

CONTENTS

Contributors	xii
Preface	xviii
Acknowledgments	xx
 1. Electron Microscopy of Viruses	
<i>Michael Laue</i>	
I. Introduction	2
II. Rationale	3
III. Methods	4
IV. Instrumentation and Materials	14
V. Discussion	15
References	18
 2. Bacterial TEM: New Insights from Cryo-Microscopy	
<i>Martin Pilhofer, Mark S. Ladinsky, Alasdair W. McDowell, and Grant J. Jensen</i>	
I. Introduction	22
II. Methods Involving Dehydration and Metal Stains	24
III. Cryo-Electron Microscopy	34
References	41
 3. Analysis of the Ultrastructure of Archaea by Electron Microscopy	
<i>Reinhard Rachel, Carolin Meyer, Andreas Klingl, Sonja Günster, Thomas Heimerl, Nadine Wasserburger, Tillmann Burghardt, Ulf Küper, Annett Bellack, Simone Schopf, Reinhard Wirth, Harald Huber, and Gerhard Wanner</i>	
I. Introduction	48
II. Growth of Cells for Electron Microscopy	49
III. Preparation for Transmission Electron Microscopy	51
IV. Preparation for Scanning Electron Microscopy	61
V. Instrumentation and Methods	64
VI. Conclusions	66
References	66
 4. <i>Chlamydomonas</i> : Cryopreparation Methods for the 3-D Analysis of Cellular Organelles	
<i>Eileen T. O'Toole</i>	
I. Introduction and Historical Perspectives	72

II. Rationale	73
III. Methods	74
IV. Instrumentation and Materials	85
V. Summary	88
References	88
5. Ultrastructure of the Asexual Blood Stages of <i>Plasmodium falciparum</i>	
<i>Eric Hanssen, Kenneth N. Goldie, and Leann Tilley</i>	
I. Introduction	94
II. Rationale	106
III. Methods	107
IV. Materials	111
References	112
6. Electron Tomography and Immuno-labeling of <i>Tetrahymena thermophila</i> Basal Bodies	
<i>Thomas H. Ciddings Jr., Janet B. Meehl, Chad G. Pearson, and Mark Winey</i>	
I. Introduction	118
II. Rationale	122
III. Methods	123
IV. Instrumentation and Materials	133
V. Discussion	136
References	139
7. Electron Microscopy of <i>Paramecium</i> (Ciliata)	
<i>Klaus Hausmann and Richard D. Allen</i>	
I. Introduction	143
II. Methods	145
III. Final Remarks	171
References	171
8. Ultrastructural Investigation Methods for <i>Trypanosoma brucei</i>	
<i>Johanna L. Höög, Eva Gluenz, Sue Vaughan, and Keith Gull</i>	
I. Introduction	176
II. Rationale	177
III. Methods	177
IV. Materials	191
V. Discussion	192
VI. Summary	193
References	194

9. <i>Dictyostelium discoideum</i> : A Model System for Ultrastructural Analyses of Cell Motility and Development	
Michael P. Koonce and Ralph Gräf	
I. Introduction	198
II. Current Approaches	201
III. Future Challenges	208
IV. Summary Comments	211
References	212
10. Toward Sub-second Correlative Light and Electron Microscopy of <i>Saccharomyces cerevisiae</i>	
Christopher Buser	
I. Introduction	218
II. Rationale	221
III. Methods	224
IV. Materials	225
V. Results	226
VI. Discussion	230
References	233
11. Fission Yeast: A Cellular Model Well Suited for Electron Microscopy Investigations	
Hélio Roque and Claude Antony	
I. Introduction	236
II. Rationale	238
III. EM Methods	239
IV. Instrumentation, Materials, and Reagents	248
V. <i>Schizosaccharomyces pombe</i> : Some Major Advances using EM	249
VI. Discussion and Outlook	252
VII. Summary	255
References	255
12. Electron Microscopy and High-Pressure Freezing of <i>Arabidopsis</i>	
Byung-Ho Kang	
I. Introduction	260
II. Rationale	262
III. Methods	262
IV. Materials	276
V. Discussion	278
VI. Concluding Remarks	279
References	280

13. Preparation Techniques for Transmission Electron Microscopy of *Hydra**Thomas W. Holstein, Michael W. Hess, and Willi Salvenmoser*

I. Introduction	286
II. Rationale	288
III. Methods	288
IV. Materials	297
V. Results and Discussion	298
VI. Concluding Remarks	301
References	302

14. Electron Microscopy of Flatworms: Standard and Cryo-Preparation Methods

Willi Salvenmoser, Bernhard Egger, Johannes G. Achatz, Peter Ladurner, and Michael W. Hess

I. Introduction	308
II. Rationale	310
III. Methods	310
IV. Materials	322
V. Results and Discussion	323
VI. Concluding Remarks	326
References	327

