Characterization of the active substances in water conditioned by the coralline red alga Corallina pilulifera as inducers of metamorphosis in larvae of the sea urchin Anthocidaris crassispina

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Abstract

Water conditioned by the coralline red alga Corallina pilulifera (C. pilulifera-conditioned water) in combination with the periphytic diatom Navicula ramosissima was found to induce metamorphosis in larvae of the sea urchin Anthocidaris crassispina. Bioassay-guided characterization of the active substances in C. pilulifera-conditioned water revealed that relatively heat-stable, non-volatile, polar substances are inducers of larval metamorphosis in A. crassispina. The molecular weights were estimated to be about 100 or less. Furthermore, fractionation by ODS column chromatography (0 to 100%, four gradients of MeOH) revealed that the activity was eluted mainly in the 0% and 70% fraction, although the activity was much lower than that of the control (C. pilulifera-conditioned water). When all four fractions (F1, F2, F3, and F4) were combined, the metamorphosis-inducing activity was recovered to almost the same level as that of the control. These results indicate that more than two metamorphosis-inducing substances may be present in C. pilulifera-conditioned water. Several authentic reagents such as phloroglucin and bromophenol did not show the metamorphosis-inducing activity even when combined with the diatom N. ramosissima.

Key words: Sea urchin Anthocidaris crassispina, coralline red alga Corallina pilulifera, larva, metamorphosis, active substances