PREFACE

This book began when, out of curiosity, I glanced at the contents of the first issue of the Quarterly Review of Biology and saw an article with the irresistible title of 'Eleven thousand generations of *Paramecium*'. Its author, L. L. Woodruff, was describing how he had maintained a strain of *Paramecium aurelia* in isolate culture for 19 years, with no sign of any decrease in vitality. My first thought was that this would provide an excellent illustration of the futility of research unguided by adequate theoretical understanding. On second thoughts, there might be more to the problem than met the eye; and little by little I was drawn into reading most of a huge literature, the bulk of it written between 1890 and 1920, generated by the speculation that sex has some ill-defined rejuvenating property that made it indispensable to the indefinite prolongation of a line of protozoans. Although most geneticists and protozoologists (I am neither) are aware of this literature, it has long since faded from the foreground, and the musty volumes in which it lies entombed are nowadays little read. I suspect that most people have been put off by the almost mystical properties ascribed to sex by many of these early workers, at a time when Mendelism had only just been rediscovered and the concept of the genotype was still novel. The attempts to 'revivify' failing cultures with extract of pancreas, for example, read rather strangely today. A large part of this book is simply historical, therefore, born of my fascination with the attempts of these early geneticists to grapple with ideas of sexuality and immortality, and of my own attempts to understand their results in modern terms. But this in turn led me to think more deeply about the limits to the fidelity with which genetic information can be transmitted through a very long sequence of generations, and this more general question forms the second facet of the book. I have tried to report my findings so that they can be understood by any moderately well-

informed reader, from the undergraduate level upwards; to the specialists who will be irritated by the necessary shallowness of many sections I offer my apologies in advance.

This project was conceived, and most of the data retrieval and analysis completed, at McGill, where the Biology Department continues to offer an enormously stimulating intellectual milieu. It was supported in part by funds from the Natural Sciences and Engineering Research Council of Canada. Most of the text and a good part of the theory was done at the University of Sussex, who provided unstinted hospitality during my sabbatical leave. In particular, I have benefited more than I can readily express from conversations with John Maynard Smith. I only hope that he will forgive me for any ideas of his that he finds embedded without acknowledgment in the text; they will be the best ones.

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