

TABLE OF CONTENTS

PREFACE	xi
LIST OF SYMBOLS	xvi
PART I - <u>Seventh Annual Scanning Electron Microscope Symposium</u>	
RESOLUTION OF THE TOPOGRAPHIC IMAGE IN THE SEM	
O. C. Wells	1
RECENT ADVANCES IN SCANNING ELECTRON MICROSCOPY WITH LANTHANUM HEXABORIDE CATHODES	
A. N. Broers.	9
THE PREPARATION AND OBSERVATION OF BIOLOGICAL SPECIMENS FOR THE HIGH RESOLUTION SCANNING TRANSMISSION ELECTRON MICROSCOPE	
M. Isaacson, J. Langmore, and J. Wall	19
PERFORMANCE OF SEM SCINTILLATION MATERIALS	
J. B. Pawley	27
SCANNING ELECTRON MICROSCOPE LENS DESIGN	
E. Munro.	35
MINI-LENSES AND THE SEM	
T. Mulvey	43
STRUCTURE ANALYSIS OF EVAPORATED FILMS BY MEANS OF TEM AND SEM	
T. Nagatani and M. Saito.	51
HIGH RESOLUTION SCANNING ELECTRON MICROSCOPY AT LOW ACCELERATING VOLTAGES	
L. M. Welter and V. J. Coates	59
LOW VOLTAGE SCANNING ELECTRON MICROSCOPY OF KERATIN FIBRE SURFACES	
A. C. Brown and J. A. Swift	67
REVIEW OF REPLICA TECHNIQUES FOR SCANNING ELECTRON MICROSCOPY	
G. Pfefferkorn and A. Boyde	75
USE OF CHEMICALLY-REACTIVE GAS PLASMAS IN PREPARING SPECIMENS FOR SCANNING ELECTRON MICROSCOPY AND ELECTRON PROBE MICROANALYSIS	
R. S. Thomas and J. R. Hollahan	83
A STEREO-PLOTTING DEVICE FOR SEM MICROGRAPHS ; AND A REAL TIME 3-D SYSTEM FOR SEM	
A. Boyde	93
PHOTOGRAMMETRY OF STEREO PAIR SEM IMAGES USING SEPARATE MEASUREMENTS FROM THE TWO IMAGES	
A. Boyde	101
SOME PRACTICAL APPLICATIONS OF REAL TIME TV SPEED STEREO SEM IN HARD TISSUE RESEARCH	
A. Boyde, S. J. Jones, and J. B. Pawley	109
STEREOSCOPIC SCANNING ELECTRON MICROSCOPY AT T.V. SCAN RATES	
E. J. Chatfield, J. More, and V. H. Nielsen	117
PROTON SCANNING MICROSCOPY: FEASIBILITY AND PROMISE	
R. Levi-Setti	125
ANALYTICAL CATHODOLUMINESCENCE MODE SCANNING ELECTRON MICROSCOPY	
M. D. Muir and D. B. Holt.	135
NONCONVENTIONAL APPLICATIONS OF NON DISPERSIVE CATHODOLUMINESCENCE	
G. Pfefferkorn and R. Blaschke.	143
LIGHT ELEMENT ANALYSIS ON THE SCANNING ELECTRON MICROSCOPE USING A WINDOWLESS ENERGY DISPERSIVE X-RAY SPECTROMETER	
N. C. Barbi, A. O. Sandborg, J. C. Russ, and C. E. Soderquist	151
USES AND LIMITATIONS OF SCANNING ELECTRON MICROSCOPE AUTORADIOGRAPHY	
G. M. Hodges, A. W. Carbonell, M. D. Muir, and P. R. Grant.	159
SOME TECHNIQUES OF SIGNAL PROCESSING IN SCANNING ELECTRON MICROSCOPY	
C. E. Fiori, H. Yakowitz, and D. E. Newbury	167
COMPUTER CONTROL AND THE SCANNING ELECTRON MICROSCOPE	
R. F. Herzog, B. L. Lewis, and T. E. Everhart	175

