

***Australobius polyspinipes* sp. n., a new species of *Australobius* Chamberlin, 1920 (Lithobiomorpha: Lithobiidae) from China**

Hui-qin Ma, Hai-peng Liu, Yan-min Lu, Xiao-jie Hou & Su-jian Pei*

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Australobius polyspinipes sp. n. (Lithobiomorpha: Lithobiidae) was recently discovered from Tianheshan Mountain, Hebei Province, China, and it is described here. Morphologically the new species is similar to *A. nodulus* Ma, Song & Zhu, 2008 and *A. magnus* (Trozina, 1894), both recorded from China. The new species can be easily distinguished from those by having 7+7–8+8 coxosternal teeth, 10–12 ocelli on each side of the cephalic plate, 5+5 spurs on the first article of the female gonopods and differences in plectrotaxy of legs. The main morphological characters and a key to the known Chinese species of genus *Australobius* based on adult specimens is presented.

H. Ma, Scientific Research Office, Hengshui University, Hengshui, Hebei 053000, P. R. China

H. Liu, Y. Lu, X. Hou & S. Pei, Hengshui University, Hengshui, Hebei 053000, P. R. China; * Corresponding author's e-mail: peisujian@126.com*

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1. Introduction

The World Catalogue of Centipedes currently records 33 species/subspecies in the genus *Australobius* Chamberlin, 1920 (Bonato *et al.* 2016), mostly in South-East Asia and East Australia (Zapparoli & Edgecombe 2011). The genus is characterized by possessing the following traits (Eason 1978, 1997, Edgecombe 2002, Zapparoli & Edgecombe 2011): antenna mostly with 20 articles, some species more than 24; ocelli few (e.g., 1+3–1+6), some species more than 8; forcipular coxosternal teeth at least 3+3; tergites with more or less distinct posterior triangular projections; female gonopods with uni-, bi-, tridentate claw, 3+3–4+4 spurs, rarely more than 4; tarsal articulation of legs 1–13 indistinct in some species.

The myriapod fauna of China is still poorly known and this is especially the case with centi-

pedes of the order Lithobiomorpha. Only 74 species/subspecies of lithobiomorphs are to date known from the country (Ma *et al.* 2014a, b, 2015, Pei *et al.* 2014, 2015, 2016, Qin *et al.* 2014). Altogether, only five species of *Australobius* have been recorded from China (Ma *et al.* 2008a, b, 2014b, Qin *et al.* 2014). Here we describe a new species recently found in Xingtai City, Hebei Province.

2. Materials and methods

All specimens were hand-collected under leaf litter or stones and preserved in 75% ethanol. 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 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. The type specimens are deposited in the School of Life Sciences, Hengshui University, Hengshui, China (HUSLS). The terminology of the external anatomy follows Bonato *et al.* (2010). The measurements are shown in millimeters (mm).

The following abbreviations are used in the text and the tables: T, TT = tergite, tergites; S, SS = sternite, sternites; C = coxa, Tr = trochanter, P = prefemur, F = femur, Ti = tibia, a = anterior, m = median, p = posterior, DaC spine = anterior spine of dorsal of coxa.

3. Description of *Australobius polyspinipes* sp. n. (Fig. 1, Table 1)

Type material. Holotype: female, Tianheshan Mountain, Qingquan village, Baian Town, Xingtai County, Xingtai City, Hebei Province, 37°05'13.88" N, 113°47'35.64" E, alt. 795 m, 4.X.2015, Sujian Pei and Huiqin Ma leg. Paratypes: 8 ♀♀, 11 ♂♂, same data as holotype.

Diagnosis. Antennae with 29 articles. Ocelli 1+11, in 2 irregular rows and only posteriormost ocellus being larger than others. Anterior margin of the coxosternite with 7+7–8+8 teeth, more or less developed. Porodonts slender, between fourth and fifth outer teeth with 8 coxosternal teeth, between third and fourth outer teeth with 7 coxosternal teeth. Tergites without posterior triangular projections. Coxal pores 6–7. Tarsal articulation well defined on legs 1–15. No secondary sexual modifications on legs 14 and 15 of male. Female gonopods with tridentate claw, 5+5 spurs. Male gonopods short and small as a small semisphere bulge, with one long setae, apically slightly sclerotized.

Description. Body length 16.5–22.5 mm.

Whole body yellow–brownish, cephalic plate, proximal parts of forcipules, forcipular coxosternite and SS 14 and 15 slightly darker. Ventral and pleural region slightly lighter.

