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American Men & Women of Science

1989-90 • 17th Edition



A Biographical Directory of Today's Leaders in
Physical, Biological and Related Sciences.

Volume 5 • M-P

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Volume I • M-P

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Preface

American Men and Women Of Science remains without peer as a chronicle of North American scientific endeavor and achievement, having recorded the careers of over 290,000 scientists and engineers since its inception. The present work is the seventeenth edition since it was first compiled as *American Men of Science* by J. McKeen Cattell in 1906. In the eighty-three years since the first edition, the number of American scientists and the fields they pursue have grown immeasurably. However, it is still our goal to achieve the purposes stated by Dr. Cattell when he first undertook the task of producing a biographical directory of currently active American scientists. His intention was not to provide intimate portraits of men's lives, but to record personal, educational and career data which would make "a contribution to the organization of science in America" and "make men [and women] of science acquainted with one another and with one another's work." It is the editors' hope that this edition, like previous ones, will fulfill these goals.

The seventeenth edition contains biographies of 3,831 men and women, for the first time. All fields of endeavor in the natural sciences are represented along with a discipline index, which groups the biographees by field of activity. The index organizes the biographees under disciplines adapted from the National Science Foundation's Taxonomy of Degree and Employment Specialties. The editors selected this classification system so that entrants would be grouped according to a consistent and recognized standard. In addition to the information provided by the discipline index, users will find information on biographees' specialties and research interests in the entries in the main volumes. Specific fields of interest may also be searched using *American Men and Women Of Science* online.

While the scientific fields covered by *American Men and Women Of Science* are comprehensive, no attempt has been made to include all American scientists. Entrants are meant to be limited to those who have made significant contributions in their field. The names of new entrants were submitted for consideration at the editors' request by current entrants and by persons in charge of academic, govern-

ment and private research programs. Those included met the following criteria:

1. Distinguished achievement, by reason of experience, training or accomplishment, including contributions to the literature, coupled with continuing activity in scientific work;
or
2. Research activity of high quality in science as evidenced by publication in reputable scientific journals; or for those whose work cannot be published due to governmental or industrial security, research activity of high quality in science as evidenced by the judgment of the individual's peers;
or
3. Attainment of a position of substantial responsibility requiring scientific training and experience.

This edition profiles living scientists in the physical and biological fields, as well as public health scientists, engineers, mathematicians, statisticians, and computer scientists. The information is collected by means of direct communication whenever possible. Forms are sent to all entrants for corroboration and updating; those whose biographies are appearing for the first time received verification proofs before publication. The information submitted by entrants is included as completely as possible within the boundaries of editorial and space restrictions. Full entries are repeated for former listees who do not return forms, but whose current location can be verified in secondary sources. References to the previous edition are given for those who do not return forms and cannot be located, but who are presumed to be still active in science or engineering. A notation is made when an entrant from the previous edition is known to be deceased. Non-citizens of the United States or Canada are included if working in North America for a reasonable duration.

In addition to the printed volumes, *American Men and Women Of Science* remains available for online searching through the subscription service of DIALOG Information

Services, Inc. (3460 Hillview Ave, Palo Alto, CA 94304). All elements of an entry, including field of interest, experience, and location can be accessed by key word. Tapes and mailing lists are also available through R.R. Bowker. Inquiries may be addressed to the Mailing List Department.

A project as large as publishing *American Men And Women Of Science* involves the efforts of a great many people. The editors take this opportunity to thank the seventeenth edition advisory committee for their guidance, encouragement and support. Appreciation is also expressed to the many scientific societies who provided their membership lists for the purpose of locating former entrants whose addresses had changed, and to the thousands of scientists across the country who took time to provide us with biographical information. Finally, we wish to thank Michael Gold and the Systems Development staff

for their dedicated programming efforts, Judy Redel and her staff for their indefatigable research, and all those whose care and devotion to accurate editing assured the successful production of this edition.

Comments and suggestions on any aspect of the seventeenth edition are encouraged and should be directed to The Editors, *American Men And Women Of Science*, R. R. Bowker, 245 West 17th Street, New York, New York 10011:

Dean Hollister, *Director*
Edgar Adcock, Jr., *Managing Editor*
Basil Daley, *Senior Editor*
Jim Olsson, *Associate Editor*

February, 1989

Abbreviations

AAAS—American Association for the Advancement of Science
 abnorm—abnormal
 abstr—abstract(s)
 acad—academic, academy
 acct—account, accountant, accounting
 acoust—acoustic(s), acoustical
 ACTH—adrenocorticotrophic hormone
 actg—acting
 activ—activities, activity
 addn—addition(s), additional
 Add—Address
 adj—adjunct, adjutant
 adjust—adjustment
 Adm—Admiral
 admin—administration, administrative
 adminr—administrator(s)
 admis—admission(s)
 adv—adviser(s), advisory
 advan—advance(d), advancement
 advert—advertisement, advertising
 AEC—Atomic Energy Commission
 aerodyn—aerodynamic(s)
 aeronaut—aeronautic(s), aeronautical
 aerophys—aerophysical, aerophysics
 aesthet—aesthetic(s)
 AFB—Air Force Base
 affil—affiliate(s), affiliation
 agr—agricultural, agriculture
 agron—agronomic, agronomical, agronomy
 agrost—agrostologic, agrostological, agrostology
 agt—agent
 AID—Agency for International Development
 Ala—Alabama
 allergol—allergological, allergology
 alt—alternate
 Alta—Alberta
 Am—America, American
 AMA—American Medical Association
 anal—analysis, analytic, analytical
 analog—analogue
 anat—anatomic, anatomical, anatomy
 anesthol—anesthesiology
 angiolo—angiology
 Ann—Annal(s)
 ann—annual
 anthrop—anthropological, anthropology
 anthropom—anthropometric, anthropometrical, anthropometry
 antiq—antiquary, antiquities, antiquity

antiqu—antiquarian
 apicult—apicultural, apiculture
 APO—Army Post Office
 app—appoint, appointed
 appl—applied
 appln—application
 approx—approximate(ly)
 Apr—April
 apt—apartment(s)
 aquacult—aquaculture
 arbit—arbitration
 arch—archives
 archaeol—archaeological, archaeology
 archit—architectural, architecture
 Arg—Argentina, Argentine
 Ariz—Arizona
 Ark—Arkansas
 artil—artillery
 asn—association
 assoc(s)—associate(s), associated
 asst(s)—assistant(s), assistantship(s)
 Assyriol—Assyriology
 astrodyn—astrodynamics
 astron—astronomical, astronomy
 astronaut—astronautical, astronautics
 astronr—astronomer
 astrophys—astrophysical, astrophysics
 attend—attendant, attending
 atty—attorney
 audiolo—audiology
 Aug—August
 auth—author
 AV—audiovisual
 Ave—Avenue
 avicult—avicultural, aviculture
 b—born
 bact—bacterial, bacteriologic, bacteriological, bacteriology
 BC—British Columbia
 bd—board
 behav—behavior(al)
 Belg—Belgian, Belgium
 bibl—biblical
 bibliog—bibliographic, bibliographical, bibliography
 bibliogr—bibliographer
 biochem—biochemical, biochemistry
 biog—biographical, biography
 biol—biological, biology
 biomed—biomedical, biomedicine

biomet—biometric(s), biometrical, biometry
 biophys—biophysical, biophysics
 bk(s)—book(s)
 bldg—building
 Blvd—Boulevard
 Bor—Borough
 bot—botanical, botany
 br—branch(es)
 Brig—Brigadier
 Brit—Britain, British
 Bro(s)—Brother(s)
 byrol—byrology
 Bull—Bulletin
 bur—bureau
 bus—business
 BWI—British West Indies
 c—children
 Calif—California
 Can—Canada, Canadian
 cand—candidate
 Capt—Captain
 cardiolo—cardiology
 cardiovasc—cardiovascular
 cartog—cartographic, cartographical, cartography
 cartogr—cartographer
 Cath—Catholic
 CEng—Corps of Engineers
 cent—central
 Cent Am—Central America
 cert—certificate(s), certification, certified
 chap—chapter
 chem—chemical(s), chemistry
 chemother—chemotherapy
 chmn—chairman
 citricult—citriculture
 class—classical
 climat—climatological, climatology
 clin(s)—clinic(s), clinical
 cmdg—commanding
 Co—Companies, Company
 coauth—coauthor
 co-dir—co-director
 co-ed—co-editor
 coeduc—coeducation, coeducational
 col(s)—college(s), collegiate, colonel
 collab—collaboration, coloborative
 collabr—collaborator
 Colo—Colorado
 com—commerce, commercial

