THE RAFFLES BULLETIN OF ZOOLOGY 2012 **60**(1): 137–155
Date of Publication: 29 Feb.2012

NEW TAXA OF AGRAECIINI (ORTHOPTERA: TETTIGONIIDAE: CONOCEPHALINAE) FROM SINGAPORE AND MALAYSIA WITH A REVIEW OF THE GENUS *JAMBILIARA*

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ABSTRACT. — Four new species of Agraeciini from Singapore and Peninsular Malaysia are described: *Nahlaksia bidadari* n. sp. (Singapore, Pahang), *Oxylakis singaporensis* n. sp. (Singapore), *Jambiliara angula* n. sp. (Penang), and *Jambiliara selita* n. sp. (Singapore, Perak). The first record and description of males of the genus *Jambiliara* is given. The genus is reviewed, a key to the species provided, and one species transferred to the genus *Mesagraecia* Ingrisch, 1998 as *Mesagraecia laticauda* (Karny, 1926), new combination.

KEY WORDS. — Agraeciini, taxonomy, new species, Southeast Asia

INTRODUCTION

A comprehensive treatment of the Agraeciini fauna of South East Asia was published by Ingrisch (1998). Due to the vast area concerned and the fragmentary exploration of its insect fauna, it is clear that not all regions could have been covered equally well. New records and previously unknown species are to be expected as the faunal exploration of a given area is continued or intensified. It proved that in several genera of Asian Tettigoniidae the species distribution can be geographically very restricted (e.g. Ingrisch, 1998; Gorochov, 2009).

The current study is based on two main sources: (1) old specimens collected between about 40 and 140 years ago, stored in various museum collections without having been identified, and (2) recent research to revise the inventory of the Orthoptera fauna in the Bukit Timah Nature Reserve (BTNR) and Central Catchment Nature Reserve (CCNR) of Singapore, conducted by Tan and collaborators since 2010.

This study revealed one new species each in the genera *Nahlaksia* and *Oxylakis* and two new species in *Jambiliara*. The new taxa are described below. For the genus *Jambiliara*, the first finding of males is reported, which gave us the opportunity for a review of the genus.

MATERIAL AND METHODS

Specimens from museum collections were studied in the museums or on loan. Photographic images were done with a digital camera mounted to a microscope; habitus images and some larger details were photographed without microscope. Drawings were done with aid of a camera lucida. Scales given with the images are approximate as the images taken with different equipment had to be adapted in size. Measurements of details of the stridulatory apparatus were done under a microscope. As the size of the teeth on the stridulatory file can greatly vary from base to apex, the densities of the teeth for the whole length and for the central area of the file were determined.

Collections of specimens by junior author and collaborators were carried out mainly in the night in different trails within and around BTNR and CCNR of Singapore. Images were taken using the Visionary Digital System. Final processing of the images was done with a drawing program on a PC.

Depositories

BMNH	Natural History Museum, London, UK
MBBJ	Museum Zoologicum Bogoriense, Bogor [now Cibinong], Indonesia
MNHN	Muséum nationale d'Histoire naturelle, Paris, France
NHMW	Naturhistorisches Museum Wien, Austria

RMNH Nationaal Natuurhistorisch Museum Naturalis, Leiden, Netherlands
ZRC Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore
ZSM Zoologische Staatssammlung, München, Germany

TAXONOMY

Nahlaksia Ingrisch, 1998

Nahlaksia Ingrisch, 1998: 115

Discussion. — The genus was established for a single species from Khao Yai in Central Thailand. No other records were reported so far. The new species described below was already collected by D. H. Murphy during his Orthoptera research in Singapore from the 1960s to 1980s, though this species remained unidentified to date. In an attempt to revise the inventory of the Orthoptera in the Bukit Timah Nature Reserve (BTNR) and Central Catchment Nature Reserve (CCNR) of Singapore, more specimens were collected by Tan et al. since 2010.

Nahlaksia bidadari, new species
(Figs. 1–3)

Material examined. — Holotype: male (ZRC), Singapore, MacRitchie Reservoir Catchment Area, along Lornie Trail, coll. M. K. Tan, 24 Feb.2011. Paratypes: Singapore, 2 males (ZRC), CCNR, Mandai Reservoir, coll. D. H. Murphy, 20 Nov.1967; 2 females, 1 male (ZRC), CCNR, along Mandai Track 15, Upper Seletar Trail and Chestnut Track, coll. M. K. Tan, M. R. B. Ismail, H. P. M. Woo, 19 Dec.2010, 29 Jan.2011; 2 females (ZRC), MacRitchie Reservoir Catchment Area, along Sime Track and MacRitchie Nature Trail, coll. M. K. Tan, M. R. B. Ismail, T. M. Leong, 26 Nov.2010, 2 Feb.2011; 1 male (ZRC), BTNR, along Belukar Track, coll. M. K. Tan, 5 Feb.2011; Malaysia: 2 females (MNHN), Pahang (?), Kg. [Kampung] Bongsu, coll. H. Steiner, 2 May 1996, 24 Jul.1996.

Diagnosis. — Similar to *N. suphattra*, but differs by the frons that is not divided by a transverse line below compound eyes and antennal scrobae and uniformly black instead of black and red, the hind femur is without black spot or whitish, pregenicular ring, the male tenth abdominal tergite with larger, stouter and little twisted apical lobes, the male cerci have the basal projection stouter with subacute tip and the apical lobe wider with spinule at tip, the titillators have the apex rounded instead of subacute. Further differences are found in the male subgenital plate having shorter and widely separated apical lobes and longer styli, and in the female subgenital plate having regular convex lateral margins and a roundly excised apex.

Description. — Fastigium verticis conical but step-like inclined in circa half of length, with lateral ocelli projecting laterad; apex sub-obtuse; dorsal surface furrowed and without a tubercle near base; ventral surface with medial carinula. Fastigium frontis with one or two tubercles in midline. Frons rugose and setose; only immediately below antennal scrobae furrowed and smooth (Fig. 1B). Fastigium verticis and vertex in anterior area rugose; vertex otherwise subsmooth but with some impressed dots. Pronotum rugose, rather short, regularly curved from one side to the other; transverse sulcus weak, interrupted in middle, a second transverse sulcus on paranota and angles; anterior margin broadly rounded, slightly concave at both sides; posterior margin concave; paranota longer than high, ventral margin subsinuate, anterior angle rounded, posterior angle circa rectangular but angle itself rounded; humeral sinus absent. Tegmen: Male micropterous (Fig. 1C), female squamipterous (Fig. 1E). Prosternum unarmed, with two minute tubercles at posterior margin; meso- and metasternal lobes rounded. Femora, especially mesofemur, compressed and widened in basal area; mesotibia compressed and widened. Legs setose. Profemur with spines on both ventral margins, meso- and postfemur on ventro-external margin; sometimes with one spine on ventro-internal margin of mesofemur. Knee lobes of all femora rounded on external, spinose on internal side; spine on mesofemur shorter than on pro- and postfemur or lobe triangular without spine. Protibia distinctly angular. Femora with the following number of spines on ventral margins: profemur 3–4 external, 3–5 internal; mesofemur 4–6 external, 0 internal; postfemur 5–8 external.

Male: Stridulatory file on underside of left tegmen about 1.0 mm long with teeth gradually getting denser from base to apex; in basal half with about 44, in centre with about 54 teeth per 0.5 mm (Fig. 2A). Tenth abdominal tergite elongate with a pair of large roughly triangular apical lobes with convex surface and downcurved medial margin (Fig. 2C). Epiproct hidden under prolongation of tenth abdominal tergite, tongue-shaped with faint medial furrow (Fig. 2D). Cerci conical in external view but little compressed laterally and internal surface flattened, apical area bent ventrad and compressed, apex obtuse, with a spinule a little externally of tip (Fig. 2B); cercus at base with a stout conical dorso-internal projection with subacute apex (Fig. 2D). Subgenital plate with apex extended into two short, narrow lobes, wide roundly excised in between; styli long, inserting at apex of projections (Fig. 2E). Titillators simple, weakly sclerotised, hyaline along lateral margins; apical area compressed with granular surface; sclerotised central ligament widening towards rounded apex (Fig. 2F).

Female: Tenth abdominal tergite with a very faint carinula in midline, apical margin faintly bilobate in middle, otherwise subtruncate. Epiproct rounded-triangular with medial furrow that is little widening apically. Cerci conical, apex pointing. Subgenital plate curved from one side to other, lateral margins convex, converging posteriorly, apex roundedly excised in middle (Fig. 1F). Ovipositor curved, elongate; margins smooth, dorsal valves furrowed (Fig. 1G).