Antennae with 29+29 articles (Fig. 1a); basal article slightly longer than wide, subsequent articles markedly longer than wide, distal article up to 2.5 times as long as wide. Abundant setae on antennal surface, less so on basal articles, gradual

increase in density of setae to about third article, then more or less constant.

Ten to twelve oval to rounded, domed, translucent, usually darkly pigmented ocelli on each side (Fig. 1b) arranged in two irregular rows; posterior one comparatively large, others about equal in size; ocelli at ventral side of cephalic plate, overhanging its lateral margin.

Tömösváry's organ ovate, situated at antero-lateral margin of cephalic plate, slightly smaller than adjoining ocelli and lying well apart from them (Fig. 1b).

Cephalic plate smooth, convex, slightly wider than long; tiny setae emerging from pores scattered very sparsely over whole surface; frontal marginal ridge with shallow anterior median furrow; from short to long setae scattered along marginal ridge of cephalic plate; lateral marginal ridge discontinuous (Fig. 1a). Length of antenna 5–7 times width of cephalic plate, and often extending close to posterior edge of T 10.

Forcipular coxosternite subtrapezoidal (Fig. 1c), anterior margin broad, external side lightly shorter than internal side; median diastema moderately broad, V-shaped; anterior margin with 7+7 or 8+8 small and blunt teeth; porodonts slender, lying between the fourth and fifth outer teeth in coxosternites with 8+8 teeth, between the third and fourth outer teeth in those with 7+7 teeth (Fig. 1d); some short setae scattered on the ventral side of coxosternite; usually there are more and longer setae near the dental margin.

All tergites smooth, without wrinkles, back-side slightly hunched; T 1 posterolaterally narrower than anterolaterally, generally trapeziform, narrower than T 3 and cephalic plate; T 10 is widest tergite. Posterior margin of TT 1, 3 and 5 slightly concave, posterior margin of TT 7, 8, 10, 12, 14 and 15 concave. Marginal ridge of TT 2, 4, 6, 9, 10, 11, 12, 13 and 14 slightly bulging, marginal ridge of T 15 bulging; lateral marginal ridge of all tergites continuous; all posterior angles generally rounded, without triangular projections; tiny setae scattered very sparsely over surface, more densely on anterior and posterior angles (Fig. 1a).

Posterior side of sternites narrower than anterior one, generally trapeziform, comparatively smooth, setae emerging from pores scattered very sparsely on surface, slightly thicker setae on sur-

