Lithobius (Ezembius) varioporus, a new species from eastern China (Lithobiomorpha, Lithobiidae)

Sujian Pei¹, Huiqin Ma¹,², Haipeng Liu¹, Yanmin Lu¹,², Xiaojie Hou¹

¹ Institute of Myriapodology, School of Life Sciences, Hengshui University, Hengshui, Hebei 053000, China
² Hebei Key Laboratory of Wetland Ecology and Conservation, Hengshui, Hebei 053000, China

Corresponding author: Huiqin Ma (mhq008@yahoo.com)

Abstract

Lithobius (Ezembius) varioporus sp. nov. (Lithobiomorpha, Lithobiidae), recently discovered from Longquanguan Town, Fuping County, Baoding City, Hebei Province, China, is described. Morphologically it resembles to Lithobius (Ezembius) laevidentata Pei, Ma, Hou, Zhu & Gai, 2015 from the Xinjiang Autonomous Region, but can be easily distinguished from the latter by the Tömösváry's organ, slightly smaller than the adjoining ocelli, no secondary sexual modifications on male tibia 14 and 15, posterior accessory spine of legs 14 and 15 present and the number of coxal pores varying considerably from three to eight. The main morphological characters of the known Chinese species of the subgenus Ezembius Chamberlin, 1919 based on adult specimens are presented.

Keywords

Centipede, Chilopoda, Hebei Province, myriapods

Introduction

Ezembius was originally proposed as a subgenus of Lithobius Leach, 1814 in the family Lithobiidae by Chamberlin (1919); it accommodates a group of approximately 60 species and subspecies mostly known from Asia, with little extension into north-western North America. Known species colonise a wide range of habitats, from...
the Arctic and sub-Arctic regions to tropical and sub-tropical forests, from steppes and overgrazed stony areas of central Asia to Himalayan montane forests, from the seashore up to 5500 m (Himalayas) (Zapparoli and Edgecombe 2011, Qiao et al. 2018). Although the subgenus was formally proposed as new (Chamberlin 1923), according to Jeekel (2005) its name was validated in 1919 (Chamberlin 1919). *Ezembius* is characterised by antennae with ca. 20 articles; ocelli 1+4–1+20; forcipular coxosternal teeth usually 2+2; porodonts generally setiform, sometimes stout. Tergites are generally without posterior triangular projections. Female gonopods are with uni-, bi-, or tridentate claws, and 2+2–3+3 (rarely 4+4) spurs (Zapparoli and 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 88 species and subspecies known from the country. Altogether, 25 species of *Ezembius* have been recorded from China, but only one of them has been reported from Hebei Province (Pei et al. 2019, Qiao et al. 2019a, b). Herein, a new species recently discovered in the Hebei Province, China, is described and illustrated. Tables of the main morphological characters of Chinese *Ezembius* species are also presented.

### Materials and methods

All specimens were hand-collected under leaf litter or stones. The material was examined with the aid of a Nikon SMZ–1500 stereo microscope equipped with a drawing attachment. The colour description is based on specimens preserved in 75 % ethanol, and the body length is measured from the anterior margin of the cephalic plate to the posterior margin of the postpedal tergite. Type specimens are preserved in 75 % ethanol and deposited in the School of Life Sciences, Hengshui University, Hengshui, China (*HUSLS*). The terminology of the external anatomy follows Bonato et al. (2010).

The following abbreviations are used in the text and the tables:

- **a**, anterior;
- **C**, coxa;
- **DaC**, anterior dorsal spur of coxa;
- **F**, femur;
- **m**, median;
- **p**, posterior;
- **P**, prefemur;
- **S, SS**, sternite, sternites;
- **T, TT**, tergite, tergites;
- **Ti**, tibia;
- **To**, Tömösváry’s organ;
- **Tr**, trochanter.
Taxonomy

Lithobiomorpha Pocock, 1895
Lithobiidae Newport, 1844
Lithobius Leach, 1814
Lithobius (Ezembius) Chamberlin, 1919

Lithobius (Ezembius) varioporus, sp. nov.
http://zoobank.org/DF87F26E-CDB7-44AE-AF12-654038A0CB93
Figures 1–7, Tables 1, 2

Diagnosis. Body length 12.4–19.1 mm, antennae composed of 20–22 articles, commonly 20 articles, 9–10 ocelli on each side of the head, arranged in three irregular rows, posterior two comparatively large ocelli; Tömösvéry’s organ larger than the adjacent ocelli; commonly 2+2 forcipular coxosternal teeth, porodonts moderately slender, postero-lateral to the lateral-most tooth, posterior angles of all tergites without triangular projections; 3–8 coxal pores, arranged in one row; female gonopods with 3+3 (few 3+2) moderately small coniform spurs, apical claw simple; male gonopods short and small, with three or four long setae on the terminal segment.

