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SHORT COMMUNICATION

EXTENSION IN ITS DISTRIBUTION RANGE AND A NEW RECORD FOR THE CICADA GENUS *SALVAZANA* DISTANT, 1913 (HEMIPTERA: CICADIDAE: CRYPTOTYMPANII) FROM INDIA

Sudhanya Ray Hajong & Rodeson Thangkiew

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EXTENSION IN ITS DISTRIBUTION RANGE AND A NEW RECORD FOR THE CICADA GENUS *SALVAZANA* DISTANT, 1913 (HEMIPTERA: CICADIDAE: CRYPTOTYPANII) FROM INDIA

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Abstract: The cicada genus *Salvazana* Distant, 1913 is reported for the first time from India with the discovery of *Salvazana mirabilis mirabilis* Boulard, 2002 from Shillong in the northeastern state of Meghalaya in India. This extends the northwestern distributional range of the genus *Salvazana* by more than a thousand kilometers. Brief descriptions of the specimen along with photographs of various structures are provided.

Keywords: Cicada, Meghalaya, range extension, *Salvazana mirabilis*.

Abbreviations: Acronyms used in the text are defined as follows: C- coastal vein; M- median vein; M₁- median first; M₂-median second; M₃- median third; M₄ – Medial vein fourth; CuA- cubitus anterior; A- anal vein; 1A- first anal vein; R- radius; RA₁- radius anterior first; RA₂ –radius anterior second; RA- radius anterior; RP-radius posterior; r-m – radiomedial cross vein and inf - infuscation; M_{1,2} - medial vein first and second; M_{3,4}- medial vein third and fourth; Sc- subcoastal vein; m-medial cross vein; m-cu- mediocubital cross vein; nl-node; nli- nodal line intersection

The cicada genus *Salvazana* was first described by Distant in 1913 with the type species *Salvazana mirabilis*. He mentioned its habitat as Indo-China. Distant in 1918 again described a second species, *Salvazana imperialis*, with its locality mentioned as Laos - Luang Prabang. The genus *Salvazana* is currently considered to be represented by only one species, *mirabilis*, with two subspecies

mirabilis and *imperialis* (Sanborn 2014). The subspecies *S. m. mirabilis* differs from *S. m. imperialis* with a greenish-yellow basal half in the hindwing, whereas, in the case of *S. m. imperialis* it is ochraceous. He (1984) described *Pulchrocicada guangxiensis*, which is a junior synonym of *S. m. imperialis* from Guangxi in China. Similarly, the subspecies *S. m. mirabilis* was also described by the junior synonym *Pulchrocicada sinensis* by He (1984).

Distant (1913) describes the distributional range of *S. m. mirabilis* as Indo-China; however, there exists no record of its occurrence in India and neighbouring countries including Bhutan, Bangladesh, Nepal, Sri Lanka and Myanmar. In a comprehensive account of cicada from this region, Price et al. (2016) compiled and provided an annotated catalogue of cicadas of the Indian region, consisting of India, Bhutan, Bangladesh, Nepal, Sri Lanka including Myanmar; based on literature and type specimens in the collection of the British and other museums they have listed a total of 281 species of cicadas, with 189 species from India and Bangladesh, 19 species from Bhutan, 81 species from Myanmar, 46 species from Nepal and 22 species from Sri Lanka. An earlier detailed analysis of cicadas from Nepal by Sanborn (2015) had listed

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59 species and Bhutan with 18 species and the Himalayan state of Sikkim in India lists 43 species. These lists also clearly indicate the absence of any historical records or specimens of the genus *Salvazana* from the Indian region. A comprehensive account of cicada fauna from the state of Meghalaya in northeastern India listed a total of 19 species based on the voucher specimen at the collection of Zoological Survey of India (Sen et al. 1998). His list also shows an absence of any representative member from the genus *Salvazana*. Presently, the known distribution of *S.m. mirabilis* extends through Laos (Boulard 1999; Lee 2014), Thailand (Boulard 2002), Vietnam (Lee 2008; Pham & Yang 2009) and China (He 1984). Similarly, *S.m. imperialis* is distributed in Laos (Distant 1918), China (He 1984; Chou et al. 1997) and Thailand (Boulard 2007). Thus, both these subspecies appear to occur sympatrically in these localities, but no reports exist of its occurrence in the north-west towards Myanmar. Here we present the first record of a subspecies of *Salvazana* from the northeastern part of India extending its distributional range northwestward into northeastern India.

