クマノミ類との相互作用によって創出される宿主イソギンチャク共生系

（様式第５－２号）課程博士

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琉球大学大学院
理工学研究科長　殿

論文審査委員
主査　氏　名　James Davis REIMER　印
副査　氏　名　立原 一憲　印
副査　氏　名　池田　譲　印

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　林　希奈 [redacted]	
指導教員名	James Davis REIMER	
成績評価	学位論文　合格　不合格	最終試験　合格　不合格
論文題目	The symbiotic system created by interactions among host sea anemones, anemonefish, and other fish (クマノミ類との相互作用によって創出される宿主イソギンチャク共生系)	

審査要旨（２０００字以内）

Coral reefs are known for their high levels of symbioses, in which different species are tied closely behaviorally or physiologically. One example is the symbiotic relationship between anemonefish Pomacentridae and host sea anemones of families Actiniidae and Stichodactylidae. Host anemones used by anemonefish vary, and anemonefish community structures are determined by species composition of host anemones. Host anemones are shelters for not only anemonefish but also for other fish species. The candidate aimed to better understand a) symbiotic relationships between anemonefish and host anemones in the Ryukyu Archipelago, and b) coexistence mechanisms between anemonefish and other fish species that utilize host anemones.

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審査要旨

In the first section, the candidate examined the symbiotic relationships between host anemones and anemonefish. Her results showed that most relationships were due to niche differentiation, by species or location within coral reefs. Her results also newly suggest that taxa previously thought to be ancestral may not be so. In addition, her results showed one case of co-habitation of two species of anemonefish on one species of anemone. Finally, differences in species of anemones present seem to indicate that the loss of natural coastline around Okinawa Island may be one factor in differences with communities in the Yaeyama Islands. The candidate's results were somewhat different than had been reported from other biogeographic provinces, and show links to anthropogenic impacts, demonstrating the importance of performing such work in Okinawa, and the need for such work as anthropogenic impacts on coral reef ecosystems continue to rise.

In the second section, the candidate examined what other species of fish asides from anemonefish utilize host anemones, and how they are affected by the presence or absence of anemonefish species. Differences in aggressiveness of anemonefish species and between females, males, and immature fish were clearly demonstrated. Her results also showed 15 species of fish aside from anemonefish use host anemones, and that the presence or absence, and relative aggressiveness of anemonefish fish species decides what other species of fish may be present on host anemones. Finally, behavior of anemonefish was shown to clearly be impacted by the presence of scuba-diving human tourists. Thus, the candidate greatly advanced our total understanding of the fish communities harbored by host anemones, and of their ecology.

These results are significant and of academic importance as our understanding of anemonefish and host anemones and the mechanisms of generation and maintenance of biodiversity on coral reefs. The candidate greatly advanced the understanding of this research in Japan, and her work will be important for future conservation considerations of coral reefs. The candidate's work can therefore be judged as being of a high academic level.

The candidate's publication history related to this thesis exceeds thesis requirements for shortened completion, with six first author papers, all in peer-reviewed international journals. The candidate gave a final thesis presentation (=final examination) on February 9, 2021, online via Zoom software, from 11:10 a.m. to 12:10 p.m. 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 her major findings and conclusions. 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 12, 2021, at 10:30 a.m., and discussed and judged the candidate's thesis, and her final presentation and 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.