

# Bugs & ALL

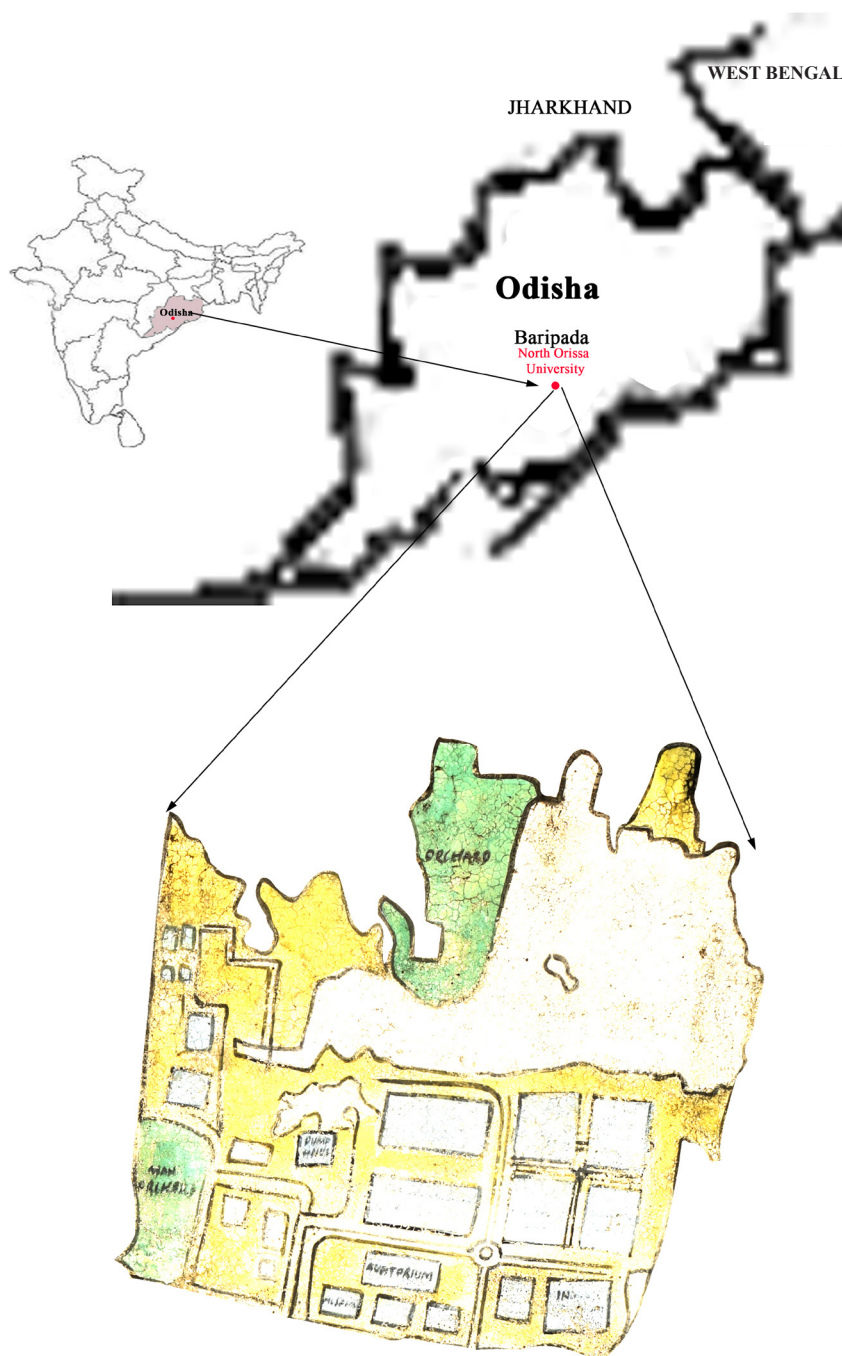
Invertebrate Conservation & Information Network of South-Asia (ICINSA)

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## A note on invertebrate fauna of North Orissa University Campus, Odisha, India

The present study deals with the documentation of the invertebrate diversity in North Orissa University (NOU) campus situated in Mayurbhanj District, Odisha. The study aims to maximize and estimate the invertebrate diversity as well as ecological value. Our aim is to develop the green space of the current estate and to contribute, whereas possible, to local, regional and national biodiversity targets. Inside the NOU campus, varieties of ornamental trees *Syagrus romanzoffiana*, *Zinnia peruviana*, *Murraya paniculata*, and *Cassia fistula* have been planted, and many species of butterflies *Ariadne ariadne*, *Danaus chrysippus*, *Melanitis leda*, and *Polyura athamas* provide aesthetic value.

