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Preface

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The goal of these volumes (Volumes 150 and 151) is to provide a useful guide for current, and especially future, researchers using the echinoderms, particularly the gametes and embryos, to investigate biological processes. These are the third in the series of volumes in the *Methods in Cell Biology* series on echinoderms. Building on the foundation of the first volume (Volume 27) in 1986, edited by Tom Schroeder, and the second (Volume 74) edited by Charles Etensohn, Gary Wessel, and Gregory Wray in 2004, we hope that these volumes will continue the long tradition of sharing updated and new methods to study echinoderms. These volumes cover the range of methods necessary for use of echinoderms in the research lab and should serve as resources for both new and seasoned researchers alike.

Volume 150 starts with chapters that describe the fundamentals of working with echinoderms—how to obtain adult echinoderms, collect and handle gametes, and culture embryos and larvae. It also includes chapters that introduce readers to echinoderm species that offer particular advantages for certain experimental manipulations, including model species suitable for egg-to-egg culturing, and establishment of transgenic lines. Basic cell biological approaches and embryo manipulation protocols are staples of the second part of this volume, including chapters on isolation and study of specific cell types, cilia, microinjection, and blastomere transplantation. Two chapters, detailing methods and best practices for studying the effects of abiotic stressors and environmental toxicants on echinoderms, reflects the long tradition of using echinoderms as models for investigating problems at the interface of oceans and human health. Echinoderms have also long been favorites in the classroom for study of fertilization and early development students, and thus Volume 150 ends with several chapters detailing new lab exercises that can be easily implemented in the college or university (and even high school) laboratory classroom setting.

Volume 151 is organized around methodologies that probe genomic structure and regulation, including transcriptome analyses, single-cell gene expression studies, proteomic and protein–protein interactions, and knockdown and knockout strategies, including the use of CRISPR–CAS technology in echinoderms. Additionally, a suite of chapters focused on imaging analyses provide starting points for investigators who wish to adapt them to their particular molecule(s) of interest. The echinoderms also continue to contribute to our knowledge of sperm motility and chemotaxis, for which cutting–edge methods are highlighted in several chapters.

For more than century the echinoderms, and particularly their gametes and embryos, have held a fascination for biologists. The chapters in these volumes highlight how many of the exceptional biological features of these organisms, such as abundance of material, developmental synchrony, and optical transparency, remain relevant today. These volumes

come at a pivotal time when functional genomic and proteomic technologies are enabling investigators to leverage these biological advantages in new and creative ways. As such, we think these volumes point to a promising future for investigators working with echinoderms.

It has been our pleasure to work with our colleagues in assembling these volumes and we thank everyone who contributed. In particular we are grateful to several senior investigators, for providing their perspectives on where the field has been and where it is going, collected in a series of essays in Volume 151. We are confident new investigators and old will find these insights, reflections, and advice to be a useful perspective on echinoderm biology.

We would also like to thank Teresa Pons–Ferrer, Fiona Pattison, and the rest of the Elsevier team for their guidance with this project. Finally, we also thank our colleague Dr. Victor Vacquier for his help with editing several of the chapters.

Dedication

K.R.F. dedicates this work to her husband and children, who have generously shared her with science these many long years. A.M.H. dedicates this work to his father, Dr. M. Hamdoun.