The present specimen was collected during our continuing studies on the cicada diversity from the biodiversity rich northeastern Indian state of Meghalaya.

MATERIALS AND METHODS

For survey of cicada fauna we generally follow forest trails and locate the male cicadas by their calls. We also attempt to locate the female individuals within the vicinity of the calling males. After spotting them we use long handled insect collecting nets (Rescholar model

No. R.I 69-05) for capturing them. GPS coordinates are recorded with the help of a Garmin (eTrex) receiver. Captured specimens in the field were immediately put in plastic specimen containers. The present specimen was collected from a forested patch in Umiam area (Barapani) (25.66488889°N & 91.89861111°E) of Ri-bhoi District in Meghalaya. The collected specimen was brought to the lab and the wings were extended on a spreading board. The specimen was then dried completely in an oven at around 40°C for 48 hours. Male genitalia were examined in situ with a Motic SMZ 168 stereo zoom microscope. Habitus photo of the dried and pinned specimen was taken with an Olympus DSLR; pygofer structure was taken with Olympus 150mm lens fitted with macro extension tubes. Measurements were made with a digital Vernier caliper. Tissues sample (left mid legs) was preserved in DNA grade ethanol for future molecular analysis. Voucher number (07616/RB) was assigned to the specimen and was deposited in the Entomological Research collection of Entomology laboratory, Department of Zoology, North-Eastern Hill University, Shillong, Meghalaya, India.

Identification

Salvazana mirabilis Distant (1913): 186

Pulchrocicada sinensis He, 1984: 226

Salvazana mirabilis mirabilis Boulard, 2002: 62–64

The specimen was identified based on a description by Distant (1913) and specimen picture of *S.m. mirabilis* available from the website cicadomania (http://www.cicadomania.com/pictures/main.php?g2_itemId=1290). The diagnosis and brief description of the specimen along



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Image 1. Habitus, *Salvazana mirabilis mirabilis*, Male

with measurements are provided; the terminology used in the description is based on Moulds (2005).

Material examined (Image 1): 07616/RB, 1 ex., male, 7.vi.2016, Umiam, Ri-Bhoi District, Meghalaya, India, 25. 66488889°N & 91. 89861111°E; 1,100m, coll. D. Synkli.

Diagnosis: Head much narrower than base of the mesonotum; transversely truncated between the eyes; length almost half the breadth between eyes. Pronotum shorter than mesonotum with lateral margins oblique and sinuate. Abdomen broad and robust with tympanal opening completely covered; rostrum nearly reaching posterior coxae. Metasternum raised in middle and bearing backward directed posterior process. Operculum not passing base of abdomen. Tegmina basal third opaque rest partly sub hyaline; longer than greatest breadth; apical areas eight. Wings about half the length of tegmina.

