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Four types of communications are published in the Journal. **Regular Articles** are of substantial length, and describe the findings of an original research project that satisfies the aims and scope of the Journal, described above. **Communications** are brief technical or scientific articles. **Reviews** summarize the current status of an important area within the aims and scope of the Journal. **Letters to the Editor** usually contain comments on recent articles that have appeared in the Journal.

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DR. KIYOTERU TOKUYASU
Biological Sciences

Kiyoteru Tokuyasu, born in Nagasaki in 1925, obtained B.S. in physics in 1949 and Ph.D. in medical science in 1957, both from Kyushu University, Japan.

After two years of associate professorship at Kurume Medical College, he worked as the head designer of electron microscopes at Hitachi from 1958 to 1963. He then returned to biological research by moving to UCLA in 1964 and to UCSD in 1969. There, in collaboration with Prof. S.J. Singer, he was able to make cryoultramicrotomy a practical method. He became Professor of Biology in Residence in 1977 and Emeritus Professor in 1991.

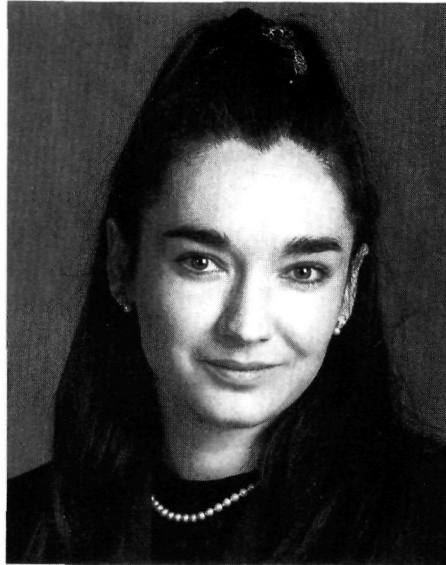
Throughout his academic life spanning half century, EM was the major means to pursue his interest in biological structures. He published more than 110 papers on a wide range of subjects including the principle involved in glass-knife making (1959). He gave invited lectures on numerous occasions, domestic and abroad.



PROFESSOR S. AMELINCKX
Physical Sciences

Severin Amelinckx was Licenced in Mathematics (1944), received his Ph.D. in Physics (1952), Aggregation in Physics (1955), all from Ghent and the Doctor honoris causa of the University of Thessaloniki, Greece. At present he is Emeritus Professor of General Physics and Crystallography at the University of Antwerp. He has held visiting professorships at Carnegie Mellon University and at Stanford University and also served as director-general of the Belgian Nuclear Research Establishment at Mol. His research interests are: electron diffraction contrast, imaging, defects in solids, phase transformations and their resulting domain structures, crystal growth, dislocations, fullerenes and nanotubes, structures of high T_c superconductors, modulated structures, and order-disorder in alloys. He was awarded the "Doctor A. de Leeuw-Damry-Bourlart" prize for physics by the Belgian National Science Foundation and is a member of the "Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België", the "Koninklijke Nederlandse Academie voor Wetenschappen" (Amsterdam), and the European Academy (London).

BURTON MEDAL



EVA NOGALES

Eva Nogales is an assistant professor in the Molecular and Cell Biology Department at UC Berkeley, and a staff scientist at Lawrence Berkeley National Lab (LBNL). Of Spanish nationality, Eva received her BS in Solid State Physics at the Autónoma University in Madrid. She moved to the Daresbury Synchrotron Source (U.K.) for her graduate research on the effect of antimetabolic drugs on tubulin assembly using X-ray solution scattering. In 1993 she joined Kenneth H. Downing as a postdoc at LBNL, where she worked on the electron crystallographic studies of tubulin. These studies culminated with the publication of the atomic structure of this essential protein in January 1998. As an assistant professor she is continuing her tubulin studies investigating the conformational changes that generate polymer dynamics. Her lab is also characterizing the structure of large protein complexes involved in gene regulation. Eva won an outstanding performance award at LBNL in 1997. She has recently become a member of the editorial board of the *Journal of Structural Biology*

