Genus *Exitianus* (Auchenorrhyncha, Cicadellidae, Deltocephalinae, and Chiasmini) in Tando Jam, Sindh, Pakistan

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ABSTRACT. *Exitianus* Ball, 1929 is studied from Tando Jam, Pakistan. Two species, *Exitianus indicus* (Distant, 1908) and *Exitianus nanus* (Distant, 1908), are reviewed and their characters, habitus, and line drawing are given.

Key Words: *Exitianus*, deltocephalinae, leafhopper

Leafhoppers are usually collected in general sweepings more commonly than any other insect groups (Ross et al. 1982). Leafhoppers can readily be recognized from other members of the Auchenorrhyncha by the presence of two or more rows of spines on the hind tibiae and by not having the pronotum extending back over the abdomen, as present in their close relative, the Membracidae, Viraktamath (2005).

*Exitianus*, a member of the subfamily Deltocephalinae, contains 43 species, of which 6 species occur in Asia. It differs from related forms in having only a small number apical, stout setae on the male pygofer; the female with long ovipositor. On every continent, at least one common form of *Exitianus* has a conspicuous black band across the top of the head. This genus from Old World was studied by Ross (1968), and recently it is reviewed by Zahniser (2008), Khatri and Webb (2010), and Duan and Zhang (2013).

Tando Jam is situated 20 km away from Hyderabad in the Sindh Province of Pakistan. Leafhoppers in Tando Jam are found on grasslands and on many economically important crops. It is misconception in Tando Jam that *Exitianus* is the pest of Mango orchard, as grasses and other weeds are usually seen in mango orchards, and this genus is very common on grass. This article will be helpful to recognize the members of the genus.

Materials and Methods

Collection and Preservation. Material presented here was mainly collected from Tando Jam, using a sweep net, aspirator, and a light trap. Crops and variety of vegetation were sampled for leafhoppers. Specimens were killed in a standard insect killing jar containing cyanide, then mounted on triangular points.

Study of Genitalia. To view internal structures a process known as maceration (removal of muscle and soft connective tissues) described by Knight (1965). A macerated abdomen was placed in glycerin and dissected under a three-dimensional dissecting microscope (Labomed CSM2, 20X–40X). For detailed study, the genitalia were observed under a compound microscope (Kyowa Medivis 20) fitted with a USB Digital Camera (350 k pixel). For line drawing, a camera Lucida was used fitted on microscope. For the improvement of some line drawings, the software Adobe Illustrator v 12.0. Zodiac, Adobe System, launched, April 27, 2005.

Sources of identification. For identification of specimens, both relevant literature and the examination of type specimens from the collection of The Natural History Museum, London, were used, hereafter referred to as BMNH.

Measurement. Mean is calculated by measuring characters of 10 specimens.

Depositories. The material on which this study is based is deposited in the institutions that are abbreviated in the text as follows:

BMNH: The Natural History Museum, London, United Kingdom

IKC: Imran Khatri’s Private Collection

IMSAU: Insect Museum Sindh Agriculture University, Tando Jam, Pakistan

Result and Discussion


Diagnosis. The members of this genus are medium sized, ranges between 4 and 5 mm, color tawny with brown or black patterns. Head wider than pronotum. Ocelli large situated dorsally, pronotum and mesonotum with different markings. They have forewing appendix long and extending around the wing apex, wing venation and with or without brown coloration on anal veins.

Male pygofer with 2–6 black spines along the apical margin of the pygofer. Male subgenital plates not touching in the middle, connective “Y” shaped, broad stems with medial sclerotization. Aedeagus broad at base and slender toward apex, having an articulation between shaft and base, the shaft relatively simple in structure, gonopore anterior/dorsal side. Female ovipositor extending a considerable distance beyond abdominal tergites.

Distribution. Cosmopolitan.

Key to the Species of *Exitianus* Occur in Pakistan.

1. Vertex usually with transverse arcuate brown band interrupted medi ally (Plate 2a–c). Scutellum with dark brown basal triangles (Plate 1a–c). Male pygofer side with 2–6 apical brown or black macrosetae (Plate 2e). Aedeagal shaft slightly laterally compressed with small gonoduct (Plate 2h); without processes (Plate 2h and i) . . . . *Exitianus nanus* — Vertex usually with transverse arcuate brown band complete (Plate 1a–c). Scutellum with faint brown basal triangles (Plate 1a–b). Male pygofer side with 2–3 apical brown or black macrosetae...
Plate 1. *E. indicus* (Distant, 1908). (a) Habitus (Pakistan); (b) habitus (holotype, BMNH); (c) head and thorax, dorsal view; (d) forewing; (e) pygofer, lateral view; (f) valve, subgenital plate, style, connective, aedeagus and valve, dorsal view; (g) connective; (h) style; (i) aedeagus, lateral view; and (j) aedeagus dorsal view.
Exitianus indicus (Distant, 1908; Athysanus) (Plate 1).
Athysanus indicus Distant (1908: 344).


