

## Two new species of lithobiid centipedes (Chilopoda: Lithobiomorpha: Lithobiidae) from southern Kazakhstan

### Два новых вида многоножек-костянок (Chilopoda: Lithobiomorpha: Lithobiidae) из Южного Казахстана

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KEY WORDS: Taxonomy, Lithobiidae, two new species, Tian-Shan, southern Kazakhstan.

КЛЮЧЕВЫЕ СЛОВА: Таксономия, Lithobiidae, два новых вида, Тянь-Шань, Южный Казахстан.

ABSTRACT. Two new species of lithobiid centipedes are described: *Lithobius (Monotarsobius) trisspurus* sp.n and *L. (M.) monococharporus* sp.n., both from the Jambyl Region of Kazakhstan, and both belonging to the *ferganensis* group.

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РЕЗЮМЕ. Описаны два новых вида: *Lithobius (Monotarsobius) trisspurus* sp.n and *L. (M.) monococharporus* sp.n. из Жамбылской области Казахстана. Оба вида принадлежат к группе *ferganensis*.

### Introduction

Knowledge of the lithobiid centipede fauna of Kazakhstan is extensive, but this huge territory is prospected very fragmentarily [Sselivanoff, 1881; Attems, 1904; Lignau, 1929; Zaleskaja, 1978; Eason, 1997; Farzalieva *et al.*, 2003, 2004, 2017; Farzalieva, 2006, 2017; Tuf, 2007; Tuf *et al.*, 2010; Tishkov, 2009; Bragina, 2012, 2016; Dányi, Tuf, 2012; Dyachkov *et al.*, 2016; Dyachkov, 2017]. Altogether, the lithobiid fauna of Kazakhstan presently comprises 32 species, 27 of them being known from eastern Kazakhstan (the East Kazakhstan and Almaty regions). Southern Kazakhstan (the South Kazakhstan, Kyzylorda and Jambyl regions) remains one of the poorly-studied parts, with only 3 species recorded from that area: *Hessebius perelae* Zaleskaja, 1978, *Cermatobius kirgiscus* (Zaleskaja, 1972) and *Australobius magnus* (Trozina, 1894) [Zaleskaja, 1978; Dyachkov, 2017].

Prompted by new material from southern Kazakhstan (Jambyl Region), we put on record another two

species, both new *Lithobius* Leach, 1814 from the subgenus *Monotarsobius* Verhoeff, 1905, and both belonging to the *ferganensis* group.

### Material and Methods

The studied material was collected in the Jambyl Region (Map) by the first author in 2017. Centipedes were taken by hands and preserved in 70% ethanol.

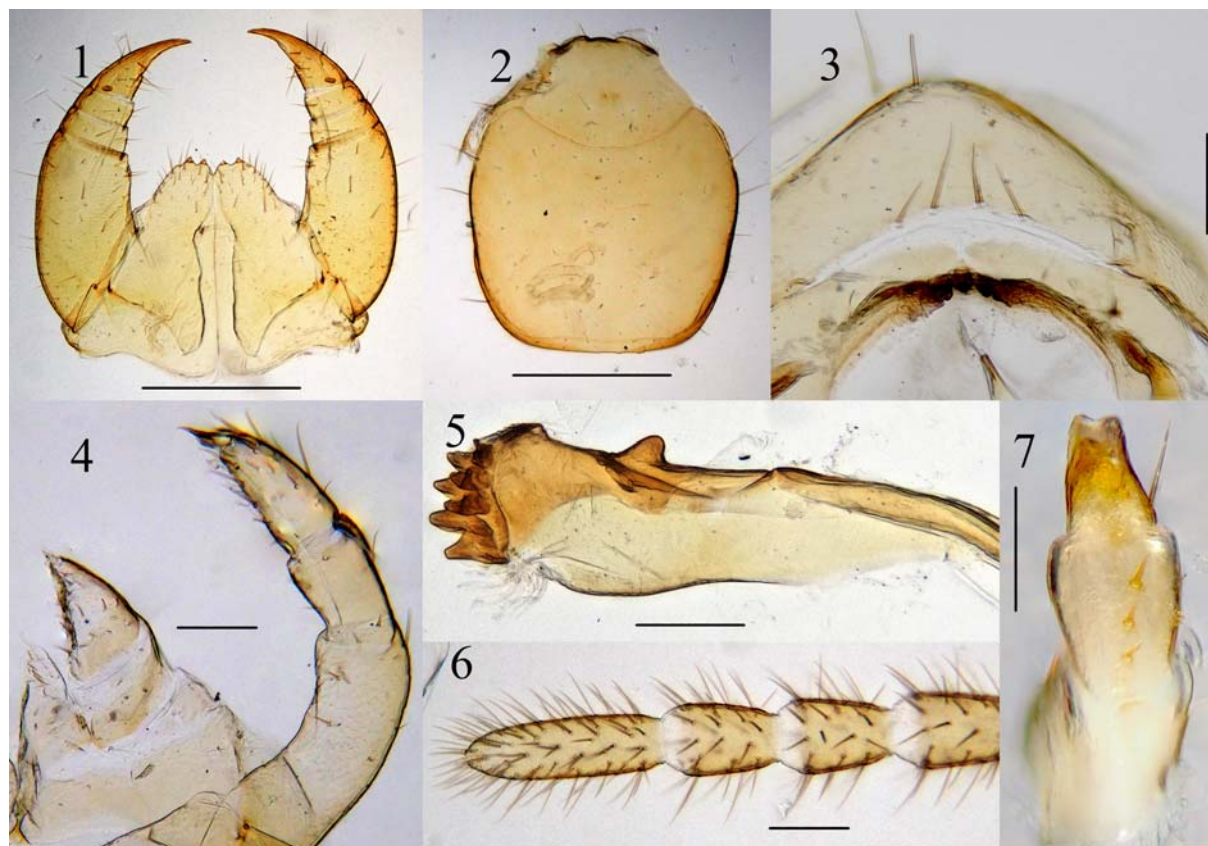
The pictures have been taken using an Olympus OMD EM-10 digital camera with a Panasonic Lumix H-H025 25 mm f/1.7 lens mounted on a Zeiss microscope and with an Axio Cam ERc-5s (Zeiss) digital camera attached to a Stemi 2000-C stereo microscope. The images were prepared using Helicon Focus 6.7.1 software. The line drawings were edited with Adobe Photoshop CS 6.1 and Paint.net 4.0. The mouthparts, legs and body segments of the new species were cleared in 10% KOH and mounted in permanent preparations in sandarac medium [Krashennikov, 2011] for examination.

