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## Notes on *Bonea* Roewer, 1914 and *Lomanius* Roewer, 1923 (Opiliones: Laniatores: Podoctidae), with the description of three new species from China

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### Abstract

The harvestman genus *Bonea* Roewer, 1914 and its type species *B. sarasinorum* Roewer, 1914 are redescribed based on the type material. In addition, two new species of *Bonea* from Hainan Island, China, are described and illustrated: *B. zhui* sp. nov. and *B. tridigitata* sp. nov. A new species of *Lomanius* Roewer, 1923 from Yunnan Province, China, is also described and illustrated: *L. bulbosus* sp. nov.. Keys to the 10 species of *Bonea* and the six species of *Lomanius* are provided. *Paralomanius* Goodnight & Goodnight, 1948 is revalidated from the synonymy of *Lomanius*, carrying as junior synonym *Eulomanius* Roewer, 1949, and containing two species from Micronesia (*Paralomanius longipalpus* Goodnight & Goodnight, 1948) and Philippines (*Paralomanius mindanaoensis* (Suzuki, 1977) **new status**). *Bonea* is transferred from the Ibaloniinae to Podoctinae. These are the first records of named species of Podoctidae from China.

**Key words:** taxonomy, harvestmen, Arachnida, Ibaloniinae, Podoctinae, genitalia, Indo-Malaya

### Introduction

Podoctids are medium-sized Laniatores (body length 2.5–5mm), usually with powerful ventral and dorsal rows of setiferous spines on leg I of both sexes. The highest diversity of the family is in Southeast Asia, while some species also occur in Australasia and Africa. A single species is known from Cuba, probably accidentally introduced in a botanic garden (Kury 2003, 2007). Podoctidae is currently represented by three subfamilies (Erecananinae Roewer, 1912, Ibaloniinae Roewer, 1912, and Podoctinae Roewer, 1912), 53 genera and 128 species worldwide, with two species belonging to two genera occurring in Taiwan Island and one unidentified species distributed in Yunnan Province, China (Kury 2007; 2011; Suzuki 1977a, b; Song 1998; Li & Song 1993).

The genus *Bonea* Roewer, 1914, was described based on the type species, *Bonea sarasinorum* Roewer, 1914, from Northern Sulawesi (Indonesia), and originally placed in Phalangodidae: Ibaloniinae. There was no further study on this genus until it appeared in a work by Suzuki (1977b). Suzuki rediagnosed this genus keeping it in Ibaloniinae, described one new species, and synonymized six monotypic genera with *Bonea*, namely, *Zmissolus* Roewer, 1927, *Posisus* Roewer, 1949, *Kappacola* Roewer, 1949, *Nurullus* Roewer, 1949, *Suraplus* Roewer, 1949, and *Parabonea* Roewer, 1949. As a result, the genus *Bonea* presently includes eight species: *B. albertus* (Roewer, 1949), *B. armatissima* (Roewer, 1949), *B. cippata* (Roewer, 1927), *B. longipalpis* Suzuki, 1977, *B. palpalis* (Roewer, 1949), *B. sarasinorum*, *B. scopulata* (Roewer, 1949), and *B. silvestris* (Roewer, 1949). These species are distributed in Southeast Asia, more specifically in Indonesia (Celebes, Java), Malaysia (Borneo), Singapore, and Philippines (Roewer 1927, 1949; Suzuki 1977b).

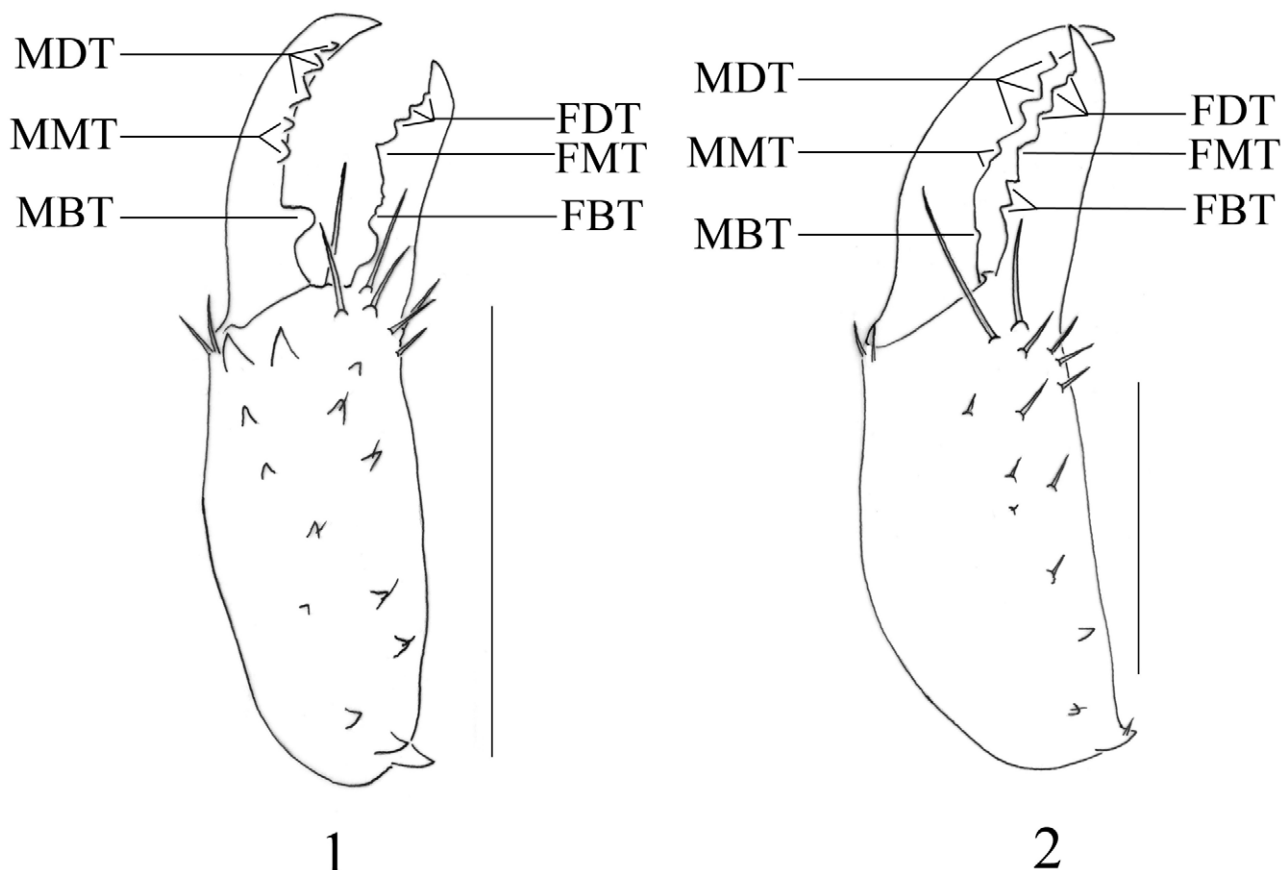
The genus *Lomanius* Roewer, 1923 was erected for *Podoctis tridens* Loman, 1905, and was placed in the subfamily Erecananinae. Roewer (1923) also transferred *Erecanana formosae* Roewer, 1912 to *Lomanius*. Roewer (1949) later erected a new genus *Thaipea* Roewer, 1949 for *Erecanana formosae*, and two other monotypic genera, *Maquilingius* Roewer, 1949 and *Eulomanius* Roewer, 1949, which are closely related to *Lomanius*. Goodnight & Goodnight (1957) synonymized *Maquilingius* and *Thaipea* with *Lomanius*, and *Eulomanius* with *Paralomanius*

Goodnight & Goodnight, 1948. Decades later, Suzuki (1976) described a new species *L. carinatus* Suzuki, 1976 from a single female from Malaysia. Suzuki (1977b) synonymized another monotypic genus *Orthossus* Roewer, 1963 with *Lomanius*. To date, the genus *Lomanius* has six species: *L. carinatus*, *L. formosae*, *L. longipalpus* (Goodnight & Goodnight, 1948), *L. minimus* (Roewer, 1926), *L. rectipes* (Roewer, 1963), and *L. tridens*. These species are mainly distributed in Southeast Asia (Roewer 1923, 1949, 1963; Goodnight & Goodnight 1948, 1957; Suzuki 1976, 1977b).

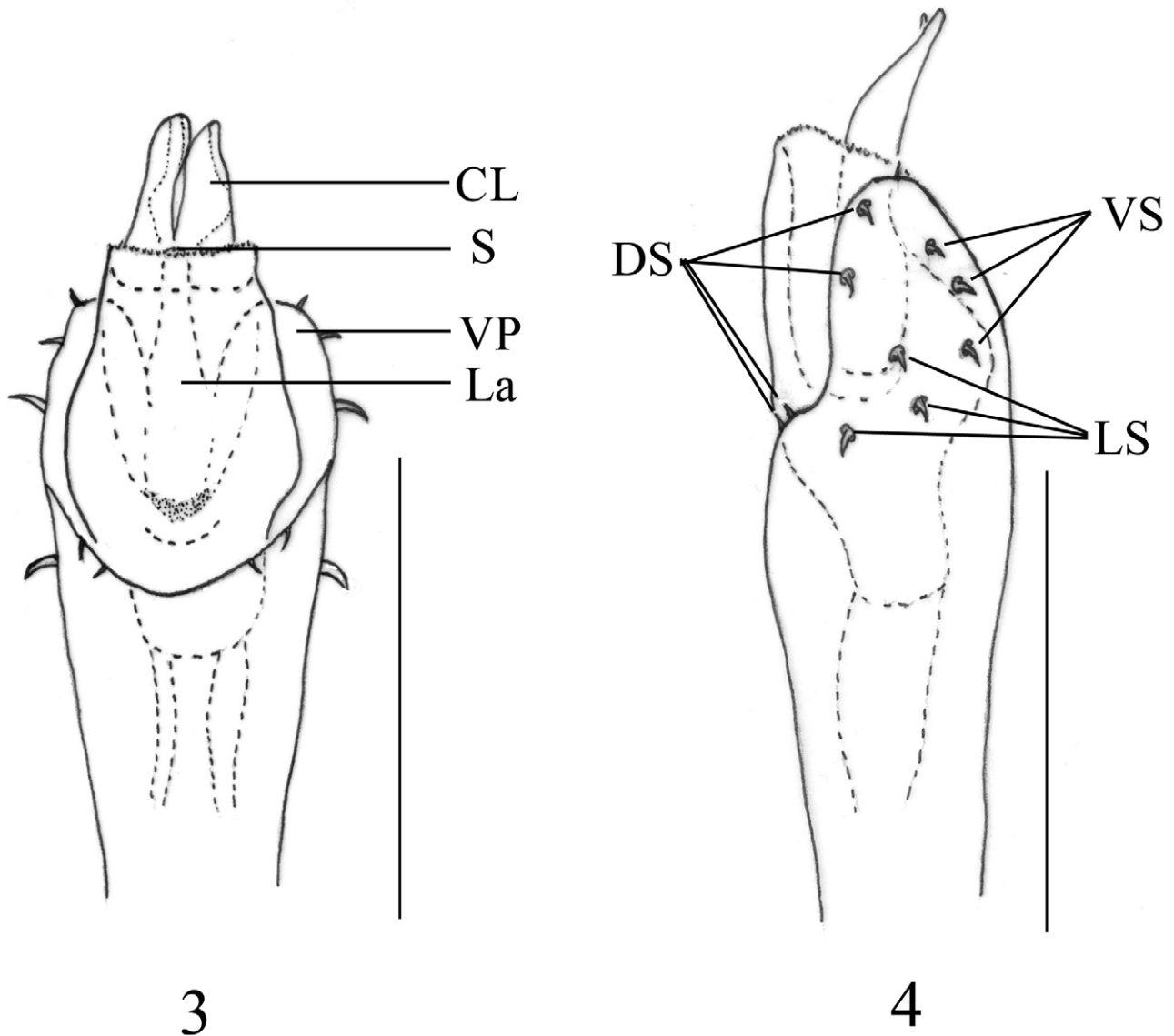
While examining the harvestman specimens collected from Hainan and Yunnan provinces, southern China, we found a few Podoctidae. Among them, we recognized three new species: *Bonea tridigitata* **sp. nov.**, *Bonea zhui* **sp. nov.**, and *Lomanius bulbosus* **sp. nov.**. In addition, we loaned the type specimen of *Bonea sarasinorum* in order to examine, redescribe, and illustrate it. Finally, keys to the 10 species of *Bonea* and the six species of *Lomanius* are provided for the first time.

## Material and methods

Specimens preserved in 75% ethanol were examined and drawn under a Leica M165c stereomicroscope equipped with drawing tube. Male and female genitalia were placed first in hot lactic acid followed by distilled water to expand movable parts for observation (Schwendinger & Martens 2002). The type material of *Bonea* was loaned from Naturhistorisches Museum Basel (NMB). The type specimens of the new species are deposited in the Museum of Hebei University, Baoding, China (MHBU). The Field Museum of Natural History, Chicago, Illinois is here abbreviated as FMNH. All measurements are given in mm. In species list of a genus, type species are marked with an asterisk.



**FIGURES 1–2.** *Bonea tridigitata* **sp. nov.** 1. Distal segment of the left chelicera, male, frontal view. 2. Distal segment of the left chelicera, female, frontal view. FBT = basal tooth of the cheliceral fixed finger; FDT = distal tooth of the cheliceral fixed finger; FMT = median tooth of the cheliceral fixed finger; MBT = basal tooth of the cheliceral movable finger; MDT = distal tooth of the cheliceral movable finger; MMT = median tooth of the cheliceral movable finger. Scale bars: 1 mm (1); 0.5 mm (2).