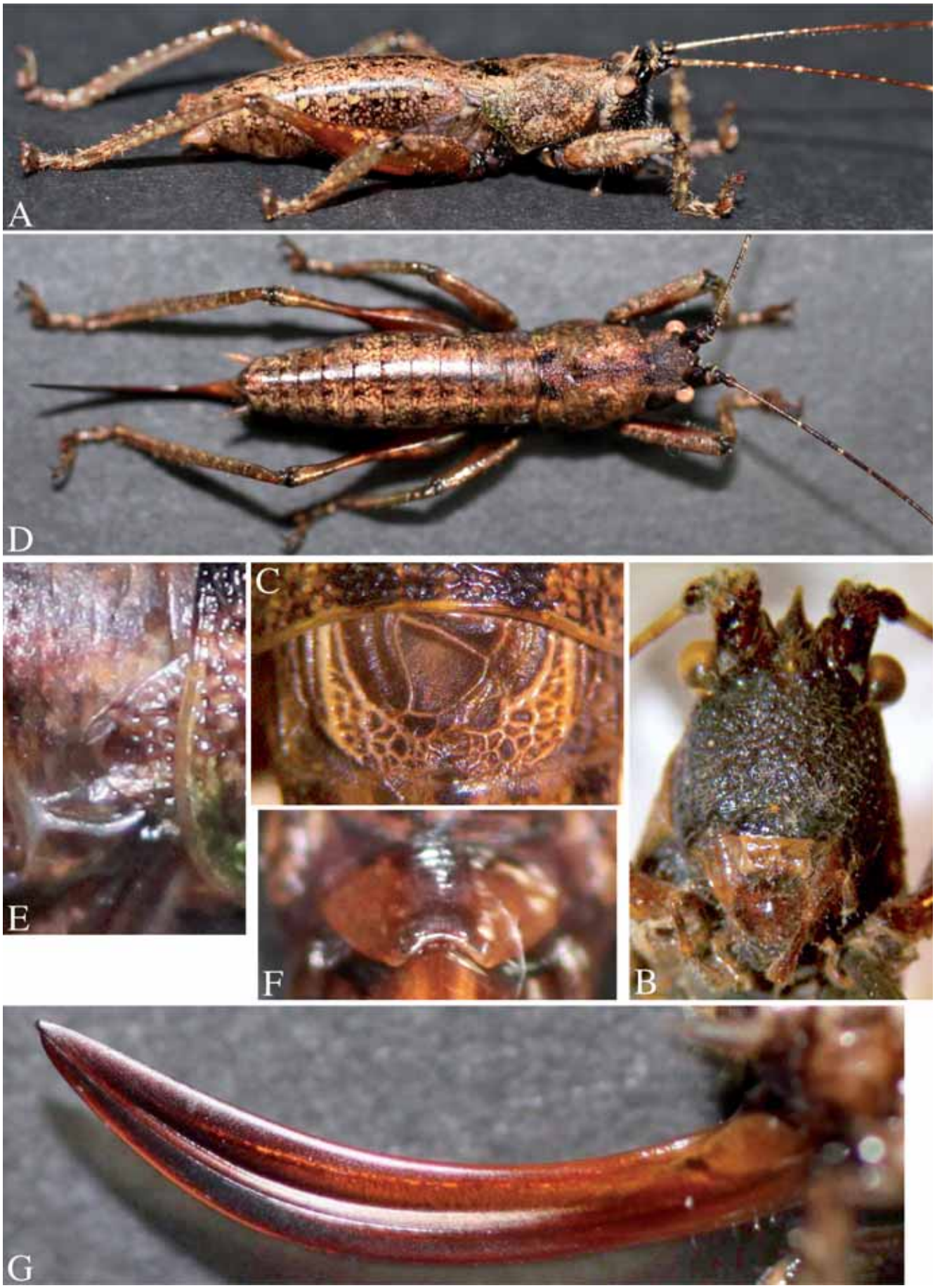

Fig. 1. *Nahlaksia bidadari* n. sp. male holotype (A), male paratype (B, C) and female paratype (D–G): A, habitus lateral view; B, face; C, tegmen in dorsal view; D, habitus dorsal view; E, tegmen in lateral view; F, subgenital plate in oblique ventral view; G, ovipositor. (Photographs by: M. K. Tan).

Fig. 2. *Nahlaksia bidadari* n. sp., details of male paratype (A, F) and holotype (B–E): A, underside of left tegmen; B, abdominal apex in oblique lateral view; C, do. in dorsal view; D, do. in apical view; E, do. in ventral view; F, titillators in lateral view, only one titillator visible. Scale bars = 1 mm, only in F = 0.1 mm. Abbreviations: 10t, tenth abdominal tergite; ce, cercus; e, epiproct; ph phallus; sg, subgenital plate; st, stylus. (Photographs by: Y. C. Ang).

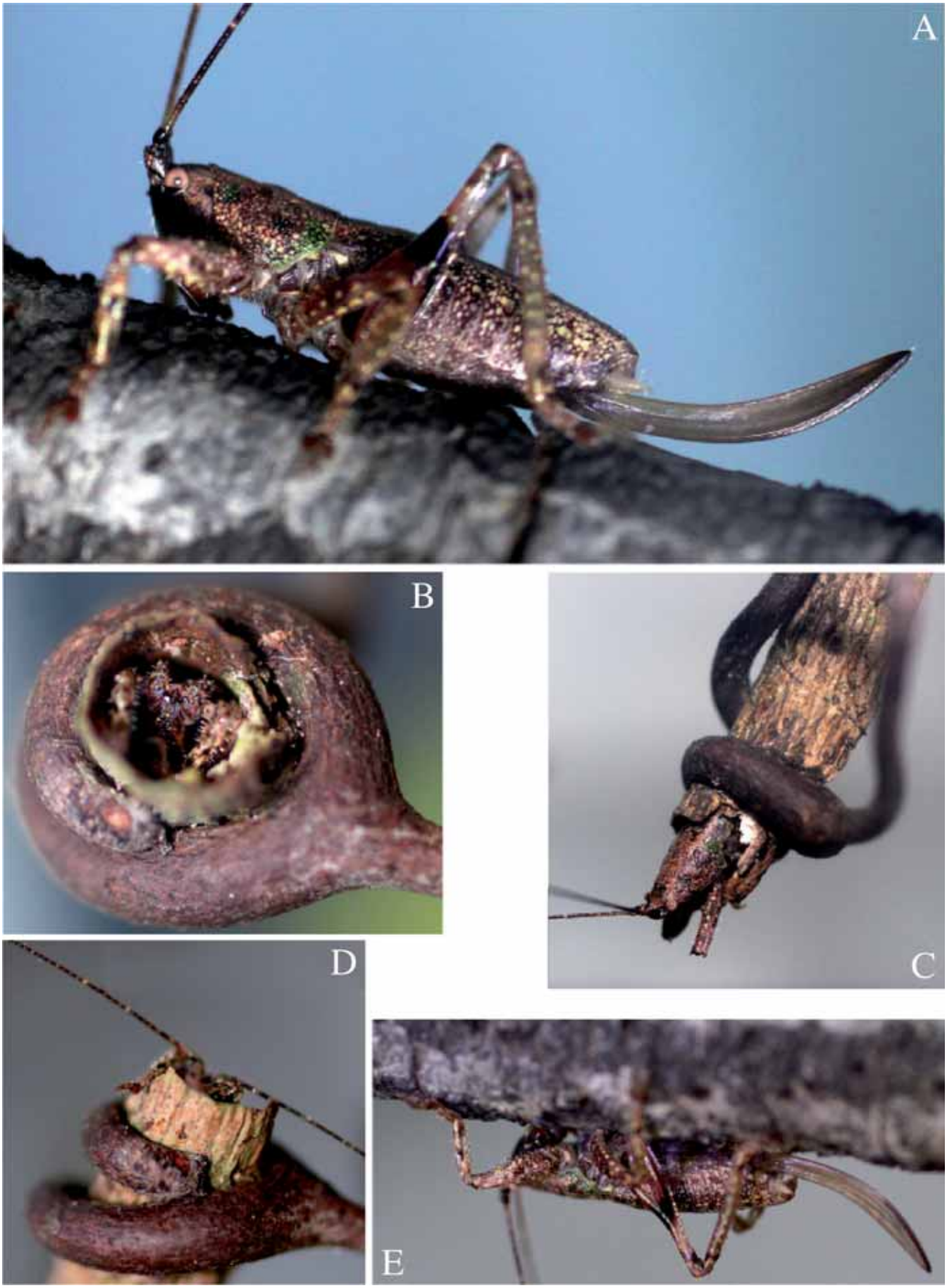

Fig. 3. *Nahlaksia bidadari* n. sp., female nymph last instar: A, habitus in lateral view; B, nymph completely hidden within a hollow dead branch; C, nymph moving posteriorly into the hollow; D, nymph exposing the antennae while hidden within the hollow; E, nymph feeding on deadwood. (Photographs by: M. K. Tan).

Colouration: Ochre or brown with irregular light and dark pattern; with or without few green spots. Frons including fastigium frontis and antennal scrobae black (Fig. 1B); sometimes less dark in middle; mouthparts reddish or brown; labrum partly orange; palpi brown, apices of most segments pale; antennae brown with spaced white annulation, first two segments with black marks. Hind area of genae brown; compound eyes light; ventral margin and a spot near scapus black. Vertex and pronotum brown with various shades of a dark and light pattern, sometimes infumate with green pattern. Tergites ochre, medium or dark brown with small light dots that partly merge to form larger spots; with fairly distinct dark medial band; sternites yellow mottled with brown or dark or reddish brown; thoracic sternites can be nearly blackish brown. Legs with various shades of brown and marbled with whitish dots of variable size; ventro-internal lobes of meso- and metacoxa nearly white, sometimes indistinct; ventral areas of all femora reddish brown, darker towards tronchanter; tronchanter dark reddish brown; very base of tibiae black or dark brown, spines whitish with dark tips; hind femur reddish brown, sometimes with light dots on outer face; dorsal areas of profemur, protibia, mesotibia, posttibia can additionally become infumate with a green pattern, sometimes indistinct. Ovipositor dark reddish brown apically, lighter reddish brown basally.

Measurements (5 males, 6 females): Body: male 18.2–22.1, female 19.0–22.1; pronotum: male 4.5–5.7, female 5.4–5.7; tegmen: male 1.9–2.9, female 0.5–1.5; hind femur: male 8.4–9.6, female 10.1–10.8; ovipositor: female 11.6–12.8; ovipositor height: female 1.5–1.7 mm.

Etymology. — The species is named after the exhumed Bidadari cemetery, Singapore; noun in apposition. "Bidadari" also implies "nymph". Adults may be easily mistaken as nymphs due to the strongly abbreviated wings.

