



A new species and a new record of the oriental stick insect genus *Presbistus* (Phasmida: Aschiphasmatae) from Thailand

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ABSTRACT: The genus *Presbistus* and the family Aschiphasmatae are recorded from Thailand for the first time. A new species of *Presbistus* Kirby, 1896, *Presbistus muka* sp. nov., is described from the Mahidol University Campus in Kanchanaburi, West Thailand based on both sexes and eggs. The new species is diagnosed and differentiated from its congeners by its distinct coloration and by the notably short wings. Illustrations of adults, specimens in situ, host plants, records on biology and a distribution map are provided. A second *Presbistus* species, *Presbistus vitivorus* Bresseel & Constant, 2022 is also recorded from West Thailand, its distribution and morphology are briefly discussed.

KEY WORDS: Aschiphasmatae, Phasmatoidea, *Presbistus*, *Presbistus muka*, *Presbistus vitivorus*, stick insect, taxonomy.

INTRODUCTION

The genus *Presbistus* Kirby, 1896 belongs to the tribe Aschiphasmatini in the subfamily Aschiphasmatinae Brunner von Wattenwyl, 1893 and currently contains ten species with one species comprising two subspecies. *Presbistus* is currently recorded from Borneo, Java, Sumatra, Peninsular Malaysia and Cambodia (Bresseel and Constant, 2022; Brock *et al.*, 2024). Within Aschiphasmatini the genus is characterized by triangular or spine-like tegmina, a uniform translucent greyish-brown anal region of the hind wings, and cylindrical or conical cerci in both sexes. The male has a well-developed vomer and has the end of the abdomen distinctively swollen and club-shaped. The eggs are slightly longer than high and lack setae (Bragg, 2001; Seow-Choen 2016; Bresseel and Constant, 2022).

During a study of stick insects in the framework of a bachelor study: “A survey of diversity of stick and leaf insects (Order: Phasmatoidea) in limestone forest at Mahidol University in Kanchanaburi Campus area.” (Kamtanom, 2022), several phasmid species were recorded and inventoried. One of the recorded species was later identified as a new species of *Presbistus*, which is described herein. Subsequent collecting efforts were made by the first author in order to acquire specimens to describe the species. The present paper aims to describe the new *Presbistus* species, provide useful characters for its differentiation, and give information on its biology and distribution.

MATERIAL AND METHODS

Specimens were collected at night due to their nocturnal habits. Females were kept alive in a

40x40x60 cm mesh cage for producing eggs. The wild caught specimens were euthanized in a 50 ml centrifuge tube with ethylacetate (EtOAc) fumes. The specimens were mounted later on.

Photographs of specimens were taken with a Canon EF 100 mm f/2.8 Macro USM lens attached to a Canon EOS 7D mark II digital camera, or with a Leica M80 stereomicroscope with an integrated camera for eggs. The pictures were stacked with CombineZ software and optimized with Adobe Photoshop CC. The distribution map was produced with SimpleMappr (Shorthouse, 2010). Measurements were taken with an electronic calliper.

The nomenclature of the morphological characters follows Bragg (2001) and that of the egg morphology follows Sellick (1997, 1998). The description of the coloration is based on live specimens.

Acronyms used for the collections: CBMUKA = Conservation Biology Mahidol University Kanchanaburi Campus, Kanchanaburi. RBINS = Royal Belgian Institute of Natural Sciences, Brussels. THNHM = Thailand Natural History Museum, Pathum Thani. **Abbreviations:** HT: holotype; PT: paratype

TAXONOMIC TREATMENT

Aschiphasmatae Brunner von Wattenwyl, 1893

Aschiphasmatinae Brunner von Wattenwyl, 1893

Aschiphasmatini Brunner von Wattenwyl, 1893

Presbistus Kirby, 1896: 475; Seow-Choen, 2020: 282 [new subspecies from Sumatra]; Seow-Choen, 2021: 826 [species from Peninsular Malaysia]; Brock and Büscher, 2022: 504; Bresseel and Constant, 2022: 105 [new species and record from Cambodia]; Seow-Choen, 2023: 542 [species from Java]. For detailed references see Bresseel and Constant (2022).



Distribution: Borneo, Java, Sumatra, Singapore, Peninsular Malaysia, Cambodia (Bresseel and Constant, 2022) and Thailand (new country record)

Keys to the species of *Presbistus* Kirby, 1896 from Continental Asia.

Males

1. Wings nearly reaching posterior margin of tergum VII, anal segment triangularly elongated *Presbistus peleus* (Gray, 1835)
- Wings at best reaching base of tergum VII, anal segment posteromedially incised, splitted into two lateral lobes 2
2. Tegmina clearly visible, projecting over base of hindwing; hindwings reaching roughly halfway along tergum VI *Presbistus vitivorus* Bresseel & Constant, 2022
- Tegmina minute, reaching base of hindwing; hind wings not reaching tergum IV *Presbistus muka*, sp. nov.