SEM TECHNIQUES FOR THE EXAMINATION OF BLIND AM) THROUGH HOLES D, K. Hindermann and R. H. Davis	183
SIGNAL STORAGE AND ENHANCEMENT TECHNIQUES FOR THE SEM N, C. Yew and D. E. Pease.	191
SEM IMAGE PROCESSING BY ANALOG HOMOMORPHIC FILTERING TECHNIQUES M. C. Baggett and L. H. Glassman	199
DEVELOPMENT OF SEM METHODS FOR SOLVING FORENSIC PROBLEMS ENCOUNTERED IN HANDWRITTEN AND PRINTED DOCUMENTS M. Oron and V. Tamir	207
SCANNING ELECTRON DIFFRACTION IN A TEM AND SEM OPERATING IN THE TRANSMISSION MODE D. M. Maher.	215
CONTRAST EFFECTS FROM CRYSTALLINE MATERIALS USING THE SCANNING TRANSMISSION ELECTRON MICROSCOPE (STEM) G. R. Booker, D. C. Joy, J. P. Spencer, H. Graf von Harrach, and M. N. Thompson	225
SOME ASPECTS OF THE STROBOSCOPIC MODE: A REVIEW A. Gopinath and M. S. Hill	235
VOID CHARACTERIZATION BY MONTE CARLO TECHNIQUES APPLIED TO SCANNING ELECTRON MICROSCOPY J. K. Gasper and R. T. Greer	243
BIOMEDICAL APPLICATIONS OF BACKSCATTERED ELECTRON IMAGING--ONE YEAR'S EXPERIENCE WITH SEM HISTOCHEMISTRY J. L. Abraham and P. B. DeNee.	251
HISTOCHEMICAL STAINS FOR THE SCANNING ELECTRON MICROSCOPE--QUALITATIVE AND SEMI-QUANTITATIVE ASPECTS OF SPECIFIC SILVER STAINS P. B. DeNee, J. L. Abraham, and P. A. Willard.	259
INJECTION REPLICATION OF THE MICROVASCULATURE FOR SEM J. A. Nowell and C. L. Lohse	267
CRITICAL POINT DRYING OF ETHANOL-INFILTRATED, CRYOFRACTURED BIOLOGICAL SPECIMENS FOR SCANNING ELECTRON MICROSCOPY W. J. Humphreys, B. O. Spurlock, and J. S. Johnson	275
PREPARATION OF LIVER FOR COMBINED SEM AND TEM STUDY K. Miyai, R. M. Wagner, and A. L. Richardson	283
A COMPARATIVE SCANNING ELECTRON MICROSCOPIC STUDY OF FROZEN AND CONVENTIONALLY PREPARED HUMAN ARTICULAR CARTILAGE I. Redler, M. L. Zimny, and J. Mansell	291
AN INEXPENSIVE PORTABLE FREEZE-DRYING UNIT FOR SEM SPECIMEN PREPARATION R. A. Spicer, P. R. Grant, and M. D. Muir.	299
EFFECT OF SPECIMEN PREPARATION TECHNIQUES ON SURFACE ULTRASTRUCTURAL STUDY OF PLATELET AGGREGATES N. F. Rodman and R. C. Caughey	305
EVALUATION AND COMPARISON OF TECHNIQUES FOR EXAMINATION OF BACTERIA BY SCANNING ELECTRON MICROSCOPY A. S. Klainer, S. Jernigan, and P. Allender.	313
DISCUSSION PAGES	319
SEM PARAMETERS AND THEIR MEASUREMENT D. C. Joy.	327
PART II - <u>Workshop on Scanning Electron Microscopy and the Plant Sciences</u>	
SCANNING ELECTRON MICROSCOPY OF CARROT CELLS AND EMBRYOIDS GROWING IN VITRO UNDER VARIOUS CULTURE CONDITIONS J. Homes	335
SEM STUDIES OF THE INTERNAL ORGANIZATION OF PLANT ORGANS C. Y. Shih	343