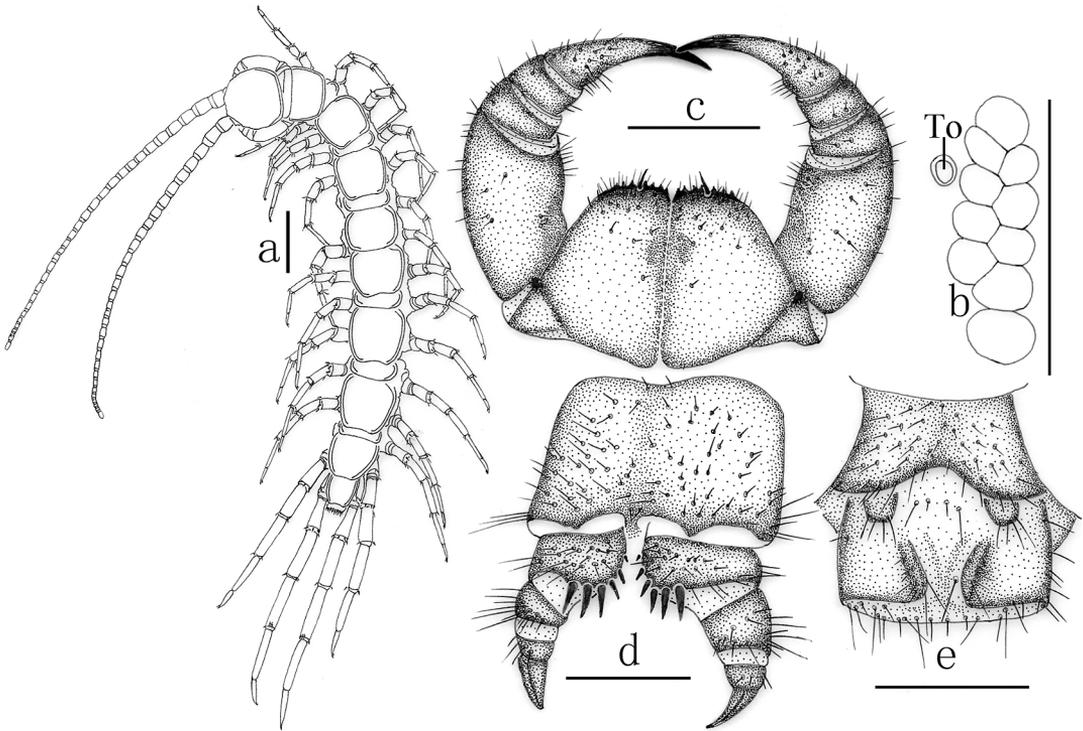


Fig. 1. *Australobius polyspinipes* sp. n. (holotype female, a–d; paratype male, e). – a. Habitus, dorsal view, scale 1 mm. – b. Ocelli and Tömösväry's organ (To), lateral view, scale 0.6 mm. – c. Forcipular coxosternite, ventral view, scale 1 mm. – d. Posterior segments and gonopods, ventral view, scale 0.5 mm. – e. Posterior segments and gonopods, ventral view, scale 0.6 mm.

face of anterior part of each sternite; on middle parts, with 1–2 very long setae in the anterior and posterior angles.

Legs strong, tarsal articulation well defined on legs 1–15; all legs with fairly long curved claws; anterior and posterior accessory spurs on legs 1–13; anterior accessory spurs moderately long and slender, forming relatively small angles with tarsal claws; posterior one slightly strong, forming relatively large angles with tarsal claws; only posterior accessory spurs on legs 14, no accessory spurs on legs 15.

Short to comparatively long setae scattered very sparsely over surface of prefemur, femur, tibia and tarsus of legs 1–13, dorsal setae slightly longer than ventral, more setae scattered on surface of tarsus, slightly thick setae arranged in two rows on ventral side of tarsus, thick setal rows on surface of tarsus 1 shorter than that of tarsus 2; setae scattered on surface of legs 14 and 15 clearly scarcer than on other legs, especially, on tarsus 1. Legs 14 and 15 thicker and stronger in

male than in female, tarsus 1 about 6.2–6.9 times as long as wide in legs 15. In male, tarsus 1 5.0–5.6 times as long as wide in legs 15, setal clusters composed of 8–10 moderately thick setae on dorsal terminal side of tibia of legs 15. Leg plectrotaxy as in Table 1.

Coxal pores 6–7, most of them ovate, few round, usually 6777, less frequently 6776, coxal pore field set in a relatively shallow groove, fringe of coxal pore field with eminence, short to moderately long setae scattered sparsely over surface of eminence.

Female S 15 anterolaterally broader than posterolaterally, generally trapeziform, posteromedially straight; sternite of genital segment usually well chitinised; posterior margin of genital sternite deeply concave between condyles of gonopods, except for a small, median approximately tongue-shaped bulge; relatively long setae scattered over ventral surface of genital segment, regularly fringed, with longer setae along posterior margin. Gonopods: first article fairly

Table 1. Leg plectrotaxy of *Australobius polyspinipes* sp. n. Abbreviations: C: coxa, Tr: trochanter, P: prefemur, F: femur, Ti: tibia, a: anterior, m: median, p: posterior.

Legs	Ventral side					Dorsal side				
	C	Tr	P*	F	Ti	C	Tr	P	F	Ti
1–2			mp	amp	amp			amp	ap	a
3			(a)mp	amp	amp			amp	ap	a
4			(a)mp	amp	amp			amp	ap	ap
5–13		m	amp	amp	amp			amp	ap	ap
14	a	m	amp	amp	am	a		amp	p	p
15	a	m	amp	amp	a	a		amp	p	

* Letters in brackets indicate variable spines.

broad, 5+5 moderately long and slender, coniform spurs, inner spur slightly smaller than outer one, few specimens with a very small sixth spur innermost (Fig. 1d); apical claw of third article simple, slender and sharp (Fig. 1d). Many short to moderately long setae on surface of all segments of gonopods.

Male S 15 posterolaterally narrower than anterolaterally, posterior edge straight, sparsely covered with long setae; sternite of genital segment smaller than in female, usually well sclerotised. Posterior margin quite deeply concave between gonopods, without a medial bulge; comparatively long setae scattered on ventral surface of genital segment, few setae near S 15, setae gradually increasing in density from anterior to posterior, gonopods short and small like a small mamillary bulge, with 3–6 long setae, apically slightly sclerotised (Fig. 1e).

