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SHORT COMMUNICATION

SPIDERS (ARACHNIDA: ARANEAE) OF GUJARAT UNIVERSITY CAMPUS, AHMEDABAD, INDIA WITH ADDITIONAL DESCRIPTION OF *EILICA TIKADERI* (PLATNICK, 1976)

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Spiders (Arachnida: Araneae) of Gujarat University Campus, Ahmedabad, India with additional description of *Eilica tikaderi* (Platnick, 1976)

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Abstract: We report a checklist of spiders based on a survey made from August 2013 to July 2014 in Gujarat University Campus, an urban area located in the middle of Ahmadabad City, Gujarat State. A total of 77 species of spiders belonging to 53 genera and 20 families of spiders were recorded from the study area represented by 31.74% of the total 63 families reported from India. Salticidae was found to be the most dominant family with 18 species from 14 genera. Guild structure analysis revealed six feeding guilds, namely stalkers, orb-web builders, space-web builders, ambushers, foliage hunters and ground runners. Stalkers and orb-web builders were the most dominant feeding guilds representing 28.58% and 20.78% respectively among all studied guilds. Species *Eilica tikaderi* (Platnick, 1976) is reported for the first time from Gujarat with additional description and detailed genitalic illustrations.

Keywords: Gujarat University Campus, guild structure, Spiders, Taxonomy.

Members of the class Arachnida are distributed in diverse habitats. Most spiders feed on insects (an abundant life form on terrestrial habitat), hence, making them a very important member in the terrestrial food chain. Some of the studies (Patel & Patel 2001; Patel 2003; Siliwal et al. 2003; Patel et al. 2012) have been carried out in the protected areas of Gujarat for the diversity of spiders; however, there is a paucity of data on spider fauna of urban areas. Likewise, no data are available for spider diversity from Ahmedabad City of Gujarat State, India. Gujarat University Campus, located in the middle of Ahmedabad City, one of the fast developing cities of India, is abundant with woody vegetation and avian diversity (Jain et al. 2005). There are slow but gradual alterations of woody and semiarid micro-habitats in the study area because of an increase in vehicular traffic, establishment of new buildings, roads and other infrastructure. To understand the impact of such alterations on the diversity of spiders, baseline information is critically required. Therefore, the present study was carried out and this study is a first attempt to document the spider fauna of Gujarat University campus.

The gnaphosid spider *Eilica tikaderi* (Platnick, 1976)

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was described by Platnick with only the female sex, later Platnick & Shadab (1981) described the male of *E. tikaderi* with only palpal illustrations. Tikader (1982) reported it without proper description of its male sex organ. Till date this species was known only from three states of India: Maharastra, Karnataka and West Bengal. In this paper we have reported *E. tikaderi* from Gujarat University Campus and its male is redescribed in detail for the first time.

Materials and Methods

Study area: Gujarat University Campus (GUC; 23°2'5"N–23°2'25"N & 72°32'22"E–72°32'56"E) is situated in Ahmedabad City which is part of central Gujarat State in western India (Fig. 1). The total study area of Gujarat University Campus is spread over 32.69 hectares. Biogeographically, the area falls in biotic province 4B - Gujarat Rajputana of 4-semi-arid zone (Rodgers & Panwar 1988). GUC has rich vegetation comprising 215 species of 171 genera belonging to 63 families (Jain et al. 2005). The study area consists of different types of micro-habitat patches, viz., garden (mostly covered with grassland and having a few flowering shrubs and trees), woody areas (highly vegetated area and mostly covered with trees), semi-arid (area with thorny shrubs along with grasses), urban (areas like road and parking where continuous human activities are observed) and houses (inside the buildings) for this study. Comparatively, the shrub covered patches are more, whereas, woody patches are less in GUC.