**FIGURES 3–4.** *Lomanius bulbosus* sp. nov. 3. Distal part of penis, dorsal view. 4. Lateral view. CL = clasp ing lobe; DS = dorsal setae; La = lamella sack; LS = lateral setae; S = stylus; VP = ventral plate; VS = ventral setae. Scale bars: 0.25 mm.

Terminology for the inner edges of cheliceral fingers teeth follows Kury & Machado (2009), but with some modifications (Figs. 1–2): MBT—abbreviation for the basal teeth of the movable finger, MMT—median teeth of the movable finger and MDT—distal teeth of the movable finger. Likewise, FBT, FMT, and FDT indicate the basal, median, and distal teeth of the fixed fingers, respectively.

The terminology of male genitalia is adapted from Martens (1986), except for the setation of ventral plate, which follows Ubick & Briggs (2004) (Figs. 3–4).

Abbreviations: BS—basal sac (fully inflatable ventral region of the follis, ‘Schwellkörper’ in Martens 1986), CL—clasp ing lobe (paired lateral rigid projections of the dorsal follis, ‘Spange’ in Martens 1986), DS—dorsal setae, La—lamellar sack (rigid dorsal region of follis ‘Lamellensack’ in Martens 1986), LS—lateral setae, S—stylus, VP—ventral plate, and VS—ventral setae.

## Taxonomy

### Podoctinae

## **Bonea** Roewer, 1914

*Bonea* Roewer 1914: 87–88; Roewer 1923: 160; Suzuki 1977b: 37.

*Zmissolus* Roewer 1927: 311 [junior subjective synonym of *Bonea* Roewer, 1914 by Suzuki (1977b); type species: *Zmissolus cippatus* Roewer, 1927, by monotypy].

*Posisus* Roewer 1949: 258 (misspelled as *Posissus* by Suzuki in 1977b) [junior subjective synonym of *Bonea* Roewer, 1914 by Suzuki (1977b); type species: *Posisus albertus* Roewer, 1949, by original designation].

*Kappacola* Roewer 1949: 260 [junior subjective synonym of *Bonea* Roewer, 1914 by Suzuki (1977b); type species: *Kappacola silvestris* Roewer, 1949, by original designation].

*Nurullus* Roewer 1949: 262 [junior subjective synonym of *Bonea* Roewer, 1914 by Suzuki (1977b); type species: *Nurullus armatissimus* Roewer, 1949, by original designation].

*Suraplus* Roewer 1949: 262 [junior subjective synonym of *Bonea* Roewer, 1914 by Suzuki (1977b); type species: *Suraplus palpalis* Roewer, 1949, by original designation].

*Parabonea* Roewer 1949: 262 [junior subjective synonym of *Bonea* Roewer, 1914 by Suzuki (1977b); type species: *Parabonea scopulata* Roewer, 1949b, by original designation].

**Type species:** *Bonea sarasinorum* Roewer, 1914, by original designation.

**Etymology:** The name *Bonea* is derived from the Bone River in Sulawesi. Gender feminine.

**Diagnosis.** Body length 2.5–4 mm. Carapace with a row of tubercles on each side of front margin near antero-lateral corner. Eyes separated, without a common eye mound. Enlarged, basally widened median spine protruding forward between the eyes (interocular mound). Opisthosomal region of scutum with five areas whose grooves are armed with a row of tubercular bridges. Coxa II retrolaterally with an enlarged tubercle. Pedipalpus elongate and slender, femur usually with five setiferous tubercles ventrally and one setiferous tubercle prolatero-distally, its patella usually with two prolateral and one retrolateral setiferous tubercle. Femur I with large spines dorsally and ventrally. Distal margin of ventral plate of penis with deep cleft; basal sac and lamellar sack sunken into a pit formed by the ventral plate; clasping lobe bifurcated, protruding beyond distal margin of glans; stylus between the clasping lobes usually sunken into lamellar sack; stylar tip blunt. Basal sac sunken into truncus. Each lobe of ovipositor usually with two ventral and three dorsal setae. Male secondary sexual characters consist of the longer pedipalpus or pedipalpal femur basally swollen and bottle-like in shape, cheliceral bulla very attenuate, heavier teeth on the chelicera and larger interocular spine.

**Distribution.** Indonesia, Malaysia, Singapore, Philippines, and China.

**Included species.** *B. albertus* (Roewer, 1949); *B. armatissima* (Roewer, 1949); *B. cippata* (Roewer, 1927); *B. longipalpis* Suzuki, 1977; *B. palpalis* (Roewer, 1949); \**B. sarasinorum* Roewer, 1914; *B. scopulata* (Roewer, 1949); *B. silvestris* (Roewer, 1949); *B. tridigitata* **sp. nov.** and *B. zhui* **sp. nov.**

### **Key to species of *Bonea***

1	Free tergite with long spines as long as dorsal scutum	2
-	Free tergite with short spines or tubercles	6
2	Posterior to the median elevation on carapace with two large median spines	3
-	Posterior to the median elevation on carapace without two large median spines	<i>B. palpalis</i>
3	First scutal area with long median spines	4
-	First scutal area without long median spines	<i>B. cippata</i>
4	Ventral surface of proximal segment of chelicera with teeth	5
-	Ventral surface of proximal segment of chelicera without teeth	<i>B. armatissima</i>
5	Ventral surface of second segment of chelicera with a row of four small teeth	<i>B. tridigitata</i> <b>sp. nov.</b>
-	Ventral surface of second segment of chelicera with one prominent tooth	<i>B. zhui</i> <b>sp. nov.</b>
6	Second scutal area with long median spines	7
-	Second scutal area without long median spines	9
7	Fifth scutal area with long median spines	8
-	Fifth scutal area without long median spines	<i>B. silvestris</i>
8	Fourth scutal area with long median spines	<i>B. longipalpis</i>
-	Fourth scutal area without long median spines	<i>B. sarasinorum</i>
9	Fourth scutal area with long median spines	<i>B. scopulata</i>
-	Fourth scutal area without long median spines	<i>B. albertus</i>

## ***Bonea sarasinorum* Roewer, 1914**

Figs. 5–15

*Bonea sarasinorum* Roewer, 1914: 88–89, figs. 7–8; Roewer, 1923: 160–161, figs. 176–177.

**Type material examined.** Holotype female (wrongly reported as a male in the original description and also in Roewer 1923). Labels of NMB 20a read (Fig. 15): (1) “*Bonea sarasinorum* n. g. n. sp. / Celebes: Bone-Tal +70 m. (?) [= Indonesia, northern Sulawesi, Minahassa Peninsula, Gorontalo province, Bone River Valley, east of Gorontalo, 70 m] / 14.I. [= January, 14, 1895], Sarasin leg. / 1 Expl. Type; and (2) [unintelligible] / 700 m / 14 Jan. Roewer 1914 reported: “Nord-Celebes (östlich von Gorontalo, Bone-Tal, bei ca. 700 m) — 1 ♂ — Sarasin leg., im Januar 1895.” Roewer 1923 reported: “Nord-Celebes (östlich von Gorontalo, Bone-Tal, ca 700 meter)—1 ♂—(Typ. Mus. Basel).” The altitude of 70 misinterpreted by Roewer in his label seems to be an error and the correct one is 700 m, as indicated both in the original label and in the publications.

**Diagnosis.** Interocular mound with a mid-dorsal interocular mound; carapace and scutal areas I–V each with transverse row of conspicuous hair-tipped tubercles and a paramedian pair of longer spines; basichelicerite with few tubercles; pedipalpal femur with five setiferous tubercles ventrally and one prolateral distal setiferous tubercle, patella with one retrolateral and two prolateral setiferous tubercles.

**Redescription.** Female (holotype) habitus as in Figs. 5–6. Coloration: entire body rusty yellow, each side of carapace dark brown, lateral ridges of the scutum margined with brown; venter lighter than dorsum, coxae yellow, free sternites brownish yellow; chelicerae and pedipalpus yellow, both of them with dark brown reticulate markings above, legs with alternating dark brown and yellow bands.

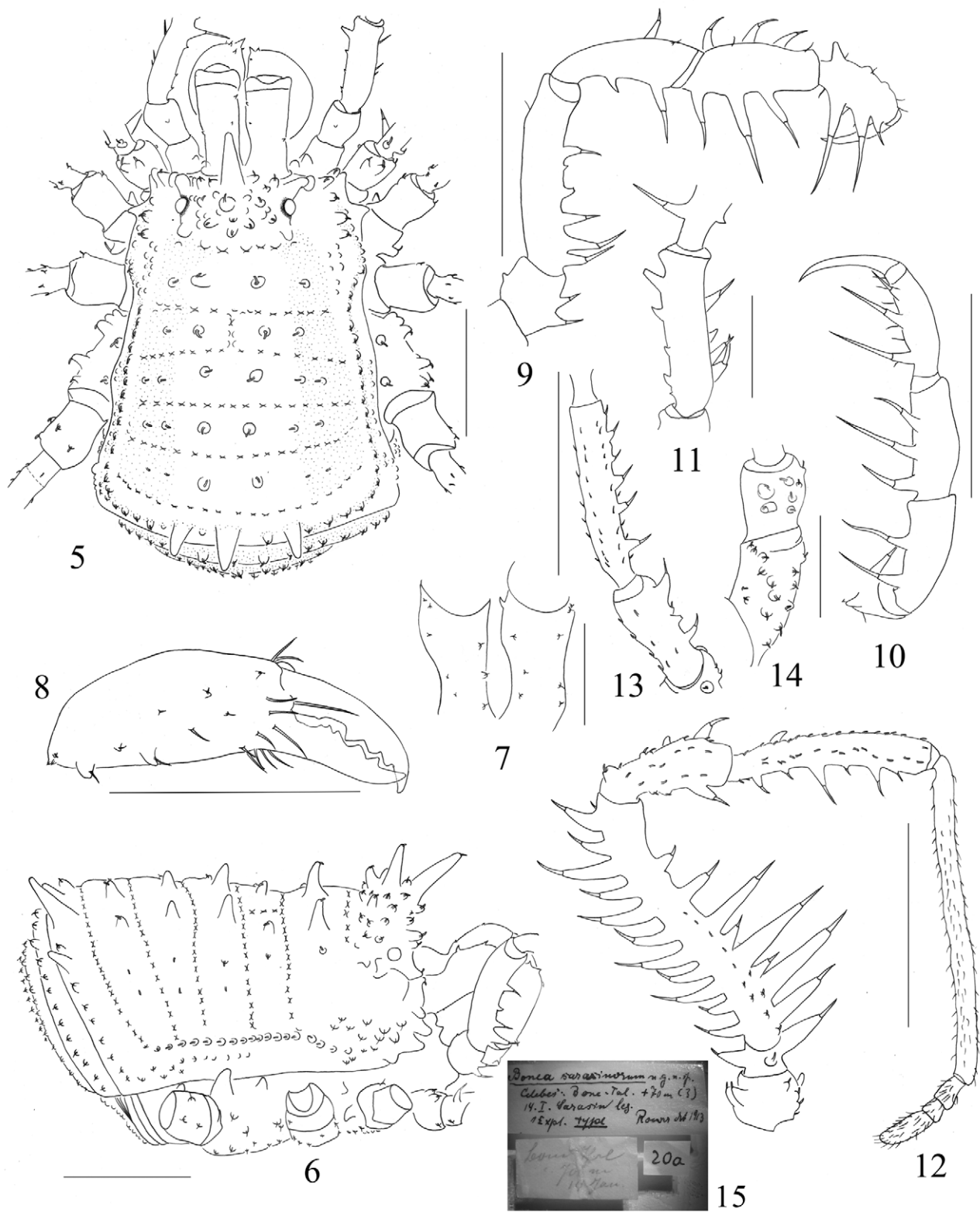
**Dorsum.** Dorsal scutum trapezoid, with posterior margin convex. Carapace with a row of three tubercles on each side of front margin near antero-lateral corner. Posterior to antero-lateral corner with one conspicuous tubercle on each side. Eyes separated, each eye with one anterior tubercle that extends forward to touch tubercle from the anterior margin of carapace. Median elevation with many hair-tipped tubercles and two enlarged spines extending forward between eyes. Posterior to the median elevation on carapace with two enlarged median spines. Scutum divided into five areas, first area divided into two halves by longitudinal furrow. First to fifth scutal areas connected by a series of tubercular bridges. First to fourth areas each with two median spines, of which only the second area with long median spines, more than half length of median spine between eyes, fifth area with three enlarged median spines. Free tergites each with a row of hair-tipped tubercles. Lateral ridges with a row of hair-tipped tubercles.

**Venter.** All coxae and genital operculum granulate, coxa I with somewhat enlarged hair-tipped tubercles on anterior side. Coxa II with one enlarged prolateral and retrolateral tubercle at tip of the margin respectively. Coxa III with prolateral and retrolateral rows of round humps. Coxa IV widened, with six enlarged hair-tipped tubercles on the prolateral surface. Free sternites each with a transverse row of hair-tipped granules. Tracheal stigmata visible.

**Chelicera** (Figs. 7–8). Basichelicerite elongate, slightly sinuous; dorsal surface with two prolateral and one retrolateral teeth respectively; ventral surface with five retrolateral and three prolateral hair-tipped tubercles. Second segment armed with 11 enlarged teeth on prodorsal surface. Fingers relatively strong, inner edges toothed as illustrated in Fig. 8: one inconspicuous MBT, one stout MMT, two stout MDT, three crest FBT, one stout FMT, and one stout FDT.

