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A new species of the genus *Validifemur* Ma, Song & Zhu, 2007 (Chilopoda: Lithobiomorpha) from China

Новый вид рода *Validifemur* Ma, Song & Zhu, 2007 (Chilopoda: Lithobiomorpha) из Китая

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КЛЮЧЕВЫЕ СЛОВА: Lithobiidae, новый вид, Хенань, Северный Китай.

ABSTRACT. A description of *Validifemur digitatus* sp.n. is given based on a single male holotype recently found in the Henan Province of North China. This is only a third congener, differing from the type-species *V. pedodontus* Ma, Song & Zhu, 2007 and *V. zapparolii* Ma, Song & Zhu, 2007, both from Shaanxi Province, China, in several characters of male leg armature. A key is compiled, and a map presented, for these three congeners.

РЕЗЮМЕ. Дано описание *Validifemur digitatus* sp.n. по единственному самцу-голотипу, недавно найденному в провинции Хенань (Северный Китай). Это всего лишь третий вид рода, отличающийся от типового вида *V. pedodontus* Ma, Song & Zhu, 2007, а также *V. zapparolii* Ma, Song & Zhu, 2007 (оба из провинции Шаанси) несколькими признаками вооружения ног самца. Представлены ключ и карта распространения для всех трех видов рода.

Introduction

The myriapod fauna of China, one of the globe's hotspots of biodiversity [Wang & Mauriès, 1996], is still poorly known. In particular, as regards Lithobiomorpha (Chilopoda), only 14 genera and 58 species have hitherto been recorded in this country [Verhoeff, 1934, 1937; Takakuwa, 1939, 1940; Takakuwa & Takashima, 1949; Chamberlin & Wang, 1952; Wang, 1959, 1963; Wang & Mauriès, 1996; Zhang, 1996; Eason, 1993, 1997; Chao, 2005; Zapparoli, 2006; Ma et al., 2007].

The genus *Validifemur* Ma, Song & Zhu, 2007 was originally proposed as new in the family Lithobiidae, with the type species *V. pedodontus* Ma, Song & Zhu, 2007 [Ma et al., 2007]. The genus is characterized by the presence of a remarkable modification of the male legs 15, with strong falciform spines; the male prefemur, femur and tibia 15 are unusually incrassate; the leg spinulation pattern and the number of coxal pores are different in both sexes; the posterior angles of all tergites are rounded; tarsi 1–13 without any marking on the dorsal side, but with the trace of a bipartite division on the ventral side.

At present, the genus comprises two species, both known only from northern China. A third congener has recently been discovered in Henan Province, China. The description of this new species is given below.

Material and methods

Centipedes were collected by hand or with forceps under stones and in the litter, and preserved in 75% ethanol. Specimens were examined under a Motic-C stereoscope, China make. The holotype is now preserved in the College of Life Sciences, Hebei University, Baoding, China.

The following abbreviations are used in the text and table: T — tergite, respectively; C — coxa, Tr — trochanter, P — prefemur, F — femur, a — anterior, m — median, p — posterior.

TAXONOMIC PART

Validifemur digitatus **sp.n.**
Figs 1–10.

TYPE MATERIAL. Holotype ♂ (Fig. 1), China, Henan Province, Xinyang City, Jigongshan Mountain, 31°48'N 114°06'E, altitude 169 m, 12 July 2005, leg. Zhi-sheng Zhang.

DIAGNOSIS. Antennae composed of 19–20 antennomeres, nine ocelli on each side; Tömösváry's organ larger than the adjoining ocelli; 2+2 prosternal teeth; porodonts

