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Spiders of Himachal Pradesh: A Preliminary Checklist

The current paper presents the first comprehensive checklist of spider fauna occurring and/or reported from the western Himalayan state of Himachal Pradesh, as compiled from peer-reviewed published secondary literature sources. 59 species of spiders belonging to 10 families have been enlisted, which have been originally either described as state-specific records or type locality from Himachal Pradesh, of which a few have been subjected to taxonomic revisions. Of the 59 reported species, 18 species across 7 families remain reported only till the generic level, leaving an information blind-spot of them being re-reported across sources as unique species, highlighting the need to have a more systematic diversity database for this understudied faunal group.

Key words: Spider diversity, Himachal Pradesh, Literature review, Araneae

A preliminary checklist of spider fauna of Himachal Pradesh.

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Introduction

The predominantly mountainous state of Himachal Pradesh can be altitudinally viewed as three distinct regions: the Shivaliks (<1500 m), the middle Himalayan region (1500 – 3000m), and the Himadri Himalayas (>3000 m), with one-third of the state perpetually under snow cover in the form of glaciers, moraines or cold deserts. The state forms the boundary where the Shivalik hills separate the complex contoured land from the extended plains of Punjab. The mountain ranges included within the geopolitical boundary of the state include the Dhauladhar range, the Pir-Panjal range, the great Himalaya range, and the Zanskar range. The Dhauladhar range stands over the Kangra valley, while the Pir-Panjal, Great Himalaya and Zanskar ranges stand guard over Chamba, Lahaul and Spiti, Kullu, and Kinnaur (Chanda, 1987).

Covering a geographical area of ~55,673 km^2, the legally classified forest cover area of Himachal Pradesh is relatively high, accounting for almost 68.16% of the total area, with the altitudinal belt of 2000-3000 m accounting for a bulk of the state's total forest cover (~34%) (FSI, 2017). Although this extensive mesh of forest coverage supports an impressive reservoir of flora and fauna (FSI, 2017), existing literature on entomological and arachnological knowledge is scattered and fragmented. Although systematic research has been carried out for certain well known arthropodal groups such as Lepidopterans, Orthopterans, Coleopterans and Dipterans (Jitender *et al*., 2007; Singh and Banyal, 2013; Thakur *et al*., 2002; Mehta *et al*., 2002; Mehta, 2003; Mukhopadhyay and Sharma, 2008; Chandra and Uniyal, 2007; Shishodia and Gupta, 2010; Shishodia *et al*., 2002; Thakur *et al*., 2008; Thakur and Mattu, 2006), the arachnological database of the state remains extremely scanty with only a handful state-specific Araneae records (Uniyal, 2006; Bastawade, 2008; Tanasevitch, 2011; Marusik *et al*., 2014).

Spiders have been gaining importance as ecological indicators owing to their extreme sensitivity to natural conditions and associated disturbances (Pearce and Venier, 2006; Ossamy *et al*., 2016) and regulatory functions in ecosystems through prey-predatory dynamics

(Nyffeler and Birkhofer, 2017), along with their high abundance and niche diversity (Nyffeler and Benz, 1982). However, despite their pivotal role in most natural ecosystems, they have received very little attention in conservation science, particularly within the Indian context. The state of knowledge is particularly rudimentary from the Indian Himalayan regions. This gap is further widened by the lack of crucial habitat and natural history information fuelled by the marginalization of the taxon from mainstream research undertakings.

A majority of the spider fauna reported from the state occurs as a reference to Himachal as their type locality with limited independent publication(s) for state-specific records. Acknowledging this gap in data availability, the current paper aims at providing the first comprehensive compilation of Araneae fauna of the state of Himachal Pradesh based entirely on available secondary literature sources. This first-hand documentation is expected to act as the foundation to build extensive primary sourced inventories upon, to better understand their presence, interactions, and possible range extensions of Araneae of Himachal Pradesh and India.

