

SPICULES IN SPONGES

The majority of Porifera possess a skeleton called autoskeleton secreted by sponge itself. The skeleton consists of spicules and spongin separately or a combination of both the elements. Skeleton is secreted by scleroblasts cells which may be calcoblasts secreting calcareous spicules, Silicoblasts secreting siliceous spicules and spongioblasts secreting the spongin. Calcareous spicules are made of $H_2Si_3O_7$.

SPICULES : Spicules are crystalline definite bodies and generally possess spines radiating from a point. These are with an axis of organic material surrounded by the deposition of inorganic substance like calcium carbonate or hydrated silica. Spicules have a great variety of shape with difference in structure.

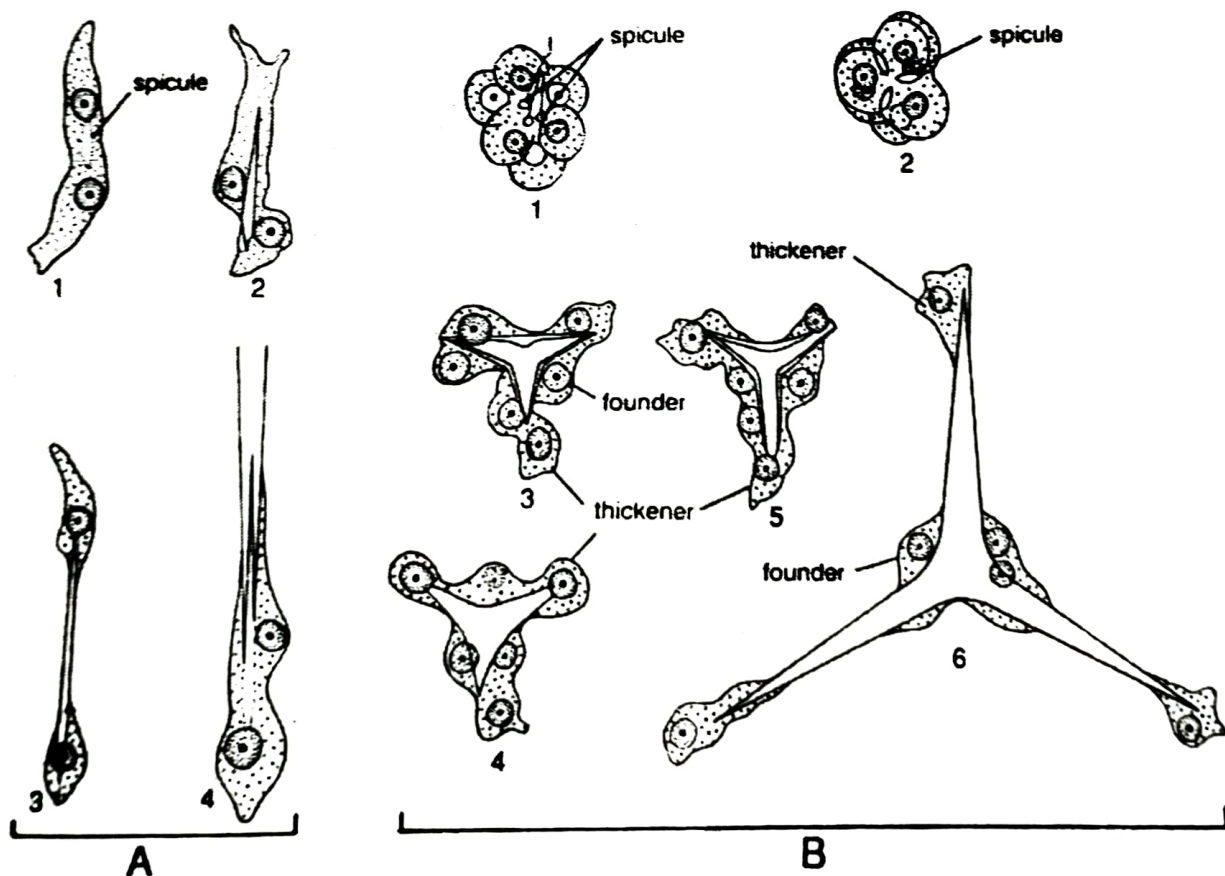


Fig. 2.5 (a) : Secretion of Spicules. A-Monoaxon, B-Triaxon

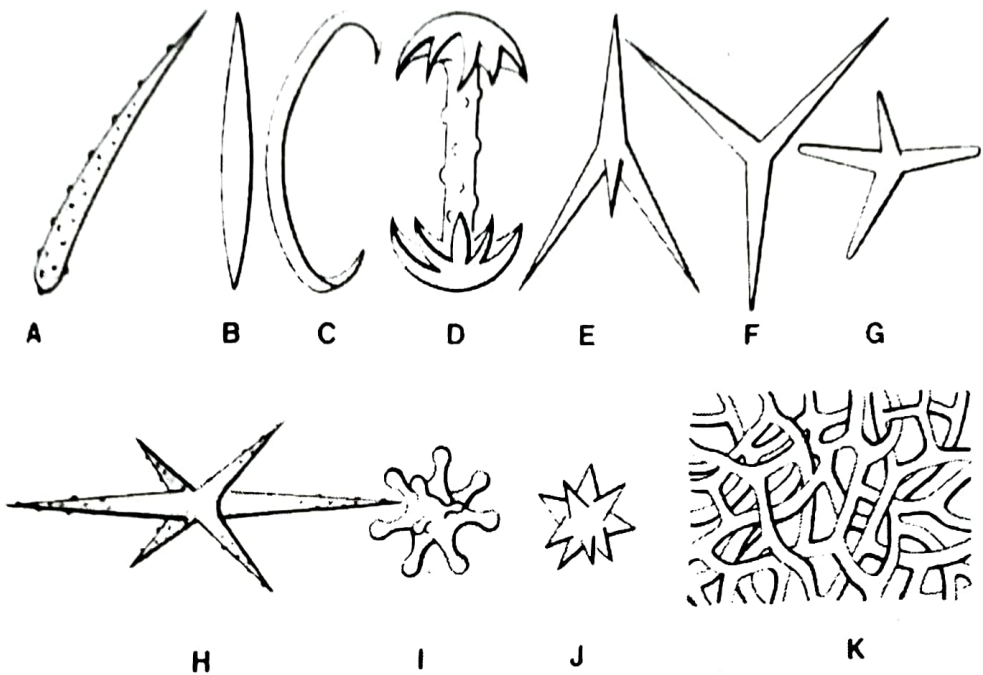


Fig. 2.5 (b) : Skeleton (Spicules) in sponges.

Generally the spicules are of two kinds namely-megascleres and microsclers.

1. MEGASCLERES : These are larger spicules and constitute the main supporting frame work of the sponges. There are following five types of megascleres :

- | | |
|----------------|----------------|
| (i) Monaxons | (ii) Tetraxons |
| (iii) Triaxons | (iv) Polyaxons |
| (v) Spheres | (iii) Desma |

