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A Preliminary checklist of Moths species from Amravati city, Maharashtra (India)

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Abstract
Present study was an attempt to explore moth diversity from different parts of the Amravati city. A total number of 628 moths were identified up to the family level. Families Sphingidae, Noctuidae, Geometridae, Crambidae, Arctiidae, Lymantiidae and Saturnidae were represented in the identified samples. The diversity index of Noctuidae family 2.63 was high as compared to the other families. While the lowest diversity index was found in family Geometridae and Saturnidae.

Keywords: Moth, Diversity, Checklist, Family, Amravati.

Introduction
Diversity is the initial footstep to develop conservation goals for all arthropods (Gillespie 1999). Moths are one of the most diversified animals which are vital form of animals universally acknowledged and related to the butterfly belonging to the order Lepidoptera. They are worldwide in distribution and have imperative position in global ecosystem. Most of the lepidopterans are moths with approximately 160,000 species worldwide (Smithsonian Institution, 2012) many of which are yet to be described. Most of the species of moths are nocturnal, but there are also crepuscular as well as diurnal species. They play important roles throughout their life cycle like as herbivorous during their larval stage, as pollinators during their adult stage as well as food for predators and parasitoids throughout their life cycle (Scoble, 1992).

Lepidoptera is one of the most quantitative comparisons between insect faunas to be valid, especially their abundance, response to the vegetation as well as climate, species richness and relative advanced taxonomy (Holloway, 1984 and 1985). Although trapping of macrolepidoptera has been carried out widely in tropical and temperate region throughout the world but result are not directly comparable between areas of different light sources, trap design, trapping periods as well as taxonomic coverage. Macrolepidopteran families in tropical and subtropical countries includes some dominating families such as Noctuidae, Erabidae and Notodontidae etc. among these family Noctuidae is dominating, both in species diversity as well as numerical strength with more than 20,000 describe species (Srivastava, 2002). Due to high diversity of species, many species is highly reproductive, migratory and phytophagous feeding of their larvae, many species have posed serious problem for agricultural as well as forest pests (Kononenko and Pinratana, 2005).

Moth diversity studies are beneficial as moths are used as a bioindicators on tropical islands (Holloway, 1984) and in Australian rainforest (Kitching *et al.,* 2000). The aim of the present work was to identify and study the diversity index and evenness of moth species from Amravati city.

Materials and Methods
The study was carried in and around Amravati city, from Maharashtra state, located at $20^0$55'45.95" North to $77^0$45'32.87" East at an elevation of 1129 feet (www.googleearth.com). The region of Amravati faces variation in temperature with extremely hot summer and cold winter. The rainfall receives from south western monsoon mainly in the month of June, July, August and September. The average annual rainfall in the district is 852.1mm and temperature recorded between 18^0C to 46^0C.

The majority of moths are nocturnal in habit while very few are active in evening and diurnal. Most of the moths were attracted through the light traps technique, by using actinic tubes and mercury bulb of about 20 to 125 watt. Baiting techniques such as sugaring as well as use of fruit pulp is also successful for some of the nocturnal moths. But, the most suitable method used is sheet method. The white cloth sheet was used for attracting the moth along with a bright light source. All the moths were photographed using cannon digital 12Mpx. camera.

The identification of moth's specimens was carried out with the help of identification keys from The Fauna of British India (Hampson, 1894) and Zoological Survey of India (Jabalpur).

Result and Discussion
During this study, a total number of 628 species were identified belonging to 7 families. Table 1 shows the all identified moths checklist. Fig. a. shows the number of individual belonging to each family at Amravati city. The highest number of moth species (250) were recorded from family Noctuidae, similar type of result are recorded from a study carried out in Peshawar (Muhammad, 2009).While family Geometidae with a total number of 22 moth species, represented the lowest number. Table No. 2 shows diversity index and evenness of each family of moths. Fig. b. represents the diversity index of each family of moths in Amravati city area. The family Noctuidae had the highest diversity index of 2.63 while family Geometidae and Saturniidae showed the lowest value with 0.69 diversity index. The diversity of the moth fauna in Amravati city was observed to be mainly due to the rich vegetation. Vegetation plays an

important role for the existence of the insect fauna in a society as it provides the main source of the food for insects. For the existence of many species of lepidopterans the conservation of natural habitat is necessary.

