

Thirty-First Annual Briefing NEW HORIZONS IN SCIENCE

*October 31 through November 4, 1993
The Ritz-Carlton
St. Louis, Missouri*

CASW Council for the
Advancement of
Science
Writing, Inc.

Program by:
Ben Patrusky, Executive Director, CASW

Sponsored by:
Washington University in St. Louis

With additional support from:
Monsanto Company
National Science Foundation

Sunday, October 31
6:30 p.m. to 9:00 p.m.

Registration and Welcome Reception
The Ritz-Carlton

Monday, November 1
8:30 a.m. to 11:30 a.m.

ANTI-FERTILITY VACCINE

Roy Curtiss III, Ph.D., Professor of Biology, Washington University, St. Louis

The ferry: strains of *Salmonella* made avirulent by genetic manipulation but still able, following oral administration, to trigger an immune response. The critical freight: genes coding for sperm- and egg-specific proteins. Result: an antibody reaction in the reproductive tract that forestalls fertilization. Best of all, this contraceptive strategy is potentially reversible. Primate studies are about to start.

AMERICAS' INDIANS: FROM WHERE? WHEN? HOW?

Douglas C. Wallace, Ph.D., Professor of Molecular Genetics and Chairman, Department of Genetics and Molecular Medicine, Emory University School of Medicine, Atlanta

When Columbus made contact with the Americas in 1492, Native American occupation stretched from the Bering Strait to Tierra del Fuego. These populations, because of their extraordinary linguistic and cultural diversity, have fueled extensive, often heated debate regarding roots and interrelationships. Among the more contentious questions: When did ancestral American Indians first arrive? How many migrations occurred? From where in Asia did they derive? By which route(s) did they come — boat and/or land bridge? Researchers believe they can now — or will soon have it in their power to — resolve many of these vexatious issues. Answers, they say, are written in the mitochondrial DNA.

12 Noon

Buffet Lunch

Monday, November 1
2:30 p.m. to 5:30 p.m.

THE ORIGINS OF TRIBAL WARFARE

Neil L. Whitehead, Ph.D., Assistant Professor and Head, Cultural Section,
Department of Anthropology, University of Wisconsin, Madison

Anthropologists involved in a searching re-examination of warfare among indigenous peoples now conclude that cherished ideas about its origins are seriously flawed. The misperception, they say, devolves largely from the fashion in which many field studies, from which prevailing wisdom grew, were done. Missing, they say, was historical context: a failure to recognize the transformational role Western Europe played in what was all-too-often erroneously perceived as purely local conflict. Does this revisionism have anything to teach us about latter-day "tribal" conflict? Those spearheading the effort certainly think so.

THE UNIVERSE: HOW BIG? HOW OLD?

Robert Kirshner, Ph.D., Professor and Chair, Department of Astronomy, Harvard University, Cambridge

Using light from exploding stars, the speed of whirling galaxies, the roughness of the smoothest galaxies, interactions with hot gas in galaxy clusters and the exotic geometry of gravitational lenses, astronomers have fashioned a variety of remarkable new tools for gauging cosmic distances and, ultimately, for measuring Hubble's constant, the number that tells how fast the universe is expanding. The stakes are high, since the value of Hubble's constant serves to set the time scale for the evolution of the universe. Fact is, the latest results yield an age for the universe that has a number of astronomers squirming.

6:00 p.m.

Hospitality Suite open
Free evening

Tuesday, November 2

8:30 a.m. to 11:30 a.m.

SPECIAL SYMPOSIUM: GETTING TO THE ROOT OF CELL DEATH

An exploration of recent advances in understanding the molecular mechanisms underlying apoptosis (programmed cell death) and necrosis (toxic cell death) and the implications for new therapies against cancer and a range of acute and chronic neurodegenerative diseases.

