

# Chapter VI —Order Hemiptera



## (Water or True Bugs)

- (Williams & Feltmate, 1992)
  - Superphylum Arthropoda
    - (jointed-legged metazoan animals [Gr, *arthron* = joint; *pous* = foot])
  - Phylum Entoma
  - Subphylum Uniramia
    - (L, *unus* = one; *ramus* = branch, referring to the unbranched nature of the appendages)
  - Superclass Hexapoda
    - (Gr, *hex* = six, *pous* = foot)
  - Class Insecta
    - (L, *insectum* meaning cut into sections)
  - Subclass Ptilota
  - Infraclass Neopterygota

This is a large order of neopterygote insects, that includes both the Heteroptera and the Homoptera (the “true bugs”). Species range in size from 1 mm to 9 cm and, characteristically, they have mouthparts adapted for piercing and sucking the fluids from plants or animals. All of the Homoptera are terrestrial and none is carnivorous. Worldwide, there are about 3,200 species of hydrophilic Heteroptera.

Hemiptera, or true bugs, belong to the infraclass Neoptera. division Exopterygota; their wings develop externally and can be folded over the dorsum. Only about 10% of all species of Hemiptera are associated with water, and these are representatives of 15 families of the suborder Heteroptera, 14 of which occur in northeastern North America.

Apart from a few aphids living on the aerial parts of water plants, the Hemiptera associated with water belong to two series of Heteroptera: the Nepomorpha, which when truly aquatic spend most of their time under water, and the Gerromorpha, which are primarily adapted to live on water surfaces.

### Life History

Hemipterans are paurometabolous, undergoing incomplete, gradual metamorphosis from egg to nymph to adult. Eggs hatch after one to four weeks of embryonic development, then the nymphs undergo 5 molts before molting to the sexually mature adults. Hemipterans generally overwinter as adults, and in regions where ponds freeze many species fly to streams to overwinter. In temperate regions, life cycles are usually univoltine, or occasionally bivoltine, with reproduction occurring in the summer. Multivoltinism is more common in the tropics.

In common with other hemimetabolous insects (no pupal stage), the nymphs are very similar to the adults in terms of their appearance, habitat and behaviour, but are smaller.

## Nepomorpha

The Nepomorpha are divided into four superfamilies.

- The **Nepoidea** contains the water scorpions and water stick insects of the family Nepidae and the giant water bugs, electric light bugs, and toe biters of the Belostomatidae; the genus *Lethocerus* contains the largest Heteroptera and the largest aquatic insects.
- The **Naucoroidea**, with a single family, the Naucoridae, are oval flat water bugs most often found in running water.
- The **Notonectoidea** consist of three families of backswimmers: Notonectidae, Pleidae, and Helotrephidae.
  - The Notonectidae are divided into two subfamilies, Notonectinae and Anisopinae.
    - The former contains three tribes. In the Notonectini the largely temperate and Neotropical *Notonecta* and the largely paleotropical *Enithares* include nearly all the large species of the family, while the Nychiini are small, like most *Anisops* and *Buenoa* in the Anisopinae.
      - *Notonecta* contains five subgenera. Of these, *Notonecta* s. str. is primarily Palearctic with two Nearctic species, two of the other subgenera are western in the New World, and a fourth is Australian. The fifth subgenus, *Paranecta*, is largely New World with species in eastern Asia. *Notonecta* feeds on almost any animal food that is available, though occasionally specific prey may be rejected. Mosquito larvae are clearly important, as are insects that have fallen on the surface. It is commonly believed that many adults pass the winter buried in mud, and this has been well documented in the case of *Notonecta (Paranecta) undulata* in western Canada. Migrations, notably from large bodies of water to small breeding pools in the spring, are clearly of considerable importance in cool temperate regions.
        - The western New World *Erythronecta* probably contains the brightest-colored freshwater insects.
        - The Nychiini are very little known ecologically and are mainly found in running water.
      - The Anisopinae consist of two species of *Paranisops* in Australia, about 130 species of *Anisops* in the warm temperate and tropical zones of the Old World and 45 *Buenoa* in the temperate and tropical New World.
    - The Pleidae consist of a few genera of very closely allied backswimmers not over 3 mm long and generally smaller.
    - The Helotrephidae are another family of minute water bugs. They consist of two subfamilies, the Helotrephinae, seeming to live like the Pleidae in tropical latitudes, and the Idiocorinae with two species in different genera.
  - The **Corixoidea** contain a single living family, the Corixidae, divided into six subfamilies, the primitive Australasian Diaprepocorinae, the very widespread Micronectinae, the Cymatiinae, the Stenocorixinae, the Heterocorixinae, and the Corixinae. Most species of Corixidae live in quite shallow water, though in cold temperate regions they evidently cannot inhabit in winter small pools that freeze solid, a fact of significance to their distribution. Very large migratory flights of Corixidae have sometimes been observed, and for many species migration is clearly a regular event in the life history, winter being spent in larger, deeper bodies of water than are used as breeding grounds. The Corixidae in general show a considerable variation in their pigmentation, which is correlated with the albedo of the background on which they are living.
    - The Corixinae are rarely under 5 mm and often over 10 mm long. They are clearly better developed in cool temperate regions than in tropical ones; in North America any one area may have a pool of over 40 species.

