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Two New Species of *Oxyopes* (Araneae: Oxyopidae) from Punjab, Pakistan

Muhammad Khalid Mukhtar*

Department of Zoology, University of Sargodha, Sargodha, Punjab, Pakistan

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ABSTRACT

The *Oxyopes* Latreille, 1804 is a large genus of spider with cosmopolitan distribution but has not been much studied in Pakistan. Two new species, *Oxyopes chenabensis* new species, and *Oxyopes bidentata* new species are being reported from Punjab.

INTRODUCTION

The spiders of the genus *Oxyopes* have the potential to reduce insect pest populations in agricultural fields, so they can be exploited as bio-control agent of insect pests (Shivakumar and Kumar, 2010; Butt and Xaaceph, 2015). Moreover, their venom is of much medical importance including the blocking of calcium ion channels (Villegas *et al*., 2008; Herzig *et al*., 2011; Vassilevski *et al*., 2013).

The *Oxyopes* Latreille, 1804 is quite a large genus comprising 303 species and subspecies with worldwide distribution (World Spider Catalog, 2016). A number of arachnologists from Asia worked on the taxonomy of genus. From Laos (Jäger and Praxaysombath, 2009), Japan (Yaginuma, 1986; Ono and Ban, 2009), Korea (Kim and Cho, 2002; Namkung, 2002, 2003), Phillipines (Barrion and Litsinger, 1995), Russia (Marusik and Kovblyuk, 2011), China (Zhao, 1993; Xie and Kim, 1996; Song *et al*., 1999; Hu, 2001; Bao and Yin, 2002; Yin *et al*., 2003; Zhang and Zhu, 2005; Tang and Li, 2012), Taiwan (Lo and Lin, 2016), Iran (Esyunin *et al*., 2011), Bangladesh (Okuma *et al*., 1993; Biswas and Raychaudhuri, 2015) and India (Pocock, 1901; Sherriffs, 1951; Tikader, 1965, 1970; Sadana and Gupta, 1995; Biswas *et al*., 1996; Gajbe, 1992, 1999, 2008; Saha and Raychaudhuri, 2003; Biswas and Ray, 2005; Biswas and Biswas, 2006; Sen *et al*., 2011; Bodkhe and Vankhede, 2012; Kulkarni and Deshpande, 2012; Dhali *et al*., 2015; Malik *et al*., 2016).

The *Oxyopes* fauna has not been much explored from Pakistan and only nineteen species have been reported up till now. Dyal (1935) reported five species (*Oxyopes ryvesii* (Pocock, 1901), *Oxyopes hindostanicus* (Pocock, 1901), *Oxyopes rufisternis* (Pocock, 1901), *Oxyopes raviensis* (Dyal, 1935) and *Oxyopes wroughtoni* (Pocock, 1901) from Lahore, Pakistan. Khatoon (1986) recoreded three species (*O. Hindostanicus*, *O. rufisternis*, *O. ryvesii*,) from Islamabad. Mushtaq and Qadar (1999) found nine species including description of three species (*Oxyopes gossypae*, *Oxyopes campii* and *Oxyopes oryzae*,) from Sialkot and Faisalabad, Punjab. Butt and Beg (2001) described one new species (*Oxyopes azhari*) from Faisalabad, Punjab. Ursani and Soomro (2010) recorded five species (*O. campii, O.hindostanicus*, *O. ryvesii*, *O. Oryzae* and *O.wroughtoni*) from Sind. Mukhtar (2013 a, b) described four species (*Oxyopes shakilae*, *Oxyopes machuensis*, *Oxyopes septumatus*, and *Oxyopes shorkotensis*) from Punjab. So, the purpose of the present study was to further explore this large but little studied genus from Pakistan. In this paper, two new species of the *Oxyopes* are described from Punjab, Pakistan.

MATERIALS AND METHODS

The collected spiders were preserved in 95% ethyl alcohol. The study was done by using stereo microscope. The measurements were done with ocular micrometer and ocular grid was used to make drawings of various body parts.

