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Description of three new species of the genus *Mata* Distant, 1906 (Hemiptera: Cicadidae: Cicadinae: Oncotympanini) with notes on their natural history from Indian state of Meghalaya, India

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ABSTRACT

Three new species of the Asian genus *Mata* Distant, 1906 (Hemiptera: Cicadidae) *viz. Mata lenonia* **sp.nov.**; *Mata ruffordii* **sp.nov.** and *Mata meghalayana* **sp.nov.** are described from Indian state of Meghalaya. Keys and taxonomic descriptions of these species are provided with detailed accounts of their natural history and acoustics.

KEY WORDS: Indo-Burma Biodiversity Hotspot, Cicada, *Mata*, Species Discovery, Natural History, Meghalaya

INTRODUCTION

The genus *Mata* Distant, 1906 is represented by two described species (Sanborn 2013) *viz. Mata kama* (Distant, 1881), which was first described from Darjeeling of Indian state of West Bengal (Distant 1881; 1906) and *Mata rama* Distant, 1912, described from Bhutan (Distant 1912). *Mata kama* (Distant, 1881) is distributed in India, Java, Malay states (Metcalf 1963) and Nepal (Duffels and van der Laan 1985) and *Mata rama* Distant, 1912 is known only from Bhutan and China (Sanborn 2013; Price *et al*. 2016). During our ongoing survey on cicada diversity in the Indian state of Meghalaya, we have come across three species of *Mata* that are distinct from these two known species of this genus. The taxonomic accounts of these three newly discovered species are described below along with their acoustics and natural history.

MATERIALS AND METHODS

The cicadas in the field were detected by their calls, a method Boulard (2007) termed as ‘sonoguidance’ in his work on Thai cicadas. Individuals of the two cicada species discovered in the year 2017 were observed through Canon EOS-600D Rebel T3i Digital SLR with Sigma 70-300mm APO-Digimacro lens, while the species discovered in the year 2014 was observed in habitus with naked eyes in close proximity, and in both the cases the observed behaviour was noted down. A custom made handheld swipe net with fine mesh bag was used to catch the cicadas except one species where the holotype was collected when it was attacked by a spider and fell to the ground. All the specimens were collected in 99% ethanol initially and later pinned with their wings expanded. The male genitalia were extended before drying the specimen.

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Live cicadas were photographed as instructed in Sarkar (2015), using Canon EOS-800D DSLR with Sigma 70-300mm APO-Digimacro lens; pinned specimens were photographed using Canon EOS-70D with Canon 100mm macro lens and the male genitalia were photographed using Canon 18-55mm lens with reverse mount ring. All the figures were prepared in Adobe Photoshop. Morphometric measurements of the adult cicadas were taken from images using ImageJ (64-bit Java 1.6.0) software. The scale of the software was set from the known scale shown in the ruler in the image and the required measurements were taken keeping it as reference. The measurements presented here are adopted from Sarkar (2019). Terminology used for the description of the adult cicada is adopted from Moulds (2005).

The male timbal calling songs were recorded using a Telinga unidirectional microphone with parabola connected with a handheld digital recorder (model H6, Zoom Inc., Hauppauga, NY, USA). The used equipment could only capture signals to 22kHz. The sound was recorded in WAVE format with the sampling rate of 48 kHz in 24 Bit dynamic range. Raven Pro 1.5 (Cornell Lab of Ornithology) was used for viewing, analysing song signals, and preparation of 'Cards for Identification by Acoustics' (here onward mentioned as CIA) as shown by Boulard (2013), and Microsoft Excel was used for statistical evaluation. Further information and images of these newly described species will be made available on the Cicadas of India website (https://www.indiancicadas.org/#!/tx/154-Mata).

SYSTEMATICS

Family Cicadidae Latreille, 1802

Subfamily Cicadinae Latreille, 1802

Tribe Oncotympanini Ishihara, 1961

Genus *Mata* Distant, 1906

Distant (1881) described *Mata kama* under the genus *Pomponia* Stål, 1866 but later erected the genus *Mata* Distant, 1906 and changed the combination based on the character set of sinuate lateral margins of timbal covers, their posterior angles only projecting beyond abdominal margins, and tegmina more than three times longer than their width, which are the key characters to distinguish it from other related genera (Distant 1906). Apart from these structures, Distant (1906) described the following characters: head (including eyes) as wide as base of mesonotum and distinctly shorter than the distance between eyes; pronotum shorter than mesonotum, its minutely convex lateral margins sinuate before the posterior lateral angles, which are moderately lobately produced; short abdomen in males, as long as the length between apex of head and base of cruciform elevation; tympanal orifices completely covered; metasternum prolonged in a broad, oblong, laminate process between the opercula, which are short, transverse, and not extending beyond the base of abdomen, their lateral margins visible from above; rostrum reaching the posterior coxae; anterior femora with spines beneath; forewing maculate, very long and narrow with eight apical areas; the basal cell longer than broad, and the hind wings with six apical areas. Almost all of these characters match all three species that are described below under this genus. However, these keys were drawn from one single species *viz. Mata kama*, and amongst all the structures, one single feature, a maculate forewing, is not accurate and consistent for all the species of the genus. The forewing is maculate in all the known species except one of the newly described species with clear forewings hence this diagnostic character can be modified for the key to this genus.

Comparison of species classified in the genus *Mata*

Postclypeus green with prominent black median part and black transverse groove laterally. Basal cell in forewing transparent with prominent infuscation radiomedial crossvein, first and second cubitus anterior veins, entire median vein, mediocubital crossvein and median crossvein of forewing. Male operculum short and entirely green with thin suffused black margin. First tergite brown. Second tergite narrowly green posteriorly in the mid with dark brown in the middle and green towards timbal cover. Timbal cover green dorsally with black triangular patch in anterior part and white spot covered with fine white scales on the lateral part which continue as traces laterally in the third tergite. . . . . ***M. kama* (Distant, 1881)**

Postclypeus green with traces of median black line. Basal cell in forewing transparent with prominent infuscation only in radiomedial

crossvein. Male operculum short, green at the centre with well spread, dark edges that are suffused broadly towards inside. First tergite brown with posterior black margin. Second tergite greenish brown in the middle with thin green posterior border. Timbal cover predominantly black with traces of fine white scales laterally which continue on the third tergite . . . ***M. rama*** **Distant, 1912**

Small when compared to other species of this genus. Postclypeus entirely green without any median black line. Basal cell in forewing entirely green. Forewing without any infuscation. Male operculum short and entirely green. First tergite green to greenish brown. Second tergite brown in the middle with dark posterior border. Entire anterior part of timbal cover black which is adjoining to the median brown patch of the second tergite. The entire posterior part of the timbal cover white with overlaid white fine scale which is wider at the dorsal end and narrows at the lateral part, appearing as a white triangular spot from the side. There are no traces of white scales continuing on the third tergite. . . . . ***M. lenonia*** **sp. nov.**

Postclypeus greenish brown with prominent black median part and black transverse groove fading laterally. Tip of the transparent basal cell in forewing has traces of infuscation. Prominent infuscation in radiomedial crossvein, first and second cubitus anterior veins, all distal median veins, mediocubital crossvein and median crossvein of forewing. Male operculum short and greenish brown with broad dark edges which is suffused to some extent posteriorly. First tergite appears white in live specimen with overlaid white fine white scales and appear brown with posterior black margin in pinned specimen. Second tergite greenish brown in the middle with thin green bordered posteriorly and black border at the sides, adjacent to the timbal cover. Timbal cover predominantly white with overlaid white fine scales and anterior angular black spot which does not extend dorsally. Traces of white pollinosity extend clearly dorsally and laterally on the third tergite . . . . . ***M. ruffordii*** **sp. nov.**

Postclypeus green with prominent thin median black line. Basal cell in forewing transparent with faint traces of infuscation at the tip. Prominent infuscation in radiomedial crossvein and faint infuscation in medial crossvein, mediocubital crossvein, first cubitus anterior vein and all distal median veins. Male operculum short and entirely green with traces of thin black border at the posterior inner edge. First tergite brown with thin posterior black margin. Second tergite rich brown in the middle with thin green bordered posteriorly and black border adjacent to the timbal cover that extends between the central brown batch and green posterior border. Timbal cover almost half black and half white, the anterior and dorsal half black and the rest white and overlain with fine white scales which do not extend to the third tergite . . . . . ***M. meghalayana*** **sp. nov.**

Species descriptions

1. *Mata lenonia* sp. nov.

(Map 1; Figures 3,4,5,14)

1.a. Type Material details: Holotype: Specimen Voucher Code of the holotype is NCBS- AH292. Male, the type locality of this species is Wahkaba valley of Sohra (Cherrapunjee) (25°17'11.27"N, 91°43'28.76"E), East Khasi Hills, Meghalaya (Map-1). The specimen was collected on 30th September, 2014 By Vivek Sarkar. The specimen was preserved in ethanol after collection. Two legs and a chunk of thoracic tissue were preserved in absolute ethanol and the specimen was pinned and dried later in June, 2015. It is deposited in the Research Collections Facility at the National Centre for Biological Sciences, Bengaluru (=Bangalore), India (NCBS). **Paratype:** Specimen Voucher Code of the paratype is NCBS- AH291. Collected from the same location on the same day and the specimen is deposited in the Research Collections Facility at NCBS, Bengaluru (=Bangalore), India.

1.b. Diagnosis: Smaller compared to other species of this genus. Postclypeus entirely green without any median black line and unlike them the basal cell in forewing green where in both of them it is transparent. Forewing of *Mata lenonia* **sp. nov.** without any infuscation (Fig-4A&B) whereas both of *M. kama* and *M. rama* have prominent infuscations on their forewing (Fig-1A&B & Fig-2A&B). Male opercula of *Mata lenonia* **sp. nov.** is short and entirely green without any black margin (Fig-4B) whereas opercula in *M. kama* is also green with thin black margin (Fig-1B) and opercula in *M. rama* are green with broad dark edges that are suffused centrally (Fig-2B). In *M. kama*, the timbal cover is green dorsally with black triangular patch in anterior part and white spot covered with fine white scales in the lateral part which continue as traces laterally on the third tergite (Fig-1C) whereas in *M. rama*, timbal cover is predominantly black with traces of fine white scales laterally which continue on the third tergite (Fig-2C). In *Mata lenonia* **sp. nov.**, entire anterior part of timbal cover is black which is adjoining to the median brown patch of the second tergite dorsally and the entire posterior part of the timbal cover white, overlaid with fine white scales which is more at the dorsal end and reduces at the lateral part, appearing as a white triangular spot from the side (Fig-4C). There are no traces of white scales continuing on the third tergite.

1.c. Etymology: The name 'lenonia' derived from the Latin word 'lenonius' which means small or miniscule. Among all the species in the genus *Mata*, this is significantly small.

1.d. General Measurements:

Sl. No.	Name of the body part	**Measurement of** NCBS- AH292 **(Holotype)**	**Measurement of** NCBS- AH291 **(Paratype)**
1.	Forewing	25.93 mm	23.58 mm
2.	Hindwing	13.94 mm	12.14 mm
3.	Width of the head	5.91 mm	4.98 mm
4.	Length of the head	1.19 mm	1.15 mm
5.	Width of pronotum	6.54 mm	6.54 mm
6.	Length of pronotum	2.31 mm	2.28 mm
7.	Width of mesonotum	5.57 mm	5.5 mm
8.	Length of mesonotum	4.32 mm	4.25 mm
9.	Length of metanotum	1.25 mm	1.20 mm
10.	Length of abdomen	9.75 mm	9.84 mm
11.	Length of Proboscis (length of rostrum including labrum and mentum)	3.96 mm	4.01 mm

1.e. Type series: Holotype: "INDIA / E. K. Hills Dist., Meghalaya / Sohra (Cherrapunjee) / Vivek S coll. / 30.ix.2014 / NCBS-AH292", male (NCBS). // Paratype: "INDIA / E. K. Hills Dist., Meghalaya / Sohra (Cherrapunjee) / Vivek S coll. / 30.ix.2014 / NCBS-AH291", male (NCBS).