THE MORTON D MASER
MSA DISTINGUISHED SERVICE AWARD



BARBARA A. REINE

Barbara A. Reine manages the Botany Department's Electron Microscopy Cooperative Laboratory at the University of Washington where she received her B.A. and M.S. degrees. She began her career in electron microscopy in 1971 studying the ultrastructure of phytoplankton. As laboratory manager she combines her interest in teaching with her curiosity about structure. A member of the MSA since 1984, she was awarded the Cecil Hall Poster Award in 1992. She served as treasurer of the XII International Congress of Electron Microscopy held in Seattle in 1990, as MSA Council Secretary for two terms from 1991–1996, and as the News and Commentary Editor for the Society's journal, **Microscopy and Microanalysis** from 1997–2000. She served as Chair of the Bylaws Revision Committee, Chair of the MSA Brochure Committee and redesigned the Society logo in 1991–'92. Additionally, she was MSA's representative to the IFSEM meeting in Granada, Spain at the EUREM meeting in 1992, a MSA delegate to the IFSEM meeting at the XIII International Congress of Electron Microscopy in Paris, France in 1994 and represented the MSA at an organizational meeting of CIASEM in Sao Paulo, Brazil, in 1994. Also, she served as an advisor to the Organizing Committee of the XIV International Congress of Electron Microscopy in Cancun, Mexico in 1998. She is a charter member of the Pacific Northwest Microscopy Society. Her research interests include morphological and analytical studies of plants and preparation techniques for plant materials for SEM and microanalysis.

MSA OUTSTANDING TECHNOLOGIST AWARD



NANCY CRISE SMITH

Nancy Crise Smith was introduced to microscopy in 1964 when she operated an RCA-3 TEM at the Veteran's Hospital and Medical Center in Martinez, CA. In 1971, she enrolled as an undergraduate at California State University, Hayward and was the first EM technologist to be hired within the California State University (CSU) system. While there she obtained her Master's degree in Biological Sciences, and later assumed the directorship of the EM facility at CSUH. For 35 years, she passionately learned and developed new techniques in microscopy. Collaborating with researchers within the CSU system, and the Universities of California, Berkeley and San Francisco, she devised methodologies for diverse studies and numerous publications and presentations resulted. She has been instrumental in developing remote control of a scanning electron microscope for K-14 outreach. She is past president of the Northern California Society for Microscopy and although she retired in 1999, she continues to develop curriculum for remote access to scientific instrumentation.

OPTICAL IMAGING ASSOCIATION AWARD
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GREGG G. GUNDERSEN

Gregg Gundersen received his PhD in Biochemistry from the University of Washington and did postdoctoral research in Cell Biology at UCLA and Caltech before joining the faculty at Columbia University in 1989. He is currently Associate Professor of Cell Biology & Anatomy and Pathology at Columbia and is serving this year as president of the New York Society for Experimental Microscopy. Dr. Gundersen studies focus on the role of microtubule dynamics in cell polarization and migration. He has conducted pioneering research into how signal transduction pathways, particularly those involving Rho GTPases, coordinate the microtubule, actin and intermediate filament cytoskeletons during cell migration. His work has also lead to a further understanding of the role of tubulin posttranslational modifications in microtubule activity. In 1997, he was the Nikon Fellow at the MBL in Woods Hole, and used multifuorescence imaging of GFP labeled proteins to obtain striking new information on the motility of focal adhesions and intermediate filaments in cells.

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J.A. Davis University of Toronto	S.V. Yanina University of Minnesota

