



Moths Diversity in Barsuan Range, Bonai Forest Division, Odisha, India and their Ecological Importance

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Moths are a group of insects belonging to Class Insecta and Order Lepidoptera. Butterflies are also coming under the Order Lepidoptera and moths can be mistaken as butterflies. Moths and their caterpillars are important food for many species of amphibians, small mammals (such as bats) and many birds. They pollinate flowers while feeding on their nectar, and therefore help in seed production. This includes wild plants, garden plants and food crops. Keeping the importance of moth, an attempt has been made to document the moth diversity of Barsuan Range, Bonai Forest Division, Odisha during 2021-2022. The results revealed that about 31 species of moths were observed. The ecological importance of the available moths is discussed in the present study. The paper highlights the importance of insects in balancing the ecology of Barsuan range, Bonai Forest Division, Odisha, India.

Keywords: Moth; lepidoptera; pollination; food of prey.

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1. INTRODUCTION

Insects are a class of living organisms within the arthropods that have a chitinous exoskeleton, a three-part body (head, thorax and abdomen), three pairs of jointed legs, two compound eyes, and two antennae [1]. Moths are a group of insects belonging to Class Insecta and Order Lepidoptera. Moths have shorter, feathery antennae and rest with their wings open while butterflies have long, thin antennae and usually rest with their wings closed. There are approximately 157,424 species of moths reported globally [2]. Generally, most of the moth species are nocturnal, but some of these are also diurnal and crepuscular. They are mainly fed on flowering plant parts, such as; flower, nectar, tree sap, fruits etc. and sometimes they eat silk clothes. Moths and butterflies have been widely used in ecological and conservation research worldwide because they are abundant, easy to sample, have a well resolved taxonomy, and high habitat conformity [3]. They have a family Erebidae which is among the largest families of moths containing about 1750 genera with approximately 24,500 described species [4]. Moths and their caterpillars are important food for many species of amphibians, small mammals (such as bats) and many birds. They pollinate flowers while feeding on their nectar, and therefore help in seed production. Many moths are economically important as they are used for silk harvesting from their cocoon. In Africa, larvae of many species are eaten by the native peoples and they do export to many countries. They also serve as major herbivores, linking primary producers and consumers in ecosystems. They are one of the important groups that play central role in numerous ecosystem processes as prey, herbivores and pollinators. Insects make an enormous contribution to both tropical diversity and ecosystem functioning.

They are one of the important pollinators in our ecosystems, they help in seed production of wild plants. More of wild plants means more diversified ecosystem. They are important indicators of change in biodiversity and environmental conditions in the surrounding areas. However, moths are rarely considered in conservation assessment [5]. In forest and grassland habitat and particularly in temperate forests, moths are richly represented, take part in vital ecological processes and deserve more conservation attention. This in particular since there are indications that moth diversity may accurately reflect conservation values" and "bio-

wealth of the range". Keeping the importance of moths, an attempt has been made to document the moth's diversity in Barsuan range of Bonai Forest Division, Sundargarh, Odisha, India. The range has rich flora and fauna along with mining activities [6-7]. The documentation of moths diversity brings attention towards the insect population and their role in forest ecology.

2. METHODOLOGY

A preliminary survey and field tour were scheduled from 2021-2022 in Barsuan Range, Bonai Forest Division, Sundargarh district of Odisha, India. Total 09 survey was made in the study areas (January, March, May, June, July, August, September, October, November). Field surveys were carried out during day and night at 5 different sites of Barsuan Range which are approximately 2 km away from each other. The landscapes are different (Near paddy field, near mining areas, near forest and inside forest areas). In experimental habitats moths' specimens were collected and photographed and then released. Specimens were identified by the authors using their morphological characters with the help of available literature.

3. RESULTS AND DISCUSSION

From the survey we found about 28 species of moth specimens and caterpillars of 3 moth species a total of 31 moth species belonging to 12 families from Barsuan Range, Bonai Forest Division of Odisha, India was observed (Fig. 1). Details are listed in Table 1. Among these 31 species of moths 3 species are considered as serious pests. The diversity of moths in the study areas shows the ecosystem status and importance of the area.

