

**A new species of the millipede genus *Jaxartes* Verhoeff, 1930  
(Diplopoda: Polydesmida: Polydesmidae) from the Ketmen Mountains,  
Tian Shan, southeastern Kazakhstan**

**Новый вид двупарноногих многоножек рода *Jaxartes* Verhoeff, 1930  
(Diplopoda: Polydesmida: Polydesmidae) с гор Кетмень  
(Тянь-Шань, юго-восточный Казахстан)**

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КЛЮЧЕВЫЕ СЛОВА: таксономия, Центральная Азия, Средняя Азия.

**ABSTRACT.** *Jaxartes golovatchi* sp.n. is described and illustrated from the Ketmen Mountains, an outcrop of northern Tian Shan, SE Kazakhstan. The new species seems to be especially similar to *J. stummeri* Attems, 1904, but differs from congeners by the combination of the following characters: non-incised paraterga, an almost wanting metatergal sculpture, and the gonopod endomere that is clearly longer than a fringed distofemoral process.

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**РЕЗЮМЕ.** С гор Кетмень, отрога северного Тянь-Шаня, юго-восточный Казахстан, описан и проиллюстрирован *Jaxartes golovatchi* sp.n. Новый вид, по-видимому, больше всего похож на *J. stummeri* Attems, 1904, однако он отличается от своих сородичей набором следующих признаков: неизрезанные паратергиты, почти лишенные скульптуры метатергиты и явственно более длинный эндомер гонопода по сравнению с бахромчатым дистофеморальным отростком.

## Introduction

The polydesmid genus *Jaxartes* Verhoeff, 1930 was originally established as monotypic, with the sole, and therefore type species *J. zachvatkini* Verhoeff, 1930, from Tashkent, Uzbekistan [Verhoeff, 1930]. It was only quite

recently that Antić *et al.* [2019] clarified the identity of this genus, synonymizing it with *Turanodesmus* Lohmander, 1933; they also described two new species, made a formal transfer of nine species from *Turanodesmus* to *Jaxartes*, and mapped all of them. At present, the Central Asian genus *Jaxartes* encompasses twelve species that range from eastern Turkmenistan in the west, through Uzbekistan and southern Kazakhstan, to eastern Kyrgyzstan in the east [Antić *et al.*, 2019], viz. *J. almassyi* (Attems, 1904), *J. communicans* Antić, Golovatch et Spelda, 2019, *J. cornutus* (Spelda, Golovatch et Meidell, 1999), *J. cynodon* (Spelda, Golovatch et Meidell, 1999), *J. elevatus* (Lohmander, 1933), *J. expressus* (Golovatch, 1979), *J. glaber* (Spelda, Golovatch et Meidell, 1998), *J. inermis* (Lohmander, 1933), *J. reductus* Antić, Golovatch et Spelda, 2019, *J. stummeri* (Attems, 1904), *J. tenuis* (Golovatch, 1979), and *J. zachvatkini* Verhoeff, 1930 [Attems, 1904, 1940; Verhoeff, 1930; Lohmander, 1933; Golovatch, 1979; Spelda *et al.*, 1999; Antić *et al.*, 2019].

The present paper is devoted to the description of a new species of *Jaxartes* discovered in the Ketmen Mountains, N Tian Shan, SE Kazakhstan.

## Material and methods

Working on a revision of the millipede genus *Schizoturanius* Verhoeff, 1931, we have recently come across samples of a new species of *Jaxartes*. Specimens were collected in 70% ethanol by S.I. Golovatch from the Ketmen Mountains, an outcrop of Tian Shan Mountains in southeastern Kazakhstan. The type material is deposited in the collection of the Zoological Museum, Lomonosov Moscow State University, Russia (ZMUM).



Figs 1–2. *Jaxartes golovatchi* sp.n., 1 — ♂ holotype; 2 — ♀ paratype. 1, 2 — habitus, lateral and dorsolateral views, respectively. Scale bar: 1 cm.

Рис. 1–2. *Jaxartes golovatchi* sp.n., 1 — ♂ голотип; 2 — ♀ паратип. 1, 2 — внешний вид, соответственно сбоку, сверху и сбоку. Масштаб: 1 см.

