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SHORT COMMUNICATION

A PRELIMINARY CHECKLIST OF SPIDERS (ARANEAE: ARACHNIDA) IN JAMBUGHODA WILDLIFE SANCTUARY, PANCHMAHAL DISTRICT, GUJARAT, INDIA

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A preliminary checklist of spiders (Araneae: Arachnida) in Jambughoda Wildlife Sanctuary, Panchmahal District, Gujarat, India

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Abstract: Studies relating to spiders in Gujarat have been sporadic and most of the spider documentation have been done from agriculture fields, wetlands and few from protected areas. One such undocumented area was Jambughoda Wildlife Sanctuary, Panchmahal District, Gujarat. Therefore, a study to document the spider diversity was carried out in Jambughoda Wildlife Sanctuary from July 2012 to October 2015. A combination of four sampling methods namely, belt transect along with hand-pick method, pitfall sampling, vegetation beating and leaf litter extraction were used for collection of spiders from different strata. During the study, a total of 138 species belonging to 90 genera and 29 families were recorded from the study area. Of which, 21 species and 17 genera were recorded for the first time from Gujarat State. The theridiid genus *Cephalobares* O. Pickard-Cambridge, 1870 was recorded for the first time from India. The families Araneidae, Salticidae, Theridiidae and Oxyopidae were found to be dominant in the area. We recognized seven feeding guilds namely ambushers, foliage runners, ground runners, orb weavers, sheet web-builders, space web-builders and stalkers. Amongst these, orb-weavers, stalkers and ground runners were dominant. This documentation, however, forms the baseline information for spiders of Jambughoda WLS, suggesting the great diversity of the spider fauna in this protected area, which can be further explored.

Keywords: Araneidae, orb-weavers, Oxyopidae, Panchmahal District, Salticidae, stalkers, Theridiidae, Vadodara District.

Spiders, in general, being chiefly entomophagous play an important ecological role in the terrestrial ecosystem (Marc et al. 1999; Skerl & Gillespie 1999). Due to their ability of aerial ballooning they can readily disperse into different habitats and being generalist predators they are abundant in all terrestrial habitats (Coddington & Levi 1991). They also play a significant role in controlling the insect populations in the agricultural fields (Riechert & Bishop 1990). They also play an important role in the food chain by being abundant food source for birds, lizards, wasps, and other animals. Over 48,643 valid species of spiders belonging to more than 4,173 genera and 128 families have been reported throughout the world (World Spider Catalog 2019). Out of which, over 1,700 species belonging to more than 450 genera and 61 different families have been reported from India (World Spider Catalog 2019).

Though in the past, spider documentation from Gujarat have been sporadic but is relatively better recorded as compared to other states in the country. Major contribution to the spider fauna of the Gujarat

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was done by Patel and team by describing 47 species from 18 families (Patel 1971, 1973, 1988, 1989, 2003; Patel & Patel 1972, 1975; Patel & Reddy 1990; Parasharya & Vyas 2013). Apart from these reports, several other sporadic checklists from agricultural fields (Kumar & Shivakumar 2006; Trivedi 2009) and habitats in Gujarat contributed to addition of new species and new distribution records (Siliwal & Kumar 2001; Kumar & Shivakumar 2006; Trivedi 2009; Parasharya et al. 2011; Vachhani et al. 2012; Parmar & Patel 2015; Vasava et al. 2015; Prajapati et al. 2016a,b,c). So far, over 400 species of spiders have been reported from Gujarat (Kumar 2015; Yadav et al. 2017).

In Gujarat State, most of the spider documentation has been done from nonprotected areas like agriculture fields, wetlands etc. and very few from protected areas. A total of 27 regions are deemed as protected areas in Gujarat from which, only 10 areas have a documentation of spiders, viz., Barda WS (62 species) (Singh et al. 2000a), Hingolghadh Nature Education Sanctuary (56 species) (Singh et al. 2000b; Patel & Vyas 2001), Jessore WS (157 species) (Pandey et al. 2004a), Narayan Sarovar WS (24 species) (Singh et al. 2001), Purna WS (116 species) (Siliwal et al. 2003; Pandey et al. 2004b), Rampara WS (21 species) (Singh & Tatu 1999), Ratanmahal Sloth Bear Sanctuary (42 species) (Patel et

al. 2012), Shoolpaneshwar WS (147 species) (Pandey & Raval 2010), Vansda NP (124 species) (Singh et al. 2000c, Patel 2003), and Wild Ass WS (27 species) (Singh et al. 1999).

The Jambughoda Wildlife Sanctuary (WS) is one such unstudied protected area in central Gujarat located between Panchmahal and Vadodara districts known for its relatively rich biodiversity including flagship species like Sloth Bear and Leopard. Studies in the past in Jambughoda WS from this protected area were restricted to flora and higher vertebrates like mammals, birds, reptiles and fishes (Padate et al. 2003; Vyas 2006; Devkar et al. 2013). Moreover, invertebrate documentation from this area was restricted only to lepidopteran and few insect species (Padate et al. 2003). Therefore, in the present study, we initiated documentation of spider diversity from Jambughoda WS.

MATERIALS AND METHODS

The study was conducted in the Jambughoda WS, which is located between 22.333–22.550 °N and 73.583–75.750 °E in Panchmahal and Vadodara districts of Gujarat State, India (Figure 1). The sanctuary area extends over 130.38km² and is covered by three forest ranges, viz., Halol, Jambughoda, and Vadodara. Altitudes ranges from 230 to 354 m. Jambughoda WS

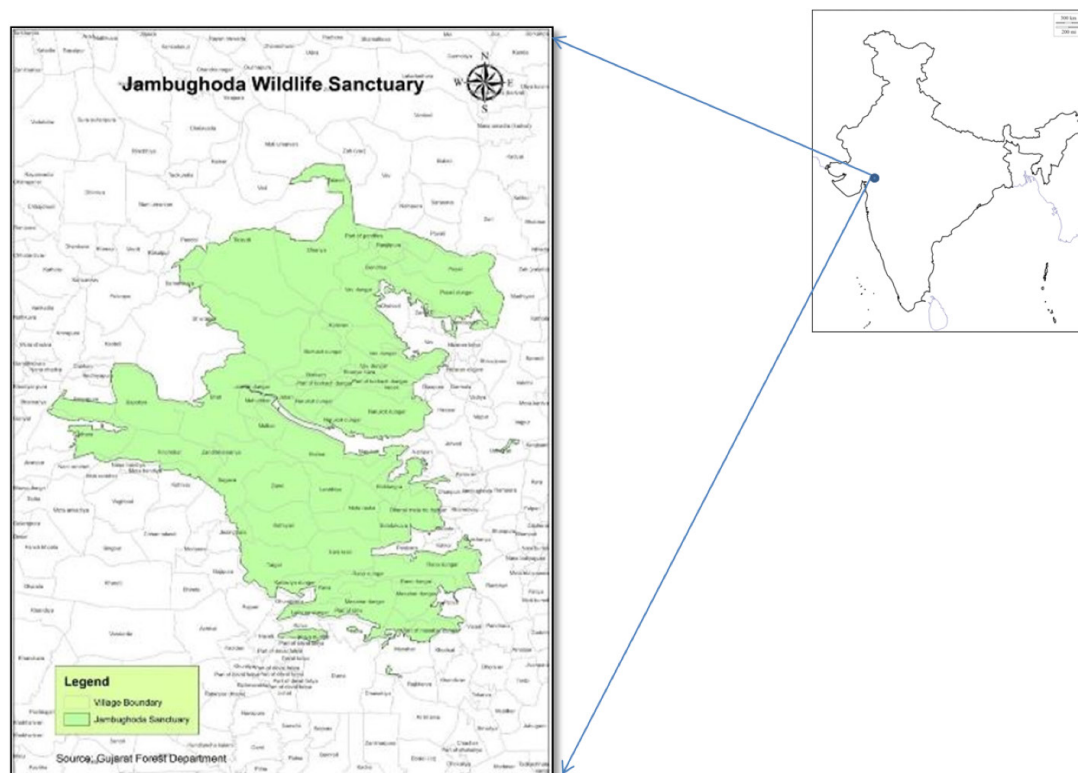


Figure 1. Jambughoda Wildlife Sanctuary, Panchmahal District, Gujarat, India.

