PRELIMINARY CHECKLIST OF SPIDERS OF KEOLADEO NATIONAL PARK, BHARATPUR, RAJASTHAN WITH FIRST RECORD OF *PTOCASIUS STRUPIFER* SIMON, 1901 (ARANEAE: SALTICIDAE) FROM INDIA

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[Kaur, M., Das, S. K., K. R. Anoop & Siliwal, M. 2014. Preliminary checklist of spiders of Keoladeo National Park, Bharatpur, Rajasthan with first record of *Ptocasius strupifer* Simon, 1901 (Araneae: Salticidae) from India. Munis Entomology & Zoology, 9 (1): 501-509**]**

ABSTRACT: A preliminary checklist of spiders of the Keoladeo National Park (KNP), Bharatpur, Rajasthan is provided here based on a short term study undertaken in June-July, 2011. A total 30 species belonging to 26 genera and 11 families were recorded from the area, which forms a baseline information for spiders of KNP. Among these, Salticidae, Araneidae and Lycosidae families were found to be dominant in the area. *Ptocasius strupifer* Simon, 1901 was first time reported from India during the study, for which we provide taxonomic description in this paper. The study also revealed association of a red mite exclusively on bodies of particular spider species during the period.

KEY WORDS: Spider, Bharatpur, first report, Keoladeo National Park, *Ptocasius strupifer*, Rajasthan, Salticidae.

India is one of the megadiverse countries with only 2.4% of world's land area, and accounting about 7.43% (91,212 species) of the world's total faunal species (12,28,103 species) (Arora & Bhatt, 2008). Spiders (Arachnida: Araneae) are one of the diverse and functionally important predators regulating the terrestrial arthropod populations (Coddington & Levi, 1991). India is also rich in spider fauna, being represented by 1729 species and 437 genera in 61 families (based on Platnick, 2013). In India, major study on spiders had been concentrated in southern, eastern, central and north-easten part (Sebastein & Peter, 2009). But little is known about spiders of arid and semiarid region of this country, the major part of which comes under the state Rajasthan. After Pocock (1900) and Tikader (1966, 1987), spider fauna of this state is limited to a very few short term studies *viz*., Sivaperuman & Rathore (2004), Singh & Sihag (2007), Chauhan et al. (2009) and Saini et al. (2012a,b).

Keoladeo National Park (KNP) is located in Bharatpur district of Rajasthan and represents both Ramsar site as well as World Heritage site (Anon, 2003; Garg et al., 2008). According to Mehra et al. (2009), the park supports more than 30 species of spiders which is based on mere speculation and till date no information is available on spiders of this area. Keeping this in mind the present study was undertaken to provide baseline information about spider fauna of this area.

STUDY AREA

The study area was Keoladeo National Park (27°7'6"N – 27°12'2"N & 77°29'5" E – 77°33'9"E; Map. 1), Bharatpur district, Rajasthan. Once being part of erstwhile state of Bharatpur which had been managed as a duck shooting reserve, in 1956 this area was declared as a Protected Area and a bird Sanctuary. Formerly known as the Ghana Bird Sanctuary, the area was upgraded into a National Park in 1981 comprising an area of 29 sq. km. at the confluence of the rivers Gambhir and Banganga (Anon, 2003). The area comes under the Biogeographic Zone 4 (Semi-Arid) (Rodgers et al. 2002) and represents a unique mosaic ecosystem supporting a rich biodiversity. The entire area is almost a flat land with a central depression of about 8.5 sq. km and that is the main submerged area of the park. The soil is alluvial with saline patches at many places and the overall climate is sub-humid to semi-arid. The vegetation of the area has been classified as Northern Tropical Thorn Forest (6B) (Champion & Seth, 1968).

