

For Degree 1 Students
(UG students)

SKELETON IN SPONGES

Sponges are animals belonging to phylum Porifera they are provided with skeleton in the form of spicules embedded in the mesenchyme of body wall.

Skeleton supports and protects the soft body parts and it also makes a basis of classification of sponges.

Structure and types of Spicules - Spicules are crystalline structure consisting of spines or rays radiating from a point, they are secreted by special mesenchymal amoebocytes called scleroblasts. Spicules develop around a core of organic material which may be either calcium carbonate (calcite) or colloidal silica (silicon). Spicules are two types -

- (i) Calcareous (characteristic of calcarea)
- (ii) Siliceous (characteristic of Hexactinellida)

The spicules with a larger size are called megascleres and smaller spicules are called microscleres. The shape of spicules may be of several types they may be rod like, forks, anchors, shovels, stars, plumes etc depending upon number of axes and rays present. they may be of following types on the basis of shape -

Monaxon - They grow in one axis, they may be straight needle like or rod like or curved their ends may be pointed, knobbed or hooked they are of two types

(a) Monaxial - Grows only one direction.

(b) diaxial - Grows in both directions.

they are both calcareous and siliceous types.



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Potraxon - Tetraxon spicules contains typically four rays pointing in a different direction usually one of the four rays is elongated giving the 3 rays crown structure. (triacenes) when all four rays are equal in size the spicule is called Calthrops.

when all the four rays are present it is called tetraradiate or quadriradiate

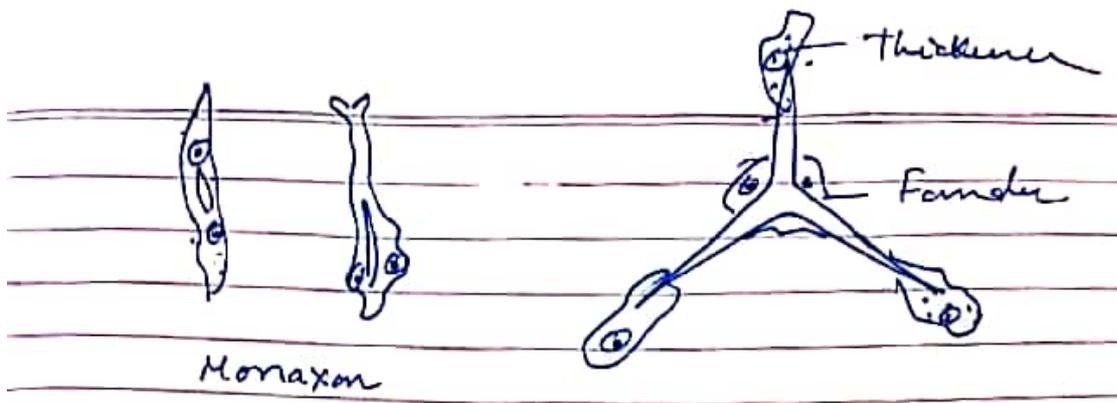
when one of the ray is lost it is called triradiate when elongated ray bears disc at both ends it is called an amphidisc.

Triaxon - Triaxon spicule has three axes crossing each other at right angles to produce six rays and called hexaxial (characteristic of glass sponges)

Polyaxon - spicules with several equal rays radiating from a central point giving a star like appearance.

Development of Spicules - Calcareous spicules are secreted by special cells called sclerocytes derived from scleroblasts. Monaxon spicule is secreted by a group of two sclerocytes, one acting as a thickener cell and the other as the founder cell. Formation of spicule begins as a deposition of a particle of calcium carbonate between two nuclei the particle grows drawing apart first the two nuclei and then the two sclerocytes, thickening cells lay down additional layers of caloz and the spicules thickens, when the spicule is fully formed the cells wander into mesenchyme

Scleroblast secreting a Calcareous spicule is called Calcioblast while a silicious spicule producing cell is called Silicoblast. A silicious monaxon is secreted by a single Silicoblast while the six rayed triaxon is secreted by a repeated nuclear division of single silicoblast and formation of mass of spicule.