THE SALVATION GENE

Stanley J. Korsmeyer, M.D., Professor of Medicine and of Molecular Microbiology, and Associate Investigator, Howard Hughes Medical Institute, Washington University School of Medicine

NEURONAL SUICIDE

Eugene B. Johnson, Jr., Ph.D., Professor of Molecular Biology and Pharmacology, Washington University School of Medicine

EXCITOTOXIC DEATH

Dennis W. Choi, M.D., Ph.D., Professor and Head of Neurology, Washington University School of Medicine

PATTERNS, SHAPES AND KNOWLEDGE

Michael I. Miller, Ph.D., Professor of Electrical Engineering, Washington University

Researchers at last have the means to equip computers with a faculty that, until now, has escaped the machines' grasp. Algorithms built from powerful, new theory now make it possible to endow computers not only with the capacity to "make sense" of exquisitely complex biological patterns and shapes — i.e. face, hand, brain — but also, and perhaps more important, to individualize, to distinguish one from another. This new pattern-analysis technology has opened the way to a number of applications. Among the most stunning: enabling neurosurgeons to perform virtual-reality brain surgery.

12 Noon

Buffet Lunch

Tuesday, November 2
2:00 p.m. to 5:00 p.m.

APPLYING CHAOS

Lou Pecora, Ph.D., Research Physicist, Naval Research Laboratory, Washington, D.C.

Time was when scientists involved in the study of chaos derived pleasure solely from the exploration of theory, from analyses aimed at detecting pattern in seemingly random phenomena. Lately, however, researchers have taken to shifting their attention toward exploitation, toward devising ways of putting chaos to work. What's beginning to emerge are strategies for, among other things: controlling erratic heart rhythms; creating eavesdrop-proof communication channels; transmitting in the clear more efficiently; regulating chemical processes...and more.

SPECIES EXTINCTION: IS THERE A CRISIS? — A DEBATE

Peter H. Raven, Ph.D., Director, Missouri Botanical Garden, St. Louis.

Julian L. Simon, Ph.D., Professor of Business Administration, University of Maryland, College Park

To many biologists and ecologists, a reading of available data leaves little room for doubt that species are dying off at a rate greater than at any time since the end of the Cretaceous period 65 million years ago, when about two-thirds of all terrestrial organisms disappeared permanently. But there are those who say otherwise, arguing that no evidence whatsoever exists to justify apocalyptic, or even modest, claims for historically rapid species extinctions — and who blame the media, in part, for not giving the countervailing position its proper due.

6:45 p.m.

RECEPTION AND ANNUAL CASW BANQUET

Holmes Lounge, Ridgley Hall, Washington University

Presentation of the 1993 National Association of Science Writers' Science-in-Society Awards.

Featured Speaker: Rustim Roy, Ph.D., Evan Pugh Professor of the Solid State, Professor of Geochemistry, and Professor of Science, Technology and Society, Pennsylvania State University, University Park, on *A Dangerous Duo: Unscrupulous Scientists and Cheerleading Journalists*.

Wednesday, November 3

8:15 a.m.

Buses depart for the Natural Sciences Building Auditorium, Washington University Hilltop campus.

9:00 a.m. to 12 Noon

ORGAN FARMING

John Atkinson, M.D., Professor and Head, Department of Medicine, Washington University School of Medicine

Given the chronic shortfall in donor organs, transplant researchers keep looking to borrow organs from other species. Biggest obstacle: hyperacute rejection by the complement system. Now, however, with genes in hand for the proteins that shield the body's own tissues from assault by this arm of the immune system, researchers think they may have a solution. The plan: to develop, via transgenics, animals with organs bearing complement-masking proteins. Transplanted to humans, these organs should escape complement's wrath.

EXPLORING MARS: WHAT NEXT?

Raymond E. Arvidson, Ph.D., Professor and Chairman, Department of Earth and Planetary Sciences, Washington University

Lost with the Mars Observer was the opportunity to acquire the detailed data (about the atmosphere, surface and interior) critical to understanding how the red planet works as a system. Or was it? For it seems there are new plans afoot and the means to obtain this much-longed-for intelligence in the very near future — information that would almost certainly also go a long way towards enhancing knowledge of the history of other planets, the Earth among them.