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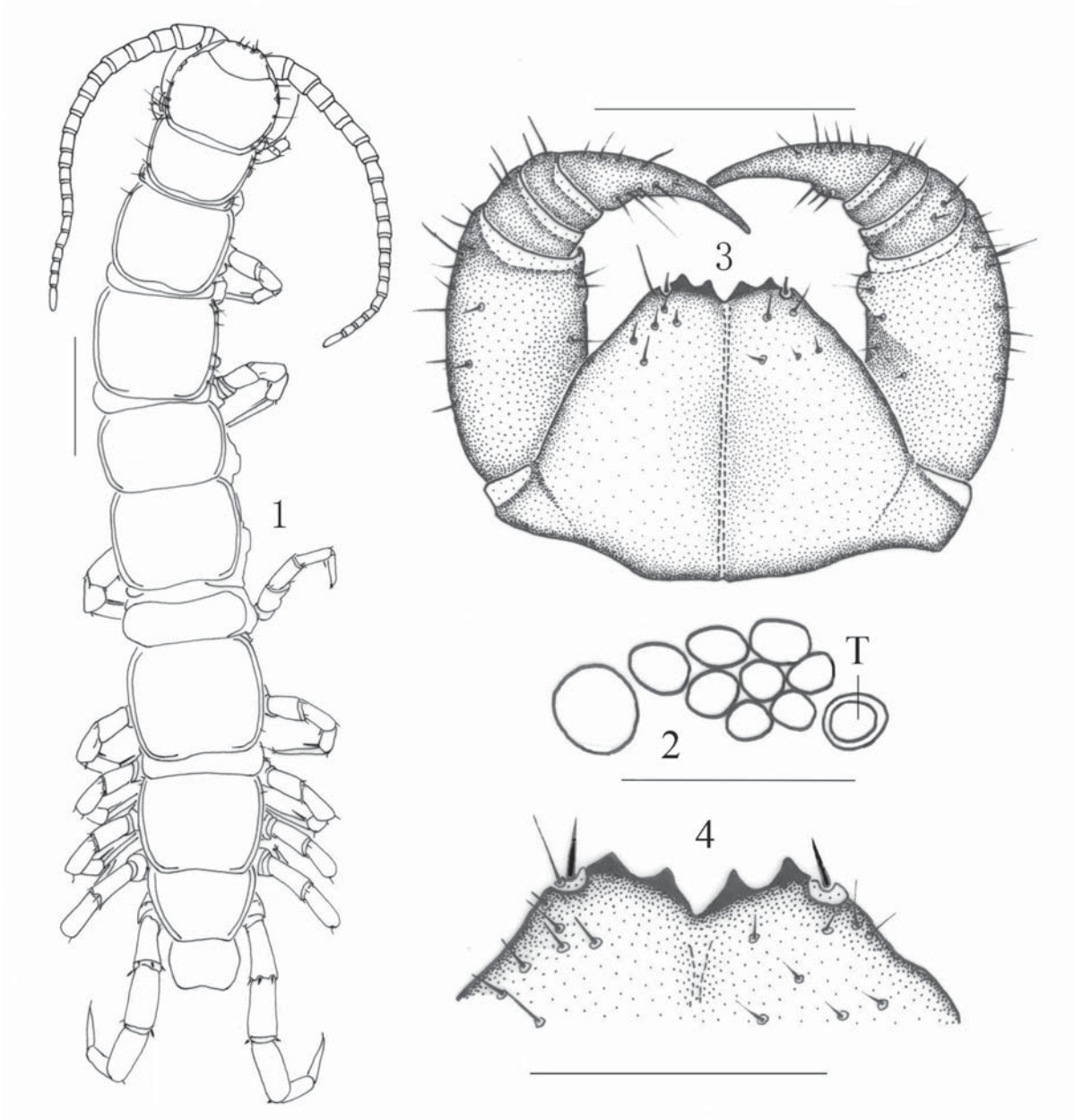


Figs 1–4. *Validifemur digitatus* sp.n.: 1 — holotype male, dorsal view, scale 500 μm; 2 — right lateral ocelli and Tömösváry's organ (T), scale 125 ìm; 3 — maxilliped coxosternum, ventral view, scales 500 μm; 4 — dental margin of maxilliped coxosternum, ventral view, scale 500 μm.

Рис. 1–4. *Validifemur digitatus* sp.n.: 1 — самец-голотип, вид сверху, масштаб 500 микрометров; 2 — правые боковые глазки и орган Темешвари (T), масштаб 125 микрометров; 3 коксостернум ногочелюсти, вид снизу, масштаб 500 мкм; 4 — зубной край коксостернума ногочелюсти, вид снизу, масштаб 500 мкм.

posterolateral to lateral tooth; 1–6 coxal pores arranged into a row, 4551 on right side, 4561 on left side; male legs 15 unusual in being shortened, posterior and medial dorsal spines of femur produced forward; tibia moderately enlarged, with a protuberance on inner side which is also produced forward, ten rostriform spines on the protuberance, four of them grouped together in the back, another one isolated from this group, and the remaining five spines near the ventral side are moderately curved caudally.