The type material is deposited in the collection of the Zoological Museum of the Moscow State University, Russia (ZMMU), with a few paratypes housed in the collections of



Map. Position of the collecting locality (circle).

Карта. Расположение места сбора материала (круг).



Figs 1–7. *Lithobius trisspurus* sp.n., female paratypes: 1 — forcipula, ventral view; 2 — cephalic plate, dorsal view; 3 — clypeus and labrum, ventral view; 4 — left part of maxillary complex, ventral view; 5 — mandible; 6 — terminal part of antenna, lateral view; 7 — female gonopod, dorsal view. Scale: 1, 2 — 0.5 mm, 3–7 — 0.1 mm.

Рис. 1–7. *Lithobius trisspurus* sp.n., паратипы самок: 1 — ногощелюсти, вентрально; 2 — головная капсула, дорсально; 3 — клипеус и лабрум, вентрально; 4 — левая часть максиллярного комплекса, вентрально; 5 — мандибула; 6 — конечная часть антенны, латерально; 7 — гонопод самки, дорсально. Масштаб: 1, 2 — 0,5 мм, 3–7 — 0,1 мм.

the Altai State University, Barnaul (ASU) and the Perm State University, Perm (PSU). The terminology for external anatomy follows that of Bonato *et al.* [2010]. Body length was measured from the anterior margin of the cephalic plate to the posterior end of the postpedal tergite. The following abbreviations are used in the text and tables: T, TT — tergite, tergites, V — ventral, D — dorsal, C — coxa, Tr — trochanter, P — prefemur, F — femur, Ti — tibia, Ts, Tss — tarsus, tarsi.

### Taxonomic part

Both new species belong to the subgenus *Monotarsobius* (legs 1–13 with unipartite tarsi, antennae with about 20 articles, 2+2 forcipular coxosternal teeth, TT without triangular projections) and both represent the *ferganensis* group which comprises *L. ferganensis* (Trotzina, 1894), *L. turkestanicus* Attems, 1904, *L. sselivanoffi* Garbowski, 1897, *L. steppicus* Farzalieva et Zaleskaja, 2003, *L. evsyukovi* Zuev, 2017, *L. ketmenensis* Farzalieva, 2006, *L. amplinus* Farzalieva, 2006, *L. farzalievae* Dányi et Tuf, 2012. This group is widespread in eastern Europe, the Caucasus and Central Asia, being characterized by small or medium sizes

(from 6.1 mm in *L. steppicus* to 18.5 mm in *L. farzalievae*); the structure of the apical claw (bi- or tridentate), the dorsolateral armature of the female gonopods and very similar secondary sexual features on male 15Ti. *Lithobius turkestanicus* Attems, 1904 was regarded as a junior subjective synonym of *L. ferganensis* by Eason [1997], but this synonymy was questioned by Farzalieva [2006], based on a study of additional abundant material. The main features of the *ferganensis* group are summarized in Tab. 1.