Biology. — In Singapore, this species appears to be restricted to the Central Catchment Nature Reserve and Bukit Timah Nature Reserve. Adults and nymphs were found mainly on dead branches of felled trees and climbers. A female nymph was collected from a branch of *Willughbeia coriacea* Wallich & G.Don, 1832 along Upper Seletar Trail on the night of 20 Jan.2011. It was reared in captivity to study the biology of the species (Fig. 3A). The nymph was observed to take shelter within a hollow dead branch and crevices during daytime or when disturbed (Fig. 3B). Upon disturbance, it moved backwards into the hollow, abdominal apex first (Fig. 3C). Initially, antennae remained in sight (Fig. 3D). After some time, the antennae were retracted into the hollow. In the dark, the nymph was observed to feed on wood of dead branches (Fig. 3E). It did not forage leaf litter. Instead, it tends to dwell among branches at higher ground. The last instar nymph had a striking black spot on the hind femur that disappeared with the final moult.

Oxylakis Redtenbacher, 1891

Oxylakis Redtenbacher, 1891: 447; Ingrisch, 1998: 98.

Discussion. — The genus contains of a number of quite similar species that mainly differ by the shape of a basal, internal appendage of the male cerci, and by the male titillators if present (Ingrisch, 1998). The sculpture of the frons can be an additional character.

Oxylakis singaporensis, new species

(Figs. 4, 5)

Material examined. — Holotype: male (BMNH, B.M. 1959–149) Singapore: Tenga, R.A.F. Station [R.S.A.F. Tengah Airbase], coll. C. Clayton, Mar.1958. Paratype: Singapore, 1 female (BMNH), coll. H.N. Ridley, 1901.

Diagnosis. — The new species is close to *O. punctipennis* Redtenbacher, 1891, *O. sumatranus* Ingrisch, 1891 and *O. karnyi* Ingrisch, 1891. The key in Ingrisch (1998) runs out near the latter two species. It differs by the male cerci and the titillators. The cerci are regularly curved mediad and only slightly narrowing towards the apex as in *O. punctipennis*, but have the apex armed with a spinule and the basal appendages deviating in a rectangular way, the cerci are a little twisted in apical area as in *O. sumatranus*, but the latter does not have an apical spinule and the basal appendages almost rectangularly deviating after having arisen from a common trunk; in *O. karnyi* they deviate in an acute angle. The male titillators, a pair of hyaline plates that obviously represent the apical parts while the basal parts are reduced, resemble those of *O. karnyi*. They differ by their shorter and wider shape, being arched and with a short medio-apical lobe. In *O. sumatranus* the titillators are reduced to the medial area, while in *O. punctipennis* the phallus is without sclerotised structures. The female subgenital plate with a slightly bilobate central plate with moderate apical excisions and auricular membranous lateral lobes also resembles the situation in *O. punctipennis, O. sumatranus* and *O. karnyi*. It differs from all three by the strong medial furrow and a distinct angular projection at the bottom of the apical excision that is very faint or hardly observable in *O. punctipennis* and *O. sumatranus*, absent in *O. karnyi*.

Description. — Agrees in general characters with the generic description given in Ingrisch (1998). Fastigium verticis conical, apex obtuse, furrowed above. Frons shining with few impressed dots, genae rugose (Fig. 4B). Pronotum rugose, anterior margin broadly rounded but faintly subtruncate in middle (Fig. 4C), posterior margin truncate; anterior-ventral angle obtusely projecting; transverse sulcus faintly indicated on disc. Prosternal spines short. Tegmen surpassing stretched hind legs (Fig. 4A). Mesocoxa with rounded swelling at ventro-internal margin rather large. Knee lobes of pro- and mesofemur obtuse on both sides; of postfemur obtuse on external, obtuse or spinose on internal side. Femora with the following number of spines on ventral margins: profemur 2–3 external, 4 internal; mesofemur 4–5 external, 0 internal; postfemur 5–7 external, 0 internal.

Male: Stridulatory file with teeth extremely dense; with about 176 teeth at 1.4 mm, equating 126 teeth per mm; in middle

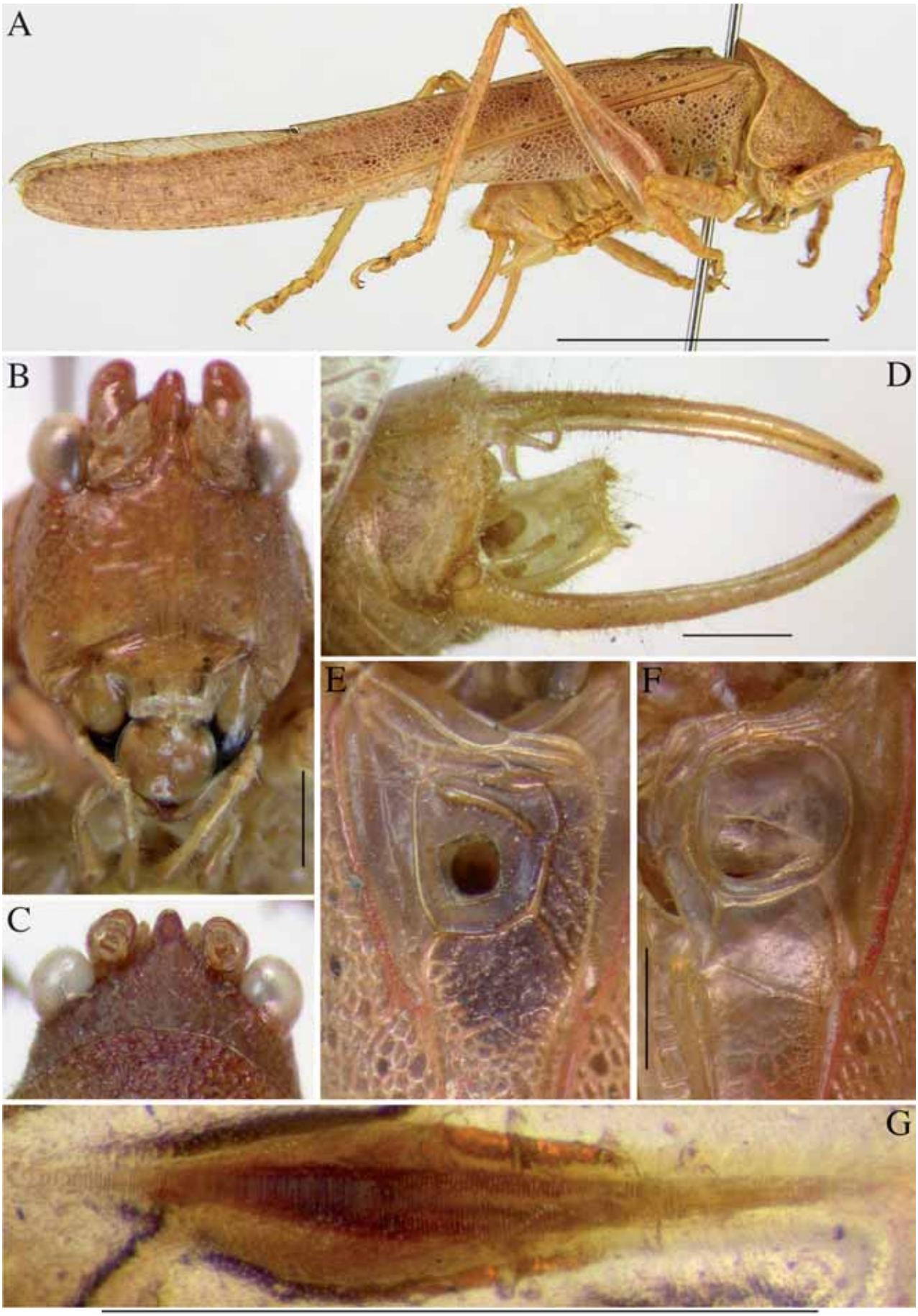

Fig. 4. *Oxylakis singaporensis* n. sp. male holotype: A, habitus lateral view; B, face; C, head in dorsal view; D, abdominal apex in oblique dorsal view; E, stridulatory area of left tegmen; F, do. of right tegmen; G, stridulatory file on underside of left tegmen. Scale bars = 1 mm, only in A = 10 mm. (Photographs by: S. Ingrisch).

