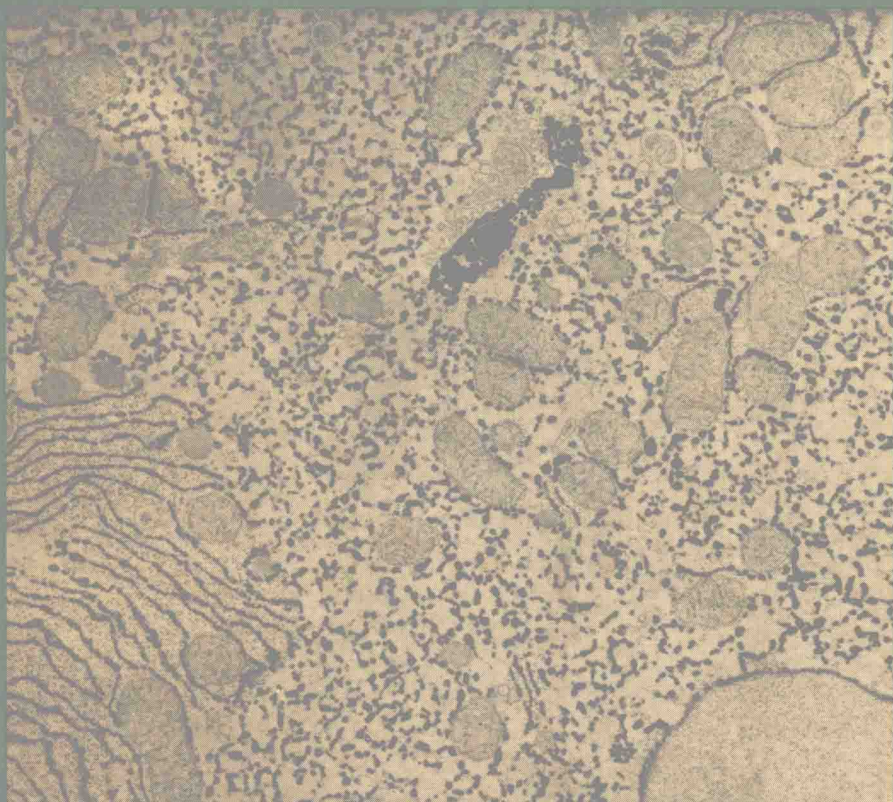


POSITIVE STAINING FOR ELECTRON MICROSCOPY



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Positive Staining for Electron Microscopy

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*To My Friends
For Their Compassion—
the only universal virtue*

PREFACE

In general, the available information on the chemical reactions between staining reagents and cellular ligands is meager. Moreover, this information has been scattered, mostly in scientific journals. This paucity of information is responsible for the “staining controversies” such as the staining specificity of phosphotungstic acid. In the absence of such information, it is difficult to achieve correct interpretation with regard to the location, structure, chemical composition, size, concentration, and function of various cell components.

Information on the chemistry of staining, however, has been emerging steadily because of the efforts of many scientists from various countries. As a result, we now know, at least in some cases, the precise chemical reactions involved between specific staining reagents and tissue ligands. Positive staining has already provided considerable information on the shape and size of molecules, although little is known concerning the distribution of chemical groups within them. Improvements in specific staining and the use of high resolution electron microscopy are expected to facilitate the resolution of many problems in molecular biology. Even a few years ago it would have been almost impossible to write a comprehensive book on positive staining for electron microscopy, although coordination complexes from a chemical point of view and in model systems have been studied extensively over the past century, and several excellent monographs deal with them. Today, sufficient information on various aspects of staining is available, which warrants the publication of this book.

This book presents what is known definitively, the gaps in our current knowledge, and ideas in progress. In the case of a controversy, an attempt has been made to present both sides. Alternative procedures and potential research areas also are pointed out. It is my hope that with this approach, the reader will better appreciate the advantages as well as the limitations and uncertainties encountered in interpreting the data on staining. I also hope that the information presented here will provide stimulation and groundwork for deeper study and understanding of the chemistry of staining.

The book provides in detail almost all the available methods of staining for electron microscopy. No attempt was made to include procedures which belong exclusively to the area of electron microscopy of enzymes, since a multivolume treatise on this subject is being published by the author. Although the majority of the methods presented have been tested for their reliability, they are subject to modifications depending upon the objective of the study. The instructions for the preparation of staining solutions and buffers are straightforward and complete, and should enable the readers to prepare their own specimens without outside help. It is suggested that the entire procedure be read and necessary solutions prepared prior to undertaking the processing. An exhaustive list of references with complete titles is provided, as are full author and subject indexes.

