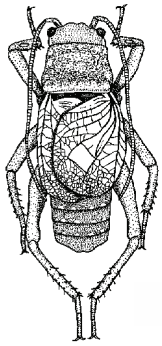

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FIRST RECORD OF THE MILLIPEDE GENUS *SCHIZOTURANIUS* VERHOEFF, 1931 (DIPLOPODA: POLYDESMIDA: POLYDESMIDAE) FROM CHINA, WITH DESCRIPTION OF A NEW SPECIES

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Summary. *Schizoturanius sinensis* **sp. n.** is described and illustrated from Xinjiang, *Schizoturanius* Verhoeff, 1931 thus being formally recorded from China for the first time. The new species seems to be especially similar to *S. levis* Mikhaljova, 2013, but it differs from congeners by the presence of transverse folds on the anterior surface of the gonotelopodite, and the postfemoral region of the gonopod endomere carrying a long and flat external process curved at an almost right angle and covered with folds, but devoid of serrations. The distributions of all *Schizoturanius* species are mapped, and an updated key to species of the genus is given.

Key words: taxonomy, new species, fauna, new record, Tian Shan, Xinjiang.

П. С. Нефедьев. Первая находка двупарноногой многоножки рода *Schizoturanius* Verhoeff, 1931 (Diplopoda: Polydesmida: Polydesmidae) из Китая с описанием нового вида // Дальневосточный энтомолог. 2023. N 491. С. 1-11.

Резюме. Из Синьцзяна описан *Schizoturanius sinensis* **sp. n.**, тем самым род *Schizoturanius* Verhoeff, 1931 впервые отмечен в Китае. Новый вид наиболее сходен с *S. levis* Mikhaljova, 2013 и отличается от него и других представителей рода наличием поперечных складок на передней поверхности гонотелоподита, а постфеморальный участок эндомера гонопода несет длинный и плоский внешний отросток, изогнутый почти под прямым углом, покрытый складками и лишенный зубцов. Приведены карта распространения видов *Schizoturanius* и определительная таблица видов рода.

INTRODUCTION

The millipede fauna of mainland China is very rich, albeit far from well known, currently comprising 367 species from 73 genera, 27 families, and eleven orders (Golovatch & Liu, 2020; Liu & Golovatch, 2020; Mikhaljova, 2020a, 2020b, 2022a, 2022b, 2023a, 2023b). Members of the order Polydesmida account thereby for more than 50%, both at the species and generic levels.

Schizoturanius Verhoeff, 1931 is a small genus that currently includes nine species which mainly occur in Central Asia. The only one species, *S. dmitriewi* (Timotheew, 1897), which inhabits the Altai Mountains, southwestern Siberia, Russia, reaches beyond the Urals and shows remarkable disjunct outposts in central and eastern Ukraine, southwestern and central European Russia. The most recent information concerning the genus *Schizoturanius* can be found in its fresh review (Nefediev, 2022), and a re-description of *S. kitabensis* (Gulička, 1963) from Uzbekistan (VandenSpiegel & Golovatch, 2023).

The present paper provides the first record of *Schizoturanius* from China with the description of a new species, as well as an updated key to species of the genus.

MATERIAL AND METHODS

The type material is deposited in the collection of the Zoological Museum, Lomonosov Moscow State University, Russia (ZMUM).

Specimens were kept in 70–75% ethanol. 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, both manipulated with 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) was performed 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 = IWEP), using a Hitachi S-3400N scanning electron microscope, and at the Bio-Geo-Clim Laboratory of the Research Institute of Biology and Biophysics (Tomsk State University, Tomsk, Russia = TSU), using a Hitachi TM3000 scanning electron microscope. Mounts for SEM were made through

air-drying, mounting on stubs, and coating with gold and platinum (only at IWEP). SEM material was removed from stubs and returned to alcohol after examination. Digital image stacking and final figure plates were processed and assembled with the help of Adobe Photoshop CS6. The distribution map was composed using QGIS 3.32.1-Lima.

The terminology used in describing the gonopod conformation follows that of Golovatch (2014, 2015). The following body ring formula is proposed: **C**ollum + **p**odous rings + **a**podous rings + **T**elson. Abbreviations used to denote habitus and gonopod structures are explained directly in the figure captions and in the text.

