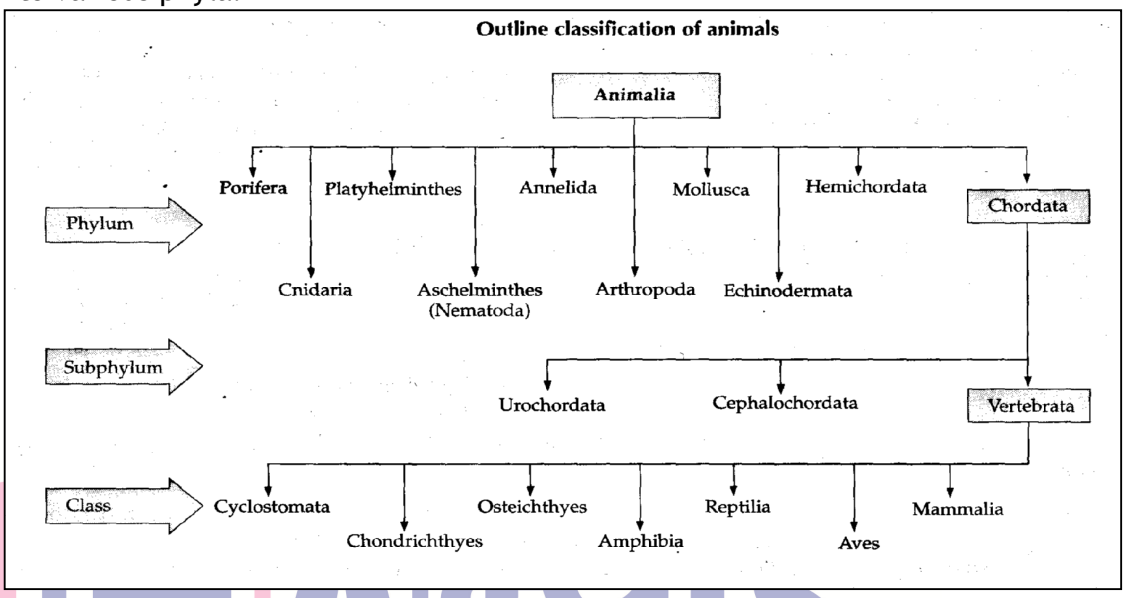
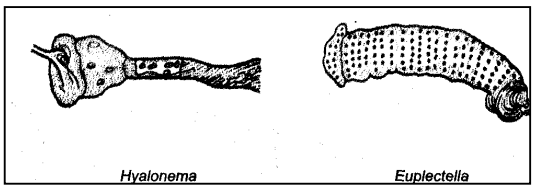
Animals are heterotrophic, eukaryotic organisms. Their most distinctive feature is that they cannot manufacture food. They have to ingest some kind of organic matter and they store carbohydrate as glycogen. Their cells are diploid and do not have cell walls. Most animals are capable of locomotion. The higher animals possess a nervous system and a muscular system. Though animals 'occupy all zones of the biosphere', the greatest diversity is found in the seas. The earliest ancestors of animals were marine protozoans. The kingdom Animalia is divided into various phyla.



Outline classification of animals: The classification of animals is based on the following.

1. Organization and differentiation of cells to form tissues and organs
2. Symmetry.
3. Formation of body cavities and blood vascular system
4. Features of embryonic development

Phylum Porifera: All sponges belong to this phylum. Sponges are aquatic animals which remain fixed to the bottom of the sea or some object. Such animals are called sessile. Most sponges are marine. Sponges can be of many shapes—round, saclike or branched. They are multicellular, but there is very little division of functions between the cells.



• Therefore, the cells are not organized into tissues. These animals do not have a nervous system.

• A very special feature of sponges is the circulation of water throughout their body cavity which is called the spongocoel. Water, carrying nutrients and oxygen, enters through pores, called ostia, all over the body. It circulates in the body cavity and leaves it through a large pore called the osculum.

• This is the way a sponge feeds. They have a hard outer layer, or skeleton. The skeleton of sponges is formed of needle-like structures called spicules. One class of sponges called chalk sponges has calcerous (made of calcium carbonate)

spicules. In glass sponges the spicules are siliceous (made of silica) and in horny sponges the spicules are of spongin fibre (proteinaceous).

Phylum Cnidaria (Coelenterata): Cnidarians are mostly marine. A few live in freshwater. They are called coelenterates (which mean hollow gut) because they have a body cavity called gastrovascular cavity, or coelenteron. This cavity has a single opening for ingestion and egestion.