This book is addressed primarily to those interested in electron microscopy, but information on the chemistry of staining should also be helpful to those involved with the techniques for light microscopy. The book is intended not only for teachers and scientists but also for students, technicians, and research workers not familiar with staining techniques.

I am grateful to Drs. Gunter Bahr, Michael Beer, James Coleman, R. Lillie, and Lee Peachey for their valuable suggestions.

M. A. HAYAT

Contents to Principles and Techniques of Electron Microscopy

Volume 1

FIXATION

EMBEDDING

SECTIONING

STAINING

SUPPORT FILMS

Volume 2

FREEZE-SUBSTITUTION AND FREEZE-DRYING, Lionel I. Rebhun

THE FREEZE-ETCHING TECHNIQUE, James K. Koehler

NEGATIVE STAINING, Rudy H. Haschemeyer and Robert J. Meyers

SHADOW CASTING AND REPLICATION, W. J. Henderson and K. Griffiths

HIGH RESOLUTION AND SHADOWING, R. Aberman, M. M. Salpeter and
L. Bachmann

AUTORADIOGRAPHY, M. M. Salpeter and L. Bachmann

Volume 3

THE ELECTRON MICROSCOPE, Saul Wischnitzer

ELECTRON MICROSCOPY OF SELECTIVELY STAINED MOLECULES,

T. Koller, M. Beer, M. Müller and K. Mühlethaler

HIGH RESOLUTION DARK-FIELD ELECTRON MICROSCOPY,
Jacques Dubochet

IN-FOCUS PHASE CONTRAST ELECTRON MICROSCOPY, H. M. Johnson

ELECTRON MICROSCOPIC EVALUATION OF SUBCELLULAR

FRACTIONS OBTAINED BY ULTRACENTRIFUGATION, Russell L. Deter

STEREOLOGICAL TECHNIQUES FOR ELECTRON MICROSCOPIC

MORPHOMETRY, Ewald R. Weibel and Robert P. Bolender
 CRITICAL POINT-DRYING METHOD, M. A. Hayat and B. R. Zirkin

Volume 4

OPTICAL SHADOWING, Glen B. Haydon
 RELATIVE MASS DETERMINATION IN DARKFIELD ELECTRON
 MICROSCOPY, G. J. Brakenhoff
 CORRELATIVE LIGHT AND ELECTRON MICROSCOPY OF SINGLE
 CULTURED CELLS, Zane H. Price
 DENATURATION MAPPING OF DNA, Ross B. Inman and Maria Schnöss
 EXAMINATION OF POLYSOME PROFILES FROM CARDIAC MUSCLES,
 Kenneth C. Hearn
 PARTICLE COUNTING OF VIRUSES, Mahlon F. Miller II
 ULTRAMICROINCINERATION OF THIN-SECTIONED TISSUE,
 Wayne R. Hohman
 PREPARATORY METHODS FOR ELECTRON PROBE ANALYSIS,
 James R. Coleman and A. Raymond Terepka

Volume 5

QUANTITATIVE MAPPING WITH THE ELECTRON MICROSCOPE,
 Peter Sterling
 PHOTOGRAPHIC ASPECTS OF ELECTRON MICROSCOPY, G. C. Farnell
 and R. B. Flint
 ENVIRONMENTAL DEVICES IN ELECTRON MICROSCOPY, David L.
 Allinson
 OPTICAL DIFFRACTOMETRY, Bjørn V. Johansen
 THE ANALYTICAL ELECTRON MICROSCOPY, EMMA-4, Barry A. Weavers

Volume 6

HIGH VOLTAGE ELECTRON MICROSCOPY, Colin Humphreys
 THE PRINCIPLES OF HIGH RESOLUTION ELECTRON MICROSCOPY,
 J. M. Cowley
 CONTRAST AND IMAGE FORMATION OF BIOLOGICAL SPECIMENS,
 R. E. Burge
 THE ANALYSIS OF BIOLOGICAL STRUCTURES WITH X-RAY
 DIFFRACTION TECHNIQUES, Alexander McPherson, Jr.
 TILTING EXPERIMENTS IN THE ELECTRON MICROSCOPE,
 Rainer H. Lange
 ELECTRON AUTORADIOGRAPHY OF FREE SPECIMENS,
 Nadir M. Maraldi

