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## SHORT COMMUNICATION

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

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**Abstract:** The present investigation is a very first attempt to generate the checklist of spiders from Chandranath Hill, Paroda, Quepem, Goa. A preliminary study was conducted from June 2018 to March 2020 to document the spider diversity from the region. In all, 125 species of spiders belonging to 102 genera from 19 families were identified. The dominant families were Salticidae followed by Araneidae. Guild structure analysis revealed six feeding guilds, namely, orb weavers, foliage runners, ground runners, stalkers, space-web builders and ambushers. This study has not only highlighted the need for conservation of this ecosystem due to the significant species diversity and endemic species but has also filled the lacuna of spider study in Goa to form the foundation for further investigation. Extensive research on the spiders from Chandranath Hill in the future can certainly expect further new discoveries.

**Keywords:** Chandreshwar, diversity, guild structure, Salticidae, spiders.

Currently, the world list of spiders comprises over 48,000 species belonging to more than 4,000 genera and 128 families (World Spider Catalog 2020), of which, 1,843 species from 472 genera and 60 families are reported from India (Caleb & Sankaran 2020). In Goa, a total of 11 families belonging to 28 genera and 39 species have been documented till date (Bastawade & Borkar 2008).

The present study aims to generate a primary report documenting the spider diversity of Chandranath

Hill, thereby highlighting the ecological aspect of this ecosystem.

### MATERIALS AND METHODS

#### Study area

The Chandranath Hill (15.213°N & 74.037°E) situated in Paroda, Quepem Taluka of South Goa District stands at a height of approximately 350m. Commonly known as Chandreshwar, this Hill has an area of approximately 2km<sup>2</sup>. This heavily wooded hill commands a panoramic view and its surroundings are enchanting accompanied with thick vegetation with riparian patches. The speciality of this hill is that it is geographically not connected to the Western Ghats yet it is rich in biodiversity. Despite this, no study on spiders has been carried out in this area till date, thus making it an important reason for conducting this exploration which will in-turn generate primary data with the help of this documentation. The study was conducted for a period of 22 months, from June 2018 till March 2020, covering all the seasons.

#### Climate and vegetation

The study area being close to the Arabian Sea

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Image 1A–B. A—location of Chandranath Hill | B—most recent satellite view of the Hill.

experiences warm and humid climate for most of the year with atmospheric temperatures ranging from 21° to 36°C. The humidity ranges from 71 to 89%.

Teak is a common occurrence which is found in association with *Macaranga peltata* (Chandada), *Mangifera indica* (Wild mango), *Garcinia* (Kokum). Shrubs like *Mussaenda frondosa* (Dhobi tree), *Ixora coccinea* (Jungle geranium) are common along with orchids like *Eria* and climbers like *Begonia* spp. Seasonal wild balsams (*Impatiens* sp.), *Sida rhombifolia* (Arrow Leaf Sida), *Sonerila rheedii* (Rheed's Sonerila) and *Melastoma malabathricum* (Malabar Melastome) are abundant. As one moves to a higher elevation through dense foliage and small streams of cascading water, breath-taking glimpses of the vegetation and the landscape can be witnessed.

### Methods

Spiders were visually searched in their microhabitats such as ground, litter, bushes, flowers, leaves, branches,

in cracks and crevices. Webs and web lines were traced to locate the spiders. Logs and stones after being upturned to search for spiders were placed back in their original position. Spiders were photographed in their natural habitat itself as soon as they were sighted using Canon EOS 500D DSLR mounted with 18–55 mm lens attached with Raynox DCR-250 magnifying lens.

Random active search was employed to capture spiders. Whenever possible, the spiders were handpicked. The lid-container method was used to trap the spiders. Vegetation beating was done using a wooden stick with an inverted umbrella placed below the vegetation to collect the spiders that were out of reach. Sweep net method was used to collect spiders that dwell in the foliage. The collected specimens were preserved in 70% alcohol. Spiders were examined under a stereo-zoom microscope (Weswox STM-80) and identified with the help of taxonomic keys and illustrations provided by Gajbe (2007, 2008), Gravely (1921a,b, 1924, 1931) Pocock (1900, 1901), Tikader (1960, 1963, 1970, 1971, 1980, 1981, 1982a,b), Tikader & Bal (1981), Tikader & Malhotra (1980), Sethi & Tikader (1988), Proszynski (1992) and other relevant literature. Nomenclature and taxonomy is according to the World Spider Catalog (2020). All the specimens were identified up to family and generic level and some to specific level. Spiders that could not be identified are not included in the checklist.

