

## Phylum Porifera

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

### Characters

1. Porifera are all aquatic, mostly marine except one family Spongillidae which lives in freshwater.
2. They are sessile and sedentary and grow like plants.
3. The body shape is vase or cylinder-like, asymmetrical, or radially symmetrical.
4. The body surface is perforated by numerous pores, the Ostia through which water enters the body and one or more large openings, the oscula by which the water exits.
5. The multicellular organism with the cellular level of body organization. No distinct tissues or organs.
6. They consist of outer ectoderm and inner endoderm with an intermediate layer of mesenchyme, therefore, diploblastic
7. The interior space of the body is either hollow or permeated by numerous canals lined with choanocytes. The interior space of the sponge body is called spongocoel.
8. Characteristic skeleton consisting of either fine flexible spongin fibers, siliceous spicules, or calcareous spicules.
9. Mouth absent, digestion intracellular.
10. Excretory and respiratory organs are absent.
11. Contractile vacuoles are present in some freshwater forms.
12. The nervous and sensory cells are probably not differentiated.
13. The primitive nervous system of neurons arranged in a definite network of bipolar or multipolar cells in some, but is of doubtful status.
14. The sponges are monoecious.
15. Reproduction occurs by both sexual and asexual methods.
16. Asexual reproduction occurs by buds and gemmules.
17. The sponge possesses a high power of regeneration.
18. Sexual reproduction occurs via ova and sperms.
19. All sponges are hermaphrodite.
20. Fertilization is internal but cross-fertilization can occur.
21. Cleavage holoblastic.
22. Development is indirect through a free-swimming ciliated larva called amphiblastula or parenchymula.
23. The organization of sponges are grouped into three types which are ascon type, sycon type, and leuconoid type, due to simple and complex forms.
24. Examples: *Clathrina*, *Sycon*, *Grantia*, *Euplectella*, *Hyalonema*, *Oscarella*, *Plakina*, *Thenea*, *Cliona*, *Halichondria*, *Cladorhiza*, *Spongilla*, *Euspondia*, etc.

## Classification

The phylum includes about 5,000 species of sponges, grouped into 3 classes depending mainly upon the types of skeleton found in them. The classification here is based on Storer and Usinger (1971) which appears to be a modification from Hyman's classification.

### **Class 1. Calcarea** (L., calx=lime) or Calcispongiae (L., *calcis*=lime+ *spongia*=sponge)

- Small-sized calcareous sponges, below 10 cm in height.
- Solitary or conical; body shape vase-like or cylindrical.
- They may show asconoid, Syconoid, or leuconoid structures.
- A skeleton of separate one or three or four-rayed calcareous spicules.
- Exclusively marine.

#### Order 1. Homocoela (=Asconosa)

- Asconoid sponges with cylindrical and radially symmetrical bodies.
- Body wall thin, not folded. Choanocytes line the Spongocoel.
- Often conical.
- Examples: *Leucosolenia*, *Clathrina*.

#### Order 2. Heterocoela (=Syconosa)

- Syconoid and leuconoid sponges having a vase-like body.
- The body wall is thick, folded. Choanocytes line the flagellated chambers (radial canals) only.
- Spongocoel is a line by flattened endoderm cells.
- Solitary or conical
- Examples: *Sycon* or *Scypha*, *Grantia*.

### **Class 2. Hexactinellida** (Gr., *hex*=six + *actin*=ray) or Hyalospongiae

(Gr., *hyalos*=glass+ *spongos*=sponge)

- Moderate-sized. Some reach 1 meter in length.
- Called glass sponges.
- Body shape cup, urn, or vase-like.
- Skeleton is of siliceous spicules which are triaxon with 6 rays. In some, the spicules are fused to form a lattice-like skeleton.
- No epidermal epithelium.
- Choanocytes line finger-shaped chambers.
- Cylindrical or funnel-shaped
- Found in deep tropical seas.

#### Order 1. Hexasterophora

- Spicules are hexasters i.e. star-like in shape with axes branching into rays at their ends.
- Flagellated chambers regularly and radially arranged.
- Usually attached to substratum directly.
- Examples: *Euplectella* (Venus' flower basket), *Farina*.

#### Order 2. Amphidiscophora

- Spicules are amphidiscs i.e. with a convex disc, bearing backwardly directed marginal teeth at both ends.
- Flagellated chambers are slightly different from the typical type.

- Attached to the substratum by root tufts.
- Examples: *Hyalonema*, *Pheronema*.

### **Class 3. Demospongiae** (Gr., *dermos*= frame+ *spongos*= sponge)

- Contains the largest number of sponge species.
- Small to large-sized.
- Conical or solitary.
- The body shape is a vase, cup, or cushion.
- Skeleton of siliceous spicules or spongin fibers, or both, or absent.
- Spicules are never 6-rayed, they are monaxon or tetraxon and are differentiated into large megascleres and small microscleres.
- The body canal system is leucon type.
- Choanocytes restricted to small rounded chambers.
- Generally marine, few freshwater forms.

#### **Subclass I. Tetractinellida**

- Sponges are mostly solid and simple rounded cushion-like flattened in shape usually without branches. Dull to brightly colored.
- Skeleton comprised mainly of tetraxon siliceous spicules but absent in order Myxospongida.
- The Canal system is a leuconoid type.
- Mostly in shallow water.

##### **Order 1. Myxospongida**

- Simple structure.
- Spicules absent.
- Examples: *Oscarella*, *Halisarca*.

##### **Order 2. Carnosa**

- Structure simple.
- Spicules are not differentiated into megascleres and microscleres.
- Asters may be present.
- Examples: *Plakina*, *Chondrilla*.

##### **Order 3. Choristida**

- Both large and small spicules present.
- Examples: *Geodia*, *Thenea*.

#### **Subclass II. Monaxonida**

- Occurs in a variety of shapes from rounded mass to branching types or elongated or stalked with funnel or fan-shaped.
- Spicules monaxon. Spongin present or absent.
- Spicules are distinguished into megascleres and microscleres.
- Found abundant throughout the world.
- Mostly in shallow waters, some in the deep sea, some in freshwater.

##### **Order 1. Hadromerina**

- Monaxon megascleres in the form of tylostyles.
- Microscleres when present in the form of asters.
- Spongia absent.

- Examples: *Cliona*, *Tethya*.

#### Order 2. Halichondrina

- Monaxon megascleres are often of 2 types i.e. monactines and diactines.
- Microscleres are absent.
- Spongia present and scanty.
- Example: Halichondria (crumb-of-bread sponge).

#### Order 3. Poecilosclerina

- Monaxon megascleres are of 2 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

- Monaxon megascleres are of only one type i.e. diactinal.
- No microscleres.
- Spongia fibers are generally present.
- Examples: *Chalina*, *Pachychalina*, *Spongilla*.

#### Subclass III. Keratosa

- The body is rounded and massive with a number of conspicuous oscula.
- Horny sponges with the skeleton of spongin fibers.
- No spicules.
- Found in shallow and warm waters of tropical and subtropical regions.
- Examples: *Euspongia*, *Hippospongia*.