ABBREVIATIONS

Comdr—Commander
 commun—communicable, communication(s)
 comm(s)—commission(s), commissioned
 comnr—commissioner
 comp—comparative
 compos—composition
 comput—computation, computer(s),
 computing
 comt(s)—committee(s)
 conchol—conchology
 conf—conference
 cong—congress, congressional
 Conn—Connecticut
 conserv—conservation, conservatory
 consol—consolidated, consolidation
 const—constitution, constitutional
 construct—construction, constructive
 consult(s)—consult, consultant(s)
 consultantship(s), consultation, consulting
 contemp—contemporary
 contrib—contribute, contributing,
 contribution(s)
 contribr—contributor
 conv—convention
 coop—cooperating, cooperation, cooperative
 coord—coordinate(d), coordinating,
 coordination
 coordr—coordinator
 corp—corporate, corporation(s)
 corresp—correspondence, correspondent,
 corresponding
 coun—council, counsel, counseling
 counr—councilor, counselor
 criminol—criminological, criminology
 cryog—cryogenic(s)
 crystallog—crystallographic, crystallographi-
 cal, crystallography
 crystallogr—crystallographer
 Ct—Court
 Ctr—Center
 cult—cultural, culture
 cur—curator
 curric—curriculum
 cybernet—cybernetic(s)
 cytol—cytological, cytology
 Czech—Czechoslovakia

DC—District of Columbia
 Dec—December
 Del—Delaware
 deleg—delegate, delegation
 delinq—delinquency, delinquent
 dem—democrat(s), democratic
 demog—demographic, demography
 demogr—demographer
 demonstr—demonstrator
 dendrol—dendrologic, dendrological,
 dendrology
 dent—dental, dentistry
 dep—deputy
 dept—department(al)
 dermat—dermatologic, dermatological,
 dermatology
 develop—developed, developing, develop-
 ment, developmental
 diag—diagnosis, diagnostic
 dialectol—dialectological, dialectology
 dict—dictionaries, dictionary
 Dig—Digest
 dipl—diploma, diplomate
 dir(s)—director(s), directories, directory
 dis—disease(s), disorders

Diss Abstr—Dissertation Abstracts
 dist—district
 distrib—distributed, distribution, distributive
 distribr—distributor(s)
 div—division, divisional, divorced
 DNA—deoxyribonucleic acid
 doc—document(s), documentary,
 documentation
 Dom—Dominion
 Dr—Drive

e—east
 ecol—ecological, ecology
 econ(s)—economic(s), economical, economy
 economet—econometric(s)
 ECT—electroconvulsive or electroshock
 therapy
 ed—edition(s), editor(s), editorial
 ed bd—editorial board
 educ—education, educational
 educr—educator(s)
 EEG—electroencephalogram, electroenceph-
 alographic, electroencephalography
 Egyptol—Egyptology
 EKG—electrocardiogram
 elec—electric, electrical, electricity
 electrochem—electrochemical, electrochem-
 istry
 electrophys—electrophysical, electrophysics
 elem—elementary
 embryol—embryologic, embryological,
 embryology
 emer—emeriti, emiratus
 employ—employment
 encour—encouragement
 encycl—encyclopedia
 endocrinol—endocrinologic, endocrinology
 eng—engineering
 Eng—England, English
 engr(s)—engineer(s)
 enol—enology
 Ens—Ensign
 entom—entomological, entomology
 environ—environment(s), environmental
 enzym—enzymology
 epidemiol—epidemiologic, epidemiological,
 epidemiology
 equip—equipment
 ESEA—Elementary & Secondary Education
 Act
 espec—especially
 estab—established, establishment(s)
 ethnog—ethnographic, ethnographical,
 ethnography
 ethnogr—ethnographer
 ethiol—ethnologic, ethnological, ethnology
 Europ—European
 eval—evaluation
 evangel—evangelical
 eve—evening
 exam—examination(s), examining
 examr—examiner
 except—exceptional
 exec(s)—executive(s)
 exeg—exegeses, exegesis, exegetic, exegetical
 exhib(s)—exhibition(s), exhibit(s)
 exp—experiment, experimental
 exped(s)—expedition(s)
 explor—exploration(s), exploratory
 expos—exposition
 exten—extension

fac—faculty

facil—facilities, facility
 Feb—February
 fed—federal
 fedn—federation
 fel(s)—fellow(s), fellowship(s)
 fermentol—fermentology
 fertil—fertility, fertilization
 Fla—Florida
 floricult—floricultural, floriculture
 found—foundation
 FPO—Fleet Post Office
 Fr—French
 Ft—Fort

Ga—Georgia
 gastroenterol—gastroenterological, gastroen-
 terology
 gen—general
 geneal—genealogical, genealogy
 geod—geodesy, geodetic
 geog—geographic, geographical, geography
 geogr—geographer
 geol—geologic, geological, geology
 geom—geometric, geometrical, geometry
 geomorphol—geomorphologic,
 geomorphology
 geophys—geophysical, geophysics
 Ger—German, Germanic, Germany
 geriat—geriatric(s)
 geront—gerontological, gerontology
 glaciol—glaciology
 gov—governing, governor(s)
 govt—government, governmental
 grad—graduate(d)
 Gt Brit—Great Britain
 guid—guidance
 gym—gymnasium
 gynec—gynecologic, gynecological,
 gynecology

handbk(s)—handbook(s)
 helminth—helminthology
 hemat—hematologic, hematological,
 hematology
 herpet—herpetologic, herpetological,
 herpetology
 Hisp—Hispanic, Hispania
 hist—historic, historical, history
 histol—histological, histology
 HM—Her Majesty
 hochsch—hochschule
 homeop—homeopathic, homeopathy
 hon(s)—honor(s), honorable, honorary
 hort—horticultural, horticulture
 hosp(s)—hospital(s), hospitalization
 hq—headquarters
 HumRRO—Human Resources Research
 Office
 husb—husbandry
 Hwy—Highway
 hydraul—hydraulic(s)
 hydrodyn—hydrodynamic(s)
 hydrol—hydrologic, hydrological, hydrology
 hyg—hygiene, hygienic(s)
 hypn—hypnosis

ichthyol—ichthyological, ichthyology
 Ill—Illinois
 illum—illuminating, illumination
 illus—illustrate, illustrated, illustration
 illusr—illustrator
 immunol—immunologic, immunological,
 immunology

Imp—Imperial
 improv—improvement
 Inc—Incorporated
 in-chg—in charge
 incl—include(s), including
 Ind—Indiana
 indust(s)—industrial, industries, industry
 inf—infantry
 info—information
 inorg—inorganic
 ins—insurance
 inst(s)—institute(s), institution(s)
 instnl—institutional(ized)
 instr(s)—instruct, instruction, instructor(s)
 instrnl—instructional
 int—international
 intel—intelligence
 introd—introduction
 invert—invertebrate
 invest(s)—investigation(s)
 investr—investigator
 irrig—irrigation
 Ital—Italian

J—Journal
 Jan—January
 Jct—Junction
 jour—journal, journalism
 jr—junior
 jurispr—jurisprudence
 juv—juvenile

Kans—Kansas
 Ky—Kentucky

La—Louisiana
 lab(s)—laboratories, laboratory
 lang—language(s)
 laryngol—laryngological, laryngology
 lect—lecture(s)
 lectr—lecturer(s)
 legis—legislation, legislative, legislature
 lett—letter(s)
 lib—liberal
 libr—libraries, library
 librn—librarian
 lic—license(d)
 limnol—limnological, limnology
 ling—linguistic(s), linguistical
 lit—literary, literature
 lithol—lithologic, lithological, lithology
 Lt—Lieutenant
 Ltd—Limited

m—married
 mach—machine(s), machinery
 mag—magazine(s)
 maj—major
 malacol—malacology
 mammal—mammalogy
 Man—Manitoba
 Mar—March
 Mariol—Mariology
 Mass—Massachusetts
 mat—material(s)
 mat med—materia medica
 math—mathematic(s), mathematical
 Md—Maryland
 mech—mechanic(s), mechanical
 med—medical, medicinal, medicine
 Mediter—Mediterranean
 Mem—Memorial
 mem—member(s), membership(s)

ment—mental(ly)
 metab—metabolic, metabolism
 metall—metallurgic, metallurgical,
 metallurgy
 metallog—metallographic, metallography
 metallogr—metallographer
 metaphys—metaphysical, metaphysics
 meteorol—meteorological, meteorology
 metrol—metrological, metrology
 metrop—metropolitan
 Mex—Mexican, Mexico
 mfg—manufacturing
 mfr(s)—manufacture(s), manufacturer(s)
 mgr—manager
 mgt—management
 Mich—Michigan
 microbiol—microbiological, microbiology
 micros—microscopic, microscopical,
 microscopy
 mid—middle
 mil—military
 mineral—mineralogical, mineralogy
 Minn—Minnesota
 Miss—Mississippi
 mkt—market, marketing
 Mo—Missouri
 mod—modern
 monogr—monograph
 Mont—Montana
 morphol—morphological, morphology
 Mt—Mount
 mult—multiple
 munic—municipal, municipalities
 mus—museum(s)
 musicol—musicological, musicology
 mycol—mycologic, mycology

n—north
 NASA—National Aeronautics & Space
 Administration
 nat—national, naturalized
 NATO—North Atlantic Treaty Organization
 navig—navigation(al)
 NB—New Brunswick
 NC—North Carolina
 NDak—North Dakota
 NDEA—National Defense Education Act
 Nebr—Nebraska
 nematol—nematological, nematology
 nerv—nervous
 Neth—Netherlands
 neurol—neurological, neurology
 neuropath—neuropathological, neuro-
 pathology
 neuropsychiat—neuropsychiatric, neuro-
 psychiatry
 neurosurg—neurosurgical, neurosurgery
 Nev—Nevada
 New Eng—New England
 New York—New York City
 Nfld—Newfoundland
 NH—New Hampshire
 NIH—National Institutes of Health
 NIMH—National Institute of Mental Health
 NJ—New Jersey
 NMex—New Mexico
 nonres—nonresident
 norm—normal
 Norweg—Norwegian
 Nov—November
 NS—Nova Scotia
 NSF—National Science Foundation
 NSW—New South Wales

