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DESCRIPTION OF A NEW SPECIES OF THE GENUS *COCKERELLIELLA* SUNDARARAJ ET DAVID, 1992 (HEMIPTERA: ALEYRODIDAE) FROM THE LITTLE ANDAMAN ISLAND, INDIA

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Summary. A new whitefly, *Cockerelliella setosus* Dubey, **sp. n.**, is described from the Little Andaman Island in Bay of Bengal. It was found infesting *Aporosa octandra* (Buch.-Ham. ex D. Don) Vickery (Pyllanthaceae). Puparia of the new species differ from all the described *Cockerelliella* species in having much longer cephalic and caudal setae compared to the eighth abdominal setae, combined with narrow submarginal ventral fold and submedian row of tubercles. Line drawings and microphotographs of holotype of the new species are given. An updated key to the puparia of Indian species of *Cockerelliella* is also provided.

Key words: whitefly, Aleyrodidae, taxonomy, new species, Andaman Islands, Bay of Bengal.

А. К. Дубей. Описание нового вида рода *Cockerelliella* Sundararaj et David, 1992 (Hemiptera: Aleyrodidae) с острова Малый Андаман, Индия // Дальневосточный энтомолог. 2020. N 415. С. 1-8.

Резюме. С острова Малый Андаман в Бенгальском заливе описан новый вид белокрылок *Cockerelliella setosus* Dubey, **sp. n.** Этот вид обнаружен на листьях

Aporosa octandra (Buch.-Ham. ex D. Don) Vickery из семейства филлантовых (Pyllanthaceae) отряда мальпигиецветных. Пупарии нового вида отличаются от всех известных видов рода *Cockerelliella* наличием более длинных головных и хвостовых щетинок (по сравнению с щетинками IX сегмента брюшка), а также узкой каудальной бороздкой и рядом субмедиальных бугорков. Приводятся рисунки и фотографии голотипа нового вида, а также определительная таблица пупариев индийских видов рода *Cockerelliella*.

INTRODUCTION

The whitefly genus *Cockerelliella* (type species *C. indica* Sundararaj et David, 1992) was described from India (Sundararaj & David, 1992). So far, the genus is represented by 20 species worldwide including the new species described here. Many of them are described from the Indo-Malayan region (including Taiwan and Thailand) with a single species, *C. citri* (Corbett, 1935) reported from Australia. *Cockerelliella* species differ little in their pupal morphology and in need of revision. Further, while describing the genus *Cockerelliella*, authors noted “longitudinal moulting suture reaching margin” (Sundararaj & David, 1992), this error continued misleading researchers in Indian literature till recent publication of Pushpa & Sundararaj (2009). The author has not seen the longitudinal moulting reaching margin in any of the *Cockerelliella* species so far examined, and clarifies here that the longitudinal moulting suture reaching cephalothoracic suture only, and agrees with the diagnosis for genus given by Martin (1999).

The genus *Cockerelliella* is recorded here for the first time from the Andaman Islands. The Little Andaman Island is located on geographical coordinates from 10°30' to 10°54' N and from 92°20' to 92°54' E covering an area of 737 sq km. A new species, *C. setosus* sp. n. is described and illustrated below.

Also, an updated key to puparia of *Cockerelliella* species so far known from India is given, based on the available literature. In life, *Cockerelliella* species are observed with median pigmentation (erroneously referred to as ‘brown patch’) which disappears in slide mounts, and the crescent-shaped plates along posterior margin of the cephalothoracic suture is common and almost always present, as well as sexual dimorphism is entirely overlooked in all the species. Possibly, this is due to availability of puparia in small numbers, and as and when studies on large population of species differing in puparial size or in number of a few marginal crenulations only may prove to be synonymous.

MATERIAL AND METHODS

The new whitefly pupal cases were collected on the Little Andaman Island along with the host plant leaves in cloth coated A4 size paper envelopes and carried to Andaman and Nicobar Regional Centre (ANRC), Zoological Survey of India (ZSI), Port Blair for further studies. Puparia were mounted following Dubey & David (2012). Photograph of the puparial habitus on leaf were taken by using a Leica

made M205 A microscope attached to an auto-montage camera with a DFC500 configuration. A Labomed LX 400 compound microscope was used for identification; both microscopes belonged to the ANRC, ZSI in Port Blair, India. A Nikon made compound microscope Eclipse 50i attached to an auto-montage camera with DFC configuration was used for imaging holotype puparium. The microscope belonged to Andaman and Nicobar Regional Centre, Botanical Survey of India, Port Blair. The terminology for puparial morphology follows those of Bink-Moenen (1983), Martin (1985) and Gill (1990). Measurements were taken for all the type specimens.

