



Description of New Species of *Oxya* from Pakistan with Comparison to a Close Ally (Oxyinae: Acrididae: Orthoptera)

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ABSTRACT

A new species *Oxya kashmorensis* (Oxyinae: Acrididae: Orthoptera) from Kashmore, Sindh, Pakistan is described and illustrated. We provide a comparison of *Oxya kashmorensis* sp.nov. and *O. nitidula* which is recorded from Pakistan for the first time. Comparative information on the female genitalia of both species is provided. Further, a note on the ecology and distribution of both species is given. With the addition of *O. kashmorensis* and the new record of *O. nitidula*, the numbers of known species in genus *Oxya* is raised to 9 for Pakistan and 5 for Sindh. We further provide a key to the *Oxya* species from Sindh.

Article Information

Received 12 February 2019

Revised 22 July 2019

Accepted 02 September 2019

Available online 26 November 2019

Authors' Contribution

RS designed the study and compiled the data. NS collected the samples and MSW identified the species.

Key words

Oxyinae, New species, Kashmore, Sindh, Illustrations, Sub-genital plate, Ecology

INTRODUCTION

The genus *Oxya* belongs to the Acrididae and has a wide distribution in Asia and Africa. Species of the genus are known to damage a variety of crops, e.g. sugarcane, wheat, maize, fodder crops, but especially rice in Pakistan (Riffat *et al.*, 2012). It is smaller in size and therefore has not attained much attention in the field. Throughout, its range occurs mainly in rice fields and grasslands and in their vicinity (Miller, 1934; Rehan, 1952). In Sumatra it was among the most abundant grasshoppers in coastal plain stands of *Mimosa invisa* (CIBC, 1970). *Oxya* species are polyphagous insects with a great importance as pests. They mostly damage leaves while chewing angular holes with their mandibles; this injury resembles the damage caused by army worms and leaf hoppers (Riffat *et al.*, 2013).

Although, there is a bulk of literature is available on the food preference, plant selection and pest status of grasshoppers (e.g. Snodgrass, 1935; Dempster, 1963; Uvarov, 1966, 1977; Thakur, 1984; Aziz and Aziz, 1985; Inayatullah *et al.*, 1986; Mohan and Manoharan, 1987; Shen *et al.*, 1988; Premchand, 1995; Yousaf, 1996; Al-Hariri *et al.*, 2001; Lanjar *et al.*, 2002; Riffat and Wagan, 2009, 2010 and 2015; Ananthaselvi *et al.*, 2009; Usmani and Nayeem, 2012; Das *et al.*, 2012; Usmani *et al.*, 2012; Akhtar *et al.*, 2012; Riffat *et al.*, 2013; Samejo and Riffat, 2019;

Seino *et al.*, 2013; Soomro *et al.*, 2019), none of these studies provided detailed taxonomic status and correct identification of *Oxya* from Sindh, Pakistan.

Species of the genus are well adapted to the marshy conditions in which they live as the hind tibia and tarsus are expanded and the oar-like enabling the insects to swim (Uvarov, 1928). The genus *Oxya* was erected by Seville (1831) and currently contains more than 59 described species; in Pakistan 8 species are known (Cigliano *et al.*, 2018). This number is likely to increase in the future if frequent surveys are carried out in different cropping seasons. During expeditions to Kashmore in 2014, we collected specimens of an Oxyinae that at first sight was in between *Oxyina* and *Oxya* and did not resemble any known species. This new species is described here.

MATERIALS AND METHODS

A total of 2 adult females were collected at Kashmore, Sindh (28.2712°N, 69.3831°E) in May 2014 from a rice field with the help of traditional hand held insect nets (8.89 cm in width and 50.8 cm in length). The standard entomological methods described by Vickery and Kevan (1983) and Riffat and Wagan (2012) were adopted (with slight modifications) for killing and preserving specimens. Identification of specimens was carried out under a Stereoscopic Dissecting Binocular Microscope (Olympus SZX7, SZ2-ILST) with the help of keys and descriptions given by Hollis (1971, 1975). The diagrams were all drawn with the help of an "Ocular Square Reticule" fitted in one eye piece of the binocular microscope. All measurements are given in millimeters and were made with scales,

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0030-9923/2020/0001-0001 \$ 9.00/0

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dividers, and ocular square reticules. All collected material was deposited in the Sindh Entomological Museum (SEM), Department of Zoology, University of Sindh, Jamshoro (SEMIDNO.107)

In describing *Oxya kashmorensis* sp. nov the following morphological characters were considered: body length, head, pronotum, tegmina, wings and femur along with illustrations of the ovipositor, the sub-genital plate, and the spermatheca. Measurements were defined as follows: the distance between two compound eyes, length of antenna, length of head, length of pronotum, length of tegmina, width of tegmina, length of wings, maximum width of wings, length of femur, maximum width of femur, length of tibia and total body length.

