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New *Angulobaloghia* species and records (Acari: Mesostigmata: Rotundabaloghiidae) from the Oriental region

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Original research

ABSTRACT

Two new *Angulobaloghia* species are described from Southeast Asia: *A. nabau* **sp. nov.** from Malaysia and *A. badangi* **sp. nov.** from Singapore. *Angulobaloghia nabau* **sp. nov.** has a three-peaked female genital shield, which is unique within the genus *Angulobaloghia*. *Angulobaloghia badangi* **sp. nov.** is distinctive by having the female genital shield between the central area of coxae II, its rectangular apical margin, and the sternal shield with oval pits. New localities for two known *Angulobaloghia* species, *A. scrobata* Kotschán and Sary, 2011 and *A. vietnamensis* (Kotschán, 2008), are presented from Vietnam.

Keywords mite; taxonomy; new species; new records; South-East Asia

Zoobank <http://zoobank.org/74C70476-DD1C-4CFA-AFAA-C153A823BCB0>

Introduction

The genus *Angulobaloghia* was established by Hirschmann (1979) for *Rotundabaloghia* species having a triangular-shaped female genital shield. Later all *Angulobaloghia*-like species were placed within a species group of *Rotundabaloghia* (see Wiśniewski & Hirschmann 1993; Wiśniewski 1993). Several years later, Kotschán (2010) re-established *Angulobaloghia* based on a morphological analysis and separated out the related genera. Subsequently, based on numerous newly described species from Southeast Asia (Kotschán 2014, 2015; Kotschán & Kiss 2015; Kotschán & Starý 2011) and from India (Kotschán 2011), Kotschán (2018) was able to provide a new diagnosis for *Angulobaloghia*.

In recent years numerous contributions were added to the distribution rotundabaloghiid mites in Southeast Asia (see Kotschán, 2018, 2021, Kotschán & Kiss 2015, Kotschán & Ripka 2016, Kotschán & Starý, 2011), but knowledge of this group is still far from complete. The present paper is a new contribution about the rotundabaloghiid mites of Southeast Asia, based on the collections of the Natural History Museum in Geneva, Switzerland.

Material and methods


The *Angulobaloghia* specimens were cleared in lactic acid for a week then examined on half-covered deep slides with a Leica 1000 microscope. Drawings were made with the aid of a drawing tube on a Leica 1000 microscope. All specimens are stored in 75% ethanol and

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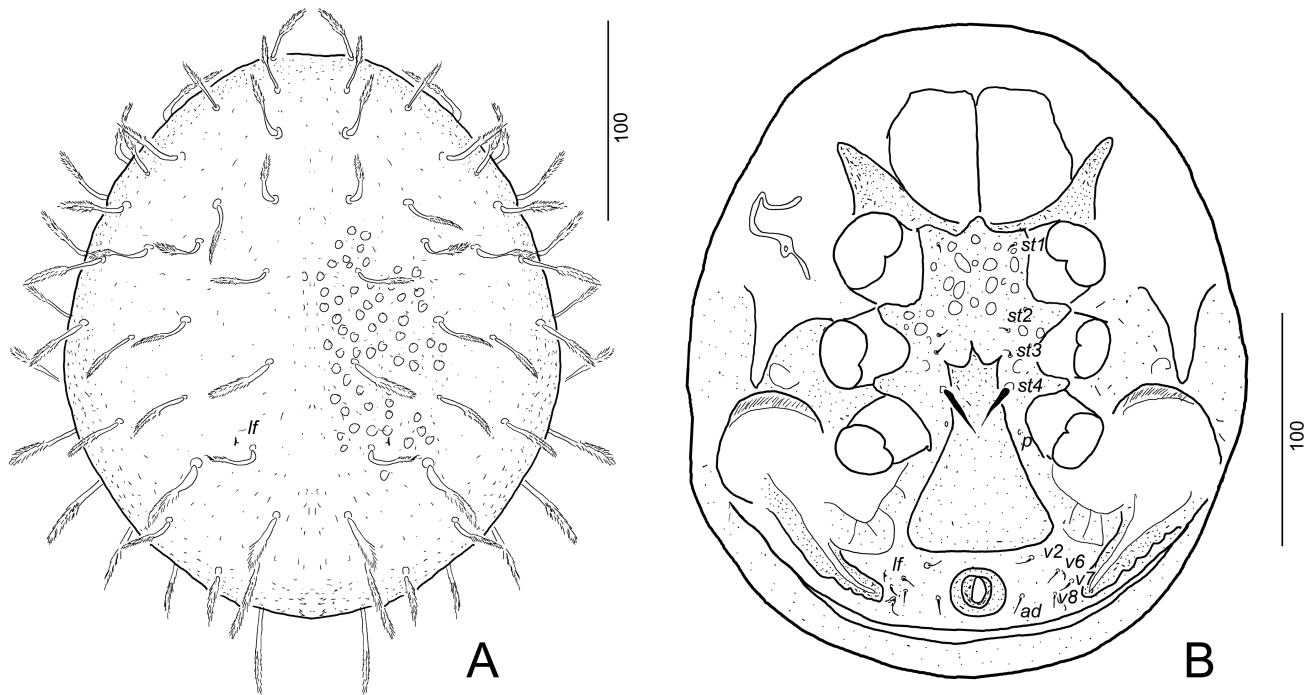