DESCRIPTION. Body length 11.4 mm; width of head shield, 1.3 mm, about as long as wide (holotype).

Color (based on specimen in 75% ethanol): basal antennomeres pale yellow-brown with slight grey hue, 6–7 distal antennomeres showing transition to yellow-brown, terminal antennomere yellow-brown with slight grey hue; tergites brown, head shield and last two tergites darker; pleural region grey, sternites yellow-brown; distal part of forcipules black-brown, maxilliped coxosternum, T14 and T15 darker, all legs pale yellow-brown with pale grey hue, tibia darker in color.

Antennae of 19–20 antennomeres; basal antennomere slightly longer than or as long as wide, 2nd markedly longer than wide, succeeding antennomeres gradually shortened;

Table. Male leg spinulation in *V. digitatus* sp.n.
Таблица. Вооружение ног самца у *V. digitatus* sp.n.

legs	ventral					dorsal				
	C	Tr	P	F	T	C	Tr	P	F	T
1–2			p	amp	am			mp	ap	a
3–5			p	amp	am			mp	ap	ap
6–9			mp	amp	am			mp	ap	ap
10–11			mp	amp	am			(a)mp	ap	ap
12			amp	amp	am			amp	p	ap
13		m	amp	amp	am			amp	p	ap
14		m	amp	amp	am	a		amp	ap	p
15		m	amp	am	am	a		amp	ap	

Letters in brackets indicate variable spines.

terminal antennomere markedly elongate, up to about 4.0 times as long as wide. Antennal surface beset with setae, fewer setae only on ventral, dorsal and mesal sides of basal antennomeres, gradually increasing in density to about antennomere 5, then remaining more or less similarly abundant.

Head shield smooth, nearly round, back hunched, with close netlike veins; frontal marginal ridge with a shallow anteromedian furrow; posterior margin of head shield straight, border variably slightly wider posteromedially than posterolaterally, posterior marginal ridge of head shield continuous and moderately broad. Tiny setae inserted in pores scattered very sparsely over the surface, moderately long setae scattered sparsely over the surface of head shield.

Nine ocelli (in male) on each side of head (Fig. 2), oval to round in shape, mostly round, arranged in three irregular rows; terminal two ocelli comparatively larger, the remaining ocelli subequal in size, overhanging the lateral margin of head; ocelli gently bulging, moderately domed, translucent, usually darkly pigmented in eyeground.

Tömösváry's organ (Fig. 2, T) moderately large, rounded, slightly larger than the adjoining ocelli, lying at ventral margin of head immediately proventral to ocelli.

Maxilliped coxosternum (Fig. 3) trapezoidal, dental margin moderately narrow; external side slightly longer than mesal one, median notch moderately deep, V-shaped; dental margin with 2+2 teeth, subtriangular, distal margin nearly blunt; porodonts moderately slender, spine-like (Fig. 4), maxilliped coxosternum with an inconspicuous bulge near base of porodont, porodonts lying just posterolateral to lateral tooth. Middle of ventral side of maxilliped coxosternum slightly hunched, lateral one sloping caudally, a few long setae near dental margin.

All tergites rather smooth, without wrinkles, back side slightly hunched; short tiny setae inserted in pores scattered very sparsely over the surface; T1 slightly narrower than both T3 and head shield, latter slightly narrower than or equal to T3; lateral marginal ridge of tergites continuous, often with some shorter setae scattered sparsely along lateral borders, thicker in both of two anterior angles; posterior angles of all tergites rounded, without projections; T1 generally trapeziform, posterolateral narrower than anterolateral; posterior margins of T1 and T3 straight; posterior margin of T3, T5, T8, T10, T12 and T14 slightly concave.

All sternites generally trapeziform, short to moderately long setae scattered sparsely over the surface, with a few moderately long setae among them, and 3–6 relatively longer bristles at both anterolateral angles, a pair of subsymmetrical longer bristles on surface of anteromedial part of each sternite, 1–2 long bristles at both posterolateral angles; long bristles on sternites 14 and 15 slightly more abundant than on anterior sternites.

