Porites astreoides (Mustard Hill Coral)

Order: Scleractinia (Stony Corals)
Class: Anthozoa (Corals and Sea Anemones)
Phylum: Cnidaria (Corals, Sea Anemones and Jellyfish)

Fig. 1. Mustard hill coral, *Porites astreoides*.

[http://reefguide.org/pixhtml/mustardhill1.html, downloaded 1 April, 2015]

TRAITS. *Porites astreoides* is a yellow or yellow-green coral which has a bumpy appearance due to its closely packed corallites (the calcium carbonate structures which form around the animals, or polyps) (Rowland and Wood, 2007). At night the coral will tend to look as seen in Fig. 1 due to the extension of the six tentacle polyps to feed. In shallow water this species is encrusting on rocks, but at depth it has a solid rounded shape up to 60cm in diameter. In even deeper water or in caves or overhangs it has a plate-like form, angled to receive the maximum light (Wikipedia, 2015).

DISTRIBUTION. The mustard hill coral is an inhabitant of the Atlantic Ocean and Caribbean Sea (Rowland and Wood, 2007). More precisely it can be found in Bermuda, the Bahamas, Florida, the Mexican Gulf, the western Atlantic as well as the Caribbean. The coral is also native to Trinidad and Tobago according to the IUCN (Aronson et al., 2008).

HABITAT AND ACTIVITY. The coral is nocturnal (Rowland and Wood, 2007) and found in all reef areas in depths of up to 50m (De Kuijver et al., 2008). It is found mainly in shallow reef

areas, sea-grass beds and sub-tidal rocky areas of marine environments (Aronson et al., 2008) especially with temperatures of the range 70-85^{o}F according to Rowland and Wood (2007). The corals are recolonizers; inhabiting a previously disturbed and highly turbid area (Aronson et al., 2008); growing on rocks and calcareous materials (Rowland and Wood, 2007).

FOOD AND FEEDING. Mustard hill corals can be said to be both diurnal and nocturnal feeders. There is a symbiotic relationship between *P. astreoides* and the zooxanthellae (microscopic algae) which exist in the polyp tissues. The zooxanthellae convert sunlight into energy through photosynthesis and provide the mustard hill polyps with nutrients in return for the corals' protection, service as a substrate and access to light (Veron, 2000), despite inhabiting areas of sedimentation (Aronson et al., 2008). *P. astreoides* use its mesentery filaments and polyp tentacles to catch and digest prey at night; namely bacteria and zooplankton (Rowland and Wood, 2007). Through suspension feeding *P. astreoides* is able to capture its prey by using the stinging cells known as nematocysts (Rowland and Wood, 2007).

POPULATION ECOLOGY. Mustard hill corals exist in areas where there are few other large species (Aronson et al, 2008). Each individual coral is comprised of colonies. These colonies are the numerous physiologically connected individual polyps which secrete the calcareous 'skeleton' (Veron 2000). These secretions build up over time and though it originates as a flat structure (see Fig. 2) the temporal accumulation results in the round-coralline structure (Veron, 2000). Based on conditions such as the geographic location, as well as location on the reef, *P. astreoides* can grow between 3-5mm per year (Rowland and Wood, 2007).

REPRODUCTION. *P. astreoides* exist as both females and as a hermaphrodite; meaning they possess both male and female reproductive organs (Rowland and Wood, 2007). In the self-fertilization of the hermaphrodites as well as the cross-fertilization of female corals, the male sperm is released and drawn into the eggs which exist within the polyps (Rowland and Wood, 2007). Once the eggs are fertilized they then develop within the female polyp as larvae. The larvae spawned will set themselves relatively close to or on the colony it was parented from once it is released and from there it will develop in an area where it will thrive and reproduce as it parent has adding to the structure (Veron, 2000). There are advantages as well as disadvantages to both methods of reproduction. With cross-fertilization between the hermaphrodite and the female there will be diversity and variation in genetic composition of the offspring (Rowland and Wood, 2007). However, there is also a loss of this genetic material as currents and predation limit the number of female polyp sites being fertilized. With self-fertilization of the hermaphrodite the fertilization process is internal; however there is little genetic variation of the coral (Rowland and Wood, 2007). Reproduction of *P. astreoides* follows a lunar cycle; usually best during a full moon and occur mostly during the months of April to August. According to Rowland and Wood (2007), the optimum temperature and time occur at 24.5-27.5°C and at around 6-18 days surrounding the full moon, respectively.

BEHAVIOUR. For each polyp on the *P. astreoides* there are six tentacles which are extended at night, used for feeding as well as defense of the coral. The polyps contain stinging cells known as nematocysts which are used to reduce the action of predation by snails, parrotfish, and worms (Rowland and Wood, 2007).