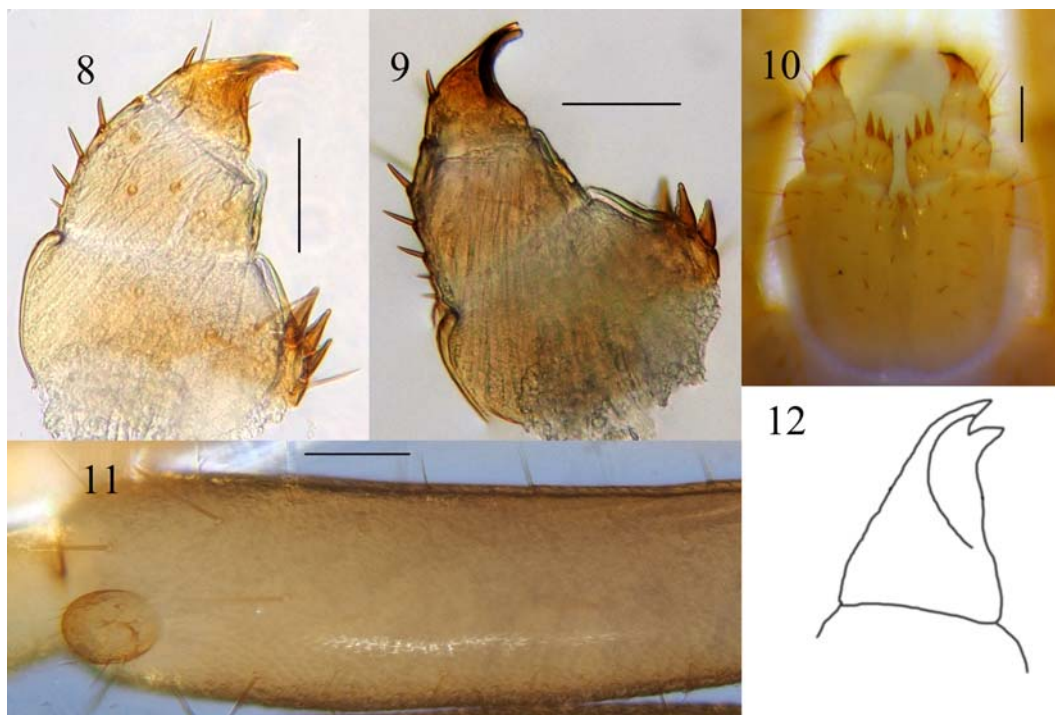
### *Lithobius (Monotarsobius) trisspurus* sp.n. Figs 1–12.

MATERIAL. Holotype ♂ (ZMMU Rc 7888), southern Kazakhstan, Jambyl Region, Kyrgyz Ala-Too Mt Range, Dzyndybay River valley, stony mountain steppe with *Juniperus*, under stones, 42°35'33"N, 73°18'21"E, 2370 m a.s.l., 12–14.VIII.2017.

Paratypes: 2 ♀♀ (ZMMU Rc 7889); 2 ♀♀ (ASU No 33); 1 ♂, 1 ♀ (PSU No 613), same data as holotype.

ETYMOLOGY. To emphasize the number of female gonopodal spurs.

DIAGNOSIS. A medium-sized (9–13 mm) *Lithobius* with 8–10 ocelli in 2 rows, Tömösváry's organ as large as the nearest ocelli; 20–22 antennal articles; forcipular coxos-



Figs 8–12. *Lithobius trisspurus* sp.n., paratypes: 8, 9 — female gonopod, lateral view; 10 — female gonopods, ventral view; 11 — tibia of 15 leg of male with wart, dorsal view; 12 — claw of female gonopod, lateral view. Scale 0.1 mm.

Рис. 8–12. *Lithobius trisspurus* sp.n., паратипы: 8, 9 — гонопод самки, латерально; 10 — гоноподы самки, вентрально; 11 — голень 15 ноги самца с бородавкой, дорсально; 12 — коготь гонопода самки, латерально. Масштаб 0,1 мм.

ternite with 2+2 teeth and setiform porodonts; TT with rounded posterior corners; legs 1–13 with unipartite tarsi; legs 15 without accessory spine; DCa present on 12(13)–15 legs; coxal pores 1–2 on legs 12–15; male Ti15 with a distodorsal wart with a crater armed by 10–12 thin setae; female with 3+3 gonopodal spurs and a bidentate claw, 1<sup>st</sup> segment of gonopods without dorsal spines, 2<sup>nd</sup> segment with 3–5 dorsal spines, 3<sup>rd</sup> segment with one dorsal spine.

**DESCRIPTION.** Holotype. Body 11 mm long, brown, cephalic plate, forcipules, antennae, legs 14–15 and TT 14–15 a bit darker. Head as in Fig. 2; median diastema V-shaped. Head a little broader than T1, ratio 1.2:1.

Antennae with 20 articles covered with dense, light, erect sensilla. Length to breadth ratio of terminal article 3.5:1 (Fig. 6). Antennae extending back to the middle of T6.

Ocelli: 8 on each side in two rows. Tömösváry's organ as large as nearest ocelli, rounded.