1.f. Description

1.f.1. Holotype

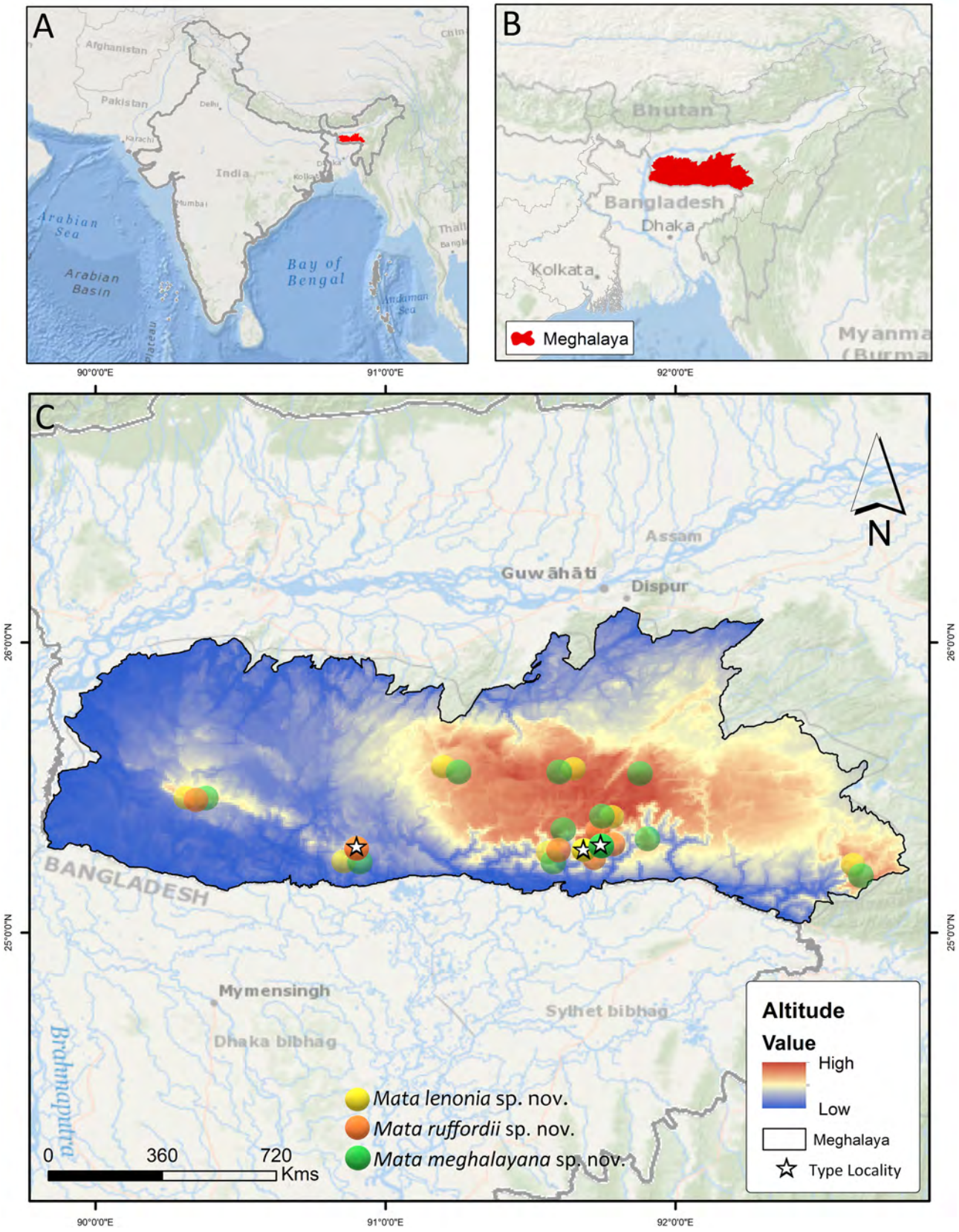
Head: Entire head leaf green anteriorly and brownish green dorsally with occasional brown patch. Ocellus pale sanguineous with thin black surroundings. Flagellum of antenna black. Eyes pale, greyish ventrally and brown dorsally with occasional occurrences of green.

Thorax: Pronotum dorsally green with pale brown patches. A comma shaped oblong black spot posterior to each paramedian fissure, close to the pronotal collar, conjoint with two mid-dorsal thin lines originating just posterior to the junction of head and pronotum. Oblong faint black spot parallel to this line located in the middle of paramedian fissure. A lateral black line, posterior to eyes, borders the medial edge of spotless, leaf green pronotal collar (Fig-3A). Pronotal collar lateral angle slightly fuscous. Mesonotum leaf green with brownish submedian sigilla and lower greenish-brownish area in live specimen. Mesonotum greenish brown in pinned specimen. Black marking through parapsidal suture which broadens at the base, adjacent to pronotal collar. A central black line, from the pronotal collar runs through mesonotum towards metanotum, covering almost 3/4th of mesonotum length and prominent in both the ends but broken in between. Black round spot surrounds scutal depression. A black oblong spot adjacent to scutal depression separated from each other by the scutellum groove. Small triangular black spot appearing posterior to pronotal collar in a straight line with this oblong spot. Scutellum leaf green. Metanotum dark brownish black beyond wing groove. Pronotum, mesonotum and metanotum leaf green ventrally with minute white-grey hairs. Wings hyaline without any infuscation. Basal vein like the 1st, 2nd, and 3rd anal vein, cubitus posterior vein, both cubitus anterior veins, median and median crossvein leaf green remaining veins black. Legs leaf green to distal femur. Basal part of tibia leaf green as well which gradually turns brown towards distal end. Segments distal to tibia brown in all three pairs of appendages. Male operculum roundish, entirely leaf green, not extending beyond first sternite.

Abdomen: First tergite greenish brown with very thin black border posteriorly. Second tergite long with distinct, globular timbal cover. Second tergite narrowly black posteriorly with rich brown in triangular shape in the middle. Anterior half of timbal cover black, extending dorsoanteriorly to metathorax. Remaining timbal cover covered with fine white scales which do not extend on third tergite. Thin green line between white and black patch of timbal cover almost non-existent dorsally and broadened laterally. Remaining tergites and sternites rich chestnut.

Male Genitalia: As shown in the Fig.14A&B. Short dorsal beak, anal style and anal tube covered with minute hair like structures. Pygofer white towards the base and rich brown apically. Upper lobe of pygofer rudimentary, appears as a distinct fold ventrally. Median lobe of uncus flat and tapered at the end. Aedeagus tube-like, bent and protruding slightly from the median lobe.

1.f.2. Paratype: Similar to that of the holotype.



MAP 1. A. Map showing the location of Meghalaya on India map. **B.** Location of Indian state of Meghalaya on North-east India. **C.** Map showing the type localities and distribution of *Mata lenonia* **sp. nov.**; *Mata ruffordii* **sp. nov.**; and *Mata meghalayana* **sp. nov.** in Meghalaya.

FIGURE 1. *Mata kama* (Distant, 1881) **A:** Dorsal view of holotype. **B:** Ventral view of holotype. **C:** Dorsal view of the timbal cover. (Copyright: Trustees of the Natural History Museum, London. Photographed by BW Price and EL Allan.)

FIGURE 2. *Mata rama* Distant, 1912 **A:** Dorsal view of holotype. **B:** Ventral view of holotype. **C:** Dorsal view of the timbal cover. (Copyright: Trustees of the Natural History Museum, London. Photographed by BW Price and EL Allan.)

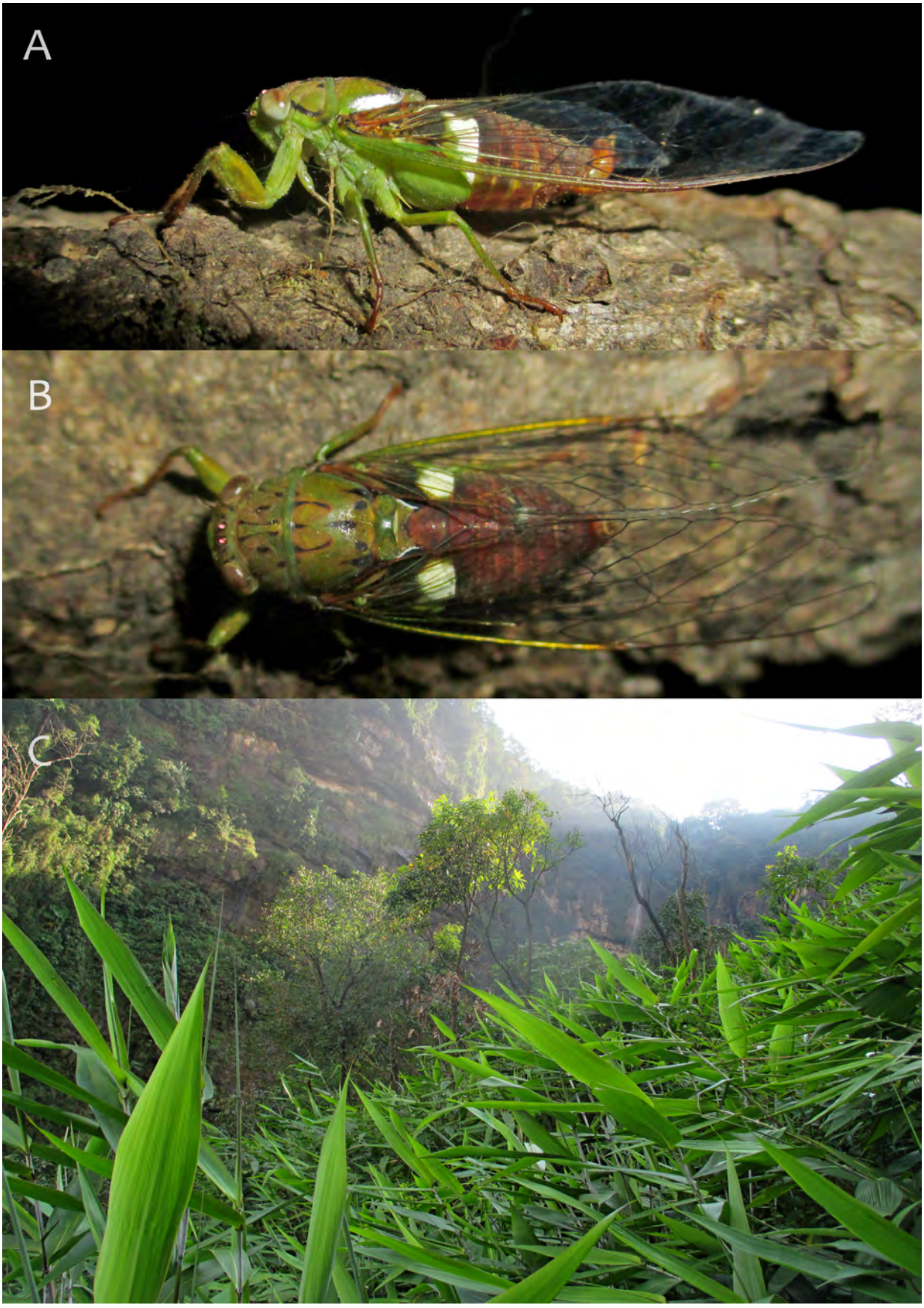


FIGURE 3. *Mata lenonia* **sp. nov. A:** Lateral view of holotype in habitus (NCBS-AH292). **B:** Dorsal view of holotype in habitus (NCBS-AH292). **C:** Habitat of the holotype. (Copyright and photographed by Vivek Sarkar.)