Transmission habitus pictures were taken using a C-mex-10 Pro digital camera attached to a NexiusZoom EVO 1703-S trinocular stereo microscope and a MtPoint iScope 1253-PLi trinocular stereo microscope, respectively, manipulated via Euromex ImageFocusAlpha (ver. x64, 1.3.7.15529.20190906) software at the Science Department Laboratory of the Tigirek State Nature Reserve. Scanning electron microscopy (SEM) micrographs were prepared at the Center for Collective Use of Microscopy and X-ray Spectroscopy (Institute for Water and Environmental Problems, Siberian Branch, Russian Academy of Sciences, Barnaul, Russia), using a Hitachi S-3400N scanning electron microscope. Mounts for SEM were made through air-drying, mounting on stubs, and coating with gold and platinum. SEM material was removed from stubs and returned to alcohol after examination. Digital images were stacked and assembled in Adobe Photoshop CS6. The approximate measurements in the images were performed using an online photo measuring tool (<https://eleif.net/photomeasure>).

The terminology used in describing the gonopod conformation follows that of Antić *et al.* [2019]. The following formula is proposed for body ring counts: Collum + podous rings + apodous rings + Telson.

Abbreviations used to denote habitus and gonopodal structures are explained in the text.

## Taxonomy

### *Jaxartes golovatchi* sp.n.

Figs 1–29.

HOLOTYPE ♂ (ZMUM Rd 5462; in 6 pieces, with dissected antenna, head, leg-pair 1, gonopod segment 7 with leg-pair 9, gonopods), Kazakhstan, Almaty Area, Uygur District, [N Tian Shan], Ketmen

Mountains, 5 km SE of Kyrgyzsai (= Podgornoye), 43°17'N, 79°31'E, ca. 1900 m a.s.l., *Picea*, *Betula*, *Populus* etc. forest, 1–2.VI.2001, S.I. Golovatch leg.

PARATYPE ♀ (ZMUM 5463; in 3 pieces, with dissected head, collum + segment 2, vulvae), same locality, together with holotype.

NAME. To honour Sergei I. Golovatch (Moscow, Russia), the collector. Noun in genitive case.