Methods: The present study was carried out for one year, from August 2013 to July 2014. Spiders were collected from the whole study area by visual searching. Stones and logs were also upturned and searched carefully for the presence of spider. Live specimens were photographed using a Sony HX100V™ camera, preserved in 70% ethyl alcohol and examined using a Magnüs MSZ-Bi stereo-zoom microscope. Dissected body parts (chelicerae and legs if needed as well as pedipalp of male and female genitalia) were photographed under a Leica M205 stereomicroscope equipped with a DFC2900 digital camera and the software package Leica Application Suite (LAS), Version 4.5.0. Adult spiders were identified up to species level and juvenile spiders were identified up to generic level with the help of available literature (Chamberlin & Gertsch 1958; Tikader 1970, 1975, 1980, 1982, 1987; Tikader & Malhotra 1980; Pocock 1900; Jocqué 1991; Majumder & Tikader 1991; Proszynski 2003; Benjamin 2004; Gajbe 2008; Eichenberger et al. 2012; Sebastian & Peter 2012; Proszynski's Salticidae of the World 2016).

Results and Discussion

Spiders belonging to 20 families, 53 genera and 77 species were recorded from GUC (Tables 1 & 2) during the study period. It represents 31.74% of the total 63 families reported from India (World Spider Catalog 2016). Also, seven species, viz., *Eilica tikaderi* (Platnick, 1976), *Hippasa loundesi* (Gravely, 1924), *Pardosa mukundi* (Tikader & Malhotra, 1980), *Pardosa mysorensis* (Tikader & Mukerji, 1971), *Thomisus pugilis* (Stoliczka, 1869), *Indoxysticus minutus* (Ono, 1980) and *Oxytate elongata* (Tikader, 1980), collected from Gujarat University Campus are endemic to India (World Spider Catalog 2016). Salticidae family has the maximum members with 18 species of 14 genera which is followed

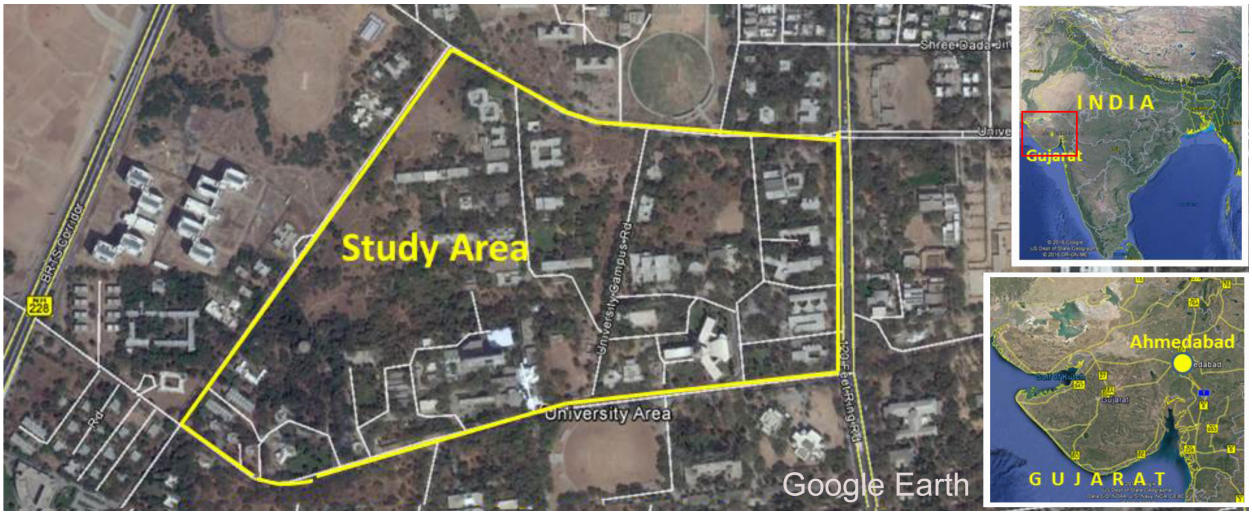

Figure 1. Study area - Gujarat University campus, Ahmedabad.

Table 1. Families, genera, species and functional guilds of spiders collected from Gujarat University Campus area.

