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02-2789-9621

Mesophotic Coral Ecosystems (MCEs) of Ludao: Potential Refuge for Future Taiwanese Coral Reefs



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Time: 2019. 12. 20 Fri. 14:30

Venue: Auditorium, 1st Floor,

Interdisciplinary Research Building

跨領域科技研究大樓1樓演講廳

Host: Dr. Chaolun Allen Chen 陳昭倫研究員

Doctoral Dissertation Defense Presentation



Abstract

Mesophotic Coral Ecosystems (MCEs) are extensions of shallow coral reef ecosystems, ranging from 30m in depth and extending to 150m. These ecosystems support an exceptional biodiversity into which hard corals (Family: Scleractinia) are among the dominant benthic communities. Considering their location, often farther away from the coastlines and deep below the sea surface, MCEs have been hypothesized to offer refuge against disturbances and serve as population sources to replenish shallow water populations. However, this role is still debated given the limited knowledge on these ecosystems. In Taiwan, there is very little information about the degree of overlap between shallow and mesophotic coral richness. In addition, whether or not mesophotic corals could constitute independent genetic lineages possibly specialized to low light environment has not been assessed around Taiwan and the ability for mesophotic populations to serve as source of propagules is virtually unknown. Therefore, the aim of this project is to fill knowledge gaps about MCEs from Taiwan using Ludao (Green Island) as a reference. Our investigations show that MCEs from Ludao display low-gradient slopes associated with substantial levels of sand and rubbles from 38 to 60m in depth, which are reported in the literature as supporting a limited scleractinian coral biodiversity. However, the presence of numerous small and large patches of hard substrates allow the development of diverse scleractinian community with at least 103 scleractinian species identified, including at least 12 new records for Taiwan (Chapter II).



Among all scleractinian species identified during our survey, *Pocillopora verrucosa*, was found to have a large bathymetric distribution and the use of molecular taxonomic tools on specimens collected from three locations at depths ranging from 7 to 45m excluded any specialization related to depth (Chapter III). Microsatellite analysis on the same specimens show little to no genetic differentiation with depth, absence of population structure and recent migration signals between depths and sites, indicating that *P. verrucosa* from Ludao constitute a panmictic population (Chapter 4). In conclusion, Ludao's MCEs support a rich faunistic and genetic diversity and act as a source of propagules. These ecosystems can contribute to the replenishment of shallow water populations suggesting that they could indeed act as refuge. This study emphasizes that MCEs from Ludao should receive more attention and protection, especially in the context of rapid decline of the shallow water coral reefs.