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AND CHAPTER SUMMARIES

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Loss of genes in meiotic oogenesis gives sexual reproduction a 50% disadvantage in relation to asexual. Sexual reproduction ought to disappear in diploid organisms. Paradoxically it coexists in evolutionary equilibrium with asexual in many life cycles, in which its occurrence is related to ecological change and uncertainty.

2. THE APHID-ROTIFER MODEL 15

When clones compete in confined spaces, the fittest one may exclude all others. Sexually reproduced colonists to such a habitat will be more diverse than those asexually produced, and more likely to include the winning genotype. This advantage balances the "cost of meiosis" so as to establish an equilibrium in the relative frequency of sexual and asexual reproduction.

3. THE STRAWBERRY-CORAL MODEL 26

Environmental gradients set limits to the vegetative spread of sessile organisms and act somewhat like habitat boundaries in the Aphid-Rotifer Model. At evolutionary equilibrium some resources will be devoted to producing genetically diverse propagules, some of which may be able to survive elsewhere in the environmental gradients.

4. THE ELM-OYSTER MODEL 35

When large numbers of young of a sessile form compete for space fully utilizable by one adult, it is likely that one of the very few fittest will win all or most of the space. Genetically diverse are more likely than uniform progenies to include the fittest few. If this advantage more than balances the cost of meiosis, asexual reproduction will disappear.

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Reasons are given for believing that sexual reproduction will augment numbers at the top end of the fitness distribution when adult movements are limited, fecundity is high, and young are widely dispersed, a common pattern in marine organisms. With sufficiently intense selection, this advantage may balance recombinational load and the cost of meiosis. Evolutionary equilibrium occurs with exclusively sexual reproduction.

6. NATURAL SELECTION IN HIGH-FECUNDITY POPULATIONS: THEORY 62

Models in Chapters 4 and 5 demand that selection in high-fecundity populations is more intense than is generally realized. Arguments in support of this proposition and implications for its acceptance are discussed.

7. NATURAL SELECTION IN HIGH-FECUNDITY POPULATIONS: EVIDENCE ON VIABILITY 77

Published information on adaptive performance, on competitive relations among developing young, and on gene-frequency gradients in relation to dispersal support the proposition of enormous viability variation among genotypes in high-fecundity populations.

8. NATURAL SELECTION IN HIGH-FECUNDITY POPULATIONS: EVIDENCE ON FERTILITY 91

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9\. DERIVED LOW-FECUNDITY POPULATIONS 102

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11\. WHY ARE MALES MASCULINE AND FEMALES FEMININE AND, OCCASIONALLY, VICE VERSA? 124

Differences between male and female reproductive behavior and physiology follow from egg-sperm contrast in size. Other factors such as internal fertilization and territoriality predispose a species towards certain evolutionary changes in the roles of the sexes. Much of courtship and family life is interpretable as resulting from partly conflicting male and female strategies.

12\. SEX AS A FACTOR IN ORGANIC EVOLUTION 140

Recent literature on this topic contains a diversity of opinion, but most of the work is based on the assumption that ability to incorporate favorable mutations commonly limits the rate of evolution, and that recombination must affect this ability. It is proposed instead that potential rates of gene substitution are always greater than actual, and that recombination is significant mainly for maintaining genotypic versatility in unpredictable environments.

Sex and
Evolution