METHODOLOGY

The study was carried out from 1st June to 31st July, 2011 in Keoladeo National Park and its immediate surroundings. Random survey was made during early morning hours (6 hours to 9 hours) and day time (16 hours to 18 hours) through visual encounter search in different possible microhabitats for spiders - under rocks, fallen trees and logs, in leaf litter, in canopy, on bark and on ground. Spiders were examined in the field, photographed and released back in their natural habitat after identification. Specimens which could not be identified in the field were collected in collection vials, preserved in 70% alcohol and later identified examining under microscope (Olympus MSZ Sterozoom microscope was used for this purpose). Female epigynes and male palps were dissected using a sharp entomological needle and transferred to concentrate KOH for 10 to 30 minutes in order to clear the non-chitinous tissues. All measurements were made with a calibrated ocular micrometer and are in millimeters. Identifications were done using manuals of Peckham & Peckham (1885), Pocock (1900), Tikader (1987), Tikader (1980 a, b); Tikader & Malhotra (1980), Barrion & Litsinger (1995), Song et al. (1999), Peng et al. (2002), Gajbe (2008), Sebastian & Peter (2009) and Prószyński (2012).

Abbreviations: ALE = anterior lateral eye, AME = anterior median eye, M = male, OQ = ocular quadrate, MK = Mandeep Kaur, PLE = posterior lateral eye, PME = posterior median eye, KNP= Keoladeo National Park, fe = femur, mt = metatarsus, pa = patella, ta = tarsus, ti = tibia.

RESULTS AND DISSCUSSION

A total of 30 species (Table 1) belonging to 26 genera and 11 families were recorded from the study area. Among these, high diversity was observed in families Salticidae (8 species), Araneidae (6 species) and Lycosidae (4 species) (Fig. 1). However, Mehra et al. (2009) speculated that more than 30 species of spiders occurs in KNP but till date no species information is available on spiders of this area. Hence, the present investigation provides the baseline information about spider fauna of this area.

Two interesting Salticid spiders, *viz*., *Bianor albobimaculatus* (Lucas, 1846) (Plate 1. D-F) and *Ptocasius strupifer* Simon, 1901 (Plate 2. A-G) were recorded

during the present study from KNP. Though, *Bianor albobimaculatus* is reported from India earlier (Logunov, 2000; Siliwal et al., 2005) but it's occurrence in India is not updated in the global spider database by Prószyński (2012) and Platnick (2013) as well as in the latest checklist of Indian spiders by Keswani et al. (2012). Hence, its occurrence in India is confirmed through this paper. And *Ptocasius strupifer* Simon, 1901 is reported here for the first time from India and taxonomic details for the species is provided here.

The study also revealed association of a red mite exclusively on bodies of *Oxyopes pankaji* and *Hyllus semicupreus* (Plate 1. A-C). Association of mites as ectoparasites to spiders is supported by similar reports by Banks (1896), Eason et al. (1967) and Welbourn & Young (1988). But association of mites with particular spider species as observed during this study is presumed to be by chance as the study was a very short term study and subjected to further investigation.

Since the study was carried out in summer, relatively low diversity was observed. However, we expect many more species from the area if the surveys in future are carried out during post monsoon season. Despite of summer, some interesting spiders were recorded during the study. Further, there is need of systematic long surveys in this area to understand overall species diversity of the region as well as seasonal variations in spider abundance, which otherwise cannot be detected by short term results, such as shown here.

TAXONOMY

Genus *Ptocasius* Simon, 1885

Diagnosis: The genus *Ptocasius* resembles genus *Hasarius*, the cephalothorax being almost the same, integuments covered with simple hairs and the fangs having two promarginal teeth, but eyes of the second row are more widely removed from the posterior than from the anterior eyes and the ocular area being a little longer above and wider behind. Equally near to the genus *Cytaea* but differing from it in having the cephalothorax shorter and higher, fangs with two promarginal teeth, as in *Hasarius* and finally by the integument being covered with simple hairs, while in *Cytaea* the hairs are scale-like (Peckham & Peckham, 1885) (www. *salticidae.org/).*

Ptocasius strupifer Simon, 1901

(Plate-2. A-G; Table-2)

Material examined: 1 male collected from KNP, Bharatpur, Rajasthan, India, 8 June, 2011, coll. M. Kaur, IPU-ARACH-53.

