Moths diversityin Barsuan Range, Bonai forest division, Odisha, India and their ecological importance

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. Moths 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 noted. 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

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] (Wilson2009). 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 are reported globally [2]. Generally, most of the moth species are nocturnal, but some of these are also diurnal and crepuscular. Moths mainly feeds 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]. Moths have a family Erebidae which is among the largest families of moths containing 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. Moths pollinate flowers while feeding on their nectar, and therefore help in seed production. This includes wild plants, garden plants and food crops. 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. Moths also serve as major herbivores, linking primary producers and consumers in ecosystems. Moths are one of the important groups that plays central role in numerous ecosystem processes as prey,

herbivores and pollinators. Insects make an enormous contribution to both tropical diversity and ecosystem functioning.

Moths 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. Moths are important herbivores, pollinators, and serve as food and hosts for multiple other organisms at higher trophic levels. Moths are important indicators of change in biodiversity and environmental conditions of 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. 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 moth diversity bring attention towards the conservation of bio-wealth of the range.

Methodology

A preliminary survey and field tour were scheduled from 2021-2022 in Barsuan Range,Bonai Forest Division,Sundargarh district of Odisha, India. Field surveys were carried out during day and night at 5 different sites of Barsuan Range which are approximately 2km away from each other. In experimental habitats moths' specimens were collected and photographed and then released. Specimens were identified by the authors usingtheir morphological characters.

Results and discussion

From the survey we found about 28 species of moth specimen 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 (Figure 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.

Comment [D1]: specimens

Table 1: Checklist of moths recorded in the study areas

Scientific name	**Family**
Actias aelene	Saturniidae
Ambulyxmoorei	Sphingidae
Arctornissubmarginata	Erebidae
Artenadotata	Erebidae
Bombyx huttoni	Bombycidae
Chalcosiadiana	Zygaenoidea

Creatonotostransiens	Erebidae
Dasychirapudibunda	Erebidae
Drepaninae spp.	Drepanidae
Dysgonialatifascia	Noctuidae
Erebus hieroglyphica	Erebidae
Eupterotepandya	Eupterotidae
Lymantria mathura	Erebidae
Lymantria semicincta	Erebidae
Macrobrochis gigas	Erebidae
Nygmiininygmiini spp.	Erebidae
Nygmiini spp.	Erebidae
Nygmiini-genera spp.	Erebidae
Olepariciniagg.	Erebidae
Pareuchaetesinsulata	Erebidae
Pataniabalteata	Crambidae
Pingasa alba	Geometridae
Pingasa CF. ruginaria	Geometridae
Polytelagloriosae	Noctuidae
Rajendrabiguttata	Erebidae
Syntomoidesimao	Arctiinae
Teldeniavestigiata	Drepanidae
Thysanoplusialectula	Noctuidae
Xyleutes persona	Cossidae
Xyleutesstrix	Cossidae
Zehebaaureatoides	Geometridae

It was observed that all the 31 species of moths belong to 12 different families (Figure 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. *Xyleutesstrix,xyleutes persona* (stem borers) and *Lymantria Mathura* (Major defoliator of *Shorearobusta, Mangifera indica, Mitragyna, Terminalia* and *Eugenia)* are three serious pests.*Macrobrochis gigas*is very common in this area, its caterpillars were abundant.

Figure 1: Moth species diversity in study areas

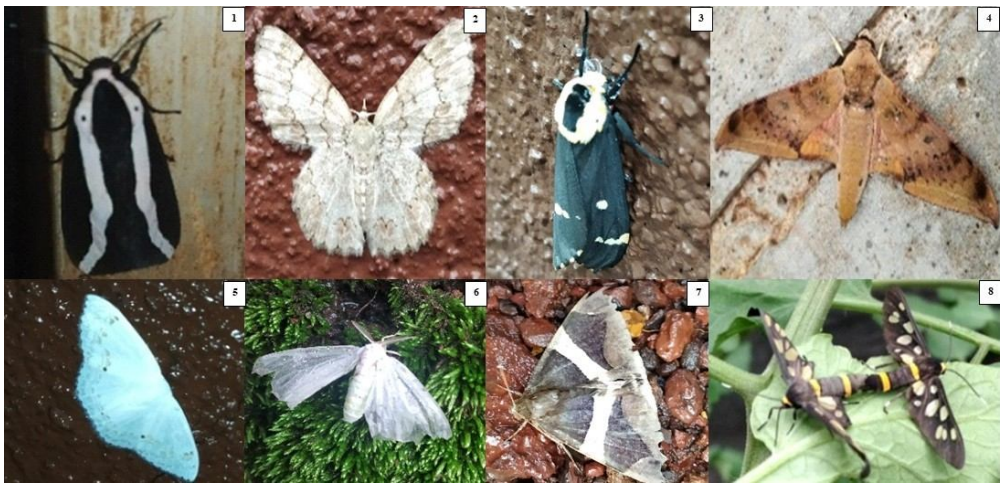

Plate 1: Some common moths in Barsuan range, 1) *Rajendra biguttata*, 2) *Pingasa cf. ruginaria*, 3) *Lymantria semicincta*, 4) *Ambulyxmoorei*, 5) *Teldeniavestigiata*, 6) *Arctornissubmarginata* 7) *Dysgonialatifascia*, 8) *Syntomoidesimaon*

