

Research Article

Studies on External Morphology of the Indian Water Boatmen, *Micronecta striata*, Fieb. (Corixidae, Hemiptera: Heteroptera)

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Abstract: The order Hemiptera is divided into two suborders, the Heteroptera and Homoptera. The water boatmen *Micronecta striata* (Fieb.), 1808 belongs to the suborder Heteroptera which is characterized by base of rostrum usually not touching anterior coxae, gular region usually well developed, long pronotum large, forewings usually thickened basally and membranous apically, hind wings membranous, both pairs folded flat over the back with apices overlapping, tarsi normally three-segmented.

Keywords: Hemiptera, Indian water boatman, *Micronecta striata*, External morphology.

1. Introduction

The water boatmen, *Micronecta striata* (Fieb.) being to the family Corixidae (Leach), 1815 of order Hemiptera Linnaeus, 1758. The order Hemiptera was established by Linnaeus in 1735 to include insects with wings but without wing covers except a few cases and the widely separated genera such as *Cimex*, *Notonecta*, *Gryllus*, *Lampreys* and *Formica* that are the representatives of four different orders in 1758, he restricted the order to the insects which are now usually thought to belong in it but also included the Thysanoptera. Latterly in 1810 divided the order into two suborders, Heteroptera and Homoptera, which are accepted up to the time. There has been, however, a lack of uniformity among entomologists in the uses of order and suborders names in 1821. Macleay was perhaps the first to raise the Homoptera to the rank of the orders. Modern authorities such as Van Duzee, 1917; Butler, 1923; Parshley, 1925; Totard, 1923; Riley, 1931 etc. used the order names Heteroptera and Homoptera.

The Hemiptera are minute to large, oval or elongate frequently flattened heterogeneous, phytophagous and predacious terrestrial and aquatic insects with simple metamorphosis and piercing and sucking mouthparts, head free, usually prognathous or rarely hypognathous, antennae two to ten or rarely 25 segmented, eyes large, ocelli present or absent, labium modified not a short and long curved or straight, simple or segmented rostrum, beak or proboscis, palpi atrophied, wings present or absent, long or short.


Hemelytra or fore pair of wings, usually thickened basally and membranous apically in Heteroptera and usually wholly membranous in Homoptera, legs for walking, running, jumping, swimming and grasping the prey, cylindrical or flattened with 1-3 segmented tarsi, 1 or 2 claws and with or without arolia or empodia, abdomen with few segments, the first segment greatly reduced or apparently wanting, cerei absent, the members of this order are commonly referred as bugs.

The water boatmen, *Micronecta striata* (Fieb.) is one of the most interesting and fascinating representatives of family Corixidae (Leach), 1815. The members of family Corixidae are easily recognized from the other allied due to case of head overlapping front margin of pronotum. Rostrum very short scarcely distinguished from the broad apex of head forelegs inserted on the posterior margin prosternum. Front tarsi one segmented spatulate and fringed with strong bristles body as depressed, head broad, as broad or broader than the thorax. Family Corixidae represented is by two genera in India viz. *Corixa*, *Geoffs* and *Micronecta* Kirk.

Key to the Indian genera:

Antennae four-jointed, scutellum covered.....
Corixa, *Geoffs*.

Antennae three jointed, scutellum not covered.....
Micronecta Kirk.

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Distribution of this genus in Palaearctic and Oriental realms. In India, the genus represented by two species viz. *Haliploides*, Horb.

Micronecta striata (Fieb.) 1898 is indigenous, found throughout India. It has been recorded from Burma, Ceylon, China, Canara also besides India. It is widely distributed in India and was recorded from Uttar Pradesh, Madhya Pradesh, Haryana, Delhi, Himachal Pradesh, Rajasthan and Uttaranchal during the course of present investigation.

