1. Modifications of the Polyp:

A. Gastrozooids or Trophozooids or Nutritive Zooids:

Characters:

1. It is like a typical polyp (Fig. 12.34A,B).

2. Each gastrozooid is a cylindrical and funnel-shaped body with a large mouth.

3. Presence of a well-formed coelenteron.

4. A single long contractile and hollow tentacle arises from the base of the gastrozooid. The tentacles may be provided with batteries of nematocysts (e.g., Apolemia).

Examples: Hydractinia, Halistemma, Apolemia, Physalia.

Function:

Those zooids are meant for nutritive or feeding.

Modification:

The gastrozooid exists in the following modified forms:

1. Siphon:

(i) The siphon is the only member of the colony which can ingest food.

(ii) It is a polyp form, but without normal tentacles.

(iii) A single large hollow tentacle is present.

(iv) The tentacle is highly contractile and hangs from or near the base (Fig. 12.34A).

(v) This tentacle bears lateral elongated contractile branches, called tentilla.

(vi) Each tentilla terminates in a large and complicated knob or coil of nematocysts.

(vii) In some cases the tentacles are absent (e.g., Velella).

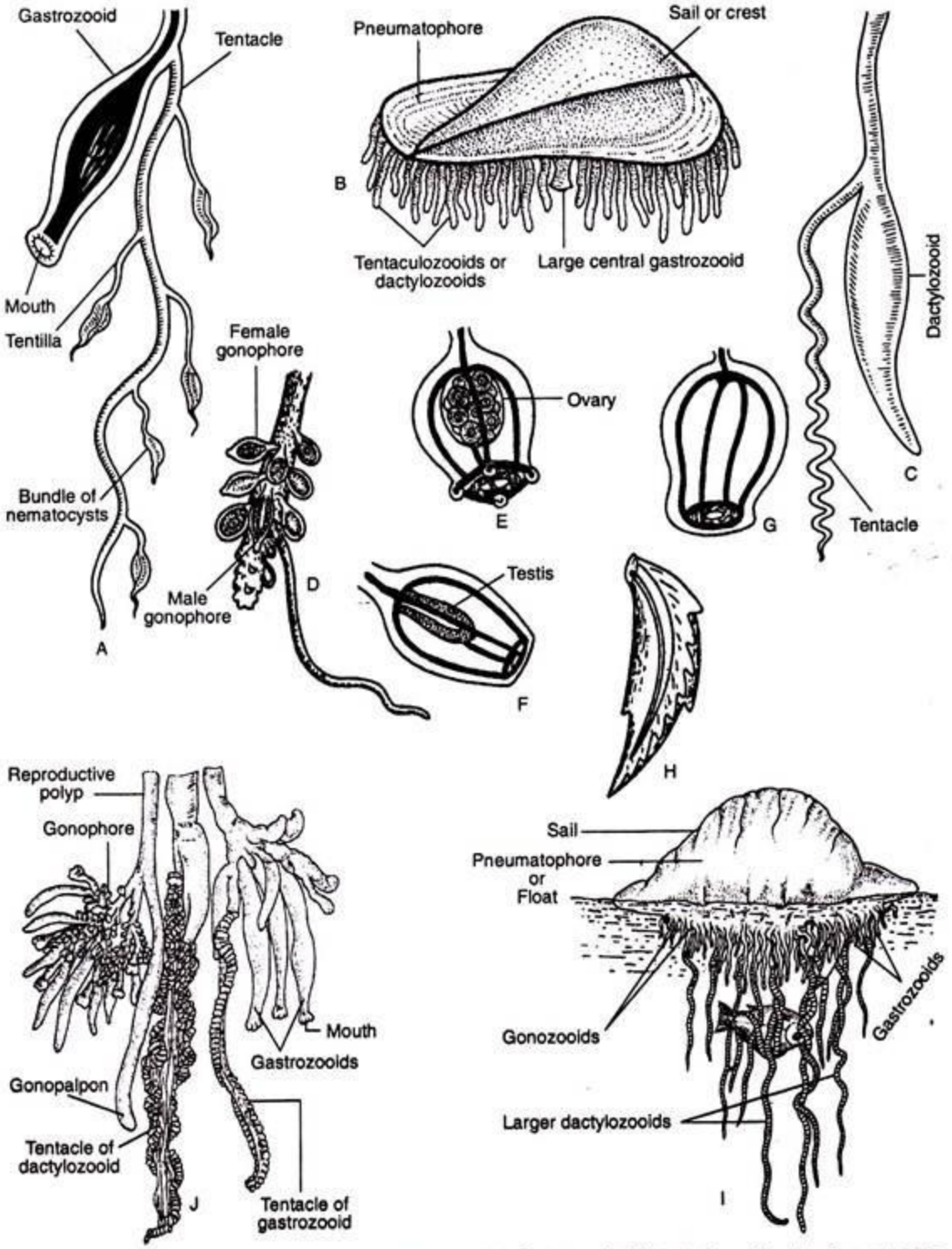

Fig. 12.34: Different types of zooids (after various sources). A. Gastrozooid with tentacle and bundle of nematocysts. B. Central gastrozooid of *Velella*. C. Dactylozooid with tentacle. D. Gonozooid. E. Female gonophore (medusoid form). F. Male gonophore (medusoid form). G. Nectophore or swimming bell. H. Bract or hydrophyllium. I. *Physalia*, Portuguese man-of-war, showing the pneumatophore or float. J. Part of *Physalia*.

2. Siphonozooid:

(i) In Pennatularia the gastrozooid is modified to produce a current— produce device at the expense of other structures.

(ii) They are inhalant in action and are merely warty projections on the body.

