

CORIXIDAE (HEMIPTERA) AS PREDATORS: REARING ON FROZEN BRINE SHRIMP

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ABSTRACT

Many Corixidae are predaceous. In the laboratory they can be reared on frozen brine shrimp. Feeding seems not to occur when temperatures are as low as 5°C.

The water boatmen or Corixidae, although members of the Hemiptera, lack a distinct beak or rostrum, the labium being reduced to a short triangular flap with a mid-dorsal median longitudinal groove (Benwitz, 1956; Parsons, 1966). However, they do have stylets and so they have been presumed to feed like other members of the Order. Feeding as they do on a liquid diet, the Hemiptera usually lack a peritrophic membrane, but Sutton (1951) believes that the membrane is present in Corixidae, although this has not been proven (Parsons, 1957). Significantly, these water-bugs also have a complex of buccopharyngeal teeth that would appear to be useful for masticating solid food and passing it along the gut (Slack, 1947; Elliott & Elliott, 1967).

Hungerford (1919) noted that the Corixidae gather their food by sweeping flocculent material into the mouth with their fore tarsi (palae). This material consists of algae, protozoa and various microscopic metazoa and the bugs were presumed to utilize it as food. They also were reported by Hungerford (1919) to feed on algal filaments by piercing each cell with their protrusible stylets and sucking out the contents. In general, the Corixidae were regarded as feeding largely on detritus or algae (e.g. Popham, 1959). Mellanby (1951) stated that they do not pierce with their mouth parts to obtain food, but suck up particles of debris using the short proboscis like a vacuum cleaner. Puchkova (1969) noted that *Sigara striata* (L.) and other Corixidae have a mixed type of feeding, with a predominance of phytophagy.

During a study of the Corixidae in a series of saline lakes in central British Columbia (Scudder, 1969a, 1969b), it was found that in the more saline lakes *Cenocorixa bifida hungerfordi* Lansbury and *C. expleta* (Uhler) fed almost exclusively on Diaptomids (*Diaptomus nevadensis* Light and *D. sicilis*

Forbes) in the zooplankton. In the laboratory, Scudder (1966) reared both species of *Cenocorixa* on living brine shrimp (*Artemia salina* L.) and in recent research (Jansson, 1971) all species of *Cenocorixa*, as well as members of other genera, were successfully reared through several generations on frozen brine shrimp.

Zwart (1965) investigated the effect of different types of food on the survival of several European Corixids and found that both adults and larvae survived longest when fed on animal food, such as *Tubifex*, daphnids and chironomid larvae. Experiments carried out by us in the past few years support this conclusion. Whether these results will apply to all genera and species of Corixidae has not yet been determined. Sutton (1951) showed that species of *Corixa* and *Sigara* would feed on chironomid larvae, mayfly naiads, daphnids, *Asellus* and *Tubifex*; and James (1966) recorded *Callicorixa audeni* Hung. as feeding on mosquito larvae in southern Ontario. Jansson (1969) has reared all North European species of *Sigara*, *Arctocorisa* and *Callicorixa* on Enchytraeid worms that were cut into 1-2 mm. pieces before placing into the corixid containers (if the worms were not cut up they escaped into detritus before the bugs could find them). Also, Jansson (unpublished) observed *Cymatia* and *Glaenocorisa* to catch and feed on mosquito larvae, but found that while *Sigara alternata* (Say) will feed on frozen brine shrimp, it will not reproduce on this diet, although it was observed to reproduce after a week on a diet of freshly killed mayfly naiads. It becomes clear that the Corixidae should no longer be regarded as mainly algae and detritus feeders.

Zwart (1965) considered that feeding on dead animal food caused high mortality in adult *Corixa punctata* (Ill.) and *Sigara distincta* (Fieb.), but he noted that this mortality resulted from the unfavourable

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conditions created by the dead and decaying chironomids, etc. that occurred from supplying the bugs with surplus food. Our experiments demonstrated that for successful rearing on frozen brine shrimp, it was important to keep the tanks containing Corixidae well aerated in order to avoid putrefaction of excess food and the resulting contamination of the water: Zwart (1965) did not record whether his

cultures were well aerated. We found that by providing sufficient but not undue excess of frozen brine shrimp, and at the same time keeping the water well aerated by use of air-stones run off a laboratory air supply, we could rear most species of Corixidae at 15 to 25°C with very little mortality. We also noted that species of *Cenocorixa* did not appear to feed in the laboratory at 5°C.

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