consists of southern tropical dry deciduous type forest, further classified into four sub-types, i.e., 5A/ C 1b dry teak forest, 5A/C 2 southern dry mixed deciduous forest, 5/E 9 dry bamboo brakes, and 3B/C 2 southern moist mixed deciduous forest (Champion & Seth 1968). The sanctuary has both natural forest and plantations. The mean annual temperature in the sanctuary is 25.5°C, with a maximum of 45°C and a minimum of 7°C and the area receives an average annual rainfall, which ranges 800–1,200 mm (Pandya & Oza 1998).

To explore the spider diversity of Jambughoda WS, the sampling was carried out from July 2012 till October 2015. A combination of four sampling methods namely, belt transect (Kapoor 2006) was applied for overall diversity count; pitfall sampling (Curtis 1980; Green 1999) was done for ground-dwelling spiders; vegetation beating was done for spiders inhabiting in vegetation; leaf litter extraction (Crossley & Høglund 1962; Kapoor 2006) was used for spider taxa associated with moisture and sheltered areas. All the collected specimens were preserved in 70–80% ethanol (ethyl alcohol) and stored separately in clear tarsons polypropylene (PP) sampling containers (50ml). Each specimen was labeled which that included the date of collection, locality of collection and the name of collector. Further, these preserved specimens were identified under a using stereomicroscope (WILD™). Spiders were identified up to the species level using the standard monographs (Levi & Levi 1962; Tikader 1977, 1980, 1982, 1987; Tikader & Biswas 1981; Tikader & Malhotra 1980; Pocock 1900; Majumder & Tikader 1991; Gajbe 2008; Javed & Tampal 2010; Vankhede et. al. 2013; Keswani & Vankehede 2014). Whereas, immature spiders were classified up to the genus or family level. For species level identification epigyn was dissected and cleaned in concentrated lactic acid for 15–20 minutes. All specimens are deposited in the museum of Department of Zoology, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, and curated by DK; later on these specimens will be deposited in a national repository.

RESULTS AND DISCUSSION

The present study resulted in the record of 138 spider species belonging to 90 genera and 29 families from Jambughoda WS along with their natural history notes (Table 3; Image 1–138). Of these 29 families, the most dominant family was Araneidae (26 species) followed by Salticidae (17 species), Theridiidae (11 species), and Oxyopidae (10 species), however, families with high generic diversity were Araneidae and Salticidae (14 genera each), followed by Theridiidae

Table 1. List of genera recorded for the first time from Gujarat, India.

	Families	List of genera
1	Araneidae	<i>Gea</i> C.L. Koch, 1843
2	Araneidae	<i>Lipocrea</i> Thorell, 1878
3	Araneidae	<i>Singa</i> C.L. Koch, 1836
4	Gnaphosidae	<i>Megamyrmaekion</i> Reuss, 1834
5	Hersiliidae	<i>Murricia</i> Simon, 1882
6	Oonopidae	<i>Brignolia</i> Dumitrescu & Georgescu, 1983
7	Oxyopidae	<i>Hamadruas</i> Deeleman-Reinhold, 2009
8	Pisauridae	<i>Hygropoda</i> Thorell, 1894
9	Pisauridae	<i>Nilus</i> O. Pickard-Cambridge, 1876
10	Prodidomidae	<i>Prodidomus</i> Hentz, 1847
11	Salticidae	<i>Portia</i> Karsch, 1878
12	Salticidae	<i>Stenaelurillus</i> Simon, 1886
13	Theridiidae	<i>Cephalobares</i> O. Pickard-Cambridge, 1870*
14	Theridiidae	<i>Euryopsis</i> Menge, 1868
15	Theridiidae	<i>Meotipa</i> Simon, 1894
16	Theridiidae	<i>Yaginumena</i> Yoshida, 2002
17	Uloboridae	<i>Zosis</i> Walckenaer, 1841

*This genus is recorded for the first time from India.

(11 genera), and Gnaphosidae (six genera). Whereas, 15 families, viz., Clubionidae, Corinnidae, Ctenidae, Eresidae, Cheiracanthiidae, Liocranidae, Oecobiidae, Palpimanidae, Philodromidae, Prodidomidae, Scytodidae, Sicariidae, Stenochilidae, Titanoecidae, and Zodariidae were represented by a single genus.

Out of the 90 genera identified from the Jambughoda WS, 17 genera were recorded for the first time from Gujarat State (Table 1). The genus *Cephalobares* O. Pickard-Cambridge, 1870 belonging to family Theridiidae is documented for the first time from India during the present study. This genus was previously reported only from two countries, i.e., China and Sri Lanka, and comprise of only two species, namely, *Cephalobares globiceps* O. Pickard-Cambridge, 1870 reported from both the countries and *Cephalobares yangdingi* Gao & Li, 2010 reported only from type locality in China (World Spider Catalog 2017).

Amongst the recorded 138 species of spiders, 21 spider species were recorded for the first time from Gujarat (Table 2) wherein *Poltys* cf. *columnaris* of the family Araneidae and *Zosis* cf. *geniculata* of the family Uloboridae were juveniles; because of their peculiar external characteristics of abdominal shape and pattern they were identified easily till species level.

Out of the eight feeding guilds described by Uetz et al. (1999), we found seven feeding guilds based on

Table 2. List of species recorded for the first time from Gujarat, India.

	Families	List of species
1	Araneidae	<i>Gea subarmata</i> Thorell, 1890
2	Araneidae	<i>Lipocrea fusiformis</i> (Thorell, 1877)
3	Araneidae	<i>Polys bhabanii</i> (Tikader, 1970)
4	Araneidae	<i>Polys cf. columnaris</i> Thorell, 1890
5	Araneidae	<i>Polys nagpurensis</i> Tikader, 1982
6	Clubionidae	<i>Clubiona foliata</i> Keswani & Vankhede, 2014
7	Ctenidae	<i>Ctenus narashinhai</i> Patel & Reddy, 1988
8	Gnaphosidae	<i>Scopoides kuljitae</i> (Tikader, 1982)
9	Gnaphosidae	<i>Zelotes mandae</i> Tikader & Gajbe, 1979
10	Hersiliidae	<i>Murricia hyderabadensis</i> Javed & Tampal, 2010
11	Oxyopidae	<i>Hamadruas sikkimensis</i> (Tikader, 1970)
12	Oxyopidae	<i>Peucetia yogeshi</i> Gajbe, 1999
13	Pisauridae	<i>Hygropoda cf. mahendriensis</i> Vankhede, Keswani & Rajoria, 2013
14	Pisauridae	<i>Nilus phipsoni</i> (F. O. Pickard-Cambridge, 1898)
15	Sicariidae	<i>Loxosceles rufescens</i> (Dufour, 1820)
16	Tetragnathidae	<i>Tetragnatha extensa</i> (Linnaeus, 1758)
17	Tetragnathidae	<i>Tylorida ventralis</i> (Thorell, 1877)
18	Theridiidae	<i>Coleosoma blandum</i> O. Pickard-Cambridge, 1882
19	Theridiidae	<i>Meotipa picturata</i> Simon, 1895
20	Theridiidae	<i>Yaginumena maculosa</i> (Yoshida & Ono, 2000)
21	Uloboridae	<i>Zosis cf. geniculata</i> (Olivier, 1789)

foraging behaviour of spiders from Jambughoda WS namely, ambushers, foliage runners, ground runners, orb weavers, sheet web-builders, space web-builders, and stalkers. From all these seven functional groups the dominant guild was of orb weavers (39 species) followed by stalkers (27 species), ground runners (25 species), foliage runners (19 species), space web-builders (14 species), ambushers (11 species), and sheet web builders (3 species) (Figure 2). The dominance of orb weavers could be due to mixed vegetation found in the forest, which provides enough space to build their webs of different sizes and also provide protection from their predators (Siliwal et al. 2003; Patel et al. 2012).