	Family	Number of genera	Number of species	Guild
1	Salticidae	14	18	Stalkers
2	Araneidae	7	12	Orb-web builders
3	Thomsidae	5	9	Ambushers
4	Lycocidae	3	6	Ground runners
5	Theridiidae	4	5	space-web builders
6	Sparassidae	2	4	Foliage hunters
7	Oxyopidae	2	4	Stalkers
8	Uloboridae	1	3	Orb-web builders
9	Pholcidae	3	3	space-web builders
10	Hersiliidae	1	2	Foliage hunters
11	Zodariidae	2	2	Ground runners
12	Tetragnathidae	1	1	Orb-web builders
13	Gnaphosidae	1	1	Ground runners
14	Dictynidae	1	1	Foliage hunters
15	Corinnidae	1	1	Ground runners
16	Clubionidae	1	1	Foliage hunters
17	Eutichuridae	1	1	Foliage hunters
18	Onopidae	1	1	Ground runners
19	Oecobiide	1	1	Space web builder
20	Scytodidae	1	1	Foliage hunters

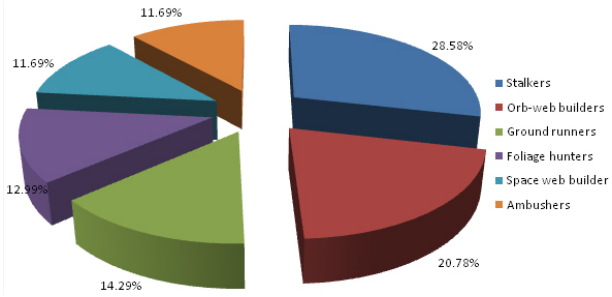

Figure 2. Distribution of spiders collected from Gujarat University Campus area according to guild structure

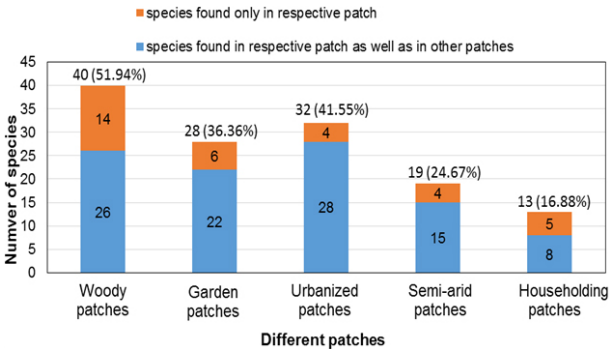

Figure 3. Number of species observed in different micro habitat patches of study area. Numbers in parenthesis indicate the percentage of total number of species found in the respective patch

by Araneidae family representing 12 species from seven genera. Guild structure analysis (Uetz et al. 1999) revealed six feeding guilds: stalkers, orb-web builders, space-web builders, ambushers, foliage hunters and ground runners (Table 1). Stalkers constituted the dominant feeding guild representing 28.58% of the total sample collected. Space-web builders and ambushers (both 11.69%) were the lowest selected feeding guild observed in the study area (Fig. 2).

Out of a total 77 species, 33 species are habitat specific and found only in a single micro-habitat patch. Among them 14 species namely *Bianor* sp., *Cyclosa confraga* (Thorell, 1892), *Cyclosa* sp., *Thelacantha brevispina* (Doleschall, 1857), *Tmarus* sp., *Oxytate elongata* (Tikader, 1980), *Zodariidae un id.* sp. *(juvenile)*, *Asceua* sp., *Pardosa mysorensis* (Tikader & Mukerji, 1971), *Xestaspis* sp., *Rhomphaea* sp.1, *Rhomphaea* sp.2, *Uloborus* sp.1 and *Uloborus* sp.2 were found only in woody patches; *Phintella vittata* (C.L. Koch, 1846), *Phintella* sp., *Epeus* sp., *Marengo* sp., *Cyclosa spirifera* (Simon, 1889), *Thomisus* sp.1 found only in garden patches; *Neoscona mukerjei* (Tikader, 1980), *Indoxysticus minutus* (Ono, 1980), *Indoxysticus* sp. and *Heteropoda* sp.2 only in urbanized patches, *Cyclosa hexatuberculata* (Tikader, 1982), *Runcinia insecta* (Simon, 1897), *Pardosa mukundi* (Tikader & Malhotra, 1980) and *Hippasa loundesi* (Gravely, 1924) only in semi-arid patches; and *Oecobius* sp., *Scytodes* sp., *Artema* sp., *Heteropoda venatoria* (Linnaeus, 1767) and *Theridion* sp. only in houses (Fig. 3; Table 2).

