Skeleton of Sponges

Like any other animals, sponges possess some sort of a skeleton that gives their bodies shape and structure. All the sponges have a skeleton embedded in the mesenchyme. Skeleton consists of separate spicules or interlacing sponging fibers or both. Skeleton supports and protects the soft body parts of the sponges. Skeleton also serves as the basis of classification of the sponges into various classes like Calcarea, Hexactanellida and Desmospongia.

SPONGIN FIBERS

Structure of spongin

Spongin is an organic, horny, elastic substance which resembles silk in chemical composition. It is a scleroprotein containing sulphur and chemically related to collagen. It is insoluble in water and chemically resistant to protein digesting enzymes. Spongin fibers are fine threads consisting of a soft granular axial core externally surrounded by concentric layers of spongin.

Spongin contains large amounts of iodine. This is the reason that in olden days the bath sponge was used a cure for croup, a throat condition in children resulting from inflammation and partial obstruction of larynx.

- In the class Desmospongia, spongin fiber occurs in various forms.
- It may occur as a cement connecting together siliceous spicules.
- It may be found in the form of branching fiber in which siliceous spicules are embedded.
- In Keratosa, spicules are completely absent and spongin alone is formed.

Development of spongin

Spongin fibers are secreted by flask-shaped mesenchyme cells called as spongioblast cells. During the development the spongioblast cells are arranged in the rows and the spongin rods secreted by them are fused with the neighboring cells to form a long fiber. Later the spongioblasts

vacuolated and finally get degenerated after secreting certain amount of spongin**.**

SPICULES

Structure and type

Spicules are microscopic crystalline structures which gives the sponges their rigidity and form. Spicule consists of spines or rays that radiate from a point. These are secreted by special mesenchymal amoebocytes called scleroblast cells. The following are various types of spicules:

On basis of type of deposit on core organic matter: All kinds of spicules have a core of organic material around which either calcium carbonate or colloidal silica is deposited. Accordingly spicules are of two types:

Calcareous spicules: The organic material in this type of spicules is calcium carbonate or calcite. This is the characteristic of the sponges of class Calcarea.

Siliceous spicules: The organics material in this type of spicules is Colloidal silica or Silicon. These types of spicules are the characteristic of the sponges of class Hexactanellida.

On the basis of size and function: Spicules can be of large size or small size. Accordingly spicules can be of two types:

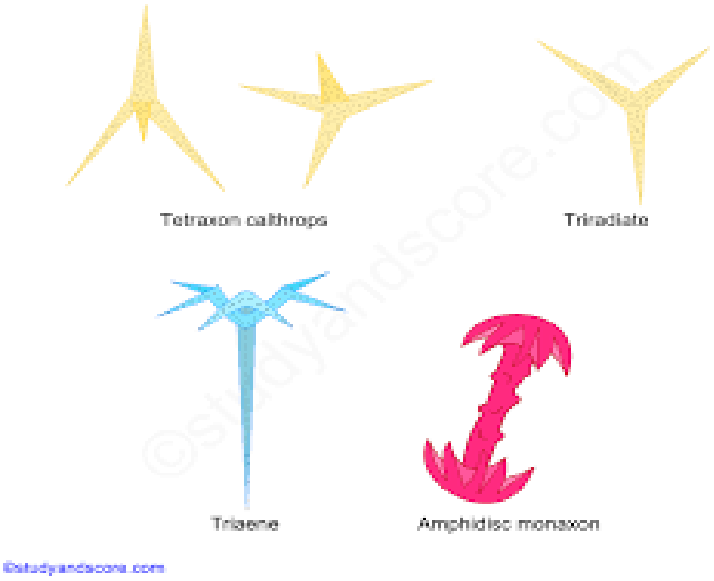
Megascleres: These are larger spicules constituting main skeleton of sponge body.

Microscleres: These are the small spicules occurring interstitially.

On the basis of number of axes and rays: Spicules may occur in several forms like the simple rod form or in the form of forks, anchors, shovels, stars, plumes etc. The spicule forms depend on the presence of number of axes and rays. Accordingly, they can be divided into the following forms:

Monaxon: These kinds of spicules are formed by the growth along one axis. They may be straight needle-like or rod like or may be curved. Their ends may be pointed or hooked or knobbed. Monaxons can be both calcareous and siliceous types.

