

PROCEEDINGS
ELECTRON MICROSCOPY
SOCIETY OF AMERICA

FORTIETH ANNUAL
MEETING

1982

Edited by
G. W. BAILEY

PROCEEDINGS

FORTIETH ANNUAL MEETING

ELECTRON MICROSCOPY SOCIETY OF AMERICA

WASHINGTON, D.C.

August 9-13, 1982

Editor

G. W. BAILEY

Baton Rouge

CLAITOR'S PUBLISHING DIVISION

1982

Copyright, 1982

by

CLAITOR'S PUBLISHING DIVISION

Library of Congress Catalog Card No. 68-3947

PERMISSIONS AND INQUIRIES

Individual readers of this book, and nonprofit libraries acting for them, are freely permitted to make fair use of the material in it, such as to copy any article for use in teaching or research. Other permissions and inquiries regarding the individual papers should be directed to the authors.

Published and for sale by:
CLAITOR'S PUBLISHING DIVISION
3165 S. Acadian at I-10
P. O. Box 3333
Baton Rouge, Louisiana 70821

1982 AWARDS
ELECTRON MICROSCOPY SOCIETY OF AMERICA

EMSA Distinguished Awards

Physical Science Benjamin M. Siegel
Biological Science Richard M. Eakin

Burton Medal Nestor Zaluzec

Presidential Scholars

Samuel S. Bowser, Jr.
State University of New York at Albany

Robert M. Briber
University of Massachusetts

Andrew H. Falls
University of Minnesota

M. John Hicks
University of Iowa

V. Jayaram
Stanford University

E. A. Kamenetzky
University of California, Berkeley

Stephen T. Koury
State University of New York at Albany

Jean-Marc Lang
University of California, Berkeley

Linda M. Marshall
University of Mississippi

C. Narayan
Lehigh University

L. M. Parysek
State University of New York at Buffalo

Christine A. Sundermann
University of Georgia

R. A. Youngman
Case-Western Reserve University

ELECTRON MICROSCOPY SOCIETY OF AMERICA

Established 1942

OFFICERS 1982

Executive Council

President	Lee D. Peachey
President Elect	David B. Wittry
Past President	John J. Hren
Council Secretary	Frances L. Ball
Treasurer	Kenneth R. Lawless
Directors	Ray W. Carpenter
	Robert F. Dunn
	David C. Joy
	Barbara J. Panessa-Warren
	Birgit H. Satir
	Linda C. Sawyer
	Ben O. Spurlock

Appointed Officers

Statistical Officer	John H. L. Watson
Bulletin Editor	Ron Anderson
Proceedings Editor	G. William Bailey
Publications Committee	John Silcox
1982 Local Arrangements Co-Chairmen	Robert L. Myklebust
	Dale E. Newbury

1982 Program Committee

T. E. Mitchell, Chairman
Patricia G. Calarco, Vice-Chairman
Nina Allen
Ron Anderson
Michael Beer
James Bentley
C. B. Carter
Robert M. Glaeser
Linn W. Hobbs
Lincoln V. Johnson
Edward A. Kenick
Charles E. Lyman
William B. McCombs
E. Rodriguez-Boulan
Albert J. Saubermann
James A. Sprague
Judy M. Strum
David B. Williams

1982 Education Committee

Morton D. Maser, Chairman
Linn W. Hobbs
Judith Murphy
Bill Redmond
Caroline Schooley
Philip S. Sklad

PREFACE

Our EMSA Proceedings has grown considerably from last year—we are back on stream! Based on the number and quality of the papers in this volume we should have an excellent annual meeting, one of our best. Our colleagues from the Microbeam Analysis Society join us again this year and will have their papers published in a separate Proceedings.

This Proceedings is the result of much hard work and cooperation by many people, especially the 1982 EMSA Program Committee, the 1982 Local Arrangements Committee and the EMSA Council. I would also like to acknowledge the help of Creighton Smith for his editorial assistance, my wife, Pat, and daughter, Lisa, for their secretarial work and proofreading. I would also like to express my thanks for the support and encouragement that I have received from the Exxon Research and Development Laboratories during the planning, preparation and publishing of this Proceedings.

G. W. BAILEY

FOREWORD

LEE D. PEACHEY

President of the Electron Microscopy Society of America

Every annual meeting is an important one, but this year's may be especially important in several regards. This year we rejoin the Microbeam Analysis Society, after a year of meeting separately. The problems of combining the two meetings have resurfaced, though overall it should work out as a result of hard work and a more integrated program committee arrangement than we have had in the past. Basic policy differences between the two Societies, such as reimbursement of invited speakers, continue to make things difficult, and will continue to do so until we somehow resolve these differences more permanently. We will meet jointly with MAS again in Phoenix in 1983, and with the Microscopical Society of Canada in Detroit in 1984, so we will do well to work on smoothing out operations for joint meetings.

