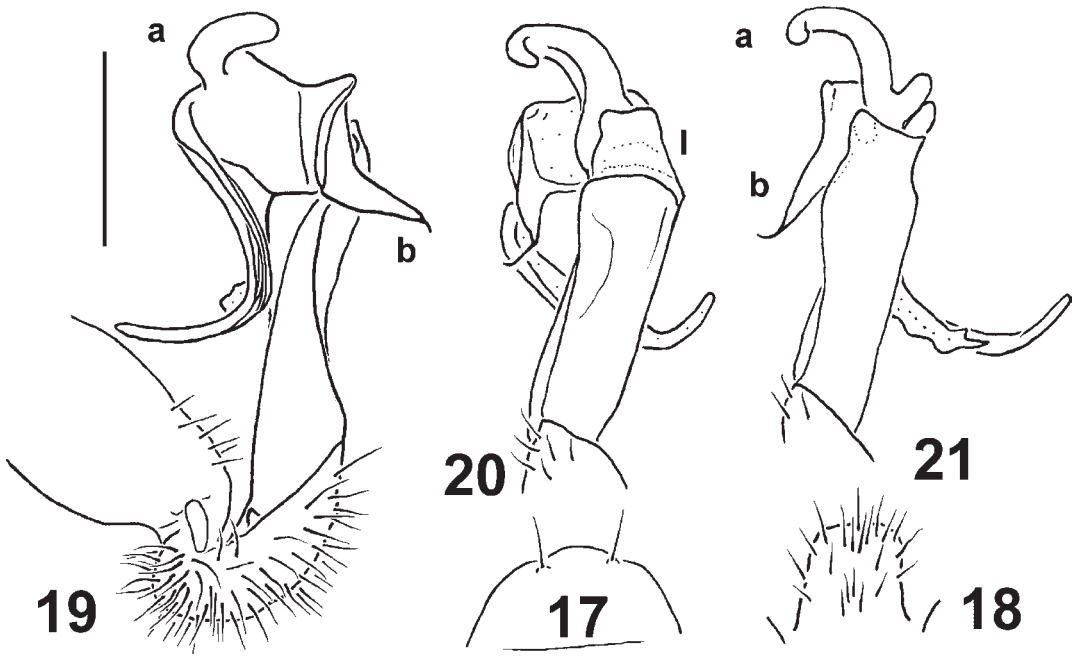


Figs 13–16. *Kronopolites typicus* sp.n., ♂ holotype. 13 — habitus, lateral view; 14 — anterior part of body, ventral view; 15–16 — middle and caudal parts of body, respectively, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 13–16. *Kronopolites typicus* sp.n., голотип ♂. 13 — общий вид, сбоку; 14 — передняя часть тела, снизу; 15–16 — соответственно средняя и задняя части тела, сверху. Фотографии К.В. Макарова, сняты без масштаба.

coxae 4 (Fig. 6). No tubercles near gonopod aperture. Legs moderately long and slender (Figs 1–4, 7), apparently slightly incrassate compared to ♀, midbody ones ca. 1.6–1.7 (♂) times as long as body height, very densely setose, neither adenostyles nor laterally swollen prefemora; ventral brushes on tarsi and tibiae gradually thinning out until segment 6.

Gonopods (Figs 8–12) relatively simple, *in situ* held parallel to each other, with tips directed laterad. Coxite subcylindrical, approximately as long as femorite, setose distoventrally; cannula as usual, a small, curved, hollow tube. Prefemoral (= densely setose) part ca. 1/3 as long as acropodite and approximately as long as a medially hollow femorite. Seminal groove running along mesal face of femorite, moving onto a long, flagelliform, free solenomere at base of a simple, rounded, apically microgranulate, postfemoral, lateral lobe (**l**) demarcated by a distinct, transverse, lateral sulcus to become squeezed between and sheathed by folds of a lamina lateralis and a lamina medialis of solenophore, both laminae being well-developed, moderately coiled, approximately half as long as a distally barbed, spiniform and apically acuminate solenophore; solenophore near midway with a prominent, subtriangular lobe **k**.



Figs 17–21. *Kronopolites typicus* sp.n., ♂ holotype. 17 — hypoproct, ventral view; 18 — sternal lobe between ♂ coxae 4, caudal view; 19–21 — left gonopod, mesal, ventral and lateral views, respectively. Scale bar: 1.0 mm. Designations explained in text.

Рис. 17–21. *Kronopolites typicus* sp.n., голотип ♂. 17 — гипопрокт, снизу; 18 — стернальная пластинка между тазиками 4, сзади; 19–21 — левый гонопод, соответственно изнутри, снизу и сбоку. Масштаб: 1,0 мм. Объяснения обозначений в тексте.