CRYOULTRAMICROTOMY, René Simard
ELECTRON INTERFERENCE MICROSCOPE, T. Hibi and K. Yada

Volumes 7----

RADIATION DAMAGE TO BIOLOGICAL SPECIMENS
OPTICAL IMAGE RECONSTRUCTION
QUANTITATIVE THREE-DIMENSIONAL ELECTRON MICROSCOPY
AUTOMATED IMAGE ANALYSIS
FREEZE-DRYING OF VIRUSES AND MACROMOLECULES,
COUNTING OF ELECTRON DENSITIES
MIRROR ELECTRON MICROSCOPY
SCANNING TRANSMISSION ELECTRON MICROSCOPE
AUTORADIOGRAPHY OF FREEZE-DRIED AND DRY-MOUNTED
SPECIMENS
SCANNING TRANSMISSION ION MICROSCOPY
COMPUTER TECHNOLOGY FOR RECONSTRUCTION OF SERIAL
SECTIONS
MOLECULAR HYBRIDIZATION
INTERFERENCE PHENOMENON ON OSMIUM TETROXIDE-FIXED
SPECIMENS
SPECIMEN SUPPORT FILMS FOR HIGH RESOLUTION ELECTRON
MICROSCOPY
LOW VOLTAGE ELECTRON MICROSCOPY
THREE-DIMENSIONAL IMAGE RECONSTRUCTION
CALIBRATION OF ELECTRON MICROSCOPE MAGNIFICATION
VISUALIZATION OF RNA IN VIRUSES
ELECTRON MICROSCOPY OF ISOLATED NUCLEAR COMPONENTS
CRYOSECTIONING OF MUSCLE
STUDY OF CHROMOSOMES USING G-BANDING TECHNIQUE
EQUIDENSITOMETRY
LORENTZ ELECTRON MICROSCOPY
EQUIDENSITE ROTATION TECHNIQUE
VISUALIZATION OF CHROMOSOME BANDS

Contents to Electron Microscopy of Enzymes

Volume 1

SPECIMEN PREPARATION, M. A. Hayat

PHOSPHATASES, Edward Essner

GLYCOSIDASES (β -Glucuronidase, β -Glucosidases), I. D. Bowen

GLYCOSIDASES (N-Acetyl- β -Glucosaminidase), D. Pugh

GLUTAMATE OXALACETATE TRANSAMINASE, Sin Hang Lee

MYROSINASE IN CRUCIFEROUS PLANTS, Tor-Henning Iversen

ENZYME IMMUNOCYTOCHEMISTRY, Ludwig A. Sternberger

Volume 2

HEMOPROTEINS, Edward Essner

ACYLTRANSFERASES, Joan A. Higgins

POLYPHENOLOXIDASES (Plants), Yvette Czaninski and Anne-Marie Catesson

TYROSINASE, John J. Eppig, Jr.