Another reason this meeting is especially important is that it comes in a year when support for research and meetings is even more restrictive than it has been over the last few years. Our attendance may be down this year, unless the location in Washington keeps it up. If attendance is down, we will need to worry about the future structure and viability of our meetings. Phoenix probably will be an even bigger test, since the average travel distance for our members will be considerably higher than for Washington. Personally I would hate to see *de facto* separate west coast and east coast meetings, but I wouldn't be surprised to see a trend in that direction if funding levels continue to decline while travel costs continue to rise, so that fewer of us can afford to cross the country for a meeting. Unfortunately, meeting in the middle of the country isn't an automatic solution, since then an even larger proportion of our members faces an expensive trip. We also mustn't forget that high travel costs also affect our exhibitors, who often transport several people and ship heavy equipment as well. I hope we can all work together to keep the quality of our meetings as high as it has been, to keep attendance up, and to select meeting sites carefully.

The program for Washington looks like an excellent one. The Program Committee had to reject fewer papers than last year, suggesting that review of abstracts is having a positive effect on the quality of what is submitted. This of course has been one of the objectives of the review process, and it seems to be working. The symposia that are scheduled are nicely diverse as a group, but focussed within themselves, and I hope they are well received. I believe that we shouldn't try to cover all subjects at each meeting, but rather should select topics and cover them in depth at any one meeting, and let the breadth of coverage come over several years. I think this year's meeting fits that pattern quite well. Another positive fact for this meeting is that we will be able to support more students as Presidential Scholars than last year, as a result of a generous increase in funds allocated for this purpose by the Council.

I am looking forward to an excellent meeting in Washington this year, and hope to see lots of you there.

Philadelphia
April, 1982

TITLES AND ORDER OF SESSIONS

PRESIDENTIAL SYMPOSIUM: BIOLOGICAL HIGH VOLTAGE ELECTRON MICROSCOPY

	<i>Page</i>
A Critique of the Theoretical Basis for the Use of HVEM in Biology—R. M. Glaeser	2
The Distribution of Water in the Cytoplasm—K. R. Porter, D. P. Boggs and K. L. Anderson	4
Patterns of Interaction between Cytoskeletal Elements of Cultured Cells: Modification by Cytochalasin D and A Tumor Promoter—M. Schliwa	8
Cytoskeletal 3-Dimensional Organization during Platelet Adhesion and Release—J. C. Lewis, M. S. White, T. Prater, F. A. Hartle, G. Campbell and G. Wray	12
High Voltage Electron Microscopy of Muscle Using Thick Slices of Embedded Tissue and Selective Stains—L. D. Peachey	14

SYMPOSIUM: PLASMA MEMBRANE GLYCOPROTEINS

Mechanisms for the Incorporation of Proteins into Membranes—D. D. Sabatini	18
Subcellular Localization of the Hepatic Asialoglycoprotein Receptor by Immunoelectron Microscopy—H. F. Lodish, H. J. Geuze, J. W. Slot, G. J. A. M. Strous, D. Louvard and A. L. Schwartz	22
Expression of Viral Membrane Proteins from Cloned cDNA by Microinjection into Eucaryotic Cell Nuclei—H. Garoff and C. Kondor-Koch	26
Involvement of Ca ⁺⁺ and Calmodulin in the Intracellular Migration of Influenza's Hemagglutinin to the Apical Surface of MDCK Cells—E. Rodriguez-Boulant, K. T. Paskiet and E. Bard	30
Inhibition of Viral Glycoprotein Transport in MDCK Cells—F. V. Alonso, M. G. Roth, L. R. Melsen, R. V. Srinivas and R. W. Compans	34

CYTOCHEMISTRY AND TOXICOLOGY

Diverse Effect of Microtubule Poisons to Alkaline Phosphatase Activity in Duodenum, Kidney, Liver and Serum of Rat and Mouse: A Histochemical Study—T. Makita, K. Sugiura and M. Hatsuoka	38
ATP-Citrate Lyase Localized with the Peroxidase-Antiperoxidase Technique in Rat Heart and Liver—W. A. Shannon, Jr., C. S. Chang and S. B. Bates ..	40
Aminotriazole-Insensitive Catalase Activity in Rabbit Peritoneal Exudate Monocytes—D. M. Zellmer and W. A. Shannon, Jr.	42
Mammalian Bone Marrow Acetylcholinesterase—E. Keyhani	44
A One Step Indigogenic Ultrastructural Method for Na ⁺ - K ⁺ Atpase—K. C. Tsou and T. Suganuma	46
Thin Section Staining of Epithelial Cells to Reveal Bound Carbohydrate—K. Marenus and M. Beer	48
Cell Reactivity Pattern of the Guinea Pig Cecal Mucosa Evidenced by the ZIO Technique—J. Mora-Galindo and J. Arauz-Contreras	50
Identification of Pulmonary Deposits from a Sandpaper Worker: A Study by Electron Microscopy and X-Ray Microanalysis—S. K. Peng, M. A. Egy, J. K. Singh and M. B. Bishop	52
Induction of Ultrastructural Alterations by Aromatic Hydrocarbons—W. N. Norton, M. Livingston and D. Mattie	54

