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Diversity and relative abundance of nocturnal coleoptera in Jhalawar, Rajasthan

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Abstract
Jhalawar district of Rajasthan state is rich in biological diversity due to its high precipitation, diversified climatic conditions, vegetation and forest area. A short-term field survey of diversity and abundance of nocturnal Coleoptera was done by light trap. Total 133 specimens of 17 species under 6 families were observed. Maximum number of five species reported from Scarabidae family followed by Dytiscidae, Carabidae, Hydrophilidae, Cerambycidae and Meloidae. Highest relative abundance was of *Digitonthophagus gazella* (Scarabidae).

Keywords: Coleoptera, relative abundance, diversity

Introduction
Coleoptera (Gr. Coleos-sheath; Ptera- wing) commonly known as beetles are one of the largest orders of class insecta. They are distributed in a wide range of climatic conditions. Coleoptera order consists of about 350,000 of the total 800,000 described insect species among which about 15,088 Coleoptera species are known from Indian region (Kazmi and Ramamurthy, 2004) [3]. Coleoptera flourished in climate with high rainfall, high relative humidity, favourable surrounding temperature gradient and varieties of vegetation (Alfred *et al*. 1998) [1]. Biodiversity extinction of Coleoptera order is one of the most complex challenges for entomologist and society world-wide. Therefore, the leaders of 193 countries that meets and made their countries as a party for the Convention on Biological Diversity (CBD) agreed to the political goal of reducing the rate of biodiversity loss by 2010. The present field research survey is a primary effort to identify nocturnal Coleoptera insect's species with abundance in Jhalawar, Rajasthan. This paves a way for further work by taxonomists and environmentalists.

Material and Methods
Light-trapping is a popular method for assessing nocturnal insect's species composition and relative abundances, but sampling has to be carried out all night in order to maximize catch size and avoid biases due to different flight times of species (Beck and Linsenmair, 2006) [2]. The surveys were carried out at selected sites of Jhalawar district, between the periods of August, 2020 to March, 2021. Light traps were used for the collection of nocturnal coleoptera. A 175W mercury vapour bulb was hung on a vertical pole. The light trap was operated once in a week at the sites and ethyl acetate was used as killing agent for trapped nocturnal insects. Then collected insects were pinned by using entomological pins and kept in the insect box for identification. All collected nocturnal insects specimens were well labelled and preserved in airtight insect boxes. The specimens were identified by Desert Regional Station, Zoological Survey of India, Jodhpur. Abundance of all species was also noted.

Results and Discussion
In the field research survey total 133 specimens of Coleoptera of 17 species from 6 families were collected from August, 2020 to March,2021. Maximum species richness was in family Scarabidae (5 species) followed by Carabidae (03 species), Dytiscidae (03 species), Cerambycidae (02 species) Hydrophilidae (02 species) and Meloidae (02 species). *Digitonthophagus gazelle* and *Eretes sticticus* were the abundance species with maximum relative abundance of 18.04% and 16.54 respectively (Table-1). Similarly, Kazmi and Ramamurthy (2004) [3] reported 99 Coleoptera insects' species of 60 genera and 13 families from the Thar Desert of Rajasthan. Parvez and Srivastava (2010) [5] carried out a short-term field investigation of Coleopteran fauna in an agro-ecosystem near Bikaner and collected total 18 species from which 10 nocturnal species collected by light traps. Thakkar and Parikh (2016) [4] presented 177 species belongings to 32 families of Coleoptera from the state of Gujrat. Family Scarabidae was most dominant (21.6%) followed by Carabidae (13.6%).

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Table 1: Nocturnal Coleoptera species and their relative abundance

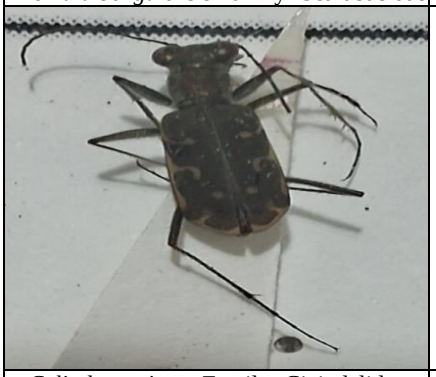
S. no.	Species scientific	Family	Abundance	Relative Abundance (%)
1.	*Brachinus sp.* (Linnaeus,1758)	Carabidae	4	3.00
2.	*Cylindera minuta* (Olivier, 1790)	Carabidae	2	1.50
3.	*Pheropsophus sp.* (Dejean,1825)	Carabidae	3	2.25
4.	*Celosterna scabrator* (Fabricius,1781)	Cerambycidae	2	1.50
5.	*Xystrocera globosa* (Olivier, 1795)	Cerambycidae	5	3.75
6.	*Cybister tripunctatus asiaticus* (Sharp,1882)	Dytiscidae	12	9.02
7.	*Eretes sticticus* (Linnaeus,1767)	Dytiscidae	22	16.54

8.	*Sandracottus dejeani* (Aube, 1838)	Dytiscidae	4	3.00
9.	*Hydrophilus olivaceous* (Fabricius, 1781)	Hydrophilidae	15	11.27
10.	*Sternolophus rufipes* (Fabricius, 1792)	Hydrophilidae	12	9.02
11.	*Cylindrothorax ruficollis* (Olivier, 1790)	Meloidae	1	0.75
12.	*Epicauta sp.*	Meloidae	2	1.50
13.	*Anomala bengalensis* (Blanchard,1851)	Scarabidae	7	5.26
14.	*Anomala rugosa* (Arrow, 1899)	Scarabidae	13	9.77
15.	*Cetonia sp.*	Scarabidae	2	1.50
16.	*Holotrichia sp.*	Scarabidae	3	2.25
17.	*Digitonthophagus gazella* (Fabricius,1787)	Scarabidae	24	18.04

Plate 1: Order- Coleoptera

Anomala bengalensis Family- Scarabaeidae

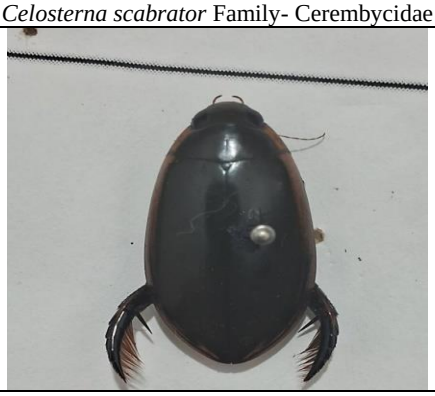
Anomala rugosa Family- Scarabaeidae



Cylindera minuta Family- Cicindelidae

Celosterna scabrator Family- Cerembycidae

Xystrocera globose Family- Cerembycidae



Cybister tripunctatus asiaticus Family- Dytiscidae

Plate 2: Order- Coleoptera

Eretes sticticus Family- Dytiscidae

Sandracottus dejeani Family- Dytiscidae

Hydrophilus olivaceous Family- Hydrophilidae

Digitonthophagus gazelle Family- Scarabaeidae

Pheropsophus sp. Family- Carabidae

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