(iii) They are devoid of tentacles, longitudinal muscles but may sometimes possess septal filaments.

(iv) In rare cases, the zooid may possess a single tentacle.

(v) The siphonozooids may remain scattered or may be limited to rachis.

(vi) Usually they are located on the dorsal side of the rachis in between the leaves.

(vii) They may be arranged in clusters as in Milk.

(viii) The siphonozooid may be modified as mesozooid and autozooid.

(a) Mesozooid:

(i) The siphonozooids are further modified to act as exhalant zooids.

(ii) They are also known as "Meso- zooids of Hickson".

(iii) They possess well-formed septa and retractor muscles.

(iv) Siphonoglyphs are very weak.

Example:

Pennatularia.

(b) Autozooids of Anthocodia:

(i) These are also present in Pennatularia.

(ii) They may be retractile and function as the feeding zooids of the colony.

(iii) They may be differentiated into a calyx and are always absent from the dorsal and ventral surfaces of the rachis.

(iv) The siphonoglyphs are reduced or absent.

3. Gastrozooids of Millepora:

(i) The body of the polyp is very short (See Fig. 12.29C)

(ii) On the surface, there are gastro- pores through which protrude polyps having 4-6 tentacles reduced into nematocyst knobs.

B. Dactylozooids or Tasters or Feelers or Macrozooids:

Characters:

1. These zooids are actually derived from the gastrozooids by the reduction or total loss of mouth.

2. They are elongated and highly extensible.

3. Single basal tentacle is usually un-branched and capitate (Fig. 12.34C).

4. They are provided with nematocysts and adhesive cells.

Function:

These are protective zooids.

Examples:

Hydractinia, Halistemma, Physalia.

Modification:

The dactylozooids exhibit following structural variations:

1. Tentaculozooids:

(i) In Hydractinia, the dactylozooid assumes a long tentacle-like appearance (Fig. 1 2.35).

