

① Classification Obelia (= The Sea fern)

Phylum - Coelenterate

Class - Hydrozoa

Order - Hydroides

Genus - Obelia sps - sericulata

② Reproduction

It is a small, branched, sedentary and colonial marine coelenterate found attached to rocks, weeds, shells of animals. Its body consists of two types of branches the horizontal called hydrorhiza and the vertical called hydrocauli. The hydrorhizas serve to attach the colony to the substratum whereas the hydrocauli bear alternate branches, each with individuals the zooids. The zooids are mainly of two types the polyps and blastostyles (= dimorphic).

Polyps are the nutritive zooids and hydroid in form whereas the blastostyles are club-shaped and reproductive zooids having no mouth and tentacles. The blastostyles reproduce by budding and form saucer-shaped zooids the medusae. Such a colony having more than two types of individuals is called polymorphic.

The colony consists of an inner tubular living portion the coenosarc, surrounded by perisarc. The cavity of coenosarc is the gastrovascular cavity and its wall is formed of outer epidermis and inner gastrodermis. It takes up digested food from polyps and distributes it to all parts of the body.

Polyp or Hydroanth

This is the nutritive zooid of the colony. It is very much like a small hydra in structure. There are present a large no. upto thirty tentacles. These are solid. There is a protective investment the hydrorhiza surrounding the hydroanth. It is produced at the base internally into a ring-shaped shelf. This structure's ~~with a purpose~~ it checks the hydroanth from being withdrawn into the perisarc of the hydrocaulus when it contracts and from where it may never be protruded again.

The body of hydroanth can be distinguished into following parts.

1. Stalk - by which it is attached to the hydrocaulus
2. Hypostome - distal $\frac{1}{3}$ part of zooid; bears mouth surrounded by tentacles.

Histology - The body wall of hydroanth consists of two layers:-

(i) the outer layer or epidermis

(ii) the inner layer of gastrodermis

The two layers are continuous with one another at mouth and the two are joined together by a non-cellular gelatinous mesoglea. The polyp is protected externally by a thin covering of perisarc which expands into a transparent conical cup and forms the hydrorhiza. At the base of hydroanth the hydrorhiza forms a horizontal shelf, a resting platform for the polyp. It checks the retraction of polyp into the coenosarc.

Function: The hydroanths are the nutritive zooids of the colony. They are carnivorous and feed upon small aquatic animals.

Blastostyles : or (The Georgia) - the blastostyles are cylindrical bodies modified for asexual reproduction. They are situated in the axis of polyps and occur towards the proximal region. Each blastostyle is narrow, elongated and tubular having two layered body wall which enclose the gastrovascular cavity. It is rudimentary and does not open to the exterior. The distal free end is closed by a flattened disc. The mouth and tentacles are absent, hence it can not feed. Each blastostyle is surrounded by a loose, glassy, transparent perisarc known as gonotheca.

Function - The blastostyles are reproductive zooids. These produce saucer shaped bodies arranged along a central rod in different stage of development. They are known as medusa buds. They develop in the form of minute buds from the wall of blastostyle. On attaining maturity the medusae detach and start independent life.

Nutrition - The polyps of Obelia are carnivorous like hydra and feed on small aquatic animals such as crustaceans, insect-larvae, worms and annelids. The method of food capture, ingestion and digestion is exactly similar to that of hydra.

Respiration and Excretion - As in Hydra respiration and excretion take place by diffusion through body surface.

Reproduction - Obelia colony is asexual in reproduction. The blastostyles reproduce by budding and form sexual individuals called medusae. The young medusae escape through a rupture in the gonotheca and lead a free swimming life.

Medusa

It is like an umbrella, shallow saucer or bell shaped. It measures about 6-7 mm in diameter. The convex surface is called ex-umbrella while the concave is called sub-umbrella. There is a hollow handle shaped process arising from the centre of concave surface. This is the manubrium. The manubrium at its free end bears a four sided mouth surrounded by four oral lobes. The mouth leads into a small gullet. This represents the gastrovascular cavity of the manubrium. At its base is the stomach which leads into four narrow radial canals. These run through the mesogloea and reach the margin of the umbrella. Near the edge of the umbrella, the radial canals open into a circular canal.

There is present a very narrow, fold or shelf the velum near the edge of the umbrella. This is insignificant in Obelia but is highly characteristic of the other hydrosan medusae.

