

琉球大学学術リポジトリ

サンゴ礁域におけるスナギンチャク類の普通種 *Palythoa tuberculosa* の生物学

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(様式第5-2号) 課程博士

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論文審査委員

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学位（博士）論文審査及び最終試験の終了報告書

学位（博士）の申請に対し、学位論文の審査及び最終試験を終了したので、下記のとおり報告します。

記

申請者	専攻名 海洋環境学 氏名 Sung-Yin YANG 学籍番号	
指導教員名	James Davis REIMER	
成績評価	学位論文 <input checked="" type="checkbox"/> 合格 <input type="checkbox"/> 不合格	最終試験 <input checked="" type="checkbox"/> 合格 <input type="checkbox"/> 不合格
論文題目	The biology of the common reef zoanthid species – <i>Palythoa tuberculosa</i> サンゴ礁域におけるスナギンチャク類の普通種 <i>Palythoa tuberculosa</i> の生物学	
審査要旨（2000字以内） In her thesis, the candidate investigated some basic biological aspects of the common reef zoanthid <i>Palythoa tuberculosa</i> (Cnidaria: Anthozoa: Hexacorallia: Sphenopidae). This species is widely distributed in the Indo-Pacific Ocean, and is found in a wide variety of habitats, as it is a 'generalist'. Previous research has shown this species is most common in the shallow intertidal reef crest and the outer reef slope. In some areas, this species is the dominant benthos on coral reefs. Due to its commonness and wide range, as well as ease of identification, this species has been relatively well investigated (for a zoanthid). Despite this, some basic aspects of its biology remain unexamined, and this study attempts to address these gaps in our knowledge in order to provide a more complete understanding of this species.		

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審査要旨

In the first section of her research, the candidate investigated the diversity of endosymbiotic *Symbiodinium* dinoflagellates in *P. tuberculosa* in Taiwan for the first time ever. Previous research had examined the diversity of these symbionts across the Indian Ocean to Singapore and Indonesia, and in Japan from Okinawa to the Izu Islands. From Taiwan, the candidate found two types of symbiont, a previously reported type, as well as a new novel type never seen before. This novel type was found only from 50% of specimens from the Penghu Islands. It is suggested that this unique type of *Symbiodinium* is due to the unique environment of Penghu, which has very low temperatures in winter (approx. 11°C) and a monsoon season. These results show that *P. tuberculosa* has flexibility and can harbor different symbiont types in different environments, perhaps due to horizontal transmission.

In the second portion of her research, the candidate investigated the relationship between *P. tuberculosa* abundance and water quality parameters on Okinawa. Recently, there have been unpublished suggestions and some scientific evidence that *Palythoa* spp. can undergo outbreaks, resulting in a stable phase shift. This is the first study of its kind in the Indo-Pacific. In this study, 6 locations on the west coast of Okinawa from the heavily anthropogenically impacted south to the relatively pristine north were investigated. Various water quality parameters and benthic composition data were acquired and analysed. Results showed that *P. tuberculosa* abundance could be related with the presence of coralline algae, some hard coral taxa, and was positively correlated only with lower than normal salinity levels. These results show that *P. tuberculosa* has its own unique environmental parameter niche, and that the species may be more common in areas with fresh water input (and subsequent levels of nitrification). These data will help researchers understand the ecological role of *P. tuberculosa* in the future.

This thesis represents the first effort to understand *P. tuberculosa* from an ecological point of view. Thus, from a scientific standpoint, the candidate's work is important for coral reef biology. The discovery of a unique and novel symbiont type adds to the known knowledge of *Symbiodinium* diversity, and demonstrates the uniqueness of Penghu Islands. Thus, further research into symbiont diversity in Penghu is needed. Her ecological data on *P. tuberculosa* in Okinawa represents a critical first step towards a more complete understanding of coral reef ecosystems and nature of outbreaks of various benthic taxa. Thus, based on the above reasons, the downstream results of this research will be applied in the future research of not only *P. tuberculosa* but also other understudied benthos worldwide.

The candidate's publication history related to this thesis more than meets graduation requirements, with 1 first author paper and 2 more papers as co-author, all in respected international journals. The candidate gave a final thesis presentation (=final examination) on February 13, 2014, in the Science Collaborative Building Room 102, from 13:00 to 14:00 in front of all three members of the Committee. This presentation was open to the public, and attended by many people from both inside and outside the university. In her presentation she discussed symbiont identification in *P. tuberculosa* in Taiwan, and then the relationship between environmental parameters and *P. tuberculosa* distribution in Okinawa. Overall, the candidate talked for 40 minutes, and then appropriately answered numerous questions related to her thesis and research field for 20 minutes. The Committee then met on February 13, 2014, at 15:45, and discussed and judged the candidate's presentation, as well as answers to questions, as demonstrating her hard work, results, and knowledge. Thus, based on the above results, for these reasons, the Committee unanimously recommended "Pass" for the candidate.