These monaxon spicules are further divided into two kinds,
Monactinal- the growth of the spicule takes place only in one direction
Diactinal- The growth of the spicule takes place in both the directions.
Tetraxon: These spicules have four rays each pointing in different direction. Usually one of the four rays is elongated giving the appearance of a crown of 3 rays. Such spicules are called as triaenes.



- Sometimes all the rays are equal, when all the rays are equal it is termed as calthrops.
- When all the four rays persist it is called as tetraradiate or quadriradiate.
- Sometimes one of the rays is lost and then it is known as triradiate. These triradiate rays are characteristic of calcareous sponges.
- If the elongated ray bears a disc at both ends, it is called as amphidisc.

Triaxon: These spicules have three axes that cross one another at right angles to produce six rays. Thus it is also called hexactinal spicule. These triaxon spicules are characteristic of glass sponges of the class Hexactanellida.

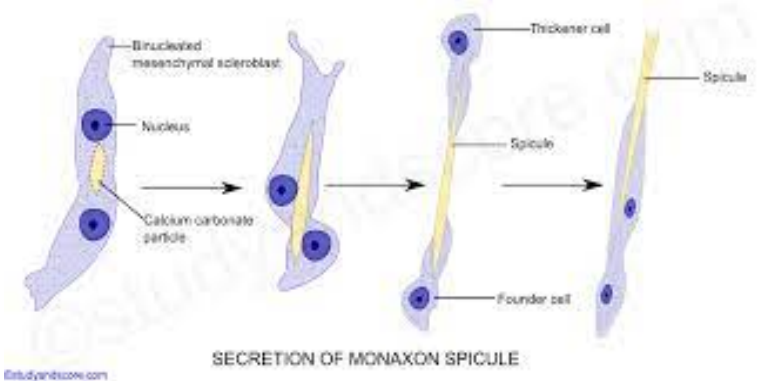
Heactinal triaxon

Polyaxon: These are the spicules with several equal rays radiating from a central point. They may be grouped to give star-like appearance. Polyaxon spicules are found along with microscleres.

Polyaxons

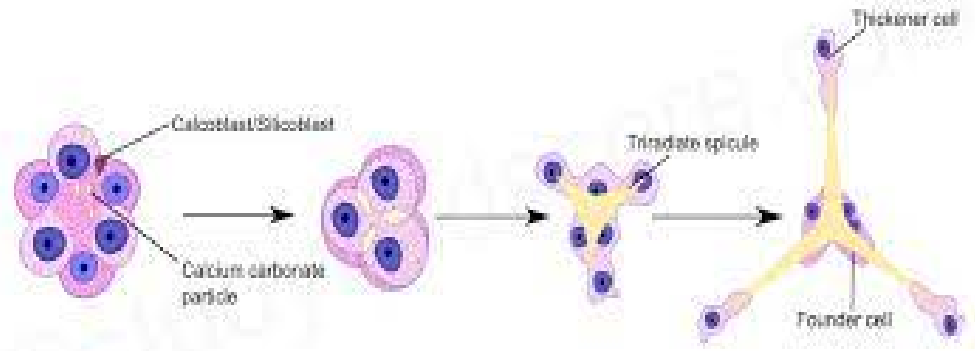
Development of spicules

The calcareous spicules are secreted by special type of cells called as sclerocytes. These sclerocytes are derived from binucleated mesenchymal scleroblasts. A monaxon spicule or each ray of the triradiate spicule is secreted by a group of two sclerocytes. Among these two sclerocytes one acts as thickener cell and the other acts as the founder cell.



SECRETION OF MONAXON SPICULE

The initiation of the formation of the spicule starts with the deposition of a particle of calcium carbonate between the two nuclei of the binucleated mesenchymal cells. This particle grows drawing apart the two nuclei and then two sclerocytes are formed. Now the thickener cell lays down additional layer of calcium carbonate adding to the thickness of the spicule. When the spicule is fully formed, both the cells i.e. thickener cell and the founder cell wander into the mesenchyme. The scleroblast secreting a calcareous spicule is called as calcoblast, while the scleroblast secreting a siliceous spicule is called silicoblast.



SECRETION OF TRIRADIATE SPICULE