Females

1. Wings projecting over anterior margin of tergum VII *Presbistus peleus* (Gray, 1835)
- Wings not reaching posterior margin of tergum VI 2
2. Tegmina clearly visible, projecting over base of hindwing; hindwings projecting over the posterior margin of tergum V *Presbistus vitivorus* Bresseel & Constant, 2022
- Tegmina minute, reaching base of hindwing; hindwings not reaching posterior margin of tergum III *Presbistus muka* sp. nov.

Presbistus muka Kamtanom & Bresseel, *sp. nov.*

แมลงกิ้งไม้หายากใหญ่ กิ้ง Figs 1–5 & 7

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Type material. Holotype: THAILAND: ♂; Kanchanaburi Prov.; Sai Yok Dist.; Mahidol University, 14°07'23.1"N, 99°09'08.8"E; 16.IX.2022; K. Jiranaisakul leg.; THNHM.

Paratypes. THAILAND: 3♂♂, 4♀♀; same collection data as holotype, 2♂, 3♀♀; THNHM; 1♂, 1♀; RBINS; 3♂♂, 4♀♀; Kanchanaburi Prov.; Sai Yok Dist.; Mahidol University, 14°07'23.1"N, 99°09'08.8"E; 1.IX.2022; S. Kamtanom leg., 2♂♂, 3♀♀; THNHM; 1♂, 1♀; CBMUKA.

Diagnosis. *Presbistus muka* sp. nov. can be separated from all other species of *Presbistus* by the following combination of characters: (1) body pale brown with darkened apex of abdomen in males, olive brown in females; (2) femora black with pale apex; (3) tegmina short, narrow and pointed, only reaching bases of alae; alae short, not surpassing posterior margin of tergum III; (4) male with apex of anal segment cleft, with the left anal lobe (lal) shorter than the right (ral), and the right anal lobe twisted; (5) praeopercular organ indistinct, present as posteromedian hump on sternum VII; slightly projecting over base of subgenital plate; (6) posterior pole of egg broadly rounded.

The species seems to be most closely related to *Presbistus vitivorus* Bresseel & Constant, 2022 with which it shares the shape of the anal lobes of the males anal segment, with the right anal lobe (ral) projecting between the right cercus and the posterior margin of tergum IX.

Table 1. Measurements [mm] of *Presbistus muka* sp. nov.

Length of	HT ♂	PT ♂♂	PT ♀♀
Body:	35.4	34.8–39.6	43.9–48.7
Head:	1.9	1.8–2.5	2.2–3.2
Pronotum:	2.6	2.4–2.9	3.5–3.9
Mesonotum:	4.1	4.0–4.6	5.9–6.3
Tegmina:	0.7	0.6–0.9	1.0–1.1
Alae:	9.3	9.0–9.9	10.9–13.1
Metanotum:	1.3	1.4–1.5	2.0–2.3
Median segment:	3.0	2.7–3.0	4.1–4.2
Profemora:	5.8	4.7–6.5	6.9–8.2
Mesofemora:	5.0	5.6–6.6	5.8–6.4
Metafemora:	8.5	7.6–8.4	9.2–10.3
Protibiae:	5.3	4.9–6.2	6.0–7.5
Mesotibiae:	4.4	3.9–5.0	5.1–6.3
Metatibiae:	7.8	7.0–7.8	9.2–10.3

The new species superficially resembles the Bornean *Presbistus asymmetricus viridialatus* Seow-Choen, 2020 because of the shortened hindwings. However the hindwings of *P. asymmetricus viridialatus* slightly project over the posterior margin of tergum III. *P. asymmetricus viridialatus* can also be differentiated by the longer tegmina, the femora coloured as body and the more tapering polar area of the eggs in lateral view.

