(*i*) **Gastrozooids** or feeding polyps are each with a mouth and a long tentacle.

(*ii*) **Dactylozooids** or protective polyps are without mouth and usually with a long unbranched basal tentacles. They bear many nematocysts and are also called **palpons**, **tasters** or **feelers**.

(*iii*) **Gonozooids** or reproductive polyps lack mouth and tentacles. They reproduce **asexually** by budding and form medusae. In *Physalia*, gonozooids are branched stalks, called **gonodendra**, and bear grape-like clusters of gonophores or medusae (Fig. 20.2).

Similarly, the medusoid zooids are of following four types:

(1) Nectophores. They are also called **nectocalyces, nectozooids** or **swimming bells**. These are free-swimming zooids with swimming bells (Fig. 20.3), velum, four radial canals and a circular canal. Nectophores do not possess mouth, manubrium, tentacles and sense organs. They serve as the locomotory organs of the colony.

(2) Pneumatophores or floats. These are bladder-like or vesicle-like structures filled with gas. Each pneumatophore represents an inverted medusa bell; it is devoid of mesogloea and consists of an external exumbrellar wall.

(3) Hydrophyllia. These are also known as **bracts** or **phyllozooids**. These are shield-like, leaf-like, helmet - shaped or prismatic covers. They are studded with nematocysts, serving for protection.

(4) Gonophores. They may occur singly on separate stalk or in clusters on polypoid gonozooids. They represent buds of immature or sessile medusae and are plate-like or bell-shaped. Gonophores are dioecious (Fig. 20.4) but the colonies are hermaphroditic bearing both types of gonophores in the same or separate clusters.

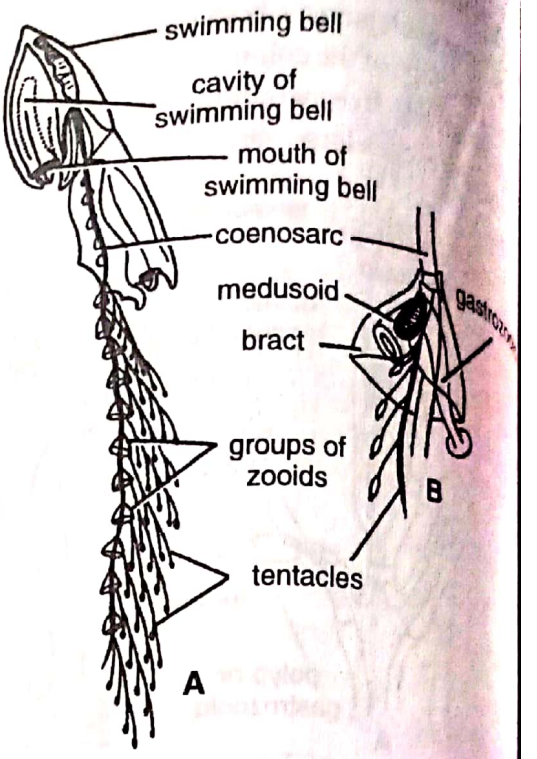

Fig. 20.3. *Diphyes*. A—Entire colony; B—Single group of zooids.

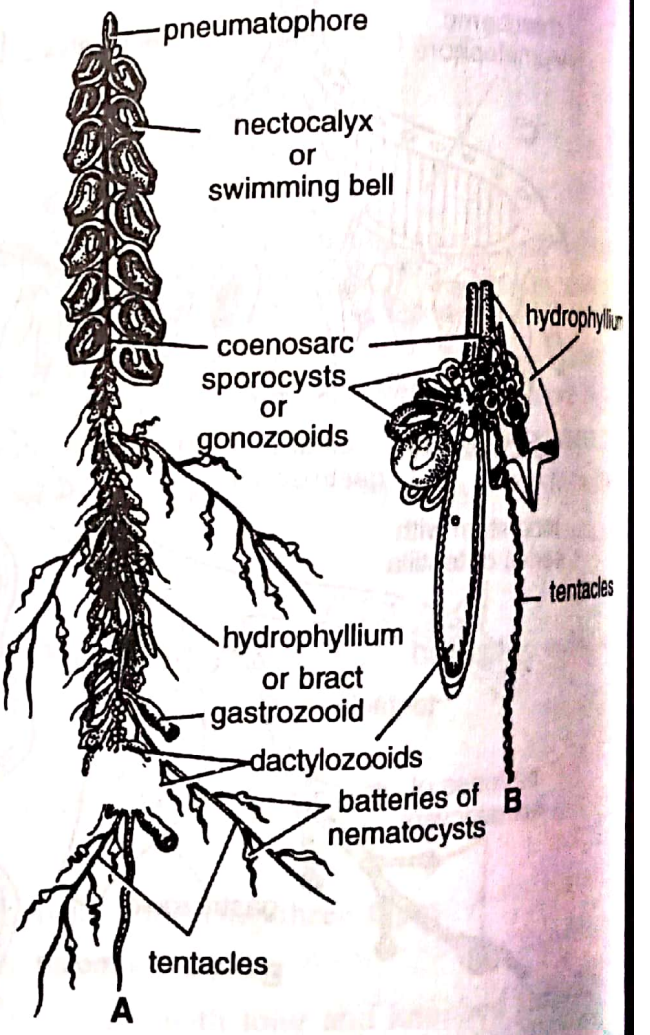

Fig. 20.4. *Halistemma*. A—Entire colony; B—One cormidium enlarged.