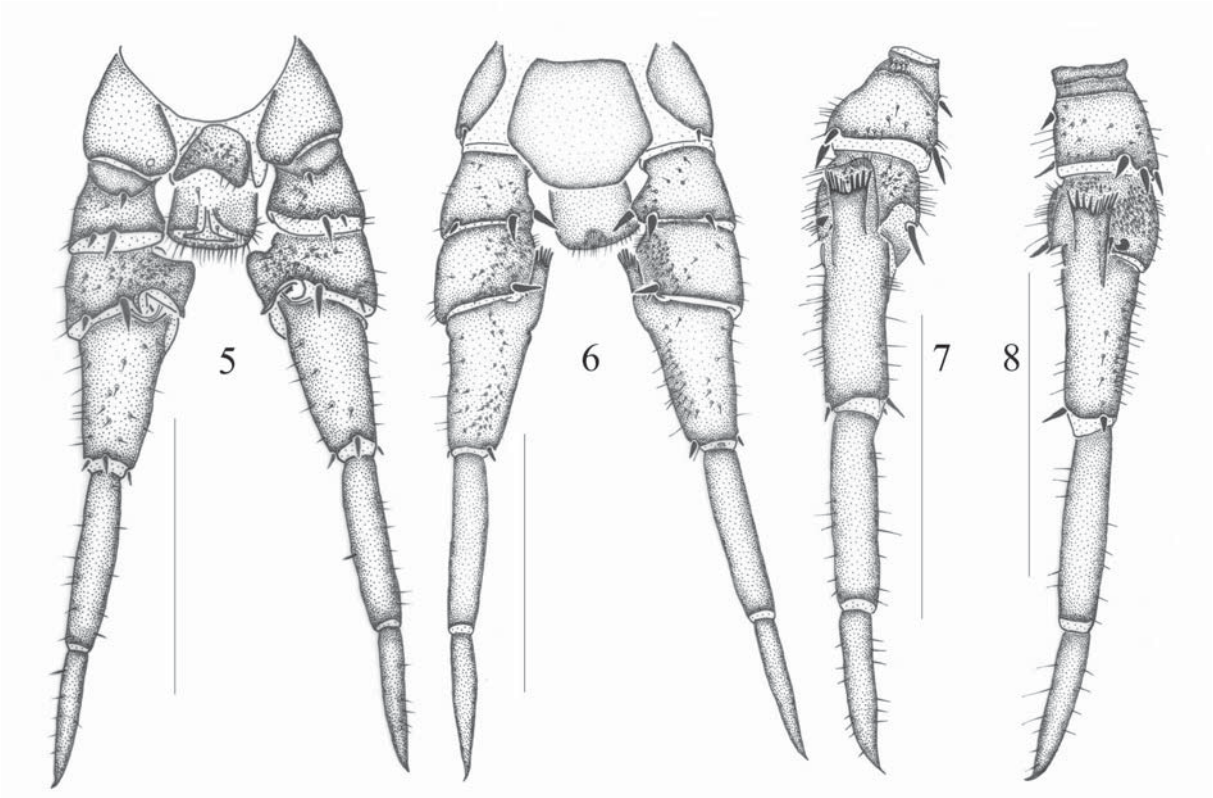
Legs strong, short to moderately long setae scattered very sparsely over the surface of coxa, trochanter, prefemur, femur, tibia of all legs, setae shorter on dorsal side than on ventral one, thicker setae present on tarsi. Basitarsal-distitarsal articulation not well-defined on legs 1–13, without any trace on dorsal side of tarsi 1–13, but with trace of a bipartite division on ventral side; a row of setae on ventral side of tarsi 1–13, up to 2/3 length of tarsus, except for legs 14 and 15; all segments of legs 14 and 15 shorter than those of anterior legs, basitarsal-distitarsal articulation well-defined; tarsal claws of all legs moderately long, curved ventrad; anterior and posterior accessory claws in legs 1–13 small, anterior accessory claws slender and sharp, posterior accessory claws moderately thicker and longer than anterior ones; distitarsus 24.7% length of tarsus on legs 14, basitarsus 4.4 times longer than its maximum width, distitarsus 44.6% length of tarsus on legs 15, basitarsus 4.8 times longer than its maximum width.