FIGURE 4. *Mata lenonia* **sp. nov. A:** Dorsal view of holotype (NCBS-AH292). **B:** Ventral view of holotype (NCBS-AH292). **C:** Lateral view of male timbal cover (NCBS-AH292). **D:** Dorsal view of male timbal cover (NCBS-AH292). (Copyright: NCBS and photographed by Vivek Sarkar.)

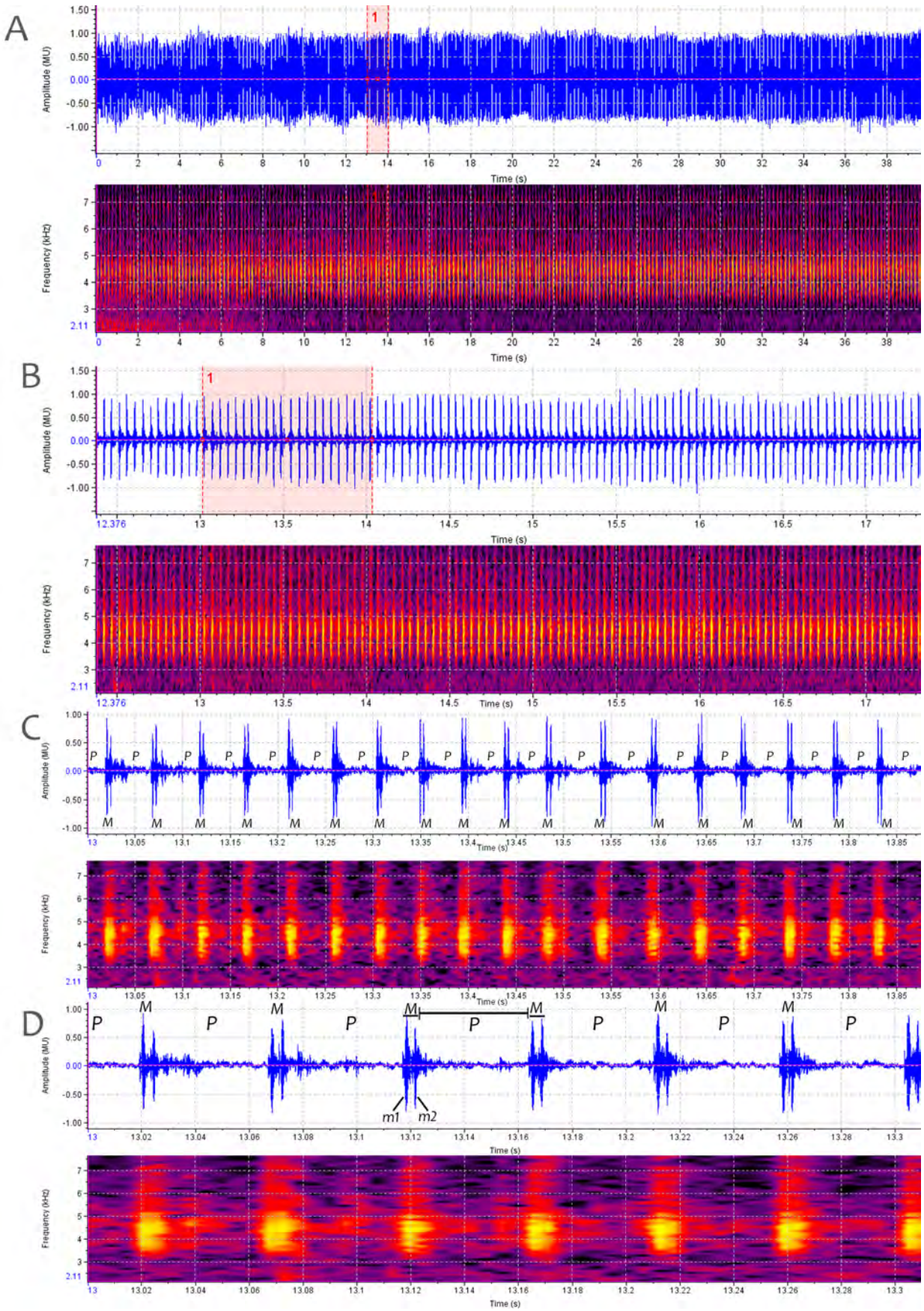


FIGURE 5. *Mata lenonia* **sp. nov. A,B,C,D**: Cards for Identification by Acoustics (CIA)

1.g. DISTRIBUTION: Apart from the type locality, this cicada was found in higher parts of Jaintia Hills in Saipong Reserve Forest; different forested parts of the Sohra (Cherrapunjee) plateau such as Maraikaphon, Wahkaba, Khliehshnong Ramakrishna Mission adjacent sacred grove and the forest above Nohkalikai Falls; forested parts of Ladmawphlang; Mawsinram; Nongstoin; Mairang of Khasi Hills and Garo Hills, at the slope adjacent to Nokrek Peak of Nokrek National Park.

1.h. BIONOMICS

1.h.1. Habitat type: Commonly seen at 1300m and above in the plateau and its well forested slopes. Apart from the bushes and stunted trees, this cicada is also found in the tall bushes of *Thysanolaena latifolia* (Roxb. ex Hornem.) Honda and bamboos in the higher steep rock cliffs.

1.h.2. Annual adult activity period: In 2014, the species appeared during third week of September and died out by the end of October. In 2017 adults of the species emerged during the middle of the second week of September and survived until the last week of October, when three days of heavy rain arrived.

1.h.3. Behaviour: Dendrophilous and heliophilous in nature. The male of this species usually sits in the peripheral part of the tree, on a thin twig where it calls beginning in the morning, as soon as the sunlight hits its resting place. Calling ceases in the late afternoon to evening when direct sunlight is lost. Calls are prolonged and continuous in the allotted time on a sunny day but during an overcast day, males call for a shorter duration and initiate calling around midday. Males are well camouflaged in shade and prefer hiding in the leaves. Specimens are very difficult to spot visually due to the green body. Flight is rapid and swift. After flight a male settles on a tree trunk then begins crawling towards the distal end of the trees where it finds a suitable place to settle. Female and its behaviour unknown.

1.h.4. Acoustics: Male timbalization is prolonged and continuous, with occasional gaps. Field observers may perceive it as faint buzzing, even in close proximity, which in actuality, consists of a regular succession of equivalent echemes. The oscillogram in Fig.5.A shows a 40 second sequence of timbalization, the tightly packed signals which are hard to interpret but Fig-5.B showing partial oscillogram stretching out in an arbitrary space-time unit showing the regular succession of equivalent echemes. There are 22 repetitive echemes per seconds on average (n=11). The selected part of Fig.5.A and Fig.5.B is further expanded in Fig.5.C to show the echemes. Each of these echemes is denoted as *M* which is repeated after a consistent pause, denoted as *P*, which last for about 0.047 second (range 0.044 to 0.057 seconds, n=21). Fig.5.D shows a partial oscillogram expanded even further in an arbitrary space-time unit showing constituents of each echemes *M*, two pulses, denoted as *m1* and *m2* and a pause of 0.004 second between them. The spectrogram shows a wide frequency range, from 3KHz to 7KHz, with maximum sound energy between 3330Hz and about 5300Hz.

1.i. PROPOSED COMMON NAME: Small Green Spotted-back cicada

1.i.1. Justification: As the name suggests, this is the smallest member of this genus and compared to others it has fewer markings on the thorax, so that it appears mostly green. Males of all the species of *Mata* have a dorsolateral spot at the base of their abdomen which is actually the black and white coloration of their robust timbal cover.

2. *Mata ruffordii* sp. nov.

(Map 1; Figures 6,7,8,9,14)

2.a. Type Material details: Holotype: Collection Voucher Code is VS-AA436 and Specimen Voucher Code of the holotype is NCBS-BI001. Male. The type locality of this species is Balpakhram National Park (BNP), (25°14'46.77"N, 90°51'41.83"E) South Garo Hills, Meghalaya (Map-1). The specimen was collected on 13th September, 2017 by Vivek Sarkar. The specimen was preserved in ethanol after collection. Two legs and a chunk of thoracic tissue was preserved in absolute ethanol and the specimen was pinned and dried later in December, 2019. It is deposited in the Research Collections Facility at NCBS, Bengaluru (=Bangalore), India. **Paratype:** Collection Voucher Code is VS-AA436 and Specimen Voucher Code of the paratype is NCBS-BI002. The locality is forested area of Laitrengew (25°19'53.95"N, 91°43'58.74"E), East Khasi Hills, Meghalaya. The specimen was collected on 15th September, 2017 by Vivek Sarkar. The specimen has been preserved in the same manner and pinned and dried later in December, 2019. It is deposited in the Research Collections Facility at NCBS, Bengaluru (=Bangalore), India.

2.b. Diagnosis: This species appears as a combination of characters from the two previously known species of *Mata*. Similar to *M. rama* but unlike the prominent infuscation only on the radial and radiomedial crossvein of the

forewing, this species has conspicuous infuscation on the radial and radiomedial crossvein; first and second cubitus anterior vein; all distal median veins; mediocubital crossvein and median crossvein (Fig-8A&B), similar to that of the *M. kama* (Distant 1881; 1906). But unlike the completely green with very thin black margined male opercula of *M. kama* (Fig-1B), this species has greenish brown male opercula with broad dark edges which is suffuse to some extent (Fig-8B) similar to *M. rama* but not as extensively suffused (Fig-2B). Timbal cover of this new species matches that of *M. kama* to some extent, having an anterior angular black spot which does not extend dorsally. But unlike *M. kama*, where the remaining timbal cover is green with overlaid white scales only at the posterior part of the lateral side (Fig-1C), this species has a predominantly white timbal cover which is overlaid with fine white scale (Fig-8C&D). In both of these species traces of these overlaid white scales clearly extend dorsally and laterally on the third tergite.

2.c. Etymology: This species was first discovered under a tenure of a project that was supported by the Rufford Foundation (UK), part of the Rufford Small Grant programme. The Rufford Foundation has been supporting various conservation related work of many young researchers in India and many other countries for more than a decade. The species is named as '*ruffordii*' to honour the support of the Rufford Foundation in conservation of nature and wildlife, starting from the smallest invertebrates to majestic mammals and their habitat.

2.d. General Measurements:

Sl. No.	**Name of the body part**	**Measurement of** NCBS- BI001 **(Holotype)**	**Measurement of** NCBS- BI002 **(Paratype)**
1.	Forewing	31.59 mm	30.54 mm
2.	Hindwing	17.93 mm	17.007 mm
3.	Width of the head	6.78 mm	6.52 mm
4.	Length of the head	1.99 mm	1.92 mm
5.	Width of pronotum	7.98 mm	7.87 mm
6.	Length of pronotum	3.06 mm	2.90 mm
7.	Width of mesonotum	7.01 mm	7.05 mm
8.	Length of mesonotum	4.55 mm	4.28 mm
9.	Length of metanotum	0.88 mm	0.74 mm
10.	Length of abdomen	12.818 mm	13.261 mm
11.	Length of Proboscis (length of rostrum including labrum and mentum)	6.76 mm	6.678 mm

2.e. Type series: Holotype: "INDIA / S. G. Hills Dist., Meghalaya / BNP / Vivek S coll./ VS-AA436 / 13.ix.2017 / NCBS-BI001", male (NCBS). // Paratype: "INDIA / E. K. Hills Dist., Meghalaya / Laitrengew / Vivek S coll./ VS-AA437 / 15.ix.2017 / NCBS-BI002", male (NCBS).