Hepatocyte Alterations in Guinea Pigs Fed Polychlorinated Biphenyls (PCBs), Dibenzodioxins (PCDD), and Dibenzofurans (PCDF)—J. N. Turner and D. N. Collins	56
The Effect of Exogenous Fluoride on the Calcium Pump, Ciliary Activity, and Shell Formation of the Fingernail Clam, <i>Musculium Transversum</i> —A. Paparo, J. A. Murphy and R. Dean	58
An Electron Microscopic Study of Kidney Cells in the Lizard Treated with Mercuric Chloride—E. C. V. Ooi and E. C. Chew	60
Accumulation and Toxicity of Cadmium in <i>Chironomus Thummi</i> —L. A. Seidman, G. Bergtrom and C. C. Remsen	62
Morphometric Analysis of Portal Hepatocytes from Rats Treated with Compound 48/80—R. V. W. Dimlich and R. R. Cardell, Jr.	64

SYMPOSIUM: MOLECULAR STRUCTURE ANALYSIS OF PERIODIC ARRAYS IN BIOLOGY

The Fluorescence of Electron Crystallography—R. M. Glaeser	66
Techniques for Obtaining High Resolution Information about Periodic Arrays of Biological Macromolecules in the Electron Microscope—S. B. Hayward	68
Preparation of Frozen Hydrated Purple Membrane for High Resolution Electron Microscopy—J. S. Jaffe and R. M. Glaeser	72
Difference Fourier Analysis of Glucose Embedded and Frozen Hydrated Purple Membrane—J. S. Jaffe and R. M. Glaeser	74
Electron Microscopy of Unstained, Hydrated Protein Crystal at 4 K—T. W. Jeng, W. Chiu, L. Brakmo, K. H. Müller, E. Knappek, A. Stemmer and E. Zeitler	76
Temperature Dependence of the Critical Electron Dose for Fatty Acid Monolayers—K. H. Downing and R. M. Glaeser	78
High Resolution Microscopy of Multi-Layered Biological Crystals—H. A. Cohen, T. W. Jeng and W. Chiu	80
Image Processing of Imperfect Protein Arrays: Sectioned Crystals and Tubulin Sheets and Rings—R. H. Crepeau, E. K. Fram, B. McEwen, C. W. Akey, D. Pantaloni, M. Szalay and S. J. Edelstein	84
Three Dimensional Reconstruction of Map-Free Tubulin Sheets—T. A. Ceska, B. McEwen and S. J. Edelstein	88
Structural Investigations of the Pore-Forming ompC Protein from <i>E. Coli</i> —D. A. Grano, C.-F. Chang and R. M. Glaeser	90
Artefact in 20Å-Resolution Electron Images of Negatively Stained Two-Dimensional Membrane Protein Crystals—D. L. Dorset and B. Moss	92
Dynamical Structure Factors for Bent Organic Crystals—B. Moss and D. L. Dorset	94
Actin Structure and Function Studied by Electron Microscopy and Image Processing—U. Aebi, W. E. Fowler and P. R. Smith	96
Isolation of the Crystalline Arrays from the Yeast Plasma Membrane—G. Sosinsky and R. M. Glaeser	100

CELL ADHESION TO A SUBSTRATUM

The Role of Collagen, Fibronectin, Chondronectin and Laminin in Cell Adhesion—H. K. Kleinman and G. R. Martin	102
Fibronectin-Like Adhesion Sites are Present at the Invasive Zones of Human Epidermoid Carcinomas—I. I. Singer	106

Analysis of Adhesion Plaque Structure and Function in the Mechanism of Transformation by Rous Sarcoma Virus—L. R. Rohrschneider, M. J. Rosok and L. E. Gentry	110
Presence of Clathrin at Adhesion Sites in Phagocytosing Macrophages—J. Aggeler, J. E. Heuser and Z. Werb	114

CYTOSKELETON, CONTRACTILITY

Study of the Molecular Architecture of Keratin Filaments by Electron Microscopy—U. Aebi, P. Rew and T.-T. Sun	118
Mass Measurements of Lobster Muscle Thick Filaments by Scanning Transmission Electron Microscopy—R. Freeman, W. Hofmann and J. Berriman	120
Stagger and Superposition in Actin Paracrystal Polymorphism—W. E. Fowler and U. Aebi	122
Microtubules and Intermediate Filaments in Human Neutrophils—L. M. Parysek	124
Stereo-Triplet Analysis of Thick Sections and Whole Mounts of Latex-Labelled <i>Allogromia</i> (Protozoa, Foraminifera)—S. M. McGee-Russell, S. S. Bowser, Jr. and G. Rupp	126
In Vivo Microtubule Assembly/Disassembly States in Reticulopods of <i>Allogromia Sp.</i> —S. T. Koury	128
More Types of Inclusion Found in Colchicine-Treated, Cultured Rat Hepatocytes—I. S. Green, W. A. Samsonoff, J. Galivan and P. Fox	130
Effect of Calcium on the Growth and Differentiation of Cultured Rat Esophageal Epithelial Cells—W. T. Gunning, M. R. Marino, M. S. Babcock and G. D. Stoner	132
Ruthenium Red Enhancement of Surface Complex Components of Isolated and <i>In Situ</i> Cardiac Myocytes of Syrian Hamsters—T. Caceci, J. M. Orenstein and S. Bloom	134
Junctional Sarcoplasmic Reticulum in Excitation-Contraction-Coupling—J. R. Sommer, E. Bossen and A. Fabiato	136