REMARK. The genus *Hedinomorpha* Verhoeff, 1934 is subendemic to China, it has recently been reviewed, and all of its 18 hitherto recognized species have been keyed [Golovatch, 2019a].

Kronopolites biagrilectus Hoffman, 1963

MATERIAL. 1 ♂ (ZMUM Rd 4678), China, Yunnan Prov., N of Weixi City, 1.35 km SE of Duonage, N 27°19′42″, E99°18′42″, 2835 m a.s.l., 21.VI.2019; 1 ♂, 1 ♀ (ZMUM Rd 4658), Yunnan Prov., E of Pingchuan, 2 km E of Mahuacun, N54°24′25″, E100° 46′46″, 2980 m a.s.l., 2.VI.2019, all leg. I. Belousov, G. Davidian & I. Kabak.

REMARKS. This species is widespread across southern China, its vertical distribution ranging from 35 to 3600 m a.s.l. [Golovatch, Liu, 2020]. Its habitus, coloration and gonopodal characters have been illustrated by Golovatch [2017]. More information on *Kronopolites* Attems, 1914 is given below, including a new key to species.

Kronopolites typicus **sp.n.**
Figs 13–24.

HOLOTYPE ♂ (ZMUM Rd 4659), China, Yunnan Prov., W of Dali City, SW of Yangbi, 1 km NE of Mt Laoheshang, N25° 36′10″, E99°55′29″, 2780 m a.s.l., 21.V.2019, leg. I. Belousov, G. Davidian & I. Kabak.

DIAGNOSIS. Using the key below, this new species is distinguished from the other known species of *Kronopolites* by the generally dark and non-contrasting coloration, coupled with the relatively poorly developed paraterga (Figs 13–16), the presence of a single lobe between ♂ coxae 4 (Fig. 18), and of ♂ tarsal and tibial brushes gradually declining towards segment 6, but above all, by the characteristic shapes of gonopodal processes **a** and **b** (Figs 19–24).

NAME. To emphasize the gonopodal conformation typical of the genus.

DESCRIPTION. Length ca. 45 mm, width of midbody pro- and metazonae 4.0 and 4.4 mm, respectively (♂). Coloration in alcohol generally blackish chocolate brown, but head, prozonae and sides a little lighter, chocolate brown; antennae, venter and legs light grey-yellow, tips of antennae pallid (Figs 13–16).

Clypeolabral region densely setose, vertigial one bare; epicranial suture fine, but distinct (Figs 13, 14). Antennae long, slender and only slightly clavate (Fig. 13), extending past metatergum 4 when stretched dorsally (♂). In length, antennomere 2=3<4=5<6<1=7. Interantennal isthmus almost as wide as diameter of antennal socket (Fig. 14). Tegument shining, prozonae finely vermiculate, metaterga more roughly vermiculate and in places rugulose/striolate (more clearly so near caudal margin, immediately above paraterga and both before and behind transverse sulcus), below paraterga microgranulate and rugose/rugulose. In width, segment 3 < 4 < head = collum < 2 < 5–16; body gradually tapering thereafter (Figs 14–16). Paraterga moderately developed, mostly set at about upper 1/4–1/3 of midbody height, slightly declined; calluses thin, in lateral view thicker on pore-bearing segments than on poreless ones due to ozopores, delimited by a complete sulcus dorsally and an anteriorly abbreviated sulcus ventrally; paraterga on collum particularly thin, bordered, regularly and broadly rounded, lateral margin with several minute insertion points of abraded setae; paraterga 2 set especially low, as usual, obviously drawn into rounded lappets both forward and caudad, with three insertion points of abraded setae at lateral margin; in dorsal view, anterior margin of following paraterga unbordered, strongly and regularly rounded, lateral edge of poreless calluses almost straight, of pore-bearing ones clearly thicker and slightly

Figs 22–24. *Kronopolites typicus* sp.n., ♂ holotype, left gonopod, mesal, dorsal and lateral views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 22–24. *Kronopolites typicus* sp.n., голотип ♂, левый гонопод, соответственно изнутри, сверху и сбоку. Фотографии К.В. Макарова, сняты без масштаба.