**Pedipalpus** (Figs. 5–6, 9–11). Coxa dorsally with two strong setiferous tubercles (Fig. 5–6). Trochanter ventrally with two setiferous tubercles, dorsally with one tooth. Femur ventrally with five setiferous tubercles and one tooth, with four teeth prolaterally, and one setiferous tubercle on the prolateral distal side. Patella with one setiferous tubercle and one tooth retrolaterally and two setiferous tubercles prolaterally. Tibia and tarsus with three setiferous tubercles on each side of ventral surface. Tarsal claw a little shorter than tarsus, slightly curved.

**Legs.** Trochanter I dorsally with two enlarged tubercles, ventrally with two enlarged tubercles and five hair-tipped tubercles; femur I dorsally with a row of twelve setiferous tubercles, ventrally with a row of nine setiferous tubercles; patella I with one retrolateral and three prolateral setiferous tubercles respectively; tibia I with six setiferous tubercles prolaterally and retrolaterally (Figs. 12–14). Trochanters II–IV with a few hair-tipped tubercles, remaining of leg segments unarmed, only with conspicuous hairs. Tarsi III–IV with unpectinated double claws, with scopulae. Tarsal formula: 3/4/5/5. Distitarsus of the first and second tarsi with two tarsalia.



**FIGURES 5–15.** *Bonea sarasinorum* Roewer, 1914, female (holotype). 5. Body, dorsal view. 6. Lateral view. 7. Proximal segments of chelicerae, dorsal view. 8. Distal segment of the left chelicera, frontal view. 9. Right pedipalpus, retrolateral view. 10. Patella, tibia and tarsus of right pedipalpus, dorsal view. 11. Femur of right pedipalpus, dorsal view. 12. Right leg I, retrolateral view. 13. Patella and tibia of left leg I, dorsal view. 14. Coxa and trochanter of left leg I, ventral view. 15. Label of *B. sarasinorum* holotype. Scale bars: 1 mm (5–6, 8–10, 12–13); 0.5 mm (7, 11, 14).

Ovipositor. Not dissected, only detected through the opened genital operculum.

**Measurements.** Female holotype: body 3.06 long, 2.40 wide at the widest portion, scutum 2.91 long. Pedipalpus claw 0.50 long. Measurements of pedipalpus and legs as in Table 1.

**TABLE 1.** Pedipalpus and leg measurements of the female holotype of *Bonea sarasinorum*.

	Trochanter	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Pedipalpus	0.33	0.88	0.68	0.55		0.63	3.07
Leg I	0.28	1.63	0.65	0.98	1.63	0.50	5.67
Leg II	0.38	4.00	0.75	3.20	2.95	1.08	12.36
Leg III	0.38	2.58	0.70	2.25	2.63	0.58	9.12
Leg IV	0.43	3.85	0.83	2.88	3.50	0.58	12.07

**Male.** Unknown.

**Distribution.** Indonesia (Sulawesi).

**Notes.** Over a century old, the type specimen shows only slight damage, *i.e.*, the left pedipalpus claw lost, metatarsus and tarsus of right leg III lost, joint between tibia and metatarsus in right leg II nearly broken as well as that of right leg IV. According to the “conditions of loan” of the Natural History Museum Basel, “the borrower must not alter the loan objects in any way”. To keep the appendages in original status, the lateral view of the type is more oblique than that of three new species described here.

Roewer (1914) described the *Bonea sarasinorum* based on one specimen. Although he failed to dissect the genitalia of *B. sarasinorum*, he believed that this specimen was male from personal experience. Thereafter, this specimen was reported by him as male. After examining the holotype, we discovered it is a female — it lacks all typical dimorphic traits of male podoctines (Kury & Machado 2003), such as dorsal scutum subrectangular, cheliceral bulla very attenuate, basichelecerite as a whole elongate, with lateral rows of acuminate tubercles, pedipalpal femur bottle-like swollen with non-seriate spination, and all pedipalpal segments elongate and slender. However, one evidence that could indicate its male gender would be the widened interocular mound (including all the carapace). This dimorphism is very clearly marked in species such as *B. longipalpis* (Suzuki 1977b: 39–42, figs, 17a, b), but not so clearly in *B. sarasinorum*. Besides the morphological characters mentioned above, the female condition of the holotype was discovered by one of the authors (CZ), by seeing the setae of ovipositor by just lifting the genital operculum without dissecting.

### ***Bonea tridigitata* sp. nov.**

Figs. 16–38

**Type material.** Male holotype, CHINA: Hainan Province, Mt. Bawangling, about 600m alt., [N 19.1°, E 109.2°], May 31, 2007, F. Zhang leg. (MHBV-Opi-ZF07032), 4 ♀ (MHBV-Opi-ZF07033–07036) paratypes, same data as holotype.

**Diagnosis.** Spine of interocular mound with two conspicuous dorsal accessory branches; carapace, scutal areas I, and IV each with a pair of strong paramedian spines; free tergite I with three median spines; femur of pedipalpus with five setiferous tubercles ventrally; ventral surface of cheliceral proximal segment armed with six large teeth retrolaterally and four teeth prolaterally; patella I with distinct setiferous tubercles.

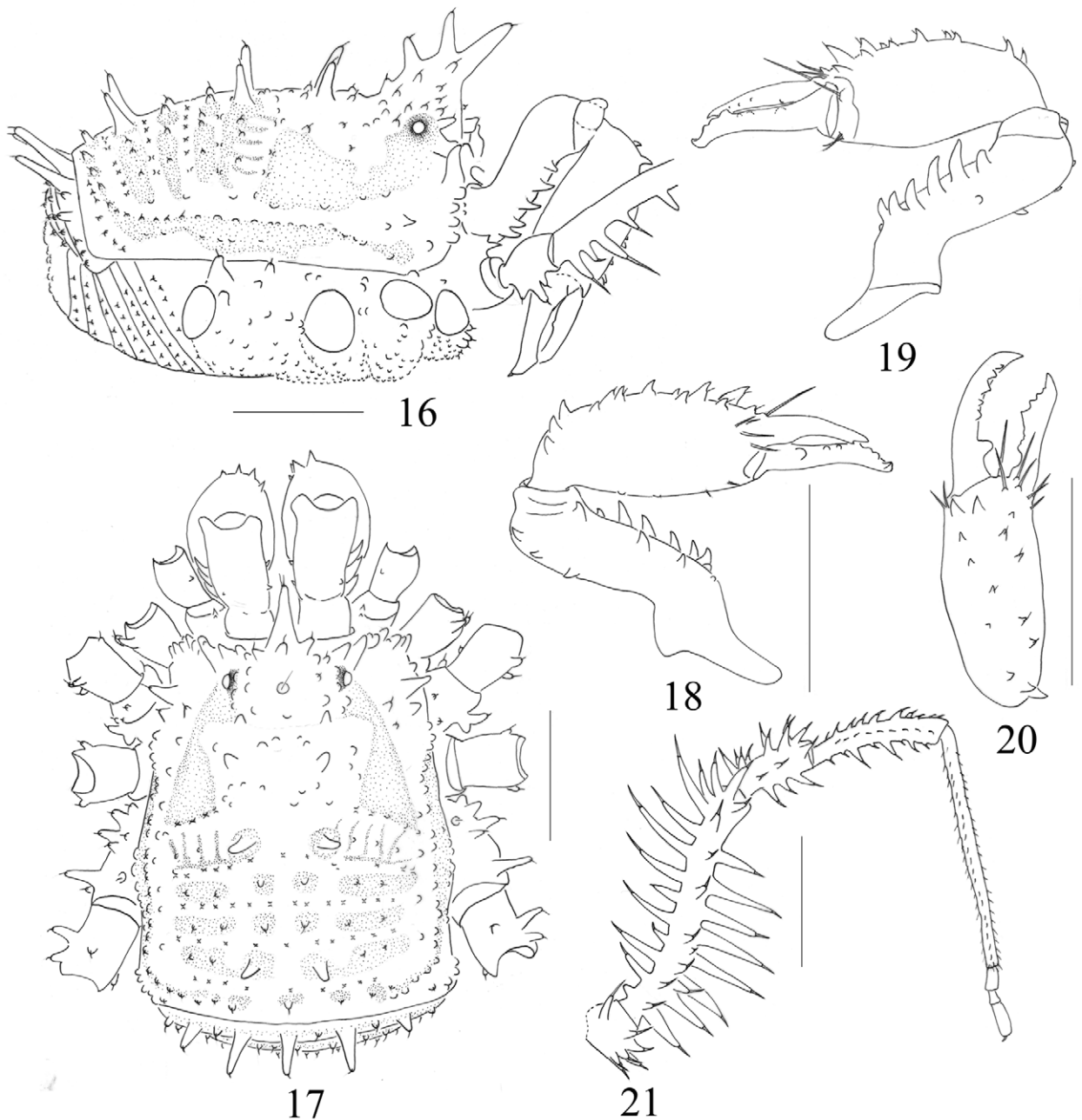
**Etymology.** The specific name is derived from the Latin words “*tri-*” and “*digitatus*” meaning “three fingered”, and refers to the three-pronged median spine protruding forward between eyes in lateral view (Fig. 16).

**Description.** Male (holotype) habitus as in Figs. 16–17. Coloration: body rusty yellow, with mottling of dark brown; median area of carapace pale yellow; each side of carapace dark brown; lateral ridges of the scutum margined with dark brown; ventral coloration same as dorsal; coxae with dark brown reticulate markings; free sternites with transverse band of dark brown; chelicerae and pedipalpus pale brown; with brown reticulate markings above; legs lighter brown, marked with alternating dark and light bands.

**Dorsum.** Dorsal scutum distinctly trapezoid in shape, posterior margin convex. Carapace with a row of four tubercles on each side of front margin near antero-lateral corner, also with two spines (the anterior one much larger

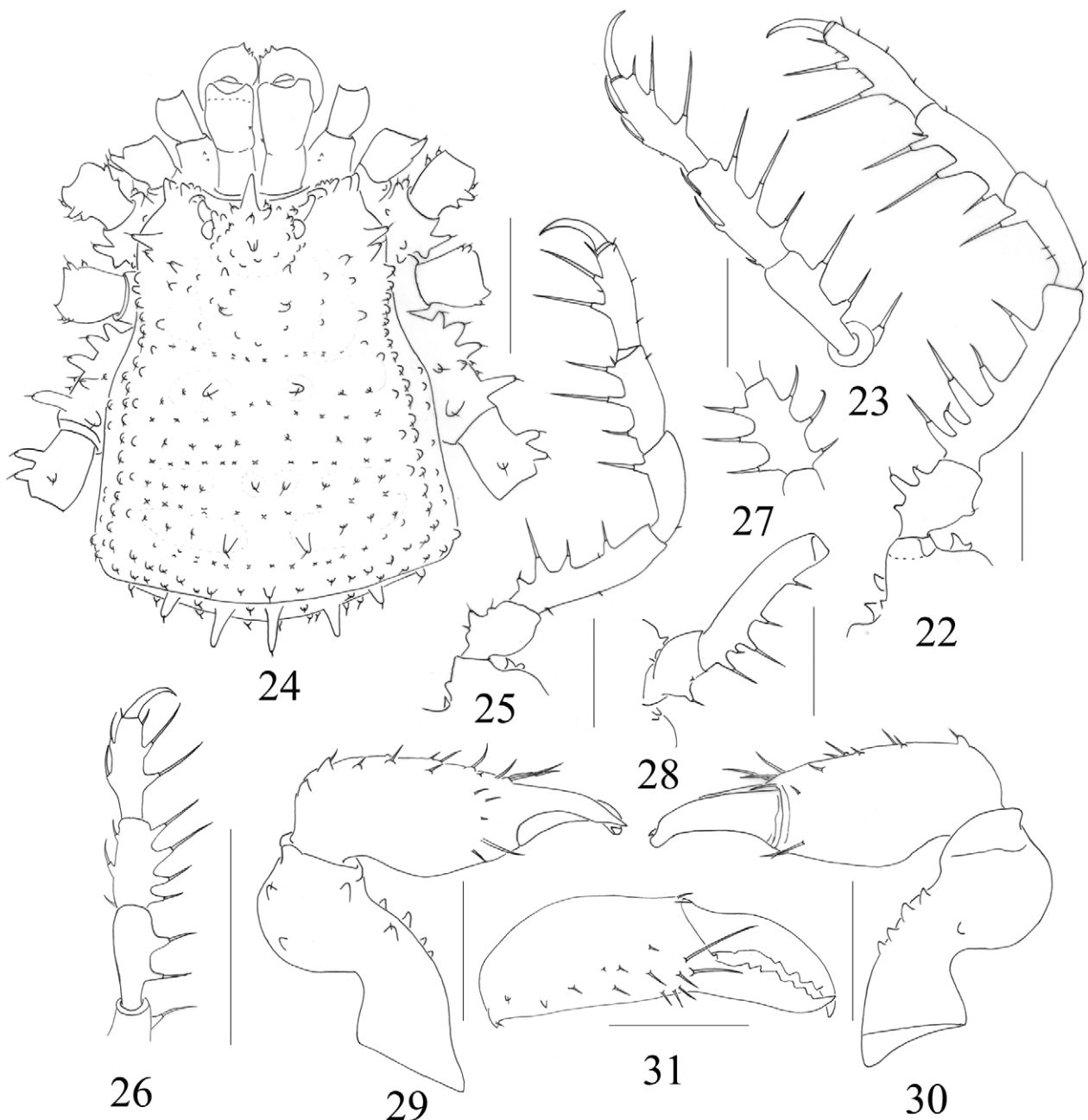
than the posterior) behind these tubercles. Eyes widely separated; each eye with a few tubercles above it and an enlarged tubercle extending forward to touch tubercle arising at anterior margin of carapace. Enlarged, basally widened median spine with two posterior branch protruding forward between eyes. Posterior to the median elevation on carapace with two large median spines. Scutum with five areas, the median longitudinal furrow in first area obscure. First to fifth scutal grooves roofed by a series of tubercular bridges. First and fourth areas with two enlarged median spines. First free tergite with a row of seven spines, median three the largest. Other free tergites each with a row of hair-tipped granules. All areas with low hair-tipped granules. Lateral ridges with a row of hair-tipped granules.

