Cnidaria / Coelenterate

Introduction

Phylum Cnidaria or coelenterate includes diverse animals like jelly fish, sea anemones, corals and the more familiar Hydra. They are diploblastic eumetazoans with tissue grade of organization. The cnidarians are characterized by the presence of Cnidocytes, polyp and medusa forms.

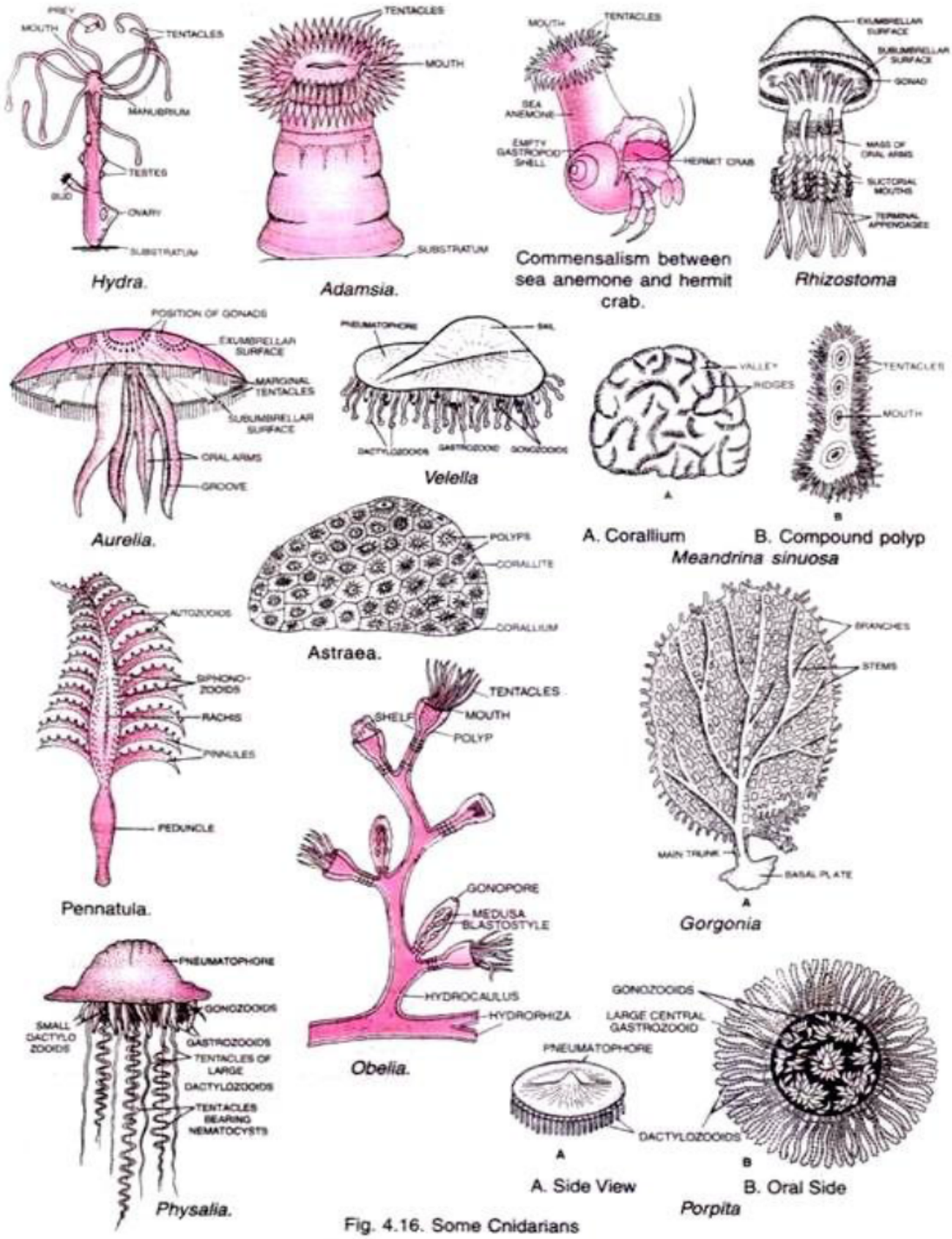

Fig. 4.16. Some Cnidarians

General Characters of Phylum Cnidaria / Coelenterate

- These are mostly marine and a few like hydra live in fresh water
- Many are colonial (Eg: Corals). Some are solitary (Eg: sea anemone)
- They are diploblastic and show tissue grade of organization
- The body is radially symmetric but sea anemones show biradial symmetry
- Polyp and medusa re the two different forms of cnidarians. Polyp is hydroid form which is sessile with mouth-up orientation. Medusa is umbrella or bell shaped with mouth down orientation. It swims by constricting the bell.
- The body wall is composed of an outer epithelium called as epidermis, an inner epithelium called gastrodermis, a gelatinous mesoglea between the outer and inner epidermis. Mesoglea consists of amoeboid cells derived from ectoderm. Mesoglea is thin in polyps. It is thick in medusa, in which it is important in buoyancy.
- The body wall contains stinging cells called as cnidocytes. Hence the name cnidaria. Each cnidocyte cell contains a fluid filled membranous capsule called cnida. Cnidocytes help in defence and capture of prey.
- The blind sac-like central cavity is called coelenterons or gastro vascular cavity. Hence the name Coelenterata. It opens out by mouth surrounded by tentacles. Mouth serves for ingestion as well as for egestion.
- In medusa form the coelenterons is specialized into stomach, radial canals and ring canal. Coelenterons helps in digestion and circulation.
- Digestion is first extracellular in the coelenterons and then intracellular in the nutritive muscular cells of gastrodermis.
- Exchange of respiratory gases and elimination f the excretory wates occurs by diffusion through the body wall.
- Neurons are interconnected to form a pair of nerve nets, one in epidermis and the other in the gastrodermis. The two nerve nets are joined by neurons that cross the mesoglea. Nerve impulse conduction is diffuse conduction. Nerve impulse can travel in any direction. Besides nerve nets, medusae have nerve rings and ganglia around the margin of the bell.