In addition to this, during the present study we also came across six spiders which are probably new to science (*Singa* sp., *Brignolia* sp., *Prodidomus* sp., *Epocilla* sp., *Euryopsis* sp., & *Storena* sp.) and will be published separately after comparative taxonomic work.

CONCLUSION

A preliminary checklist of spiders from Jambughoda WS, Panchmahal District, Gujarat is provided in this paper which is the first ever documentation of the spiders of Jambughoda from this sanctuary. Data presented here may aid future initiatives to build a biodiversity database of spider fauna in this region. The presence of 138 species of spiders in a dry deciduous forest like Jambughoda WS indicates that, to sustain such rich biodiversity the habitat has to be ecologically balanced and this southern tropical dry deciduous forest is one of them as it has capability to sustain such diverse number of flora and fauna including spiders. And, therefore, it was possible to get interesting first records of genus and species from this area. This documentation, however, is by no means inclusive but forms the baseline information for spiders of Jambughoda WS suggesting the great diversity of the spider fauna in this protected area.

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Table 3. List of spider species documented from Jambughoda Wildlife Sanctuary, Panchmahal District, Gujarat, India.

	Family	Scientific name	No. of specimens collected & sex	Voucher no. 12,13,14,15	Natural history notes	Image no.
1.	Araneidae	<i>Araneus mitificus</i> (Simon, 1886)	3F, 1M	ZOL-13-ARA-61 ZOL-13-ARA-62 ZOL-13-ARA-63 ZOL-14-ARA-125	Found resting in the retreat of folded leaf which was attached to the one end of its orb web	Image 1
2.	Araneidae	<i>Argiope aemula</i> (Walckenaer, 1841)	2F, 1M	ZOL-12-ARA-1 ZOL-12-ARA-2 ZOL-12-ARA-3	Observed resting in upside down position at the center (Hub) of its orb web	Image 2
3.	Araneidae	<i>Argiope anasujia</i> Thorell, 1887	2F, 1M	ZOL-12-ARA-4 ZOL-12-ARA-5 ZOL-12-ARA-6	Observed feeding on moths, grasshoppers entangled in its web	Image 3
4.	Araneidae	<i>Charizopes</i> sp.	1F	ZOL-14-ARA-126	Collected from underside of leave resting in its mesh web	Image 4
5.	Araneidae	<i>Cyclosa confragosa</i> (Thorell, 1892)	1F	ZOL-14-ARA-127	Collected from its web, decorated with a longitudinal line of debris passing through the hub were the spider camouflages itself	Image 5
6.	Araneidae	<i>Cyclosa hexatuberculata</i> Tikader, 1982	1F	ZOL-13-ARA-64	Collected from its web, decorated with a longitudinal line of debris passing through the hub were the spider camouflages it self	Image 6
7.	Araneidae	<i>Cyclosa moanduisensis</i> Tikader, 1963	1F, 1M	ZOL-12-ARA-7 ZOL-12-ARA-8	Observed hanging by a single strand of silk over the lower vegetation	Image 7
8.	Araneidae	<i>Cyclosa spirifera</i> Simon, 1889	1F	ZOL-13-ARA-65	Collected from its web, decorated with a longitudinal line of debris passing through the hub were the spider camouflages it self	Image 8
9.	Araneidae	<i>Cyrtophora cicutrosa</i> (Stoliczka, 1869)	2F	ZOL-12-ARA-9 ZOL-12-ARA-10	Observed resting in upside down position at the center of its tent shape web	Image 9
10.	Araneidae	<i>Cyrtophora citricola</i> (Forskål, 1775)	2F, 1M	ZOL-13-ARA-66 ZOL-13-ARA-67 ZOL-14-ARA-128	Observed resting in upside down position at the center of the tent shape web	Image 10
11.	Araneidae	<i>Eriovixia excelsa</i> (Simon, 1889)	2F, 1M	ZOL-12-ARA-11 ZOL-12-ARA-12 ZOL-14-ARA-129	Nocturnal spider, during day time hides in their retreat (rolled leaf) attached at one end of its web	Image 11
12.	Araneidae	<i>Eriovixia laglaizei</i> (Simon, 1877)	1F	ZOL-14-ARA-130	Nocturnal spider, collected from its orb web	Image 12
13.	Araneidae	<i>Eriovixia poonaensis</i> (Tikader & Bal, 1981)	1F	ZOL-15-ARA-174	Nocturnal spider, found resting during day time in its retreat (rolled leaf)	Image 13
14.	Araneidae	<i>Gasteracantha kuhli</i> C.L. Koch, 1837	1F	ZOL-15-ARA-175	Collected from its orb web	Image 14
15.	Araneidae	<i>Gea subarmata</i> Thorell, 1890	1F	ZOL-15-ARA-176	Small orb web with uniformly circular radii constructed between blades of grass. Spider was found resting in the centre of the web. New record from Gujarat	Image 15
16.	Araneidae	<i>Larinia chloris</i> (Audouin, 1826)	1F	ZOL-12-ARA-13	Observed resting in upside down position at the center (Hub) of the orb web	Image 16
17.	Araneidae	<i>Lipocrea fusiformis</i> (Thorell, 1877)	1F	ZOL-12-ARA-14	Observed resting in upside down position at the center (Hub) of the orb web	Image 17
18.	Araneidae	<i>Neoscona mukerjeei</i> Tikader, 1980	3F, 2M	ZOL-12-ARA-15 ZOL-12-ARA-16 ZOL-12-ARA-17 ZOL-13-ARA-68 ZOL-13-ARA-69	Observed resting in upside down position at the center (Hub) of its orb web	Image 18
19.	Araneidae	<i>Neoscona nautica</i> (L. Koch, 1875)	1F	ZOL-14-ARA-131	Observed resting in upside down position at the center (Hub) of its orb web	Image 19