DESCRIPTION OF NEW SPECIES

Schizoturanius sinensis **Nefediev, sp. n.**

https://zoobank.org/NomenclaturalActs/9963546F-EA35-4337-BF1E-D1ADEC6FBD86

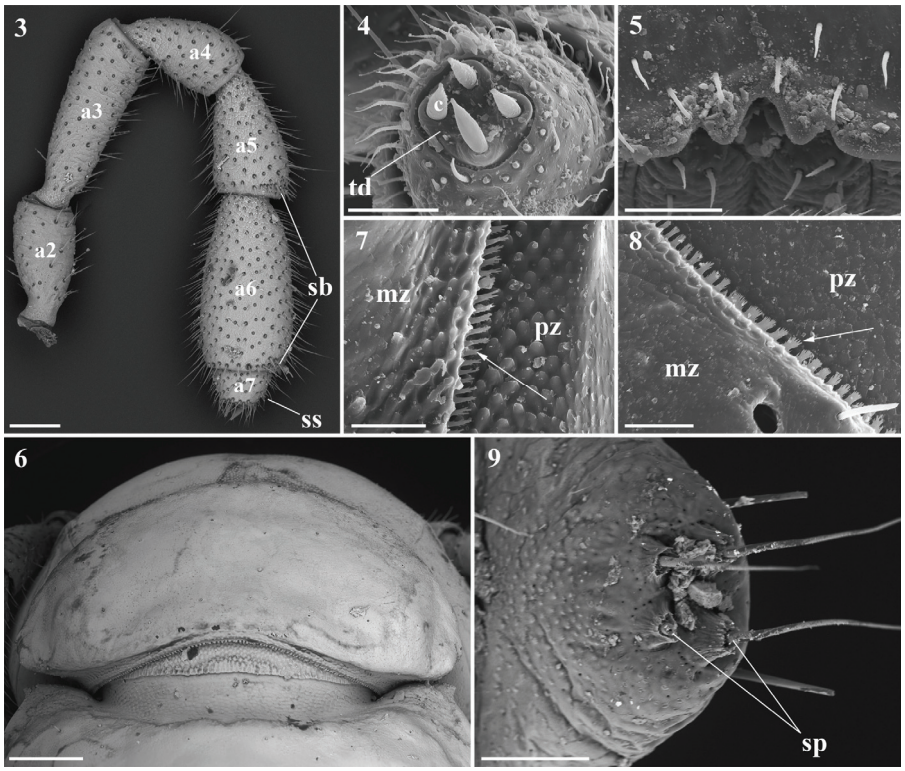
Figs 1–30

TYPE MATERIAL. Holotype – ♂, **China**, Xinjiang [= Xinjiang Uygur Autonomous Region], Narat Mt. Range, Bodon Valley, 43°01′47″N, 83°10′25″E [= 43.029722°N, 83.173611°E], 3000 m, alpine meadow, 25.VII 2014, leg. I.I. Kabak (ZMUM Rd 5300). Paratype: ♀, **China**, Xinjiang [= Xinjiang Uygur Autonomous Region], Narat Mt. Range, ENE of Tshon-Kushtai, 42°56′36″N, 82°17′10″E [= 42.943333°N, 82.286111°E], 2965 m, 14.VII 2014, leg. I.I. Kabak (ZMUM Rd 5301).

Figs 1–2. *Schizoturanius sinensis* sp. n. (1 – holotype, male; 2 – paratype, female): 1 – habitus, dorsolateral view; 2 – habitus, lateral view. Scale bars: 10 mm.

DIAGNOSIS. Differs from all congeners mainly by the presence of transverse folds on the anterior surface of the gonopod telopodite (*vs* smooth surface in all other species), and the postfemoral region of the endomere carrying a long and flat external process curved at an almost right angle, also covered with folds and devoid of serrations (*vs* curved, hook-shaped, serrate or straight, non-serrate or long, flat, not hook-shaped, serrate or even without an external process in other species).

