Octocorallia – Octocorals
Leen van Ofwegen (soft corals), Odalisca Breedy (non-primnoid gorgonians) & Stephen Cairns (primnoid gorgonians)
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General Introduction

Octocorals are sessile, mostly colonial Anthozoa having polyps invariably containing eight tentacles, which are almost always pinnate. Most species have a calcium carbonate skeletal structure consisting of numerous microscopic sclerites and many taxa also have an axis of calcified, horn-like substance (gorgonin). There are three major octocorallian orders: Helioporacea (blue coral), Alcyonacea (soft corals and gorgonians) and Pennatulacea (sea pens), only the latter two occurring off Chile. Approximately 3,000 species of Octocorallia are distributed worldwide and can be found at depths between zero and 6,620 m. New species, even genera, continue to be described, especially from the deep-sea environment and the Indo-Pacific. In Chile, 44 octocoral species have been reported (see Appendix 2).

Morphological Characteristics

The polyp is the individual zooid in octocorals (Fig. 1). The polyps are responsible for all the vital functions of the colony, such as growth, food capture, transport of nutrients, irrigation with seawater, defence and reproduction. The majority of species have one type of polyp (the autozooid), and thus are called monomorphic. Species in some groups have a second type of polyp (the siphonozooid) and thus are called dimorphic. The siphonozooids have one rudimentary tentacle or none at all and they transport water around the colony. In the dimorphic species of Alcyonacea, siphonozooids are the sexual individuals but in pennatulaceans they are sterile. Normally, the term polyp refers to the autozooids. They are quite uniform throughout the Octocorallia, with minor variations in size, number and size of pinnules on tentacles, colour and occurrence of sclerites. The polyp is basically a tubular structure. The lower part of the polyp is embedded in a gelatinous material, the coenenchyme, which is penetrated by a complex system of tubes (the solenia) that communicate with all the polyps in a colony (Fig. 1). The upper free end of the polyp (the anthocodida) has a central mouth opening surrounded by eight tentacles. Tentacles have finger-like extensions along each side (the pinnules) which enhance the surface area of the polyp. Tentacles are contractile and contain sensory cells and stinging capsules; in some genera they are filled with symbiotic algae, the zooxanthellae. The mouth extends into a gastrovascular or gastric cavity through a short tubular pharynx. The pharynx has a modified side wall that is called the siphonoglyph or sulcus. This serves to drive water into the gastric cavity and from there to the rest of the colony through the canal system. The gastrovascular cavity has eight protruding calyces and stolons.

Fig. 1. Structure of a gorgonian, showing the eight pinnate tentacles, coenenchym, and the gorgonin axis (Figure from plate collection from University of Berlin).

Fig. 2. Paratype of Incrustatus comauensis, showing calyces and stolons.
tissue plates radially arranged (the mesenteries) which have an important function in the polyp hydraulic system, contain digestive gland cells and in most genera, produce the gonads.

**Biology and Ecology**

The gonads or reproductive structures are separated as male and female colonies in most octocorals, however, some species are hermaphroditic. Sexual reproduction or asexual propagation are the reproductive strategies in octocorals and are revealed in their extent of aggregation or colonisation to far places. Three types of sexual reproduction occur: (1) broadcasting of eggs and sperm (the release of large numbers of eggs and sperm into the water where fertilisation takes place); (2) internal brooding of larvae (sperm but not the eggs, are released into the water, fertilisation takes place within the females); (3) external brooding of larvae (fertilised eggs remain attached to the mother colony and develop to larvae in mucus pouches on the surface of the colony). In all cases, planular larvae are produced and settle according to the precise substrate requirements for the species. Once a larva is settled it goes through metamorphosis to become a founder polyp that starts a new colony by budding. Asexual propagation is common in soft corals and is achieved by runner formation (stolons, see Fig. 2), colony fragmentation, fission or budding. Gorgonians from the Caribbean are able to propagate by physical fragmentation of branches from a primary colony.

