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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

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論 文 要 旨

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)

The order Pennatulacea (sea pens) is a specialized taxon within subclass Octocorallia (Cnidaria: Anthozoa) consisting of species that spend their sessile lives in soft sediments on the seafloor. Despite importance in such environments and a long history of human interest, basic studies of sea pens are still lacking. This thesis contributes to the fundamental knowledge of sea pens' phylogeny, taxonomy, diversity, ecology and evolution. Until this study, phylogenetic knowledge of shallow water taxa within Pennatulacea was sparse. From my molecular phylogenetic analyses, the phylogeny, taxonomy, and diversity of sea pens were investigated, and at least seven of 14 sea pen families were shown to be polyphyletic, with similar colony forms as a result of convergent evolution. In addition, surveys during my thesis almost doubled the number of sea pen species known from the Ryukyu Islands, as well as resulting in the discovery of undescribed species. These results suggest a high level of unknown biodiversity of sea pens in the western Pacific Ocean. From my examinations of the biology and ecology of sea pens, I reported unexpected aspects of sea pens; two novel sea pen behaviors, namely "mole-like burrowing" and "bending of the colony when re-emerging from the sand", and as well a sea pen field were reported on. In sea pen fields, sea pens have important roles as ecosystem engineers. At the site I examined in the Amakusa Islands, geographic features were likely important factors to create suitable sedimentation for sea pens. Finally, from my research on adaptation and evolution of sea pens, divergences of sea pens and their sclerites were suggested to depend on habitat depths. Sea pen sclerite forms seems to be flexible in adapting to the surrounding environment, and different forms of sclerites may help create their unique morphological and ecological characters. As soft bottom ecosystems are threaten by human disturbances and have not been thoroughly studied, further research on under-studied taxa in under-studied environments such as sea pens from shallow waters are needed in order to better recognize and understand marine biodiversity.

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