

Coelenterata (Cnidaria) Definition

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Coelenterata (Cnidaria) Definition

The Coelenterata may be defined as diploblastic metazoa with tissue grade of construction having nematocyst and a single gastrovascular cavity or the coelenteron.

1. They are aquatic, mostly marine except few freshwater forms like the *hydra*.
2. They are multicellular with tissue grade of organization.
3. They are solitary or colonial. Sessile or free-swimming.
4. Individuals are radially or biradially symmetrical about a longitudinal oral-aboral axis.
5. Body organization of cell-tissue grade. Cells mostly scattered and specialized for different functions. Some cells form tissues like nerve nets or nervous tissues.
6. Exoskeleton chitinous (perisarc) or calcareous (corals).
7. They are diploblastic animals with 2 cellular layers-outer an epidermis and an inner gastrodermis- with a gelatinous acellular mesoglea in between.
8. Acoelomate animals because they do not possess a second body cavity, the coelom.
9. Short and slender tentacles encircle the mouth in one or two whorls.
10. The tentacles are provided with nematocysts; tentacles serve for food capture, its ingestion, serve for adhesion, and for defense.
11. Two types of individuals occur, attached sessile and asexual zooid (polyps) and free swimming and sexual zooid (medusae). Some species are notable for polymorphism or variety of forms.
12. They are usually carnivorous; digestion is extracellular as well as intracellular.

13. No anus.
14. Coelom and respiratory, circulatory, and excretory system wanting.
15. Nervous system primitive, consisting of a diffuse nerve net. Central nervous system absent.
16. The muscular system includes longitudinal and circular fibers formed by epithelia-muscle and endothelial-muscle cells.
17. A single cavity, lined with gastrodermis, called gastrovascular cavity or coelenteron, into which mouth opens.
18. Sensory organs form ocelli and statocysts.
19. Reproduction is both by asexual and sexual methods.
20. Asexual reproduction occurs by budding and sexual reproduction by the formation of gametes.
21. The development includes a free-swimming ciliated planula larva.
22. Life history exhibits the phenomena of [alternation of generation](#) or metagenesis in which the asexual polypoid, sessile generation alternates with sexual medusoid, free-swimming generation.

Phylum Coelenterata (Cnidaria) Classification

Phylum Coelenterata includes nearly 11,000 known species half of which are extinct. The classification followed here is given by **Hyman, L.H.**, (1940). According to Hyman phylum, Coelenterata has been classified into 3 classes.

Class 1. Hydrozoa (Gr., *hydra*=water + *zoios*=animal)

- Freshwater or marine. Solitary or colonial. Sessile or free-swimming.
- Exhibit tetramerous and polymerous radial symmetry.
- The body wall consists of outer ectoderm and inner endoderm separated by non-cellular mesoglea.
- Gastrovascular cavity without stomodaeum, septa, or nematocysts bearing gastric filament.
- Skeleton or horny structure is horny perisarc in some forms, while coenosarc secretes a skeleton of calcium carbonate forming a massive stony structure or coral in other forms.

- They exhibit polymorphism. These are two main types of zooids, the asexual polyp, and sexual medusa.
- Polyp without stomodaeum and septa (mesentery).
- Medusa with true velum (Craspedote).
- Mesoglea non-cellular.
- Many of them exhibit alternation of generations.
- Gonads are epidermal. Sex cells shed directly on the outside.
- Cleavage is holoblastic, embryo ciliated in planula.

Order 1. Hydroida

- Solitary or conical.
- Polypoid stage predominant.
- Medusae are short-lived or absent.
- Sense organ of medusae are ocelli and statocysts and exclusively ectodermal in origin.

Suborder 1. Anthomedusae or Athecata

- Solitary or conical.
- Polyps and blastostyles athecate, i.e. perisarc not forming hydrothecae and gonothecae.
- Medusae are tall, bell-like bearing gonads on the manubrium having a strongly arched umbrella.
- Medusae bear eyespot or ocelli at the bases of tentacles.
- Statocysts absent.
- Examples: *Hydra*, *Ceratella*, *Tubularia*, *Clava*, *Eudendrium*.