sinuate in caudal 1/3, marking small and dorsally almost invisible ozopores; caudal corners of paraterga 7–18 sharp, dentiform and increasingly projecting past caudal tergal margin, beak-shaped pointed in segments 15–19 (Figs 13–16). Each ozopore lying inside an elongate groove in front of caudal corner of poriferous paraterga. Tergal setae abraded, pattern almost untraceable, probably 2–3 insertion points in two transverse rows on each side, regardless of those 2–3 points on calluses. Limbus entire. Stricture between pro- and metazonae shallow and rather broad, very delicately striolate at bottom. Transverse metatergal sulci shallow, slightly arched medially, not reaching the bases of paraterga, present on segments 5–17, almost wanting on 18th (Fig. 16). Axial line generally missing, traceable only near caudal margin of some metaterga. Pleurosternal carinae small, but evident, rounded, granular ridges with a narrowly rounded caudal lappet only on segments 7 and 8, thereafter increasingly reduced towards telson to remain only a small bulge on segment 18. Epiproct (Fig. 16) long, conical, tip slightly bimodal, lateral pre-apical papillae small. Hypoproct (Fig. 17) almost semi-circular, caudal margin with 1+1 setae borne on minute knobs.

Sterna setose, cross-impressions shallow, without modifications except for a high, linguiform, setose lobe between ♂ coxae 4 (Fig. 18). No tubercles near gonopod aperture. Legs long and slender (Fig. 13), apparently slightly incrassate compared to ♀, midbody ones ca. 1.8–1.9 (♂) times as long as body height, densely setose, neither adenostyles nor laterally swollen prefemora; ventral brushes on tarsi and tibiae gradually thinning out towards segment 6.

Gonopods (Figs 19–24) typical of the genus, relatively simple, *in situ* held parallel to each other, with tips directed mesad. Coxite subcylindrical, almost as long as femorite, setose distoventrally; cannula as usual, a small, curved, hollow tube. Prefemoral (= densely setose) part >1/3 as long as acropodite and only slightly shorter than a medially hollow femorite. Seminal groove running along mesal face of femorite, moving onto a very long, flagelliform, free solenomere at base of a simple, subquadrate, postfemoral, lateral lobe (**l**) demarcated by a distinct, transverse, lateral sulcus to become squeezed between and sheathed by folds of a lamina lateralis and a lamina medialis of solenophore, both laminae being well-developed, very long, moderately coiled, concealing nearly entire solenomere; postfemoral part bearing not only lobe **l**, but also two distinct processes: a curved, rather short, apically pointed ribbon (**a**) nearly as long as a subtriangular **b** bearing a sharp basal spine with a mesal rib near base; tip of **b** with a short filament.

REMARKS. Considering the recent transfer of two *Kronopolites* species into the very similar and partly sympatric genus *Mandarinopus* Verhoeff, 1934, which is endemic to China [Golovatch, 2019a], as well as the latest review of and key to *Kronopolites* spp. by Likhitrakarn *et al*. [2015], *Kronopolites* has hitherto been known to encompass ten species. These are arranged below more or less from west to east: *K. occidentalis* Golovatch, 1983, from the Kashmir Himalaya, *K. coriaceus* Golovatch, 2015, from Nepal, *K. biagrilectus* Hoffman, 1963, *K. davidiani* Golovatch, 2014 and *K. swinhoei* (Pocock, 1895) (the type-species), all three from China, *K. fuscocingulatus* Jeekel, 1982, from northern Thailand, *K. lunatus* Likhitrakarn, Golovatch et Panha, 2015, from northern Laos, *K. acuminatus* Attems, 1937 and *K. montanus* Golovatch, 2009, both from northern Vietnam, and *K. formosanus* (Verhoeff, 1939), from northern Taiwan [Likhi-

trakarn et al., 2015; Golovatch, 2015, 2019a]. Prompted by the discovery of *K. typicus* sp.n., another congener from China described just above, the following updated key to all 11 presently distinguished species of *Kronopolites* can be proposed.

