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Troglobiotic terrestrial isopods from Myanmar, with descriptions of a new genus and three new species (Crustacea, Oniscidea)

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Abstract. A new genus of Styloniscidae (*Bamaoniscus*) with the new species *B. lobatus* and two new species of *Thailandoniscus* (*T. whitteni* and *T. brehieri*) are described from Myanmar caves. All the new species are troglobiotic and *B. lobatus* is amphibious. The affinities of the new taxa are discussed. *Burmoniscus coecus* (Philosciidae) is also recorded from Saddan cave.

Key words. Oniscidea, Styloniscidae, Philoscidae, new genus, new species, caves, Myanmar

INTRODUCTION

In Southeast Asia, Myanmar (Burma) is one of the countries with the largest karst areas and number of caves. The main karst areas are located in the Shan Plateau, Pa-an and Mawlamyine region, Tannintharyi Region, and Myeik Archipelago (Mouret & Lebreton, 2001; Mouret 2004).

The terrestrial isopods of Myanmar are still poorly known. At present, only 19 extant species are known (Schmalfuss, 2003), many of which were poorly described, mainly at the end of 1800 and first half of 1900 (Budde-Lund, 1895, 1904; Collinge, 1914, 1916; Verhoeff, 1946), and their identifications are often very difficult. A much larger number of species of Oniscidea is certainly present in a tropical country like Myanmar, and intensive investigations need to be conducted. Only three species were recorded from Myanmar caves: *Burmoniscus coecus* (Budde-Lund, 1895) (Philosciidae) from Farm caves near Moulmein, *Trichorhina lobata* Verhoeff, 1946 (Platyarthridae) from "Pekkong" (= Pekon) Caves and Htamsang (= Htem Sann) Caves, southern Shan State, and *Antrodillo perkeo* Verhoeff, 1946 (Armadillidae) from "Pekkong" (= Pekon) Caves. Only the first species is considered to be troglobiotic.

We have recently received a collection of terrestrial isopods from several Myanmar caves located in the Shan State and Kayin State. Four troglobiotic species are recorded, including two new species in the genus *Thailandoniscus* Dalens, 1989 and one in a new genus of Styloniscidae.

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MATERIAL AND METHODS

The specimens were stored in 75% and 95% ethanol, and identifications were based on morphological characters. For each new species, the material examined, description, etymology, and remarks are given. The specimens were illustrated with the aid of a camera lucida mounted on Wild M5 and M20 microscopes. Figures were digitally drawn with the methods described in Montesanto (2015, 2016). The material is deposited in the collections of the Museo di Storia Naturale, Sezione di Zoologia "La Specola" of the University of Florence, Italy (MZUF), and the Muséum national d'Histoire naturelle, Paris, France (MNHN). The cave entrances were located with GPS using WGS84 datum.

SYSTEMATICS

Family Styloniscidae Vandel, 1952

Subfamily Styloniscinae Vandel, 1952

Thailandoniscus Dalens, 1989

Type species. *Thailandoniscus annae* Dalens, 1989 by original designation and monotypy.

Diagnosis. Body slightly convex, unable to roll up into a ball, with pleon narrower than pereon. Dorsum smooth or with low tubercles. Sides of pleonites 4, 5, and uropodal protopods with visible gland pores. Cephalon with narrow quadrangular antennal lobes, distinct suprantennal line, no frontal line. Pleonites 3–5 with reduced epimera. Antennula of three articles, third article with a row of apical aesthetascs. Antenna with flagellum of 4–6 articles. Left mandible with

2 free penicils; right mandible with 1 free penicil and molar penicil. Maxillula outer branch with 10 or 11 simple teeth and 2 setose stalks; inner branch with 3 penicils at apex, proximal one largest. Maxilla with wide inner lobe and narrow outer lobe. Maxilliped endite with 2 triangular spines and segmented stout penicil at apex. Pereopod dactylus with apically bifid dactylar seta; pereopod 7 basis with scales for water conducting system. Uropodal protopod not grooved laterally; insertion of endopod proximal to that of exopod. Genital papilla lanceolate, more or less enlarged subapically and with triangular apical tip. Male pleopod 1 with endopod of two articles with flagelliform distal article. Male pleopod 2 endopod of two thickset articles, in situ covered by pleopods 3–5 exopods. Male pleopod 5 exopod with 2 lobes on dorsal surface to hold tip of pleopod 2 endopod.

Remarks. The genus *Thailandoniscus* was erected by Dalens (1989) for the species *T. annae* Dalens, 1989 collected in the cave Tham Ta Pan, near Phang Nga, southern Thailand. The species was collected in water pools by Anne Bedos and Louis Deharveng and is considered to be amphibious. Dalens (1989) did not provide a diagnosis of the genus, thus a new diagnosis is here given on the basis of the description of the type species and the two new species described herein. In the structure of the male pleopod 2 endopod, the genus *Thailandoniscus* is very similar to the genus *Clavigeroniscus* Arcangeli, 1930 with type species *C. riquieri* (Arcangeli, 1930), originally described from Costa Rica but with a wide distribution in the tropics (Arcangeli, 1930; Schmalfuss, 2003). At present, beside the type species, the genus *Clavigeroniscus* includes also *C. alticolus* Vandel, 1972 from Colombia, *C. mussaui* Vandel, 1973 from New Guinea, Solomon, and Bismarck archipelagos, and *C. orghidani* Vandel, 1981 from a Cuban cave. All the species are epigean with pigmented body and eyes, except *C. orghidani* which is troglobiotic, depigmented and blind. The differences between *Clavigeroniscus* and *Thailandoniscus* are very small, the main one being the presence of one more free penicil on the left mandible in *Clavigeroniscus* (cf. Vandel, 1952: 69, fig. 58). Curiously, Dalens (1989) did not mention any affinities between these two genera. It is possible that they are synonymous but a further analysis, also with molecular tools, is necessary to achieve a definite conclusion. For the time being, we prefer to keep the two genera as distinct.

A thickset male pleopod 2 endopod is present also in the troglobiotic genus *Xangoniscus* Campos-Filho, Araujo & Taiti, 2014 which comprises three species from Brazilian caves (Campos-Filho et al., 2014, 2016; Bastos-Pereira et al., 2017). *Thailandoniscus* differs from *Xangoniscus* in having a molar penicil on the right mandible, in lacking a groove on the frontal margin of vertex, and in the less complex tip of the male pleopod 2 endopod.

Thailandoniscus whitteni, new species
(Figs. 1–3, 10)

Material examined. Myanmar: male holotype (MZUF 9884), Parpant Cave #1, 20°51'43.1"N 97°14'22.6"E, Shan State, 2 December 2015, leg F. Bréhier; 10 males, 17 females, 2 juvs. paratypes (MZUF 9884), 4 males, 5 females paratypes (MNHN-IU-2019-501), same data as holotype; 3 males, 7 females, 1 juv. paratypes (MZUF 9885), Parpant Cave #2, 20°51'03.5"N 97°14'28.2"E, Shan State, 2 December 2015, leg. F. Bréhier; 1 female paratype (MZUF 9886), Mondawa Gu, 20°45'16.7"N 97°01'03.2"E, Shan State, 1 December 2015, leg. F. Bréhier.