(i) MONOAXONS : Monoaxons spicules possess a single axis in one both directions. It may be straight or curved. When it is formed in one direction, it is referred as monoaxon or style which may be of following natures.

- Oxeote :** Rounded at one end and pointed at the other end.
- Tylostyles :** Broad end is knobbed.
- Acanthostyles :** Curved with thorny processes
- Tornotes :** Lance headed at each end
- Strongyles :** Rounded at each end
- Tylotes :** Knobbed like a pin head at each ends.

(ii) TETRAXONS : Tetraxon spicules are of four rays radiating from a common point.

These spicules are of following natures :

- Calthrops :** Four rays of equal size
- Triacenes :** Rhabdome-bears a crown of three small rays.
- Diacenes :** Rhabdome-bears a crown of two small rays.

(d) **Amphidisc** : Disc at both end of the elongated ray.

(e) **Triod** : Three rays are present.

(iii) **TRIAXONS** : Triaxon spicules consist of six rays extending at right angles from a central point. Modification in structure may be due to loss of rays and the development of spicules and knobs Ex. *Euplectella*, *Hyalonema*.

(iv) **POLYAXONS** : Polyaxon spicules have several equal rays radiating from a central point.

(v) **SPHERES** : Spheres are rounded bodies with a concentric centre.

(vi) **DESMA** : Desma are ordinary minute monaxon, triradiate or tetraxon spicule termed as crepis. According to the shape of crepis, desma may be **monocrepid**, **tricrepid** or **tetracrepid**.