Venter. All coxae and genital operculum granulate, coxa I with coarse hair-tipped tubercles on anterior side. Coxa II with an enlarged tubercle prolateral and a large bifurcated tubercle retrolateral at tip of the margin. Coxa III with prolateral and retrolateral rows of small humps. Coxa IV widened, with several enlarged hair-tipped tubercles on the prolateral surface. Free sternites each with a transverse row of hair-tipped granules. Tracheal stigmata visible.



**FIGURES 16–21.** *Bonea tridigitata* sp. nov. 16. Male body, lateral view. 17. Dorsal view. 18. Left chelicera of male, prolateral view. 19. Retrolateral view. 20. Distal segment of the left chelicera, male, frontal view. 21. Right leg I of male, retrolateral view. Scale bars: 1 mm.





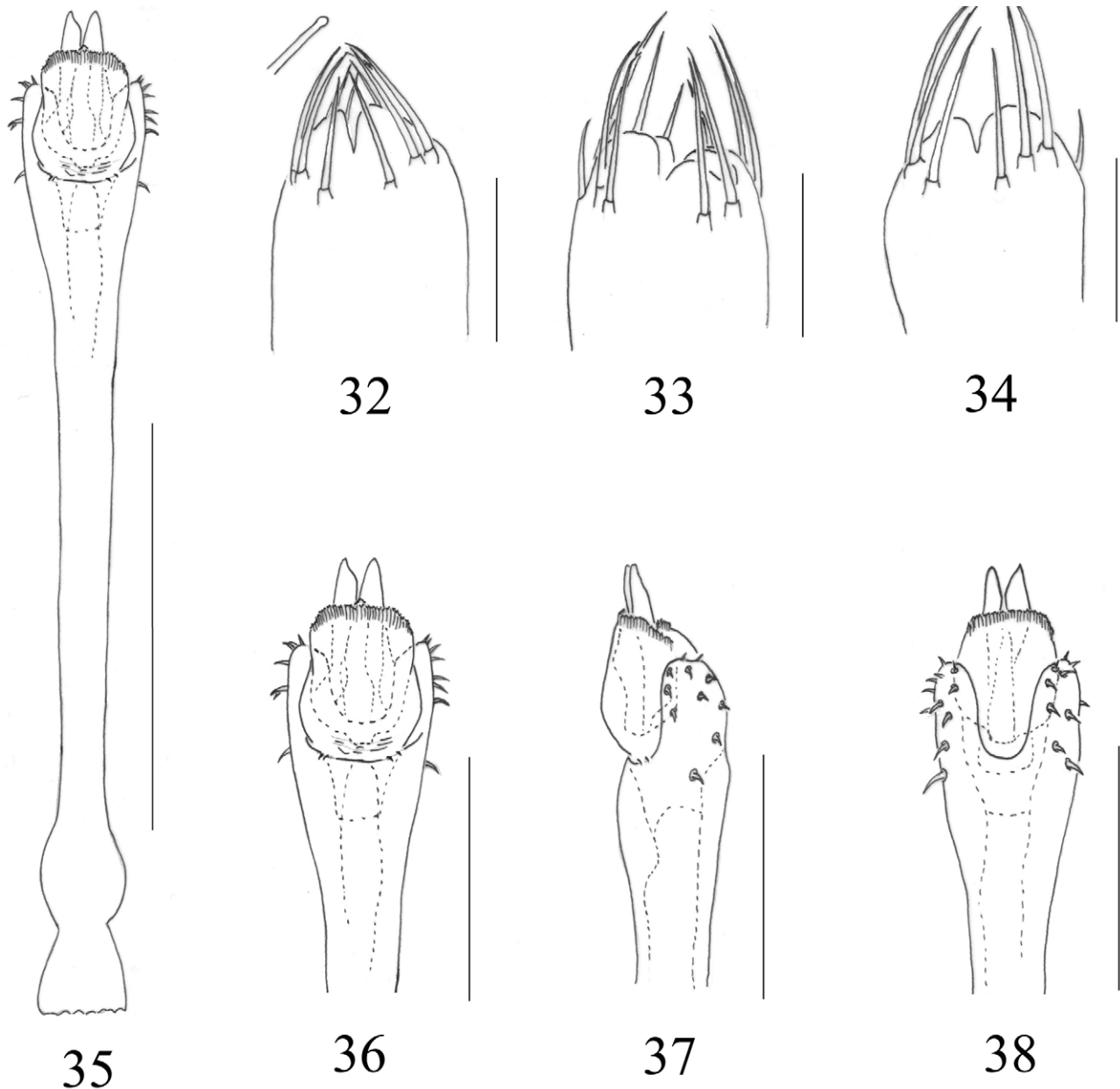
**FIGURES 22–31.** *Bonea tridigitata* sp. nov. 22. Left pedipalpus of male, retrolateral view. 23. Patella, tibia, and tarsus of male left pedipalpus, dorsal view. 24. Female body, dorsal view. 25. Left pedipalpus of female, retrolateral view. 26. Patella, tibia and tarsus of female left pedipalpus, dorsal view. 27. Tibia of female right pedipalpus, dorsal view. 28. Femur of female right pedipalpus, prolateral view. 29. Left chelicera of female, prolateral view. 30. Retrolateral view. 31. Distal segment of the left chelicera, female, frontal view. Scale bars: 1 mm (24); 0.5 mm (22–23, 25–31).

Chelicera (Figs. 1–2, 18–20). Strongly developed. Basichelecerite elongate, slightly sinuous; dorsal surface with three teeth prolaterally; ventral surface with a row of six large teeth retrolaterally, and a row of four teeth prolaterally. Second segment armed with some teeth on prodorsal surface; laterally smooth; ventral surface with a row of four small teeth prolaterally. Fingers relatively short and strong, inner edges toothed as illustrated in Fig. 20: one stout MBT, two tiny MMT, three MDT, one FBT, one crest FMT, and three FDT.

Pedipalpus (Figs. 22–23). Coxa dorsally with one strong bifurcated setiferous tubercle. Trochanter with three setiferous tubercles ventrally, and one small setiferous tubercle dorsally. Femur with five setiferous tubercles ventrally, on the prolateral distal side with a setiferous tubercle. Patella with a setiferous tubercle retrolateral and two prolateral setiferous tubercles. Tibia with three prolateral and four retrolateral setiferous tubercles. Tarsus with three setiferous tubercles on both sides of ventral surface. Tarsal claw shorter than tarsus, slightly curved.

Legs. Trochanter I dorsally with one enlarged tubercle, ventrally with six enlarged tubercles, femur I dorsally with a row of twelve setiferous spines, ventrally with a row of eight setiferous spines, patella and tibia with many setiferous spines, arranged more or less in five rows (Fig. 21). Femur II with two posterior setiferous tubercles at base, femur III–IV with setiferous tubercles. Tarsi III–IV with bare double claws, with scopulae. Tarsal formula: 3/4/5/5. Distitarsus of first and second tarsi with two tarsalia.

Penis (Figs. 35–38). Long, slender, its shaft widened distally. Distal margin of ventral plate with a median cleft. Setae arranged as follow: six dorsal setae, 10 ventral setae, and 10 lateral setae. Basal sac sunken into truncus. Lamellar sack nearly rectangle, distal margin with serrated rim. Clasping lobe bifurcated, protruding beyond distal margin of glans. Stylus between the clasping lobes nearly sunken into lamellar sack, stylar tip blunt.



**FIGURES 32–38.** *Bonea tridigitata* sp. nov. 32. Ovipositor, dorsal view. 33. Ovipositor of another specimens, dorsal view. 34. Ventral view. 35. Penis, dorsal view. 36. Distal part of penis, dorsal view. 37. Lateral view. 38. Ventral view. Scale bars: 0.25 mm (32–34, 36–38); 0.5 mm (35).

**Female.** In general appearance similar to the male, but with scutum more widely trapezoid (instead of subrectangular), interocular mound reduced, chelicera and pedipalpus less strongly armed (Figs. 24–31). Inner edges of finger toothed as illustrated in Fig. 31: one MBT, one small and one tiny MMT, three MDT, two FBT, one FMT, and three FDT.

Ovipositor as illustrated in Figs. 32–34. Each lobe usually with two ventral and three dorsal setae. Tip of each seta somewhat spherical (Fig. 32).

**Measurements.** Male holotype (female paratype): body 3.04 (2.90) long, 2.31 (2.57) wide at the widest portion, scutum 2.81 (2.84) long. Pedipalpus claw 0.45 (0.38) long. Penis 1.20 long. Measurements of left pedipalpus and right legs as in Table 2.

**Habitat.** Collected from leaf litter by sieving in the humid tropical forest.

**TABLE 2.** Pedipalpus and leg measurements of the male holotype (female paratype) of *Bonea tridigitata* **sp. nov.**

	Trochanter	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Pedipalpus	0.50(0.38)	1.25(0.95)	0.75(0.63)	0.75(0.63)		0.65(0.55)	3.90(3.14)
Leg I	0.45(0.35)	1.82(1.32)	0.59(0.59)	1.06(0.86)	1.72(1.32)	0.59(0.46)	6.23(4.90)
Leg II	0.50(0.45)	4.49(3.80)	0.76(0.76)	4.13(3.30)	3.53(2.84)	1.35(0.92)	14.76(12.07)
Leg III	0.50(0.45)	2.81(2.31)	0.76(0.73)	2.24(1.98)	3.10(2.74)	0.67(0.59)	10.08(8.80)
Leg IV	0.63(0.50)	3.89(3.56)	0.79(0.73)	2.97(2.81)	4.29(3.97)	0.73(0.59)	13.30(12.16)

**Variation.** Four female specimens were examined. Body 2.90–3.67 long, 2.19–2.50 wide at the widest portion, scutum 2.55–2.86 long. Pedipalpi of three female specimens resemble that of holotype. However, the right pedipalpus of another female with normal shape as in the others (Figs. 27–28), but with left pedipalpal femur retrolaterally and tibia prolaterally with four setiferous tubercles respectively (Figs. 25–26). Ventral ovipositor bears an extra seta (Figs. 33–34).

**Distribution.** China: Hainan (Mt. Bawangling).

**Notes.** *Bonea tridigitata* **sp. nov.** is similar to some Podoctinae currently not placed in *Bonea*, such as *Dongmoa oshimensis* Suzuki, 1964, *D. silvestrii* Roewer, 1927, and *Metapodoctis siamensis* Suzuki, 1985 (see Discussion). *Bonea tridigitata* **sp. nov.** is distinct from the latter species by the conspicuous median long spines on the first and fourth areas (Suzuki 1964a: 164, fig. 2; Roewer 1949: 273, fig. 63; Suzuki 1985: 90, fig. 11). Second segment of chelicera in *Dongmoa oshimensis* has many ventral tubercles (Suzuki 1964a: 165, fig. 3) that are absent in *Bonea tridigitata* **sp. nov.** The ventral tubercles retrolaterally on male basichelicerite in *B. tridigitata* **sp. nov.** are stout, while tubercles in *Metapodoctis siamensis* are delicate. The male genitalia of *Bonea tridigitata* **sp. nov.** is very similar to *Dongmoa oshimensis* and *Metapodoctis siamensis*. Distal margin of lamellar sack has serrated rim in *Bonea tridigitata* **sp. nov.** dorsally and ventrally, while *Metapodoctis siamensis* only has conspicuous serrated rim dorsally. As for *Dongmoa oshimensis*, Suzuki's description and illustrations are in outline. The most important character is the lamellar sack of this species with inconspicuous serrated rim ventrally.

### *Bonea zhui* **sp. nov.**

Figs. 39–57

**Type material.** Male holotype, CHINA: Hainan Province, Mt. Jianfengling, about 190 m alt., [N 18.7°, E 108.8°], December 13, 1989, M. S. Zhu leg. (MHBUS-Opi-ZMS89009), 1 ♀ (MHBUS-Opi-ZMS89010) paratype, same data as holotype.

**Diagnosis.** Median spine between eyes has two conspicuous branches; carapace, scutal areas I, IV, and free tergite I each has long median spines; femur of pedipalpus with five setiferous tubercles ventrally; second segment of chelicera with one prominent tooth on retro-ventral surface.

**Etymology.** The specific name is a patronymic in honor of Prof. Mingsheng Zhu (1950–2010), the collector of the type materials and a prominent researcher of Chinese arachnids.

**Description.** Male (holotype) habitus as in Figs. 39–40. Coloration: entire body rusty yellow, with somewhat dark brown patches on the dorsum; median area of carapace with dark brown reticulations; each side of carapace dark brown; lateral ridges of the scutum margined with brown; venter lighter in color than dorsum; coxae and free sternites yellow; free sternites with obscure transverse brown band; chelicerae and pedipalpus yellow, both of them with brown reticulate markings above; legs yellow to brown, femur and tibia lighter.

**Dorsum.** Dorsal scutum approximately quadrate in shape, sides slightly bulged at the region of the first scutum; abdomen broadly rounded posteriorly. Carapace with a row of four tubercles on each side of front margin near antero-lateral corner, also with two subequal spines behind these tubercles. Eyes separated; each eye with one anterior tubercle extending forward to touch tubercle from the frontal margin of carapace, between eyes with strong elevation tipped by a large bifurcate spine. Posterior to the median elevation on carapace with two large median spines. Opisthosomal region of scutum with five areas, the first area without a median furrow. The first and fourth areas with two enlarged median spines. The first free tergite with a row of seven spines, three the largest in the middle. Other free tergites each with a row of hair-tipped granules. All areas with small hair-tipped granules. Each lateral margin of the scutum with a longitudinal row of hair-tipped granules.

