

## **B.Sc. Zoology Part I**

### **CHARACTERS AND CLASSIFICATION OF PHYLUM PORIFERA**

The Porifera may be defined as “asymmetrical or radially symmetrical multicellular organisms with cellular grade of organization without well-defined tissues and organs: exclusively aquatic; mostly marine, sedentary, solitary or colonial animals with body perforated by pores, canals and chambers through which water flows; with one or more internal cavities lined with choanocytes; and with characteristic skeleton made of calcareous spicules, siliceous spicules or horny fibers of sponging.”

#### **General Characters:-**

- ❖ Porifera are all aquatic, mostly marine except one family **spongillidae** which lives in freshwater.
- ❖ They are sessile and sedentary and grow like plants.
- ❖ Body shape is vase or cylinder-like asymmetrical or radially symmetrical.
- ❖ The body surface is perforated by numerous pores, the **ostia** through which the water enters the body and one or more large openings, the **oscula** by which the water passes out.
- ❖ Multicellular body consisting of outer ectoderm and inner endoderm with an intermediate layer of mesenchyme, therefore **diploblastic** animal.
- ❖ The interior space of the body is either hollow or permeated by numerous canals lined with **choanocytes**. The interior space of sponge body is called **spongocoel**.
- ❖ Characteristic skeleton consisting of either fine flexible **spongin fibers**, **siliceous spicules** or **calcareous spicules**.
- ❖ Mouth absent, digestion intracellular.
- ❖ Excretory and respiratory organs absent.
- ❖ The nervous and sensory cells are probably not differentiated.
- ❖ The sponges are monoecious; reproduction both by asexual and sexual methods.
- ❖ Asexual reproduction occurs by **buds** and **gemmules**.
- ❖ The sponges possess high power of regeneration.
- ❖ Sexual reproduction occurs by **ova** and **sperms**.
- ❖ Fertilization is internal but cross fertilization occurs as a rule.
- ❖ Cleavage **holoblastic**, development indirect through a free-swimming ciliated larva called **amphiblastula** or **parenchymula**.

- ❖ The organization of sponges has been grouped into three main types, viz; **ascon** type, **sycon** type and **leuconoid** type due to simplicity in some forms and complexity in others.

### Classification:-

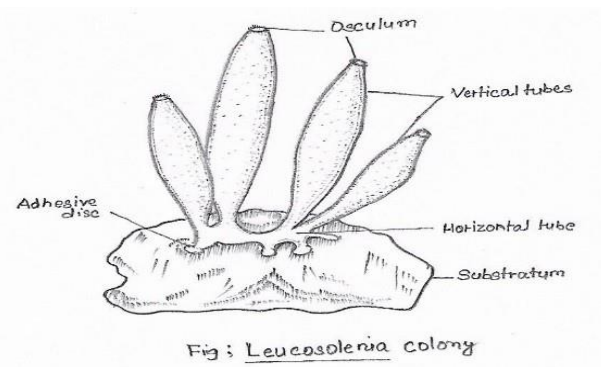
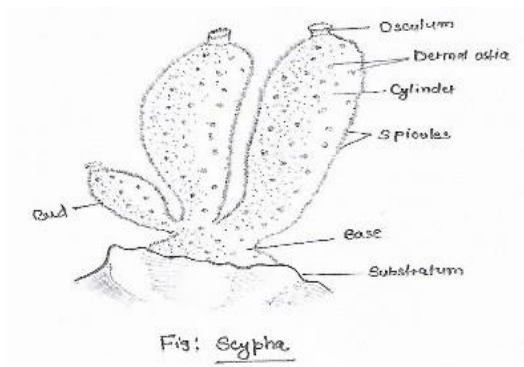
The classification of Porifera is based chiefly on types of skeleton found in them.

