
Contents

<i>Preface to the Series</i>	v
<i>Preface</i>	vii
<i>Acknowledgements</i>	ix

Section I Aquatic Invertebrate Reproduction: Stem Cells

1. Reproduction and Stem Cells	3
1.1 Introduction	3
1.2 Ontogenetic Pathways	4
1.3 Motility and Modes of Reproduction	10
1.4 Hermaphroditism	14
1.5 Asexual Reproduction	16
1.6 Stem Cells	19
1.7 Primordial and Embryonic Stem Cells	20
1.8 Pseudocoelom and Hemocoelom	24

Section II Crustacea

2. Introduction	29
2.1 Taxonomy and Diversity	29
2.2 Life Span and Reproduction	32
2.3 Ovigerous Molt and Fecundity	38
2.4 Energy Allocation	46
2.5 Gametogenesis and Fertilization	48
2.6 Morphology and Anatomy	52
2.7 Brooders and Shedders	54
2.8 Larval Development	59
2.9 <i>In vitro</i> Incubation and Translocation	63
3. Sexual Reproduction	67
3.1 Sexuality and Sex	67
3.2 Gonads and Ovotestes	69
3.3 Gonochorism	72
3.3.1 Sex Ratio	73

3.3.2	Spawning and Fecundity	74
3.3.3	Reproductive Senescence	80
3.3.4	Special Groups	86
3.4	Parthenogenesis	90
3.4.1	Taxonomic Survey	90
3.4.2	Cladocera	94
3.4.3	Aging and Senescence	102
3.5	Hermaphroditism	104
3.5.1	Simultaneous Hermaphroditism	106
3.5.2	Sequential Hermaphrodites	109
3.6	Intersexuality	112
3.6.1	Gynandromorphism	113
3.6.2	Intersexes	113
3.7	Mating Systems	114
3.7.1	Male's Presence Needed	115
3.7.2	Induction of Parthenogenesis	116
3.7.3	Social Induction	116
3.7.4	Hybridizing Systems	117
3.7.5	Alternative Mating Strategy (AMS)	118
4.	Asexual Reproduction and Regeneration	122
4.1	Parasitic Colonial Rhizocephalans	122
4.2	Autotomy and Regeneration	123
4.3	Claw Tissue Transplantation	126
5.	Cysts and Resting Stages	131
5.1	Ovarian Diapause	131
5.2	Diapausing Cysts	132
5.3	Cyst and Ornamentation	135
5.4	Commercial Potential of Cysts	138
5.5	Brine Shrimps	140
5.6	Daphnids	144
5.7	Copepods	148
5.8	Diapausing Larvae	148
5.9	Cyst Viability and Metabolism	149
5.10	Hatching Phenology	153
6.	Sex Determination	157
6.1	Genome and Sequencing	157
6.2	Sex Specific Markers	160
6.3	Karyotypic Analysis	163
6.4	Heterogametism	163
6.5	Ploidy Induction	167

7. Sex Differentiation	172
7.1 Crustacean Hormones	172
7.1.1 Androgenic Gland (AG)	174
7.1.2 Eyestalk: Sinus Gland (SG)	181
7.1.3 Y-organ and MIH	184
7.1.4 Mandibular Organs and MO-IH	187
7.1.5 Vertebrate Type Hormones	190
7.2 Endocrine Disruption	192
7.2.1 Larvae and Maturation	194
7.2.2 Induction of <i>Daphnia</i> Males	196
7.3 Parasitic Disruption	198
7.3.1 Parasites and Taxonomy	198
7.3.2 Life Cycle and Biology	200
7.3.3 Energy Drainers	205
7.3.4 Reproductive Death	206
7.3.5 <i>Secondary Sexual Characteristics (SSCs)</i>	209
7.3.6 Single Sexed Hermaphrodites	210
7.3.7 Induction of Sex Change	211
7.3.8 Obstruction of Spawning	212
7.3.9 Chemical Induction	213
7.3.10 Validation of Hypotheses	213
7.4 Food Disruption	214
7.4.1 Sex Change in Copepods	214
7.4.2 Induction to Females	215
8. Highlights and Directions	217
9. References	227
<i>Author Index</i>	281
<i>Species Index</i>	291
<i>Subject Index</i>	300