SCANNING ELECTRON MICROSCOPY OF ALGAL CELLS H. J. Marchant.	351
SCANNING ELECTRON MICROSCOPY OF FOSSIL MEGASPORES : WALL DEVELOPMENT T. N. Taylor.	359
COMPARATIVE SCANNING ELECTRON MICROSCOPY OF PENICILLIUM CONIDIA SUBJECTED TO CRITICAL POINT DRYING, FREEZE DRYING AND FREEZE-ETCHING G. T. Cole and R. Ramirez-Mitchell.	367
SEM STUDIES OF SMALL SEEDS A. S. Tomb	375
SIZE REDUCTION AND STRUCTURAL CHANGE IN LYCOPODIUM CLAVATUM SPORES PRODUCED BY TEMPERATURE AND PRESSURE CHANGES S. Sengupta.	381
SILICIFICATION OF WOOD G. Scurfield, E. R. Segnit, and C. A. Anderson	389
A SCANNING ELECTRON MICROSCOPY STUDY OF THE HOST-PATHOGEN INTERACTION OF PHYTOPHTHORA INFESTANS WITH POTATO TISSUE S. B. Jones, R. J. Carroll, and E. B. Kalan.	397
MORPHOLOGICAL ASPECTS OF DIPLODIA MAYDIS AND ITS ROLE IN THE STALK ROT OF CORN J. A. Murphy, A. J. Pappelis, M. R. Thompson, and L. L. Campbell	405
SCANNING ELECTRON MICROSCOPY OF CONIDIOPHORE ORNAMENTATIONS IN ASPERGILLUS SPECIES D. I. Fennell, G. St. Julian, L. A. Bulla, Jr., and F. L. Baker.	413
TOBACCO MOSAIC VIRUS PARTICLES ON INOCULATED LEAVES OBSERVED WITH SEM T. Duafala and M. K. Nemanic	421
SPATIAL RELATIONSHIPS OF PESTICIDES ON LEAF SURFACES R. H. Falk, D. E. Bayer, and F. D. Hess.	429
THE SURFACE ARCHITECTURE OF PAPER DERIVED FROM THE WOOD OF SPECIES OF EUCALYPTUS G. Scurfield	437
INITIAL WOOD DECAY STAGES AS REVEALED BY SCANNING ELECTRON MICROSCOPY S. M. Jutte and R. A. Zabel.	445
SCANNING ELECTRON MICROSCOPY OF BACTERTAL WETWOOD AND NORMAL HEARTWOOD IN POPLAR TREES I. B. Sachs, J. C. Ward, and R. E. Kinney.	453
FUNGI IN WOOD J. F. Levy	461
USE OF SCANNING ELECTRON MICROSCOPY IN STUDIES OF WOOD CHARCOAL FORMATION E. A. McGinnes, Jr., P. S. Szopa, and J. E. Phelps	469
THE APPLICATION OF SCANNING ELECTRON MICROSCOPY AND X-RAY MICROANALYSIS IN THE PLANT SCIENCES: A BIBLIOGRAPHY P. Echlin.	477
PART III - <u>Workshop on Advances in Biomedical Applications of the SEM</u>	
OBSERVATIONS ON THE DEVELOPMENT OF THE EARLY CHICK EMBRYO M. Backhouse	525
SEM STUDIES OF EARLY FACIAL DEVELOPMENT IN RODENTS AND MAN R. E. Waterman.	533
SCANNING ELECTRON MICROSCOPE STUDIES OF CELL SURFACE MORPHOLOGY AND LABELING, IN SITU AND IN VITRO J. P. Revel.	541
SCANNING ELECTRON MICROSCOPY OF THE APICAL, LATERAL AND BASAL SURFACES OF TRANSPORTING EPITHELIA IN MATURE AND EMBRYONIC TISSUE M. M. Miller and J. P. Revel	549
SCANNING ELECTRON MICROSCOPY OF VARIOUS SENSORY RECEPTOR CELLS IN DIFFERENT VERTEBRATES W. Breipohl, G. J. Bijvank, and G. E. Pfefferkorn.	557