Family	Scientific name	No. of specimens collected & sex	Voucher no. 12,13,14,15	Natural history notes	Image no.
Araneidae	<i>Neoscona theisi</i> (Walckenaer, 1841)	3F, 1M	ZOL-13-ARA-70 ZOL-13-ARA-71 ZOL-14-ARA-132 ZOL-14-ARA-133	Observed resting in upside down position at the center (Hub) of its orb web	Image 20
Araneidae	<i>Neoscona vigilans</i> (Blackwall, 1865)	1F	ZOL-13-ARA-72	Observed resting in upside down position at the center (Hub) of its orb web	Image 21
Araneidae	<i>Poltys bhabanii</i> (Tikader, 1970)	1F	ZOL-14-ARA-134	Nocturnal spider, observed resting in upside down position at the center (Hub) of its orb web	Image 22
Araneidae	<i>Poltys cf. columnaris</i> Thorell, 1890	1J	ZOL-15-ARA-177	Nocturnal spiders, looks like dry broken twig of plant. At night they were found resting in the centre of their large orb web	Image 23
Araneidae	<i>Poltys nagpurensis</i> Tikader, 1982	1F	ZOL-15-ARA-178	Nocturnal spider, collected from its orb web constructed between two lower branches of <i>Tectona grandis</i>	Image 24
Araneidae	<i>Singa</i> sp.	2F, 1M	ZOL-15-ARA-179	Observed hanging with a single strand of silk attached on one side to a leave and other side to a shrub branch	Image 25
Araneidae	<i>Thelacantha brevispina</i> (Doleschall, 1857)	1F	ZOL-15-ARA-180	Observed resting in upside down position at the center (Hub) of its orb web	Image 26
Clubionidae	<i>Clubiona drassodes</i> O. Pickard-Cambridge, 1874	1F	ZOL-12-ARA-18	Found resting on the underside of leaf	Image 27
Clubionidae	<i>Clubiona filicata</i> O. Pickard-Cambridge, 1874	1F	ZOL-13-ARA-73	Found resting on the underside of leaf	Image 28
Clubionidae	<i>Clubiona foliata</i> Keswani & Vankhede, 2014	1F	ZOL-13-ARA-74	Observed wandering on the foliage	Image 29
Clubionidae	<i>Clubiona pashabhaii</i> Patel & Patel, 1973	1F	ZOL-12-ARA-19	Found resting on the underside of leaf	Image 30
Corinnidae	<i>Costianeira zetes</i> Simon, 1897	1F	ZOL-14-ARA-135	Found running in the leaf litter	Image 31
Ctenidae	<i>Ctenus narashinai</i> Patel & Reddy, 1988	1F	ZOL-13-ARA-75	Found running in the leaf litter	Image 32
Eresidae	<i>Stegodyphus pacificus</i> Pocock, 1900	1F	ZOL-15-ARA-181	Colonial spider, collected from its web which was having many entrances	Image 33
Eresidae	<i>Stegodyphus sarasinorum</i> Karsch, 1892	2F, 1M	ZOL-13-ARA-76 ZOL-13-ARA-77 ZOL-14-ARA-136	Colonial spider, collected from its web which was having many entrances	Image 34
Cheiracanthiidae	<i>Cheiracanthium inornatum</i> O. Pickard-Cambridge, 1874	1F, 1M	ZOL-13-ARA-78 ZOL-13-ARA-79	Collected resting on the grass blade	Image 35
Eutichuridae	<i>Cheiracanthium melanostomum</i> (Thorell, 1895)	1F	ZOL-14-ARA-137	Collected while it was resting on the underside of leaf	Image 36
Eutichuridae	<i>Cheiracanthium triviale</i> (Thorell, 1895)	1F	ZOL-14-ARA-138	Collected while it was resting on the underside of leaf	Image 37
Eutichuridae	<i>Cheiracanthium</i> sp.	1F	ZOL-15-ARA-182	Collected while it was resting on the underside of leaf	Image 38
Gnaphosidae	<i>Drassodes</i> sp.	1J	ZOL-15-ARA-183	Found under the bark of palm tree	Image 39
Gnaphosidae	<i>Haplodrassus</i> sp.	1J	ZOL-15-ARA-184	Collected by pitfall method	Image 40
Gnaphosidae	<i>Megarmyrmaekion ashae</i> Tikader & Gajbe, 1977	1F	ZOL-15-ARA-185	Collected by pitfall method	Image 41
Gnaphosidae	<i>Scopoides kuljitae</i> (Tikader, 1982)	1F	ZOL-15-ARA-186	Collected by applying litter sampling	Image 42
Gnaphosidae	<i>Scopoides</i> sp.	1J	ZOL-15-ARA-187	Collected by applying litter sampling	Image 43
Gnaphosidae	<i>Trachyzelotes jaxartensis</i> (Kroneberg, 1875)	1F	ZOL-15-ARA-188	Collected by pitfall method	Image 44
Gnaphosidae	<i>Zelotes mandae</i> Tikader & Gajbe, 1979	1F	ZOL-14-ARA-139	Collected by pitfall method	Image 45

Family	Scientific name	No. of specimens collected & sex	Voucher no. 12,13,14,15	Natural history notes	Image no.
Hersiliidae	<i>Hersilia savignyi</i> Lucas, 1836	3F, 2M	ZOL-12-ARA-20 ZOL-12-ARA-21 ZOL-13-ARA-80 ZOL-12-ARA-22 ZOL-13-ARA-81	Found camouflaged on the bark of trees. Observed feeding on <i>Comptonotus compressus</i>	Image 46
Hersiliidae	<i>Murricia hyderabadensis</i> Javed & Tampal, 2010	1F	ZOL-15-ARA-189	Found camouflaged on the bark of trees	Image 47
Liocranidae	<i>Oedignatha</i> sp.	1M	ZOL-14-ARA-140	Collected by applying litter sampling	Image 48
Lycosidae	<i>Eviropa</i> sp.	1F	ZOL-12-ARA-23	Collected by pitfall method	Image 49
Lycosidae	<i>Hippasa lycosina</i> Pocock, 1900	1F	ZOL-12-ARA-24	Collected by pitfall method	Image 50
Lycosidae	<i>Lycosa poonaensis</i> Tikader & Malhotra, 1980	1F	ZOL-12-ARA-25	Collected by pitfall method	Image 51
Lycosidae	<i>Lycosa</i> sp.	1F	ZOL-12-ARA-26	Collected by pitfall method	Image 52
Lycosidae	<i>Pardosa birmanica</i> Simon, 1884	1F	ZOL-12-ARA-27	Collected by pitfall method	Image 53
Lycosidae	<i>Pardosa sumatrana</i> (Thorell, 1890)	1F, 1M	ZOL-13-ARA-82	Collected by pitfall method	Image 54
Oecobiidae	<i>Oecobius putus</i> O. Pickard-Cambridge, 1876	2F, 1M	ZOL-12-ARA-28 ZOL-12-ARA-29 ZOL-12-ARA-30	Collected from its web, constructed at the corner of huts in the village	Image 55
Onopidae	<i>Brignolia</i> sp.	1F	ZOL-14-ARA-141	Collected by pitfall method	Image 56
Onopidae	Unidentified species 1	1F	ZOL-14-ARA-142	Collected by pitfall method	Image 57
Oxyopidae	<i>Hamadruas sikkimensis</i> (Tikader, 1970)	1F	ZOL-15-ARA-190	Collected from the underside of leaf	Image 58
Oxyopidae	<i>Oxyopes ashiae</i> Gajbe, 1999	1F	ZOL-14-ARA-143	Found resting on grass blades	Image 59
Oxyopidae	<i>Oxyopes bharatae</i> Gajbe, 1999	1F	ZOL-14-ARA-144	Collected from the underside of leaf	Image 60
Oxyopidae	<i>Oxyopes birmanicus</i> Thorell, 1887	2F	ZOL-12-ARA-31	Found resting on grass blades	Image 61
Oxyopidae	<i>Oxyopes pankaji</i> Gajbe & Gajbe, 2000	1F	ZOL-14-ARA-145	Collected from the underside of leaf	Image 62
Oxyopidae	<i>Oxyopes</i> sp.	1F	ZOL-12-ARA-32	Collected from the underside of leaf	Image 63
Oxyopidae	<i>Peucetia akwadaensis</i> Patel, 1978	1M	ZOL-14-ARA-146	Collected from the underside of leaf	Image 64
Oxyopidae	<i>Peucetia viridana</i> (Stoliczka, 1869)	1F	ZOL-14-ARA-147	Collected from the underside of leaf	Image 65
Oxyopidae	<i>Peucetia yogeshi</i> Gajbe, 1999	1F, 1M	ZOL-14-ARA-148	Collected from the underside of leaf	Image 66
Oxyopidae	<i>Peucetia</i> sp.	1F	ZOL-12-ARA-33	Collected from the underside of leaf	Image 67
Palpimanidae	Unidentified species 2	1F	ZOL-13-ARA-83	Collected by pitfall method	Image 68
Philodromidae	<i>Tibellus elongatus</i> Tikader, 1960	1F	ZOL-15-ARA-	Collected from the branch of tree where it was fully camouflaged	Image 69
Pholcidae	<i>Crossopriza lyoni</i> (Blackwall, 1867)	2F, 2M	ZOL-12-ARA-34	Collected from tangled web constructed between the lower vegetation in the forest	Image 70
Pholcidae	<i>Pholcus fragillimus</i> Strand, 1907	2F, 2M	ZOL-12-ARA-35 ZOL-13-ARA-84 ZOL-12-ARA-36 ZOL-13-ARA-85	Collected from its tangled untidy web constructed between the lower vegetation in the forest	Image 71
Pholcidae	<i>Pholcus phalangoides</i> (Fuesslin, 1775)	2F	ZOL-13-ARA-86 ZOL-13-ARA-87	Collected from its tangled web constructed between the lower vegetation in the forest	Image 72