APPLIED ECOLOGY. *P. astreoides* has been listed by the IUCN as a species of "least concern" (Aronson et al., 2008). The major threats to the mustard hill coral are algal blooms

which occur as a result of the high nutrient content in the water, as well as sedimentation and pollution (Wilkinson, 2004) due to poor land management by humans (Rowland and Wood, 2007), which block light access to the photosynthesizing zooxanthellae. High predation by the stoplight parrotfish is also a problem (Arronson et al., 2008). Stress due to global climate change also has an effect, increasing sea-levels and raising the temperature of the water above the level the coral can survive; usually 30^{o}C which results in coral bleaching as can be seen in Fig. 3 (Rowland and Wood, 2007). This also leads to increases in susceptibility of the coral to diseases such as the white plague (Fig. 4) which is identified by the exposed skeleton of the coral after the tissue has been lost (Castro, 2013). Over harvesting of fish also has a ripple effect on the coral as the removal of fish results in the thriving of seagrass and macro-algae which can 'smother' the coral by reducing light or competing for space (Wilkinson, 2004). Tourism is also a factor which can harm the coral; the harvesting of coral for jewelry or for aquariums as well as coral collectors on reef tours all have a diminishing effect on coral (Green and Shirley, 1999).

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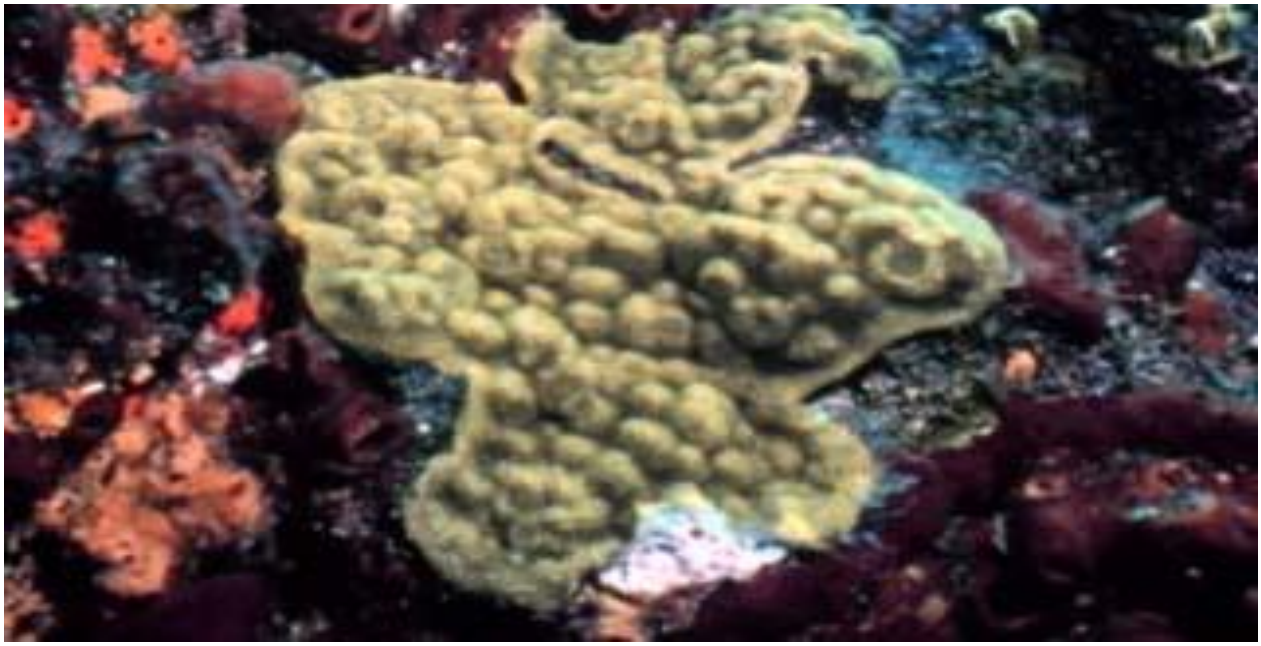

Fig. 2. The flattened shape of early development of *P. astreoides.*

[http://www.flmnh.ufl.edu/fish/Southflorida/coral/Profiles.html, downloaded 1 April, 2015]

Fig. 3. Coral bleaching of *P. astreoides* (with bristle worm).

[http://www.arkive.org/mustard-hill-coral/porites-astreoides/, downloaded 1 April, 2015]

Fig. 4. White plague on coral.

[http://www.livescience.com/40419-coral-white-plague-viruses.html, downloaded 1 April, 2015]