Description. **Male** (Fig. 1, table 1): **Colouration:** Head capsule orange-brown with a short mediolongitudinal black marking between the eyes and a narrow postocular line; antennae black. Pro- and mesonotum orange-brown with anterior portion of pronotum slightly darker, mesopleura dark. Tegmina coloured as body with black inner margin and apex; alae with costal area coloured as body and with green area around the radius in the basal half, anal area slightly infusate. Abdomen predominantly coloured as body, last three terga conspicuously darkened. Legs with femora and tibiae black; femora with orange-brown tip. **Head:** (Fig. 1C) Capsule smooth, flattened dorsally; wider than long with a shallow longitudinal impression posteriorly; with two minute impressions between the bases of antennae. Eyes strongly protruding. Antennae reaching about halfway the abdomen; scapus subcylindrical, roughly as long as pedicellus; pedicellus cylindrical; first flagellomere almost as long as scapus and pedicellus combined; flagellomere II about 0.4 times shorter than flagellomere I; following segments varying in length. **Thorax:** (Fig. 1C, E) Pronotum longer than wide, indistinctly narrowing towards the posterior; anterior margin slightly convex medially; anterolateral angles concave above prosternal gland openings. Prozona with longitudinal median line; slightly higher than metazona in lateral view. Posterior margin nearly straight. Mesonotum smooth, about 1.7 times longer than pronotum; anterior margin incurved with transverse raised and incurved carina; lateral margins nearly parallel-sided; posterior margin incurved. **Wings:** (Fig. 1A–B) Tegmina very small, almost

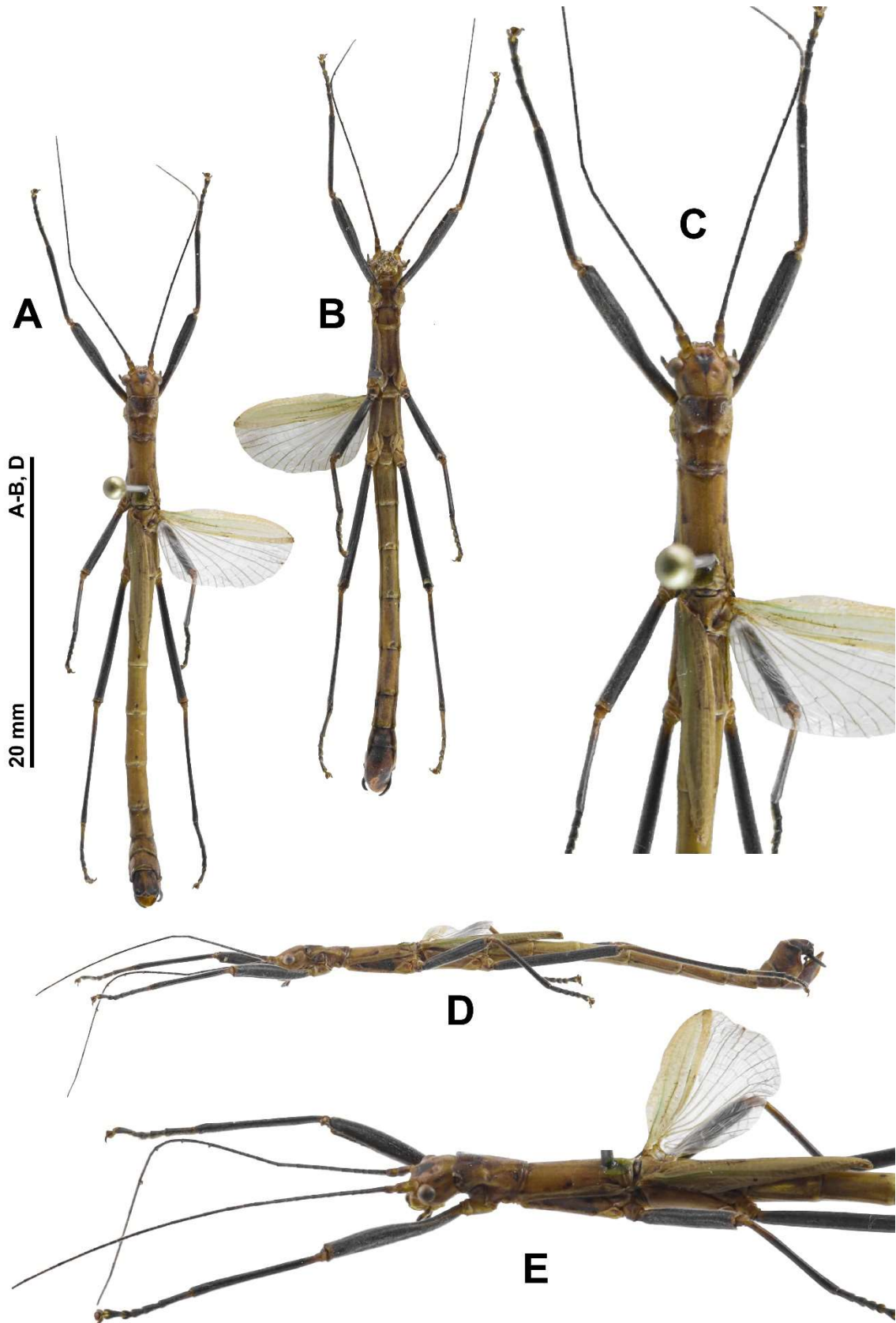


Fig. 1. *Presbistus muka* Kamtanom & Bresseel sp. nov., Holotype ♂ (THNHM), **A.** habitus, dorsal view, **B.** habitus, ventral view, **C.** head and thorax, dorsal view, **D.** habitus, lateral view, **E.** head and thorax, laterodorsal view.

