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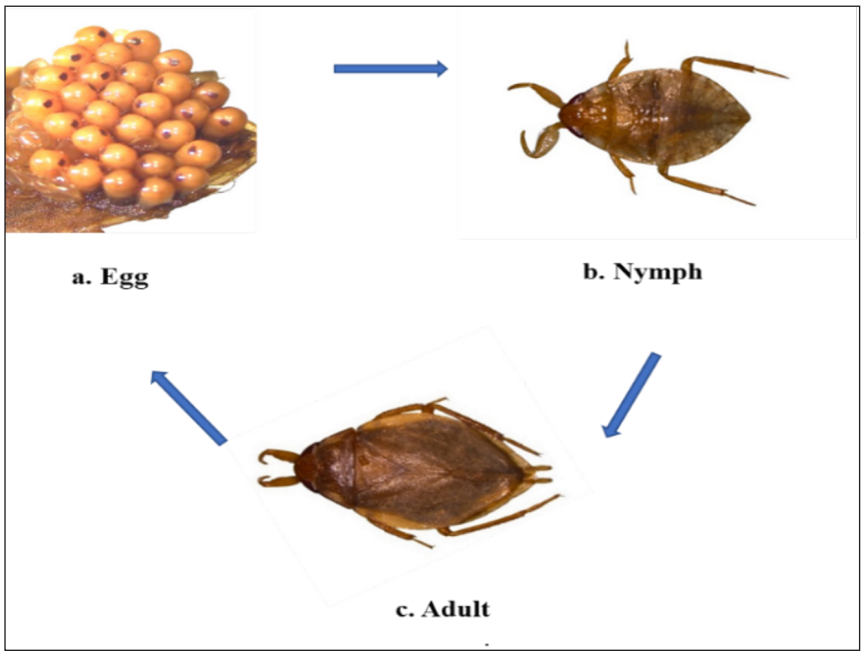
Aquatic bug *Diplonychus molestus* as potential bioindicators and biocontrol agents

The suborder Heteroptera are a set of about 45,000 species and more than 6,000 genera of insects among the order Hemiptera, also called as "true bugs". They are divided into three divisions based on their habitat preferences and ecological niche, that is terrestrial (Geocorisae), semi-aquatic (Amphibicorisae) and aquatic heteropterans (Hydrocorisae). The aquatic and semi aquatic heteropteran bugs are mainly inhabited in the water ecosystems, these are commonly called "water bugs".



Life cycle stages of *Diplonychus molestus* Dufour, 1863. © S. Ranjini.

The adult female water bug, *Diplonychus molestus* Dufour, 1863 belong to the family Belostomatidae, was observed in pond ecosystem of Thiruvalathur (10.7425 N 76.6868 E), Palakkad District, Kerala. Photographs were taken by using stereo-zoom microscope (Leica S8AP0).

The specimens were collected and identified with the help of available literature and taxonomic key (Chandra & Jehamalar 2012). It shows sexual dimorphism, i.e., adult males are usually smaller in size than females. They are hemimetabolous insect. The developmental stage completes from egg to nymph to adult and they produce one or more generations per year (Chen et al. 2005). They lay eggs on the dorsal side of the male bug and this male bug guard their eggs until hatching. The nymphal stage completes through the five instars to become an adult bug. The adult bugs can be easily distinguished by the division of the insect body. The life cycle of the water bugs may complete from 2–3 months (Chandra et al. 2017).

D. molestus Dufour, 1863 is an active predator and feeds on aquatic crustaceans, fishes, amphibians, and mosquito larvae (Chandra & Jehamalar 2012). The usage of the chemical pesticides against

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mosquitoes including larvae, will be eluted to aquatic habitats, which accumulates and magnify through the food chain and finally reaches the human beings (Pazou et al. 2013). So, in this situation, it is very urgent to find out and conserve the natural biological agents by using to decrease the population of mosquitoes. Few species under the Family Belostomatidae are active predators of mosquito larvae (Ohba & Nakasuji 2006) and these bugs may also be used in biomonitoring programmes (Corbi et al. 2011). This quality favours the *D. molestus* Dufour 1863 can be used as both bioindicators as well as biocontrol agents.

Around the world, freshwater habitats are being exposed to increase the levels of anthropogenic activities (Saunders et al. 2002) which leads to severe water pollution and finally affects the survival of different aquatic diversity. Aquatic biodiversity is one of the most important characteristics of an aquatic ecosystem for sustaining the ecological stability (Vinson & Hawkins 1998). They are very important as bioindicator species that characterize the health of an aquatic habitat and at the same time, they play a major role in maintaining the ecological balance. Water bugs are beneficial as bio-indicators as well as biocontrol agents, no doubt, more research studies are needed in the future to formulate the conservation strategies for these bugs.

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