Description. Maximum length: male, 4.5 mm; female, 5.5 mm. Colourless, body outline as in Fig. 1A. Dorsal surface of pereon with low tubercles disposed in 2 ranges on all pereonites, pleon smooth. Each tubercle with triangular scale-seta on top (Fig. 1B). Several gland pores on lateral margins of pleonites 4 and 5 and uropodal protopods, and some scattered pores on dorsal surface of uropodal exopods (Fig. 1E). Cephalon (Fig. 1C, D) with suprantennal line rounded, bent down in middle part; antennal lobes narrow. Eyes absent. Posterior margin of pereonites 1–4 straight, and of pereonites 5–7 progressively more concave (Fig. 1A). Pleonites 3–5 with very short posterior points (Fig. 1A, E). Telson (Fig. 1E) about 3 times as wide as long, with concave sides, narrow apical part, and truncate apex. Antennula (Fig. 1F) with second article shorter than first and third, third article enlarged in distal half, bearing 10 or 11 aesthetascs. Antenna (Fig. 1G) with fifth article of peduncle almost as long as flagellum; flagellum of 6 articles with groups of aesthetascs on second to fourth article. Mandibles as in Fig. 2A, B. Maxillula (Fig. 2C) outer branch with 4+6 teeth, apically entire, and 2 slender setose stalks; inner branch with 3 segmented penicils, decreasing in length from proximal to distal. Maxilla (Fig. 2D) with setose and bilobate apex, inner lobe narrow with 2 thick setae at apex; outer lobe much wider than inner one, with line of strong setae near distal and outer margin. Maxilliped (Fig. 2E) palp triangular, apically with tuft of setae and 3 tufts of setae on medial margin, outer margin with 2 groups of thick long setae, basal article with 2 short setae; endite narrow, with 2 apical triangular setae and large triangular and segmented penicil. Pereopod 7 with water conducting system on basis and, reduced, on ischium and merus. Pleopods 3–5 endopods irregular in shape with many rounded lobes (Fig. 3G). Uropod (Fig. 1E) with endopod bearing a single strong terminal seta.

Male. Pereopod 1 (Fig. 3A) without particular modifications; carpus and merus with few strong setae apically fringed on sternal margin. Pereopod 7 (Fig. 3B) ischium with straight sternal margin. Genital papilla as in Fig. 3C. Pleopod 1 (Fig. 3C) exopod cordiform, with concave outer margin and narrow distal point; endopod distinctly longer than exopod, distal article with thin suture in middle and with slightly enlarged apical part. Pleopod 2 (Fig. 3D) exopod subrectangular with short seta at apex; endopod with second article more than twice longer than first, with triangular lobe directed outwards at apex. Pleopod 3 and 4 exopods (Fig. 3E, F) subtriangular with apical seta and few setae near outer margin. Pleopod 5 exopod (Fig. 3H) ovoidal, with apical seta, few setae near outer margin and two rounded lobes on dorsal surface.

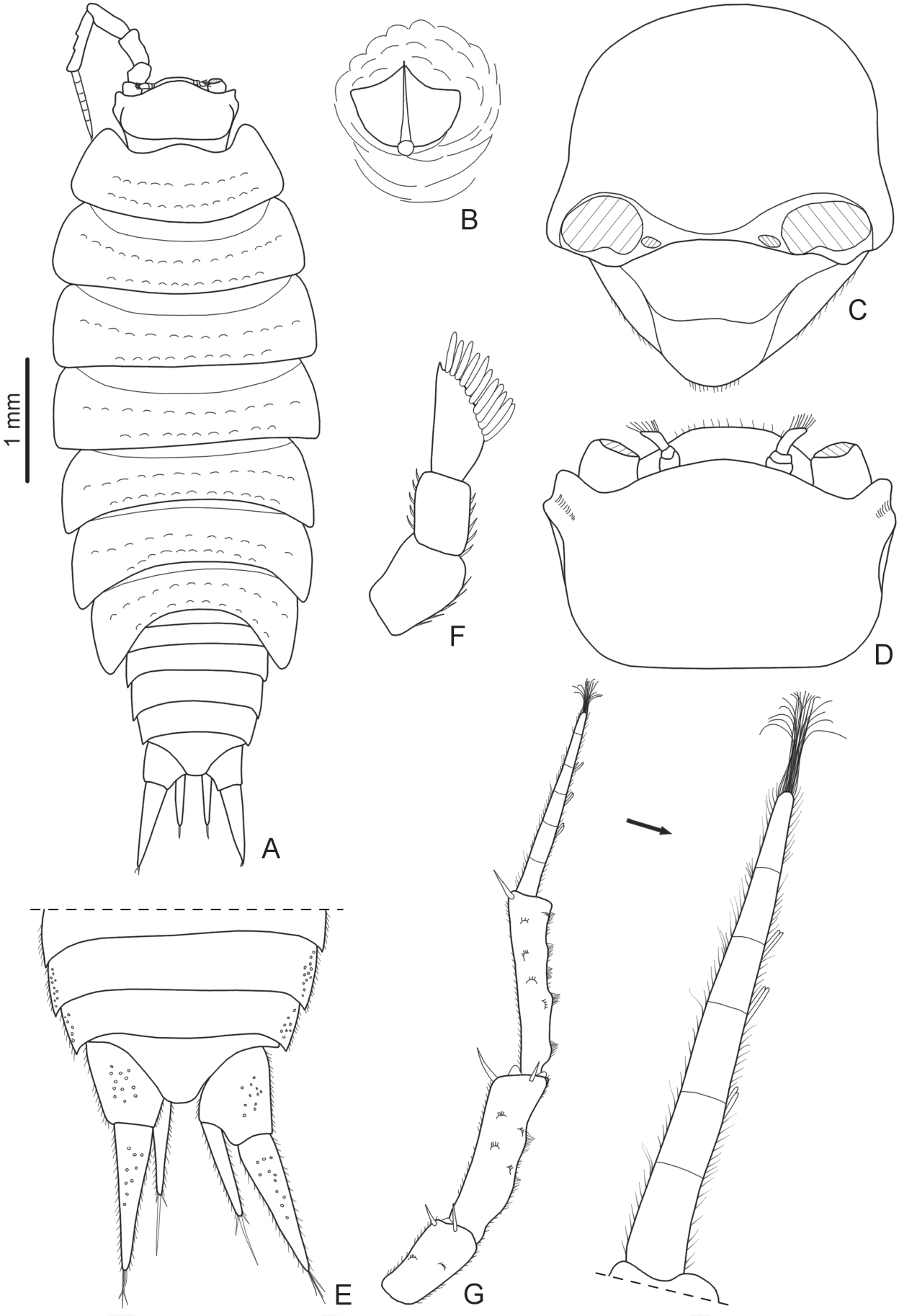

Fig. 1. *Thailandoniscus whitteni*, new species. A–D, female paratype; E–G, male paratype from Parpent Cave #1. A, adult specimen, dorsal; B, dorsal scale-seta; C, cephalon, frontal; D, cephalon, dorsal; E, pleonites 3–5, telson and uropods; F, antennula, G, antenna.