- Sensory structures like statocysts occur in the medusoid form
- Asexual reproduction takes place by budding, fission and fragmentation.
- Cnidarians are generally unisexual but some are bisexual. Fertilization is external. Cleavage is holoblastic. Development is indirect and includes a free swimming ciliated larval stage called planula. 16.In species having polyp and medusa phases, the alternation of asexually reproducing polyp form and sexually reproducing medusa form is called as metagenesis.
- Cnidarians have remarkable power of regeneration.

Classification of Phylum Cnidaria

Phylum Coelenterata/Cnidaria includes about 10,000 known species.

It is classified into three classes namely Hydrozoa, Scyphozoa and Anthozoa.

The following are the general characters of each of them,

Class I: Hydrozoa (Gr. Hydros=water, zoon=animal)

- These are mostly marine animals but some may also live in fresh water.
- They are chiefly colonial. Some forms may also appear solitary.
- Medusa stage is absent in few animals. Sometimes both polyp and medusa stages are present in few animals of this class. Medusa is craspedote (presence of velum)
- Coelenteron of the polyps of this class is undivided
- Mesoglea is acellular
- Cnidocytes are restricted to the epidermis
- Gonads also occur in the epidermal region
- Their colonies are polymorphic with different types of zooids like gastrozooids (feeding type), dactylozooids (defensive type) and gonozooids (reproductive type)

Order 1 : Hydroidea : Solitary or colonial forms. Polyp well developed. Sense organs or medusa are statocysts.

Sub-Order 1 : Anthomedusae. Ex : Hydra, Bougainvillea.

Sub-Order 2. Leptomedusae. Ex : Obelia.

Order 2 : Trachylina

Fixed stage is absent. They are all mobile medusae. Marginal sense organs are modified tentacles.

Sub-Order I : Trachymedusae Ex : Petasus.

Sub-Order II : Narcomedusae. Ex : Polycolpa.

Order 3: Hydrocorallina : It includes coral like hydrozoans. CaC03 skeleton is secreted by coenosarc. Polyps are dimorphic.

1)Millipora (Hydrozoans coral)

2)Stylaster (Hydrozoan corals)

Order 4 : Chondrophora : It includes organisms with big floats.

Ex: l)Velella 2)Porpita.

Order 5: Pteromedusae: Pelagic hydrozoans.

Ex : Tetraplatia.

