

Lithobius (Monotarsobius) femoratus sp.n., a new centipede species from China (Chilopoda: Lithobiomorpha: Lithobiidae)

Lithobius (Monotarsobius) femoratus sp.n., новый вид губоногих многоножек из Китая (Chilopoda: Lithobiomorpha: Lithobiidae)

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KEY WORDS: Myriapoda, taxonomy, new species, eastern China.

КЛЮЧЕВЫЕ СЛОВА: Мугиарода, таксономия, новый вид, Восточный Китай.

ABSTRACT. A new lithobiid species, *Lithobius (Monotarsobius) femoratus* sp.n., is described from Hebei Province, China. Morphologically, the new species seems to be extremely close to *Lithobius (Monotarsobius) fugax* Stuxberg, 1876 from Siberia and Mongolia, but it can easily be distinguished by its two longitudinal grooves on the dorsal side of the femur and one longitudinal groove on the ventral side of male legs 15, the presence of a DaC spine on legs 14 and 15, the dorsal plectrotaxy being 121 in legs 2, 10300 in legs 15, and Tömösváry's organ larger than the adjacent ocelli.

How to cite this paper: Pei Sujian, Ma Huiqin, Liu Haipeng, Lu Yanmin, Liang Kuijing. 2021. *Lithobius (Monotarsobius) femoratus* sp.n., a new centipede species from China (Chilopoda: Lithobiomorpha: Lithobiidae) // Arthropoda Selecta. Vol.30. No.4. P.497–501. doi: 10.15298/arthsel.30.4.05

РЕЗЮМЕ. Из провинции Хебей (Китай) описана новая костянка: *Lithobius (Monotarsobius) femoratus* sp.n. Морфологически новый вид, кажется, очень сходен с *Lithobius (Monotarsobius) fugax* Stuxberg, 1876 из Сибири и Монголии, но легко отличается своими двумя продольными бороздками на спинной стороне бедра и одной продольной бороздкой на брюшной стороне ног 15 самца, наличием шипа DaC на ногах 14 и 15, дорсальной плектротаксией 121 на ногах 2, 10300 на ногах 15 и более крупным органом Темешвари по сравнению с соседними глазками.

Introduction

Verhoeff [1905] originally proposed *Monotarsobius* Verhoeff, 1905 as a subgenus of *Lithobius* Leach, 1814 in the family Lithobiidae. It presently accommo-

dates a group of about 115 species or subspecies mostly known from Eurasia, but some introduced elsewhere. They occur over a wide range of epigeic habitats, from low altitudes to 4200 m a.s.l., also living in caves. [Zapparoli, Edgecombe, 2011]. *Monotarsobius* is characterised by the following combination of characters: Forcipular coxosternal teeth 2+2; prodonts setiform. Tergites without posterior triangular projections. Tarsal articulation of legs 1–13 very faint or indistinct. Secondary sexual modifications sometimes on ♂ legs 14 and 15. ♀ gonopods with a uni-, bi- or tridentate claw and usually 2+2 spurs [Zapparoli, Edgecombe, 2011].

The myriapod fauna of China is still poorly known and very little attention has been paid to the study of Lithobiomorpha, with only 100 species or subspecies known from the country. Altogether, 11 species of *Monotarsobius* have been recorded from China, including only two hitherto reported from the Hebei Province [Takakuwa, 1940; Wang, 1955, 1956, 1957, 1959, 1963; Wang, Mauriès, 1996; Eason, 1997; Ma *et al.*, 2009, 2014; Pei *et al.*, 2011, 2020a, b; Chao *et al.*, 2018, 2020; Qiao *et al.*, 2019]. Below, a new species recently discovered in Hebei Province, China, is described and illustrated.

Materials and methods

Specimens were collected under leaf litter or stones and preserved in 75% ethanol. Illustrations and measurements were produced using a ZEISS SteREO Discovery.V20 microscope equipped with an Abbe drawing tube, an ocular micrometre and an Axiocam 512 colour camera. The description is based on specimens fixed in 75% ethanol. The body length is measured from the anterior margin of the cephalic plate to the posterior end of the postpedal tergite. Type specimens and other material are mostly deposited in the School of Life Sciences, Hengshui University, Heng-

shui, China (HUSLS), with a few paratypes to be shared with the collection of the Zoological Museum, State University of Moscow (ZMUM), Russia, as indicated below. The terminology of the external anatomy follows Bonato *et al.* [2010]. Measurements are shown in millimetres (mm). The following abbreviations are used in the text and Table: a — anterior, C — coxa, F — femur, m — median, P — prefe-mur, p — posterior; S, SS — sternite, sternites, T, TT — tergite, tergites, Ti — tibia, Tr — trochanter.