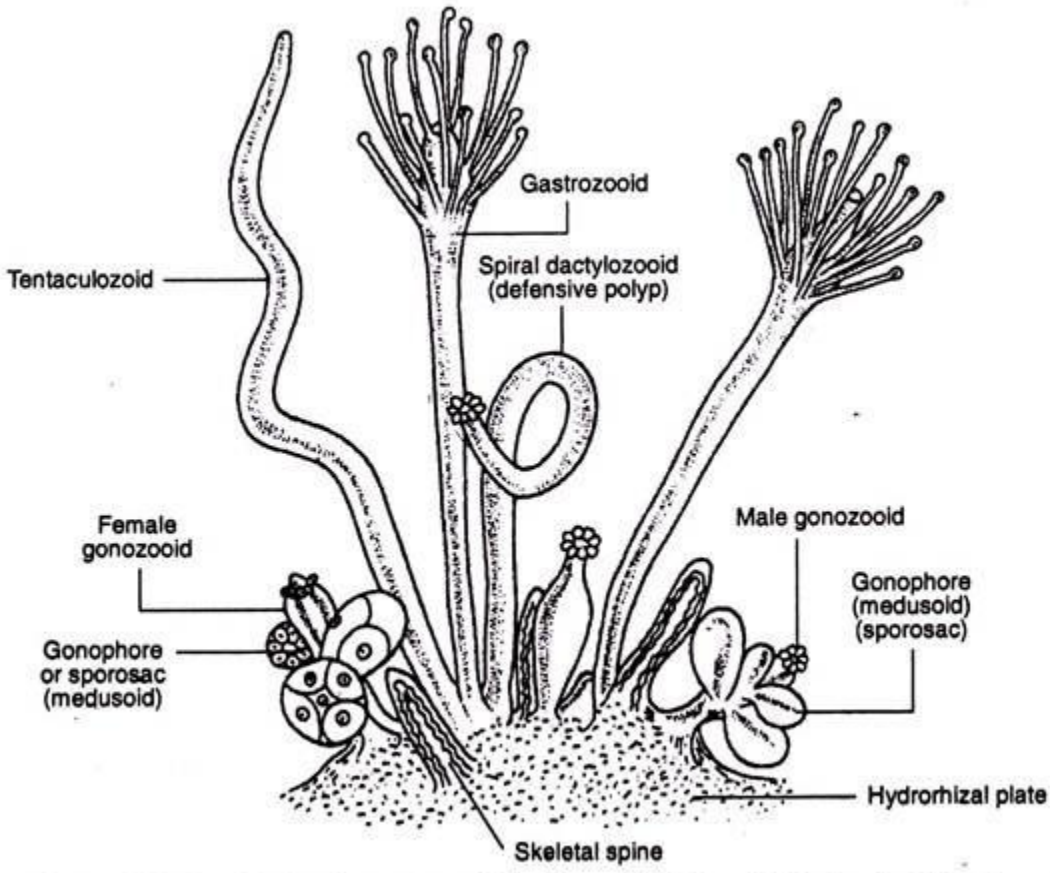

Fig. 12.35: Colony of *Hydractinia* showing gastrozooid, dactylozooid (spiral zooid), tentaculozooid and gonozooids.

(ii) They may be definitely arranged in relation to gastrozooids and are usually situated at the margin.

(iii) In Velella and Porpita, the margin of the colony bears long, hollow and tentacle-like defensive dactylozooids called tentaculo- zooids (Fig. 12.34B).

2. Spiral Zooids:

(i) In Hydractinia (Fig. 12.35), the spiral zooids (dactylozooids) with capitate tentacles remain scattered throughout the colony.

(ii) The spiral zooids are tubular- shaped with cnidocytes and adhesive cells.

Function:

Defensive.

3. Sarcostyles or Nematophores:

(i) In Plumulariidae, the sarcostyles spring from tiny thecae (nematothecae) located on the stems and on the Hydrothecae (usually three to each) of the gastrozooids.

(ii) The nematophores are usually with club or capitate ends, beset with nematocysts or adhesive cells or both.

4. Palpons:

(i) The palpons in Chondrophora consist of simple, hollow, tentacle like bodies which spring from the margin of the body.

(ii) The palpons act as the dactylozooids in Velella and Porpita.

(iii) In these two forms the palpons may remain associated with gonophores in these two above men- Honed forms, called gonopalpons.

5. Cyston:

(i) In Siphonophora, a distal pore present in the dactylozooid is called the cyston.

(ii) It is excretory in function,

6. Dactylozooid of Millepora:

(i) On the surface of the body there are dactylopores from which project long, filamentous, mouth- less dactylozooids with irregularly disposed tentacles. (Fig. 12.29C).

C. Gonozooids or Blastostyles or Gonangia:

Characters:

(i) These are reproductive zooids of the colony.

(ii) They have club-shaped bodies without mouth and tentacles.

(iii) Coelenteron is greatly reduced (Fig. 12.34D).

(iv) The gonozooids give rise to medusa buds by budding, called gonophores.

(v) May be dioecious or monoecious.

(vi) The living tissue of gonozooid is called blastostyle (Fig. 12.24 I, J).

(vii) They are enclosed by gonotheca.

Examples:

Velella, Physalia.

Function:

Reproductive in function.

Modification:

The typical form becomes modified in different members.

1. Gonosiphon:

(i) In Velella and Porpita (Fig. 12.36) the gonozooids may resemble gastrozooids and may even possess a mouth.

(ii) The tentacles are absent.