The holotype and five paratypes are deposited in the National Zoological Collection, Zoological Survey of India, Kolkata (ZSI). One paratype is also deposited in the National Forest Insect Collection, Forest Research Institute, Dehradun (NFIC).

TAXONOMY

Cockerelliella setosus Dubey, sp. n.

<http://zoobank.org/NomenclaturalActs/8F84630E-598B-4CC2-9A28-B1929277631F>

Figs 1–11

TYPE MATERIAL. Holotype – one female puparium on slide, **India**: Andaman and Nicobar Islands, Little Andaman Island, 10°40'41.83" N, 92°32'29.86" E, on *Aporosa octandra*, 2.II 2020, leg. A.K. Dubey (ZSI). Paratypes: six puparia on four slides, data same as the holotype (ZSI, NFIC).

DESCRIPTION. **Puparium.** White; shiny; dorsally flat; without secretion of wax; broadly rounded anteriorly, posteriorly narrow (Figs 1, 3); dimorphic, female 870–880 microns long, 700–770 microns wide; male 700–780 microns long, 540–680 microns wide. Found singly on the underside of leaves, only one puparium per leaf.

Margin. Smooth. Thoracic and caudal tracheal pores indicated in the margin as C-shaped invaginations. Thoracic tracheal furrows absent. Caudal tracheal furrow present, inner margins of furrow with 10–11 crenulations, furrow filled with microtubercles (Figs 1, 10).

Dorsum. Cephalothorax separated from the dorsal disc by a suture, suture not extending to abdominal region. Median length of cephalothorax and abdomen 375–475 and 360–460 microns long, respectively. Median length of abdominal segment I–VII: 47–50, 40–45, 37–40, 35–37, 33–37, 32–37, 30–33, 40–43 microns long, respectively. Seven pairs of submarginal setae, one pair located each lateral to prothorax, above thoracic tracheal pores, meso-metathoracic suture or on metathorax, first abdominal segment, segment suture V/VI or segment VI, pockets or below, and two pairs on caudal region. Caudal furrow 118 microns long in female, 100–103 microns long in male. Geminate pores present in four rows, one row each along the submargin and submedian area and two rows in middle of these on subdorsal area. Two pairs of geminate pores present on the first abdominal segment, between metathoracic legs.

Vasiform orifice. Subcordate (Figs 2, 10), 22–28 microns long, 35–38 microns long, inner margin smooth; operculum subcordate, entirely covering the orifice and obscuring the lingula, 20–25 microns long, 35–38 microns wide.

Venter. Narrow submarginal area demarcated by a fold. Paired ventral eighth abdominal setae 10–13 microns long, apart 30–45 microns. Antennae extending through inside prothoracic legs and reaching near base, 14 (5 microns keel) microns long. Adhesive sacs and spiracles visible.

Figs 1, 2. *Cockerelliella setosus* sp. n.: 1 – holotype puparium; 2 – vasiform orifice and submarginal caudal end.

Chaetotaxy. Cephalic and caudal setae exceptionally longer than the eighth abdominal setae, 96 and 82–92 microns long, respectively. Eighth abdominal setae cephalolateral to vasiform orifice, 7–10 microns long, 43–48 microns apart. First abdominal setae absent. Anterior and posterior marginal setae prominent, 20–23 and 17–25 microns long, respectively. Submarginal setae 11–13 microns long.

Figs 3–11. *Cockerelliella setosus* sp. n., holotype: 3 – puparium; 4 – margin; 5 – thoracic tracheal pore; 6 – cephalothorax; 7 – cephalic seta; 8 – submedian tubercles; 9 – abdominal segments; 10 – vasiform orifice, caudal furrow, caudal pore; 11 – ventral setae, caudal fold.

HOST PLANT. Pyllanthaceae: *Aporosa octandra* (Buch.-Ham. ex D. Don) Vickery.

DISTRIBUTION. India: Andaman and Nicobar Islands, Little Andaman Island.

ETYMOLOGY. The species epithet '*setosus*' is attributing exceptionally long dorsal setae.