SURFACE STRUCTURES OF THE NORMAL MUCOSA IN DEVELOPING R4T MIDDLE EAR S. Maeda, S. Honjo, and G. Mogi	565
OBSERVATIONS OF THE SURFACE OF SYNCHRONIZED CHINESE HAMSTER OVARY CELLS IN SUSPENSION CULTURE D. Enlander, T. Scott, and R. A. Tobey	573
A CRITICAL APPROACH TO THE SCANNING ELECTRON MICROSCOPY OF CELLS IN SUSPENSION B. Wetzell, G. B. Cannon, E. L. Alexander, B. W. Erickson, Jr., and E. W. Westbrook.	581
THE EFFECTS OF CYTOCHALASIN B ON BALB/3T3 MAMMALIAN CELLS CULTURED IN VITRO AS OBSERVED BY SCANNING AND HIGH VOLTAGE ELECTRON MICROSCOPY M. R. Gershenbaum, J. W. Shay, and K. R. Porter.	589
SEM STUDIES OF THE SURFACE OF VARIOUS RAT CELL LINES TREATED WITH CYTOCHALASIN B, COLCEMIDE AND VINBLASTINE A. Boyde, E. Bailey, and P. Vesely	597
CORRELATE SEM-TEM INVESTIGATIONS ON THE EFFECTS OF SEX HORMONES ON IMPLANTATION OF THE OVUM S. Bergström	605
THE SURFACE ULTRASTRUCTURE OF THE HUMAN FALLOPIAN TUBE. A COMPARATIVE MORPHOPHYSIOLOGIC STUDY A. Ferenczy.	613
CUMULUS CELLS OF THE HAMSTER OVUM AND THEIR INTERACTION WITH SPERMATOZOA: A CORRELATIVE LIGHT AND SCANNING ELECTRON MICROSCOPY STUDY H. W. Carter.	623
THE LOCALIZATION OF SULFUR IN SPERMATOZOA BY ENERGY DISPERSIVE X-RAY ANALYSIS AND SCANNING ELECTRON MICROSCOPY E. W. Dempsey, J. U. M. Jarvis, and M. L. Purkerson.	631
INTERNAL TOPOGRAPHY OF THE MALE REPRODUCTIVE SYSTEM J. A. Nowell and L. J. Faulkin	639
VASA DEFERENTIA OF THE HUMAN AND DOG: A STUDY WITH THE SEM D. M. Berns, R. A. Rodzen, E. E. Brueschke, and L. J. D. Zaneveld.	647
UTILISATION OF ION-ETCHING IN STUDYING BLOOD CELL ULTRASTRUCTURE B. Frisch, S. M. Lewis, D. Sherman, P. R. Stuart, and J. S. Osborn	655
APPLICATION OF SCANNING ELECTRON MICROSCOPE AND ION BEAM ETCHING TECHNIQUES TO THE STUDY OF NORMAL AND DISEASED RED BLOOD CELLS M. Spector, S. L. Kimzey, and L. Burns	665
SCANNING ELECTRON MICROSCOPY OF LYMPHOCYTES OF KNOWN B AND T DERIVATION A. Polliack, N. Lampen, and E. deHarven.	673
CORRELATIVE SEM AND TEM STUDY OF THE IN VITRO MACROPHAGE MIGRATION RESPONSE TO ANTIGEN CHALLENGE T. A. Barber and P. M. Burkholder.	683
THE EFFECT OF RADLATION, INSULIN, CONCANAVALIN A, AND TRYPSIN ON THE SURFACE TOPOLOGY OF RAT THYMOCYTES P. S. Lin, L. Kwock, and C. Ehrhart.	691
SPECIALIZED LYMPHOID FOLLICLE EPITHELIAL CELLS IN THE HUMAN AND NONHUMAN PRIMATE: A POSSIBLE ANTIGEN UPTAKE SITE R. L. Owen and A. L. Jones	697