The NOU campus (21.9299° N, 86.7658° E) of 98 acres is approximately 108 km away from Similipal Biosphere



Study area map.

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## Road Network.

Reserve. The campus supports a high diversity of plants including several rare, exotic, as well as native species. The entire campus is rich with green vegetation having garden lands, botanical garden, large trees, shrubs, herbs and grasses of different types. The whole campus has a good concrete road network.

Detailed field surveys were carried out daily from 28 September 2019 to 10 March 2020. Both direct and indirect sampling methods were employed to understand the diversity of invertebrate (butterfly, spider, dragonfly, damselflies) and other insects. The survey covered the autumn (20–30 °C) and winter (15–28 °C) seasons. Besides, several trapping methods, random walks, survey transects, trap stations, and point counts were established at each sampling site. The survey was carried out by three persons for a minimum of four hours during each sampling period twice a day (0600–0800 h and

1600–1800 h) for seven days at each site. The invertebrate fauna was observed using the quadrant method and the Lepidoptera, Aranea, Odonata, and Hymenoptera were recorded by frequency of occurrence. For the study of moths as well as other nocturnal invertebrates, we used light trap method and details of the invertebrate-specific methodology using related literature.

The identifications were done by experts, field guides, and relevant literature (Chapman & Capco 1951; Raju & Ramachandran 2016). The use of digital gears (cameras and head torch), butterfly nets, etc. for digital collections and identifications (photos, audio-video clips of different activities of invertebrates) were carried out during the survey. Other observations like habitat, various life stages as well as direct and indirect sign like moults were also recorded. Blattodea, Coleoptera, and Orthoptera were studied by the direct sighting and indirect



## Grassland.

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**Table 1. Total number of invertebrate and the percentage of occurrence of invertebrate order in the present campus.**

	Orders	Species	Percent occurrence
1	Araneae	28	19.71
2	Blattodea	3	2.11
3	Coleoptera	7	4.92
4	Decapoda	1	0.70
5	Diptera	7	4.52
6	Haplotaxida	3	2.11
7	Hemiptera	4	2.81
8	Hirudinida	1	0.70
9	Hymenoptera	8	5.63
10	Lepidoptera	44	30.98
11	Mantodae	1	0.70
12	Orthoptera	5	3.52
13	Odonata	17	11.57
14	Phasmatodea	1	0.70
15	Polydesmida	2	1.40
16	Scolopendromorpha	1	0.70
17	Scorpiones	1	0.70
18	Scutigermorpha	1	0.70
19	Spirobolida	2	1.40
20	Stylommatophora	5	3.52
	<b>Total recorded species</b>	<b>142</b>	<b>100</b>

signs, like moults, as road kills, and calls along transects as well as quadrants. For measuring the percentage of occurrence of families we used the following formula (Basavarajappa 2006).

$$\text{Percentage Occurrence} = \frac{\text{No. of species of each Family}}{\text{Total no. of different species seen}} \times 100$$

A total of 142 species of invertebrates from 20 orders belonging to 56 families were recorded – the order of Araneae (spiders), Blattodea (roaches and cockroaches), Coleoptera (beetles), Decapoda (crabs), Diptera (flies), Haplotaxida (earthworms), Hemiptera (plant-bug), Hymenoptera (wasps, bees and ants), Hirudinida (leeches) Lepidoptera (butterfly and moth), Libellulidae (skimmers), Mantodae (mantis), Odonata (dragonfly and damselfly), Orthoptera (grasshoppers and crickets), and Phasmatodea (stick insects, stick-bugs), and other insects. One species of ant *Dorylus laevigatus* was found invasive.