Oxya kashmorensis, sp.nov

Diagnostic features

This species is closely related to *Oxya fuscovittata* (Marschall, 1836), but larger in size (about 5mm). Beside this, there is significant variation in the sub-genital plate and the ovipositor. The sub-genital plate is pointed, while the ovipositor valves are sharp with horny teeth.

Description of female holotype

Body size large. Integument finely pitted and shiny. Antenna filiform (8.4mm) as long as head (4.5mm) and pronotum (7.1mm) together. Antennal joints overall short with middle segments. Fastigium of vertex wide, bulging. Transverse furrow present. Frontal ridge uniformly sulcate, widened above median ocellus, narrowed below. Carinula virtually parallel in posterior half, but converging anteriorly. Dorsum of pronotum parallel forwards, posterior margin of metazoan obtusely angular. Metasternal pits sulcated. Tegmina fully developed, weakly spined, extending beyond abdomen, broad basally, while narrowed gradually in distal half. Pre-costal and costal veins with sparsely distributed fine bristle, while dense serration present all along the anterior margin, up to two-third of its length, hind tibia with two rows of dorsal black tipped spines, nine externally and ten internally.

Female genital component

Female sub-genital plate is with very broad, with flattened ventral surface, emarginated posterior margin, medially concave, with two very small medial spines. Spermatheca is short and conical. Valves of ovipositor with tooth like spines. Spermatheca elongated (Fig. 1).

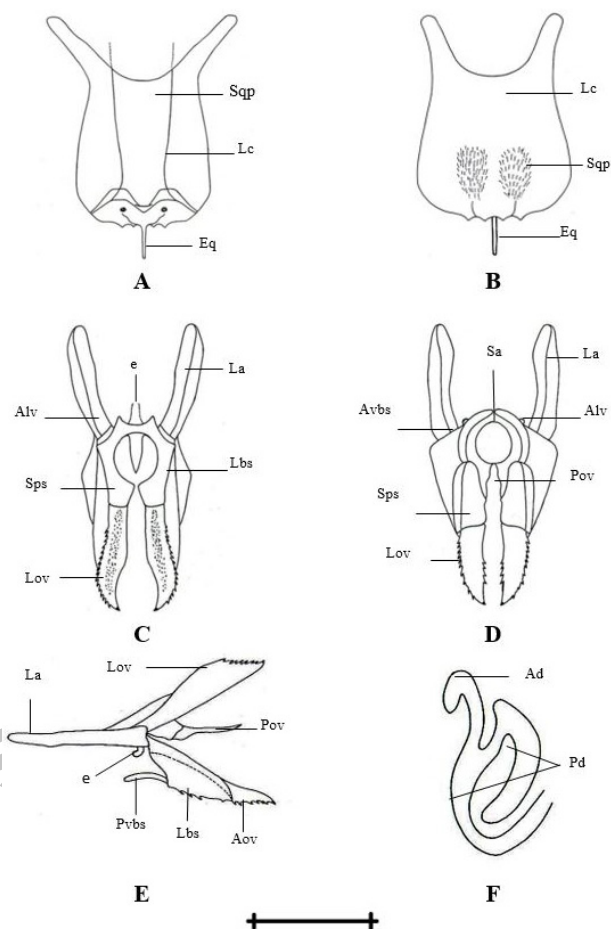


Fig. 1. *O. kashmorensis*; A, Sub-genital plate dorsal view; B, same ventral view; C, Ovipositor dorsal view; D, same ventral view; E, same lateral view; F, Spermatheca, (Bar line 4mm).

General body coloration

Body pale green, head, pronotum and folded tegmina from hind margin to median vein pale green. Upper half of head and pronotum blackish brown laterally. Antenna, eyes and edges of vertex brown, tegmina at basal part light brown, light brown basally while hyaline posteriorly, wings hyaline, abdomen yellowish brown; hind femur yellowish brown, hind tibia and tarsi bluish green with black tipped spines (Fig. 2).

Measurements (mm) female

1 ♀: length of antenna 8.4 mm, distance between eyes 1.4 mm, length of head 4.5 mm, length of pronotum 7.1 mm, length of tegmina 25 mm, width of tegmina 6 mm, length of wings 23 mm, max. width of wings 10 mm, length of femur 19 mm, max. width of femur 5 mm, length of tibia 17 mm, total body length 30 mm.