Material examined. Holotype: ♂ (Fig. 1) (EV1). Body length 19.1 mm, cephalic plate 1.8 mm long, 1.7 mm wide, Heiyagou Village, Longquanguan Town, Fuping County, Baoding City, Hebei Province, China, 38°57′03.77″N, 113°48′40.70″E, 1100 m, under litter of the forest floor in a mixed coniferous broad-leaved forest, 5 August 2014, leg. S. Pei, H. Ma. Paratypes [13♀♂, 19♂♂] (EV1): same data as holotype. Other material: 26♀, 32♂ (EV2) Liaodaobei, Longquanguan Town, Fuping County, Baoding City, Hebei Province, China, 38°50′50.12″N, 113°49′50.33″E, 1800 m, 5 August 2014, leg. S. Pei, H. Ma. 20♀, 21♂ (EV3) Wuyuezhai Mountain, Lingshou County, Shijiazhuang City, Hebei Province, China, 38°43′15.02″N, 114°08′32.62″E, 500 m, under litter of the forest floor in a mixed coniferous broad-leaved forest, 28 Sept 2014, leg. S. Pei, H. Ma.

Description. Body length: 12.4–19.1 mm, cephalic plate 1.4–2.0 mm long, 1.4–1.8 mm wide.

Colour: antennal articles yellow-brown with blackish hue, the black gradually becomes lighter at the end of articles 6 and 7, distal-most article yellow-brown; and all tergites yellow-brown, TT 1, 3, 14, and 15 darker, pleural region pale grey with lavender hue, and sternites pale yellow-brown; basal and proximal parts of forcipules, forcipular coxosternite, SS 14 and 15 darker yellow-brown; all legs yellow-brown, distal tarsi darker.

Antennae: 20–22 articles, commonly 20+20 articles (Fig. 1), few specimens 20+21 or 20+22 articles; antennae article lengths are longer than wide except basal articles, which are equal to widths, distal-most article 2.9–3.2 times as long as wide; abundant setae on the antennal surface, less so on the basal articles, gradual increase in density of setae to ca. the fifth article, then more or less constant.
Figures 1–7. *Lithobius (Ezembius) varioporus* sp. nov., 1–2, 4, 7 holotype, male 1 habitus, dorsal view 2, 3 ocelli and Tömös váry’s organ (To), lateral view 4 forcipulae, ventral view 5, 6 paratype, female 5 posterior segments and gonopods, ventral view 6 gonopods, ventral view 7 posterior segments and gonopods, ventral view. Scale bars: 2 mm (1); 250 μm (2, 3); 500 μm (4–7).

*Cephalic plate* smooth, convex, slightly longer than wide; tiny setae emerging from setal sockets scattered very sparsely over the whole surface; frontal marginal ridge with shallow anterior median furrow; short to long setae scattered along the marginal ridge of the cephalic plate; lateral marginal ridge discontinuous, posterior margin continuous, straight, wider than lateral marginal ridge, the middle of the posterior edge is very slightly concaved forward (Fig. 1). Nine to ten approximate oval ocelli on each side (Figs 2, 3), domed, translucent, usually darkly pigmented, situated in three irregular rows; the posterior two ocelli comparatively large; others subequal in size. Tömös váry’s organ situated at anterolateral margin of the cephalic plate, slightly smaller than the adjoining ocelli and lying well apart from them (Figs 2, 3).

*Coxosternite* subtrapezoidal (Fig. 1), anterior margin narrow, lateral margins slightly longer than medial margins; median diastema moderately deep, narrow U-shaped; anterior margin with 2+2 blunt triangular teeth; porodonts slender, lying posterolateral to and separated from the lateral-most tooth (Fig. 4); scattered long setae on the ventral side of coxosternite, longer setae near the dental margin.
A new Lithobiidae species from eastern China

All tergites smooth, without wrinkles, dorsum slightly convex; tiny setae emerging from setal sockets scattered sparsely over the entire surface, few long setae near the margin. Lateral marginal ridges of all tergites continuous. Posterior margin of TT 1, 3, and 5 feebly concave, posterior marginal ridges continuous, posterior margins of TT 7, 8, 10, 12, and 14 feebly concave, posterior marginal ridges discontinuous. Posterior angles of tergites generally rounded, without triangular projections. Miniscule setae scattered sparsely over the surface, two or three slightly thick and long setae on anterior and posterior angles of each tergite.

Sternites. Posterior side narrower than anterior side, generally inverted trapezoidal, smooth; setae emerging from setal sockets sparsely scattered on the surface and lateral margin, 3–5 long setae on the surface of the anterior part of each sternite, two or three comparatively long setae scattered sparsely on the surface of the posterior part of each sternite.

