

Bathymetric and latitudinal variations in the predation pressure in comatulid crinoids and identification of their possible predators

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Predator-prey interaction is one of the most important biotic interactions and is widely recognized as a major cause of ecologically and evolutionary change. For example, crinoids were abundant in shallow water throughout the Paleozoic and Mesozoic, but they started moving to deeper water possibly due to increased predation pressure during the Mesozoic Marine Revolution. Previous studies about estimating predation pressure onto crinoids, based on the number of regenerated arms as a result of non-lethal predations, have focused on bathyal stalked crinoids from limited geographic range. In this study, by using arm regeneration frequency in comatulid (unstaked) crinoids, intensity of predation pressure in various environments from wide geographic range and upper slope to neritic zones, was quantitatively examined. Frequency of regenerated arms of three species and subspecies of antedonid comatulids, *Heliometra glacialis glacialis*, *H. glacialis maxima* and *Florometra serratissima*, which are distribute in the North Atlantic, North West Pacific and North East Pacific respectively, were examined. All of the three species and subspecies displayed much higher predation pressure roughly above the continental shelf than in slope environment, and lower pressure in high than low latitudinal seas. In order to clarify which of the co-occurred benthic animals are principal predators of these comatulid crinoids, database of invertebrates collected from the same locations with *H. glacialis glacialis* was examined, based on the Invertebrate database of the Smithsonian Natural History Museum. As a result, it was suggested that sea stars and sea urchins most commonly occur with this comatulid, and thus are concluded as possible major predators in the North Atlantic. Decapod crustaceans are thought to prey on crinoids, but absence of decapods from the same stations with the comatulids, explains the low predation incidences in high latitude and predatory echinoderms should be more important in predation there. An intercontinental comparison of predation pressure between the Pacific and the Atlantic, based on the regeneration frequencies of *H. glacialis glacialis* (Atlantic) and the average of frequencies of *F. serratissima* and *H. glacialis maxima* (Pacific) shows that there is higher predation pressure in the Pacific than in the Atlantic.

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