The diversity of spider indicates the presence of its associates especially insects. Insects are the main prey base for spiders as well as for many other higher fauna such as birds and reptiles (Sebastian & Peter 2012). Woody patches in GUC are gradually decreasing due to construction of new buildings and infrastructure. Anthropological activities like construction of new roads and parking for vehicles can cause habitat loss and threat to the current diversity of spider species in the study area. The same habitat is shared by other faunal groups such as birds, arboreal mammals and reptiles. Therefore, such alteration of the habitats in GUC should be carried out only after proper environment impact assessment study.

Amongst 77 species, one species *Eilica tikaderi* (Platnick, 1976) is recorded for the first time in Gujarat

Table 2. Checklist of spiders present in different microhabitats types in study area. (+ = Present; - = Absent).

Registration No.	Species Name	Micro-Habitat Patches				
		Woody patch	Garden areas	Urbanized area	Semi-arid patches	House holds
Family: Araneidae						
GUZ 21	*Araneus mitificus* (Simon, 1886)	-	+	-	+	-
GUZ 22	*Argiope anasuja* (Thorell, 1887)	+	+	+	+	-
GUZ 24	*Cyclosa confraga* (Thorell, 1892)	+	-	-	-	-
GUZ 25	*Cyclosa hexatuberculata* (Tikader, 1982)	-	-	-	+	-
GUZ 23	*Cyclosa spirifera* (Simon, 1889)	-	+	-	-	-
GUZ 26	*Cyclosa sp.* (juvenile)	+	-	-	-	-
GUZ 28	*Cyrtophora cicatrosa* (Stoliczka, 1869)	+	+	+	-	-
GUZ 27	*Cyrtophora citricola* (Forsskål, 1775)	-	-	+	+	-
GUZ 29	*Eriovixia sp.* (juvenile)	+	+	-	-	-
GUZ 19	*Neoscona mukherjei* (Tikader, 1980)	-	-	+	-	-
GUZ 20	*Neoscona theisi* (Walckenaer, 1841)	+	-	-	+	-
GUZ 30	*Thelacantha brevispina* (Doleschall, 1857)	+	-	-	-	-
Family: Clubionidae						
GUZ 74	*Clubiona sp. (juvenile)*	+	-	+	-	-
Family: Corinnidae						
GUZ 71	*Castianeira sp.*	+	-	+	-	-
Family: Dictynidae						
GUZ 72	*Nigma sp. (juvenile)*	+	+	-	-	-
Family: Eutichuridae						
GUZ 75	*Cheiracanthium sp.*	+	+	-	+	-
Family: Gnaphosidae						
GUZ 70	*Eilica tikaderi* (Platnick, 1976)	-	-	+	-	+
Family: Hersiliidae						
GUZ 67	*Hersilia savignyi* (Lucas, 1836)	+	-	+	+	-
GUZ 68	*Hersilia sp.* (juvenile)	+	+	-	-	-
Family: Lycosidae						
GUZ 45	*Hippasa loundasi* (Gravely, 1924)	-	-	-	+	-
GUZ 40	*Lycosa sp.1* (juvenile)	+	-	+	-	-
GUZ 41	*Lycosa sp.2* (juvenile)	+	-	+	-	-
GUZ 42	*Lycosa sp.3* (juvenile)	+	+	-	-	-
GUZ 43	*Pardosa mukundi* (Tikader & Malhotra, 1980)	-	-	-	+	-
GUZ 44	*Pardosa mysorensis* (Tikader & Mukerji, 1971)	+	-	-	-	-
Family: Oecobiidae						
GUZ 76	*Oecobius sp.*	-	-	-	-	+
Family: Oonopidae						
GUZ 73	*Xestaspis sp.*	+	-	-	-	-
Family: Oxyopidae						
GUZ 55	*Oxyopes javanus* (Thorell, 1887)	-	+	+	+	-
GUZ 56	*Oxyopes sp.1* (juvenile)	-	+	-	+	-
GUZ 57	*Oxyopes sp.2*	-	+	+	+	-
GUZ 58	*Peucetia viridana* (Stoliczka, 1869)	+	-	-	+	-
Family: Pholcidae						
GUZ 62	*Crossopriza lyoni* (Blackwall, 1867)	-	+	+	-	+

