

Preface

IN THIS text it is my intention to explain the major groups of methods used in the preparation of biological specimens for examination with the optical microscope. The scientific principles involved are illustrated by detailed descriptions of selected practical procedures. The reader should be in a position to understand exactly what he is doing and why he is doing it when carrying out any of the techniques.

It is not feasible to explain everything from first principles, so I have assumed that the reader's education in science includes the subjects of chemistry and biology to standards a little below those of the Advanced Level of the General Certificate of Education in Great Britain or a little above those of first-year university courses in North America. An elementary knowledge of biochemistry will also be helpful, and the interpretation of stained sections will obviously be easier for the reader who knows some histology. The methods discussed in this book are all applicable to the tissues of vertebrate animals. Most of them may also be used for invertebrates and plants.

The number of references to the literature has been kept fairly small. Those cited fall into three categories:

- (a) Books and review articles, to which the reader is referred for more information. References of this type are given both for the methods discussed in detail and for others which are mentioned only briefly.
- (b) Original papers of recent date when the material is not adequately covered in books or review articles.
- (c) Original papers concerned with controversial issues when the interested reader may wish to evaluate the evidence for himself.

Anyone proposing to use a histological or histochemical method in research or for any other important purpose is urged to find out as much as possible about the underlying physics and chemistry. Few of the methods used for staining tissues are fully understood, but sound scientific principles govern both the choice of the technique for a particular purpose and the practical conduct of the procedure. This book is not a collection of recipes to be

followed unthinkingly: the student will have to read the "theory" in order to carry out the "practice" intelligently. Although the text is set out in such a way that it may, with advantage, be read from beginning to end, many readers will want to refer only to single chapters. Numerous cross-references are given in order to avoid repetition of explanatory material contained in the various parts of the book. No student taking a course in histological techniques could reasonably be expected to memorize the whole book. Indeed, much of the content is included solely for purposes of reference: much of the material in Chapters 5 and 20 and all the detailed practical instructions, for example, fall into this category. It is not unreasonable that the text be available for consultation by students while sitting written or practical examinations.

The "theoretical" exercises at the end of each chapter should help the student to assess his own progress. These are mostly questions requiring deductive reasoning based on the information presented. The "practical" exercises may serve as a guide to teachers in planning laboratory classes. A few of the suggested experiments involve live animals: in Great Britain these must be carried out by a person holding a Home Office licence with the appropriate certificates. Universities and colleges in most other countries have their own regulations, which should be observed.

Various colleagues have commented on parts of the manuscript. I am especially grateful to Drs R. C. Buck, M. G. Cherian, B. A. Flumerfelt, P. Haase, and J. R. Sparrow. Their advice has resulted in several improvements to the text, but I remain responsible for any errors or failures to explain subjects clearly enough. Comments on the content and style of this book will be welcomed, especially from those readers who are making their first encounters with practical histology and histochemistry. My own understanding of these subjects has been acquired from having to use the methods in research, which has been supported by grants from several organizations. Thanks are due to the British Medical Research Council and the National Fund for Research into Crippling Diseases, and to the J. P. Bickell Foundation (Toronto), the Canadian Medical Research Council, the Multiple Sclerosis Society of Canada, and the Ontario Thoracic Society.

London, Ontario

J. A. KIERNAN