Polymorphism in *Halistemma*

Coelenterates of the order Siphonophora represent the most specialized hydrozoa attaining the highest degree of polymorphism. The composition and arrangement of various zooids is very different. The diversity is so great that each individual is to be studied

separately. The best known polymorphic siphonophores are *Halistemma*, *Velella*, *Physalia*, *Porpita* and *Hydractinia*.

Halistemma. It possesses a long and slender **stem.** Its upper end is expanded into a bubble-like **pneumatophore** and the stem is divided into following two parts (Fig. 20.4):

1. Proximal part. It is also called **nectosome**. It bears closely set bell-shaped **swimming bells, nectocalyces** or **nectophores**. They lack mouth, tentacles and sense organs. They are modified medusae, muscular and propel the colony forward.

2. Distal part. It is also called **siphonosome**. It carries repeated groups of closely set polyps, called **cormidia**. Each cormidium consists of following types of zooids (Fig. 20.4B):

(*i*) **Bract.** It is the protective zooid and is also called **hydrophyllium**. It is in the form of a flat scale or leaf-like bract.

(*ii*) **Gastrozooid.** It is the nutritive zooid. It bears mouth and long branched basal tentacles.

(*iii*) **Dactylozooid or feeler.** It is without mouth but with a single unbranched basal tentacle.

(*iv*) **Gonozooid.** It is a reproductive zooid. It has either testes or ovaries.

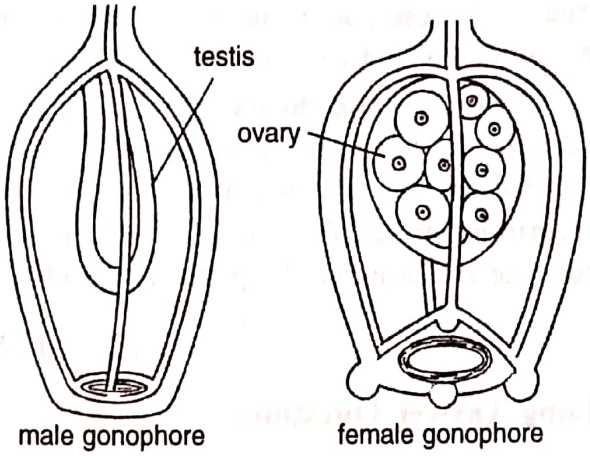

Fig. 20.5. Siphonophora. Male and female gonophores.

Forms of Polymorphism

Polymorphism has two main forms: metabolic and reproductive.

1. Metabolic form. Metabolic form of polymorphism is represented by the zooids having vegetative functions such as feeding, swimming and defence. It includes gastrozooids, dactylozooids, pneumatophores, nectocalyces, etc. All these individuals are polypoid.

2. Reproductive form. Reproductive form of polymorphism is represented by the zooids having reproductive function. It includes the asexual zooids, such as blastostyles or gonozooids and sexual zooids such as gonophores or medusae. The gonozooid is polypoid while the medusae is medusoid.

20.2 POLYMORPHISM AND ALTERNATION OF GENERATION

Polymorphism is essentially a phenomenon of "division of labour", *i.e.*, different functions are assinged to different individuals rather than to the organs of one individuals. Polymorphism is intimately associated with life history. In monomorphic forms such as *Hydra* and the class Anthozoa, the polyps reproduce both asexually and sexually, so that, life-cycle remains simple, without any larval stage and may be represented by the following, formula: **polyp-egg-polyp**. With the advent of polymorphism, the reproductive power of the organism are divided among the different individuals of the colony. In these organisms the polyps reproduce asexually to produce medusoid forms, the **gonophores**, which reproduce sexually to form polyp. The life-cycle then is represented by the following formula: **polyp-medusa-egg-planula-polyp**. Thus, the **alternation of generation** comes into existence in the life-cycle. The asexual polypoid generation alternates with the sexual medusoid generation.

20.3 ORIGIN OF POLYMORPHISM

Regarding the origin of polymorphism, there are many views. According to one view the original coelenterate was a polyp and through specialization the sexual function was relegated to secondarily developed medusoid form and this led to alternation of generation. According to another view, the

ancestral coelenterate was a medusoid form, while the polypoid generation represent a persis
larval form, thus, leading to polymorphism.

Theories of Origin of Polymorphism

A number of theories have been put forward by various zoologists; some of them are as follo

1. Polyorgan theory. This theory was put forward by **Huxley**, **Eschscholtz** and **Metschnik**
According to this theory the component zooids are organs of a single medusoid individual. Cer
organs of these zooids such as manubrium, tentacles and umbrella have become multip
independently and have assumed different forms to perform different functions.

2. Polyperson theory. This theory was put forward by **Leuckart, Vogt** and **Gegenba**
According to this theory a polymorphic individual is a colonial form of highly specialized po
with the power to produce medusa. Their diversified organisms or zooids have grouped tog
to perform different functions. This theory maintains that the part of a polymorphic colony are
polyp or medusae but the primitive zooids of the colony are of polyp type.