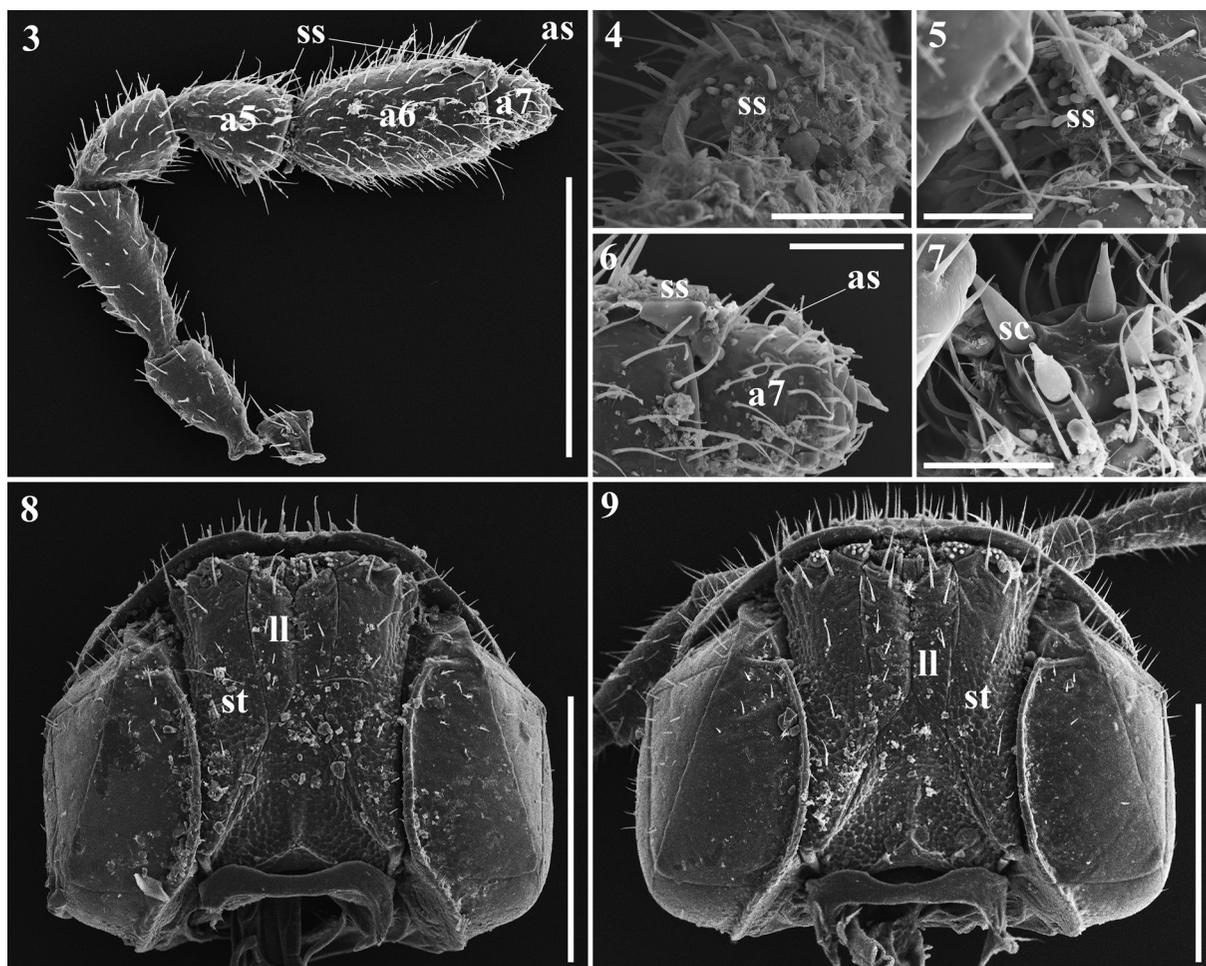
DIAGNOSIS. Differs from congeners mainly by the combination of the following characters: non-incised paraterga, an almost wanting metatergal sculpture, and the gonopod endomere that is clearly longer than a fringed distofemoral process.

DESCRIPTION. Length 8.3 mm (holotype ♂), 8.1 mm (paratype ♀), width of midbody pro- and metazona 0.5 and 0.6 mm (holotype ♂) or 0.6 and 0.7 mm (paratype ♀), respectively.

Body moniliform, with 20 rings (C+17p+1a+T) in adults of both sexes. Coloration in alcohol pale pinkish beige to yellowish, legs lighter (Figs 1–2). Tegument moderately shining throughout; texture very delicately shagreened, alveolate, except for smooth and convex metatergal surfaces.

Head mostly densely pubescent, with convex genae, clypeolabral region with stronger setae, but occiput and near-antennal regions bare (Figs 13, 16). Antennae moderately long, clavate, *in situ* reaching past ring 2 dorsally; in length, antennomere 6 > 3 > 4 > 5 > 2 > 7 > 1; antennomeres 5 and 6 (a5 and a6) each with a small group of subbacilliform sensilla (ss) distodorsally (Figs 4–5); antennomere 7 (a7) with a terminal disc bearing four sensory cones (sc) (Fig. 7), and a small, distodorsal knob with a few acuminate sensilla (as) (Fig. 6). Gnathochilarium (Figs 8–9) typical of Polydesmida, each stipes (st) with 8–11 setae, each lamella lingualis (ll) with 5–6 setae increasingly long distally.

In holotype ♂, width of head (0.6 mm broad) > collum < ring 2 = 3 < 4 < 5 < 6 = 12 > 13 = 14 < 15 < 16; thereafter body



Figs 3–9. *Jaxartes golovatchi* sp.n., 3–8 — ♂ holotype; 9 — ♀ paratype. 3 — antenna, lateral view; 4–5 — antennomeres 5 and 6, frontodorsal views; 6 — antennomere 7, lateral view; 7 — terminal disc of antenna, front view; 8–9 — gnathochilarium. Scale bars: 0.03 mm (5, 7), 0.05 mm (4, 6), 0.3 mm (3, 8, 9).

