MEASUREMENT OF ESTRADIOL AND ESTRONE IN TISSUE OF THE SCLERACTINIAN CORAL *MONTIPORA VERRUCOSA*: ANALYTICAL DEVELOPMENTS AND INDICATIONS OF SEASONALITY

A THESIS SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAI'I IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN

OCEANOGRAPHY (MARINE BIOLOGY)

AUGUST 1998

By

Ann M. Tarrant

Thesis Committee:

Marlin Atkinson, Chairperson
Shannon Atkinson
Robert Bidigare
Michael Landry
Craig Smith

ABSTRACT

Estrogens are essential to development of female gametes and reproductive organs in vertebrates, and they occur in diverse invertebrates. Sexual reproduction in scleractinian corals is affected by light, temperature and other environmental cues, but no studies have elucidated the physiological mechanisms that regulate coral gamete development. Two potent estrogens, estrone (E_1) and estradiol-17β (E_2), were measured in homogenates of tissue and skeleton from *Montipora verrucosa* over one year. In Hawaii, *M. verrucosa* spawns egg-sperm bundles following the new moons of June and July. Cores of coral tissue and skeleton were collected monthly throughout the year and weekly in July and August. Steroids were extracted in diethyl ether, purified via celite chromatography and assayed using highly specific radioimmunoassays. Non-specific binding was measured directly in coral samples and was found to vary with sample weight. Monthly mean E_1 concentrations ranged from 20 to 70 ng E_1/g ash-free dry weight (AFDW) with the highest values occurred in April. Smaller peaks occurred in early July, prior to the spawning, but asynchrony in spawning is likely to have obscured trends in the data. Monthly mean E_2 concentrations ranged from 8 to 25 pg E_2/g AFDW, and the highest values occurred in February and March. Peaks in E_2 preceded peaks in E_1, indicating metabolism of a single pool of estrogen. Peaks in estrogens in the spring and immediately prior to the July spawn suggest that estrogens may help to regulate gametogenesis and spawning, as they do in vertebrates.