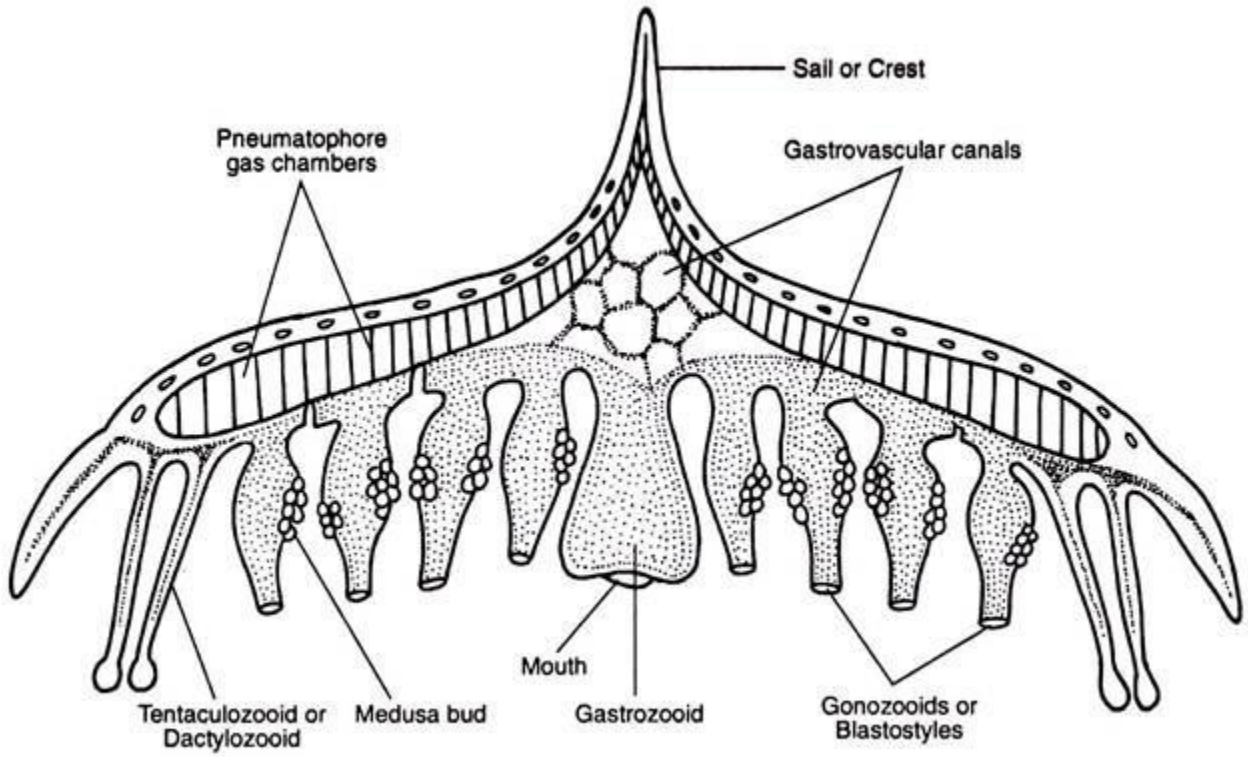

Fig. 12.36: V. S. of *Velella*.

2. Gonodendron:

(i) In Siphonophora, gonodendrons are present as branched stalks which bear grape-like clusters of gonophores.

(ii) They are usually provided with a long retractile gonopalpon.

3. Gonopalpon:

In Siphonophora, a tentacle-like dactylozooid remains associated with the gonophores and is then termed as gonopalpon.

D. Special Types of Zooids:

(1) Gonostyles or Secondary Siphonozooids:

In Porpita, the gonostyles are primarily reproductive in function and may secondarily be nutritive. The mouth and coelenteron are present. The gonads remain attached with the siphonozooids.

Remarks:

Some authors claim Hydrorhiza and Hydrocaulus of Obelia to be special types of zooids.

(2) Hydrorhiza:

In Obelia, the hydrorhiza acts as the organ of attachment for the whole colony.

(3) Hydrocaulus:

In Obelia, the hydrocaulus, arising from the hydrorhiza, bears different zooids and helps to convey the food matters to the different parts of the colony.

2. Modifications of Medusoid Form:

A. Nectocalyx or Nectophore or Swimming Bell:

Characters:

(i) It is a medusoid form having a bell, velum, 4 radial canals and a ring canal.

(ii) The mouth, manubrium, tentacles and sense organs are absent (Fig. 12.34G).

(iii) The body is bilaterally flattened, may be prismatic or may be elongated.

(iv) In bilateral forms, two of the four radial canals, take sinuous courses.

(v) The musculature of the body is well- developed and helps in the process of locomotion.

(vi) This form is present in Siphonophora except physalia.

Examples:

Muggiaea, Diphyes, Halistemma.

Function:

It helps to maintain their position in water and helps in locomotion. The contraction of nectophore in Nectalia helps in jet propulsion.

B. Bract or Hydrophyllium or Phyllozooid:

Characters:

(i) These forms do not resemble the medusa, though they are actually medusoid in origin.

(ii) They have thick gelatinous, prismatic or leaf-like or helmet-shaped in appearance.

(iii) Mouth (except in Agalma) and tentacles are absent.

