

石灰藻ピリヒバ分泌液に含まれるムラサキウニ幼生の変態を誘起する活性物質の特性

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### 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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(Received September 5, 2003; Accepted November 21, 2003)

#### 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

海洋無脊椎動物の多くは浮遊幼生の段階を経て、底棲性の成体になる。幼生は、通常、将来の成長や生存を保証できる好適な環境に出会うまでは、変態を行わないと報告されている (Crisp, 1974; Cameron and Schroeter, 1980; Crisp *et al.*, 1985; Snelgrove *et al.*, 1999)。変態に際して、幼生は種々の基質と接触し、化学的な刺激 (ケミカル・シグナル) などを感じる事が知られ

ている (Pawlik, 1992)。基質としては、同種の個体 (群居性) や大型海藻および微生物フィルムなどがあげられる。これらの基質は化学物質を含有、あるいは放出し、幼生はこれらのシグナルを感じるようになる。

ウニ幼生に関しては、同種個体に反応して変態が起こる例はなく、各種の大型海藻および微生物フィルムとの接触が重要であるとされている (Pawlik, 1992;