Registration No.	Species Name	Micro-Habitat Patches				
		Woody patch	Garden areas	Urbanized area	Semi-arid patches	House holds
GUZ 63	*Pholcus sp.*	-	-	+	-	+
GUZ 64	*Artema sp.*	-	-	-	-	+
Family: Salticidae						
GUZ 4	*Aelurillus sp.*	+	+	-	-	-
GUZ 3	*Bianor sp.* (Juvenile)	+	-	-	-	-
GUZ 9	*Epeus sp.* (Juvenile)	-	+	-	-	-
GUZ 16	*Epocilla aurantiaca* (Simon, 1885)	-	+	+	-	-
GUZ 8	*Hasarius adansoni* (Audouin, 1826)	-	-	+	-	+
GUZ 2	*Hyllus semicuprius* (Simon, 1885)	+	+	+	-	-
GUZ 18	*Langona sp*.	+	-	-	+	-
GUZ 17	*Marengo sp*.	-	+	-	-	-
GUZ 15	*Menemerus bivittatus* (Dufour, 1831)	-	-	+	-	+
GUZ 11	*Myrmarachne melanocephala* (MacLeay, 1839)	+	-	+	-	-
GUZ 12	*Myrmarachne plataleoides* (O. Pickard-Cambridge, 1869)	-	+	+	-	-
GUZ 10	*Myrmarachne sp.* (juvenile)	+	+	+	-	-
GUZ 5	*Phintella vittata* (C. L. Koch, 1846)	-	+	-	-	-
GUZ 6	*Phintella sp.*	-	+	-	-	-
GUZ 13	*Plexippus paykulli* (Audouin, 1826)	-	-	+	-	+
GUZ 14	*Plexippus petersi* (Karsch, 1878)	-	-	+	-	+
GUZ 1	*Telamonia dimidiata* (Simon, 1899)	+	+	+	+	-
GUZ 7	*Thyene imperialis* (Rossi, 1846)	-	+	-	+	-
Family: Scytodidae						
GUZ 77	*Scytodes sp.*	-	-	-	-	+
Family: Sparassidae						
GUZ 53	*Heteropoda venatoria* (Linnaeus, 1767)	-	-	-	-	+
GUZ 54	*Heteropoda sp.*	-	-	+	-	-
GUZ 51	*Olios milleti* (Pocock, 1901)	+	-	+	+	-
GUZ 52	*Olios Sp.*(juvenile)	+	+	-	-	-
Family: Tetragnathidae						
GUZ 69	*Leucauge decorate* (Blackwall, 1864)	-	+	+	-	-
Family: Theridiidae						
GUZ 48	*Argyrodes sp.*	-	+	-	+	-
GUZ 46	*Parasteatoda mundula* (L. Koch, 1872)	+	-	+	+	-
GUZ 49	*Rhomphaea sp.1*	+	-	-	-	-
GUZ 50	*Rhomphaea sp.2*	+	-	-	-	-
GUZ 47	*Theridion sp.*	-	-	-	-	+
Family: Thomisidae						
GUZ 35	*Indoxysticus minutes* (Ono, 1980)	-	-	+	-	-
GUZ 36	*Indoxysticus sp.*	-	-	+	-	-
GUZ 38	*Oxytate elongate* (Tikader, 1980)	+	-	-	-	-
GUZ 37	*Oxytate sp.* (juvenile)	+	+	-	-	-
GUZ 34	*Runcinia insecta* (Simon, 1897)	-	-	-	+	-
GUZ 31	*Thomisus pugilis* (Stoliczka, 1869)	+	+	-	-	-
GUZ 32	*Thomisus sp.1*	-	+	-	-	-
GUZ 33	*Thomisus sp.2* (juvenile)	-	+	+	-	-
GUZ 39	*Tmarus sp.*	+	-	-	-	-