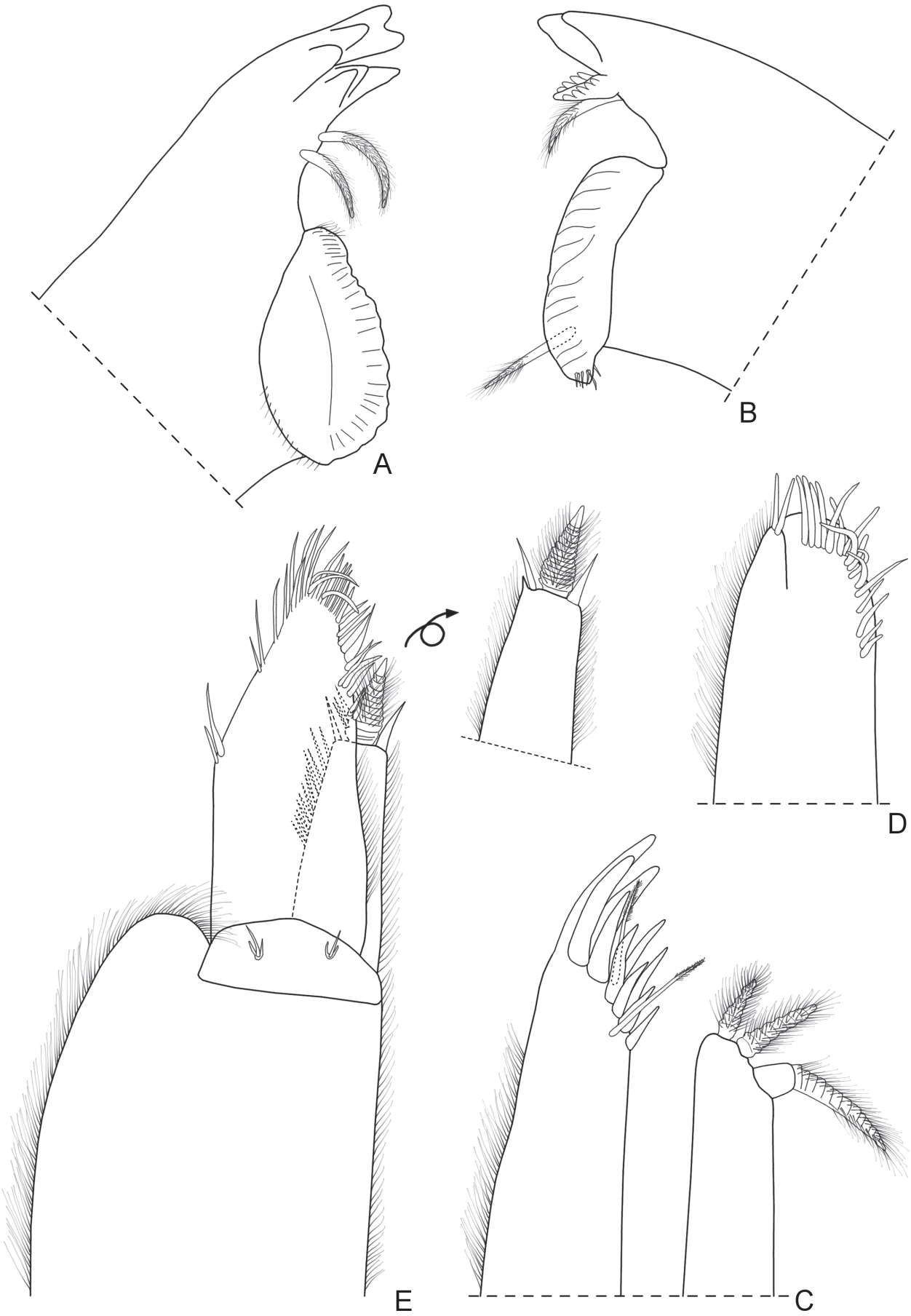

Fig. 2. *Thailandoniscus whitteni*, new species. A–E, male paratype from Parpent Cave #1. A, left mandible; B, right mandible; C, maxillula; D, maxilla; E, maxilliped.

Fig. 3. *Thailandoniscus whitteni*, new species. A–H, male paratype from Parpent Cave #1. A, pereopod 1; B, pereopod 7; C, genital papilla and pleopod 1; D, pleopod 2; E, pleopod 3 exopod; F, pleopod 4 exopod; G, pleopod 4 endopod; H, pleopod 5 exopod.

Etymology. *Thailandoniscus whitteni* is named after the late Dr. Anthony Whitten, in recognition of his outstanding contribution to the study and protection of cave invertebrates and their habitats in Southeast Asia.

Remarks. *Thailandoniscus whitteni* differs from *T. annae* in having the dorsal surface of pereon tuberculated (vs. smooth), antennula with distal article enlarged bearing 10 or 11 aesthetascs (vs. three), antenna with six flagellar articles (vs. four), male pleopod 1 exopod with distinctly concave outer margin (vs. straight), and male pleopod 2 endopod with narrower articles and an apical triangular lobe directed outwards. The specimens of *T. whitteni* were collected on the ground and not in water.

Thailandoniscus brehieri, new species
(Figs. 4, 5, 10)

Material examined. Myanmar: male holotype (MZUF 9887), Saddan Gu, 16°44'22.8"N 97°43'04.2"E, Kayin State, Hpa-An, 25 November 2015, leg. F. Bréhier; 2 males, 2 females paratypes (MZUF 9887), 1 male, 2 females paratypes (MNHN-IU-2019-502), same data as holotype.

Description. Maximum length: male, 4.5 mm; female, 6 mm. Colourless, body outline as in Fig. 4A. Dorsal surface smooth with scattered triangular scale-setae (Fig. 4B). Several gland pores on lateral margins of pleonites 4 and 5, uropodal protopods, and dorsal surface of uropodal exopods (Fig. 4E). Cephalon (Fig. 4C, D) with suprantennal line rounded, bent down in middle part; antennal lobes narrow, quadrangular, obliquely directed outwards. Eyes absent. Posterior margin of pereonite 1 straight, and of pereonites 2–7 progressively more concave (Fig. 4A). Pleonites 3–5 with very short posterior points (Fig. 4A, E). Telson (Fig. 4E) almost 3 times as wide as long, with concave sides, narrow apical part and rounded apex. Antennula (Fig. 4F) with second article slightly shorter than first and third, third article coniform, bearing 6 aesthetascs. Antenna (Fig. 4G) with fifth article of peduncle as long as flagellum; flagellum of 6 articles with groups of aesthetascs on second to fourth article. Buccal pieces as in *T. whitteni*, new species. Pereopod 7 with water conducting system on basis. Pleopods 3–5 endopods irregular in shape with many rounded lobes (Fig. 5G). Uropod (Fig. 4E) with endopod shorter than exopod, endopod inserted proximally to exopod.