Legs robust, tarsal articulation ill-defined on legs 1–13, faint trace on ventral side, well-defined on legs 14 and 15; short to long setae sparsely scattered over the surface of prefemur, femur, tibia, and tarsus of all legs, with more setae on the tarsal surface; setae on dorsal and ventral surface of tarsus slightly longer than the anterior and posterior, one row of thicker setae regularly arranged on the medial ventral side of tibia of legs 1–13, with setae significantly reduced in legs 14 and 15, no thicker setae regularly arranged in one row on the medial ventral side of tibia. All legs with fairly long curved claws; legs 1–13 with anterior and posterior accessory spines; anterior accessory spines

| Legs | Ventral | Dorsal |
|------|---------|--------|
|      | C       | Tr     | P | F | Ti | C       | Tr | P | F | Ti |
| 1    | mp      | amp    | am|    |    | mp      | ap | a |    |    |
| 2    | mp      | am     | am|    |    | amp     | ap | a |    |    |
| 3–10 | mp      | amp    | am|    |    | amp     | ap | a |    |    |
| 11   | amp     | am     | am|    |    | amp     | ap | a |    |    |
| 12   | m       | amp    | am|    |    | amp     | ap | a |    |    |
| 13   | m       | amp    | am|    |    | a       | amp | p | a   |    |
| 14   | m       | amp    | am|    |    | a       | amp | p | p   |    |
| 15   | m       | amp    | a |    |    | a       | amp | p |    |    |

Letters in brackets indicate variable spines (absent in 5 specimens).
moderately long and slender, forming a moderately small angle with the claw, posterior accessory spines slightly more robust, forming a comparatively large angle with the claw, legs 14 and 15 only with small posterior accessory spines; legs 14 and 15 moderately thicker and longer than the anterior pairs in the female; In the female, tarsus 1 4.0–6.0 times as long as wide in legs 15, tarsus 2 ca. 73.1 %–77.3 % length of tarsus on legs 15; In the male, tarsus 1 3.3–7.3 times as long as wide in legs 15, tarsus 2 ca. 51.1 %–77.6 % length of tarsus on legs 15. Leg plectrotaxy provided in Table 1.

Coxal pores 3–8, round to slightly oval, in a row; in the female, 4554, 678787, 857665, 677776, 677665, in the male, 6777654, 56563, coxal pore field set in a relatively shallow groove, the coxal pore-field fringe with a prominence; prominence with 10–15 short to moderately long setae sparsely scattered over the surface.

**Female** S 15 anterior margin broader than posterior, generally inverted trapezoidal, posteriomedially straight, colour usually yellow-brown; short to long sparse setae evenly scattered on surface; surface of the lateral sternal margin of genital segment well chitinised, posterior margin of genital sternite deeply concave between condyles of gonopods, except for a small, median approximately rhombic-shaped bulge; relatively long setae sparsely scattered over ventral surface of the genital segment. Gonopods (Figs 5, 6): first article fairly broad, bearing 22–26 moderately long setae, arranged in five irregular rows; generally with 3+3 (3+2 in only two specimens) moderately long and slender, coniform spurs, inner spur slightly smaller than the outer, dorsolateral setae absent; second article with 12–16 long setae, arranged in three irregular rows, 9–12 stout setae on the dorsal side; third article with five or six comparatively long setae, arranged in two irregular rows, four or five stout setae on the dorsal side; third article with a simple broad apical claw (Figs 5, 6).

**Male** S 15 posterior margin narrower than anterior, posteriomedially straight, sparsely covered with long setae on the surface; sternite of genital segment smaller than in female, usually well sclerotised, posterior margin deeply concave between the gonopods, without median bulge; long setae sparsely scattered on the ventral surface of the genital segment, fringed with longer setae along the posterior margin; gonopods short, appearing as a small hemispherical bulge, with three or four long setae, apically slightly sclerotised (Fig. 7).

**Habitat.** The specimens studied here were collected from a mixed coniferous broad-leaved forest at ca. 500–1800 m above sea level, in moderately moist habitats under roadside stones and litter of the forest floor.

**Etymology.** The specific epithet varioporus refers to the coxal pore numbers varying considerably from three to eight.

**Discussion.** The new species is morphologically close to *L. (E.) laevidentata* Pei, Ma, Hou, Zhu & Gai, 2015 and to *L. (E.) tetraspinus* Pei, Lu, Liu, Hou & Ma, 2018, both from the Xinjiang Uygur Autonomous Region, China, with which it shares 20–22 antennal articles, 9–10 ocelli arranged in three irregular rows, the posterior two ocelli comparatively large, 3+3 spurs on female gonopods, no anterior accessory spines on legs 15.