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Volume 3

ESTERASES-NONSPECIFIC ESTERASES, Theodore K. Shnitka

PURINE NUCLEOSIDE PHOSPHORYLASE, Rafael Rubio

CELLULASE, Arya K. Bal

CARBONIC ANHYDRASE, Marie Mullaney Cassidy and Fred G. Lightfoot

CARBONIC ANHYDRASE-ALTERNATIVE METHOD, Seymour Rosin

CREATINE PHOSPHOKINASE, E. Christis Farrell and Nobuhisa Baba

ACETYL COENZYME A CARBOXYLASE, Joan A. Higgins and R. D. Yates

Volume 4

OXIDOREDUCTASES, Jacob S. Hanker

5-NUCLEOTIDE PHOSPHODIESTERASE, K. C. Tsou

MALATE SYNTHASE, Richard N. Trelease

LOCALIZATION OF ENZYMATIC ACTIVITY IN SUBCELLULAR

FRACTIONS, A. A. El-Aaser and Eric Reid

NAD-PYROPHOSPHORYLASE, E. Ungar and I. B. Buchwalow

APPLICATION OF ELECTRON AUTORADIOGRAPHY TO ENZYME

LOCALIZATION, J. Jacob and G. C. Budd

Volumes 5 ---

GLUTAMIC ACID DECARBOXYLASE

GLYCOGEN PHOSPHORYLASE

3,5-CYCLIC NUCLEOTIDE PHOSPHODIESTERASE

AMINO PEPTIDASES

5' NUCLEOTIDASE

URATE OXIDASE

ACETYLCHOLINESTERASE

PROLYL HYDROXYLASE

PHENYLETHANOLAMINE-N-METHYLTRANSFERASE

LOCALIZATION OF ENZYMES IN BACTERIA

FRUCTOSE 1,6-BIPHOSPHATE ALDOLASE

Contents to Principles and Techniques of Scanning Electron Microscopy

Volume 1

THE SCANNING ELECTRON MICROSCOPE, J. Temple Black

CRITICAL POINT DRYING, Arthur L. Cohen

CRYOTECHNIQUES, Tokio Nei

FROZEN RESIN CRACKING METHOD AND ITS ROLE IN CYTOLOGY,
Keiichi Tanaka

PREPARATION OF STEREO SLIDES FROM ELECTRON MICROGRAPH
STEREOPAIRS, Michael Nemanic

LOW-MAGNIFICATION STUDY OF UNCOATED SPECIMENS, H. F. Howden
and L. E. C. Ling

SPORES, Ann W. Nickerson, Lee A. Bulla, Jr., and Cletus P. Kurtzman

THE AERIAL SURFACES OF HIGHER PLANTS, P. J. Holloway and
E. A. Baker

PLANT CELL WALLS AND INTRACELLULAR STRUCTURES,
Lewis G. Briarty

INTRACELLULAR STRUCTURES, Barbara J. Panessa and Joseph F.
Gennaro, Jr.

WOOD, Karl Borgin

Volume 2

CATHODOLUMINESCENCE OF ORGANIC CHEMICALS, M. De Mets

CATHODOLUMINESCENCE OF HERBICIDES, Richard H. Falk

SILVER AS A STAIN, H. D. Geissinger

SECTIONS INCUBATED IN THE HISTOCHEMICAL MEDIA, Takashi Makita

SCANNING AND TRANSMISSION ELECTRON MICROSCOPY OF SINGLE
TISSUE SPECIMENS, M. Gary Wickham and David M. Worthen

SOFT TISSUES OF MARINE TELEOSTS, Gary Hobson Dobbs, III
CILIATED EPITHELIA, Ellen Roter Dirksen
EMBRYONIC AND FETAL TISSUES OF VERTEBRATES, Robert E.
Waterman
LUNG, Charles Kuhn, III
BONE AND OTHER HARD TISSUES, Alan Boyde and Sheila J. Jones
FOSSIL PALYNOMORPHS, H. A. Leffingwell

Volume 3

ISOLATED GIANT CHROMOSOMES, Ch. Holderegger
MICRODISSECTION, J. B. Pawley, T. L. Hayes, and J. A. Nowell
VERY SMALL BIOLOGICAL SPECIMENS, Thomas L. Hayes and James B.
Pawley
MICROORGANISMS, Agnes C. Kormendy
CULTURED AND FREE LIVING CELLS, R. M. Albrecht and A. P.
MacKenzie
STEREOGRAPHIC TECHNIQUES, Ian C. Clarke
APPLICATION OF A FIELD EMISSION SOURCE TO SEM, Leonard M.
Welter

Volume 4

PREPARATION AND EXAMINATION OF SPECIMENS AT LOW
TEMPERATURES, George R. Koch
THIOCARBOHYDRAZIDE-MEDIATED OSMIUM BINDING: A Technique for
Protecting Soft Biological Specimens in the Scanning Electron Microscopy,
Robert O. Kelley, Ronald A. F. Dekker, and John G. Bluemink
REPLICA TECHNIQUES, Cornelis H. Pameijer
SPERMATOZA, Baccio Baccetti
ELECTRON PROBE X-RAY MICROANALYSIS, A. T. Marshall
SCANNING ELECTRON SPECTROMETERIC MICROSCOPY, Raymond K.
Hart

Volumes 5-6

SCANNING X-RAY MICROSCOPE
METAL STAINING AND BACKSCATTER ELECTRON IMAGING
VASCULAR CASTS OF BLOOD VESSELS
REPLICAS OF TISSUES
SCANNING TRANSMISSION ELECTRON MICROSCOPY OF FROZEN
SPECIMENS
REMOVAL OF RESINS FROM SPECIMENS FOR SEM