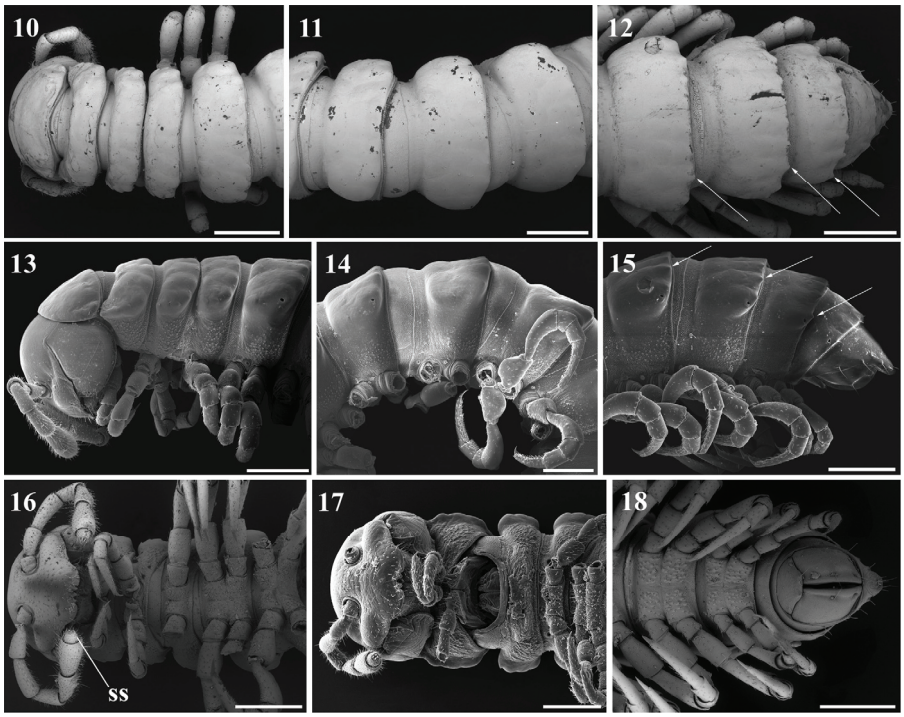
DESCRIPTION. Length 12.5 mm (holotype male), 16.6 mm (paratype female), width of midbody pro- and metazonae 0.9 and 1.2 mm (holotype male), 1.1 and 1.5 mm (paratype female), respectively.



Figs 3–9. *Schizoturanius sinensis* sp. n. (3–5 – paratype, female; 6–9 – holotype, male): 3 – antenna (antennomere 1 is broken off); 4 – terminal disc of antenna; 5 – anteromedian margin of the labrum; 6 – head and anteriormost rings, dorsal view; 7 – margin of prozonite and metazonite between rings 3 and 4, lateral view; 8 – margin of prozonite and metazonite between ring 19 and telson, lateral view; 9 – distal part of epiproct, ventral view. Abbreviations: **a2**–**a7** – antennomeres 2–7; **c** – sensory cone; **mz** – metazonite; **pz** – prozonite; **sb** – sensilla basiconica; **sp** – spinnerets; **ss** – sensilla basiconica spiniformia; **td** – terminal disc; arrows show microtrichs on the limbus. Scale bars: 3, 5 – 100 μm, 4, 7–9 – 50 μm, 6 – 150 μm.

Body moniliform, with 20 segments (C+17p+1a+T) in both sexes (Figs 1, 2). Coloration in alcohol pale pinkish beige with a darker anterior body part and convex metatergal surface along rear margin; legs lighter, especially prefemora. Tegument moderately shining throughout; texture very delicately shagreened, alveolate, except for convex metatergal surfaces. Cuticular ornamentation of prozonites (**pz**) with serration along rear margin of alveolae (Figs 7, 8).

Head densely pubescent, mostly forehead, frons and convex genae, but epicranium bare. Antennae moderately long, clavate, reaching past segment 3 dorsally. Length ratios of antennomeres 1–7 as 1.7:3.3:4.5:3.3:3.3:3.3:4.0:1, width ratios as 1.1:1.1:1.1:1.1:1.1:1.3:1.8:1, respectively (Fig. 3); antennomeres 5 and 6 (**a5** & **a6**) each with a small, compact, distodorsal group of sensilla basiconica (**sb**); antennomere 7 (**a7**) with a terminal disc (**td**) bearing four sensory cones (**c**) (Fig. 4), and a distodorsal group of sensilla basiconica spiniformia (**ss**) (Figs 3, 16). Labrum with three medial teeth at fore margin in male, but two ones in female (Figs 5, 16, 17).



