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DESCRIPTION OF DIGESTIVE SYSTEM OF *MICRONECTA STRIATA*, FIEB., THE INDIAN WATER BOATMEN

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Abstract

The Hemiptera are insects that feed on plants and animals and can be found in both land and water. They can be small or big, oval or long, and sometimes flattened. Their bodies can change shape, and they have simple metamorphosis and sucking and piercing mouth parts. Their heads can be free and either prognathous or hypognathous, and their antennae can be two to ten or even twenty-five segments. Their eyes can be large, and they have ocelli or absence. Labium modifications can be simple or segmented rostrums, beaks or proboscis, palpi atrophied, and wings can be long or short, and ocelli can be present or absent. The common Indian water boatman belongs to a family of aquatic insects. In the present study an effort is made to explore bionomics of *Micronecta striata* Fieb. To introduce its habitat, habit, food, feeding and morphology. It is very common in ponds of rural area of India. Sound observations were made to ensure the validity of study. These insects are harmless, so that no special management to control them exists today.

Keywords : Hemiptera, Indian water boatman, *Micronecta striata*, Digestive system

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Introduction

Water boatmen are aquatic insects belonging to the family Corixidae. These insects are commonly found in freshwater ecosystems such as ponds, lakes, rivers, and marshes. They are known for their unique adaptations to life in aquatic environments. While they are not exclusively Indian, they can be found in various parts of the world, including India. Water boatmen are relatively small insects, typically ranging from 3 to 15 millimeters in length. They have streamlined bodies, which are adapted for swimming in water. Their bodies are flattened, and their legs are modified into oar-like structures for efficient swimming. These adaptations allow them to move easily through the water, resembling the way a boat moves, hence the name "boatmen."

Water boatmen are well-adapted to both still and flowing waters. They are often seen near the surface of the water, where they move by rowing their legs in a coordinated manner. These insects are skilled swimmers and are capable of diving to different depths in search of food. They feed on algae, small invertebrates, and detritus, contributing to the balance of aquatic ecosystems.

One interesting aspect of water boatmen is their ability to produce sound. They can generate stridulatory sounds by rubbing body parts together, primarily for communication purposes. These sounds are often used to attract mates or establish territory within their aquatic habitats. The life cycle of water boatmen typically includes egg, nymph, and adult stages. Females lay eggs on underwater surfaces, and the nymphs that hatch from these eggs go through several molts before reaching adulthood. The nymphs closely resemble the adults but lack wings. As they grow, they shed their exoskeletons in a process called molting. Water boatmen play a crucial role in aquatic ecosystems. As predators of small aquatic organisms and algae, they help control population sizes and contribute to nutrient cycling. Additionally, they serve as a food source for various aquatic predators, including fish and birds, making them an integral part of the food web.

While there isn't a specific insect known as the "Indian boatman," water boatmen are common aquatic insects found in India and around the world. These fascinating insects have unique adaptations for life in freshwater habitats and play a vital role in maintaining the ecological balance of aquatic ecosystems. Studying their behavior and ecology contributes to our understanding of the intricate relationships within natural environments.

Material and Methods

For the morphological study, water boatmen (*Micronecta striata* Fieb) were gathered from Mathura's ponds and the Yamuna River between July and November. They floated on the water's surface. They typically inhabit communities. After being fixed in various fixatives, these bugs were killed by chloroform vapours. To make sure they were properly fixed, tiny holes were poked in the belly using microneedles and then placed in the fixative. It was Zenker's fluid, alcoholic bouin's fluid, and Bouin's fluid that were utilized as fixatives. Once immersed in fixatives for a day or two. Using multiple cycles of 70% alcohol and a few drops of glycerin, they were completely washed.

The specimens were immersed in 5% KOH for around one month or, on occasion, boiled in the solution for approximately twenty minutes to partially remove muscles and bleach the heavily pigmented integument, in order to analyze the exterior anatomy. The specimens were left in glacial acetic acid for about an hour after being treated with KOH solution to neutralize the alkaline effect. The samples were subsequently cleaned, stored in glycerine, and mounted in balsam from Canada. Scaples, forceps, and microneedles were useful for dissecting specimens in a small dish under the high power of the binocular dissecting microscope, which aided in the study of the skeleton.

Results and Discussion

Micronecta striata, commonly known as the water boatman, is a small aquatic insect belonging to the family Corixidae. As part of the larger order Hemiptera, these insects exhibit characteristic features in their digestive system that enable them to thrive in freshwater environments. The digestive system of *Micronecta striata* is adapted to its aquatic lifestyle, reflecting the insect's reliance on both solid and liquid nutrients found in its watery habitat.

1. Mouthparts:- The digestive process in *Micronecta striata* begins with its specialized mouthparts, which are designed for piercing and sucking. As a true bug (order Hemiptera), it possesses a proboscis or rostrum that it uses to pierce plant tissues or other prey. The proboscis is adapted for both feeding on plant fluids and capturing small aquatic organisms. This unique mouthpart structure allows *Micronecta striata* to extract nutrients from a variety of sources in its freshwater habitat.

2. Foregut:- Upon piercing its prey or host plant, the insect's foregut comes into play. The foregut serves primarily for the initial processing of food. It includes the pharynx, esophagus, and crop. The pharynx is responsible for sucking in the food, while the esophagus transports it to the crop. The crop acts as a storage organ, allowing the insect to consume large quantities of food and process it gradually.

