

# 琉球大学学術リポジトリ

## Phylogenetic study of orders Zoantharia and Actiniaria (Cnidaria: Anthozoa: Hexacorallia)

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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

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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	Phylogenetic study of orders Zoantharia and Actiniaria (Cnidaria: Anthozoa: Hexacorallia) (六放サンゴ亜綱の系統分類学的研究—スナギンチャク目の単系統性の検証—)	
審査要旨（2000字以内）	The candidate investigated the diversity of two orders within Anthozoa, Zoantharia and Actiniaria, and additionally the phylogenetic relationship between the two groups. Although both of these groups have been shown as ancestral within Anthozoa and as closely related, no research until now has focused on their relationship. While Zoantharia have been well investigated phylogenetically, overall research on this group is lacking, and it is likely much undiscovered remains. On the other hand, Actiniaria has been well investigated historically, but phylogenetic investigations on this group are only just beginning. As well, two of the three suborders in this order have never been examined phylogenetically.	

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## 審査要旨

The candidate pursued research along two main lines. The first line of research was to locate and describe previously undescribed taxonomic groups within Zoantharia, and characterize them phylogenetically. To this end, two new colonial families of zoanths highly divergent from all previously known groups were described, Microzoanthidae and Nanozoanthidae. Microzoanthidae currently consists of 2 species, and is found across the Indo-Pacific. This group is not rare, but occurs on the undersides of coral rubble and in cracks, and has escaped notice until now likely due to its cryptic habitat, small size (oral disk diameter <2 mm) and lack of bright coloration. Nanozoanthidae currently consists of 1 species from Okinawa (and potentially Australia) and is even smaller (oral disk diameter approx. 1 mm), and is found in “pools” of sand on shallow coral reefs. Both new groups were phylogenetically different (COI, 16S sequence data) from zoanths at the order of level, and similarly distant to Actiniaria.

The second line of research was to investigate the phylogeny of an unexamined suborder of Actiniaria, the Endocoelantheae. Not unexpectedly, the group was divergent from known anemones in suborder Nyantheae, but also surprisingly formed a weakly supported monophyly with zoanths (COI sequences). Furthermore, results indicate examined Endocoelantheae specimens include 1 to 2 undescribed species

Overall, these results show that the two orders Zoantharia and Actiniaria are much closer than previously thought, and higher scale taxonomic revision may be needed. Before any questions on which of these groups is most ancestral within Anthozoa, their relationship and diversity must be clarified. In particular, it is imperative to examine the remaining unexamined suborder in Actiniaria, the suborder Protantheae.

Throughout his study, the candidate has demonstrated a high level of academic achievement, with four publications (including 2 first author papers describing each new family) in high-level international journals, and has been nominated for and won awards. His work has also received attention from local, domestic and international media.

From a scientific standpoint, his work is very significant in anthozoan biology. The discovery of 2 very divergent new families in between all known zoanths and anemones forces researchers to reconsider the definition and relationship of these groups, and of the ancestral position and character of the class Anthozoa. Furthermore, identification and description of these two widely distributed and divergent groups demonstrates how little is known of marine biodiversity for many groups of organisms. Such results show how important it is to search for biodiversity in previously under-examined environments and locations. Finally, alpha taxonomy research is a critical first step towards a more complete understanding of coral reef ecosystems, allowing for more effective and accurate management and conservation. Thus, based on the above reasons, the downstream results of this research will be seen in various fields from basic zoology and biogeography to genomic and developmental studies, and to conservation-related themes.

The candidate's publication history related to this thesis more than meets graduation requirements, with 2 first author papers 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 14:00 to 15:00 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 his presentation he discussed his major results, and the implications for future anthozoan research. Overall, the candidate talked for 40 minutes, and then appropriately answered numerous questions related to his thesis and research field for 20 minutes. The Committee then met on February 13, 2014, at 16:45, and discussed and judged the candidate's presentation, as well as answers to questions, as demonstrating his hard work, results, and knowledge. Thus, based on the above results, for these reasons, the Committee unanimously recommended “Pass” for the candidate.