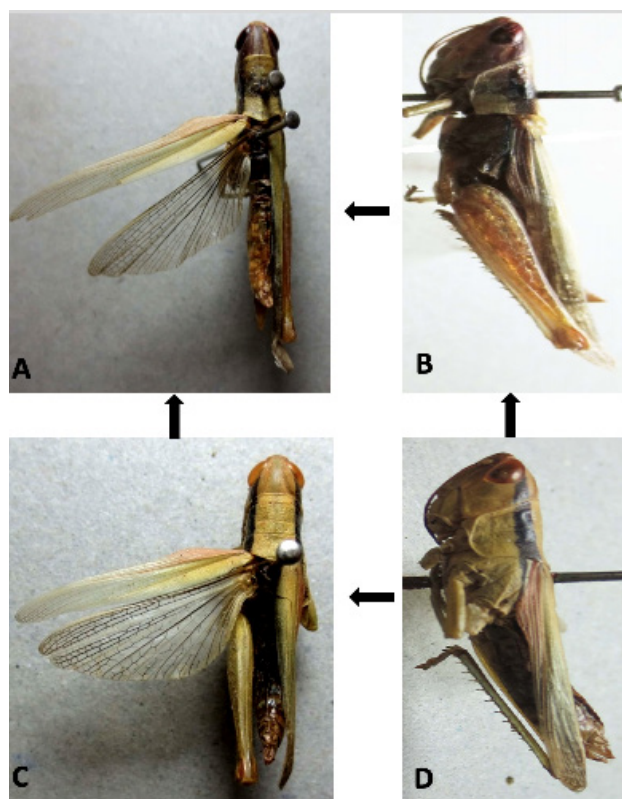


Fig. 2. *O. Kashmorensis* (sp. nov); A, Dorsal view ♀; B, same but lateral view, *O. nitidula*; C, Dorsal view ♀; D, same but lateral view.

Material examined

Sindh: Kashmore 1 ♀ holotype 7.v. 2014 (Riffat. S. and Nuzhat. S.)

Depository

The type material was deposited in Sindh Entomological Museum (SEM), Department of Zoology, University of Sindh, Jamshoro, Pakistan (SEMID NO.107)

Etymology

The specific epithet refers to the locality “Kashmore” from where the type was collected.

Ecological account

Kashmore is surrounded by pastures and mountains with a variety of plantations, i.e. rice, wheat, maize, cotton and sugarcane. The holotype was collected from a rice field.

Oxya nitidula (Walker, 1870) new record

Description of female

Integument finely irregular and polished. Antenna

filiform with 24-26 segments, slightly shorter than combined head and pronotum length. Interocular distance wider than that of frontal ridge at median ocellus. Pronotum hardly cylindrical, narrowing forwards, posterior part of metazona rounded. Tegmen fully developed and anterior margin weakly spined, clearly surpassing the apex of hind femur. Hind tibia with two rows of dorsal black-tipped spines, nine external and ten internal spines. Black tipped spine present at hind knee of femur.

Genital components

Ovipositor valves small uniform blunt dents, posterior ventral basi-valvular sclerite with spines on its inner ventral margin, sub-genital plate without lateral longitudinal carinae on ventral surface, posterior margin with a single median spine and pair of lateral spine. Spermatheca with apical diverticulum narrow slightly dilated apically, pre-apical diverticulum tubular (Fig. 3).