**Venter.** All coxae and genital operculum granulate, coxa I with coarse hair-tipped tubercles on anterior side. Coxa II with an enlarged tubercle prolateral and a large bifurcated tubercle retrolateral at tip of the margin (Fig. 40). Coxa III with prolateral and retrolateral rows of small humps. Coxa IV widened, with several enlarged hair-tipped tubercles on the prolateral surface, the largest one on the prolateral distal side. Free sternites each with a transverse row of small hair-tipped granules. Tracheal stigmata visible.

**Chelicera (Figs. 41–43).** Relatively long. Proximal segment S-shaped; the dorsal surface with numerous teeth; ventral surface retrolaterally with a row of 10 large teeth, prolaterally with a row of three teeth separated far away. Second segment armed with 11 enlarged teeth on prodorsal surface and one prominent tooth on retroventral surface. Fingers relatively strong, inner edges toothed as illustrated in Fig. 43: one stout MBT, two tiny MMT, three MDT, one molar FBT, one crest FMT, and three FDT.

**Pedipalpus (Figs. 45–46).** Coxa dorsally with one strongly bifurcating setiferous tubercle. Trochanter with three setiferous tubercles ventrally, but dorsally smooth. Femur somewhat widened proximally, ventrally with five setiferous tubercles, and with a setiferous tubercle on the prolateral distal side. Patella with a setiferous tubercle retrolateral and two prolateral setiferous tubercles. Tibia with three prolateral and four retrolateral setiferous tubercles. Tarsus with three setiferous tubercles on both sides of ventral surface. Tarsal claw shorter than tarsus, slightly curved.

**Legs.** Trochanter I dorsally with one enlarged tubercle, ventrally with four enlarged tubercles, femur I dorsally with a row of twelve setiferous tubercles, ventrally with a row of eight setiferous tubercles, patella and tibia with many setiferous tubercles, arranged more or less in five rows (Fig. 44). Femur II with four enlarged setiferous tubercles dorsally. Femur III with 3–4 enlarged setiferous tubercles prolaterally. Femur IV with 3–4 dorsally and 1–2 enlarged setiferous tubercles ventrally. Patella II–IV dorsally with 1–2 enlarged setiferous tubercles respectively. Tarsi III–IV with bare double claws, with scopulae. Tarsal formula: 3/4/5/5. Distitarsus of the first and second tarsi with two tarsalia.

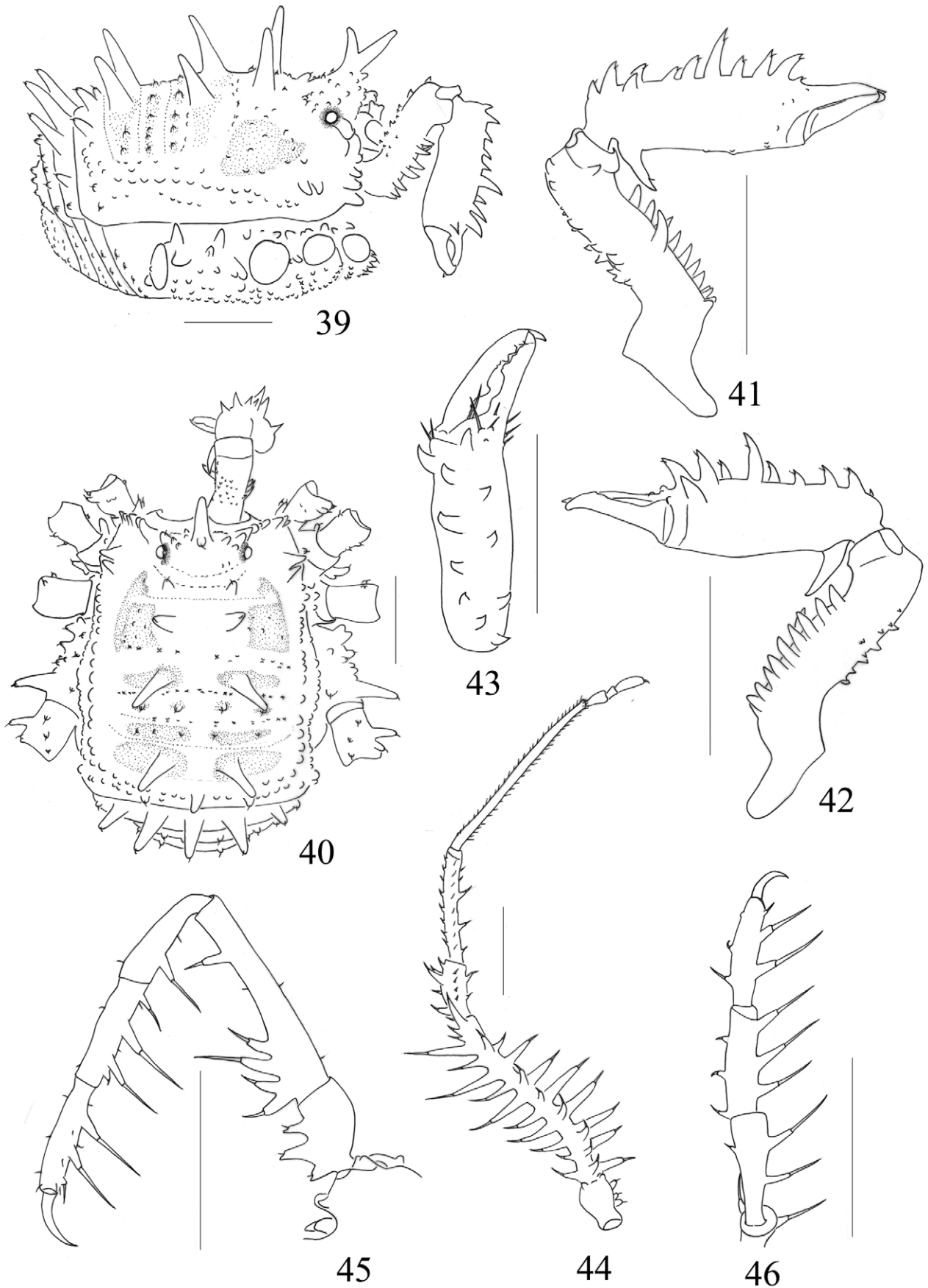
**Penis (Figs. 54–57).** Slender with shaft widened distally. Distal margin of ventral plate with a wide median cleft. Setae arranged as follow: six dorsal setae, six ventral setae, and two lateral setae. Basal sac sunken into truncus. Lamellar sack somewhat as the shape of tulip, distal margin with obscure serrated rim. Claspings lobe bifurcated, protruding beyond distal margin of glans. Stylus between the claspings lobe wholly sunken into lamellar sack, invisible.

**Female.** In general appearance, similar to the male but with trapezoid (instead of subrectangular) scutum, reduced median interocular spine (Fig. 47), basichelecerite shorter and less strongly armed and pedipalpus without bottle-shaped swelling (Figs. 48–50). Inner edges of cheliceral finger toothed as illustrated (Fig. 51): one MBT, two MMT, three MDT, two FBT, one FMT, and three FDT.

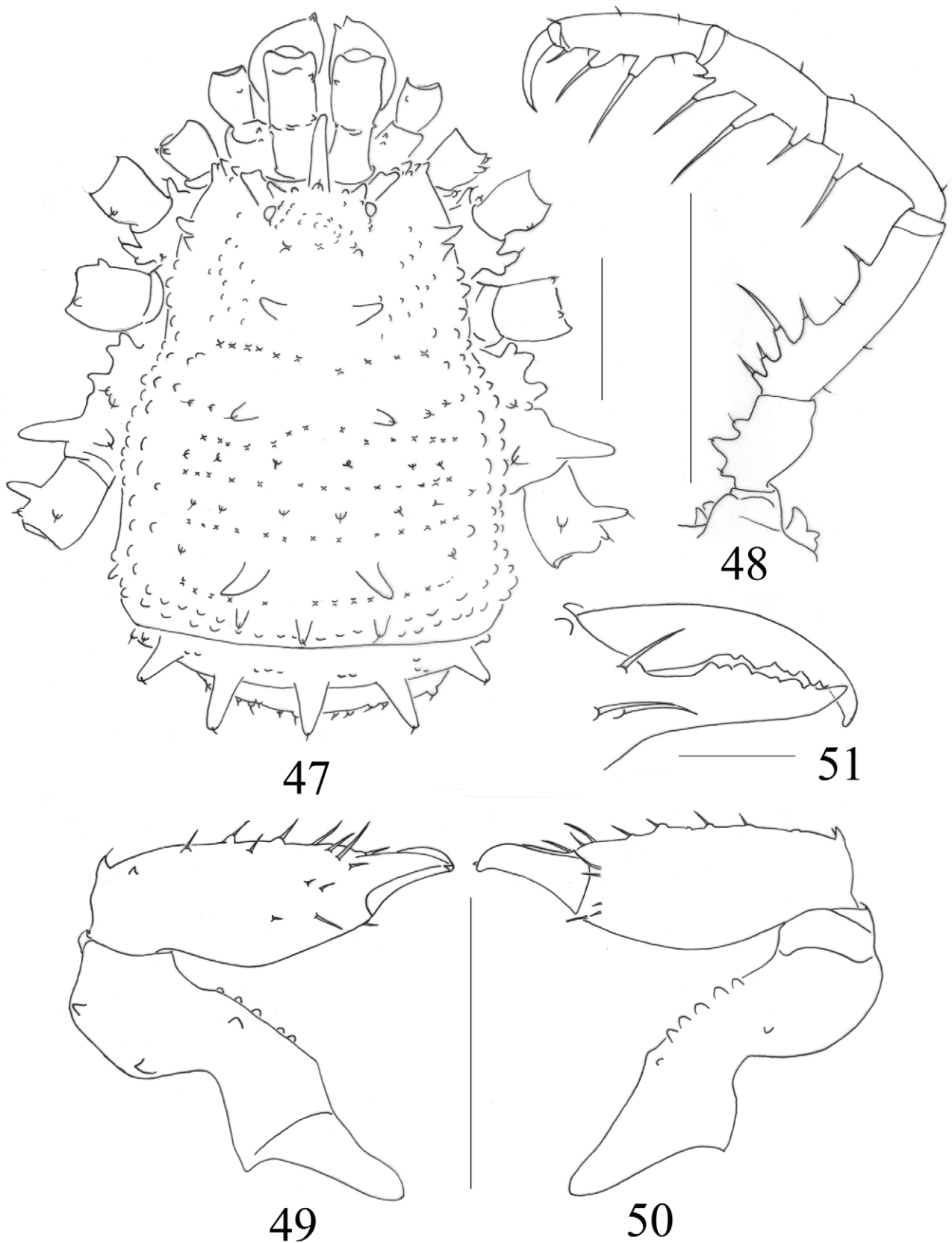
Ovipositor as illustrated in Figs. 52–53. Each lobe with two ventral and three dorsal setae. Tip of each seta somewhat spherical (Fig. 53).

**Measurements.** Male holotype (female paratype): body 3.67 (3.67) long, 2.75 (2.81) wide at the widest portion, scutum 3.26 (3.26) long. Pedipalpus claw 0.43 (0.43) long. Penis 1.30 long. Measurements of left pedipalpus and right legs as in Table 3.

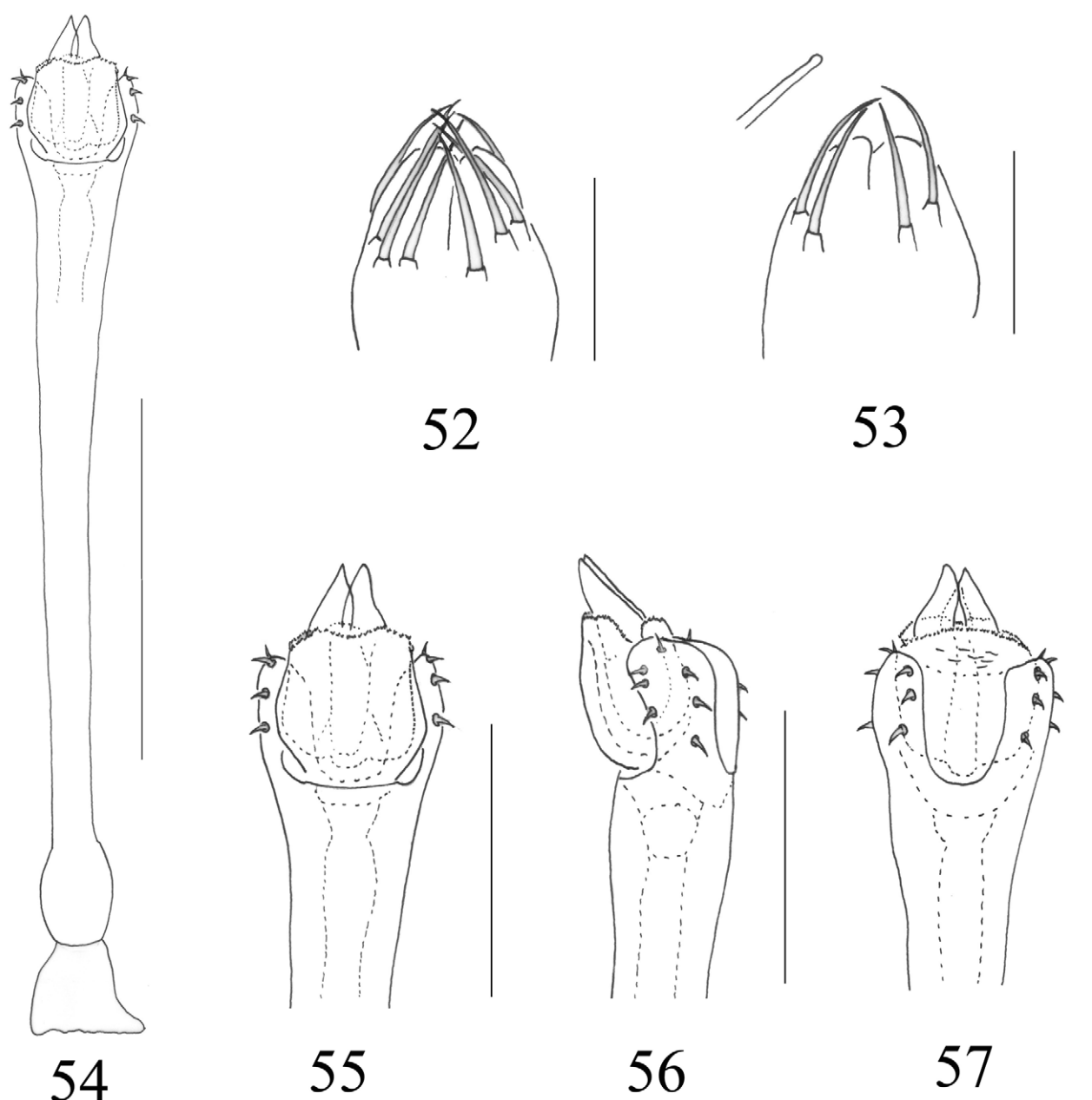
**Habitat.** Collected under fallen logs in the humid tropical forest.



