

琉球大学学術リポジトリ

無腸目コンボルータ科ワミノア属とその近縁群および共生藻(Symbiodiniaceae)における生態学的・分子系統学的研究

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論 文 要 旨

論文題目 Ecological and phylogenetic studies on genus *Waminoa* and related acoel flatworms (family Convolutidae) and their symbiotic Symbiodiniaceae

It is known that the genus *Waminoa* (order Acoela, Family Convolutidae) associates with anthozoans (Scleractinia, Octocorallia, and Zoantharia) and feeds on the mucus of their hosts, and occasionally it has been found that hosts may have their whole surface covered by these flatworms. Thus, *Waminoa* species are epizoic and are thought to have negative effects on their hosts.

In chapter 2, we conducted field surveys focused on distribution and occurrence of *Waminoa* on coral reefs around Okinawa Main Island. *Waminoa* individuals were significantly more abundant close to the sandy bottom at the lower end of reef slopes and were always absent in the shallowest 5 m of every site. In Okinawa, the distribution of *Waminoa* on coral reefs is not random, but has patterns specific to certain anthozoan host species, with the highest occurrences within 10 m in depth from the sandy bottom areas of reefs.

In chapter 3, we conducted phylogenetic and morphological analyses on *Waminoa* specimens collected from Japan, Palau, and Indonesia. At least 18 morphotypes of *Waminoa* were found on at least 20 anthozoan species. Two main body shapes were observed, and each formed a subclade in 18S rDNA and mitochondrial cytochrome c oxidase subunit 1 (COI) phylogenetic trees. We estimated the number of species using Automatic Barcode Gap Discovery (ABGD) analyses on COI sequences, and there were at least five operational taxonomic units (OTUs) in the collected specimens. Two large subclades in five OTUs contain numerous morphotypes and were associated with a variety of hosts. Finally, based on genetic distances, the molar-like shaped specimens may be considered as a genus-group separate from *Waminoa*; future studies including histology and additional molecular data are needed to clarify this.

In chapter 4, we investigated the endosymbionts of *Waminoa*. *Waminoa* are known to contain two endosymbiotic photosynthetic dinoflagellate genera, *Symbiodinium* and *Amphidinium*. Moreover, these dinoflagellates have been observed in the oocytes of *Waminoa*, suggesting *Symbiodinium* and *Amphidinium* are inherited via vertical transmission. It is known from phylogenetic analyses of sequences of the internal transcribed spacer 2 of ribosomal DNA (ITS-2) that photosymbiotic *Symbiodinium* isolated from *Waminoa* are different from the *Symbiodinium* of their anthozoan hosts. In order to re-examine the diversity of *Symbiodinium* of *Waminoa*, a high resolution DNA marker, the hyper-variable non-coding region of the plastid minicircle (*psbA^{ncr}*), was used for phylogenetic analyses. These results confirmed *Symbiodinium* from *Waminoa* collected from various depths formed a unique group within *Symbiodinium* clade C. Therefore, it is suggested that *Symbiodinium* of *Waminoa* may be a generalist that is able to survive under different environmental conditions.

From these results of these studies, it has been revealed that the occurrence of *Waminoa* varies by different depths, locations, and hosts. Moreover, although *Waminoa* are found from different environments, their *Symbiodinium* are likely the same unique type. From the phylogenetic study of phylogenetics of *Waminoa*, it appears that the genus may contain many at least five species, and could be split into two genera. Future work needs to consider the variation of *Waminoa* and their surrounding environments.