	Family	Scientific name	No. of specimens collected & sex	Voucher no. 12,13,14,15	Natural history notes	Image no.
73.	Pisauridae	<i>Hygropoda cf. mahendriensis</i> Vankhede, Keswani & Rajoria, 2013	3F, 2M	WILD-14-ARA-1277, WILD-14-ARA-1278, WILD-14-ARA-1279, WILD-14-ARA-1276, WILD-14-ARA-1293	Found near the streams of water, resting at periphery of stream and waiting for its prey (Hunting position)	Image 73
74.	Pisauridae	<i>Nilus phipsoni</i> (F.O. Pickard-Cambridge, 1898)	2F, 1M	ZOL-14-ARA-149 ZOL-14-ARA-150 ZOL-14-ARA-151	Found near the streams of water, resting on stones at the periphery of streams	Image 74
75.	Pisauridae	<i>Perenethis venusta</i> L. Koch, 1878	1M	ZOL-15-ARA-191	Found on the vegetation near the stream of water	Image 75
76.	Pisauridae	<i>Pisaura podilensis</i> Patel & Reddy, 1990	1F, 1M	ZOL-14-ARA-152 ZOL-15-ARA-192	Collected from the upper side of leaf near its nursery web	Image 76
77.	Prodidomidae	<i>Prodidomus</i> sp.	1M	ZOL-15-ARA-193	Accidentally found moving in the leaf litter and collected by handpick method	Image 77
78.	Salticidae	<i>Epocilla</i> sp.	1M	ZOL-14-ARA-153	Found in the underside of leaf	Image 78
79.	Salticidae	<i>Harmochirus brachiatus</i> (Thorell, 1877)	1M	ZOL-14-ARA-154	Found under the bark of Palm tree	Image 79
80.	Salticidae	<i>Hosarius adansonii</i> (Audouin, 1826)	2F, 1M	ZOL-13-ARA-88 ZOL-13-ARA-89 ZOL-13-ARA-90	Found underside of leaf	Image 80
81.	Salticidae	<i>Hyllus semicupreus</i> (Simon, 1885)	1F, 1M	ZOL-13-ARA-91 ZOL-13-ARA-92	Found underside of leaf	Image 81
82.	Salticidae	<i>Marpissa tigrina</i> Tikader, 1965	1F	ZOL-14-ARA-155	Found underside of leaf	Image 82
83.	Salticidae	<i>Marpissa</i> sp.	1F	ZOL-14-ARA-156	Collected from the lower vegetation by handpick method	Image 83
84.	Salticidae	<i>Menemerus bivittatus</i> (Dufour, 1831)	1F, 1M	ZOL-12-ARA-37 ZOL-12-ARA-38	Found underside of leaf	Image 84
85.	Salticidae	<i>Myrmarchne tristis</i> (Simon, 1882)	1F, 1M	ZOL-13-ARA-93 ZOL-13-ARA-94	Found underside of leaf	Image 85
86.	Salticidae	<i>Myrmarchne</i> sp.	1F	ZOL-12-ARA-39	Collected from its retreat constructed in a rolled leaf	Image 86
87.	Salticidae	<i>Phintella vittata</i> (C.L. Koch, 1846)	3F, 1M	ZOL-12-ARA-40 ZOL-13-ARA-95 ZOL-13-ARA-96 ZOL-12-ARA-41	Found underside of leaf	Image 87
88.	Salticidae	<i>Plexippus paykulli</i> (Audouin, 1826)	1F, 1M	ZOL-13-ARA-97 ZOL-13-ARA-98	Found wandering on the walls of huts in the village	Image 88
89.	Salticidae	<i>Plexippus petersi</i> (Karsch, 1878)	1F, 1M	ZOL-14-ARA-157 ZOL-13-ARA-99	Found wandering on the walls of huts in the village	Image 89
90.	Salticidae	<i>Portia</i> sp.	1M	ZOL-15-ARA-194	Observed wandering on the ground within the leaf litter	Image 90
91.	Salticidae	<i>Rhene albigena</i> (C.L. Koch, 1846)	1M	ZOL-15-ARA-195	Found underside of leaf	Image 91
92.	Salticidae	<i>Stenaelurillus</i> sp.	1F, 1M	ZOL-14-ARA-158 ZOL-14-ARA-159	Collected wandering on the ground and in the dry leaf litter	Image 92
93.	Salticidae	<i>Telamonia dimidiata</i> (Simon, 1899)	2F, 1M	ZOL-12-ARA-42 ZOL-13-ARA-100 ZOL-12-ARA-43	Found underside of leaf	Image 93