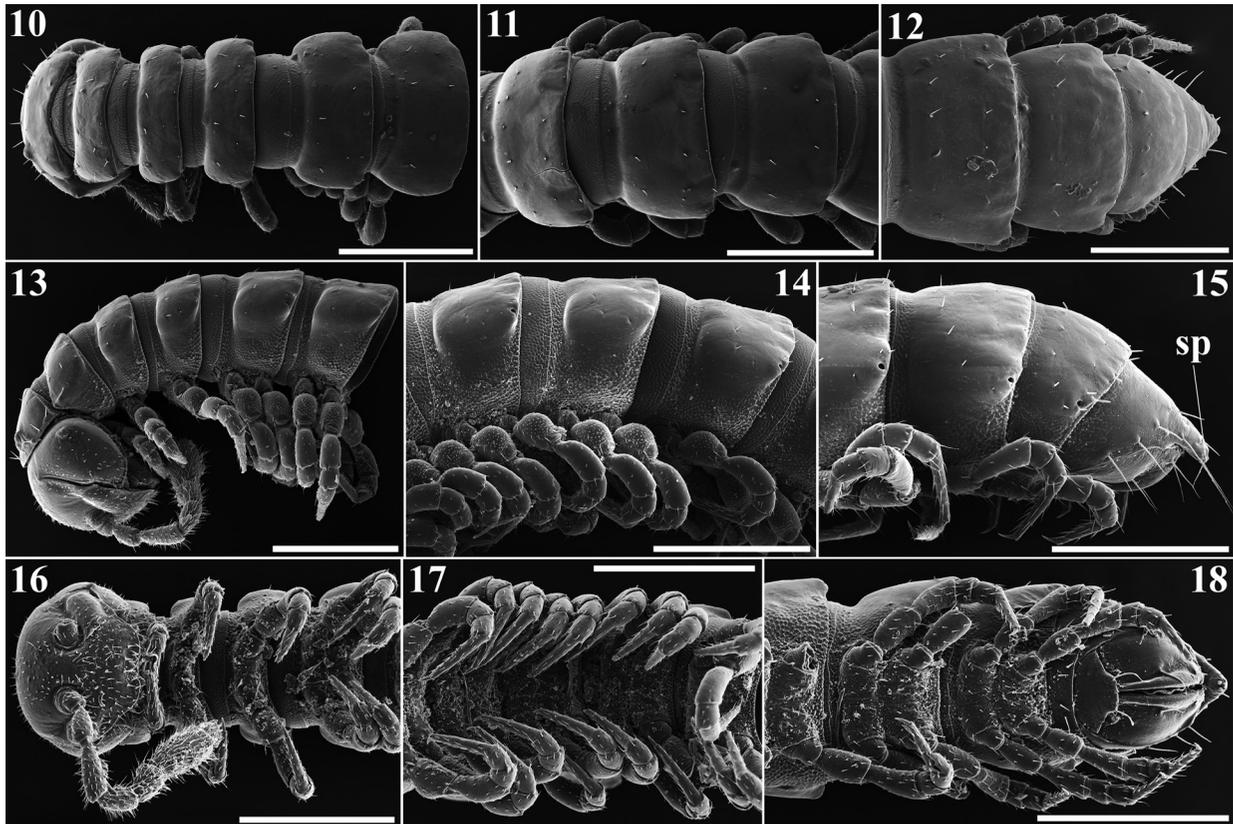
Рис. 3–9. *Jaxartes golovatchi* sp.n., 3–8 — ♂ голотип; 9 — ♀ паратип. 3 — антенна, сбоку; 4–5 — антенномеры 5 и 6, спереди и сверху; 6 — антенномер 7, сбоку; 7 — терминальный диск антенны, спереди; 8–9 — гнатохилирий. Масштаб: 0,03 мм (5, 7), 0,05 мм (4, 6), 0,3 мм (3, 8, 9).

