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Revision of the genus *Rustia* Stål, 1866 (Hemiptera: Cicadidae: Cicadinae) including a generic synonymy, four new combinations, and two new species from the Western Ghats, India

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Abstract

The cicada genus *Rustia* Stål, 1866 is redescribed. The synonymy of *Gudaba* Distant, 1906 **n. syn.** is proposed reassigning the four species of that genus to become *Rustia apicata* (Distant, 1906) **n. comb.**, *Rustia longicauda* (Lei, 1996) **n. comb.**, *Rustia maculata* (Distant, 1912) **n. comb.**, and *Rustia marginata* (Distant, 1897) **n. comb.** Two new species, *Rustia mimuta* **n. sp.** and *Rustia kodagura* **n. sp.** that were found during our Indian cicada surveys in the Western Ghats are described. A key for the known species of the genus is provided.

Key words: Cicadinae, Cicadini, *Gudaba*, morphotaxonomy, biodiversity inventory, Peninsular India

Introduction

The genus *Rustia* Stål, 1866a was originally introduced as part of a larger taxonomic key (Stål, 1866a) without reference to an individual species. The first species to be included in the genus, *Rustia pedunculata* Stål, 1866b, was described from a female collected in ‘Cambodga’ (now Cambodia) in a separate work (Stål 1866b). However, *Rustia pedunculata* Stål turned out to be a junior synonym of *Cicada dentivitta* Walker, 1862 that was based on a male specimen collected from ‘Siam’ (now Thailand). Thus, *Rustia dentivitta* (Walker, 1861) is currently valid and the type species for the genus *Rustia*.

The use of a female to distinguish the genus meant a character important in erecting *Gudaba* Distant, 1906a, the abdominal tubercles, was not available to Stål. These tubercles were a key structure used by Distant (1906a; 1906b) to distinguish his new genus *Gudaba* and to differentiate the genus from *Rustia*. It is apparent that Distant had examples of *Rustia* while writing these works so it is unclear as to why he did not notice or include the presence of the abdominal tubercles on male specimens of *Rustia* in his description, including a male that was illustrated (Distant, 1906a). Distant continued to use the lack of abdominal tubercles in the keys he later produced (Distant, 1906b; 1914) to separate *Rustia* from related genera.

The genus *Rustia* currently contains two species known to have distributional ranges in the Indian subcontinent, Himalayas, and Southeast Asia (Metcalf 1963; Duffels and van der Laan 1985; Sanborn 2013; 2015; Price *et al.* 2016). We add two new species from the Western Ghats, India to this group along with the reassignment of four species from *Gudaba* which we propose to be a junior synonym of *Rustia*.

Material and methods

Specimen Collection. We surveyed cicadas in the Western Ghats from 2013 to 2017. We collected specimens in the field with insect nets and by hand, and preserved them either as ‘dry’, those that were only pinned specimens for morphological work, or as ‘wet and dry’, those that were pinned dry for morphological work with several legs and thoracic muscle tissue being preserved in 100% ethanol for molecular sequencing. We made every effort possible to collect several males and females of each species. These specimens are now deposited in the fully climate-controlled Research Collections of the National Centre for Biological Sciences, Bengaluru (popularly known as Bangalore), India (NCBS) and Zoological Survey of India, Kolkata, India (ZSI-K).

Dissections. We treated the last two abdominal segments of male paratypes NCBS-QA445 and NCBS-AY392 in 10% KOH to dissect male genitalia. The dissected genitalia are preserved in anhydrous glycerol and deposited in the NCBS.

Imaging. Dissected genitalia were photographed using a Leica MC120 HD digital camera mounted on a Leica S8 APO stereomicroscope. A Labomed Luxeo 2SA microscope was used to examine specimens for morpho-taxonomic work. Pinned specimens were photographed (Figure 1A–1D and 2A–2D) using a Canon EOS 1200D DSLR camera body, a Canon 60mm macro lens, and two Canon Speedlite 430 EX II flashes fitted with photography umbrellas. We used Adobe Photoshop CS5 to stack multiple photographs of pinned specimens to achieve better depth of field.

Measurements. ImageJ, an open source Java image-processing program for morphometric measurements (Schneider et al. 2012), was used to collect measurements from photographs of scaled pinned specimens.

Morpho-taxonomy. The terminology of Moulds (2005, 2012) was used for species descriptions.

SYSTEMATICS

Family Cicadidae Latreille, 1802

Subfamily Cicadinae Latreille, 1802

Tribe Leptopsaltriini Moulton, 1923

Remarks. Lee and Emery (2013) provided the following as diagnostic features for members of the Leptopsaltriini: head about as wide as or narrower than the mesonotum, a very narrow posterior pronotal collar, hyaline wings, small and scale-like male opercula, male abdominal sternite III and sometimes sternite IV with a tubercle-like projection, and male abdominal sternite VII distinctly separated from tergite 7 by folding (Lee and Emery 2013). The abdominal tubercles are unique to members of the tribe (Lee and Emery 2013).

Subtribe Gudabina Lee, 2013

Remarks. The subtribe Gudabina was first introduced by Boulard (2008). However, he failed to provide data that are required for the name to be available under the *International Code of Zoological Nomenclature* (ICZN 1999). Lee (Lee and Emery 2013) provided these data so Lee becomes the authority for the subtribe. The diagnostic features for members of the subtribe are a head about as wide as the mesonotum, a lateral pronotal collar that is not dentate, marginal areas of fore wings being extremely narrow, hind wings with five apical cells, small and scale-like male opercula, minute timbal covers, and male abdominal sternites III and IV with a projection on each posterolateral surface (Lee and Emery 2013). Two genera, *Rustia* and *Gudaba*, were included in the subtribe at its formation (Lee and Emery 2013).

Rustia Stål, 1866a

Rustia Stål 1866a: 8.

Gudaba Distant 1906a: 138. (Burma) **n. syn.**

TYPE SPECIES. *Cicada dentivitta* Walker, 1862: 304 (Siam).

SPECIES INCLUDED. *Rustia apicata* (Distant, 1906c) **n. comb.**, *Rustia dentivitta* (Walker, 1862), *Rustia kodagura* **n. sp.**, *Rustia longicauda* (Lei, 1996) **n. comb.**, *Rustia maculata* (Distant, 1912) **n. comb.**, *Rustia marginata* (Distant, 1897) **n. comb.**, *Rustia minuta* **n. sp.**, and *Rustia tigrina* (Distant, 1888).