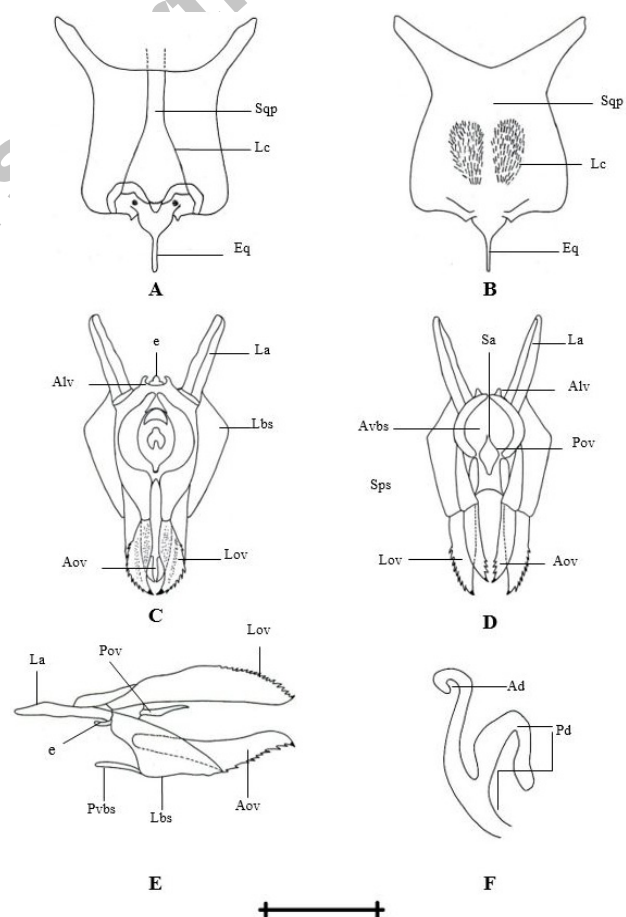


Fig. 3. *O. nitidula*; A, Sub-genital plate dorsal view; B, Same ventral view; C, Ovipositor dorsal view; D, Same ventral view; E, Same lateral view; F, Spermatheca, (Bar line 4mm).

General body coloration

Body pale green. Antenna, eyes and edges of vertex light brown. Upper part of lateral plate of head and pronotum with black band. Tegmen reddish brown in the basal part while hyaline at the costal margin and costal field. Wings hyaline. Abdomen yellowish brown. Hind femur pale green with brown band at hind knee with black tipped spine. Hind tibia dirty bluish green with black band at base, spines buff with black tip. Base of tarsi black with bluish tinge.

KEY TO FEMALE SPECIES OF THE GENUS *OXYA* OCCURRING IN SINDH

1	Anterior margin of tegmen with few small bristles, median vein green and light, Costal bulge of tegmen weakly spined.	2 <i>O. hyla</i> <i>hyla</i> Serville, 1831
--	Anterior margin of tegmen (leading edges) with a dense row of short bristles extending from costal bulges almost to apex of tegmen.	
2.	Sub genital plate broadly flattened ventral surface, posterior margin emerges medially straight or with two very small medial spines.	<i>O. velox</i> (Fabricius, 1787)3
--	Subgenital plate, wide, narrowing apically apex truncated setae confined apically large median spines.	
3.	Pronotum flattened running parallel sides, posterior metazona slightly rounded, interocular distance slightly narrower, supra-anal plate short, broad, converging inside.	<i>O. fuscovittata</i> (Marschall, 1836) 4
--	Pronotum cylindrical and narrow; posterior metazona rounded, supra-anal plate rounded, triangular with developed folds.	
4.	Ovipositor valves small uniform with blunt dents, Spermatheca with apical diverticulum narrow.	<i>O. nitidula</i> (Walker, 1870)
--	Ovipositor valves has tooth like spines. Spermatheca with apical diverticulum elongated.	<i>O. kashmirensis</i> sp. nov

Measurements (mm) female

1 ♀: length of antenna 7.3 mm, distance between eyes 1.0 mm, length of head 3.8 mm, length of pronotum 5.6 mm, length of tegmina 19 mm, max. width of tegmina 5 mm, length of wings 17 mm, max. width of wings 8 mm, length of femur, 14 Max: width of femur 4 mm, length of tibia 12 mm, total body length 26 mm.

Material examined

Sindh: Kashmore 1 ♀ 7.v.2014 (Riffat, S. and Nuzhat, S.)

Comparative account

This species is very closely related to *Oxya japonica* (Thunberg), but it can be differentiated from the latter by the truncate apex of male cerci. During the present survey only one female was reported but, with due time when comparative DNA barcoding of *Oxya* species would be carried out it will be confirmed whether it is *O. japonica* or its sibling species. The occurrence of this *Oxya nitidula* has been reported from India, Ceylon and Mahe by [Usmani and Shafee \(1985\)](#). Formerly, it was not reported from Pakistan its entry from Kashmore constructed new record for Sindh, Pakistan. Beside this, during the field survey authors also observed *Oxya* significantly damaged the rice, maize, and wheat and surrounding vegetation. Earlier, [Ahmed \(1980\)](#) did not report this species from Sindh while [Usmani and Nayeem \(2012\)](#) reported a single female of *Oxya japonica* from India. Presently the authors have collected a large number of *Oxya* species from different localities and our results are in conformity with those of [Chitra *et al.* \(2000\)](#), who detected 28 species of grasshoppers from paddy fields. They have observed a greater number of Oxyinae, particularly *Oxya fuscovittata*. Presently, we agree *O. fuscovittata* is the dominant species of the genus at Sindh, followed by *Oxya hyla hyla* and *Oxya velox*.

Statement of conflict of interest

The authors declare no conflict of interest.

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