SYMPOSIUM: EXPERIMENTAL MANIPULATION OF CELLULAR DIFFERENTIATION

Mesenchyme-Induced Alteration of Urothelial Differentiation—G. R. Cunha, J. M. Shannon and H. Fujii	138
Induction and Differentiation of Dental Epithelium <i>In Vivo</i> and <i>In Vitro</i> —E. J. Kollar	142
Cation Transport and the Initiation of MEL Cell Differentiation—R. Levenson and D. Housman	146

CELL STRUCTURE AND FUNCTION

An SEM and X-Ray Evaluation of Crystals in the Leaves of <i>Rosa</i> —H. J. Arnott, M. L. Kelly and M. A. Webb	150
The Ultrastructure of Cellular Ontogeny in Leaf Cavity Trichomes of <i>Azolla Caroliniana</i> Willd.—H. E. Calvert, M. K. Pence and G. A. Peters	152
Calcium Oxalate Dihydrate-Monohydrate Association in Grape (<i>Vitis Vinifera</i>) Endosperm—M. A. Webb and H. J. Arnott	154
Ultrastructure of the Plastids in the Overwintering Green Leaves of <i>Taxus Canadensis</i> —E. R. Rivera	156
Electron and Immunoelectron Microscopical Studies on the Extracellular Protease (Keratinase) of Dermatophytes—Y. Sei, I. Takiuchi and M. Masutani	158

Views of Ribosome Tetramers and the Localization of Ribosomal Subunits—M. K. Lamvik and E. Zeitler	160
Complex of 40S Ribosomal Subunit with Initiation Factor eIF-3—M. Boublik, W. Hellmann, F. Jenkins, T. Staehelin and H. Trachsel	162
Radioautographic Analysis of the Intralobular and Intracellular Distribution of Newly Formed Hepatic Glycogen after Injection of ^3H -Galactose—J. E. Michaels, J. T. Hung and R. R. Cardell, Jr.	164
Control of Vacuole Formation in the Parotid Gland—B. A. Leslie and J. W. Putney, Jr.	166
The Absence of Direct Permeability Pathways in Continuous Capillaries and the Internal Nature of Endothelial Vesicles—R. C. Wagner and C. S. Robinson	168
The Ultrastructure of the Distal Tubule of <i>Amphiuma</i> : A TEM and SEM Study—D. Biemesderfer, B. Stanton, M. Kashgarian and G. Giebisch	170
Osmiophilic Lamellated Bodies between the Gill Lamellae of Fish—K. C. Liu and G. Y. Sun	172

CORRELATIVE MICROSCOPIC TECHNIQUES

Biological Acoustic Microscopy—Living Cells at 37°C and Fixed Cells in Cryogenic Liquids—J. A. Hildebrand, D. Rugar and C. F. Quate	174
Interference Reflection Microscopy—C. S. Izzard	178
Video-Enhanced Microscopy—Better Visibility of Plant Cell Structures—N. S. Allen and R. D. Allen	182

NERVOUS SYSTEM

Analytical Electron Microscopy (AEM) of Meningeal Cells Exposed to Particulate Cobalt during Studies of Experimental Epilepsy—R. G. Frederickson, R. G. Ulrich and J. L. Culberson	186
Localization of Substance P and Methionine Enkephalin on Ultrathin Sections using a Modified Immunocytochemical Technique in Rat Neostriatum—R. H. Bradley and S. T. Kitai	188
XRF and PIXE Analysis of Light and Dark Adapted Ocular Tissue—B. J. Panessa, H. W. Kraner, J. B. Warren and K. W. Jones	190
The Effect of Activity on the Denervated Endplate—B. R. Pachter, A. Eberstein and J. Goodgold	192
Human Neurofibromas in Co-Culture with Mouse Neurons—R. L. Martuze, T. Liszczak, A. Okun and T.-Y. Wang	194
The Vestibular Nerve and Ganglia of the Squirrel Monkey after Labyrinthectomy—C. D. Fermin and M. Igarashi	196
Unusual Astrocytic Junctions Induced by Nickel Wire Implant in Rat Brain—Y. Kress, F. Gaskin and D. S. Horoupian	198
Characteristics of Irreversibly Constricted Cerebral Blood Vessels—T. M. Liszczak, V. G. Varsos, P. M. Black, R. C. Heros and N. T. Zervas	200
Brain Vessels Permeability to Ruthenium Red (RR) in the Adult Rat. A Qualitative X-Ray Spectrometric Study with the Scanning Electron Microscope (SEM)—J. Arauz-Contreras and A. Feria-Velasco	202
Evidence for a Blood Ganglion Barrier in the Superior Cervical Ganglion of the Rat—D. M. DePace	204
Synapse Formation in Familial Retinoblastoma, Electron Microscopy Study of Three Siblings Including Fraternal Twins—C. N. Sun	206

