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A hasty survey on diversity of moths (Lepidoptera: Heterocera) from Bargi region of Jabalpur (M.P.)

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Abstract

Lepidoptera is an order that includes moths (Heterocera). A preliminary analysis of the moth fauna in the catchment of the Bargi reservoir was conducted between 2021 and 2023, and it revealed a total of 30 moth species. Every attempt was made to discover and preserve the secret fauna of the Narmada basin and some nearby locations for the preservation of the environment's health. To ascertain the variety and occurrence of moths, collection of moths was done throughout the year. 30 moth species overall, belonging to 09 families, 29 Genus were obtained from the reservoir by the present findings utilizing simple light traps that were in operation from nightfall to dawn. Among the families represented in the collection samples were Noctuidae, Arctiidae, Pyralidae, Geometridae, Sphingidae, Saturniidae, Eupterotidae, Zygaenidae and Cosmopterygidae. There may be opportunities for new records, according to the study. The study has also indicated that there are possibilities of new records of moth family, genus and species of in Madhya Pradesh.

Keywords: Heterocera, Bargi reservoir, light trap, diversity, indicator

Introduction

The Narmada River is one of the most important aquatic resources in Madhya Pradesh, as well as an important ecological hub in central India, and is thus known as an epicentre for biodiversity research. Rich biodiversity indicates the ecological balance in the area, which is necessary for human survival (Ashok, 2017; Verma, 2018) ^[1, 25]. The anthropogenic activities, electronic wastes and climate change influence the biodiversity and sustainable development (Verma and Prakash, 2020a; Verma, 2021; Prakash and Verma, 2022) ^[27, 25, 20].

Insects are the largest (Verma and Prakash, 2020b) ^[28] and most diverse class, with both moths and butterflies belonging to the same order, Lepidoptera, which means "Scaled wings" in Greek. Moths (Heterocera) are one of the most diverse groups of insects. There are approximately 1, 27, 000 species of moths worldwide, with over 5000 species reported from India (Paul *et al.*, 2016) ^[18]. As per reports of ZSI (2017), a total of 313 species/subspecies of moths belonging to 221 genera and 25 families from central India, revealing a new record of 48 species of moths pertaining to genera and families. However, the Jabalpur moth fauna is represented by 42 species belonging to 38 genera and 6 families. Moths are important agricultural pests (Sharma, 2011; Sharma and Bisen, 2013) ^[23, 22], night pollinators (Devoto *et al.*, 2011) ^[8], and ecological health markers in urban vegetative areas (Holloway, 1985) ^[12]. The pesticides have negative effects on insect pests (Prakash and Verma, 2014) ^[19]. However, moth research is severely underfunded in central India. This study was primarily conducted to elucidate the biodiversity of previously unstudied moth fauna.

Materials and Methods

The findings presented here are based on random surveys carried out January 2021 to December 2023 in Bargi region, (35 km from Jabalpur bus stand) in Jabalpur region of river Narmada. Jabalpur is located between 23°10'N latitude and 79°56'E longitude. Moths are nocturnal so Light trap was use for the collection of them. Light traps were in the evening onwards till morning on next day using a 160W mercury vapour bulb over a three by three white cloth sheet which was hung between two vertical poles. The moths sitting on the white cloth were picked into the killing bottles containing chloroform (CHCl₃).

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Later they were pinned on insect stretching board using entomological pins and have been kept in the insect box for later identification. All specimens were well labeled and preserved in airtight insect box, having naphthalene balls as fumigant for later identification. The identification of moths was carried out in laboratory at Zoological Survey of India, Jabalpur with help of identified specimens and available literature such as Hampson (1895) ^[11] and Bell and Scott (1937a and 1937b) ^[2-3].

Results and Discussion: During the present study, total of 30

species of moths (Heterocera), belonging to 9 families, were collected from catchment of Bargi reservoir, Jabalpur by using light traps. The maximum number of moth species belonged to family Noctuidae (08 Species) while families Sphingidae and Pyralidae with 5-5 species, Saturniidae 03 sp. And Eupterotidae, Geometridae, Zygaenidae, Cosmopterygidae of moth each represented the minimum 02-02 species and Acrtiidae represented the minimum 01 species. Noctuidae members may account for their higher species richness (Table 01 & Figure 01).

Table 1: List of Moth (Heterocera) and their occurrence in Bargi Reservoir, Jabalpur (M.P.)