### RESULTS AND DISCUSSION

The study at Chandranath Hill, Goa from June 2018 to March 2020 resulted in the documentation of 125 species belonging to 102 genera of 19 families (Table 1).

Spiders from family Salticidae proved to be the most dominant constituting 26.40% of the total species (33). Further, 22.40% of the species (28) belonged to Araneidae making it the second dominant family. The families with least number of species (01) were Cheiracanthiidae, Ctenidae, Gnaphosidae, Hersiliidae, Philodromidae and Scytodidae.

### Guild structure

Six feeding guilds, namely, orb weavers, foliage runners, ground runners, stalkers, space-web builders, and ambushers were identified based on the foraging behaviour (Uetz et al. 1999).

The most dominant guild was of the stalkers with 40 species followed by orb weavers (39), ambushers (16), space-web builders (14), ground runners (10) and foliage runners (06).

Vegetation architecture plays a major role in the species composition found within a habitat (Greenstone

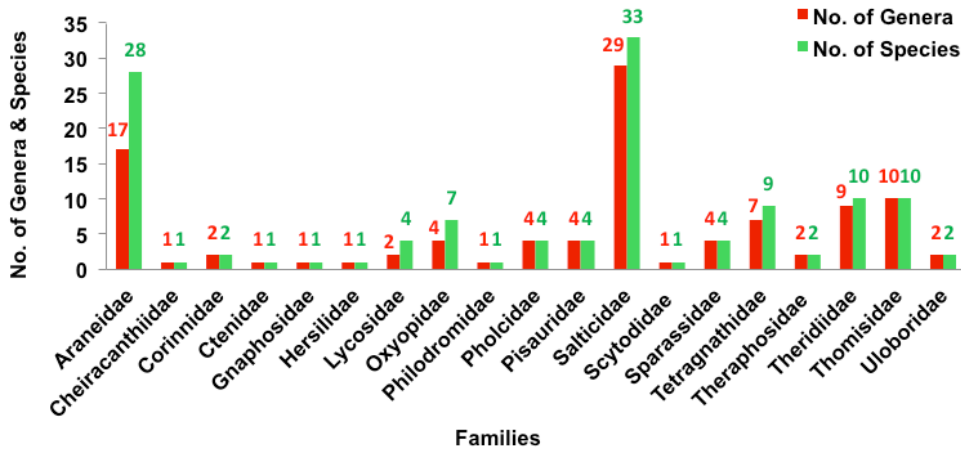


Figure 1. Comparative distribution of genera and species in different families.