CANCER

Electron Microscopic Image Processing in the Classification and Quantitation of Human Glial Tumor Cell Properties—B. H. Smith, J. R. Ellis, A. Robinson, M. A. Greenwood, E. R. Pleasants, C. Cooke and P. L. Kornblith	208
Ultrastructural Correlations between Clonal Human Tumor Colonies and <i>In Vivo</i> Neoplasms—M. J. Murphy, Jr., R. R. Price and J. C. Sloman	210
Ultrastructural Features of Leydig Cell Hyperplasia Due to an hCG-Producing Testicular Tumor—S. L. Asa, T. A. Bayley, E. Horvath and K. Kovacs ..	212
Fine Structural Changes in the Renal Tubules and the Blood Pressure in Rats after Cisplatin Treatment—S. K. Aggarwal	214
Ultrastructural Investigation of Spontaneous Pituitary Adenomas in Aging Sprague-Dawley Rats—D. J. McComb, J. Beri, F. Zak and K. Kovacs ...	216
Ultrastructural Contributions to the Histogenesis of Pleomorphic Adenoma—I. Dardick, A. W. P. van Nostrand, D. Jeans, P. Rippstein and V. Edwards	218
Cytochemical Observations on Human Breast Tumor Plasma Membranes—S. W. Lucid, K. J. Wen, J. W. Wen, M. P. Lerner and R. E. Nordquist	220
An Established Epithelial Cell Line (NPC/HK1) from a Nasopharyngeal Carcinoma - I. A TEM Study—C. L. Li, E. C. Chew, D. P. Huang, H. C. Ho, M. Lui and L. S. Mak	222
An Established Epithelial Cell Line (NPC/HK1) from a Nasopharyngeal Carcinoma - II. A SEM Study—C. L. Li, E. C. Chew, D. P. Huang, H. C. Ho, L. S. Mak and M. Lui	224
Selective Destruction of Mitochondria by Aziridinylbenzoquinone (AZQ)—M. A. Greenwood, B. H. Smith, C. Cooke, A. Robinson, P. L. Kornblith and C. Cummins	226
A Scanning Electron Microscopic Study on the Initial Invasion of Ehrlich Ascites (EA) Tumor Cells in Peritoneal Layer—E. C. Chew, E. C. V. Ooi, O. W. Lam and S. M. Kwan	228
Granular Cell Tumor (Myoblastoma) of Rat Brain—Y. White, W. Sheldon, T. Hoage and R. West	230
Sebaceous Basal Cell Carcinoma—An Ultrastructural Study—A. M. Andrews, B.-N. Blackwell, T. R. Hoage and F. F. Kadlubar	232
Glycosomes in Squamous Cell Carcinoma of the Lung—K. Rybicka and C. Bedrossian	234
Ultrastructure of NPC/HK1 Cells Heterotransplanted in Athymic Nude Mice—E. C. Chew, C. L. Li, D. P. Huang, H. C. Ho, L. S. Mak and M. Lui	236

REPRODUCTION AND EMBRYOLOGY

Inhibition of Compaction in the Preimplantation Mouse Embryo—A. E. Sutherland and P. G. Calarco	238
Ultrastructure of the Surface Epithelium of the Polycystic Ovary in Constant Light Rats—K. B. Singh and F. K. Khosho	240
Intracellular and Extracellular Acid Hydrolase Activity in the <i>Drosophila Melanogaster</i> Ovary—L. G. Altman, R. Witkus and G. M. Vernon	242
Serum-Induced Hypersecretion in Isolated and Native Rabbit Endocervical Mucous Cells—S. V. Nicosia, J. H. Johnson, E. J. Streibel and L. Mogul ..	244
Visualization of Antibody Transport in Rat Visceral Yolk-Sac Placenta—W. P. Jollie	246

Dexamethasone Effect on Embryonic Chick Respiratory Epithelium—M. R. Richter and R. V. Blystone	248
Ultrastructure of the Omphalomesenteric Duct Rest in the Umbilical Cord at Term—B. A. Clark and T. Okagaki	250
The Response of Testes Cells to Low Level, Single Dose Helium Particle Irradiation—D. E. Philpott, W. Sapp, C. Williams, J. Stevenson, S. Black, R. Corbett and J. Miquel	252
Analysis of Secretory Granule Containing Cells in the Sperm Duct of <i>Aeolidia Papillosa</i> (Nudibranchia)—R. Berlo	254
Characterization of Prostatic Epithelial Cells in Organotypic Culture—L. Terracio and W. H. J. Douglas	256

DIAGNOSTIC ELECTRON MICROSCOPY IN PATHOLOGY

Membranous Glomerular Lesions—B. H. Spargo	258
Tumor Diagnosis—B. Mackay	262
Elemental Analysis in Disease Progression and Diagnosis—S. S. Barham and J. E. Tarara	266
The Diagnosis of Viral Disease by Electron Microscopy—W. B. McCombs, III and C. E. McCoy	270
On Future Directions in Pathology—B. F. Trump, I. K. Berezsky and R. T. Jones	274