Description. A single arcuate, dark line on crown, pronotum with black spots near crown, and scutellum with a pair of triangular faint spots. Forewing with four apical cells, three anteapical cells, and medium sized appendix.

Pygofer with two spines at apex, 6–8 macrosetae on male subgenital plate; anal tube chitinous; aedeagus robust with pair of process on

Plate 2. E. nanus (Distant, 1908). (a) Habitus (Pakistan); (b) habitus (holotype, BMNH); (c) head and thorax, dorsal view; (d) forewing; (e) pygofer, lateral view; (f) valve and subgenital plate; (g) style and connective; (h) aedeagus, lateral view; and (i) aedeagus, dorsal view.
Aedeagal shaft medially. Aedeagus pointed laterally, basal apodeme square shape, gonopore at dorsal side of aedeagus. Connective “Y” shaped; apexfysis firmly attached with style. Style apophysis pointed.

**Measurements (mm).** Male total length 4.67, forewing length 3.7, crown length at middle 0.34, crown width across eyes 1.42, interocular width at anterior 0.89, eyes length in cross 0.56, pronotum width 1.32, pronotum length 0.6, mesonotum length 0.25, and scutellum length 0.38.

**Material examined.** Pakistan: three paratypes of E. major, Sindh Province, Karachi, grass, 26.4.85, Qadeer (ZMUK); 8.3, 16.2, Sindh Province, Tando Jam, 22.vii.07, I. Khatri, Paddy. Holotype E. indicus, Distant (BMNH); 3.3, 2.3, Sindh Province, Tando Jam, 17.v.2011, I. Khatri, grass in mango orchard (IMSAU).

**Notes.** E. indicus (Distant) is close to E. nanus in appearance but E. indicus can be differentiated by having two macrosetae on pygofer and also from the shape of aedeagus.

**Exitianus nanus** (Distant, 1908; Athysanus) (Plate 2).

**Athysanus nanus** Distant (1908: 345).

**Athysanus insularis** Distant (1909: 47), synonymized by Ross (1968: 7).

**Athysanus fasciolatus** Melichar (1911: 107), synonymized by Linnavauri (1975: 626).

**Athysanus simillimus** Matsumura (1914: 185), synonymized by Ross (1968: 7).

**Euscelis vulnerans** Bergevin (1925: 42), synonymized by Ross (1968: 7).

**Limotettix albipennis** Hault (1927: 25), synonymized by Dhabola (1963: 325).

**Limotettix unifasciata** Hault (1930: 159), synonymized by Dhabola (1963: 325).

**Athysanus digressus** Van Duzee (1933: 32), synonymized by Linnavauri and DeLong (1978: 237).


**Exitianus falvineris** Li and He (1993: 27), synonymized by Duan and Zhang (2013: 33).

**Description.** Most widespread Old World species of the genus, dorsal head markings like crescentic bars, it may be faint, and this species is found with great variation. Mesonotum with pair of triangular marks.

Pygofer having five to four apical brown or black spines, anal tube chitinous, connective “Y” shaped. Male plate triangular with 11–14 macrosetae, aedeagus without medial process, shaft thin at base, flap like at apex; gonopore dorsal. Style broad at base, apophysis pointed and scaled.

**Measurements (mm).** Male total length 4.0, forewing length 3.40, crown length at middle 0.25, crown width across eyes 1.17, interocular width at anterior 0.72, eyes width in cross 0.48, pronotum width 1.11, pronotum length 0.47, mesonotum length 0.16, and scutellum length 0.25.

**Material examined.** Pakistan: holotype $\exists$ and nine paratypes of E. minor, Sindh Province, Karachi, grass, 12.v.1985, Qadeer; 2.3, 7.3, Sindh Province, Tando Jam, 22.v.2009, A. Behan. 5.3, 18.3, Sindh Province, Mithi, 12.xi.2007, I. Khatri. Holotype E. nanus, Distant (BMNH).

**Notes.** External, E. nanus is closely related to E. indicus. Connective and in style are similar, but it can easily be separated by examining four macrosetae on pygofer. The aedeagus in E. nanus is less broad when compared with E. indicus in lateral view, and the process in the mid of aedeagus is absent.