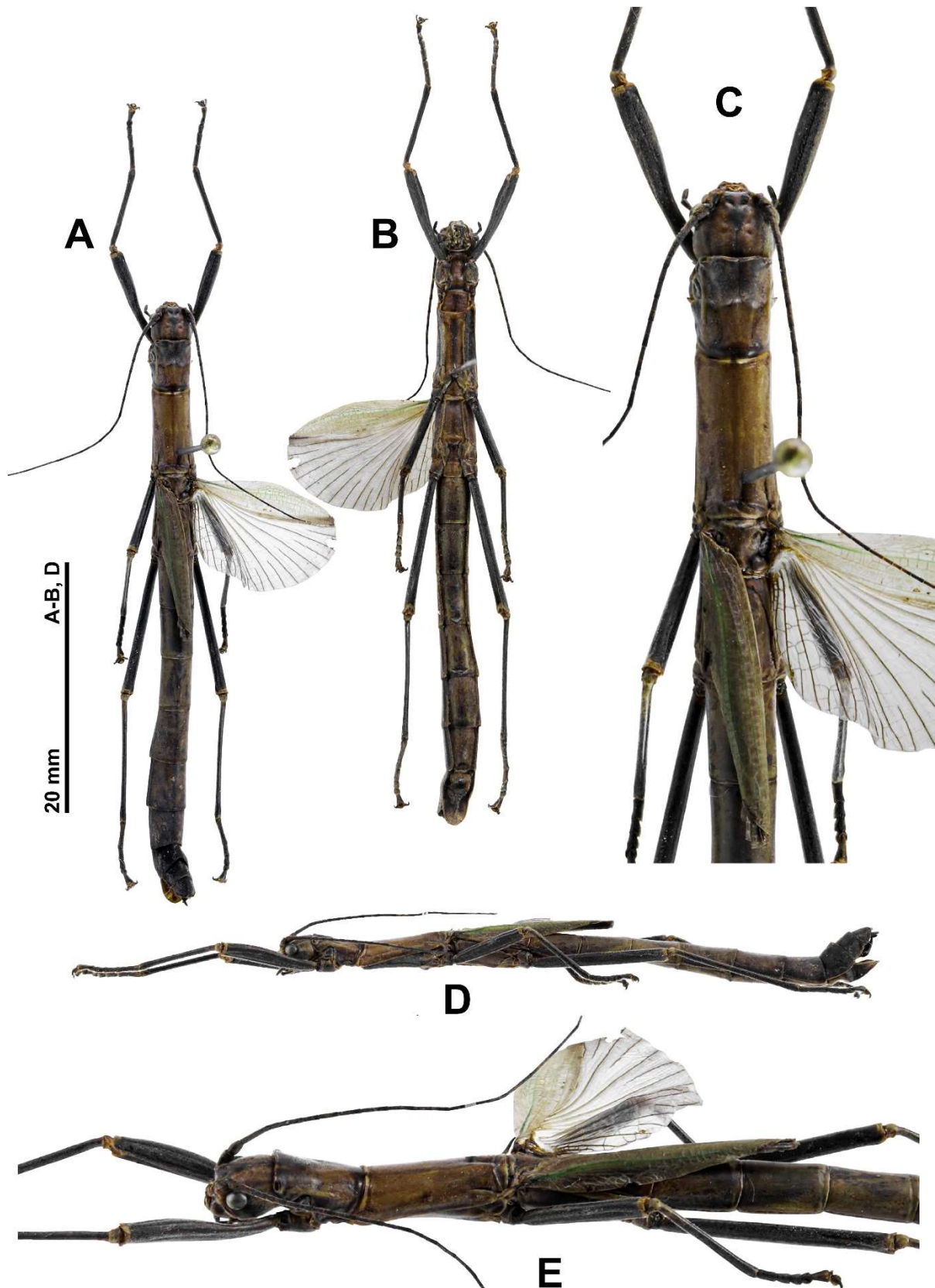


Fig. 2. *Presbistus muka* Kamtanom & Bresseel sp. nov., paratype ♀ (THNHM), **A.** habitus, dorsal view, **B.** habitus, ventral view, **C.** head and thorax, dorsal view, **D.** habitus, lateral view, **E.** head and thorax, laterodorsal view.

