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Two Economically Important Leafhoppers *Cicadulina bipunctata* (Melichar) and *Balclutha incisa* (Matsumura) (Hemiptera: Cicadellidae: Deltocephalinae: Macrostelini) From Tando Jam, Pakistan*

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Abstract.- Two economical important leafhoppers, *Cicadulina bipunctata* (Melichar) and *Balclutha incisa* (Matsumura), are redescribed. A key to the genera of Macrostelini known from Pakistan is also provided. Their abundance and records on various hosts are provided from different localities of Sindh.

Key words: Macrostelini, *Balclutha*, *Cicadulina*, leafhoppers.

INTRODUCTION

The tribe *Macrostelini* Kirkaldy, 1906 is represented with three genera in the checklist of Deltocephalinae of Pakistan; *Balclutha* Kirkaldy, *Cicadulina* China and *Macrosteles* Fieber (Khatri and Webb, 2010). Illustration was only provided for *Macrosteles indrina* and the rest of two species (*Cicadulina bipunctata* (Melichar) and *Balclutha incisa* (Matsumura)) are illustrated in present paper. Both the genera *Balclutha* Kirkaldy and *Cicadulina* China are economically important and were reviewed respectively by Webb and Vilbaste and Webb (1994, 1987a,b). The genera *Macrosteles* Fieber, *Cicadulina* China and *Balclutha* Kirkaldy include species which are capable of transmitting viruses (Knight, 1987).

Tribe Macrostelini can be identified with forewing having two subapical cells, appendix extending to third apical cell, connective with arms divergent, aedeagal shaft not hinged and ovipositor with sculpture reticulate, extending to dorsal margin.

There are 29 species of *Cicadulina* of which eight are known to transmit Maize Streak Virus in Africa (Webb, 1987a,b). They are mostly widespread in tropical and warm temperate regions as pests of cereals and sugarcane and are frequently found in Asia on rice crop but not as serious pests (Wilson, 1990). *C. bipunctata* (Melichar) causes Ragi Streak Virus on rice in Asia (Nielson, 1979), from Tando Jam it has been collected from wheat and lufa guord and rose and from Tharparkar on grass. It is a very variable species hence many subspecies have been described from different regions. Genus *Balclutha* Kirkaldy contains about 100 species of which 25 have been recorded from Oriental region (Webb and Vilbaste, 1994). *B. incisa* (Matsumura) has been recorded as the most abundant leafhopper on rice in Egypt (Ammar *et al*., 1978); from Tando Jam it has extensively been collected on various crops including: lentil, wheat, lufa guord, sugar cane, tomato and banana (see material examined).

MATERIALS AND METHODS

Leafhoppers were collected from Tando Jam and Tharparkar. Line drawings were made with camera Lucida fitted on 2D microscope (Leica), further improved with the help of Adobe Illustrator 12.0. Identifications were carried out using both pertinent literature and the examination of specimens in the collections of The Natural History Museum, London, hereafter referred to BMNH. All the specimens studied are held in the personal collection of first author as well as in the BMNH.

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To view internal structures it is necessary to have transparent abdomen, to achieve this process known as maceration (removal of muscle and soft connective tissues) described by Knight (1965) was followed.

KEY TO GENERA OF MACROSTELINI FOUND IN TANDO JAM, PAKISTAN

1. Vertex of head short, of uniform length, more than 4 times broader than wide between eyes than long; lack prominent black markings ..... *Balclutha*
- Vertex longer medially than next to eyes, twice than or less as wide between eyes as long; with proment black markings 2
2. Vertex with two round spots, head and thorax golden yellow; male pygofer with long, slender hook-like process; aedeagus without paired apical process .... *Cicadulina*
- Vertex with four round spots, head and thorax greenish; male pygofer without such process; aedeagus with pair of apical processes ..... *Macrosteles*

Genus *CICADULINA* China

Cicadulina China, 1926: 43. Type species*:* *Cicadulina zeae* China, 1926: 43, by original designation.

Remarks

This genus closely resembles the African genus *Afrosteles*. Under this genus one species *Cicadulina bipunctata* has been recorded from study area and other species *C. striata* Ahmed, 1986 is also known to occur in Pakistan. *Cicadulina* forms a group with *Nesoclutha*, *Cicadula*, *Balclutha*, *Picchusteles*, *Agelina* and *Elrabonia*, in having three, rather than four apical cells in hind wing. *Cicadulina* have the aedeagal process absent or distant from apex of shaft.