Coxosternum with 2+2 acute teeth and thin setiform porodonts. Shoulders very strongly sloping behind porodonts (Fig. 1).

All TT with rounded posterior corners, macrotergites poorly emarginated. T1 breadth 0.61 mm, T8 breadth 0.85 mm. Terminal T slightly emarginate at caudal margin, length to breadth ratio 1:0.7.

Legs 1–13 with clearly unipartite Tss. Legs 1–14 with one true accessory spine (in addition, legs 1–13 with a seta located near spine, similar in shape to accessory spine). Legs 15 without accessory spines. Legs 14 and 15 slightly incrassate. 15Ti with a distodorsal wart with a crater at apex, armed 10–12 very thin and light setae (Fig. 11). Leg plectrotaxy as in Tab. 2.

DCa developed from legs 12 on. Coxal pores small, rounded, separated from one another by a distance about 4

times greater than their own diameter, formula 2211. Gonopods 1-segmented, with one or two setae placed at gonopodal middle.

**Male variation.** Body 13 mm long. Antennae with 22 antennomeres, length to breadth ratio of terminal antennomere 3:1. Ocelli: 9+10 in 2 rows. Each gonopod with one seta. Coxal pore formula 2221. DCa developed on legs 13–15.

**Female.** Body 10.5 (9–12) mm long. Head broader than T1, ratio 1.2:1–1.5:1.2.

Labrum, maxillae and mandibles as in Figs 3–5.

Ocelli: 8–9 on each side. Antennae with 22 articles. T1 breadth 0.6 mm, T8 breadth 0.9 mm. Leg plectrotaxy as in Tab. 3. Coxal pore formula 2221. Terminal T length to breadth ratio 1:0.9.

Gonopods: with 3+3 acute spurs and a bidentate claw (teeth well-developed) (Figs 10, 12); 1<sup>st</sup> segment without spines, 2<sup>nd</sup> segment with 3–5 dorsal spines and 3<sup>rd</sup> segment with one dorsal spine (Figs 7–9).

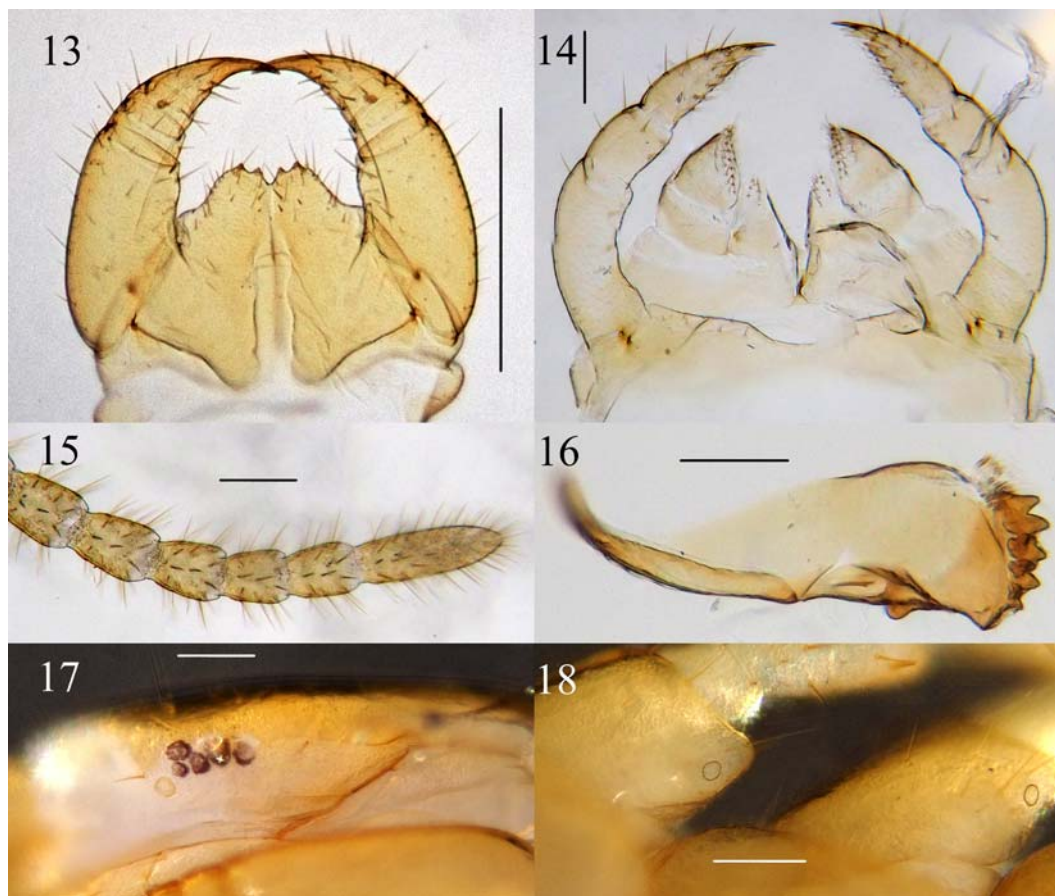
**REMARKS.** Females of this new species differ from those of the other species of the *ferganensis* group by 3+3 gonopodal spurs, vs. 2+2 in the females of the other members of the *ferganensis* group (Tab. 1).