Description (all measurements in mm): Total length 9.00. Carapace length 4.00, width 3.75. Abdomen length 5.00, width 3.00. Morphometry of legs and palp is given in Table 2.

The cephalothorax is high with a rounded upper surface entirely covered with hairs, inclined in both directions from the rear eyes and has a somewhat truncated posterior margin. In live specimens it is grey brown in color with white border except OQ that is dull white with two dark brown stumpy extensions from base of the PLE to ALE. Ocular area a little wider behind than in front and almost equal to cephalic width. Eight eyes in three rows, transparent and with black bases, the eyes of the second row (PME) are a little nearer to the ALE of first row than the third row (PLE), and are separated from the ALE by deep depressions. Fovea present, clypeus brown, chelicera feathery with brown axis covered with

thick white hairs. Elongated and strong reddish brown fangs with two promarginal teeth and one unequally bifid retromarginal teeth (fissidentati), sternum light brown, oval and slightly truncated towards posterior end, maxilla and labium dark brown with creamy white top and dense hairs. Legs grey brown with dense spines and hairs, the first leg is darker than the rest of the legs, leg formula 1423. Abdomen elongated oval, truncated anteriorly and slightly pointed near spinnerets; dorsum greyish brown with white border, anterior end with chalk white patch and posterior end near spinnerets with small white spot; ventrally yellowish brown, mid-ventrally yellowish brown with 2 longitudinal lines formed by light yellowish dots and surrounded by yellow and greyish brown longitudinal patches on either side. Cribellum absent and spinnerets brown. Palp organ with blunt tips, embolus of palpal organ long and originating at base of bulb.

Remark: *Ptocasius* is very close to and possibly synonymous with the much larger genus *Yaginumaella* (www. *salticidae.org/).*

Distribution: India (present record), China, Taiwan, Vietnam.

ACKNOWLEDGEMENTS

The authors are grateful to the Department of Forest, Government of Rajasthan for granting permission to carry out this work in KNP, Bharatpur, Rajasthan. Author (MK) expresses her sincere thanks to Mr. Abrar Khan, Range Forest Officer, KNP, for his valuable support and guidance during the field study. MK also thankful to Miss Subhi Mallick, Research Scholar. Guru Gobind Singh Indraprastha University for her help and support during lab study.

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Table 1. Checklist of spiders recorded from KNP.

FAMILY	GENUS/SPECIES	M/F
Araneidae Simon, 1895	*Argiope aemula* Walckenaer, 1842	F
	Cyrtophora citricola Forskal, 1775	F
	Eriovixia excelsa (Simon, 1889)	F
	Larinia chloris (Audouin, 1826)	M
	Neoscona mukerjei Tikader, 1980	F
	Zygeilla indica Tikader and Bal, 1980	F
Hersiliidae Thorell, 1870	*Hersilia savignyi* Lucas, 1836	M & F
Lycosidae Sundevall, 1833	*Hippasa madhuae* Tikader and Malhotra, 1980	F
	Hippasa pisaurina Pocock, 1900	F
	Pardosa songosa Tikader and Malhotra, 1976	F
	Pardosa birmanica Simon, 1884	F
Oxyopidae Thorell, 1870	*Peucetia viridana* Stoliczka, 1869	F
	Oxyopes pankaji Gajbe and Gajbe, 2001	F
Pholcidae CL Koch, 1851	*Artema atlanta* Walckenaer, 1837	F
	Pholcus phalangioides Fuesslin, 1775	F
Pisauridae Simon, 1890	*Pisaurina* sp.	M (J)
Salticidae Blackwall, 1841	*Hasarius adansoni* (Audouin, 1826)	F
	Hyllus semicupreus Simon, 1885	F
	Phintella vittata CL Koch, 1846	M & F
	Plexippus paykulli Audouin, 1826	M & F
	Telamonia dimidiata Simon, 1899	F
	Bianor albobimaculatus (Lucas, 1846)	F
	Bianor pseudomaculatus Logunov, 2001	F
	Ptocasius strupifer Simon, 1901 *	M
Sparassidae Bertkau, 1872	*Olios milleti* Pocock, 1901	F
Tetragnathidae Menge, 1866	*Leucauge decorata* (Blackwall, 1864)	F
	Tetragnatha sp.	F (J)
Thomisidae Sundevall, 1833	*Thomisus lobosus* Tikader, 1965	F
	Thomisus pugilis Stoliczka, 1869	F
Uloboridae Thorell, 1869	*Uloborus* sp.	F (J)

