

琉球大学学術リポジトリ

北西太平洋産ウミエラ類の系統・分類・多様性・生態・進化に関する研究

メタデータ	言語: 出版者: 琉球大学 公開日: 2021-04-15 キーワード (Ja): キーワード (En): 作成者: Kushida, Yuka, 櫛田, 優花 メールアドレス: 所属:
URL	http://hdl.handle.net/20.500.12000/48175

令和 3年 2月 9日

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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 榎田 優花
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	Sea pens of the north-western Pacific: phylogeny, taxonomy, diversity, ecology and evolution (北西太平洋産ウミエラ類の系統・分類・多様性・生態・進化に関する研究)
審査要旨（2000字以内） The order Pennatulacea (Cnidaria: Octocorallia) is distributed worldwide, primarily on sandy and soft seafloors, and the species in this order are commonly known as sea pens. Sea pens are known as ecosystem engineers, changing the currents on the seafloor and providing habitat for numerous species, and are thus very important components of the benthos. However, compared to many other benthic cnidarians, this group has received little research attention, particularly in shallow waters. In her thesis the candidate aimed to fill knowledge gaps on the phylogeny, taxonomy, diversity, ecology, and evolution of sea pens, with a focus on examining specimens from the northwestern Pacific and Japanese waters.	

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審査要旨

In the first section, the candidate explored the phylogeny, diversity, and taxonomy of sea pens, with a concatenated dataset that represents the most comprehensive phylogenetic analyses to date, and includes specimens from shallow coral reefs around Japan. Her results suggested that the Pennatulacea can be divided into four clades, as previously hypothesized, with approximately half of all families examined appear to not be monophyletic, demonstrating a need for widespread taxonomic reconsideration. Her results also newly suggest that taxa previously thought to be ancestral may not be so. In addition, her specimen collection resulted in the discovery of previously unknown species, and greatly increases the number of species known from the Ryukyu Archipelago, demonstrating the importance of shallow water coral reef research to better understand sea pen diversity.

In the second section, the candidate examined the ecology and behavior of some sea pen species, reporting on a sea pen field from the Amakusa Islands, and mole-like movement within sand for another species. Both of these reports represent findings new to science. The candidate showed that our understanding of sea pen ecology and behavior remains nascent, and again further research is needed.

Finally, in the third section, the candidate examined the evolution of sclerites, calcified structures used by octocorals for structural support and defense. Specifically, she examined the presence and absence of different types of sclerites on a phylogenetic tree combined with analyses of the depth of specimens. Her results showed that one type of sclerite, the three-flanged sclerite, appears to be an adaptation to the deep-sea, while another type of sclerite, plate sclerites, appear primarily in shallow waters. As well, among the four clades within Pennatulacea, different clades appear to have bias towards certain depth habitats. These large analyses are the first to be conducted in this manner, and will provide a path forward for a better understanding of the structure and form of sea pens and how they evolve and adapt in different environments.

These results are significant and of academic importance as our understanding of sea pen biodiversity and evolution, as such studies have not been performed to date, or only performed on very few taxa. As soft bottom seafloors are among the largest ecosystems on earth, the importance of the candidate's research is clear. 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, with four 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 14:20 to 15:20 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 9, 2021, at 17:00, 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.