Coxal pores rounded to slightly ovate, 1–6 coxal pores arranged into a row, 4551 on right side, 4561 on left side; size of coxal pores variable. Coxal pore field set in a moderately superficial groove.

Leg spinulation as in Table.

Male sternite 15 trapezoidal, anterior and posterior angles rounded, posterior margin straight, moderately long setae scattered very sparsely over the surface and at lateral borders. Sternite of genital segment usually well-sclerotized, a few short to moderately long setae scattered regularly over the surface, bristles longer on both lateral sides, 3–5 longer bristles at both posterior angles of sternite of genital segment; posteromedial edge slightly concave, not bulged medially, gonopods invisible.

Legs 15 prominent, very thick; in dorsal view (Fig. 5), coxa, trochanter and prefemur remarkably incrassate, femur conspicuously enlarged and shortened, posterior and medial dorsal spines of femur strongly produced forward, lying on a protuberance directed mesally; anterodistal part of this protuberance moderately rounded, a translucent spur directed mesally placed in its posterior part; abundant, comparatively thick setae present on external side, gradually decreasing mesad. Tibia moderately enlarged and shortened, mesal border strongly extended anteriad, forming a round channel leading posteriad, on inner side with a protuberance produced forward. In dorsal view, posterior and medial dorsal spines of femur very strong, posterior spine even more prom-



Figs 5–8. *Validifemur digitatus* sp.n.: 5 — holotype male, anal legs, posterior segments and gonopods, ventral view, scale 500 μm; 6 — anal legs, posterior segments and gonopods, dorsal view, scale 500 μm; 7 — left anal leg, mesal view, scale 500 μm; 8 — right anal leg, mesal view, scale 500 μm.

Рис. 5–8. *Validifemur digitatus* sp.n.: 5 — самец-голотип, анальные ноги, задние сегменты и гоноподы, вид снизу, масштаб 500 микрометров; 6 — анальные ноги, задние сегменты и гоноподы, вид сверху, масштаб 500 микрометров; 7 — левая анальная нога, вид изнутри, масштаб 500 мкм; 8 — правая анальная нога, вид изнутри, , масштаб 500 мкм.

inent, forming an extraordinarily strong spur directed posteriad from the opposite side; rear part of protuberance of femur sparsely setose, abundant thick bristles on back of protuberance base; posterior spine thick and strong, placed nearly perpendicular to femur. In ventral view (Fig. 6), base of protuberance of tibia relatively thick, distal part of protuberance slender, ten sclerotized rostriform spines in distal part of protuberance (Figs 7–8), four of them grouped together in back part, another one isolated from them; the remaining five placed near ventral side, moderately curved caudally, several thick bristles placed on inner side of back of tibia.

Female unknown.

ETYMOLOGY. The specific name refers to the shape of the inner falciform spines on the protuberance on the tibia of the anal legs, which are similar to fingers.

Discussion

The new species resembles *V. zapparolii* Ma, Song & Zhu, 2007, from Shaanxi Province, China, in having the same number of teeth at the dental margin of the maxilliped coxosternum, the posterior angles of all tergites being rounded. However, the new species can easily be distinguished in showing a different number of ocelli and a remarkably different leg spinulation pattern; among the falciform spines on male tibia 4, four are grouped together and restricted to a protuberance, one more is strongly isolated while the remaining five rostriform spines are situated subventrally, moderately curved caudally, versus three separated spines as observed in *V. zapparolii*. In addition, the new species can readily be distinguished from *V. pedodontus* Ma, Song & Zhu, 2007, also from Shaanxi Province, China (see Fig. 9), in having evident, strong spines on the prefemur and femur of the last pair of legs in the male instead of small spines and a remarkably different leg spinulation pattern as observed in *V. pedodontus*; in the new species, among the spines on tibia 4 which are confined to a protuberance only one is isolated while the remaining five rostriform spines lie subventrally and are moderately curved caudad, versus all lying on a protuberance as observed in *V. pedodontus.* A better outline of the differences is given below in a key, and distribution of *Validifemur* species is presented in Fig. 9.