2.f. Description

2.f.1. Holotype

Head: Postclypeus greenish brown with prominent black median part and black transverse groove fading laterally. Eyes brown with tinge of green and ocelli pale sanguine, more pinkish. Epicranium green towards posterior end adjacent to pronotum and gradually turns brown anteriorly in live insects but the entire vertex turns pale brown in pinned specimens. Dark supra-antennal plate with a greenish brown spot at the top. Vertex with black patches adjacent to eyes, broadens anteriorly and extends to the posterior part of supra-antennal plate. This dorsolateral black patch encircles a triangular pale brown patch between eye and supra-antennal plate. Pedicels brown, antennal flagellum black. Area around the ocelli black, mark extends posteriorly, adjacent to pronotum and anteriorly to frons but does not enter into the frons, adjacent to postclypeus. Lorum black. Anteclypeus brown with inverted black 'T' mark and bottom half of the anteclypeus with black outer margin as an extension of the horizontal arms of this 'T' mark. Rostrum brown with less than one fifth of its length black at the tip.

Thorax: The base colour of the pronotum green, turning brown gradually at the centre in live specimens and entire uniformly brown thorax in pinned specimens. Pronotum with a mid-dorsal brown arrow-shaped marking pointing posteriorly. This median arrow-shaped marking surrounded by a broad black margin, appearing in the shape of a pawn chess piece with its broad base facing anteriorly, adjacent to head. Area between lateral fissure and paramedian fissure with irregular patches of black. Thin black border at the inner lateral part of pronotal collar.

Lateral part of pronotal collar with broad black outer margin to the lateral angle where it broadens and curves internally, making the posterior part of lateral angle look distinctively greener. Posterior part of the pronotal collar green with thin black margin including the pronotal collar lateral angle. A thin black dorsolateral line at medial pronotal collar lateral angle crossing pronotal collar on both sides. Mesonotum greenish brown with green lateral side that looks like the extension of the green pronotal collar lateral angle in live specimens. Mesonotum with a mid-dorsal black arrow-shaped marking, pointing posteriorly. Parapsidal suture brown. Submedian sigilla with a fish hook or "J" shaped black spot adjacent to the parapsidal suture. Lateral sigilla with a black "Y" shaped mark, adjacent to the parapsidal suture. Black spot encircles black scutal depression, appearing as elongated, somewhat comma-shaped black dots at the base of the mesonotum. Scutellum plain green in live insects which turns uniform brown in pinned specimens. Metanotum beyond wing groove black with green patch before the black tip. Forewing with greenish brown amber tinge that darkens at the base. Infuscation at the tip of the transparent basal cell of forewing. Prominent infuscation on radiomedial crossvein, first and second cubitus anterior veins, all submarginal median veins, mediocubital crossvein and median crossvein of forewing. Costa of the forewing greenish brown to node and dark brown past the node. Basal veins such as arculus, cubitus anterior veins, cubitus posterior veins, median vein of the forewing greenish brown in live insects which gradually turn dark in distant veins. The greenish brown colour of basal veins of live insects turns pale brown in pinned specimens. Median vein prominently white at node, proximal to the confluence of radius anterior and radius posterior. Hindwing completely transparent with black to dark brown veins except the black base of cubitus anterior vein and first anal vein. The basal membrane of forewings and jugum of hindwings greyish black. Legs pale greenish brown with dark brown patches at the joints of trochanter, femur and tibia. Tarsi of foreleg and midleg entirely dark brown. Tarsi and tibial spurs including the tibial comb of hind leg pale greenish brown with dark brown pointed tip. Meracanthus black with pale brown outer edge.Male opercula short and greenish brown with broad dark edges which, to some extent, suffused posteriorly. Ventral thorax overlaid with fine white scales.

Abdomen: First tergite appears white in live specimens with overlaid fine white scales and brown with posterior black margin in pinned specimens. Second tergite greenish brown in the middle with thin green posterior border and black lateral border, adjacent to timbal cover. Timbal cover predominantly white, overlaid with fine white scales with anterior angular black spot which does extend dorsally. Traces of white scales clearly extend dorsally and laterally on the third tergite. Third to eighth tergites chestnut brown with darker posterior edge. Abdomen ventrally overlaid with pollinosity in live insects. First sternite dark brown, second to sixth sternites uniformly chestnut. Seventh sternite chestnut which gradually darkens posteriorly, adjacent to the eighth sternite. Eighth sternite dark brown with two ventrolateral pale brown oblong spots.

Male Genitalia: As shown in the Fig.14 C&D. Pygofer pale brown which turns dark gradually at the protruded distal shoulder. Dark brown edge of the pygofer from the rudimentary upper lobe to the distal shoulder gradually turns darker. Prominent dorsal beak dark with brown hair like structures. Anal style and anal tube pale brown with overlaid hairy structures. Median lobe of uncus beige, broadened laterally and flat at the tip with a minutely protruding notch adjacent to the opening of the aedeagus (Fig.14 C). Chestnut aedeagus tube-like with tapered end and slender white membranous gonopore which does not extend dorsally.

2.f.2. Paratype: Very similar to the holotype with darker and more conspicuous spots in the head and thorax due to hyper pigmentation.

2.g. DISTRIBUTION: In addition to the localities of the type series, the species has been recorded in the Nokrek Peak area of Nokrek National Park, West Garo Hills and the entire Cherrapunjee-Mawsynram plateau and its slopes, East Khasi Hills, especially the elevated forested parts and steep valleys (Map-1). The species is more common in parts of the Khasi Hills than Garo Hills, with the highest congregation recorded at the Nohkalikai Slope of Sohra (Cherrapunjee), East Khasi Hills. Other places where large congregations were also observed include the Wahkaba Valley of Sohra (Cherrapunjee) that opens towards Nongpreyang village, Khasi Hills; Ladmawphlang Valley which is the continuation of Mawkodok Valley, Khasi Hills; and the steep slopes of southern valley of Mawsinram, (on the way to Ranikore-Baghmara road) East Khasi Hills (Map-1). The species is desideratum for Jaintia Hills, especially the higher forested slopes and valleys of Saipong Reserve Forest.

2.h. BIONOMICS

2.h.1. Habitat type: This species is primarily recorded at the edges of well forested slopes, 1100 meters ASL and above. The species is occasionally seen in the edges of riparian forest of the plateau (Fig.7D). It appears to prefer thick forest edges with Bamboo, species of *Prunus* L., *Rhododendron* L., and *Castanopsis* (D. Don) Spach.

FIGURE 6. *Mata ruffordii* **sp. nov. A:** Lateral view of paratype in habitus (NCBS-BI002). **B:** Dorsal view of paratype in habitus (NCBS-BI002). **C:** Ventral view of paratype in habitus (NCBS-BI002). **D:** Close up dorsal view of paratype in habitus (NCBS-BI002). (Copyright and photographed by Vivek Sarkar.)

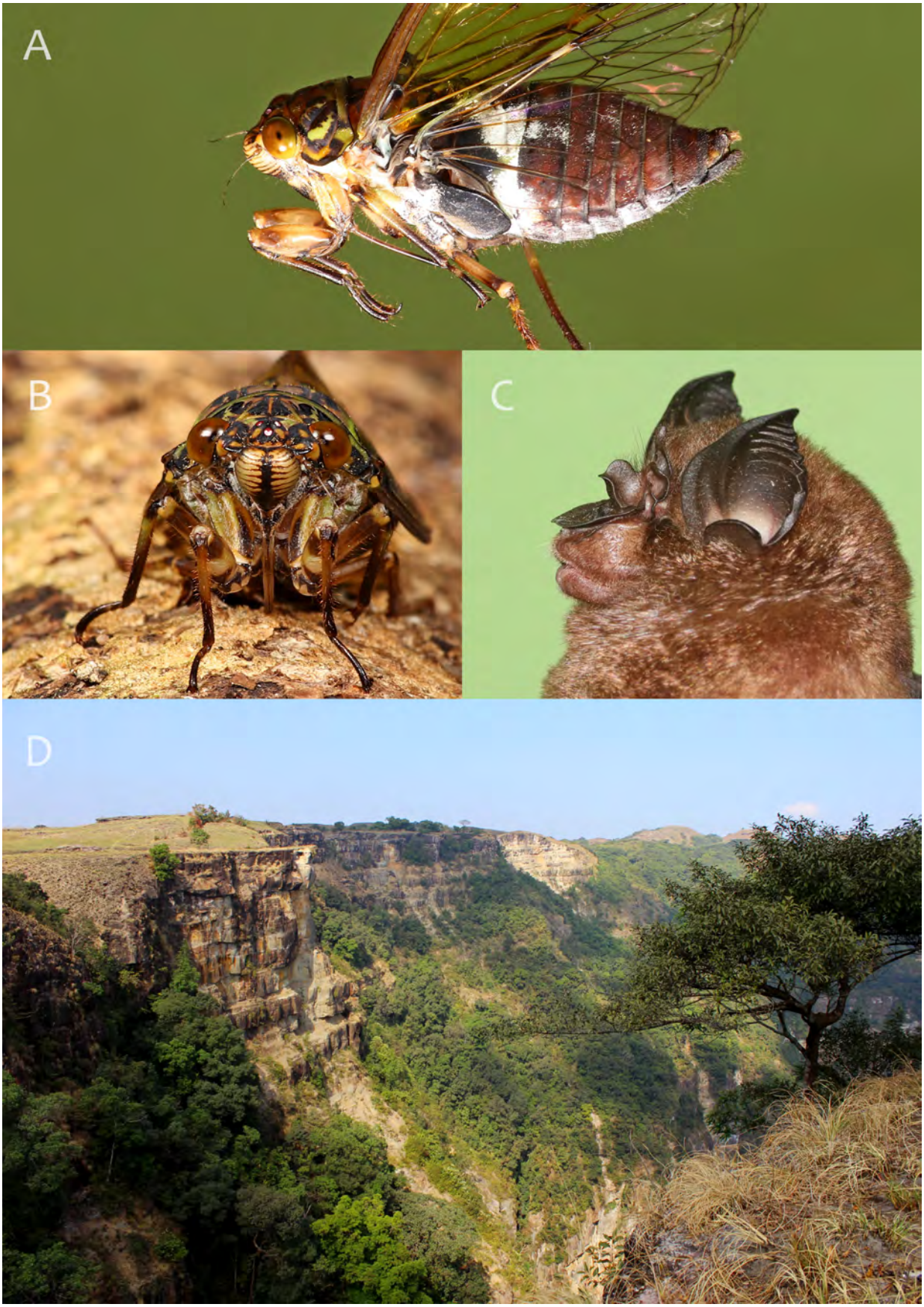


FIGURE 7. *Mata ruffordii* **sp. nov. A:** Close up lateral view of paratype in habitus (NCBS-BI002). **B:** Close up of the front of the head of paratype in habitus (NCBS-BI002). **C:** A bat that has been captured while hunting this cicada. **D:** Habitat of the holotype (NCBS-BI001). (Copyright and photographed by Vivek Sarkar.)

