The Evolution of Sex

TO THE MEMBERS OF THE
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The Evolution of Sex

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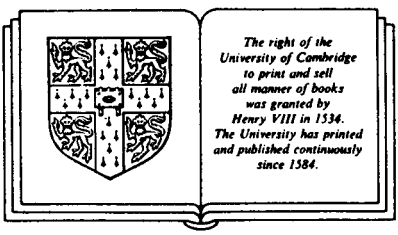

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Preface

The aim of this book is to elucidate the selective forces responsible for the evolution of sex, of recombination rates, of breeding systems, and of mutation rates. I might have called it 'The Evolution of Genetic Systems' were it not that a classic with that title already exists. But whereas Darlington approached these topics from the standpoint of a cytologist with a distrust of mathematical reasoning, my own approach is that of a population geneticist.

It will be obvious that I have been greatly influenced by G. C. Williams's *Sex and Evolution*. I share with him a distaste for the Panglossian belief that if some characteristic can be seen as benefiting the species, then all is explained. I am under no illusion that I have solved all the problems which I raise. Indeed, on the most fundamental questions – the nature of the forces responsible for the maintenance of sexual reproduction and genetic recombination – my mind is not made up. On sex, the relative importance of group and individual selection is not easy to decide. On recombination, group selection can hardly play a significant role, but it is not clear to me whether the short-term selective forces I discuss are sufficient to account for the facts, or whether models of a qualitatively different kind are needed.

Inevitably, this uncertainty will make the book harder to follow. An author who knows his own mind about everything can present a clear and consistent case. I have felt more that I was carrying on a debate with myself, presenting the arguments first on one side and then on the other. To help the reader, I have provided a 'preamble' to most of the chapters, and I have not been afraid to repeat myself if it seemed to make for clarity.

I have made no attempt to present an exhaustive review of the comparative data on breeding systems. Instead, I have tried to put the theoretical issues as clearly as I can, and to give enough of the

evidence to show what *kinds* of facts might be relevant. It has struck me, while writing, that the crucial evidence is often missing, simply because the theoretical issues have not been clearly stated, so that the relevance of a particular fact has not been appreciated. If I do no more than encourage experimentalists and field workers to collect the relevant data, I shall be well satisfied.

There are several aspects of the evolution of genetic systems about which I say little. These include chromosome structure, the genetics of sex determination and self-incompatibility, the significance of haplo-diploid life cycles, and parasexual processes in prokaryotes. I have made no attempt to discuss the molecular basis of recombination and mutation. All these topics are relevant to my general theme, but I have preferred to stick to topics about which I have something new to say.

The major part of the writing was done while I was a visitor at the Museum of Zoology at the University of Michigan, Ann Arbor. While there, I ran a seminar at which many of the topics in the book were discussed. I have exploited the graduate students who looked up references, told me of their own work, and suggested ideas; my only excuse is that I warned them that I would do so. I am grateful to them for making my stay at Ann Arbor so stimulating. The book has been read in manuscript by my colleagues Brian and Deborah Charlesworth, by Joe Felsenstein of the University of Washington, and by Eric Charnov and Jim Bull of the University of Utah. I have been helped greatly by their comments, although I have not always taken their advice.

Sussex University J. Maynard Smith
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