Etymology. The specific name refers to the 5+5 comparatively long and slender coniform spurs on the first article of female gonopods.

Habitat. The specimens were collected from under roadside stones and forest floor in forests of *Castanea mollissima* Blume and *Diospyros kaki* L.f. at about 795 m above the sea level in moderately moist habitats.

Discussion. The new species resembles both *Australobius nodulus* Ma, Song & Zhu, 2008 from Qinghai-Tibet Plateau, China and *A. magnus* (Trozina, 1894) from North-Western China in having the ocelli arranged in two irregular rows, Tömösváry’s organ being smaller than the adjacent ocelli, the coxal pores numbering 6–7, and the plectrotaxy of the 15th legs being 10310 in dorsal side and 11331 in ventral side. However,

the new species can be easily distinguished from *A. nodulus* by the antennae of the new species having 29 articles in contrast to 31–33 articles in *A. nodulus*; the anterior margin of the coxosternite having 7+7–8+8 teeth in contrast to 5+5–6+6 in *A. nodulus*; the DaC spine being present on the 12th–15th legs vs. on the 14th–15th legs; the 14th accessory spur lacking vs. to the posterior accessory spurs present in *A. nodulus*; the first article of the female gonopods having 5+5 spurs instead of 2+2 or 4+4 in *A. nodulus*; the plectrotaxy of the 13th legs being 00322 in the dorsal and 01333 in the ventral side compared to the dorsal side 10322 and the ventral side 00333 in *A. nodulus*. The new species can also be easily distinguished from *A. magnus* by the anterior margin of the coxosternite having 7+7–8+8 teeth in contrast to 2+2–7+7 (few specimens 3+4 or 6+3) in *A. magnus*; having 10–12 ocelli on each side of the cephalic plate vs. 8–9 ocelli in *A. magnus*; the first article of the female gonopods having 5+5 spurs instead of 2+2–4+4, rarely 4+5 in *A. magnus*; the DaC spine being present or absent on the 8th–10th legs and present on the 11th–15th legs in contrast to being present on the 14th–15th legs in *A. magnus*; the plectrotaxy of the 12th legs being 00322 in the dorsal side and 01333 in the ventral side vs. 10322 in the dorsal side and 00333 in the ventral side in *A. magnus*.

On the other hand, several diagnostic features of the recently described Chinese species that are routinely used to diagnose species of *Australobius* Chamberlin, 1920 are variable within the framework of the original description. Perhaps the most conspicuous variation pertains to the number of teeth on the anterior margin of the

Table 2. Numbers of examined specimens, distribution and main morphological characters of the six known Chinese species of *Australobius* Chamberlin, 1920. Abbreviation: DaC spine, anterior spine of dorsal of coxa.

A.	<i>A. anamagnus</i>	<i>A. apicicornis</i>	<i>A. magnus</i>
Original description	Ma et al. 2008a	Qin et al. 2014	Trotzina 1894
Specimens originally examined	2♀1♂	3♀2♂	1♀
Other sources			Eason 1997, Dyachkov 2017
Specimens examined in other sources			13♀6♂, 34♀8♂
Distribution	Qinghai-Tibet Plateau, China (Tibet)	Qinghai-Tibet Plateau, China (Sichuan)	Qinghai-Tibet Plateau, China (Tibet); Kirghizia and Kazakhstan;
Body length (mm)	15.9–26.6	17.6–22.5	16.0–30.0
Number of antennal articles	26+26, rarely 25+26	24+24	25–30
No. and arrangement of ocelli	10, in 2 rows	7–9, in 2 rows	8–9, in 2 rows
Tömösváry's organ	Nearly round, smaller than adjoining ocelli	Round, smaller than adjacent ocellus	Round, smaller than adjacent ocellus
No. and arrangement of coxosternal teeth	3+3, 3+4, 4+4, roughly triangular	8+6, 5+5, 6+6, 5+6, 6+7, small, blunt, triangular	2+2–7+7, few 3+4 or 6+3
Porodont	Comparatively thick and strong, situated between outer two teeth, few between second and third	Absent	Short and pointed, situated between outer two teeth, or between second and third
No. of coxal pores	4–9 Females: 5676, 5777, 6776, 6787, 6797 Males: 6785, 6775, 4565, 5665	5–8, usually 6666, 6665, 8888, 6776, 6777	3–7, rarely 8
DaC spine	On 12 th (present or absent)–15 th legs	On 13 th –15 th legs	On 8–10 th present or absent, on 11 th –15 th legs present
14 th accessory spur	Absent	Present	Absent
15 th accessory spur	Absent	Absent	Absent
No. and shape of spurs on female gonopods	3+3, 3+4, 4+4 moderately small, coniform spurs, inner one much smaller than outer	3+3 or 4+4 coniform spurs, inner ones smaller than outer spurs	2+2–4+4, rarely 4+5
Apical claw of female gonopods and lateral denticles	Broad, simple	Simple	Simple
Male gonopods	A small hemispherical protuberance, with a single long seta, distal region slightly sclerotised	Small, indistinct swellings, with one or two long setae	Small, spherical
B.	<i>A. nodulus</i>	<i>A. polyspinipes</i> sp. n.	<i>A. tetrophthalmus</i>
Original description	Ma et al. 2008b	This paper	Loksa 1960
Specimens originally examined	4♀2♂	9♀11♂	1♂