numis—numismatic(s)
 nutrit—nutrition, nutritional
 NY—New York State
 NZ—New Zealand

observ—observatories, observatory
 obstet—obstetric(s), obstétrical
 occas—occasional(ly)
 occup—occupation, occupational
 oceanog—oceanographic, oceanographical,
 oceanography
 oceanogr—oceanographer
 Oct—October
 odontol—odontology
 OEEC—Organization for European
 Economic Cooperation
 off—office, official
 Okla—Oklahoma
 olericult—olericulture
 oncol—oncologic, oncology
 Ont—Ontario
 oper(s)—operation(s), operational,
 operative
 ophthal—ophthalmologic, ophthalmological,
 ophthalmology
 optom—optometric, optometrical, optometry
 ord—ordnance
 Ore—Oregon
 org—organic
 orgn—organization(s), organizational
 orient—oriental
 ornith—ornithological, ornithology
 orthod—orthodontia, orthodontic(s)
 orthop—orthopedic(s)
 osteop—osteopathic, osteopathy
 otol—otological, otology
 otolaryngol—otolaryngological, otolaryn-
 gology
 otorhinol—otorhinologic, otorhinology

Pa—Pennsylvania
 Pac—Pacific
 paleobot—paleobotanical, paleobotany
 paleont—paleontological, paleontology
 Pan-Am—Pan-American
 parasitol—parasitology
 partic—participant, participating
 path—pathologic, pathological, pathology
 pedagog—pedagogic(s), pedagogical, pedagogy
 pediat—pediatric(s)
 PEI—Prince Edward Islands
 penol—penological, penology
 periodont—periodontal, periodontic(s),
 periodontology
 petrog—petrographic, petrographical,
 petrography
 petrogr—petrographer
 petrol—petroleum, petrologic, petrological,
 petrology
 pharm—pharmacy
 pharmaceut—pharmaceutic(s), pharmaceu-
 tical(s)
 pharmacog—pharmacognosy
 pharamacol—pharmacologic, pharmaco-
 logical, pharmacology
 phenomenol—phenomenologic(al),
 phenomenology
 philol—philological, philology
 philos—philosophic, philosophical,
 philosophy
 photog—photographic, photography
 photogeog—photogeographic, photo-
 geography

ABBREVIATIONS

fotogr—photographer(s)
 photogram—photogrammetric, photogrammetry
 photom—photometric, photometrical, photometry
 phycol—phycology
 phys—physical
 physiog—physiographic, physiographical, physiography
 physiol—physiological, physiology
 Pkwy—Parkway
 Pl—Place
 polit—political, politics
 polytech—polytechnic(al)
 pomol—pomological, pomology
 pontif—pontifical
 pop—population
 Port—Portugal, Portuguese
 postgrad—postgraduate
 PQ—Province of Quebec
 PR—Puerto Rico
 pract—practice
 practr—practitioner
 prehist—prehistoric, prehistory
 prep—preparation, preparative, preparatory
 pres—president
 Presby—Presbyterian
 preserv—preservation
 prev—prevention, preventive
 prin—principal
 prob(s)—problem(s)
 proc—proceedings
 proctol—proctologic, proctological, proctology
 prod—product(s), production, productive
 prof—professional, professor, professorial
 Prof Exp—Professional Experience
 prog(s)—program(s), programmed, programming
 proj—project(s), projection(al), projective
 prom—promotion
 protozool—protozoology
 prov—province, provincial
 psychiat—psychiatric, psychiatry
 psychoanal—psychoanalysis, psychoanalytic, psychoanalytical
 psychol—psychological, psychology
 psychomet—psychometric(s)
 psychopath—psychopathologic, psychopathology
 psychophys—psychophysical, psychophysics
 psychophysiol—psychophysiological, psychophysiology
 psychosom—psychosomatic(s)
 psychother—psychotherapeutic(s), psychotherapy
 Pt—Point
 pub—public
 publ—publication(s), publish(ed), publisher, publishing
 pvt—private

Qm—Quartermaster
 Qm Gen—Quartermaster General
 qual—qualitative, quality
 quant—quantitative
 quart—quarterly

radiol—radiological, radiology
 RAF—Royal Air Force
 RAFVR—Royal Air Force Volunteer Reserve

RAMC—Royal Army Medical Corps
 RAMCR—Royal Army Medical Corps Reserve
 RAOC—Royal Army Ordnance Corps
 RASC—Royal Army Service Corps
 RASCR—Royal Army Service Corps Reserve
 RCAF—Royal Canadian Air Force
 RCAFVR—Royal Canadian Air Force Reserve
 RCAFVR—Royal Canadian Air Force Volunteer Reserve
 RCAMC—Royal Canadian Army Medical Corps
 RCAMCR—Royal Canadian Army Medical Corps Reserve
 RCASC—Royal Canadian Army Service Corps
 RCASCR—Royal Canadian Army Service Corps Reserve
 RCEME—Royal Canadian Electrical & Mechanical Engineers
 RCN—Royal Canadian Navy
 RCNR—Royal Canadian Naval Reserve
 RCNVR—Royal Canadian Naval Volunteer Reserve
 Rd—Road
 RD—Rural Delivery
 rec—record(s), recording
 redevelop—redevelopment
 ref—reference(s)
 refrig—refrigeration
 regist—register(ed), registration
 registr—registrar
 regt—regiment(al)
 rehab—rehabilitation
 rel(s)—relation(s), relative
 relig—religion, religious
 REME—Royal Electrical & Mechanical Engineers
 rep—represent, representative
 repub—republic
 req—requirements
 res—research, reserve
 rev—review, revised, revision
 RFD—Rural Free Delivery
 rhet—rhetoric, rhetorical
 RI—Rhode Island
 Rm—Room
 RM—Royal Marines
 RN—Royal Navy
 RNA—ribonucleic acid
 RNR—Royal Naval Reserve
 RNVR—Royal Naval Volunteer Reserve
 roentgenol—roentgenologic, roentgenological, roentgenology
 RR—Railroad, Rural Route
 rte—route
 Russ—Russian
 rwy—railway

s—south
 SAfrica—South Africa
 SAm—South America, South American
 sanit—sanitary, sanitation
 Sask—Saskatchewan
 SC—South Carolina
 Scand—Scandinavia(n)
 sch(s)—school(s)
 scholar—scholarship
 sci—science(s), scientific
 SDak—South Dakota
 SEATO—Southeast Asia Treaty Organization
 sec—secondary
 sect—section

secy—secretary
 seismog—seismograph, seismographic, seismography
 seismogr—seismographer
 seismol—seismological, seismology
 sem—seminar, seminary
 sen—senator, senatorial
 Sept—September
 ser—serial, series
 serol—serologic, serological, serology
 serv—service(s), serving
 silvicult—silvicultural, silviculture
 soc(s)—societies, society
 soc sci—social science
 sociol—sociologic, sociological, sociology
 Span—Spanish
 spec—special
 specif—specification(s)
 spectrogr—spectrograph, spectrographic, spectrography
 spectrogr—spectrographer
 spectrophotom—spectrophotometer, spectrophotometric, spectrophotometry
 spectros—spectroscopic, spectroscopy
 speleol—speleological, speleology
 Sq—Square
 sr—senior
 St—Saint, Street(s)
 sta(s)—station(s)
 stand—standard(s), standardization
 statist—statistical, statistics
 Ste—Sainte
 steril—sterility
 stomatol—stomatology
 stratig—stratigraphic, stratigraphy
 stratigr—stratigrapher
 struct—structural, structure(s)
 stud—student (ship)
 subcomt—subcommittee
 subj—subject
 subsid—subsidiary
 substa—substation
 super—superior
 suppl—supplement(s), supplemental, supplementary
 supt—superintendent
 supv—supervising, supervision
 supvr—supervisor
 supvry—supervisory
 surg—surgery, surgical
 surv—survey, surveying
 survr—surveyor
 Swed—Swedish
 Switz—Switzerland
 symp—symposia, symposium(s)
 syphil—syphilology
 syst(s)—system(s), systematic(s), systematical

taxon—taxonomic, taxonomy
 tech—technical, technique(s)
 technol—technologic(al), technology
 tel—telegraph(y), telephone
 temp—temporary
 Tenn—Tennessee
 Terr—Terrace
 Tex—Texas
 textbk(s)—textbook(s)
 text ed—text edition
 theol—theological, theology
 theoret—theoretic(al)
 ther—therapy
 therapeut—therapeutic(s)

ABBREVIATIONS

thermodyn—thermodynamic(s)
topog—topographic, topographical,
topography
topogr—topographer
toxicol—toxicologic, toxicological, toxicology
trans—transactions
transl—translated, translation(s)
translr—translator(s)
transp—transport, transportation
treas—treasurer, treasury
treat—treatment
trop—tropical
tuberc—tuberculosis
TV—television
Twp—Township