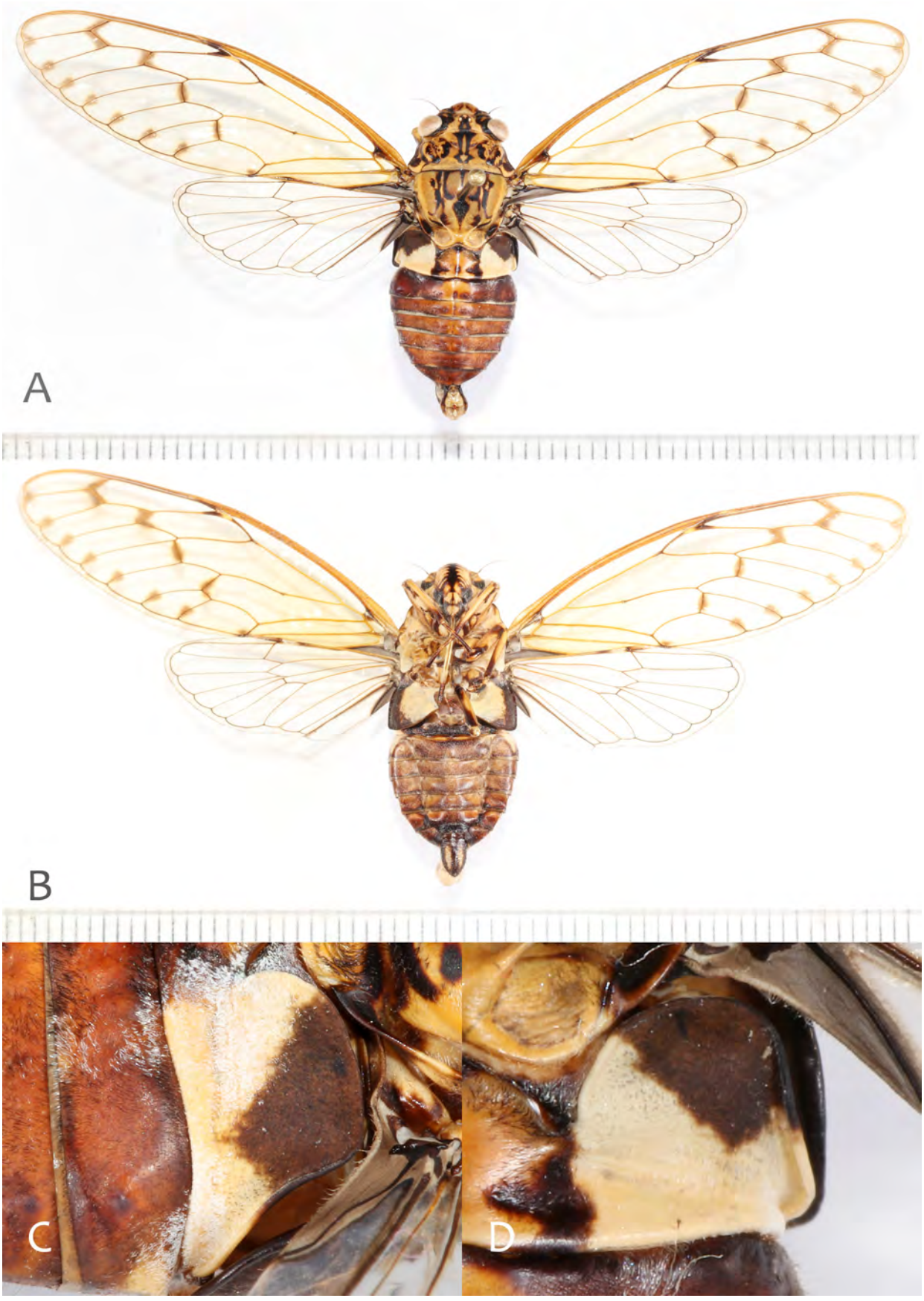


FIGURE 8. *Mata ruffordii* **sp. nov. A:** Dorsal view of holotype (NCBS-BI001). **B:** Ventral view of holotype (NCBS-BI001). **C:** Lateral view of male timbal cover (NCBS-BI001). **D:** Dorsal view of male timbal cover (NCBS-BI001). (Copyright and photographed by Vivek Sarkar.)

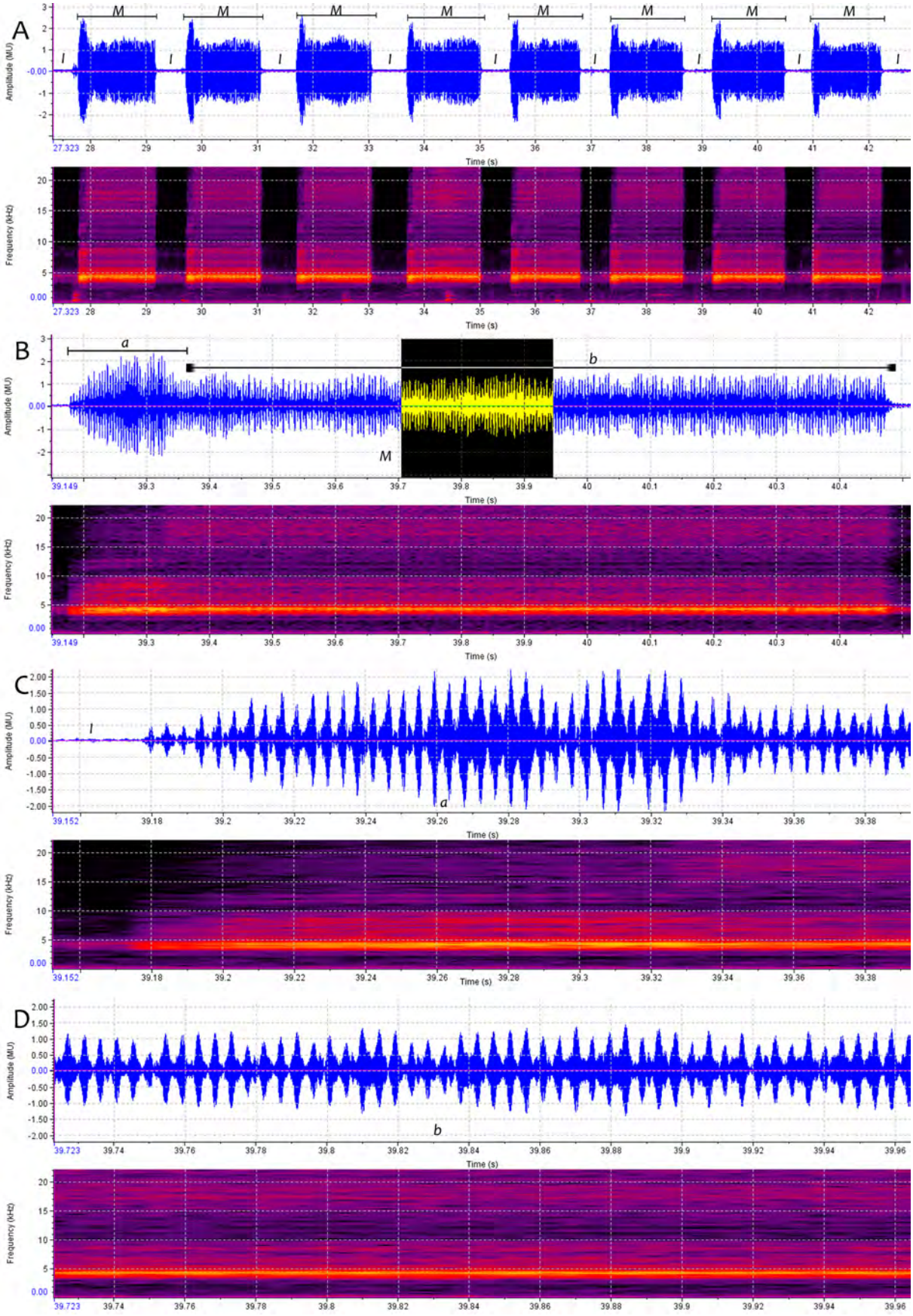


FIGURE 9. *Mata ruffordii* **sp. nov. A,B,C,D**: Cards for Identification by Acoustics (CIA).

2.h.2. Annual adult activity period: The activity of this cicada was only noted in 2017. The first individual was spotted during the second week of September in parts of Garo Hills and Khasi Hills. Peak activity was recorded during the first week of October. The last individual was recorded at the beginning of the third week of October, 2017.

2.h.3. Behaviour: Crepuscular species, active only at the dusk and does not call at dawn. Dendrophilous in nature, stays inactive the entire day except for jet spraying once in a while. Males stay at the thick canopies of the trees during the day time while females stay on the lower part of the same tree or nearby bushes. Males emit timbalizing signals right after the roosting calls of birds and continue until the beginning of Chiropteran activities, leaving a very narrow window for acoustic activity. This behaviour was studied from 11th September 2017 to 10th October 2017 both in Garo and Khasi Hills and it was found that male timbalization sessions last only for 40 minutes on average per day. Sub-gregarious in nature, males emit timbalizing calls rigorously from nearby trees, bushes and shrubs simultaneously, making it difficult to record a single call. They often keep on changing their perch position while calling. Individuals responds to pre-recorded calling songs. It was observed almost on a daily basis that after the sundown, towards the end of their calling session, bats hunt the cicadas, most likely by locating the cicadas by their calls. The bats swiftly approach the calling insect, grab it in their mouth and fly away. Once captured by the bat, timbalizing males makes a continuous buzzing noise, different from the usual advertising call, somewhat as a distress call which may be perceived as warning call for other males to terminate the chorus for the day. However, this needs to be supported with quantitative ecological experiments. In the evening these bats hunt boldly and do not get affected by human presence in close proximity to the calling cicadas. In one incident on 27th September 2017, an individual of this cicada species was spotted calling from a lower perch of *Prunus*, L. tree behind St. John Bosco Boys Secondary High School at Maraikaphon of Sohra (Cherrapunjee), East Khasi Hills. While swinging the handheld net, an approaching bat, which was about to capture the same cicada, was caught in the net instead of the targeted insect. The bat was photographed and released immediately and later, it was identified as a Horseshoe bat, *Rhinolophus* sp. (Fig.7D).

2.h.4. Acoustics: Male timbalization consists of short, near identical echemes *M*, repeated continuously for as long as 40 minutes. Fig.9A is a temporal oscillogram and spectrogram illustrating about 15.5 seconds of the male timbalization, showing 8 of these repetitive echemes *M*. Each echeme *M* lasts for 1.373 seconds on average (range 1.284 to 1.432 seconds, n=22). The intervals *I* between the echemes *M* are .539 seconds long on average (range .448 to .606 seconds, n=23). The spectrograms appear to show a harmonic series at intervals of about 4 kHz. Fig.9B illustrates an oscillogram and spectrogram of more than 1.4 seconds to show a complete echeme *M* consists of pulses produced at a rate of about 189/second, with the average first 0.159s (n=22) of each echeme, '*a*', produced at a higher amplitude, almost twice as loud than the rest, '*b*'. Fig.9C illustrates an oscillogram and spectrogram extending in an arbitrary space-time unit of 0.238 seconds to show the signal ultrastructure of the spindle-shaped, loud, initial '*a*' of the echeme *M* and Fig.9D illustrating an oscillogram and spectrogram of the inverted part of the Fig.9B to show the signal ultrastructure of part of the prolonged posterior '*b*' of the echeme *M*. The spectrogram corresponding to the oscillogram illustrates a wide frequency spread, from 3KHz to 20KHz and beyond. The sound energy is strongly concentrated at approximately 4.2 kHz.

2.i. Proposed Common Name: Rufford's Spotted-back cicada

2.i.1. Justification: The justification of calling all the species classified in the genus *Mata* as 'Spotted-back cicadas' is explained in the common name of *Mata lenonia* **sp. nov.** This species is named '*ruffordii*' to honour the support of the Rufford Foundation in conservation of nature and wildlife, the species is called Rufford's Spotted-back cicada.

