Chapter 3 Phylum Cnidaria

The cnidarians have a tissue level of organisation. They include sea anemones, corals, jellyfishes and the few freshwater hydrozoa. The body has two layers (= **diploblastic**): the epidermis and the gastrodermis, with jelly-like mesoglea between the two layers (Fig. 1b).

General structure and function

Cnidarians have **radial symmetry and** two body forms: sessile **polyps** (tube shaped bodies) which may be solitary or colonial, and free-swimming **medusae** (bell-shaped or umbrella-shaped bodies). Medusae have a much thicker mesoglea layer than polyps making them more buoyant. Both polyps and medusae have tentacles surrounding the mouth, which is the only opening into the digestive system. All cnidarians have cnidoblasts in which the small stinging organelles called **nematocysts** are formed. Nematocysts are a unique characteristic of the phylum, and they are located in both the epidermis and gastrodermis. They are abundant on the tentacles where they may form rings or batteries. Nematocysts function to capture prey and for defence. Tactile stimulation causes the nematocyst to discharge. When it is discharged, its **cnidoblast** is absorbed. Some nematocysts inject poison or penetrate into the prey, but other nematocysts recoil to hold or grasp some part of the prey. Cnidarians prey upon a variety of small invertebrates and vertebrates. The whole prey is drawn into the **gastrovascular cavity**, where gland cells in the gastrodermis discharge enzymes to begin extracellular digestion. In addition, nutritive muscular cells in the gastrodermis phagocytize some food particles for intracellular digestion. Undigested particles are carried into the gastrovascular cavity by amoebocytes and are expelled with other undigested food through mouth to the outside. Hydrozoan medusae have a **velum** below the umbrella.

Cnidarians have a nerve net. There are no excretory and respiratory systems. Ridding of waste products and gas exchange occurs by diffusion.

Cnidarians can be monoecious or dioecious. Asexual reproduction is by budding.

Sexual reproduction involves gamete formation with external fertilization. The zygote develops into the free-swimming planula larva.

Ecological relationships and economic importance in the region

Freshwater hydrozoans are much less diverse than marine forms. They usually feed on water fleas and other small invertebrates. They have no economic value, but they can provide education material for schools and universities.

Classification

Cnidarians are classified into four classes: Hydrozoa, Scyphozoa, Cubozoa and Anthozoa.

Except a few freshwater hydrozoa, all are marine. Hydras of the family Hydridae, order Hydroida (Fig. 1a), are very common freshwater hydrozoans. They have only the polyp form, a slender body and about 4-8 contractile tentacles arranged in a single ring around mouth. Hydras are usually found attached to aquatic vegetation but they may hang from the surface film of water.

Freshwater jellyfish of the family Petasidae, order Trachylina (Fig. 2) are very small medusae that are very rare. They have been found in the Mekong River and its tributaries.

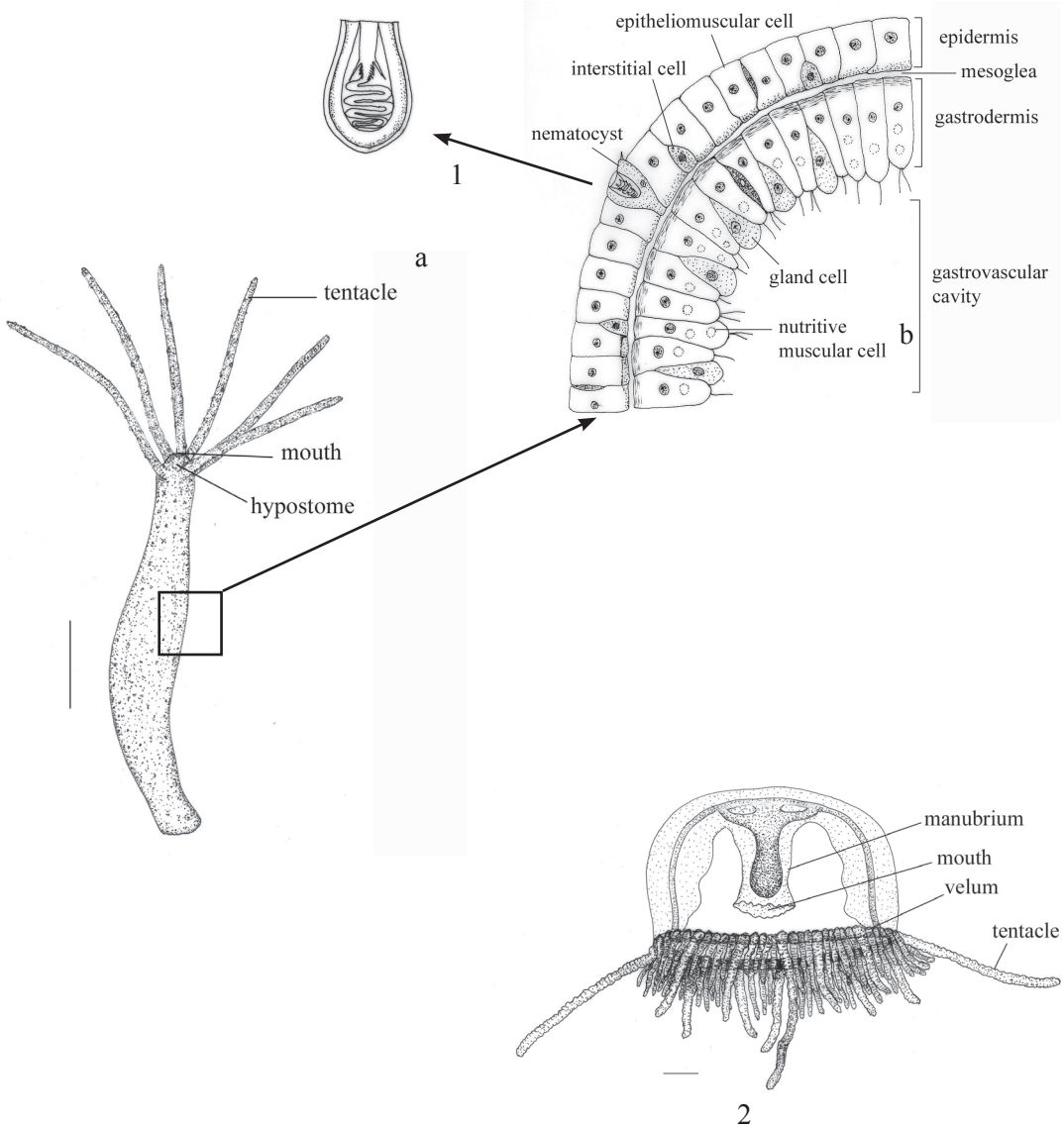

Fig. 1–2 1. Structure (a) and cross section (b) of hydra (1b modified from Hickman & Roberts, 1995, fig. 6.3B); 2. Structure of fresh water jellyfish. Scale: (1) 1 mm; (2) 2 mm.