It was observed that all the 31 species of moths belong to 12 different families (Fig. 1 & Plate 1). From them 14 species belong to the family Erebidae, 3 species from Geometridae, 3 from Noctuidae, 2 from Cossidae, 2 from Drepanidae and 1 from Zygaenoidea, Bombycidae, Eupterotidae, Crambidae, Sphingidae, Arctiinae and Saturniidae respectively. Moths of family Erebidae are dominating the area followed by Noctuidae and Geometridae. *Xyleutes strix*, *Xyleutes persona* (stem borers) and *Lymantria mathura* (Major defoliator of *Shorea robusta*, *Mangifera indica*, *Mitragyna*, *Terminalia* and *Eugenia* spp.) are three serious pests. It was noticed that *Macrobrochis gigas* is very common in study area, its caterpillars are abundant.

Table 1. Checklist of moths recorded in the study areas

Family	Scientific name	Species descriptor
Arctiinae	<i>Syntomoides imaon</i>	Cramer, 1780
Bombycidae	<i>Bombyx huttoni</i>	Westwood, 1847
Cossidae	<i>Xyleutes persona</i>	Guillou, 1841
	<i>Xyleutes strix</i>	Linnaeus, 1758
Crambidae	<i>Patania balteata</i>	Fabricius, 1798
Drepanidae	<i>Deroca hidda</i>	Swinhoe, 1900
	<i>Teldenia vestigiata</i>	Butler, 1880
Erebidae	<i>Arctornis submarginata</i>	Walker, 1855
	<i>Artena dotata</i>	Fabricius, 1794
	<i>Cretonotos transiens</i>	Walker, 1855
	<i>Dasychira pudibunda</i>	Linnaeus, 1758
	<i>Erebus hieroglyphica</i>	Drury, 1773
	<i>Lymantria mathura</i>	Moore, 1866
	<i>L. semicincta</i>	Walker, 1855
	<i>Macrobrochis gigas</i>	Walker, 1854
	<i>Nygmia icilia</i>	Stoll, 1790
	<i>Nygmiiini</i> tribe	Holloway, 1999
	<i>Orvasca subnotata</i>	Walker, 1855
	<i>Olepa ricini</i>	Fabricius, 1775
	<i>Pareuchaetes insulata</i>	Walker, 1855
	<i>Rajendra biguttata</i>	Walker, 1855
Eupterotidae	<i>Eupterote pandya</i>	Moore, 1865
Geometridae	<i>Pingasa alba</i>	C. Swinhoe, 1891
	<i>Pingasa ruginaria</i>	Guenée, 1857
Noctuidae	<i>Zeheba aureatoides</i>	Holloway, 1993
	<i>Dysgonia latifascia</i>	Warren, 1888
	<i>Polytela gloriosae</i>	Fabricius, 1781
Saturniidae	<i>Thysanoplusia lectula</i>	Walker, 1858
	<i>Actias aelene</i>	Hubner, 1807
Zygaenidae	<i>Ambulyx moorei</i>	Moore, 1858
	<i>Chalcosia diana</i>	Butler, 1877

