

Reproduction of deep-sea *Calyptogena* bivalves

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Successful fertilization is a critical factor in the life-history of free-spawning aquatic animals. Our knowledge of the reproductive biology and ecology of most deep-sea animals is very limited due to the logistic difficulties of deep-sea investigations. In this study, spawning by males and females of the vesicomid bivalves *Calyptogena soyoe* and *C. okutanii* complex were observed in situ over 1 year using the long-term deep-sea observatory located at cold seeps in Sagami Bay, Japan. Egg and sperm spawning events by clam aggregations occurred roughly 90 and 213 times per 1 m² for 1 year, respectively, and the local population of *C. soyoe* and *C. okutanii* complex yielded 5.8×10^8 eggs per 1 m² y⁻¹ into the water column over the seep location studied. Males displayed a -sprinkle siphon-, behavior, waving their siphons left and right to sprinkle sperm in the water. Female spawning by egg release into the water column was always preceded by male spawning and decreasing near-bottom current speeds. Two hypotheses are proposed for cues to stimulate egg release by *C. soyoe/okutanii* females. First, a -double trigger- hypothesis requires the presence of sperm in the water column and decreasing current speed before eggs are released. Second, a -single trigger- hypothesis requires that egg release is induced when compounds in or released with sperm exceed a threshold concentration. These results demonstrate the utility of long term observatories for studies of deep-sea reproductive biology, particularly for species characterized by rare, episodic spawning events.