

TABLE OF CONTENTS

PREFACE	x
LIST OF SYMBOLS	xv
 PART I - <u>Sixth Annual Scanning Electron Microscope Symposium</u> 	
COMPARATIVE CONSIDERATIONS IN SCANNING AND CONVENTIONAL ELECTRON MICROSCOPY S. Kimoto	1
A SCANNING TRANSMISSION ELECTRON MICROSCOPE W. Kuypers, M. N. Thompson, and W.H. J. Andersen	9
THE THEORETICAL RESOLVING POWER OF THE TRANSMISSION SEM AT HIGH VOLTAGES A. Strojnik	17
THE SEM TO STEM CONVERSION STUB M. K. Nemanic and T. E. Everhart.	25
CHARACTERISTICS AND APPLICATIONS OF POINTED CATHODES IN SCANNING ELECTRON MICROSCOPES J. C. Wiesner	33
LIFETIME AND NOISE CHARACTERISTICS OF TUNGSTEN FIELD EMITTERS D. J. Swann and K.C.A. Smith.	41
TWO-LENS PROBE FORMING SYSTEMS EMPLOYING FIELD EMISSION GUNS J.R.A. Cleaver and K.C.A. Smith	49
THE DEVELOPMENT OF A FIELD EMISSION SEM D. J. Swann and D. Kynaston	57
STABLE FIELD EMISSION GUN WITH AN ELECTRONIC FEEDBACK SYSTEM S. Nomura, T. Komoda, T. Kamiryo, and Y. Nakaizumi.	65
FIELD EMISSION SCANNING ELECTRON MICROSCOPE WITH PARALLEL PLATE GUN ELECTRODES R. Shimizu, K. Kuroda, T. Suzuki, S. Nakamura, T. Sugauma, and H. Hashimoto.	73
ION ANALYSIS IN THE SEM W. C. Lane and N. C. Yew.	81
PRESENT TRENDS IN X-RAY ANALYSIS WITH THE SEM E. Lifshin and M. F. Ciccarelli	89
STEREOSCOPIC TECHNIQUES FOR IMPROVED X-RAY ANALYSIS OF ROUGH SEM SPECIMENS J. L. Bomback.	97
TIME-SHARED COMPUTER TREATMENT OF ENERGY-DISPERSIVE X-RAY DATA J. M. Short.	105
MICROANALYSIS OF THIN SECTIONS, COATINGS AND ROUGH SURFACES J. C. Russ.	113
NEW METHODS FOR QUANTITATIVE CHARACTERIZATION OF MULTIPHASE PARTICULATE MATERIALS INCLUDING THICKNESS MEASUREMENT J. Lebieczik, K. G. Burke, S. Troutman, G. G. Johnson, Jr., and E. W. White	121

OPTIMIZATION OF AN SEM X-RAY SPECTROMETER SYSTEM FOR THE IDENTIFICATION AND CHARACTERIZATION OF ULTRAMICROSCOPIC PARTICLES C. J. Maggiore and I. B. Rubin	129
RECENT DEVELOPMENTS IN ELECTRON CHANNELLING TECHNIQUES D. C. Joy and G. R. Booker	137
LOW MAGNIFICATION SCANNING ELECTRON MICROSCOPY J. D. Meakin and L. M. Fallon.	145
CHARACTERISTICS OF SEM SIGNALS AND TECHNIQUES FOR SIGNAL PROCESSING D. E. Newbury and D. C. Joy.	151
A SPLIT-FIELD COMPARISON SEM C. G. van Essen and J. E. Morgan	159
A TOPOGRAPHICAL COMPARISON IMAGING SYSTEM FOR SEM APPLICATIONS G. Judd, R. Wilson, and H. Weiss	167
IMPLICATIONS OF SPECIMEN CURRENT AND TIME DIFFERENTIATED IMAGING IN SEM H. Yakowitz, C. E. Fiori, and D. E. Newbury.	173
CONTAMINATION IN THE SEM W. R. Bottoms.	181
AN INTEGRATED DEVICE FOR CONTROLLING CHARGING ARTIFACTS IN THE SEM G. E. Garner, A. L. Cohen, and R.G.E. Steever, Jr.	189
SEM STROBOSCOPY AT 9 GHz A. Gopinath and M. S. Hill	197
COMPACT, CONTROLLED-ATMOSPHERE CELL FOR TSEM OF HYDRATED BIOLOGICAL MATERIALS R. S. Morgan, J. Lebedzik, and E. W. White.	205
NEW DISPLAY TECHNIQUES FOR THE SCANNING ELECTRON MICROSCOPE R. S. Paden, P. I. Tillet, and J. M. Upton	211
BORIDE GUNS FOR HIGH SIGNAL LEVEL SEM H. Ahmed and W. C. Nixon	217
PART II - <u>Workshop on Electron Specimen Interactions: Theory for SEM</u>	
SOME ASPECTS OF INELASTIC AND ELASTIC ELECTRON SCATTERING IN THE SCANNING ELECTRON MICROSCOPE D. L. Misell	225
CONTRAST ENHANCEMENT FROM SINGLE ATOMS AND FROM CRYSTALS USING ENERGY ANALYSIS C. J. Humphreys, R. Sandstrom, and J. P. Spencer	233
RESOLUTION AND CONTRAST IN HIGH VOLTAGE SEM J. R. Sellar and J. M. Cowley.	243
IMAGING OF CRYSTAL DEFECTS IN THE SEM G. R. Booker, D. C. Joy, J. P. Spencer, and C. J. Humphreys.	251
MAGNETIC CONTRAST IN THE SEM D. J. Fathers, D. C. Joy, and J. P. Jakubovics	259