Key to *Validifemur* species

1. Strong spines on prefemur and femur of last pair of legs in male, only one coxal pore 2
— Smaller spines on prefemur and femur of last pair of legs in male, two coxal pores .... *V. pedodontus* Ma, Song & Zhu

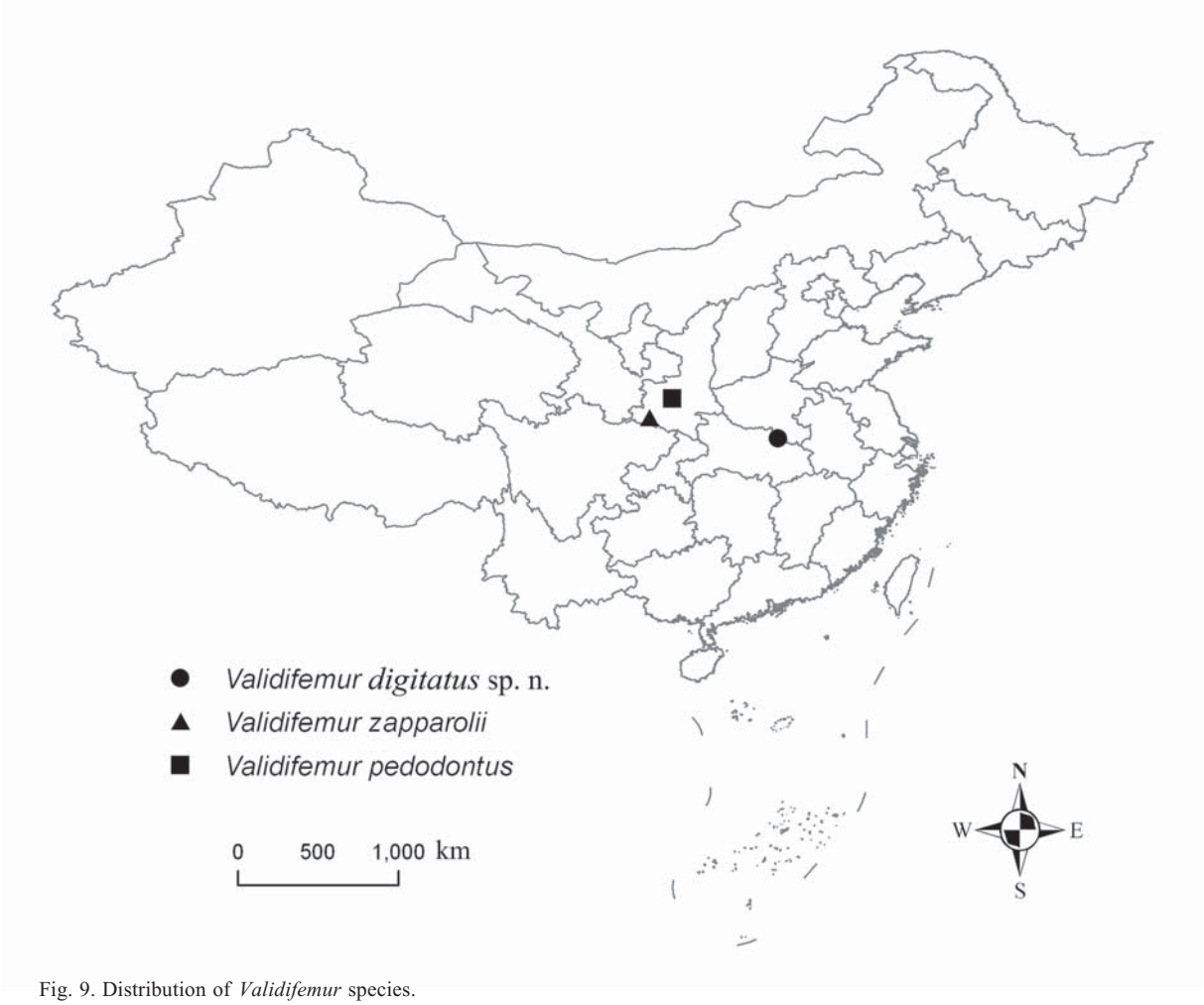


Fig. 9. Distribution of *Validifemur* species.
Рис. 9. Распространение видов *Validifemur*.

2. Three falciform spines, all separated from others, on a protuberance of male tibia 15 .... *V. zapparolii* Ma, Song & Zhu
— One falciform spine separated from others on a protuberance of male tibia 15 ..... *V. digitatus* sp.n.

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