CELL SURFACE AND EXTRACELLULAR MATRIX

Ruthenium Red Staining of Human Hard Keratin Fibers—M. C. Buhrer and R. A. Mathews	278
Lanthanum in Human Red Cell—E. Keyhani and E. Bland	280
Selective Contrasting of Cell Surface Material in <i>Allogromia Sp.</i> (Protozoa, Foraminifera) with Alcian Blue—S. S. Bowser, Jr.	282
Concanavalin a (Con A) Binding Sites in Bronchial Epithelium of Hamster—T. Sato and B. F. Trump	284
Changes Occur in Plasma Membrane Turnover when K562 Leukemia Cells are Induced to Differentiate—L. M. Marshall	286
Localization of Anionic Binding Sites in the Glomerular Basement Membrane of a Cold Water Teleost—R. B. Boyd and A. L. DeVries	288
Cytoskeleton and Extracellular Matrix Interactions during Sertoli Cell-Cell Adhesion <i>In Vitro</i> —G. L. Decker, D. Carson and W. J. Lennarz	290
The Myofibroblast Anchoring Strand is Both a Cell Tether and the Apparent Site of Collagen Fibril Assembly—P. S. Baur, Jr.	292
Methionine-Specific Staining of Collagen—E. M. Kuhn, K. D. Marenus and M. Beer	294
Acid-Etching of Caries-Like Lesions Treated with Acidulated Phosphate Fluoride: An SEM and Microprobe Study—M. J. Hicks	296
Developing Antler as a Model System of Fibrillogenesis—D. P. Speer and C. W. Kischer	298

MICROBIOLOGY

FMDV-RNA Polymerase—The Localization of an Enzyme and its Product by EM Immunocytochemistry and Autoradiometric Analysis—J. Polatnick and S. H. Wool	300
Periodic Structure in the Matrix Protein of an Insect Virus—H. M. Mazzone, W. F. Engler, R. Zerillo and G. F. Bahr	302

Morphogenesis of the Murine Mammary Tumor Virus in Cells Treated with Inhibitors of Protein Glycosylation—N. H. Sarkar	304
Electron Microscopic Detection and Characterization of Nonhuman Primate Enteric Viruses—G. C. Smith, R. L. Heberling and S. S. Kalter	306
Ultrastructural Changes in Human Cells Associated with Herpesvirus Latency and Reactivation <i>In Vitro</i> —T. Hung, Z. Y. Fang, B. Wigdahl and F. Rapp	308
Lactic Dehydrogenase Virus Infection in the Liver of Swiss Mice—M. Lattyak, V. Mumaw and S. Cross	310
Subcellular Localization of Amylose Precipitating Factor in <i>Neurospora</i> —J. P. Varkey, M. J. Nadakavukaren and D. A. McCracken	312
Freeze-Fracture Demonstration of a Suture in the Free Sporozoite of <i>Plasmodium Berghei</i> —C. A. M. Meszoely, E. F. Erbe, R. L. Steere, N. D. Pacheco and R. L. Beaudoin	314
A Chlamydial-Like Organism Isolated from Insects in Insect Mass Rearing Facilities—J. R. Adams, C. C. Beegle and G. J. Tompkins	316
Three-Dimensional Ultrastructure of <i>Agmenellum Quadruplicatum</i> —S. A. Nierzwicki, D. L. Balkwill and S. E. Stevens, Jr.	318
Ultrastructural Changes of the Symbiotic <i>Chlorella</i> -Like Alga Isolated from <i>Hydra Viridis</i> —K. W. Lee, R. H. Meints, D. Kuczmarski and J. L. Van Etten	320
Cell Surface Properties of a Suctorian Ciliate—C. A. Sundermann	322
Cellular Effects of Herbicide Simazine on Blue-Green Algae—R. S. Mehta and K. W. Hawxby	324

PATHOLOGY

X-Ray Spectroscopic Localization of Selenium in Four Patients Having Heavy Metal Intoxication—J. T. McMahon, R. R. Tubbs and W. F. Bergfeld ...	326
TEM Identification of Persistent Cocci in Treated Infective Endocarditis—S. Siew	328
Isolation of Asbestos from Lung Tissue and Sputum—M. G. Williams, Jr., C. Corn, R. F. Dodson and G. A. Hurst	330
Quantification of Silica Uptake by Alveolar Macrophages—An Empirical Scanning Electron Microprobe Method—V. V. Damiano, R. P. Daniele, H. T. Tucker and J. H. Dauber	332
Reactivity of Pulmonary Alveolar Cells to Crocidolite Asbestos Fibers—C. L. Sanders and R. R. Adee	334
Diagnosis of Silica Induced Granulomatous Hypersensitivity—C. W. Mehard and W. L. Epstein	336
The Influence of Inflation Level on the Ultrastructure of Pleura—M. F. O'Sullivan, C. Corn, R. F. Dodson and G. A. Hurst	338
The Effect of Oxidized Cholesterol on the Aorta of Rabbits: Scanning Electron Microscopic Observations—S. K. Peng, C. B. Taylor, J. Hill and J. Safarik	340
Qualitative and Quantitative Characteristics of Rat Aortic Intimal Response to Endothelial Cell Injury—G. E. Visscher, R. L. Robison, C. W. Billings ..	342
Differentiation of Skin Lesions in Acute Myeloid Leukemia by Myeloperoxidase Cytochemistry—J. S. Hanker, W. W. Ambrose, J. O. Moore and B. L. Giammara	344
Electron Microscopic Identification of Pre-B Lymphocytes in the Bone Marrow of a Patient with Chronic Myelocytic Leukemia in Blast Crisis—T. Mullins, G. Yee, M. Ahearn and J. Trujillo	346