Remarks. Stål (1866a) described *Rustia* with the following characteristics (using current anatomical terminology): mesonotum width equal to the width of head, anterior margin of head between frons and rather prominent lobes of vertex deeply incised, lateral part of eyes hemispherical inclined upwards a small amount, postclypeus somewhat prominent; rostrum short; ocelli twice distance from eyes than from one another; hind wings with five apical areas. Distant (1905a) expanded the description of *Rustia* in the same work in which he established *Gudaba*. He described both *Rustia* and *Gudaba* possessing a head with eyes about as wide as the mesonotum and about as long as the pronotum, lateral pronotal margins nearly straight, abdomen longer than the distance between the apex of the head and base of the cruciform elevation, timbal covers shorter and narrower than timbal cavities, short male opercula not covering tympanal cavity, rostrum reaching posterior coxae, anterior femora strongly spined, fore wings and hind wings hyaline with eight and five apical cells, respectively (Distant 1906a). Characters listed in one of the generic descriptions (Distant, 1906a) that apply to both genera include the length of the head being about the distance between the eyes, the ocelli being closer to one another than to the eyes, lateral margins of the vertex not in line with those of the frons, the vertical angles globosely produced, eyes somewhat pedunculate, pronotum as long as mesonotum, the structure of the pronotal collar lateral angles and sinuate lateral margin of the pronotum, transverse male opercula, abdominal sternites III and IV in males with tubercles with the tubercle on sternite III being longest, and the fore wing basal cell being much longer than broad (see images in Fig. 5). The only character that is not obviously found in both genera is the lateral margins of the head being discontinuous found in the *Rustia* description (Distant 1906a).

It is clear that the two genera share a common morphology and their status as separate genera is questionable. In addition to the shared characters from the original species descriptions, the genitalia are also highly similar. The pygofer distal shoulder is extended and wing-like curving laterad at its apex, and the uncus is broad at the base and tapering towards the apex. Distant (1906a; 1906b; 1914) used the 5 apical cells of the hind wings to distinguish *Gudaba* and *Rustia* from related genera. Distant's failure to recognize that *Rustia* possesses abdominal tubercles appears to be the reason for the erection of *Gudaba*. However, the presence of abdominal tubercles in *Rustia* was essential to the classification of the genus into their current subtribe (Lee and Emery 2013). Therefore, without any significant general morphological features that appear to be unique in the two genera, we recognize *Gudaba* Distant, 1906 **n. syn.** as a junior synonym of *Rustia* Stål, 1866a. As a result of this synonymy, the species previously assigned to *Gudaba* become *Rustia apicata* (Distant, 1906c) **n. comb.**, *Rustia longicauda* (Lei, 1996) **n. comb.**, *Rustia maculata* (Distant, 1912) **n. comb.**, and *Rustia marginata* (Distant, 1897) **n. comb.**

Description. Body size small (8–17mm body length), female shorter than male due to the male's elongated abdomen. Head about as wide as mesonotum and as long as distance between eyes, eyes protruding beyond anterior pronotal margin with a slight dorsal incline, somewhat pedunculate, ocelli closer to one another than to eyes; vertex at area of ocelli about as long as front, with a deep depression lateral to lateral ocelli and globosely produced anterolateral margins; postclypeus rounded in transverse section, lacking central sulcus, rostrum length varying among species but extended to some point between middle trochanters and abdominal sternite I. Pronotum as long as mesonotum, trapezoidal with anterior margin narrower than lateral margins of pronotal collar, lateral angles of pronotal collar slightly expanded, lateral margins of pronotal collar confluent with adjoining pronotal sclerites, sinusoidal when viewed from dorsal side. Dorsal midline of metanotum entirely concealed. Fore wing and hind wing hyaline, with eight and five apical cells, respectively, with various patterns of infuscation on apex, radial and radiomedial crossveins, distal marginal cells and ambient vein of fore wing, radial and radiomedial crossveins generally not parallel. Basal cell longer than broad and unmarked. Basal area of fore wing clavus and hind wing costal cell without infuscation. Fore wing cubitus posterior and anal vein 1 fused in part, median vein and cubitus anterior separated when meeting the basal cell, hind wing radius posterior and median veins fused at their bases, cubitus posterior and anal vein 1 unfused, and distal end of anal vein 3 straight. Fore femur with oblique primary spine, upright or less oblique secondary spine, possibly with very small apical spine, tarsi three-segmented. Male operculum small, scale-like, not covering tympanal cavity or encapsulating meracanthus, opercula well separated along midline, meracanthus tapering to a point, reaching to or past posterior margin of operculum. Abdomen longer than the distance between the apex of head and cruciform elevation in males but about the same distance in females, timbal cover small, recurved laterally forming a flattened ridge on the posterior timbal cavity, timbals

extend below wing bases, abdominal segments with parallel sides to segment 8 where they narrow posteriorly to the genitalia, sternites III and IV with tubercles on posterolateral surface, the tubercle on sternite III longer. Pygofer distal shoulder well developed extending into a point or wing-like structure that is curved laterad, dorsal beak absent, pygofer upper lobe small, adpressed to lateral pygofer, pygofer basal lobes absent, uncus well developed with broad base and tapering towards apex, uncus retractable within pygofer, claspers absent, and male aedeagus simple, restrained under uncus. Female abdominal segment 9 with dorsal beak well defined and sinuate posterior margin, ovipositor sheath extends to about the level of the dorsal beak. Female sternite VII with medial notch.

Measurements (MM). Length of body: 8.3–17.0; length of fore wing: 13.1–22.4; width of fore wing: 4.5–7.2; length of head: 0.6–1.8; width of head including eyes: 3.2–5.2; width of pronotum including suprahumeral plates: 3.6–5.2; width of mesonotum: 3.0–4.7. Female body length is generally less than in males due to the longer male abdomen.

Diagnosis. The diagnostic features for members of the subtribe as described by Lee and Emery (2013) will distinguish what is now the only genus of the subtribe from all other members of the tribe. All other Leptopsaltriini have six apical cells in the hind wing.

Distribution. The genus in its new concept is found over much of Southeastern Asia including Borneo, Burma, Cambodia, China, Himalayas, India, Indonesia, Korea, Nepal, Philippine Republic, Thailand, and Vietnam (Metcalf 1963; Sanborn 2013; 2015; Price et al. 2016). It has yet to be recorded from Laos (Lee 2014).

