

LOCOMOTION IN OBELIA

A. Movement in Polyps

- The polypoid colony of Obelia is sessile and attached to the substratum.
- It does not move from place to place. However, polyps exhibit certain movements under the force of water currents due to the presence of annuli in the perisarc.
- The polyps can also undergo contraction and extension because of the presence of longitudinal and circular muscles in their body wall.

B. Locomotion in Medusa

a. Hydro propulsion:

- Medusae are free swimming forms.
- They generally swim in the water by jet propulsion method.
- The contraction and expansion of bell muscles alternatively closes and opens the bell which forces water out of the sub-umbrellar cavity downwards and propels the body in upward direction.
- The contraction of the epidermal muscle tails of the sub-umbrellar surface helps in the closure of the bell cavity while the opening of the bell is brought about by elastic mesoglea and contraction of the muscle tails in the middle of upper surface.
- This kind of jet propulsion method is called hydro propulsion.

b). Passive drifting:

- Medusae also drift and float passively in sea water under the force of strong water currents and *wind*.
- Thick mesoglea of medusae provides them buoyancy and helps in floating.

NUTRITION IN OBELIA

Nutrition in Polyps

- The gastrozooids are the nutritive zooids of the Obelia colony.
- They are primarily carnivorous and feed upon small crustaceans, tadpoles, worms, insect larvae, etc.
- The gastrozooids capture the food with the help of nematocysts present on the tentacles.
- The food is pushed into the gastrovascular cavity through the mouth where the proteolytic enzymes secreted by the gastrodermal gland cells partially digest the food.
- The semi-digested food is engulfed by the food vacuoles of the nutritive cells for complete digestion.
- Thus, digestion is both extracellular and intracellular.

- The digested products of the food are distributed throughout the body by cell-to-cell diffusion helped by beating of flagella of gastrodermal cells; the gastrovascular cavity thus serving for both digestion and transportation of food.
- The undigested food material is egested through the mouth of the gastrozooids.

Nutrition in Medusa

- The process of feeding in medusa is similar to that in polyps.
- Medusa is strictly carnivorous and captures food with the help of tentacles beset with nematocysts.
- As in polyps, the food is digested both extracellularly and intracellularly but exclusively in stomach.
- The digested food is distributed to whole body through the network of radial and circular canals present in medusa.

RESPIRATION IN OBELIA

- Obelia does not have any respiratory organs and the gas exchange takes place by diffusion through the general body surface.
- Oxygen diffuses directly from the surrounding water into the epidermal cells and carbon dioxide is diffused out.
- The diffusion of gases can also take place during circulation of water in the gastrovascular cavity of polyp or medusa as there is a continuous influx of water.
- Here, exchange of gases takes place between water and the gastrodermal cells from where oxygen diffuses to each cells of Obelia.

EXCRETION AND OSMOREGULATION IN OBELIA

- Obelia does not have special excretory or osmoregulatory organs.
- It excretes nitrogenous waste in the form of ammonia that diffuses through the body wall.
- Excess water is thrown out of the gastrovascular cavity through the mouth. Thus, mouth being the single opening functions as a contractile vacuole also.

SENSE ORGANS – STATOCYST

- Polyps of Obelia are sessile zooids and they do not require any sense organs.
- However, medusae are free-swimming zooids and while swimming, their body may tilt and lose balance.
- Thus, they possess balancing organs, statocysts with the help of which they can regain their position.
- Structure A statocyst is a fluid-filled sac lined by sensory epithelial cells.

- The basal part of the cells is connected to the nerve cells while the inner ends bear sensory processes.
- The cavity of statocyst contains a round particle of calcium carbonate, called statolith or otolith. The particle is movable and is secreted by a large cell, lithocyte.
- Function The statocysts help in balance and equilibrium of medusa. While swimming, if the medusa tilts, the movable particle of statolith rolls over the tilted side and presses against the sensory processes. The stimulated cells transmit the nerve impulse to the nerve ring which is connected to the muscle tails.
- The nerve impulse causes the rapid contraction of the muscle tails of the stimulated side regaining the original position of medusa.