## Habitat

Hemipterans are generally found in lentic habitats or in backwater or pool areas of streams to which they may have flown to overwinter. Hemipterans are found in three general habitats.

- Six families are fully aquatic in all life history stages (true water bugs: Belostomatidae, Corixidae, Naucoridae, Nepidae, Notonectidae, and Pleidae). These families are classified as swimmers, clingers, or climbers. Two of them (Notonectidae and Pleidae) swim upside down (venter up) and have been given the common name, *backswimmers*.
- Four families are surface dwellers or skaters (Gerridae, Hydrometridae, Mesoveliidae, and Veliidae) and are thus semiaquatic.
- Four families are shore bugs and live along the edges of ponds or streams. Gelastocoridae, Hebridae, Ochteridae, and Saldidae contain species classified as skaters, climbers, clingers, burrowers, or sprawlers.

**Table VI-1: Families within the suborder Heteroptera that are associated with water and their habitat (Williams & Feltmate, 1992)**

Family	Habitat
<b>Infraorder Leptopodomorpha</b>	
Saldidae	(shore bugs)- margins of streams & ponds
<b>Infraorder Gerromorpha</b>	
Mesoveliidae	(water treaders)- vegetated banks of ponds & lakes
Macroveliidae	(shore bugs)- stream margins
Gerridae	(water striders)- surface of fresh & brackish waters (sea)
Veliidae	(riffle bugs)- surface of ponds & streams, also brackish
Hydrometridae	(water measurers)- surface of calm waters
Hebridae	(velvet water bugs)- marshes & wet riparian mosses
<b>Infraorder Nepomorpha</b>	
Nepidae	(water scorpions)- ponds, on vegetation
Belostomatidae	(giant water bugs)- ponds, in vegetation
Corixidae	(water boatmen)- fresh & brackish lentic waters
Notonectidae	(backswimmers)- ponds and lakes
Naucoridae	(creeping water bugs)- lentic & lotic, stones & vegetation
Ochteridae	(shore bugs)- stream margins, pond vegetation
Gelastocoridae	(toad bugs)- shorelines, in mud & plant debris
Pleidae	(pygmy backswimmers)- ponds & lakes, in vegetation
Helotrephidae	ponds & lakes, in vegetation

## Feeding

Adult and nymphal hemipterans are predaceous, having mouthparts specialized for piercing and sucking the contents of their prey. They prey on a variety of aquatic insects and crustaceans. There are even accounts of large aquatic hemipterans consuming vertebrates; for example, a *Lethocerus americanus* attacking a woodpecker, an *L. uhleri* feeding on a 30-cm-long banded water snake! Giant water bugs can be important pests in fish hatcheries, since they feed on fish up to 7.5 cm long.

## References

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