Brief Description: Head: (Image 2) black, sparsely golden tomentose, vertex transversely flattened with light spots on; a medium round spots in between eyes and supra-antennal plates, a minute more or less curved spots between lateral ocelli and epicranium and another in between lateral ocellus on posterior epicranial suture; antennal scape, pedicel and flagellum black; gena black; postclypeus and transverse grooves blackish with golden tomentose; anteclypeus narrow blackish; rostrum not reaching hind coxa. Thorax: Pronotum black, anterior margin greenish; paramedial fissure deep meeting medial black stripe; lateral fissure only half the length of paramedial fissure; Pronotal collar yellowish green, lateral angle of pronotal collar rounded, anterior area of lateral margins black. Mesonotum well developed and robust, greenish, submedian sigilla and lateral sigilla black merged along parapsidal suture, scutel depression black, anterior angles of cruciform elevation black, medial ridges of cruciform elevation brownish, lateral depression of cruciform elevation yellowish-green. Legs: foreleg black with brown spot on outer coxa and femur; primary spine thin rod shaped with blunt apex; secondary spine short along with a small subapical spine black. Mid leg with inner brown streak on femur and tibia; hind leg with brown streak on femur and tibia; tarsus black. Operculum (Image 3): posterior angle rounded, short, broad transversely, inner three quarter black, posterior margin almost reaching distal margin of sternite I; two opercula meeting medially. Meracanthus (Image 4): Short about 2mm, basal three quarter broad rest acute with tip curved inward, outer margin lighter. Forewing (Image 7): basal third opaque greenish yellow with outward black suffusions on CuA_2 and along $n1$ and M_1 , M_2 , rest subhyaline; costal veins brown; post costal membrane black M , CuA , CuA , $1A$ greenish; RA_1 , RA_2 RP , M_1 , M_2 , M_3 - M_4



Image 2. Head frontal view



Image 3. Ventral view showing operculum



Image 4. Meracanthus (arrow)



Image 5. Pygofer (lateral view)



Image 6. Pygofer (rear view)

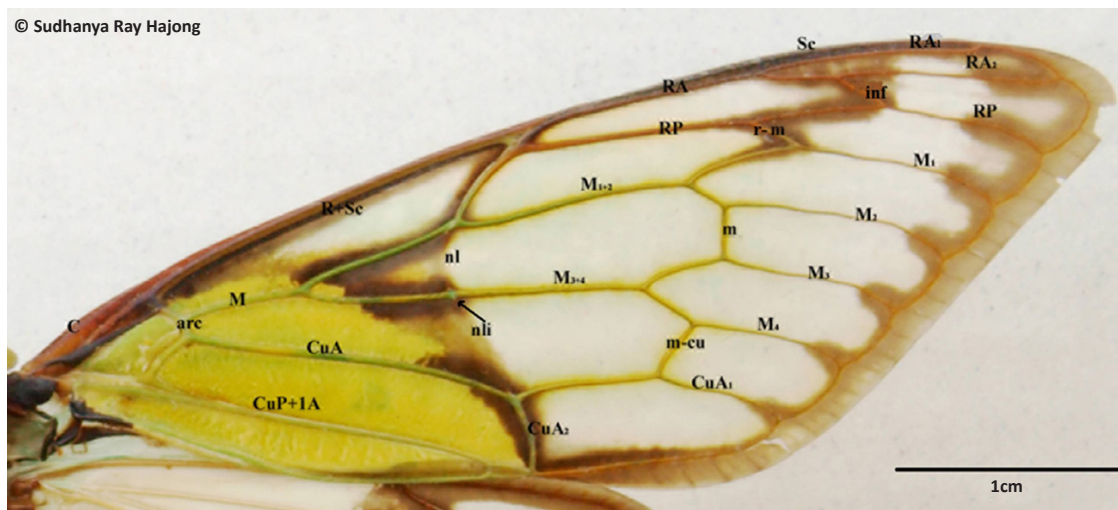


Image 7. Forewing (C) costal vein; (M) median vein; (R) radius; (RA) radius anterior; (RP) radius posterior; (RS) radial sector; (r) radial crossvein; (arc) arcus; (Sc) subcostal vein; (CuA) cubitus anterior vein; (CuP) cubitus posterior vein; (A) anal vein; (inf) infuscation; (nl) nodal line; (nli) nodal line intersection (m) medial crossvein; (m-cu) mediocubital crossvein; (r-m) radiomedial crossvein