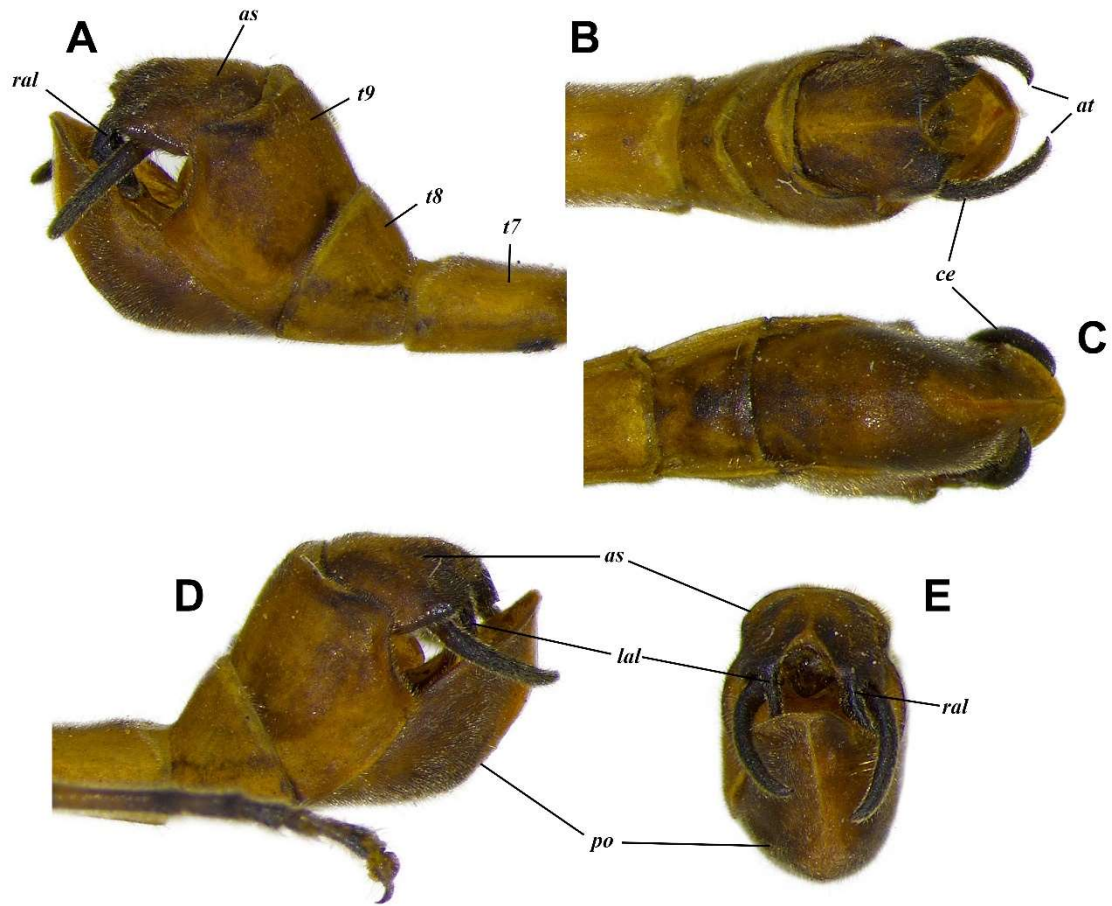


Fig. 3. *Presbistus muka* Kamtanom & Bresseel sp. nov., Holotype ♂ terminalia, A. right lateral view, B. dorsal view, C. ventral view, D. left lateral view, E. posterior view. Abbreviations: as, anal segment. at, apical tooth. ce, cercus. lal, left anal lobe. po, poculum. ral, right anal lobe. t7, tergum VII. t8, tergum VIII. t9, tergum IX.



Fig. 4. *Presbistus muka* Kamtanom & Bresseel sp. nov., eggs, A. dorsal view, B. lateral view, C. ventral view, D. polar view, E. opercular view.



indiscernible with the naked eye, elongate-triangular and apically acute; reaching bases of alae. Hindwings very short, surpassing half of tergum III but not reaching tergum IV. **Legs:** (Fig. 1A-B) Femora with dorsal carinae indistinct; surface between ventral carinae gradually excavated towards the posterior. Profemora slightly incurved basally with few minute spines on the vague ventral carinae, medioventral carinae absent. Meso- and metafemora straight, armed as profemora. Tibiae smooth, round in cross-section. Tarsi with basitarsus longer than at least the following two tarsomeres combined; first three tarsomeres with short posteromedian prolongation, projecting over base of next tarsomere; unguis pectinate. **Abdomen:** (Fig. 1A-B) Median segment distinctly longer than metanotum with rounded anterior margin. Median segment and terga II–VII more or less of the same width. Terga II–VI only slightly varying in length; tergum VII (t7) distinctly shorter with posterior margin incurved; tergum VIII (t8) shorter than VII and slightly widening; IX (t9) distinctly higher than other terga in lateral view; anal segment (as) narrower than IX, with indistinct mediolongitudinal carina, slightly wider at posterior margin; apex incised, splitting into two lateral lobes. Left anal lobe (lal) short, more or less straight, somewhat backcurving towards the anterior; tapering and ending in a minute spine. Right anal lobe (ral) more elongated and twisted; apex with two minute spines, projecting between cercus and posterior margin of tergum IX. Cerci (ce) black and elongated, incurving and round in cross section with an apical tooth. Poculum bulgy and angular, posterior part with fine mediolongitudinal carina, apex rounded.