2000 MSA PROFESSIONAL TECHNICAL STAFF AWARDS

K.W. Grant
Wake Forest University School of Medicine
Winston-Salem, NC

F. McDonald
University of South Alabama
Mobile, AL

MSA DISTINGUISHED SCIENTIST AWARD

Biological Sciences	Physical Sciences
1975 Keith Porter	1975 Robert Heidenreich
1976 L.L. Marton	1976 Albert Crewe
1977 Robley Williams	1977 James Hillier
1978 Thomas Anderson	1978 V.E. Cosslet
1979 Daniel Pease	1979 John Cowley
1980 George Palade	1980 Gareth Thomas
1981 Sanford Palay	1981 Vladimir Zworykin
1982 Richard Eakin	1982 Benjamin M. Siegel
1983 Hans Ris	1983 Otto Scherzer
1984 Cecil Hall	1984 Sir Charles Oatley
1985 Gaston Dupouy	1985 Ernst Ruska
1986 F.O. Schmitt	1986 Peter Hirsch
1987 Marilyn Farquhar	1987 Jan LePoole
1988 Morris Karnovsky	1988 Hatsujiro Hashimoto
1989 Don W. Fawcett	1989 Elmar Zeitler
1990 Audrey M. Glauert	1990 Gertrude F. Rempfer
1991 Hugh E. Huxley	1991 Archie Howie
1992 Fritiof Sjöstrand	1992 Oliver Wells
1993 Jean-Paul Revel	1993 Ken Smith
1994 Andrew Somlyo	1994 Dennis McMullan
1995 Shinya Inoué	1995 David B. Wittry
1996 Myron C. Ledbetter	1996 John Silcox
1997 S. J. Singer	1997 Peter Swann
1998 Avril V. Somlyo	1998 Michael J. Whelan
1999 Sir Aaron Klug	1999 Takeo Ichinokawa

MSA BURTON MEDALIST

1975 James Lake	1987 Ronald Milligan
1976 Michael Isaacson	1988 A.D. Romig, Jr.
1977 Robert Sinclair	1989 Laurence D. Marks
1978 David Joy	1990 W. Mason Skiff
1979 Norton B. Gilula	1991 Joseph R. Michael
1980 John Spence	1992 Kannan Krishnan
1981 Barbara Panessa-Warren	1993 Joseph A. N. Zasadzinski
1982 Nestor Zaluzec	1994 Jan M. Chabala
1983 Ronald Gronsky	1995 Joanna L. Batstone
1984 David B. Williams	1996 Vinayak P. Dravid
1985 Richard Leapman	1997 P. M. Ajayan
1986 J. Murray Gibson	1998 Ian M. Anderson
	1999 Zhong Lin Wang

THE MORTON D MASER
MSA DISTINGUISHED SERVICE AWARD

1992	Ronald Anderson	1993	E. Laurence Thurston
	G.W. "Bill" Bailey	1994	Richard F.E. Crang
	Frances Ball	1995	Raymond K. Hart
	Blair Bowers	1996	José A. Mascorro
	Deborah Clayton	1997	William T. Gunning, III
	Joseph Harb	1998	Nestor J. Zaluzec
	Kenneth Lawless	1999	Charles E. Lyman
	Morton Maser		
	Caroline Schooley		
	John H.L. Watson		

MSA OUTSTANDING TECHNOLOGIST AWARD

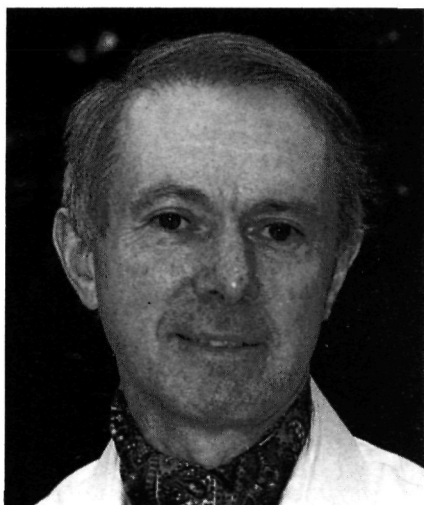
1993	Ben O. Spurlock	1997	John P. Benedict
1994	Bernard J. Kestel		Stanley J. Klepeis
1995	Kai Chien	1998	Hilton H. Molenhauer
1996	David W. Ackland		Charles J. Echer
		1999	John M. Basgen
			John C. Wheatley