## Araneae

A total of 28 species belonging to six families were recorded. Araneidae was recorded as having highest species richness followed by Salticidae, Oxyopidae, Lycosidae, Tetragnathidae, and Pisauridae. Field guides and literature review (Gajbe 2008; Choudhury et al. 2019) helped in the identification along with expert help.

## Odonata

For the identification of odonates, we used the field guides (Subramanian 2005; Nair 2011), experts' help, and various other research papers (Kalita et al. 2014; Silsby 2011). A total of 17 species were recorded belonging to four families from which, Libellulidae was recorded highest species richness, followed by Coenagrionidae, Aeshnidae and lastly Platycnemididae.



Table 2. List of Araneae.

	Order	Family	Scientific name	Guild	Distribution in Campus
1.	Araneae	Araneidae	<i>Eriovixia laglaizei</i>	Orb-weaver spider	C
2.			<i>Laucage tessellate</i>	Long- jawed orb weavers	C
3.			<i>Aranus bilunifer</i>	Orb-weaver spider	C
4.			<i>Araneus mitificus</i>	Orb-weaver spider	C
5.			<i>Larinia</i> sp.	Orb-weaver spider	UC
6.			<i>Argiope aemula</i>	Signature spider	A
7.			<i>Neoscona</i> sp.	Orb-weaver spider	A
8.			<i>Argiope minuta</i>	Signature spider	C
9.			<i>Cyclosa confraga</i>	Orb-weaver spider	C
10.			<i>Cyclosa insulana</i>	Orb-weaver spider	R
11.			<i>Cylosa spirifera</i>	Orb-weaver spider	R
12.			<i>Nephilia pilipes</i>	Golden orb-web spider	A
13.			<i>Cyclosa hexatuberculata</i>	Orb-weaver spider	C
14.			<i>Thwaitesia</i> sp.	Mirror spider	C
15.			<i>Zygeilla</i> sp.	Orb-weaver spider	A
16.		Lycosidae	<i>Hippasa</i> sp.	Wolf spider	C
17.		Oxyopidae	<i>Oxyopes salticus</i>	Lynx spider	UC
18.			<i>Oxyopes bhartae</i>	Lynx spider	UC
19.			<i>Peucetia viridians</i>	Lynx spider	C
20.			<i>Oxyopes javanus</i>	Lynx spider	C
21.		Pisauridae	<i>Dendrolycosa gitae</i>	Nursery web spider	C
22.		Salticidae	<i>Marpissa decorate</i>	Jumping spider	C
23.			<i>Thyene imperialis</i>	Jumping spider	C
24.			<i>Stenaelurillus gabrieli</i>	Jumping spider	C
25.			<i>Hyllus semicupreus</i>	Jumping spider	UC
26.			<i>Stenaelurillus gabrieli</i>	Jumping spider	C
27.			<i>Harmochirus branchiatus</i>	Jumping spider	UC
28.		Tetragnathidae	<i>Leucauge decorate</i>	Long- jawed orb weavers	UC

# Bugsnail

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**Table 3. List of Lepidoptera.**