Family	Scientific name	No. of specimens collected & sex	Voucher no. 12,13,14,15	Natural history notes	Image no.
94. Salticidae	<i>Thyene imperialis</i> (Rossi, 1846)	2F, 2M	ZOL-12-ARA-44 ZOL-13-ARA-101 ZOL-12-ARA-45 ZOL-13-ARA-102	Found underside of leaf	Image 94
95. Scytodidae	<i>Scytodes fusca</i> Walckenaer, 1837	2F	ZOL-13-ARA-103 ZOL-13-ARA-104	Found underside of leaf	Image 95
96. Scytodidae	<i>Scytodes pallida</i> Doleschall, 1859	1F	ZOL-14-ARA-160	Found inside the folded leaf probably resting during day time	Image 96
97. Scytodidae	<i>Scytodes thoracica</i> (Latreille, 1802)	1F	ZOL-15-ARA-196	Found inside the folded leaf probably resting during day time	Image 97
98. Scytodidae	<i>Scytodes</i> sp.	1F	ZOL-15-ARA-197	Found underside of leaf	Image 98
99. Sicariidae	<i>Loxosceles rufescens</i> (Dufour, 1820)	2F, 1M	ZOL-13-ARA-105 ZOL-13-ARA-106 ZOL-14-ARA-161	Collected from the leaf litter and also from its web constructed in the crevices of mines walls	Image 99
100. Sparassidae	<i>Heteropoda bhaikakal</i> Patel & Patel, 1973	1F	ZOL-12-ARA-46	Collected from the inner & outer walls of huts in the village, also seen in the leaf litter of <i>Tectona grandis</i>	Image 100
101. Sparassidae	<i>Heteropoda venatoria</i> (Linnaeus, 1767)	1F	ZOL-12-ARA-47	Collected from the outer walls of huts in the village, also seen in the leaf litter of <i>Tectona grandis</i>	Image 101
102. Sparassidae	<i>Olios bhavnagarensis</i> Sethi & Tikader, 1988	1F	ZOL-13-ARA-107	Collected from the underside of leaf	Image 102
103. Sparassidae	<i>Olios graveyi</i> Sethi & Tikader, 1988	1F	ZOL-13-ARA-108	Collected from the underside of leaf	Image 103
104. Sparassidae	<i>Olios milleti</i> (Pocock, 1901)	1F	ZOL-12-ARA-48	Collected from the folded leaf	Image 104
105. Sparassidae	<i>Olios wroughtoni</i> (Simon, 1897)	1M	ZOL-12-ARA-49	Collected from the underside of leaf	Image 105
106. Sparassidae	<i>Olios</i> sp.	1F	ZOL-12-ARA-50	Collected from the underside of leaf	Image 106
107. Stenochilidae	<i>Stenochilus hobsoni</i> O. Pickard-Cambridge, 1871	1M	ZOL-15-ARA-198	Collected by pitfall method. Probably inhabits in leaf litter	Image 107
108. Tetragnathidae	<i>Guizygiella indica</i> (Tikader & Bal, 1980)	1F, 1M	ZOL-13-ARA-109 ZOL-13-ARA-110	Collected from its orb web constructed between lower branches of tree	Image 108
109. Tetragnathidae	<i>Guizygiella melanocrania</i> (Thorell, 1887)	2F, 1M	ZOL-13-ARA-111 ZOL-14-ARA-162 ZOL-14-ARA-163	Collected from its orb web constructed between lower branches of tree	Image 109
110. Tetragnathidae	<i>Guizygiella shivui</i> (Patel & Reddy, 1990)	2F, 1M	ZOL-13-ARA-112 ZOL-13-ARA-113 ZOL-13-ARA-114	Collected from its orb web constructed between lower branches of tree	Image 110
111. Tetragnathidae	<i>Leucauge decorata</i> (Blackwall, 1864)	3F, 1M	ZOL-12-ARA-51 ZOL-12-ARA-52 ZOL-12-ARA-53	Collected from its web near the water stream	Image 111
112. Tetragnathidae	<i>Tetragnatha extensa</i> (Linnaeus, 1758)	1F, 1M	ZOL-12-ARA-54 ZOL-12-ARA-55	Found resting on the leaves of lower branches of <i>Pongamia pinnata</i> tree near water stream	Image 112
113. Tetragnathidae	<i>Tetragnatha mandibulata</i> Walckenaer, 1841	2F, 1M	ZOL-12-ARA-56 ZOL-13-ARA-115 ZOL-13-ARA-116	Found resting on the leaves of lower branches of <i>Pongamia pinnata</i> tree near water stream	Image 113
114. Tetragnathidae	<i>Tetragnatha maxillosa</i> Thorell, 1895	1F, 1M	ZOL-14-ARA-164 ZOL-14-ARA-165	Found resting on the leaves of lower branches of <i>Pongamia pinnata</i> tree near water stream	Image 114
115. Tetragnathidae	<i>Tylorida ventralis</i> (Thorell, 1877)	1F, 1M	ZOL-14-ARA-166 ZOL-14-ARA-167	Found resting at the periphery of streams on twigs of plants with their legs stretched longitudinally	Image 115



Family	Scientific name	No. of specimens collected & sex	Voucher no. 12, 13, 14, 15	Natural history notes	Image no.
Theridiidae	<i>Argyrodes argentatus</i> O. Pickard-Cambridge, 1880	1F, 1M	ZOL-13-ARA-117 ZOL-13-ARA-118	Observed hanging on a single strand of silk attached to nearby vegetation or twigs	Image 116
Theridiidae	<i>Cephalobares</i> sp.	3F, 1M	WILD-14-ARA-1299, WILD-14-ARA-1300, WILD-14-ARA-1301, WILD-14-ARA-1298	Collected from the web of <i>Guizygiella shivui</i> . kleptoparasitic	Image 117
Theridiidae	<i>Coleosoma blandum</i> O. Pickard-Cambridge, 1882	1M	ZOL-12-ARA-57	Collected from the base of dried palm tree leaf by handpick method	Image 118
Theridiidae	<i>Euryopsis</i> sp.	1F	ZOL-15-ARA-199	Observed hanging by a single strand of silk attached to the leaves/branch of tree from both the sides	Image 119
Theridiidae	<i>Latrodectus hasselti</i> Thorell, 1870	1F	ZOL-14-ARA-168	Collected from the underside of rock by uplifting it. Female was observed guarding the egg-sac	Image 120
Theridiidae	<i>Meotipa picturata</i> Simon, 1895	1F	ZOL-14-ARA-169	Observed hanging on a single strand of silk attached to the leaves/branch of tree from both the sides	Image 121
Theridiidae	<i>Nihonhimea mundula</i> (L. Koch, 1872)	3F	ZOL-12-ARA-58 ZOL-13-ARA-119 ZOL-14-ARA-170	Collected from mesh web. In which it was resting in the conical shaped folded dry leaf	Image 122
Theridiidae	<i>Rhomphaea projiciens</i> O. Pickard-Cambridge, 1896	2F, 1M	ZOL-12-ARA-59 ZOL-13-ARA-120 ZOL-13-ARA-121	Mostly seen hanging on a single strand of silk attached from both the sides on either leaf/branch of tree/shrub	Image 123
Theridiidae	<i>Steatoda</i> sp.	1F	ZOL-15-ARA-200	Found in the crevices and holes of the trees	Image 124
Theridiidae	<i>Yaginumena maculosa</i> (Yoshida & Ono, 2000)	1M	ZOL-15-ARA-201	Collected from small untidy mesh web constructed underside of large leaves	Image 125
Thomisidae	<i>Amicycia forticeps</i> (O. Pickard-Cambridge, 1873)	2F, 1M	ZOL-14-ARA-171 ZOL-14-ARA-172 ZOL-15-ARA-202	Collected from the trail of red weaver ants on tree branches. They were also observed feeding on these ants	Image 126
Thomisidae	<i>Camarcus</i> sp.	1F	ZOL-13-ARA-122	Collected from the lower foliage by handpick method	Image 127
Thomisidae	<i>Indoxysticus minutus</i> (Tikader, 1960)	1F	ZOL-13-ARA-123	Found on lower branches of tree, fully camouflaged with the background	Image 128
Thomisidae	<i>Runcinia</i> sp.	1F	ZOL-15-ARA-203	Collected from the underside of leaf	Image 129
Thomisidae	<i>Thomisus</i> sp.	1F	ZOL-13-ARA-124	Found on and underside of lower foliage/shrubs	Image 130
Titanoecidae	<i>Pandava</i> sp.	2F, 1M	WILD-14-ARA-1268, WILD-14-ARA-1269, WILD-14-ARA-1267	Collected from the underside of loose barks of tree and can be easily located by the outline of cribellate silk at the periphery of loose bark	Image 131
Uloboridae	<i>Micragrammopes</i> sp.	1J	ZOL-15-ARA-204	Collected from leaf litter by handpick method	Image 132
Uloboridae	<i>Uloborus danaluis</i> Tikader, 1969	1F	ZOL-15-ARA-205	Collected from its web constructed in between dry twigs	Image 133
Uloboridae	<i>Uloborus krishnae</i> Tikader, 1970	1F	ZOL-15-ARA-206	Observed resting underside of the leaf in its web	Image 134
Uloboridae	<i>Uloborus</i> sp.	1F	ZOL-14-ARA-173	Found hanging on a single strand of silk attached underside of leaf	Image 135
Uloboridae	<i>Zosis cf. geniculata</i> (Olivier, 1789)	1J	ZOL-15-ARA-207	Collected from its web constructed attached to the walls of mines	Image 136
Zodariidae	<i>Storena gujaratensis</i> Tikader & Patel, 1975	1M	ZOL-12-ARA-60	Leaf litter dwelling spider; collected by pitfall method	Image 137
Zodariidae	<i>Storena</i> sp.	1F	ZOL-15-ARA-208	Leaf litter dwelling spider; collected by pitfall method	Image 138