Permanent glass slides of the genitalia were prepared following Mukhtar (2013b). Epigyne were removed from the abdomen with entomological needle number 1. Male palp was removed from the base by the same needle. Potassium hydroxide pellets were used to clear the extra tissues with epigyne, washed with distilled water and gradually dehydrated by keeping in different grades of alcohol for five to seven minutes in each. After treating with clove oil and xylene, the epigyne were mounted on Canada balsam. Male palp was simply washed with xylene and mounted on Canada balsam using concave slide.

* Corresponding author: mkmukhtar@gmail.com
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Morphometric characters were used to identify specimens. The related keys, catalogues and literature were used to decide new species. The spination on the legs is given in the following sequence: dorsal, ventral, prolateral, and retrolateral, *e.g.* spination of femur I = 3 (111) – 0 – 2 (011) – 2 (011). It indicates that femur I has three dorsal spine (one each on proximal, medial, and distal position), no ventral spine, two prolateral spine (one each on medial and distal position) and, two retrolateral spines (one each on medial and distal position).

The specimens and slides were housed in the Museum, Department of Zoology and Fisheries, University of Agriculture, Faisalabad, Pakistan.

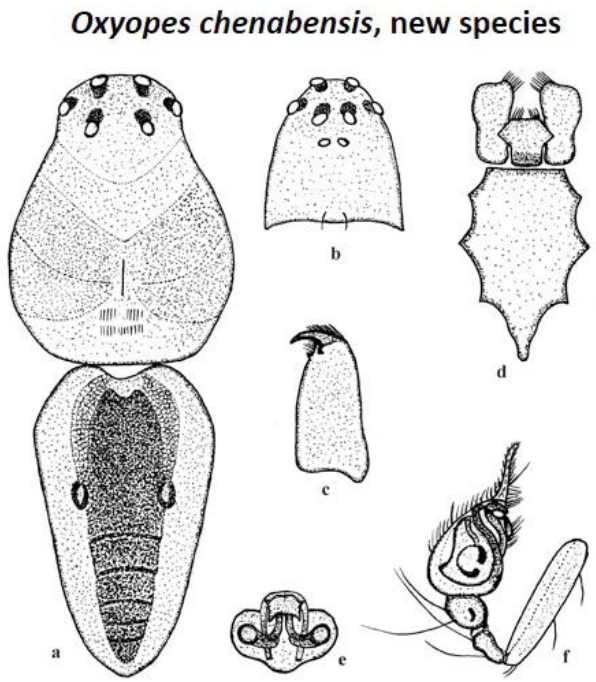

Fig. 1. *Oxyopes chenabensis*, new species a, body dorsal view 18x; b, cephalothorax frontal view 18x; c, chelicera ventrolateral view 24x; d, labium, maxillae and sternum ventral view 24x; e, epigyne internal view 80x; f, left male palp ventrolateral view 24x.

Type material

Holotype ♀, *Acacia nilotica*, jerring, Mukhtar, 28.7.1996, Pattan Gar Maharaja (near river Chenab), Shorkot City, District Jhang, 30º 50´N, 72º 04´E; allotype ♂, same data as holotype; 1 ♀, 3 Imm *Phoenix dactylifera*, jerring, Mukhtar, 28.7.1996, Basti Mangan, Shorkot City, District Jhang, 30º 50´N, 72º 04´E.

Description

Female (holotype): total body length 4.8 mm, carapace length, 2.3 mm, carapace width 1.5 mm, abdomen length 2.5 mm, abdomen width 1.3 mm.

Table I.- Length of leg segments (mm) of female (*Oxyopes chenabensis*, new species).

Leg	Femur	Patella+Tibia	Metatarsus	Tarsus	Total
1	2.6	2.9	2.2	1.0	8.7
2	2.2	2.3	2.1	1.0	7.6
3	1.5	2.0	1.4	0.7	5.6
4	2.1	2.1	1.8	0.7	6.7

Male (allotype): total body length 4.4, mm, carapace length, 2.0 mm, carapace width 1.5 mm, abdomen length 2.4 mm, abdomen width 1.1 mm.