MSA PAST PRESIDENTS

1942	G.L. Clark ¹	1972	Daniel C. Pease
1943	R. Bowling Barnes ²	1973	Benjamin Siegel
1944	R. Bowling Barnes	1974	Russell J. Barnett
1945	James Hillier	1975	Gareth Thomas
1946	David Harker	1976	Etienne de Harven
1947	William G. Kinsinger	1977	T.E. Everhart
1948	Perry C. Smith	1978	Myron Ledbetter
1949	F.O. Schmitt	1979	John Silcox
1950	Ralph W.G. Wyckoff	1980	Michael Beer
1951	Robley C. Williams	1981	John Hren
1952	R.D. Heidenreich	1982	Lee Peachey
1953	Cecil E. Hall	1983	David Wittry
1954	Robert G. Picard	1984	J. David Robertson
1955	Thomas F. Anderson	1985	Dale Johnson
1956	William L. Grube	1986	Robert Glaeser
1957	John H.L. Watson	1987	Linn W. Hobbs
1958	Max Swerdlow	1988	John-Paul Revel
1959	John H. Reisner	1989	Ray Carpenter
1960	D. Gordon Sharp	1990	Keith R. Porter
1961	D. Maxwell Teague	1991	Charles Lyman
1962	Keith R. Porter	1992	Patricia Calarco
1963	Charles Schwartz	1993	Michael S. Isaacson
1964	Sidney S. Breese	1994	Robert R. Cardell
1965	Virgil G. Peck	1995	Terence E. Mitchell
1966	Walter Frajola	1996	Margaret Ann Goldstein
1967	Joseph J. Comer	1997	C. Barry Carter
1968	John H. Luft	1998	Ralph M. Albrecht
1969	W.C. Bigelow	1999	David Joy
1970	Russell Steere		
1971	Robert M. Fisher		

¹Chair of committee to arrange first meeting

²Temporary (pre-constitution)



RAYMOND F. EGERTON

Ray Egerton received a BA degree in Natural and Electrical Sciences from Cambridge University, then did graduate research at Imperial College, London, on epitaxial films of lead chalcogenides. This work led to a PhD in Materials Science in 1968 and employment at Zenith Radio Research Laboratories (north London) aimed at developing a PbTe thin-film transistor for flat-panel displays.

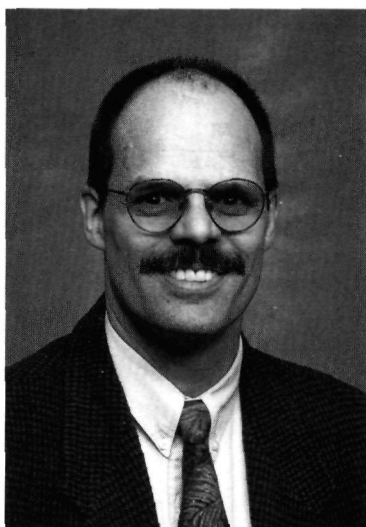
In 1971 he joined Mike Whelan at Oxford University to develop applications for an energy-filtering TEM. These applications included the development of procedures for quantitative elemental analysis based on energy-loss ionization edges, work which continued at the University of Alberta and resulted in a textbook "EELS in the Electron Microscope" in 1986, revised as a second edition ten years later.

Ray has served as an MSA Physical Science Director, as President of the Microscopical Society of Canada, and (since 1994) as an editor for the journal *Micron*. His research interests continue to be in the fields of analytical TEM, radiation damage processes and thin films (including patterned nanostructures). Currently he is also working on electron optics with Gertrude Rempfer at Portland State University.



RYNA B. MARINENKO

Ryna Marinenko has been a member of MAS since 1974 when she started working in the field of X-ray microanalysis at the National Bureau of Standards (NBS) which is now National Institute of Standards and Technology (NIST). From 1990–1992 she served as an MAS director, and in 1997 she served as President of MAS. She was an MAS Tour Speaker in 1992 and served on the MAS Meeting Committee which evaluated the future MAS national meeting commitments (1994–5). She has attended MAS national meetings regularly where she has chaired sessions and presented papers. In 1999 Ryna co-chaired the special symposium *50 Years of Electron Probe Microanalysis, A Symposium Dedicated to Raimond Castaing*. Since the spring of 1996 she has been the editor of *MicroNews*, and during the past eight years she has organized meetings for the local affiliated regional society, the MAMAS (Mid-Atlantic Microbeam Analysis Society) at NIST.