They have a radially symmetrical body, which means if you cut them longitudinally through any diameter, you will get two identical halves. The cells of cnidarians are organized into tissues. A characteristic organ is the tentacle.

Cnidarians use tentacles to catch prey and fight enemies. Nematoblasts, or cnidoblasts, are characteristic stinging cells present particularly in the tentacles to fight enemies and paralyse prey. These cells contain a coiled-up, barbed, threadlike structure that shoots out when stimulated.

• They also release a poisonous substance. Cnidarians are called diploblastic because the body wall has two layers—ectoderm and endoderm. Diploblastic also means possessing two germ layers. Germ layers are embryonic layers of cells from which the tissues of the organism develop. Cnidarians have a loose network of nerve cells. Cnidarians are of two types—polyps, which have a cylindrical body, and medusae, which look like umbrellas.

• Many cnidarians are polymorphic (e.g., *Physalia),* or they change forms. They change from the polyp to the medusa form in the course of their life cycle. The polyp reproduces asexually to give rise to the medusa, which reproduces sexually in a cycle known as the alternation of generation. The polyp form is sedentary, while the medusa form swims freely. Polyps can lead a solitary life or can form colonies.

• Some cnidarians, like those of the genus *Hydra,* exist only in one form. Hydra exists in the polyp form. It lives in freshwater and reproduces sexually and asexually. Jellyfish *(Aurelia)* are medusoid and marine. Coral organisms, sea anemones and sea pens are of the polyp form. Coral polyps have an external skeleton of $CaCO_3$. They live in vast colonies and when they die, their chalklike skeletons form coral *reefs*.

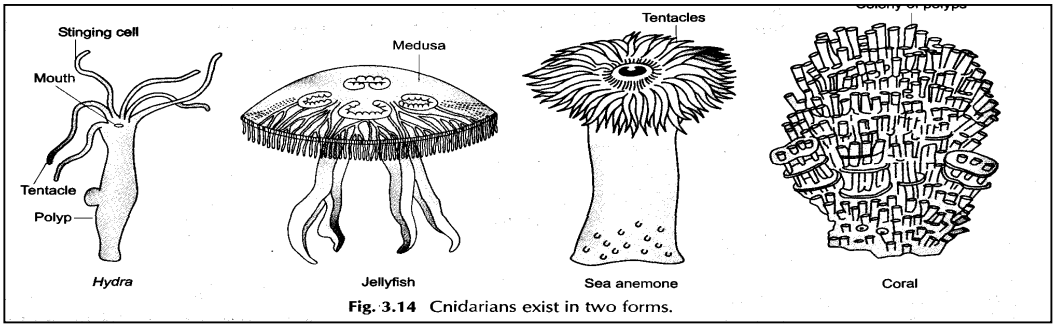
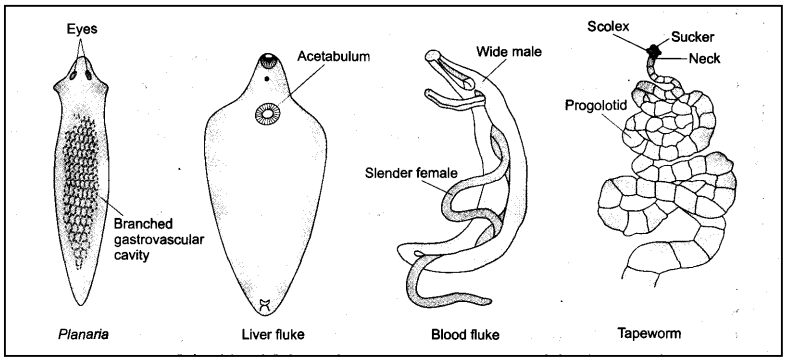


Fig. 3.14 Cnidarians exist in two forms.

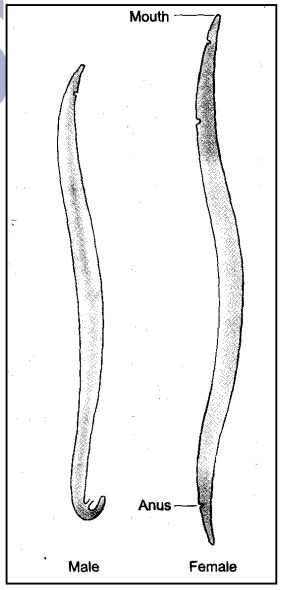
Phylum Platyhelminthes: Generally called flatworms, organisms of this phylum are bilaterally symmetrical, triploblastic (having three germ layers—ectoderm, mesoderm and endoderm) and dorsoventrally flat like the leaves. They are acoelomate, which means they do not have a body cavity. They have a gut with a mouth cavity but no anus. Special cells called flame cells constitute the excretory system. Flatworms do not have special respiratory and circulatory systems. Tapeworms *(Taenia,* particularly *Taenia solium),* liver flukes *(Fasciola)* and blood

flukes *(Schistosoma)* are. Parasitic flatworms. *Planaria* are free-living aquatic flatworms. Flatworms reproduce sexually and asexually. Most of them are hermaphrodites.