KEY TO KNOWN SPECIES OF *KRONOPOLITES*, CHIEFLY BASED ON ♂ CHARACTERS

1 Coloration with a strongly contrasting pattern, some parts of body segments being much lighter, some other ones (regardless of largely yellowish venter and legs) much darker 2
– Coloration more uniform, usually brown to brown-blackish, regardless of largely yellowish venter and legs (Fig. 13–16); more rarely generally light 6
2 Paraterga relatively poorly developed, set low (mostly at ca. upper 1/3 of segments), caudal corners of midbody paraterga not projecting past tergal margin, at most narrowly rounded 3
– Paraterga relatively well developed, mostly set higher, caudal corners of midbody paraterga clearly produced past caudal tergal margin, acuminate 4
3 Sternal lobe between ♂ coxae 4 roundly subquadrate, with a straight apical margin; ♂ sternal cones absent; processes **a** and **b** of gonopod nearly independent, both ribbon-shaped, blunt, slender and long. Northern Thailand ..... *K. fuscocingulatus*
– Sternal lobe between ♂ coxae 4 concave, with a paramedian pair of small knobs between rounded apicolateral corners; ♂ sternal cones present; processes **a** and **b** of gonopod on a broad common stem, **b** sharp, axe-shaped and considerably shorter than **a**. China ..... *K. swinhoei*
4 Coloration dark brown with yellow paraterga; paraterga largely wing-shaped and upturned; paramedian sternal cones between ♂ coxae 3–5, the largest between 4th; processes **a** and **b** of gonopod short and small, sharing a very distinct common stem. Kashmir Himalaya ..... *K. occidentalis*
– Colour pattern different, rear halves of prozonae and fore halves of metazonae usually black-brown, remaining parts yellowish; paraterga neither wing-shaped nor upturned, lying well below dorsum; a single sternal lobe present only between ♂ coxae 4; processes **a** and **b** of gonopod longer and more slender, their shared base far less conspicuous 5
5 Process **a** of gonopod somewhat shorter than process **b**. Northern Vietnam ..... *K. acuminatus*
– Process **a** of gonopod somewhat longer than process **b**. Southern China ..... *K. biagrilectus*
6 General coloration light, paraterga yellow, metaterga light brown; paraterga very strongly developed, wing-shaped, mostly upturned; metaterga clearly coriaceous; processes **a** and **b** of gonopod subequal, both forming a short, strong, sharp fork on a distinct stem. Nepal ..... *K. coriaceus*
– General coloration dark; paraterga neither wing-shaped nor upturned; metaterga never coriaceous, at most rugulose/vermiculate; processes **a** and **b** of gonopod clearly different in shape and/or length 7
7 A pair of small paramedian cones between ♂ coxae 4; process **a** of gonopod almost twice as long as **b**. Northern Laos ..... *K. lunatus*
– Either a single lobe between ♂ coxae 4 or a lobe absent; process **a** of gonopod either subequal in length to or almost half as long as **b** 8
8 Processes **a** and **b** of gonopod subequal in length. Northern Taiwan ..... *K. formosanus*
– Process **a** of gonopod almost half as long as **b** 9
9 Neither a lobe between ♂ coxae 4 nor ♂ tarsal brushes. Northern Vietnam ..... *K. montanus*
– A single lobe between ♂ coxae 4; ♂ tarsal brushes present. Southwestern China 10
10 Process **a** of gonopod a small, pointed, leaf-shaped lobe, while **b** a slender and acuminate ribbon .... *K. davidiani*
– Process **a** of gonopod a curved, rather short, apically pointed ribbon nearly as long as a subtriangular **b** bearing a sharp basal spine with a mesal rib near base (Figs 19–24) ..... *K. typicus* sp.n.

Sigipinius grahami Hoffman, 1963

MATERIAL. 1 ♂ (ZMUM Rd 4660), China, Sichuan Prov., NW slope of Jiuding Shan, SE of Maoxian, 1.3 km NNW of Mt Jiuding, N31°37′06″, E103°53′58″, 3945 m a.s.l., 28.VI.2019, leg. I. Belousov, G. Davidian & I. Kabak.

REMARKS. This high-montane species seems to be endemic to Sichuan, southern China, its vertical distribution ranging from 2810 to 4170 m a.s.l. [Golovatch, Liu, 2020]. Its habitus, coloration and gonopodal characters have been illustrated by Golovatch [2017].

Sigipinius montanus (Golovatch, 2011)
Figs 25–26.

Chinomorpha montana Golovatch, 2011: 260 (original description).

Sigipinius montanus – Golovatch, 2013: 321 (new combination).

MATERIAL. 2 ♂♂ (ZMUM Rd 4661), China, Yunnan Prov., NW of Shangri-La, 2.25 km E of Nixi, N28°04′10″, E99°31′05″, 3835 m a.s.l., 13.VI.2019, leg. I. Belousov, G. Davidian & I. Kabak.

REMARKS. This high-montane species has hitherto been known only from its original description, also from near Nixi, Yunnan, occurring at 3710–4090 m a.s.l. [Golovatch, 2011]. The fresh samples are thus near-topotypes, one of which is illustrated here to confirm the species' identity, in particular the gonopodal conformation (Figs 25–26).