Cephalothrox slightly elevated and narrow anteriorly, cephalic region yellowish brown, thoracic region orange brown anteriorly and yellowish brown posteriorly, patch of gray leaf like hairs behind fovea, distinctly longer than wide, fovea long and brown. Ocular area yellowish brown, eight eyes in a compact group of four transverse rows with interior black patches except anterior median eyes. Anterior median eyes not visible dorsally, anterior lateral eyes on anterior margin, posterior lateral eyes on lateral margins. Anterior median eyes close, very small, other six eyes forming hexagon are not equidistant; eye formula: anterior lateral eyes > posterior median eyes > posterior lateral eyes > anterior median eyes. Anterior eye row recurved, posterior eye row procurved. Clypeus height large, with paired short setae, black streaks absent. Chelicerae yellowish, broad basally, gradually narrow anteriorly; promargin and retromargin with one tooth each, retromarginal tooth higher; fangs yellowish brown, short, strongly curved. Labium yellowish brown, except basal dark brown portion, with long hairs on apical margin, slightly wider than long, more than half of maxillae, narrow and truncate anteriorly, widest and projected laterally at median position, truncate posteriorly. Maxillae yellowish brown with dense black scopulae, distinctly longer than wide, medially constricted outer lateral margin without setae, somewhat narrow basally, broad apically. Sternum yellowish, margins yellowish brown, distinctly longer than wide, heart shaped, narrow anterior margin straighten, widest medially, strongly tapering between coxae IV. Female pedipalp yellowish with fine hairs and long spines, tarsus single clawed. Male palp yellowish with dark brown tinges on tegulum; cymbium longer than wide, apically long with two spines – one on apical and one on basal segment; embolus long, coiled; conductor curved and tube like; tibial apophysis blunt, not curved; femur with two short apicodorsal and two long dorsal spines;

patella with two mid dorsal spines, one long reaching 1/3 length of cymbium; tibia with two long dorsal spines. Legs long, pale yellow, femora without longitudinal dark brown ventral line, femora and tibiae with dorsodistal transverse band. spination on legs: femora I – II = 3 (111) – 0 – 2 (011) – 2 (011), III – IV = 3 (111) – 0 – 1 (001) – 1 (001); patellae I – IV = one short basodorsal, one long apicodorsal, one short retrolateral; tibiae I– II = 2 (101) – 4 (220) – 1 (001), III = 2 (110) – 4 (220) – 1 (001) – 1 (001), IV = 1 (010) – 4 (220) – 2 (110) – 2 (110); metatarsi I – IV = 0 – 6 (222) – 3 (111) – 3 (111). Tarsi three clawed. Leg formula 1243.

Abdomen distinctly longer than wide, anterior margin notched, widest and pointed near anterior end, gradually tapering posteriorly. Dorsum with median longitudinal broad dark brown band extending almost entire length of abdomen; band with anterior margin notched, broad anteriorly and tapering posteriorly, a pair of oval lateral patches on anterior half, five transverse markings on posterior half; paired chalk white area on lateral sides of band from anterior margin to 1/3 length, lateral margins yellowish brown. Ventral side with median longitudinal broad dark brown band running form epigastric furrow to base of Spinnerets, lateral area pale brown. Spinnerets dark brown, short, not projected behind. Epigyne with globular, posteriolateral, diverging spermathecal sacs; spermathecal ducts coil inward; epigynal orifices thin, ovoid, at posterior margin; epigynal plate narrow and projected anteriorly, narrow and scape like posteriorly.

Etymology

Name is derived from river Chenab (collection site).

Diagnosis

Oxyopes chenabensis, new species has been thoroughly checked and compared with already described species of the genus especially to Indo-Pak species. In this species both inner and outer margins of chelicerae are provided with one tooth each. No Pakistani species of the genus *Oxyopes* so for recorded has such teeth arrangement. *Oxyopes biharensis* Gajbe and *Oxyopes kamalae* Gajbe has one tooth on each inner and outer margin but in *O. chenabensis* sp. nov., inner tooth is higher and bigger than outer tooth that is different from the mentioned Indian species. Labium slightly wider than long, with lateral projections that is also different from *Oxyopes biharensis* Gajbe and *Oxyopes kamalae* Gajbe and other described species. Many of other important body characters including gentalia also differs disticntly from *O. biharensis* Gajbe and O. *kamalae* Gajbe. So, this new species differs from its congeners due to following characters. Cephalothorax very long, slightly shorter than abdomen. Eyes forming hexagon are not equidistant. Labium slightly wider than long, with lateral projections. Abdomen very short with anterior margin notched, shape and patterns on abdomen differ. Male palp and epigyne also differ from other species.

