
Preface

Though perhaps not as intimidating as writing a book from scratch, taking on a new edition of an established text is a daunting task. William and Daphne Elliott, in their preface to the fourth edition, described this as a book 'designed for undergraduates taking science and health-related courses in biochemistry and molecular biology' and said that their aim was 'to provide a text suitable for students meeting those subjects for the first time, but of sufficient depth to be intellectually satisfying ... written in an approachable style, but with lots of explanation to promote understanding.' Our experience of using this book for undergraduate courses is that they succeeded in their aim, achieving what one reviewer has described as a style that is 'refreshingly different more personal and more direct' that 'seems to take the reader on a one-to-one tutorial'. It is this admirable quality of the earlier editions that we have sought to retain. The book is aimed at students in the early years of their undergraduate programmes. It assumes little prior knowledge, and seeks to provide accessible explanations of terms and concepts that may be unfamiliar, while building up to a level that should enable students to tackle short review articles of the kind found in many journals. It also avoids giving the impression that biochemistry and molecular biology are closed subjects. Undergraduates at the beginning of their course are sometimes uncomfortable with the notion of uncertainty and ask to be given 'just the facts'. However, by emphasizing the relevance of this material to current medical and biological research and pointing out areas where our knowledge is still imperfect, we hope to give students an appreciation of the interest and importance of continuing developments and to inspire some of them to pursue their studies to a higher level.

It has been noted many times that adding new material to a textbook creates the dilemma of which older material should be discarded in order to keep the size of the book manageable. While we have tried to be up to date we have been relatively cautious about leaving anything out that was covered in previous editions, recent developments in metabolomics and cancer research having shown that those who suggested that certain metabolic topics or even the whole of metabolism were no longer worth learning were speaking prematurely. In genomics and molecular biology the vast quantity of new data and novel methodology presents particular challenges, and we have included some new material in that area. However, we have considered it worthwhile to retain coverage of techniques such as Southern blotting and library screening for now, even though they may be rarely used in modern laboratories, because we feel that knowledge of these methods provides an

historic framework that allows students to build up a thorough understanding of our present position. In order to save space and allow for these additions and retentions we have taken the step of moving online the suggestions for further reading and the web based bioinformatics exercise. This has the added advantage that these resources can be more easily updated.

About the book

The book is organized into six main parts:

- 1 Basic concepts of life
- 2 Structure and function of proteins and membranes
- 3 Metabolism and nutrition
- 4 Information storage and utilization
- 5 Cells and tissues
- 6 Protective mechanisms against disease.

The chapters are arranged to give a seamless progression through the subject but we recognize that the order in which topics are taught varies with the teacher. There is, therefore, extensive cross-referencing between chapters in order to help students with their learning.

What is new in this edition?

- All the chapters have been reviewed to update them. The extent of the update varies in the different chapters from extensive rewriting and major additions to minor changes. A number of complex areas, which some students find difficult, have been rewritten for increased clarity. These include X-ray crystallography and nuclear magnetic resonance (Chapter 5); mechanisms of transport, storage and mobilization of dietary components (Chapter 11); mechanisms of metabolic control and their applications to metabolic integration (Chapter 20); homologous recombination (Chapter 23); cell signalling, particularly the insulin receptor and insulin signalling (Chapter 29); and vesicle transport of proteins (Chapter 27).
- A new chapter has been added, General principles of nutrition (Chapter 9) to introduce the subject and the terminology before dealing with the handling of dietary components.

- Material on regulation of gene expression, both transcriptional and post-transcriptional, has been reorganized and moved into a single new chapter (Chapter 26). This chapter includes an updated section on the role of chromatin in eukaryotic gene control with a new box on Genomic imprinting disorders (Box 26.1). It also incorporates material on microRNAs and RNA interference, which was given a separate chapter in the previous edition.
- The last section of the book has been reorganized. Part 5, *Cells and tissues*, is designed to illustrate how cell communication and coordination of cell division and cell death take place in eukaryotes, and then to illustrate how perturbation of these processes may lead to cancer. Part 6 then deals briefly with some special topics relating to protective mechanisms against disease.
- Cell division (mitosis and meiosis) is dealt with in the same chapter as the cell cycle (Chapter 30), which also includes cell death (apoptosis).

In metabolism, attention has been paid to the clinical relevance of the biochemical events. New material includes:

- Lipid transport, including cholesterol homeostasis and the hyperlipoproteinaemias.
- An extensive review of the regulation of metabolism in the fed state, fasting state, starvation and diabetes mellitus.
- New boxes: The Warburg effect (Box 13.1); Glucose-6-phosphate dehydrogenase deficiency (Box 15.1); Alcohol and the oriental flushing syndrome (Box 16.1); The alpha and the omega of fatty acids and diet (Box 17.1).

Important developments covered in Chapter 28 on DNA manipulation include the following:

- An introduction to Next Generation Sequencing methods for DNA and the potential medical application of rapid sequencing. No doubt these topics will gain still greater prominence in future editions.

- The principle of Genome Wide Association Studies used for elucidation of genetic causes for common complex diseases such as type 2 diabetes and coronary heart disease.
- Recent promising clinical trials using human embryonic stem cells, and the production of induced pluripotent stem cells from patients and their use to model diseases.

Using the book

This book includes a number of features to help make it easy to use, and to make learning from it as effective as possible.

- Index of diseases. A separate index of diseases and medically relevant topics helps students on health-related courses to identify relevant topics.
- Medical boxes. These illustrate the direct relevance of biochemistry and molecular biology to medicine and health-related issues. A separate list of these boxes is shown on the Contents pages.
- Questions and answers. Questions at the end of each chapter (with answers at the back of the book) are designed to support student learning.
- Chapter summaries. Summaries at the end of each chapter highlight the key concepts presented and aid revision.
- Further reading references. References online direct the reader mainly to review articles of the shorter type found in Trends journals. References can be accessed by scanning the QR code image at the end of each chapter. QR Code images are used throughout this book. QR Code is a registered trademark of DENSO WAVE INCORPORATED. If your mobile device does not have a QR Code reader try this website for advice www.mobile-barcodes.com/qr-code-software.

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