Wednesday, November 3
12:30 p.m.

Box Lunch

1:30 p.m. to 4:30 p.m.

TOURS OF WASHINGTON UNIVERSITY SCIENCE LABORATORIES

6:30 p.m.

GALA EVENING AT THE ST. LOUIS SCIENCE CENTER

Reception and dinner hosted by the Center and the Academy of Science of St. Louis, with special showing of new Omnimax feature on the Antarctic and ample opportunity to tour this splendid facility. Buses depart Ritz-Carlton at 6:00 p.m.

*Thursday, November 4
8:30 a.m. to 11:30 a.m.*

DIAMOND ELECTRONICS

Mark A. Prelas, Ph.D., Professor of Nuclear Engineering, University of Missouri, Columbia

Boris Spitsyn, Ph.D., Head, Laboratory of Diamond Film Crystallization, Institute of Physical Chemistry, Moscow

By the turn of the century, the market for diamond-film, currently estimated at \$20 million per year, may well soar into the billions — if, as many expect, it comes to supplant silicon as the electronic material of choice in semiconductors and other devices. Much of the promise stems from the work done in the Former Soviet Union. American and Russian scientists have now teamed up in a drive to advance the commercial potential of this technology.

THE LASAGNA PROJECT: A NEW TAKE ON WASTE CLEANUP

Philip H. Brodsky, Ph.D., Director, Corporate Research and Environmental Technology, Monsanto Company, St. Louis

On reflection, it seems surprising that no one had thought of the idea before. In any event, the eureka moment has finally arrived, the notion of marrying two well-established technologies — electro-osmosis and in situ (bacterial or enzymatic) scrubbing — to produce a first-of-its-kind hybrid that could effectively and permanently clean up deeply contaminated, otherwise-hard-to-treat, dense subsurface soils. Why the project name? Because of the lasagna-like layering required to extract the hazardous wastes. Then again, the designation might also serve as tribute to how well scientists used their noodles on this one. Multi-site field trials are now in the planning stage.

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About the Speakers/ CASW New Horizons 1993

RAYMOND E. ARVIDSON received his Ph.D. from Brown University in 1974. That same year he joined the Washington University faculty, where he now holds rank as chair and professor, department of earth and planetary sciences, and as fellow of the McDonnell Center for Space Sciences at the university. He led the Viking Lander Imaging Team from 1972-82, was associate editor of the *Journal of Geophysical Research* from 1982-84, and co-editor of *Geology* from 1988-90. He serves as an interdisciplinary scientist for the Mars Observer mission and as head of the Geosciences Node, NASA's planetary data system. He has published more than 80 scientific articles dealing with remote sensing of Earth, Mars and Venus. (314/935-5609)

JOHN P. ATKINSON earned his B.A. (1965) and M.D. (1969) at the University of Kansas. He trained in internal medicine at Massachusetts General Hospital and at the National Institutes of Health. He has been on the faculty of Washington University School of Medicine since 1976, and directed the division of rheumatology within the department of medicine from 1976 to 1992. He was an investigator of the Howard Hughes Medical Institute during that same period. Currently physician-in-chief and head of the John Milliken Department of Internal Medicine and professor of molecular microbiology, Atkinson is author or co-author of more than 130 research papers. (314/362-8060)

PHILIP H. BRODSKY, a native of Philadelphia, received his B.Ch.E. in 1965 and his Ph.D. (chemical engineering) in 1969 from Cornell University. He came to Monsanto in 1968 and has since held various positions in research and research management, including director of technology in the company's plastics division. He was named director of corporate research and environmental technology in 1991. He currently serves on the board of directors of the MIT Program for Senior Executives, the Industrial Research Institute and Inroads, Inc., and on key committees of several prominent scientific organizations. (314/694-3235)