UAR—United Arab Republic
UK—United Kingdom
UN—United Nations
undergrad—undergraduate
unemploy—unemployment
UNESCO—United Nations Educational
Scientific & Cultural Organization
UNICEF—United Nations International
Childrens Fund
univ(s)—universities, university
UNRRA—United Nations Relief &
Rehabilitation Administration
UNRWA—United Nations Relief & Works
Agency
urol—urologic, urological, urology
US—United States

USA—US Army
USAAF—US Army Air Force
USAAFR—US Army Air Force Reserve
USAF—US Air Force
USAFR—US Air Force Reserve
USAR—US Army Reserve
USCG—US Coast Guard
USCGR—US Coast Guard Reserve
USDA—US Department of Agriculture
USMC—US Marine Corps
USMCR—US Marine Corps Reserve
USN—US Navy
USNAF—US Naval Air Force
USNAFR—US Naval Air Force Reserve
USNR—US Naval Reserve
USPHS—US Public Health Service
USPHSR—US Public Health Service Reserve
USSR—Union of Soviet Socialist Republics
USWMC—US Women's Marine Corps
USWMCR—US Women's Marine Corps
Reserve

Va—Virginia
var—various
veg—vegetable(s), vegetation
vent—ventilating, ventilation
vert—vertebrate
vet—veteran(s), veterinarian, veterinary
VI—Virgin Islands
vinicult—viniculture
virol—virological, virology
vis—visiting

voc—vocational
vocab—vocabulary
vol(s)—voluntary, volunteer(s), volume(s)
vpres—vice president
vs—versus
Vt—Vermont

w—west
WAC—Women's Army Corps
Wash—Washington
WAVES—Women Accepted for Voluntary
Emergency Service
WHO—World Health Organization
WI—West Indies
wid—widow, widowed, widower
Wis—Wisconsin
WRCNS—Women's Royal Canadian Naval
Service
WRNS—Women's Royal Naval Service
WVa—West Virginia
Wyo—Wyoming

yearbk(s)—yearbook(s)
YMCA—Young Men's Christian Association
YMHA—Young Men's Hebrew Association
yr(s)—year(s)
YWCA—Young Women's Christian Asso-
ciation
YWHA—Young Women's Hebrew Asso-
ciation

zool—zoological, zoology

Contents

Advisory Committee	vi
Preface	vii
Abbreviations	ix
Biographies	1

American Men & Women of Science

M

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MA, CYNTHIA SANMAN, b Hong Kong, May 16, 40; US citizen; m 66; c 2. **STATISTICS, COMPUTER SCIENCE.** Educ: Siena Col, BS, 62; Fla State Univ, MS, 66, PhD(systs anal), 69. *Prof Exp:* Statistician, Community Studies Inst, Kansas City, Mo, 62-63; res asst statist, Fla State Univ, 63-66, comput programmer & analyst, Dept Physics, 66-67, systs design analyst, Systs Planning & Develop Ctr, 67-69; **ASSOC PROF DATA PROCESSING & STATIST, BALL STATE UNIV, 69- Concurrent Pos:** Consult, 70- *Mem:* Am Statist Asn; Asn Systs Mgt; Asn Comput Mach. *Res:* Design of computer-based systems for finance analysis and teaching; design and allocation resource model for planning; use of graphics for information systems. *Mailing Add:* Dept Mgt & Sci Ball State Univ Muncie IN 47304

MA, ER-CHIEH, b Jukao, China, Dec 7, 22; m 46; c 3. **ENGINEERING MECHANICS, APPLIED MATHEMATICS.** Educ: Chiao-Tung Univ, BS, 46; Kans State Univ, MS, 59, PhD(appl mech), 62. *Prof Exp:* Res assoc design, Ord Res Inst, 47-55; sr expert sci educ, Ministry Educ, 55-58; res assoc appl mech, Kans State Univ, 60-62; assoc prof, Wichita State Univ, 62-64; from assoc prof to prof eng, 64-81, **PROF MATH, UNIV ARK, LITTLE ROCK, 81- Concurrent Pos:** Chinese del, Study Conf Sci Teaching, UNESCO, 56. *Mem:* Am Soc Eng Educ; Am Soc Mech Engrs. *Res:* Elasticity; viscoelasticity; vibrations; celestial mechanics; applied analysis. *Mailing Add:* Dept Math & Statist Univ Ark 33 & Univ Ave Little Rock AR 72204

MA, MARK T., b Kiangsu, China, Mar 21, 33; m 58; c 2. **ELECTROMAGNETISM, TELECOMMUNICATION.** Educ: Nat Taiwan Univ, BS, 55; Univ Ill, MS, 57; Syracuse Univ, PhD(elec eng), 61. *Prof Exp:* Lectr elec eng, Nat Taiwan Univ, 55-56; engr electronics, Int Bus Mach Corp, 57-58 & Gen Elec Co, 61-64; **RES SCIENTIST & GROUP LEADER, NAT BUR STAND, US DEPT COMMERCE, 64- Concurrent Pos:** Adj prof, Univ Colo, 64; assoc ed, Radio Sci, 66-67. *Mem:* Fel Inst Elec & Electronics Engrs. *Res:* Electromagnetic theory; electromagnetic interference; antenna theory; telecommunications. *Mailing Add:* Dept Elec Engr Ecot 2 Univ Colo Boulder CO 80309

MA, MAW-SUEN, b Peking, China, July 18, 47, US citizen; m 71; c 2. **RADIO ANALYTICAL CHEMISTRY, GEOCHEMISTRY.** Educ: Cheng Kung Univ, Taiwan, BS, 68; Univ Ky, PhD(radio anal chem), 75. *Prof Exp:* Teaching asst chem, Cent Univ, Taiwan, 70-71; teaching asst, Univ Ky, 71-72, res fel, 72-75; co-investr NASA lunar prog geochem, Ore State Univ, 75-81, res asst prof, 81; res scientist, US Testing Co, Inc, 81-82; chem supvr, Consumers Power Co, 82-84; radiol serv mgr, Impell Corp, 84-87; **RADIOCHEM SECT HEAD, LILCO, 87- Mem:** Am Nuclear Soc; Health Phys Soc. *Res:* Applications of analytical chemistry; radio chemical methods of analysis; neutron activation analysis to samples of geological, environmental and industrial interests; trace element geochemistry; nuclear power plant chemistry. *Mailing Add:* 18 Mink Lane East Setauket NY 11733

MA, NANCY SHUI-FONG, US citizen. **CYTOGENETICS.** Educ: Mt St Vincent Col, Can, BSc, 64; Northeastern Univ, MS, 68; Boston Col, PhD(biol), 73. *Prof Exp:* **ASSOC PATH, NEW ENGLAND REGIONAL PRIMATE RES CTR, HARVARD UNIV, 73- Concurrent Pos:** Cytogenetics consult, Pathobiol Inc, 75- *Res:* Cytogenetic studies of the New World monkeys. *Mailing Add:* New Eng Regional Primate Res Ctr Med Sch Harvard Univ Southborough MA 01772

MA, TE HSIU, b Hopei, China, Aug 24, 24; nat US; m 60; c 2. **CYTOGENETICS.** Educ: Cath Univ Peking, BS, 48; Nat Taiwan Univ, MS, 50; Univ Va, PhD(biol), 59. *Prof Exp:* Asst cytologist, Sugarcane Cytol, Taiwan Sugar Exp Sta, 50-55; from asst prof to assoc prof biol, Emory & Henry Col, 59-64; asst prof, Western Ill Univ, 64-66; geneticist, Radiation Biol Lab, Smithsonian Inst, Wash, DC, 66-69; assoc prof, 69-73, **PROF BIOL SCI, WESTERN ILL UNIV, 73- Concurrent Pos:** Res partic, Oak Ridge Nat Lab, 63-64; res consult, Oak Ridge Inst Nuclear Studies, 63-; Atomic Energy Comm res grant, 65; Environ Protection Agency res grant, 71-73; radiation safety officer, Western Ill Univ, 71- *Mem:* AAAS; Am Genetics Soc; Am Soc Cell Biol; NY Acad Sci. *Res:* Cytogenetics of sugarcane, corn and Tradescantia; radiation effects on chromosomes of Tradescantia and Vicia; air pollutant effects on chromosomes of Tradescantia; radioactive pollutant effect on fish. *Mailing Add:* Dept of Biol Sci Western Ill Univ Macomb IL 61455

MA, TSO-PING, b Lan-Chov, China, Nov 13, 45. **SOLID STATE PHYSICS, MICRO ELECTRONICS.** Educ: Nat Taiwan Univ, BS, 68; Yale Univ, MS, 70, PhD(appl physics), 74. *Prof Exp:* Sr asst, Inst Bus Mach, 74-75, staff eng, 75-77; res asst physics, 70-74, asst prof physics, 77-80, **PROF MICRO-ELEC & SOLID STATE PHYSICS, YALE UNIV, 80- Honors & Awards:** G E Whitney Award, 85. *Mem:* Mat Res Soc; fel Am Phys Soc; Inst Elec & Electronic Engrs. *Res:* Conductor physics; mos-interface newgate dielectric radiation; hot electron plasma interface; annealing of auto electric devices. *Mailing Add:* 169 Northford Brandford CT 06045