First described as the type, and sole, species of a new genus, *Chinomorpha* Golovatch, 2011, it was soon transferred to *Sigipinius* Hoffman, 1963, because *Chinomorpha* was shown to be a junior synonym of *Sigipinius* [Golovatch, 2013]. At the moment, this genus contains nine species [Golovatch, 2016], three from Yunnan, five from Sichuan and one from Xinjiang Uygur [Golovatch, Liu, 2020]; it belongs to the tribe Sundaninini [Golovatch, 2013]. That small, largely Sunda tribe currently contains 54 species in 11 genera, only three of which show the gonopod supplied with a distinct postfemoral sulcus/region: *Arthrogonopus* Jeekel, 1963 (6 species from Borneo), *Parasundanina* Golovatch, 2019 (2 species from Vietnam [Golovatch, 2019a]) and *Sigipinius*. This latter genus is the northernmost representative of the tribe, being confined to high mountains in south- and northwestern China, easily distinguished by the hypertrophied, foliate and mostly complex solenophore only feebly supporting a long flagelliform solenomere on the mesal side alone.

Tylopus kabaki Golovatch, 2014

MATERIAL. 1 ♂ (ZMUM Rd 4676), China, Yunnan Prov., Diancan Shan Mts, 0.9 km NW of Mt Lianhuafeng, N25°47′39″, E100°01′40″, 3675 m a.s.l., 28.V.2019; 2 ♂♂ (ZMUM Rd 4674,

Figs 25–26. *Sigipinius montanus* (Golovatch, 2011), ♂ from near Nixi, left gonopod, mesal and lateral views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 25–26. *Sigipinius montanus* (Golovatch, 2011), ♂ из окрестностей Nixi, левый гонопод, соответственно изнутри и сбоку. Фотографии К.В. Макарова, сняты без масштаба.

ZMUM Rd 4675), Yunnan Prov., Diancan Shan Mts, 0.8 km ENE of Mt Wutaifeng, N25°49′27″, E100°01′40″, 3665 m a.s.l., 27.V. 2019, all leg. I. Belousov, G. Davidian & I. Kabak.

REMARKS. This species is known only from high in the mountains of Yunnan, southern China [Golovatch, 2014, 2019b].

Tylopus uncinatus **sp.n.**
Figs 27–39.

HOLOTYPE ♂ (ZMUM Rd 4662), China, Yunnan Prov., W of Dali City, SW of Yangbi, 1 km NE of Mt Laoheshang, N25°36′10″, E99°55′29″, 2780 m a.s.l., 21.V.2019, leg. I. Belousov, G. Davidian & I. Kabak.

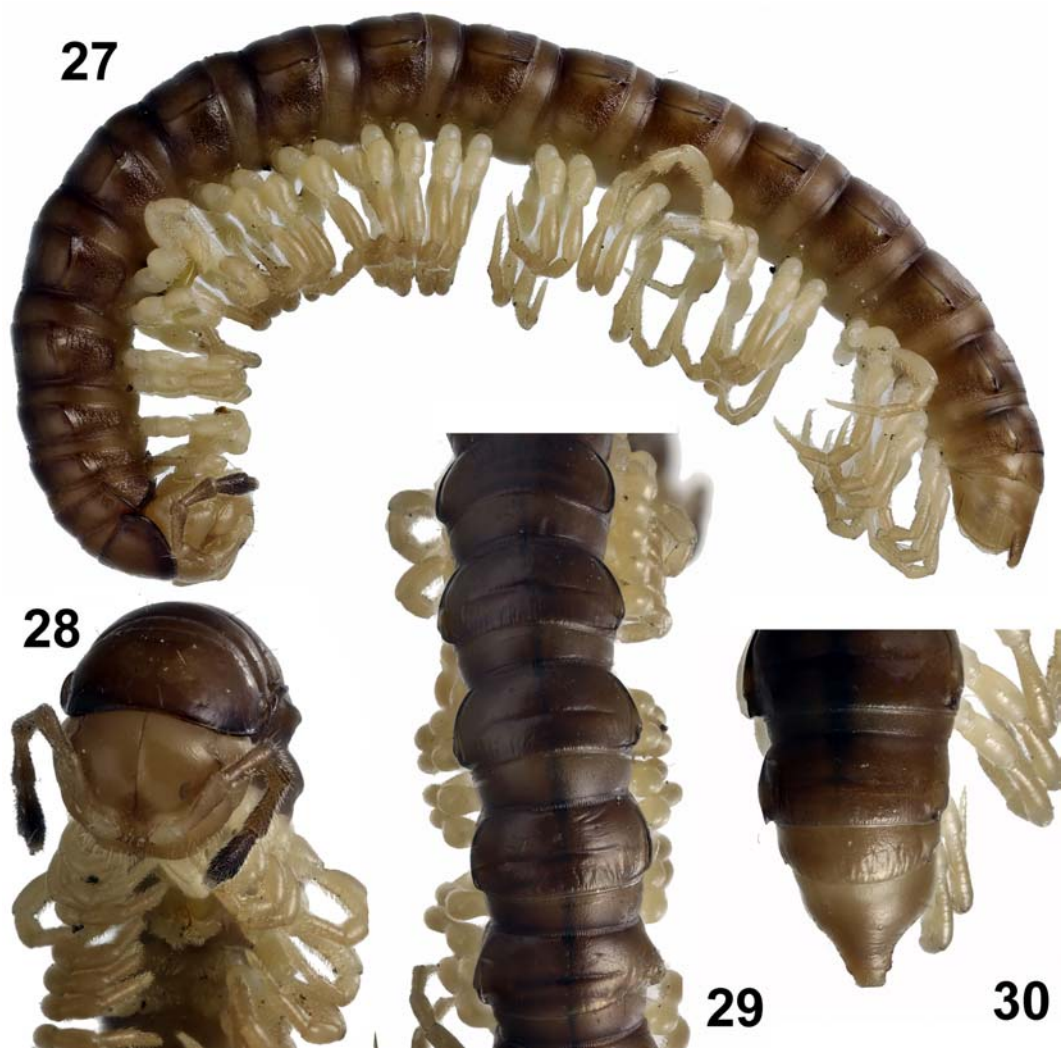
PARATYPES: 4 ♂♂, 1 ♀ (ZMUM Rd 4663), 1 ♂ (ZMUM Rd 4677), same data, together with holotype.