Growth of the colonies depends on the environmental conditions and ecological setting. Growth and feeding in octocorals is related to current flow. Most of the octocorals are suspension feeders, taking particulate organic matter from the water. Larger particles, such as small, weak or damaged zooplankton and larvae are captured when they are intercepted by the tentacles, their capture aided in some cases by the nematocysts (stinging capsules). Food capture is selective, when food is not suitable it is released after a few minutes.

Octocorals are abundant components of shallow-water, rocky wall and coral reef environments. They are a widespread group, occurring from littoral waters down to the deep-sea abyss and from the Arctic to the Antarctic oceans. Octocorals are found in variable densities in almost all marine habitats depending on physical environmental parameters such as light, sedimentation, depth, wave exposure and especially water motion. The impact these conditions have on abundance depends on the specific type of octocoral. While all these gradients are related, it is difficult to discern which of them is most important in controlling the abundance and distribution of species. Studies have demonstrated that the octocorals are distributed along a wide depth gradient, especially Fig. 1
**Alcyonium haddoni**
Wright & Studer, 1889

*Common name:* Common soft coral, Dead man's finger; Coral blando común, Mano de muerto

*Description:* Colonies alive and preserved orange to red. Colonies consisting of single, flattened, rounded lobe (a). Sometimes several digit form colonies grow together to form one large digitate colony (b). Calyces dome shaped. *Sclerites:* Anthocodiae with collaret composed of 5–6 rows of spindles. These spindles up to 0.40 mm long; with simple tubercles (c). Points with spindles similar to those of collaret. Distally clubs present; up to 0.25 mm long (d). Tentacles with spiny rods up to 0.20 mm long (e). Surface layer of top of colony with clubs up to 0.20 mm long, with spiny heads (f); interior contains spindles with rather complex tubercles up to 0.30 mm long (g). Surface layer and interior of base of colony with sclerites similar to those of top of colony but slightly shorter (h). Tentacle rods colourless, other sclerites yellow. *Possibility for confusion:* *A. glaciophilum* and *A. yepayek*, both of which are only known from the CPZ. Sclerite examination is necessary for proper identification. *A. jorgei* (see corresponding description).


*Biology:* In several colonies, conspicuous pink eggs/larvae were visible through the transparent body wall of some polyps. *Comments:* This species has been reported from Argentina but we consider these records doubtful. 

*Main references:* Wright & Studer (1889); Ofwegen et al. (2007).

**Alcyonium jorgei** Ofwegen et al., 2007

*Common name:* Jorge's soft coral, Dead man's finger; Coral blando de Jorge, Mano de muerto

*Description:* Colonies alive orange to red; preserved whitish to orange. Colonies unbranched (a) or digitate; with short slender lobes (b). Polyps distributed all over stem and lobes but most abundant at end of lobes. Calyces dome-shaped. *Sclerites:* Anthocodiae with collaret composed of 5 or 6 rows of spindles. Anthocodial spindles up to 0.50 mm long with simple tubercles (c). Distally clubs up to 0.20 mm long (d). Tentacles with spiny rods up to 0.25 mm long (Fig. e). Surface layer of lobes with clubs up to 0.20 mm long, with spiny heads (f); interior contains spindles with rather complex tubercles up to 0.35 mm long (g). Surface layer of stalk with short clubs up to 0.10 mm long (h) and capstans slightly longer than clubs (i); interior with spindles and rods up to 0.20 mm long (j). Smallest tentacular sclerites colourless, sometimes even all anthocodial sclerites; other sclerites yellow. *Possibility for confusion:* *A. haddoni*, which possibly lives in the same habitat. When examining sclerites, may be easily distinguished from other *Alcyonium* species by its slender lobes.

*Habitat:* Moderately steep to vertical rocky substratum; in sites with low to moderate sedimentation in moderately exposed fjords and bays. *Depth:* 15–35 m. *Abundance:* Common in the continental fjords of the NPZ. *Distribution:* SE Pacific (NPZ, possibly CPZ). *Chile:* 41°S–45°S(48°S?). *Biology:* Unknown. *Comments:* One specimen from the CPZ with slightly different sclerites is tentatively included in this species. One specimen that probably belongs to this species was observed on a ROV transect on the sill of the Quintupeu fjord (42°S, 55 m). 