According to Mathew and Rahmatullah (1993) survival of a large quantity of widespread species in a habitat warrants common monitoring of the environmental processes as well as adoption of suitable conservation strategies in order to protect its rich genetic diversity. During this study, family noctuiodae have more species richness than the other moth's families. This species rich diversity of noctuiodae is due to the nocturnal habit that they inhabit and get protect from many enemies directly in the day light. Moreover, family sphingidae fly only for short periods either around twilight or sunrise, hence exhibit less species richness than the Noctuidae. As compared to other families like Geometridae, Crambidae, Arctiidae, Lymantiidae and Saturniidae exhibit nocturnal as well as diurnal behavior which causes less species rich in this study area. The diversity of Lepidoptera is correlated with overall habitat quality, abundance, richness and composition of the flora as well as other invertebrates that they share the biological system (Uehara-Prado and Freitas, 2009).

Table No. 1. Checklist of all identified moth species

Sr. No.	Name of the Species	Family	Subfamily	No. of Species	Identified
1	*Acherontia styx styx* Ww	Sphingidae	Sphinginae	20	
2	*Agrius convolvuli convolvuli* (Linnaeus)	Sphingidae	Sphinginae	21	
3	*Daphnis nerii* (Linnaeus)	Sphingidae	Macroglossinae	23	
4	*Hippotion velox* (Fabricius)	Sphingidae	Macroglossinae	12	
5	*Theretra alecto alecto* (Linnaeus)	Sphingidae	Macroglossinae	16	7
6	*Hippotion Boerhaviae* (Fabricius)	Sphingidae	Macroglossinae	14	
7	*Macroglossum sp.*	Sphingidae	Macroglossinae	15	
10	*Anomis fulvida* (Guenee)	Noctuidae	Catocalinae	17	
11	*Asota caricae* (Fabricius)	Noctuidae	Aganainae	18	
12	*Remigia undata* (Fabricius)	Noctuidae	Catocalinae	21	
13	*Chrysodeixis eriosoma* (Doubleday)	Noctuidae	Plusiinae	18	
14	*Othreis fullonica* (Linnaeus)	Noctuidae	Calpinae	20	
15	*Ophideres maternal* (Linnaeus)	Noctuidae	Calpinae	16	
16	*Spirama retorta* (Clerck)	Noctuidae	Catocalinae	18	
17	*Spodoptera litura* (Fabricius)	Noctuidae	Hadeninae	19	
18	*Trigonides hyppasia* (Cramer)	Noctuidae	Catocalinae	15	
19	*Polytela gloriosae* (Fabricius)	Noctuidae	-	16	
20	*Aedia sp.*	Noctuidae	-	15	
21	*Remigia frigalis* (Fabricius)	Noctuidae	Catocalinae	19	14
22	*Ophiusa tirrhaca* (Cramer)	Noctuidae	Catocalinae	20	
23	*Grammodes geometrica* (Fabricius)	Noctuidae	-	18	
26	*Macaria fasciata* (Fabricius)	Geometridae	Ennominae	10	
27	*Ascotis selenaria* (Denis & Schiff)	Geometridae		12	2
28	*Caprinia conchylasis* (Guenee)	Crambidae	Spilomelinae	16	
29	*Diaphania indica* (Saunders)	Crambidae	Spilomelinae	18	
30	*Pygospila tyres* (Cramer)	Crambidae	Spilomelinae	15	
31	*Spoladea recurvalis* (Fabricius)	Crambidae	Spilomelinae	19	4
32	*Amata passalis* (Fabricius)	Arctiidae	Syntominae	15	
33	*Argina astrea* (Drury)	Arctiidae	Arctiinae	17	
34	*Pericallia ricini* (Fabricius)	Arctiidae	Arctiinae	14	
35	*Creatonotus lactineus* (Cramer)	Arctiidae	Arctiinae	17	
36	*Creatonotus gangis* (Linnaeus)	Arctiidae	Arctiinae	18	5
39	*Euproctis lunata* (Walker)	Lymantiidae	-	16	
40	*Euproctis sp.*	Lymantiidae	-	19	
41	*Lymantria sp.*	Lymantiidae	-	15	3
42	*Actias selene* (Hubner)	Saturniidae	Saturniinae	17	
43	*Antheraea mylitta* (Drury)	Saturniidae	Saturniinae	19	2
Total no. of species				628	37