MONTE CARLO CALCULATIONS ON ELECTRON SCATTERING AND SECONDARY ELECTRON PRODUCTION IN THE SEM K. Murata	267
DETERMINATION OF KILOVOLT ELECTRON ENERGY DISSIPATION IN DEPTH IN SOLIDS T. Matsukawa, R. Shimizu, K. Murata, and K. Harada.	277
THE USE OF MONTE CARLO TECHNIQUES FOR X-RAY ANALYSIS OF THIN FILMS AND FINE STRUCTURE R. B. Bolon and E. Lifshin.	285
THE SEM-SPECIMEN SYSTEM--A MACROSCOPIC MATHEMATICAL MODEL T. J. Shaffner.	293
CATHODOLUMINESCENCE STUDIES IN THE SEM A. D. Yoffe, K. J. Howlett, and P. M. Williams.	301
TEMPERATURE VARIATION OF CATHODOLUMINESCENCE IN DIRECT GAP SEMICONDUCTORS G.A.C. Jones, B. R. Nag, and A. Gopinath.	309
PART III - <u>Workshop on Scanning Electron Microscopy in Pathology</u>	
A CRITICAL POINT DRYING TECHNIQUE FOR SEM OF TISSUE CULTURE CELLS GROWN ON PLASTIC SUBSTRATUM L. E. DeBault	317
THE PREPARATION, COATING AND EXAMINATION OF FROZEN BIOLOGICAL MATERIALS IN THE SEM P. Echlin and R. Moreton.	325
MICRODISSECTION OF BIOLOGICAL SEM SAMPLES FOR FURTHER STUDY IN THE TEM J. B. Pawley and J. A. Nowell	333
PREPARATION OF CARDIAC MUSCLE FOR SEM H. D. Sybers and M. Ashraf.	341
A SIMPLE TECHNIQUE FOR CORRELATING SEM WITH TEM ON BIOLOGICAL TISSUE ORIGINALLY EMBEDDED IN EPOXY RESIN FOR TEM S. L. Erlandsen, A. Thomas, and G. Wendelschafer.	349
THREE REPLICA TECHNIQUES FOR BIOLOGICAL SPECIMEN PREPARATION C. H. Pameijer and R. E. Stallard	357
QUANTITATIVE EVALUATION OF FIXATION AND DEHYDRATION METHODS FOR SCANNING ELECTRON MICROSCOPIC PREPARATION OF SOFT SEA WATER ORGANISMS K. M. Ulmer and S. Honjo.	365
FIXATION & DEHYDRATION IN THE PRESERVATION OF SURFACE STRUCTURE IN CRITICAL POINT DRYING OF PLANT MATERIAL A. L. Cohen and M. Shaykh	371
ION ETCHING OF ORGANIC MATERIALS M. J. Fulker, L. Holland, and R. E. Hurley.	379
TECHNIQUE FOR EXAMINING UNCOATED SPECIMENS IN THE SEM WITH LIGHT MICROSCOPE AND TEM CORRELATION B. R. Pachter, D. Penha, J. Davidowitz, and G. M. Breinin	387
USE OF POTASSIUM IODIDE/LEAD ACETATE FOR EXAMINING UNCOATED SPECIMENS B. J. Panessa and J. F. Gennaro, Jr.	395