INJECTION REPLICA TECHNIQUE
HAPTEN-SANDWICH LABELING IN SEM
SCANNING ELECTRON MICROSCOPY OF CONCANAVALIN A BINDING
VIRUSES
CHROMOMERES
HUMAN KIDNEY
BACTERIOPHAGES
ORGANELLES
HUMAN CEREBRAL VENTRICULAR SURFACES
STEREO SEM TECHNIQUES
PREPARATION OF PLAQUE
CARTILAGE
HUMAN PLATELET AGGREGATES
LIVER
WET CHEMICAL METHOD FOR SEM SPECIMENS
SCANNING TRANSMISSION ENERGY ANALYZING MICROSCOPE
PHOTOGRAPHIC RECORDING OF INFORMATION FROM SEM
SCANNING ELECTRON MICROSCOPY IN FORENSIC SCIENCE

CONTENTS

PREFACE	vii
INTRODUCTION	1
IMAGE CONTRAST	8
FACTORS AFFECTING CONTRAST	9
DURATION OF STAINING	11
SIZE OF STAIN AGGREGATES	11
STAIN SPECIFICITY	12
STAINS	14
Lead	17
Mechanism of Staining	19
Reaction with Membranes	21
Reaction with Glycogen	21
Reaction with Other Cell Components	22
Lead Hydroxide	23
Lead Acetate	27
Lead Tartrate	29
Lead Citrate	29
Glycogen Staining	31
Tricomplex Fixation and Staining	31
Uranyl Preparations	33
Mechanism of Staining	35
Reaction with Nucleic Acids	36
Reaction with Proteins	37
Reaction with Lipids	38
Overall Effect on Tissues	39
pH	42
Other Factors Affecting Uranyl Staining	43
Staining Solutions	44
Phosphotungstic Acid	47

Mechanism of Staining	47
pH	55
Fixation and Staining Procedures	57
Staining of Ultrathin Frozen Sections	62
Phosphotungstic Acid-Chromic Acid	63
Phosphotungstic Acid-Hematoxylin	64
Acriflavin-Phosphotungstate	64
Potassium Permanganate	66
Osmium Tetroxide	69
Osmeth	75
Iodide-Osmium Tetroxide Mixtures	75
Zinc Iodide-Osmium Tetroxide	75
Sodium Iodide-Osmium Tetroxide	83
Potassium Pyroantimonate-Osmium Tetroxide	84
Mechanism of Staining	88
Reliability of the Method	89
Fixation and Staining Procedures	93
Silver Lactate-Osmium Tetroxide	99
Osmium Tetroxide-Dimethylethylenediamine	101
Oxalate-Glutaraldehyde	101
Diaminobenzidine-Osmium Tetroxide	106
Ferrocenylmethyl Carboxyhydrazide	108
Preparation of FMC	108
Procedure	110
Thiosemicarbazide and Thiocarbohydrazide	110
Periodic Acid-Thiosemicarbazide or Thiocarbohydrazide-Silver Proteinates	111
Periodic Acid-Thiosemicarbazide or Thiocarbohydrazide-Osmium Tetroxide	117
Sodium Periodate-Thiosemicarbazide-Osmium Tetroxide	119
Osmium Amine	121
Silver	124
Mechanism of Staining	124
Fixation and Staining Procedures	129
Periodic Acid-Silver Method	141
Periodic Acid-Chromic Acid-Silver Method	143
Golgi Impregnation Method	146
Iron	146
Mechanism of Staining	147
pH	154
Rate of Penetration	156

Mode of Staining	156
Staining Solutions	156
Ruthenium Red	162
Penetration	163
Impurities	164
Applications	164
Effect on the Cell Surface	166
Role in Ion Transport	166
Mechanism of Staining	166
Fixation and Staining Procedures	169
Ruthenium Violet	176
Lanthanum	176
Effects on Calcium Metabolism	182
Mechanism of Staining	182
Fixation and Staining Procedures	183
Alcian Blue	187
Mechanism of Staining	187
Fixation and Staining Procedures	189
Purification Procedure	191
Thorium	191
Fixation and Staining Procedures	193
Concanavalin A	194
Isolation and Purification	197
Application in Microscopy	200
Mechanism of Staining	201
Fixation and Staining Procedures	202
Tris 1-AziridinyI Phosphine Oxide	211
Tetraphenylporphine Sulfonate	211
Fixation and Staining Procedures	213
Bismuth	215
Fixation and Staining Procedures	216
Indium	219
Fixation and Staining Procedures	220
Vanadium	221
Mercury	221
Fixation and Staining Procedures	225
Golgi Impregnation Method	228
Thallium	229
Fixation and Staining Procedure	232
Zirconium	233
Compounds of Zirconium	233