Dr. N. Annandale has rightly mentioned about them by the statement that, "In October they flew to my lamp in numbers every day coming from the tank" a few hundred yards away. Now in November, they are far less numerous. The interesting point is that my rooms are at the top of a house three-story high and that therefore these insects must have a lofty flight. I have not seen them at the tanks or the study below where I dine about once a week. These insects are quite abundant in tanks in the plains swimming actively and periodically returning to the surface then air supply.

2. Material and Methods

The water boatmen *Micronecta striata* (Fieb.) for the morphological investigation were collected during the months of July to November from the various ponds and the river Yamuna at Mathura. They were found upon the surface of the water. They are usually found in groups.

These bugs were killed by chloroform vapours and fixed in different fixatives. Small punctures by microneedles were made in the abdomen before putting them into the fixative in order to ensure proper fixation. The fixative used was Bouin's fluid, alcoholic bouin's fluid, Zenker's fluid. After keeping in fixatives for about 24 hours they were washed thoroughly through several changes of 70% alcohol with a few drops of glycerine.

For the study of external anatomy, the specimens were kept in 5% KOH for about one month or sometimes boiled in the solution for about 20 minutes for the partial removal of muscles and bleaching of the highly pigmented integument. After treating the material with KOH solution, the alkaline effect was neutralized by keeping the specimens in glacial acetic acid for an hour or so. These specimens were later on washed, upgrade and preserved in glycerine and mounted in Canada balsam. Dissections of the specimens in a small dish under high power of the binocular dissecting microscope with microscaples, forceps and microneedles were helpful for the skeletal studies.

3. Results and discussion

Micronecta striata (Fieb.) has a broadly elongate body. The average length of the male is 10.4mm and that of the female 10.8mm. General colour of the body

is dull ochraceous, coarsely and darkly punctate; head with the margins of the central lobe, pronotum with obscure oblique fasciae; scutellum with short case and obscure central discal fascial and two marginal spots before apex and conum, with some obscure discal patches, black; apex of acutellum pale, in apical margins piecous; connexivum alternately ochraceous and piecous, membrane Greyish-brown, the veins darker; body beneath and legs ochraceous; head beneath and sternum coarsely and darkly punctate, abdomen finely and densely punctate, its lateral margins spotted with piecous, legs finely spotted with piecous; more thickly at apices of femora and tibia, antennae piecous, signs of second and third joints and base of fifth joint luteous, antennae with the second and fourth and the third and fifth joints subequal in length. The body has three distinct regions, the head, the thorax and abdomen. The posterior part of the head is overlapped by the anterior collar of the prothorax. The apex of the head bears a beak, which extends back along the ventral surface to 4th abdominal segment from across the 5th abdominal segment. There are two dark brown compound eyes, situated dorsolaterally on such of the head.

The thorax comprises of the three segments the prothorax, mesothorax and metathorax. The prothorax being the largest and with crenate ventral margins. The meso- and metathoracic segments are fused to form the prothorax and each bears on the dorsal side, a pair of wings. During repose, the forewings or the hemelytra are folded cross-wise so that the membrane of one completely overlaps that of the other. Each of the thoracic segments bears leg terminating in a pair of claws. The abdomen is made up of ten segments of which the last four are telescopic and remains concealed and terminal segment is entirely membranous. The dorsal side of the abdomen is covered entirely by forewing scutellum. Only the lateral margin of the abdomen is exposed. The terga and sterna of abdomen are membranous, while the head, thorax and scutellum are hard chitinous. Scutellum is present between two wings and apex of scutellum reaches the third abdominal segment.

Micronecta striata (Fieb.) 1898 is 3 to 4mm in length. Head pale yellow, somewhat discoloured at base, pronotum with the anterior and posterior margins and a central transverse line back, hemelytra with longitudinal black lines, body beneath and less uniformly pale yellow. They are usually somber coloured and heavy smooth, tough, exoskeleton. Forelegs are raptorial and provided with one or two rows of spines or stiff bristles. Middle legs are long and used for walking and clinging. The hind legs are long and furnished with stiff swimming hairs and are used like oars, enabling them to swim back and upward with rapid jerky motion. Abdomen is asymmetrical in female, one side being greatly reduced males possess a hidden genital capsule containing genital claspers and stylets.