Taxonomy

Family Lithobiidae Newport, 1844

Genus *Lithobius* Leach, 1814

Subgenus *Monotarsobius* Chamberlin, 1919

Lithobius (Monotarsobius) femoratus sp.n.

Figs 1A–E, 2F–K, Table.

TYPE MATERIAL: HOLOTYPE ♂ (Lmon01-1) (Fig. 1A), China, Hebei Province, Shijiazhuang City, Pingshan County, Xiushui Park, 38.093677 S, 114.38752 E, 136 m a.s.l., 28 May 2017, S. Pei, H. Ma leg. PARATYPES: 24 ♀♀, 31 ♂♂ (Lmon01-1), 2 ♀♀, 2 ♂♂ (ZMUM), same data as holotype.

OTHER MATERIAL: 4 ♀♀, 10 ♂♂ (Lmon01-2), same place, 3 May 2019, S. Pei, H. Ma leg.

DIAGNOSIS. In accordance with the grouping of species proposed for the subgenus *Monotarsobius* [Zapparoli, Edgecombe, 2011], the new species differs from other con-subgenera in having the antennae composed of 19–21, commonly 20+20 articles, ocelli 6–7, usually 6 on each side, arranged in three irregular rows, with the posterior ocellus the largest, Tömösváry's organ larger than the adjacent ocelli; commonly 2+2 coxosternal teeth, porodonts lying posterolateral to the lateralmost tooth; coxal pore formula 3–5, arranged in one row; legs 14 and 15 thicker than the anterior pairs in both sexes, with two longitudinal grooves on the dorsal and a central longitudinal groove on the ventral side of the femur of ♂ legs 15. ♀ gonopods with 3+3 moderately small coniform spurs, apical claw of the third article simple, with a larger subtriangular denticle on the ventral side.

ETYMOLOGY. To emphasise that the dorsal side of the femur of ♂ legs 15 is white in live, translucent in 75% ethanol.

DESCRIPTION. Holotype 10.9 mm long, cephalic plate: 1.2 mm long, 1.2 mm wide. Body: 9.2–12.5 mm long, cephalic plate 1.16–1.34 mm long, 1.16–1.23 mm wide.

Coloration: Antennae grey-brown to brown, distal article with yellowish hue; tergites grey-brown with yellowish hue; cephalic plate heavily brown to yellow-brown with blackish hue; pleural region pale grey with purplish hue; sternites pale brown with greyish hue; distal part of forcipules darker yellow-brown, with basal and proximal parts of forcipules and forcipular coxosternite, and SS 14 and 15 yellow-brown with blackish hue; especially, dorsal side of femur of ♂ legs 15 white in live, but translucent in 75% ethanol; all legs pale grey, tarsi yellow-brown, tarsus-II darker in all legs.

Antennae with 19–21 articles, commonly 20+20 (Fig. 1A). Antennal article I slightly longer than width at base, remaining articles significantly longer than wide; from article II on, each article gradually shortened, distalmost articles still being significantly, 2.3–3.0 times as long as wide; abundant setae on antennal surface, less so in basal articles, gradually and increasingly setose to approximately article V, then more or less constant.

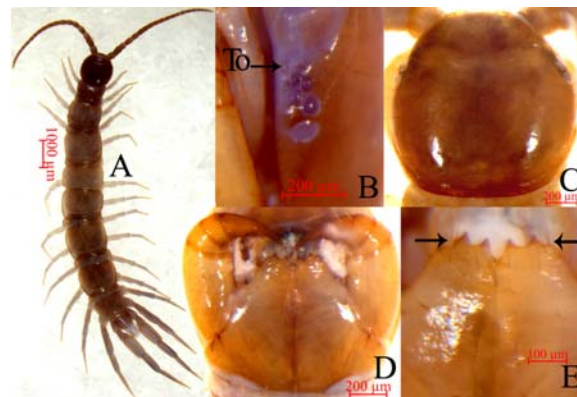


Fig. 1A–E. *Lithobius (Monotarsobius) femoratus* sp.n., ♂ holotype. A — habitus, dorsal view; B — ocelli and Tömösváry's organ (To), lateral view; C — cephalic plate, dorsal view; D — cephalic plate, ventral view; E — forcipular coxosternite, ventral view.