Figs 10–18. *Schizoturanius sinensis* sp. n. (10–16, 18 – holotype, male; 17 – paratype, female): 10, 13, 16, 17 – front body part, dorsal, lateral and ventral views, respectively; 11, 14 – mid-body part, dorsal and lateral views, respectively; 12, 15, 18 – rear body part, dorsal, lateral and ventral views, respectively. Abbreviation: **ss** – sensilla basiconica spiniformia; arrows show pointed tips of bosses. Scale bars: 500 μm.

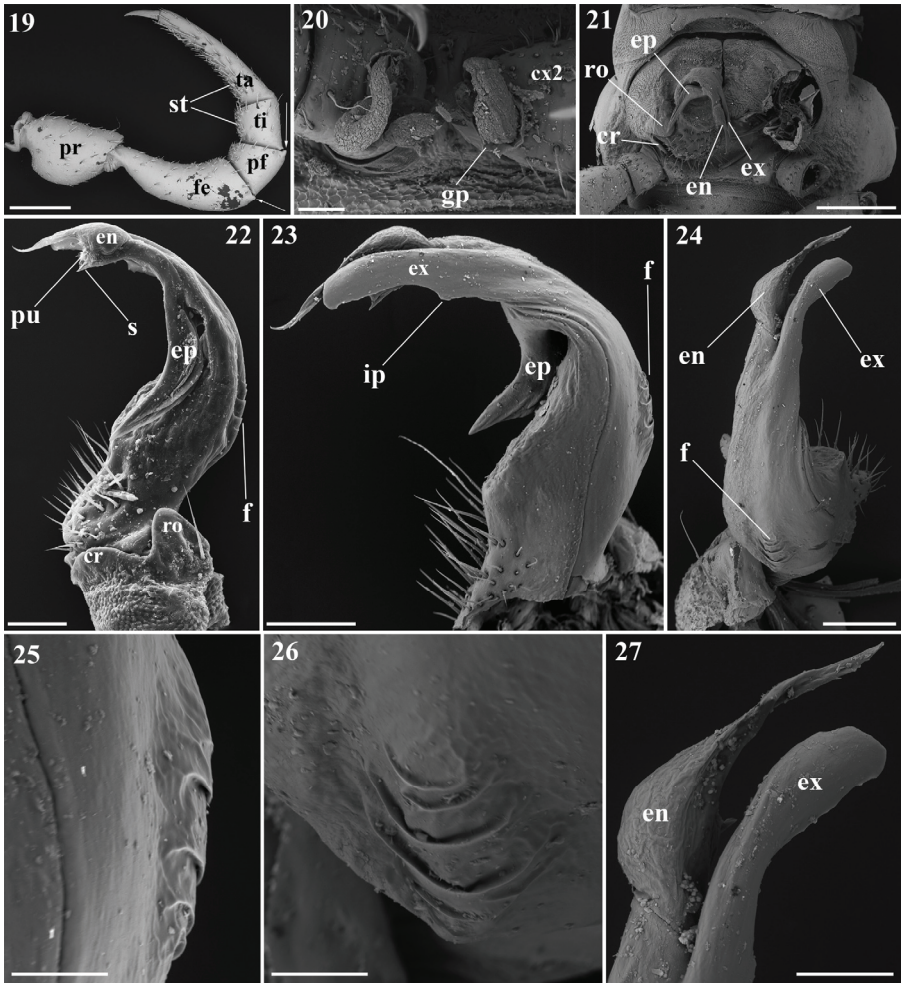
In holotype male, width of head (1.1 mm broad) > collum < ring 2 = 3 < 4 < 5 < 6 < 7 > 8 < 9 = 13 > 14 = 16; thereafter body gradually, but significantly tapering towards telson (0.6 mm broad). In paratype female, width of head (1.3 mm broad) > collum < ring 2 < 3 < 4 < 5 < 6 = 12 > 13 > 14 = 17; thereafter body rather rapidly tapering towards telson (0.8 mm broad). Collum transversely oval, ellipsoid (Fig. 6). Convex metatergal surfaces of rings 2–4 somewhat shorter than following ones.