	Order	Family	Scientific Name	Common Name	Distribution in Campus
1.	Lepidoptera	Hesperiidae	<i>Potanthus omaha</i>	Lesser Dart	R
2.			<i>Tanaecia lepidea</i>	Grey Count	R
3.			<i>Cigaritis vulcanus</i>	Common Silverline	R
4.			<i>Anthene lycaenina</i>	Common Pointed Cilliatedblue	R
5.			<i>Castalius rosimon</i>	Common Pierrot	UC
6.			<i>Acytolepis Puspa</i>	Common Hedge Blue	UC
7.		Lycaenidae	<i>Loxura atymnus</i>	Common Yamfly	C
8.			<i>Curetis thetis</i>	Indian Sunbeam	R
9.		Nymphalidae	<i>Ariadne ariadne</i>	Angled Castor	C
10.			<i>Acraea terpsicore</i>	Tawny Coster	C
11.			<i>Ypthima huebneri</i>	Common Furring	C
12.			<i>Danaus chrysippus</i>	Plain Tiger	C
13.			<i>Hypolimnas bolina</i>	Great Eggfly	R
14.			<i>Melanitis leda</i>	Common Evening Brown	C
15.			<i>Junonia almana</i>	Peacock Pansy	R
16.			<i>Junonia atlites</i>	Grey Pansy	R
17.			<i>Ariadne merione</i>	Common Castor	UC
18.			<i>Elymnias hypermnestra</i>	Common Palmfly	R
19.			<i>Moduza procris</i>	Commander Butterfly	R
20.			<i>Euploea sylvester</i>	Double Branded Crow	C
21.			<i>Neptis hylas</i>	Common Sailor	R
22.			<i>Junonia orithya</i>	Blue Pansy	R
23.			<i>Mycalesis perseus</i>	Bush Brown	UC
24.			<i>Phalanta phalantha</i>	Common Leopard	R
25.			<i>Polyura athamas</i>	Common Nawab	R
26.			<i>Euthalia nais</i>	Baronate	R
27.			<i>Vanessa cardui</i>	Painted Lady	R
28.			Pailionidae	<i>Pachliopta aristolochiae</i>	Common Rose
29.		<i>Papilio demoleus</i>		Lime Butterfly	R
30.		<i>Graphium Agamemnon</i>		Tailed Jay	R
31.		<i>Graphium polices</i>		Common Swordtail	R
32.		Pieridae	<i>Eurema hecabe</i>	Common Grass Yellow	C
33.			<i>Delias eucharis</i>	Common Jezebel	UC
34.			<i>Catopsilia Pomona</i>	Common Emigrant	C

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	Order	Family	Scientific Name	Common Name	Distribution in Campus
35.	Lepidoptera	Pieridae	<i>Eurema blanda</i>	Three Spotted Grassyellow	UC
36.			<i>Cepora nerissa</i>	Common Gull	UC
37.		Cambridae	<i>Samea multiplialis</i>	Salvinia Stem Borer	C
38.			<i>Cnaphalocrocis medianails</i>	Rice Leafroller	C
39.			<i>Pyrausta purpuralis</i>	Mint Moth	R
40.		Erebidae	<i>Mocis frugalis</i>	Sugarcane Looper	C
41.			<i>Argina astrea</i>	Crotalaria Podborer	UC
42.			<i>Amata huebneri</i>	Wasp Moth	C
43.		Geometridae	<i>Scopula ornata</i>	Lace Border	C
44.		Noctuidae	<i>Chalciopse mygdon</i>	Triangular Striped Moth	R

Table 4. List of Odonata.

	Order	Family	Scientific Name	Common Name	Distribution in Campus
1	Odonata	Aeshnidae	<i>Gynacantha dravida</i>	Indian Dusk Hawker	A
2		Libellulidae	<i>Orthetrum pruinosum</i>	Crimson Tailed Marsh Hawk	C
3			<i>Protamarcha congener</i>	Common Chaser	C
4			<i>Brachydiplax farinose</i>	Emerald Flanked Marsh Hawk	UC
5			<i>Urothemis signata</i>	Greater Crimson Glider	C
6			<i>Orthetrum Sabina</i>	Green Marsh Hawk	A
7			<i>Diplocodes trivialis</i>	Ground Skimmer	C
8			<i>Brachydiplax sobrina</i>	Little Blue Marsh Hawk	UC
9			<i>Brachydiplax chalybea</i>	Rufous backed Marsh Hawk	C
10			<i>Pantala flavescens</i>	Wandering Glider	R
11			Coenagrionidae	<i>Ceriagrion coromandelium</i>	Coromandel Marsh Dart
12		<i>Ischnura aurora</i>		Golden Dartlet	A
13		<i>Agriocnemis lecteola</i>		Milky Dartlet	C
14		<i>Agriocnemis femina</i>		Pruinosed Dartlet	R
15		<i>Pseudagrion decorum</i>		Three Striped Blue Dart	UC
16		<i>Agriocnemis pygmaea</i>		Wandering Midget	C
17		Platycnemididae	<i>Copera marginipes</i>	Yellow Bush Dart	C



Table 5. Checklist of other invertebrates.