(iv) Coelenteron is simple or branched.

(v) These forms are present in Siphonophora (Fig. 12.34H).

Function:

Bracts are protective zooids.

C. Pneumatophore or Float:

(i) These are inverted medusoid bells without mouth and tentacles (Fig. 12.341).

(ii) The mesoglea is absent and it is lined with an ectodermal layer.

(iii) Usually, there is one gas filled, bladder-like/ apical float or pneumatophore in a colony (e.g., Halistemma, Physalia). In Nectalia, the float is relatively small, oval and containing a large branched gas gland. In Velella, the float is flat and divided into a number of gus-filled cavities.

(iv) The external exumbrellar side is called pneumatocodon and an internal subumbrallar side is called pneumatosaccus or air sac.

(v) The original opening of the air sac is directed upward.

(vi) This opening may be closed or reduced to a pore guarded by a sphincter muscle.

(vii) The air sac is usually lined by a chitinous layer secreted by the ectoderm.

(viii) At the bottom of the air sac there is usually an expanded chamber termed as trichter or funnel.

(ix) The ectodermal lining of the trichter is modified into gas gland.

(x) The air sac is filled up with oxygen, nitrogen, argon, etc., but in physalia it includes a high proportion of carbon monoxide.

(xi) This type is present in siphonophores [e.g., Physalia (Fig. 12.34 I, J), Halistemma, Agalma] except Diphyes.

Remark:

Once it was considered as a modified medusa but now it is known that it represents a modified polyp.

Function:

It is hydrostatic in function that helps the colony to float in water.

D. Aurophores:

Characters:

(i) It is ovoidal in shape.

(ii) A part of the pneumatophore becomes partially constricted off to form a bell-like aurophore (Fig. 12.37) which remains amongst the nectophores (e.g., Stephalia).

(iii) The aurophore remains in communication with the pneumatophore as well as with the exterior.

Function:

These forms help in swimming and excretion.

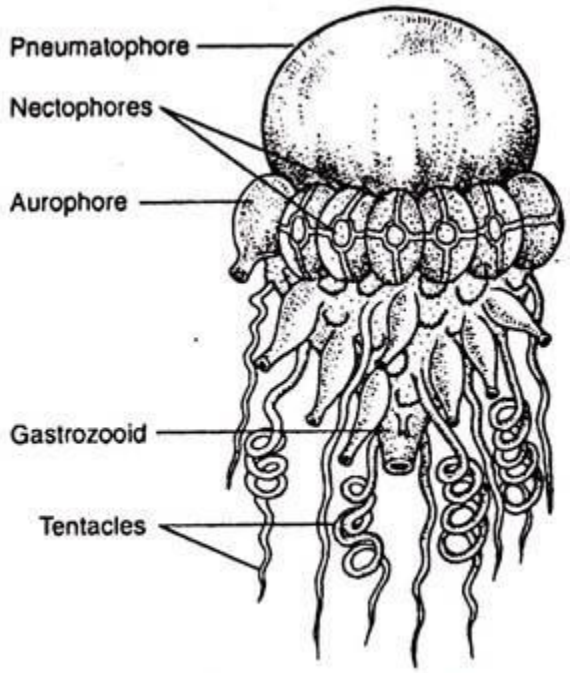

Fig. 12.37: *Stephalia* showing aurophore.

E. Gonophores or Spore sacs:

Characters:

(i) These reproductive zooids may occur singly or in clusters (e.g., Velella).

(ii) They look like medusae in having bell, velum radial canals and manubrium (Fig. 12.34 E, F).

(iii) Gonads are situated on the manubrium.

(iv) Mouth, tentacles and sense-organs are lacking.

(v) They are dioecious but the colony is hermaphroditic.

(vi) The female gonophores are medusa-like (e.g., Physalia, Porpita) but the male gonophores are sac-like.

(vii) In most of the members of Hydroidea, the gonophores are sessile.

(viii) From these medusa-like gonophores, gradations of reduction from umbrella-like to sac-like forms are encountered.

The following stages in the process of reduction are recognised:

(1) Eumedusoid Stage:

This is observed in Tubularia. In this form, tentacles and other marginal structures are lacking.

(2) Cryptomedusoid Stage:

This stage is seen in Clava. The body lacks velum and radial canals.

(3) Heteromedusoid Stage:

This stage is noticed in the family Plumulariidae, where the endoderm is inactive.

(4) Styloid Stage:

This stage is seen in Eudendrium. They are just the original ectodermal and endodermal protruberances.

The cryptomedusoid, heteromedusoid and styloid stage of the gonophores are usually designated as sporosacs.