3. *Mata meghalayana* sp. nov.

(Map 1; Figures 10,11,12,13,14)

3.a. Type Material details: Holotype: Collection Voucher Code is VS-AA468 and Specimen Voucher Code of the holotype is NCBS-BH999. Male, the type locality of this species is Mawkisiyem village, (25°16'26.83"N, 91°43'31.10"E) of Sohra (Cherrapunjee) East Khasi Hills, Meghalaya (Map-1). The specimen was captured by a spider and fell from the high canopy. It was photographed and collected on 17th September, 2017 by Vivek Sarkar. The specimen was preserved in ethanol after collection. Two legs and a chunk of thoracic tissue was preserved in

absolute ethanol and the specimen was pinned and dried later in December, 2019. It is deposited in the Research Collections Facility at NCBS, Bengaluru (=Bangalore), India (NCBS).

3.b. Diagnosis: Like *Mata ruffordii* **sp. nov.**, this species also appears to have a combination of characters from both the previously known species of *Mata*. Similar to *M. kama* in having prominent spots on the radiomedial crossvein and faint infuscation on the medial crossvein, mediocubital crossvein, first cubitus anterior vein and median veins, the male opercula are short and entirely green with traces of black at the entire posterior edges (Fig-1A&B) but unlike *M. kama* this thin border is only on the inner edges of the opercula. The anterior and dorsal half of the timbal cover of this species is black, similar to that of *M. rama* while in *M. kama* the anterior angular black spot of the timbal cover does not extend dorsally (Fig-1C&D). The lateroposterior part of the timbal cover is prominently white and overlaid with fine white scales unlike *Mata rama* which has a predominantly black timbal cover with traces of fine white scales laterally. In addition, *Mata rama* has prominent infuscation only on the radial and radiomedial crossveins and the male opercula have broad dark edges that are broadly suffused inwardly unlike this new species.

3.c. Etymology: This species was first discovered on the Sohra (Cherrapunjee) plateau of Meghalaya and on further investigation it was found that among the three newly discovered species of *Mata* from Meghalaya, this species is most widely distributed in the state hence the species was named as 'meghalayana'.

3.d. General Measurements:

Sl. No.	**Name of the body part**	**Measurement of** NCBS- BH999 **(Holotype)**
1.	Forewing	27.06 mm
2.	Hindwing	13.84 mm
3.	Width of the head	6.34 mm
4.	Length of the head	2 mm
5.	Width of pronotum	6.62 mm
6.	Length of pronotum	2.67 mm
7.	Width of mesonotum	5.86 mm
8.	Length of mesonotum	3.49 mm
9.	Length of metanotum	.81 mm
10.	Length of abdomen	9.78 mm
11.	Length of Proboscis (length of rostrum including labrum and mentum)	6.26 mm

3.e. Type series: Holotype: "INDIA / E. K. Hills Dist., Meghalaya / Mawkisiyem / Sohra (Cherrapunjee) / Vivek S coll./ VS- AA468 / 17.ix.2017 / NCBS-BH999", male (NCBS).

3.f. Description

3.f.1. Holotype

Head: Postclypeus greenish brown with prominent thin black median line which bifurcates dorsally and continues as a black patch to the brown supra-antennal plates. Postclypeus transverse grooves green with some pollinosity. Eyes green in live specimens which turn completely uniform pale brown in pinned specimens. Ocelli pale sanguine, more pinkish. Epicranium brown with faint green patches at the posterior end and adjacent to pronotum in live insects but entire vertex turns pale brown in pinned specimens. Vertex with thin black patches, resembling borders adjacent to eyes, marks continues anteriorly and extend to edge of supra-antennal plate but do not enter. From both dorsal corners of the postclypeus, clubbed-shape spots extend from the thin dark border of epicranium. Pedicels brown, antennal flagellum black. Area around ocelli black, mark extends posteriorly to adjacent to pronotum and anteriorly on frons adjacent to postclypeus. Lorum pale brown with black base adjacent to the anteclypeus. Anteclypeus green in live insect, turns pale brown in pinned specimens. The median line of postclypeus incompletely continues in anteclypeus which has black outer margins at the base, adjacent to the labrum. Greenish brown rostrum with less than one tenth of its length black, at the tip.

Thorax: The base colour of the pronotum green with brownish tinge at the sutures in live insects, the entire thorax yellowish brown in pinned specimens. Pronotum with a mid-dorsal brown arrow-shaped marking pointing posteriorly surrounded by thin black border. Spaces between lateral fissure, paramedian fissure and inner edges of pronotal collar with irregular patches of black. Inner lateral part of pronotal collar with thin black border. Entire

pronotal collar green, turning pale brown in pinned specimens. Two barely joined black spots anterior to lateral angle of pronotal collar. Posterior part of pronotal collar with prominent, thin black margin, extending from one end of lateral angle to another. Mesonotum greenish brown with greener dorsolateral parts and brownish median part in live insects that turns yellowish brown in pinned specimens. Mid-dorsal black arrow-shaped marking with paper kite-like arrow head pointing posteriorly on mesonotum. Parapsidal suture brown. Submedian sigilla with a fish hook or "J" shaped black spot bordered along the parapsidal suture. Lateral sigilla green with posterior thin black border which looks like oblong, bent, dorsolateral spots adjacent to the metanotum. Two dorsolateral oblong spots at each side, adjacent to submedian sigilla, one of which attached to the thin black border of pronotal collar. Scutellum plain green in live insects and uniform brown in pinned specimens. Metanotum green with small triangular black patch beyond wing groove. Forewing completely transparent with very faint traces of brown amber at the base. Tip of the transparent basal cell of forewing infuscated. Prominent infuscation on radial and radiomedial crossveins and faint infuscation on medial crossvein, mediocubital crossvein, first cubitus anterior vein and median veins of forewing. Costa of the forewing greenish brown to node and dark brown past the node. Basal veins such as arculus, first cubitus anterior vein, cubitus posterior veins, basal median vein of the forewing greenish brown in live insects which gradually turn dark brown in distal veins. The greenish brown colour of basal veins of live insects turns pale brown in pinned specimens. Median vein prominently white at node, proximal to confluence of radius anterior and radius posterior. Hindwing completely transparent with black to dark brown veins except the piceous base of cubitus anterior vein and first anal vein. The basal membrane of forewings completely greyish black and jugum of hindwings partially greyish black with white. Base colour of all the legs mostly green with pale brownish patches in live insects but turns uniformly pale yellowish brown in pinned specimens. Foreleg green with darker tip. Primary and secondary spine of the femur blackish brown and the region around the spines of the green femur black with bands basally. Tibia of foreleg green with dark brown terminus at the junction of metatarsus. Metatarsus and mesotarsus dark brown and pretarsus pale brown with only the tip including the claw dark brown. Similar coloration of tarsomeres and tibia in the middle legs with the exception of entirely green femur with some traces of black. Hind leg femur greenish brown with black proximal to greenish brown distal end. Tibia green at the proximal end, gradually turning brown towards the tip. Tarsomeres same colour as the distal end of the tibia. Tibial spurs and tibial comb of hind leg pale greenish brown with dark brown pointed tip. Meracanthus pale greenish brown with narrow dark brown base. Opercula short, entirely green with traces of black on posterior edges, appearing as thin border only on the inner edges of the opercula. Ventral side of the thorax overlaid with fine white scales to some extent but do not obscure the base colour completely.

Abdomen: First tergite, brown with thin posterior black margin, overlaid with fine white scales in live specimens. Second tergite rich brown mid-dorsally with thin green posterior border which broadens posterior to timbal covers. The middle brown patch of the second tergite bordered with black spots as an extension of the black patch from the timbal cover. This black border extends partially between the median brown patch and green posterior border. Timbal cover almost half black and half white, the anterior and dorsal part of timbal cover black and remaining posterolateral half overlaid with white fine scales which do not enter onto third tergite. Third tergite chestnut colour with dark rich brown laterally, the remainder it paler chestnut brown. Series of dorsolateral dark brown patches, two in each tergite, from third to seventh tergite, shifting outwardly in every subsequent tergite making the patch appear inner most at the third tergite and almost laterally in seventh tergite. All tergites have thin green posterior border. Eighth tergite dark rich chestnut with broad posterior green border adjacent to the pygofer and with two, almost circular, dorsolateral patches adjacent to seventh tergite. All sternites uniform rich chestnut brown except the seventh and eighth sternite. Seventh sternite with dark brown posterior border and paler eighth sternite with lateral dark edges and a central elongated dark line. Ventral side of the abdomen with some fine white scales but not heavily overlaid.

Male Genitalia: As shown in the Fig.14 E&F. Pygofer pale brown which turns dark gradually at the protruded distal shoulder. Apex of pygofer with a lateral, oblong, rectangular pale brown patch adjacent to the distal shoulder. Dark brown edge of the pygofer from the rudimentary upper lobe to the distal shoulder gradually turning darker. Prominent dorsal beak dark with tiny brown hair like structures. Anal style and anal tube dark brown overlaid with tiny hairy structures. Median lobe of uncus pale brown, bulbous and not broad or flat at the tip, rather globous at the edge. The edges of the median lobe straight at the opening of the aedeagus. Chestnut aedeagus tube-like with tapered end and slender white membranous gonopore which extends as a slit dorsally.