Metatergal sculpture very poorly developed, with three transverse rows of slightly swollen polygonal bosses; each boss with a simple, very short tergal seta at its rear margin, more distinct on body rings 2–4 and 19, almost obliterate on midbody ones (Figs 10–18). Collum with 14 setae only in first row, and ten setae in each of two following rows, while following metaterga with three rows of eight setae each. Lateral edges of paratergites 2–4 with three rounded teeth; frontolateral corners of paratergites 2 and 3 slightly elongated anteriorly and pointed; lateral edges of following swollen paraterga weakly rounded, smooth, with three setae on each side. Limbus serrated, excluding telson; microtrichs thinner and slightly longer on anteriormost rings, and thicker and shorter on caudalmost ones (marked with arrows in Figs 7, 8). Metazona 16–18 with slightly pointed tips of bosses in row 3, more distinct on lateral sides of trunk, with an apical seta each (marked with arrows in Figs 12, 15). Epiproct process rather long, rounded at tip, carrying a couple of dorsal and lateral setae, and a group of four setiform spinnerets (**sp**) (some spinnerets may be broken off) (Fig. 9). 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 males compared to females, podomeres setose; femora (**fe**) and postfemora (**pf**) with prominent distodorsal protrusions (marked with arrows in Fig. 19). Male podomeres especially densely setose ventrally, with sphaerotrichomes (**st**) on femora, postfemora, tibiae (**ti**) and tarsi (**ta**); prefemora (**pr**) papillate dorsally as well; in female, all podomeres with simple setae, these located mostly ventrally; prefemora clearly bulged dorsad only in males (Fig. 19). Male leg-pair 1 somewhat reduced compared to following walking legs, coxae elongate ventrally. Female leg-pair 1 subequal in size compared to following ones, all other characters as in male leg 1. Leg-pair 2 in male without accessory claw (Fig. 19). Gonapophysis (**gp**) on male coxa 2 (**cx2**) relatively short, with a twisted sperm band (Fig. 20). Female coxae 2 (**cx2**) flattened, with a lateral prominence (marked with arrow in Fig. 28). Other walking legs in both sexes with normal claws and devoid of accessory claws.

Gonopod aperture of segment 7 enlarged, bean-shaped, with a transverse internal shelf anteriorly (Fig. 21). Pre- and postgonopodal sterna unmodified, densely setose. Gonopods falcate, telopodites amber-light yellowish, in situ crossing each other, directed caudodorsally (Fig. 21). Gonopod coxite strongly enlarged, alveolate, with a rounded external outgrowth (**ro**), bearing a single seta at base, and a small crest (**cr**) located a little more caudally (Figs 21, 22). Basal (= prefemoral) part of telopodite densely setose, as usual. Gonotelopodite with six transverse folds (**f**) anteriorly, and distally branched into an endomere (**en**) and an exomere (**ex**) (Figs 22–27). Endomere clearly longer than exomere, swollen at base, with distal part very slim and curved ventrad, covered with tiny spikes (Fig. 27). Postfemoral region of endomere with a long and flat external process (**ep**), curved at an almost right angle and directed caudad, covered with folds and devoid of serrations (Figs 21–23). Pulvillus (**pu**) densely micropilose, supplied with a distad oriented spine (**s**) (apparently, homologue to a thin process, or **p**, in Nefediev, 2019, as well as a minute spinous process, or **msp**, in Nefediev, 2022, and a distad oriented spine, or **sp**, in VandenSpiegel & Golovatch, 2023) (Fig. 22). Exomere thin, flattened on sides, with a blunt apex, and

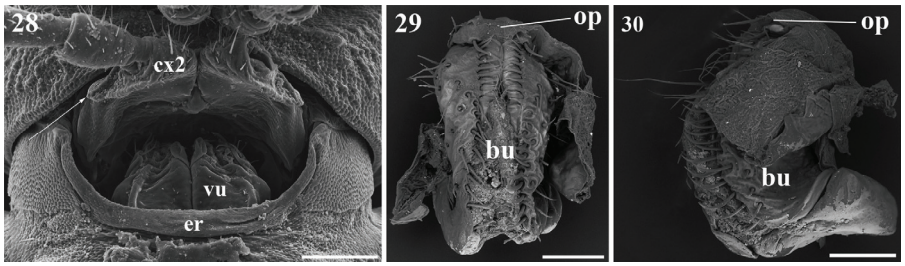
a small, subtriangular inner plate (**ip**) (apparently, homologue to a small triangular blade, or **b**, in Nefediev, 2019, as well as a subtriangular inner plate, or **sip**, in Nefediev, 2022, or an evident tooth, or **d**, in VandenSpiegel & Golovatch, 2023) (Fig. 23).



