Chapter 2-7
Benthic Invertebrates

Abstract
Benthic invertebrates account for roughly two-thirds of the endemic species, as well as about one-third of the animal, plant and protist species so far reported from Lake Biwa. Insects feature the most numerous species followed by mollusks and oligochaetes. Most these species inhabit the littoral areas, with relatively few species found on the profundal bottom.
Keywords: Endemic species, Insects, Mollusks, Littoral, Profundal

1. About Benthic Invertebrates

Benthic invertebrates are invertebrate animals that inhabit lake bottoms. Most of these live on and in the lake bottoms throughout their lives with the exception of jellyfish, unionid mussels and freshwater shrimps, whose medusa forms or larvae are planktonic.

2. Characteristics of Benthic Invertebrates

More than 1,700 indigenous aquatic animal and plant species have so far been reported from Lake Biwa (Nishino, 2012). Among these, about one-third, i.e., 700 or more species, belong to benthic invertebrate species such as hydrozoans, sponges, flatworms, ribbon worms, oligochaetes, leeches, mollusks, crustacea, aquatic insects and Bryozoa. Other small benthic invertebrates, such as tardigrades, gastrotrichs and water mites also inhabit the lake, but have not been comprehensively studied.

Among benthic invertebrates, more than 310 species are aquatic insects (mayflies, stoneflies, dragonflies, caddisflies, Hemiptera, Coleoptera and Diptera), followed by 56 species of mollusks, and 49 species of oligochaetes.

Benthic invertebrates also account for roughly two-thirds (38 taxa) of the endemic taxa of the lake, among which 29 taxa are mollusks. Aquatic insects comprise only two endemic species.

3. Distribution in the Lake

Most of the benthic invertebrates live in the littoral area, i.e., water less than approximately 10 m deep in the North Basin, although the littoral area accounts for less than 20% of the lake area. There are two kinds of littoral benthic communities: those inhabiting cobble, rocky and pebble substrata and those living on sandy, sandy-mud and muddy bottoms. Some species live in both environments.

On the other hand, quite a few species inhabit the profundal bottoms, where water temperatures are almost a constant 7 - 10 ℃ throughout a year, and the substratum consist of muddy bottoms. The endemic flatworm *Bdellocephala annandalei* lives only on the profundal bottoms throughout their lives.

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Fig. 2-7-1 Hydridae sp. (hydrozoan)

Fig. 2-7-2 Colonies of *Spongilla lacustris* (sponges)

Fig. 2-7-3 *Bdellocephala annandalei* (En: flatworm)

Fig. 2-7-4 *Prostoma* sp. (ribbon worm)

Fig. 2-7-5 Tardigrada sp. (waterbear)

Fig. 2-7-6 A ribbed type of *Semisulcospira* (*Biwamelania*) *niponica* (En: gastropod)

Fig. 2-7-7 A larva of *Epholon limnobium* (En: mayfly) (photo by S. Ishiwata)

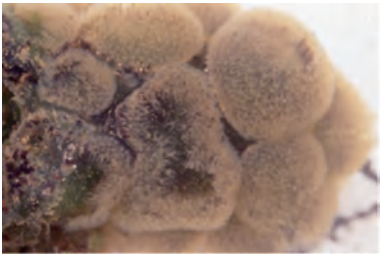

Fig. 2-7-8 Colonies of *Asajirella geratinosa* (Bryozoa)

*En: Endemic species