

**PRACTICAL STUDIES OF
ANIMAL DEVELOPMENT**

Practical Studies of Animal Development

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and

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Contents

Preface	page ix
1 General Requirements	1
Animals	1
Legal considerations	2
The laboratory	3
Equipment	4
Glassware	5
Instruments	6
Sources of information	12
References	12
2 Echinoderms and Ascidians	14
Echinoderms	15
Induced spawning and artificial fertilization	17
Ascidians	20
<i>Ciona intestinalis</i>	22
<i>Dendrodoa grossularia</i>	27
References	28
3 Molluscs, Annelids and Nematodes	29
Molluscs	29
<i>Patella</i>	30
<i>Crepidula</i>	32
<i>Littorina saxatilis</i>	34
Annelids	36
<i>Tubifex</i>	36
<i>Pomatoceros</i>	39
Nematodes	41
Female reproductive system of <i>Ascaris</i>	42

Development of <i>Rhabditis</i>	46
References	48
4 Insects and Crustacea	50
The Locust	54
Life history	54
Examination of the ovaries	55
Development	55
Calliphora	59
Maintenance and life cycle	61
Demonstration of hormonal control of metamorphosis	63
Drosophila	67
Life cycle and culture of larvae	67
Observations of puffing patterns in the polytene chromosomes	68
Crustacea	74
Larval forms	75
Culture of <i>Artemia salina</i>	76
References	77
5 Fish	81
Goldfish	82
Examination of the gonads	82
Killifish	83
General care	85
Egg collection and rearing	85
Development of <i>Aphyosemion scheeli</i>	86
Guppies	87
Artificial fertilization	90
Experimental Work on Fish Embryos	92
Decapsulation	93
Explants of the blastoderm	93
Experimental analysis of development	94
References	94
6 Amphibia	96
Xenopus	97
Induced spawning	98
Development	101
Notes on feeding tadpoles	107
Axolotls	109
Spawning	110

CONTENTS

vii

Development	112
Notes on rearing from the larval stage	119
Experiments on Amphibian Embryos	119
Artificial fertilization	122
Mechanical decapsulation	124
Chemical decapsulation	125
Exogastrulation	127
Ectodermal explants from gastrulae	128
Implantation of the dorsal lip of the blastopore	133
Optic vesicle transplantation	134
Other experiments on amphibian embryos	140
Experiments on amphibian larvae	141
Lens regeneration from the cornea	142
Immuno-electrophoretic analysis of lens proteins	149
Thyroxine induced regression of isolated tadpole tails	159
References	163
7 Birds	166
Examination of the early chick blastoderm	167
Isolation of the blastoderm	168
Stained preparations	171
Culture of chick blastoderms	172
Removal and culture of the blastoderm	173
Preparation of chorio-allantoic grafts	180
Isolation of limb buds	181
Preparation of host embryos	181
References	183
8 Mammals	185
The oestrous cycle in the mouse	187
Preparation of vaginal smears	190
Examination of unfertilized ova from superovulated mice	193
Superovulation	194
Female reproductive system	196
Isolation of living, unfertilized eggs	197
Reproductive system of the male mouse	200
Male reproductive system	201
Examination of spermatozoa	204
Examination of mouse embryos up to and including the blastocyst stage	206

Timing of matings	208
Removal of eggs from the oviduct	209
Removal of blastocysts from the uterus	210
In vitro culture of mouse eggs and egg fusion technique	212
Culturing eight cell and earlier stage eggs	215
Removal of the zona pellucida and fusion of eggs	218
Arrangement of the foetal membranes in the rabbit and localization of immunoglobulin in the yolk sac splanchnopleur	219
Examination of the rabbit conceptus	224
Preparation of tissue for treatment with fluorescent labelled antibodies	226
Immunofluorescent staining	227
References	230
Index	233

Preface

The purpose of this book is twofold: it is meant to serve both as a practical manual for the study of animal development and as a general introduction to the subject. Central to our endeavour is the belief that developmental biology is best taught and learnt at the laboratory bench, with specimens which are either alive and can be seen to develop or with fresh material derived directly from the egg (as in birds) or mother (as in mammals). Once the dynamic nature of development is appreciated and the overall structure of the developing organism discerned the more conventional study of sections and whole mounts is more likely to become a delight rather than a difficult, and often meaningless, chore. We have laid considerable stress on the early development of animal embryos and the ways in which they can be obtained from a relatively few, but reliable, sources. In addition, emphasis has been placed on fairly simple experiments which make use of the embryos and larvae chosen for the purpose of illustrating development. Embryology ceased to be a descriptive science at the beginning of this century and any practical course, at whatever level, should attempt to reflect this change. It is true that the analysis of development, particularly the genesis of chordate structure, owed much to the invention of the microtome. However, it is as well to remember that a far greater insight into the nature of the developmental process was achieved by a few simple experiments on the embryos of echinoderms and

molluscs, and not by sectioning the embryo from one end to the other.

All the practical instructions given in this book are based on our experience of teaching undergraduates over a period of ten years or more and the material is derived from a core of about 30 different practicals and projects. Nothing is included in the detailed instructions which is not based on our own experience. Our aim has been to include sufficient information about each piece of work to enable students to undertake it and for teachers and technicians to prepare it. We have also tried to provide a more general framework by a relevant introduction to each section and by indicating further experiments of a more advanced kind suitable for more demanding projects and research. Obviously the practicals which we describe vary both in the skills required and in the time needed for their completion, and for these reasons they will need to be matched to the average capability of a student group. Thus, although some of the practicals are suitable for large classes at the level of the sixth form, or for students in their first year of higher education, others should only be attempted by small groups of students and a few are best considered as individual projects.

In a general way the practical studies described in the following pages become progressively more difficult as they proceed from invertebrates to fish and amphibia, and then to birds and mammals. This progression reflects the fact that, by and large, it is far easier to initiate and observe development in certain invertebrates than it is in many vertebrates, and among the vertebrates, the embryos of fish and amphibia are more accessible than are those of birds and mammals. It also reflects a deliberate choice in the design of our practical courses, which has been to use some of the invertebrate material at the beginning of a course to illustrate fertilization and the initial stages of development, before proceeding with observation and experiments on the higher forms. Some major groups of animals have either been omitted completely (e.g. reptiles), or have only received a very limited treatment (e.g. crustacea).

The reason for this is either that the animals are difficult to obtain or are not, in our view, especially useful for teaching purposes.

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