VOLUME FIFTY-FIVE

ADVANCES IN MARINE BIOLOGY

Endogenous and Exogenous Control of Gametogenesis and Spawning in Echinoderms

ANNIE MERCIER
Ocean Sciences Centre (OSC) Memorial University
St. John's, Newfoundland & Labrador
Canada

and

JEAN-FRANÇOIS HAMEL
Society for the Exploration and
Valuing of the Environment (SEVE)
Portugal Cove-St. Philips, Newfoundland & Labrador
Canada

AMSTERDAM • BOSTON • HEIDELBERG • LONDON
NEW YORK • OXFORD • PARIS • SAN DIEGO
SAN FRANCISCO • SINGAPORE • SYDNEY • TOKYO
Academic Press is an imprint of Elsevier

Contents

CHAPTER ONE

Introduction

Abstract

Most echinoderms display seasonal or other temporal cycles of reproduction that presumably result from the complex interplay of endogenous and exogenous signals. Various environmental, chemical and hormonal factors, acting directly or indirectly, individually or in combination, have been proposed to cue, favour or modulate a suite of reproductive functions from the onset of gametogenesis to gamete release. From as early as the nineteenth century, an astonishing array of studies has been published on topics related to the control of reproduction in echinoderms, ranging from fortuitous behavioural observations to complex experimental demonstrations and molecular analyses. Although the exact pathways involved in the perception of external signals and their transduction into coordinated spawning events remain obscure for most species, significant advances have been made that shed new light on the information gathered over decades of research. By compiling the existing literature (over 1000 references), interpreting the main results, critically assessing the methodologies used and reviewing the emerging hypotheses, we endeavour to draw a clearer picture of the existing knowledge and to provide a framework for future investigation of the mechanisms that underlie reproductive strategies in echinoderms and, by extension, in other marine invertebrates.

Contents

The regulation of reproductive processes in marine invertebrates has been discussed in the literature since the end of the nineteenth century. Echinoderms were initially studied in this context because they were abundant and fairly easy to collect and maintain in captivity. More recently, they have become models for the study of gamete biology and some species of echinoids and holothuroids have been reared in captivity as part of aquaculture or restocking programmes, yielding a larger body of knowledge on their reproductive processes.

Except for a small number of mammals, including humans, most animals show distinct reproductive seasons or cycles (Cloudsley-Thompson, 1961; Rusak and Zucker, 1975). Both timing and duration of breeding periods are crucial elements of the overall life history strategy of an organism

Advances in Marine Biology, Volume 55
ISSN 0065-2881, DOI: 10.1016/S0065-2881(09)55001-8