	Order	Family	Scientific Name	Common name / Guild	Distribution in Campus
1.	Blattodea	Blattidae	<i>Blatta orientalis</i>	Oriental cockroach	C
2.			<i>Periplaneta americana</i>	Bombay canary	A
3.		Rhinotermitidae	<i>Coptotermes gestroi</i>	Formosan subterranean termite	A
4.	Coleoptera	Carabidae	<i>Anthia sexguttata</i>	Six spotted tiger beetle	C
5.		Coccinellidae	<i>Coccinella septempunctata</i>	Seven spotted lady beetle	C
6.			<i>Harmonia axyridis</i>	Asian multicolored lady beetle	C
7.		Lampyridae	<i>Lampyris noctiluca</i>	Common glow worm	C
8.		Scarabaeidae	<i>Oryctes rhinoceros</i>	Coconut rhinoceros beetle	C
9.			<i>Onthophagus cervus</i>	Dung beetle	A
10.		Tenebrionidae	<i>Tenebrionidae alphaltobius</i>	Long jointed beetle	C
11.	Decapoda	Portunidae	<i>Scylla serrata</i>	Mud crab	C
12.	Diptera	Culicidae	<i>Anopheles culifacies</i>	Mosquito	C
13.			<i>Anopheles jamesii</i>	Mosquito	C
14.			<i>Anopheles karwari</i>	Mosquito	C
15.			<i>Culex bitaeniorhynchus</i>	Mosquito	C
16.		Rhiniidae	<i>Stomorphina melastoma</i>	Fire fly	C
17.		Sarcophagidae	<i>Sarcophaga nodosa</i>	Flesh fly	C
18.		Tipulidae	<i>Crane fly Spp</i>	Crane fly	C
19.	Haplotaxida	Glossoscolecidae	<i>Pontoscolex corethrurs</i>	Earthworm	C
20.		Megascolecidae	<i>Amyntas corticis</i>	Earthworm	C
21.			<i>Perionyx excavates</i>	Earthworm	C
22.	Hemiptera	Coreidae	<i>Anasa tristis</i>	Squash bug	C
23.			<i>Leptoglossus opposites</i>	Leaf footed bug	C
24.		Pentatomidae	<i>Halyomorpha halys</i>	Brown marmorated stink bug	C
25.		Pyrrhocoridae	<i>Dysdercus cingulatus</i>	Red cotton stainer	C
26.	Hirudinida	Hirudinidae	<i>Hirudinaria manillensis</i>	Asian medicinal leech	R
27.	Hymenoptera	Apidae	<i>Apis mellifera</i>	Honey bee	C
28.		Formicidae	<i>Oecophylla smaragdina</i>	Weaver ant	A
29.			<i>Paratrechina longicornis</i>	Black crazy ant	A



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	Order	Family	Scientific Name	Common name / Guild	Distribution in Campus
30.	Hymenoptera		<i>Camponotus pennsylvanicus</i>	Black carpenter ants	C
31.			<i>Solenopsis geminate</i>	Fire ant	C
32.			<i>Dorylus laevigatus</i>	Driver ants	R
33.		Sphecidae	<i>Sphex lucae</i>	Thread waisted wasp	C
34.		Vespidae	<i>Ropalidia marginata</i>	Yellow paper wasp	A
35.	Mantodae	Mantidae	<i>Statilia maculate</i>	Mantis	C
36.	Orthoptera	Acrididae	<i>Gesonula punctifrons</i>	Oyxa grasshopper	A
37.			<i>Patanga succinct</i>	Bombay locusts	C
38.		Gryllidae	<i>Acheta domesticus</i>	House cricket	A
39.		Gryllotalpidae	<i>Gryllotalpa orientalis</i>	Oriental mole cricket	C
40.		Pyrgomorphidae	<i>Atractomorpha crenulata</i>	Tobacco grasshoppers	C
41.	Phasmatodea	Lonchodidae	<i>Carausius morosus</i>	Indian stick insect	C
42.	Polydesmida	Paradoxosomatidae	<i>Chondromorpha xanthotricha</i>	Millipede	A
43.			<i>Oxidus gracilis</i>	Hothouse millipede	A
44.	Scolopendromorpha	Scolocrylopidae	<i>Scolopocryptops sexspinosus</i>	Bark centipede	C
45.	Scorpiones	Scorpionidae	<i>Heterometrus bengalensis</i>	Indian Black Scorpion	C
46.	Scutigermorpha	Scutigeraidae	<i>Scutigera coleoptrata</i>	House centipede	C
47.	Spirobolida	Spirobolidae	<i>Narceus americanus</i>	Worm millipede	A
48.		Trigoniulidae	<i>Trigoniulus corallines</i>	Common Asian millipede	A
49.	Stylommatophora	Achatinidae	<i>Achatina fulica</i>	Giant African Snail	C
50.		Ariophantidae	<i>Ariophanta laidlayana</i>	Air breathing land snail	C
51.			<i>Ariophanta interrupta</i>	Air breathing land snail	C
52.			<i>Macrochlamys indica</i>	Air breathing land snail	A
53.		Planorbidae	<i>Indoplanorbis existus</i>	Air-breathing freshwater snail	C