Suborder 2. Leptomedusae or Thecata

- Conical Hydrozoa.
- Polyps are enclosed in hydrothecae and medusae are covered with gonothecae.
- Free medusae are flattened, bowl or saucer-shaped, bearing gonads on the radial canal.
- Medusa with gonads on radial canals.
- Medusae usually bear statocysts.

- Eyespots or ocelli are absent.
- Examples: *Obelia*, *Sertularia*, *Plumularia*, *Aglaophenia*.

Order 2. Milleporina

- Conical coral-like Hydrozoa without perisarc.
- The massive calcareous skeleton is secreted by ectoderm provided with pores through which polyps protrude out.
- Colony have 2 types of zooids, the gastrozoid and dactylozoid.
- Gastrozooids (nutritive zooids) are short provided with mouth and tentacles.
- Dactylozooids are elongated, hollow, slender with tentacles but without a mouth.
- Medusae develop in small chambers, becoming free, devoid of mouth, radial canals, and tentacles.
- Example: *Millepora*.

Order 3. Stylasterina

- Colonial coral-like Hydrozoa colony have 2 kinds of zooids, the dactylozooids, and gastrozooids.
- Dactylozooids are small, solid without tentacles.
- Gastrozooids have a cup with a pointed spine.
- Gonophores reduced to sporosacs. Medusae not free.
- Larva is liberated as planula.
- Example: *Stylaster*.

Order 4. Trachylina

- Polypoid stage reduced or absent.
- Medusae are large, dominant, free-swimming, and may develop directly from the fertilized egg.
- Marginal sense organs or statocysts with endodermal statoliths.

Suborder 1. Trachymedusae

- Tentacles inserted above bell margin.
- The margin of the umbrella is smooth.

- The manubrium is long.
- Gonads develop in radial canals.
- Example: *Geryonia*.

Suborder 2. Narcomedusae

- Tentacles arise between the bell margin and vertex of the exumbrella.
- The manubrium is short.
- Gonads present on the manubrium or on the stomach floor.
- Examples: *Cunina*, *Solmaris*.

Order 5. Siphonophora

- They are polymorphic, free-swimming, or floating colonial Hydrozoa.
- The colony consists of several types of polypoid and medusoid individuals attached to stem or disc.
- Polyps without oral tentacles.
- Medusae incomplete and rarely freed.

Suborder 1. Calycophora

- The upper end of the colony is provided with one or more swimming bells (nectophores).
- Apical float or Pneumatophore absent.
- Examples: *Diphyes*, *Praya*, *Abyla*.

Suborder 2. Physophorida

- Upper end of colony forms a large gas-filled float (pneumatophore).
- Examples: *Physalia*, *Halistemma*, *Stephalia*.

Class 2. Scyphozoa (Gr., skyphos=cup +zoios=animal)

- It includes large jelly-fishes or true medusae that are exclusively marine.
- Medusae are large, bell or umbrella-shaped, without true velum, free-swimming, or attached by an aboral stalk.

- Polyp stage reduced or absent.
- Marginal sense organs are tentaculocysts having endodermal statoliths.
- Gastrovascular cavity with gastric pouches and endodermal gastric filaments. No stomodaeum.
- Mesoglea extensive, gelatinous, with fibers and cells.
- Gonads are gastrodermal. Sex cells released in the digestive cavity.

Order 1. Stauromedusae or Lucernaridae

- Body goblet or trumpet-shaped.
- Sessile, attached by an aboral stalk.
- Mouth cruciform (four-cornered) with small oral lobes and a short quadrangular manubrium.
- The gastrovascular system is divided into the central stomach and four per-radial pouches by the four inter-radial septa.
- Gonads are elongated band-like borne on the faces of septa.
- No marginal sense organs or tentaculocysts.
- Fertilization external.
- The larva is planula without cilia.
- Examples: *Lucernaria*, *Haliclystus*.