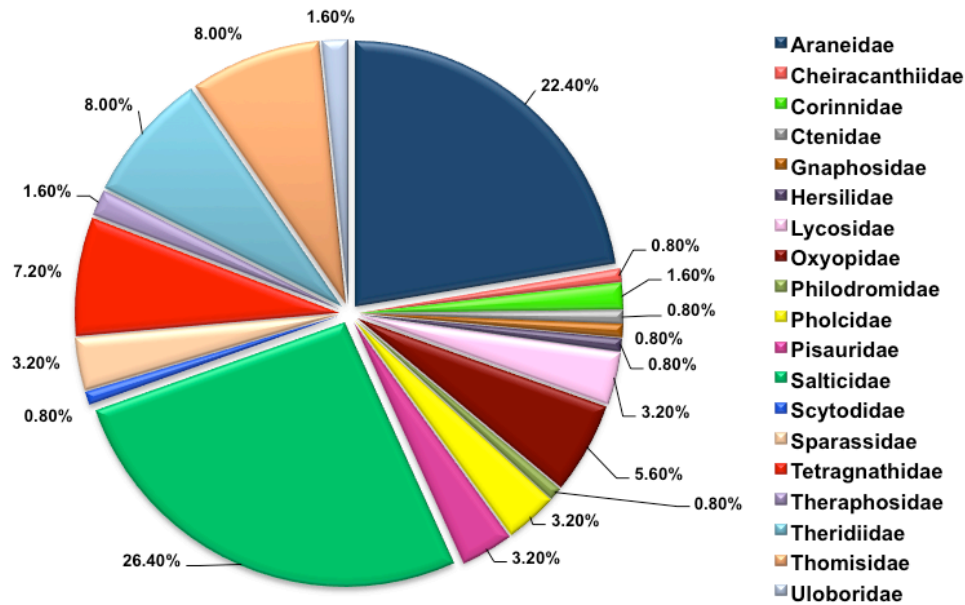


Figure 2. Percentage distribution of spider families of Chandranath Hill, Goa.

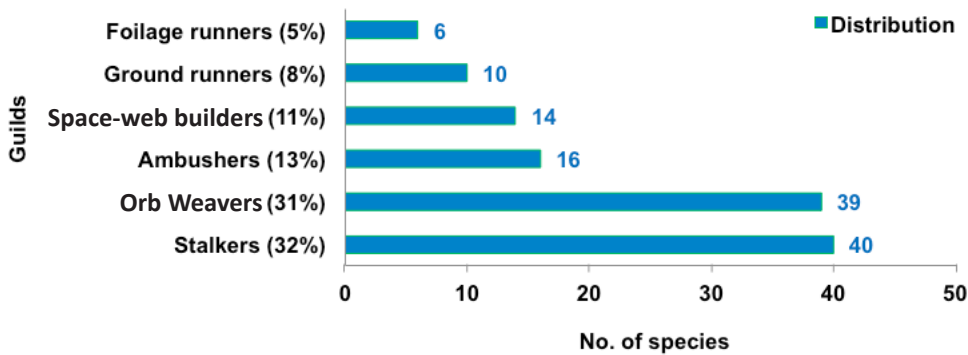


Figure 3. Guild structure of spiders at Chandranath Hill, Goa.