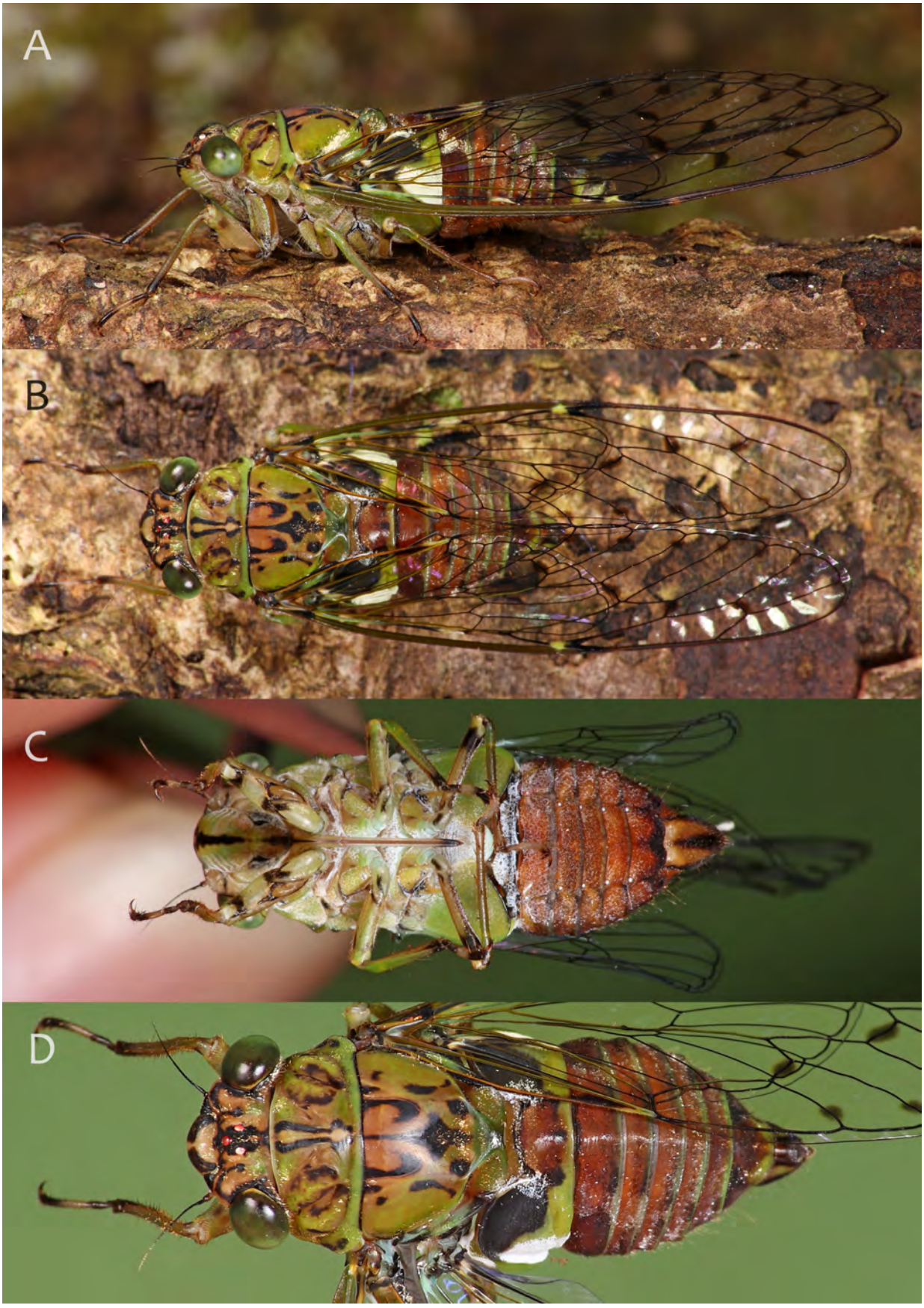


FIGURE 10. *Mata meghalayana* **sp. nov. A:** Lateral view of holotype in habitus (NCBS-BH999). **B:** Dorsal view of holotype in habitus (NCBS-BH999). **C:** Ventral view of holotype in habitus (NCBS-BH999). **D:** Close up dorsal view of holotype in habitus (NCBS-BH999). (Copyright and photographed by Vivek Sarkar.)

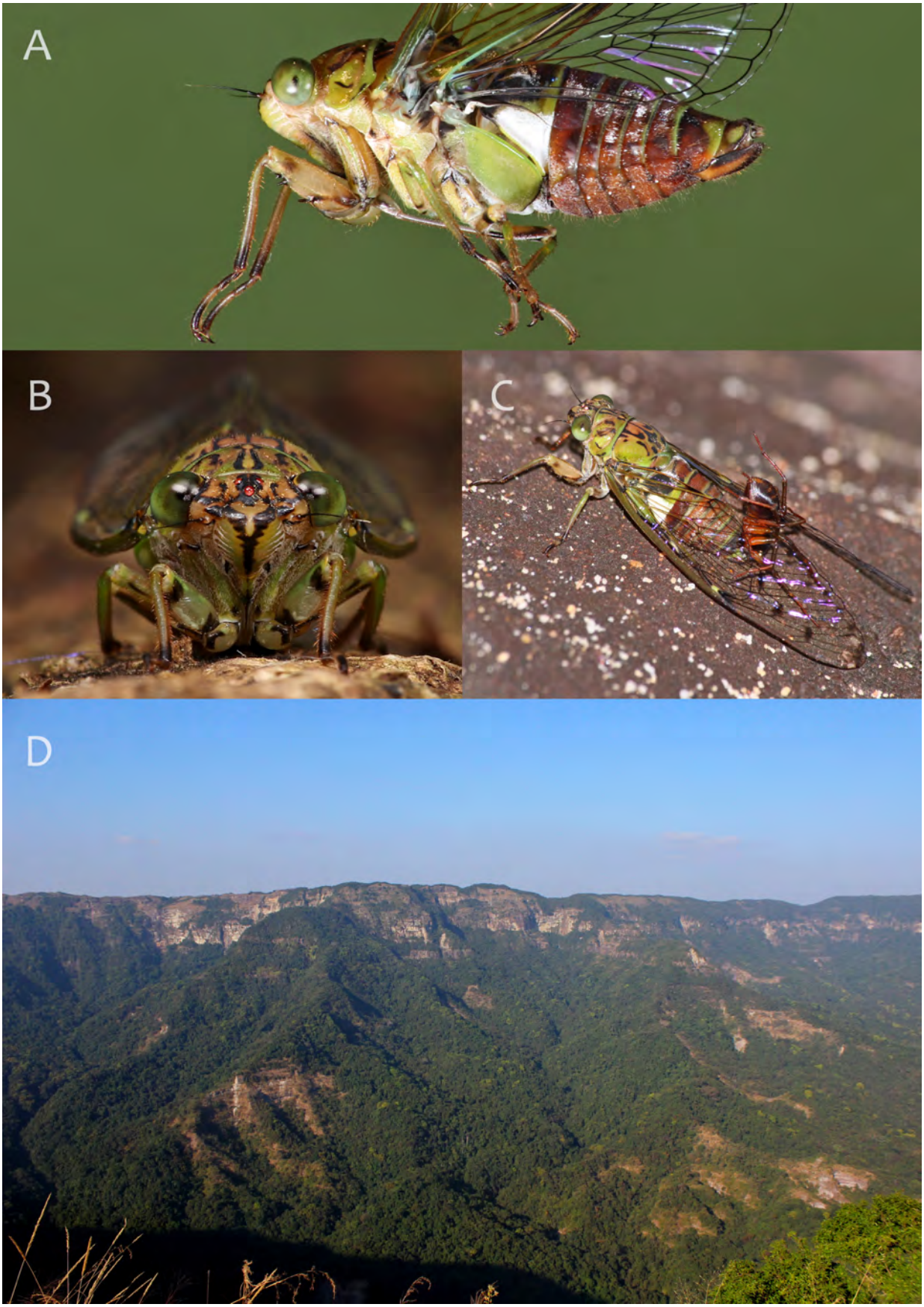


FIGURE 11. *Mata meghalayana* **sp. nov. A:** Close up lateral view of holotype in habitus (NCBS-BH999). **B:** Close up of the front of the head of holotype in habitus (NCBS-BH999). **C:** The holotype (NCBS-BH999) was attacked by a spider and fell off from higher canopy. **D:** Habitat. (Copyright and photographed by Vivek Sarkar.)

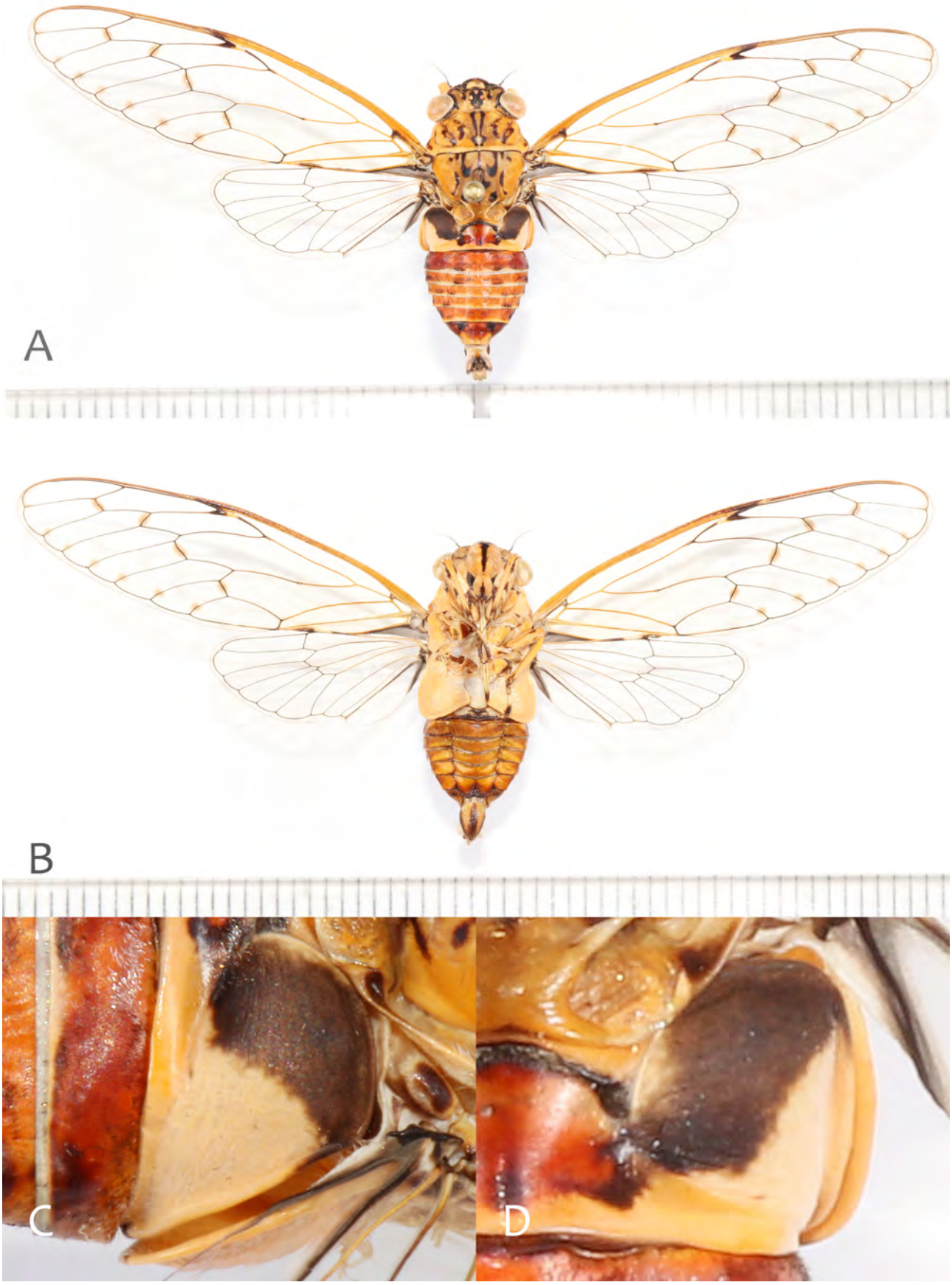


FIGURE 12. *Mata meghalayana* **sp. nov. A:** Dorsal view of holotype (NCBS-BH999). **B:** Ventral view of holotype (NCBS-BH999). **C:** Lateral view of male timbal cover (NCBS-BH999). **D:** Dorsal view of male timbal covering of holotype (NCBS-BH999). (Copyright and photographed by Vivek Sarkar.)

