

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 have skeleton of separate calcareous spicules which are monaxon or tetraxon; tetraxon spicules lose one ray to become triradiate.
- ❖ They are solitary or colonial; body shape vase-like or cylindrical.
- ❖ They may show asconoid, syconoid or leuconoid structure.
- ❖ They are dull coloured sponges less than 15 cm in size.
- ❖ They occur in shallow waters in all oceans.

Order 1: Homocoela

- ❖ Asconoid sponges with radially symmetrical, cylindrical body.
- ❖ Body wall is thin and not folded, spongocoel is lined by choanocytes.

Example: *Leucosolenia*, *Clathrina*.

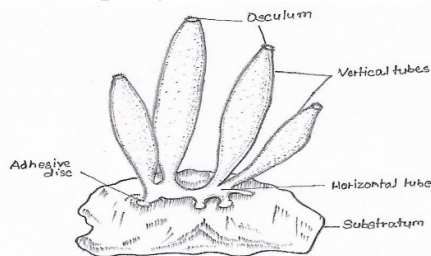


Fig: *Leucosolenia* colony

Order 2: Heterocoela

- ❖ Syconoid or leuconoid sponges having vase-shaped body.
- ❖ The body wall is thick and folded, **choanocytes** line only radial canals.
- ❖ Spongocoel is lined by flattened endoderm cell.

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

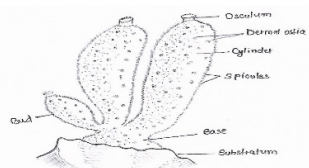


Fig: *Scypha*.

CLASS II: HEXATINELIDA OR HYALOSPONGIAE

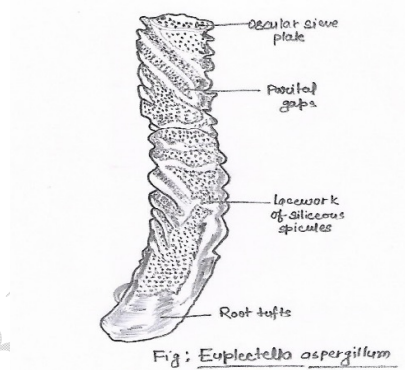
(G; *hyalos*= glassy + *spongos*= sponge)

- ❖ 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.

Order 1: Hexasterophora

- ❖ 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.

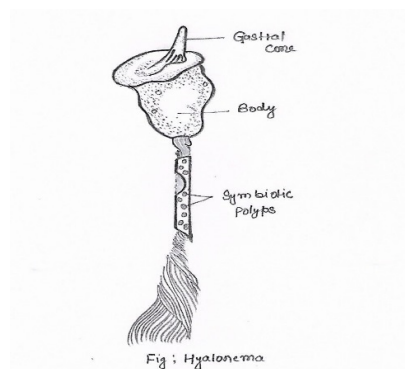
Example: *Euplectella*, *Farnera*.



Order 2: Amphidiscophora

- ❖ Spicules are amphidiscs. No hexasters.
- ❖ They are attached to the substratum by root tufts.

Example: *Hyalonema*, *Pheronema*.



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 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.

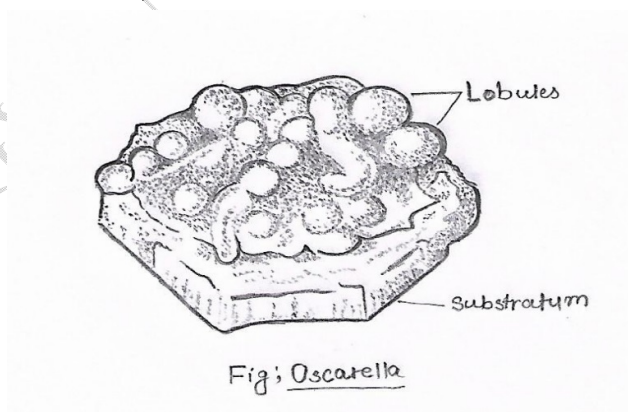
Subclass I: Terractinellida

- ❖ 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.

Order 1: Myxospongida

- ❖ Simple structure.
- ❖ Skeleton absent.