Registration No.	Species Name	Micro-Habitat Patches				
		Woody patch	Garden areas	Urbanized area	Semi-arid patches	House holds
Family: Uloboridae						
GUZ 59	*Uloborus plumipes* (Lucas, 1846)	+	-	+	-	+
GUZ 60	*Uloborus sp.1*	+	-	-	-	-
GUZ 61	*Uloborus sp.2*	+	-	-	-	-
Family: Zodariidae						
GUZ 66	*Asceua sp.*	+	-	-	-	-
GUZ 65	*Zodariidae un id. sp.* (juvenile)	+	-	-	-	-

State.

Taxonomy

Gnaphosidae Pocock, 1898

Eilica tikaderi (Platnick, 1976)

(Image 1A–F, Fig. 4A–B)

Diagnosis: The genus *Eilica* can be distinguished from other all genera of the family Gnaphosidae by two or three laminae on the cheliceral retromargin (Image 1B). The females of *E. tikaderi* can be easily distinguished from all other *Eilica* species by "V-shaped" mark on the epigyne (Image 1C), the basal spermathecal ducts being divided into globose median and tubular lateral portions (Image 1D). Males can be easily distinguished by disto-retrolaterally directed spur of embolic base, the embolic tip lies far away from cymbium, shape and position of median apophysis (Image 1E–F; Fig. 4A–B).

Female (Image 1A–D): Cephalothorax oval, reddish-brown in colour, having small longitudinal fovia with dark reticulation. Chelicerae brown, with two laminae on retromargin. Endites with scopule. Sternum oval, light brown in colour. Legs brown in colour. Abdomen grey with light brown striation. Anterior spinnerets widely separated. Body length 6.21mm. Prosoma length 2.61mm, width 2.28mm. Opisthosoma length 3.6mm, width 2.82mm. Femur II 1.76mm. Eye diameters: AME 0.11mm, ALE 0.15mm, PME 0.13mm, PLE 0.15mm; eye inter-distances: AME-AME 0.11mm, AME-ALE 0.03mm, PME-PME 0.14mm, PME-PLE 0.11mm, ALE-PLE 0.12mm. Epigynum (Image 1C–D): Epigynum with horizontal 'bow-shaped' anterior margin, ventrally having "V-shaped" mark, but incomplete at the base (Image 1C). Spermathecae with basal ducts divided into wide median and narrow lateral portions, small dorsal lobe, and large ventral lobe (Image 1D).

Male (Image 1E–F, Fig. 4A–B): All details similar to the female except the following: Cephalothorax pear-shaped, brown in colour. Femora darker than other leg segments. Chelicerae light brown. Body length 3.13mm. Prosoma length 1.76mm, width 1.16mm. Opisthosoma length 1.37mm, width 1.02mm. Femur II