Figure 1 *Angulobaloghia nabau* sp. nov. female, holotype, A – idiosoma in dorsal view, B – idiosoma in ventral view.

deposited in the Natural History Museum in Geneva. Abbreviations: *v* = ventral setae, *st* = sternal setae, *ad* = adanal setae, *p* = pores, *lf* = lyriform fissures. All measurements and the scale bars of the figures are given in micrometres (μm).

Taxonomy

Angulobaloghia nabau sp. nov.

Zoobank: 27EDF372-4AEF-4DBA-8F08-D69E6FEF8924

(Figures 1–2)

Diagnosis

Surface of dorsal shield covered by oval pits, dorsal setae pilose. All ventral setae short and smooth. Setae *st1*, *st2* and *st3* very short, *st4* long and robust. Apical margin of female genital shield three-peaked. Surface of female genital shield covered by oval pits. Peritreme R-shaped.

Material examined

Holotype (female): Sar-87/60. Malaysia, Sarawak, Serian District, Penrissen Road 12 miles de Kuching, Semongok Wildlife Rehabilitation Centre: Nursery Centre of the Forest Department, prélèvement de sol dans les angles formés par les contreforts de grands arbres, 50 m; 8. July 1987, B. Hauser coll. (Berlese à Kuching, Sarawak) (= soil sample taken between the buttresses of large trees; Berlese extraction in Kuching). Paratypes (four females): locality and date same as for holotype.

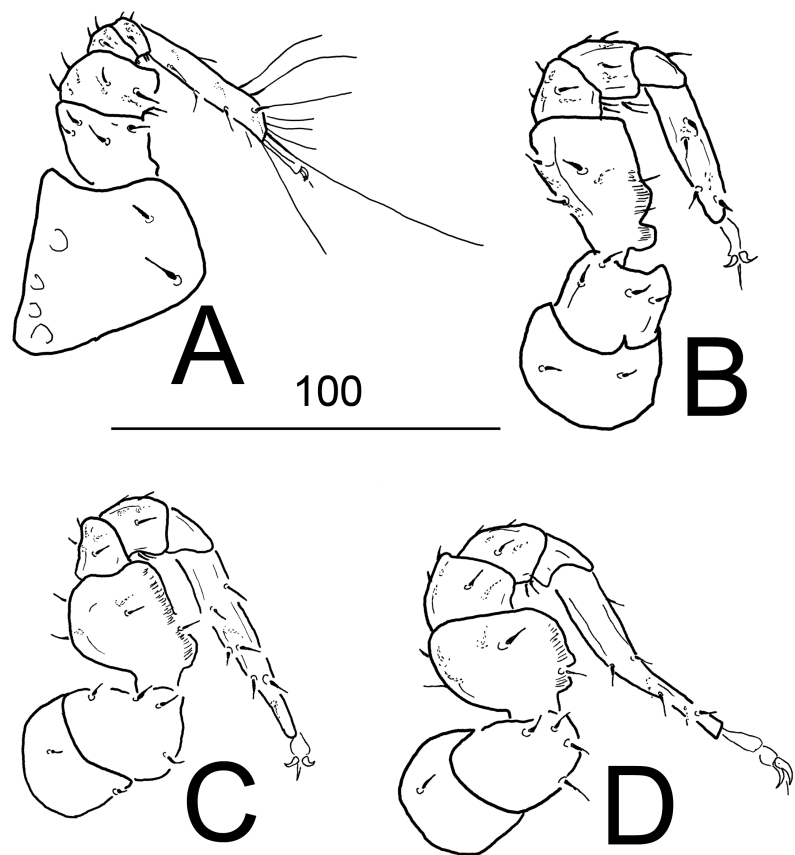


Figure 2 *Angulobaloghia nabau* sp. nov. female, holotype, A – leg I in ventral view, B – leg II in ventral view, C – leg III in ventral view, D – leg IV in ventral view.

