Class Anthozoa – Anthozoans

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Anthozoans are almost exclusively marine cnidarians, with only a few species living in brackish water. Approximately 7,500 extant species are described worldwide from the intertidal to the deep-sea and at least the same number of species, mainly scleractinians, are additionally known from fossil records. Anthozoa is subdivided into two subclasses, Octocorallia (also called Alcyonaria) and Hexacorallia (also called Zoantharia). Octocorals nearly always possess eight pinnate tentacles, while hexacorals generally have six, or rather a multiple of six tentacles. Subclass Octocorallia includes the orders Alcyonacea (soft corals and gorgonians), Pennatulacea (sea pens and sea pansies), and Helioporacea (blue corals). Subclass Hexacorallia includes the orders Ceriantharia (tube anemones), Scleractinia (true or stony corals), Corallimorpharia (jewel anemones), Actiniaria (sea anemones), Zoantharia (encrusting anemones), and Antipatharia (black corals).

Anthozoans lack a medusa stage. Their bilaterally symmetric polyps are relatively large and can measure up to 1.25 m in diameter in tropical sea anemones. A polyp is built up of a tube with one opening, the mouth, which is surrounded by one or more cycles of hollow tentacles. Phylogenetic analyses of morphological data have suggested at least three diagnostic apomorphies: actinopharynx, siphonoglyph, and mesenteries. The actinopharynx is an ectoderm-lined tube extending from the mouth into the coelenteron. It possesses at least one histologically specialized, densely ciliated longitudinal channel called a siphonoglyph that drives water into the coelenteron. In most sea anemones and corals, two siphonoglyphs are situated diametrically opposite one another in the actinopharynx. Mesenteries are longitudinal sheets of tissue that extend radially from the body wall and sub-divide the coelenteron; some reach all the way to the actinopharynx and are termed “complete” or “perfect”, the others are “incomplete” or “imperfect” (they used to be called septae, but this term should be reserved for the calcareous radial partitions secreted by the mesenteries of scleractinians). The mesenteries are arranged in cycles and bear the gametogenic tissue. Octocorals have eight complete mesenteries, most hexacoral orders possess a multiple of six paired mesenteries, in Ceriantharia and Antipatharia mesenteries occur singularly. The free edge of each mesentery is normally equipped with cilia, gland cells, and cnidae. Mesenteries probably increase the surface for respiration and absorption of food and provide mechanical support. The mesogloea is relatively thick and cellular, compared to some other classes. Some anthozoan groups, mainly of the subclass Octocorallia, have developed an internal skeleton (soft corals, gorgonians, sea pens and pansies, black corals), and some an external one (stony and blue corals). Skeletons are mineralic and/or proteinaceous.

Most anthozoans are colonial. Their polyps are connected by a living tissue, the coenenchyme. The members of a colony are derived by vegetative (asexual) propagation from an original founder polyp that was the product of sexual reproduction. Some clonal species can proliferate asexually through fission, budding or laceration; however, the individuals do not stay connected as in colonial species. Reproductive strategies of anthozoans are very diverse. Most anthozoan species are gonochoric, some species are hermaphroditic, and others can change sex during their lifetime. Gametes are usually broadcasted but some species are known to brood their embryos in the coelenteron (e.g. *Bunodactis hermaphroditic*a, *Anthopleura hermaphroditica*), and others have them attached to the surface of the polyp.

Most species are benthic; they have a sessile or sedentary life style. However, some anemones can swim (e.g. the small cosmopolitan species *Gonactinia prolifera*) and a small group of tropical anemones live pelagically by drifting at the surface using their pedal disc (which encompasses an air bubble) as a buoy.

Based on the most recent molecular data available, phylogenetic analyses have corroborated anthozoans, and its two subclasses Octocorallia and Hexacorallia, to be monophyletic. Octocorallia, due to its polyps uniformity, has long been considered monophyletic. Classification of soft corals and gorgonians into higher taxonomic levels remains difficult. Bayer (1981) merged

them into a single order, Alcyonacea, which is widely accepted. For taxonomic convenience, it is sub-divided into six sub-ordinal groups which do not reflect phylogenetic relationships. The phylogenetic positions of the order Pennatulacea and Helioporacea, as well as relationships among hexacorals remain unsolved. Monophyly of Ceriantharia and Antipatharia, which show some morphological similarities, is not supported. The placement of Ceriantharia remains uncertain; it seems to be the basal-most lineage within Hexacorallia. The relationship between Scleractinia and Corallimorpharia is controversial; either both taxa are sister groups or Corallimorpharia nests in Scleractinia. However, most analyses agree that Actiniaria, Antipatharia, Corallimorpharia, Scleractinia and Zoantharia are a clade, and Ceriantharia is its sister group.