However, the new species can be easily distinguished from *L. (E.) laevidentata* by the size of the Tömösváry’s organ, slightly smaller than the adjoining ocelli, rather
A new Lithobiidae species from eastern China

than subequal to the largest ocellus as in L. (E.) laevidentata. The new species has no secondary sexual modifications on the male 15 tibia compared to L. (E.) laevidentata, in which a distinct and shallow dorsal furrow is present on the same leg; moreover, in the new species legs 14 and 15 bear a small accessory spines only on the posterior side vs. both anterior and posterior accessory spines are present on legs 14, and only with posterior accessory spines present on legs 15 in L. (E.) laevidentata.

The new species can be easily distinguished from L. (E.) tetraspinus by the Tömösváry's organ, slightly smaller than the adjoining ocelli in contrast to subequal in size to adjoining ocelli in L. (E.) tetraspinus. Moreover, the new species has no secondary sexual modifications on the leg 15 male tibia vs. the dorsal sulci on the femur in L. (E.) tetraspinus. In the new species, legs 14 and 15 bear small accessory spines only in the posterior side instead of both anterior and posterior accessory spines present on legs 14, and lacking accessory spines on legs 15 in L. (E.) tetraspinus. The new species must be also easily distinguished from the other Lithobius (Ezembius) species to date known from China by the coxal pore number, varying considerably from three to eight, not only among specimens, but also in the same individual.

To assist in the identification of the Lithobius species of the subgenus Ezembius from China, the main morphological characters based on adult specimens are presented in Table 3.

Table 3. Range and main morphological characters of the known Chinese species of subgenus Lithobius (Ezembius) Chamberlin, 1919.

| Characters | L. anabilineatus | L. anasulciferemulato | L. bidens | L. bilineatus | L. chekianus | L. datongensis |
|-----------|-----------------|----------------------|---------|-------------|-------------|--------------|
| Authorities | Ma et al. 2015 | Ma et al. 2013 | Takakuwa 1939 | Pei et al. 2014 | Chamberlin and Wang 1952 | Qiao et al. 2018 |
| Distribution | China S (Guangxi) | China S (Guangxi) | China S (Taiwan) | China S (Guangxi) | China S (Zhengjiang and Taiwan) | China NW (Qinghai Province) |
| Body length (mm) | 11.9–12.1 | 10.1–12.3 | 15.0 | 9.0–9.1 | 16.0 | 12.3–14.2 |
| Number of antennal articles | 23+23 articles in female, unknown in male | 19+19–24+24, commonly 20+20 | 20–21 | two specimens with 20+23, one specimen with 20+23 | 20+20 | 20+20 |
| Number, arrangement and shape of the ocelli | 5–6, in 2 rows | 6, in 3 rows | 7 | 5–6, in 2 rows | 5, in 3 rows | 10, in 3 rows |
| Seriate ocelli | subequal, all ocelli domed, translucent, usually darkly pigmented | one near ventral margin moderately small, others almost equal | not reported | subequal, all ocelli domed, translucent, usually darkly pigmented | not reported | not reported |
| Tömösváry’s organ | round, smaller than adjoining ocelli | moderately large, rounded, slightly larger than adjoining ocelli | at most same size as one ocellus | slightly larger than adjoining ocelli | not reported | slightly larger than nearest ocellus |
| Number and arrangement of coxosternal teeth | 2+2, subtriangular | 2+2, moderately blunt | 2+2 | 2+2, slightly triangular | 2+2 | 2+2, slightly acute |
| Porodont | long, lying posterolateral to lateral-most teeth | slender, lying posterolateral to lateral-most tooth, their base moderately bulged | moderately long, thick and long, lying posterolateral to lateral-most tooth | not reported | setiform porodonts separated from lateral tooth laterally |
| Characters | L. anabilineatus | L. anasulcifemoralis | L. bidens | L. bilineatus | L. chekianus | L. datongensis |
|------------|-----------------|----------------------|-----------|---------------|--------------|---------------|
| Tergites   | smooth, backside slightly hunched | smooth | not reported | smooth, slightly hunched behind | not reported | almost smooth |
| Number of coxal pores | 3–5, female 4454, 3554; male 4443, 4453 | 3–6, usually 4663, 5654, 5553, 5563 and 5565 | 5 (6) 555 | usually females 4554, 5565; males 4553, 4454 | 6655 or 7665 | 4655 and 5575. Coxal pores 4654 and 4554 in male |
| Shape of coxal pores | round or slightly ovate | round or slightly ovate | round | ovate | not reported | rounded |
| Tarsus 1–tarsus 2 articulation on legs 1–13 | not well-defined | not well-defined | Well-defined | not well-defined | not reported | distinct |
| Male 14th legs | Obvious, thicker and stronger than other legs | markedly thicker and stronger than 1–13 legs, thicker and stronger than female | not reported | distinctly thick and strong | not reported | not reported |
| Male 15th legs | obvious thicker and stronger than other legs | markedly thicker and stronger than 1–13 legs, thicker and stronger than female | not reported | distinctly thick and strong | not reported | not reported |
| Dorsal sulci on male 14th legs | absent | absent | not reported | with two, shallow longitudinal sulci | not reported | not reported |
| Dorsal sulci on male 15th legs | two distinct, shallow, dorsal sulci on femur and tibia | with a distinct, shallow, dorsal sulci on tibia | not reported | with two, shallow longitudinal sulci | not reported | not reported |
| DaC spure on 14th–15th legs | on 14th–15th legs | absent | on 14th–15th legs | absent | on 14th–15th legs | on 12th–15th |
| 14th accessory spine | anterior accessory spine reduced in size, only half length of posterior accessory spine | not reported | anterior accessory spine absent | present | present |
| 15th accessory spine | absent | absent | not reported | anterior accessory spine absent | present | anterior accessory spine absent |
| Number and shape of spurs on female gonopods | 2+2 moderately small, blunt, coniform spurs, inner spur slightly smaller than the outer | 2+2 moderately small, blunt, conical spurs, inner spur slightly smaller | 3+3 or 4+4, sharp | 2+2 moderately small, blunt, coniform spurs, inner spur slightly smaller than outer one | not reported | 2+2 moderately large, coniform spurs |
| Dorsal side of second article of female gonopods | with one spine lying dorsally on its external margin | no striking features | not reported | with three short, robust setae lying dorsally on its external margin | not reported | 5–6 setae and five long curved spines |
| Apical claw of female gonopods (and lateral denticles) | simple, small subtrangular teeth in the inner | apical claw dimidiate | simple, small sharply teeth in the inner | apical claw bipartite, and its inner aspect broader | not reported | undivided, bearing a small triangular protuberance on ventral side |
| Male gonopods | short and small bulge, with one to two long setae, apically less sclerotised | with a small bulge, without setae and apically less sclerotised | hemisperical, with two long setae | short and small bulge, having a long seta, apically slightly sclerotised | not reported | a hemisperical bulge, with three setae |