DENNIS W. CHOI, a native of Ann Arbor, MI, did his undergraduate and graduate work at Harvard, where he obtained his A.B. in 1974, and both his Ph.D. (pharmacology) and M.D. degrees in 1978. After several years of training at Harvard-associated hospitals, Choi accepted appointment to the Stanford Medical Center faculty in 1983. He left Stanford in 1991 to become Andrew B. and Gretchen P. Jones Professor, head of neurology and director of the Center for the Study of Nervous System Injury at the Washington University School of Medicine. He also serves as neurologist-in-chief at St. Louis' Barnes Hospital. Recipient of many honors, including a 1992 Wakesman Award for his outstanding contributions to neuroscience research, Choi has more than 100 scientific papers, book chapters and reviews to his publishing credit. (314/362-7175)

ROY CURTISS III was born in New York City, did his undergraduate work at Cornell University and went on to earn his Ph.D. at the University of Chicago in 1962. He spent the next 10 years as a biologist with the Oak Ridge National Laboratory. From 1969-1972 he was also associate director at the University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences. In 1973, he was named George McCauley Professor of Microbiology at the University of Alabama Medical Center, Birmingham. In 1984, he moved to Washington University, where he is currently George William and Irene Koechig Freiberg Professor of Biology and where, until recently, he also served as chairman of the department. Curtiss was a member of the CASW Board for six years, two as vice president. (314/935-6819)

EUGENE M. JOHNSON, JR. was educated at the University of Maryland, receiving his B.Sc. in 1966 and Ph.D. (medicinal chemistry) in 1970. He joined the Washington University department of pharmacology, initially as an NIH and American Heart Association Research Fellow. He rose to associate professor in 1978, the same year he was selected to become an AHA Established Investigator, which guaranteed five years of research support. He was named a full professor in 1983. Johnson is the author of more than 80 research papers on brain chemistry. (314/362-3926)

ROBERT KIRSHNER attended Harvard College, graduating in 1970 with an A.B. After completing his Ph.D. (astronomy) at the California Institute of Technology in 1975 and another year of postdoctoral work at the Kitt Peak National Observatory, he went to the University of Michigan, where he became professor and chairman of the astronomy department and director of the McGraw-Hill Observatory. In 1985, Kirshner accepted appointment as professor of astronomy at Harvard. In 1990, he was named department chairman. He is the author of more than 100 scientific papers and has written extensively for popular audiences. He is also much in demand as a lecturer. In 1992, he was elected a fellow of the American Academy of Arts and Sciences. (617/495-7519)

STANLEY J. KORSMEYER received his B.S. in biology from the University of Maryland in 1972 and his M.D. from the University of Illinois in 1976. He did his internship and residency in internal medicine at the University of California, San Francisco, and postdoctoral research at the NIH, where, in 1982, he was named a senior investigator in the National Cancer Institute. In 1986, he moved to the Washington University School of Medicine, where he is now professor of medicine and molecular microbiology. He is also an associate investigator in the Howard Hughes Medical Institute. Korsmeyer has published some 120 research papers and he currently serves on the editorial board of a number of journals, including *The New Biologist*, *Blood*, *Leukemia Research*, *Cancer Research*, and *The Journal of Clinical Immunology*. (314/362-9062)

MICHAEL I. MILLER studied electrical engineering at the State University of New York at Stony Brook (B.S.E.E., 1976) and Johns Hopkins University (M.S.E.E., 1978). After a stint in industry, as a senior engineer at GTE, he returned to Hopkins to complete work on his Ph.D. (biomedical engineering, 1983). He then joined the electrical engineering faculty of Washington University and was appointed full professor in 1992. In 1986, Miller was the recipient of a National Science Foundation Presidential Young Investigator Award. He has published over 40 papers and some dozen book chapters related to image processing. (314/935-6195)

