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Endocrine interactions during larval development of the American lobster, Homarus americanus (Crustacea, Decapoda)

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ABSTRACT

This work was concerned with the control of larval developmental processes in the American lobster, Homarus americanus. The purposes of this study were to delineate the effects of eyestalk neurohormones on the following: 1) the molting rates of zoeal through megalopal larval stages, 2) growth and development through the metamorphosis, and 3) the titer and identity of the ecdysteroid molting hormones.

The results suggest bilateral eyestalk removal in early 2nd stage or older lobster larvae accelerated the timing of subsequent molts. A growth effect of destalking was noted. Larvae ablated in the second stage exhibited larger carapace, chelae, and antennae lengths at 4th stage. Eyestalk removal before a critical period during 2nd zoea sometimes resulted in larvae that molted to intermediates in form between 3rd and 4th stages. These intermediates readily resulted from larvae that were reared under suboptimal conditions. Thus it may indicate that eyestalks are not involved in the control of metamorphic development.

Ablation of 2nd stage larvae also results in an accelerated rise in whole larval ecdysteroid titers during the postmolt and premolt periods of the 3rd stage. The control over the timing of both the premolt ecdysteroid peak and subsequent ecdysis is lost by destalking during the previous molt interval. Only slight differences were

apparent in high-performance liquid chromatographic ecdysteroid profiles of 3rd stage ablated and control larvae.

Replacement therapy using sinus gland (SG) extracts from juvenile lobsters injected into 3rd stage ablated larvae delayed the next molt. This delay was significantly longer than for larvae injected with non-sinus gland extracts. Sinus gland extracts similarly decreased ecdysteroid titers of injected, ablated larvae within 12 hr. Basal levels were maintained in SG-injected larvae while control groups reached the premolt peak. The SG-injected premolt peak and the following molt were significantly delayed. These results indicate that a similar molt-inhibitory mechanism to that of juvenile and adult crustaceans may also exist in larvae.

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