Fig. a. Number of Individuals of each family of moths

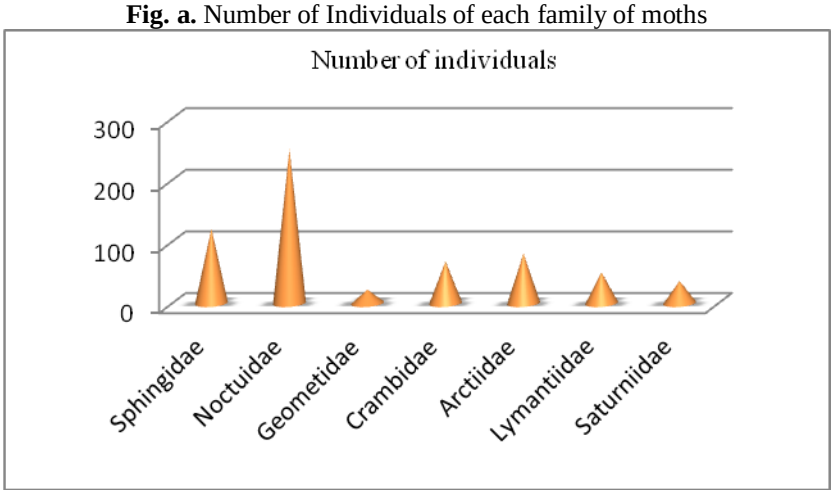
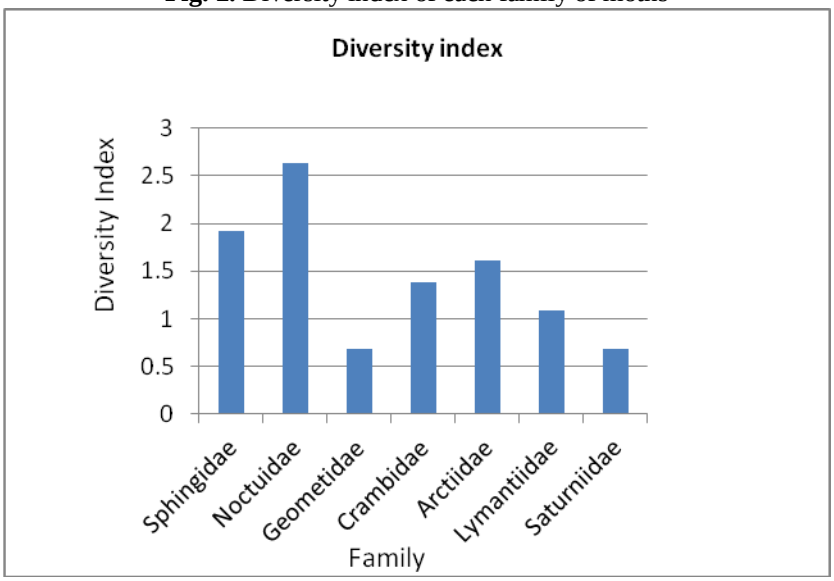


Table No. 2. Diversity index and evenness of each family of moths

Sr. No.	Family	Shannon diversity Index (H)	Evenness
1	Sphingidae	1.92	0.99
2	Noctuidae	2.63	1
3	Geometridae	0.69	1
4	Crambidae	1.38	1
5	Arctiidae	1.61	1
6	Lymantiidae	1.09	0.99
7	Saturniidae	0.69	1

Fig. 2. Diversity index of each family of moths



Conclusion

This work was an attempt to describe diversity of moth fauna. Apart from the distribution and species richness, there is a need to carryout extensive investigation about the species of moths in this area as well as in Vidarbha (MS, INDIA) region. This study is an preliminary step to explore the moth diversity from Amravati city.

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