THE POTENTIAL OF SEM IN STUDIES OF EXPERIMENTAL AND SPONTANEOUS DISEASES W. S. Tyler, D. L. Dungworth, and J. A. Nowell	403
METHODS FOR A SEM STUDY OF COAL WORKERS' PNEUMOCONIOSIS P. B. DeNee, J. L. Abraham, and A. H. Gelderman.	411
SURGICAL PRODUCTION OF ENDOLYMPHATIC HYDROPS: A SCANNING ELECTRON MICROSCOPIC COMPARATIVE STUDY OF THE FIVE NORMAL AND HYDROPIIC SENSORY REGIONS OF THE LEMON SHARK INNER EAR I. K. Arenberg and E. Rauchbach.	419
OBSERVATIONS ON THE COCHLEA WITH SEM T. Tanaka, N. Kosaka, T. Takiguchi, T. Aoki, and S. Takahara	427
CHANGES IN SURFACE STRUCTURES OF BRAIN SYNAPTOSOMES OF RAT FOLLOWING BINDING OF TETANUS TOXIN R. P. Choudhury and A. Narayanaswami	435
STUDIES ON THE DYNAMIC AORTIC PATCH AND THE AORTA IN CLINICAL TRIALS C. A. Baechler, M. I. Barnhart, W. Schraut, and A. Kantrowitz.	443
SURFACE EFFECTS OF AORTIC BALLOON COUNTERPULSATION M. D. Schneider and F.A. O. Eckner.	451
CORRELATED SCANNING AND TRANSMISSION ELECTRON MICROSCOPY OF ARTERIAL ENDOTHELIUM T. Sunaga, T. Shimamoto, and E. Nelson	459
ISCHEMIA OF THE COMMON CAROTID ARTERY IN RABBITS: SEM AND TEM STUDY OF THE LUMINAL SURFACE J. Kawamura, T. Sunaga, H. Mulhern, and E. Nelson.	465
A SCANNING AND TRANSMISSION ELECTRON MICROSCOPIC STUDY OF CANINE JUGULAR VEINS G. J. Stewart, W.G.M. Ritchie, and P. R. Lynch	473
BLOOD PLATELET SURFACES IN 3-DIMENSION R. T. Walsh and M. I. Barnhart	481
SCANNING ELECTRON MICROSCOPY STUDIES OF INTRACELLULAR SYMBIOSIS OF BACTERIODS AND BLATTIDS R. S. Daniel	489
A MORPHOLOGICAL INVESTIGATION IN THE SEM OF HAEMAGGLUTINATION WITH INFLUENZA AND VACCINIA VIRUSES J. P. Carteau, M. D. Muir, and G. Cataigne.	497
THE CYTOPATHIC EFFECTS OF HERPES SIMPLEX VIRUS IN CELL CULTURE D. Enlander, T. E. Everhart, T. Scott, R. Hoo, and L. Drew	505
COMPARATIVE SEM AND TEM STUDIES ON NORMAL AND VIRUS-INFECTED CULTURE CELLS (ATTEMPTS TO LABEL VIRUS-SPECIFIC SURFACE ANTIGENS) K. Mannweiler and G. Rutter.	513
SURFACE FEATURES OF SOME ESTABLISHED MURINE CELL LINES UNDER VARIOUS CONDITIONS OF ONCOGENIC VIRUS INFECTION J. P. Perecko, I. K. Berezsky, and P. M. Grimley.	521
COMPARISON OF AIR DRYING AND CRITICAL POINT DRYING PROCEDURES FOR THE STUDY OF HUMAN BLOOD CELLS BY SCANNING ELECTRON MICROSCOPY A. Polliack, N. Lampen, and E. deHarven.	529