Male. Pereopod 1 (Fig. 5A) without particular modifications, merus with short scales on sternal margin. Pereopod 7 (Fig. 5B) ischium with sternal margin slightly convex, short scales on sternal margin of merus and on distal margin of carpus. Genital papilla as in Fig. 5C. Pleopod 1 (Fig. 5C) exopod triangular, with slightly concave outer margin and rounded apex; endopod distinctly longer than exopod, distal article flagelliform, with thin suture in middle part and slightly enlarged apical part. Pleopod 2 (Fig. 5D) exopod subrectangular with short setae at apex; endopod of two thickset articles, second article more than 3 times longer than first, slightly bent outwards, rounded apex. Pleopod 3 and 4 exopods (Fig. 5E, F) subtriangular with apical seta, few setae on ventral surface and fringe of long thin setae on outer and inner margins. Pleopod 5 exopod (Fig. 5H) ovoidal, with apical seta, few setae on ventral surface, fringe of thin setae along margins, and 2 rounded lobes on dorsal surface.

Etymology. *Thailandoniscus brehieri* is named after Dr. Franck Bréhier (Alas, Balaguères, France) who collected the specimens.

Remarks. *Thailandoniscus brehieri* is morphologically similar to *T. whitteni*, from which it is readily distinguishable by the smooth dorsum (vs. tuberculated), the antennula not apically enlarged with a shorter number of aesthetascs (six vs. 10 or 11), male pleopod 1 exopod with outer margin less concave, and male pleopod 2 endopod with rounded apical margin (vs. bearing a triangular lobe). *Thailandoniscus brehieri* differs from *T. annae* in the antennula with six instead of three aesthetascs, the antenna with six instead of four flagellar articles, wider male pleopod 1 exopod, and male pleopod 2 endopod with rounded instead of truncate apex. The specimens were collected on the ground and not in water. However, the fring of long setae on the pleopod 3–5 exopods shows that the species might have an amphibious way of life.

Bamaoniscus, new genus

Type species. *Bamaoniscus lobatus*, new species.

Diagnosis. Body slightly convex, unable to roll up into a ball, with pleon narrower than pereon. Sides of pleonites 4, 5, and uropodal protopods with visible gland pores. Cephalon with narrow quadrangular antennal lobes, distinct suprantennal line. Antennula of 3 articles, third article with a row of apical aesthetascs. Antenna with flagellum of 6 articles. Left mandible with 2 free penicils; right mandible with 1 free penicil. Maxillula outer branch with 10 simple teeth and two setose stalks; inner branch with 3 penicils at apex, the proximal one larger than other two. Maxilla with wide inner lobe and narrow outer lobe. Maxilliped endite with 4 large triangular setae and large penicil at apex. Pereopod dactylus with apically bifid dactylar seta; pereopod 7 basis with scales for water conducting system. Uropodal protopod not grooved laterally; insertion of endopod proximal to that of exopod. Male pereopod 7 with lobes on ischium and merus. Genital papilla lanceolate, not enlarged apically, and with triangular apical tip. Male pleopod 1 with endopod of 2 articles, distal article flagelliform. Male pleopod 2 endopod of 2 articles, second article with distal part elongated, narrower than basal part, and, in situ, covered by pleopods 3–5 exopods. Male pleopod 5 exopod with 2 lobes on caudal surface to hold tip of pleopod 2 endopod.

Etymology. From the Burmese colloquial name of the country, Bama + *oniscus*. Gender masculine.

Remarks. *Bamaoniscus*, new genus, shows closest affinities with the genus *Thailandoniscus*, from which it is readily distinguished by the right mandible without molar penicil, maxilliped endite with four instead of two large triangular setae at apex, male pereopod 7 with lobes on ischium and merus, and male pleopod 2 endopod with elongated distal part narrower than basal part, instead of thickset for its entire length. *Bamaoniscus* is also readily distinguishable from *Styloniscus* Dana, 1853, *Cordioniscus* Graeve, 1914, and *Indoniscus* Vandel, 1952 by the genital papilla not apically enlarged; from *Trogloniscus* Taiti & Xue, 2012 by the lack of frontal line and presence of suprantennal line on cephalon, and antennal flagellum with six instead of three distinct articles; from *Spelunconiscus* Campos-Filho, Araujo & Taiti 2014 by the bifid instead of unbranched dactylar seta, and the uropod with endopod inserted proximally to exopod instead of at the same level (compare Vandel, 1952; Schmalfuss & Erhard, 1998; Taiti & Xue, 2012; Campos-Filho et al., 2014). Broly et al. (2015) described the fossil

