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New records of Mecopodinae (Orthoptera: Tettigonioidea: Tettigoniidae) from Pakistan.

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Abstract: There is no data about the taxonomic and ecological status of the Mecopodinae from Pakistan. During a recent survey only two species, *Mecopoda platyphoea* Walker, 1870 and *Afromecopoda monroviana* (Karsch, 1886) were collected. Apart from initial taxonomic description and few geographical recording, no detailed study has been conducted within this group since 2005. In this paper a taxonomic account and illustrations of ovipositor and subgenital plate are provided.
Key words: Orthoptera, Tettigonioidea, Tettigoniidae, Mecopodinae, taxonomic account, ovipositor, subgenital plate, Pakistan.

Resumen: Nuevas citas de Mecopodinae (Orthoptera: Tettigonioidea: Tettigoniidae) de Pakistán. No hay datos sobre el status taxonómico y ecológico de los Mecopodinae (Orthoptera: Tettigonioidea: Tettigoniidae) de Pakistán. Durante un reciente muestreo se capturaron sólo dos especies, *Mecopoda platyphoea* Walker, 1870 y *Afromecopoda monroviana* (Karsch, 1886). Aparte de la descripción original y unas pocas citas, no se ha llevado a cabo ningún estudio detallado de este grupo desde 2005. En este trabajo se proporcionan información taxonómica así como ilustraciones del ovipositor y la placa subgenital.
Palabras clave: Orthoptera, Tettigonioidea, Tettigoniidae, Mecopodinae, taxonomía, ovipositor, placa subgenital, Pakistán.

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Introduction

Subfamily Mecopodinae Karsch, 1886 (Orthoptera: Tettigonioidea: Tettigoniidae) comprises 6 tribes and 54 genera. Within this subfamily, the tribe Mecopodini comprises 8 genera: *Mecopoda* Serville, 1831, *Afromecopoda* Uvarov, 1940, *Anoedopoda* Karsch, 1891, *Arachnacris* Giebel, 1861, *Austromecopoda* Rentz, Su & Ueshima, 2006, *Characta* Redtenbacher, 1892, *Eumecopoda* Hebard, 1922, and *Euthypoda* Karsch, 1886. Nearly 6 species of *Mecopoda* are known to occur in Asia (Eades *et al.*, 2016). Of these, 4 have been reported from Indonesia: *Mecopoda divergens* Redtenbacher, 1892, *M. dilatata* Redtenbacher, 1892, *M. macassariensis* (Haan, 1842), and *M. elongata* (Linnaeus, 1758); 1 from Srilanka and Japan, respectively, *M. platyphoea* Walker, 1870 and *M. niponensis* (Haan, 1842); and only 2 species, namely *M. elongata* (Linnaeus, 1758) and *M. platyphoea* Walker, 1870 have been reported from India. Previously many workers as Uvarov (1942), Bey-Bienko (1954), Ragge (1956, 1961), Ingrisch (1990, 2002), Ingrish & Shishodia (1998), Naskrecki (2001), Desutter-Grandcolas (2003), Heller & Lehman (2003), Heller (2004), Jost & Shaw (2006), Hugel (2009), Panhwar *et al.* (2013a, 2013b, 2014a, 2014b), Sultana *et al.* (2012, 2013a, 2013b, 2014, 2015), Panhwar (2015), Eades *et al.* (2016) have carried out

significant work on the taxonomic status of Tettigonioidea from many parts of the world but there is no data about the taxonomic and ecological status of the Mecopodinae from Pakistan. The aim of the present study is to contribute to the knowledge of the Mecopodinae from this region.

Material and methods

As a result of a recent survey, 2 species of Mecopodinae were collected from Islamabad (Pakistan) during the year 2013-2014. The material was killed and preserved by adopting conventional method described by Sultana & Wagan (2012). The material is deposited at Sindh Entomological Museum (SEM) at Department of Zoology, University of Sindh Jamshoro (Pakistan). The genitalia was dissected out by using standard method according to Dirsh (1956) or Panhwar (2015). The abdomen was detached with micro-scissors and was transferred to a test tube containing 10% KOH, then slightly heated and later transferred to a glass cavity block with tap water. The processed soft tissues were removed by repeated washings with water and finally placed in glass cavity with few drops of glycerine. Subsequently, muscular tissues were removed gently and genitalia was examined and parts were then preserved in a glass vial containing few drops of glycerine and was labelled. Identification of specimens was carried out under a Stereoscopic Dissecting Binocular Microscope with the help of keys and descriptions available in literature and on the website *Orthoptera Species File Online* (http://www.orthoptera.org). The diagrams were drawn with the help of an ocular square reticule graph fitted into the binocular dissecting microscope. All measurements are given in millimeters (mm).