DIAGNOSIS. Using the latest available key to 62 species [Likhitrakarn et al., 2016], as well as the later additions of further 11 *Tylopus* spp. described since [Golovatch et al., 2016; Golovatch, Semenyuk, 2018; Golovatch, 2018, 2019b], this new species keys out to *T. prosperus* Golovatch et Enghoff, 1993, from northern Thailand [Golovatch, Enghoff, 1993]. However, it is distinguished from *T. prosperus* by the smaller body (16–17 (♂) or 20 mm (♀) long, 1.5–1.6 and 1.9–2.0 (♂) or 2.0 and 2.4 mm (♀) wide on midbody pro- and metazonae, respectively, vs. 20–22 (♂) or 23–26 mm (♀) long, 1.8–2.0 and 2.2–2.3 (♂) or 2.1–2.4 and 2.5–28 mm (♀) wide on midbody pro- and metazonae, respectively), the lighter brown coloration, the absence of adenostyles, the caudally dentiform paraterga (18 and 19) never drawn past rear tergal margin (vs. drawn on segments 16–19) etc. The new species differs from all congeners by the peculiar shape of the gonopod, in particular the unciform and pointed gonopodal tip, process **h** and tooth **z** (Figs 35–39).

NAME. To emphasize the unciform and pointed gonopodal tip, process **h** and tooth **z**.

DESCRIPTION. Length ca. 16–17 (♂) or 20 mm (♀), width of midbody pro- and metazonae 1.5–1.6 and 1.9–2.0 (♂) or 2.0 and 2.4 mm (♀), respectively. Holotype ca. 16 mm long and 1.5 and 1.9 mm wide, respectively. Coloration in alcohol uniformly light brown to brown, often with a slightly cingulate pattern due to somewhat lighter prozonae; antennae brown, increasingly infuscate distad, with antennomeres 6 and 7 dark brown; genae, vertex, venter and legs lighter, nearly pallid to light brown, legs being increasingly infuscate distad (Figs 27–30).

Clypeolabral region moderately setose, vertigial one bare; epicranial suture fine, but distinct (Fig. 28). Antennae long, slender and only slightly clavate (Figs 27, 28), extending past metatergum 3 (♂) or 2 (♀) when stretched dorsally. In length, antennomeres 2–6<1=7. Interantennal isthmus ca. 0.7–0.8x diameter of antennal socket (Fig. 28). Tegument shining, generally smooth, metaterga only in places rugulose or striolate, below paraterga microgranulate and faintly rugulose. In width, head = segment 3 < collum < 2=4 < 5–16; body gradually tapering thereafter. Paraterga poorly developed (Figs 27–30), mostly set at about upper 1/3 of midbody height, distinctly declined; in ♂, calluses thin, in lateral view only slightly thicker on pore-bearing segments than on poreless ones due to ozopores, delimited by a complete sulcus only dorsally; ♀ paraterga suppressed, represented only by a shallow dorsal sulcus; paraterga on collum particularly thin, bordered, regularly and broadly rounded at anterior and lateral margins, obtuse-angled and rather narrowly rounded at caudal corner; paraterga 2 set especially low, as usual, obviously drawn into rounded lappets both forward and caudad, with three insertion points of abraded setae at lateral margin; in dorsal view, anterior and lateral margins of following ♂ paraterga regularly rounded, pore-bearing ones slightly thicker and sinuate in caudal ca. 1/5, marking small and dorsally invisible ozopores; caudal corners of ♂ paraterga 3–16 obtuse-angled and rounded, of ♂ paraterga 17–19 dentiform, sharp and small denticles on 18th and 19th, but never drawn past caudal tergal margin (Figs 27–30). Each ozopore lying inside an elongate groove in front of caudal corner of poriferous paraterga. Tergal setae mostly abraded,