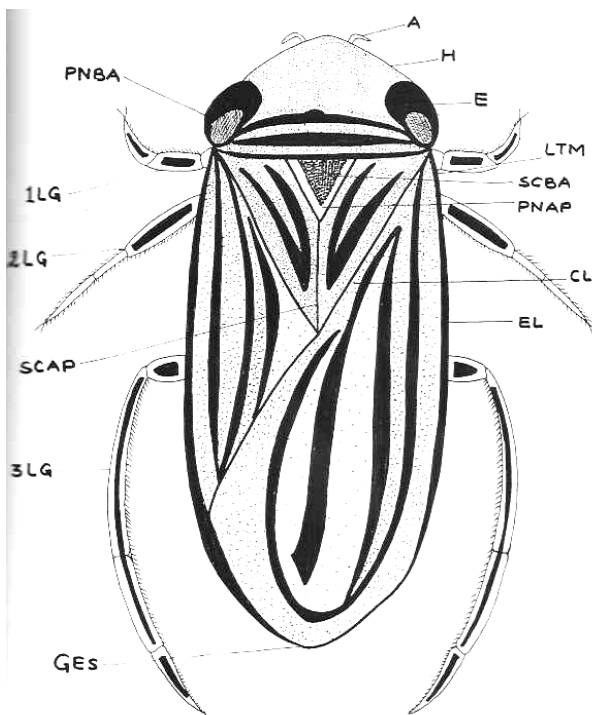


Plate-1. Dorsal view.

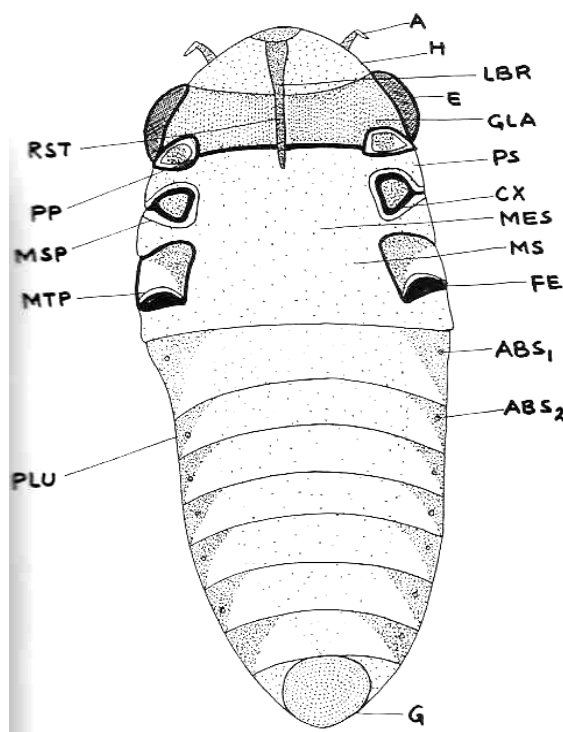


Plate-2. Ventral view.