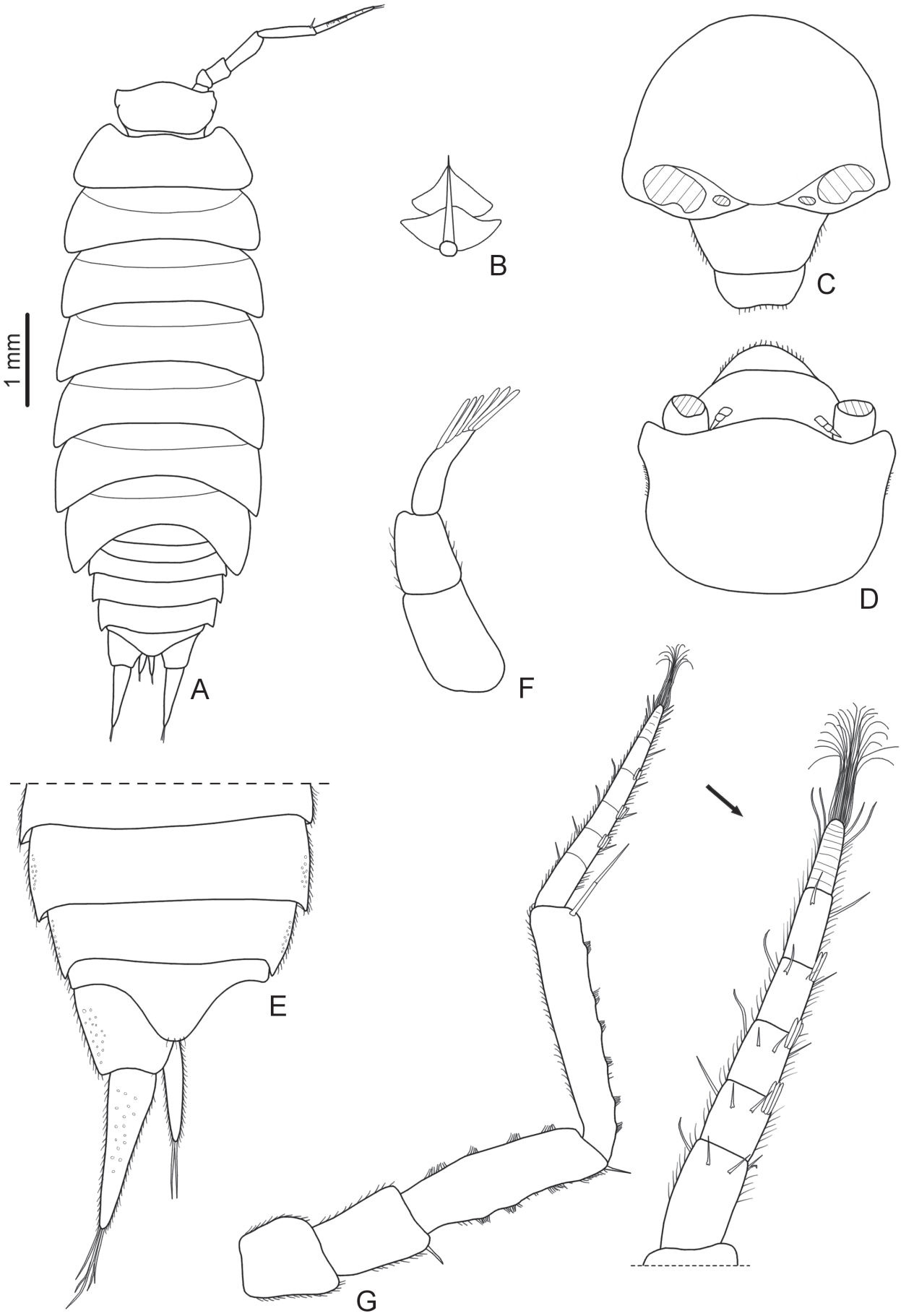

Fig. 4. *Thailandoniscus brehieri*, new species. A–D, F male paratype; E, G, female paratype from Saddan Gu. A, adult specimen, dorsal; B, dorsal scale-seta; C, cephalon, frontal; D, cephalon, dorsal; E, pleonites 3–5, telson and left uropod; F, antennula, G, antenna.

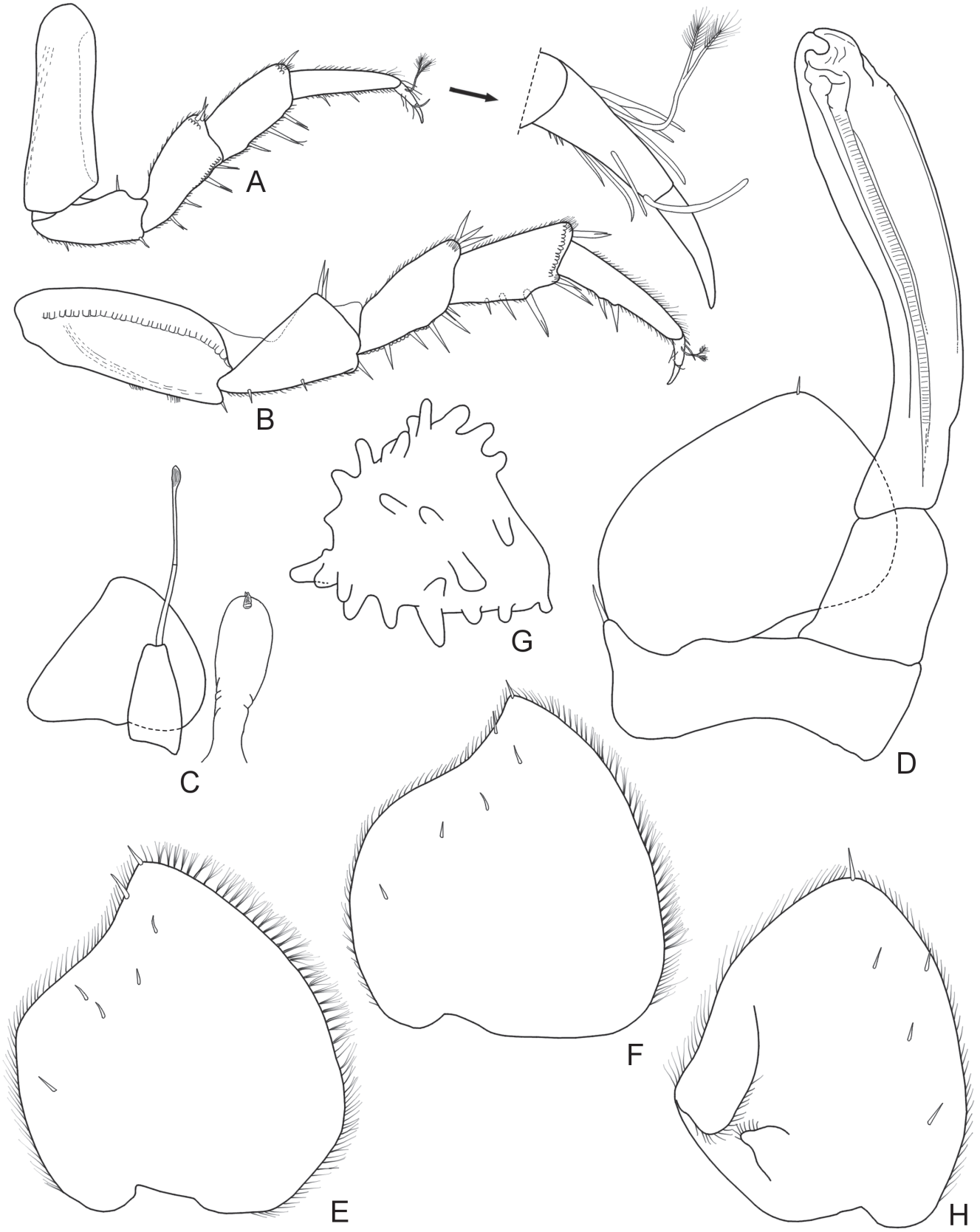

Fig. 5. *Thailandoniscus brehieri*, new species. A–H male paratype from Saddan Gu. A, pereopod 1; B, pereopod 7; C, genital papilla and pleopod 1; D, pleopod 2; E, pleopod 3 exopod; F, pleopod 4 exopod; G, pleopod 4 endopod; H, pleopod 5 exopod.

genus *Myanmariscus* Broly, Maillet & Ross, 2015 for the species *M. deboiseae* Broly, Maillet & Ross, 2015 from Cretaceous amber of Myanmar, which was included in the family Styloniscidae with a question mark. Unfortunately, both the genus and species are so poorly defined that a comparison with the other genera of Styloniscidae is impossible.

Bamaoniscus lobatus, new species
(Figs. 6–10)

Type material. Myanmar: male holotype (MZUF 9888), Win Twin Cave (Kuauk Hgak Cave), 21°12'18.5"N 96°32'53.4"E, Kuauk Hgak, Ywa Ngan, southern Shan State, 16 November 2018, leg. A. Komerički; 13 males, 15 females paratypes (MZUF 9888), 3 males, 4 females paratypes (MNHN-IU-2019-503), same data as holotype; 3 males, 4 females paratypes (MZUF 9889), same locality as holotype, 8 May 2018, leg. N.M. Thway; 1 male, 5 females paratypes (MZUF 9890), Stone Cave (Kyauk Khaung), 21°11'28.2"N 96°33'09.4"E, Sin Sar Pyar, Ywa Ngan, southern Shan State, 9 May 2018, leg. N.M. Thway; 2 males, 1 female, 1 juv. paratypes (MNHN-IU-2019-504), same locality, 30 November 2015, leg. F. Bréhier.