**FIGURES 39–46.** *Bonea zhui* sp. nov. 39. Male body, lateral view. 40. Dorsal view. 41. Left chelicera of male, prolateral view. 42. Retrolateral view. 43. Distal segment of the left chelicera, male, frontal view. 44. Right leg I of male, retrolateral view. 45. Left pedipalpus of male, retrolateral view. 46. Patella, tibia, and tarsus of male left pedipalpus, dorsal view. Scale bars: 1 mm.



**FIGURES 47–51.** *Bonea zhui* sp. nov. 47. Female body, dorsal view. 48. Left pedipalpus of female, retrolateral view. 49. Left chelicera of female, prolateral view. 50. Retrolateral view. 51. Cheliceral fingers of female, frontal view. Scale bars: 1 mm (47–50); 0.25 mm (51).



**FIGURES 52–57.** *Bonea zhui* sp. nov. 52. Ovipositor, dorsal view. 53. Ventral view. 54. Penis, dorsal view. 55. Distal part of penis, dorsal view. 56. Lateral view. 57. Ventral view. Scale bars: 0.25 mm (52–53, 55–57); 0.5 mm (54).

**TABLE 3.** Pedipalpus and leg measurements of the male holotype (female paratype) of *Bonea zhui* sp. nov.

	Trochanter	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Pedipalpus	0.60(0.45)	1.55(1.00)	0.78(0.68)	0.85(0.68)		0.85(0.65)	4.63(3.46)
Leg I	0.38(0.40)	2.35(1.68)	0.66(0.61)	1.28(0.92)	2.14(1.73)	0.71(0.66)	7.52(6.00)
Leg II	0.55(0.50)	6.53(5.46)	0.87(0.92)	5.81(4.59)	4.85(4.13)	1.48(1.38)	20.09(16.98)
Leg III	0.55(0.50)	4.08(3.32)	0.87(0.92)	2.81(2.45)	4.08(3.47)	0.71(0.66)	13.10(11.32)
Leg IV	0.63(0.60)	5.61(4.95)	0.87(0.92)	3.98(3.42)	5.87(5.65)	0.71(0.66)	17.67(16.11)

**Distribution.** China: Hainan (Mt. Jianfengling).

**Notes.** *Bonea zhui* sp. nov. has similar appearance of body and cheliceral tubercles to some species not currently placed in *Bonea*, such as *Hoplodino gapensis* Suzuki, 1972, *H. hoogstraali* Suzuki, 1977, *Lundulla*

*bifurcata* Roewer, 1927, and *Baramella quadrispina* (Roewer, 1915). *Bonea zhui* **sp. nov.** is distinguished from the latter species by the first area and the first free tergite with long median spines, the teeth on male basichelicerite distinctively stouter than that of *Hoplodino hoogstraali* (Suzuki 1977b: 28, figs B–C), and the teeth on female basichelicerite more conspicuous than that of *H. gapensis* (Suzuki 1972: 8, figs 14–15). Second segment of chelicera armed with more tubercles than that of *Baramella quadrispina* and *Lundulla bifurcata* on prodorsal surface (Roewer 1923: 182, fig. 204; Roewer 1927: 319, fig. 25). Moreover, the penis of *Hoplodino hoogstraali* has paired small horn-shaped processes on ventral plate (Suzuki 1977b: 27, figs E–F), which differs from the species of *Bonea*.

## Erecananinae

### *Paralomanius* Goodnight & Goodnight, 1948 revalidated

*Paralomanius* Goodnight & Goodnight 1948: 9 [junior subjective synonym of *Lomanius* Roewer, 1923 by Goodnight & Goodnight (1957); type species: *Paralomanius longipalpus* Goodnight & Goodnight, 1948, by original designation].

*Eulomanius* Roewer 1949: 286 [junior subjective synonym of *Lomanius* Roewer, 1923 by Goodnight & Goodnight (1957); type species: *Paralomanius brevipalpus* Goodnight & Goodnight, 1948, by original designation].

**Etymology.** *Paralomanius* from Greek παρά (beside) + pre-existing genus *Lomanius*. Gender masculine.

**Remarks.** The synonymy of *Eulomanius* Roewer, 1949 and *Paralomanius* Goodnight & Goodnight, 1948 with *Lomanius* Roewer, 1923 proposed by Goodnight & Goodnight (1957) lacks characters to substantiate it. Likewise, in the analysis by Kury & Machado (2003) the two terminals of *Paralomanius* are nested in a group separated from *Lomanius*. Therefore we propose here the revalidation of *Paralomanius* (with *Eulomanius* as its junior synonym), which may be diagnosed by characters already advanced in Kury & Machado (2003). Suzuki (1977b) described a subspecies of *Paralomanius longipalpus* from the Philippines, but there is no reason to join those two species further than assigning them to the same genus. Therefore, the Philippines subspecies is here raised to full species.

**Diagnosis.** Posterior margin of each ocular globe joined to carapace by tubercular bridge (absent in *Lomanius*). Interocular mound erect (strongly bent forward in *Lomanius*). Pedipalpal femur of male much longer and more slender than femur I, with attenuate spines (cylindrical, comparable to femur I in thickness and length in *Lomanius*).

**Included species.** \**Paralomanius longipalpus* Goodnight & Goodnight, 1948 and *Paralomanius mindanaoensis* (Suzuki, 1977) **new status**.

### *Paralomanius mindanaoensis* (Suzuki, 1977) new status

*Lomanius longipalpus mindanaoensis* Suzuki 1977: 22, figs. 8–9, 45A–B.

**Type data.** ♂ holotype (FMNH, not examined), from Philippines, Davao Prov., Mindanao, East slope of Mt. McKinley, beating trees, mossy forest; 1 ♀ paratype (FMNH), same data, beating trees, open forest, elev. 3200 ft; 1 ♀, 1 pull. paratypes (FMNH), Mindanao, Davao Prov., Lake Linau, north slope of Mt. Apo, beating shrubs, mossy forest, elev., 7900 ft.

**Diagnosis.** Scutal areas interconnected by tubercular bridges; scutal area I clearly divided; scutal area IV unarmed. Otherwise, very similar to *P. longipalpus*, at the present state of knowledge.

### *Lomanius* Roewer, 1923

*Lomanius* Roewer 1923: 187; Goodnight & Goodnight 1957: 75; Suzuki 1977b: 22.

*Thaipea* Roewer 1949: 284 [junior subjective synonym of *Lomanius* Roewer, 1923 by Goodnight & Goodnight (1957); type species: *Erecanana formosae* Roewer, 1912, by original designation].



*Maquilingius* Roewer 1949: 284 [junior subjective synonym of *Lomanius* Roewer, 1923 by Goodnight & Goodnight (1957); type species: *Lomanius minimus* Roewer, 1926, by original designation].

*Orthossus* Roewer 1963: 225 [junior subjective synonym of *Lomanius* Roewer, 1923 by Suzuki (1977b); type species: *Orthossus rectipes* Roewer, 1963, by original designation].

**Type species:** *Podoctis tridens* Loman, 1905, by subsequent designation: Roewer, 1949.

**Diagnosis.** See Suzuki 1977b.

**Distribution.** Indonesia, Malaysia, Philippines and China (Fig. 78).

**Included species.** *L. bulbosus* sp. nov.; *L. carinatus* Suzuki, 1976; *L. formosae* (Roewer, 1912); *L. minimus* (Roewer, 1926); *L. rectipes* (Roewer, 1963) and \**L. tridens* (Loman, 1905).

### Key to species of *Lomanius*

1	Scutum with median spines (the height of spines is at least double the size of its width) . . . . .	2
-	Scutum with tubercles (the height of tubercles is approximately equal to its width) . . . . .	4
2	Free tergites I–III with median spines . . . . .	3
-	Free tergites I with median spines, free tergites II–III without median spines . . . . .	<i>L. tridens</i>
3	Fourth scutal area with two median spines . . . . .	<i>L. rectipes</i>
-	Fourth scutal area without median spines . . . . .	<i>L. formosae</i>
4	Free tergites I with median spines . . . . .	<i>L. minimus</i>
-	Free tergites I without median spines . . . . .	5
5	Ventral surface of proximal segment of chelicera with tubercles . . . . .	<i>L. bulbosus</i> sp. nov.
-	Ventral surface of proximal segment of chelicera smooth . . . . .	<i>L. carinatus</i>

### *Lomanius bulbosus* sp. nov.

Figs. 58–76

**Type material.** ♂ holotype, CHINA: Yunnan Province, Dali City, Mt. Diancang, about 2600 m alt., [N 25. 97°, E 99.87°], September 20, 2008, Z.Z. Yang leg. (MHBU-Opi-YZZ080660), 1 ♂ 1 ♀ (MHBU-Opi-YZZ080661–080662) paratypes, same data as holotype.

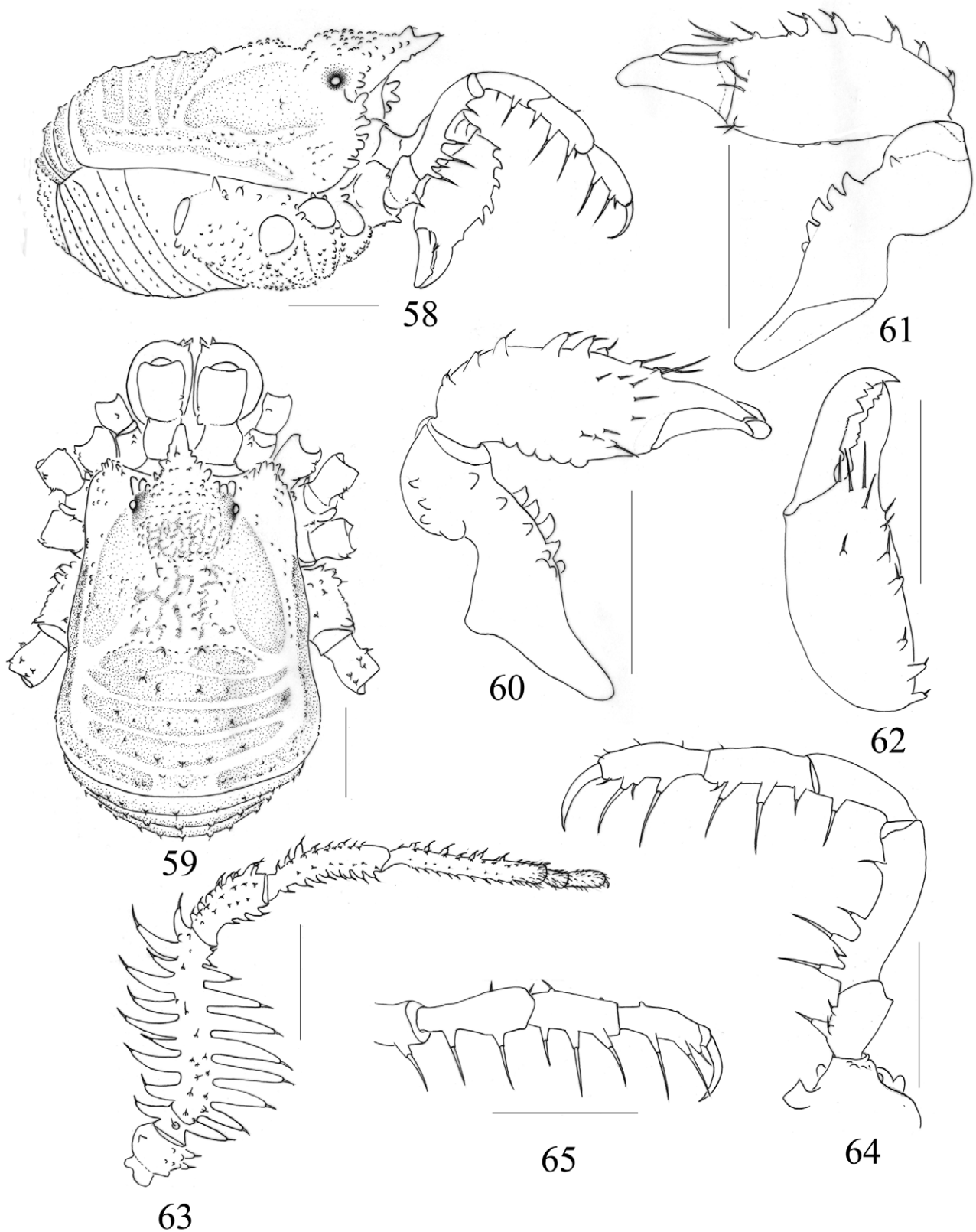
**Diagnosis.** Scutal areas without any long median spines, the median spine between eyes bent in a square angle, inconspicuous bridge tubercles on scutum, proximal segment of chelicera in ventral surface prolaterally with a row of five teeth, the shape of lamellar sack of penis dorsally resembles an upside-down light bulb, with the penis at rest.