### CLASS I: CALCARIA OR CALCISPONGIAE

(L; *calx*= lime) or (L; *calx*= lime + *spongos*= sponge)

- ❖ They are commonly called calcareous sponges.
- ❖ Skeleton consist of monaxon or triradiate and tetraxon spicules of calcium carbonate.
- ❖ They are dull coloured sponges less than 15 cm in size.
- ❖ They are solitary or colonial; body shape vase-like or cylindrical.
- ❖ They may show asconoid, syconoid or leuconoid structure.
- ❖ They occur in shallow waters in all oceans.
- ❖ Asconoid sponges with radially symmetrical, cylindrical body.
- ❖ Spongocoel is lined by choanocytes.
- ❖ Syconoid or leuconoid sponges having vase-shaped body.
- ❖ The body wall is thick and folded, **choanocytes** line only radial canals.
- ❖ Asexual reproduction by budding. The free swimming larva is called amphiblastula.

**Example:** *Leucosolenia*, *Clathrina*, *Sycon* or *Scypha*, *Grantia*.



## CLASS II: HEXATINELIDA OR HYALOSPONGIAE

(G; *hyalos*= glassy + *spongos*= sponge)

- ❖ They are called glass sponges.
- ❖ Skeleton is of siliceous spicules which are triaxon with 6 rays. In some the spicules are fused to form a lattice-like skeleton.
- ❖ There is no epidermal epithelium.
- ❖ Choanocytes line finger-shaped chambers.
- ❖ They are cylindrical or funnel shaped and are found in deep tropical seas, they grow up to one meter.
- ❖ Spicules are hexasters, i.e. star-like in shape.
- ❖ Radial canals or flagellated chambers are simple.
- ❖ They are not attached by root tufts but commonly attaches to a hard surface.
- ❖ Spicules are amphidiscs. No hexasters.
- ❖ They are attached to the substratum by root tufts.

**Example:** *Euplectella*, *Hyalonema*.



Fig: *Euplectella aspergillum*

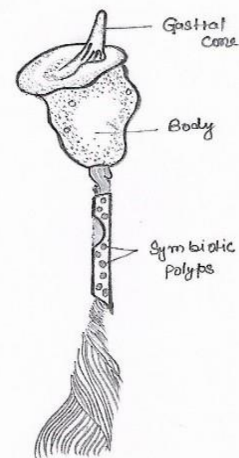


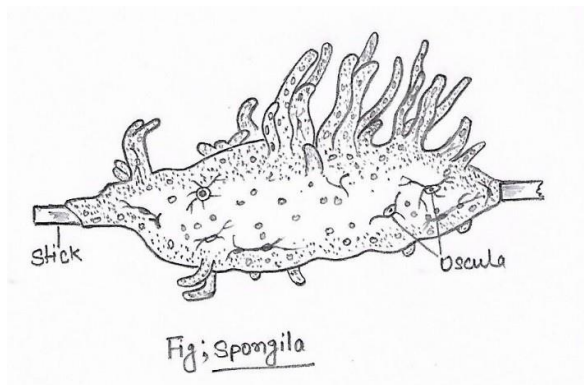
Fig: *Hyalonema*

### CLASS III: DEMOSPONGIAE

(Gr; *demos*= frame + *spongos*= sponge)

- ❖ Contains the largest number of sponge species. Large-sized, solitary or colonial.
- ❖ The skeleton may be of sponging fibers or of sponging fibers with siliceous spicules or there may be no skeleton.
- ❖ Spicules are never six-rayed, they are monaxon or tetraxon and are differentiated into large megascleres and small microscleres.
- ❖ Body shape is irregular and the canal system is of leucon type.
- ❖ Generally marine, few freshwater forms.
- ❖ Sponges are mostly solid and simple rounded cushion like flattened in shape usually without branches.
- ❖ Skeleton comprised mainly of tetraxon siliceous spicules but absent in order myxospongida.
- ❖ Canal system is leuconoid type. Shallow water form.
- ❖ Simple structure.
- ❖ Skeleton absent.
- ❖ Spicules are not differentiated into megascleres and microscleres.
- ❖ Asters may be present.
- ❖ Spicules are differentiated into megascleres and microscleres.