15. Three-Dimensional Reconstruction Methods for *Caenorhabditis elegans* Ultrastructure*Thomas Müller-Reichert, Joel Mancuso, Ben Lich, and Kent McDonald*

I. Introduction	332
II. Rationale	340
III. Methods	340
IV. Materials and Instrumentation	353
V. Discussion	355
References	358

16. Insects as Model Systems in Cell Biology

Thomas A. Keil and R. Alexander Steinbrecht

I. Introduction	364
II. Rationale	366
III. Methods	366
IV. Materials	378
V. Results and Discussion	379
VI. Concluding Remarks	387
VII. Summary	388
References	388

17. Electron Microscopy of the Amphibian Model Systems *Xenopus laevis* and *Ambystoma mexicanum*

Thomas Kurth, Jürgen Berger, Michaela Wilsch-Bräuninger, Susanne Kretschmar, Robert Cerny, Heinz Schwarz, Jan Löffberg, Thomas Piendl, and Hans H. Epperlein

I. Introduction	396
II. Rationale	397
III. Methods	398
IV. Materials	415
V. Discussion and Outlook	416
References	418

18. Modern Approaches for Ultrastructural Analysis of the Zebrafish Embryo

Nicole L. Schieber, Susan J. Nixon, Richard I. Webb, Viola M.J. Oorschot, and Robert G. Parton

I. Introduction	426
II. Rationale	428
III. Methods	429
IV. Materials	437
V. Concluding Remarks and Perspectives	439
References	440

19. Transmission Electron Microscopy of Cartilage and Bone

Douglas R. Keene and Sara F. Tufta

I. Introduction	444
II. Rationale	446
III. Methods	446
IV. Materials	468
V. Concluding Remarks	470
References	470

20. Electron Microscopy of the Mouse Central Nervous System

Wiebke Möbius, Benjamin Cooper, Walter A. Kaufmann, Cordelia Imig, Torben Rühwedel, Nicolas Snaidero, Aiman S. Saab, and Frédérique Varoqueaux

I. Introduction	476
II. Rationale	479
III. Methods	480
IV. Materials	494
V. Results and Discussion	495
VI. Concluding Remarks	508
References	508

21. Rapidly Excised and Cryofixed Rat Tissue

Dimitri Vanhecke, Werner Graber, and Daniel Studer

I. Introduction	514
II. Rationale	516
III. Methods	516
IV. Materials	520
V. Results and Discussion	521
References	525

22. The Actin Cytoskeleton in Whole Mount Preparations and Sections

Guenter P. Resch, Edit Urban, and Sonja Jacob

I. Introduction and Rationale	530
II. Whole Mount Techniques	531
III. Sectioning Techniques	553
IV. Summary	556
References	557

23. Three-Dimensional Cryo-Electron Microscopy on Intermediate Filaments

Robert Kimse, Cédric Bouchet-Marquis, Cynthia Page, and Andreas Hoenger

I. Introduction	566
II. Rationale	568
III. Methods	569
IV. Materials	578
V. Discussion	581
References	586

24. Correlative Time-Lapse Imaging and Electron Microscopy to Study
Abscission in HeLa Cells*Julien Guizetti, Jana Mäntler, Thomas Müller-Reichert, and Daniel W. Gerlich*

I. Introduction	592
II. Rationale	593
III. Methods	594
IV. Instrumentation and Materials	599
V. Discussion	600
References	601

25. Viral Infection of Cells in Culture—Approaches for Electron Microscopy

Paul Walther, Li Wang, Sandra Ließem, and Giada Frascaroli

I. Introduction	604
II. Rationale	605
III. Methods	606

IV. Materials	613
V. Discussion	615
References	617

26. Intracellular Membrane Traffic at High Resolution

*Jan R.T. van Weering, Edward Brown, Thomas H. Sharp, Judith Mantell,
Peter J. Cullen, and Paul Verkade*

I. Abstract	620
II. Introduction	620
III. Methods	624
IV. Outlook	643
V. Materials and Equipment	644
References	645

27. 3D Versus 2D Cell Culture: Implications for Electron Microscopy

*Michael W. Hess, Kristian Pfäfler, Hannes L. Ebner, Beate Beer,
Daniel Hekl, and Thomas Seppi*

I. Introduction	650
II. Rationale	652
III. Methods	652
IV. Materials	657
V. Results	659
VI. Discussion	662
VII. Synopsis	666
References	667

28. "Tips and Tricks" for High-Pressure Freezing of Model Systems

*Kent McDonald, Heinz Schwarz, Thomas Müller-Reichert, Rick Webb,
Christopher Buser, and Mary Morpheu*

I. Introduction	672
II. Rationale	672
III. Methods	673
References	691

Subject Index	695
---------------	-----

Volumes in Series	717
-------------------	-----