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[International Cooperation][BioDiversity] Scientists Prove Soft Corals are Also Reef Builders, Bring into Question Conventional Understanding of Reef Corals

[International Cooperation][BioDiversity] Scientists Prove Soft Corals are Also Reef Builders, Bring into Question Conventional Understanding of Reef Corals (Chinese Version)

Academia Sinica Newsletter (2011/07/15) Stony corals, also known as hard corals, represent hundreds of species that deposit the calcium carbonate (mainly aragonite) that makes up the exoskeleton of coral reefs. Soft corals, on the other hand, are fleshy and soft, with tiny calcite sclerites embedded inside. In soft corals, sclerites are known to function as physical support, defense against predation, and may help the colony to withstand flow drag. As the sclerites do not form continuous structures, soft corals have long been considered not to be involved in coral reef architecture. A recent study by a group of Taiwanese and Israeli scientists, however, has shown that at least one group of soft corals can consolidate discrete sclerites into solid reef structures. This finding brings into question conventional understanding of reef corals.

The investigation was led by Dr. Ming-Shiou JENG of the Academia Sinica's Biodiversity Research Center, along with colleagues from National Museum of Natural Science in Taichung, National Taiwan University, and Tel Aviv University, Israel. It started in 1985, with a chunk of soft coral Sinularia found in Kenting National Park in southern Taiwan. This block of coral flesh had been dislodged by a storm and left on the beach. It was found to contain desiccated tissue with a solid boulder of consolidated sclerites underneath. Subsequent surveys at the site found more Sinularia sclerite rocks (spiculites) both on land and in the sea. Boulders of over 100 kilograms in weight and numerous rolling stones of spiculite were found across the beach. Sampling showed these rocks had high sclerite content; and it was estimated that the uplifted reef in the area was made up of approximately 30-40% spiculite. Section-radiographs of an 18.5 kilogram boulder showed regular density banding of the sclerite similar to trees and massive reef corals, which indicated that the sclerites had been deposited periodically over time.

In the water, more than 50% of the coral reef in the area was covered by soft corals (Alcyonacean corals). Living colonies were sampled to examine sclerite rocks. Approximately 90% of the colonies sampled from the Sinularia genus, which represented 22 species, contained a significant spiculite layer under the colony. Between the coral tissue and the solid sclerite rock was a thin transition zone of loosely cemented sclerites, indicating sclerite consolidation in process. Under scanning electron microscope, sclerites at the colony base were seen cemented by amorphous calcium carbonate, which covered the sclerites' surface microstructure. And under the transmission electron microscope, the colony base of the fast-growing Sinularia gibberosa, the area of sclerite consolidation, was seen to have granular vesicles distributed among the sclerites which may secrete calcium carbonate adhesives.

The phenomenon of spiculite has been recorded in coral reefs around the world from areas such as the Red Sea and Okinawa Islands. This study, however, revealed a continuous sclerite rock-forming zone in the Sinularia colonies from the subtidal zone to uplifted reefs of Nanwan Bay, southern Taiwan. Fleshy octocorals are able to inhabit more-turbid environments than scleractinian corals; species such as Sinularia are capable of accreting material into significant reef structures over geological time scales, allowing the development of reef structures in areas where stony coral communities cannot develop.

The full article entitled "Sclerite calcification and reef-building in the fleshy octocoral genus Sinularia (Octocorallia: Alcyonacea)" published in the journal Coral Reefs is available at:
http://www.springerlink.com/content/a1uw306q2r2260x8/fulltext.pdf

The complete list of authors is: Ming-Shiou JENG, H.-D. HUANG, C.-F. Dai,Y.-C. HSIAO, and Y. BENAYAHU

Media Contacts:
Dr. Ming-Shiou JENG, Biodiversity Research Center, Academia Sinica (Tel) +886-2-2789-9514
Ms. Mei-Hui LIN, Public Affairs Office, Central Office of Administration, Academia Sinica (Tel) +886-2-2789-8821, (Fax) +886-2-2782-1551, (M) 0921-845-234 mhlin313@gate.sinica.edu.tw
Ms. Pearl HUANG, Public Affairs Office, Central Office of Administration, Academia Sinica (Tel)886-2-2789-8820 (Fax)886-2-2782-1551 (M)0912-831-188 pearlhuang@gate.sinica.edu.tw

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