MA, TSU SHENG, b Canton, China, Oct 15, 11; nat US; m 42; c 2. **MICROCHEMISTRY, ORGANIC CHEMISTRY.** Educ: Tsing Hua Univ, China, BS, 31; Univ Chicago, PhD(chem), 38. *Prof Exp:* Instr in charge microchem lab, Univ Chicago, 38-46; prof, Peking Univ, 46-49; sr lectr microchem, Univ Otago, NZ, 49-51; asst prof chem, NY Univ, 51-54; assoc prof, 54-58, **PROF CHEM, CITY UNIV NEW YORK, 58- Concurrent Pos:** Vis prof, Tsinghua Univ, Peking, 47, Lingnan Univ, 49, NY Univ, 54-60, Univ Singapore, 75-76; Fulbright-Hays lectr, China, Japan, Hong Kong, India, Malaya, Australia & NZ, 61-62, Korea, Thailand, Hong Kong & Iran, 68-69; Am specialist, Bur Educ & Cult Affairs, US State Dept, Ceylon, Burma, Thailand, Hong Kong & Philippines, 64; mem comm reagents & reactions, Int Union Pure & Appl Chem, 64-69; ed, Mikrochimica Acta, 65- *Honors & Awards:* Benedetti-Pichler Award in Microchem, 76. *Mem:* AAAS; Am Inst Chem; Am Chem Soc; Royal Soc Chem; NY Acad Sci; Soc Appl Spectros. *Res:* Synthetic drugs; medicinal plants; microchemical analysis; microtechniques in organic synthesis; small scale experiments for teaching general and organic chemistry. *Mailing Add:* Seven Banbury Lane Chapel Hill NC 27514

MA, WILLIAM HSIOH-LIEN, b China, Jan 31, 47; US citizen; m 70; c 1. **ELECTRICAL ENGINEERING, PHYSICAL SCIENCE.** Educ: Univ Ark, BSEE, 70; Ga Inst Technol, MSEE, 70; Purdue Univ, PhD(elec eng), 74. *Prof Exp:* **ENGR RES & DEVELOP MGT, IBM CORP, 74- Mem:** Inst Elec & Electronics Engrs; Am Phys Soc; Am Vacuum Soc. *Res:* Research and development in semiconductor device fabrication process; dry etching, plasma etching, reactive ion etching and device processing development. *Mailing Add:* IBM Ltd Zip 77n IBM E Fishkill Hopewell Junction NY 12533

MA, YI HUA, b Nanking, China, Nov 7, 36; m 63; c 3. **CHEMICAL ENGINEERING.** Educ: Nat Taiwan Univ, BS, 59; Univ Notre Dame, MS, 63; Mass Inst Technol, ScD(chem eng), 67. *Prof Exp:* From asst prof to assoc prof, 67-76, **PROF CHEM ENG, WORCESTER POLYTECH INST, 76- DEPT HEAD, 79- Concurrent Pos:** Consultant. *Mem:* Am Chem Soc; Am Inst Chem Engrs; Am Asn Univ Professors. *Res:* Adsorption and diffusion in zeolites; transport phenomena in porous catalyst; applied mathematics in chemical engineering; drying. *Mailing Add:* Dept Chem Eng Worcester Polytech Inst Worcester MA 01609

MA, ZEE-MING, b Shanghai, China, Feb 4, 42; m 64; c 2. **HIGH ENERGY PHYSICS**. Educ: Southwestern Univ, Tex, BS, 62; Duke Univ, PhD(Physics), 67. Prof Exp: From instr to asst prof physics, Mich State Univ, 67-74, assoc prof, 74-80; MEM STAFF, BELL LABS, 80- Concurrent Pos: Prin investr, US Dept Energy. Mem: Am Phys Soc. Res: Experimental high energy physics. Mailing Add: AT&T Bell Labs 3C 332A One Whippany Rd Whippany NJ 07981

MAA, JER-SHEN, b Shanghai, July 6, 44; m. **THIN FILM SCIENCE, MATERIALS CHARACTERIZATION**. Educ: Nat Cheng Kung Univ, Taiwan, BS, 68; Univ Minn, PhD(mat sci), 74. Prof Exp: Res asst, Mat Sci Dept, Univ Minn, 69-74; res assoc, Phys Div, Argonne Nat Lab, 74-75; assoc prof, Mat Sci Dept, Nat Tsing Hua Univ, Taiwan, 75-79; mem tech staff, Solid State Technol Ctr, Solid State Div, 79-81; mem tech staff, RCA Labs, Princeton, 81-87; SR RESIDENT INSPECTOR, DAVID SARNOFF RES CTR, SOLID STATE TECHNOL, PRINCETON, 87- Concurrent Pos: Mem staff, Thin Film Technol Group, RCA Labs, 79. Mem: Am Vacuum Soc; Electrochem Soc Am; Mat Res Soc. Res: Thin film processes, material characterization, dry etching technology; metallization technology, multilevel metallization processes; refractory metal silicide technology, bias sputtering; chemical vapor deposition of tungsten and silicide; dry process for large area electroluminescence display devices. Mailing Add: Seven Linden Lane Plainsboro NJ 08536

MAAG, URS RICHARD, b Winterthur, Switz, Jan 20, 38; m 65; c 3. **STATISTICS**. Educ: Swiss Fed Inst Technol, Dipl Math, 61; Univ Toronto, MA, 62, PhD, 65. Prof Exp: From lectr to assoc prof math, 64-73, assoc prof, 73-78, PROF COMPUT SCI & OPERS RES, UNIV MONTREAL, 78- Concurrent Pos: Statist consult. Mem: Am Statist Asn; Inst Math Statist; Statist Soc Can (pres, 80). Res: Nonparametric statistics, robust methods in multivariate analysis; applications to genetics; data analysis. Mailing Add: Dept of Comput Sci & Opers Res Univ of Montreal Box 6128 Montreal PQ H3C 3J7 Can

MAAHS, HOWARD GORDON, b Los Angeles, Calif, May 16, 39; m 62; c 4. **HIGH TEMPERATURE CHEMISTRY, KINETICS**. Educ: Stanford Univ, BS, 59; Univ Wash, PhD(chem eng), 64. Prof Exp: Chem engr, Univ Wash, 60-61; AEROSPACE TECHNOLOGIST, LANGLEY RES CTR, NASA, 64- Mem: Am Chem Soc; Am Carbon Soc. Res: High temperature materials and coatings for aerospace applications; chemical kinetics and catalysis; aqueous chemistry of tropospheric cloud droplets; combustion kinetics and pollution formation; heat transfer; graphite ablation and sublimation. Mailing Add: 22 Ridgewood Pkwy Newport News VA 23602

MAAR, JAMES RICHARD, b Wellsville, NY, Oct 7, 43. **MATHEMATICAL STATISTICS, STATISTICAL ANALYSIS**. Educ: Eckerd Col, BS, 65; Brown Univ, ScM, 67; George Washington Univ, PhD(math statist), 73. Prof Exp: MATHEMATICIAN, US DEPT DEFENSE, FT GEORGE G MEADE, 67- Concurrent Pos: Assoc prof lectr mgt sci, Col Gen Studies, George Washington Univ, 73-78; lectr math, Univ Md, 79- Mem: Sigma Xi; Inst Math Statist; Am Statist Asn. Res: Multivariate data analysis, including cluster analysis, discriminant analysis, statistical computing and graphical data analysis; new counterexamples to plausible but false statements in probability theory and mathematical statistics. Mailing Add: 9608 Basket Ring Columbia MD 21045

MAAS, EUGENE VERNON, b Jamestown, NDak, Dec 18, 36; m 61; c 3. **PLANT PHYSIOLOGY**. Educ: Jamestown Col, BS, 58; Univ Ariz, MS, 61; Ore State Univ, PhD(soils), 66. Prof Exp: Res assoc soil physics, Univ Ariz, 61; asst soils, Ore State Univ, 61-66; plant physiologist, Mineral Nutrit Lab, USDA, 66-68, PLANT PHYSIOLOGIST, AGR RES SERV, US DEPT AGR, USSALINITY LAB, 68- Concurrent Pos: Nat Acad Sci-Nat Res Coun resident res associateship, 66-68; adj prof, Dept Soil & Environ Sci, Univ Calif, Riverside, 80- Mem: Am Soc Plant Physiol; Am Soc Agron. Res: Ion absorption and transport in plants; environmental physiology of plants; tolerance to salts and air pollution. Mailing Add: US Salinity Lab 4500 Glenwood Dr Riverside CA 92501

