Colpophyllia natans (Boulder Brain Coral)

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

Fig. 1. Boulder brain coral, *Colpophyllia natans*.

[http://www.inaturalist.org/taxa/98317-Colpophyllia-natans, downloaded 5 March 2017]

TRAITS. The coral *Colpophyllia natans*, also called the boulder brain coral, can be easily distinguished by its enormous boulder-like colonies and skeletal surfaces which are roofed by meandering folding patterns resembling that found in the mammalian cerebrum. This intricate pattern has brown ridges separated by green, whitish or tan depressions called valleys (Fig. 1). Colonies may form into large hemispherical domes or rounded plates up to 2m in diameter. Valleys are long and wide up to 2cm across. Broad ridges are present which have a distinctive groove at the apex. Boulder brain corals, reef building corals, are usually eroded at the base resulting in overhangs (Kaplan, 1982).

DISTRIBUTION. *Colpophyllia natans* is an inhabitant of the Caribbean Sea and the Atlantic Ocean. More precisely these brain corals are present in the Gulf of Mexico, the Bahamas, Florida and the western central Atlantic as well as the Caribbean (Fig. 2). *Colpophyllia natans* is also

native to Trinidad and Tobago with large colonies being present in reefs such as the Buccoo Reef located in the Leeward Coast of southwestern Tobago (IUCN, 2017).

HABITAT AND ACTIVITY. The coral is nocturnal and found in fore reef and back reef environments ranging from 0.5-55m in depth, in which the fastest growing corals live closer to the surface (IUCN, 2017). Boulder brain corals favour water temperatures of 23-29^{0}C and are easily susceptible to water temperature below 18^{0}C. Clear water and a salinity of 32-38 parts per thousand are also required for these corals to grow at their best. *Colpophyllia* can be found in disturbed habitats but are vulnerable to coral diseases.

FOOD AND FEEDING. *Colpophyllia natans* is a zooxanthellate coral, containing symbiotic algae called zooxanthellae existing within its polyp tissues. The zooxanthellae convert sunlight into energy by photosynthesis and provide the boulder brain polyps with nutrients in exchange for a stable and safe environment to dwell. Although zooxanthellae corals are limited to shallow, clear, warm waters which are the site of photosynthesis, it enables them to grow quicker and develop huge reef structures, produced by resting on the brain coral's rigid skeleton (IUCN, 2017). *Colpophyllia natans* utilize its mesentery filaments to capture and digest prey during the night: specifically, zooplankton and bacteria. Through suspension feeding after expansion of the tentacles, *Colpophyllia natans* is able to catch and subdue prey using stinging cells identified as nematocysts.

POPULATION ECOLOGY. Boulder brain corals occur in areas where there are a few other large species. Each coral is made up of a colony of numerous individual polyps which secrete the calcareous "skeleton". These secretions accumulate over time from a flat structure into a large domed hemispherical structure (IUCN, 2017). Based on conditions including location on reef, as well as geographical location, *Colpophyllia natans* are slow growing corals, growing, at a rate of roughly 1cm a year. Remarkably, they can live for over 250 years.

REPRODUCTION. *Colpophyllia* can either reproduce asexually or sexually. The coral reproduces asexually by undergoing budding which causes polyps to split into two or more polyps. Sexual reproduction in boulder brain corals involve the release of millions of gametes from individual colonies that are hermaphrodite, that is each polyp produces both produce sperm and eggs, during broadcast spawning (Fig. 3). These gametes are produced within the mesenteries of temporary gonads for external fertilization occurring in the water. After fertilization, the eggs will develop into larvae, which will settle on the sea floor and form new polyps (Veron, 2000). Spawning in *Colpophyllia natans* generally occurs in August and September, shortly after sunset.

BEHAVIOUR. *Colpophyllia natans* polyps emerge at night (Fig. 4) and retract inside the hard-coral skeleton during the daytime. These polyps have nematocysts which are found on the tentacles that act as stinging cells to paralyze and capture prey. Once paralyzed, the prey is then transported to the mouth to be digested by the gastrovascular cavity. These corals can also dominate adjacent corals by forcing out filaments orally which digests the tissue of their competitors revealing its underlying skeleton. This technique assists the coral to effectively vie for space on the reef.

APPLIED ECOLOGY. *Colpophyllia natans* has been listed by the IUCN as a species of a Least Concern. This species, although widespread and common, is facing numerous threats, one of which is predation by the stoplight parrotfish and three-spot damselfish. Stress due to global climate change raising water temperatures above the level the coral can thrive (generally 30^{0}C) results

in coral bleaching (Fig. 5) in which corals eject their zooxanthellae, thereby leading to death. Coral bleaching also increases chances of vulnerability to diseases such as the white plague disease which can be recognized by exposed skeleton of the coral after loss of tissues. Other threats faced by these corals involves: tourism, detrimental fishing practices, pollution and invasive species as well as sedimentation which can lead to black band disease. The boulder brain coral is registered in Appendix II of CITES therefore the trade of this coral is controlled, and a license is required to carry objects made from the coral or the coral itself, into countries which have signed the CITES Convention. These corals have received protection within several Marine Protected Areas such as the Dry Tortuga Park. In the US harvesting of corals are illegal. Recommended measures for protecting these corals include: monitoring and further research, the increasing of protected areas, disease research, creating awareness and attempts to alleviate global climate alteration (Veron, 2000).

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Fig. 2. Boulder brain coral geographic distribution.

[http://maps.iucnredlist.org/map.html?id=132884, downloaded 5 March 2017]

Fig. 3. *Colpophyllia natans* spawning.

[http://www.arkive.org/boulder-brain-coral/colpophyllia-natans/image-G83564.html, downloaded 5 March 2017]

Fig. 4. A small boulder brain coral feeding at night with polyps extended.

[http://www.arkive.org/boulder-brain-coral/colpophyllia-natans/image-G83563.html, downloaded 5 March 2017]

Fig. 5. *Colpophyllia natans* showing bleaching.

[http://www.arkive.org/boulder-brain-coral/colpophyllia-natans/image-G84421.html, downloaded 5 March2017]