2. MICROSLERES : Microscleres are small spicules and occur throughout the mesenchyme. These are of two types : Spires and asters.

(i) **SPIRES** : Spires exhibit many shapes. These are spirally twisted or curved in one plane. These are of following natures :

(a) **Sigma**- C-shaped spicule

(b) **Toxas**- Bow-shaped spicule

(c) **Chelas** - Recurved hooks and flukes Similar ends-isochelas, dissimilar ends-anisochelas.

(ii) **ASTERS** : Asters are microscleres having small centres with long rays and large centres with small rays. These are of following natures.

(a) **Oxyasters**- With pointed rays

(b) **Strongylaster**- With rounded ends

(c) **Tylasters**- With knobbed rays

(d) **Sphereasters**- With definite rays

(e) **Sterracasters**- With reduced small projections

(f) **Sanidasters**- With rod-shaped ends

(g) **Plesioasters**- With few spines from a short axis

(h) **Amphiasters**- With spines at both ends

(i) **Streptasters**- Spiny microscopic axons

(j) **Spirasters**- Spirally twisted rays

SPONGIN FIBRES : Spongin fibres are organic substances made of lucine and glycine proteins. As a skeletal element spongin fibres occur in two forms : (i) Elastic cementing substance (ii) Elastic fibrillae.

(i) **Elastic cementing substance** is a tenacious cuticular secretion of the spongin which has a property of adhesion to siliceous spicules and form a definite system of skeletal fibres.

(ii) **Elastic fibrillae** are minute spongin fibres secreted in the cells furnishing an elastic

tissue of spongin fibres. Spongin fibres have foreign particles like sand grains, spicules, protozoan skeleton embedded in the elastic texture.

GEMMULES

Gemmules are small, solid bodies in fresh-water sponges such as *Spongilla*. It has also

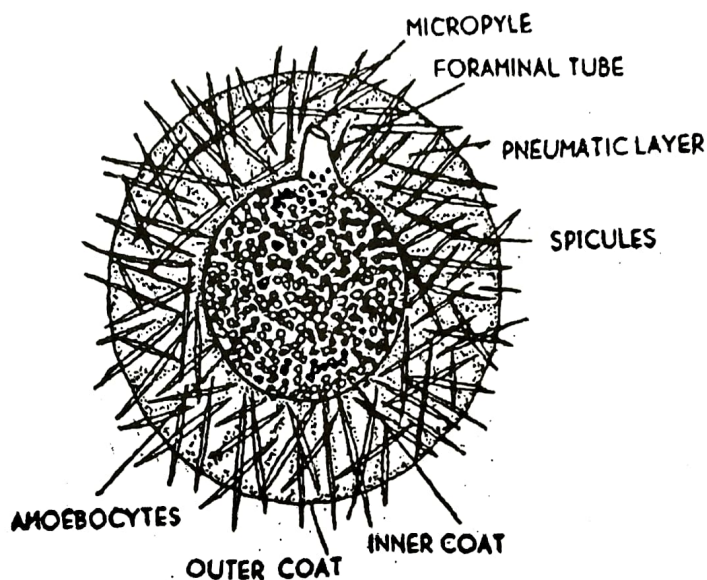


Fig. 2.6 : Gemmule in sponge.

been reported in few marine sponges. These are produced to survive in unfavourable conditions such as low and high temperature extremes and drought. These are the means of dispersal of sponges because they are carried by wind or in water from one place to the other habitat.

FORMATION OF GEMMULES : Gemmules are formed in mesenchyme. A number of archaeocytes, first collect at a place in the mesenchyme. Now trophocytes also surround the archaeocytes to supply the food. Soon, more amoeboid cells surround the cellular mass of archaeocytes, and begin to secrete a thick inner and a thin outer protective coat of scleroproteins. Scleroblast cells creep inside and give rise to spicules enclosing air. Thus the gemmule is formed. One sponge can produce a large number of gemmules. The gemmules are set free by the decay of the part of the parent sponge and fall to the bottom of the pond.

Gemmules are carried by water currents or blown with the wind due to dry up of the ponds. These may be transported by water birds entangling on feet. Under favourable conditions, the gemmules germinate with the help of uninucleate histiocytes which escape from the gemmules through micropyle. Histiocytes are organised into new sponge.