Female (Fig. 2; table 1) **Colouration:** Head capsule orange-brown with a short mediolongitudinal black marking between the eyes and a narrow postocular line; antennae black. Pro- and mesonotum orange-brown with anterior portion of pronotum slightly darker. Tegmina orange-brown on disc, black apically; alae with costal area coloured as body with green radius, anal area infuscate. Abdomen predominantly coloured as body, last three terga conspicuously darkened. Legs with femora and tibiae black; femora with orange-brown tip. **Head:** (Fig. 2C) About as long as wide, flattened dorsally. Eyes strongly protruding. Central area between the bases of the antennae caved in. Antennae reaching about halfway the abdomen; scapus subcylindrical, slightly longer than pedicellus. Pedicellus cylindrical. First flagellomere longer than pedicellus; flagellomere II shorter than half the length of previous one; following segments varying in length. **Thorax:** (Fig. 2C) Pronotum distinctly longer than wide, more or less rectangular in dorsal view. Prozona with anterior margin concave and with distinct gland openings anterolaterally; with short median line; slightly higher than metazona in lateral view. Between pro- and metazona an indentation centrally. Metazona smooth with posterior margin nearly straight. Mesonotum

smooth, about 1.6 times longer than pronotum; anterior margin followed by transverse, slightly concave raised carina; lateral margins nearly parallel-sided; posterior margin incurved. **Wings:** (Fig. 2A) Tegmina very small, almost indiscernible with the naked eye, elongate-triangular and apically acute; reaching bases of alae. Hindwings short, projecting over posterior margin of tergum II but not reaching posterior margin of tergum III. **Legs:** (Fig. 2A-B) Femora with dorsal carinae indistinct; surface between ventral carinae gradually excavated towards the posterior. Profemora slightly incurved basally, ventral carinae indistinct and medioventral carinae absent. Meso- and metafemora straight, with few minute spines on the vague ventral carinae. Tibiae smooth, round in cross-section. Tarsi with basitarsus longer than at least the following two tarsomeres combined; first three tarsomeres with short posteromedian prolongation, projecting over base of next tarsomere; unguis pectinate. **Abdomen:** (Figs 2A-B, 3) Median segment nearly twice as long as metanotum and smooth. Abdominal terga smooth; terga II–VII of uniform width; terga I–V only slightly varying in length and distinctly longer than wide. Terga V–VII gradually slightly shortening; tergum VII only slightly longer than wide. Tergum VIII (t8), IX (t9) and anal segment (as) gradually shortening, somewhat tectiform and indistinctly laterally compressed. Anal segment apically incised with minute epiproct visible in dorsal view, epiproct apically rounded. Cerci narrow, short, projecting over apex of abdomen. Sternum VII with indistinct praeopercular organ, posterior margin of sternum VII slightly raised in lateral view, posteromedially with ill-defined, minute impression; projecting over base of subgenital plate. Subgenital plate with anterior margin rounded, projecting under posterior margin tergum VII; basal portion swollen with shallow depression; posterior portion with mediolongitudinal carina, slightly narrowing towards the posterior with apex broadly rounded. **Egg:** (Fig. 4) Measurements [mm]: length 1.8, width 1.0, height 1.5. Capsule dark reddish brown, only slightly longer than height; surface minutely punctuate without setae; almost oval in shape and laterally compressed. Micropylar plate coloured yellowish brown; long and narrow, longitudinally carinate laterally and medially, extending from the operculum across the posterior pole and back to the operculum. Micropylar cup distinct, displaced towards the posterior pole. Operculum elongate oval, smooth and somewhat sulcate in dorsal view.

Etymology. The specific name “*muka*” is a noun in apposition, derived from the abbreviation of Mahidol University Kanchanaburi Campus, the type-locality where the specimens were found and collected for the first time.