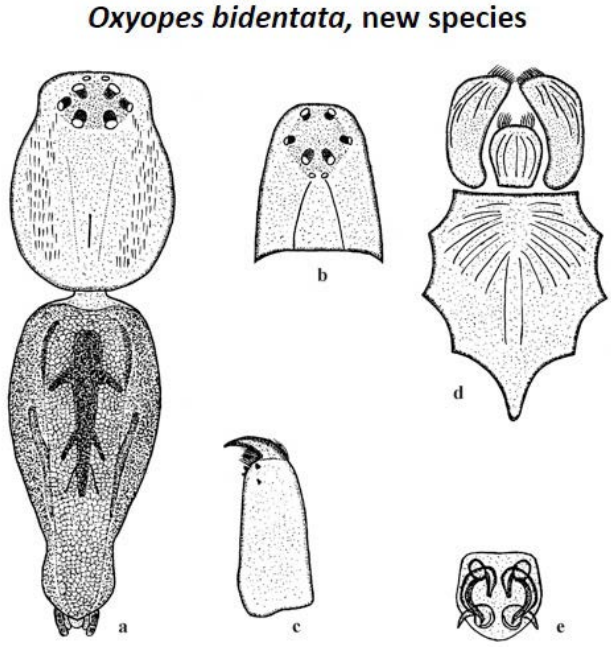

Fig. 2. *Oxyopes bindentata*, new species, a, Body dorsal view 12x; b, cephalothorax frontal view 12x; c, Chelicera ventrolateral view 24x; d, labium, maxillae and sternum ventral view 24x; e, epigyne internal view 60x.

Type material

Holotype ♀, Ipomoea spp., handpicked, Mukhtar, 8.3.2000, Tariq Hall, University of Agriculture Faisalabad, District Faisalabad, 31º25´N 73º07´E.

Description

Female (holotype): total body length 7.3 mm, carapace length 2.8 mm, carapace width 2.0 mm, abdomen length 4.5 mm, abdomen width 1.9 mm.

Table II.- Length of leg segments (mm) of female (*Oxyopes bidentata,* new species).

Leg	Femur	Patella+Tibia	Metatarsus	Tarsus	Total
1	2.9	3.4	2.8	1.3	10.4
2	2.5	3.2	1.7	1.0	8.4
3	2.0	2.5	3.0	1.0	8.5
4	2.8	3.1	3.0	1.1	10.0

Cephalothorax narrow anteriorly, orange brown with two longitudinal patches of gray leaf like hairs on

