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Molecular Embryology

Methods and Protocols

Edited by

Paul T. Sharpe

and

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and St. Thomas's Hospitals, King's College, London, UK*

Humana Press **Totowa, New Jersey**

© 1999 Humana Press Inc.
999 Riverview Drive, Suite 208
Totowa, New Jersey 07512

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This publication is printed on acid-free paper. ∞
ANSI Z39.48-1984 (American Standards Institute)
Permanence of Paper for Printed Library Materials.

Cover illustration: TO BE UPDATED

Cover design by Jill Nogrady.

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Printed in the United States of America. 10 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging in Publication Data

Main entry under title:

Methods in molecular biology™.

Molecular embryology : methods and protocols / edited by Paul T. Sharpe and Ivor Mason.

p. cm. -- (Methods in molecular biology™ ; 97)

Includes index.

ISBN 0-89603-387-2 (alk. paper)

1. Embryology--Vertebrates--Methodology. 2. Chemical embryology--Methodology I. Sharpe, Paul T. II. Mason, I. III. Series: Methods in molecular biology (Totowa, NJ) ; 97.

QL959.M65 1998

571.8'616--dc21

98-23234

CIP

Preface

Most people have some interest in embryos; this probably results, in part, from their interest in understanding the biological origins of themselves and their offspring and, increasingly, concerns about how environmental change such as pollution might affect human development. Obviously, ethical considerations preclude experimental studies of human embryos and, consequently, the developmental biologist has turned to other species to examine this process. Fortunately, the most significant conclusion to be drawn from the experimental embryology of the last two decades is the manner in which orthologous or closely related molecules are deployed to mediate similar developmental processes in both vertebrates and invertebrates. The molecular mechanisms regulating processes fundamental to most animals, such as axial patterning or axon guidance, are frequently conserved during evolution. (It is now widely believed that the differences between phyla and classes are the result of new genes, arising mostly by duplication and divergence of extant sequences, regulating the appearance of derived characters.)

Other vertebrates are obviously most likely to use the same developmental mechanisms as humans and, within the vertebrate subphylum, the apparent degree of conservation of developmental mechanism is considerable. It has long been recognized that particular vertebrate species offer either distinct advantages in investigating particular stages of development or are especially amenable to particular manipulations. No single animal can provide all the answers because not all types of experiments can be carried out on a single species. Traditionally, developmental biologists have worked on their particular experimental favorite, working, for example, solely on *Drosophila*, or *Xenopus*, or the mouse. In the last few years, this has started to change and there are now increasing numbers of laboratories that have acquired the expertise to work on several different animals and are thus able to harness the experimental advantages of different developmental systems to address specific developmental questions. Alternatively, Developmental Biology Departments are becoming organized such that they have expertise in several model organisms. It is the increasing necessity to be able to move between embryos of different vertebrate classes as a project progresses that prompted us to as-

semble *Molecular Embryology: Methods and Protocols*. We hope that it will allow researchers to familiarize themselves with the various commonly studied vertebrate embryos, to make informed choices about which might be best suited to their investigations, and to understand the techniques by which they might be manipulated.

Sadly, while this book was going to press, Nigel Holder, one of its contributors, died. Nigel was an excellent developmental biologist, a founder of the Developmental Biology Research Group at King's College, and had recently been appointed to the Chair of Anatomy and Human Biology at University College London. He was both a colleague and friend to ourselves and to many of the other contributors to this volume. He is greatly missed.

Paul T. Sharpe
Ivor Mason

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