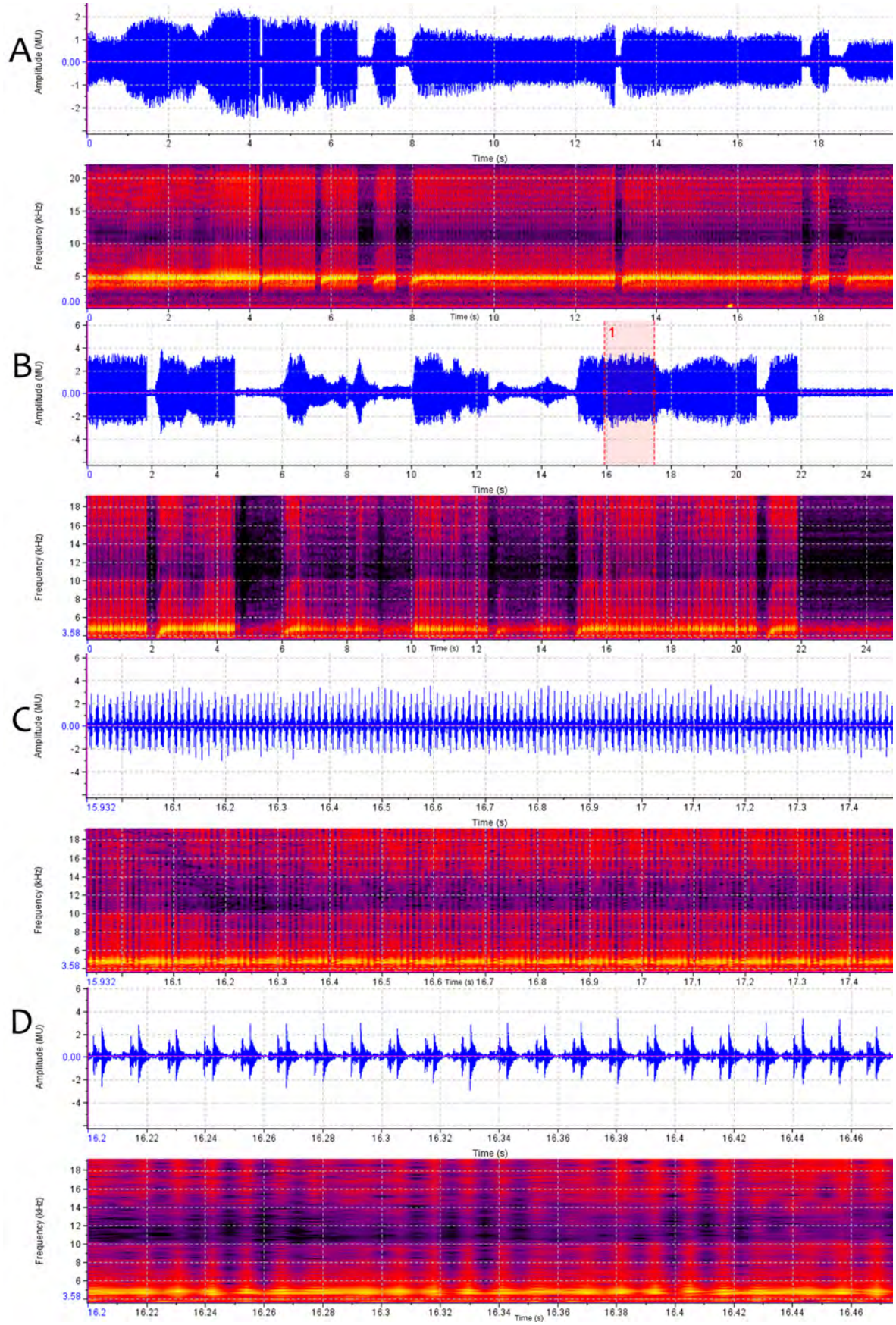


FIGURE 13. *Mata meghalayana* **sp. nov. A,B,C,D**: Cards for Identification by Acoustics (CIA).

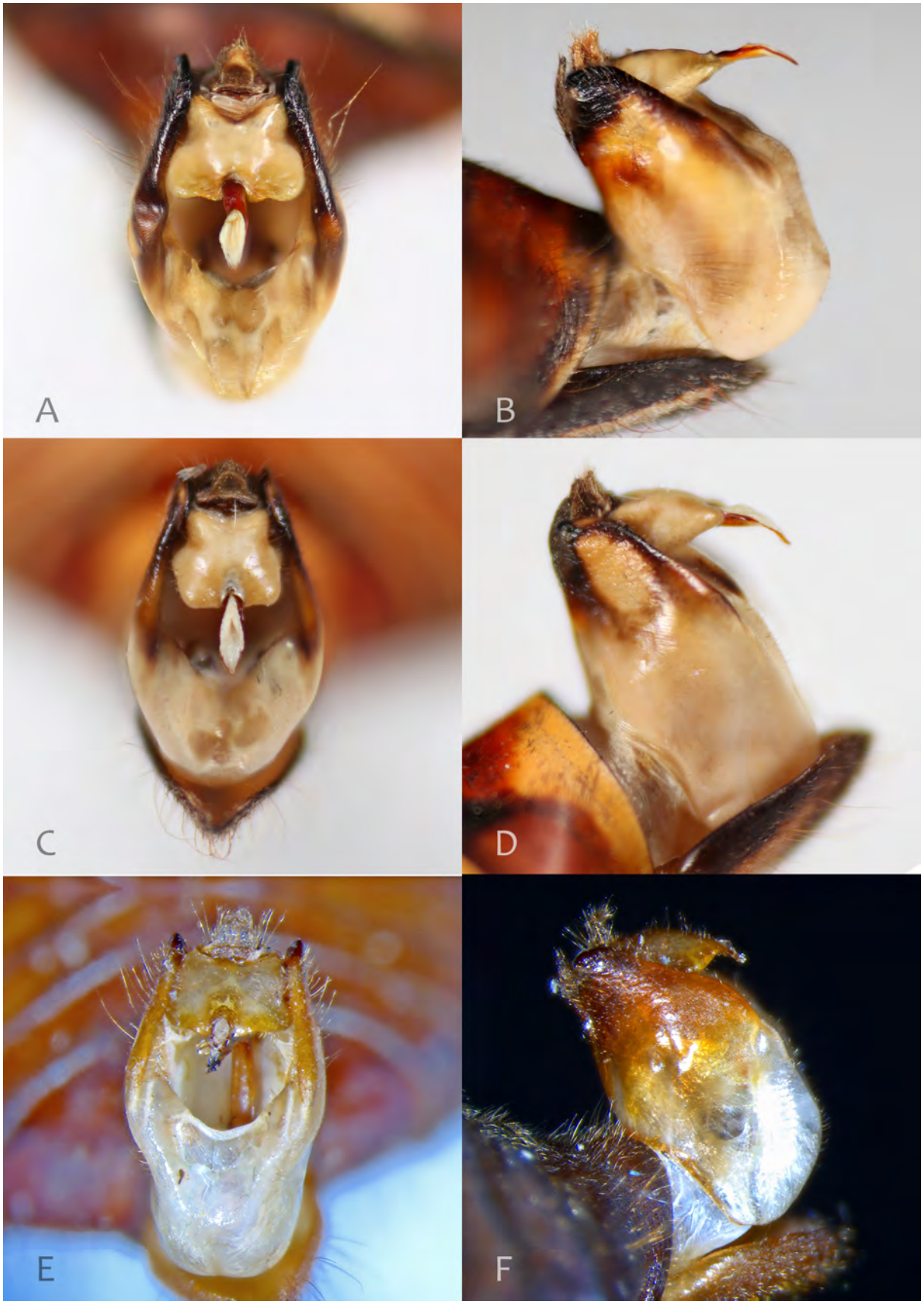


FIGURE 14. Comparison of the Male Genitalia. **A&B:** *Mata lenonia* **sp. nov.** Ventral and lateral side of the male genitalia of the holotype (NCBS-AH292). **C&D:** *Mata ruffordii* **sp. nov.** Ventral and lateral side of the male genitalia of the holotype (NCBS-BI001). **E&F:** *Mata meghalayana* **sp. nov.** Ventral and lateral side of the male genitalia of the holotype (NCBS-BH999). (A&B: Copyright NCBS and photographed by Vivek Sarkar C,D,E&F: Copyright and photographed by Vivek Sarkar.)

3.g. DISTRIBUTION: Apart from the type locality, this cicada was found in different forested parts of the Sohra (Cherrapunjee) plateau such as Mawmloh, Maraikaphon, Khliehshnong, Wahlong, Wahkaba, Khleishinong, Ramakrishna Mission adjacent to the sacred area in and around Nohkalikai Falls, Nongriath, Pomsomen, Umidengpoh, Laitrengew, Mawkodok; Parts of Shillong Peak; forested parts of Ladmawphlang, Mawphlang, Mawsinram, Nongstoin, and Mairang of Khasi Hills; elevated parts of the Saipong Reserve Forest and Mawlynnong of Jaintia Hills; and Nokrek Peak of Nokrek National Park and parts of the Balpakram Plateau.

3.h. BIONOMICS

3.h.1. Habitat type: Very similar to *Mata ruffordii* **sp. nov.** when it comes to habitat preferences but also largely found in the thick forests of the plateau comprising species of *Prunus* L., *Rhododendron*, L., *Castanopsis* (D. Don) Spach. and other plants. Found on well forested slopes at 900 meters ASL and above.

3.h.2. Annual adult activity period: Same as *Mata ruffordii* **sp. nov.**

3.h.3. Behaviour: Crepuscular, similar to *Mata ruffordii* **sp. nov.**, active only at dusk but does not call at dawn. Very weary, males start calling after the males of *Mata ruffordii* **sp. nov.** start emitting the timbalized signals and also stops earlier than its associate. This behaviour was studied from 11th September 2017 to 10th October 2017 and it was found that male timbalization sessions last only for 25 minutes on average per day. Dendrophilous in nature, usually taking shelter in thick foliage of the upper perches, making it very hard to spot. Once it finds a suitable position, the male stays inactive in one location for days. One individual was spotted near the Maraikaphon-Mawkisiyem border road at the hill top forest and was observed in the same location of the same tree for 12 days from 28th September to 9th October, 2017 despite the occurrence of strong winds and thunder storms during that time. The individual did not change its position despite all these disturbances. This cicada is very hard to capture in the conventional way as one cannot swing the long handheld sweep net due to the tightly packed upper canopy and attempting to climb the tree or nearby trees would make the upper canopy shake causing the insect to fly. Despite several attempts, the only specimen that was collected was due to the extremely lucky encounter where one individual was attacked by a spider and fell on the ground. Female and its behaviour unknown.

3.h.4. Acoustics: Male timbalization resembles the timbalization of *Mata lenonia* **sp. nov.** to the observers in the field but is more prominent and bold with abrupt random pauses during the call. Fig.13A shows the temporal oscillogram and spectrogram based on the recording of almost 20 seconds, illustrating in real time, part of the prolonged call with the abrupt pauses. The spectrogram illustrates the wide frequency spread of the call ranging from 3KHz to 21KHz. Average spectrogram illustrating major call energy between 3335 Hz to 5327Hz with maximum energy between 4545Hz and 5300Hz. Spectrogram also illustrates a harmonic series at intervals of about 4 kHz. The sudden pauses are more frequent towards the beginning and ending of their prolonged calling bout (Fig.13B). Like *Mata lenonia* **sp. nov.**, the call is comprised of tightly packed signals which sound like a drumming-like buzz but more pure-toned, focused on a narrow band of frequencies. Fig.13C illustrates the temporal oscillogram and spectrogram representing the selected part of Fig.13B which is expanded to illustrate these repetitive signals. There are 80 such signals per second on average (n=18). Each of these repetitive sequences consists of two predominant pulses (Fig.13D) which are at 0.003 seconds intervals without exception. The interval between the last pulse of a sequence and first pulse of the next repetitive sequences is generally 0.01 seconds with occasional exceptions of 0.009 seconds of interval in few cases (n=30).

3.i. Proposed Common Name: Meghalayan Spotted-back cicada

3.i.1. Justification: The justification of classifying all the species in the genus *Mata* as 'Spotted-back cicadas' is explained in the common name of *Mata lenonia* **sp. nov.** This species is named as '*meghalayana*' as it was first discovered in Meghalaya and it also has the widest distribution in the state of all the newly described *Mata* species from the state so that this common name is suggested.

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AUTHOR CONTRIBUTION

VS: Conceived the project (2017), collected samples (2014 and 2017), recorded acoustics and other field data, inspected collected specimens, compiled data, verified records, and wrote the manuscript. CM: Assisted in manuscript writing. PPM: Assisted in manuscript writing. KK: Conceived the project and facilitated the fieldwork in 2014, assisted in manuscript writing and verified records. MVN: Collected additional field data (2018-19) and assisted in manuscript writing.

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