Arrays of Paired Helical Filaments in Alzheimer's Disease—J. Metuzals, V. Montpetit, D. F. Clapin and R. F. Nelson	348
Use of Protein A Conjugated to Peroxidase to Localize Immunoglobulin G in SSPE Ferret Brain—H. R. Brown, A. F. Nostro and H. Thormar	350
Peliosis in Spontaneous Adenomas of the Rat Pituitary. An Electron Microscopic Study—G. Ilse, K. Kovacs, J. Beri and F. Zak	352
Electron Microscopy in Diagnostic Virology: A Five Year Study of the Etiologic Agents of Acute Non-Bacterial Gastroenteritis—C. M. Payne, C. G. Ray, V. F. Borduin and L. L. Minnich	354

TECHNIQUES IN BIOLOGICAL SCIENCES

A One-Step Method for Re-Embedding Paraffin Embedded Specimens for Electron Microscopy—K. Chien, R. L. Van de Velde and R. C. Heusser	356
Epoxy Slide Embedment for LM, TEM, STEM and HVEM Cytochemistry—B. L. Giammara and J. S. Hanker	358
Comparison of 2,2-Dimethoxypropane and Ethanol Dehydration: A Morphometric Evaluation—G. M. Buchanan	360
Mass Measurement of Macromolecular Complexes with the STEM—J. S. Wall and J. F. Hainfeld	362
Clusters: The New Markers—J. F. Hainfeld and J. S. Wall	364
Paracrystalline Arrays of Horse Spleen Ferritin—W. H. Massover	366
Validation of George and Robinson SE-I Signal Theorem. Implications for Ultrahigh Resolution SEM on Bulk Untilted Specimens—K.-R. Peters	368
Correlative Electron, Ion and Laser Microprobe Analysis of Particle-Laden Alveolar Macrophages—R. W. Linton, J. D. Shelburne, D. S. Simons and P. Ingram	370
Frozen-Hydrated Lung Preparation for Low Temperature Scanning Electron Microscopy—G. Hook, J. Bastacky, T. Hayes, R. Conhaim and N. Staub	372
Low-Temperature Imaging for Biological Applications of High-Voltage Electron Microscopy—M. Fotino, T. H. Giddings, Jr., R. O. Voth and G. P. Wray	374
Radiation-Induced Movement of a Mercury Stain at Room Temperature and Liquid Helium Temperature—M. K. Lamvik, K.-H. Müller and K. Weiss	376
Evaluation of <i>In Vivo</i> Adsorption of Plasma Proteins onto Hydrogel Coated Silicon Rubber by Scanning Electron Microscopy and Fourier Transform Infrared Spectroscopy—L. J. Miller and R. T. Greer	378

BIOLOGICAL X-RAY MICROANALYSIS I

Low Temperature X-Ray Microanalysis of Solid Biological Samples: Prospects and Problems—P. Echlin	380
Wavelength Dispersive Spectrometer Background Estimation with Si(Li) Energy Detector—F. D. Ingram	384
Some Observations Concerning Tissue Collection for Electron Probe Microanalysis of Skeletal Muscle Electrolytes—F. D. Ingram and M. J. Ingram	388
An Assessment of Ca-Naphthenate-Epon Mixtures as Standards for Calcium Quantification in Aortic Valve Leaflets—K. N. Colonna, S. S. Breese, S. C. Sellers and J. D. Deck	390
SEM/EDX Microanalysis of Chlorinated Cake Flour Particles: Initial Study—R. S. Thomas	392

BIOLOGICAL X-RAY MICROANALYSIS II

The Imaging Problem in the X-Ray Microanalysis of Matrix-Free Extracellular Spaces in Frozen-Hydrated Tissue Sections—T. A. Hall and B. L. Gupta	394
Electron Probe Analysis of Muscle—A. V. Somlyo, H. Shuman and A. P. Somlyo	398
Electron Probe Microanalysis of Frozen Hydrated Kidneys, Isolated Cells, and Cultured Cells—C. Lechene	402
Advances in Microprobe Analysis Applied to Muscle, Nerve and Gland—T. E. Hutchinson, D. E. Johnson, A. C. Lee and E. Y. Wang	404
The Uptake and Distribution of Potassium in Roots of Duckweed (<i>Lemna Minor</i> L) as Measured Using Low Temperature X-Ray Microanalysis—P. Echlin, C. Lai and T. L. Hayes	408

BIOLOGICAL X-RAY MICROANALYSIS III

Applications of Electron Energy Loss Spectroscopy in Biology: Detection of Calcium and Fluorine—R. D. Leapman	412
Energy Loss Imaging in Biology—H. Shuman, A. V. Somlyo, A. P. Somlyo, T. Frey and D. Safer	416
Quantification in Elemental Distributions of Light Atoms by EEL Image Analysis in Biological Sections—F. P. Ottensmeyer	420