**DISTRIBUTION.** Only the *terra typica*.

*Lithobius (Monotarsobius) monocoxaporus* sp.n.

Figs 13–27.

**MATERIAL.** Holotype ♂ (ZMMU Rc 7890), southern Kazakhstan, Zhambyl Region, Kyrgyz Ala-Too Mt. Range, Dzhyndybay River valley, stony mountain steppe with *Juniperus*, under stones, 42°35'33"N, 73°18'21"E, 2370 m a.s.l., 12–14.VIII.2017.



Figs 13–18. *Lithobius monocoxaporus* sp.n., paratypes: 13 — forcipula, ventral view (female); 14 — maxillary complex, ventral view (female); 15 — terminal part of antenna, lateral view (female); 16 — mandible (female); 17 — ocelli, lateral view (male); 18 — 13 and 14 coxae, ventral view (female). Scale: 13 — 0.5 mm, 14–18 — 0.1 mm.

Рис. 13–18. *Lithobius monocoxaporus* sp.n., паратипы: 13 — ногоchelюсти, вентрально (самка); 14 — максиллярный комплекс, вентрально (самка); 15 — конечная часть антенны, латерально (самка); 16 — мандибула (самка); 17 — глазки, латерально (самец); 18 — 13 и 14 тазики, вентрально (самка). Масштаб: 13 — 0,5 мм, 14–18 — 0,1 мм.

Paratypes: 7 ♂♂, 7 ♀♀, 6 juv. (ZMMU Rc 7891), 4 ♂♂, 3 ♀♀, 1 juv. (ASU No 34); 2 ♂♂, 2 ♀♀ (PSU No 614), same data as holotype.

NAME. To emphasize the number of coxal pores.

DIAGNOSIS. A small-sized *Lithobius* (up to 10 mm long), 4–8 ocelli in 1–2 rows, Tömösváry's organ of the same size as the nearest ocelli; antennae composed of 18–20 articles (usually 20); forcipular coxosternite with 2+2 teeth and setiform prodonts; pairs of legs 14 and 15 slightly swollen in both sexes, legs 15 without accessory spines; DCa developed from legs 12 on; number of coxal pores varying from 1 to 2; distodorsal part of male 15Ti with an oval wart with a crater; male gonopods each with a single seta; female gonopods each with 2+2 conical spurs and a tridentate claw, 1<sup>st</sup> segment without dorsal spines, 2<sup>nd</sup> segment with two dorsolateral spines, 3<sup>rd</sup> segment with 1 dorsal spine.

DESCRIPTION. Holotype. Body 9 mm long, yellow, head a bit darker. All TT with rounded posterior corners, macrotergites poorly-emarginated, terminal T elongate, emarginated at caudal margin, length to breath ratio 1.3:1.

Head length 0.5 mm, breadth 0.55 mm; head a little broader than T1 (breadth 0.49 mm).

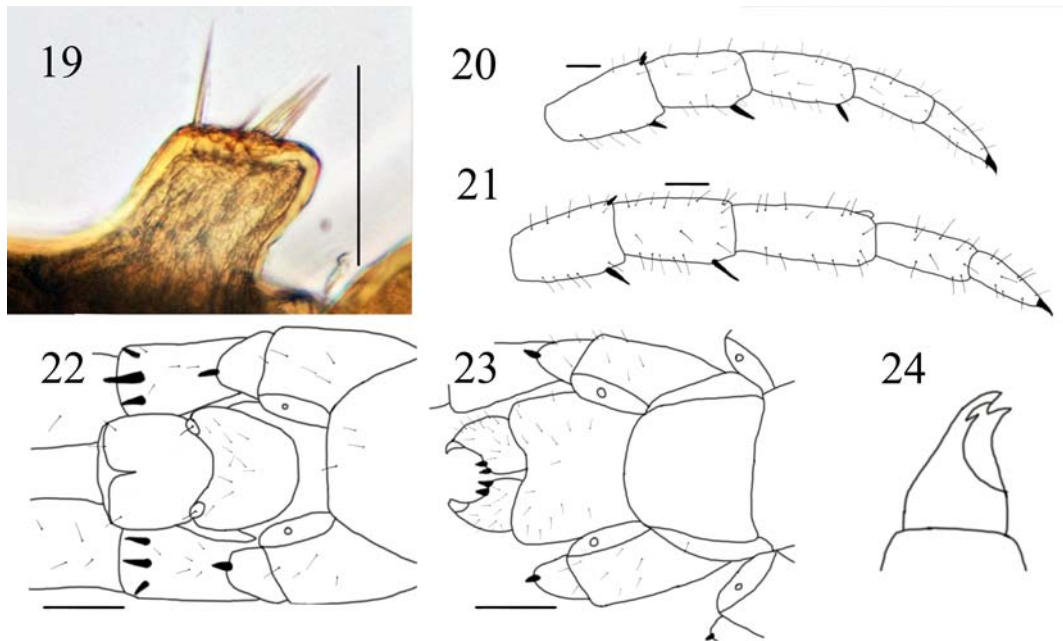
Antennae about 2 times as long as head, with 20+20 antennomeres, covered with dense, light, erect sensilla. Length to breadth ratio of terminal antennomere 4:1, larger than previous two (Fig. 15).

