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Northern Star Coral (Astrangia poculata)

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Northern Star Coral (*Astrangia poculata*)

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The sleepy, stony coral located at the bottom of the Narragansett Bay.

U.S. National Science Foundation . (2021, May 20). Northern Star Coral Study Findings Could Help Protect Tropical Corals. https://new.nsf.gov/news/northern-star-coral-study-findings-could-help#image-caption-credit-block

Identification:
Northern star corals are large ovular clumps that contain about ten to fifteen tentacles per small circle (or unit). These tentacles are transparent while the main body itself ranges from a pale yellow to a pale pink color. These clumps are made up of corallites that range from 5 mm (0.2 in) to 10 mm (0.4 in) in diameter (Bowling 2012). This species of coral was given the name Northern Cup Coral due to the cupped shape of the stone structures, corallites. Within these cup-like structures, zooxanthellae (microorganisms) have a symbiotic relationship with the coral, as the coral provides shelter and the zooxanthellae provide nutrients (and color) (Roberson Lab n.d.).

Similar Species:
Orbicella annularis is a star coral that is present in the Caribbean Islands and has a similar, colonial structure to the Northern Star Coral (Roos 1971). The Boulder Star Coral, similarly named to the Northern Star Coral, can be commonly confused in photographs however they are not geographically located in the same regions therefore making them difficult to confuse in their own specific regions. In the Narragansett Bay, there are no other star coral species to confuse the

Northern Star (cup) Coral with. There is also no other coral located in the Narragansett Bay aquatic environment.

Classification:
Phylum: Cnidaria

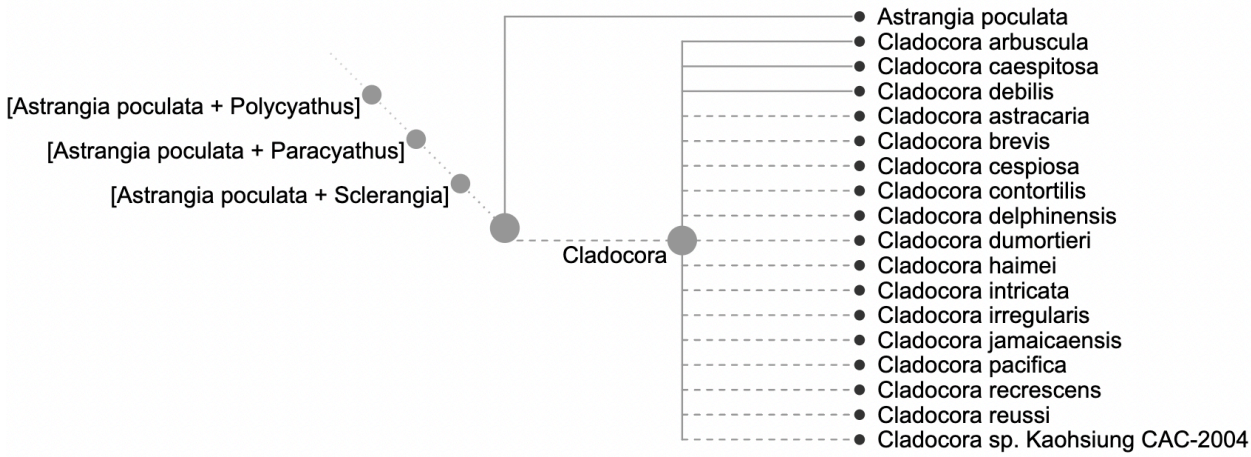
Class: Hexacorallia

Order: Scleractinia

Family: Rhizangiidae

Genus: Astrangia

Species: poculata



Open Tree of Life. (2023, Sep 18). Astrangia. https://tree.opentreeoflife.org/opentree/opentree14.9@mrcaott250725ott322058/Astrangia-poculata--Cladocora

Geographic Variation:
There are many different types of star coral mainly located in the Caribbean. The different types of star coral can be differentiated primarily based on their coloration, shapes, and corallite size. For example, the mountainous star coral is the largest of all the star corals as it grows to be 7.01 meters (23 feet) wide and 3.96 meters (13 feet) high (Helgason 2020). The Northern star coral naturally exists in New England and is referred to as a keystone species in these environments (Bent et al. 2021).