S. No.	Family	Name of Species	Occurrence
1.	Noctuidae	<i>Amsacta lineola</i> (Fabricus)	Common
2.		<i>Achaea janata</i> (Linnaeus)	Very Common
3.		<i>Chrysodeixis eriosoma</i> (Doubleday)	Common
4.		<i>Cosmophila erosa</i> (Hubner)	Rare
5.		<i>Thermesia rubicans</i> (Boisduval)	Very Common
6.		<i>Trigonodes hyppasia</i> (Cramer)	Rare
7.		<i>Hyblaea pueria</i> (Cramer)	Common
8.		<i>Pseudaletia separata</i> (Walker)	Very Common
9.	Acrtiidae	<i>Amsacta lineola</i> (Fabricus)	Common
10.	Sphingidae	<i>Acherontia styx</i> (Westwood)	Common
11.		<i>Acherontia lachesis</i> (Fabricius)	Not Rare
12.		<i>Deilephila nerii</i> (Linnaeus)	Rare
13.		<i>Herse convolvuli</i> (Linnaeus)	Not Rare
14.		<i>Theretra alecto</i> (Linnaeus)	Common
15.	Pyralidae	<i>Cirrhochrista brizalis</i> (Walker)	Not Rare
16.		<i>Nephopteryx rhodobasalis</i> (Hampson)	Common
17.		<i>Diaphania indica</i> (Saunders)	Common
18.		<i>Microthrix omichleua</i> (Mey)	Very Common
19.		<i>Ancylolomia chryographalla</i> (Kollar)	Common
20.	Saturniidae	<i>Actias selene</i> (Hubner)	Common
21.		<i>Antheraea paphia</i> (Linnaeus)	Common
22.		<i>Samia cynthia</i> (Drury, 1773)	Rare
23.	Eupterotidae	<i>Caligula thibeta extensa</i> (Butler)	Rare
24.		<i>Eupterote undara</i> (Blanch)	Very Common
25.	Geometridae	<i>Euchloris uvidula</i> (Swinhoe)	Very Common
26.		<i>Hyperythra swinhoei</i> (Butler)	Rare
27.	Zygaenidae	<i>Gynautocera papilionaria</i> (Guerin)	Rare
28.		<i>Campylotes histrionicus</i> (Westwood)	Rare
29.	Cosmopterygidae	<i>Lecithorus trigonopsis</i> (Meyrick)	Very Common
30.		<i>Caloptilia tetratypa</i> (Meyrick)	Very Common

Table 2: Summarization of collected data of Heterocera in Bargi reservoir.