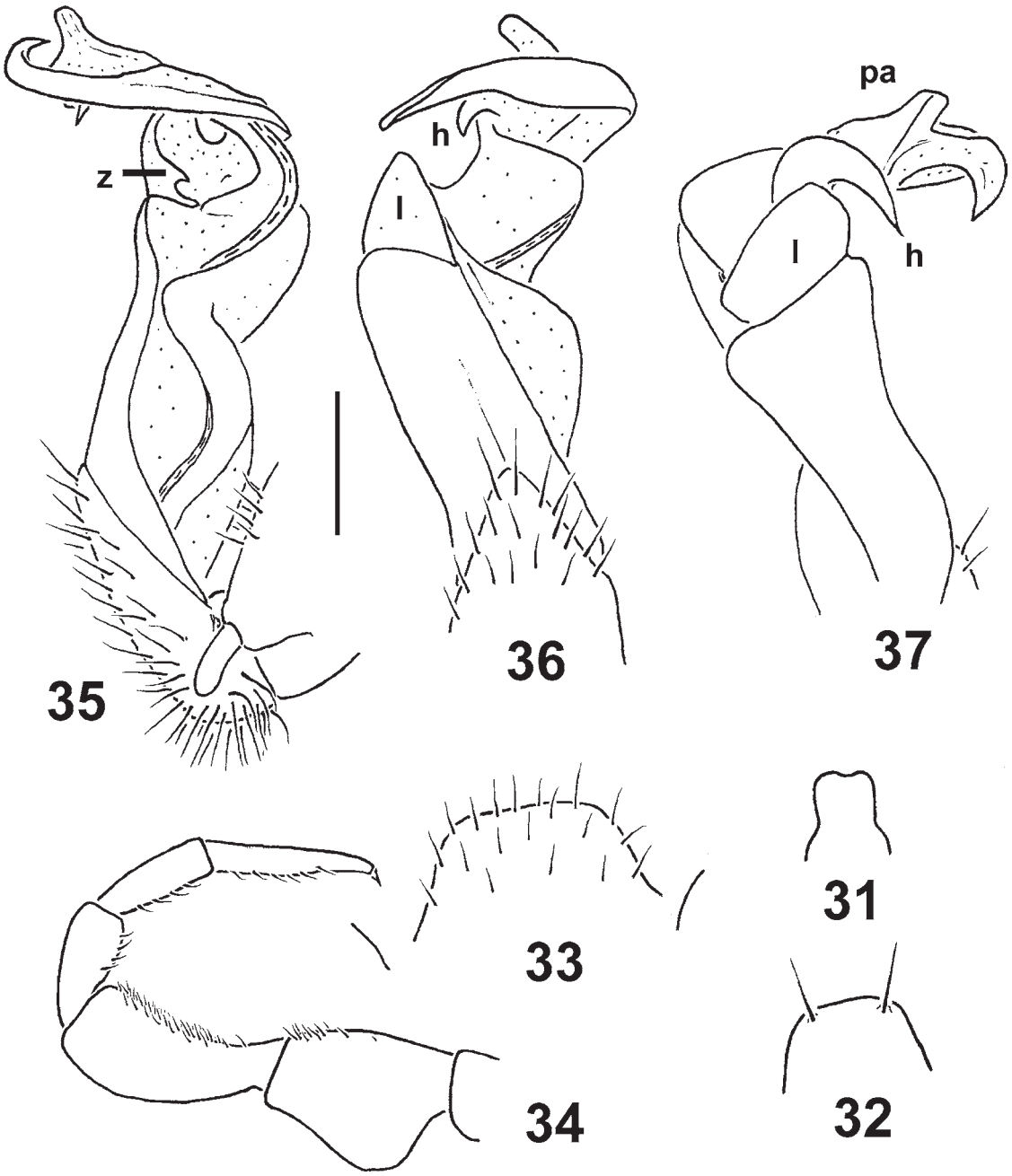
Figs 27–30. *Tylopus uncinatus* sp.n., ♂ paratype. 27 — habitus, lateral view; 28 — anterior part of body, ventral view; 29–30 — middle and caudal parts of body, respectively, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 27–30. *Tylopus uncinatus* sp.n., паратип ♂♂. 27 — общий вид, сбоку; 28 — передняя часть тела, снизу; 29–30 — соответственно средняя и задняя части тела, сверху. Фотографии К.В. Макарова, сняты без масштаба.