HARALD ADE

Harald Ade received his Ph.D. in Physics in 1990 from SUNY at Stony Brook. He joined the North Carolina State University (NCSU) faculty in 1992 as an Assistant Professor and was promoted to Associate Professor in 1997. His research group at NCSU is interested in the development of novel X-ray and photoemission microscopies and their applications. Of particular interest is the quantitative mapping of the composition and the determination of orientation of specific functional groups in multi-component polymers and polymer composites at high spatial resolution and the relationship of the structure to important properties in these materials. Compositional characterization is primarily achieved via Near Edge X-ray Absorption fine Structure (NEXAFS) spectroscopy. NEXAFS microscopy in transmission was pioneered by Ade and collaborators in 1992. For his novel work on the microscopy of polymers Ade received a DuPont Young Faculty Award (1994–97) and a NSF Young Investigator Award (1994–1999). He was also recognized by the Proctor & Gamble Presidential Faculty Fellow Support Program (1995), a Sigma Xi Research Award of the NCSU Sigma Xi chapter (1995) and an R&D100 Award (1990). H. Ade has delivered more than 110 invited presentations and (co)-authored more than 60 refereed research papers. Ade has been a member of the MAS since 1993.

2000 MAS DISTINGUISHED SCHOLAR AWARDS

J.M. Cairney University of New South Wales	D.N. Leonard North Carolina State University
J.P. Craven University of Cambridge	S. Ramanathan Stanford University
H. Demers Université de Sherbrooke	Y. Tan University of Arizona
Q. Ding University of Michigan	S. Taylor University of California-Berkeley

D.A. Winesett
North Carolina State University

MAS PRESIDENTIAL AWARDS

	Science		Service
1977	R. Castaing	1977	P. Lublin
1978	K.F.J. Heinrich	1978	D.R. Beaman
1979	P. Duncumb	1979	M.A. Giles
1980	D.B. Wittry	1980	A.A. Chodos
1981	S.J. Reed	1981	R. Myklebust
1982	R. Shimizu	1982	J. Doyle
1983	J. Philibert	1983	D. Newbury
1984	L.S. Birks	1984	J.I. Goldstein
1985	E. Lifshin	1985	M.C. Finn
1986	R. Myklebust	1986	V. Shull
1987	O.C. Wells	1987	D.C. Joy
1988	J.D. Brown	1988	C.G. Cleaver
1989	J. Hillier	1989	W.F. Chambers
1990	T.E. Everhart	1990	C.E. Fiori
1991	J.I. Goldstein	1991	T.G. Huber
1992	G. Lorimer	1992	E. Etz
	G. Cliff	1993	H.A. Freeman
1993	D.E. Newbury	1994	J.L. Worrall
1994	D.C. Joy	1995	R.W. Linton
1995	G. Bastin	1996	P.F. Hlava
1996	A.V. Somlyo	1997	J.A. Small
	A.P. Somlyo	1998	J.J. McCarthy
1997	D.B. Williams	1999	T.G. Huber
1998	F.H. Schamber		
1999	R.A. Sareen		

MAS K.F.J. HEINRICH AWARDS

1986	P. Statham	1992	S. Pennycook
1987	J.T. Armstrong	1993	P.E. Russell
1988	D.B. Williams	1994	J.R. Michael
1989	R. Leapman	1995	N. Lewis
1990	R.W. Linton	1997	R. Gauvin
1991	A.D. Romig, Jr.	1998	V.P. Dravid
		1999	J. Bruley

MAS PAST PRESIDENTS

1968	L.S. Birks	1984	D.C. Joy
1969	K.F.J. Heinrich	1985	D.E. Newbury
1970	R.E. Ogilvie	1986	C.G. Cleaver
1971	A.A. Chodos	1987	C. Fiori
1972	K. Keil	1988	W.F. Chambers
1973	D.R. Beaman	1989	D.B. Wittry
1974	P. Lublin	1990	A.D. Romig, Jr.
1975	J.W. Colby	1991	J.T. Armstrong
1976	E. Lifshin	1992	D.B. Williams
1977	J.I. Goldstein	1993	T.G. Huber
1978	J.D. Brown	1994	J. Small
1979	D.F. Kyser	1995	J. McCarthy
1980	O.C. Wells	1996	D.E. Johnson
1981	J.R. Coleman	1997	Joseph R. Michael
1982	R. Myklebust	1998	Ryna B. Marineko
1983	R. Bolon	1999	John J. Friel