Other sources			Eason 1978
Specimens examined in other sources			1♂
Distribution	Qinghai-Tibet Plateau, China (Hebei)	China S (Guangxi)	China (Tibet)
Body length (mm)	17.1–22.1	16.5–22.5	19.0
Number of antennal articles	31+31–33+33	29+29	29
No. and arrangement of ocelli	9–11, in 2 rows	10–12, in 2 rows	4, in 2 rows
Tömösváry's organ	Smaller than adjoining ocelli	Ovate, slightly smaller than adjoining ocelli	Ovate, larger than adjoining ocelli
No. and arrangement of coxosternal teeth	6+6 or 6+5, small and blunt	7+7 or 8+8, small blunt	5+5, small
Porodont	Situated between outer third and fourth teeth, rarely between second and third teeth	Situated between outer fourth and fifth teeth in coxosternites with 8+8 teeth, between outer third and fourth teeth in those with 7+7 teeth	Not reported
No. of coxal pores	4–7 arranged into an irregular row, 5665, 4555, 6776, 6775	6–7, usually 6777, less frequently 6776	3333
DaC spine	On 12 th –15 th legs	On 14 th –15 th legs	Absent
14 th accessory spur	Absent	Posterior ones present	Not reported
15 th accessory spur	Absent	Absent	Not reported
No. and shape of spurs on female gonopods	2+2 or 4+4 moderately small, coniform spurs, inner spur clearly smaller than outer one	5+5 moderately long and slender, coniform spurs, inner spur slightly smaller than outer one, few specimens with a very small sixth spur innermost	Not reported
Apical claw of female gonopods and lateral denticles	Broad, simple	simple, slender and sharp	Not reported
Male gonopods	Small hemispheroid protuberance, with 3–4 long setae, apically slightly sclerotized	small mammillary bulge, with 3–6 long setae, apically slightly sclerotized	Not reported

coxosternite and the numbers of the antennal articles and the ocelli. For example, in the original description of the genus *Australobius*, the number of antennal articles is mostly 20, in some species more than 24 articles, whereas in many species occurring in China it is higher (Table 2). The same is true for the number of the ocelli, which is few (e.g., 1+3–1+6) or in some species more than 8 in the original description of the genus, whereas in many species occurring in China it is higher (Table 2), and for the number of coxosternal teeth, which is at least 3+3 in the original description, whereas in many species occurring in China it is more variable (Table 2).

4. Key to the known Chinese species of genus *Australobius* Chamberlin, 1920

- 1 Four ocelli on each side of cephalic plate, Tömösváry's organ larger than adjacent ocelli
A. tetrophthalmus (Loksa, 1959)
- More than seven ocelli on each side of cephalic plate, Tömösváry's organ smaller than adjacent ocelli 2
- 2 No prodonts
A. apicicornis Qin, Lin, Zhao, Li, Xie, Ma, Su & Zhang, 2014
- Porodonts present 3

- 3 Large posterior tergites wrinkled; bulge present on terminal part of tarsus
A. magnus (Trozina, 1894)
- Large posterior tergites smooth; no bulge on the terminal part of tarsus 4
- 4 Antenna with at most 26 articles and 2+2 or 4+4 forcipular coxosternal teeth
A. anamagnus Ma, Song & Zhu, 2008
- Antenna with at least 29 articles and 5+5 forcipular coxosternal teeth 5
- 5 Antenna with at least 31 articles and at most 6+6 forcipular coxosternal teeth
A. nodulus Ma, Song & Zhu, 2008
- Antenna with at most 29 articles and at least 7+7 forcipular coxosternal teeth
A. polyspinipes sp. n.

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