MAAS, JAMES WELDON, b St Louis, Mo, Oct 26, 29; m 53; c 3. **PSYCHIATRY**. Educ: Wash Univ, BA, 50, MD, 54. Prof Exp: Intern med, Grady Mem Hosp, Atlanta, Ga, 54-55; resident psychiat, Cincinnati Gen Hosp, Ohio, 55-56 & 58-60; chief sect psychosom med, NIMH, 60-66; prof psychiat, Univ Ill Col Med, 66-72, PROF PSYCHIAT, SCH MED, YALE UNIV, 72- Concurrent Pos: Dir res, Ill State Psychiat Inst, 66-72. Mem: AAAS; Am Psychiat Asn; Am Psychosom Soc; fel Am Col Neuropsychopharmacology; Am Soc Pharmacol & Exp Therapeut. Res: Relationship between biology and behavior; brain chemistry and behavior; biochemistry of synapse; biogenic amines in brain; neurochemistry. Mailing Add: Univ Texas Hlth Sci Ctr 7703 Floyd Curl Dr San Antonio TX 78284

MAAS, JOHN LEWIS, b Detroit, Mich, Aug 13, 40; m 62; c 3. **PLANT PATHOLOGY**. Educ: Mich State Univ, BS, 62; Univ Wash, MS, 64; Ore State Univ, PhD(plant path), 68. Prof Exp: RES PLANT PATHOLOGIST, FRUIT LAB, HORT SCI INST, AGR RES CTR, NORTHEAST REGION, USDA, 68- Concurrent Pos: ed, Compendium Strawberry Dis, Am Phytopath Soc, 84, Advances in Strawberry Prod, 86; Consult, strawberry prod prog, China, Lectr Prog anal, 86. Honors & Awards: Award of Achievement, N Am Strawberry Growers Asn, 84. Mem: Am Phytopath Soc; Am Soc Horticult Sci; North Am Strawberry Growers Asn. Res: Fungus diseases of small fruit crops; etiology and control of Phytophthora fragariae root rot and Botrytis cinerea fruit rot of strawberry. Mailing Add: Hort Sci Inst Agr Res Ctr NE Region US Dept of Agr Beltsville MD 20705

MAAS, KEITH ALLAN, b Burlington, Wis, Apr 7, 36; div; c 2. **PHOTOGRAPHIC CHEMISTRY**. Educ: Mass Inst Technol, SB, 58; Univ Vt, MS, 60; Univ Calif, Davis, PhD(chem), 63. Prof Exp: Res chemist, tech rep & col rels rep, E I du Pont de Nemours & Co, Inc, 63-71; SR STAFF SCIENTIST, PHOTOGRAPHIC SYSTS, TECHNICOLOR GRAPHIC SERVS, INC, 72- Mem: Am Chem Soc; Soc Photog Scientists & Engrs. Res: Photographic materials and processes; techniques of image presentation. Mailing Add: 1526 S Center St Redlands CA 92373

MAAS, PETER, b Evanston, Ill, Apr 9, 39; m 64; c 2. **SOLID STATE PHYSICS, BIOPHYSICS**. Educ: Mass Inst Tech, BS, 62; Stanford Univ, MS, 64; Univ Colo, PhD(physics), 69. Prof Exp: Asst engr, Lockheed Missile & Space Co, 62-63, grad study scientist, 63-65, scientist, 64-65; asst physics, Univ Colo, Boulder, 65-67, solid state physics, 67-69, res assoc & instr biophys, Med Ctr, 69-70; lectr appl physics, 70-76, SR LECTR APPL PHYSICS, UNIV STRATHCLYDE, 76- Concurrent Pos: Consult to various co. Mem: Asn Comput Mach; fel Inst Physics; IEEE Comput Soc. Res: Physics applications in biology; experimental population biology; computer uses in science. Mailing Add: Dept of Physics & Appl Physics Univ of Strathclyde 107 Rottenrow Glasgow G40NG Scotland

MAAS, STEPHEN JOSEPH, b Temple, Tex, Nov 17, 50. **AGRICULTURAL REMOTE SENSING**. Educ: Tex A&M Univ, BS, 73, MS, 75, PhD(agron), 85. Prof Exp: Grad asst, Tex A&M Univ, 73-75, grad asst meteorol & soil sci, 82-84; sr meteorologist, Meteorol Res Inc, 75-77; res scientist, Tex Agr Exp Sta, 77-82; PLANT PHYSIOLOGIST REMOTE SENSING RES, AGR RES SERV, USDA, 84- Mem: Am Soc Agron; Am Meteorol Soc; Sigma Xi. Res: Quantifying the effects of the climatic and edaphic environment on plant growth and development; crop simulation modeling. Mailing Add: USDA/ARS/RSRU PO Box 267 Weslaco TX 78596

MAAS, WERNER KARL, b Kaiserslautern, Ger, Apr 27, 21; nat US; m 60; c 3. **MOLECULAR GENETICS**. Educ: Harvard Univ, BA, 43; Columbia Univ, PhD(zool), 48. Prof Exp: Asst zool, Columbia Univ, 43-45; mem staff, Med Col, Cornell Univ, 49-54; from asst prof pharmacol to assoc prof microbiol, 54-63, adv, Grad Dept, 64-70, chmn, Dept Basic Med Sci, 75-80, PROF MICROBIOL, SCH MED, NY UNIV, 63- Concurrent Pos: Vis investr, Mass Gen Hosp, 52-53; dir honors prog, Sch Med, NY Univ, 58-61, co-dir, USPHS Genetics Training Grant, 61-68; dir, 68-75, dir, Microbiol Training Grant, 64-69; mem, NIH Genetics Training Grants Comt, 61-65, mem study sect microbial chem, 68-72, chmn, 70-72; mem staff, Univ Brussels, 63; mem test comt microbiol, Nat Bd Med Exam, 71-75. Mem: Am Soc Microbiol; Am Soc Biol Chem; Genetics Soc Am. Res: Microbial genetics and physiology, with emphasis on regulatory mechanisms, especially of protein synthesis; amino acid permeases; polyamine metabolism; genetics of extrachromosomal elements. Mailing Add: Dept of Microbiol NY Univ Sch of Med 550 1st Ave New York NY 10016

MAASBERG, ALBERT THOMAS, b Bronx, NY, Feb 10, 15; m 41; c 2. **CHEMISTRY, CHEMICAL ENGINEERING**. Educ: State Univ NY, BS, 36. Prof Exp: Res dir cellulose prod dept, Dow Chem USA, 46-50, asst prod mgr, 50-52, mgr, 52-54, tech dir plastics prod dept, 54-56, dir res & develop, Midland Div, 56-63, dir contract res, develop & eng, 63-79. Mem: Am Chem Soc; Sigma Xi; Tech Asn Pulp & Paper Indust; fel Am Inst Chem Eng. Res: Pulp and paper manufacturing; cellulose ethers; water soluble polymers; chemicals and plastics process and product; government and industrial contract research and development administration. Mailing Add: 3220 Noeske Midland MI 48640

MAASS, ALFRED ROLAND, b Plymouth, Wis, Apr 14, 18; m 47; c 3. **BIOCHEMISTRY**. Educ: Antioch Col, BS, 42; Univ Wis, MS, 47, PhD(biochem), 50. Prof Exp: Consult, Argonne Nat Labs, 51; sr res biochemist, 51-56, group leader, Biochem Sect, 56-57, asst sect head, 57-62, sect head, 62-67, assoc dir biochem, 67-74, dir develop proj, 74-78, dir anal biochem res, 78-81, dir sci admin pre-clin develop, Smith, Kline & French Labs, 81-82; CONSULT, MAASS ASSOC, 82- Concurrent Pos: Chmn civilian adv comt radiation safety, City Philadelphia, 64-73. Mem: AAAS; Health Physics Soc; Am Chem Soc, Am Acad Neuro; NY Acad Sci. Res: Isotope tracers; drug metabolism; enzymes; neurobiochemistry; gastric and renal physiology; anti-hypertensive, diuretic, uricosuric and anti-lipemic agents. Mailing Add: PO Box 50 Rd 2 New Milford PA 18834

MAASS, WOLFGANG SIEGFRIED GUNTHER, b Helsinki, Finland, Oct 23, 29; m 60; c 2. **PLANT PHYSIOLOGY, PLANT BIOCHEMISTRY**. Educ: Univ Tübingen, Dr rer nat, 57. Prof Exp: Asst bot, Univ Tübingen, 57; sci collabor, Max-Planck Inst Protein & Leather Res, 58-60; fel biol, Dalhousie Univ, 60-62; asst res officer, Atlantic Regional Lab, Nat Res Coun Can, 62-65, assoc res officer, 66-; AT DEPT MATH, STAT & COMPUT SCI, UNIV ILL, CHICAGO. Concurrent Pos: Mem, Plant Phenolics Group NAm. Mem: Can Soc Plant Physiol; Ger Bot Soc. Res: Taxonomy and distribution of Sphagnum; chemical taxonomy; biochemical aspects of cellular development; biosynthesis of pulvinic acid derivatives and phenolic compounds in general. Mailing Add: Dept Math Univ Ill Chicago IL 60680

MAASSAB, HUNEIN FADLO, b Damascus, Syria, June 11, 28; nat US; m 59; c 2. **EPIDEMIOLOGY, VIROLOGY**. Educ: Univ Mo, BA, 50, MA, 52; Univ Mich, MPH, 55, PhD(epidemiol sci), 56; Am Bd Med Microbiol, dipl. Prof Exp: Res assoc, 57-60, from asst prof to assoc prof, 60-72, PROF EPIDEMIOLOGIST, UNIV MICH, ANN ARBOR, 72- Mem: AAAS; Am Asn Immunol; Brit Soc Gen Microbiol; Tissue Cult Asn; Soc Exp Biol & Med. Res: Metabolism of infection; host-virus interaction; immunology; tissue culture; tumors; biology of myxoviruses. Mailing Add: Dept Epidemiol Univ Mich Sch Pub Health Ann Arbor MI 48109