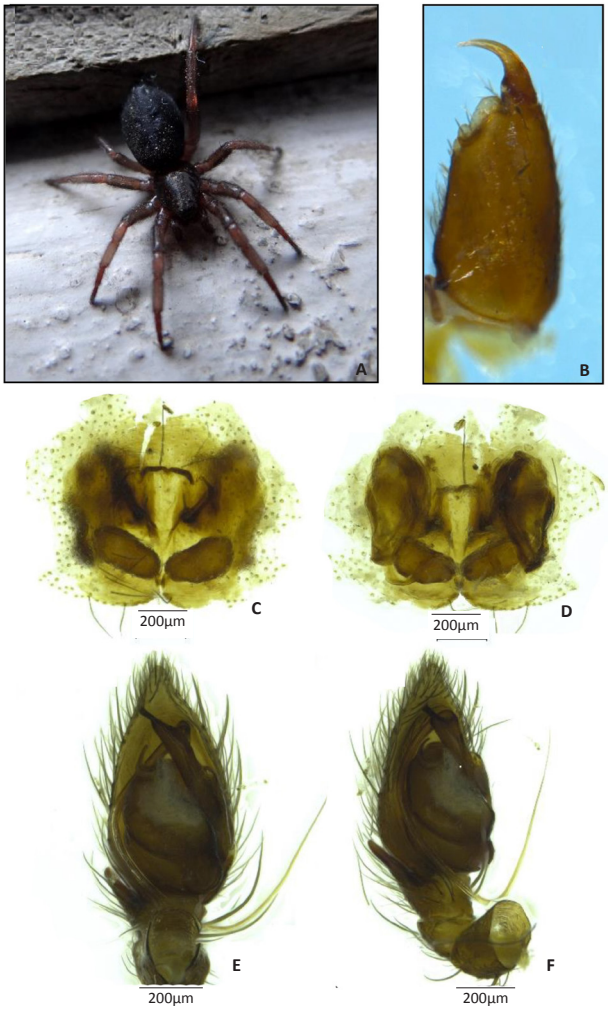

Image 1A–F. *Eilica tikaderi* (Platnick, 1976). A - Live specimen of *Eilica tikaderi* (Platnick, 1976); B - Chelicerae, retrolateral view showing two laminae; C - Epigyne; D - Vulva; E - Palp, ventral view; F - same, retro-ventral view. © Dhruv Prajapati

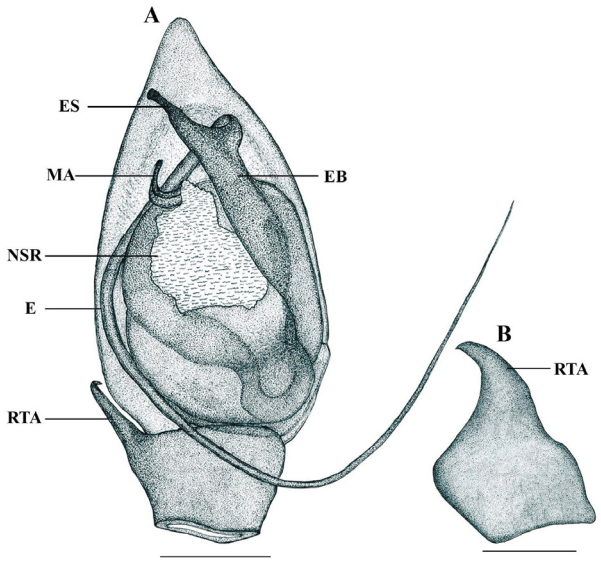

Figure 4A–B: *Eilica tikaderi* (Platnick, 1976). A - Palp, ventral view; B - Tibia, retrolateral view showing retrolateral tibial apophysis. Abbreviations: E - embolus, EB - embolic base, ES - embolic spur, MA - median apophysis, NSR - non-sclerotized region, RTA - retrolateral tibial apophysis. Scale: A–B, 0.1mm.

1.18mm. Eye diameters: AME 0.04mm, ALE 0.06mm, PME 0.03mm, PLE 0.06mm; Eye inter-distances: AME-AME 0.06mm, AME-ALE 0.03mm, PME-PME 0.05mm, PME-PLE 0.05mm, ALE-PLE 0.08mm. Pedipalp (Image 1E–F, Fig. 4A–B): Palpal segments dark brown in colour. Embolic base with disto-retrolaterally directed narrow spur (Image 1E, Fig. 4A). Embolus extremely long, whip-like, embolic tip lies far from the cymbium (Image 1E, Fig. 4A). Bulb anteriorly have whitish non-sclerotized region; retrolaterally directed hook-shaped median apophysis arising from the distal region of the non-sclerotized region (Image 1F, Fig. 4A). Tibia with single, broad based and backwardly tilted retrolateral tibial apophysis (Fig. 4B).

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