Cicadulina bipunctata (Melichar) (Fig. 1)

Gnathodus bipunctatus Melichar, 1904: 47-48.
Cicadula bipunctella Matsumura, 1908: 12. Synonymized by Heller & Linnavuori, 1968:4.
Cicadulina zeae China 1926: 43. Synonymized with *C. bipunctella* Matsumura by Zachvatkin, 1935: 11; and with *C. bipunctata bipunctata* (Melichar) by Vilbaste, 1976: 27.
Cicadulina bipunctella bipunctella (Matsumura), Zachvatkin, 1946: 157. Synonymized by Webb, 1987: 694.
Cicadulina bipunctella zeae China. Synonymized by Zachvatkin, 1946: 157.
Cicadulina bipunctata (Melichar); Webb, 1987a: 236-240, figs 1-4, 11-36.

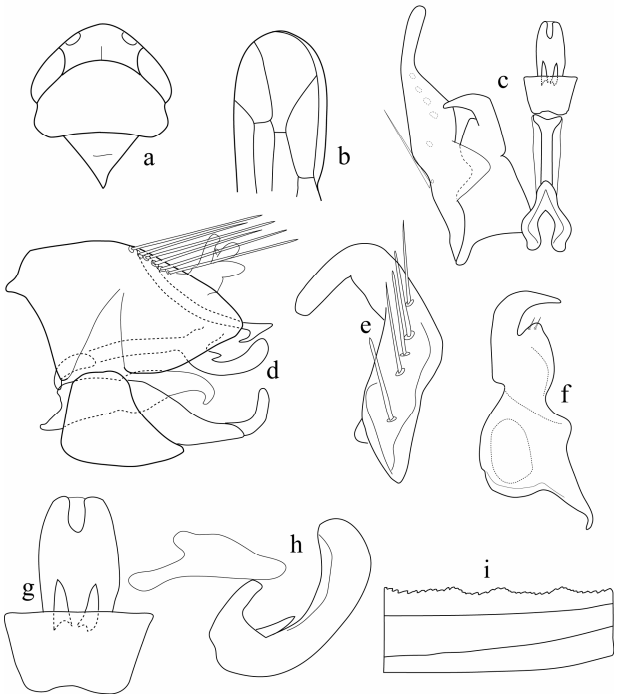

Fig. 1. *Cicadulina bipunctata* (Melichar); a, head and thorax, dorsal view; b, forewing; valve, subgenital plate style and connective, dorsal view; d, pygofer, lateral view; e, subgenital plate; f, style; g, h, aedeagus dorsal and lateral view respectively; i, middle teeth of second valvulae

Description

Small leafhoppers, colour pale to golden yellow with two conspicuous black spots on vertex (Fig. 1a). Head and pronotum with equal width; crown longer medially than next to eyes; face shagreen, wider than long; ocelli near to eye and marginal; pronotum without lateral carinae; scutellum shagreen. Forewing with three apical cells (Fig. 1b).

Pygofer incised deeply dorsally with long, slender hook-like process emerging out caudally

(Fig. 1d), without marginal comb-like serrations, with 7-8 macrosetae. Subgenital plate with five macrosetae along ventrolateral margin (Fig. 1e). Style with robust apical process. Connective Y-shaped with arms close together. Aedeagal shaft cylindrical and C-shaped curved dorsally with pair of processes dorsally (Figs. 1g, h), gonopore apical on posterior surface.

Measurements (mm)

Male total length 2.05, forewing length 1.63, crown length at middle 0.19, crown width across eyes 0.62, interocular width at anterior 0.44, eyes length in cross 0.27, pronotum width 0.59, pronotum length 0.33, mesonotum length 0.06, scutellum length 0.16.

Material examined

Several specimens (♂, ♀) from Africa, Lebanon and India, all in BMNH. Pakistan: 1♂, 3♀, Sindh Prov., Tando Jam, 7.viii.2007, I. Khatri; 3♂, 4♀, Sindh Prov., Tando Jam, 12.vi.07, I. Khatri, rose; 1♂, Tando Jam, 7.viii.2007, I. Khatri, Wheat; several specimens (♂, ♀), Tando Jam, 12.xi.07, lufa guord; 5♂, 18♀, Sindh Prov., Mithi, 15.vii.07, I. Khatri, Grass.

Remarks

Cicadulina bipunctata is similar to *C. bimaculata*, *C. arachidis* and *C. chinai* in external features shape of connective and style, but they differ in pygofer and aedeagus. However, no variation in placement of aedeagal process and number has been recorded in the material examined from Pakistan.

Genus *BALCLUTHA* Kirkaldy

Balclutha Kirkaldy, 1900: 243, new name for *Gnathodus* Fabricius. Type species: *Cicada punctata* Fabricius, by monotypy.