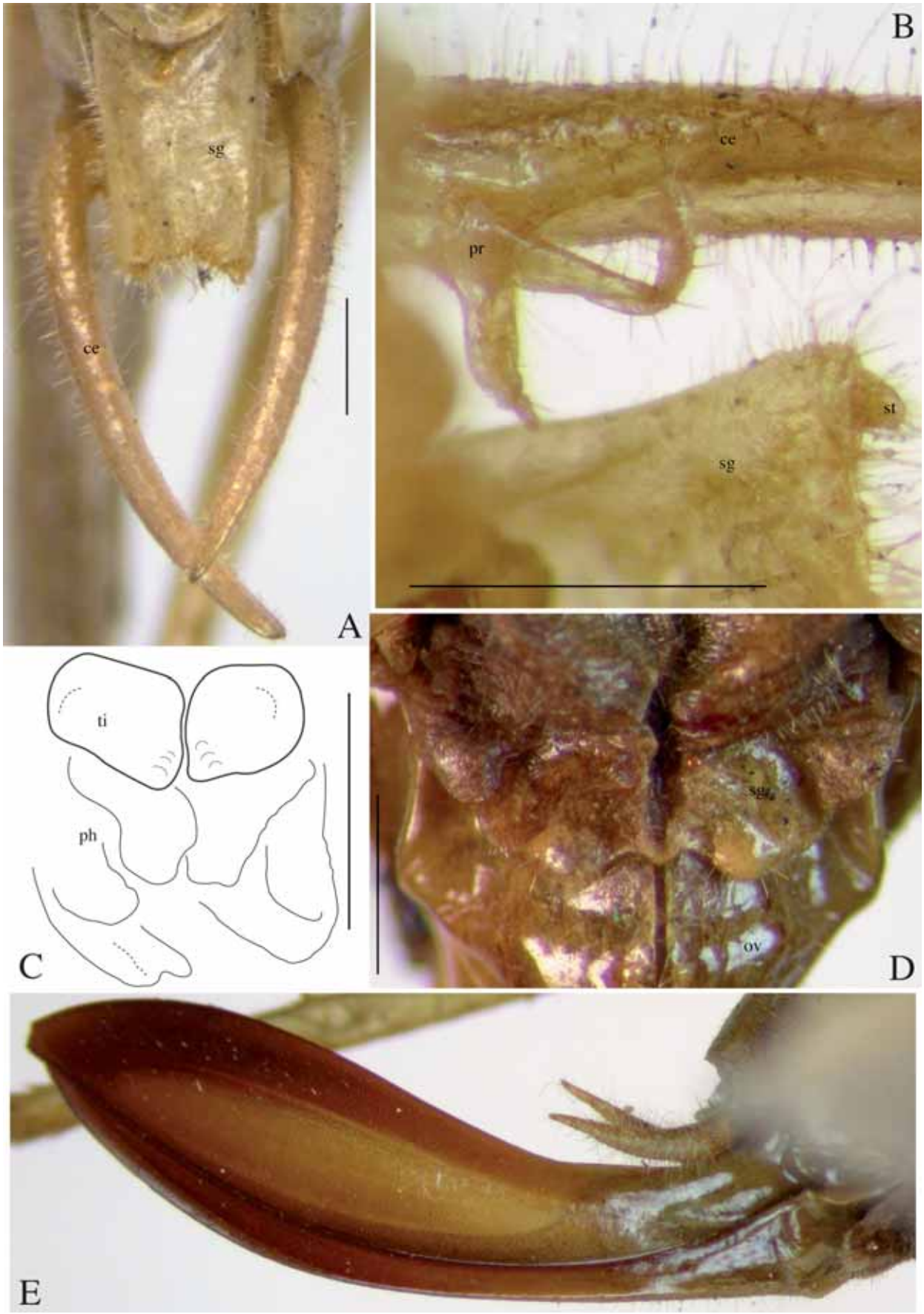

Fig. 5. *Oxylakis singaporensis* n. sp. details of male holotype (A–C) and female paratype (D, E): A, subgenital plate and cerci in ventral view; B, base of right cercus in oblique internal view and part of subgenital plate with stylus (note that the fold in the dorsal process of the cercus is due to distortion during drying); C, titillators (thick lines) and soft part of phallus (thin lines) in dorsal view; D, subgenital plate in ventral view; E, ovipositor. Scale bars = 1 mm (E not to scale). Abbreviations: ce, cercus; ov, base of ovipositor; ph, phallus; pr, baso-internal projections; sg, subgenital plate; st, stylus; ti, titillator. (Photographs and illustration by: S. Ingrisch).

with about 68 teeth per 0.5 mm (Fig. 4G). Tenth abdominal tergite with apical area strongly setose; apical margin weakly bilobate (Fig. 4D). Epiproct rounded. Cerci long, substraight, at apex little twisted, external surface rounded, internal surface furrowed; apex with a minute spinule at tip (Fig. 4D); at very base with two internal projections on a common trunk, one pointing medio-apicad, the other medio-ventrad (Fig. 5B). Subgenital plate with apex subtruncate, little concave; styli short (Fig. 5A). Titillators hyaline, reduced to the apical parts, forming a pair of convex hyaline plates with the medio-apical angle little obtusely projecting (Fig. 5C).

Female: Cerci long-conical, slightly curved, apex pointing (Fig. 5E). Subgenital plate transverse, with a strong medial furrow; apical margin bilobate, broadly excised between both lobes and with a small angular projection in bottom of excision; on each side with a baso-lateral, more or less membranous, auricular projection (Fig. 5D). Ovipositor compressed-ovoid, with substraight basal and ovoid apical part, margins regularly curved and smooth (Fig. 5E).

Colouration: Brownish testaceous. Tegmen with darker spots; in male at end of stridulatory field with a dark brown spot. Ovipositor with marginal area reddish-brown, becoming very dark towards apex, base and central areas yellowish-brown.

Measurements (1 male, 1 female): Body with wings: male 32; body without wings: male 15, female 21; pronotum: male 4.8, female 5.3; tegmen: male 28, female 32; hind femur: male 9, female 11; hind wing: female 32; ovipositor: female 10.5 mm.

Etymology. — Named after the type locality, Singapore.

Jambiliara Ingrisch, 1998

Jambiliara Ingrisch, 1998: 56; type species: *Jambiliara macroptera* Ingrisch, 1998.

History. — The genus *Jambiliara* was described by Ingrisch (1998) for a species from central Sumatra. Two other, known species were provisionally assigned with it. All three species were only known from females. Meanwhile the senior author had the opportunity to re-examine the types of *Jambiliara (?) laticauda* (Karny, 1925) and *Jambiliara (?) moultonii* (Karny, 1923) in BMNH and study additional specimens of the genus including males from the same and other collections. New specimens were discovered by the junior author during research on the Orthoptera diversity of Singapore. It thus becomes possible to give a review of the genus and describe the male characters for the first time. Specimens of the genus are rarely collected. They probably live in the canopy, as one of the males studied carries a label "dropped on jungle path from the canopy".

Diagnosis. — The genus is characterised by the saddle-shaped, rugose pronotum. The male subgenital plate is unique for its narrow, compressed appendages imitating styli, while the styli proper are largely reduced. The titillators are rather uniform within the genus but striking and unique for the long dorsal process.

Description. — Fastigium verticis conical, shorter than scapus; in frontal view rather well separated from fastigium frontis. Frons shining with shallowly impressed dots. Pronotum saddle-shaped, rugose or subrugose, disc broadly rounded into paranota, apical area raised, flattened, shouldered and with a medial carinula; transverse sulcus distinct, (sub-)interrupted in middle; anterior margin broadly rounded, posterior margin rounded; ventral margin subsinuate, sloping posteriorly, anterior angle rounded, posterior angle angularly-rounded, humeral sinus distinct but not deep. Fully winged, tegmen surpassing hind knees. Tegmen in about basal half with costal field widened, gradually narrowing into narrow apical area with parallel margins. Prosternum without spine, at most with two minute tubercles. Meso- and metasternum rather flat, lobes conical; medial plate without apical projection. Procoxa with spine; mesocoxa without spinule but with tubercle. Pro- and postfemur with spines on both ventral margins; mesofemur on ventro-external margin and sometimes one spine on ventro-internal margin. Knee lobes of profemur obtuse on external, angular to acute on internal side; of mesofemur obtuse or obtuse-angular on external, spinose on internal side; of postfemur spinose on both sides.

Male: Tenth abdominal tergite wider than long; dorsal area very little prolonged, faintly bi-globular with shallow medial furrow; apical margin excised in middle with a spinose projection on both sides of excision. Cerci short cylindrical, curved; with two preapical internal projections: a short spiniform on inner surface and a long compressed on ventro-internal margin. Subgenital plate longer than wide; mainly in lateral areas setose; triangularly excised from base; in ventral view basal half wider than apical half; about apical third curved dorsad in a 90°-angle or little more, not visible from below; in apical view wide-roundedly excised and provided with a pair of compressed projections that carry reduced styli near rounded apex. Titillators fused in middle and there with a common projection that is obtusely widening at tip; basal and apical areas compressed. Membranous part of phallus near titillator apex densely setose.

Female: Tenth abdominal tergite furrowed in midline, apical margin subtruncate but slightly projecting at each side of medial furrow. Epiproct rounded-triangular. Cerci cylindrical, slightly curved, apex pointing. Subgenital plate simple; rather weakly sclerotised and subject to distortion when dried up. Ovipositor compressed blade-shaped, highest behind middle of length, margins smooth.

Jambiliara macroptera Ingrisch, 1998
Figs. 6B–D, 7A,B, 8A, 9A B, 10A,B, 11A,B

Jambiliara macroptera Ingrisch, 1998: 56.

Material examined. — Holotype: female (MBBJ), Indonesia: Sumatra, Djambi exp., Gunung Mongko, coll. O. Posthumus, 7 Aug.1925. Other specimens: Indonesia: 1 male (Coll. F. Willemse

in RMNH), North Sumatra, Bivonae One, Mt. Bandahara, no. 23, lowland evergreen multistratal forest at light, elev. 810 m (3°43'N, 97°41'E), coll. J. Krikken, 25 Jun. – 5 Jul.1972.

Remarks. — The female holotype was collected during the palaeobotanical expedition of Oene Posthumus, which was to the vicinity of Bangko [2°06'S, 102°13'E] (van Waveren et al., 2007; Flora Malesiana Online, 2011). The male is described here for the first time. The male at hand comes from a lowland forest in North Sumatra. Thus it is not completely certain, if it really belongs to *J. macroptera* or to another undescribed taxon. Due to the weak differences between the species in *Jambiliara*, we have to wait until a male of *J. macroptera* from the type locality becomes known to settle the question.

Diagnosis. — *J. macroptera* differs from the other taxa of the genus by the combination of male cerci with apex rounded, the male subgenital plate at base of apical projections with a faint angle only but with distinct styli, the titillators in apico-dorsal view with the serrulation at dorsal margin not reaching the apical widening of the dorsal process, and the teeth of the stridulatory file on the underside of the left tegmen with 58 teeth per mm being rather dense. The female subgenital plate has the apex faintly excised.

Description. — As genus. Fastigium verticis conical with weak dorsal furrow; apex obtuse, nearly truncate. Pronotum with anterior and posterior margins rounded; with fold behind first transverse sulcus; posterior area distinctly elevated, widened, shouldered and with medial carinula; humeral sinus distinct but not strong. Mesosternal lobes conical, acute. Femora with the following number of spines on ventral margins: profemur 1–2 external, 2–3 internal; mesofemur 2–4 external, 0–1 internal; postfemur 8–9 external, 5–6 internal.

