

Japan Fisheries Research and Education Agency (FRA)  
University of Miyazaki

### First-time detection of dense larval cloud of crown-of-thorns sea star

Using DNA-based identification technology, we discovered a highly dense population of crown-of-thorns sea star larvae. This will help in elucidating the mechanism causing outbreaks of crown-of-thorns sea stars.

Outbreaks of crown-of-thorns sea stars, which prey on corals, have recently become a major cause in the decline of coral reefs in Okinawa and worldwide. Recent studies have shown that outbreaks of crown-of-thorns sea stars are caused by the increase in larval food, phytoplankton, which is in turn caused by terrestrial nutrient runoff. The larval ecology of crown-of-thorns sea star, however, has not been elaborated, and their distribution and population density in coral reefs are not known.

The Japan Fisheries Research and Education Agency (formed by the merger of the Japan Fisheries Research Agency and National Fisheries University) and University of Miyazaki, in joint research with Tokyo Institute of Technology, have conducted an intensive wide-area sampling over the entire Sekisei Lagoon, Japan's largest coral reef area located between Ishigaki and Iriomote islands in Okinawa Prefecture. We used DNA-based technology to identify crown-of-thorns sea star larvae from collected phytoplankton samples, enabling the quantitative detection of larvae. This led to the detection that crown-of-thorns sea star larvae exist in highly dense populations in the largest channel of Sekisei Lagoon, Yonara Channel (53.3 larvae/m<sup>3</sup>). This dense larval cloud was consisted of 94% larvae in the pre-juvenile stage (brachiolaria), suggesting that they settle intensively on relatively narrow area, and could potentially trigger an adult outbreak. This finding is considered an important first step in elucidating the mechanism causing outbreaks of crown-of-thorns sea stars.

These results were obtained through the Environment Research and Technology Development Fund Research Project on "Contribution to the Ecosystem Restoration of Sekisei Lagoon based on Elucidation of the Integrated Islands-Reefs-Ocean Network System" (FY2013-2015 Project Code 4-1304) and were published in the international journal *Diversity*, volume 8(2) (Online version released on March 31, 2016).

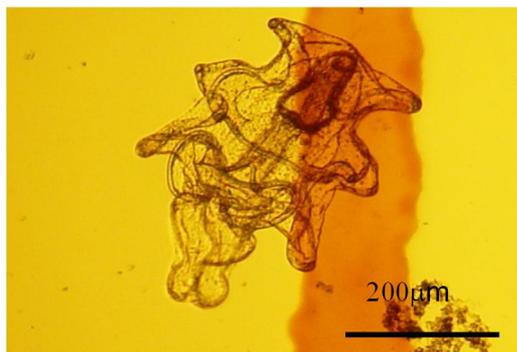


Photo 2. Crown-of-thorns sea star brachiolaria larva