Ocelli: 6 on each side, arranged in a single row. Tömösváry's organ of the same size as the nearest ocelli, rounded.

Coxosternite with 2+2 acute teeth and well-expressed prodonts, shoulders very strongly sloping behind prodonts (Fig. 13).

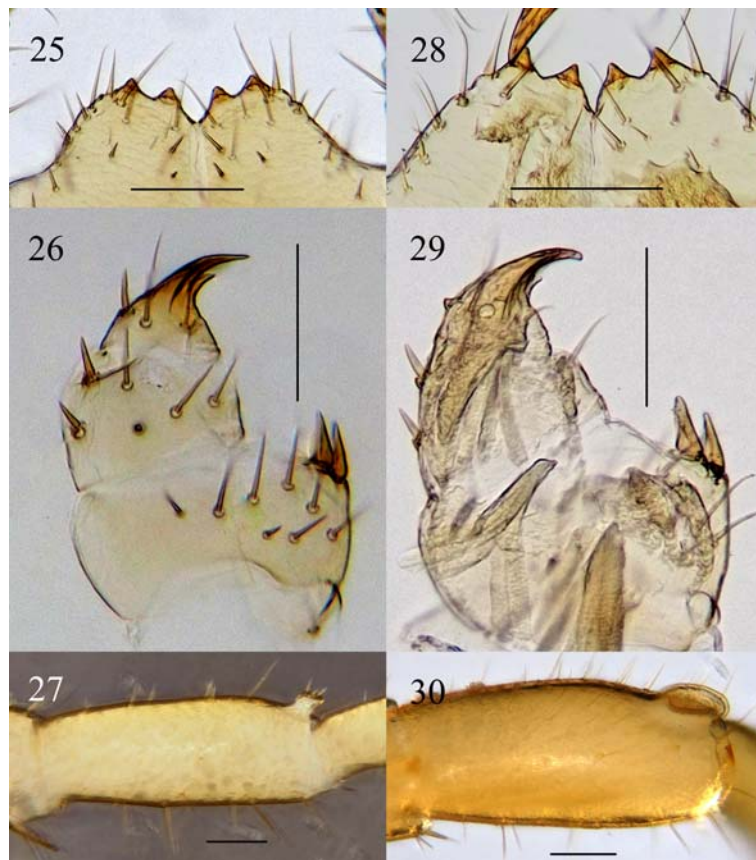
Legs 1–13 with clearly unipartite Tss; DCa developed from legs 12 on. Legs 1–14 each with one true accessory posterior spine; legs 15 without accessory spines. Leg plecotaxy as in Tab. 4. Tr, P, F and Ti of legs 14 and 15 slightly incrassate (Figs 20–21), 15Ti with a distodorsal oval wart with a crater surrounded by several very thin short setae (Figs 19, 27).

Рис. 25–30. *Lithobius monocoxaporus* sp.n. (паратипы) (25–27) и *L. farzalievae* Dányi et Tuf, 2012 (паратипы) (28–30): 25 — зубной край кокостернита ногоchelюсти, вентрально; 26 — гонопод самки, латерально; 27 — голень 15 ноги, латерально (самец); 28 — зубной край кокостернита ногоchelюсти, вентрально; 29 — гонопод самки, латерально; 30 — голень 15 ноги, латерально (самец). Масштаб 0,1 мм.



Figs 19–24. *Lithobius monocoxaporus* sp.n., paratypes: 19 — wart on 15 tibia (male); 20 — leg 14, lateral view (male); 21 — leg 15, lateral view (male); 22 — terminal part of body, ventral view (male); 23 — same of female; 24 — claw of female gonopod. Scale: 19 — 0.05 mm, 20–23 — 0.1 mm.

Рис. 19–24. *Lithobius monocoxaporus* sp.n., паратипы: 19 — бородавка на голени 15 ноги (самец); 20 — нога 14, латерально (самец); 21 — нога 15, латерально (самец); 22 — задняя часть тела, вентрально (самец); 23 — то же, самка; 24 — коготь гонопода самки. Масштаб: 19 — 0,05 мм, 20–23 — 0,1 мм.