Description

Female (n=5)

Measurements, body form, colour — Length of idiosoma 280–292, width 245–253. Shape circular, posterior margin rounded, colour yellowish brown.

Dorsal idiosoma — (Figure 1A). Marginal and dorsal shields fused. Majority of dorsal setae straight, some curved. All setae marginally pilose and ca 31–35 long. Dorsal idiosoma covered by oval pits, size of pits ca 4–5×4–5. One pair of lyriform fissures visible in posterior area of *j*-*J* rows.

Ventral idiosoma — (Figure 1B). Surface of sternal shield with some oval pits. Majority of pits larger (ca 9–10×5–6), some others smaller (ca 3–4×4–5). All sternal setae smooth, *st1*, *st2* and *st3* short (ca 4–6), *st4* long (ca 19–22) and robust. Setae *st1* situated close to anterior margin of sternal shield, *st2* and *st3* at level of central area of coxae III, *st4* at level of anterior margin of coxae IV. All ventral setae smooth and short (ca 6–8 long). Setae *v2* situated close to posterior margin of genital shield. Setae *v6*, *v7* and *v8* situated close to posterior end of pedofossae IV. Ventral shield without sculptural pattern. Setae *ad* similar in shape and length to ventral setae and situated lateral to anal opening. Anal plate oval, ca 12–13 long and 8–10 wide. One pair of lyriform fissures situated close to setae *v7* and one pair of pores at level of posterior margin of coxae IV close to lateral margin of genital shield. Peritremes short, poststigmatid part