| Authorities | Qiao et al. 2019 | Takakuwa and Takashima 1949 | Eason 1986 | Eason 1993 | Takakuwa and Takashima 1949 | Pei et al. 2015 |
|-------------|-----------------|-----------------|-----------|-----------|-----------------|---------------|
| Distribution | China NW (Qinghai Province) | China NW (Shanxi) | China N (Inner Mongolia Autonomous region) | China S (Hong Kong) | China W (Shanxi) | China NW (Xinjiang Uygur) |
| Body length (mm) | 20.5 | 9.0 | 15.0–50.0 | 10.0–11.5 | 12.0 | 9.6–13.3 |
| Number of antennal articles | 20–21 | 20–23 | 20+20 | 18+18–19+19 | 20+20 | 19+19–21+21 commonly 20+20 |
| Number of antennal articles | 11–12, in 3 rows | 6, in 2 rows | 6–10, in 2–3 rows | 6–8, in 2 rows | 7, in 2 rows | 8–10, in 3 rows |
A new Lithobiidae species from eastern China

A new Lithobiidae species from eastern China

| Characters | L. dulanensis | L. gantoensis | L. giganteus | L. insolitus | L. irregularis | L. laevidentata |
|------------|---------------|---------------|--------------|--------------|---------------|---------------|
| Posterior ocellus | oval to rounded, comparatively large | oval to round, comparatively large | oval to rounded, comparatively large | round, comparatively large | posterior two ocelli bigger than seriate ocelli |
| Seriate ocelli | the second row smaller than the first, the third smallest | not reported | not reported | not reported | subequal other seriate ocelli slightly larger than ocelli adjoining ventrally |
| Tomósváry's organ | subequal in size to adjoining medium large ocelli | slightly smaller than adjoining ocelli | slightly smaller than adjoining ocelli | same size as largest ocellus | subequal in size to adjoining ocelli |
| Number and arrangement of gonostomial teeth | 2+2 moderately robust teeth | 2+2, approximately sharp, small | 2+2 | 2+2, small | 2+2, approximately blunt |
| Porodont | slender lying posterolateral to the most lateral tooth | not reported | not reported | slender, lying posterolateral to lateral tooth, their base slightly bulged | long, their base slightly bulged |
| Tergetes | smooth and all posterior angles rounded without projections | smooth, without wrinkles | smooth, with slightly wrinkles | T1 smooth, other with wrinkles | smooth, without wrinkles, backside slightly hunched |
| Number of coxal pores | 5666 or 5666 | 3333 | 3333, 4554, 4555, 5565, 5566 or 5666 | 3–6, male 3–6 in 12th leg, 4–6 in 13th leg, 7–10 in 14th and 15th leg | 2–5, female commonly 4555, 4554, sometime 3454, 3455, 3343, male commonly 2332, 2333, sometime 3444, 3333 |
| Shape of coxal pores | Circulator slightly ovate | round | round | round | round or slightly ovate |
| Tarsi 1–tarsus 2 articulation on legs 1–13 | fused | not reported | Well-defined | not defined | Well-defined not well-defined |
| Male 14th legs | longer and thicker than legs 1–13 | not reported | not reported | distinctly thick and strong | not reported remarkably thicker and stronger |
| Male 15th legs | longer and thicker than legs 1–13 | not reported | not reported | distinctly thick and strong, with dark zones on dorsal of tibia | not reported markedly thicker and stronger |
| Dorsal sulci on male 14th legs | absent | not reported | not reported | absent | not reported |
| Dorsal sulci on male 15th legs | absent | not reported | not reported | absent | not reported |
| DaC spure on 11th–15th legs | absent | on 12th–15th legs (on 11th and 12th legs sometimes present) | on dorsal of tibia | absent on 13th–15th legs | on 12th–15th legs |
| 14th accessory spine | anterior accessory spines absent | present | present | not reported | not reported |
| 15th accessory spine | absent | present | absent | absent | anterior accessory spines absent |
| Number and shape of spurs on female gonopods | 2+2 moderately small coniform spurs | 1+1, conical spurs | 2+2 | 3+3, coniform spurs | 3+4, or 4+4 small, blunt, coniform spurs, commonly with 3+3, inner spur smaller than outer one |