gradually, but significantly tapering towards telson (0.3 mm broad). In paratype ♀, width of head (0.6 mm broad) > collum < ring 2 < 3 < 4 < 5 < 6 = 12 < 13 = 14 < 15 < 16; thereafter body rather rapidly tapering towards telson (0.4 mm broad). Collum transversely ovoid, ellipsoid. Convex metatergal surfaces of rings 2–4 increasingly short compared to following ones. Metatergal polygonal sculpture very poorly developed, with three hardly visible transverse rows of flat bosses, more distinct on a few posteriormost rings, almost obliterate on midbody ones; each boss supporting a simple, short, conicospiniform tergal seta at its rear margin; telson with four long lateral setae (Figs 10–15). Collum with 10 setae only in first row, and eight setae in each of two following rows, while following metaterga with three rows of eight setae each. Lateral edges of swollen paraterga non-incised, smooth, without lateral teeth. Limbus, or caudal margin of metazona serrated, excluding telson. Epiproct process rather long, rounded at tip, carrying a couple of dorsal and long, acuminate, lateral setae, and a group of four setiform spinnerets (**sp**) (some spinnerets broken off) (Fig. 15). Paraprocts with a couple of setae each, and hypoproct with a pair of setae (Fig. 18).

Legs generally rather long and slender, incrassate and slightly longer in ♂ compared to ♀, podomeres setose; femora

and postfemora with prominent distodorsal protrusions (Fig. 14). ♂ podomeres ventrally with sphaerotrichomes on femora, postfemora, tibiae and tarsi; prefemora papillate dorsally as well; ♂ prefemora clearly bulged dorsad. ♂ leg-pair 1 (Fig. 19) somewhat reduced compared to following walking legs, coxae elongate ventrally; each claw (**c**) with an accessory claw (**ac**) ventrally (Fig. 21). Leg-pair 2 in both sexes without accessory claw ventrally. Female coxae 2 (**cx2**) flattened, with a lateral lobe (Fig. 20). Both ♂ leg-pairs of ring 19 with tiny accessory claws (**ac**) frontoventrally (Figs 22–23). Pregonopodal sterna unmodified.

Gonopods (Figs 24–27) simple. Gonopod coxites enlarged and prominent, delicately papillate laterally, each with a rounded external outgrowth (**ro**) bearing no apical seta, as well as a small crest (**cr**) located a little more caudally; cannula slender, curved, as usual. Telopodite slightly longer than coxite, stout, distal end strongly curved posteriorly at a nearly right angle; basal (= prefemoral) part of telopodite densely setose; seminal groove entirely mesal; endomere (**end**) considerably longer than a fringed distofemoral process (**f**); **end** with neither any tooth nor bulge, ending up in a bifid, short and ventrally curved lobule resembling the end of the trunk of an African elephant; a hairy pulvillus absent.



Figs 10–18. *Jaxartes golovatchi* sp.n., ♂ holotype. 10, 13, 16 — anterior part of body, dorsal, lateral and ventral views, respectively; 11, 14, 17 — middle part of body, dorsal, lateral and ventral views, respectively; 12, 15, 18 — posterior part of body, dorsal, lateral and ventral views, respectively. Scale bars: 0.4 mm (12, 15), 0.5 mm (10–11, 13–14, 16–17).

Рис. 10–18. *Jaxartes golovatchi* sp.n., ♂ голотип. 10, 13, 16 — передняя часть тела, соответственно сверху, сбоку и снизу; 11, 14, 17 — средняя часть тела, соответственно сверху, сбоку и снизу; 12, 15, 18 — задняя часть тела, соответственно сверху, сбоку и снизу. Масштаб: 0,4 мм (12, 15), 0,5 мм (10–11, 13–14, 16–17).

Transverse epigynal ridge (**er**) behind ♀ leg-pair 2 well-developed (Fig. 20). Vulvae oval, front surface of bursa (**bu**) on top with six pairs of long setae twisted at end, and a longitudinal crest (**lc**) at 3/4 of its extent (Figs 28–29); lateral surfaces of **bu** with robust, acuminate, increasingly long setae; operculum (**op**) with several pairs of long setae on top.

