

Preface

In the preface to the fourth edition (published in 2004) we referred to the revolution in bacterial genetics that was started by gene cloning and sequencing, coupled with related techniques such as the polymerase chain reaction (PCR) and microarrays, and culminated in knowledge of genome sequences of a rapidly expanding range of bacteria. This posed a dilemma. How could we accommodate these new techniques, and the wealth of exciting new information they provided, while not losing sight of classical bacterial genetics? This dilemma has become even more acute.

True, many of the older methods are now no longer used, and could be relegated to the pages of history. But there is a danger of throwing out the baby with the bathwater. Not only is there a need to maintain some sense of how the subject has got to the stage we are now at, but also a discussion of some of these methods is useful in establishing an understanding of how bacterial genetics operates in natural environments. Genetics is not just about how we find out about bacteria: it is about how bacteria have evolved, and continue to evolve, and continue to adapt to changing environments. Molecular genetics, in isolation, is essentially reductionist. Even genome sequencing, and global analysis of gene expression, by themselves merely provide catalogues of genes. Ultimately, those lists have to be related to the behaviour of the whole organism, and from there to how organisms interact with one another and with their environment.

So we have continued with a compromise approach, slimming down even further the description of classical bacterial genetics to allow space not only for some of the new technological advances but also for some of the advances that these methods have allowed in understanding important aspects of bacterial behaviour.

One further aspect needs a word of explanation. What is a bacterium? It is now clear that there are two distinct types of prokaryote: the bacteria proper and the Archaea. Most of this book concerns the bacteria in the proper taxonomic sense, but some aspects are also relevant to Archaea, especially where we consider the differences between prokaryotes and eukaryotes. It complicates the text too much to make this distinction, so we apologize if anyone is offended by occasional blurring of the lines between bacteria and prokaryotes.

As with the earlier editions, the choice of what to include and what to leave out is very much a personal one. We hope that the final product will remain accessible for a non-specialist reader, and will succeed in introducing them to both the exciting and rapidly developing field of molecular genetics and also the fascinating world of bacteria.

Appendix F: Standard Genetic Code

Appendix G: Bacterial Species

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