Methodology

An extensive literature review was carried out to identify the documented record of spiders that either occur/have been directly reported from the state or those whose records pin the species type locality to Himachal Pradesh. All peer-reviewed published records were assessed and gathered data was corroborated with the World Spider Catalog (21.5) to revise any taxonomic changes and/or transfers made at the family/genus levels since their original descriptions in respected literature sources. Any such encounter of taxonomic shuffling has been noted separately for a more transparent understating of the current checklist.

Results

The first comprehensive checklist of spider fauna of Himachal Pradesh as sourced from secondary literature accounts for 59 species belonging to 10 families (as per original accounts) (Table 1), of which 18 species from 7 families were reported only till the generic level, raising the possibility of either the same species being mistakenly re-reported across sources or the species being taxonomically unique and distinctly separated

Table 1: Spider records of Himachal Pradesh as originally sourced from secondary literature

Sl.No.	Family	Species (as originally mentioned in source literature)	Literature
1	Amaurobiidae	*Amaurobius koponeni* Marusik, Ballarin and Omelko, 2012	Marusik, Ballarin and Omelko, 2012
2		*Amaurobius sharmai* Bastawade, 2008	Bastawade, 2008; Marusik, Ballarin and Omelko, 2012
3	Araneidae	*Aranea bituberculata* Walckenaer, 1802	Tikader, 1982
4		*Araneus nympha* (Simon, 1889)	Gajbe, 1995
5		*Argiope sp.*	Bastawade, 2008
6		*Leucauge fastigiata* Simon, 1905	Bastawade, 2008
7		*Meta simlaensis* Tikader, 1982	Tikader, 1982
8		*Neoscona sp.*	Uniyal, 2006
9	Gnaphosidae	*Drassodes deoprayagensis* Tikader and Gajbe, 1975	Tikader, 1982
10		*Drassodes parvidens* Caporiacco, 1934	Bastawade, 2008
11		*Geodrassus sirmourensis* Tikader and Gajbe, 1977	Bastawade, 2008; Tikader, 1982; Biswas and Biswas, 1992
12		*Gnaphosa dege* Ovtsharenko, Platnick et Song, 1992	Marusik, Ballarin and Omelko, 2014
13		*Gnaphosa poonaensis* Tikader, 1973	Gajbe, 2004; Biswas and Biswas 1992; Tikader, 1982
14		*Gnaphosa sp.*	Bastawade, 2008
15		*Gnaphosa sp.*	Uniyal, 2006
16		*Haplodrassus sataraensis* Tikader and Gajbe, 1977	Gajbe, 1995
17		*Haplodrassus sp.*	Bastawade, 2008
18		*Liodrassus mandae* Tikader and Gajbe, 1977	Tikader, 1982
19		*Micaria pulcherrima* Caporiacco, 1935	Marusik, Ballarin and Omelko, 2014
20		*Nodocion solanensis* Tikader and Gajbe, 1977	Tikader, 1982
21		*Phaeocedus sp.*	Bastawade, 2008
22		*Scotopaeus sp.*	Bastawade, 2008
23		*Scotophaeus simlaensis* Tikader, 1982	Tikader, 1982
24		*Sosticus solanensis* Gajbe, 1979	Tikader, 1982
25		*Zelotes sp.*	Bastawade, 2008
26	Linyphiidae	*Caviphantes pseudosaxetorum* Wunderlich, 1979	Tanasevitch, 2019
27		*Erigone rohtangensis* Tikader, 1981	Tikader, 1981
28		*Gongylidioides pectinatus* Tanasevitch, 2011	Tanasevitch, 2011; Tanasevitch, 2014
29		*Gongylidiellum confusu*m Thaler, 1987	Tanasevitch, 2011
30		*Gongylidioides pectinatus* Tanasevitch, 2011	Tanasevitch, 2011
31		*Indophantes digitulus* (Thaler, 1987)	Tanasevitch, 2011
32		*Pelecopsis indus* Tanasevitch, 2011	Tanasevitch, 2011
33		*Scotargus pilosus S*imon, 1913	Tanasevitch, 2011
34		*Tisoincisus* Tanasevitch, 2011	Tanasevitch, 2011

