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Diversity of heteropteran bugs (Pentatomoidea and Coreoidea) of Toranmal hill station (Satpuda Ranges) from Nandurbar District (M.S.)

Hasina E Ansari[1*], Dhanraj B Goswami[2]
[1] Department of Zoology, Faculty of Science, Zoology Research Centre, K. T. H. M. College, Nashik, Maharashtra, India
[2] Head, Department of Zoology, K.V.N. Naik College, Nashik, Maharashtra, India

Abstract
One of the well-known and second-coolest hill stations in the Nandurbar district of Maharashtra is Toranmal, situated in the Satpuda mountains range. Due to dense forest area, a study was carried out on diversity of Heteropteran bugs from Forest region of Toranmal hill station. A total ten species of Heteroptera belonging to the 6 families and 9 genera found from Toranmal hill station. The two superfamilies were reported i.e. Superfamily Pentatomoidea and superfamily Coreoidea. Out of these two superfamilies the Pentatomoidea superfamily was to be high in number. Three species i.e., *Coptosoma* sp. 1, *Chysarcoris purpureus*, and *Cletus* sp. Found to be common and abundant in Toranmal hills.

Keywords: Heteroptera, diversity, toranmal hills, satpuda region

Introduction
The Indian state of Maharashtra, which is located in the country's west, is dedicated to a remarkable diversity of ecosystems, from dense forests to parched plateaus (Pande and Inamdar, 2024) [1]. One of the well-known and second-coolest hill stations in the Nandurbar district of Maharashtra is Toranmal, situated in the Satpuda mountains range, it is among the top hill stations. (Padvi, 2019) [7].

The phylum arthropoda contains the extremely diverse class i.e., class insecta. The insect word is coming from Latin word "insectum," which means "cut" into section, is whence the term "insecta" originates. The research on diversity of Insect is becoming increasingly significant. There are over 1.5 million species in the class Insecta, which makes up almost 90% of the animal kingdom and Insects alone account for over 55% of all species currently known. (Charaple & Bharmal, 2024; Kumar *et al.*, 2022) [10, 11]. Since insects are favourably phototrophic, using light traps to capture insects yields useful faunistic information. This information might be interpreted as a measure of the biodiversity health of the area in question. (Dadmal & Khadakkar, 2014) [9].

The Hemiptera were the most prevalent group of insects. (Dorlikar, 2018) [5]. There are 103,590 Hemipteran species in the world, which are divided into 152 families (Muley *et al.*, 2025) [12]. Although many insects are vital to their ecology, some are regarded as agricultural pests and Hemitera is one of the most prevalent order referred as a pest. Auchenorrhyncha, Coleorrhyncha, Heteroptera, and Sternorrhyncha are the four orders into which Hemiptera have been divided. Enicocephalomorpha and Dipsocoromorpha (terrestrial), Gerromorpha (semicaquatic), Nepomorpha (aquatic), Leptopodomorpha (intertidal), Cimicomorpha (terrestrial), and Pentatomomorpha (terrestrial) are the seven infraorders that make up the Heteroptera. (Dorlikar, 2018) [5].

A significant order of insects known as "true bugs," Hemiptera is economically significant because the majority of its members are pests of different agricultural crops. (Chandra *et al.*, 2012) [8]. Among hemimetabolous insects, the Heteroptera is the largest as well as diversified group. They are among the most common and numerous insect groups, found in a wide range of habitats and climates (Pande and Inamdar, 2024) [1]. Approximately 40,000 species have been described globally, and many more are still pending description hence they are representing more species diversity (Rabitsch, 2008; Kaur *et al.*, 2012) [4, 6]. The Sub order Heteroptera mainly have pests, scavengers and even predators (Kaur *et al.*, 2012) [6].