***Rustia minuta* n. sp.**

(Figures 1–3, Table 1, Map 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:7F9E18D0-CCBA-4CD1-AC36-22BC9B78F511>

Etymology. The name is in reference to the small body size of the species, *minuta* (L. little, small).

Type material. Holotype male (NCBS-QA436; Figure 1A–B); 16.vi.2014; Verlem village in South Goa District, Goa, India (Lat: 15.0491, Long: 74.2766, Map 1); leg. K. Marathe (NCBS). Paratypes. – Same data as holotype, six males and five females (NCBS) and two males, NCBS-QA446 and NCBS-QA448 (ZSI-K). A consolidated list of these specimens is in Table 1.

Diagnosis. *Rustia minuta* n. sp. can easily be distinguished from its congeneric species by its small body length. *Rustia minuta* n. sp. has the smallest body length (10.4mm for males and 9.8mm for females) reported for a species of *Rustia* with all other species being larger at least on average, *R. dentivitta* (female, 16.3mm), *R. tigrina* (male, 14.3mm), *R. marginata* n. comb. (male, 16.7mm), *R. apicata* n. comb. (male, 15.0mm), *R. maculata* n. comb. (male, 15.6mm), and *Rustia kodagura* n. sp. (males, 15.3mm; female, 10.3mm). The lack of infuscation on the distal fore wing veins between apical cells distinguish *R. minuta* n. sp. from *R. apicata* n. comb., *R. kodagura* n. sp., *R. longicauda* n. comb., and *R. tigrina*. The infuscation along the ambient vein of the fore wing in *R. marginata* n. comb. distinguishes it from *R. minuta* n. sp. Abdominal tergites 6–8 are dark brown or piceous in *R. maculata* n. comb. but only margined posteriorly in *R. minuta* n. sp. Finally, in *R. minuta* n. sp. the pygofer distal shoulder is curved laterad at its apex, extending to the level of the anal styles, the radiomedial crossvein is separated from the bifurcation of median veins 1 and 2 by more than its length, and the fore wing infuscation connects across apical cells 2 and 3 but in *R. dentivitta* the pygofer distal shoulder is straight, not curved, and extends well beyond the level of anal styles, the radiomedial crossvein is separated from the bifurcation of median veins 1 and 2 by less than its length, and the fore wing infuscation connects across apical cells 2–5.

Description. Basic colouration olivaceous, ochraceous, and piceous; some paratypes more piceous on head, thorax, and abdomen. Pattern on abdomen either continuous or discontinuous depending on amount of piceous pigment. Fore wings infuscation varying in intensity. Some females darker than males.

Head. Head including eyes narrower than prothorax and as wide as widest part of mesonotum, ochraceous marked with piceous. Areas around and lateral to ocelli piceous, posterior vertex and frons olivaceous and ochraceous. Epicranial suture olivaceous. Supra-antennal plate olivaceous with ochraceous anterior margin. Postclypeus olivaceous, with eight pairs of transverse grooves. Rostrum ochraceous with piceous tip, extending to hind coxa.

TABLE 1. A consolidated list and information of type specimens of *Rustia minuta* n. sp. and *Rustia kodagura* n. sp. Preservation type: (i) Wet and dry=Specimen is pinned dry for morphological work, with several legs and thoracic muscle tissue preserved in 100% ethanol for molecular sequencing. (ii) Dry only=The specimen is pinned dry without preserving tissue sample in ethanol.

Type	Voucher code	Sex	Collection locality	Collection date	Repository	Preservation type
<i>Rustia minuta</i> n. sp.						
Holotype	NCBS-QA436	♂	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Allotype	NCBS-QA432	♀	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA425	♂	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA426	♂	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA427	♀	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA428	♀	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA429	♀	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA430	♀	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA437	♂	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA442	♂	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA445	♂	Verlem village, South Goa District, Goa	2014-06-16	NCBS	Wet and dry
Paratype	NCBS-QA446	♂	Verlem village, South Goa District, Goa	2014-06-16	ZSI-K	Wet and dry
Paratype	NCBS-QA448	♂	Verlem village, South Goa District, Goa	2014-06-16	ZSI-K	Wet and dry
<i>Rustia kodagura</i> n. sp.						
Holotype	NCBS-AY378	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-07-06	NCBS	Dry only
Allotype	NCBS-AY483	♀	Honey Valley Estate, Kodagu District, Karnataka	2017-08-07	NCBS	Dry only
Paratype	NCBS-AY379	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-07-06	NCBS	Dry only
Paratype	NCBS-AY381	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-07-06	NCBS	Dry only
Paratype	NCBS-AY382	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-07-06	NCBS	Dry only
Paratype	NCBS-AY384	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-07-06	NCBS	Dry only
Paratype	NCBS-AY387	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-07-06	NCBS	Dry only
Paratype	NCBS-AY392	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-07-06	NCBS	Dry only
Paratype	NCBS-AY394	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-07-06	ZSI-K	Dry only
Paratype	NCBS-AY395	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-07-06	ZSI-K	Dry only
Paratype	NCBS-AY482	♂	Honey Valley Estate, Kodagu District, Karnataka	2017-08-07	NCBS	Dry only

Thorax. Prothorax ochraceous and piceous with some olivaceous patches. Anteriorly broad and posteriorly fused piceous fasciae present on either side of the dorsomedially depressed midline. Paramedian fissures ochraceous, longer than heavily piceous lateral fissures which reach to median piceous fasciae. Ochraceous area between paramedian and lateral fissures marked with piceous. Lateral ambient fissure and pronotal collar lateral angle piceous. Pronotal collar width greater than anterior width of mesothorax and abdomen. Mesothorax ochraceous and olivaceous with central piceous fascia, sagittal sigillae not prominently marked, parapsidal suture piceous, lateral sigillae faintly marked with piceous as is lateral mesothorax. Scutal depression piceous. Cruciform elevation olivaceous. Posterior mesothorax piceous. Ventral segments olivaceous.

Legs. Ochraceous-olivaceous marked with piceous, covered with pile. Primary spine and secondary spine of fore femur of similar size, sharp at tip, secondary spine curved near tip, small apical spine present. Hind tibia olivaceous with piceous tibial spur and tibial comb.