N.B. * First report from India; M= Male, F= Female, J=Juvenile

Table 2. Morphometry of legs of *P. weyersi* Simon, 1885 (in mm).

	Leg I	Leg II	Leg III	Leg IV	Male Palp
Fe	3.50	2.50	3.00	3.00	2.00
Pa	3.00	2.00	1.75	1.25	1.25
Ti	3.50	2.00	2.00	2.00	2.00
Mt	2.00	1.25	2.00	1.50	0.00
Ta	1.00	0.75	1.00	1.00	1.10
Total	13.00	8.50	9.75	8.75	5.35

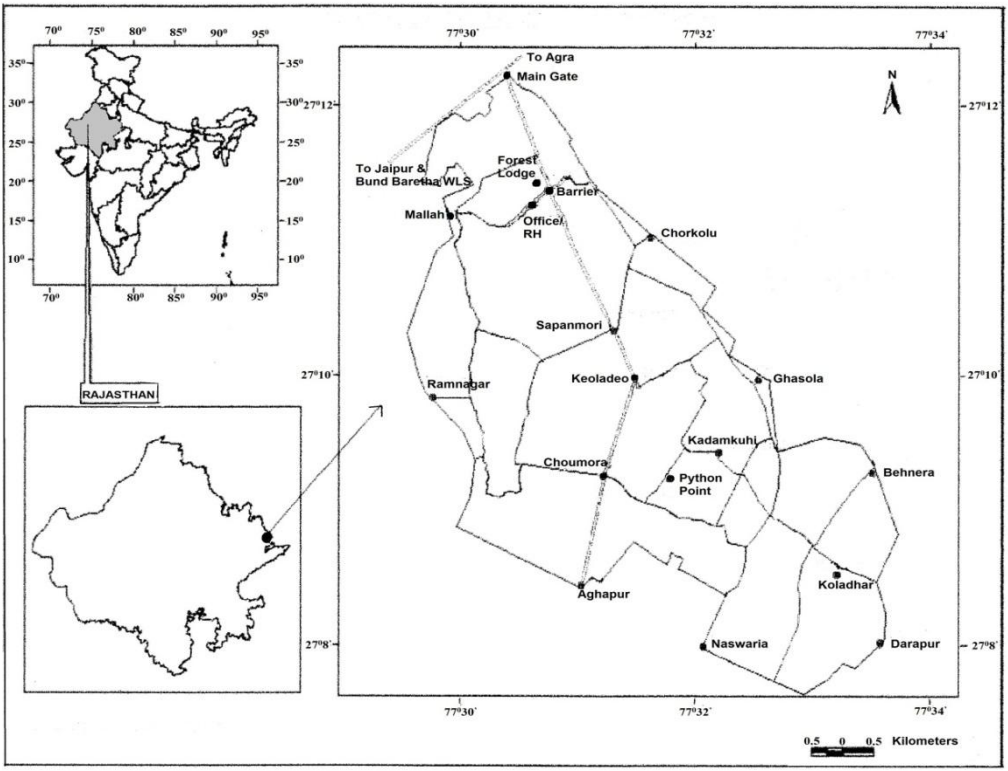

Figure 1. Map of Keoladeo National Park.