Figs 19–27. *Schizoturanius sinensis* sp. n. (holotype, male): 19 – leg 2, caudal view; 20 – coxae of leg-pair 2, ventral view; 21 – segment 7 with gonopods, ventral view; 22–24 – left gonopod, lateral, mesal and front views, respectively; 25, 26 – transverse folds on the anterior surface of the gonopod telopodite, mesal and front views, respectively; 27 – tip of left gonopod, front view. Abbreviation: **cr** – small crest; **cx2** – coxa 2; **en** – gonopod endomere; **ep** – external endomere process; **ex** – gonopod exomere; **f** – transverse folds; **fe** – femur; **gp** – gonapophysis; **pf** – postfemur; **pr** – prefemur; **pu** – pulvillus; **ro** – rounded external coxal outgrowth; **ip** – subtriangular inner plate; **s** –spine near pulvillus; **st** – sphaerotrichomes; **ta** – tarsus; **ti** – tibia; arrows show distodorsal protrusions on the femur and postfemur. Scale bars: 19 – 200 μm, 20, 25–27 – 50 μm, 21 – 300 μm, 22–24 – 100 μm.

Seminal groove forming a loop level to gonotelopodite division into an endo- and an exomere, ending up on a micropilose pulvillus supplied with a subterminal accessory seminal chamber.

Vulvar aperture oval; transverse epigynal ridge (**er**) located behind leg-pair 2 on ventral surface of segment 3, well developed, slightly concave ventrally (Fig. 28). Vulvae (**vu**) bean-shaped, external and internal valves of bursa (**bu**) densely clothed with robust setae over entire surface and along split-like depression in its centre, directed towards each other (Fig. 29); operculum (**op**) with sparse setae (Fig. 30). Vulvae devoid of spiral structures at bottom of bursa's gutter.



Figs 28–30. *Schizoturanius sinensis* sp. n. (paratype, female): 28 – segment 3, ventral view (left leg 2 is broken off); 29, 30 – vulva, front and lateral views, respectively. Abbreviation: **bu** – bursa of vulva; **cx2** – coxa 2; **er** – epigynal ridge; **op** – operculum of vulva; **vu** – vulva; arrow shows the lateral prominence on coxa 2. Scale bars: 28 – 200 μm, 29, 30 – 100 μm.

DISTRIBUTION. New species is known only from the type locality: Narat Mt. Range, Tian Shan, Xinjiang Uygur Autonomous Region, China.

REMARKS. In Polydesmida, the anteromedian margin of the labrum is well known to usually be equipped with three teeth. The presence of only two median teeth at the fore margin of the labrum in the single paratype female does not allow one to be confident that this is a distinctive character in females. On the contrary, most likely this is nothing else but an aberration. Only additional material may shed light on the problem. Leg-pairs 1 were dissected in neither of the sexes, nor was the presence or absence of additional claws examined.

ETYMOLOGY. The specific name is an adjective derived from the type locality, emphasizing the first *Schizoturanius* to be encountered in China.

Key to *Schizoturanius* species

1(18) Gonopod endomere with an external process.
2(9) External process of gonopod endomere distinctly serrate.
3(4) Gonopod endomere longer than gonopod exomere ….. *S. montivagus* Lohmander, 1933
4(3) Gonopod endomere shorter than gonopod exomere.
5(8) External process of gonopod endomere curved, hook-shaped. Pulvillus bare.
6(7) Lateral edge of gonopod endomere smooth. A small inner plate on gonopod exomere present ……..……..……. *S. clavatipes* (Stuxberg, 1876)