Abbreviations used for measurements:

LP = Length of pronotum. LT = Length of tegmina. LF = Length of femur. LTB = Length of tibia. LO = Length of ovipositor. TBL = Total body length. LV = Lateral view. DV = Dorsal view. VV = Ventral view.

Results

Tribe Mecopodini Walker, 1871

Mecopodae Walker, 1871
Mecopodi Walker, 1871

Diagnostic features:

Fastigium of vertex rounded or truncate. Head sulcate with transverse lateral apices. Pronotum flat dorsally, truncate anteriorly with obtuse angulation at its posterior part, two transverse sulcus present at dorsal side. Lateral carina distinguishable, lateral lobes with dark patches, with distinct humeral notch. Tegmina more elongated than femoral apices. Prosternum bispinose, cerci with incurved apices. Subgenital plate elongate, triangular. Ovipositor robust, elongate, sometimes incurved from middle half.

***Mecopoda* Serville, 1831**

Lucera Walker, 1869
Type species: *Mecopoda maculata* Serville, 1831 (= *elongata elongata* Serville, 1831), by original monotypy.

Diagnostic features:

Fastigium of vertex widened anteriorly. Head sulcate, with or without transverse lateral apices. Pronotum flat dorsally, truncate anteriorly, with obtuse angulation at its posterior part, two transverse sulci present at dorsal side. Lateral carina distinguishable, lateral lobes with or without dark patches, with or without distinct humeral notch. Tegmina more elongated than femoral apices. Prosternum bispinose, cerci with incurved apices. Subgenital plate elongate; triangular. Ovipositor robust, elongate, sometime incurved from middle half.

***Mecopoda platyphoea* Walker, 1870** (Fig. 1a-e)

Mecopoda platyphoea Kirby, 1891
Mecopoda platyphoea Redtenbacher, 1892

Diagnostic features:

Head robust, sulcate with transverse lateral apices. Fastigium of vertex rugose anteriorly with transverse carina. Antennae long, annulated. Abdomen cylindrical shaped. Pronotum flat, slightly truncate anteriorly (Fig. 1a, b), two transverse sulci present at dorsal side (Fig. 1c, d), lateral lobes with dark patches (Fig. 1a). Tegmina and wings well developed reaching the hind femoral apices; tegmina 21 mm longer than the total body length (Fig. 1a, c), narrow, having light bands on the anterior margin of the tegmina. Femora with 3 spinules. Ovipositor arcuate, elongate (24.5-25 mm long), brownish in color, slightly tapering to apex (Fig. 1e).

Material examined: Pakistan: Punjab: Islamabad, 9.IV.2014, 2♀♀ (W.A Panhwar & R. Sultana).

Measurements: ♀, LP 9-9.5; LT 53.5-54; LF 43-43.5; LTB 39.5-40; LO 24.5-25; TBL 32.5-33.

Remarks: Kirby (1891) reported 1♂ and 1♀ *Mecopoda platyphoea* from Berlin. In addition to this, he also provided detail information about its morphometrics. This is the first record of this species for Pakistan.

Ecological account:

Field observations showed that these katydids voraciously feed upon the fresh tips of paddy crops that are comparatively soft. In the present survey a very few number of specimens were captured. The present study recommends that more surveys would be carried out in other areas of Islamabad, and particularly Margalla hills would be visited, as these hills present a great diversity of trees, shrubs, herbs, climbers, grasses as well as fodder crops. Beside this, the vegetation of the southern slopes along with flowering trees as *Ficus carica*, *F. religiosa*, *Bauhinia variegata*, *Pinus roxburghii* or *Quercus leucotrichophora* are also the shelter of many insects. Furthermore, typical version of humid subtropical climate of Islamabad is favorable for the biodiversity of this group.

***Afromecopoda* Uvarov, 1940**

Sthenaropoda Karsch, 1891
Type species: *Sthenaropoda preussiana* Karsch, 1891, by original monotypy.

Diagnostic features:

Fastigium of vertex obtuse not sulcate, with or without transverse carina. Pronotum flat dorsally, with humeral sinus. Wings and tegmina well developed. Femora with 1-2 spinules, femora with 4 posterior spinules. Tibiae sulcate with spines on lateral side.

***Afromecopoda monroviana* (Karsch, 1886)** (Fig. 2a-e)

Sthenaropoda monroviana Karsch, 1891
Macroscirtus monrovianus Redtenbacher, 1892
Sthenaropoda monroviana I. Bolívar, 1893

Diagnostic features:

Head broad (Fig. 2a); fastigium of vertex obtuse, not sulcate; without transverse carina; pronotum flattened dorsally (Fig. 2b, c, d), with humeral sinus; antennae with 241 segments; tegmina 22 mm longer than the total body length; wings and tegmina well developed; femora obtuse, longitudinally carinated, with 4 internal spines and 2 external; tibiae with numerous spines; cerci broad at base slightly pointed at apices; subgenital plate V-shaped; paler basally, brownish at apices (Fig. 2e).