**Table 1. Checklist of spider species recorded at Chandranath Hill, Goa.**

Family		Species	Guild
Araneidae	1	<i>Anepision maritatum</i> (O. Pickard-Cambridge, 1877) <sup>#</sup> (Image 2)	Orb Weavers
	2	<i>Arachnura angura</i> Tikader, 1970 <sup>#</sup>	
	3	<i>Araneus mitificus</i> (Simon, 1886) <sup>#</sup>	
	4	<i>Araneus viridisomus</i> Gravely, 1921 <sup>#</sup> (Image 3)	
	5	<i>Argiope aemula</i> (Walckenaer, 1841)	
	6	<i>Argiope anasuja</i> Thorell, 1887 <sup>#</sup>	
	7	<i>Argiope pulchella</i> Thorell, 1881	
	8	<i>Chorizopes</i> sp. <sup>#</sup>	
	9	<i>Cyclosa bifida</i> (Doleschall, 1859) <sup>#</sup>	
	10	<i>Cyclosa spirifera</i> (Simon, 1889) <sup>#</sup>	
	11	<i>Cyrtophora cicatrosa</i> (Stoliczka, 1869)	
	12	<i>Cyrtophora unicolor</i> (Doleschall, 1857) <sup>#</sup> (Image 4)	
	13	<i>Eriovixia</i> sp. 1 <sup>#</sup>	
	14	<i>Eriovixia</i> sp. 2 <sup>#</sup>	
	15	<i>Gasteracantha geminata</i> (Fabricius, 1798) (Image 5)	
	16	<i>Gasteracantha hasselti</i> C.L.Koch, 1837	
	17	<i>Gasteracantha kuhli</i> C.L.Koch, 1837 <sup>#</sup>	
	18	<i>Gea spinipes</i> C.L.Koch, 1843 <sup>#</sup> (Image 6)	
	19	<i>Herennia multipuncta</i> (Doleschall, 1859)	
	20	<i>Larinia</i> sp. <sup>#</sup>	
	21	<i>Neoscona bengalensis</i> Tikader & Bal, 1981	
	22	<i>Neoscona mukerjei</i> Tikader, 1980	
	23	<i>Neoscona theisi</i> (Walckenaer, 1841) <sup>#</sup>	
	24	<i>Nephila kuhli</i> (Doleschall, 1859) <sup>#</sup>	
	25	<i>Nephila pilipes</i> (Fabricius, 1793)	
	26	<i>Parawixia dehaani</i> (Doleschall, 1859) (Image 7)	
	27	<i>Poltya</i> sp. <sup>#</sup> (Image 8)	
	28	<i>Thelacantha brevispina</i> (Doleschall, 1857) <sup>#</sup>	
Cheiracanthiidae*	29	<i>Cheiracanthium</i> sp. <sup>#</sup>	Foliage runners
Corinnidae*	30	<i>Castianeira zetes</i> Simon, 1897 <sup>#</sup>	Ground runners
	31	<i>Echinax panache</i> Deeleman-Reinhold, 2001 (Image 9) <sup>#</sup>	
Ctenidae	32	<i>Ctenus</i> sp.	Ground runners
Gnaphosidae	33	<i>Zelotes</i> sp. <sup>#</sup>	Ground runners
Hersiliidae	34	<i>Hersilia savignyi</i> Lucas, 1836	Ambushers
Lycosidae	35	<i>Hippasa pisaurina</i> Pocock, 1900 <sup>#</sup>	Ground runners
	36	<i>Hippasa agelenoides</i> (Simon, 1884)	
	37	<i>Hippasa greenalliae</i> (Blackwall, 1867) <sup>#</sup>	
	38	<i>Pardosa</i> sp.	
Oxyopidae*	39	<i>Hamadruas</i> sp. <sup>#</sup> (Image 10)	Stalkers
	40	<i>Hamataliwa</i> sp. <sup>#</sup>	
	41	<i>Oxyopes birmanicus</i> Thorell, 1887 <sup>#</sup>	
	42	<i>Oxyopes shweta</i> Tikader, 1970 <sup>#</sup>	
	43	<i>Oxyopes javanus</i> Thorell, 1887 <sup>#</sup>	
	44	<i>Oxyopes</i> sp. <sup>#</sup>	
45	<i>Peucetia viridana</i> (Stoliczka, 1869) <sup>#</sup> (Image 11)		
Philodromidae*	46	<i>Tibellus elongatus</i> Tikader, 1960 <sup>#</sup> (Image 12)	Ambushers