Рис. 1A–E. *Lithobius (Monotarsobius) femoratus* sp.n., голо-тип ♂. А — общий вид, сверху; В — глазки и орган Темешвари (То), сбоку; С — головная пластина, сверху; D — головная пластина, снизу; E — кокостернит ногочелюстей, снизу.

Cephalic plate smooth, convex, equal to or slightly longer than wide; tiny setae emerging from pores scattered very sparsely over the whole surface; frontal marginal ridge with a shallow anteromedian furrow; short to long setae very sparsely scattered along marginal ridge of cephalic plate; lateral marginal ridge discontinuous, posterior margin continuous, straight, slightly wider than lateral marginal ridge (Fig. 1C).

Ocelli six to seven, commonly six oval ocelli on each side, from small to large, arranged in three irregular rows, posterior ocellus the largest. Ventral ocelli smaller than dorsal ones, domed, translucent and usually dark (Fig. 1B).

Tömösváry's organ located close to ocelli at anterolateral margin of cephalic plate, surrounding sclerotised area always narrow, slightly larger than adjoining ocelli (Fig. 1B, To).

Coxosternite subtrapezoidal (Fig. 1D), anterior margin narrow, lateral margins slightly longer than medial margins; median diastema moderately deep, U-shaped; anterior margin with 2+2 acute triangular teeth; porodonts feebly thicker, posterolateral, separated from lateral tooth, lying posterolaterally to lateralmost tooth, with a marked bulge at base (Fig. 1D, E); long setae scattered on ventral side of coxosternite, longer setae near dental margin.

All tergites smooth, without wrinkles, dorsum slightly convex; tiny setae emerging from pores scattered sparsely over entire surface; T1 narrower posterolaterally than anterolaterally, generally inverted trapezoidal; cephalic plate and T1 obviously narrower than T3, cephalic plate slightly wider than T1. Lateral marginal ridges of all tergites continuous. Posterior margin of TT 1, 3 and 5 continuous, posterior margin of TT 10, 12 and 14 discontinuous. Posterior marginal ridges of TT 1, 3 and 5 feebly concave, posterior marginal ridges of TT 8, 10, 12 and 14 moderately concave. Posterior angles of tergites rounded, with moderate triangular projections. Short to long miniscule setae scattered sparsely over surface.

Sternites: Posterior side of sternites narrower than anterior one, generally inverted trapezoidal, smooth; setae emerging from very sparsely scattered pores on surface and at