pattern traceable as 2+2 insertion points in anterior transverse row, regardless of 2–3 points on calluses; setae ca. 1/4–1/5 as long as metatergum. Limbus entire. Stricture between pro- and metazonae shallow and rather broad, striolate dorsally at bottom. Transverse metatergal sulci shallow, slightly arched medially, not reaching the bases of paraterga, present on segments 5–17. Axial line missing. Pleurosternal carinae small, but increasingly evident, rounded, granular ridges on segments 2–7, vestigial on 8th, thereafter wanting (♂) or only vestigial on segments 2–7 (♀). Epiproct (Figs 30, 31) long, conical, tip slightly bimodal or subtruncate, lateral pre-apical papillae small, but evident. Hypoproct (Fig. 32) roundly subtrapeziform, caudal margin with 1+1 setae not borne on knobs.

Sterna densely setose, cross-impressions shallow, axial impressions especially weak, without modifications except for a broad, roundly subtrapeziform, setose lobe between ♂ coxae 4 (Fig. 33). No tubercles near gonopod aperture. Legs rather long (Figs 27–30, 34), ♂ ones clearly incrassate compared to ♀, midbody ones ca. 2.1–2.2 (♂) or 0.9–1.0 (♀) times as long as body height, ♂ legs more densely setose, devoid of adenostyles; ♂ prefemora laterally strongly bulging (Fig. 34), ♀ ones subcylindrical; ventral brushes on ♂ tarsi gradually thinning out towards segments 7–9, on ♂ femora towards midbody segments.

Gonopods (Figs 35–39) typical of the genus, relatively complex, *in situ* held parallel to each other, with tips directed mesad. Coxite subcylindrical, almost as long as femorite, setose distoventrally; cannula as usual, a small, curved, hollow tube. Prefemoral (= densely setose) part ca. 0.6x as long as acropodite and only slightly shorter than a medially hollow femorite. Seminal groove running along mesal face of femorite at bottom of a distinct gutter, moving onto a very long, flagelliform, free solenomere at base of a simple, subquadrate, postfemoral, lateral lobe (**l**) demarcated by a distinct, transverse, lateral sulcus to become squeezed between and sheathed by folds of a lamina lateralis and a lamina medialis of solenophore, both laminae being well-devel-



Figs 31–37. *Tylopus uncinatus* sp.n., ♂ paratype. 31 — epiproct, dorsal view; 32 — hypoproct, ventral view; 33 — sternal lobe between coxae 4, caudal view; 34 — leg 7, lateral view; 35–37 — right gonopod, mesal, ventral and lateral views, respectively. Scale bars: 0.1 (31–34) and 0.2 mm (35–37). Designations explained in text.

Рис. 31–37. *Tylopus uncinatus* sp.n., паратип ♂. 31 — эпипрокт, сверху; 32 — гипопрокт, снизу; 33 — стернальная пластинка между тазиками 4, сзади; 34 — нога 7, сбоку; 35–37 — правый гонопод, соответственно изнутри, снизу и сбоку. Масштаб: 0,1 (31–34) и 0,2 мм (35–37). Объяснения обозначений даны в тексте.

oped, very long, coiled, concealing entire solenomere; post-femoral part bearing not only lobe **l**, but also a small tooth (**z**) and a large, pointed, unciform process **h**; pre-apical part (**pa**) of solenophore membranous and axe-shaped, tip acuminate and pointed.

REMARKS. With its 73 currently recognized species (and many still to be expected in future) that range from southern China in the north, through most of Indochina, to Myanmar in the south, *Tylopus* Jeekel, 1968 remains the largest genus of Paradoxosomatidae globally [Golovatch, 2019b].

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Figs 38–39. *Tylopus uncinatus* sp.n., ♂ paratype, right gonopod, mesal and ventral views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 38–39. *Tylopus uncinatus* sp.n., паратип ♂, правый гонопод, соответственно изнутри и снизу. Фотографии К.В. Макарова, сняты без масштаба.

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