

SPIDER DIVERSITY ALONG ALTITUDINAL GRADIENT IN MILAM VALLEY NANDA DEVI BIOSPHERE RESERVE, WESTERN HIMALAYA

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Introduction

Spiders are diverse groups of animals attaining 7th number in diversity (Nyffeler and Benz, 1980). They are abundant generalist predators in terrestrial habitats and are themselves an important food source for other animals and are a valuable component of ecosystem function (Wise, 1993). The knowledge on diversity and distribution of spiders in India is sparse as compared to other regions of the world. Little information is available from the Northern part of India especially from the Himalayan region. A total of 96 species/morphospecies of spiders belonging to 52 genera and 24 families were also reported from Chir pine forest habitat of Nanda Devi Biosphere Reserve (Quasin and Uniyal, 2010a). Quasin and Uniyal (2010b) also reported 64 species/morphospecies (40 genus and 19 families) of spiders from Kedarnath Wildlife Sanctuary. Thus a serious need exists to explore spider diversity in the Northern part of the country. The present study was carried out in Milam valley (Munsiyari to Milam Glacier) area of Pithoragarh district of Uttarakhand to provide base line information for future studies. It is the first approach in this region to study the spider fauna and aims to investigate the spider species composition in this region which will help in assessing the status of spider diversity in this region keeping in mind its conservational value.

Material and Methods

Spider species were visually searched in shrubs, trees and ground cover and also different microhabitats like under fallen rocks, stones and logs. The methods employed for spider collection were vegetation beating, hand picking and net sweeping. Collected specimens were transferred to 70% alcohol. All adult specimens were identified up to family, genus and species level. Accurate identification was only feasible with adult specimen as the identification of the spider groups rely heavily on the genitalia, the most accessible and likely identification of specific identity. Thus, identifying immature spiders to species level was considered impractical because sexual characters were needed for species level identification (Edwards, 1993). All voucher specimens were deposited at the Wildlife Institute of India, Dehradun.

Study Area

The study was conducted along the Milam Valley (Munsiyari to Milam Glacier) located in the district of Pithoragarh, Kumaoun Himalayas in Uttarakhand. The

area falls under Nanda Devi Biosphere Reserve, the World Heritage Site. Milam Glacier originates from the slopes of Trishul peak and is the source of the Milam River and a tributary of the Pindar River. Some areas along this valley towards Milam were semi-arid in nature. The area is rich and diverse in both floral and fauna species. The major vegetation types ranges from tropical moist deciduous Forests to alpine moist and semi arid pastures. The sampling sites included Munsiyari (latitude 30°4' 17.4" N; longitude 80° 13' 57.7" E; Elevation 2310 m); Lilam (latitude 30°09'8"N; longitude 80°14' 56"E; Elevation 1850 m); Rargari (latitude 30°11'2"N; longitude 80°14'00"E; Elevation 2256 m); Bogudyar (latitude 80°13'24.5"E; longitude 30°12'51.1"N; Elevation 2450 m); Rilkot (latitude 30°18'38.15"N; longitude 80°12'30.78" E; Elevation 3135m) and Milam (latitude 30°25'58"N; longitude 80°9'11"E; Elevation 3900 m) Fig. 1. The survey was conducted during June 2010.

Fig. 1



Result and Discussion

A total of 86 species/morphospecies under 39 genus and 16 families (Table 1) were recorded during the survey. In the preliminary findings, it was observed that Araneidae was found to be most diverse in terms of species diversity. The 16 families recorded in the area represent 26.6% of the total families in India (Sebastian and Peter, 2009). The families with the highest number of total species were Araneidae with 26 species (19.5% of all the species), followed by Gnaphosidae (9.8%, 9 species); Linyphiidae, Salticidae, Lycosidae and Theridiidae (7.3 % of the total species each) followed by Thomisidae, Uloboridae, Philodromidae and Clubionidae (4.9% of the total species each). While the other families represented the remaining 9.6% of total species (Fig. 2).

Spiders were divided into three major functional

Fig. 4



Study Area Landscape

*Luloborus* sp. 1*Selenops radiatus**Neoscona* Mukherjee*Olios* sp. 1

Spiders collected from the study area

groups: the plant wanderers (Thomisidae, Salticidae, Oxyopidae, Philodromidae and Sparassidae), the web builders (Araneidae, Theridiidae, Linyphiidae, Uloboridae and Pholcidae), and the ground wanderers (Gnaphosidae, Lycosidae and Selenopidae). Overall the number of web building spiders was greater than that of the ground and plant wanderers. The web builders

comprised of 60.7% of the total species, followed by plant wanderers (14.6%) and ground wanderers (24.7%) (Fig.3). The result suggests that the Himalayan region has a rich diversity of spiders. Further investigation of spider fauna may provide interesting results on new, endemic, rare and range restricted species of these areas.

Sampling transect in the study area

Fig. 2

Spider families recorded from Milam Valley.