Phylum Aschelminthes (Nematoda): Generally called roundworms, these organisms have narrow bodies which are round in cross section. They are bilaterally symmetrical, unsegmented and triploblastic. The internal organs lie in a pseudocoelom (not a true coelom). The alimentary canal (gut) is tubular and complete with a mouth and an anus. They lack a circulatory system.

Roundworms reproduce sexually and the sexes are separate. Most of them are free-living, many live in moist soil. Some live in freshwater, while others are marine. Of the parasitic species, some live in the body of plants, while others make animals their hosts. The genus *Ascaris* has several parasitic species, of which *Ascaris lumbricoides* is the common roundworm which lives in the intestine of man. Another parasitic genus is *Wuchereria*. The worm that causes filaria belongs to this genus. Pinworms *(Enterobius)*, hookworms, guineaworms, trichinia worms are all disease- causing organisms belonging to this phylum.



Phylum Annelida: Annelids are segmented worms. The segments are visible externally as rings and separated internally by septa. Many annelids have bristle-like appendages protruding from each segment. These are chitinous (nitrogenous polysaccharide which is strong and light) projections, called chaetae (setae) that help in locomotion. Some annelids, like leeches, do not have chaetae. In the course of evolution, annelids were the first animals to have a true body cavity, or coelom. The alimentary canal has special regions.

- The circulatory system is of the closed type and the excretory system consists of coiled tubes called etanephridia. Reproduction in annelids takes place sexually.
- The sexes may be separate (e.g., *Nereis) or* the animal (like earthworms) may be a hermaphrodite. Annelids live in moist soil, freshwater and the sea. Earthworms *(Pheretima),* leeches *Hirudinaria),* clamworms *(Nereis)* and sea mouse *(Aphrodite)* are all annelids. Leeches are ectoparasites. They attach themselves to animals and feed by suckers.
- **Phylum Arthopoda:** This is the largest phylum in the animal kingdom. In other words, there are more animals in this phylum than in any other. In fact, arthropods comprise 75% of the animal types identified by zoologists so far.
- Prawns (crustaceans), spiders, scorpions and insects of all kinds comprise this phylum of creatures with jointed *(arthros* means jointed) legs. Their body is

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segmented and is covered by an exoskeleton of protein and chitin. This exoskeleton is cast off (moulting) periodically to allow the body to grow. The segments of the body are grouped either into two regions (cephalothorax and abdomen) as in spiders or into three regions (head, thorax and abdomen) as in insects.

• Arthropods have an open circulatory system. The heart has pores (ostia). It pumps blood into a cavity called haemocoel that surrounds the body organs. The body organs are bathed in this blood called haemolymph. Respiration takes place through different organs in different arthropods. Crustaceans (lobsters, prawns, shrimps, barnacles, etc.) have gills and most insects have a system of air tubes called the tracheal system. The openings of these air tubes are called spiracles.

• Spiders and scorpions have fine leaflike structures called book lungs in the abdomen. The openings of book lungs can be closed to prevent water loss. Excretion occurs through green gland in crustacea and through Malpighian tubules in other arthropods. Many arthropods, like flies, lobsters and crabs, have compound eyes. Spiders have special organs in the abdomen called spinnerets that help them spin webs. They also have poison glands like, scorpions. Centipedes have simple eyes, many legs (one pair per segment) and a pair of poison claws. Millipedes too have simple eyes and many legs (two pairs per segment) but they do not have poison claws. Some arthropods like ticks and mites are parasitic, and carry diseases. King crabs and sea spiders are marine. Crustaceans have a hard covering called carapace. They are aquatic.

• Most insects, on the other hand, are terrestrial. Some like silver fish are wingless, while many have wings. Many insects (mosquitoes, flies, butterflies, etc.) change form during the course of growth. The eggs hatch into larvae, the larva passes through a pupal stage and then comes the winged adult. This process is called metamorphosis. Louse is an ectoparasite. Beetles are among the most abundant of insects. Many insects like bees, ants and termites are social—they live in large colonies. Reproduction among arthropods is sexual and the sexes are separate.