## Discussion

*Jaxartes golovatchi* sp.n. seems to be especially similar to *J. stummeri*. Both species are characterized by an almost wanting metatergal sculpture and the presence of a fringed distofemoral process on the gonopodal telopodite, but the gonopod endomere is clearly longer than a fringed distofemoral process in *J. golovatchi* sp.n., vs subequal in size in *J. stummeri* in the original description or even vice versa, a fringed distofemoral process distinctly longer than the gonopod endomere [see Attems, 1904, fig. 18; Spelda *et al.*, 1999, fig. 38]. At the same time, *J. golovatchi* sp.n. differs from *J. stummeri* in the absence of a serrate ledge (“gezackte Leiste” in the original description).

In gonopodal conformation, *J. golovatchi* sp.n. seems to be particularly similar to *J. cynodon*, from the Nuratinsky Nature Reserve and *J. communicans* (see below). All

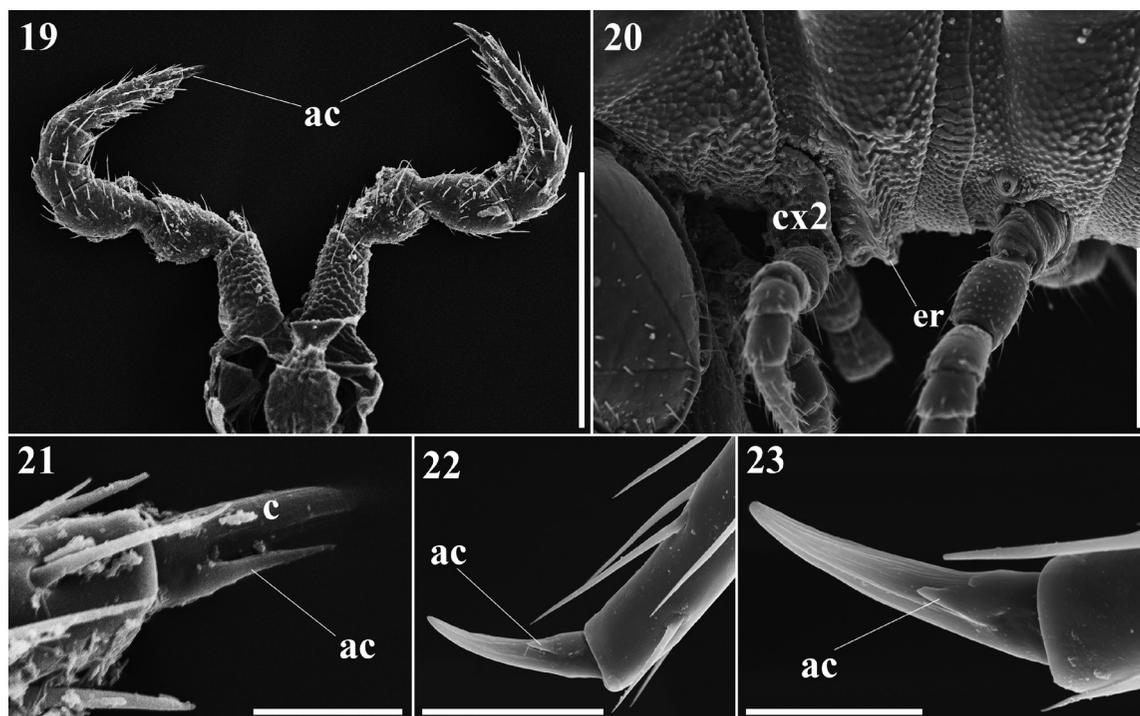
these three species compared share a fringed or flagelloid distofemoral process of the gonopod endomere. At the same time, *J. golovatchi* sp.n. has non-incised paraterga devoid of lateral teeth, and a poorly developed, almost wanting metatergal sculpture with hardly visible transverse rows of flat bosses with short, conicospiniform setae, almost obliterate on midbody rings, vs incised paraterga, and an evident metatergal sculpture of bosses/tubercles with bacilliform or subbacilliform to clavate setae in *J. cynodon* and *J. communicans*.

*Jaxartes golovatchi* sp.n. is the first millipede to be reported from the Ketmen Mountains.