Order 6: Siphonophora: They show highest polymorphic tendency.

Class II: Scyphozoa (Gr. skyphos=cup, zoon=animal)

- All the animals belonging to this class are marine in nature
- Medusa stage is predominant in this class. Medusa is acraspedote (No velum)
- Mouth is surrounded by four oral arms.
- Mesoglea is cellular and contains amoebocytes
- Cnidocytes occur in the epidermis and also in the gastrodermis region
- Gonads occur in the gastrodermal region.
- Polyps are solitary or may also exist in colonies. Polyp stage is syphistoma (body is divided by septa). This syphistoma produces juvenile medusa called as ephyrae by the process of strobilation. Finally this ephyra grows into the sexual adult medusa.
- This class includes Jelly fish

Order 1 : Stauromedusae : (Lucernarida) Sense organs absent. Medusa is pyramidal shaped. Sedentary. Ex : 1) Lucernaria 2) Haliclystus.

Order 2 : Coronatae : The umbrella shows coronary grooves. 4 to 16 tentaclocysts are present. Ex: 1) Periphylla. 2) Nausithoe (It lives inside Porifera animals (sponges).

Order 3 : Cubotnedusae : Medusa is cubical 4 perradial tentacalocysts are present. Free swimming.

Ex : 1) Choropsaimum (free medusa) 2)Chatybdaea.

Order 4 : Semeastomeae (or) Discomedusae : Most common medusae. Medusa is disc shaped, 4 perradial and 4 interradial tentaculocysts are present.

Ex : 1) Aurelia -Jelly fish 2)'Rhopilema3)Pelagia (Luminescent Jelly fish)

Order 5 : Rhyzostomeae : Free swimming medusa. The oral arms are branched. Tentacles absent. 8 or more tentaculocysts are present.

Ex : 1) Pilema, 2) Rhizostoma.

Class III: Anthozoa (Gr. anthos=flower, zoon=animal)

- All the animals of this class are marine
- They may be solitary or colonial
- All are sedentary polyploid forms. The medusa stage is absent
- Mouth is oval and is surrounded by a whorl of tentacles resembling a flower like structure. Hence the name of the class.
- The mouth leads into tubular pharynx called stomodaeum that in turn opens into coelenteron. Coelenteron is divided into radial compartments by vertical septa called as mesenteries.
- Cnidocytes occur in epidermal as well as gastrodermal region
- Gonads occur in the gastrodermis.

Order 2: Madreporaria : (True corals) Stony corals are present Polyps are small. Siphonoglyphs absent.

Ex: 1) Meandrina (brain coral) 2) Fungia.

Order 3 : Zoanthidea :Solitaryor colonial organisms. Polyps are united by basal stolons. Only ventral siphonoglyphis present.

Ex: 1) Zoanthus.

Order 4 : Antipatharia : Includes black corals. Two siphonoglyphs are present.

Ex: Antipathes (Black coral)

Order 5: Ceriantharia : Solitary structure. Tentacles many, arranged into two whorls. Only single siphonoglyph occurs.

Ex .- Cerianthus.

Order 6: Corallimorpharia : Solitary or aggregate, anemone like polyps.

Ex : Corynactis.

Order 7: Ptychodactaria : Includes animals which are anemone like polyps.

Ex: Ptychodactis

Sub class : Octocoralia (Alcyonaria) :

In these Anthozoan members the tentacles and mesentries are in multiples of eight. On the stomodium never more than one siphonoglyph will be present. It is ventral in position.

Order 1: Stolonifera : Polyps are connected by creeping stolon.

Ex: Tubipora (orange pipe coral).

Order 2 : Telestacea : The colonies contain simple or branched stem which bears lateral polyps.

Ex: Telesto.

Order3: Alcyonacea : These are soft corals. Polyps may be dimorphic.

Ex: 1) Alcyonium (dead man's fingers).

Order 4 : Coenothecalia : It includes a single genus.

Ex: Heliopora (Blue coral)

Order 5: Gorgonacea : It is a compound tree like coral.

Ex: 1) Gorgonia (seafan) 2) Corallium (red coral)

Order 6: Pennatulacea: These are elongated members. Emended in the mud, and sea bottom.

Ex : Pennatula (Sea pen)