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Uptake of Dissolved Estrone by Scleractinian Corals

A.M. Tarrant¹, M.J. Atkinson², and S. Atkinson³

¹ Department of Oceanography; University of Hawaii at Manoa; Honolulu, HI.

² Hawaii Institute of Marine Biology; University of Hawaii at Manoa, Kaneohe, HI.

³ Alaska Sealife Center, University of Alaska, Seward, AK.

Phone: (808) 956-6050; Fax: (808) 956-9516; Email: atarrant@soest.hawaii.edu

Estrogens and other steroids are present in coral tissues and estrogens are hypothesized to regulate coral gamete development. It is not known whether corals synthesize estrogen, accumulate them from dietary sources, or concentrate them from the surrounding seawater. To determine whether corals can remove estrogens from the water column at environmentally relevant concentrations, we conducted a series of experiments in a 24-m flume filled with 2 m² of scleractinian corals. In each experiment, the flume was spiked with estrone (starting concentrations 1.0 - 2.5 ng l⁻¹), water was recirculated, and water samples were collected intermittently for 1-7 days. Corals removed estrone from the water column at a rate directly proportional to concentration (rate = S[estrone]_l: the estimated first-order rate constant (S) was 85 x 10⁻⁶ m s⁻¹). Incubations of coral tissue with radiolabeled estrone demonstrated that estrone was removed from the water column and was released slowly compared to uptake. The reported rate constants are close to maximal uptake rates, based on mass transfer theory of nutrient uptake by corals. Reported estrone concentrations range from 50 - 500 pg l⁻¹ in the seawater over coral reefs, so predicted uptake rates of estrone into coral communities from the water column range from 0.1 to 1 g estrone m⁻² day⁻¹ with turnover times on the order of 10-100 days. We conclude that corals can remove estrone from the water column and that the water column is a significant source of estrogens to reef-building corals.