3. Midgut:- The midgut is the central component of the digestive system where enzymatic digestion and absorption take place. In *Micronecta striata*, the midgut is responsible for breaking down complex nutrients into simpler forms that can be absorbed by the insect's body. Enzymes produced in the midgut play a crucial role in the digestion of proteins, carbohydrates, and other macromolecules present in the insect's diet.

4. Hindgut:-The hindgut is the final portion of the digestive system and is responsible for water reabsorption and the formation of feces. In *Micronecta striata*, the hindgut helps in concentrating the ingested nutrients and reabsorbing water to maintain the insect's osmotic balance in its aquatic environment. The hindgut terminates in the rectum, from which indigestible residues are expelled as feces.

5. Malpighian Tubules:-The Malpighian tubules are another vital component of *Micronecta striata*'s digestive system. These tubules are extensions of the digestive tract and are involved in excretion and maintaining the insect's internal balance of water and ions. By removing metabolic waste products from the hemolymph, the Malpighian tubules contribute to the insect's overall physiological homeostasis.

6. Adaptations to Aquatic Environment: *Micronecta striata*'s digestive system reflects adaptations to its aquatic lifestyle. Water boatmen, in general, need to cope with the challenges of livin g in a submerged environment. The digestive system is optimized to extract nutrients efficiently from both solid and liquid food sources found in freshwater habitats. Additionally, the insect's ability to osmoregulate, facilitated by its Malpighian tubules and hindgut, is crucial for maintaining a stable internal environment in the face of changing water conditions.

In conclusion, *Micronecta striata*'s digestive system is a well-coordinated and specialized structure that enables the insect to thrive in its aquatic habitat. From its unique mouthparts for piercing and sucking to the various segments of its digestive tract, each component plays a crucial role in the insect's feeding, digestion, and excretion processes. These adaptations contribute to the water boatman's success in navigating the diverse environments of freshwater ecosystems.

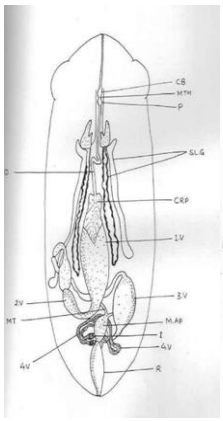
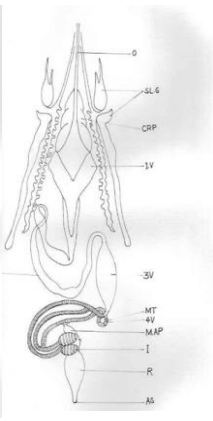


Plate-1



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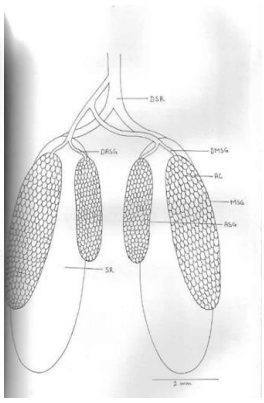

Plate-3

CB = Cibarium CRP = Crop I = Intestine M.AP = Malpighian ampulla MT = Malpighian tubule MTH = Mouth 0 = Oesophagus P = Pharynx R = Rectum SL.G = Salivary gland 1 V = first ventnculus 2 V = second ventnculus 3 V = third ventnculus 4 V = fourth ventriculus, AS = Anus CRP = Crop I = Intestine M AP = Malpighian ampulla 0 = Oesophagus R = Rectum SL .G = Salivary gland 1 V = first ventnculus 2 V = second ventriculus 3 V = third ventriculus 4 V = fourth ventriculus MT = Malpighian tubule, AC = Aceni ASG = Accessory salivary gla7z DASG = Duct of accessory sair.a-. DMSG = Duct of the main saliva-. ;_DSR = Duct of salivary reserv't. -MSG = Main salivary gland SR = Salivary reservoir SV = salivary vesicle

References

Aukema B, Rieger C. (Eds) (1995) Catalogue of the Heteroptera of the Palaearctic Region. Vol. 1.Enticocephalomorpha, Dipsocoromorpha, Nepomorpha, Gerromorpha and Leptopodomorpha. The Netherlands Entomological Society, Amsterdam, 222 pp.

Dyadichko VG. (2008) Seasonal changes in species content of water predator beetles Hydradephaga (Coleoptera) intermittent rivers of South Ukraine. Vestnik zoologii 42 (3): 255-261 [In Russian]

Dyadichko VG. (2009) Seasonal dynamic of numbers and biomass of Hydradephaga (Coleoptera) in flood area

ecosystems and springs of northwestern Black sea region. Hydrobiological journal 45 (3): 24–35

Kanyukova EV. (2006) Aquatic Heteroptera (Nepomorpha, Gerromorpha) fauna of Russia and neighboring regions. Dal'nauka, Vladivostok, 297 pp.

Saulich AH, Musolin DL. (2007) Seasonal development of aquatic and semiaquatic true bugs (Heteroptera). St Petersburg University, St Petersburg, 205 pp.

Sokolskaya NP, Zhiteneva LD. (1973) on the water boatmen (Heteroptera, Corixidae), harmful in fisheries of Rostov region. Zoological journal 52 (9): 1330-1334

Wroblewski A. (1958) The Polish species of the genus Micronecta Kirk. (Heteroptera, Corixidae). Annales Zoologici (Warszawa) 17 (10): 247-381

Savage AA. (1989) Adults of the British aquatic Hemiptera Heteroptera: a key with ecological notes. Freshwater Biological Association. Scientific Publication 50 pp

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