Family	Genus	Species	Very Common	Common	Not Rare	Rare
9	29	30	8	11	3	8

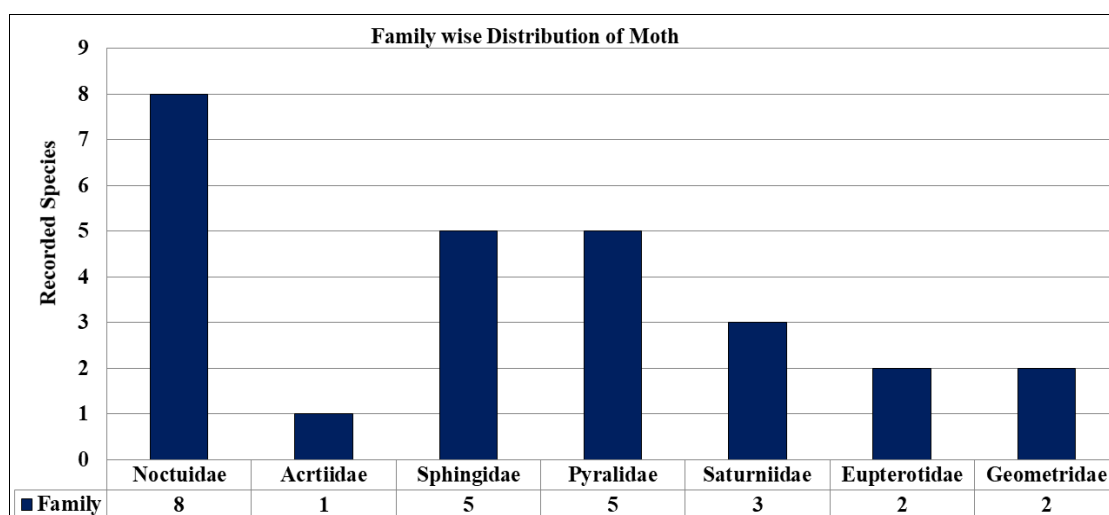


Fig 1: Familywise distribution of Heterocera in Bargi Reservoir Catchment

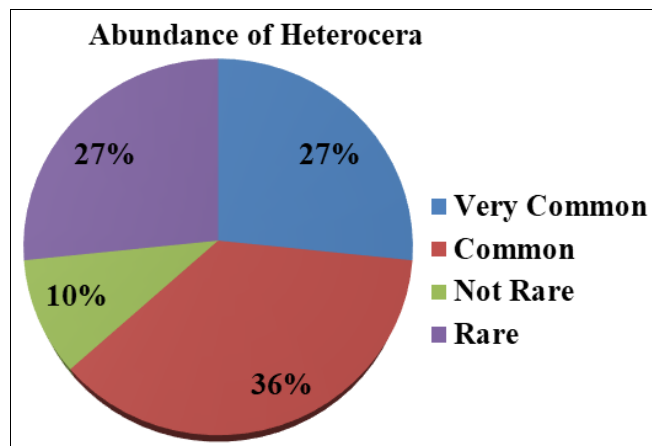


Fig 2: Occurrence of Heterocera in Bargi Reservoir Catchment

The occurrence of moth in study area was shown that, among 30 recorded species of moths, 8 species were found to be very common (27%), 11 species were common (36%), 8 species were rare (27%) and 3 species were not rare (10%) were found to the study areas shown in table 2 and Figure 2. It thus implies that further work undertaken in greater depth and covering large areas may reveal a rich biodiversity of moth fauna. Rare species were those which were encounter only 1 to 5 in numbers though out the study period.

Comprehensible surveys of moth diversity have been done in Madhya Pradesh and Chhattisgarh, which included the annotated list of all 313 species/subspecies of moths belonging to 221 genera and 25 families and incorporates the information on district-wise localities (Chandra and Nema, 2007) [5]. During the present study 7 species were recorded from Bargi reservoir which previously recorded by ZSI from Madhya Pradesh namely *Achaea janata*, *Thermesia rubicans* and *Trigonodes hyppasia* belongs to family Noctuidae; *Herse convolvuli* belongs to family Sphingidae; *Cirrhochrasta brizoalis* belongs to family Pyralidae; *Antheraea paphia* and *Actias selene* belongs to family Saturniidae as new record. In the same order Chandra and Sambath (2013) [6] reported the moth fauna of Tawang District, Arunachal Pradesh, India. During the survey, more than 250 morpho-species were collected, of which 102 species pertaining to 15 families were identified. The analysis of the fauna revealed that the moth fauna of the area is dominated by the family Geometridae, followed by Arctiidae, Drepanidae, Crambidae, Lymantriidae, Noctuidae, Uraniidae, Lasiocampidae, Sphingidae, Pyralidae, Zygaenidae, Bombycidae, Saturniidae, Pantheidae and Notodontidae. Saha and Raychaudhuri (1998) [21] reported about 31 moths from West Bengal while Gurule and Nikam (2013) [10] documented 260 moths only in the family Geometridae from the same state.

Throughout India, 15 species were previously reported by many authors such as *Chrysodeixis eriosoma* in Jabalpur by Singh and Rawat (1980) [24], *Hyblaea puera* on Soybean in M.P. by Verma *et al.* (1980) [29] and in teak forest of M.P. by Khan *et al.* (1988) [13], *Pseudaletia separate* in Tripura by Mandal and Ghosh (1991) [16], *Cosmophila erosa* in Orissa by Mandal and Maulik (1991) [17] of family Noctuidae; *Amsacta lineola* in West Bangal by Ghosh and Chaudhary (1997) [9] of family Arctiidae; *Acherontia styx*, *Acherontia lachesis*, *Deilephila nerii* and *Theretra alecto* by Bell and Scott (1937a) [2] of family Sphingidae; *Diaphania indica* in West Bangal by Bhattacharya (1997) [4], *Nephopteryx rhodobasali* and *Microthrix omichleula* by Kulkarni and Joshi (1998) [14]

of family Pyralidae: *Eupterote undata* by Cotes and Swinhoe (1886) [7] of family Eupterotidae: *Euchloris uvidula* and *Hyperythra swinhoei* by Hampson (1895) [11] of family Geometridae. Likewise many more species may be recorded in all seasons from this study area in future through systematic surveys covering. Generally, the diversity of insects and the diversity of angiosperms in a landscape show positive correlation since plants provide food, shelter, sites for mating, and oviposition to insects (Leps *et al.*, 2001) [15].

Conclusion

The biodiversity and occurrence of widespread moth fauna in the Bargi reservoir catchment are primarily due to the area's rich vegetation, as vegetation plays an important role in the existence of insect fauna in a community by providing the primary source of food, among other things. Future research will aid in understanding overall species diversity as well as seasonal variations in moth abundance in the Jabalpur region, as well as underlying biotic interactions.

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