7(6) Lateral edge of gonopod endomere serrate. A small inner plate on gonopod exomere absent ……..……..... *S. dmitriewi* (Timotheew, 1897)
8(5) External process of gonopod endomere long, flat, not hook-shaped. Pulvillus micropilose ……..……..…. *S. levis* Mikhaljova, 2013
9(2) External process of gonopod endomere devoid or almost devoid of serration.
10(11) External process of gonopod endomere curved. Anterior surface of gonotelopodite with transverse folds ……..……...……..... *S. sinensis* **sp. n.**
11(10) External process of gonopod endomere straight. Anterior surface of gonotelopodite smooth, without transverse folds.
12(13) Postfemoral region of gonopod exomere with a prominent process bearing six blunt teeth (folds) on its edge ……..…….. *S. strongylosomoides* (Attems, 1904), type species
13(12) Postfemoral region of gonopod exomere without a prominent process bearing six blunt teeth (folds) on its edge.
14(15) Gonopod endomere with a tubiform membranous process at base of a distinct hairy pulvillus ……..……..……..…….. *S. kitabensis* (Gulička, 1963)
15(14) Gonopod endomere without tubiform membranous process at base of a distinct hairy pulvillus.
16(17) Gonopod endomere slightly longer than gonopod exomere, its tip with tiny spikes … ……..……..……..... *S. dshungaricus* Golovatch, 1979
17(16) Gonopod endomere significantly longer than gonopod exomere, its tip bifid ….....… ……..……..……..…… *S. krugovae* Nefediev, 2022
18(1) Gonopod endomere without external process ….....…..... *S. tabescens* (Stuxberg, 1876)

CONCLUSION

To date, the polydesmid genus *Schizoturanius* includes ten species found mainly in Central Asia, with the exception of *S. dmitriewi*, which reaches the Eastern European Plain in the west (Fig. 31).

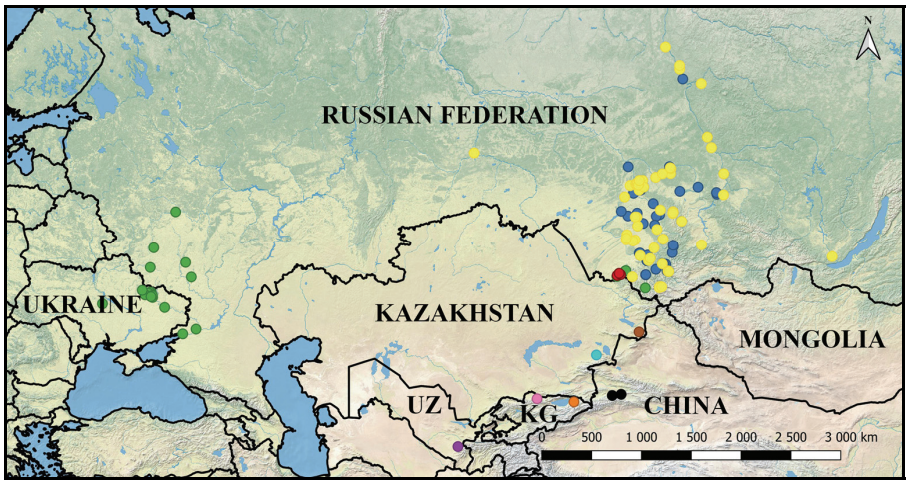


Fig. 31. Distribution of *Schizoturanius* species (circles): *S. clavatipes* (dark blue), *S. dmitriewi* (green), *S. dshungaricus* (light blue), *S. kitabensis* (violet), *S. krugovae* (red), *S. levis* (brown), *S. montivagus* (pink), *S. sinensis* **sp. n.** (black), *S. strongylosomoides* (orange), *S. tabescens* (yellow). Abbreviations: KG – Kyrgyzstan; UZ – Uzbekistan.

Schizoturanius sinensis sp. n. seems to be particularly similar to *S. levis*: both have a long and flat external process (**ep**) of the gonopod endomere, but it is curved at an almost right angle, also covered with folds and devoid of serrations in the new species (*vs* straight and serrate laterally in *S. levis*).

All previously known information concerning the vertical distribution of *Schizoturanius* spp. shows them to be restricted to mean altitudes of 2000 m. The new species is exceptional in reaching 3000 m in the Tian Shan Mountains, the highest record for the entire genus.

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