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*Junonia atlites*. © Parvez Khan.



*Junonia almana*. © Prajna Parimita Sahoo.



*Chondromorpha xanthotricha*.  
© Parvez Khan.



*Orthetrum Sabina*. © Parvez Khan.



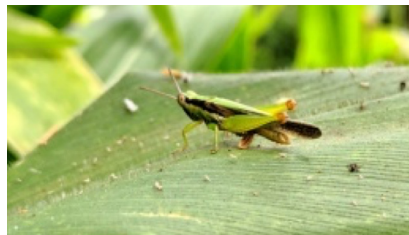
*Anthia sexguttata*. © Parvez Khan.



*Argiope minuta*. © Prajna Parimita Sahoo.



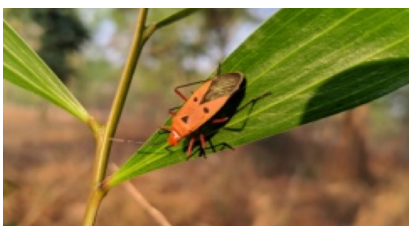
*Nephila pilipes*. © Parvez Khan.



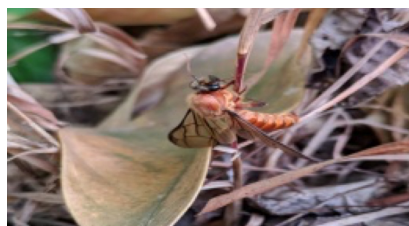
*Gesunula punctifrons*. © Subhadra Barik.



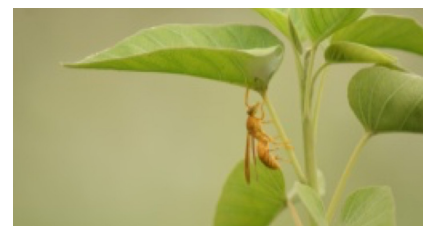
*Ceriagrion coromandelium*. © Prajna Parimita Sahoo.



*Dysdercus cingulatus*. © Prajna Parimita Sahoo.



*Dorylus laevigatus*. © Prajna Parimita Sahoo.



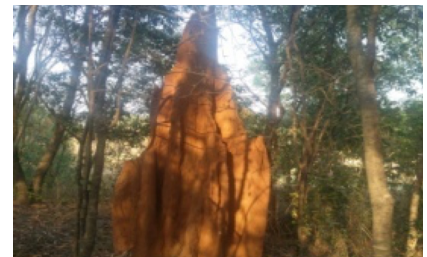
*Ropalidia marginata*. © Parvez Khan.



*Coptotermes gestroi*. © Parvez Khan.



A Hive of Honeybee. © Parvez Khan.