Additional material. Myanmar: 5 males, 8 females, 3 juvs. (MZUF 9891), Jatwet Gu (Linwe Depression Cave #2), 21°13'40.1"N 96°33'23.5"E, Shan State, 29 November 2015, leg. F. Bréhier.

Description. Maximum length: male, 8 mm; female, 9 mm. Colourless body, pleon narrower than pereon (Fig. 6A). Dorsal surface smooth with triangular scale-setae as in Fig. 6B. Many gland pores on lateral margins of pleonites 4 and 5 and uropodal protopods, and some scattered pores on dorsal surface of uropodal exopods (Fig. 6E). Cephalon (Fig. 6C, D) with suprantennal line rounded, bent down in middle part; antennal lobes quadrangular, obliquely directed outwards with slightly concave dorsal surface. Eyes absent. Posterior margin of pereonite 1–3 straight, and of pereonites 4–7 progressively more concave (Fig. 6A). Pleonites 3–5 with very short posterior points (Fig. 6A, E). Telson (Fig. 6E) about 3 times as wide as long; distal part trapezoidal with concave sides and widely truncate apex. Antennula (Fig. 6F) with articles subequal in length; third article bearing 6 apical aesthetascs. Antenna (Fig. 6G) with fifth article of peduncle almost as long as flagellum; flagellum of 6 articles with groups of aesthetascs on second to fourth article. Mandibles as in Fig. 7A, B. Maxillula (Fig. 7C) outer branch with 5+5 teeth, apically entire, and 2 slender setose stalks; inner branch with distal 2 penicils subequal, proximal penicil longest. Maxilla (Fig. 7D) with setose and bilobate apex, inner lobe narrow with 3 apical setae. Maxilliped (Fig. 7E) palp stout, apically with tuft of setae and 3 tufts of setae on medial margin, outer margin with 3 groups of thick long setae, basal article with 2 setae; endite narrow, with 4 apical stout triangular setae and a large triangular segmented penicil. Pleopods 3–5 endopods irregular in shape with many digitiform lobes (Fig. 8G). Uropod (Fig. 6E) with endopod distinctly shorter than exopod.

Male. Pereopod 1–3 (Fig. 8A) carpus and merus and proximal part of pereopod 4 merus bearing numerous short scales on sternal margin. Pereopod 7 (Fig. 8B) ischium with straight sternal margin covered with short setae and large rounded lobe on distal part of caudal surface; merus with triangular lobe on proximal part of tergal margin. Genital papilla as in Fig. 8C. Pleopod 1 (Fig. 8C) exopod triangular with rounded apex; endopod distinctly longer than exopod, distal article flagelliform without enlarged tip. Pleopod 2 (Fig. 8D) exopod subrectangular with some short setae on medial margin; endopod with second article almost 4 times longer than first, with distal part slightly bent outwards bearing acute lobe on medial margin and slightly swollen subapically, apex rounded. Pleopod 3 and 4 exopods (Fig. 8E, F) subtriangular with apical seta (Fig. 8B–D). Pleopod 5 exopod (Fig. 8H) ovoidal, with apical seta and two rounded lobes on basal part of caudal surface.

Etymology. From the Latin lobatus (= lobed). The name refers to the lobes on ischium and merus of the male pereopod 7.

Remarks. *Bamaoniscus lobatus* is amphibious. In Win Twin cave and Stone cave the specimens were collected both in small water pools (Fig. 9) and on the wet rocks close to water (A. Komerički and F. Bréhier, pers. comm.). In Win Twin cave the water temperature was 20°C and the pH 7.7. The specimens from Jatwet Gu are much smaller (maximum length: male, 3.5 mm; ovigerous female, 4.5 mm) while the male characters (pereopod 7, pleopods 1 and 2) are identical to the type specimens. Therefore, these specimens are also identified as *B. lobatus*. As far as we know, the presence of pleopod 3–5 exopods with irregular shape and several digitiform or rounded lobes, as described for this species and the two new species of *Thailandoniscus*, were never reported for other species of terrestrial isopods but this characteristic might be common in the family Styloniscidae.

Family Philosciidae Kinahan, 1857

Burmoniscus Collinge, 1914

Type species. *Burmoniscus moulmeinus* Collinge, 1914 = *B. coecus* (Budde-Lund, 1895) by monotypy.

Burmoniscus coecus (Budde-Lund, 1895)

Philoscia coeca Budde-Lund, 1895: 611; Jeppesen, 2000: 236.
Setaphora coeca – Budde-Lund, 1913: 386; Vandel, 1958: 67; Lindberg, 1960: 44.
Burmoniscus moulmeinus Collinge, 1914: 466, pl. 31, figs. 1–8.
Burmoniscus moulinensis [sic!] – Wolf, 1937: 513.
Philoscia moulmeinus – Ramakrishna, 1980: 87.
Burmoniscus coecus – Taiti & Ferrara, 1986: 188, figs. 1–11; Schmalfuss, 2003: 71; Beron, 2015: 182.

Material examined. Myanmar: 6 males, 10 females (MZUF 9892), 2 males, 3 females (MNHN-IU2019-505), Saddan