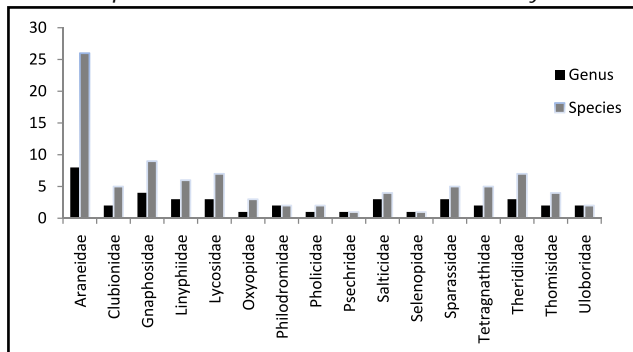


Fig. 3

Functional groups (%) of spiders from Milam Valley

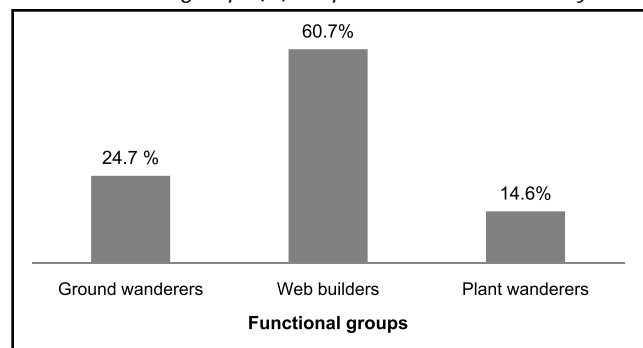


Table 1

Spiders recorded in Millam Valley

48 Family	Genus	Species	Guild
Araneidae	Araniella	<i>Araniella</i> sp.1	Web Builder
		<i>Araniella</i> sp.2	Web Builder
	Araneus	<i>Araneus</i> sp.1	Web Builder
		<i>Araneus</i> sp.2	Web Builder
		<i>Araneus</i> sp.3	Web Builder
	Cyclosa	<i>Cyclosa insulana</i> (Costa, 1834)	Web Builder
		<i>Cyclosa confragra</i> (Thorell, 1892)	Web Builder
		<i>Cyclosa</i> sp.1	Web Builder
	Cyrtophora	<i>Cyrtophora moluccensis</i> (Doleschall, 1857)	Web Builder
		<i>Cyrtophora</i> sp.1	Web Builder
	Parawixia	<i>Parawixia dehaani</i> (Doleschall, 1859)	Web Builder
		<i>Parawixia</i> sp.1	Web Builder
		<i>Parawixia</i> sp.2	Web Builder
	Thelacantha	<i>Thelacantha brevispina</i> (Doleschall, 1857)	Web Builder
	Larinia	<i>Larinia</i> sp.1	Web Builder
	Neoscona	<i>Neoscona achine</i> (Simon, 1906)	Web Builder
		<i>Neoscona begalensis</i> (Tikader & Bal, 1981)	Web Builder
		<i>Neoscona biswasi</i> (Bhandari & Gajbe, 2001)	Web Builder
		<i>Neoscona muckerjei</i> (Tikader, 1980)	Web Builder
		<i>Neoscona nautica</i> (L. Koch, 1875)	Web Builder
		<i>Neoscona shillongensis</i> (Tikader & Bal, 1981)	Web Builder
		<i>Neoscona theisi</i> (Walckennear, 1842)	Web Builder
		<i>Neoscona vigilans</i> (Blackwall, 1865)	Web Builder
		<i>Neoscona</i> sp. 1	Web Builder
		<i>Neoscona</i> sp. 2	Web Builder
Clubionidae	Clubiona	<i>Clubiona</i> sp.1	Plant wanderer
		<i>Clubiona</i> sp.2	Plant wanderer
	Cheiracanthium	<i>Cheiracanthium danieli</i> (Tikader, 1975)	Plant wanderer
		<i>Cheiracanthium</i> sp.1	Plant wanderer
Gnaphosidae	Drassodes	<i>Drassodes</i> sp.1	Plant wanderer
		<i>Drassodes</i> sp.2	Plant wanderer
	Gnaphosa	<i>Gnaphosa</i> sp.1	Ground wanderer
		<i>Gnaphosa</i> sp.2	Ground wanderer
	Scotophaeus	<i>Scotophaeus</i> sp.1	Ground wanderer
		<i>Scotophaeus</i> sp.2	Ground wanderer
	Zelotes	<i>Zelotes</i> sp.1	Ground wanderer
		<i>Zelotes</i> sp.2	Ground wanderer
		<i>Zelotes</i> sp.3	Ground wanderer
Linyphiidae	Erigone	<i>Erigone</i> sp.1	Web Builder
		<i>Erigone</i> sp.2	Web Builder
	Linyphia	<i>Linyphia</i> sp.1	Web Builder
		<i>Linyphia</i> sp.2	Web Builder