Male: Stridulatory area of left tegmen as in Fig. 7A, B. Stridulatory file on underside of left tegmen regularly curved with densely arranged teeth; 3.0 mm long, with 173 teeth, equating 58 teeth per mm; in middle of file with 41 teeth per mm (Fig. 8A). Mirror on right tegmen 2.17 mm long, 1.88 mm wide; index length to width 1.15 (Fig. 7B). Tenth abdominal tergite with dorsal area very little prolonged, surface nearly flat with shallow and wide medial furrow; apical margin in middle excised with truncate bottom and spinose projection of both sides of excision (Fig. 9A, B). Epiproct rounded; dorsal surface grooved; margins with irregular carinae. Paraproctes with tuberculate projection. Cerci short cylindrical, curved; apex broadly rounded with short stylate pre-apical internal tooth; before tooth, on ventro-internal margin, with a long, compressed, curved projection pointing interno-ventrad, at tip with proximal angle obtuse, distal angle little prolonged into acute cone. Subgenital plate longer than wide; mainly in lateral areas setose; triangularly excised from base; in ventral view basal half wider than apical half; about apical third curved dorsad in a 90°-angle or little more, not visible from below; upcurved area in apical view wide-roundedly excised, margin very little constricted at base of compressed projections; projections with concave internal surface; styli inserted at internal surface of projections, rather well developed, surpassing margins of projection (Fig. 9A, B). Titillators fused in middle; basal parts deviating, with little diverging margins to base; very base with irregular margin; apical parts divided from fused central area into a pair of plates supporting the membranous phallus lobes and a subfused dorsal process; apical part of process widened, thickened and standing vertically to the plates; apical margin of apical plates granulated with granules not reaching terminal structure of process (Fig. 10A, B). Membranous part of phallus near titillator apex densely setose.

Female: Subgenital plate transverse, broader than long, apical angles rounded and slightly concave in between (Fig. 11A, B).

Colouration: Brown. Frons and genae medium brown with light spots; ventral area of genae, clypeus and labrum yellowish brown; mandibles with internal and apical areas black; ventro-lateral areas of scapus and pedicellus dark brown or black, flagellum indistinctly annulated. Pronotum medium brown including light spots; with narrow irregular black lateral bands; medial of lateral bands and along ventral margin with whitish brown bands. Abdominal tergites red with blackish brown lateral areas; intersegmental membranes of abdomen black including light spots. Tegmen maculated. Hind wings infumated; in the male at hand less so than in the female type. Legs indistinctly maculated; ventral area of hind femur green.

Measurements (1 male, 1 female): Body with wings: male 35, female 41; body without wings: male 26, female 25; pronotum: male 8.7, female 8.5; tegmen: male 27, female 33; hind femur: male 20.5, female 24; ovipositor: female 23; ovipositor height: female 2.6; antenna: male 110 mm.

Jambiliara selita, new species

Figs. 6E–G, 7C, D, 8B, 9C–F, 10C–F, 11C–H

Material examined. — Holotype: male (BMNH): Singapore (1°22'N, 103°49'E), coll. H. N. Ridley, 1901. Paratypes: Singapore: 1 female (NHMW), Selita [Seletar, 1°25'N, 103°52'E], coll. Ransont [Eugen von Ransonnet], 10 Mar.1871; 1 male (ZRC), CCNR, along Chestnut Track, coll. M. K. Tan, 17 Dec.2010; 1 female (ZRC), Dairy Farm Nature Park (near BTNR), along Wallace Trail, coll. M. K. Tan, 27 Jan.2011. Malaysia: 1 female (ZSM), Perak, coll. H. Stichel, from old collection.

Diagnosis. — The new species is very similar to *J. macroptera*. It differs by the male subgenital plate having a small tooth at the base of the compressed apical projections but the styli reduced to soft button-like structures, the shape of the stridulatory area of both tegmina, and the teeth of the stridulatory file on the underside of the left tegmen with 43 teeth per mm being rather spaced. The female subgenital plate has the apex rounded.

Description. — As genus. Fastigium verticis conical with weak dorsal furrow; apex obtuse, nearly truncate. Pronotum with apical area little elevated, widened, shouldered and with medial carinula; humeral sinus distinct but not strong. Mesosternal lobes conical, acute. Femora with the following number of spines on ventral margins: profemur 0–2 external, 3 internal; mesofemur 3–4 external, 0–1 internal; postfemur 7–9 external, 5–6 internal.

Male: Stridulatory area of left tegmen as in Fig. 7C, D. Stridulatory file on underside of left tegmen regularly curved with densely arranged teeth; 3.1 mm long, with 135 teeth, equating 43 teeth per mm; in middle of file with 33 teeth per mm (Fig. 8B). Mirror on right tegmen 2.14 mm long, 2.00 mm wide; index length to width 1.07–1.11 (Fig. 7D). Tenth abdominal tergite wider than long; dorsal area very little prolonged, faintly bi-globular with shallow medial furrow; apical margin in middle excised with truncate bottom and spinose projection on both sides of excision (Fig. 9C). Epiproct rounded laterally, apex triangular (can be rounded in dried specimens); dorsal surface faintly grooved with carinate margins. Paraproctes with tuberculate projection. Cerci short cylindrical, curved; apex broadly rounded with preapical, internal, short triangular projection with spiniform tip; before apical projection on ventro-internal margin with a long, compressed, curved projection gradually tapering ventrad, at tip with proximal angle obtuse, distal angle little prolonged into acute cone (Fig. 9D). Subgenital plate longer than wide; mainly in lateral areas setose; triangularly excised from base; in ventral view basal half wider than apical half; about apical third curved dorsad in a 90°-angle or little more, not visible from below; in apical view margin on both sides of excision with a small obtuse tooth at base of compressed projections; projections with concave internal surface; before rounded apex of projection with reduced tuberculate stylus with soft base; in dried specimens stylus collapsed to a fold, tubercle or weak elevation of various shapes (Fig. 9E, F). Titillators fused in middle; basal parts deviating, with nearly parallel margins to base; very base with margin partly recurved, irregular and furrowed; apical parts divided from fused central area into a pair of plates supporting the membranous phallus lobes and a subfused dorsal process; apical part of process widened, thickened, with double-fold margins and standing vertically to the plates; apical margin of apical plates granulated with granules not reaching terminal structure of process (Fig. 10C–F). Membranous part of phallus near titillator apex densely setose; on opposing side with a small elongate apico-lateral sclerite.

Female: Epiproct triangularly rounded. Cerci conical, apex pointing (Fig. 11H). Subgenital plate in general outline rounded; in alive specimens smooth (Fig. 11G), in dried specimens often distorted with folds or furrows (Fig. 11D, F); lateral areas setose. Ovipositor compressed blade-shaped; highest little behind middle; margins smooth.

Colouration: Brown. Lateral areas of scapus and pedicellus black. Vertex at hind margin with two black spots. Pronotum with narrow irregular black lateral bands. Abdomen with intersegmental membranes surrounding sternites black. Tegmen maculated. Hind wings with dark brown infumation, along fore margin paler and with white veinlets, in some specimens also along external margin brightened up (Fig. 6F). Legs indistinctly maculated.

Measurements (2 males, 3 females): Body with wings: male 39–40, female 43–44; body without wings: male 25–31, female 26–29; pronotum: male 9.2–9.5, female 8.2–8.7; tegmen: male 29.0–29.5, female 34.0–34.5; hind femur: male 21.0–22.4, female 22.5–24.6; ovipositor: female 22.0–26.5; ovipositor height: female 2.0–2.2 mm.

Etymology. — The name is derived from the locality of the oldest specimen, Selita. Two images in Ransonnet (1876) give us an idea of how the habitat looked like at the time of collection in 1871.

Jambiliara angula, new species

Figs. 6A, 7E, F, 8C, 9G, H, 10G, H

Material examined. — Holotype: male (BMNH), Malaysia: Penang, Sungei, Batu Feringgi [5°28'N, 100°15'E], dropped on jungle path from the canopy, coll. H. T. Pagden, 22 Jan.1956.

Diagnosis. — The new species differs from *J. macroptera* and *J. selita* by the stridulatory apparatus with the mirror on left tegmen being short and the mirror on right tegmen having the hind margin angular, the male cerci terminating into a triangular apex, and the titillators having the apical margin granulated unto the terminal structure of the dorsal process. The arrangement of teeth of the stridulatory file with 51 teeth per mm resembles the situation in *J. macroptera* but not in *J. selita*, while male subgenital plate and styli resemble *J. selita* but not *J. macroptera*.

Description. — As genus. Fastigium verticis conical with weak dorsal furrow; apex obtuse, nearly truncate. Pronotum with apical area little elevated, widened, shouldered and with medial carinula; humeral sinus distinct but not strong. Mesosternal lobes conical, acute. Femora with the following number of spines on ventral margins: profemur 0–1 external, 3 internal; mesofemur 3 external, 0 internal; postfemur 8–9 external, 5–7 internal.