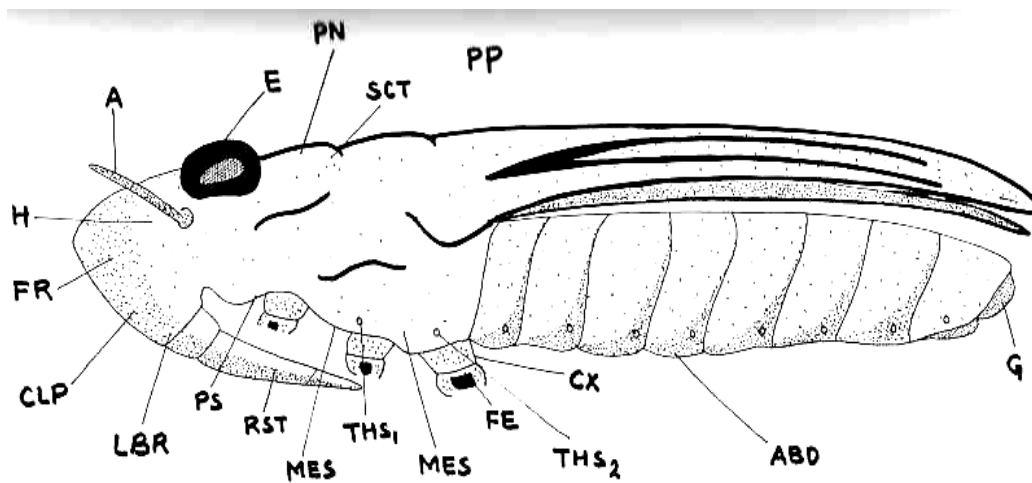


Plate-3. Lateral view.

A - Antenna, Ab.S. - Abdominal spiracles, ABD - Abdomen, CLP - Clypeus, CX - Coxa, E - Eye, FE - Femur, FR - Frons, G - Genitalia, GA - Gena, GLA - Gula, LBR - Labrum, PN - Pronotum, RST - Rostrum, SCT - Scutellum, TH - Thoracic segment, 1A, SEG - First Antennal Segment, H - Head, J - Jugum, MS - Metasternum, MES - Mesosternum, MTP - Metapleuron, PP - Propleuron, PS - Prostomium, T - Tylus, C - Corium, CLA - Clavus, HM - Hemelytra, LR - Longitudinal ridge, LTA - Lateral angle, M - Membrane, SCAP - Scutellum apex.

Micronecta striata (Fieb.) 1898 is the common water boatmen found in sluggish fresh and brackish water of ponds, lakes and rivers in India. They are admirably fitted in the structure of a subaqueous life. They are attached to aquatic plants and objects beneath the surface of water. The adult flies readily and are often hot only annoying because of this presence around lights but even invade open-air swimming pools

and freely bite the bathers. These bugs sweep are sorts of organic ooze, including animal, sand, plants matters. They also break the cell walls and extract the contents of spirogyra and others water plants.

The water boatmen *Micronecta striata* (Fieb.) is very voracious and feeds upon aquatic insects which fall into the water. They have also been conserved to feed upon the ova of the fishes. At times several insects

collectively capture and feed if the prey is too large for one bug. They capture and kill the prey by piercing with their rostrum. Sometimes, they have been eating the dead insects as well. *Micronecta striata* (Fieb.) is found infested by mites.

Economically the water boatmen *Micronecta striata* (Fieb.) is of great importance to the human being as they destroy the eggs of fishes of water tanks. They have also been observed to destroy the eggs, larvae, pupae and the adults of *Anopheles*, *Culex* and *Aedes* mosquitoes as these are predated by them.

References

- [1]. 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.
- [2]. Dyadichko, V.G. (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].
- [3]. Dyadichko, V.G. (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.
- [4]. Kanyukova, E.V. (2006). Aquatic Heteroptera (Nepomorpha, Gerromorpha) fauna of Russia and neighboring regions. Dal'nauka, Vladivostok, 297 pp.
- [5]. Saulich, A.H., Musolin, D.L. (2007). Seasonal development of aquatic and semiaquatic true bugs (Heteroptera). St Petersburg University, St Petersburg, 205 pp.
- [6]. Sokolskaya, N.P., Zhiteneva, L.D. (1973). On the water boatmen (Heteroptera, Corixidae), harmful in fisheries of Rostov region. *Zoological Journal*, 52(9): 1330-1334.
- [7]. Wroblewski, A. (1958). The Polish species of the genus *Micronecta* Kirk. (Heteroptera, Corixidae). *Annales Zoologici (Warszawa)*, 17(10): 247-381.
- [8]. Savage, A.A. (1989). Adults of the British aquatic Hemiptera Heteroptera: a key with ecological notes. Freshwater Biological Association. Scientific Publication 50 pp.