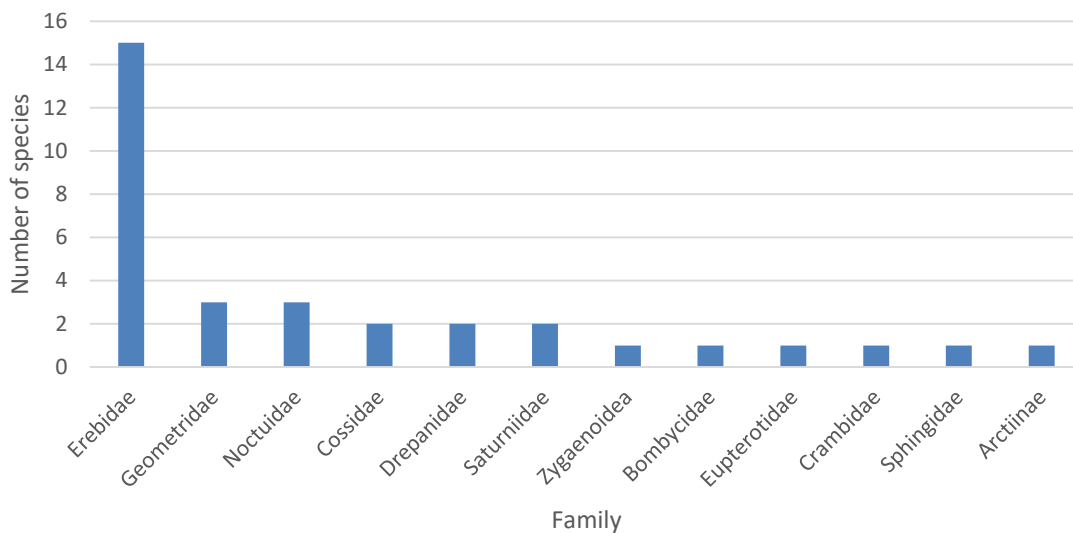


Fig. 1. Moth species diversity in study areas

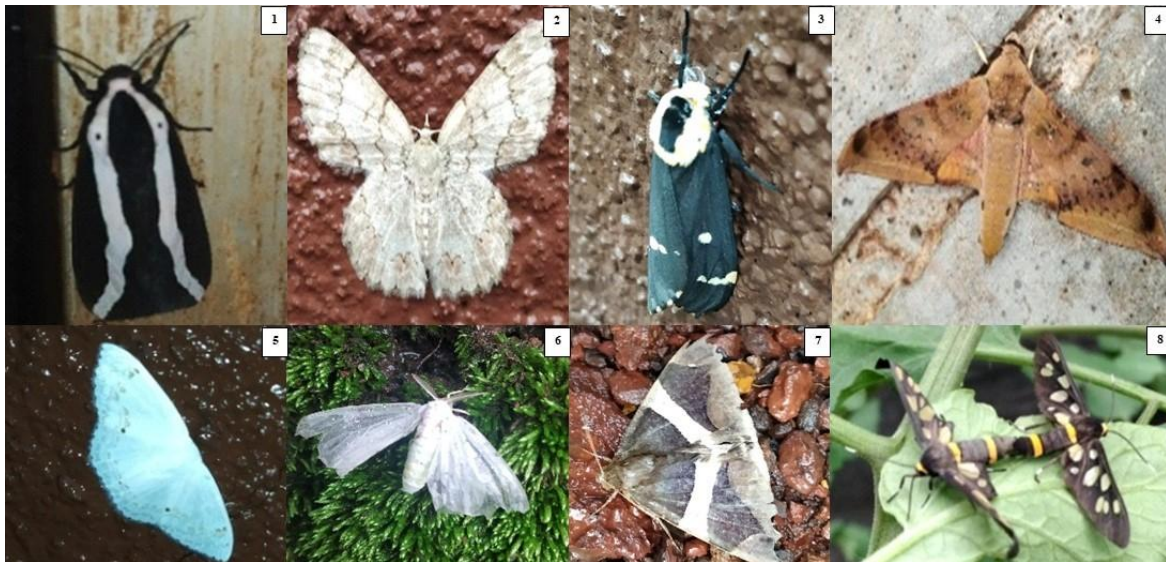


Plate 1. Some common moths in Barsuan range, 1) *Rajendra biguttata*, 2) *Pingasa cf. ruginaria*, 3) *Lymantria semicincta*, 4) *Ambulyx moorei*, 5) *Teldenia vestigiata*, 6) *Arctornis submarginata*, 7) *Dysgonia latifascia*, 8) *Syntomoides imaon*

Other researchers also have reported the moth's diversity from different parts of India. Singh et al. (2017) reported 81 species of moths from North-east Jharkhand [8]. In 2018, Jena et al. [9] reported 30 species of moths under 7 families from Gupteswar proposed reserve forest area of Eastern Ghats, Koraput, Odisha, India. In 2021, Pattanaik et al. [10] reported 154 species belonging to 129 genera and 19 families from Bhubaneswar, Odisha, India. Pawar et al. [11] reported 45 moth species from Panvel, Navi Mumbai, Maharashtra.

In 2021, Dar et al. [12] reported 758 species of moths from Aravalli Hill Range of Rajasthan, India. Komal et al. [2] reported 338 moths from Delhi. Alex et al. [13] reported 503 species of moths from Kavvai river basin of Kerala.

4. CONCLUSION

The study area is dominated by moths of family Erebiidae, Geometridae and Noctuidae. During the month of July and August we can observe huge number of caterpillars of *Macrobrochis gigas* of family Erebiidae on its host plants like *Shorea robusta* and *Artocarpus heterophyllus*. During rest months of studied period, authors observed less diversity. The study area is also home to one of the giant moths *Actias selene* (moon moth/ Indian luna moth) of family Saturniidae. The present study highlights the biodiversity of the study area and to bring attention towards their conservation.

5. RECOMMENDATIONS FOR FUTURE WORKS

A major limitation of this version of the article is that it only makes a descriptive comparison between species diversity, therefore there is need a quantitative data for each species. Furthermore, need of species similarity between different works along with the comparison among different environments and their possible effects on entomofauna.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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