yellowish brown; marginal area and spots at apices of RA₁, RA₂, RP, M₁-M₄ and CuA₁ black, r-m and inf blackish; yellow suffusion along RP, M₁₋₂, M₃₋₄, m-cu. Hind wing: basal half creamy white and opaque; transverse black fascia on outer margins connected with apical and postcostal margins, surrounding the apical hyaline area. Abdomen: robust; about 1.05 times as long as distance from head to cruciform elevation; tergites blackish with pale brownish spots on mediaolateral tergite 1; lateral edges of tergites 3-7 yellowish; sternite I-IV with a broad black longitudinal streak I, sternite VI-VII with narrow black longitudinal streak. Male genitalia (Images 5 & 6): pygofer oblong in ventral view; black patches proximally on dorsal beak; median dorsal lobe small, upper lobe of pygofer obtuse; clasper long curved inward, aedeagus brown, basal and upper lobe of pygofer reduced and not prominent.

Measurements: Body length (frons to abdominal tip) excluding wings = 42.01mm; width of head including eyes = 14.70mm; distance between eyes = 8.75mm; pronotum width = 14.33mm; mesonotal width (greatest) = 15.20mm; ratio of body length to head width = 2.85. Tegmina length = 53.83; Tegmina greatest breadth = 18.82; hind wing length = 32.73; total wing span 121.22mm

Distribution: India (Meghalaya), southern China (Guangxi), Laos (Luang Prabang), Thailand, Vietnam (Kon Tum, Vinh Phuc).

DISCUSSIONS

Based on the distribution records both subspecies appear to occur sympatrically in China, Thailand, Vietnam and Laos. The present record of *S.m. mirabilis* is the only record of the Genus *Salvazana* from India. It is also not

known whether its sister subspecies *S.m. imperialis* also occurs in this region, as no reports exist, it is however possible that *S. m. imperialis* also exists sympatrically in the reported area and further field surveys in the near future would likely reveal its occurrence. The present specimen of *S.m. mirabilis* was collected from an area called Umiam, which is around 20km northeast of Shillong the state capital of the state of Meghalaya. It is located at an altitude ranging from 1,000–1,100 m, and has a mixed vegetation consisting mainly of pine trees. The major pine species belong to *Pinus kesiya* var. *kesiya* which grow to a height of some 10–20 m and thus may constitute an important canopy habitat for this large cicada.

In terms of diversity of cicadas Southeast Asia is considered as a hotspot and one of the centers for cicada diversification. Many fauna of this region can be traced in terms of their biogeography by means of their westward dispersal towards Myanmar and into northeastern India and finally further southwards towards peninsular India (Mani 1974). Several cicadas biogeographically show such a dispersal and range extension farther westward from Thailand, Myanmar, northeastern part of India to peninsular India. For instance the cicada genus *Chremistica* which is mainly distributed in Southeast Asia and Sundaland has an extension till the Western Ghats of India and Sri Lanka (Bregman 1985). The genus *Salvazana* has so far had a distributional range covering China, Vietnam, Laos and Thailand. The present record on the extension of its distributional range westward by more than a thousand kilometers to northeastern India can therefore also be understood in light of the fact that the northeastern part of India which was termed as the 'eastern borderland' by Mani (1974) biogeographically together constitutes what is presently known as the Indo-Chinese subregion.

Like many other cicadas, hardly anything is known about the natural history and the annual seasonal phenology of *S. m. mirabilis* from the northeastern part of India in particular, although some aspects of *S. m. mirabilis* is available from Thailand (Boulard 2007, 2013); however, here in Shillong they appear to emerge during the vernal season and appear to peak around the month of June–July. They most likely prefer tall pine tree canopy for resting and also likely gather below the canopy layer of medium or high trees (Pham & Yang 2009). With regards to the occurrence of the sister subspecies, *S.m. imperialis* from this region, it is expected that further fieldwork will be required to bring its ecology and biogeography to light.

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