HUMAN AND CANINE SPLENIC VASCULATURE: STRUCTURE AND FUNCTION M. I. Barnhart and C. A. Baechler.	705
STEREO ULTRASTRUCTURE OF CARDIAC MEMBRANE SYSTEMS IN THE RAT HEART L. P. McCallister, V. R. Mumaw, and B. L. Munger	713
SCANNING ELECTRON MICROSCOPY OF ISCHEMIC HEART M. Ashraf and H. D. Sybers	721
SURFACE ULTRASTRUCTURAL STUDIES OF MITRAL VALVE PROSTHETIC DEVICES N. F. Rodman, D. B. Doty, and R. C. Caughey.	729
SEM STUDIES OF THE HUMAN KIDNEY S. Siew.	737

A SEM STUDY OF NORMAL 4ND OZONE EXPOSED MOUSE LUNG B. R. Pachter, D. Penha , and J. Davidowitz	745
SCANNING ELECTRON MICROSCOPY OF PULMONARY ACARIASIS (PNEUMONYSSUS SP.) IN THE RHESUS MONKEY (MACACA MULATTA) M. E. G. Brummer and L. W. Schwartz.	753
MORPHOLOGICAL MODIFICATIONS OF APICAL SURFACES OF THYROID CELLS IN DIFFERENT FUNCTIONAL CONDITIONS P. Ketelbant- Balasse and P. Neve	761
THE SURFACE TOPOGRAPHY OF ACUTE EROSIVE GASTRITIS J. M. Riddle, B. F. Rosenberg, C. E. Lucas, and C. Sugawa.	769
SCANNING ELECTRON MICROSCOPY OF INTESTINAL GIARDIASIS: LESIONS OF THE MICROVILLOUS BORDER OF VILLUS EPITHELIAL CELLS PRODUCED BY TROPHOZOITES OF GIARDIA S. L. Erlandsen.	775
THE EPENDYMAL SURFACE OF THE THIRD VENTRICLE OF R4T TO HYPOTHALAMIC AREA: A REFLECTION SCANNING ELECTRON MICROSCOPIC STUDY P. Mestres, W. Breipohl , and G. J. Bijvank	783
MORPHOGENESIS OF AUDITORY RECEPTOR EPITHELIA IN THE BULLFROG C. W. Li and R. E. Lewis	791
NEW NEUROANATOMICAL CONCEPTS OF THE HOUSEFLY COMPOUND EYE AND OPTIC NEUROPILES DERIVED BY SCANNING ELECTRON MICROSCOPY C. Chi and S. D. Carlson	799
CHONDROCYTES IN HEALTH AND DISEASE. A SCANNING ELECTRON MICROSCOPIC STUDY M. L. Zimnyand I. Redler	805
CELL DESQUAMATION IN INHERITED AND ACQUIRED ICHTHYOSIS A. C. Brown and R. J. Gerdes	813
THE SURFACE MOXPHOLOGY OF PHAGOCYTOSIS OF BACTERIA BY PERITONEAL MACROPHAGES A. S. Klainer and M. Rectenwald.	821
VISUALIZATION IN WHOLE CELLS OF HERPES SIMPLEX VIRUS USING SEM AND TEM V. G. Fonte and K. R. Porter	827
BIOMEDICAL APPLICATIONS BIBLIOGRAPHY 1973- 74 UPDATE S. J. Jones, E. Bailey, and A. Boyde	835
PART IV - <u>Workshop- on Failure Analysis and the SEM</u>	
FRACTURE MECHANICS AND SEM FAILURE ANALYSIS R. M. Pelloux.	851
THE ROLE OF THE SEM IN THE FAILURE ANALYSIS OF WELDED STRUCTURES J. C. M. Farrar.	859
FAILURE ANALYSIS OF STRESS CORROSION CRACKING WITH THE SCANNING ELECTRON MICROSCOPE J. C. Scully	867
THE APPLICATION OF SCANNING ELECTRON MICROSCOPY TO STUDIES IN ROLLING CONTACT FATIGUE L. Leonard and J. D. Meakin.	875