lateral area, two faint longitudinal lines in central area, distinctly longer than wide, fovea long and reddish brown. Ocular area dark brown. Eight eyes in a compact group of four transverse rows with interior black patches except anterior median eyes. Anterior median eyes very small, closer, other six eyes forming hexagon are equidistant; eye formula: anterior lateral eyes > posterior median eyes > posterior lateral eyes > anterior median eyes. Anterior eye row recurved, posterior eye row procurved. Clypeus height large, small black area one anteriolateral sides, two black streaks extend from base of anterior median eyes up to 2/3 length of chelicerae. Chelicerae yellowish brown, broad basally, gradually narrow anteriorly; promargin with two teeth, lower small, upper large; retromargin with two teeth, lower farther low, upper higher than respective promarginal teeth; fangs dark brown, short, strongly curved, with scopulae at base. Pedipalp dark brown, with fine hairs and long spines, single clawed. Labium dark brown with long black hairs on apical margin, few long gray hairs on other areas, distinctly longer than wide, more than half of maxillae, rounded anteriorly, widest medially, narrow and truncate posteriorly. Maxillae dark brown with dense black scopulae, forwardly directed gray long hairs on more than half of anterior portion, distinctly longer than wide, outer lateral margin rounded without constriction, narrow basally, broad apically. Sternum yellowish brown, with long gray anteriorly converging hairs, distinctly longer than wide, heart shaped, narrow anterior margin nearly straight, widest medially, strongly tapering posteriorly between coxae IV. Legs long; femora pale yellow with dorsodistal transverse yellowish brown patch, without longitudinal dark brown ventral line; patellae yellowish brown with dorsal longitudinal dark brown line, other segments dark brown. Spination on legs: femora I = III = 3 (111) – 0 – 2 (011) – 3 (111), II = 3 (111) – 0 – 2 (011) – 2 (011), IV = 3 (111) – 0 – 1 (001) – 1 (001); patellae I – IV one short basodorsal, one long apicodorsal and one short retrolateral; tibiae I = III = 2 (110) – 4 (220) – 1 (010) – 1 (010), II = I (100) – 4 (220) – 2 (101) – 1(001), IV = 2 (110) – 4 (220) – 2 (110) – 1 (010); metatarsi I – IV = 0 – 6 (222) – 3 (111) – 3 (111). Tarsi three clawed. Leg formula 1423.

Abdomen distinctly longer than wide, anterior margin rounded, widest near anterior end, strongly tapering posteriorly, constricted laterally near 2/3 length from anterior margin, posterior end narrow, pointed and triangular. Dorsum mainly chalk white with narrow median longitudinal dark brown band running nearly from anterior end up to more than mid length, band with three paired diagonal lateral arms; lateral area dark brown with two longitudinal darker patches. Anal tubercle dark brown, conical. Ventral side with median longitudinal dark brown band extending from epigastric furrow to base of Spinnerets, sides chalk white. Spinnerets dark brown, both anterior and posterior pairs converging, median small. Epigyne with globular, anteriolateral, diverging spermathecal sacs; spermathecal ducts after coiling outward turns inward and downward; epigynal orifices thin, ovoid, posterior, projecting outward laterally; epigynal plate broad and truncate anteriorly, narrow and rounded posteriorly.

Male

Unknown.

Etymology

Named due to two retromarginal teeth.

Diagnosis

Oxyopes bidentata sp. nov. has been critically compared with all the known species with special reference to the fauna of Sub-continent and found different from all the described species. It has somewhat resemblance with *Oxyopes shakilae* (Mukhtar, 2013) but can be regarded as new species on following basis. Shape and patterns on cephalothorax differ in the two species. Chelicerae with two teeth on retromargin in *O. bidentata* sp. nov., whereas *O. shakilae* (Mukhtar, 2013) has only one retromarginal tooth. Labium and maxillae with long gray hairs; labium rounded anteriorly; outer margin of maxillae without constriction in *O. bidentata* sp. nov., whereas in *O. shakilae* Mukhtar, the labium pointed anteriorly and maxillae with outer median constriction. Sternum with long brown anteriorly converging hairs. Abdomen constricted laterally near posterior end, pointed and triangular posteriorly in this new species but neither such constriction near posterior end of abdomen nor abdomen triangular posteriorly in *O. shakilae* Mukhtar. Spination on legs also differs in the two species. Epigynal plate rounded posteriorly in *O. bidentata* sp. nov. whereas it is hexagonal with posterior margin narrow and straight in *O. shakilae*; epigynal orifices posterior, projecting laterally in *O. bidentata* sp. nov. that differ from the species compared; internal genetalia also differs in other details between the two species. The important taxonomic characters of body parts including genital characters sufficiently differ from other species of Indo-Pak, like *Oxyopes wroughtoni* Pocock, *Oxyopes ratnae* Tikader, *Oxyopes shweta* Tikader, *Oxyopes rufisternis* Pocock, *Oxyopes ryvesii* Pocock, *Oxyopes kohaensis* Bodkhe and Vankhede, *Oxyopes boriensis* Bodkhe and Vankhede etc., to decide it as new species.

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Statement of conflict of interest

Author has declared no conflict of interest.

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