LOU PECORA received his B.S. in physics in 1969 and Ph.D. (solid state science) in 1977 from Syracuse University. In 1979, after completing a postdoctoral fellowship at the Naval Research Laboratory, he accepted a permanent position as research physicist at NRL, where he also heads the programs for nonlinear dynamics in solid state physics. In the mid-1980's, Pecora's work centered on theoretical aspects of chaos. In recent years, he has been looking at ways to put chaos to practical use. Author of more than 50 scientific papers, Pecora has filed for five patents related to chaos applications. (202/767-3614)

MARK A. PRELAS has been a member of the University of Missouri-Columbia nuclear engineering faculty since 1979. Appointed H.O. Croft Professor in 1990, Prelas has centered his research attention on diamond and other wide bandgap materials for electronics, nuclear fusion and nuclear-pumped laser technology. During the last academic year he was on a Fulbright scholarship doing fusion research at the University of New South Wales in Australia. In 1991, he led a delegation of the first Western scientists to be allowed to visit the former Soviet Union's top-secret weapons laboratory. (314/882-9691)

PETER H. RAVEN has been director of the Missouri Botanical Garden for the past 22 years. He is also Engelman Professor in the department of botany at Washington University. A native of California, Raven received his Ph.D. from UCLA in 1960. A widely acknowledged authority on biodiversity, Raven has more than 400 scientific papers and some 18 books to his credit, including standard texts in biology, botany and the environment. He is a member of the National Science Board and serves as home secretary of the National Academy of Sciences and chairman of the report review committee of the National Research Council. (314/577-9410)

JULIAN L. SIMON earned his B.A. at Harvard in 1953, his M.B.A. in 1959 and Ph.D. (business economics) in 1961 at the University of Chicago. He worked in business, ran his own mail-order firm and also served as a naval officer before turning to teaching, initially at the University of Illinois and, since 1983, as professor of business administration at the University of Maryland. Simon's main interest is the economic effects of population changes. He is the author of more than a dozen books and monographs and nearly 200 professional studies in technical journals. He has also written dozens of popular articles for such mass outlets as *Readers Digest*, *The New York Times* and *Atlantic Monthly*. (301/405-2123)

BORIS SPITSYN heads the Laboratory of Diamond Film Crystallization of the Institute of Physical Chemistry in Russia. He is widely recognized for having fathered the field of epitaxial diamond film synthesis. He and his colleagues were the first to produce epitaxial diamond films, the first to generate p- and n-type-doped epitaxial diamond films and the first to obtain polycrystalline growth on a non-crystalline surface. For his many seminal achievements, in a career now spanning four decades, Spitsyn was named to receive the 1993 Pioneer Award from the Electrochemical Society. (314/882-3550)

DOUGLAS C. WALLACE received his B.S. from Cornell University. Following two years of military service, he attended Yale University, where he completed work on his M. Ph. in 1972 and Ph.D. (microbiology and human genetics) in 1975. After a year of postdoctoral research, he joined the genetics faculty of Stanford University and remained until 1983. He then moved to Emory University as professor of biochemistry and associate professor of neurology, pediatrics and anthropology. In 1990, he was named Robert W. Woodruff Professor of Molecular Genetics and director of the Center for Genetics and Molecular Medicine. In 1992, he assumed the chairmanship of the department of genetics and molecular medicine. A much-sought-after lecturer, Wallace has published more than 110 papers on human mitochondrial genetics. (404/727-3346)

NEIL L. WHITEHEAD was born and raised in London. He attended Oxford University, where he read for degrees in philosophy and psychology (B.A., 1977) and social anthropology (Ph.D., 1984) at Balliol College. He has held research and academic appointments with the British Academy, the Universities of London, Oxford, Leiden and Paris and the H.F. Guggenheim Foundation. Whitehead has spent much of the last 12 years conducting anthropological research on the indigenous peoples of the Amazon. He is widely published and has co-edited four scholarly books, including *War in the Tribal Zone: Expanding States and Indigenous Warfare* (1992). He recently moved to the United States to take up his present position as assistant professor and head of the cultural section in the University of Wisconsin's anthropology department. (608/262-7395)