Opercula. Male operculum small, scale-like, almost covering tympanal cavity, not encapsulating meracanthus medially, opercula well separated along midline, meracanthus tapering to point, reaching to or past posterior margin of operculum.

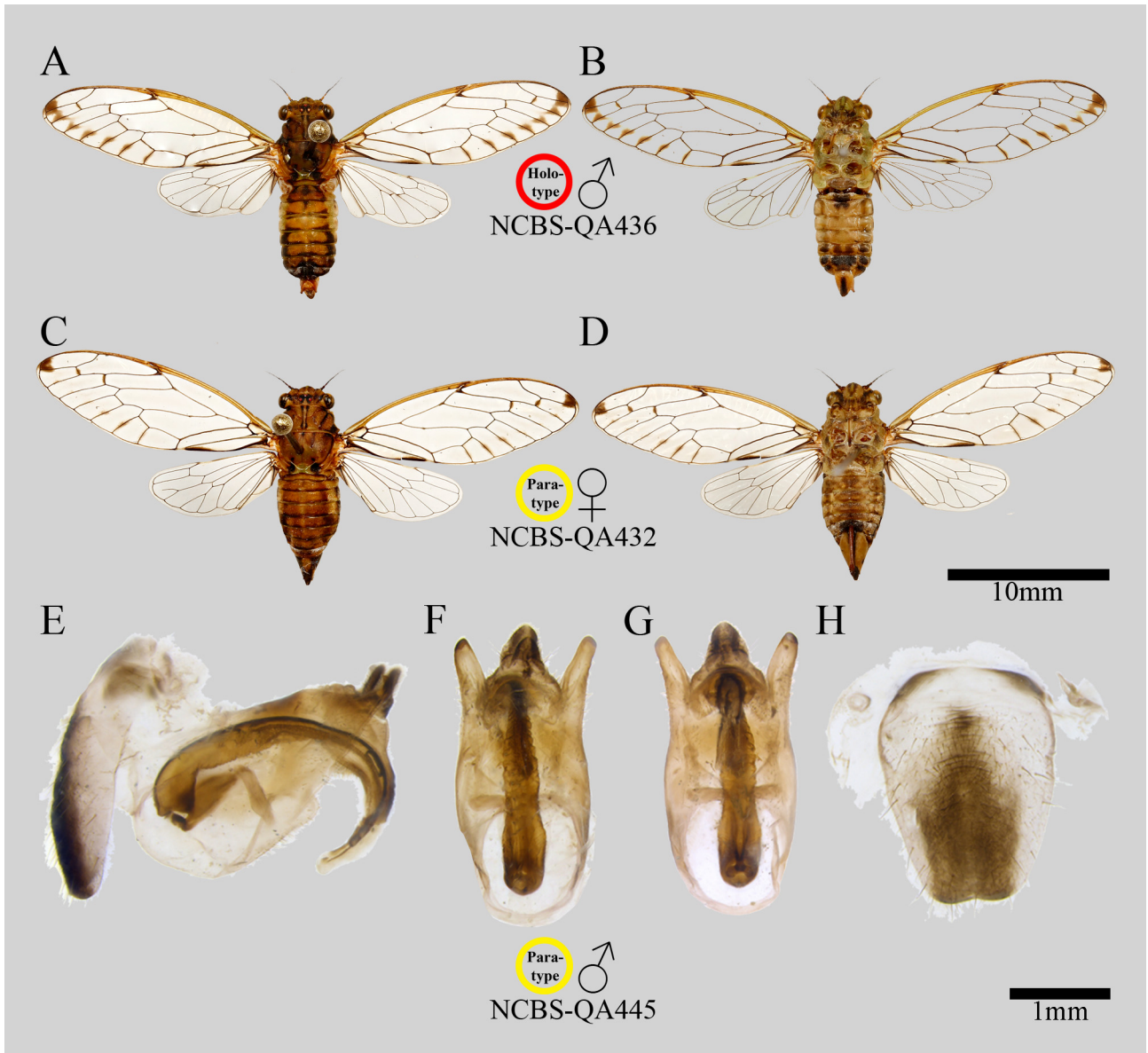


FIGURE 1. Dorsal and ventral sides of the holotype (A–B) and allotype (C–D), male genitalia (E–H) of *Rustia minuta* n. sp. Separate millimeter-scales are at the bottom of the type specimens and genitalia.

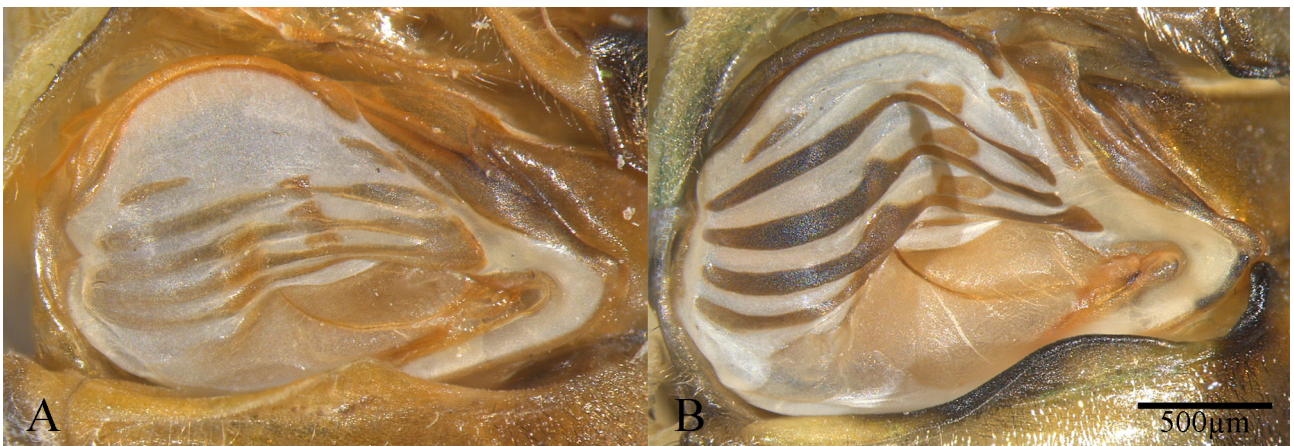


FIGURE 2. Timbal structures of *Rustia minuta* n. sp. (A) and *Rustia kodagura* n. sp. (B).