Order 2. Cubomedusae or Carybdeida

- Body cubical with 4 flattened sides.
- Free-swimming Scyphozoa found in warm and shallow waters of tropical and subtropical regions.
- 4 hollow inter-radial tentacles borne on the margin of the sub-umbrella.
- 4 per- radial tentaculocysts or rhopalia are present.
- Each tentaculocyst is provided with a lithocyst and one or more ocelli.
- The mouth is cruciform and gastric pouches are present.
- Leaf-like gonads.
- Examples: *Charybdaea*, *Tamoya*.

Order 3. Coronate

- Body conical, divided by a deep circular coronary groove.
- Free-swimming scyphomedusae found inhabiting the deepwater of the ocean.
- The umbrella is divided by a coronal groove (horizontal furrow) into an upper cone and a lower crown.
- The crown consists of pedal lobes, pedalia.
- The pedalia bear solid tentacles.
- The bell margin is scalloped into lappets alternate with pedalia.
- Cruciform mouth.
- 4 to 16 tentaculocysts present.
- Examples: *Pericolpa*, *Periphylla*.

Order 4. Semaestomeae

- Most common free-swimming medusae found inhabiting the coastal waters of all oceans.
- The umbrella is a flat, saucer, or bowl-shaped.
- Square shaped mouth extending into 4 long oral arms.
- The margin of the umbrella is fringed with hollow tentacles.
- 8 tentaculocysts present.
- Gastric pouches and filaments are absent.
- Examples: *Aurelia*, *Cyanea*.

Order 5. Rhizostomae

- Body usually hemisphere without marginal tentacles.
- Free-swimming Scyphozoa found in shallow waters of tropical and subtropical oceans.
- The umbrella is saucer or bowl-shaped or flattened or even concave on the top.
- The mouth is surrounded by 8 oral arms-bearing numerous funnel-shaped mouths on their edge.
- Typically, 8 or more tentaculocysts.
- Four subgenital pits are generally present.
- Examples: *Rhizostoma* or *Pilema*, *Cassiopeia*.

Class 3. Anthozoa (Gr., *anthos*= flower+ *zoios*= animal)

- Exclusively marine. Solitary or colonial.
- Exclusively polypoid.
- No medusoid stage.
- The body is usually cylindrical with hexamerous, octamerous, or polymerous biradial or radobilateral symmetry.
- The oral end of the body is expanded radially into an oral disc bearing hollow tentacles surrounding the mouth in the center.
- The stomodaeum is present, often provided with 1 or more ciliated grooves the siphonoglyphs.
- The gastrovascular cavity subdivided by 8 or more septa or mesenteries.
- Mesenteries bear nematocysts at their inner free edges.
- Mesoglea stout and contains fibrous connective tissue and amoeboid cell.
- Skeleton either external or internal.
- The exoskeleton is formed from calcium carbonate which often forms a massive coral.
- The nervous system is in the form of a typical nerve net without a concentrated central nervous system.
- Endodermal gonads, develop in the mesenteries.
- The ripe sexual products are discharged into coelenteron.
- External fertilization.
- The fertilized egg develops into a planula larva, which after a short free life settles down and develops into an adult.

Subclass 1. Alcyonaria or Octocorallia

- Exclusively colonial.
- Polyp are long or short cylinder terminating orally into a flat circular oral disc having an oval or elongated mouth in the center.
- Polyp with 8 pinnate tentacles and 8 septa.
- 8 complete mesenteries are present.
- Single ventral siphonoglyphs present.

- Endoskeleton is the product of mesogleal cells comprised of calcareous spicules either calcareous or horny in nature.
- Polyps are dimorphic in some form.

Order 1. Stolonifera

- Inhabitants of shallow water in the tropical and temperate region.
- Polyps arising independently from a creeping mat or stolon.
- Skeleton of calcareous tubes or separate calcareous spicules or absent.
- Examples: *Tubipora*, *Clavularia*.

Order 2. Telestacea

- The colony consists of simple or branched stems arising from a creeping base.
- Each stem is a very elongated polyp bearing lateral polyps.
- Skeleton consists of calcareous spicules.
- Example: *Telesto*.

