

Preface

Until recently sixth form biology courses centred on the structure and physiology of a series of animal and plant types. For the most part modern biology was given a raw deal. There was virtually no cell biology, no functional genetics, no experimental embryology, very little biochemistry and no molecular biology.

In the last five years things have changed. Influenced by the Nuffield programme and the American BSCS curricula, and encouraged by some of the examining boards, schools have been swinging away from the descriptive approach and placing greater emphasis on investigation. Six of the examining boards have already rewritten their Advanced level syllabuses to take into account modern developments, and there has been a general shift from the memorization of facts to the understanding of principles.

Most teachers and students have welcomed these changes but they have brought problems. How far should one take the modern discoveries? What should one do about the traditional topics?

This book attempts to strike the right balance between the two. I have tried to reassess traditional topics such as anatomy and organ physiology in the light of recent advances and to combine both into a modern functional framework. Modern work in biology, particularly cell structure and function, is making it possible to draw together seemingly disconnected threads into a series of unifying principles, and it is these that I try to emphasize. I have kept the burden of descriptive facts to the minimum consistent with an understanding of these principles.

Within limits the chapters can be taken in any order. The grouping of the various topics and the overall sequence gives a thematic development that I personally favour, but I have intentionally made each chapter as self-contained as possible so as to give teachers and students maximum freedom and flexibility in using the book.

I have not included laboratory schedules or examination questions. To have done so would have made the book unwieldy, and I feel that such material is best dealt with separately. But biology is an experimental science and I have taken pains to give evidence for stated facts wherever possible, particularly where it would be difficult or impossible for the student to verify them for himself. This has obviously taken up space, but I have allowed room for it by omitting any systematic treatment of the animal and plant kingdoms. I decided at the outset that to include a superficial survey of the animal and plant kingdoms would be of little value and indeed would run contrary to the philosophy behind the book. Nevertheless I firmly believe that the 'whole organism' should occupy a central position in any basic biology text. I have therefore drawn examples from a wide range of organisms, describing each in sufficient detail to illustrate the basic principle under discussion.

This book is intended to be a pre-university text for prospective biologists, medical students and agriculturalists. At the same time I hope it may provide a useful introduction for the increasing number of students who choose to read biological science at university having done no formal biology at school. I have assumed an elementary knowledge of physics and chemistry, but I have tried to write the book in such a way that it is intelligible to a student who has not done biology before. I have not stuck rigidly to any particular syllabus but the content and approach should make the book suitable for those following any Advanced level biology syllabus or overseas equivalent.