Wings. Fore wing hyaline, about 15mm in length, with 8 apical cells. Apex, radial, radiomedial, medial and mediocubital crossveins, radius anterior 2, radius posterior, median veins 1—4 and cubitus anterior 1 infuscated. Arculus piceous, costa and radius & subcostal vein ochraceous, node marked with piceous, distal subcostal vein and radius anterior ochraceous, remaining venation ochraceous proximally becoming piceous distally. Basal membrane greyish. Apical cell 1 longer than apical cell 2 and about same length as apical cells 3 and 4. Ulnar cells 1 and 3 distinctly longer than ulnar cell 2. Hind wings hyaline, about 7mm in length, with 5 apical cells, and ochraceous and piceous venation.

Abdomen. Timbals with four ribs (Fig. 2), completely exposed, timbal covers rudimentary not covering any portion of timbal. Tergite 1 ochraceous medially, piceous laterally. Tergite 2 brownish with central piceous fascia and piceous fasciae on dorsolateral surface. Tergites 3—6 ochraceous with piceous fascia on dorsolateral surface, incomplete anteriorly on tergites 3 and 4, with transverse medial extensions. Tergites 7 and 8 with prominent piceous band covering most of the segments. Sternites ochraceous except for piceous marks on midline of sternite II and anterior of sternite III, either side midline on sternite VI and sternite VII are piceous. Ochraceous tubercles on lateral sides of sternites III and IV with tubercles on sternite III larger and more prominent. Tympanal cavity clearly visible.

Genitalia. Male pygofer (Figure 1E–H) – pygofer oblong, pygofer distal shoulder extended almost to level of anal styles, tapering to apex, curved laterad when viewed from posterior. Upper pygofer lobes directed slightly outward with lobed tips. Anal styles prominent. Uncus median lobe tapered ventromedially, apex of uncus bifurcated with tips recurved medially. Aedeagus wider proximally with tapered distal end with basal plate bifurcated and extended laterally, hinge with curved cylindrical theca.

Measurements (MM). N = 8 males and 5 females, mean (range). Length of body: male 10.4 (9.9—12.6), female 9.8 (8.3—11.9); length of fore wing: male 14.7 (13.1—15.0), female 14.7 (14.0—15.7); width of fore wing: male 4.8 (4.5—4.9), female 4.8 (4.6—5.0); length of head: male 0.9 (0.7—1.2), female 0.9 (0.6—1.3); width of head including eyes: male 3.4 (3.2—3.7), female 3.4 (3.4—3.6); width of pronotum including suprahumeral plates: male 3.8 (3.6—4.0), female 3.8 (3.6—4.1); width of mesonotum: male 3.3 (3.0—3.4), female 3.3 (3.2—3.6).

Ecology and distribution. *Rustia minuta* n. sp. is currently known from a single location, Verlem in the South Goa District of the Indian state of Goa but may be found across the northern Western Ghats. Verlem has a mix of moist deciduous to semi-evergreen vegetation dominating the habitat (Fig. 3). Adults were abundant and found mostly on shrubs or shrub-like plants. The adults are gregarious and interestingly, preferred to perch on the underside of leaves while they were calling. A single leaf was typically occupied by two or more individuals which made it easy to handpick them. Their activity did not cease due to heavy rains which indicates that *R. minuta* n. sp. could be a monsoon species with June representing the beginning of their season. The population did not appear to be biased towards a particular sex when sampled. We did not record their calls but the calls were feeble and almost inaudible. As new information on this species is generated, it will be made available on the Cicadas of India website (<http://www.indiancicadas.org/sp/573/Rustia-minuta>).

***Rustia kodagura* n. sp.**

(Figures 2–4, Table 1, Map 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:4032F9A0-68DC-4025-A68A-F07C701661A0>

Type material. Holotype male (NCBS-AY378; Figure 4A–B); 06.vii.2017; Honey Valley Estate in Kodagu District, Karnataka, India (Lat: 12.2204, Long: 75.6560, Map 1); leg. A. Sanyal, G. S. Girish Kumar, and N. Achari (NCBS). **Paratypes.** Same data as holotype, six males (NCBS) and two males, NCBS-AY394 and NCBS-AY395 (ZSI-K). Same data as paratype except collection date 07.viii.2017, one female and one male. A consolidated list of these specimens is provided in Table 1.

Etymology. The name is reference to the name of the region in the native language of the area where the type series was collected; *kodagura* in the Kodava language means anything that belongs to the Kodagu (Coorg) region.

Diagnosis. *Rustia kodagura* n. sp. can be distinguished from *R. dentivitta*, *R. maculata* n. comb., *R. marginata* n. comb., and *R. minuta* n. sp. by the infuscation on the distal fore wing veins between apical cells in these species. Similarly, the infuscation on the fore wing of *R. apicata* n. comb., *R. longicauda* n. comb., and *R. tigrina* is found only on the apex of the fore wing in these species while there is additional infuscation on the radial and radiomedial

crossveins and the proximal base of radius anterior 2. In addition, *R. kodagura* **n. sp.** has narrow elliptical fore wings with an angle at the node while the margin is smoothly curved in all other species.



FIGURE 3. Habitat at the type locality of *Rustia minuta* **n. sp.**, Verlem, South Goa District, Goa (A) and *Rustia kodagura* **n. sp.**, Honey Valley Estate, Kodagu District, Karnataka (B).

Description. Basic coloration olivaceous and piceous; some paratypes more ochraceous. Piceous pigment on the prothorax, mesothorax, and abdomen variable. Fore wings infuscation varying only slightly in intensity. Brownish-piceous female largely resembling male counterpart.

Head. Head including eyes narrower than prothorax and the widest part of mesothorax, olivaceous marked with piceous. Area around ocelli (epicranial suture and epicranial suture anterior arm) and areas anteriorly adjacent to it piceous. Supra-antennal plate piceous. Lateral ocelli elevated compared to median ocellus. Areas between ocelli and lateral epicranium depressed. Antennae piceous, pedicel partly olivaceous. Postclypeus olivaceous with eight pairs of transverse grooves. Rostrum olivaceous with piceous tip reaching to abdominal sternite I.