ARA—Araneae | F—female | J—Juvenile | M—male | WILD—Wildlife Information Liaison Development Society | ZOL—Zoology

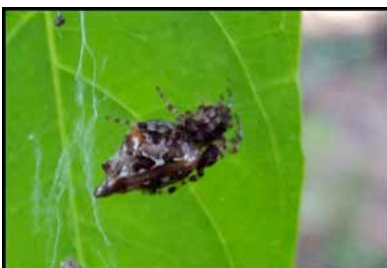
Image 1. *Araneus mitificus*Image 2. *Argiope aemula*Image 3. *Argiope anasuja*Image 4. *Chorizopes* sp.Image 5. *Cyclosa confragra*Image 6. *C. hexatuberculata*Image 7. *Cyclosa moonduensis*Image 8. *Cyclosa spirifera*Image 9. *Cyrtophora cicatrosa*Image 10. *Cyrtophora citricola*Image 11. *Eriovixia excelsa*Image 12. *Eriovixia laglaizei*Image 13. *Eriovixia poonaensis*Image 14. *Gasteracantha kuhli*Image 15. *Gea subarmata*

Image 16. *Larinia chloris*Image 17. *Lipocrea fusiformis*Image 18. *Neoscona mukerjei*Image 19. *Neoscona nautica*Image 20. *Neoscona theisi*Image 21. *Neoscona vigilans*Image 22. *Poltys bhabanii*Image 23. *Poltys cf columnaris*Image 24. *Poltys nagpurensis*Image 25. *Singa* sp.Image 26. *Thelacantha brevispina*Image 27. *Clubiona drassodes*Image 28. *Clubiona filicata*Image 29. *Clubiona foliata*Image 30. *Clubiona pashabhail*

Image 31. *Castianeira zetes*Image 32. *Ctenus narashinhai*Image 33. *Stegodyphus pacificus*Image 34. *Stegodyphus sarasinorum*Image 35. *Cheiracanthium inornatum*Image 36. *C. melanostomum*Image 37. *Cheiracanthium triviale*Image 38. *Cheiracanthium* sp.Image 39. *Drassodes* sp.40. *Haplodrassus* sp.Image 41. *Megamyrmæcion ashae*Image 42. *Scopoides kuljitae*Image 43. *Scopoides* sp.Image 44. *Trachyzelotes jaxartensis*Image 45. *Zelotes mandae*

Image 46. *Hersilia savignyi*Image 47. *Murricia hyderabadensis*Image 48. *Oedignatha* sp.Image 49. *Evippa* sp.Image 50. *Hippasa lycosina*Image 51. *Lycosa poonaensis*Image 52. *Lycosa* sp.Image 53. *Pardosa birmanica*Image 54. *Pardosa sumatrana*Image 55. *Oecobius putus*Image 56. *Brignolia* sp.

Image 57. Unidentified sp. 1

Image 58. *Hamadruas sikkimensis*Image 59. *Oxyopes ashae*Image 60. *Oxyopes bhataratae*

Image 61. *Oxyopes birmanicus*Image 62. *Oxyopes pankaji*Image 63. *Oxyopes* sp.Image 64. *Peucetia akwadaensis*Image 65. *Peucetia viridana*Image 66. *Peucetia yogeshi*Image 67. *Peucetia* sp.

Image 68. Unidentified sp. 2 (Palpimanidae)

Image 69. *Tibellus elongates*Image 70. *Crossopriza lyoni*Image 71. *Pholcus fragillimus*Image 72. *Pholcus phalangioides*Image 73. *Hygropoda* cf. *mahendriensis*Image 74. *Nilus phipsoni*Image 75. *Perenethis venusta*

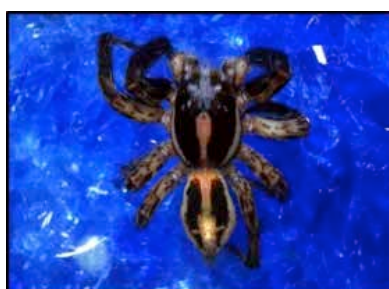
Image 76. *Pisaura podilensis*Image 77. *Prodidomus* sp.Image 78. *Epocilla* sp.Image 79. *Harmochirus brachiatus*Image 80. *Hasarius adansoni*Image 81. *Hyllus semicupreus*Image 82. *Marpissa tigrina*Image 83. *Marpissa* sp.Image 84. *Menemerus bivittatus*Image 85. *Myrmarachne tristis*Image 86. *Myrmarachne* sp.Image 87. *Phintella vittata*Image 88. *Plexippus paykulli*Image 89. *Plexippus petersi*Image 90. *Portia* sp.

Image 91. *Rhene albiger a*Image 92. *Stenaelurillus* sp.Image 93. *Telamonia dimidiata*Image 94. *Thyene imperialis*Image 95. *Scytodes fusca*Image 96. *Scytodes pallida*Image 97. *Scytodes thoracica*Image 98. *Scytodes* sp.Image 99. *Loxosceles rufescens*Image 100. *Heteropoda bhaikakai*Image 101. *Heteropoda venatoria*Image 102. *Olios bhavnagarensis*Image 103. *Olios gravellyi*Image. 104. *Olios milleti*Image 105. *Olios wroughtoni*

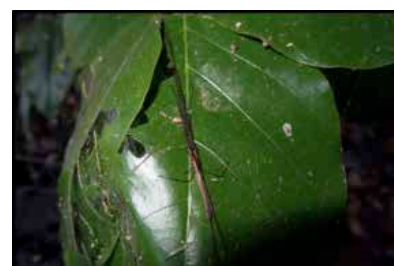
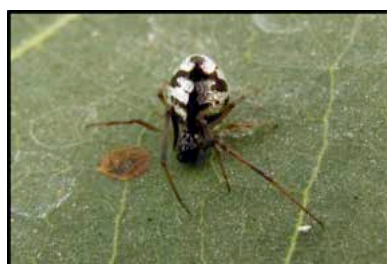
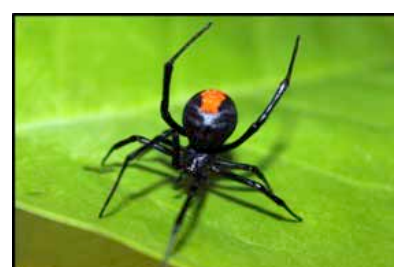
Image 106. *Olios* sp.Image 107. *Stenochilus hobsoni*Image. 108. *Guizygiella indica*Image 109. *Guizygiella melanocrania*Image 110. *Guizygiella shivui*Image 111. *Leucauge decorata*Image 112. *Tetragnatha extensa*Image 113. *Tetragnatha mandibulata*Image 114. *Tetragnatha maxillosa*Image 115. *Tylorida ventralis*Image 116. *Argyrodes argentatus*Image 117. *Cephalobares* sp.Image 118. *Coleosoma blandum*Image 119. *Euryopis* sp.Image 120. *Latrodectus hasseltii*