**Example:** *Spongilla*, *Chalina*, *Spongia*.



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## Economics Importance of Phylum Porifera (Sponges)

### Economic importance:

- They are used in the production of medicines.
- They act protective shelter for animals.
- Skeleton of some sponges are used as decorative pieces.
- Dried, fibrous skeleton is used for the purpose of.....
  - Bathing, polishing, washing, scrubbing

**SPONGES PLAY A VITAL ROLE IN THE ECONOMIC AND COMMERCIAL GROWTH OF OUR SOCIETY. SOME SPONGES ARE USED IN THE BATH BECAUSE OF THEIR SKELETON. THE FOLLOWINGS ARE THE USES OF SPONGES.**

- 1. MAN USES THE SKELETON OF SPONGES FOR WASHING AND BATHING. MANY ARTIFICIAL SPONGES HAVE BEEN MADE FROM SYNTHETIC MATERIAL. BUT STILL, THERE IS MUCH DEMAND FOR THE NATURAL SPONGE. IT IS AN IMPORTANT INDUSTRY IN ANY PART OF THE WORLD. THE BEST COMMERCIAL SPONGES ARE FOUND IN THE WARM WATER OF THE MEDITERRANEAN SEA.**
- 2. SPONGES HAVE A GREAT CAPACITY TO ABSORB WATER. SO THEY ARE USED IN SURGICAL OPERATIONS FOR ABSORBING FLUID AND BLOOD.**
- 3. SPONGES ARE ALSO USED FOR SOUND ABSORPTION IN BUILDINGS.**

- 4. DURING THE CULTIVATION OF RADISH AND OTHER FAST-GROWING SEEDS AND FOOD ITEMS, SPONGES ARE USED TO MAINTAIN AGRICULTURE ON A LARGE SCALE.**
- 5. FOR THE QUICK SPROUTING OUT OF SEEDS IN AGRICULTURE, SPONGES ARE USED AS A MOISTENED. IT CREATES A CONTAINER AROUND THE SEED.**
- 6. TO AVOID CRACKS, IT IS ALSO USED AS A BOX WITH FRAGILE THINGS TO PROTECT THEM FROM HAVING CRACKS ON THEM. WHICH PROVIDES SOFTNESS AND SAFETY AGAINST BEING BREAKABLE.**
- 7. SPONGES PLAY AN IMPORTANT ROLE IN CATCHING THE OIL LEAKS. THEY ARE WRAPPED UP WITH SOME TOOLS TO HOLD THEM SAFELY SO THAT THEY DON'T SLIP INTO YOUR HANDS.**
- 8. THEY ARE ALSO USED TO TRY THE INSIDE OF THE VASE BY PUTTING IT IN A STICK.**
- 9. BY MIXING IT IN SOAPS AND DETERGENTS, IT SAVES SOAPS FROM MELTING FAST, MORE EVER, PUTTING SPONGES ON THE SOAPS, IT CAN SUCK EXTRA WATER WHICH CAUSED THE MELTING DOWN OF THE SOAP.**
- 10. IT CAN BE USED TO ELIMINATE STINK ODOR FROM THE REFRIGERATOR BY SPRINKLING IT A SMALL AMOUNT.**
- 11. BY PUTTING SOME SPONGES ON THE BASE OF WARES, IT CAN AVOID WARES FROM SCRATCHES.**
- 12. IT IS ALSO USED TO REMOVE STICKING WALLPAPERS FROM THE WALLS JUST BECAUSE OF SOAKING THE SPONGES INTO THE WATER AND VAPING IT OVER THE WALL WITH THE HELP OF STUBBORN LEFT PAPER.**
- 13. USED AS A SCRUB WHILE TAKING BATH.**