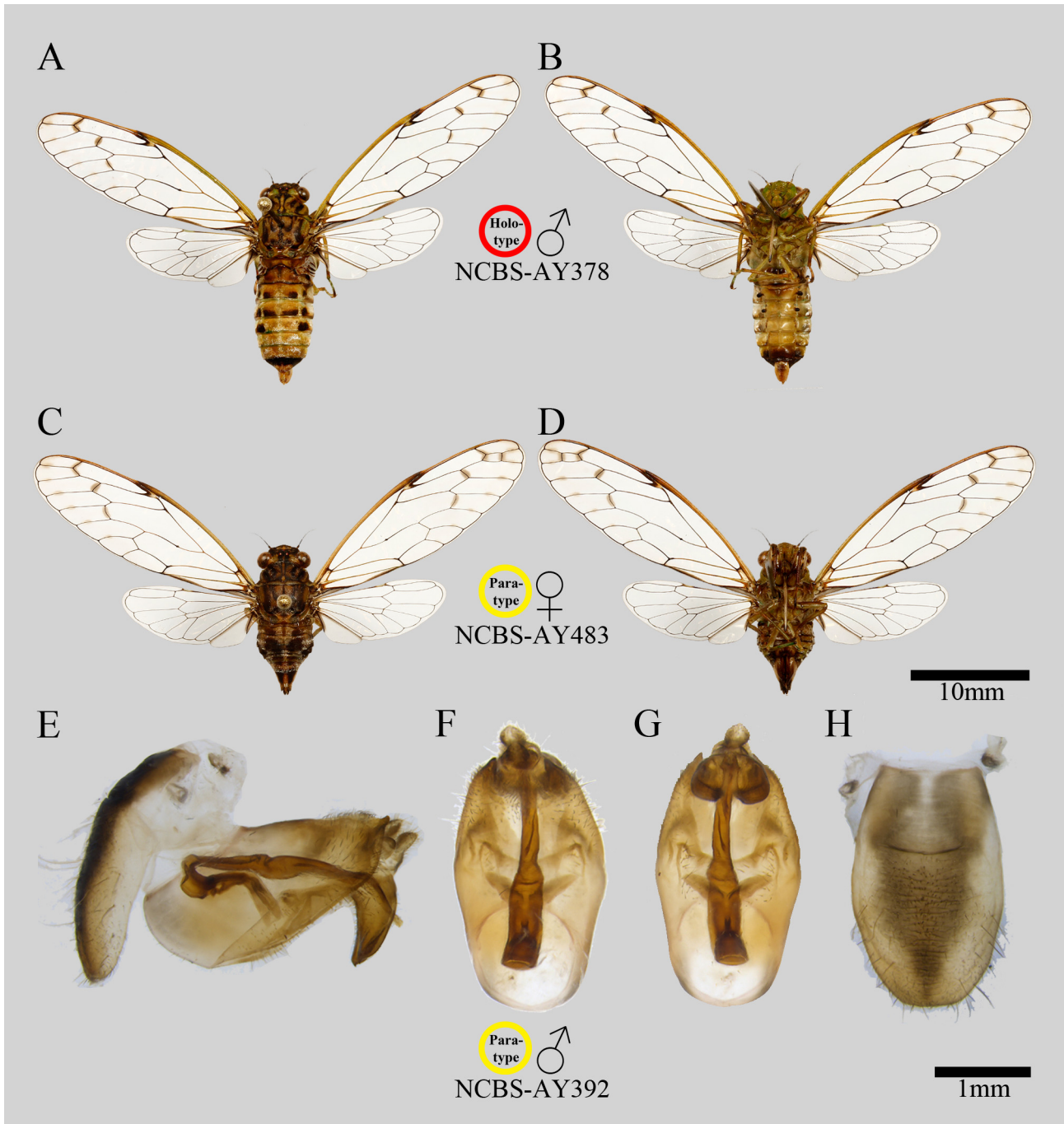


FIGURE 4. Dorsal and ventral sides of the holotype (A–B) and allotype (C–D), male genitalia of (E–H) of *Rustia kodagura* n. sp. Separate millimeter-scales are at the bottom of the type specimens and genitalia.

Thorax. Prothorax olivaceous marked with piceous, female brownish where male olivaceous. Central olivaceous fascia, mildly biconcave shaped piceous fasciae on either side, anterior ends broad and merging medially on posterior end. Paramedian and lateral fissures almost equal in length, piceous. Lateral ambient fissure, lateral angle of the pronotal collar and posterior pronotal collar margin piceous. Pronotal collar wider than anterior mesothorax, almost as wide as abdominal tergite 4. Mesothorax ochraceous and piceous dorsally, olivaceous laterally. Central piceous fascia, narrow anteriorly expanding laterally near posterior to merge with scutal depressions, extending to cruciform elevation appearing trilobed at terminus. Piceous along parasidal suture. Piceous fascia along lateral lateral sigillae, narrowed anteriorly, expanding posteriorly terminating in wing groove. Cruciform elevation olivaceous. Ventral side olivaceous.

