

Simultaneous observations of both hard and soft tissues of *Oulastrea crispata* (Cnidaria: Scleractinia)

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Oulastrea crispata is a zooxanthellate colonial Scleractinia with a black skeleton. This coral inhabits areas of very shallow water where mud accumulates, and occupies the northernmost range of Japanese zooxanthellate corals. In this study, the hard and soft tissues of *O. crispata* were observed simultaneously by transmitted-light binocular microscope, fluorescence microscope, and scanning electron microscope by using the resin penetration technique (Tajiri and Fujita 2013) and the dehydration method (Tajiri and Ezaki 2018). Symbiotic algae are considered to play a key role in the life of *O. crispata*; however, the spatial distribution of such algae within the coral remains unknown. The present observations indicate that algal density is extremely high in the outer layers of polyps, and algae are densely distributed adjacent to the radial septa that partition the inner parts of polyps. The algal density is lower in deeper parts of polyps, and algae are scarce in the deepest part (up to 1 cm in depth), suggesting that little sunlight, if any, is available for photosynthesis. The hard skeletons of *O. crispata* are locally bored by euendoliths, which include microorganisms such as cyanobacteria, Chlorophyta, Rhodophyta, and fungi. These organisms erode not only the postmortem skeletal remains but also the living skeletons (e.g. Le Campion-Alsumard et al. 1995; Tribollet 2007). In living *Oulastrea*, skeletons located near the underlying hard substrate are intensively bored by euendoliths, mainly cyanobacteria and Chlorophyta. Endolithic filaments invade the soft parts of the coral, and the density of endolithic traces is lower near the upper part of skeletons and rare in upper peripheral areas. In contrast, both the lower and upper parts of dead skeletons are affected by intense endolithic activity. *O. crispata* manages to survive the prolonged biotic attack, especially the effects on its lower parts near the substrate that are subjected to a severe environment of intensive sedimentation and mechanical erosion.

Keywords: *Oulastrea crispata*, thin section, soft tissue, zooxanthella, euendolith, cyanobacteria