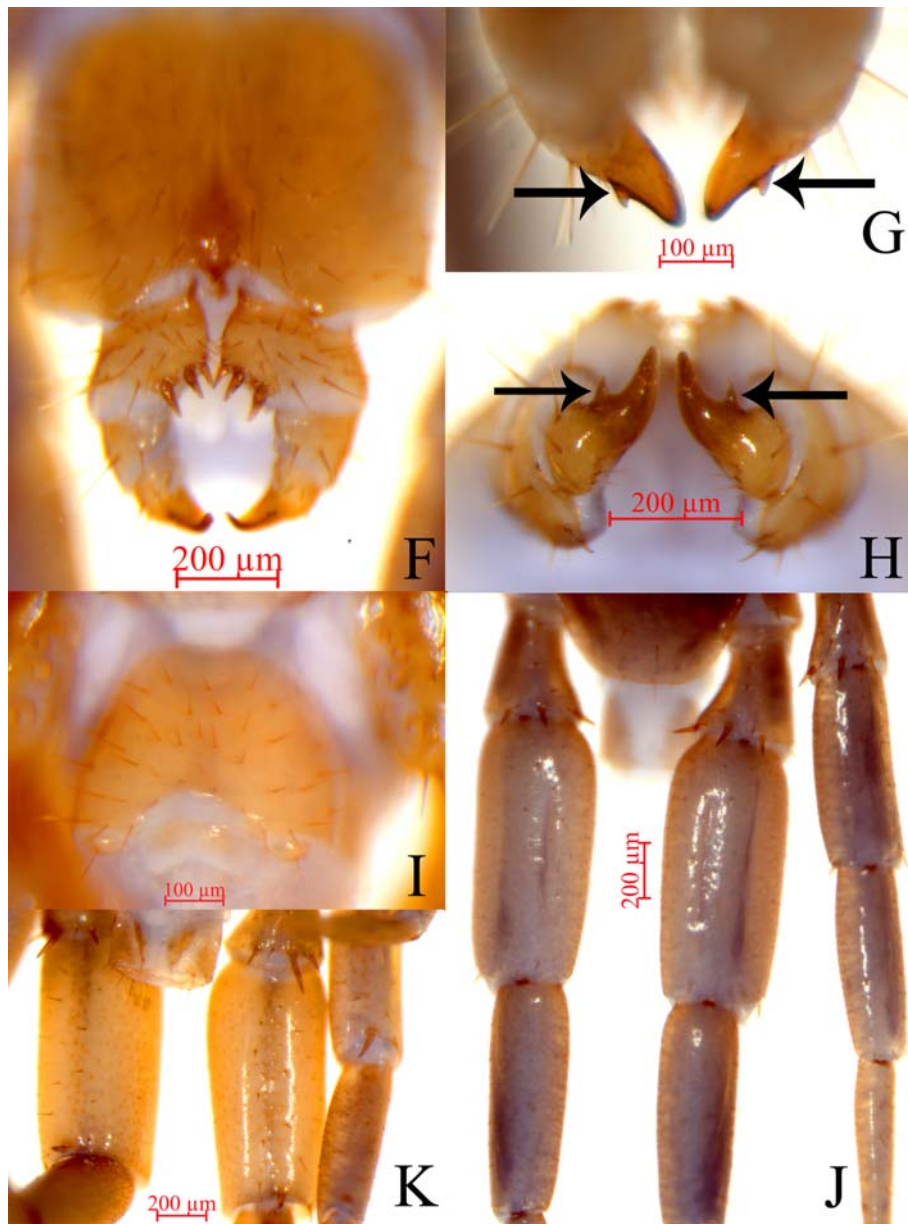


Fig. 2F–K. *Lithobius (Monotarsobius) femoratus* sp.n., ♀ paratype (F–H), ♂ holotype (I–K). F — posterior segments and gonopods, ventral view; G, H — apical claw of gonopods, ventral and dorsal views, respectively; H–I — posterior segments and gonopods, ventral view J, K — femur of legs 15, dorsal and ventral views, respectively.

Рис. 2F–K. *Lithobius (Monotarsobius) femoratus* sp.n., паратип ♀ (F–H), голотип ♂ (I–K). F — задние сегменты и гоноподы, снизу; G, H — верхний коготь гоноподов, соответственно снизу и сверху; H–I — задние сегменты и гоноподы, снизу; J, K — бедро ног 15, соответственно сверху и снизу.

lateral margin. Middle part of each sternite with a very shallow depression. One pair of approximately symmetrically arranged long setae in middle part of anterior portion, and 2–3 long setae in anterior and posterior parts of each sternite.

Legs: Relatively robust, tarsi ill-defined on all legs, tarsal articulations on dorsal side indistinct, being visible only as a shallow ventral suture; well-defined on legs 14 and 15. From short to long setae sparsely scattered over surface of coxa, trochanter, prefemur, femur, and tibia of all legs, more setae on tarsal surface; setae on dorsal and ventral surfaces slightly longer; some notably thickened setae arranged in

one row on ventral surface of tarsi 1–13, no setae arranged in one row on ventral surface of tarsi 14 and 15. All legs with moderately long and curved claws; legs 1–13 with anterior and posterior accessory spurs, anterior accessory spurs moderately long and slender, forming a moderately small angle to claw; posterior accessory spurs slightly more robust, forming a comparatively large angle to claw, only posterior accessory spurs present in legs 14 and 15. Legs 14 and 15 thicker than anterior pairs in both sexes, ♂ legs 15 thicker and stronger than ♀ ones. Femur 2.2–2.4 or 1.8–2.0 times longer than width in ♀ and ♂, respectively. Tarsus-II,

Table. Leg plectrotaxy of *Lithobius (Monotarsobius) femoratus* sp.n.
Таблица. Плектротаксия ног у *Lithobius (Monotarsobius) femoratus* sp.n.

legs	ventral					dorsal				
	C	Tr	P	F	Ti	C	Tr	P	F	Ti
1			p	am	m			p	a	a
2			p	am	m			p	ap	a
3			p	amp	am			(a)p	ap	ap
4			mp	am(p)	am			ap	ap	ap
5–10			mp	amp	am			ap	ap	ap
11–12			mp	amp	am			amp	ap	ap
13			mp	amp	am			amp	p	p
14		m	amp	am	m	a		amp	p	
15		m	amp	am		a		amp		

NB: Letters in brackets indicate variable spines.

