

Chapter 33 An Introduction to Invertebrates

Invertebrates account for over 95% of all known animal species.

12 Phyla of Invertebrates

PORIFERA-Informally called sponges. Lack true tissues

CNIDARIA-Include corals, jellies, hydras. Diploblastic and radially symmetrical with gastrovascular cavity that serves as both mouth and anus.

ACOELA-Acoel flatworms have simple nervous system and saclike gut.

PLACOZA-Single species that consists of a simple bilayer of a few thousand cells. Relationship with other animals unclear.

CTENOPHORA-Commonly called Comb jellies, they are diploblastic and radially symmetrical like cnidarians, suggesting both phyla diverged from other animals very early. Comb jellies make up much of oceans plankton.

LOPHOTROCHOZOA

PLATYHELMINTHES-Flatworms, have bilateral symmetry and a central nervous system that processes information from sensory structures. Have no body cavity or organs for circulation.

ECTOPROCTA-Ectoprocts (aka bryozoans) live as sessile colonies and are covered by a tough exoskeleton.

ROTIFERA-rotifers have specialized organ systems despite microscopic size. Have alimentary canal (digestive tract with mouth and anus).

ACANTHOCEPHALA-Called spiny-headed worms because of the curved hooks on the proboscis and the anterior end of their body. ALL species are parasites. Manipulate behavior of their hosts (generally arthropods)

NEMERTEA-called proboscis worms or ribbon worms. Swim through water or burrow in sand extending a unique proboscis to capture prey. Have alimentary canal and closed circulatory system.

CYCLIPHORA-Rare, only known species discovered on lobsters. Males impregnate females while still in their mothers bodies. Females escape, settle elsewhere on lobster and release offspring.

ANNELIDA-annelids or segmented worms have segmented bodies. Earthworms are most popular species

MOLLUSCA- includes snails, clams, squids, and octopuses, have soft body that is protected by a hard shell in many species.

ECDYSOZOA

LORICIFERA-tiny animals that inhabit sediments. Can telescope its head, neck and thorax in and out of the lorica, a pocket in the abdomen.

PRIAPULA-worms with large rounded proboscis at the anterior end. Fossil evidence indicates that they were among the major predators during the Cambrian period.

ONYCHOPHORA-called velvet worms originated during the Cambrian explosion. Used to thrive in forests but live only in human forests today. Have fleshy antennae and several dozen pairs of saclike legs.

NEMATODA-also called roundworms, abundant. Parasitize plants and animals. Most distinctive feature is tough cuticle that coats the body.

TARDIGRADA-Sometimes called water bears for their rounded shape, stubby appendages, and lumbering bearlike gait. Can enter dormancy due to harsh conditions.

ARTHROPODA-Vast majority of known animal species. Have segmented exoskeleton and jointed appendages.

DEUTEROSTOMIA

HEMICHORDATA-Share some traits with chordates such as gill slits and dorsal nerve cord. Largest group is the enteropneusts or acorn worms.

CHORDATA-More than 90% of all known chordate species have backbones. However includes 2 groups of invertebrates, lancelets and tunicates.

ECHINODERMATA-Bilaterally symmetrical as larvae but not adults. Feed by using internal canals to pump water to different parts of the body.

33.1 SPONGES ARE BASAL ANIMALS THAT LACK TRUE TISSUES

Informally known as sponges. Molecular evidence says they are monophyletic but some studies say they are paraphyletic. Simplest of animals. Most are marines and are FILTER FEEDERS-drawing in food particles suspended from the surrounding water. Water is drawn through the pores into a central cavity, the SPONGOCOEL and then flows out of the sponge through a larger opening called the OSCULUM. More complex sponges have folded body walls, and many contain branched water canals and several oscula. Lack tissues but contain several different cell types. CHOANOCYTES, or collar cells line the interior of the spongocoel and engulf food particles and bacteria through PHAGOCYTOSIS. Cells of CHOANOCYTES and CHOANOFLLAGELLATES supports the hypothesis that animals evolved from CHOANOFLLAGELLATES.

Sponges contain 2 layers of cells separated by gelatinous region called MESOHYL. The 2 layers are involved in gas exchange and waste removal. AMOEBOCYTES made in the skeletal fibers with MESOHYL use pseudopodia to take up food and carry nutrients. AMOEBOCYTES ARE TOTIPOTENT AND CAN BECOME OTHER TYPES OF SPONGE CELLS, GIVING FLEXIBILITY TO CHANGE SHAPE IN RESPONSE TO SURROUNDINGS. Most sponges are HERMAPHRODITES (each individual functions as both male and female in sexual reproduction by making sperm and egg). SPONGES COULD BE USEFUL IN THE FORM OF ANTIBIOTICS AND OTHER ANTICANCER AGENTS.

33.2 CNIDARIANS ARE AN ANCIENT PHYLUM OF EUMETAZOANS

All animals except sponges and a few other groups are in this phylum. One of the oldest lineages in this clade is the phylum CNIDARIA. CNIDARIANS have diversified into a wide range of sessile and motile forms, including hydras, corals, and jellies. Yet most cnidarians are mostly simple, diploblastic, and have radial body plans. The body plan of a CNIDARIAN is a sac with a central digestive compartment, the GASTROVASCULAR CAVITY with two versions, the SESSILE POLYPS and the MOTILE MEDUSA. The single opening acts as both a mouth and anus. Polyps are cylindrical forms that adhere to substrate at the aboral end of their body and extend tentacles to catch prey. A MEDUSA resembles a flattened mouth down version of the polyp. Cnidarians are predators that often use tentacles armed with CNIDOCYTES arranged around their mouth to capture prey. The prey gets forced into their gastro-vascular cavity where they get digested. CNIDOCYTES are unique to cnidarians and function in defense and capturing prey. Cnidocytes contain cnidae, capsule like organelles that explode outward. NEMATOCYSTs, specialized CNIDAE contain a stinging thread that can penetrate cell wall of prey. Cnidarians have simple contractile tissues and nerves. Gastrovascular cavity acts as a hydrostatic Skeleton, which allows for microfilaments to work as contractile fibers. Movement coordinated by nerve net which uses sensory structures distributed around body. Have no brain.

MEDUSOZOANS

All Cnidarians that produce Medusa are a part of this group. Members include scyphozoans (jellies) and cubozoans (box jellies) which spend majority of their life time in the medusa stage and hydrozoans. Hydrozoans alternate between polyp and medusa forms.

ANTOZOANS

See anemones and corals belong to this clade. These cnidarians occur only as polyps. Many species secrete a hard EXOSKELETON of calcium carbonate. Each polyp generation builds on the skeletal remains of earlier generations. These skeletons are what we usually think of corals.