Feedback Regulation of Y-Organ Secretion in the European Green Crab, Carcinus maenas

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INTRODUCTION
Crabs are decapod crustaceans in the phylum Arthropoda. In order to grow, all arthropods must periodically shed their exoskeletons. This process of molting is controlled by the release of hormones. 20-hydroxyecdysone (20E) is the primary molting hormone in most insects and crustaceans. This hormone is formed by the hydroxylation of its prohormone, ecdysone (E), which is secreted by the Y-organ. During intermolt, the time between molts, 20E concentration is kept low by the molt-inhibiting hormone (MIH). MIH is released by a neurosecretory gland, the X-organ, located in the eyestalks. MIH then binds to the Y-organ and prevents ecdysone production.

RESULTS

PART I: Time Course of Y-Organ Secretion

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METHODS

PART I: Time Course of Y-Organ Secretion

• Anaesthetize crabs on ice
• Draw hemolymph sample; preserve in 100% MeOH
• Dissect crabs and collect Y-organs
• Place Y-organs in separate culture wells with sterilized crab saline
• Take samples from each well after 0.5, 1, 2, 4, & 6 hours; preserve in 100% MeOH
• Determine 20E concentration of each sample through radioimmunoassay (RIA) analysis

RADIOIMMUNOASSAY (RIA)

• Add Radiolabeled Hormone
• Add Antiserum
• Pellet Bound Hormone

Higher Concentration of E in Sample
Lower % Bound of Radiolabeled E

When the Y-organs were moved to new wells, the cumulative amounts of ecdysone produced no longer displayed exponential growth, but linear. This contrast indicates that that the Y-organ is indeed secreting a substance that stimulates itself to increase 20E production.

DISCUSSION:
The overall trend here indicates that the molting hormone, ecdysone, has a stimulatory effect on its own production by the Y-organ.

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