Figs 25–30. *Lithobius monocoxaporus* sp.n. (paratypes) (25–27) and *L. farzalievae* Dányi et Tuf, 2012 (paratypes) (28–30): 25 — dental margin of forcipular coxosternite, ventral view; 26 — female gonopod, lateral view; 27 — tibia of 15 leg, lateral view (male); 28 — dental margin of forcipular coxosternite, ventral view; 29 — female gonopod, lateral view; 30 — tibia of 15 leg, lateral view (male). Scale 0.1 mm.

A single coxal pore on each of legs 12–15, large and rounded (Fig. 22). Gonopods 1-segmented, each with a single seta.

Male variation. Body length 7–9 mm. Length to breadth ratio of terminal T 1:0.8. Antennae with 18–20 articles. Number of ocelli varying from 4 to 8 (Fig. 17). DCa developed on legs 13–15. Leg plectrotaxy as in Tab 5. Coxal pore formula 1111.

Female variation. Body length 7–10 mm. Coxosternal teeth as in Fig. 25. Maxillae and mandibles as in Figs 14 and 16. Macrotergites poorly-emarginated. Coxal pores as in Figs 18 and 23, formula 111(2)1. Antennae with 19–20 articles. Number of ocelli varying from 5 to 7. Gonopods: with 2+2 conical spurs (one specimen with 2+3 spurs) separated from one another by less than their diameter at base (Fig. 23); 1<sup>st</sup> segment without spines, 2<sup>nd</sup> segment with two dorsolateral spines, 3<sup>rd</sup> segment with a single dorsal spine (Fig. 26); claw tridentate (all teeth well-developed) (Fig. 24).

REMARKS. Based on some of the main characters (Tab. 1), *L. monocoxaporus* sp.n. is extremely similar to *L. farzalievae* Dányi et Tuf, 2012 (see Figs 26, 29), but differs by the shape of the coxosternite (cf. Fig. 25 and Fig. 28). Moreover, males of this species differ from those of the other congeners by the shape of their wart on 15Ti (i.e. the wart is wider in *L. farzalievae* than in *L. monocoxaporus* sp.n.; cf. Fig. 27 and Fig. 30).

Based on the structure of the female gonopods and other main characters (see details [Pei *et al.*, 2011; Ma *et al.*, 2012, 2014]), *L. monocoxaporus* sp.n. also resembles three Chinese *Monotarsobius*, viz. *L. (M.) monoforamini* Ma, Pei, Wu, Lin, Gai, 2012, *L. (M.) zhangii* Ma, Pei, Hou, Zhu, 2014 and *L. (M.) songii* Pei, Ma, Shi, Wu, Zhou, 2011, but differs by the presence of a wart on male 15Ti.

In addition, the new species is similar to *L. ferganensis* (Trotzina, 1894) and *L. steppicus* Farzalieva et Zaleskaja, 2003 (Tab. 1), especially in the shape of the wart on male 15Ti and in some details of female gonopodal structure (i.e. 2+2 spurs and two spines on 2<sup>nd</sup> segment), but it differs by the tridentate claw of the female gonopods (vs. bidentate in *L. ferganensis* and *L. steppicus*).

DISTRIBUTION. Only the *terra typica*.

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Table 1. Diagnostic characters of the *ferganensis* group of *Lithobius* species  
Таблица 1. Диагностические признаки видов *Lithobius* группы *ferganensis*

Species	Ocelli	Number of antennomeres	Coxal pores formula	Wart on male 15Ti	Female gonopod		
					Dorsolateral/dorsal spines/setae and number of spurs on the 1 <sup>st</sup> segment	Dorsolateral/dorsal spines/setae on the 2 <sup>nd</sup> segment	Dorsolateral/dorsal spines/setae on the 3 <sup>rd</sup> segment; shape of apical claw
<i>L. turkestanicus</i> Attems, 1904	8 in 2 rows	20	1221– 3333	small, cylindrical; with a crater and without setae	without setae, 2+2 spurs	3 setae	1 seta; tridentate
<i>L. sselivanoffi</i> Garbowski, 1897	6–12 in 3 rows	20	2443– 4554	small, cylindrical; without crater and with a few short setae	1 setae, 2+2 spurs	3–5 setae	3–4 short and thin setae; tridentate
<i>L. evsyukovi</i> Zuev, 2016	10–15 in 3– 4 rows	18–21	3443– 4543	large, flat, ovoid; without crater and with a few short setae	2–4 setae, 2+2 spurs	4–6 setae	3 short and thin setae; tridentate
<i>L. ketmenensis</i> Farzalieva, 2006	10 in 3 rows	19–21	2333–	small, cylindrical; with a crater and 3–5 thin light setae	without spines, 2+2 spurs	3–4 spines	1 spine; tridentate
<i>L. amplinus</i> Farzalieva, 2006	13 in 3–4 rows	20–23	3433– 34343	small; with a crater surrounded by thin and short setae	without spines, 2+2 spurs	3–4 spines	1 spine; tridentate
<i>L. farzalievae</i> Dányi & Tuf, 2012	7–10 in 2–3 rows	20–22	1–2	flat, wide; with a crater surrounded 9 setae	without spines, 2+2 spurs	2 spines	1 spine; tridentate
<i>L. ferganensis</i> (Trotzina, 1894)	6–10 in 2–3 rows	19–20	1222– 2222	small, cylindrical; without crater and with a few short setae	without setae, 2+2 spurs	2 setae	1 setae; bidentate
<i>L. steppicus</i> Farzalieva et Zalesskaja, 2003	6–9 in 2 rows	19–20	1122– 1122	small; with 3–5 thin and short setae	without spines, 2+2 spurs	2 spines	2 spines; bidentate
<i>L. trissurus</i> sp.n.	8–10 in 2 rows	20–22	2211– 2221	oval; with a crater surrounded 10–12 thin and light setae	without spines, 3+3 spurs	3–5 spines	1 spine; bidentate
<i>L. monocoxaporus</i> sp.n.	4–8 in 1–2 rows	18–20	111(2)1	oval; with a crater and with a few thin light setae	without spines, 2+2 spurs	2 spines	1 spine; tridentate