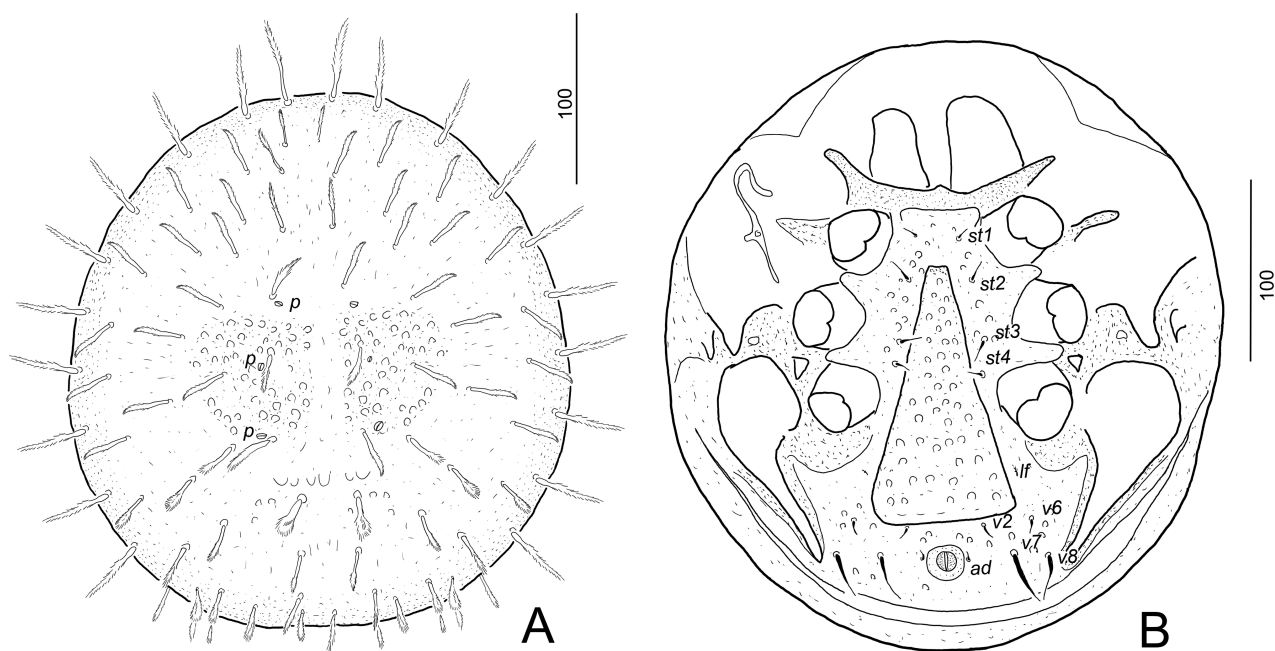


Figure 3 *Angulobaloghia badangi* sp. nov. female, holotype, A – idiosoma in dorsal view, B – idiosoma in ventral view.

short and straight, prestigmatid part R-shaped. Stigmata located between coxae II and III. Base of genital shield wide, its shape triangular, but its apical margin three-peaked (96–102 long and 56–58 wide at basal line), its surface smooth. Pedofossae deep, their surface smooth, separate furrows for tarsi IV present. Base of tritosternum narrow, vase-like, tritosternal laciniae smooth, subdivided into three smooth branches in distal half.

Gnathosoma — Corniculi horn-like, internal malae smooth and as long as corniculi. All hypostomal setae smooth and needle-like, *h1* long (ca 17–21), *h2*, *h3* and *h4* shorter (ca 6–7). Epistome apically serrate. Palp with smooth and needle-like setae. Fixed digit of chelicerae longer than movable digit.

Legs — (Figures 2A–D). All legs with smooth and needle-like setae, the claws on first leg present, but smaller than others. All femora bearing ventral lamellae processes. Leg I 140–145, leg II 156–160, leg III 145–154, leg IV 157–165.

Male, nymph and larva unknown.

Etymology

The new species is named after the mythical snake of Sarawak, Nabau.

Remarks

The apical margin of the female genital shield is unique; there are no comparable species within the genus *Angulobaloghia*.

Angulobaloghia badangi sp. nov.

Zoobank: C6D97052-7C87-4784-8485-C5F3E61D9C13

(Figures 3–4)

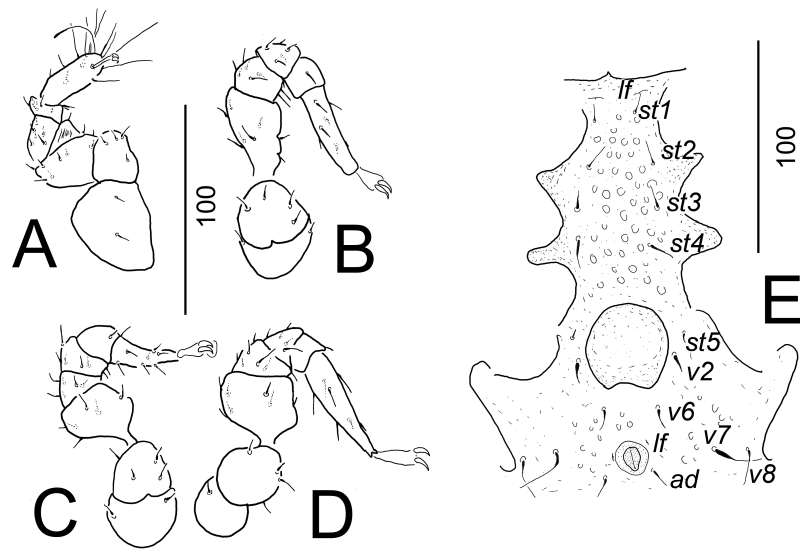


Figure 4 *Angulobaloghia badangi* sp. nov. female, holotype, A – leg I in ventral view, B – leg II in ventral view, C – leg III in ventral view, D – leg IV in ventral view, E – male paratype, ventral view.

Diagnosis

Surface of dorsal shield covered by oval pits, dorsal setae pilose. All ventral setae short and smooth, *v7* and *v8* four times longer than *v2* and *v6*. Sternal setae short and needle-like. Genital shield of female triangular, its surface covered by oval pits. Surface of sternal and ventral shield with oval pits. Peritreme hook-shaped.