2000 MICROSCOPICAL SOCIETY OF CANADA/
SOCIÉTÉ de MICROSCOPIE du CANADA AWARDS

MSC/SMC Gerard T. Simon Student Awards

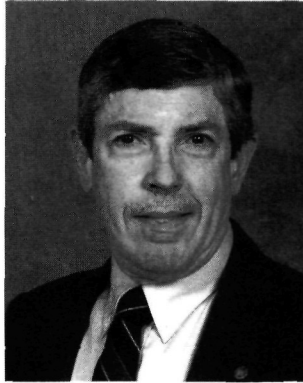
K.T. Moore
Johns Hopkins University

J.A. Davis
University of Toronto

MSC/SMC Past Presidents

1972–1975 A.F. Howatson
1975–1977 E.J. Chatfield
1977–1979 G.T. Simon
1979–1981 G.H. Haggis
1981–1983 F.P. Ottensmeyer
1983–1984 D.O. Northwood
1984–1985 J.M. Sturgess

1985–1987 D.A. Craig
1987–1989 R.F. Egerton
1989–1991 P.J. Lea
1991–1993 G. L'Esperance
1993–1995 L. Arsenault
1995–1997 J.M. Corbett
1997–1999 Richard Sherburne



Kenneth H. Downing
MSA President



Charles E. Lyman
MAS President



George Harauz
MSC/SMC President



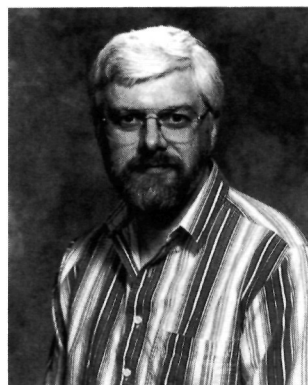
Staci Kirsch
Local Arrangements Chair



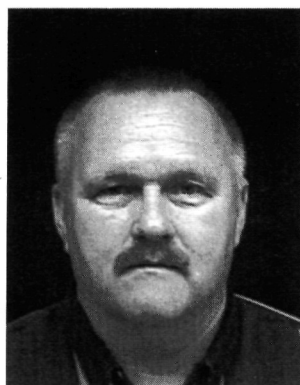
Beverly Maleeff
Local Arrangements
Co-Treasurer



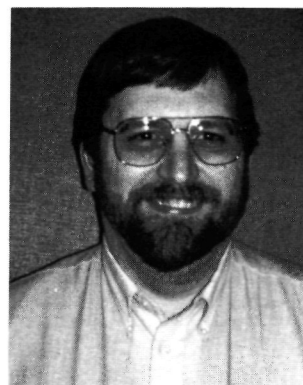
Robyn Rufner
Local Arrangements
Co-Treasurer



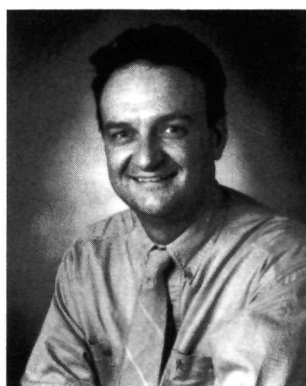
Stuart McKernan
MSA Program Chair



Robert L. Price
MSA Program Vice Chair



Scott Walck
MAS Program Co Chair



Pierre-Mathieu Charest
MSC/SMC Program Co Chair



Raynald Gauvin
MSC/SMC Program Co Chair

MICROSCOPY AND MICROANALYSIS 2000

PROGRAM COMMITTEE

Stuart McKernan, MSA Program Chair
Robert L. Price, MSA Program Vice Chair
Scott Walck, MAS Program Co Chair
Pierre-Mathieu Charest, MSC/SMC Program Co Chair
Raynald Gauvin, MSC/SMC Program Co Chair