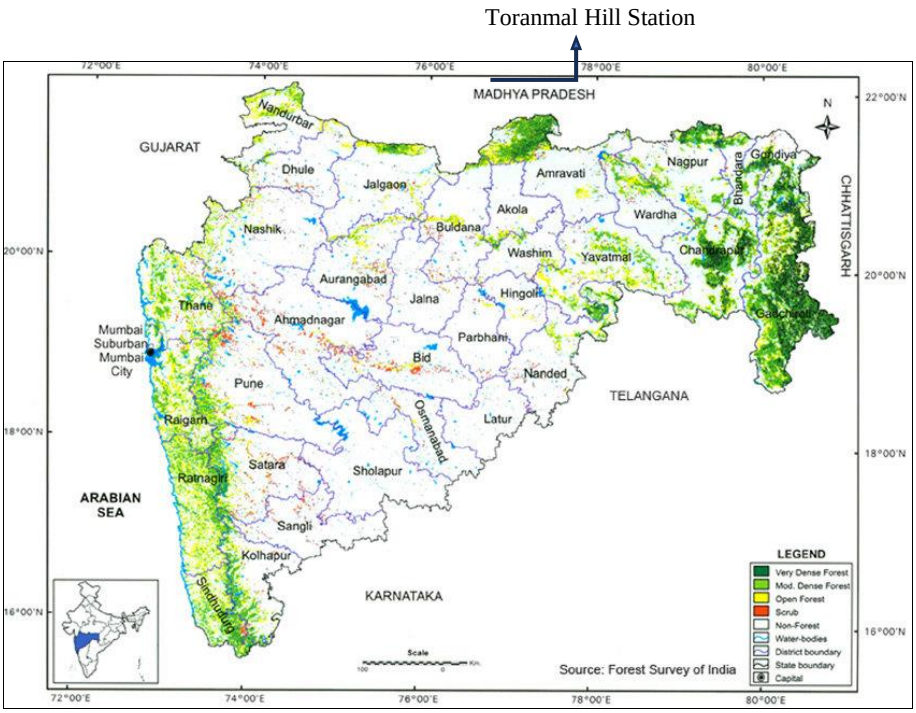
A detailed study was done by Distant (1902 &1904) [2, 3] on Hemipteran bugs. Chandra *et al.*, (2012) [8] from Madhya Pradesh of Veerangana Durgavati Wildlife Sanctuary, Damoh represented 24 species. The present research was held to understand and identified the total number of the species of heteropteran bugs found in Toranmal hill station of Nandurbar. The large mountain area of Toranmal region is forest, of which mainly medicinal plants. So that true bugs at species level studied from Toranmal hill station.

Methodology
Study area
One of Maharashtra's most important hill stations is Toranmal. It is Maharashtra's final border with the states of Madhya Pradesh and Gujarat. Toranmal is situated between latitudes 21.545645° N and longitudes 74.467531° E. Approximately 41.45 square kilometers make up Toranmal Hill Station. (Padvi, 2019) [7].

Collection method
The Heteropteran bugs were collected from the different localities of Toranmal mountains. The collection of these bugs was done by hand picking, net catcher. The bugs were picked up by long trees, shrubs and even on the grass field nearby Toranmal region. The collection was performed from June 2021 to January 2023, in morning (8 to 10.30 am) and evening (3.45 to 5.20 pm), even some of the bugs were trapped by the mercury light in night. The bugs were not found in heavy rainy season which starts from August ends to September month.

Preservation and Identification

The Collected bugs were killed by the Chloroform and preserved in 75% ethanol (Kumar *et al*., 2022) [11] which is the best liquid solution for preserving the Heteropteran bugs. Identification of the bugs were done by the Distant (1902 and 1904) [2, 3]. Also Dr. H. V. Ghate help in confirming the species name.



Map: map representing Toranmal hill station of forest region. (source obtained from Google)

Photo 1: Toranmal lake

Photo 2: Farm Region nearby Toranmal

Photo captured from mountains of Toranmal region.