**Etymology.** The specific name is derived from the Latin word “*bulbosus*” meaning bulbous, refers to the shape of lamellar sack of penis.

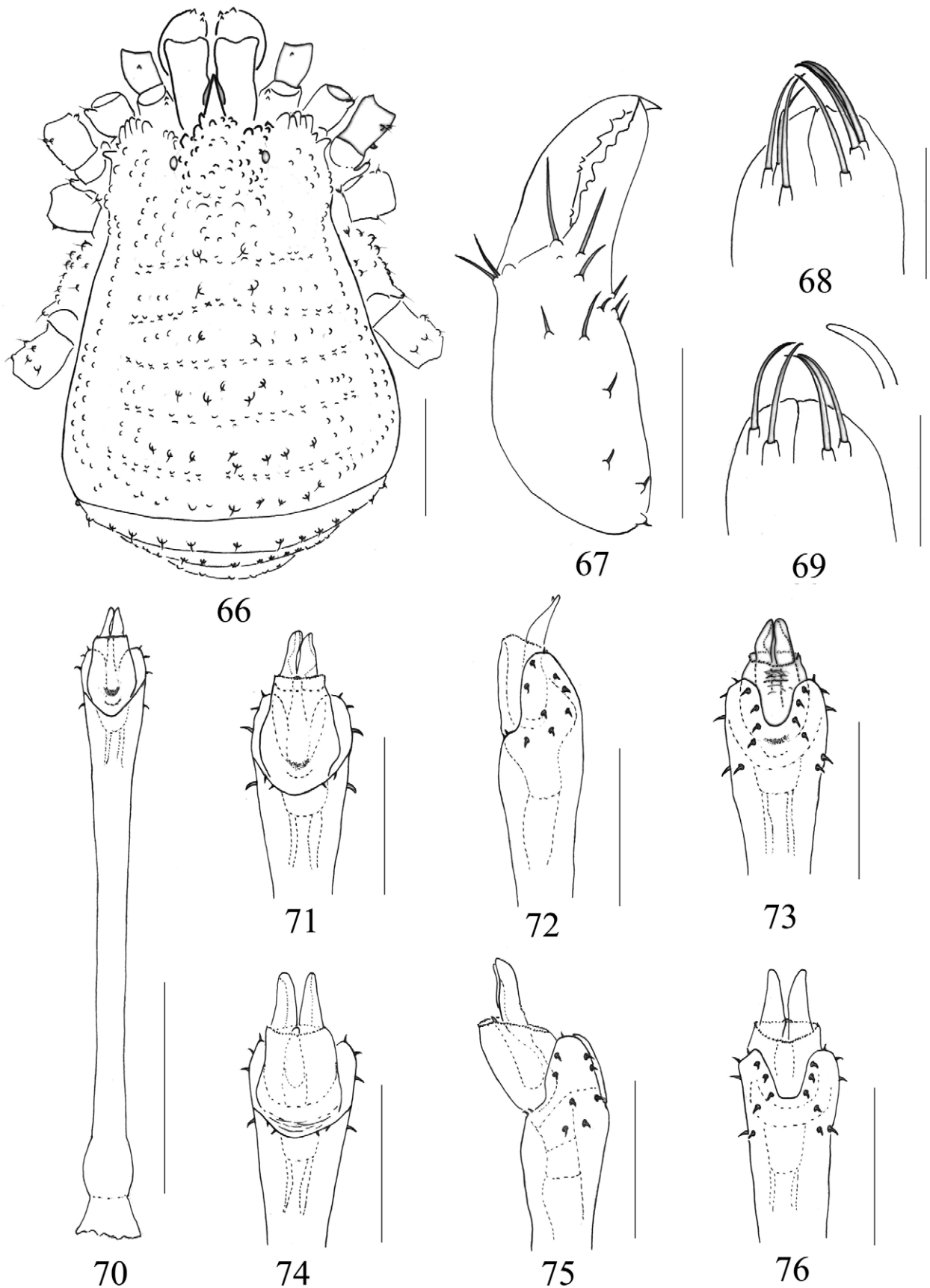
**Description.** Male (holotype) habitus as in Figs. 58–59. Coloration: entire body rusty yellow, only median area of carapace with dark brown reticulations; each side of carapace dark brown; lateral ridges of the scutum margined with dark brown; ventral coloration same as dorsal, mottled with yellowish brown to dark brown; chelicerae and pedipalpus yellowish, both of them with brown reticulate markings above; legs yellowish to brown, femur and tibia lighter.

**Dorsum.** Dorsal scutum subrectangular, posterior margin a little wider than anterior margin and sides slightly constricted twice; abdomen broadly rounded posteriorly. Carapace with a row of six tubercles on each side of front margin near antero-lateral corner. Eyes separated; each eye with three anterior tubercles of which the most lateral one extending forward to touch tubercle from the frontal margin of carapace; enlarged, basally widened median spine with one branches protruding upward between eyes. Posterior to the median elevation on carapace without any large median spines, surface of carapace clothed with coarse rounded hair-tipped granules, median areas of scutum with somewhat enlarged hair-tipped tubercles. Scutum with five areas, first with a median line. 1–5 scutal grooves each with numerous obscure tubercular bridges. 1–3 free tergites likewise with a row of hair-tipped granules. Lateral ridges of scutum with a row of coarse rounded hair-tipped granules. Anal plate with small hair-tipped granules.

Venter. All coxae and genital operculum granulate. Coxa II with an enlarged retrolateral tubercle at tip of the margin. Coxa IV widened, with several enlarged hair-tipped tubercles on the prolateral surface. Free sternites each with a transverse row of hair-tipped granules. Tracheal stigmata concealed.



**FIGURES 58–65.** *Lomanius bulbosus* sp. nov. 58. Male body, lateral view. 59. Dorsal view. 60. Left chelicera of male, prolateral view. 61. Retrolateral view. 62. Distal segment of the left chelicera, male, frontal view. 63. Right leg I of male, retrolateral view. 64. Left pedipalpus of male, retrolateral view. 65. Patella, tibia, and tarsus of male left pedipalpus, dorsal view. Scale bars: 1 mm.



**FIGURES 66–76.** *Lomanius bulbosus* sp. nov. 66. Female body, dorsal view. 67. Distal segment of left chelicera, female, frontal view. 68. Ovipositor, dorsal view. 69. Ventral view. 70. Penis, dorsal view. 71. Distal part of penis, dorsal view. 72. Lateral view. 73. Ventral view. 74. Expanded penis, dorsal view. 75. Lateral view. 76. Ventral view. Scale bars: 1 mm (66); 0.5 mm (67, 70); 0.25 mm (68–69, 71–76).

Chelicera (Figs. 60–62). Proximal segment S-shaped; dorsal surface with four teeth prolaterally; ventral surface retrolaterally with a row of six large teeth, with a row of 4–5 teeth prolaterally. Second segment armed with 8–9 teeth on prodorsal surface and five blunt teeth on proventral surface. Fingers relatively strong, inner edges toothed as illustrated in Fig. 62: one moundy MBT, four tiny MMT, three MDT, one crest FBT, one big and two small FMT, and three FDT.

Pedipalpus (Figs. 64–65). Coxa dorsally with one strong bifurcated setiferous tubercle. Trochanter with three setiferous tubercles ventrally, and one obscure setiferous tubercle dorsally. Femur with five setiferous tubercles ventrally, and a setiferous tubercle on the prolateral distal side. Patella with a setiferous tubercle retrolateral and two prolateral setiferous tubercles. Tibia with three prolateral and four retrolateral setiferous tubercles. Tarsus with three prolateral and two enlarged and two small retrolateral setiferous tubercles. Tarsal claw shorter than tarsus, slightly curved.

Legs. Trochanter I dorsally with one enlarged tubercle, ventrally with two enlarged tubercles, femur I dorsally with a row of 10 setiferous tubercles, ventrally with a row of nine setiferous tubercles, patella, tibia and metatarsus with many setiferous tubercles, arranged more or less in five rows (Fig. 63). Femur, patella, and tibia of leg II–IV with numerous setiferous tubercles. Tarsi III–IV with bare double claws, with scopulae. Tarsal formula: 2/2/4/4.

Penis (Figs. 3–4, 70–76). Shaft elongate, somewhat widened distally. Ventral side of the apical part with a median cleft. Setae arranged as follow: 10 dorsal setae, six ventral setae, and six lateral setae. Basal sac sunken into truncus. Lamellar sack somewhat resembles the shape of upside-down light bulb at rest, distal margin with obscure serrated rim. Clasping lobe bifurcated, protruding beyond distal margin of glans. Stylus between the clasping lobe nearly sunken into lamellar sack, stylar tip blunt ended.

**Female.** (Fig. 66). In general appearance and coloration, similar to the male, but with more asymmetrical trapezoid scutum, different dentition of inner edges of cheliceral fingers: one tiny MBT, two tiny MMT, three MDT, two FBT, one FMT, and three FDT (Fig. 67).

Ovipositor as illustrated in Figs. 68–69. Each lobe with two ventral and three dorsal setae. Tip of each seta blunt (Fig. 69).

**Measurements.** Male holotype (female paratype): body 3.98 (3.77) long, 2.86 (2.81) wide at the widest portion, scutum 3.42 (3.32) long. Pedipalpus claw 0.53 (0.45) long. Penis 1.49 long. Measurements of left pedipalpus and right legs as in Table 4.

**Habitat.** This species was collected by pit trap in the forest of Mt. Diancang.

**TABLE 4.** Pedipalpus and leg measurements of the male holotype (female paratype) of *Lomanius bulbosus* sp. nov.

	Trochanter	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Pedipalpus	0.50(0.38)	1.18(0.88)	0.80(0.70)	0.75(0.60)		0.68(0.55)	3.91(3.11)
Leg I	0.38(0.38)	1.73(1.53)	0.77(0.66)	0.97(0.87)	1.33(1.17)	0.61(0.51)	5.79(5.12)
Leg II	0.43(0.43)	2.55(2.04)	0.82(0.66)	1.94(1.53)	1.79(1.53)	1.12(1.02)	8.65(7.21)
Leg III	0.43(0.43)	1.84(1.53)	0.82(0.66)	1.48(1.28)	2.04(1.84)	0.61(0.51)	7.22(6.25)
Leg IV	0.53(0.53)	2.40(1.89)	0.82(0.77)	1.68(1.68)	2.81(2.55)	0.61(0.51)	8.85(7.93)

**Variation** (male paratype). Body 3.72 long, 2.91 wide at the widest portion, scutum 3.42 long.

**Distribution.** China: Yunnan (Mt. Diancang).

## Discussion

Podoctidae presently comprises three subfamilies, namely Ibaloniinae, Erecanaginae, and Podoctinae. These subfamilies are traditionally separated by greatly labile and unstable characters, such as number of segments of distitarsus I and absence or presence of scopula in posterior tarsi. Roewer (1912, 1923, 1949) established the vast majority of genera of Podoctidae, most of them monotypic. This series of taxonomic actions resulted in the present poor condition of podoctid systematics (Kury 2007). During the 1960's and 1970's, Suzuki carefully described and re-described some species from Southeast Asia, and started to synonymize some of those monotypic genera. Rambla (1984) did the same with the podoctids of the Seychelles Islands, but this was not enough to overturn the effect of Roewer's taxonomic actions. There is still much to be done on the systematics of Podoctidae.

The three subfamilies of Podoctidae were originally placed in the family Phalangodidae Simon, 1879. The first person to sort them into a separate family was Mello-Leitão (1938), but it took some time for this change to permeate the literature. For example, Kratochvíl (1958), Briggs (1969), Šilhavý (1961), and Suzuki (1964a, b; 1972) all still listed these subfamilies in the Phalangodidae. Starega (1992) even raised one of three subfamilies, the Erecaninae, to family because “the structure of the genital apparatus is quite different”. However, the family Podoctidae was gradually accepted since the second half of the 1970’s (e.g., Šilhavý 1973; Suzuki 1977b; Shear 1982; Martens 1986; Kury 2003, 2007; and Kury & Machado 2003, 2009; Pérez-González 2011).

Over the years, even with the paucity of data available from literature, Kury and Machado (2003) have built a large data matrix for a cladistic analysis of the family Podoctidae. Though they did not examine some critical species (e.g., some type specimens), they still obtained a strong signal and a topology that does not coincide with Roewer’s subfamilies, and which is not supported by the isolated characters of absence/presence of scopulae and tarsal segmentation. According to the preliminary cladistic analysis of Podoctidae of Kury and Machado (2003; *unpublished data*), the family may be divided in Ibaloniinae and Podoctinae (including Erecaninae), although the boundaries of these are not the same as Roewer’s. The original inclusion of *Bonea* in the Ibaloniinae, based on combination of scopula and tarsal characters, is not supported by these data.