Order 3. Alcyonacea

- Colony mushroom-shaped or branched into stout blunt processes.
- Lower parts of the polyp fused into a fleshy mass or coenenchyma with one oral end protruding.
- Polyps are dimorphic in some form bearing autozooids and siphonozooids.
- Skeleton consists of separate calcareous spicules, not axial.
- Examples: soft corals. *Alcyonium*, *Xenia*.

Order 4. Coenothecalia

- Skeleton is massively composed of crystalline calcareous fibers of calcium carbonate, not of fused spicules.
- Polyps embedded and connected by solenial tubes.
- Commonly called blue corals found on the coral reefs in the Indo-pacific.
- Example: *Heliopora* (blue coral).

Order 5. Gorgonaceae

- The colony usually plant-like, consists of the main stem arising from the basal plate or tuft of stolon and a number of branches bearing polyp.
- Axial skeleton composed of horn-like gorgonin, separate or fused calcareous spicules, or both.
- Commonly called sea fans, sea feathers, and sea whips.
- Found in tropical and subtropical shores.
- Examples: *Gorgonia*, *Corallium*.

Order 6. Pennatulacea

- Colony elongated and divided into a proximal stalk or peduncle and distal rachis.
- Their lower part (peduncle) embedded in mud and sand.
- The upper part (rachis) consists of a very long axial polyp with lateral branches bearing a dimorphic polyp.
- The main stem is supported by a calcareous or horny skeleton.
- Examples: *Pennatula*, *Renilla*, *Cavernularia*, *Pteroides*.

Subclass 2. Zoantharia or Hexacorallia

- Solitary or colonial.
- Marine form.
- Tentacles simple usually unbranched, numerous arranged in multiples of five and six but never 8.
- Mesenteries are numerous arranged in multiple of 5 or 6, maybe complete or incomplete.
- Gullet commonly with 2 siphonoglyphs.
- Endoskeleton when present calcareous, derived from ectoderm.
- Usually monomorphic polyp.

Order 1. Actiniaria

- Solitary or colonial.
- Simple often large-sized.
- No skeleton.

- Body muscular, often with an aboral pedal disc.
- Tentacles and mesenteries are numerous.
- One or more siphonoglyphs.
- Examples: *Actinia*, *Metridium*, *Adamsia*, *Edwardsia*.

Order 2. Madreporaria

- Rarely Solitary or mostly colonial.
- The exoskeleton is hard, compact, often massive calcareous.
- Polyp small, living in cup-like cavities on the exoskeleton.
- No siphonoglyph and muscles feeble.
- Examples: true or stony corals. *Astraea* (star coral), *Fungia*, *Favia*, *Madrepora* (staghorn coral), *Meandrina* (brain coral).

Order 3. Zoanthidea

- Mostly colonial sometimes solitary forms.
- No skeleton and pedal disc but, the body wall contains calcareous bodies.
- Mostly epizoic.
- Small polyp and usually united by basal stolons.
- Paired mesenteries. A pair composed of one complete and one incomplete mesentery.
- Only one ventral siphonoglyph present.
- Example: *Zoanthus*.

Order 4. Antipatharia

- Colonial and tree-like.
- Found in the deep waters in the oceans.
- The lower end of the colony usually consists of a basal plate for the attachment of some objects.
- Tentacles and mesenteries comparatively few (6-24) in numbers.
- Skeleton as branched, chitinoid axis derived from ectoderm.
- The axial skeleton bears the polyps which are dioecious but the colony may be hermaphrodite.
- 2 siphonoglyphs present.
- Examples: Black corals. *Antipathes*.

Order 5. Ceriantharia

- Long, solitary, anemone-like forms living in the vertical cylindrical cavities in the sea bottom.
- No pedal disc and skeleton.
- Body smooth cylindrical and elongated with an oral disc.
- Tentacles simple, numerous, arranged in 2 whorls- oral and marginal.
- Single and dorsal siphonoglyphs.
- Mesenteries are numerous, single, and complete.
- Examples: *Cerianthus*.

CPA COLLEGE