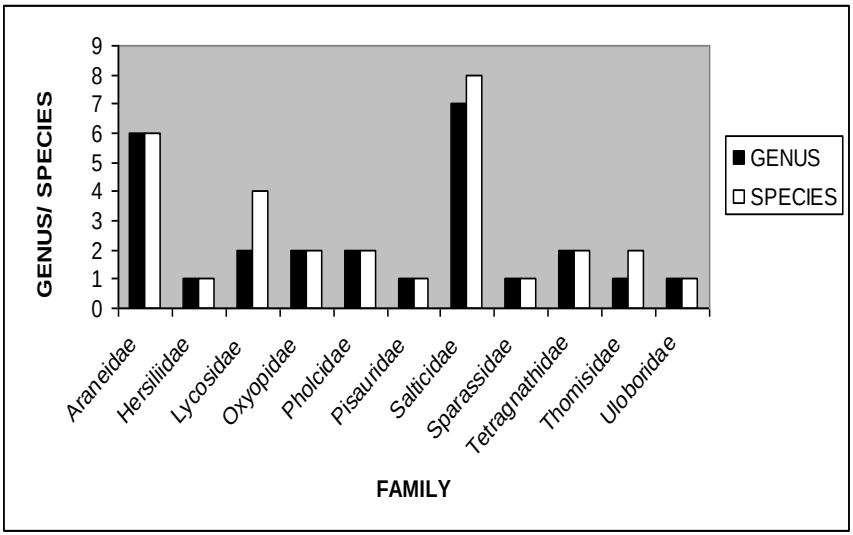

Figure 2. Spider diversity of KNP.