As most probably the paratypes of *J. cynodon* from Vannovka, S Kazakhstan differ from the holotype and paratypes from the Nuratinsky Nature Reserve, Uzbekistan (endomere serrate and longer than a fringed distofemoral process in the holotype and paratypes from the Nuratinsky Nature Reserve, vs a bare endomere with a small tooth at base, and shorter than an unfringed distofemoral process in the paratypes from Vannovka) strongly enough, they seem to belong to different species and require restudy.

## COMPLIANCE WITH ETHICAL STANDARDS

**Ethical approval:** No ethical issues were raised during our research.



Figs 19–23. *Jaxartes golovatchi* sp.n., 19, 21–23 — ♂ holotype; 20 — ♀ paratype. 19 — leg-pair 1, front view; 20 — anterior part of body, lateral view; 21–23 — claw on leg-pair 1, preultimate and ultimate leg-pairs, frontolateral views. Scale bars: 0.02 mm (21, 23), 0.04 mm (22), 0.2 mm (20), 0.3 mm (19).

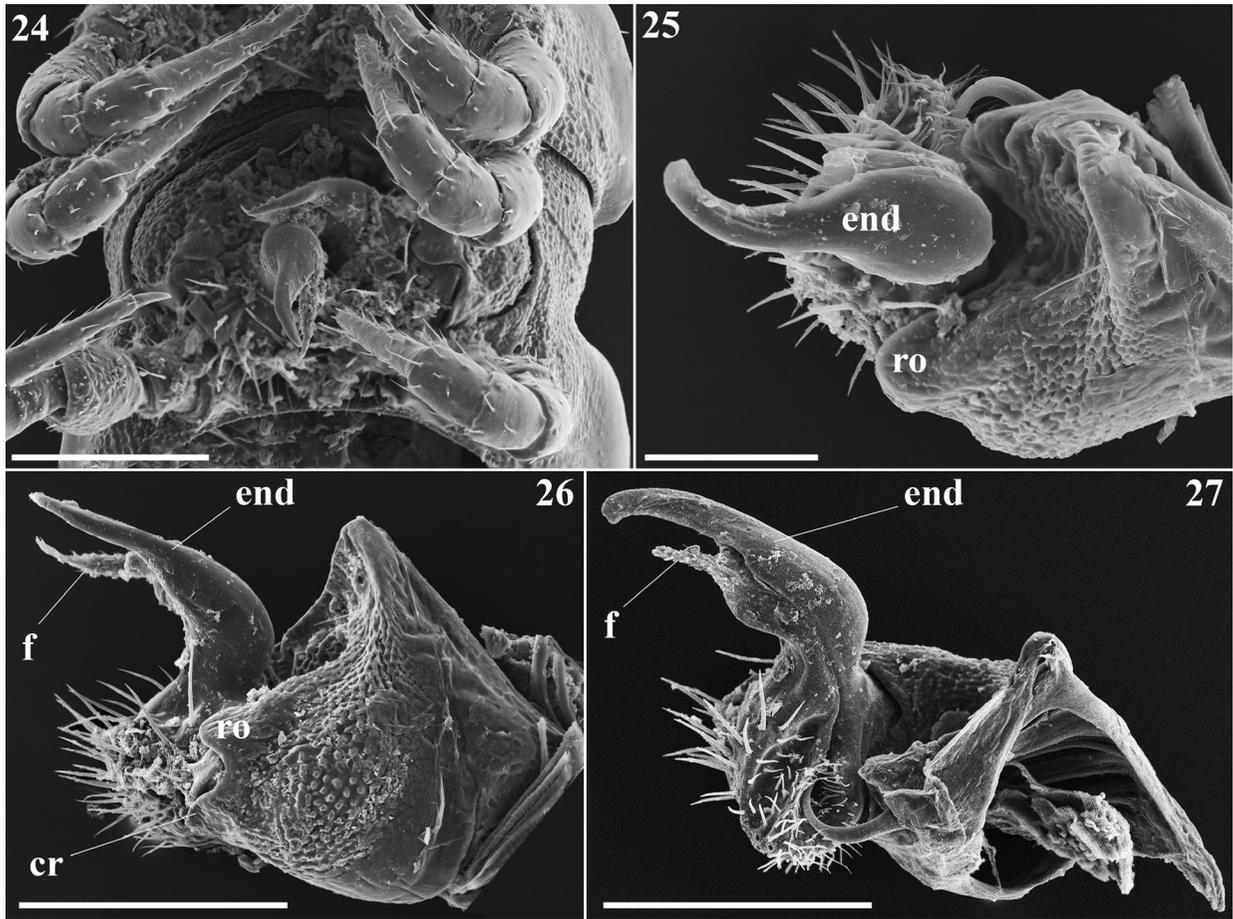
Рис. 19–23. *Jaxartes golovatchi* sp.n., 19, 21–23 — ♂ голотип; 20 — ♀ паратип. 19 — 1-я пара ног, спереди; 20 — передняя часть тела, сбоку; 21–23 — коготь на 1-й, предпоследней и последней парах ног, спереди и сбоку. Масштаб: 0,02 мм (21, 23), 0,04 мм (22), 0,2 мм (20), 0,3 мм (19).