Sl.No.	Family	Species (as originally mentioned in source literature)	Literature
35	Lycosidae	*Arctosa sp.*	Uniyal, 2006
36		*Evippa sohani* Tikader and Malhotra, 1980	Uniyal, 2006
37		*Evippa solanensis* Tikader and Malhotra, 1980	Tikader and Malhotra, 1980
38		*Hippasa himalayensis* Gravely, 1924	Saha, Roy and Raychaudhuri, 2016; Tikader and Malhotra, 1980
39		*Lycosa nigrotibialis* Simon, 1884	Gajbe, 2004; Biswas and Biswas 1992; Tikader and Malhotra, 1980; Biswas and Majumder, 1995
40		*Lycosa sp.*	Bastawade, 2008
41		*Pardosa birmanica* Simon, 1884	Gajbe, 1995; Gajbe, 2004; Dhali *et al*., 2012; Tikader and Malhotra, 1980; Biswas and Majumder, 1995
42		*Pardosa chambaensis* Tikader and Malhotra, 1976	Dhali *et al*., 2012; Tikader and Malhotra, 1976; Tikader and Malhotra, 1980
43		*Pardosa fletcheri* (Gravely, 1924)	Tikader and Malhotra, 1980
44		*Pardosa minuta* Tikader and Malhotra, 1976	Bastawade, 2008; Biswas and Biswas 1992; Tikader and Malhotra, 1976; Tikader and Malhotra, 1980
45		*Pardosas umatrana* (Thorell, 1890)	Gajbe, 1995; Biswas and Biswas 1992; Dhali *et al*., 2012; Tikader and Malhotra, 1980; Biswas and Majumder, 1995
46		*Trochosa sp.*	Bastawade, 2008
47		*Wadicosa fidelis* (O. Pickard-Cambridge, 1872)	Caleb, 2020
48	Oonopidae	*Camptoscaphiella fulva* Caporiacco, 1934	Baehr and Ubick, 2010
49		*Camptoscaphiella gunsa* Baehr, 2012	Baehr and Ubick, 2010
50	Pisauridae	*Pisaurus sp.*	Bastawade, 2008
51	Salticidae	*Marpissasp*	Uniyal, 2006
52		*Salticus sp.*	Bastawade, 2008
53	Theridiidae	*Achaearanea budana* Tikader, 1970	Uniyal, 2006
54		*Enoplognatha diodonta* Zhu et Zhang, 1992	Marusik, Ballarin and Omelko, 2014
55		*Episinus pentagonalis* Chakrabarti, 2013	Chakrabarti, 2013
56		*Theridionsp*	Uniyal, 2006
57	Thomisidae	*Thomisus sp.*	Bastawade, 2008
58		*Xysticus sp.*	Bastawade, 2008
59		*Xysticus sp.*	Uniyal, 2006

from other species. In both cases, the importance of the species as official state records remains undisputed. Of the 59 species records, 3 species (*Amaurobius sharmai*, *Leucauge fastigiate*, *Meta simlaensis*) have undergone taxonomic transfers at the family level (Titanoecidae, Tetragnathidae, Tetragnathidae, respectively), bringing the total family record count in the of the state to 11. 5 species (*Amaurobius sharmai*, *Aranea bituberculata*, *Leucauge fastigiata*, *Geodrassus sirmourensis*, *Nodocion solanensis*) have been transferred to different genera, while 1 species, *Liodrassus mandae*, has been synonymized as *Setaphis browni* within the same family as the original record.

Gnaphosidae, Lycosidae, and Linyphiidae account for more than 50% of the total species records, among which Gnaphosidae and Lycosidae together report 51% of cumulative species. Several species of the compiled checklist occur in multiple literatures, either as direct state-specific, or as type locality records, and each source has been specified against their respective species records.