Monaxon

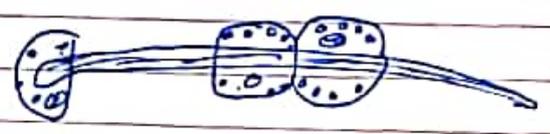
tri-radiate Spicule

Section of Monaxon and tri-radiate Spicule.

SPONGIN - Spongin is found in class Demospongiae occurring as a cement connecting together siliceous spicules. Mostly it is found in the form of branching or anastomosing fibres in which siliceous spicules are embedded.

Spongin fibres are fine threads consisting of a soft granular axial core or medulla surrounded by concentric layers of spongin.

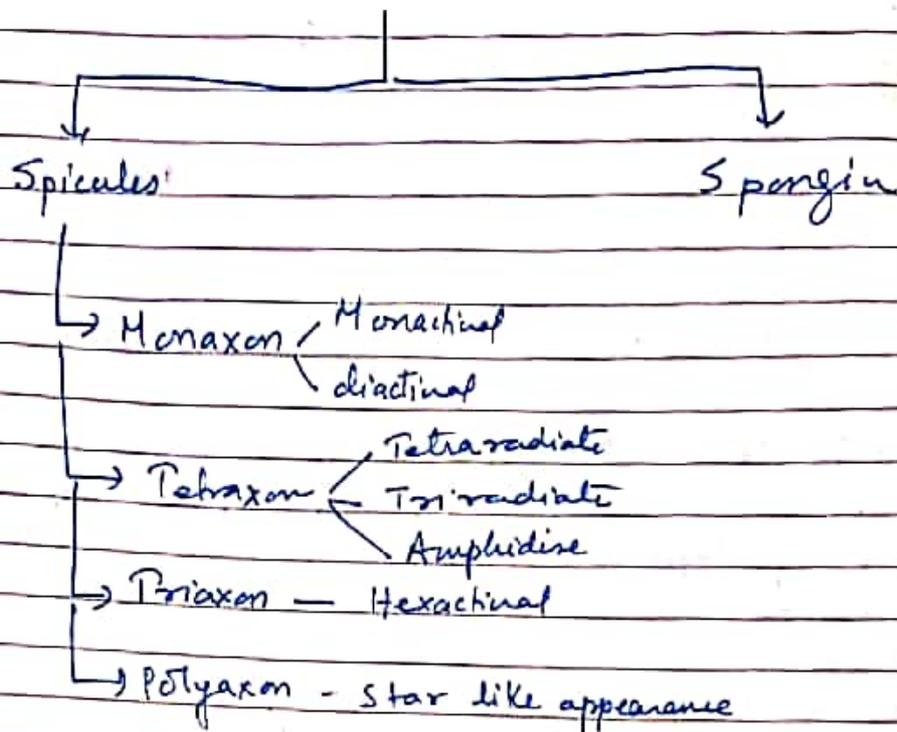
Spongin fibres are secreted by flask shaped mesenchyme cells called Spongioblasts, which are seen coating the fibres. Spongioblasts become arranged in row and spongin is secreted by each fibres with those of neighbouring cells to form a long fibre. Spongioblast later becomes vacuolated and degenerates after secretion of spongin.



Spongioblasts in series secreting a Spongin fibre.

Spongin is a scleroprotein containing sulphur and like collagen, it is insoluble, chemically inert and resistant to protein digesting enzymes. Spongin contains a large amount of Iodine.

SKELETON IN SPONGES CHART



Some general characters of Sponges -

- 1) They belong to phylum porifera
- 2) They have only cellular grade of organization
no tissue formation
- 3) They are solitary or colonial and sessile in nature.
- 4) Body form vase like, cylindrical, tubular, cushion shaped or ir branched.
- 5) Body with many pores, canals and chambers for flow of water canal system present.
- 6) Skeleton of calcareous or siliceous spicules or of protein spongin fibres or of both or absent.

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