Histology - The histology of medusa is basically similar to that of hydra. The mesogloea is however much thickened. All the exposed parts are lined by a continuous layer of epidermis. The entire canal system is lined by gastrodermis.

Velum - Velum is made of double layer of epidermal cells enclosing a middle layer of mesogloea. The tentacles are solid. The centre are gastrodermal cells and covered on the outside by epidermis.

Nervous System - Nervous system is essentially like that of Hydra. On each side of mesogloea, nerve cells belonging to epidermis and gastrodermis form nerve net. Nerve cells are especially concentrated along the margin of bell forming two circular nerve rings. One just above and other just below the base of velum. Formation of nerve rings along the bell margin is correlated with the concentration of muscle rings and presence of statocysts in the region. Upper and lower Ex. umbrella nerve ring supplies the tentacles while lower or outer nerve ring supplies the subumbrella musculature and statocyst.

Locomotion - Medusa is free living and swims in water by alternately opening and closing the bell of its body. As the bell contracts, it forces water behind and the medusa is propelled forwards.

Nutrition - Medusa is exclusively carnivorous and its food consists of minute worms, insects and crustaceans. Nutrition of medusa is similar to that of Hydra and polyps. The food is digested in the stomach and then distributed through radial canals and ring canals.

Respiration and Excretion - no special organ, take place only by diffusion through body surface.

Reproduction - Medusae are the sexually reprod. zooids possessing gonads (testis and ovary). Each medusa bears four gonads. Each gonad is an ovoid, knob like body having an outer covering of epidermis continuous with that of subumbrella and an inner lining of gastrodermis continuous with that of radial canal. The space between these two layers is filled with a mass of sex cells (sperm and ova).

Sex cells originate in the epidermis of manubrium while medusa is still attached to the blastostyle. They soon pass into the gullet through gastrodermis and finally make their way into gonads. Here they undergo maturation divisions and become gametes. These gametes are not true gonads but only aggregations of developing gametes. Outer wall (epidermis) of mature gonads ruptures to release the gametes in water.

Life-History of Obelia

Obelia colony reproduces asexually by budding producing hydranths and blastostyles. These represent asexual generation. The blastostyles bear medusae which constitute the sexual or the reproductive individuals possessing four groups of gonads. These gonads present on a medusa are of the same sex, either being male or female.

GONADS - The gonads are situated on the subumbrella surface and are periradial in position. Each is an ovoid mass of undifferentiated interstitial cells between

the ectoderm and endoderm. The former is continuous with the ectoderm of the subumbrella and the latter with endodermal lining of the radial canal. The interstitial cells differentiate into ova in female medusa and into sperms in male medusa and are budded off from the ectoderm of manubrium. On maturation of the gametes, the endodermal wall surrounding the gonad ruptures and the germ cells are set free in sea water.

FERTILIZATION - Cross fertilization occurs as a rule and the ova are fertilized either inside the female medusa or in sea water. The sperms are carried to the ovum by the water currents.

DEVELOPMENT - The zygote undergoes repeated holoblastic and equal divisions and a blastula is formed. The blastula is hollow internally by a central cavity the blastocoel, which is surrounded by a single layer of cells. Soon the blastocoel gets filled with the cells which are budded off from the wall of blastula. Thus, a solid gastrula is formed as a result of delamination and multipolar immigration of ectoderm cells. The outer layer of the gastrula constitutes the ectoderm while the inner one forms the endoderm. Shortly after this, the ectodermal cells develop cilia and enterion appears by the delamination of endoderm. This ciliated gastrula represents the planula larva. It breaks through brood pouch and starts a free swimming existence.

After enjoying a short period of free-swimming existence, the planula settles down on some solid substratum and undergoes metamorphosis. Its anterior end forms the basal disc for attachment and the posterior end forms manubrium with a terminal mouth, surrounded by a circle of tentacles. Thus a ~~simple~~ simple polyp or hydrula stage is reached. The basal part of the hydrula elongates into hydrorhiza, from which vertical and lateral branches are budded off and a complex ~~of~~ branching obelia colony is formed. This, later on, develops medusa buds on the blastostyles to start sexual generation.

The occurrence of a free-swimming medusoid stage in the life-history of a sedentary organism like Obelia is of great significance, since it provides a means for the dispersal of organisms and ensures better chance of survival.