DEBRIS EXAMINATION IN THE SEM: A PROGNOSTIC APPROACH TO FAILURE PREVENTION D. Scott and G. H. Mills	883
FAILURE BY DELAMINATION DURING WEAR E. P. Abrahamson, II , S. Jahanmir, D. A. Colling, and N. P. Suh.	889
AN INVESTIGATION OF THE RELATIONSHIP BETWEEN FRACTURE TOPOGRAPHY AND MICROSTRUCTURE OF THREE TITANIUM ALLOYS J. C. Chesnutt and J. C. Williams.	895
PRECISION MATCHING OF MATING FRACTURE SURFACES IN THE ELECTRON MICROSCOPE D. A. Meyn and C. D. Beachem	903
TECHNIQUES FOR CLEANING SERVICE FAILURES IN PREPARATION FOR SCANNING ELECTRON MICROSCOPE AND MICROPROBE ANALYSIS E. P. Dahlberg	911

ELECTRON CHANNELLING PATTERNS FROM DEFORMED CRYSTALS J. P. Spencer, G. R. Booker, D. C. Joy, and C. J. Humphreys.	919
A METHOD FOR QUANTIFYING ELECTRON CHANNELING PATTERN DEGRADATION DUE TO MATERIAL DEFORMATION D. L. Davidson	927
VOLTAGE CONTRAST METHODS FOR SEMICONDUCTOR DEVICE FAILURE ANALYSIS D. L. Crosthwait and F. W. Ivy	935
ON THE ELECTRON BEAM INDUCED CURRENT ANALYSIS OF SEMICONDUCTOR DEVICES A. J. Gonzales.	941
FAILURE ANALYSIS OF INTEGRATED CIRCUITS WITH SEM BEAM INDUCED CURRENTS J. D. Schick.	949
ROLE OF SEM IN MICROCIRCUIT FAILURE ANALYSIS D. P. Nicolas.	955
PROPER SEM INSPECTION OF IC STEP COVERAGE USING THE NASA GODDARD S-311-P12-A SPZCIFICATION AS CRITERIA R. E. Flutie	963
SEM FAILURE ANALYSIS TECHNIQUES FOR THIN FILMS AND MICROWAVE POWER TRANSISTOR METALLIZATIONS A. Christou.	971
SEM EXAMINATION OF THE AU-AL INTERMETALLIC ON IC LEAD BOADS J. R. Clifford, R. M. Sega, G. D. Foos, and A. A. Throckmorton	979
FRACTURE SURFACE MAPPING WITH THE SCANNING ELECTRON MICROSCOPE AND ITS APPLICATION TO FAILURE ANALYSIS R. J. Willard and G. R. Vandenbos.	987
THE TENSILE FAILURE OF THERMOPLASTICS: AN INVESTIGATION USING THE SCANNING ELECTRON MICROSCOPE P. M. Cross, F. H. C. Edgecornbe, and P. Jeffrey.	995
IMPROVED CONDITIONS FOR BACK-SCATTERED ELECTRON SEM-MICROGRAPHS OF POLISHED SECTIONS USING A MODIFIED SCINTILLATOR DETECTOR K. Schur, R. Blaschke, and G. Pfefferkorn.	1003
TUTORIALS	
FUNDAMENTALS OF THE SCANNING ELECTRON MICROSCOPE FOR BIOLOGISTS M. D. Muir	1011
COATING TECHNIQUES FOR SCANNING ELECTRON MICROSCOPY P. Echlin.	1019
X-RAY MICRO-ANALYSIS IN SCANNING ELECTRON MICROSCOPY H. Yakowitz.	1029
FREEZING, FREEZE-FRACTURING AND FREEZE-DRYING IN BIOLOGICAL SPECIMEN PREPARATION FOR THE SEM A. Boyde.	1043
THE ORIGIN, DETECTION, AND USES OF ELECTRON CHANNELLING CONTRAST D. E. Newbury.	1047
ADDITIONALDISCUSSIONS	1055
AUTHOR INDEX	1063