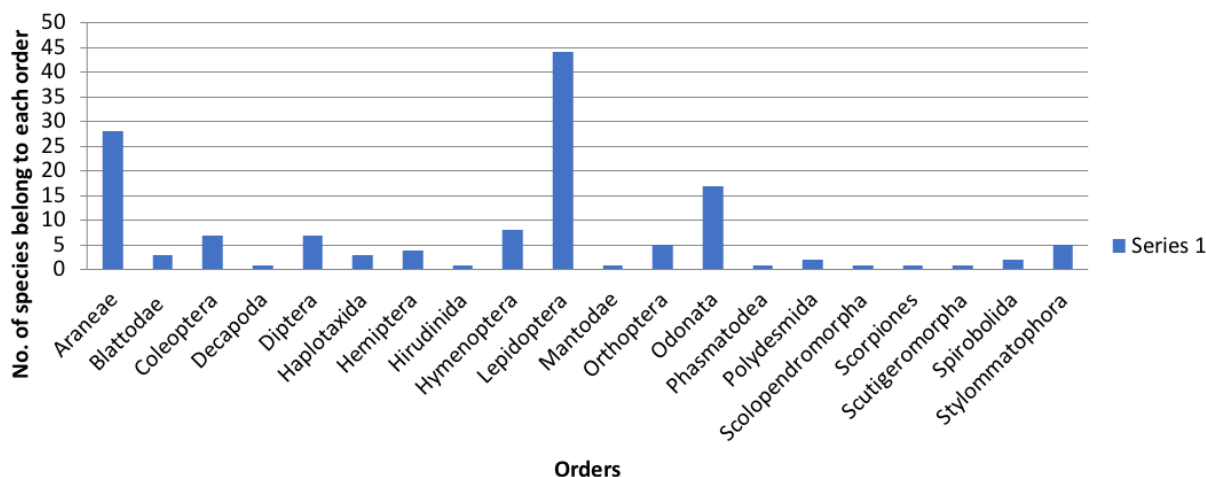


A Termitarium. © Parvez Khan.

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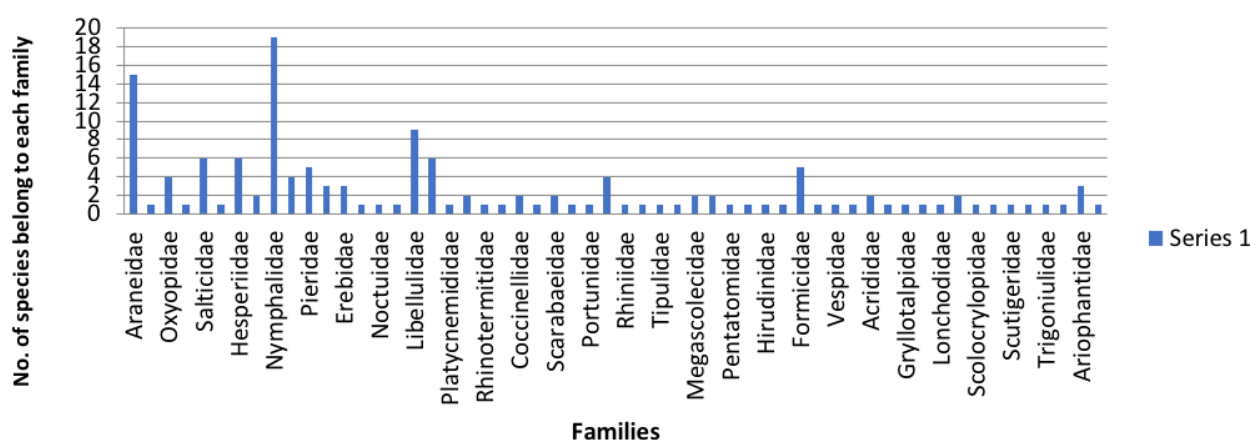
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## Occurrence of Insects Orders



Occurrence of Insect orders recorded from the campus.

## Occurrence of Invertebrate Families



Occurrence of Invertebrate families recorded from the campus.

Damselly species *Orthetrum pruinosum* and *Orthetrum sabina* were observed abundant and one species *Pantala flavescens* was observed only two times.

