# FEDERAL UNIVERSITY OF AGRICULTURE, ABEOKUTA

# DEPARTMENT OF BIOLOGICAL SCIENCES

# ZOO 261-INVERTEBRATE ZOOLOGY (3 UNITS)

# COURSE CONTENT BY DR O.A OKE.

## PHYLUM PORIFERA (SPONGES)

The phylum were once included in plants, largely because they are sedentary and do not possess a nervous system. Later on, they were included in the animal kingdom with the sub kingdom Metazoa. However, sponges show a special low grade of organization which is unknown among all other Metazoa. Although they are cellular animals (composed of many cells), yet their cells are far less specialized and less dependent upon one another (i.e they hardly form tissues) than the cells of other Metazoa.

### CHARACTERISTICS

The Porifera are asymmetrical or radially symmetrical, aquatic (mostly marine), sedantry animals, but have a ciliated larva.

The body is perforated by numerous pores serving for the igress and egress of water, with a single body cavity (the paragaster) which is lined with peculiar collared-cells, and usually with an internal skeleton of various materials. Besides, having no nervous system or sensory cells, sponges possess no mouth, proper tissues or organs, the cells of the body are capable of de-differentiation, that is, reverting to an indifferentiated condition, but they may then differentiate again into any type of cell found in the body.

### CLASSIFICATION

Three types of sponges are known- the ascon, sycon and leucon types, according to the structural complexity of the body, the first being the simplest.

### The Ascon Type e.g Leucosolenia

Leucosolenia is a simple sponge which grows on rocks near the seashore in colonies. It has a skeleton of calcium carbonate, deposited mostly in the form of minute triradiate spicules.

### External Features

General form of colony with numerous horizontal branches over which grow many vase-shaped individuals, each with a single large opening at its free end, the osculum.

(The body wall is thin, transparent, perforated by many thin inhalant pores or OSTIA and supported by numerous triradiate spicules which lie in the wall with two rays towards the osculum and one away from it).

In live specimens a continuous current of water passes in through the ostia and out through the osculum. It is composed of a single layer of collared flagellated cells or CHOANOCYTES.

**THE SYCON TYPE e.g Sycon**

Sycon is a sponge of more complexity than leucosolenia. It is a solitary sponge that lives attached to rocks near the seashore and possesses a skeleton of calcareous spicules.

The general body form is vase-shaped, with a large osculum at the free end, and encircled by a fringe of large straight monoaxomic spicules. Buds may be seen arising near the base.

The body wall is thick and perforated by numerous OSTIA with spicules projecting around them, giving the animal a bristly appearance.

**The amphiblastula larva**

Besides reproducing asexually by budding, sponges also reproduce sexually by formation of germ cells. These are developed from the amoebogites.

Fertilization is followed by cleavage and then a peculiar larva is formed called amphiblastula larva. This is oval in shape with one half covered by small flagellated cells and the other half by larger granular cells. After swimming freely for some time, the amphiblastula settles down to develop into the sedentary adult sponge.

**The Leucon Type e.g Euspongia (the bath sponge)**

The bath sponge, like the vast majority of sponges belong to the leucon or the most complex type of sponge in which there is further increase in the folding of the body wall.

Different species of Euspongia live on rocky sea bottoms, fixed to the substratum by a secretion of spongin, a horny substance of which the skeleton is formed.

## PHYLUM CNIDARIA

All the members of this phylum possess specialized stinging cells called **cnidoblasts** that have given rise to the phylum name. Each cnidoblast contains a poison-filled, barbed thread, the nematocyst. When the trigger of the cnidoblast is touched, the nematocyst is discharged. It is used for trapping and paralyzing prey as well as for defense against enemies.

The body of all members of this phylum consists of two layers of cells with a jelly-like mesoglea between them. The mesoglea has cells scattered through it, however, and is considered by some biologists to be a third cell layer. The body is organized as a hollow cylinder with a single opening at one end. Food is introduced through this opening, the mouth, and into the inner cavity, called the **gastrovascular cavity.** This cavity is also called a coelenterons and for many years the name of this phylum was coelenterate. Another group of animals (called comb jellies) were included then as they also have a coelenterons. They have no cnidoblasts, however, and are no longer thought to be closely related to the forms we are discussing.

All the parts, such as tentacles,in the Cnidaria are arranged in a circle around the cylindrical body. This pattern of organization is known as radial symmetry. If we should cut a hydra from the head (anterior) to the base (posterior) in any plane passing through the midline, the organism would b divided into two equal halves. Contrast this with the bilateral symmetry of a man. There is only one plane passing through the midline that will divide the human body into two equal halves. This is the plane running from the back (dorsal) surface to the front (ventral) surface. It divides the body into right and left halves. Radially symmetrical animals like the cnidarians have neither dorsal and ventral surfaces nor right and left sides.

About 9600 species of Cnidaria are known. Most of these are found in the oceans, although a few species, such as *Hydra*, occur in fresh water. The phylum is divided into three classe.

The ready availability of the common fresh water hydra makes it the most common cnidarians studied by biology students. Although it exhibits the major structural features of the phylum, it is really not typical of either its phylum or its class (Hydrozoa). First of all, unlike most of the other members of the phylum it is found in fresh water. Second, it exists as a single individual. Most members of its class are colonial, that is, many individuals live attached to one another. Third, *Hydra* exhibits only one body

form, the **polyp**. Most members of the class produce a second body type, the **medusa**, that floats or swims freely in the water and aids in the dispersal of the species. Despite its superficial difference in appearance, the medusa is basically an upside-down polyp. The Portuguese man-of-war (Physalia), whose nematocysts may cause serious, even fatal, poisoning in man, is also a member of this class. It consists of a floating, gas-filled bag from which dangle long chains of polyps.

The main body form of jellyfishes (cnidarians of the class Scyphozoa) is the medusa. Their jelly is simply a greatly enlarged mesoglea. The tentacles of the medusa bear the cnidoblasts, which in some species can cause considerable pain to unwary swimmers. Sea anemones and corals (which belong to the class Anthozoa) consist of a polyp stage only. The corals secrete limestone shelters that are responsible for the development of great reefs and atolls in tropical waters.

## PHYLUM ASCHELMINTHES (Nematodes)

The most important members of this phylum are the roundworms or nematodes. These are elongated, cylindrical creatures. Unlike flatworms, each roundworm has either male or female sex organs, that is, the sexes are separate. The worms have a one-way digestive tract running from a mouth at the front to an anus at the rear. This one-way digestive system is advantageous as it eliminates the mixing of incoming food with outgoing wastes. After food enters the mouth, it can be processed step-by-step as it passes from one section of the digestive tract to another. Finally, undigested remains are eliminated at the anus.

### The Rotifers

The rotifers are a member of this phylum, because it is a rare biology student who will not see these organisms when he examines pond water under the microscope. These little creatures are not much larger than many of the one-celled protists found in fresh water. Nevertheless, they are multicellular. (infact, the number of cells has been found to be fixed precisely in each species). They often attach themselves to some underwater object by their “toes” and feed on microorganisms in the water, sweeping it past their mouth by means of a wheel-like ring of cilia.