Discussion

Documentation of spider fauna of the western and trans-Himalayan region is limited, both spatially and temporally. Nevertheless, previous inventories by Caporiacco (1934) in the Karakorams and Tikader (1964) in the Cho-Oyu expedition of Nepal shed some light on spiders inhabiting extreme geographical spaces, while studies by Uniyal *et al*. (2011), and Quasin and Uniyal (2011) elaborate on Araneae diversity of western Himalayan belts across wide elevational gradients. However, the state of Himachal Pradesh and its specific trans-Himalayan region faces a severe dearth of documentation of Araneae, with only a handful of attempts to bridge this gap highlighting the need to expand researched taxa. Although the state houses large and well-managed expanses of protected areas, Bastawade (2008) provides the only comprehensive literature from the extensive protected area of Pin Valley National Park.

Gnaphosidae, Lycosidae, and Linyphiidae emerge as the dominant families, accounting for 66% of species

records. Among them, Gnaphosidae (29%) and Lycosidae (22%) share commonalities of being non-web building and active foraging groups, further studies on which could shed some light on how species belonging to these families have adapted to living in anthropogenically influenced ecological spaces. Although web building families such as Araneidae and Tetragnathidae, and some cosmopolitan individuals of Salticidae are the most frequently encountered groups in cityscapes, the alarming under-representation of these human-adaptable species could be a reflectance of highly opportunistic reports, highlighting the need for systematic taxon-focussed documentation in the state.

Since spiders have been extensively established as an ecologically indicative arthropod group (Gerlach *et al*., 2013; Ossamy *et al*., 2016), playing integral roles in agricultural ecosystems, and allowing for effective monitoring of ecosystem functionalities (Buddle *et al*., 2000; Ziesche and Roth, 2008), documenting their diversity and assemblage interactions becomes an indispensable task. This also synchronizes with the need to understand spatial drivers of lesser-known biota distributions to better aid larger conservation strategies (Whittaker *et al*., 2005). Furthermore, the development of a comprehensive Araneae knowledgebase for the state, could not only aid in assessing ecological relationships within sensitive biogeographical regions such as the Himalayas but may also have cascading advantages in long-term ecological monitoring opportunities.

हिमाचल प्रदेश की मकड़ियाँ: एक प्रारंभिक जांच सूची

इरीना दास सरकार, वी.पी. उनियाल और मंजू सिलीवाल

सारांश

यह अध्ययन मौजूदा पेपर हिमाचल प्रदेश के पश्चिमी हिमालयी राज्य से मकड़ी जीवों पर घटने वाली या रिपोर्ट की गई प्रथम विस्तृत जांच सूची को प्रस्तुत करता है जिसे पूर्व में प्रकाशित सहायक समीक्षा के लिखित स्त्रोतों से संकलित किया गया है। इसमें 10 श्रेणियों से सम्बंधित मकड़ी की 59 प्रजातियों को सूचीबद्ध किया गया है जिन्हें मूल रूप से हिमाचल प्रदेश से राज्य विशिष्ट रिकॉर्ड या इलाके के प्रकार के रूप में वर्णित किया गया है जिनमें से कुछ को वर्गीकृत पुनरीक्षण के अधीन रखा गया है। रिपोर्ट की गई 59 प्रजातियों में से 7 श्रेणियों की 18 प्रजातियों को केवल वर्गीय स्तर तक ही रिपोर्ट किया गया है जिसमें उनकी सूचना को स्रोतों में फिर से रिपोर्ट की जानेवाली अनोखी प्रजातियों के रूप में एक अस्पष्ट स्थान दिया गया है। इस कम अध्ययन किये गए जीव समूह पर अधिक व्यवस्थित विविधता वाले डेटाबेस की आवश्यकता पर प्रकाश डाला गया है।

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