Male: Stridulatory area of left tegmen as in Fig. 7E, F. Stridulatory file regularly curved with densely arranged teeth; 3.1 mm long, with 157 teeth, equating 51 teeth per mm; in middle of file with 43 teeth per mm (Fig. 8C). Mirror on right tegmen with hind margin angularly projecting; 2.35 mm long, 1.91 mm wide; index length to width 1.23 (Fig. 7F). Tenth abdominal tergite with dorsal area very little prolonged, surface nearly flat with shallow but wide medial furrow; apical margin in middle excised with truncate bottom and spinose projection on both sides of excision (Fig. 9H). Epiproct triangular; dorsal surface faintly grooved; margins carinate. Paraproctes with tuberculate projection. Cerci short cylindrical, curved; apex conical, obtuse with short stylate pre-apical internal tooth; before tooth, on ventro-internal

margin, with a long, compressed, curved projection pointing interno-ventrad, at tip with proximal angle obtuse, distal angle little prolonged into acute cone (Fig. 9G, H). Subgenital plate longer than wide; mainly in lateral areas setose; triangularly excised from base; in ventral view basal half wider than apical half; about apical third curved dorsad in a 90°-angle or little more, not visible from below; in apical view margin on both sides of excision with distinct right-angular constriction at base of compressed projections; projections with concave internal surface, before apex with reduced tuberculate stylus (Fig. 9G). Titillators fused in middle; basal parts deviating, with nearly parallel margins to base; very base with margin partly recurved, irregular and furrowed; apical parts divided from fused central area into a pair of plates supporting the membranous phallus lobes and a subfused dorsal process; apical part of process triangular, widened, thickened and standing vertically to the plates; apical margin of apical plates granulated with granules almost reaching terminal structure of process (Fig. 10G–I). Membranous part of phallus near titillator apex densely setose.

Female: Unknown.

Colouration: Brown. Frons medium brown, in middle less dark; labrum and genae yellowish brown; mandibles with internal and apical areas black; lateral areas of scapus and pedicellus black. Compound eyes with narrow black band. Vertex at hind margin with two black spots. Pronotum with narrow irregular black lateral bands. Abdomen with intersegmental membranes surrounding sternites black. Tegmen maculated. Hind wings at base almost transparent, otherwise with greyish brown infumation. Legs indistinctly maculated.

Measurements (1 male): Body with wings: 36; body without wings: 27; pronotum: 8.2; tegmen: 27; hind femur: 20.5; antenna: 140 mm.

Jambiliara moultonii (Karny, 1923)

Figs. 6H, I, 11I

Subria moultonii Karny, 1923: 184
Subria moultoni Otte, 1997: 70
Jambiliara (?) moultonii Ingrisch, 1998: 57

Material examined. — Holotype: female (BMNH), East Malaysia: Sarawak, Baram river, coll. J. C. Moulton, 1920.

Diagnosis and discussion. — The female type of *J. moultonii* is very similar to other females of *Jambiliara* described above, it thus clearly belongs to this genus. It differs from *J. macroptera* and *J. selita* by the triangular female subgenital plate, a wider head, and the antennal scrobae having the ventral side black. As the differences between the females of *Jambiliara* are weak, we have to wait, until the male will be discovered to find more distinct diagnostic characters. An extensive description of the type is given by Karny (1923).

Mesagraecia laticauda (Karny, 1926), new combination

Scytocera laticauda Karny, 1926: 149
Jambiliara (?) laticauda Ingrisch, 1998: 57

Material examined. — Holotype: female (BMNH), Malaysia: Perak, Batang Padang, Jor camp, 2000 ft., nocturnal, coll. H. M. Pendlebury, 2 Jun.1923.

Discussion. — The species differs from *Jambiliara* by the pronotum that is not saddle-shaped and by the overall appearance with narrow, shortened tegmina not reaching the hind knees and the dorso-ventrally higher ovipositor. It agrees in general habitus with *Mesagraecia* Ingrisch, 1998 with the exception that the disc of pronotum is rugose and less prolonged behind; the paranota are less deep and subsmooth in marginal area; and the ovipositor is more robust and more strongly dorso-ventrally expanded. The species has a more slender appearance than the other two species of the genus from Thailand and Vietnam. On the other hand, the rather narrow, a little abbreviated tegmina with truncate apex and the unsclerotised, fully membranous subgenital plate are characteristic for *Mesagraecia*. *Jambiliara laticauda* is thus transferred to the genus *Mesagraecia*. Unfortunately, the male is still unknown.

Key to Species

1. Head with frons wider; antennal scrobae in ventral area black (Fig. 9I). Female subgenital plate triangular (Fig. 11I). Male unknown. Borneo ..... *J. moultonii* (Karny, 1923)
– Head with frons narrower; antennal scrobae in ventral area concolorous (Fig. 6D). Female subgenital plate rounded or slightly excised in middle. Malay Peninsula and Sumatra ... 2
2. Stridulatory area of male tegmina as in Fig. 7E–F; mirror on right tegmen at end angularly projecting (Fig. 7F). Male cercus at apex triangular (Fig. 9H). Male titillators in dorso-apical view with margin granular to apical widening of dorsal process (Fig. 10I). Penang ..... *J. angula* n. sp.
– Stridulatory area of male tegmina as in Fig. 7A–D; mirror on right tegmen with hind margin not projecting. Male cercus at apex rounded, obtuse (Fig. 9A–C). Male titillators in dorso-apical view with granular area of margin not reaching apical widening of dorsal process (Fig. 10B) 3
3. Stridulatory area in males as in Fig. 7A–B. Stridulatory file on underside of left tegmen with teeth dense, in middle with about 58 teeth per mm (Fig. 8A). Male subgenital plate with a faint constriction at base of apical lobes (Fig. 9A); with distinct styli (Fig. 9B). Female subgenital plate faintly excised at apex (Fig. 11B). Sumatra ..... *J. macroptera* Ingrisch, 1998
– Stridulatory area in male as in Fig. 7C–D. Stridulatory file on underside of left tegmen with teeth less dense, in middle with about 43 teeth per mm (Fig. 8B). Male subgenital plate with a tooth at base of apical lobes (Figs. 9E–F); with small, button-like styli that may be collapsed in dried specimens (Fig. 9E–F). Females subgenital plate in alive specimens rounded (Fig. 11G). Singapore; Perak ..... *J. selita* n. sp.

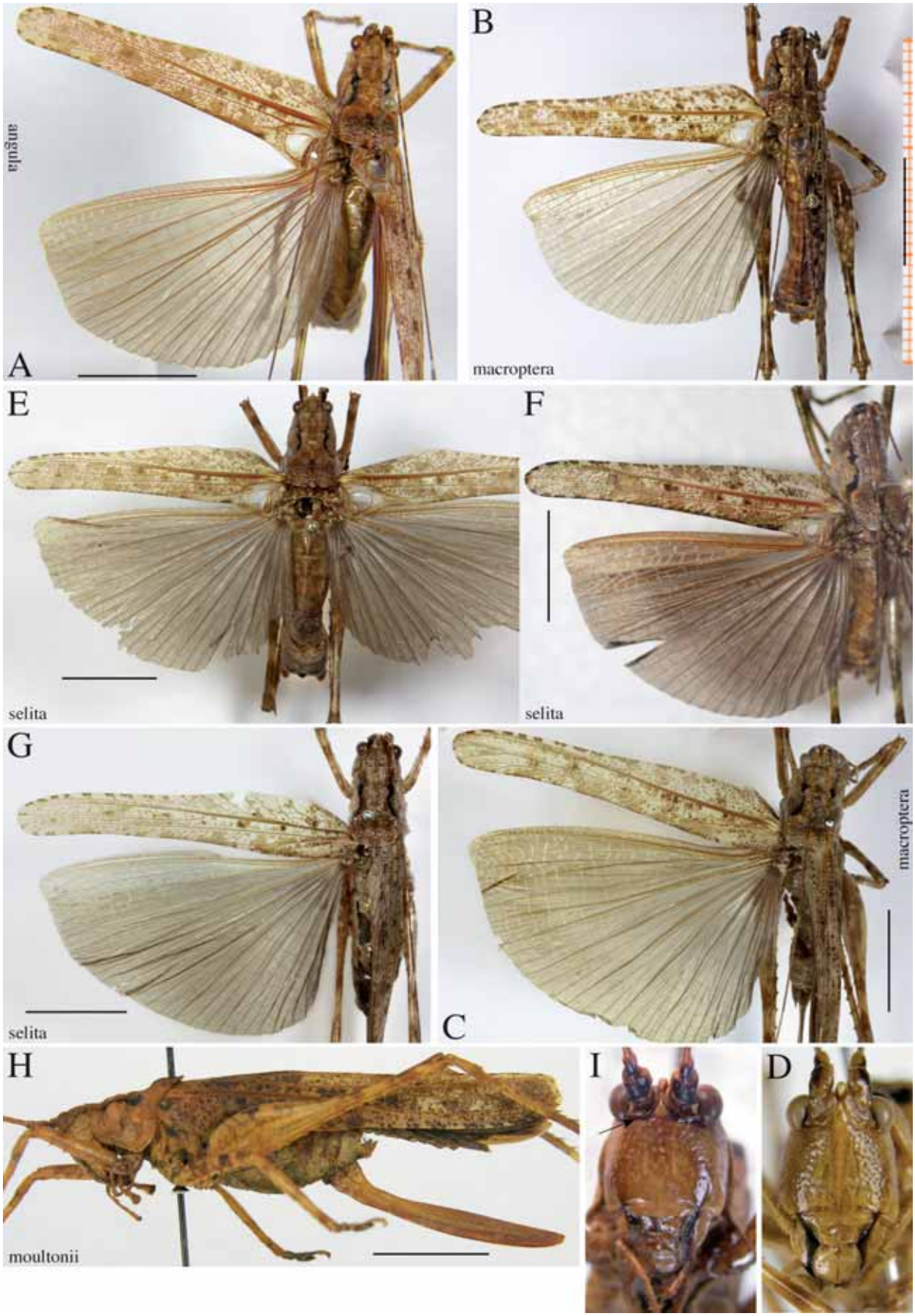

Fig. 6. *Jambiliara* species: A–C, E–G, habitus with spread wings in dorsal view; D, I, face; H, habitus in lateral view. – A, *J. angula* n. sp. male holotype; B–D, *J. macroptera* Ingrisch, 1998 (B, male from Mt. Bandahara; C, D, female holotype); E–G, *J. selita* n. sp. (E, male holotype; F, male paratype; G, female paratype from Perak); H, I, *J. moultonii* (Karny, 1923) female holotype. The arrow points at the antennal scrobus. Scale bars = 10 mm. (Photographs by: S. Ingrisch [A–I except F] and M. K. Tan [F]).