Material examined: Punjab, Islamabad, 15.XI.2013, 1♂ (W.A Panhwar & R. Sultana).

Measurements: 1♂, LP 8.5; LT 50 ; LF 40.5; LTB 32; TBL 28 .

Remarks: Karsch (1886) reported as holotype for *monroviana* only a female, of dark brown colour, while the colour of our specimen is light greenish. This is the first record of this species for Pakistan.

Ecological account:

Kocarek & Holusa (2005) collected most of specimens from the dense wild vegetation near by the pulse crop. Moreover, it was pointed out that its feeding on the upper portion of leaves of crop might be due to the presence of strong mandibles. At the present we have collected sample from the wheat crop bordering by grass.

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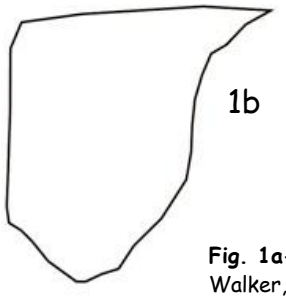


Fig. 1a-e.- *Mecopoda platyphoea* Walker, 1870, female:

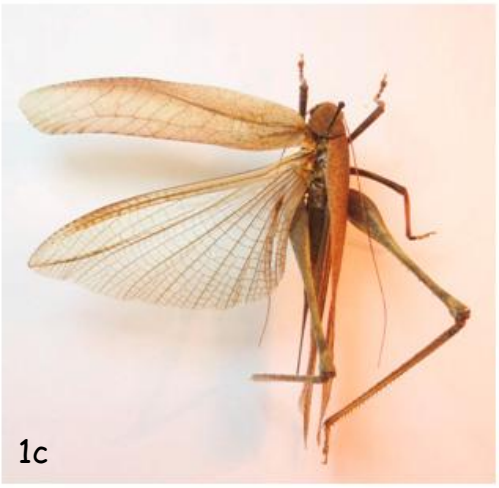
a.- Adult, lateral view.

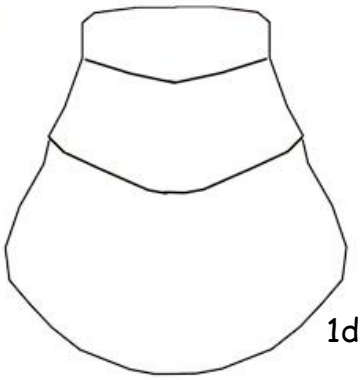
b.- Pronotum, lateral view.

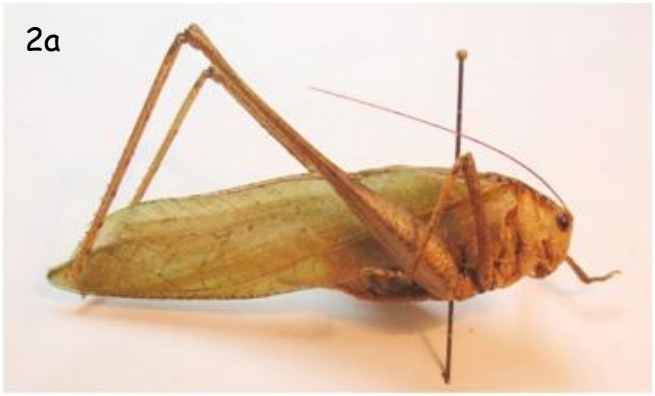
c.- Adult, dorsal view.

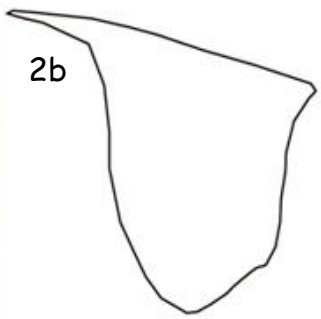
d.- Pronotum, dorsal view.

e.- Ovipositor, lateral view.









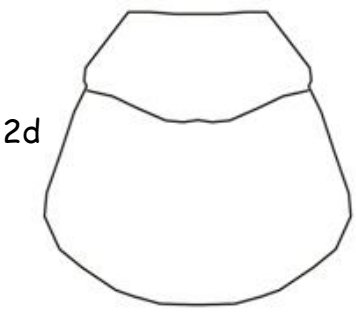


Fig. 2a-e.- *Afromecopoda monroviana* (Karsch, 1886), male:

a.- Adult, lateral view. **b.-** Pronotum, lateral view. **c.-** Adult, dorsal view.

d.- Pronotum, dorsal view. **e.-** Subgenital plate, ventral view.