		<i>Linyphia</i> sp.3	Web Builder
		<i>Linyphia</i> sp.4	Web Builder
	Nerienne	<i>Nerienne</i> sp.1	Web Builder
Lycosidae	Hippasa	<i>Hippasa agelenoides</i> (Simon, 1884)	Web Builder
	Lycosa	<i>Lycosa</i> sp.1	Ground wanderer
		<i>Lycosa</i> sp.2	Ground wanderer
	Pardosa	<i>Pardosa pseudoannulata</i> (B?senberg & Strand, 1906)	Ground wanderer
		<i>Pardosa sumatrana</i> (Thorell, 1890)	Ground wanderer
		<i>Pardosa</i> sp.1	Ground wanderer
		<i>Pardosa</i> sp.2	Ground wanderer
Oxyopidae	Oxyopes	<i>Oxyopes</i> sp.1	Plant wanderer
		<i>Oxyopes</i> sp.2	Plant wanderer
		<i>Oxyopes</i> sp.3	Plant wanderer
Philodromidae	Philodromus	<i>Philodromus</i> sp.1	Plant wanderer
	Tibellus	<i>Tibellus</i> sp.1	Plant wanderer
Pholcidae	Pholcus	<i>Pholcus phalangoides</i> (Fuesslin, 1775)	Tangle web builder
		<i>Pholcus</i> sp.1	Tangle web builder
Psechridae	Psechrus	<i>Psechrus himalayanus</i> (Simon, 1906)	web Builder
Salticidae	Rhene	<i>Rhene</i> sp.1	Plant wanderer
		<i>Rhene</i> sp.2	Plant wanderer
	Siler	<i>Siler</i> sp.1	Plant wanderer
	Myrmarachne	<i>Myrmarachne Orientales</i> (Tikader, 1973)	Plant wanderer
Selenopidae	Selenops	<i>Selenops</i> sp.1	Human habitations
Sparassidae	Heteropoda	<i>Heteropoda venatoria</i> (Linnaeus, 1767)	Human habitations
		<i>Heteropoda</i> sp.1	Ground wanderers
	Olios	<i>Olios</i> sp.1	Plant wanderers
	Pseudopoda	<i>Pseudopoda promta</i> (O.P.Cambridge, 1885)	Ground wanderers
		<i>Pseudopoda</i> sp.1	Ground wanderers
Tetragnathidae	Leucage	<i>Leucage celebesiana</i> (Walckerenaer, 1842)	web builders
		<i>Leucage decorata</i> (Blackwall, 1864)	web builders
		<i>Leucage</i> sp.1	web builders
	Tetragnatha	<i>Tetragnatha</i> sp.1	web builders
		<i>Tetragnatha</i> sp.2	web builders
Theridiidae	Parasteatoda	<i>Parasteatoda</i> sp.1	Tangle web builders
		<i>Parasteatoda</i> sp.2	Tangle web builders
	Argyrodes	<i>Argyrodes</i> sp.1	Tangle web builders
		<i>Argyrodes</i> sp.2	Tangle web builders
	Theridion	<i>Theridion</i> sp.1	Tangle web builders
		<i>Theridion</i> sp.2	Tangle web builders
		<i>Theridion</i> sp.3	Tangle web builders
Thomisidae	Misumena	<i>Misumena</i> sp.1	Plant wanderers
		<i>Misumena</i> sp.2	Plant wanderers
	Xysticus	<i>Xysticus</i> sp.1	Ground wanderers
		<i>Xysticus</i> sp.2	Ground wanderers
Uloboridae	Uloborus	<i>Uloborus</i> sp.1	Web builders
		<i>Uloborus</i> sp.2	Web builders

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SUMMARY

During preliminary investigation of spiders in Milam Valley, Nanda Devi Biosphere Reserve, the authors documented a total of 86 species/morphospecies under 39 genus and 16 families. Araneidae was the most dominant family recording 26 species belonging to 8 genera. Spider fauna in the valley was rich and diverse. More extensive surveys are needed to be carried out in these unexplored regions of the Himalayas to document various species of spiders and other micro fauna.

Key words: Diversity, Spiders, Nanda Devi Biosphere Reserve, Milam Valley.


मिलम घाटी, नन्दा देवी जीव मण्डल संरक्षित क्षेत्र पश्चिमी हिमालयी भूभाग में ऊंचाईगत प्रवण के सहारे मिलती मकड़ियों की विविधता
शाजिया क्वासिन व वी.पी. उनियाल

सारांश

मिलम घाटी, नन्दा देवी जीव मण्डल संरक्षित क्षेत्र में मकड़ियों का प्रारम्भिक अन्वेषण करने के दौरान लेखकों ने कुल मिलाकर 16 वर्णों की उन प्रजातियों में आती 86 जातियों/रचनाजातियों को प्रलेखित किया। एरेनेहिड सर्वाधिक बहुल वंश रहा जिसकी 8 प्रजातियों में आती 26 जातियां आलेखित हुईं मकड़ियां इस घाटी में बहुत अधिक और तरह-तरह की मिलती हैं। हिमालयी भूभाग के अनखोजे इन क्षेत्रों में अधिक विस्तृत और सर्वेक्षण करने की आवश्यकता है ताकि यहां मिलने वाली मकड़ियों और सूक्ष्म जीवों की अन्य जातियों को प्रलेखित किया जा सके।

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