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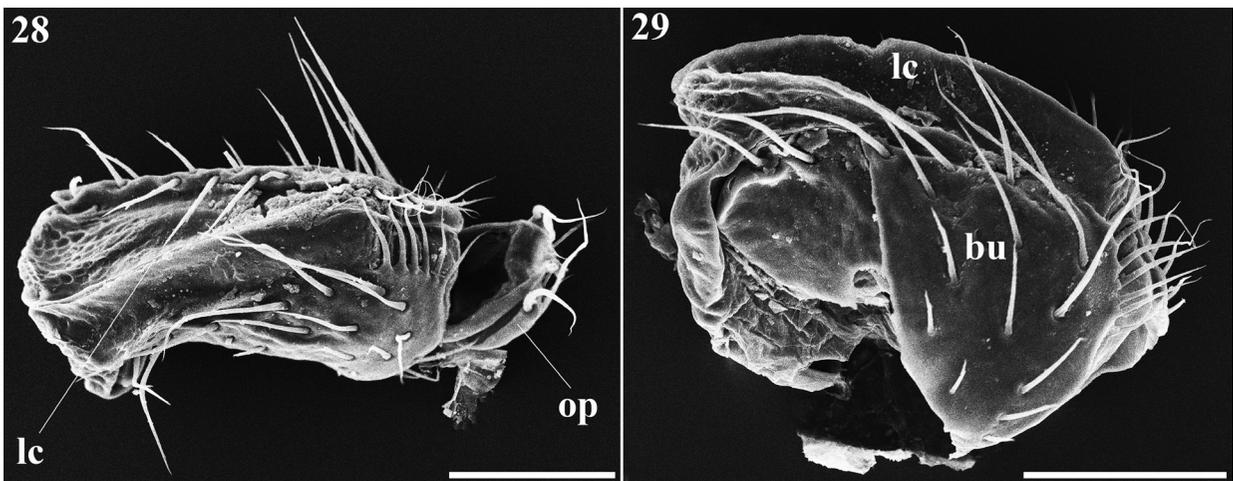
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Figs 24–27. *Jaxartes golovatchi* sp.n., ♂ holotype. 24 — gonopod-bearing ring 7 with gonopods *in situ*, ventral view; 25–27 — gonopod, front, lateral and mesal views, respectively. Scale bars: 0.1 mm (25), 0.2 mm (24, 26–27).

Рис. 24–27. *Jaxartes golovatchi* sp.n., ♂ голотип. 24 — несущий гоноподы сегмент 7 с гоноподами *in situ*, снизу; 25–27 — гонопод, соответственно спереди, сбоку и изнутри. Масштаб: 0,1 мм (25), 0,2 мм (24, 26–27).



Figs 28–29. *Jaxartes golovatchi* sp.n., ♀ paratype. 28–29 — vulva, front and lateral views, respectively. Scale bars: 0.1 mm.

Рис. 28–29. *Jaxartes golovatchi* sp.n., ♀ паратип. 28–29 — вульва, соответственно спереди и сбоку. Масштаб: 0,1 мм.