Example: *Oscarella*, *Halisarca*.



Order 2: Carnosa

- ❖ Simple structure.
- ❖ Spicules are not differentiated into megascleres and microscleres.
- ❖ Asters may be present.

Example: *Plakina*.

Order 3: Choristida

- ❖ Spicules are differentiated into megascleres and microscleres.

Example: *Geodia*, *Thenea*.

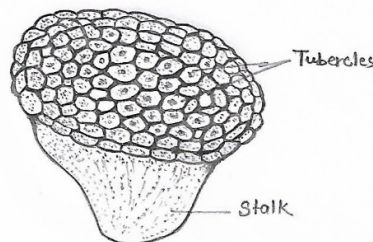
Subclass II: Monaxonida

- ❖ Monaxonids occur in variety of shapes from rounded mass to branching type or elongated or stalked with funnel or fan shaped.
- ❖ Skeleton consists of monaxon spicules with or without spongin.
- ❖ Spicules are distinguished into megascleres and microscleres.
- ❖ They are found in abundance throughout the world.
- ❖ Shallow and deep water forms.

Order 1: Hadromerida

- ❖ Monaxon megascleres in the form of tylostyles.
- ❖ Microscleres when present in the form of asters.
- ❖ Sponging fibers are absent.

Example: *Cliona*, *Tethya*.

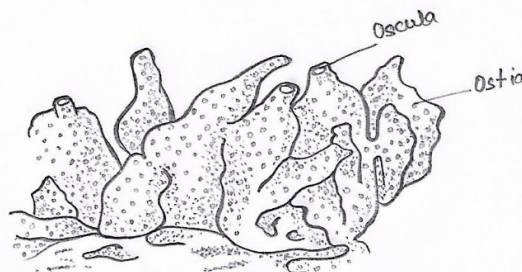


Fig; Tethya

Order 2: Halichondrida

- ❖ Monaxon megascleres are often of two types viz; monoactins and diactins.
- ❖ Microscleres are absent. Sponging fibers present but scanty.

Example: *Halichondria*.



Fig; Halichondria

Order 3: Poecilosclerida

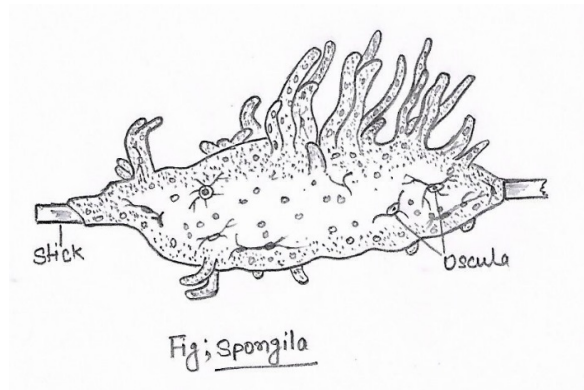
- ❖ Monaxon megascleres are of two types, one type in the ectoderm and another type in the choanocyte layer.
- ❖ Microscleres are typically chelas, sigmas and toxas.

Example: *Cladorhiza*.

Order 4: Haplosclerida

- ❖ Monaxone megascleres are of only one type, viz; diactinal.
- ❖ Microscleres are absent.
- ❖ Spongin fibers are generally present.

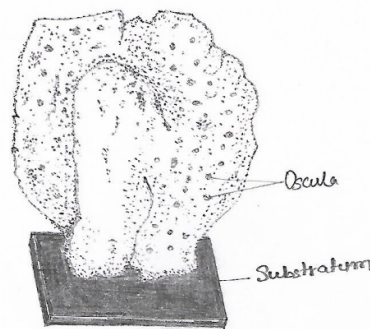
Example: *Chalina*, *Pachychalina*, *Spongilla*.



Subclass III: Keratosa

- ❖ Body is rounded and massive with a number of conspicuous oscula.
- ❖ Skeleton composed of network of sponging fibers only.
- ❖ Siliceous spicules are absent.
- ❖ They are also known as horny sponges found in shallow and warm waters of tropical and sub-tropical region.

Example: *Euspongia*, *Hippospongia*.



Fig; *Euspongia*