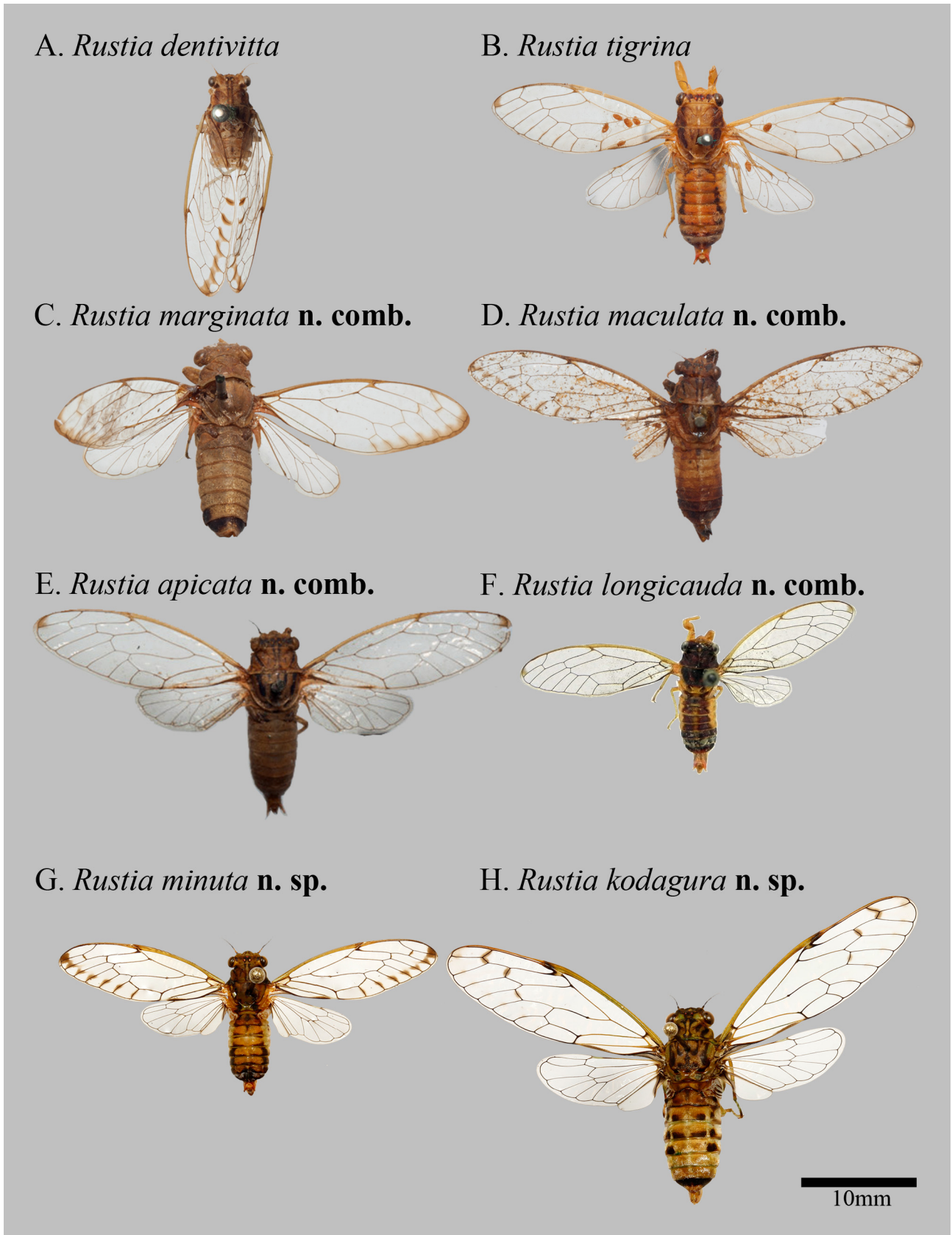


FIGURE 5. A comparison of all the know members of *Rustia* genus. (A) *Rustia dentivitta* (Walker, 1862), (B) *Rustia tigrina* (Distant, 1888), (C) *Rustia marginata* (Distant, 1897) **n. comb.**, (D) *Rustia maculata* (Distant, 1912) **n. comb.**, (E) *Rustia apicata* (Distant, 1906c) **n. comb.**, (F) *Rustia longicauda* (Lei, 1996) **n. comb.**, (G) *Rustia minuta* **n. sp.**, and (H) *Rustia kodagura* **n. sp.**

Legs. Olivaceous marked with piceous. Fore femur primary spine blunt at the tip, piceous, secondary spine sharp at the tip, angled, piceous. Small apical spine situated distally to the secondary spine. Hind tibia olivaceous, tibial spur and tibial comb piceous.

Opercula. Male operculum small, scale-like, almost covering tympanal cavity, not encapsulating meracanthus medially, opercula well separated along midline, meracanthus tapering to a point, not reaching to posterior margin of operculum.

Wings. Fore wing hyaline, about 21mm in length, with 8 apical cells, basal cell slightly clouded. Radial, radiomedial and medial crossveins and proximal radius anterior 2 prominently infuscated, radius anterior 2, radius posterior, median veins 1–4, and cubitus anterior 1 mildly infuscated sub-distally, apex of wing mildly infuscated. Arculus piceous, costa and radius & subcostal vein olivaceous, node piceous, subcostal vein and radius anterior ochraceous, median vein, cubitus anterior, cubitus posterior + anal vein 1 and anal vein 2+3 olivaceous, remaining venation piceous. Basal membrane greyish. Apical cell 1 longer than apical cell 2, apical cell 3 or 4 longest, about the same size. Ulnar cells 1 and 2 about the same length, much shorter than ulnar cell 3. Hind wing hyaline, about 11mm in length, with 5 apical cells. Veins ochraceous proximally, becoming piceous distally. Radius posterior mildly arched.

Abdomen. Timbals with four ribs (Fig. 2), completely exposed, rudimentary timbal cover not covering any portion of timbal. Tergite 1 brownish, transverse piceous fascia on anterior and posterior margins, tergite 2 with piceous anterior margin between timbal cavities and piceous spot near dorsal timbal cover. Piceous mark near posterior margin on either side of midline and dorsolateral surfaces on tergites 3 and 4. Tergite 5 piceous only laterally. Tergites 6 and 7 olivaceous. Tergite 8 mainly piceous with olivaceous posterior margin. Sternites olivaceous except piceous sternite VII with olivaceous anterolateral margins. Sternites III and IV with a pair of piceous tubercles on the lateral surfaces, tubercles on sternite III larger. Tympanal cavity clearly visible.

Genitalia. Pygofer oblong, distal pygofer shoulders with pointed dorso-posterior tip reaching to base of anal styles (Figure 4E–H). Upper pygofer lobes short extending distally. Anal styles prominent. Median uncus lobe tapered ventro-medially, pronounced bifurcated opposing tips recurved medially. Aedeagus bifurcated laterally, extended basal plate, flattened hinge, proximally flattened theca region, cylindrical middle region with tapered terminus.

Measurements (MM). N = 9 males or 1 female, mean (range). Length of body: male 15.3 (14.6–17.0), female 10.3; length of fore wing: male 21.1 (19.9–22.4), female 20.7; width of fore wing: male 6.7 (6.3–7.2), female 6.6; length of head: male 0.9 (0.8–1.0), female 1.0; width of head including eyes: male 4.4 (4.1–4.8), female 4.4; width of pronotum including suprahumeral plates: male 4.8 (4.5–5.1), female 4.6; width of mesonotum: male 4.3 (3.9–4.6), female 4.1.