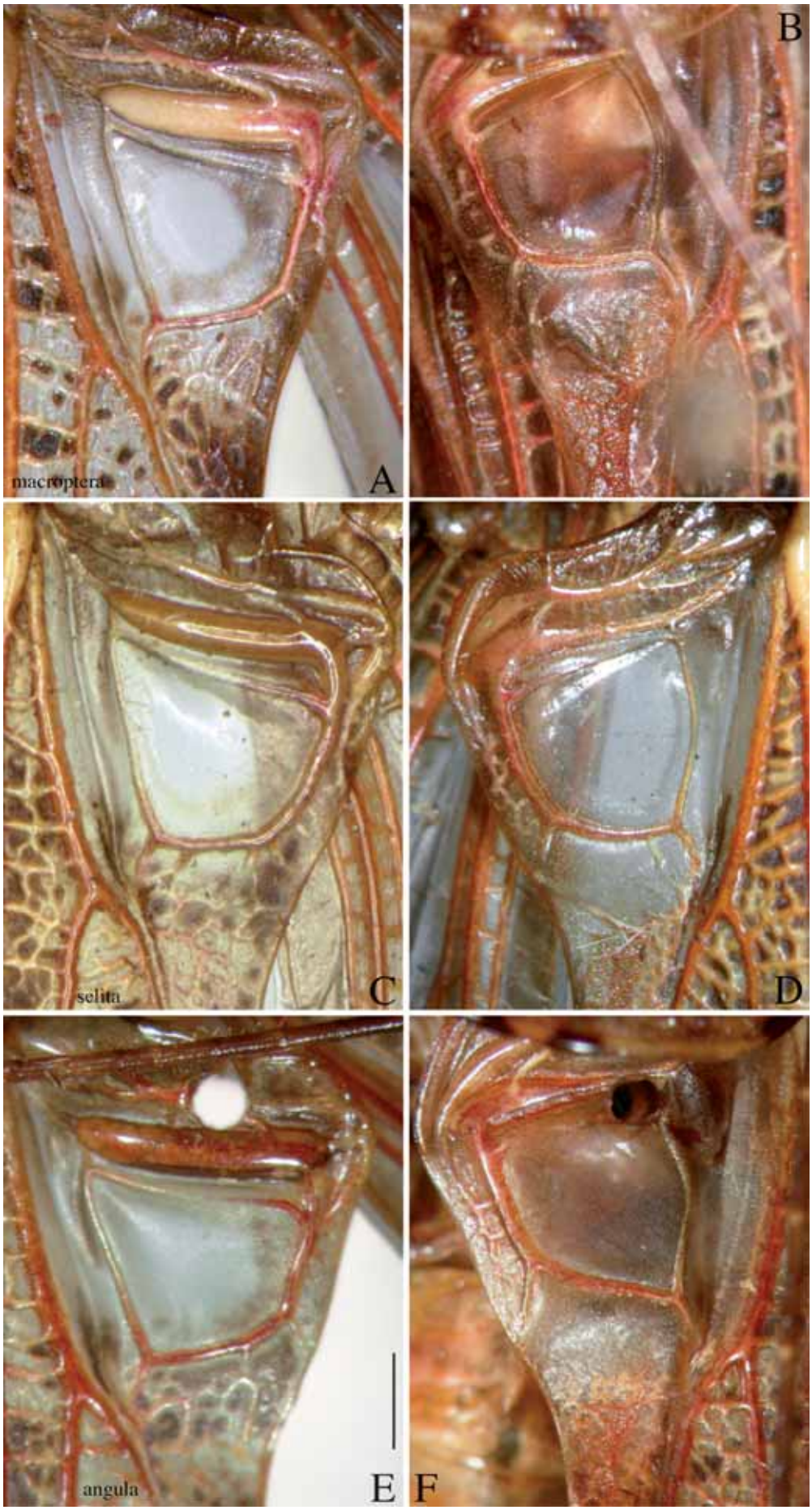

Fig. 7. Male stridulatory area of left (A, C, E) and right (B, D, F) tegmen of *Jambiliara* species: A, B, *J. macroptera* Ingrisch, 1998 from Mt. Bandahara; C, D, *J. selita* n. sp. holotype; E, F, *J. angula* n. sp. holotype. (Photographs by: S. Ingrisch).

Fig. 8. Male stridulatory file on underside of left tegmen of *Jambiliara* species: A, *J. macroptera* Ingrisch, 1998 from Mt. Bandahara; B, *J. selita* n. sp. holotype; C, *J. angula* n. sp. holotype. Scale bar = 1 mm. (Photographs by: S. Ingrisch).

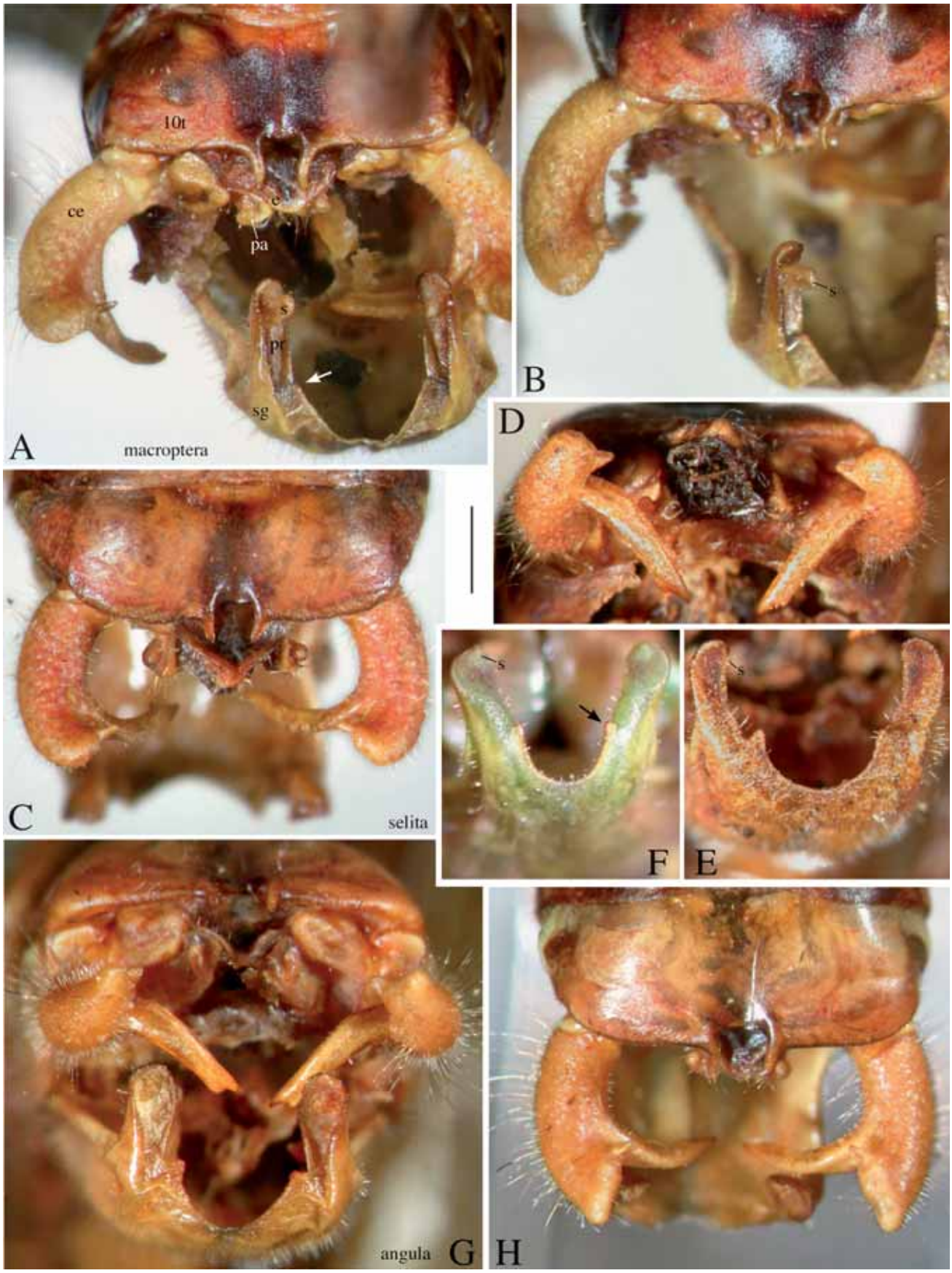

Fig. 9. Male abdominal apex of *Jambiliara* species: A, B, in oblique dorsal view; C, H, in dorsal view; D, G, in apical view; E, F, apex of subgenital plate in apical view (E, in dried specimen with styli collapsed; F, in fresh specimen with styli firm): A, B, *J. macroptera* Ingrisch, 1998 from Mt. Bandahara; C–F, *J. selita* n. sp. (C–E, holotype; F, paratype); G, H, *J. angula* n. sp. holotype. Abbreviations: 10t, tenth abdominal tergite; ce, cercus; e, epiproct; pa, paraproct; pr, projection of subgenital plate; sg, subgenital plate; s, stylus. The arrows point at the tooth or constriction of the subgenital plate lobes. Scale bar = 1 mm. (Photographs by: S. Ingrisch [A–H except F] and M. K. Tan [F]).