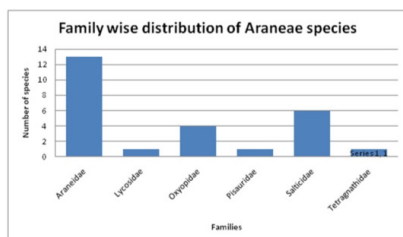
### Hymenoptera

The hymenopterans including ants *Campanotus* sp. and *Dorylus laevigatus*,

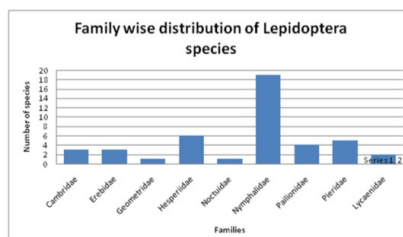
*Oecophylla* sp., *Paratrechina* sp., *Solenopsis* sp., bees *Apis mellifera* wasps *Ropalidia marginata*, *Sphex* sp.) were reported in the diet of the Jungle Owlet and Spotted Owlet. A total of eight species belonging to four families were recorded from the whole study area. Among all the orders, Apidae, showed highest species richness followed by

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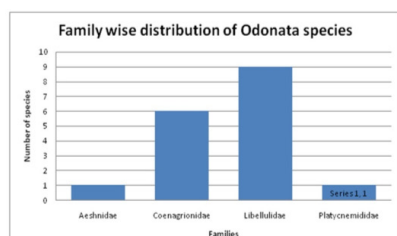
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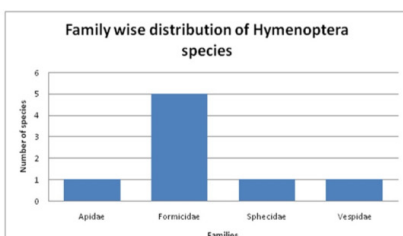
**Fig 3. Species richness of the Araneae families recorded from the campus**



**Fig 4. Species richness of the Lepidoptera families recorded from the campus**



**Fig 5. Species richness of the Odonata families recorded from the campus**



**Fig 6. Species richness of the Hymenoptera families recorded from the campus**

Formicidae, Sphecidae, and Vespidae recorded during this survey. For the identification of species name and family, we used field guide (Chapman & Capco 1951; Subramanian 2005) and relevant literature (Sureshan 2009).

## Lepidoptera

According to the survey, a total of 44 species belonging to nine families were recorded. The order Nymphalidae recorded highest species richness followed by Hesperidae, Pieridae, Pailionidae, Crambidae, Erebidae,

Lycaenidae, Geometridae, and Noctuidae. For the identification of Lepidopterans, we used field guides (Raju & Ramachandran 2016), relevant literatures like (Nerlekar et al. 2016). Some species of butterflies *Polyura athamas*, *Phalanta phalantha*, *Hypolimnas bolina*, and *Tanaecia lepidea* were noticed only one or two times.

## Coleoptera

From the order Coleoptera, eight species belonging to five families were recorded, and *Anthia sexguttata* was

noticed only one time. Two families of Coleoptera, i.e., Coccinellidae and Scrabaeidae, were reported having two species each, and Carabidae, Lampyridae, & Tenebrionidae were reported having one species each. The checklist is following Kharel et al. (2020).

## Blattodea

Three species of Blattodea belong to two families (Blattidae & Rhinotermitidae) were reported. We observed many terminarium and used shadow estimation method for measuring the height (approximately 3.5 m height) of *Coptotermes gestroi's* terminarium.

Besides this, other members of invertebrate order like Stylommatophora were recorded. Five species belonging to three families, Homoptera, Decapoda, Diptera, Haplotaaxida, Hemiptera, Isoptera, Hirudinidae (Leech), Mantodae, Orthoptera, Phasmatodea, Polydesmida, Scolopendromorpha, Scorpiones, Scutigermorpha

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and Spirobolida were reported but in low species occurrence. The research paper (Nagpal & Sharma 1984) and (Nguyen 2007) were used for understanding about millipede and mosquito.

## Conclusion

Since it is a preliminary study on the diversity of invertebrate, a lot of research is essential for the same and further collections are needed for getting a detailed record of the invertebrate diversity in NOU. We recognize that activities like changing land-use in form of development inside the campus, habitat loss in form of littering, fire, and removal of herbaceous and arboreal vegetation create a great threat to the invertebrate diversity.

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