Family		Species	Guild
Pholcidae	47	<i>Artema atlanta</i> Walckenaer, 1837	Space-web builders
	48	<i>Crossopriza lyoni</i> (Blackwall, 1867) <sup>#</sup>	
	49	<i>Leptopholcus</i> sp. <sup>#</sup>	
	50	<i>Pholcus</i> sp.	
Pisauridae*	51	<i>Dendrolycosa gitae</i> (Tikader, 1970) <sup>#</sup>	Ambushers
	52	<i>Hygropoda</i> sp. <sup>#</sup> (Image 13)	
	53	<i>Nilus</i> sp. <sup>#</sup>	
	54	<i>Polyboea</i> sp. <sup>#</sup> (Image 14)	
Salticidae	55	<i>Asemonea tenuipes</i> (O. Pickard-Cambridge, 1869) <sup>#</sup> (Image 15)	Stalkers
	56	<i>Bianor</i> sp. <sup>#</sup>	
	57	<i>Brettus cingulatus</i> Thorell, 1895 <sup>#</sup> (Image 16)	
	58	<i>Bristowia</i> sp. <sup>#</sup> (Image 17)	
	59	<i>Carrhotus viduus</i> (C.L.Koch, 1846) <sup>#</sup>	
	60	<i>Chryzilla volupe</i> (Karsch, 1879) <sup>#</sup>	
	61	<i>Cyrba ocellata</i> (Kroneberg, 1875) <sup>#</sup>	
	62	<i>Epeus indicus</i> Prószyński, 1992 <sup>#</sup> (Image 18)	
	63	<i>Harmochirus brachiatus</i> (Thorell, 1877) <sup>#</sup>	
	64	<i>Hasarius adansonii</i> (Audouin, 1826) <sup>#</sup>	
	65	<i>Hyllus semicupreus</i> (Simon, 1885) <sup>#</sup> (Image 19)	
	66	<i>Icius vikrambatrai</i> Prajapati, Malamel, Sudhikumar & Sebastian, 2018 <sup>#</sup> (Image 20)	
	67	<i>Indopadilla insularis</i> (Malamel, Sankaran & Sebastian, 2015) <sup>#</sup> (Image 21)	
	68	<i>Langona</i> sp. <sup>#</sup>	
	69	<i>Marengo</i> sp. <sup>#</sup> (Image 22)	
	70	<i>Menemerus bivittatus</i> (Dufour, 1831) <sup>#</sup>	
	71	<i>Menemerus</i> sp. <sup>#</sup>	
	72	<i>Myrmaplata platealeoides</i> (O. Pickard-Cambridge, 1869) (Image 23)	
	73	<i>Myrmarachne melanocephala</i> MacLeay, 1839 <sup>#</sup>	
	74	<i>Myrmarachne prava</i> (Karsch, 1880) <sup>#</sup>	
	75	<i>Phaeacius</i> sp. <sup>#</sup>	
	76	<i>Phanuelus</i> sp. <sup>#</sup>	
	77	<i>Phintella vittata</i> (C.L.Koch, 1846) <sup>#</sup>	
	78	<i>Piranthus</i> sp. <sup>#</sup>	
	79	<i>Plexippus paykulli</i> (Audouin, 1826) <sup>#</sup>	
	80	<i>Plexippus petersi</i> (Karsch, 1878) <sup>#</sup>	
	81	<i>Plexippus</i> sp. <sup>#</sup>	
82	<i>Portia albimana</i> (Simon, 1900) <sup>#</sup> (Image 24)		
83	<i>Rhene flavicomans</i> Simon, 1902 <sup>#</sup>		
84	<i>Stenaelurillus</i> sp. <sup>#</sup> (Image 25)		
85	<i>Telamonia dimidiata</i> (Simon, 1899) <sup>#</sup> (Image 26)		
86	<i>Thiania bhamoensis</i> Thorell, 1887 <sup>#</sup> (Image 27)		
87	<i>Vailimia</i> sp. <sup>#</sup>		
Scytodidae*	88	<i>Scytodes</i> sp. <sup>#</sup>	Foliage runners
Sparassidae*	89	<i>Heteropoda</i> sp. <sup>#</sup>	Foliage runners
	90	<i>Olios milleti</i> (Pocock, 1901) <sup>#</sup>	
	91	<i>Palystes</i> sp. <sup>#</sup> (Image 28)	
	92	<i>Pandercetes</i> sp. <sup>#</sup>	