Material examined

Holotype (female): Singapore, Central Water Catchment area, Lowe Peirce Reservoir Forest, near Casuarina Entrance, dryland rainforest, soil sample between *Terentags (Camponosperma auriculatum)* 45 m, 6. March 2000, B. Hauser coll. Paratypes (five females and four males): locality and date same as for holotype.

Description

Female (n=6)

Measurements, body form, colour — Length of idiosoma 310–315, width 295–306. Shape circular, posterior margin rounded, colour yellowish brown.

Dorsal idiosoma — (Figure 3A). Marginal and dorsal shields fused. All dorsal setae straight, pilose and ca 32–41 long. Dorsal idiosoma covered by oval pits (ca 3–4×3–4). Three pairs of pores visible on central area of dorsal shield.

Ventral idiosoma — (Figure 3B). Surface of sternal shield with some oval pits (ca 2–3×3–4). All sternal setae smooth and short (ca 9–12). Setae *st1* situated at level of anterior margin of coxae II, *st2* at level of posterior margin of coxae II, and *st3* at level of posterior margin of coxae III, *st4* at level of anterior margin of coxae IV. All ventral setae smooth, *v2* and *v6* short (ca 8–9), *v7* and *v8* longer (ca 25–28). Setae *v2* situated close to the posterior margin of genital shield. Setae *v6* at level of *v2* but at same distance from *v2* and pedofossae IV. Setae *v7* and *v8* situated close to posterior end of pedofossae IV. Ventral shield covered by small oval pits (ca 3–4×3–4). Setae *ad* similar in shape and length to setae *v2* and *v6*, and situated lateral to anal opening. Anal plate oval, ca 9–10 long and 7–9 wide. One pair of lyriform fissures situated

close to anterior part of pedofossae IV. Peritremes short, poststigmatid part short and straight, prestigmatid part hook-shaped. Stigmata situated between coxae II and III. Base of genital shield wide, its shape triangular with straight anterior margin (135–142 long and 75–80 wide at basal line), its surface covered by oval pits. Pedofossae deep, their surface smooth, separate furrows for tarsi IV present. Base of tritosternum narrow, vase-like, tritosternal laciniae smooth, subdivided into three smooth branches in its distal half.

Gnathosoma — Corniculi horn-like, internal malae smooth and as long as corniculi. All hypostomal setae smooth and needle-like, *h1* long (ca 17–19), *h2*, *h3* and *h4* shorter (ca 6–7). Epistome apically serrate. Palp with smooth and needle-like setae. Fixed digit of chelicerae longer than movable digit.

Legs — (Figures 4A–D). All legs with smooth and needle-like setae, the claws on first leg present, but smaller than others. All femora bearing ventral lamellae. Leg I 140–145, leg II 165–170, leg III 152–157, leg IV 160–164.

Male. (n=5)

Measurements, body form, colour — Length of idiosoma 295–305, width 285–300. Body form and colour same as in females.

Dorsal idiosoma — Ornamentation and chaetotaxy of dorsal shield as for female.

Ventral idiosoma — (Figure 4E). All sternal setae smooth, needle-like. First four pairs ca 9–11 long and situated anterior to genital shield. Setae *st5* shorter (ca 5–6) and situated at level of central area of genital shield. Setae *v2* situated close to *st5*, the position, shape and length of other ventral setae same as in females. One pair of lyriform fissures situated close to anterior margin of sternal shield, another pair close to setae *ad*. Surface of sternal shield and ventral shield similar to females. Genital shield oval, its surface without sculptural pattern and situated between coxae IV.

Nymph and larva unknown.

Etymology

The new species is named after Badang, a mythical strongman from Singapore folklore.

Remarks

This shape of genital shield is rarely found among *Angulobaloghia* species. *Angulobaloghia aoki* (Hiramatsu, 1977), *A. angustigynella* (Hirschmann, 1975), *A. scrobia* Kontschán & Stary, 2011 and *A. pallgergelyi* Kontschán, 2018 have this typical long and triangular female genital shield. The most important differences among these species are summarised in Table 1.

Angulobaloghia scrobia Kontschán & Stary, 2011

Angulobaloghia scrobia Kontschán & Stary, 2011: 22–23.

New records — Vietnam, Lam Dong Province, Datanla Waterfall, ca 5 km S of Da Lat, 11°45'02"N, 108°26'54"E, 1300 m, evergreen hill forest, 12. September 2003, P. Schwendinger coll.

