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論　文　要　旨

Study on gamete recognition and reproductive strategy of the coral *Acropora*

The broadcast spawning corals *Acropora* spp are sympatric and most of them release gametes synchronously. After the spawning, gametes from conspecific and heterospecifics are mixed in the seawater, but their reproductive barriers are maintained. Based on the experimental fertilization trials in vitro, eggs of many species prefer conspecific sperm for fertilization. On the other hand, 1/3 of sympatric and synchronous spawning species have gametes that are compatible with the heterospecific gametes; their eggs accept heterospecific sperm for their fertilization. In addition, there are many species with an intermediate morphology of different species and presumed hybrids in nature are reported. These reports support hybridization through speciation of the *Acropora* called "reticulate evolution". However, ongoing hybridization in nature is predicted not to cause benefit because of its low fecundity and difficulty to mate with the other hybrids. In other words, new species need reproductive isolation from the mother and father species, and thus the other profit of gamete compatibility that could cause hybridization should be considered. In this study, I investigated the following topics using the intercrossing species *Acropora florida*, *A. intermedia*, *A. tenuis* and *A. donei* ; 1) Can hybridization occurs in nature? 2) Does hybridization have any meaning in their reproduction? To examine sperm preference at fertilization between intercrossing species (*A. florida* x *A. intermedia* or *A. tenuis* x *A. donei*), sperm choice experiment using gametes were carried out. Results showed that eggs preferred to choose conspecific sperm at optimal sperm concentration for their fertilization (10^6 sperm/ml). In the case of *A. florida* eggs at lower sperm concentration, their eggs accepted heterospecific sperm for fertilization; hybridization increases at sever fertilization condition. In turn, hybridization between *A. florida* eggs and *A. intermedia* sperm could occur in nature at lower sperm concentration. Spawning of the hybrid (HyB; *A. florida* eggs × *A. intermedia* sperm) is reported, HyB hybrid is predicted to reproduce F2 generation sexually. In contrast, the hybrid (HyA; *A. intermedia* eggs ×*A. florida* sperm) did not release large number of gametes. To examine the reproductive mode of the hybrids, I examined the fertilization preference of their gametes. As a result, most eggs of the hybrid HyB hybrid showed self-fertilization but those of HyA hybrid did not. HyA hybrid eggs fertilized with sperm of mother species. Therefore, eggs of HyB hybrid reproduce asexually but those of HyA hybrid sexually. Both HyB hybrid and HyA hybrid sperm can fertilize eggs of the mother species even in the presence of sperm from mother species. Collectively, the sperm of hybrids can accomplish backcrossing in nature. In the case of *A. tenuis* and *A. donei*, their gametes did not hybridize in the presence of conspecific sperm. Moreover, sperm concentration of *A. tenuis* in situ after the spawning was lower than the optimal concentration. The sperm concentration-dependent hybridization manner seems not equipped in *A. tenuis* and *A. donei* because of its low sperm concentration in nature. Collectively, hybridization occurs in specific species group and it could be a strategy to send their genes via not mono-species dependent but bi-species dependent manner.

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