DIAGNOSIS. Puparia of the *Cockerelliella setosus* sp. n. differ from all the Indian congeners in having much longer cephalic and caudal setae compared to the eighth abdominal setae, combined with narrow submarginal ventral fold and submedian row of tubercles. It differs from *C. dioscoreae* from India (Sundararaj & David, 1992), *C. schimae* Lalneihpuia et Sundararaj, 2011 and *C. williamsoni* Lalneihpuia, 2011 in Chhakchhuak *et al.* (2011) from India in longer dorsal setae, structure of caudal furrow, also from later two in shape and dorsal sculpture. The new species differs from *C. psidii* (Corbett, 1935) described from Malaysia (Corbett, 1935) in shape, longer cephalic setae reaching beyond cephalothoracic furrow, ventral fold and in lacking a ring of papilla-like markings on the submargin; and from *C. kamardini* (Corbett, 1935) known from Malaysia (Corbett, 1935) in shape, larger size, shape of caudal furrow and in lacking submarginal ventral fold. Among these *C. psidii* has median patch on metathorax and abdominal segment I. I also believe that the longer cephalic and caudal setae are not host-correlated variations as only these two setae were longer and the host plant has smooth surfaces of leaves.

Key to the puparia of Indian species of *Cockerelliella*

- 1 Cephalic and caudal setae much longer than the eighth abdominal setae; cephalic setae reaching beyond cephalothoracic suture ***C. setosus* sp. n.**
- Cephalic and caudal setae minute, almost equal to the length of eighth abdominal setae; cephalic setae not reaching beyond cephalothoracic suture 2
- 2 Ventral submargin differentiated from subventral area by a fold 3
- Ventral submargin not differentiated from subventral area by a fold 5
- 3 Dorsal and submarginal setae pointed; seven pairs of submarginal setae, 2 pairs on cephalothorax and five pairs on abdomen 4
- Dorsal setae fimbriate, most of the submarginal setae fimbriate; ten pairs of submarginal setae, 5 pairs each on cephalothorax and abdomen, one abdominal pair pointed ***C. rotunda*** Regu et David, 1993
- 4 Subdorsum and submargin with papilla-like structures; a distinct row of crescent-shaped papilla-like structures extending from lateral of vasiform orifice to anterior end of cephalothorax absent ***C. somnathensis*** Sundararaj, 2000
- Subdorsum and submargin without papilla-like structures; a distinct row of crescent-shaped papilla-like structures extending from lateral of vasiform orifice to anterior end of cephalothorax present ***C. dioscoreae*** Sundararaj et David, 1992
- 5 Caudal furrow smooth 6
- Caudal furrow with distinct polygonal markings or papillae like markings or tessellated 7
- 6 Median pigmentation present on metathoracic and abdominal segment I; submedian papillae present; cephalothoracic tubercles absent ***C. quaintancei*** Sundararaj et David, 1992

- Median pigmentation absent on metathoracic and abdominal segment I; submedian papillae absent; 5 pairs of tubercles present on cephalothorax *C. kudremukhensis* Sundararaj, 2007
- 7 Subdorsum with three to seven pairs of enlarged tubercles 8
- Subdorsum without tubercles 10
- 8. Dorsum without distinct granules; with a submedian row of papillae; subdorsum with papilla-like structures along the cephalothoracic suture at cephalic region 9
- Dorsum with distinct granules; without a submedian row of papillae; subdorsum without papilla-like structures along the cephalothoracic suture at cephalic region *C. dehradunensis* (Jesudasan et David, 1991)
- 9 Vasiform orifice without lateral tubercles; median pigmentation absent on metathorax, abdominal segment I, VII and VIII; dorsum tessellated *C. meghalayensis* Sundararaj et David, 1992
- Vasiform orifice with lateral tubercles; median pigmentation present on metathorax, abdominal segment I, VII and VIII; dorsum with polygonal papillae-like structures *C. cinnamomi* Pushpa et Sundararaj, 2009
- 10 Margin crenulated; caudal furrow with polygonal markings 11
- Margin smooth; caudal furrow tessellated *C. vijendrai* Pushpa et Sundararaj, 2009
- 11 Puparium 0.75-0.93 mm long, a submedian row of papillae-like structures on dorsum present 12
- Puparium 0.94-1.19 mm long; a submedian row of papillae-like structures on dorsum absent *C. zingiberiae* Sundararaj et David, 1992
- 12 Margin with 22-24 crenulations in 0.1 mm; submargin without papillae-like structures, with striations; dorsum tessellated *C. indica* Sundararaj et David, 1992
- Margin with 13-15 crenulations in 0.1 mm; submargin with papillae-like structures, without striations; dorsum with numerous papillae-like structures *C. splendens* Meganathan et David, 1994

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