| Dorsal side of second article of female gonopods | with six dorsolateral setae | without eight spines in two irregular rows lying dorsally on its external margin | not reported | not reported | with three long setae lying dorsally on its anterior external margin |
| Apical claw of female gonopods (and lateral denrites) | unidentate, curved | simple | simple | simple | simple and broad |
| Male gonopods | small, one-segmented, with two long setae, apically slightly chitinized, flat | not reported | not reported | not reported | small bulge, with one to two long setae apically slightly sclerotised |

| Characters | L. longibasitarsus | L. lineatus | L. mandschreiensis | L. maqinensis | L. multispinipes | L. parvicornis |
|------------|-------------------|-------------|-------------------|--------------|---------------|--------------|
| Authorities | Qiao et al. 2018 | Takakuwa 1939 | Takakuwa 1940 | Qiao et al. 2019b | Pei et al. 2016 | Zapparoli 1991 |
| Distribution | China NW (Qinghai) | China (Taiwan, Sichuan, Jiangsu, Heilongjiang, Jilin, Liaoning) | China NW (Qinghai) | China NW (Xinjiang Uygar) | China S (Taiwan) | China S (Taiwan) |

A new Lithobiidae species from eastern China
| Characters | L. longibasitarsus | L. lineatus | L. mandschreiensis | L. maqinensis | L. multispinipes | L. parvicornis |
|------------|------------------|-------------|-------------------|---------------|-----------------|--------------|
| Body length (mm) | 17.0–18.0 | 18.0 | 22.0–23.0 | 13.10–14.60 | 11.6–22.6 | 16.0 |
| Number of antennal articles | 20+20 | 19+19–21+21 | 20–28 | 20+20 | commonly 20+20, (three specimens with 20+21, one specimen with 20+26 of 134 specimens) | 20+20, 21+21 |
| Number, arrangement and shape of the ocelli | 11, in 3 rows | 8–11, in 3 rows | 9–13, in 3 rows | 9–10, in 3 rows | 8, in 3 rows | 3–4, in 1 or 2 rows |
| Posterior ocellus | posterior ocellus larger | comparatively small large | the most posterior ocellus largest | two ocelli large, oval to rounded | comparatively large |
| Seriate ocelli | not reported | not reported | same size | the ocelli of the bottom row small | two near ventral margin moderately small, others almost equal |
| Tomósváry’s organ | smaller than adjacent ocelli | same size as adjoining ocelli | larger than adjoining ocelli | almost the same size as adjacent ocelli | slightly smaller than adjoining ocelli |
| Number and arrangement of coxosternal teeth | 3+2 blunt nipple-like teeth | 2+2, comparatively large | 2+2, small and sharp | 2 + 2 | 3+3, slightly triangular |
| Pododont | thick and strong separated from lateral tooth ventrolaterally | long and strong | lying posterolateral to lateral-most tooth | setiform pododonts on small knobs | thick and long, lying posterolateral to lateral-most tooth |
| Tergites | all smooth, without wrinkles | smooth | smooth, without wrinkles | smooth, never rugose | smooth, without wrinkles and slightly hunched behind |
| Number of coxal pores | 6555 | 6–7, usually 66(7)6 | 776(756) | 6666 | 3,–5, 4555, 5555, 4444, 4455 (females) and 4444, 3344 (males) |
| Shape of coxal pores | circular | round to ovate | round or ovate | round and uni-seriate, the most proximal pore on 15th coxae minute | round to ovate |
| Tarsus 1–tarsus 2 articulation on legs 1–13 | well-defined | well-defined | well-defined | unipartite tarsi | well-defined |
| Male 14th leg | moderately thicker and longer | not reported | not reported | longer and thicker than 1–13 | thick and strong |
| Male 15th leg | moderately thicker and longer | not reported | not reported | longer and thicker than 1–13 | thick and strong |
| Dorsal sulci on male 14th legs | absent | absent | not reported | not reported | absent |
| Dorsal sulci on male 15th legs | absent | not reported | not reported | not reported | absent |
| DaC spure on 13th–15th legs, 12th sometimes present | on 14th–15th legs | on 12th–15th legs | on 12th–15th legs, 11th sometimes present | on 13th–15th legs, 9th–10th sometimes present | not reported |
| 14th accessory spine | present | present | not reported | posterior accessory spurs present | present |
| 15th accessory spine | absent | present | not reported | absent | not reported |