Result and Discussion

The research on Heteropteran bugs species from Toranmal Hill station reveled that diversity of bugs was found to be less. Due to Forest region covered by the mountains of Toranmal and less crop farms were available to the bug species, hence the number of species in Toranmal forest was less. The Bugs were confined to the crops, and acting as pest of crops. So, the number of species of Heteroptera was less in forest region of Toranmal as compare to the agricultural region.

A total ten species of Heteroptera found from Toranmal hill station. The two superfamilies were reported i.e. Superfamily Pentatomoidea and superfamily Coreoidea. Out of these two superfamilies the Pentatomoidea superfamily was to be high in number. Three species i.e *Coptosoma* sp. 1, *Chysarcoris purpureus*, and *Cletus* sp. Found to be common and abundant in Toranmal hills.

Observation Table

Table 1: Table 1. representing the species name along with their species number from the toranmal region.

Superfamily	Family	Species name	No. of species
Pentatomoidea	Pentatomidae	*Placosternum* sp.	1
		Piezodorus hybneri	4
		Nezara viridula	6
	Asopinae	*Eocanthecona furcellata*	3
	Plataspidae	*Coptosoma* sp. 1	15
		Coptosoma sp. 2	2
	Scutelleridae	*Chysarcoris purpureus*	11
	Tessaratomidae	*Tessaratoma javanica*	7
Coreoidea	Coreidae	*Anoplocnemis phasiana*	9
		Cletus sp.	12

(Saha *et al.*, 2024) [13] reported 14 coreoidea species from Dalma Wildlife Sanctuary of Jharkhand. They gave a detailed characteristic of each species of superfamily of coreoidea.

Conclusion

A survey was carried out to determine and measure the number of Heteroptera species in Toranmal Hill Station, which is located in the Satpuda region of Maharashtra. Toranmal Hill Station has a low species richness due to the forest area in the Satpuda region, whereas the majority of the heteropteran bugs are agricultural pests. There were 10 species detected in the six families (Pentatomidae, Asopinae, Plataspidae, Scutelleridae, Tessaratomidae, and Coreidae).

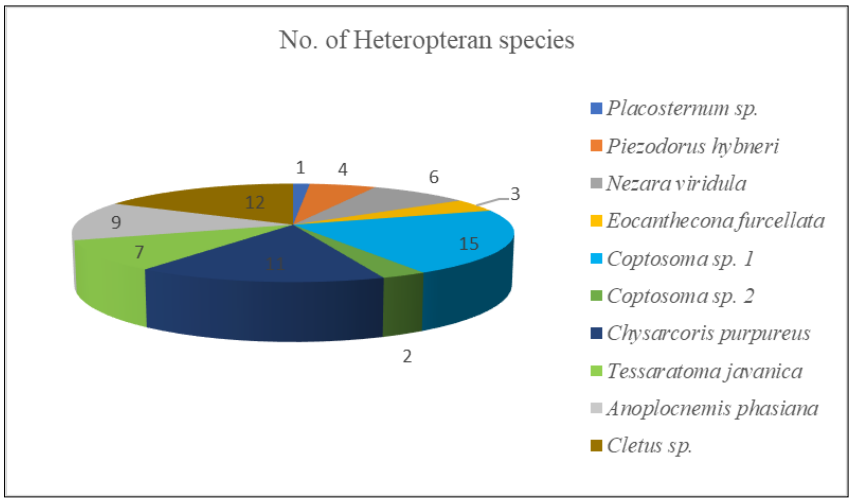


Chart 1: Representing the number of total species found from Toranmal Hill Station

1.*Placosternum* sp. 2. *Piezodorus hybneri* 3. *Nezara viridula* 4. *Eocanthecona furcellata*

5. *Coptosoma* sp.1 6. *Coptosoma* sp. 2 7. *Chysarcoris purpureus* *8. Tessaratoma javanica*

9. *Anoplocnemis phasiana* 10. *Cletus* sp.

Fig: Phtoplate of Heteropteran bug Diversity

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