3.6–4.9 times longer than width; tarsus-II, 71.7%–94.7% or 69.7–87.2% length of tarsus-I of legs 15 in ♀ and ♂, respectively; tarsus-II, 4.0–4.5 times longer than width. Leg plectrotaxy as in Table.

Coxal pores: Round, 3–5 in a row, 3-4-4-4 in smaller ♀♀, 4-5-5-5 in larger ♀♀, 3-4-4-4(3) in ♂♂; commonly round, coxal pore field set inside a relatively shallow groove, coxal pore-field fringe with a slight prominence and moderately long setae sparsely scattered over surface.

♀: S 15 anterior margin broader than posterior one, posterior angles generally rounded, posterior marginal ridges straight. Moderately long setae sparsely scattered on S 15 surface. Surface of lateral sternal margin of genital segment well-chitinised, posterior margin of genital sternite deeply concave between condyles of gonopods, except for a small, median, rhomboid bulge. Short to long setae very sparsely scattered over ventral surface of genital segment, slightly more setae in posterior part, especially at posterior edge. Gonopods: first article fairly broad, bearing 20–22 moderately long setae arranged in three irregular rows; with 3+3 small coniform spurs, inner spur slightly smaller than outer one (Fig. 2F); second article with 3–5 long setae in ventral part, arranged in two irregular rows; third article with 3–5 long setae in ventral part, arranged in two irregular rows, with a simple apical claw with a larger subtriangular denticle in ventral part (Fig. 2G, H).

♂: S 15 posterior margin narrower than anterior one, straight posteromedially, generally inverted trapezoidal, covered with sparse long setae; sternite of genital segment evidently smaller than in ♀, usually sclerotised; posterior margin deeply concave between gonopods, without medial bulge. Short to long setae equably scattered over ventral surface of genital segment. Gonopods short, each appearing as a small ball-like bulge with a long seta, slightly sclerotised apically (Fig. 2I). With two longitudinal grooves on dorsal side of femur of legs 15, of which outer groove 2 times as long as inner one, with a clear black line therein; outer groove wide and shallow, inner one narrow and deeper; with a narrow, central, longitudinal groove extending to terminal end of ventral side of femur 15 (Fig. 2J, K).

HABITAT. Under the leaf litter of a mixed pine and poplar forest.

COMMENTS. Morphologically, the new species seems to be extremely close to *Lithobius (Monotarsobius) fugax* Stuxberg, 1876 [Stuxberg, 1876; Loksa, 1965; Zaleskaja, 1978] from Siberia and Mongolia, with which it shares the antennae with 19–21 articles, and 6–7 ocelli on each side, the posterior ocellus being the largest, 2+2 prosternal teeth, and the coxal pore formula as 3–5, ♀ gonopods with 3+3 moderately small coniform spurs, apical claw of the third article simple, with a larger subtriangular denticle on the ventral side. However, they can easily be distinguished by the following characters: the new species has two longitudinal grooves on the dorsal side and one longitudinal groove on the ventral side of the femur of ♂ legs 15, vs. no other special features except that the dorsal side is slightly flat in *L. (M.) fugax*; DaC spine on legs 14 and 15, vs. DaC spine on legs 13, 14 and 15 in *L. (M.) fugax*; the dorsal plectrotaxy is 121 in legs 2, 10300 in legs 15, vs. 222 in legs 2, 10310 in legs 15 in *L. (M.) fugax*; Tömösváry's organ larger than the adjacent ocelli. vs. smaller than the adjacent ocelli in *L. (M.) fugax*.

Acknowledgements. We thank Prime Proofreaders and Dr. Sergei Golovatch (Moscow, Russia) for their linguistic help. We are particularly indebted to Dr. Gyulli Farzaliyeva (Perm, Russia) for her very useful suggestions and valuable literature she provided as a reviewer. This study was supported by the project of Hebei Provincial Key Laboratory of Wetland Ecology and Conservation (No.hklz201908), the National Natural Science Foundation of China (NSFC grant No. 31572239), the Natural Science Foundation of Hebei Province (Grant No. C2018111019), and the Key Discipline of Zoology of Hengshui University. We are grateful to Dr. Gregory D. Edgecombe (London, UK), Dr. Pavel Stoev (Sofia, Bulgaria) and Dr. Marzio Zapparoli (Viterbo, Italy), for their hospitality and valuable assistance during our research. We thank Dr. Rowland M. Shelley, North Carolina, USA, and Dr. His-Te Shih, Taichung, China, for providing us with invaluable literature.

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Responsible editor S.I. Golovatch