Balcluthina Pruthi, 1930:46. Type-species: *Balcluthina viridis* Pruthi, by original designation. Synonymized by Webb & Vilbaste 1994: 58 [See Knight 1987 and Webb & Vilbaste 1994, for other synonyms].

Remarks

This genus was revised for the Oriental region by Webb and Vilbaste (1994). Knight (1987) described the genus *Balclutha* in detail, several characters of *Balclutha* and other related taxa were reviewed by Knight and Webb (1993), but didn't prove the possibility to designate the *Balclutha* as a separate tribe. Only *B. incisa* (Matsumura) is presented here for the other species of this genus see Khatri and Webb (2010).

Balclutha incisa (Matsumura)
(Fig. 2)

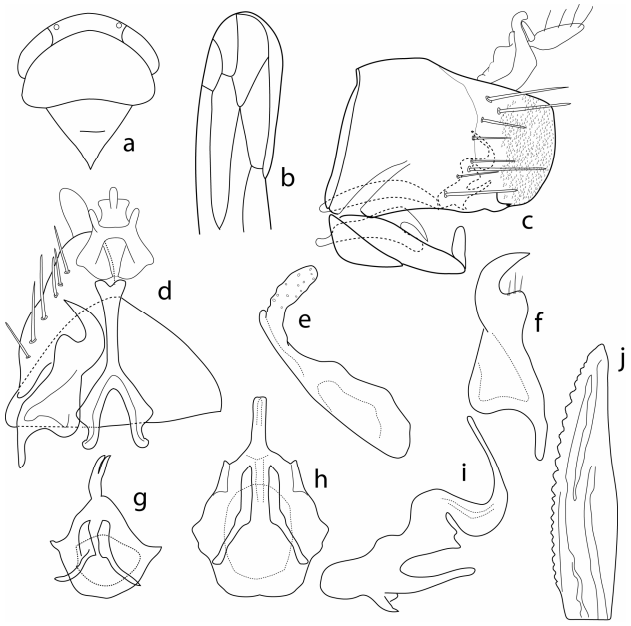

Fig. 2. *Balclutha incisa* (Matsumura); a, head and thorax, dorsal view; b, forewing; c, pygofer, lateral view; d, valve, subgenital plate, style and connective, dorsal view; e, subgenital plate; f, style; g-i, aedeagus, dorsal, ventral and lateral view respectively; j, apex of second valvulae.

Gnathodus incisus Matsumura, 1902: 360.

Balclutha indica Pruthi, 1930: 48 (*Eugnathodus*), India. Synonymized by Knight, 1987:1206.

Balclutha modesta Ahmed, Murtaza & Malik, 1988: 415, Pakistan. Synonymized by Webb & Vilbaste, 1994: 57.

Description

Elongate leafhoppers with greenish to yellowish brown. Head equal in width to pronotum;

crown of head short, of uniform length, more than 4 times broader than wide; ocelli on anterior margin of crown.

Pygofer rounded caudally with 8-9 macrosetae near midline (Fig. 2c); pygofer process brown, visible in dry specimens. Subgenital plates rapidly narrowed apically with 7-8 macrosetae. Style with apical process well developed and preapical lobe with fine setae. Connective elongate, Y-shaped (Fig. 2d). Aedeagal apex bilobed with pair of processes (Fig. 2g).

Pregenital sternite of female with W-shaped brown mark at hind margin.

Measurements (mm)

Male total length 3.29, forewing length 2.89, crown length at middle 0.1, crown width across eyes 0.76, interocular width at anterior 0.44, eyes length in cross 0.29, pronotum width 0.76, pronotum length 0.36, mesonotum length 0.17, scutellum length 0.19.

Material examined

Several specimens (♂, ♀) from Sudan, Philippines and Indonesia, all in BMNH. Pakistan: several specimens (♂, ♀), Sindh Prov., Tando Jam, 05.viii.2006; 5♂, 8♀, Sindh Prov., Tando Jam, 8.ii.06, I. Khatri, lentil; several specimens (♂, ♀), Tando Jam, 27.viii.2006. I. Khatri, lufa guord; several specimens (♂, ♀), 3♂, 3♀ Tando Jam, 15.ii.2007, sugar cane; 4♂, 7♀ Tando Jam, 31.iii.2007, I. Khatri, tomato; 5♂, 8♀, Tando Jam, 12.vi.2007, I. Khatri, rose;1♂, Tando Jam, 5.viii.2007, I. Khatri, Wheat; 6♂, 23♀, Sindh Prov., Naon Kot, 15.vii.07, I. Khatri, Grass.

Remarks

Balclutha incisa, widely distributed in tropical and temperate regions, is similar to *B. rubrostriata* in external features, pygofer, subgenital plate and connective, but can be distinguished from the latter by the shape of aedeagus.

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