Table 2. *L. trisspurus* sp.n. (holotype): plectrotaxy; spines in brackets are asymmetric.  
 Таблица 2. *L. trisspurus* sp.n. (голотип): распределение шипов; шипы в скобках асимметричны.

Leg pairs	V					D				
	C	Tr	P	F	Ti	C	Tr	P	F	Ti
1	–	–	m	am	m	–	–	p	ap	a(p)
2	–	–	m	am	m	–	–	p	ap	ap
3–5	–	–	p	am	am	–	–	p	ap	ap
6–10	–	–	p	am	am	–	–	–	ap	ap
11	–	–	p	am(p)	am	–	–	–	p	ap
12	–	–	p	am	am	a	–	mp	p	p
13	–	–	p	amp	am	a	–	mp	p	p
14	–	m	mp	am	m	a	–	mp	p	p
15	–	m	mp	m	–	a	–	mp	–	–

Table 3. *L. trisspurus* sp.n. (paratypes): plectrotaxy; spines in brackets are variable.  
 Таблица 3. *L. trisspurus* sp.n. (паратипы): распределение шипов; переменные шипы в скобках.

Leg pairs	V					D				
	C	Tr	P	F	Ti	C	Tr	P	F	Ti
1	–	–	m	am	m	–	–	p	ap	p
2	–	–	m	am	m	–	–	p	ap	ap
3–5	–	–	p	am	am	–	–	p	ap	ap
6–10	–	–	p	am	am	–	–	–	ap	ap
11	–	–	p	am	am	–	–	–	p	ap
12	–	–	p	am	am	(a)	–	mp	p	p
13	–	–	p	amp	am	a	–	mp	p	p
14	–	m	mp	am	m	a	–	mp	p	p
15	–	m	mp	m	–	a	–	mp	–	–

Table 4. *L. monosoxaporus* sp.n. (holotype): plectrotaxy.  
 Таблица 4. *L. monosoxaporus* sp.n. (голотип): распределение шипов.

Leg pairs	V					D				
	C	Tr	P	F	Ti	C	Tr	P	F	Ti
1	–	–	p	am	m	–	–	p	ap	ap
2–4	–	–	–	am	m	–	–	p	ap	ap
5	–	–	–	am	m	–	–	–	ap	ap
6–11	–	–	–	am	am	–	–	–	ap	ap
12	–	–	mp	amp	am	a	–	p	p	p
13	–	–	mp	amp	am	a	–	mp	p	p
14	–	m	amp	am	m	a	–	mp	p	–
15	–	m	amp	m	–	a	–	mp	–	–



Table 5. *L. monococharporus* sp.n. (paratypes): plectrotaxy; spines in brackets are variable.  
 Таблица 5. *L. monococharporus* sp.n. (паратипы): распределение шипов; переменные шипы в скобках.

Leg pairs	V					D				
	C	Tr	P	F	Ti	C	Tr	P	F	Ti
1	–	–	–	ap	m	–	–	p	ap	ap
2–3	–	–	–	am	m	–	–	p	ap	ap
4–8	–	–	–	am	m	–	–	–	ap	ap
9	–	–	–	am	m	–	–	–	ap	ap
10	–	–	–	am	am	–	–	–	ap	ap
11	–	–	p	am	am	–	–	–	p	ap
12	–	–	p	amp	am	(a)	–	mp	p	p
13	–	–	p	(a)mp	am	a	–	mp	p	p
14	–	m	mp	ap	–	a	–	mp	p	(p)
15	–	m	amp	(m)	–	a	–	mp	–	–