Tetragnathidae	93	<i>Dolichognatha longiceps</i> (Thorell, 1895) <sup>#</sup>	Orb Weavers
	94	<i>Guizygiella</i> sp. <sup>#</sup>	
	95	<i>Leucauge decorata</i> (Blackwall, 1864) <sup>#</sup>	
	96	<i>Mesida</i> sp. <sup>#</sup>	
	97	<i>Opadometa fastigata</i> (Simon, 1877) <sup>#</sup> (Image 29)	
	98	<i>Tetragnatha mandibulata</i> Walckenaer, 1841	
	99	<i>Tetragnatha viridorufa</i> Gravely, 1921 <sup>#</sup>	
	100	<i>Tylorida striata</i> (Thorell, 1877) (Image 30) <sup>#</sup>	
Theraphosidae	101	<i>Tylorida</i> sp.	Ground runners
	102	<i>Chilobrachys fimbriatus</i> Pocock, 1899	
Theridiidae*	103	<i>Thrigmopoes</i> sp.	Space-web builders
	104	<i>Ariamnes</i> sp. <sup>#</sup>	
	105	<i>Argyrodes flavescens</i> O. Pickard-Cambridge, 1880 <sup>#</sup> (Image 31)	
	106	<i>Chikunia nigra</i> (O. Pickard-Cambridge, 1880) <sup>#</sup> (Image 32)	
	107	<i>Chryso angula</i> (Tikader, 1970) <sup>#</sup> (Image 33)	
	108	<i>Chryso urbasae</i> (Tikader, 1970) <sup>#</sup> (Image 34)	
	109	<i>Coleosoma blandum</i> O. Pickard-Cambridge, 1882 <sup>#</sup> (Image 35)	
	110	<i>Episinus</i> sp. <sup>#</sup>	
	111	<i>Meotipa sahyadri</i> Kulkarni, Vartak, Deshpande & Halali, 2017 <sup>#</sup>	
	112	<i>Propostira ranii</i> Bhattacharya, 1935 <sup>#</sup> (Image 36)	
	113	<i>Thwaitesia</i> sp. <sup>#</sup>	
Thomisidae	114	<i>Amyciaea forticeps</i> (O. Pickard-Cambridge, 1873) <sup>#</sup> (Image 37)	Ambushers
	115	<i>Angaeus</i> sp. <sup>#</sup> (Image 38)	
	116	<i>Camarius formosus</i> Thorell, 1887	
	117	<i>Massuria</i> sp. <sup>#</sup> (Image 39)	
	118	<i>Oxytate</i> sp. <sup>#</sup> (Image 40)	
	119	<i>Stiphropus</i> sp. <sup>#</sup>	
	120	<i>Strigoplus netravati</i> Tikader, 1963 (Image 41)	
	121	<i>Synema revolutum</i> Tang & Li, 2010 <sup>#</sup>	
	122	<i>Thomisus</i> sp. <sup>#</sup>	
	123	<i>Xysticus</i> sp. <sup>#</sup>	
Uloboridae*	124	<i>Miagrammopes</i> sp. <sup>#</sup> (Image 42)	Orb Weavers
	125	<i>Uloborus</i> sp. <sup>#</sup> (Image 43)	

\*—Families newly recorded in Goa | #—Species newly recorded in Goa

1984; Scheidler 1990; Sudhikumar et al. 2005) and vegetation which is structurally more complex can sustain higher abundance and diversity of spiders (Hatley & Macmahon 1980; Sudhikumar et al. 2005). Additionally, good vegetation along with floral diversity houses a number of insect species, this in turn results in hosting a high diversity of spiders as insects happen to be their main prey (Chetia & Kalita 2012).

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Image 2. *Anepsion maritatum*



Image 3. *Araneus viridisomus*



Image 4. *Cyrtophora unicolor*



Image 5. *Gasteracantha geminata*



Image 6. *Gea spinipes*



Image 7. *Parawixia dehaani*



Image 8. *Poltys* sp.



Image 9. *Echinax panache*



Image 10. *Hamadruas* sp.



Image 11. *Peucetia viridana*



Image 12. *Tibellus elongatus*



Image 13. *Hygropoda* sp.



Image 14. *Polyboea* sp.



Image 15. *Asemonea tenuipes*



Image 16. *Indopadilla insularis*



Image 17. *Brettus cingulatus*



Image 18. *Bristowia* sp.



Image 19. *Epeus indicus*



Image 20. *Hyllus semicupreus*



Image 21. *Icius vikrambatrai*



Image 22. *Marengo* sp.



Image 23. *Myrmaplata plataleoides*



Image 24. *Portia albimana*



Image 25. *Stenaelurillus* sp.



Image 26. *Telamonia dimidiata*



Image 27. *Thiania bhamoensis*



Image 28. *Palystes* sp.



Image 29. *Opadometa fastigata*



Image 30. *Tylorida striata*



Image 31. *Argyrodes flavescens*



Image 32. *Chikunia nigra*



Image 33. *Chryso angula*



Image 34. *Chryso urbasae*



Image 35. *Coleosoma blandum*



Image 36. *Propostira ranii*



Image 37. *Amyciaea forticeps*


 Image 38. *Angaeus* sp.

 Image 39. *Massuria* sp.

 Image 40. *Oxytate* sp.

 Image 41. *Strigoplus netravati*

 Image 42. *Miagrammopes* sp.

 Image 43. *Uloborus* 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

#### Member



#### 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 Pratihar & 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 & Boby 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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