Ralph Albrecht	David Joy
Ian M. Anderson	Jeanette Killius
Ron Anderson	Paul Kotula
Steve Barlow	Ratnash Lal
Dawn Bonnell	Eric Lifshin
Gianluigi Botton	John MacKenzie
E.D. Boyes	Bev Maleeff
John Bozzola	Jim Mancuso
Nigel Browning	Jon McCarthy
Mary Buckett	Kent McDonald
C. Barry Carter	Greg Meeker
Wah Chiu	Joseph Michael
Eric Doehne	Charles Mims
Patrick Echlin	David Muller
Steven Eppell	Dale Newbury
John Friel	Matthew Phillips
Manfred Fütting	David Piston
Prathiba L. Gai	John Robinson
Lucille A. Giannuzzi	Mark Sanders
William Gunning	Steve Samuelsson
Stephen T. Haley	Jim Turner
Paul Hlava	Geoffrey Vince
Fred E. Hossler	Edgar Volkl
John Hunt	George Weatherly
Michael Isaacson	Andrea Weisberg
Jay Jerome	Karen Winey

FOREWORD

Kenneth H. Downing, President
Microscopy Society of America

Charles E. Lyman, President
Microbeam Analysis Society

George Harauz, President
Microscopical Society of Canada/Société de Microscopie du Canada

Microscopy and Microanalysis 2000 is sponsored by the Microscopy Society of America, the Microbeam Analysis Society, and the Microscopical Society of Canada/Société de Microscopie du Canada. These Proceedings are justly recognized as the archive for the scientific content of the world's most significant annual meeting with a focus on microscopy and microanalysis. Since 1997 the annual meeting Proceedings have been published as a supplement to *Microscopy and Microanalysis*, the official journal of all three sponsoring societies. Since the M&M meeting and the Proceedings are a joint effort of the three sponsoring societies, under the direction of a single Program Committee, the strengths of these Societies are combined to maximize the impact of the meeting.

We thank the Program Committee, chaired by Stuart McKernan, and the Local Arrangements Committee, chaired by Stacie Kirsch, for their hard work in making this another in an extended series of outstanding meetings, and we congratulate them for their success. Program chair McKernan, vice-chair Bob Price (MSA), co-chair Scott Walck (MAS), co-chair Pierre-Mathieu Charest (MSC/SMC), and co-chair Raynald Gauvin (MSC/SMC) have worked extremely hard through over the last two years organizing sessions, speakers, tutorials, and pre-meeting events. The result is a comprehensive and wide-ranging program of platform symposia and coordinated poster sessions complemented by a number of special offerings. The symposia include, as always, the latest breakthroughs in techniques and results over a range of techniques that reflects the newer light microscopies and spectroscopies as well as the traditional electron beam-based methods.

Our thanks are due to Bill Bailey, Proceedings Editor, who has been responsible for these first class Proceedings for many years. His tireless attention to detail keeps everything and everybody on schedule. We also appreciate the efforts of Herb Niemirow and the extremely competent and professional staff at Springer-Verlag-NY for their support in the production of the Proceedings and the journal *Microscopy and Microanalysis*.

We extend our hearty congratulations to all the award winners honored at this meeting. The major awards given by MSA and MAS are the following: MSA Distinguished Biological Science Award to Kiyoteru Tokuyasu, MSA Distinguished Physical Science Award to Severin Amelinckx, MSA Burton Metal to Eva Nogales, MSA Morton D Maser Distinguished Service Award to Barbara Reine, MSA Outstanding Technologist Award to Nancy Crise Smith, MSA Award for Achievement in Optical Microscopy (sponsored by OPIA) to Gregg Gunderson, MAS Presidential Science Award to Raymond Egerton, MAS Presidential Service Award to Ryna Marinenko, and the MAS Heinrich Award to Harald Ade. And a special congratulations go to our other award winners: MSA Professional Technical Staff awardees, MSA Presidential Scholars, MAS Distinguished Scholars, and MSC/SMC Gérard T. Simon Scholars.

Philadelphia is an exciting city with both an uncommonly rich history and an uncommonly rich tradition of involvement in microscopy, making for an exceptional venue for this meeting. We thank all of the organizers and participants for making M&M 2000 the premier event in the world of microscopy and microanalysis.

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