*Main reference:* Ofwegen et al. (2007).
Phylum Cnidaria

Class Anthozoa

Subclass Octocorallia

Alcyonium jorgei
**Thouarella** (T.) sp 1

Phylum Cnidaria

Class Anthozoa

Subclass Octocorallia
**Thouarella (T.) sp. 1**

**Common name:** Wiry bottlebrush gorgonian; Pluma del mar nervuda, Hisopo robusto  
**Description:** Colonies usually consist of 1 main vertical stem from which numerous short (5–6 cm long) secondary branchlets diverge from all sides, producing the characteristic bottlebrush shape; no tertiary branches (a). Secondary branches robust and wiry in tensile strength. Colonies up to 27 cm high, probably higher, basal branch Ø of 2.1 mm. Tissue and polyps white to light yellow or orange.  
**Polyps:** Closely spaced (~18/cm) but not touching, occurring individually on all sides of branches; initially perpendicular to branch but ultimately curve upward (b); cylindrical, expanding slightly toward apex (but not clavate), 1.3–1.7 mm long and 0.6–0.8 mm Ø (c).  
**Scales:** Each polyp covered by 8 alternating rows of body wall scales, 2 adaxial rows do not persist to base of polyp, overlapped by adjacent lateral row scales (b&c). Abaxial rows consist of 5–6 scales, broader toward base of polyp; no naked zone adaxially. Distal margin of 8 marginal scales prominently pointed (attenuate) and finely serrate to either side (d&e); other body wall scales have straight, rounded distal edges. All body wall scales coarsely granular; granules occasionally arranged in rows radiating from centre of scale. Operculars and marginals prominently keeled on inner surface, latter bearing up to 3 parallel keels. 8 opercular scales form a well-developed, canopied operculum.  
**Possibility for confusion:** See key to Thouarella.  
**Habitat:** Hard substrates.  
**Depth:** 25–1,500 m.  
**Abundance:** Locally very abundant.  
**Distribution:** SE Pacific (CPZ).  
**Chile:** 44°S–50°S.  
**Biology:** Eaten by sea anemone Dactylanthus antarcticus. Mobile invertebrates regularly cling to it. Dead parts generally overgrown.  
**Comments:** Of 13 known species in the nominate subgenus Thouarella, this species is most similar to T. variabilis Wright & Studer, 1889 (Heard I., Prince Edward I.) and T. versluysi Küchenthal, 1907 (S Africa), but differs in minor aspects of scale number and length of marginal spine.

**Thouarella (T.) sp. 2**

**Common name:** Limp bottlebrush gorgonian; Pluma de mar flávida, Hisopo flácido  
**Description:** Colonies consist of vertical main stem from which numerous short (3–5 cm long) secondary branches diverge from all sides (bottlebrush arrangement); no tertiary branches (a). Secondary branches weak and flaccid, adhering to main stem when removed from fluid. Colonies up to 53 cm high, with a basal branch of 2 mm Ø. Tissue and polyps white in life as well as preserved.  
**Polyps:** Closely placed (~16/cm), occurring individually on all sides of branch, usually curved upward. Clavate, 1.0–1.5 mm in length, and 0.7–0.8 mm in distal Ø (b).  
**Scales:** Each polyp covered by 8 alternating rows of body wall scales, although the 2 adaxial rows do not persist to base of polyp, being overlapped by adjacent lateral row scales. Abaxial rows consist of 5–6 crowded imbricating scales, which become broader toward base of polyp; no naked zone adaxially (c). Distal margin of the 8 marginal scales prominently pointed medially (d&e), submarginals less pointed and remaining scales with rounded distal edge. Body wall scales coarsely granular, occasionally also bearing ridges radiating from centre of scale. Operculars and marginals prominently keeled on inner surface. The 8 operculars form a well-developed operculum.  
**Possibility for confusion:** See key to Chilean Thouarella above.  
**Habitat:** Hard substrates.  
**Depth:** ~32 m.  
**Abundance:** Probably uncommon.  
**Distribution:** SE Pacific (NPZ).  
**Chile:** 41°S–42°S.  
**Biology:** Unknown.  
**Comments:** This species has similar affinities as Thouarella sp. 1. It was only collected once during diving.