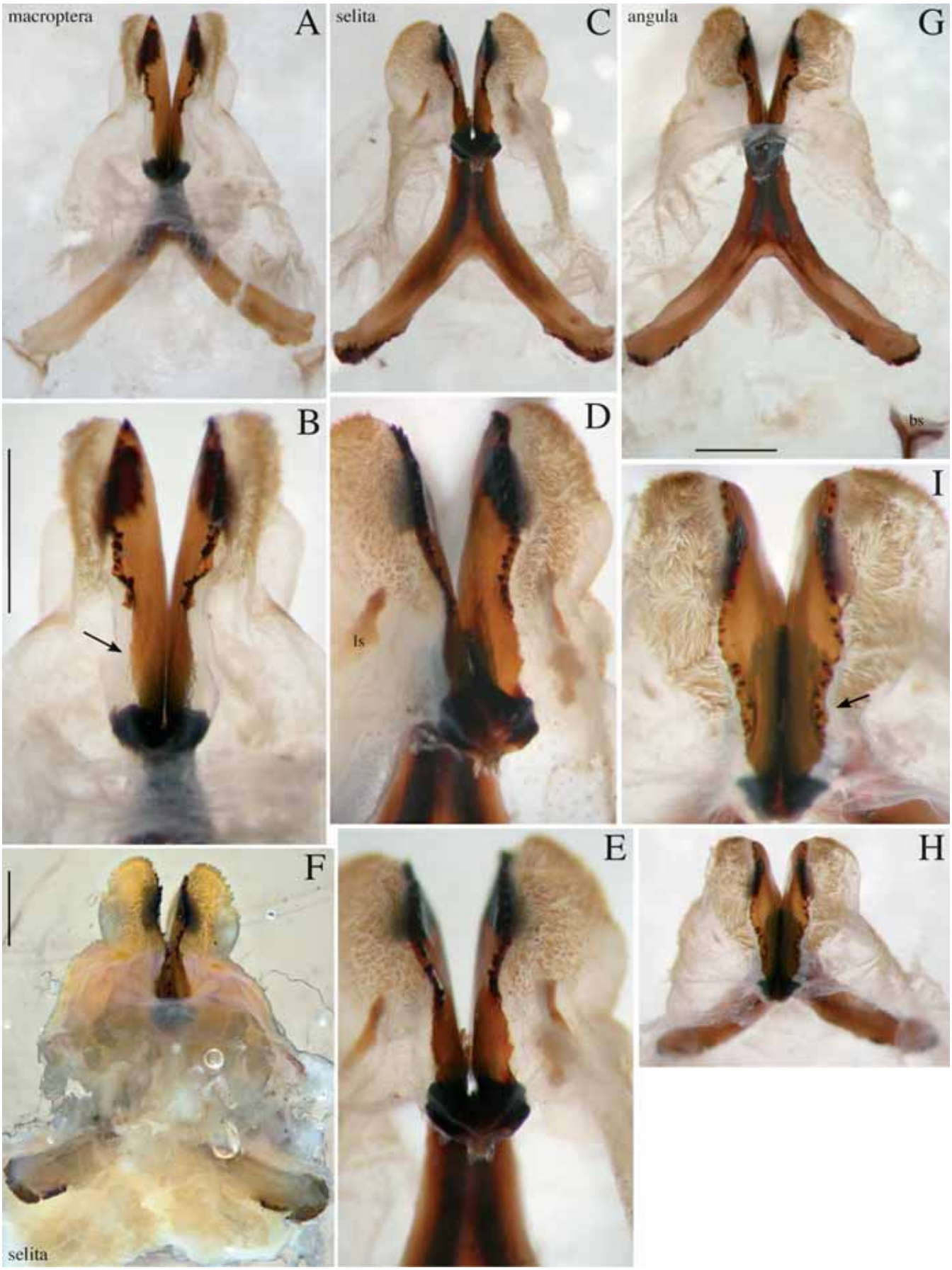

Fig. 10. Male titillators of *Jambiliara* species in dorsal view (A, C, F, G) and dorso-apical view (B, D, H, I): A, B, *J. macroptera* Ingrisch, 1998 from Mt. Bandahara; C–F, *J. selita* n. sp. (C–E, holotype; F, paratype); G–I, *J. angula* n. sp. holotype. Abbreviations: bs, baso-lateral sclerite; ls, small lateral sclerite. The arrows point at the different serrulation of the titillator margin. Scale in G for upper row and H, in B for middle row and E. Scale bars = 1 mm. (Photographs by: S. Ingrisch [A–I except F] and Y. C. Ang [F]).

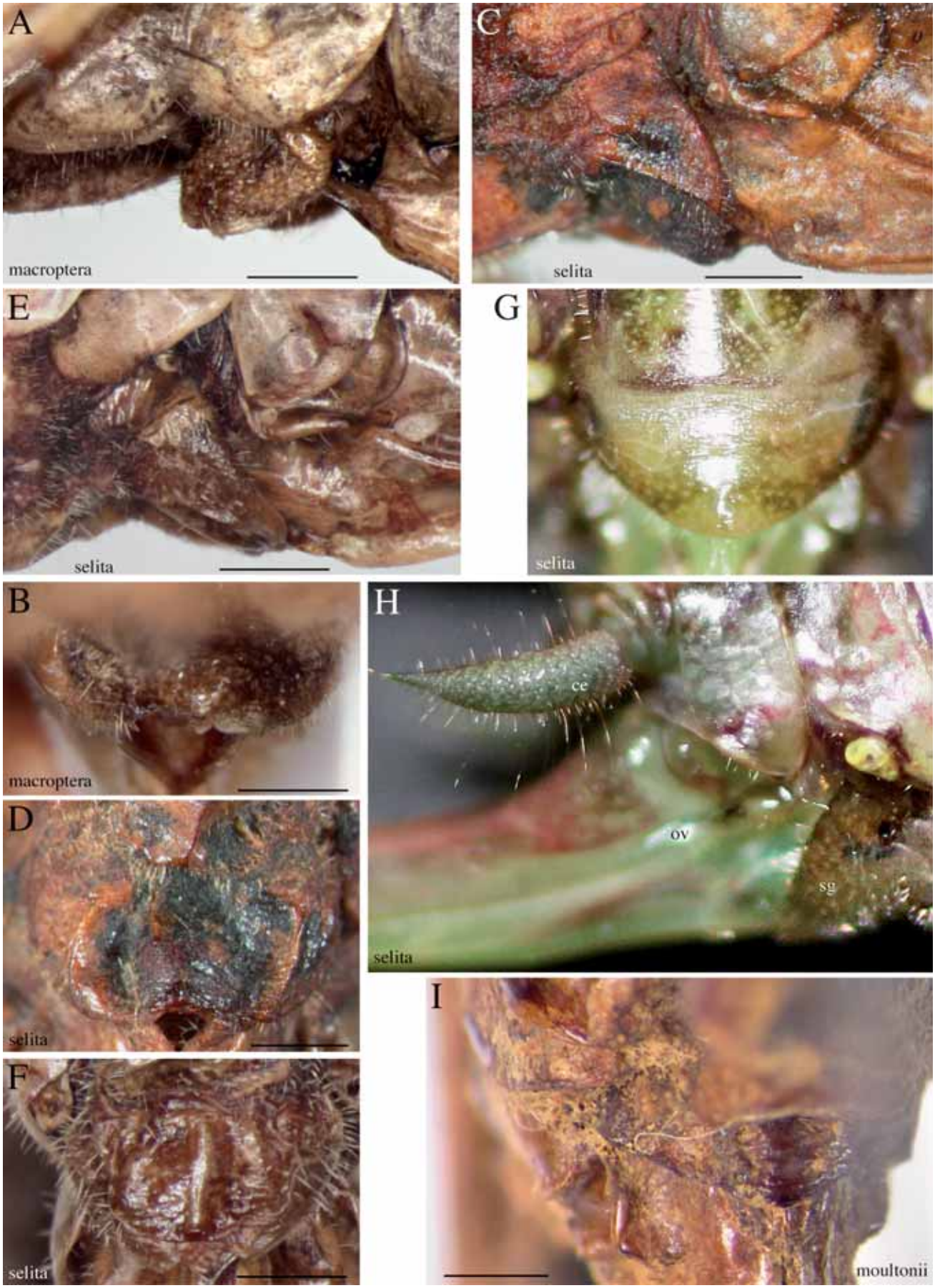

Fig. 11. *Jambiliara* species: A, C, E, H, female abdominal apex with subgenital plate in lateral view; B, D, F, G, I, female subgenital plate in ventral view: A, B, *J. macroptera* Ingrisch, 1998 holotype; C–H, *J. selita* n. sp. paratypes (C, D, from Selita; E, F, from Perak; G, H, from BTNR); I, *J. moultonii* (Karny, 1923) holotype. Abbreviations: ce, cercus; ov, base of ovipositor; sg, subgenital plate. Scale bars = 1 mm. (Photographs by: S. Ingrisch [A–I except G, H] and M. K. Tan [G, H]).

ACKNOWLEDGEMENTS

For guidance in the collections or the loan of specimens we thank Dr. G. Beccaloni and J. Marshall (London), Dr. Y. R. Suhardjono (Cibinong), Dr. U. Aspöck (Wien), Dr. L. Desutter-Grandcolas (Paris), Dr. K. Schönitzer (München), Dr. F. Willemse (formerly Eygelshoven, collection in RMNH), and H. K. Lua (curator of Zoological Reference Collection, Raffles Museum of Biodiversity Research, Singapore). The junior author is thankful to R. W. J. Ngiam, M. R. B. Ismail, T. M. Leong and H. P. M. Woo for their help in collecting specimens, Y. C. Ang for his help with the Visionary Digital System. The working visit of the senior author to the Natural History Museum London was supported by SYNTHESYS. The collection of material by the junior author and collaborators in the Central Catchment Nature Reserve and Bukit Timah Nature Reserve was granted by the National Parks Board, Singapore (NP/RP10-073).

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