分子系統学的手法を用いた,琉球列島のサンゴ礁における八放サンゴ類の潜在的多様性に関する研究

（様式第３号）

論　文　要　旨

論　文　題　目

Phylogenetic studies of cryptic octocoral diversity from coral reefs of the Ryukyu Archipelago

This study focused on cryptic diversity of octocorals in coral reef environments in the Ryukyu Archipelago, and the appropriate application of various analyses for biodiversity research.

In Chapter 1, the major problems that have historically hindered octocoral taxonomy were reviewed. The history of octocoral taxonomy started even before the age of Linnaeus, and today, the number of described species of octocorals has reached approximately 3400. However, five major obstacles had hindered, or are continuously hindering octocoral taxonomy; insufficient information from type specimens, morphological plasticity, simple morphology, discrepancy between morphology and phylogeny, and inadequate nucleic variation in molecular marker regions. Although recent popularization of molecular phylogenetic approaches have revealed many relationships at all levels of taxa and resulted in the description of previously unrecognized taxa, the absolute lack of molecular markers with enough resolution, and inadequate numbers of morphological characters shared in clades, still hinders taxonomic revision.

In Chapter 2, the relationship between morphological characters and molecular phylogeny of three forms of *Briareum* from the Ryukyu Archipelago were discussed. Five molecular markers (mitochondrial COI, mtMutS and nuclear 18S, ITS2 and ITS1-5.8s-ITS2-28S) failed to discriminate two morphologically distinct forms (type-1 and 2) of *Briareum*; while type-3 *Briareum*, morphologically slightly different with type-1, showed slight nucleic variation in ITS1-5.8s-ITS2-28S region. From these results, type-3 was concluded to be a closely related species while relationship of type-1and 2 remained ambiguous.

In Chapter 3, the taxonomy of a previously unknown octocoral with rigid aragonite skeleton, found from Zamami Island, Okinawa, Japan, was discussed from morphological and molecular phylogenetic aspects. Observation by scanning electro-microscope (SEM) and by micro CT revealed the skeleton was not composed of fused sclerites. X-ray diffraction analyses revealed the skeleton was made of aragonite calcium-carbonate, suggesting that the unknown species belongs to Helioporacea. Three molecular markers: mitochondrial COI, mtMutS, and nuclear ITS1-5.8s-ITS2-28S, strongly supported a close relationship of the species with blue coral *Heliopora*. Although this species is somewhat similar to the previously recorded genus *Epiphaxum,* which has rigid aragonite skeleton, from morphological differences such as the lack of sclerites, etc., a genus was erected within order Helioporacea family Lithotelestidae and described as *Nanipora kamurai*.

In Chapter 4, problems in applying molecular phylogenetic approaches to taxonomically poorly studied groups were discussed. Also, the importance of evaluation of octocoral phylogeny from various angles is discussed. Using nucleic substitution rates of taxonomically poorly studied groups of organisms as species (genus, family) boundary thresholds contains a circular argument. To avoid this, accumulation of taxonomic insights and some corroboration by different approaches, including ecological, biogeographical and evolutional studies, are necessary. In this study, the presence of unknown cryptic diversity of octocorals and importance of evaluating diversity by both morphological and molecular phylogenetic aspects, were indicated.

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