Fossil History:
The Astrangia Genus has fossils of several different species recovered primarily on the East and West Coasts of North America as well as along the West Coast of Europe and Africa. The oldest

Astrangia fossil recovered was labeled to be from the late Cretaceous period, 101-92 Ma (Sepkoski 2002).

Systematics Summary:
The Star Coral most likely originated in the oceans off the Caribbean islands (Cairns 2013). The Northern Star Coral is the only Star Coral suited to live in the colder, northern waters as they have better evolved to inhabit this environment. Therefore, there is little genetic variation among Astrangia as Astrangia poculata is located off the coast of New England while the other species of Astrangia are in the Caribbean.

Distribution:
The Northern Star Coral is one of the only Corals to thrive in Narragansett Bay. However, there have been issues regarding the coral population size in the bay leading to the introduction of "reef balls" (also known as artificial reefs) off the coast of Sabin Point Park. This was a $47,000 project effort by the Nature Conservatory (Doiron 2019).
Another type of common Star Coral is the Great Star Coral which is located in the waters off the Caribbean, however it contains bright pigmentation and colonies that are domed shaped (Helgason 2020). Within the species itself however, there is no geographic variation as the Northern Star Coral is primarily located on the coast of New England.

Habitat:
The Northern Star Coral thrives in colder waters. It is found mainly clumped together on solid surfaces such as rocks, piers and even crustacean shells (i.e., oysters). They are located in shallow waters attaching themselves to stationary objects (Roberson Lab n.d.). The reef balls have presented a new secure environment for the coral to attach.

Feeding Behavior:
In order to obtain their food, each polyp of the Northern Star Coral contains tentacles that are used to catch zooplankton and bring them to their "mouth" opening (referred to as the stomach in coral anatomy) (Patrick 2016).

Breeding Biology:
The Northern Star Coral reproduces both sexually and asexually. One sexual method utilized by the coral is spawning. This is when several small eggs and sperm are released into the nearby waters and allows for rapid development of the young close to the parent coral (Madin 2016).

Preservation Behavior:
Similar to the behaviors of squirrels, bears and other land mammals, the Northern Star Coral has been known to hibernate during the winter. When the coral detects colder temperatures it: reacts by retracting its tentacles, does not consume any zooplankton and no longer has a response to

stimuli. Studies show that these coral produce pathogen-associated and nutrient-loving microbes while simultaneously increasing microbes that contribute the nitrogen levels needed during their period of fasting (Kerlin 2023).

Behavior Summary:
Northern Star Coral are active primarily during the summer months and utilize their tentacles to capture their food (zooplankton). However, the Northern Star Coral is different than many other stony corals because it can withstand cold temperatures due to its ability to utilize hibernation. While the Northern Star Coral can reproduce both sexually and asexually, it primarily reproduces using spawning causing colonies to form in shallow waters.

Conservation and Management:
The Northern Star Coral is one of the only Corals to thrive in Narragansett Bay. However, there have been issues regarding the corals population size in the bay leading to the introduction of "reef balls" (also known as artificial reefs) off the coast of Sabin Point Park in a $47,000 project effort by the Nature Conservatory (Doiron 2019). Climate change is also affecting the prosperity of the Northern Star Coral due to coral bleaching. When temperatures increase, the coral will expel the colorful algae that they obtained a symbiotic relationship with which leads to population decline (Kuffner 2021). The management being taken against this issue is being led by scientists, particularly, coral expert Professor Koty Sharp of Roger Williams University. She believes by presenting this issue to local and potentially national governments, awareness of the dangers facing the coral will cause measures to be taken against their extinction (Kuffner 2021). Humans pose a threat to the Northern Star Coral via water pollution and overfishing (Nature Conservation of Rhode Island, 2015).

Priorities for Future Research:
The Northern Star Coral utilizes hibernation to survive during the winter when the water temperatures drop. By studying the habits of these coral and how they can deal with intense temperature fluctuation, scientists can potentially learn how corals in different habitats thrive in areas of high temperature fluctuation. By studying the habits of coral during hibernation, the microbes that are most important to coral success can be determined by watching what microbes from the microbial community are utilized compared to release during hibernation (Kerlin 2023).

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