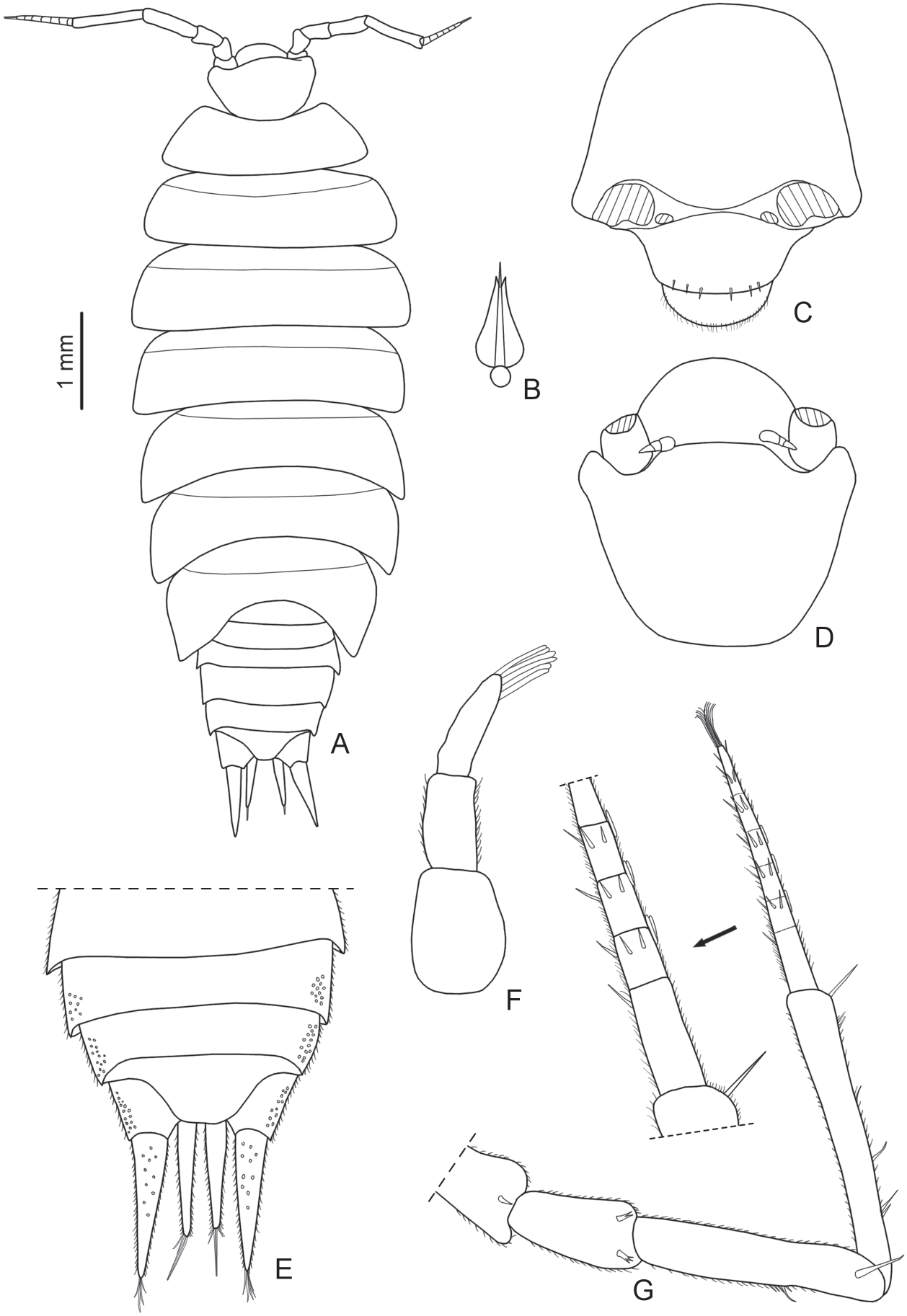

Fig. 6. *Bamaoniscus lobatus*, new species. A–D, F, female paratype; E, G, male paratype from Win Twin Cave. A, adult specimen, dorsal; B, dorsal scale-seta; C, cephalon, frontal; D, cephalon, dorsal; E, pleonites 3–5, telson and uropods; F, antennula, G, antenna.

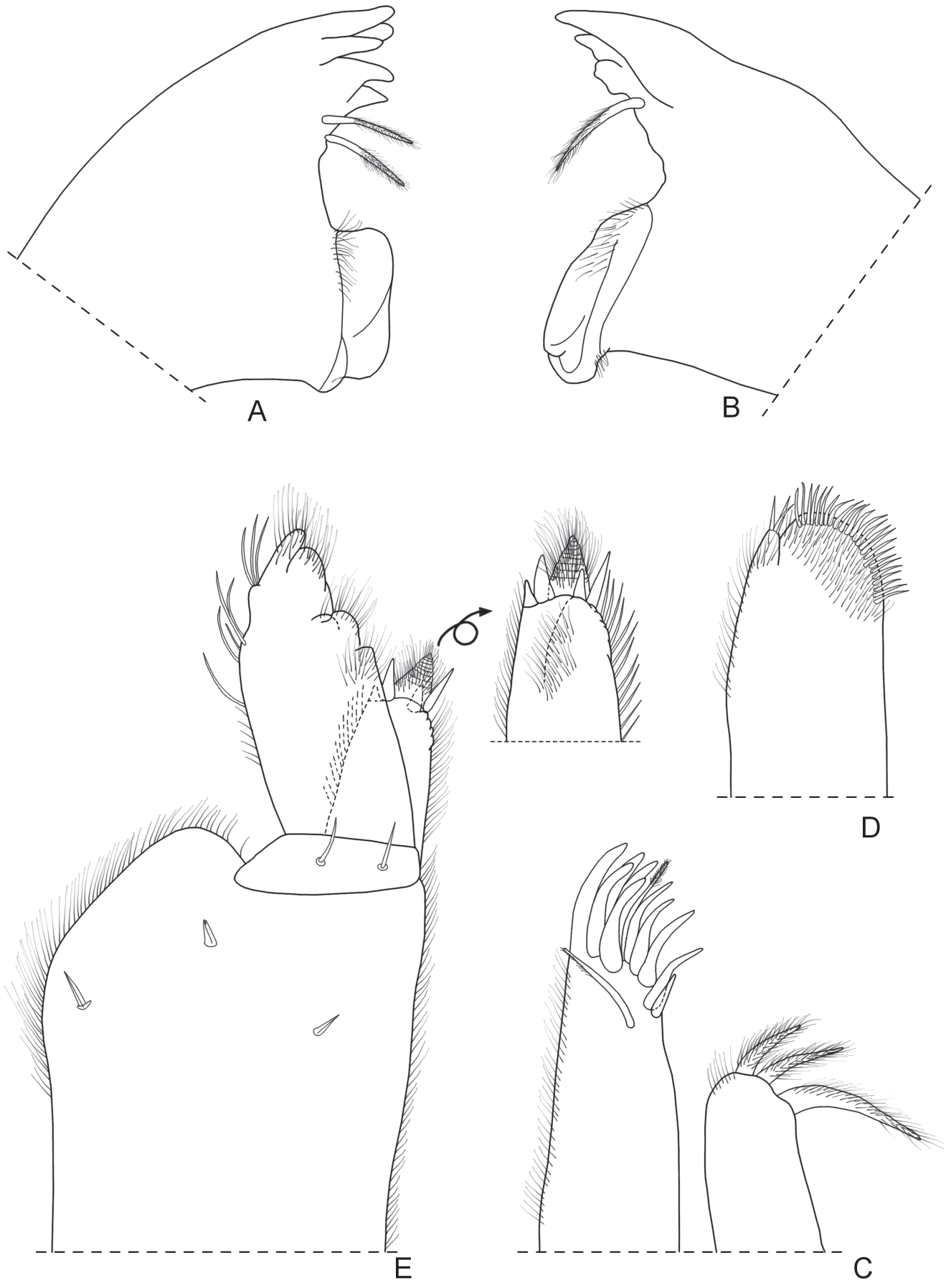

Fig. 7. *Bamaoniscus lobatus*, new species. A–E, female paratype. A, left mandible; B, right mandible; C, maxillula; D, maxilla; E, maxilliped.