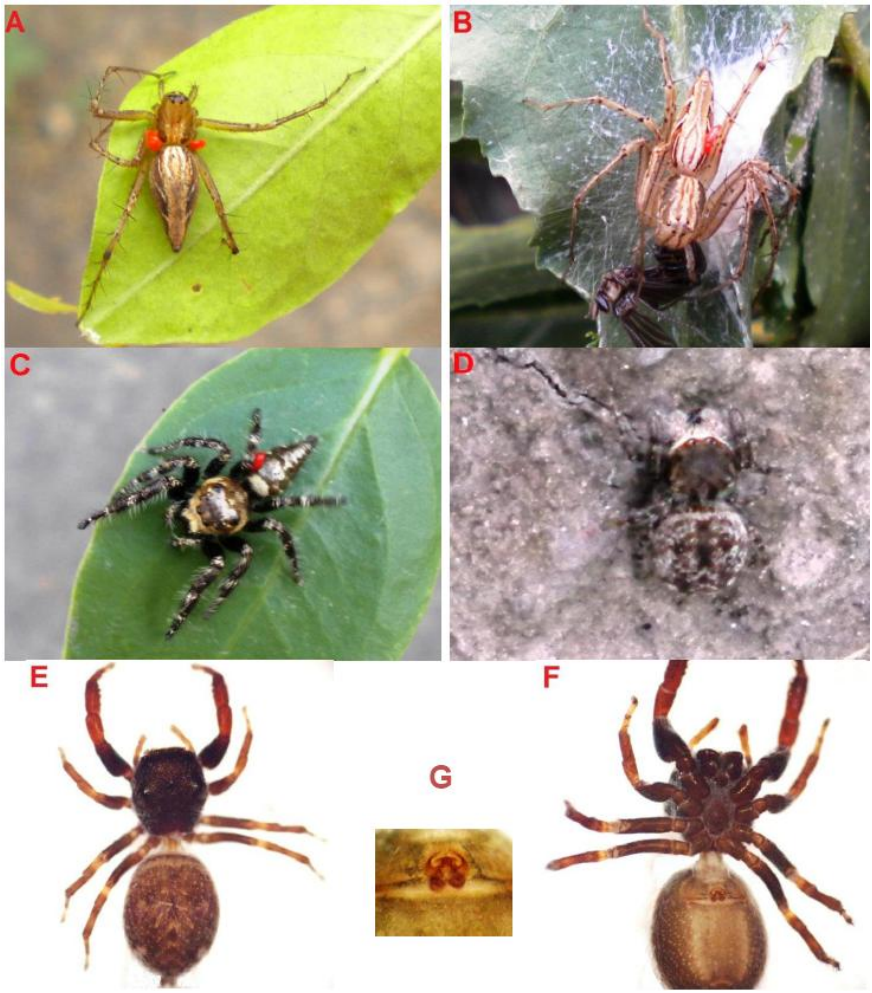

Plate 1. Spiders recorded from KNP. A, B, C (field photo): *Oxyopes pankaji* ♀ (A, B), *Hyllus semicupreus* ♀ (C); D, E, F: *Bianor albobimaculatus* ♀, Field photo (D), Dorsal view (E), Ventral view (F), Epigyne (G)

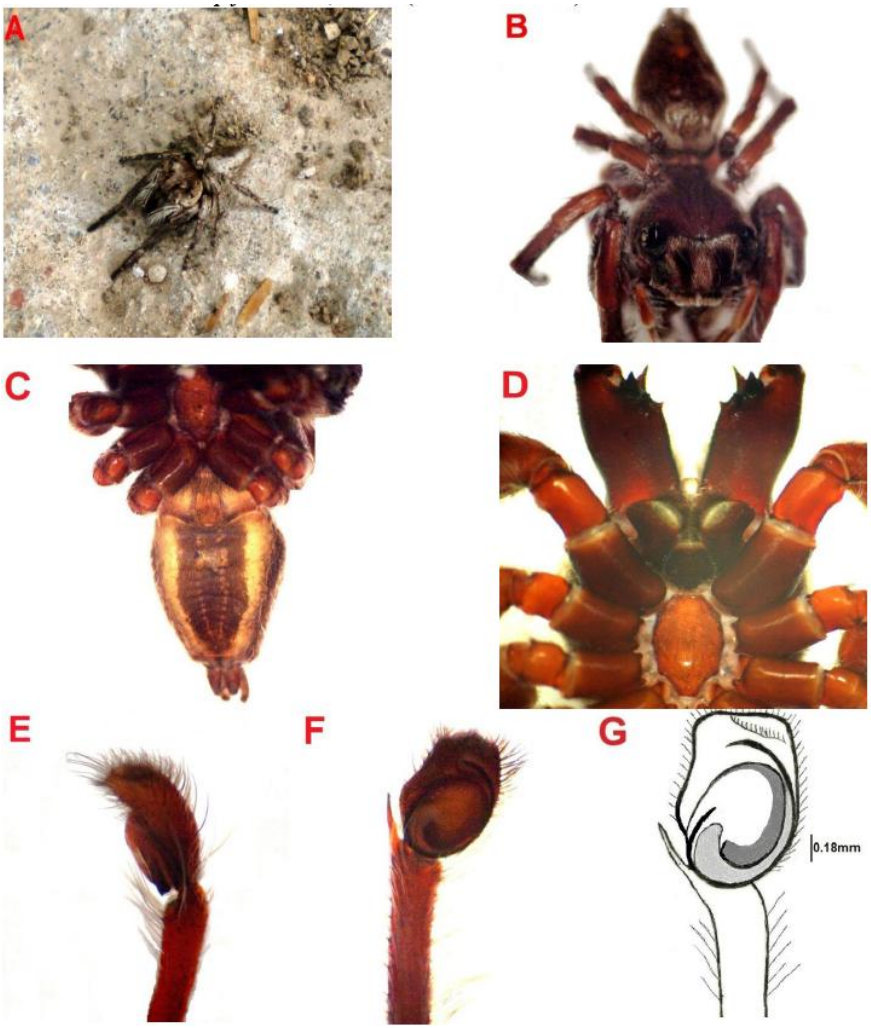

Plate-2. *Ptocasius strupifer* Simon, 1901♂ (IPU-ARACH-53) Plate 2. A: Field photo; B: Carapace and abdomen dorsal view; C: Abdomen ventral view-legs omitted; D: Sternum, maxillae, labium, chelicerae; E, F, G: Palp, Retrolateral (E), Ventral view (F, G).