Biology. (Fig. 5) The specimens were found feeding on bushes of an unidentified plant species of the family Vitaceae and on *Lantana camara* L. (Verbenaceae) at an altitude of 220 m during August–September. The Mahidol

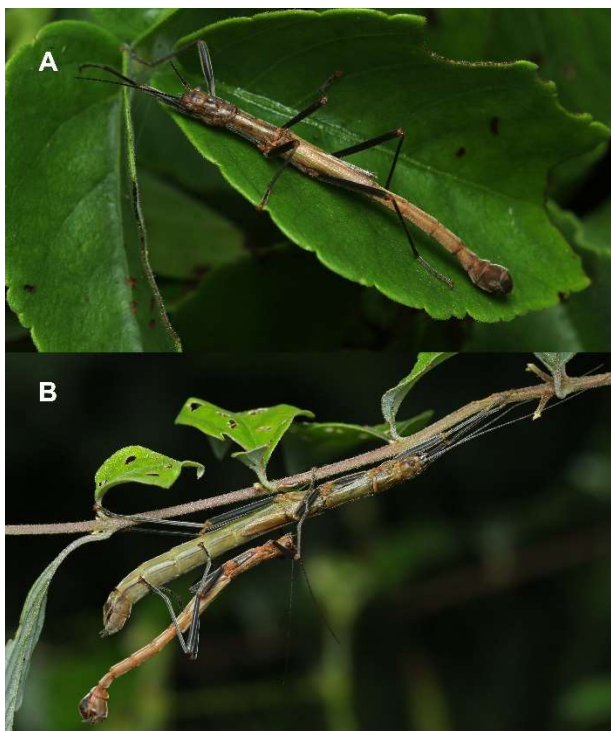


Fig. 5. *Presbistus muka* Kamtanom & Bresseel sp. nov., living specimens, A. male, in situ, B. mating pair, in situ.

University Kanchanaburi Campus covers 10.87 km² including the dedicated forest area. The habitat mostly consists of limestone mixed with deciduous forest. The average temperature and relative humidity in the study area are approximately 25.8 degree Celsius and 77.7 percent, respectively (Kamtanom, 2022).

Distribution. Currently only known from Kanchanaburi Province (Fig 7).

Presbistus vitivorus Bresseel & Constant, 2022

Figs. 6 & 7

Type material. Holotype: CAMBODIA: ♂; Pursat prov., Phnom Samkos; 12°13'02"N, 102°55'07"E; 15–18 October 2016; GTI project; Leg J. Constant & J. Bresseel; I.G.: 33.345; RBINS.

Paratypes: CAMBODIA: 7♂, 22♀; same collection data as holotype; 4♂, 19♀: RBINS; 2♂, 2♀: RUPP; 1♂, 1♀: VNMN.

Additional material. THAILAND: ♂; W' Thailand, Ratchaburi prov., Suan Phueng dist., 22.X.2019, K. Jiaranaisakul leg. (THNHM); ♀; W' Thailand, Ratchaburi prov., Suan Phueng dist., 16.XI.2019, K. Jiaranaisakul leg. (THNHM).

Photographic records. THAILAND: ♂ (Fig. 6A), Phetchaburi province, Kaeng Krachan district, Baan Maka, 12°50'37.5"N 99°35'28.2"E, 5.IX.2020, iNaturalist user ian_dugdale, <https://www.inaturalist.org/observations/78801359>; 1♂ 1♀ (Fig. 6B), Sisaket prov., Kantharalak dist., 14°26'42.25"N 104°43'58.52"E, 18.IX.2023, I. Dugdale; ♀, Phetchaburi province, Kaeng Krachan district, Baan Maka, 12°50'32.3"N 99°35'26.2"E, 19.X.22, iNaturalist user plains-wanderer, <https://www.inaturalist.org/observations/139277993>.

Comments. First time recorded outside Cambodia and seems to be widespread. The specimens from Suan

