

PREDATION ON *Biomphalaria* sp. (MOLLUSCA: PLANORBIDAE)
BY THREE SPECIES OF THE GENUS *Belostoma*
(HETEROPTERA: BELOSTOMATIDAE)*

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The voracious behaviour of water bugs is well known as they attack a great diversity of invertebrate and vertebrate organisms which may be of various sizes, even larger than they are (Schnack, 1976; Menke, 1979). All of the Belostomatidae family members have forelegs adapted to catch prey which are usually ambushed by bugs. After catching prey, bugs handle it in order to insert their piercing mouth parts to inject saliva and liquefy prey's tissues to suck.

The only insects that feed on snails during the larval and adult stages are belostomatids (Smith, 1997). *Limnogeton* Mayr, 1853 is a compulsory predator of snails (Voelker, 1968; Tawfik *et al.*, 1978). There are few reports on members of genera *Abedus* Stål, 1862 and *Diplonychus* Laporte, 1833 preying on snails in the field or in the laboratory (Saha & Raut, 1992; Tawfik *et al.*, 1978; Okada & Nakasuji, 1993; Smith, 1997). Somasundarao (1963), Voelker (1968) and Saha & Raut (1992) suggested the importance of these bugs as useful snails control agents to eradicate severe worm diseases. Pointier & Delplanque (1976) pointed out the importance of *B. boscii* as a *B. glabrata* predator in Guadeloupe and Kesler & Munns (1989) cited *B. flumineum* as an important cause of snails' mortality in the U.S.A.

Little is known about the alimentary preference of *Belostoma* species under laboratory conditions. Several authors fed immature and adult stages of *Belostoma* species with varied prey for different purposes: Kehr & Schnack (1991) fed *B. oxyurum* Dufour 1863 with tadpoles; Armúa &

Estévez (1997) fed immature stages of *B. elegans* Mayr with mosquito larvae, small crustacean as *Daphnia* sp. and *Hyalella* sp., and tadpoles. Some species of *Belostoma* Latreille, 1807 have occasionally been observed feeding on snails such as *B. malkini* (Cullen, 1969). Pereira & Melo (1998) fed specimens of *B. plebejum* and *B. anurum* under laboratory conditions, with *Culex quinquefasciatus*, *Daphnia* sp. and *Biomphalaria glabrata* and both species fed on all offered prey but they showed preference for mosquito larvae; *B. micantulum* was fed with larvae and pupae of *Aedes fluviatilis* and *Biomphalaria glabrata*, showing preference for mosquitoes in all stages (Consoli *et al.*, 1989).

Presented herein is an experimental study with *Biomphalaria* sp. as prey for specimens of the genus *Belostoma*. The selected species, included in the three size categories proposed by Lauck (1962), *B. micantulum* (small species), *B. elegans* (medium species) and *B. elongatum* (moderately large species) show different structural characteristics on their heads. The aim of this work is to compare the ability of each species with snails according to the head morphological features.

MATERIAL AND METHODS

During March and April, 1997 specimens of *B. micantulum*, *B. elegans*, *B. elongatum*, together with snails of the genus *Biomphalaria* were captured with a net in a pond close to Santa Ana, Corrientes province, Argentina.

Ten specimens of the selected *Belostoma* species were put into individual vials with tap

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water and *Elodea* sp. as a substrate at a laboratory. After two days with no food supply, two snails were offered to each bug as the unique food source. Snails were selected by their size, small snails (2 mm in diameter) were offered to *B. micantulum*; medium size (3-5 mm) to *B. elegans* and those of a large size (6 mm or more) to *B. elongatum*.

They were observed every 24 h over 5 days in order to replace the eaten snails (emptied shells) by a new stock of snails. This procedure was replicated 6 times. *Belostoma* specimens and snails were replaced by recently captured specimens when each experiment started. The results are shown as a percentage of eaten snails and a percentage of bugs which ate snails.

RESULTS AND DISCUSSION

B. micantulum used snails as resting support most of the time, piercing shells on all its surface; there were one or two ingested snails in 4 experiments representing 6% of the total offered snails (n = 120); 85% of the bugs did not feed on snails.

The *B. elegans* behavior was similar to *B. micantulum*; empty shells were found in all the experiments, which represented 16% of the total offered snails (n = 124); 71% of the bugs did not feed on snails.

B. elongatum showed a different behavior to that of the above mentioned species. When the prey was offered it was instantly seized with its fore legs. Bugs of this species handled the snail, aiming to direct the opening of the shell in front of the beak, inserting it immediately into the snail's body. Bugs maintained this position during 45 to 60 min before releasing the empty shell. Bugs carrying prey were able to go around inside the vials. Snails were eaten in all the experiments, 76% of the offered snails were eaten (n = 193); only 3% of bugs did not eat *Biomphalaria* sp.

Small species such as *B. micantulum* have a short anteoculus and a short and stout beak. This species rejected *Biomphalaria* sp. diet. This species failed to introduce the stilettos properly into the snail's shell due to characteristics of the head morphology.

Medium size species such as *B. elegans* showed a certain ability to catch and feed on *Biomphalaria* sp. Medium sized species heads

are characterized by having anteoculus which are slightly longer than their interoculus and a long and slender beak.

B. elongatum showed a great ability to catch and feed on snails. This moderately large species has anteoculus longer than interoculus and its beak is long and slender.

Although few observations on *Belostoma* species predatory ability on snails have been made, we are able to assume on the basis of literature and this experimental study, that medium and moderately large or large *Belostoma* species showed a remarkable preference for snails as a food source. These groups of species are successful in preying on snails due to the specialized characteristics of their heads such as the presence of anteoculus which is longer than their interoculus and a slender and long beak, enabling the styletes to be inserted deeper into the shells thus reaching the retracted body of *Biomphalaria*. The effectiveness of *Belostoma* species preying on snails needs to be studied in the field in order to know if these insects' populations may have a controlling effect on snails' populations.

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