Angulobaloghia vietnamensis (Kontschán, 2008)

Rotundabaloghia vietnamensis Kontschán, 2008: 20.

Angulobaloghia vietnamensis Kontschán 2010: 24, Kontschán & Stary, 2011: 22.

New records — Vietnam, Lam Dong Province, Datanla Waterfall, ca 5 km S of Da Lat, 11°45'02"N, 108°26'54"E, 1300 m, evergreen hill forest, 12. September 2003, P. Schwendinger coll.

Key to the known *Angulobaloghia* species (after Kontschán 2018, modified)

1. Ventral shield ornamented by oval pits 2
 – Ventral shield smooth 5
2. Anterior margin of genital shield reaches to coxae II 3
 – Anterior margin of genital shield reaches to coxae III
 *A. pedunculata* Kontschán & Kiss, 2015
3. Anterior margin of genital shield rounded, *st1* situated on pits ... *A. pallgergelyi* Kontschán, 2018
 – Anterior margin of genital shield rectangular, *st1* not situated on pits 4
4. Sternal shield smooth *A. aokii* (Hiramatsu, 1977)
 – Sternal shield ornamented by oval pits *Angulobaloghia badangi* **sp. nov.**
5. Genital shield of female triangular 7
 – Genital shield of female not triangular 6
6. Female genital shield quadrangular with long anterior process ... *A. rutra* Kontschán, 2014
 – Female genital shield semicircular with short anterior process . *A. danyii* (Kontschán, 2008)
7. Peritremes mushroom-shaped 8
 – Peritremes hook-shaped 11
8. Genital shield with ornamentation 9
 – Genital shield without ornamentation 10
9. Setae *st3* three times longer than other sternal setae
 *A. cuyi* (Hiramatsu & Hirschmann in Hirschmann & Hiramatsu, 1992)
 – Setae *st3* as long as other sternal setae
 *A. pyrigynella* (Hirschmann in Hirschmann & Hiramatsu, 1992)
10. Sternal shield with ornamentation *A. vietnamensis* (Kontschán, 2008)
 – Sternal shield without ornamentation *A. triangulata* (Kontschán, 2008)
11. Sternal shield with ornamentation 12
 – Sternal shield without ornamentation 15
12. Setae *st2* and *st3* three times longer than *st1* *A. indica* Kontschán, 2011
 – Setae *st2* and *st3* as long as *st1* 13
13. Anterior process on genital shield present *A. bruneiensis* Kontschán, 2018
 – Anterior process on genital shield absent 14
14. Apical part of female genital shield single-peaked, and as long as wide
 *A. luzonensis* (Hiramatsu & Hirschmann in Hirschmann & Hiramatsu, 1992)
 – Apical part of female genital shield three-peaked and twice longer than wide
 *Angulobaloghia nabau* **sp. nov.**
15. Genital shield with ornamentation 16
 – Genital shield without ornamentation 18

16. Anterior margin of genital shield smooth and rounded, setae *v6* smooth 17
 — Anterior margin of genital shield serrate, setae *v6* with one pair of lateral spines
 *A. scrobia* Kontschán & Starý, 2011
17. Basal part of genital shield narrow, *v6* situated near *V7* and *V8*
 *A. angustigynella* (Hirschmann, 1975)
 — Basal part of genital shield wide, *v6* situated in central area of ventral shield
 *A. staryi* Kontschán, 2015
18. Setae *st2* and *st3* three times longer than *st1* *A. angulogynella* (Hirschmann, 1975)
 — Setae *st2* and *st3* as long as *st1* 19
19. Additional setae on sternal shield present *A. latigynella* (Hirschmann, 1975)
 — Additional setae on sternal shield absent *A. tamilica* Kontschán, 2011

Discussion

The genus *Angulobaloghia* is a typical Oriental-Australasian group of the Uropodina mites. Seems to be that the origin of this genus can be in South-East Asia, and *Angulobaloghia* mites from South-East Asia colonized Japan and Papua New Guinea. Colonization of the Indian subcontinent can be after the collision with Eurasia (Kontschán 2011). But our knowledge about this genus is far from complete, numerous new species are discovered and described in this region in the last some years (see Kontschán 2014, 2015, 2018, Kontschán & Kiss 2015), but the discovery of several other new species is also expectable in the future.

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