| Characters | L. longibasitarsus | L. lineatus | L. mandschreiensis | L. maqinensis | L. multispinipes | L. parvicornis |
|------------|------------------|-------------|-------------------|---------------|-----------------|--------------|
| Number and shape of spurs on female gonopods | 2+2 moderately long, buller-shaped spurs inner spur slightly smaller and more anterior than outer one | 3+3 moderately sharp, slender conical spurs | 3+3, same size | 2+2 moderately small, coniform spurs, inner spur smaller | 2+2, blunt, coniform spurs, with inner spur smaller than outer one | 2+2 |
A new Lithobiidae species from eastern China

| Characters | L. longibasitarsus | L. lineatus | L. mandschuensis | L. maquinensis | L. multispinipes | L. parvicornis |
|------------|-------------------|-------------|-----------------|---------------|-----------------|---------------|
| Dorsal side of second article of female gonopods | three long setae along donolateral ridge | not reported | not reported | with 5–6 long setae and 5–6 spines lying dorsally on its external margin | not reported | not reported |
| Apical claw of female gonopods (and lateral denticles) | simple, having small triangular protuberance on ventral side | simple | simple | unidentate, curved with a small triangular protuberance on ventral side | simple | simple |
| Male gonopods | small, semicircular article with 3–5 setae on its surface | hemispherical bulge, without setae | small, undivided, oblique apically, with 2 setae | hemispherical bulge, having a long seta, and apically slightly sclerotised | not reported | |