The male genitalia and external habitus of *Bonea zhui* **sp. nov.** and *B. tridigitata* **sp. nov.** are very similar to some species of *Dongmoa*, *Metapodoctis*, and *Hoplodino* (for example, *Dongmoa oshimensis* Suzuki, 1964, *Metapodoctis siamensis* Suzuki, 1985, and *Hoplodino hoogstraali* Suzuki, 1977). *Dongmoa oshimensis* and two new species (*Bonea zhui* **sp. nov.** and *B. tridigitata* **sp. nov.**) have a U-shaped median cleft in distal margin of ventral plate of penis. The distal margin of lamellar sack has a serrated rim dorsally and ventrally in *B. tridigitata* **sp. nov.** and *B. zhui* **sp. nov.**, while it is inconspicuous in *Dongmoa oshimensis* (Suzuki 1964a: 163–167, fig. 3). *Metapodoctis siamensis* and *Hoplodino hoogstraali* have a V-shaped median cleft in distal margin of ventral plate of the penis (Suzuki 1985: 89–91, fig. 11). Besides that, distal margin of lamellar sack does not have a serrated rim ventrally in *Metapodoctis siamensis*; distal margin of ventral plate has two small horn processes in *Hoplodino hoogstraali* (Suzuki 1977b: 26–29, fig. 10).

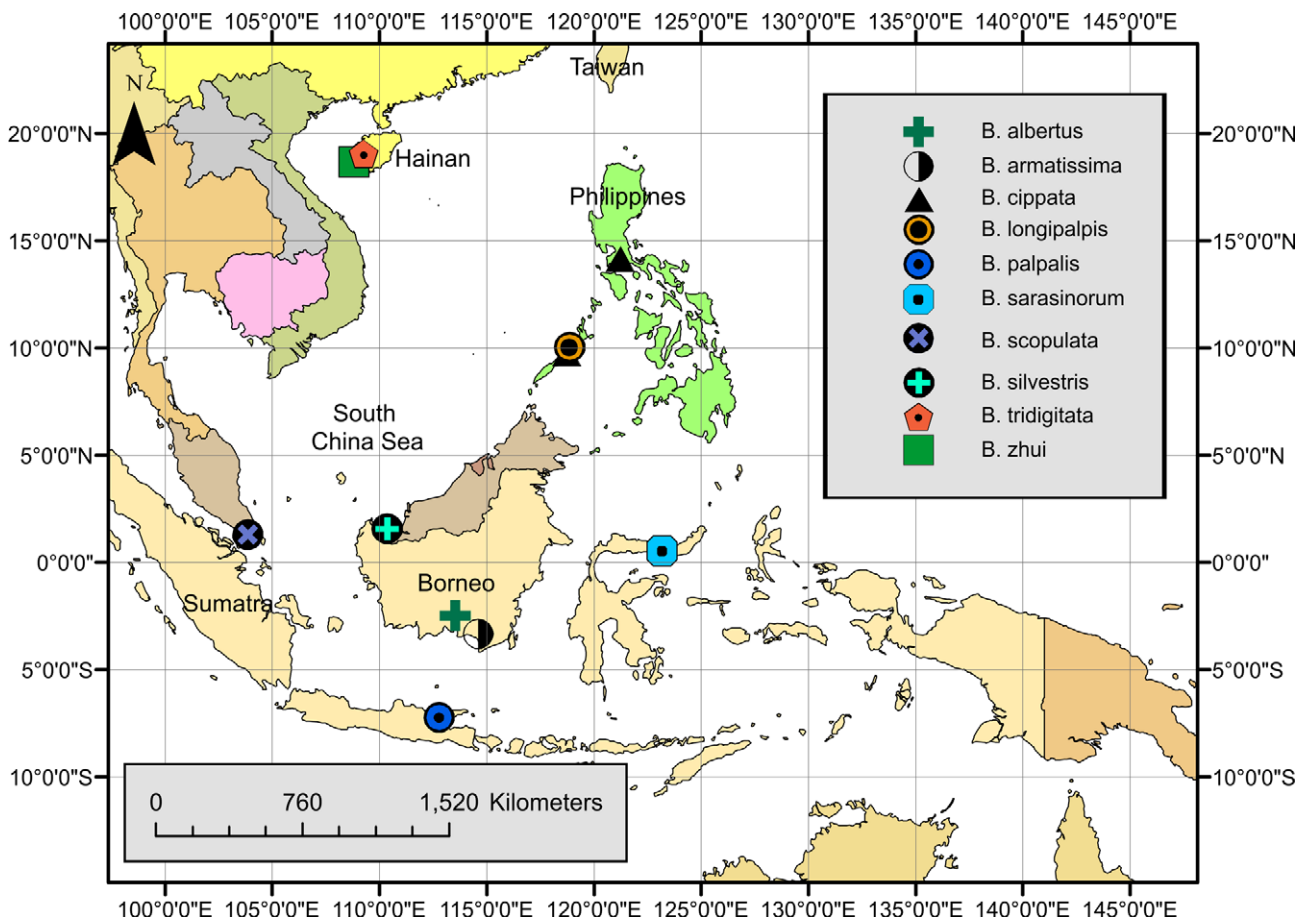
*Lejokus*, *Trencona*, *Baramella*, *Lundulla*, and *Stobitus* are all monotypic genera, whereas *Baramia* has five species. *Lejokus silvestris* Roewer, 1949, *Trencona setipes* Roewer, 1949, and the type species of *Baramia* (*B. vorax* Hirst, 1912) have long median spines on scutal areas II, IV, and V; median spine between eyes has not any conspicuous branches (Roewer 1949: 272, fig. 67; Roewer 1949: 277, fig. 76; Roewer 1949: 271, fig. 64). Although *Baramella quadrispina* (Roewer, 1915) also has not branches on median spine between eyes, it only has long median spines on scutal areas II and IV (Roewer 1949: 272, fig. 66). Unlike the four genera mentioned above, *Lundulla bifurcata* Roewer, 1927 and *Stobitus spinipes* Roewer, 1949 have conspicuous branches on median spine between eyes; *Lundulla bifurcata* has long median spines on scutal areas II and IV, *Stobitus spinipes* has long median spines on scutal areas II, IV, and V (Roewer 1927: 319, fig. 25; Roewer 1949: 276, fig. 70). *Bonea tridigitata* **sp. nov.** and *B. zhui* **sp. nov.** have conspicuous branches on the median spine between eyes, also have long median spines on scutal areas I, IV, and the free tergite I as well as the carapace. According to these morphological characters, the two new species cannot belong to the genera *Lejokus*, *Trencona*, *Baramia* or *Baramella*. Although *Lundulla* and *Stobitus* have branches on median spine between eyes, the position of long median spines on scutal area is different in two monotypic genera and two new species.

Therefore, *Bonea tridigitata* **sp. nov.** and *B. zhui* **sp. nov.** belong in *Bonea*, which may have to be expanded to accommodate species now in other genera. Moreover, according to the external morphology of *B. sarasinorum* Roewer, 1914 (the type species), including the shape of median spine between eyes, the median spines on scutal areas, and the shape of pedipalpus and chelicera, we prefer to assign these two new species to the genus *Bonea*. While no males of *B. sarasinorum* are known, we restrict the diagnosis of this genus to characters present in both sexes and in sexually dimorphic features known from other species. As suggested by both new northwestern records, *Bonea* appears to have a circum-China Sea distribution (Fig. 77), with some southeastern expansions reaching as far as Java and Sulawesi; all known species occur in low elevations.

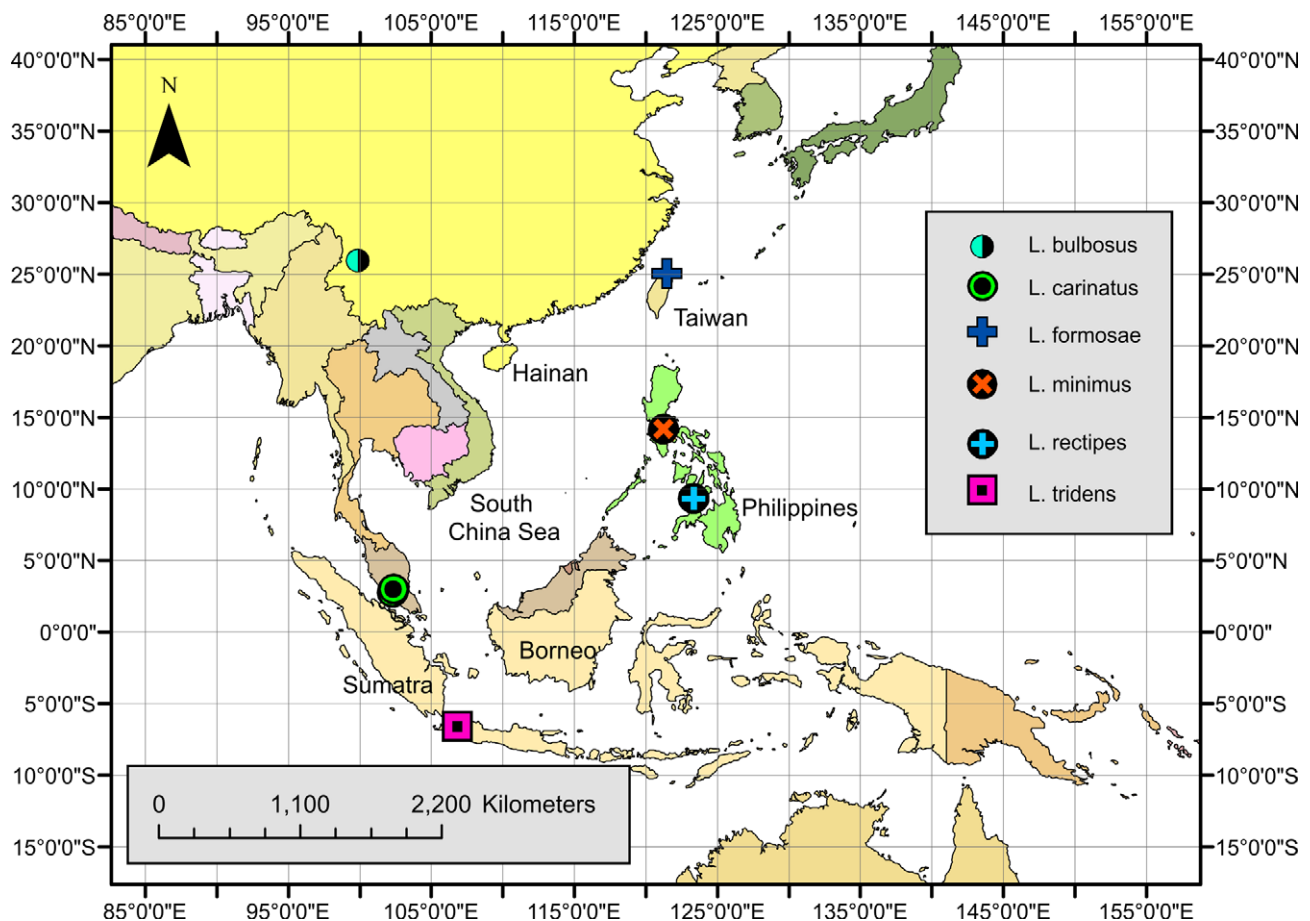
Erecaninae currently includes three genera, *Erecanana* Strand, 1911 (nine species), *Iyonus* Suzuki, 1964 (one species) and *Lomanius* (eight species). *Erecanana* is presently known only from Africa (Starega 1992). *Iyonus* is restricted to Japan (Suzuki 1964b). *Lomanius* is endemic to Southeast Asia (Suzuki 1977b). A fourth genus, *Paralomanius* Goodnight & Goodnight, 1948, from Micronesia, has been synonymized with *Lomanius* by Goodnight & Goodnight (1957), but this synonymy is not supported by any characters, and it has been revalidated here.

The monotypic genus *Iyonus* is poorly known, only by a single female from Shikoku. *I. yuyama* Suzuki, 1964 has the two halves of area I touching only narrowly and the spine of interocular mound not strongly bent as in *Lomanius bulbosus* **sp. nov.** The species of *Erecanana* possess much stronger armature on leg I, strong tubercles on free tergites, upright interocular mound, ventral plate uncleft, with macrosetae concentrated apically, all of these features disagree with *Lomanius bulbosus* **sp. nov.** *Paralomanius longipalpus* Goodnight & Goodnight, 1948 has some discordant features, which relate it to other genera, such as presence of a tubercular bridges joining posterior margin of each ocular globe to carapace and pedipalpal femur of male much longer and more slender than femur I, with attenuate spines.

On the other hand, many species of the concededly heterogeneous *Lomanius* possess features similar to the new species. Therefore, in the absence of a review of the Erecananinae, *L. bulbosus* **sp. nov.** is more confidently placed in *Lomanius*. Accordingly, this new species lacks long median spines on dorsal scutum, bottle-shaped pedipalpal femur of male, elongate dimorphic basichelicerite armed with spine rows. However, it has inconspicuous bridge tubercles on scutum and strong interocular mound which are bent in a right angle. The new species of *Lomanius* described here considerably expands the known range of the genus to the northwest of Southeast Asia, penetrating well into the Asian mainland and recorded from a much higher elevation than any of the previous species (Fig. 78).



**FIGURE 77.** Southeastern Asia showing geographical distribution of the species of *Bonea*. The 10 species are mainly scattered on the insular part of this area (Borneo, Java, Luzon, Palawan, and Sulawesi), with an isolated occurrence in continental Malaysia. The two new species from Hainan represent a northwestern expansion of the range of the genus by more than 1,500 km.



**FIGURE 78.** Southeastern Asia showing the geographical distribution of the species of *Lomanius*. The six species have a distribution similar to that of *Bonea*, with the difference that they have been reported from Taiwan instead of Hainan, and that, with the discovery of the new species, the genus now is known to penetrate much more deeply into the Asian continent.

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