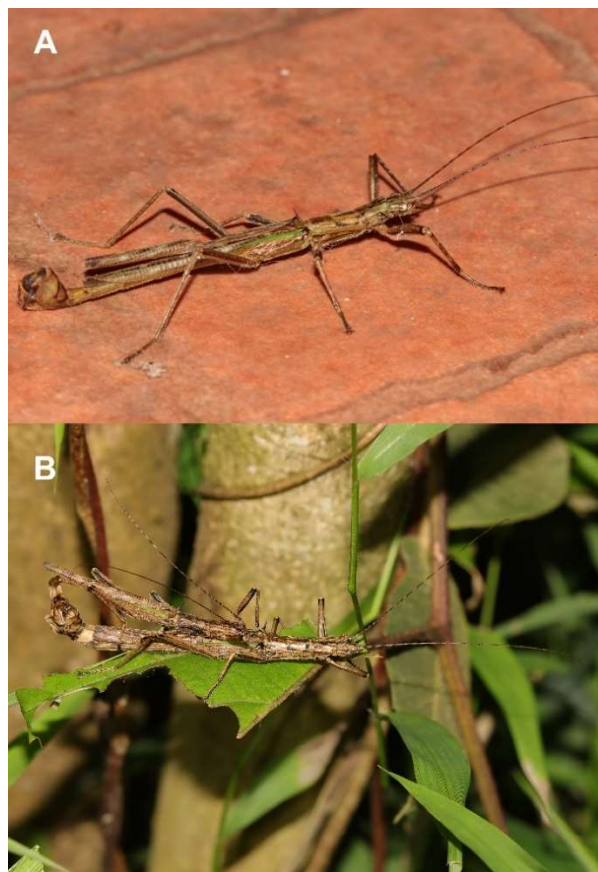


Fig. 6. *Presbistus vitivorus* Bresseel & Constant, 2022 living specimens, A. Phetchaburi province, Kaeng Krachan district, Baan Maka, 5.IX.2020 (© iNaturalist user: ian_dugdale), B. Sisaket prov., Kantharalak dist., 18.IX.2023, © I. Dugdale.

Phueng only differ from the Cambodian specimens by their smaller size: body length ♂: 38.1mm, ♀: 49.7mm. Although the specimens are indiscernible from those from Cambodia, more research is needed to be confident about the current identification. More material from more localities, including eggs and nymphs, as well as molecular data would certainly provide more insight.

DISCUSSION

The family Aschiphasmatae is for the first time recorded from Thailand with the observation of two *Presbistus* Kirby, 1896 species. However, several observations on the online social network site iNaturalist (Available from <https://www.inaturalist.org>. Accessed [10/03/2024]) suggest a wider range of Aschiphasmatae genera in the country. Records of *Aschiphasma* Westwood, 1835 (chanon_chirachitmichai [2023]. iNaturalist observation: [https://www.inaturalist.org/observations/185669512]. Accessed on [10/03/2024]) and of *Abrosoma* Redtenbacher, 1906 (parinyaherp [2022]. iNaturalist observation: [https://www.inaturalist.org/observations/107751572]. Accessed on [10/03/2024]) can be found within the citizen science sourced data.

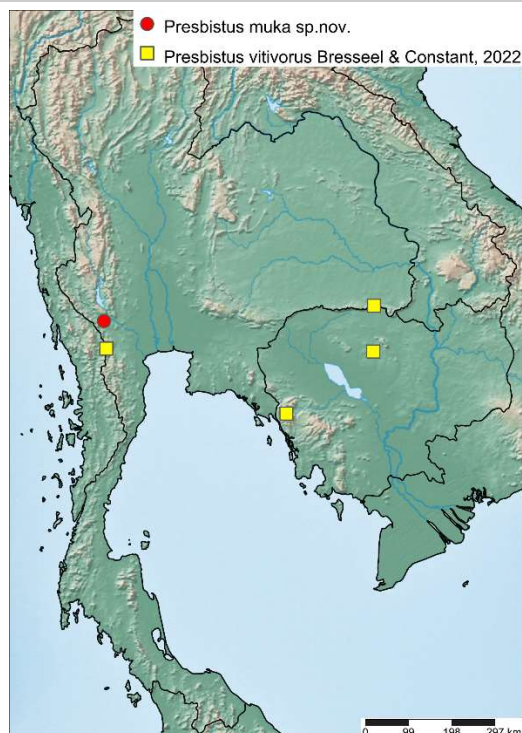


Fig. 7. *Presbistus muka* Kamtanom & Bresseel sp. nov. and *Presbistus vitivorus* Bresseel & Constant, 2022, distribution map.

Presbistus muka Kamtanom & Bresseel sp. nov. feeds on an unidentified species of Vitaceae. Bresseel and Constant (2022) had already shown *Presbistus vitivorus* feeds on a variety of Vitaceae in different localities in Cambodia as do *Presbistus* species from Sumatra and Borneo (Seow-Choen, 2016, 2017, 2018, 2021). It appears that several Aschiphasmataidae genera are predominantly feeding on a certain plant family. For example *Abrosoma* species are known to feed mainly on Melastomataceae (Seow-Choen, 2016, 2018) and *Orthomeria* species on Urticaceae (Seow-Choen, 2016; Vallotto *et al.*, 2016).

With the description of *Presbistus muka* Kamtanom & Bresseel sp. nov., there are currently ten known *Presbistus* species of which three occur in Continental Asia (Brock *et al.*, 2024). According to Seow-Choen (2021), only *Presbistus peleus* is present in Peninsular Malaysia and Bresseel and Constant (2022) described *P. vitivorus* from Cambodia which is here also recorded from Thailand. Distribution records of the latter two species suggest that the Isthmus of Kra is possibly acting as a zoogeographic barrier between the two species ranges (de Bruyn *et al.*, 2005)

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