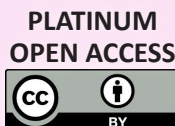
Image 121. *Meotipa picturata*Image 122. *Nihonhimea mundula*Image 123. *Rhomphaea projiciens*Image 124. *Steatoda* spImage 125. *Yaginumena maculosa*Image 126. *Amyciaea forticeps*Image 127. *Camaricus* sp.Image 128. *Indoxysticus minutes*Image 129. *Runcinia* sp.Image 130. *Thomisus* sp.Image 131. *Pandava* sp.Image 132. *Miagrammopes* sp.Image 133. *Uloborus danolius*Image 134. *Uloborus* sp.Image 135. *Uloborus* sp.

Image 136. *Zosis cf. geniculata*Image 137. *Storena gujaratensis*Image 138. *Storena* sp.

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Article

Use of an embedded fruit by Nicobar Long-tailed Macaque *Macaca fascicularis umbrosus*: II. Demographic influences on choices of coconuts *Cocos nucifera* and pattern of forays to palm plantations

– Sayantan Das, Rebekah C. David, Ashvita Anand, Saurav Harikumar, Rubina Rajan & Mewa Singh, Pp. 16407–16423

Communications

Habitat preference and current distribution of Chinese Pangolin (*Manis pentadactyla* L. 1758) in Dorokha Dungkhag, Samtse, southern Bhutan

– Dago Dorji, Jambay, Ju Lian Chong & Tshering Dorji, Pp. 16424–16433

A checklist of mammals with historical records from Darjeeling-Sikkim Himalaya landscape, India

– Thangsuanlian Naulak & Sunita Pradhan, Pp. 16434–16459

Golden Jackal *Canis aureus* Linnaeus, 1758 (Mammalia: Carnivora: Canidae) distribution pattern and feeding at Point Calimere Wildlife Sanctuary, India

– Nagarajan Baskaran, Ganesan Karthikeyan & Kamaraj Ramkumaran, Pp. 16460–16468

Suppression of ovarian activity in a captive African Lion *Panthera leo* after deslorelin treatment

– Daniela Paes de Almeida Ferreira Braga, Cristiane Schilbach Pizzutto, Derek Andrew Rosenfield, Priscila Viau Furtado, Cláudio A. Oliveira, Sandra Helena Ramiro Corrêa, Pedro Nacib Jorge-Neto & Marcelo Alcindo de Barros Vaz Guimarães, Pp. 16469–16477

Spatial aggregation and specificity of incidents with wildlife make tea plantations in southern India potential buffers with protected areas

– Tamanna Kalam, Tejesvini A. Puttaveeraswamy, Rajeev K. Srivastava, Jean-Philippe Puyravaud & Priya Davidar, Pp. 16478–16493

Innovative way of human-elephant competition mitigation

– Sanjit Kumar Saha, Pp. 16494–16501

New locality records and call description of the Resplendent Shrub Frog *Raorchestes resplendens* (Amphibia: Anura: Rhacophoridae) from the Western Ghats, India

– Sandeep Das, K.P. Rajkumar, K.A. Sreejith, M. Royaltata & P.S. Easa, Pp. 16502–16509

First record of a morphologically abnormal and highly metal-contaminated Spotback Skate *Atlantoraja castelnaui* (Rajiformes: Arhynchobatidae) from southeastern Rio de Janeiro, Brazil

– Rachel Ann Hauser-Davis, Márcio L.V. Barbosa-Filho, Lucia Helena S. de S. Pereira, Catarina A. Lopes, Sérgio C. Moreira, Rafael C.C. Rocha, Tatiana D. Saint’Pierre, Paula Baldassin & Salvatore Siciliano, Pp. 16510–16520

Butterfly diversity in an organic tea estate of Darjeeling Hills, eastern Himalaya, India

– Aditya Pradhan & Sarala Khaling, Pp. 16521–16530

Freshwater decapods (Crustacea: Decapoda) of Palair Reservoir, Telangana, India

– Sudipta Mandal, Deepa Jaiswal, A. Narahari & C. Shiva Shankar, Pp. 16531–16547

Diversity and distribution of figs in Tripura with four new additional records

– Smita Debbarma, Biplab Banik, Biswajit Baishnab, B.K. Datta & Koushik Majumdar, Pp. 16548–16570

Short Communications

Open garbage dumps near protected areas in Uttarakhand: an emerging threat to Asian Elephants in the Shivalik Elephant Reserve

– Kanchan Puri, Ritesh Joshi & Vaibhav Singh, Pp. 16571–16575

A preliminary checklist of spiders (Araneae: Arachnida) in Jambughoda Wildlife Sanctuary, Panchmahal District, Gujarat, India

– Reshma Solanki, Manju Siliwal & Dolly Kumar, Pp. 16576–16596

Preliminary checklist of spider fauna (Araneae: Arachnida) of Chandranath Hill, Goa, India

– Rupali Pandit & Mangirish Dharwadkar, Pp. 16597–16606

Butterfly (Lepidoptera: Rhopalocera) fauna of Jabalpur City, Madhya Pradesh, India

– Jagat S. Flora, Ashish D. Tiple, Ashok Sengupta & Sonali V. Padwad, Pp. 16607–16613

Evaluating threats and conservation status of South African *Aloe*

– Samuel O. Bamigboye, Pp. 16614–16619

Notes

The first record of Montagu’s Harrier *Circus pygargus* (Aves: Accipitridae) in West Bengal, India

– Suman Pratihari & Niloy Mandal, Pp. 16620–16621

An account of snake specimens in St. Joseph’s College Museum Kozhikode, India, with data on species diversity

– V.J. Zacharias & Bobby Jose, Pp. 16622–16627

Notes on the occurrence of a rare pufferfish, *Chelonodontops leopardus* (Day, 1878) (Tetraodontiformes: Tetraodontidae), in the freshwaters of Payaswini River, Karnataka, India

– Priyanka Chakraborty, Subhrendu Sekhar Mishra & Kranti Yardi, Pp. 16628–16631

New records of hoverflies of the genus *Volucella* Geoffroy (Diptera: Syrphidae) from Pakistan along with a checklist of known species

– Muhammad Asghar Hassan, Imran Bodlah, Anjum Shehzad & Noor Fatima, Pp. 16632–16635

A new species of *Dillenia* (Angiosperms: Dilleniaceae) from the Eastern Ghats of Andhra Pradesh, India

– J. Swamy, L. Rasingam, S. Nagaraju & Pooja R. Mane, Pp. 16636–16640

Reinstatement of *Pimpinella katrajensis* R.S.Rao & Hemadri (Apiaceae), an endemic species to Maharashtra with notes on its taxonomy and distribution

– S.M. Deshpande, S.D. Kulkarni, R.B. More & K.V.C. Gosavi, Pp. 16641–16643

***Puccinia duthiei* Ellis & Tracy: a new host record on *Chrysopogon velutinus* from India**

– Suhas Kundlik Kamble, Pp. 16644–16646

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