MAATMAN, RUSSELL WAYNE, b Chicago, Ill, Nov 7, 23; m 48; c 5. **PHYSICAL CHEMISTRY**. Educ: Calvin Col, AB, 46; Mich State Col, PhD(chem), 50. Prof Exp: Asst prof chem, DePauw Univ, 49-51; sr technologist, Socony-Mobil Oil Co, 51-58; assoc prof chem, Univ Miss, 58-63; PROF CHEM, DORDT COL, 63- Mem: Am Chem Soc; Am Sci Affil. Res: Catalysis; solution-solid reactions; ion solvation. Mailing Add: Dept of Chem Dordt Col Sioux Center IA 51250

MABEY, WILLIAM RAY, b Los Angeles, Calif, Oct 16, 41; m 81. **PHYSICAL ORGANIC CHEMISTRY**. Educ: Univ Calif, Riverside, BA, 65; San Diego State Univ, MS, 68; Univ Ore, PhD(chem), 72. Prof Exp: Phys org chemist, SRI Int, 72-84; SR ENVIRON CHEMIST, KENNEDY JENKS & CHILTON INC CONSULT ENGRS, 84- Mem: Am Chem Soc; AAAS; Soc

Environ Toxicol Chem. Res: Environmental chemistry; kinetics and mechanisms of processes in environment; persistence and fate of chemicals in environment; hazardous chemicals investigation and site cleanup. *Mailing Add:* 240 Aptos Place Danville CA 94526-5430

MABIE, CURTIS PARSONS, b Memphis, Tenn, Feb 26, 32; m 59; c 1. DENTAL MATERIALS, MICROSCOPY. *Educ:* Western Reserve Univ, BA, 54; Univ Mich, MS, 58. *Prof Exp:* Res geologist, US Bur Mines, 58-61; anthracologist, Appl Res Ctr, US Steel Corp, 61-63; res microscopist, IRC, 63-65; res engr, Norton Co, 65-66; ceramic technologist, NL Indust Inc, 66-67; chief scientist, Ceramics Div, Am Dent Asn, Nat Bur Standards, 68-80; MGR CERAMIC RES, SEMIX INC, 80-. *Mem:* Am Ceramic Soc; Am Soc Testing & Mat; Sigma Xi. *Res:* Dental porcelains, investments, fillers, and cements; microscopy of dental materials and biological calcifications. *Mailing Add:* 20 Franklin St Frederick MD 21701

MABIE, HAMILTON HORTH, b Rochester, NY, Oct 21, 14; m 41; c 3. MECHANICAL ENGINEERING. *Educ:* Univ Rochester, BS, 40; Cornell Univ, MS, 43; Pa State Univ, PhD(mech eng), 54. *Prof Exp:* From instr to assoc prof mech eng, Cornell Univ, 41-60; res & develop engr, Sandia Corp, NMex, 60-64; PROF MECH ENG, VA POLYTECH INST & STATE UNIV, 64-. *Concurrent Pos:* Consult, Sandia Corp, NMex, 58-59 & 64-67 & Westinghouse Elec Corp, Va, 69-70. *Mem:* Fel Am Soc Mech Engrs; Am Soc Lubrication Engrs; Am Soc Eng Educ; Soc Exp Stress Anal. *Res:* Mechanisms and kinematics; fatigue of mechanical components; instrument bearings and lubrication. *Mailing Add:* Dept of Mech Eng Va Polytech Inst & State Univ Blacksburg VA 24061

MABROUK, AHMED FAHMY, b Cairo, UAR, Sept 30, 23; m 54; c 3. AGRICULTURAL CHEMISTRY. *Educ:* Univ Cairo, BSc, 45, MSc, 50; Ohio State Univ, PhD(lipid chem), 54. *Prof Exp:* Chemist, Ministry Agr, Egypt, 45-46; instr chem, Fac Agr, Univ Cairo, 46-48, instr agr indust, 48-51; fel agr chem, Ohio State Univ, 54-55; lectr & asst prof chem, Univ Cairo, 55-58, lectr, Grad Sch, 56-58; res org chemist, Am Meat Inst Found, Univ Chicago, 58-61; prin org chemist, Northern Utilization Res & Develop Div, USDA, 61-65; sr res chemist, Food Sci Lab, 65-80, SR RES CHEMIST, SCI & ADVAN TECHNOL LAB, US ARMY NATICK RES & DEVELOP LABS, 80-. *Concurrent Pos:* Fel physiol chem, Ohio State Univ, 56; lectr to postgrads, Agr Schs, Egypt; consult, Tahreer Prov Authority, Egypt, 55-57; abstractor, Chem Abstr, 55-65. *Honors & Awards:* Sci Dir Silver Key Res Award, 68. *Mem:* Am Oil Chemists Soc; Am Chem Soc; Inst Food Technologists; Royal Soc Chem; Brit Soc Chem Indust. *Res:* Chromatography of organic compounds; gel permeation chromatography; gas chromatography; ultrafiltration; fat and flavor chemistry; heterogeneous and homogenous hydrogenation of fats and organic compounds; chemical kinetics of oxidative rancidity; antioxidants; isolation and synthesis of naturally occurring compounds; polymer chemistry. *Mailing Add:* 9 Wildewood Terr Framingham MA 01701-3609

MABRY, JOHN WILLIAM, b Batesville, Ark, Oct 17, 50. ANIMAL BREEDING, SWINE MANAGEMENT. *Educ:* Okla State Univ, BS, 72; Iowa State Univ, MS, 74, PhD(animal breeding), 76. *Prof Exp:* Grad asst animal breeding, Iowa State Univ, 72-76; asst prof, Univ Wis, River Falls, 76-79; ASST PROF ANIMAL BREEDING, UNIV GA, 79-. *Mem:* Am Soc Animal Sci; Nat Asn Col Teachers Agr. *Res:* Effects of photoperiod, breeding herd management and the relationships between compositional and sexual maturity. *Mailing Add:* 208 Livestock-Poultry Bldg Univ Ga Athens GA 30602

MABRY, PAUL DAVIS, b Meridian, Miss, Sept 28, 43. NEUROPSYCHOPHARMACOLOGY, DEVELOPMENTAL PSYCHOBIOLOGY. *Educ:* Millsaps Col, BS, 65; Univ Miss, MS, 67, PhD(psychobiol), 70. *Prof Exp:* Res fel, Nat Inst Neurol Dis & Stroke, NIH, dept neurosurg, Univ Miss Med Ctr, 69-70; res assoc, Neurosci & Behav Prog, Princeton Univ, 70-76; PROF PSYCHOL, CHMN DEPT & HEAD, DIV BEHAV SCI, SACRED HEART COL, 76-. *Mem:* Soc Neurosci; AAAS; Am Psychol Asn; Sigma Xi. *Res:* The functional development of neurotransmitter systems in the brain; the role of monoamines in behavioral arousal motivation and emotion. *Mailing Add:* Dept Psychol Col St Thomas 2115 Summit Ave St Paul MN 55105

MABRY, TOM JOE, b Commerce, Tex, June 6, 32; m 54, 71; c 1. ORGANIC CHEMISTRY, PHYTOCHEMISTRY. *Educ:* ETex State Univ, BS & MS, 53; Rice Univ, PhD(chem), 60. *Prof Exp:* NIH fel chem, Org Chem Inst, Univ Zurich, 60-61; res scientist, 62, from asst prof to prof phytochem, 63-73. *Prof Bot*, UNIV TEX, AUSTIN, 73-. *Concurrent Pos:* Guggenheim fel, Univ Freiburg, 71. *Mem:* Am Chem Soc; Royal Soc Chem; Bot Soc Am; Phytochem Soc NAm (vpres, 65, pres, 66-67). *Res:* Natural products chemistry; biochemical systematics; molecular evolution. *Mailing Add:* Dept Bot Univ Tex Austin TX 78712

MACADAM, DAVID LEWIS, b Philadelphia, Pa, July 1, 10; m 38; c 4. COLOR MEASUREMENT. *Educ:* Lehigh Univ, BS, 32; Mass Inst Technol, PhD, 36. *Prof Exp:* Sr res assoc, Res Labs, Eastman Kodak Co, 36-75; PROF OPTICS, UNIV ROCHESTER, 76-. *Concurrent Pos:* Mattiello mem lectr, Fedn Soc Paint Technol, 65; Hurter & Driffield mem lectr, Royal Photog Soc, 66; hon mem, Inter-Soc Color Coun; ed jour, Optical Soc Am, 64-75; chmn, Color Measurement Comt, Mil Personnel Supplies Adv Bd, Nat Res Coun, 78-82. *Honors & Awards:* Godlove Award, Inter-Soc Color Coun, 63; Lomb Medal, Optical Soc Am, 40; Ives Medal, 74; Judd Medal Int Asn Color, 83; Sir Isaac Newton Medal, Gt Brit Color Group, 85. *Mem:* Fel Optical Soc Am (pres, 62); Int Comm Illum. *Res:* Optics; color photography; influence of color contrast on visual acuity; spectroradiometry; color television; photographic image structure; visual sensitivity to small color differences. *Mailing Add:* 68 Hammond St Rochester NY 14615