| Characters | L. polyommatus | L. rhysus | L. sulcipes | L. sulcifemoralis | L. tetraspinus | L. variporus | L. zhui |
|------------|---------------|-----------|-------------|----------------|--------------|-------------|--------|
| Authorities | Qiao et al. 2019 | Artemis 1934 | China S (Taiwan) | China W (Shanxi) | China NW (Xinjiang Uygur) | China NW (Xinjiang Uygur) | China E (Hebei) |
| Distribution | China NW (Tibet) | China S (Fujian and Taiwan) | China S (Taiwan) | China NW (Shanxi) | China NW (Xinjiang Uygur) | China NW (Xinjiang Uygur) | China NW (Xinjiang Uygur) |
| Body length (mm) | 16.10–18.30 | 15.0 | Not reported | 12.0 | 9.6–13.3 | 12.4–19.1 | 8.1–15.0 |
| Number of antennal articles | 20±20 | 20±20 in female, 20±21 in male | 19–22 | 20±20 | 19–22, commonly 20 | 20–22, commonly 20 | 20–24, commonly 20 |
| Number, arrangement and shape of the ocelli | 14, in 3 rows | 8, in 4 rows | 7, in 2 rows | 6 | 8–10, in 3 rows | 9–10, in 3 rows | 10–13, in 5–4 rows |
| Posterior ocellus | posterior ocellus comparatively large | comparatively large | all ocelli same size | two ocelli comparatively large | posterior two ocelli comparatively large | comparatively large |
| Seriate ocelli | almost equal | not reported | not reported | same size | the adjoining Tömösváry organ slightly small | others subequal in size | dorsal ones moderately large, those near ventral margin of ocellar field moderately small, others of moderate size |
| Tömösváry’s organ | moderately smaller than the adjoining ocelli | not reported | not reported | same size as ocelli | subequal in size to adjoining ocelli | slightly smaller than the adjacent ocelli | slightly larger than adjoining ocelli |
| Number and arrangement of coxosternal teeth | 2 + 2 | 2 + 2 | 2 + 2, small and sharp | 2 + 2 | 2 + 2 | 2 + 2, blunt | 2 + 2 moderately small and pointed |
| Podostern | thick and strong, just posterolateral and separated from the lateral tooth | not obvious | not reported | slender and long | thick and strong, just posterolateral and separated from lateral tooth | slender, lying posterolateral to and separated from the lateral-most tooth | moderately thick in basal, moderately pointed, just posterolateral to lateral tooth |
| Tergites | smooth without wrinkles | with shallow wrinkles | Smooth, posterior angles slightly triangular in T14 | not reported | smooth, without wrinkles, dorsum slightly convex | smooth, without wrinkles, dorsum slightly convex | smooth, without wrinkles, backward slightly hunched |
| Number of coxal pores | 4–7, 56/7, 5666 (female) 5665, 4554 (male) | 6554 | 4554 | 5555 | usually 4555, 4554, rarely 3454, 3455, 3343 in females and usually 2332, 2333, rarely 3444, 3333 in males | 6554, 6758706, 560765, 677776, 667665, in the male, 66777063(4), 665603 | 2–4, 3444, 3443, 3333 in female, and 3443, 2343, 2333, 2333 in male |
| Shape of coxal pores | round or slightly oval | round | round | round or slightly oval | round to slightly oval | round or slightly oval | round or slightly oval |
| Tarsus 1–tarsus 2 articulation on legs 1–13 | ill-defined | not reported | well-defined | ill-defined | well-defined | well-defined | well-defined |
| Male 14th legs | slightly thicker in the female, significantly thicker and stronger in the male | not reported | not reported | thick and strong | significantly thicker and stronger | moderately thicker and longer | moderately thicker and stronger |
### Characters

| Characters | *L. polyommatus* | *L. rhysus* | *L. suliceps* | *L. sulcifemoralis* | *L. tetraspinus* | *L. varioporus* | *L. zhui* |
|-----------|----------------|------------|--------------|-------------------|---------------|---------------|---------|
| Male 15*th* legs | slightly thicker in the female, significantly thicker and stronger in the male | femur and tibia thicker | femur and tibia thicker | thick and strong | significantly thicker and stronger | moderately thicker and stronger | thicker and stronger, with a circular protuberance on distal end of tibia |
| Dorsal sulci on male 14*th* legs | with a longitudinal discontinuous shallow and narrow groove on dorsal side of tibia, and a fairly black vertical line at the bottom on dorsal side | not reported | present on femur | present on femur and tibia | absent | absent | absent |
| Dorsal sulci on male 15*th* legs | with a longitudinal discontinuous shallow and narrow groove on dorsal side of tibia, and a fairly black vertical line at the bottom on dorsal side | not reported | present on femur and tibia | present on femur and tibia | present on femur | absent | absent |
| DaC spur | on 11*th*–15*th* legs | on 15*th* legs present | on 15*th* legs present | absent | on 12*th*–15*th* legs | on 12*th*–15*th* legs, 12*th* sometimes present | 2+2, slender |
| 14*th* accessory spine | present | not reported | not reported | not reported | present | anterior accessory spine absent | absent |
| 15*th* accessory spine | absent | absent | not reported | not reported | absent | anterior accessory spine absent | absent |
| Number and shape of spurs on female gonopods | 2+2 moderately long and slender, bullet-shape spurs | 2+2, slender | 2+2, strong, long and sharp | 3+3, few 3+4, only one 4+4 coniform spurs | 3+3 (seldom 3+2) moderately long and slender, coniform | 2+2 moderately long, coniform spurs, inner spur slightly smaller and more anterior than outer |
| Dorsal side of second article of female gonopods | 9 long setae lying dorsally on the posterior part of the external margin | not reported | not reported | not reported | 3 long setae and four short, robust spines lying dorsally on posterior part of external margin | three spurs arranged in one irregular row on dorsal terminal part |
| Apical claw of female gonopods (and lateral denticles) | simple | simple | dimidiate | simple, with a very small subtriangular blunt denticle on inner margin | simple | broad, and tridentate |
| Male gonopods | short, apically slightly sclerotized, appearing as a small hemispherical bulge with 2 long setae | not reported | not reported | not reported | small hemispherical bulge, with 1–2 long setae | short, small hemispherical bulge, with 1–3 long setae, apically slightly sclerotized | small bulge, with 1–2 long setae on surface, and terminal slightly sclerotised |

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