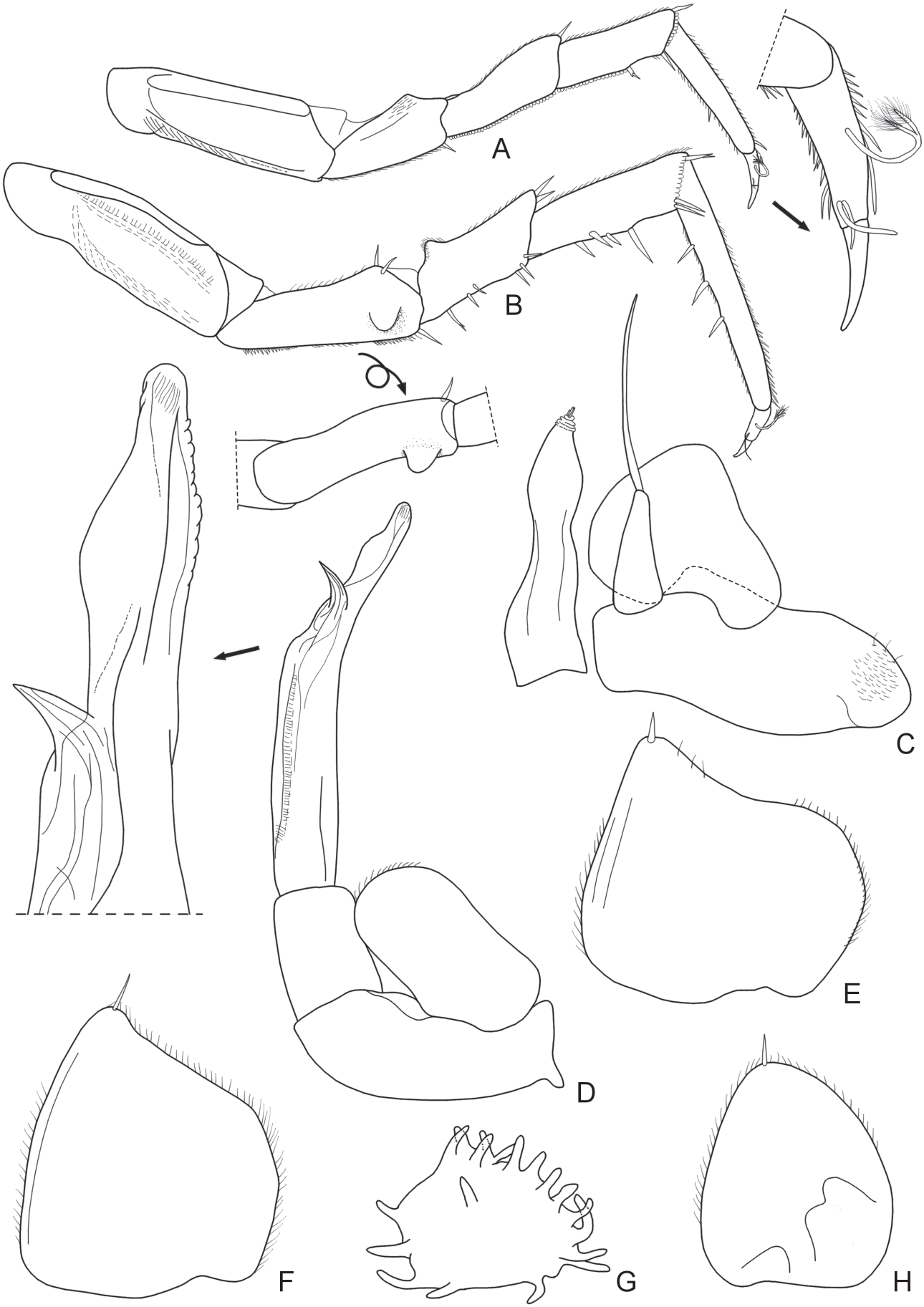

Fig. 8. *Bamaoniscus lobatus*, new species. A–H, male paratype. A, pereopod 1; B, pereopod 7; C, genital papilla and pleopod 1; D, pleopod 2; E, pleopod 3 exopod; F, pleopod 4 exopod; G, pleopod 4 endopod; H, pleopod 5 exopod.

Fig. 9. Specimens of *Bamaoniscus lobatus* in a water pool of Win Twin cave (photograph by A. Komerički).

Gu, 16°44'22.8"N 97°43'04.2"E, Kayin State, Hpa-An, 25 November 2015, leg. F. Bréhier.

Previous records. Farm caves near Moulmein (Mawlamyine) (Budde-Lund, 1895; Collinge, 1914).

Distribution. Presently known only from caves in Kayon Hill, near Mawlamyine, Myanmar.

Remarks. For a redescription of this species, see Taiti & Ferrara (1986).

DISCUSSION

With the three new species of Styloniscidae described here, the number of troglobiotic species of Oniscidea of Myanmar is now four, a number which certainly will increase when more caves are thoroughly investigated. It is interesting to note that *Bamaoniscus lobatus* is an amphibious species since it was collected in both water pools and on the walls outside water. Among the Syloniscidae this condition was known only in *Thailandoniscus annae* from southern Thailand, while two species in the genus *Trogloniscus* from southern China, *T. clarkei* Taiti & Xue, 2012 and *T. trilobatus* Taiti & Xue, 2012, are truly stygobiotic; other species in the same genus are troglobiotic. The two new species of *Thailando-*

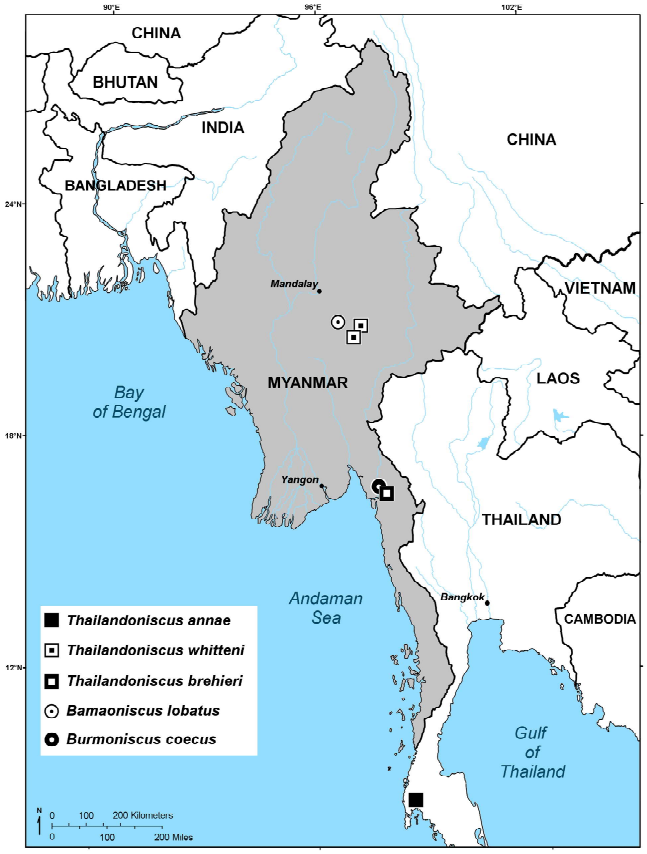

Fig. 10. Distribution of *Burmoniscus coecus*, *Bamaoniscus lobatus* and species of *Thailandoniscus*.

niscus from Myanmar caves were not collected in water, even if an amphibious way of life cannot be excluded, considering the presence of long setae on the margins of pleopods 3–5 exopods. For a discussion on aquatic Oniscidea see Taiti & Xue (2012).

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