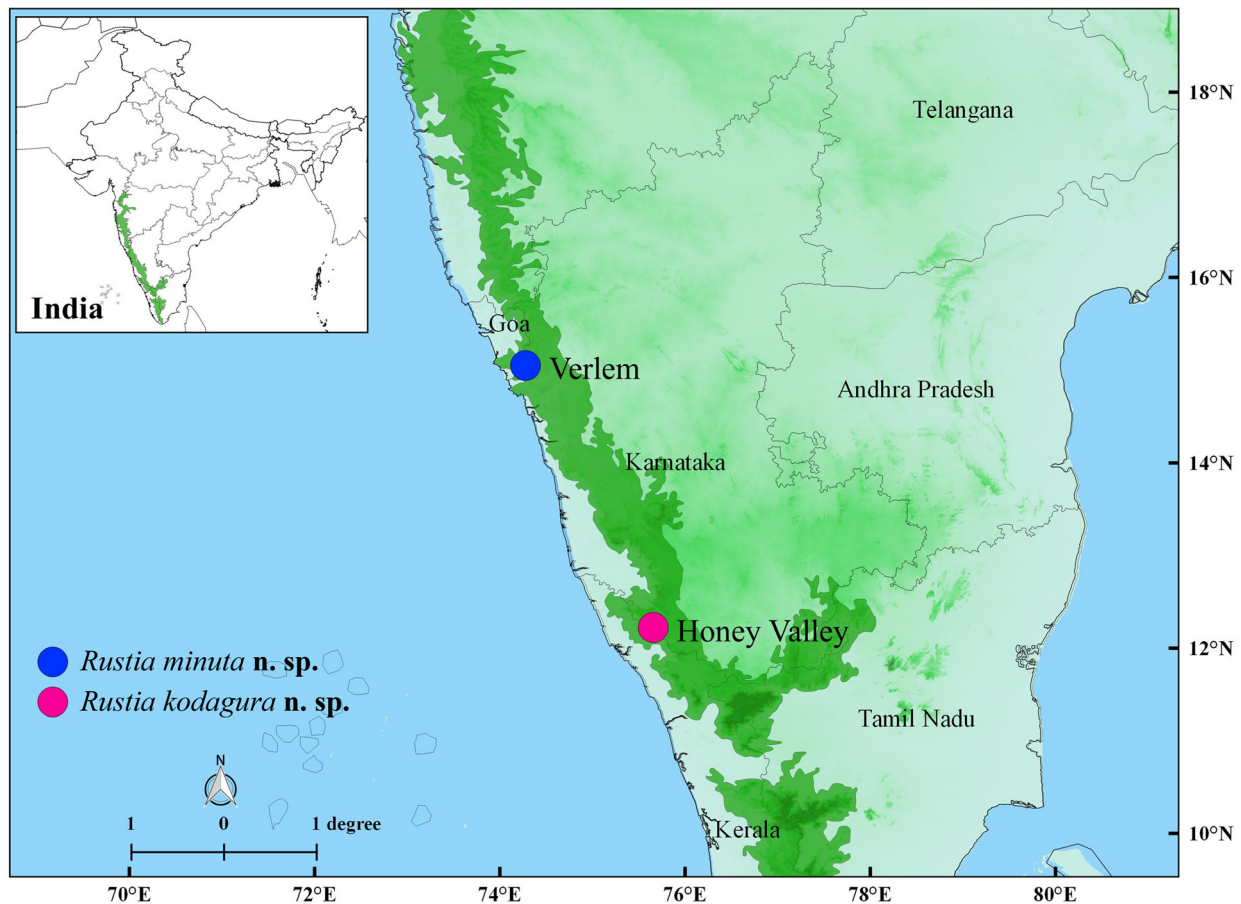
Remarks. The female paratype is considerably smaller than the holotype.

Ecology and distribution. *Rustia kodagura* n. sp. is currently known from two locations, the type locality of Honey Valley and a photographic observation from Thadiyandamol both in the Kodagu District of the Indian state of Karnataka but the species may be distributed across the Western Ghats. Honey Valley has a mix of coffee plantation, semi-evergreen and evergreen vegetation types dominating the habitat (Fig. 3). Adults were abundant and found on trees, unlike *R. minuta* n. sp.. Just a few individuals typically occupied a single tree and preferred the tree stem for perching. Adults activity did not appear to cease due to heavy rains which indicates that *R. kodagura* n. sp. is also monsoon species. It appeared that the population was male biased at the time of sampling. We did not record their calls but the calls were easily heard even without special attention. As new information on this species is generated, it will be made available on the Cicadas of Indian website (<http://www.indiancicadas.org/sp/574/Rustia-kodagura>).

Key to the species of *Rustia*

1	Fore wing with infuscation on all distal veins between apical cells	2
1'	Fore wing with a spot of infuscation only on apex	5
2	Infuscation extending along ambient vein of fore wing	<i>R. marginata</i> n. comb.
2'	Infuscation not extending along ambient vein of fore wing	3
3	Abdominal tergites 6–8 dark brown or piceous	<i>R. maculata</i> n. comb.
3'	Abdominal tergites 6–8 with ground color or only posterior margin marked with piceous	4

- 4 Pygofer distal shoulder curved laterad at apex, extending to level of anal styles, radiomedial crossvein separated from bifurcation of median veins 1 and 2 by more than its length, fore wing infuscation connecting across apical cells 2 and 3 *R. minuta* n. sp.
- 4' Pygofer distal shoulder straight, not curved, extending beyond level of anal styles, radiomedial crossvein separated from bifurcation of median veins 1 and 2 by less than its length, fore wing infuscation connecting across apical cells 2–5 *R. dentivitta*
- 5 Infuscation on fore wing radial and radiomedial crossveins and base of proximal radius anterior 2. *R. kodagura* n. sp.
- 5' Infuscation lacking on fore wing radial and radiomedial crossveins and base of proximal radius anterior 2 6
- 6 Abdominal tergites with dorsolateral dark markings producing an angled longitudinal stripe of dorsolateral abdomen *R. tigrina*
- 6' Abdominal tergites without dorsolateral dark markings. 7
- 7 Mesonotum marked with piceous in submedian and lateral sigillae, distal shoulder of pygofer strongly curved laterally *R. apicata* n. comb.
- 7' Mesonotum ground color or only marked with piceous in submedian sigillae, distal shoulder of pygofer weakly curved laterally. *R. longicauda* n. comb.



MAP 1. Verlem, the type locality of *Rustia minuta* n. sp. in South Goa District of the Indian state of Goa and Honey Valley, the type locality of *Rustia kodagura* n. sp. in Kodagu District of the Indian state of Karnataka.

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