SYMPOSIUM: ELECTRONIC MATERIALS

Computer Simulation and Analysis of High Resolution Electron Microscope Images and Diffraction Patterns of Semiconductor Interfaces—W. Krakow	424
Periodic Extension in Optical Diffraction Analysis—R. Gronsky and C. S. Murty	428
Atomic Structure at Single-Crystal Metal-Semiconductor Interfaces and Misfit Dislocations—J. M. Gibson	430
Defect Studies in Solar Cell Silicon—B. Cunningham	434
The Electrical Behaviour of Individual Dislocations, Shockley Partials and Stacking Faults—A. Ourmazd, P. R. Wilshaw, E. Weber, H. Gottschalk, G. R. Booker and H. Alexander	438
Defects in Heavily Doped MBE GaAs—C. B. Carter, D. M. DeSimone, T. Griem and C. E. C. Wood	442
Analysis of Defects Exhibiting Fringe Contrast in Gallium Arsenide Implanted with Beryllium—A. K. Rai, R. B. Benson, Jr., H. B. Dietrich and J. Bentley	446
The Analysis of Composition Variations in LED's Using CBED—Z. Liliental and K. Ishizuka	448
Reflection Electron Microscopy (REM) of Surface Steps and Dislocations on GaP(110) and GaAs(110)—T. Hsu and S. Iijima	450
Defects in Heteroepitaxial Silicon on Sapphire—M. S. Abrahams	452
Laser Annealing—Crystal Growth at High Velocities—J. M. Poate	456
Pulsed Ion Beam Annealing of Metal and Silicide Thin Films on Silicon—L. J. Chen, L. S. Hung and J. W. Mayer	458
Electron Diffraction Analysis of Microtwin Structures in Regrown (111) Silicon—P. Ling, R. Gronsky and J. Washburn	460

MECHANICAL PROPERTIES OF METALS

Microstructural Contributions to Stress Corrosion Cracking in High Strength Steels—R. Padmanabhan and W. E. Wood	462
--	-----

Influence of Heat Treatment on the Failure Mode of High Strength Steel in Aggressive Environments—R. Padmanabhan and W. E. Wood	464
Microstructural Evaluation of A533-B Pressure Vessel Steels—O. C. de Hodgins, B. L. Shriver and C. F. Aliotta	466
Dislocation Structures in Deformed Tin Single Crystals—G. W. Qiao	468
Formation of Persistent Slip Band in Fatigued Copper Single Crystals—N. Y. Jin	470
TEM Studies of Dislocations Generated at Crack Tips—J. A. Horton and S. M. Ohr	472
Effects of Temperature and Incoherent Dispersoids on Slip Dispersal in Al-3Li Alloys—J. E. O'Neal, K. K. Sankaran and S. M. L. Sastry	474
Effects of Incoherent Dispersoids, Temperature, and Deformation Mode on Dislocation-Substructure Development in Ti-8Al and Ti-10Al Alloys—J. E. O'Neal and S. M. L. Sastry	476
Microstructures in Explosively Consolidated Molybdenum Powder: A TEM Study—L. E. Murr	478
The Microstructure of Explosively Loaded 304 Stainless Steel Flyer Plate—K. A. Johnson, K. P. Staudhammer and L. E. Murr	480
A TEM Study of Low Temperature Shock Induced α' -Martensite in 304 Stainless Steel—K. P. Staudhammer and L. E. Murr	482

AEM TUTORIAL / WORKSHOP

The Effect of Surface Layers on Thin Foil Standards on the Accuracy of Quantitative E.D.S. Analysis—J. M. Brown and H. L. Fraser	484
The Thickness Dependence of Energy Loss Spectra—M. Sarikaya and P. Rez ..	486
Signal/Noise Ratio and Elemental Detectivity by EELS—R. F. Egerton	488
Spatial Resolution of STEM and EDS in An Al-Ge Alloy—M. E. Twigg, J. P. McCarthy and H. L. Fraser	490
EELS Under Standing Wave Conditions—O. L. Krivanek and J. Taftø	492
Alternative Background Fitting for Electron Energy Loss Spectra—J. Bentley, G. L. Lehman and P. S. Sklad	496
Application of Quantitative EELS to Analysis of the Titanium Carbide Phase in Austenitic Stainless Steels—P. J. Maziasz and N. J. Zaluzec	498
Energy Loss Analysis of Oxygen Microprecipitates in Silicon—I. Y. T. Chan, R. W. Carpenter, C. J. Varker, L. Chang and L. J. Demer	500
Precipitate Chemistry in an 18Cr-2Mo-Ti Stabilized Ferritic Stainless Steel—A. M. Ritter, E. L. Hall and T. M. Devine	502
TEM Imaging and EELS Measurement of Mass-Thickness Variations in Thick Foils—R. R. Whitlock and J. A. Sprague	504
Electron Energy-Loss Spectroscopy Used for Localized Compton Scattering—A. J. Bourdillon and B. G. Williams	506
Crystallographic Orientation Effects in X-Ray Production from Ordered Intermetallic Alloys—C. S. Pande and R. L. Sabatini	508
Secondary Fluorescence Corrections in Thin Film Microanalysis—A. J. Bourdillon	510
Analytical Electron Microscopy Applied to the Study of the Solid State Reaction Between Si-Base Ceramics and Ni-Base Superalloys—E. L. Hall and Y. M. Kouh	512
Characterization of the Chromium-Depleted Zone in Sensitized Austenitic Stainless Steel—M. G. Burke and E. P. Butler	514
Microanalysis of Prior Austenite Grain Boundaries in Temper Embrittled Cr-Mo-V Turbine Rotor Steel by STEM-EDS—J. Wittig	516