THE NEED FOR POSITIVE IDENTIFICATION OF LEUKOCYTES EXAMINED BY SCANNING ELECTRON MICROSCOPY B. Wetzel, B. W. Erickson, Jr., and W. R. Levis	535
MEMBRANE INTERACTION BETWEEN LYMPHOCYTES AND MONOLAYER CELLS IN VITRO P. S. Lin, S. Tsai, D.F.H. Wallach, and P. Neurath.	543
SCANNING ELECTRON MICROSCOPY IN PATHOLOGIC DIAGNOSIS OF MAMMALIAN PARASITIC DISEASES A. E. McKee, Jr.	549
SEM OBSERVATIONS IN HUMAN GIARDIASIS J. C. Mueller, A. L. Jones, and L. L. Brandborg	557
SCANNING ELECTRON MICROSCOPE STUDIES OF IRRADIATED RAT INTESTINAL MUCOSA J. H. Anderson and R. H. Withers.	565
ORTHOLOGY AND PATHOLOGY OF THE RENAL PODOCYTES H. Buss, B. Lamberts, and H. Brass.	573
SCANNING ELECTRON MICROSCOPIC STUDIES OF NORMAL AND PATHOLOGIC HUMAN GENITOURINARY TRACT ORGANS. A PRELIMINARY REPORT M. A. Clark and K. J. O'Connell	581
A SCANNING ELECTRON MICROSCOPE STUDY OF NORMAL AND CARCINOGEN- TREATED MOUSE BLADDER IN VIVO AND IN VITRO G. M. Hodges, M. D. Muir, and G. Spacey	589
THE SURFACE ULTRASTRUCTURE OF NORMAL AND ABNORMAL CERVICAL EPITHELIA A. E. Williams, J. A. Jordan, J. F. Murphy, and J. M. Allen	597
EXAMINATION OF EXFOLIATED CERVICAL CELLS BY THE SCANNING ELECTRON MICROSCOPE J. F. Murphy, J. M. Allen, J. A. Jordan, and A. E. Williams	605
SCANNING ELECTRON MICROSCOPY OF HYPERPLASTIC AND NEOPLASTIC ENDOMETRIA A. Ferenczy and R. M. Richart	613
SEM OBSERVATIONS OF THE EFFECTS OF A COPPER IUD ON THE ENDOMETRIUM OF THE HUMAN UTERUS J. L. Daniel, W. G. Riches, and Y. Gibor.	621
SCANNING ELECTRON MICROSCOPY IN SKIN PATHOLOGY J. P. Carteaude.	629
THE IMPORTANCE OF THE STRUCTURAL ORGANIZATION OF DERMAL FIBRES AS RELATED TO THE PATHOLOGY OF HUMAN SKIN J. B. Finlay and J.A.A. Hunter.	637
SCANNING ELECTRON MICROSCOPY OF HAIR SHAFTS FROM FOLIC ACID DEFICIENT MICE D. N. Singh, W. B. Greene, R. A. Schreiber, and G. R. Hennigar.	645
COMPARATIVE PENETRATION OF TRICHOPHYTON MENTAGROPHYTES IN NORMAL AND THE LOW SULFUR DEFECTIVE CUTICLE HAIR OF TRICHOSCHISIS A. C. Brown, R. J. Gerdes, and L. Haley	651
CORRELATION OF SEM, REPLICATION AND LIGHT MICROSCOPY STUDIES OF THE BEARING SURFACES IN HUMAN JOINTS I. C. Clarke.	659

LESIONS OF THE MENISCI IN MAN - A SCANNING ELECTRON MICROSCOPE STUDY H. U. Cameron and I. Macnab	667
SEM OBSERVATIONS ON THE STRUCTURE OF THE ARTICULAR CARTILAGE SURFACE IN NORMAL AND PATHOLOGICAL CONDITIONS W. Puhl and V. Iyer	675
OBSERVATIONS ON THE TOPOGRAPHY OF NORMAL AND CANCER CELLS K. R. Porter and V. G. Fonte.	683
THE SIGNIFICANCE OF SEM EVALUATION OF THE CELL SURFACE FOR TUMOR CELL BIOLOGY P. Vesely and A. Boyde.	689
BIBLIOGRAPHY ON BIOMEDICAL APPLICATIONS OF SEM A. Boyde, S. J. Jones, and E. Bailey.	697
PREPARATION OF MICROBES FOR SCANNING ELECTRON MICROSCOPY S. T. Williams, C. J. Veldkamp, and C. S. Robinson.	735
GENERAL	
THE SCANNING ELECTRON MICROSCOPE - PRINCIPLES AND APPLICATIONS D. Joy.	743
TECHNIQUES FOR NON-CONDUCTIVE SAMPLES G.E. Pfefferkorn.	751
FREEZING AND FREEZE-DRYING - A PREPARATIVE TECHNIQUE FOR SCANNING ELECTRON MICROSCOPY A. Boyde and P. Echlin.	759
CRITICAL POINT DRYING TECHNIQUES E. R. Lewis and M. K. Nemanic	767
UPDATE OF BIBLIOGRAPHY ON THE SCANNING ELECTRON MICROSCOPE (PHYSICAL SCIENCES ONLY) J. Young.	775
PROGRAM FOR SCANNING ELECTRON MICROSCOPY/1973 MEETINGS.	781
AUTHOR INDEX.	787