MACADAM, WILL, b Wheeling, WV, Oct 22, 21; m 45; c 2. CONTROL SYSTEMS ENGINEERING. *Educ:* Case Inst Technol, BS, 42; Univ Pa, MS, 59. *Prof Exp:* Asst, 45-49, res technologist, 49-51, sr res technologist, 51-57, head elec sect, Res Div, 57-68, assoc dir res opers, Tech Ctr, 68-80, mgr chem inst res & develop, Leeds & Northrup Co, 80-. *CONSULT.* *Mem:* Fel Inst Elec & Electronics Engrs. *Res:* Electrical instruments for measurement industrial recording and process control. *Mailing Add:* Hickory Hill Dr Worcester PA 19490

MACADAMS, ARTHUR JAMES, b Santa Barbara, Calif, July 16, 23; m 46; c 4. PEDIATRICS, PATHOLOGY. *Educ:* Johns Hopkins Univ, MD, 48. *Prof Exp:* Instr pediat path, Col Med, Univ Cincinnati, 56-58; dir labs, Children's Hosp East Bay, Oakland, Calif, 58-63; assoc prof, 63-69. *PROF PEDIAT & PATH. COL MED. UNIV CINCINNATI*, 69-. *DIRECTING PATHOLOGIST, CHILDREN'S HOSP & RES FOUND*, 63-. *Concurrent Pos:* Asst pathologist, Cincinnati Children's Hosp, 56-58; clin asst prof, Sch Med, Univ Calif, 62-63. *Mem:* AAAS; Am Asn Path & Bact; Soc Pediat Res; Int Acad Path; Am Pediat Soc. *Res:* Role of complement in nephritis; pulmonary disease in the newborn; anoxic brain damage. *Mailing Add:* Dept of Path Children's Hosp Med Ctr Eland & Bethesda Ave Cincinnati OH 45229

MACADAMS, ROBERT ELI, b Hudson, Colo, Jan 2, 29; m 50. NUCLEAR PHYSICS. *Educ:* Colo State Univ, BS, 57; Iowa State Univ, PhD(physics), 64. *Prof Exp:* Fel physics, Iowa State Univ, 64-65; asst prof, 65-73. *ASSOC PROF PHYSICS, UTAH STATE UNIV*, 73-. *Mem:* Am Phys Soc. *Res:* Intermediate-energy physics. *Mailing Add:* Dept Physics Utah State Univ Logan UT 84322

MCADIE, HENRY GEORGE, b Montreal, Que, May 12, 30; m 56; c 4. ENVIRONMENTAL CHEMISTRY, ANALYTICAL CHEMISTRY. *Educ:* McGill Univ, BSc, 51; Queen's Univ, Ont, MA, 53, PhD(physics chem), 56. *Prof Exp:* Res fel, Ont Res Found, 56-63, sr res scientist, 64-67, prin res scientist, 67-70, from asst dir to actg dir, dept phys chem, 70-71, dir, dept environ chem, 72-83, assoc dir, Div Environ & Chem Eng, 83-84; FOUNDER & CONSULT, H G MCADIE ASSOCS, 84-. *Concurrent Pos:* Chmn, Can Adv Comat, Int Stand Org/Tech Comt-146 Air Qual, 74-77, 83-; chmn bd dirs, Chem Inst Can, 77-79; designated chartered chemist, Ont, 84; fel NAm Thermal Anal Soc, 83. *Honors & Awards:* J Charles Honey Award, 78; N S Kurnskow Medal, 85. *Mem:* Fel Chem Inst Can; Int Conf Thermal Anal (vpres, 74-77, pres, 77-80); Am Chem Soc; Air Pollution Control Asn; fel Royal Soc Chem; Am Soc Testing & Mat. *Res:* Thermoanalytical methods and applications; heterogeneous processes; air pollution instrumentation; ambient and work-room monitoring; emissions testing; emission control processes; long-range transport. *Mailing Add:* H G McAdie Assocs 104 Golfdale Rd Toronto ON M4N 2B7 Can

MCADOO, JOHN HART, b Baltimore, Md, Mar 16, 45; m 76. CHARGED PARTICLE BEAMS. *Educ:* Princeton Univ, BSE, 67; Univ Rochester, MS, 76, PhD(plasma physics), 81. *Prof Exp:* Res physicist optics, Sachs/Freeman Assoc, Inc, 81-83; res physicist optics, Naval Res Lab, 83; RES PHYSICIST OPTICS, UNIV MD, 83-. *Mem:* Am Phys Soc; AAAS; Astron Soc Pac; Inst Elec & Electronics Engrs. *Res:* Propagation of high current density electron beams through periodic focusing channels; development of a 30 Megawatt, 10 Gigahertz source of microwave radiation for driving electron accelerators. *Mailing Add:* Lab Plasma Fusion & Energy Studies Univ Md College Park MD 20742

MCAFFEE, JERRY, b Port Arthur, Tex, Nov 3, 16; m 40; c 4. CHEMICAL ENGINEERING. *Educ:* Univ Tex, BS, 37; Mass Inst Technol, ScD(chem eng), 40. *Hon Degrees:* LLD, Waynesburg Col, 81. *Prof Exp:* Res chem engr, Universal Oil Prod Co, Ill, 40-45; tech specialist, Gulf Oil Corp, 45-50, dir chem div, Gulf Res & Develop Co, 50-51, asst dir res, 51-54, vpres & assoc dir res, 54-55; vpres eng, Gulf Oil Corp, 55-60, vpres & exec tech adv, 60-62, vpres & dir planning & econs, 62-64, sr vpres, 64-67; exec vpres, Brit Am Oil Co Ltd, 67-69; pres, Gulf Oil Can Ltd, 69-76; chmn bd, Gulf Oil Corp, 76-81; RETIRED. *Mem:* Nat Acad Eng; Am Chem Soc; Am Inst Chem Engrs (vpres, 59, pres, 60). *Res:* Products: crude oil, refined oil products, and natural gas. *Mailing Add:* 4 Indian Hill Rd Pittsburgh PA 15238

MCAFFEE, JOHN GILMOUR, b Toronto, Ont, June 11, 26; nat US; wid; c 3. RADIOLOGY, NUCLEAR MEDICINE. *Educ:* Univ Toronto, MD, 48. *Prof Exp:* Jr intern, Victoria Hosp, London, Ont, 48-49, asst resident radiol, 50-51; sr intern, Westminster Hosp, 49-50; resident radiol, Johns Hopkins Hosp, 51-52; from instr to assoc prof, Johns Hopkins Univ, 53-65; fac scholar, 75, PROF RADIOLOG, STATE UNIV NY HEALTH SCI CTR, 65-. *Concurrent Pos:* Fel radiol, Johns Hopkins Univ, 52-53. *Honors & Awards:* John G McAfee Lectr, 78; Paul C Aebersold Award, Soc Nuclear Med, 79. *Mem:* Soc Nuclear Med; Radiol Soc NAm; Am Roentgen Ray Soc; Royal Col Physicians & Surgeons Can; Asn Univ Radiologists. *Res:* Use of radioactive tracers in clinical diagnosis; nuclear instrumentation and radiochemistry; magnetic resonance imaging. *Mailing Add:* Dept Radiol State Univ NY Health Sci Ctr Syracuse NY 13210

MCAFFEE, KENNETH BAILEY, JR, b Chicago, Ill, June 22, 24; m 59; c 2. CHEMICAL PHYSICS, ATMOSPHERIC CHEMISTRY. *Educ:* Harvard Univ, BS, 46, MA, 47, PhD(chem physics), 50. *Prof Exp:* Mem tech staff, 50-66, HEAD ATMOSPHERIC RES DEPT, AT&T BELL LABS, 66-. *Concurrent Pos:* Mem, Defense Sci Bd, Dept Defense, 65-66; mem, sci adv comt, Advan Res Projs Agency, 67-68; mem, Health Res Coun, New York, 71-74; mem, Delphi panel on sulfur oxides forecasting, US Environ Protection Agency, 72-74; chmn comt sulfur oxides control technol, Nat Acad Sci-Nat Acad Eng, comn sociotech systs, Nat Res Coun, 75-78 & gov's sci adv comt, State of NJ, 79-83; chmn panel status of sulfur oxides technol, Comn on Sociotech Systs, Nat Res Coun, 75-79. *Honors & Awards:* Distinguished Scientist Award, AT&T Bell Labs, 82. *Mem:* Fel Am Phys Soc; Am Chem Soc; Sigma Xi. *Res:* Semiconductors; gaseous diffusion and separation; atomic collision processes; reentry physics; upper atmosphere; atmospheric reactions and dispersion of contaminants; environmental physics and chemistry; halogen photochemistry and excited state reactions; atomic and molecular physics. *Mailing Add:* 41 Ellis Dr Basking Ridge NJ 07920