

Cambridge University Press

978-0-521-38539-8 - Practical Electron Microscopy: A Beginner's Illustrated Guide, Second Edition

Elaine Hunter

Frontmatter

[More information](#)

*Practical Electron
Microscopy*

- *Practical Electron
Microscopy*

*A beginner's illustrated guide
Second edition*

- Elaine Hunter
University Hospital, London, Ontario
- With contributions from
Peter Maloney and Moïse Bendayan

Cambridge University Press

978-0-521-38539-8 - Practical Electron Microscopy: A Beginner's Illustrated Guide, Second Edition

Elaine Hunter

Frontmatter

[More information](#)

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo, Delhi

Cambridge University Press

The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.orgInformation on this title: www.cambridge.org/9780521385398

First edition © Praeger Publishers 1984

This edition © Cambridge University Press 1993

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of the copyright holder.

First edition published by Praeger Publishers 1984

This edition published 1993

*A catalogue record for this publication is available from the British Library**Library of Congress Cataloguing in Publication data*

Hunter, Elaine E. (Elaine Evelyn)

Practical electron microscopy : a beginner's illustrated guide /

Elaine Hunter ; with contributions from Peter Maloney and Moïse

Bendayan. – 2nd ed.

p. cm.

Includes bibliographical references and index.

ISBN 0-521-38539-3 (pbk.)

1. Electron microscopy – Technique. 2. Transmission electron

microscopes – Laboratory manuals. I. Maloney, Peter, 1955–

II. Bendayan, Moïse. III. Title.

[DNLM: 1. Microscopy, Electron – methods. QH 212.E4 H945p]

QH0212.E4H86 1993

578'.45–dc20

DNLM/DLC

92-49456

for Library of Congress

CIP

ISBN 978-0-521-38539-8 paperback

Transferred to digital printing 2008

Cambridge University Press

978-0-521-38539-8 - Practical Electron Microscopy: A Beginner's Illustrated Guide, Second Edition

Elaine Hunter

Frontmatter

[More information](#)

*To my husband,
Iain*

● Contents

Foreword		ix
Preface		xi
Chapter 1	Fixation	1
Chapter 2	Dehydration and Embedding	17
Chapter 3	Cutting	31
Chapter 4	Immunoelectron Microscopy Moïse Bendayan	71
Chapter 5	Special Methods	93
Chapter 6	The Electron Microscope Peter Maloney	103
Chapter 7	Photography	135
Appendix		157
Index		171

● Foreword

This is a well-written, beautifully illustrated manual for electron microscopy. It reflects Elaine Hunter's very considerable experience in this field and offers both those setting out to use electron microscopic techniques and experienced individuals very useful information.

In tradition, this book is related to *Electron Microscopy, A Handbook for Biologists* written by Edgar Mercer, who was in charge of the Electron Microscopy suite at the John Curtin School of Medical Research at the Australian National University during my sojourn there as a postdoctoral fellow and Daniel Pease's *Histological Techniques for Electron Microscopy* used when I established an electron microscopy laboratory in Toronto in the 1960s. In Ms. Hunter's book the reader is taken through chapters on the handling of tissues and the necessary steps in fixation, processing, embedding, and examination of tissue to assure the best results from electron microscopy. I particularly like the comparative photographs with which the author illustrates the use of different techniques in tissue preparation and believe the "trouble-shooting" guide, when using an electron microscope, most useful. Special techniques commonly used in electron microscopy are covered and details of the importance of recording observations photographically are given. Above all, the importance of keeping detailed records of all activities is emphasized. Information related to protection of the health of those engaged in electron microscopy and for the disposal of noxious agents used is not forgotten.

Elaine Hunter is to be congratulated, not only in extending tradition but, in this book, making a reader aware of technology in this field.

M. D. Silver, Chairman
Department of Pathology
University of Toronto

● *Preface*

This book is an illustrated workbench manual of electron microscopy techniques. All the methods cited have been used successfully by the authors in both clinical and research laboratories and have proven to be both reliable and reproducible.

It is intended that someone with very little experience and using only this manual as a guide could set up and operate an electron microscopy laboratory. The preparative techniques outlined apply to animals and human material and are not necessarily applicable to plants and insects. Some will be especially helpful in a clinical setting, which is where the author is presently employed.

Usually only one technique has been outlined in each section, and the methods and materials are very specific and detailed. This has not been done to discredit other methods or products. Rather, it has been done for simplicity in order to eliminate pitfalls for the beginner, to get a reliable method working quickly and easily, and to present as many "tricks of the trade" as possible. Although the methods outlined have been tested extensively and are reliable, scrupulous attention to detail when both reading and applying them is advised. Laboratory cleanliness and accuracy in weighing and mixing chemicals are extremely important. Many of the chemicals used in electron microscopy are very dangerous, and great care should be exercised both in the handling and disposal of these chemicals.

References and descriptions have been kept to a minimum for the sake of clarity and to avoid confusing the novice. There are several very good texts on the market that go into great theoretical detail and provide a variety of special methods once the technologist has gained experience.

It was decided to include a section on immunoelectron microscopy and Dr. Moïse Bendayan, who is a leading expert in the field, very kindly consented to write this chapter. While this is not a field for the beginner, it is an area that is gaining popularity, and most laboratories in the biological field require personnel with a knowledge of the subject. Although it is a complicated field, Dr. Bendayan has made every effort to outline as simply as possible some basic techniques. Experience, expertise, and a wealth of current literature (much of it written by Dr. Bendayan) will enable the technologist to develop the area once basic skills have been mastered. I wish to thank him for his excellent contribution.

The chapter on the electron microscope was contributed by Peter Maloney who has been an electronic equipment specialist with Philips Electronics for ten years. In addition to being an expert service person and excellent trouble shooter, Peter has

Cambridge University Press

978-0-521-38539-8 - Practical Electron Microscopy: A Beginner's Illustrated Guide, Second Edition

Elaine Hunter

Frontmatter

[More information](#)

taken a complicated subject and made it both interesting to read and easy to understand. The line drawings were done by Peter's brother, John, who is a civil draftsman. The drawings and the picture of the transmission electron microscope were used with the permission of Philips Electronics.

Few authors have had the advantage of the dedicated and meticulous editorial assistance given by my husband, Iain. He has devoted hours to reading, changing, and sometimes rewriting with the intended audience in mind. After years of doing the same techniques, it is easy to forget the many little traps one fell into as a beginner. Iain never failed to ask: Why? How? Why that way and not this way? Did you really mean to say this? Are you sure you didn't leave something out here? I thank him for his patience, guidance, and help.

Most of the manuscript was typed into WordPerfect by Mr. Geoffrey Thoms, Computer Science teacher at Lord Dorchester Secondary School, Middlesex County, Ontario. His help was greatly appreciated. I am grateful also to University Hospital for providing such excellent facilities. In particular my thanks go to Peter Munavich of the Pathology Department, to Kathy Stuart and Steve Mesjaric, Instructional Resources, for their photographic assistance, as well as to George Moogk for many of the line drawings. All are employed at University Hospital.

Special thanks are due to Cambridge University Press and especially to Dr. Robin Smith, whose patience and support through some rather difficult times went well beyond the call of duty.

Elaine Evelyn Hunter
London, Ontario
Canada