Key to the Anthozoans of the Chilean Fjord Region

1) a) Polyp small; always with 8 pinnately branched tentacles. Mostly colonial[1]. Encrusting, fleshy, or axis with internal core of flexible or hard material .....(2) (Octocorallia)
   b) Polyp with 6 or more unbranched tentacles. Solitary or colonial. Without skeleton or with rigid calcareous or flexible thorny skeleton. ..... (9) (Hexacorallia)

Subclass Octocorallia (Alcyonaria)

2) a) Colonies encrusting; polyps arising singly from creeping stolons. ..... **Clavulariidae**
   b) Colonies erect, or a fleshy mass in which several to many polyps are embedded, or kidney-shaped stalked disc. ... (3)
3) a) Colonies without internal core of hard material; fleshy..... (4)
   b) Colonies erect; whip-like or irregularly branched; with internal core of flexible or hard material..... (5)
4) a) Colony a fleshy mass in which several to many polyps are embedded; sometimes with fleshy branches; fixed on primary or secondary hard substratum ..... **Alcyoniidae**
   b) Colony kidney-shaped or featherlike. Lower portion or stalk swollen, anchoring colony in mud or sand..... **Pennatulacea**
5) a) Central axis with solid core .....(7)
   b) Central axis with hollow, cross-chambered core. ..... (6)
6) a) Polyps non-retractile; covered with spindles that form chevrons. ..... **Acanthogorgiidae**
   b) Polyps retractile; usually with sclerites[2] comprising some form of crown and points. Sclerites >0.3 mm in length..... **Paramuriceidae**
7) a) Solid core made up of sclerites ..... Paragorgiidae
   b) Solid core without sclerites .....(8)
8) a) Solid core jointed (nodes and internodes) ..... Isiidae
   b) Solid core uniform ..... **Primnoidae**

Subclass Hexacorallia (Zoantharia)

9) a) Single polyps or colonies with rigid or flexible skeleton .....(10)
   b) Single polyps or colonies without skeleton.....(11)
10) a) Erect colony with flexible slim, hard, thorny axial skeleton. Small polyps with 6 tentacles.....Antipatharia
    b) Polyp with calcareous skeleton[3]. Solitary, or colonial[4]. Tentacles with distinct round knobs at tips..... **Scleractinia**
11) a) Polyp with 2 clearly distinct types of tentacles. Short oral tentacles and long marginal tentacles; often distinctly coloured. Specimens can retract into parchment-like tube buried in soft sediment .....Ceriantharia

1 The genus *Taiaroa*, with one species, *T. tauhou*, is the only solitary octocoral known to date.

2 The microscopic, calcareous structures that are found in the coenenchyme and sometimes the axis of octocorals.

3 Not to confuse with hydrocorals (see chapter Hydrozoa: Stylasteridae).

4 Only some deep-water species; fjord species may form pseudo-colonies.

b) Polyp with only 1 type of tentacles of same or differing size; not inhabiting parchment-like tubes ..... (12)

12) a) Colonial. Only bases of clearly separate polyps connected, in some species with inconspicuous stolons only. Entire column encrusted with fine sand ..... **Zoantharia / Zoanthidae**

b) solitary[5] polyps. Column not encrusted with fine sand, but foreign particles may stick to column ..... (13)

13) a) Polyp generally solitary[5]. Tentacles without distinct round knobs at tips. Column slimy or with foreign particles stuck to it; or with cuticle ..... **Actiniaria**

b) Polyp solitary (or colonial[6]); generally in aggregations. Tentacles with distinct round knobs at tips. Column always smooth ..... **Corallimorpharia**

5 The Chilean species *Cereus herpetodes* is the only colonial sea anemone known.

6 Only in the tropics.

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