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. reported 30 species of moths under 7 families from Gupteswarproposed reserve forest area of

Eastern Ghats, Koraput, Odisha, India [9]. In 2021, Pattanaik et al reported 154 species belonging to 129 genera and 19 families from Bhubaneswar, Odisha, India [10]. Pawar et al. (2021) reported 45 moth species from Panvel, Navi Mumbai, Maharashtra [11]. In 2021, Dar et al. reported 758 species of moths from Aravalli Hill Range of Rajasthan, India [12]. Komal et al. (2021) reported 338 moths from Delhi [2]. Alex et al. (2021) reported 503 species of moths from Kavvai river basin of Kerala [13].

Conclusion

Moths play very important role in ecosystem as they are important as primary consumers and pollinators. They lay their eggs on plant parts and when the larvae (caterpillars) hatch out they feeds upon leaves of the plants whereas imago (adult) moths feed upon different flowering parts and tree sap. Some adult moths do not feed as they lack of mouth like *Actias selene*and*Dasychirapudibunda*. The study area is dominated by moths of family Erebidae, Geometridae and Noctuidae. During the month of July and August we can observe huge number of caterpillars of *Macrobrochis gigas* of family Erebidae on its host plants like *Shorea robusta* and *Artocarpusheterophyllus*.The study area is 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.

Comment [D2]: feed

References

1. Loxdale HD. (2016). Insect science- a vulnerable discipline ?. EntomologiaExperimentalis et Applicata. 1-14.
2. Komal J, Shashank PR, Sondhi S, Madan S, Sondhi Y, Meshram NM and Anooj SS. (2021). Moths (Insecta: Lepidoptera) of Delhi, India: An illustrated checklist based on museum specimens and surveys. Biodiversity Data Journal 9: e73997.
3. Fiedler K andTruxa C. (2012). Species richness measures fail in resolving diversity patterns of speciose forest moth assemblages. Biodiversity Conservation. 21:2499–2508.
4. Homziak NT, Breinholt JW and Kawahara AY. (2016). A historical review of the classification of Erebine (Lepidoptera: Erebidae). Zootaxa. 10: 10.11646/zootaxa.4189.3.4.
5. Lintott PR, Brunnefeld N, Fuentes-Montemayor E, Minderman J, Blackmore L, Goulson D, Park KJ (2014) Moth species richness, Abundance and diversity in fragmented urban woodlands: implications for conservation and management strategies. BiodiversConserv. 23:2875–2901.
6. Kumar SN, Mishra S and Kumar S. (2021). *Polygala abyssinica* R.Br. ex Fresen. (Polygalaceae): A new addition to the flora of Odisha, India. Species. 22(70): 414-416.
7. Kumar SN, Marndi, S., & Kumar, S. (2021). Some Common Medicinal Plants in Barsuan Range, Bonai Forest Division, Sundargarh, Odisha. *Asian Journal of Biology*, *13*(3), 11-22. https://doi.org/10.9734/ajob/2021/v13i330186.

8. Singh N, Ahmad J and Joshi R. (2017). Diversity of moths (Lepidoptera) with new faunistic records from North East Jharkhand, India. Record of Zoological Survey of India. 117(4): 326-340.
9. Jena SK, Singh AP and De K. (2018). Diversity of moths (Insecta: Lepidoptera) in the Gupteswar Proposed Reserve Forest of the Eastern Ghat Hill, Koraput, Odisha, India: apreliminary study. 11(3): 11-17.
10. Pattamaik N, Satapathy A and Priyadarshini D. (2021). Moth (Lepidoptera: Heterocera) diversity of Bhubaneswar, Odisha, India: a preliminary study. Notulae Scientia Biologica. 13(3): 0934.
11. Pawar PR, Supnekar SP, Meshram LN, Pawar NB and Rokade AG. (2021). Checklist of moth fauna (Lepidoptera: Heterocera) from Panvel, Navi Mumbai, Maharashtra, West Coast of India. Uttar Pradesh Journal of Zoology. 42(13): 11-21.
12. Dar AH, Jamal K, Alhazmi A, Sharnouby ME, Salah M and Sayed S. (2021). Moth diversity, species composition, and distributional pattern in Aravalli Hill Range of Rajasthan, India,Saudi Journal of Biological Sciences. 28(9): 4884-4890.
13. Alex, C.J., K.C. Soumya & T.V. Sajeev (2021). A report on the moth (Lepidoptera: Heterocera) diversity of Kavvai River basin in Kerala, India. *Journal of Threatened Taxa* 13(2): 17753–17779.