

*Twenty-Seventh
Annual Briefing*
**NEW HORIZONS
IN SCIENCE**

*November 5 through 9, 1989
The Statler Hotel, Ithaca, NY*

CASW *Council for the
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Sunday, November 5

6:30 p.m. to 9:00 p.m.

Registration and Welcome Reception
A.D. White House

Monday, November 6

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

CHEMICAL PROSPECTING

Thomas Eisner, Ph.D., Schurman Professor of Biology, Cornell University,
Ithaca, NY

Species extinction is occurring at an ever-increasing rate, far greater than that of evolutionary replacement, with no reprieve in sight. Biotic depletion is tantamount to chemical impoverishment, the irreplaceable loss of unique natural substances of enormous commercial and clinical potential. To forestall that disaster, a new, highly rational plan is being proposed for uncovering valuable compounds still locked in nature's chemical treasury, primarily in tropical rainforests where mass extinction is fast becoming the norm.

PREVENTING METASTASIS

Michael Feldman, Ph.D., Klutznik Professor of Developmental Biology, and Head,
Department of Cell Biology, Weizmann Institute of Science, Rehovot, Israel

If malignant cells did not metastasize, surgical removal of a tumor would generally be enough to cure the patient — and cancer would be a far less formidable foe. As a result of research begun more than a decade ago, scientists have discovered important clues as to how cells metastasize — and how to prevent them from doing so. By applying key principles drawn from that research, the investigators recently succeeded in immunizing experimental animals against cancer's otherwise-inevitable spread. Such trials may lay the groundwork for the development of a new breed of "cancer vaccine."

Monday, November 6
2:30 p.m. to 5:30 p.m.

ANNIHILATION RADIATION FROM THE GALACTIC CENTER

Marvin Leventhal, Ph.D., Member, Technical Staff, AT&T Bell Laboratories,
Murray Hill, NJ

In the early 1970s, via a series of high-altitude balloon and satellite observations, space scientists detected powerful gamma rays emanating from the center of the Milky Way. In the early 1980s, this 511,000-volt signal — a signature of electron-positron (anti-electron) annihilation — switched off, only to reappear in 1988. What's at the root of this on-again, off-again radiation? Several candidates have been proposed, sources ranging from black holes to exotic neutron star systems. New high-altitude experiments scheduled for 1990 may provide answers that could also serve as a Rosetta stone for defining the engines that power quasars and other galaxies.

SINGLE-PARTICLE PHYSICS

Gerald Gabrielse, Ph.D., Professor of Physics, Harvard University, Cambridge, MA

It began with the trapping of individual electrons in free space. Physicists have since come up with ingenious schemes for long-term capture of other sub-atomic and atomic particles, including positrons, anti-protons, ions — and, now, even "neutral" (uncharged) atoms. Such entrapment will, among other things, enable scientists to test widely accepted fundamental theory about nature and reality at hitherto unheard-of levels of precision. Practical applications? New super-atomic clocks, for one, and there's even talk, however blue-sky, of launching future rockets into space by combining antimatter (assuming enough of it could ever be trapped) with matter.

6:00 p.m.

Hospitality Suite open
Free evening

Tuesday, November 7
8:30 a.m. to 11:30 a.m.

STRESS PROTEINS

Mary Lou Pardue, Ph.D., Professor of Biology, Massachusetts Institute of Technology, Cambridge, MA

Subjected to potentially harmful environmental conditions (e.g. high temperature, lack of oxygen, exposure to heavy metals or alcohol), all organisms respond by stepping up production of stress proteins, a.k.a. heat-shock proteins. These agents presumably act to protect cells against additional damage that further exposure would induce. With growing understanding of the molecular ins-and-outs of this response, researchers are beginning to think about putting stress proteins to work pinpointing sites of pollution and improving medical diagnosis and treatment.

REAL-TIME SEISMOLOGY

Thomas H. Heaton, Ph.D., Scientist in Charge, Pasadena Office, U.S. Geological Survey, Pasadena, CA

Recent advances in digital communication and concurrent development of ultra-sensitive, broad-band seismologic sensors provide the basis for a revolutionary early warning system that could significantly reduce the hazard from earthquakes, volcanic eruptions and tsunamis. And beyond its immediate life- and property-saving potential, the system, once in place, would contribute immeasurably to our ability to monitor arms-control agreements and, more generally, to basic knowledge about the Earth's structure and interior dynamics.

Tuesday, November 7
2:30 p.m. to 5:30 p.m.

REPORTING NUMBERS IN THE NEWS:
A WORKSHOP FOR JOURNALISTS

Stephen E. Fienberg, Ph.D., Dean, School of Humanities, and Falk Professor of
Statistics and Social Science, Carnegie Mellon University, Pittsburgh, PA

Victor Cohn, Senior Writer and Columnist, Health Section, *Washington Post*,
Washington, DC

With Vic Cohn's newly published, widely acclaimed book, *News & Numbers*, as
the guiding text, this session, specially designed for science, medical and
environmental writers, offers practical lessons on: statistical rules for testing and
questioning claims of would-be experts; how careful scientists structure studies
to get valid (truthful) and reliable (reproducible) results; how much trust to put in
Federal numbers; and, from the real world of journalism, examples of good and
not-so-good reporting.

6:00 p.m.

Hospitality Suite open

7:00 p.m.

THE ANNUAL CASW BANQUET

Presentation of the 1989 National Association of Science Writers' Science-in-
Society Journalism Awards.

Speaker: Carl Sagan, Ph.D., David Duncan Professor of Astronomy and Space
Sciences at Cornell University, on "Science Writing and Science Illiteracy in
America."

Wednesday, November 8
8:30 a.m. to 11:30 a.m.

GENE TARGETING

Oliver Smithies, M.A.,D.Phil.(Oxon), Excellence Professor of Pathology, University of North Carolina at Chapel Hill, Chapel Hill, NC

Scientists have become quite adept at introducing foreign DNA into the genetic machinery of mammalian cells, but they have had no way of telling just where the new DNA would take up residence among the host-cell's genes — often with undesirable consequences. Recently, however, researchers have learned how to take the guesswork (and prayer) out of DNA transplantation. With their new-found gene-targeting prowess, they now, in principle, have the wherewithal to: generate tailor-made animal models of human diseases; mutate or modify virtually any gene any way they want to, as a way of unraveling details about its structure and function. And there's growing belief that DNA targeting will bring gene therapy closer to reality.

THE BIGGEST CHILL

Robert C. Richardson, Ph.D., Newman Professor of Physics, Cornell University, Ithaca, NY

Over the last century, with each significant reduction of temperature, researchers, in their hot pursuit of absolute zero, have uncovered totally unexpected properties of matter (e.g. superfluidity and superconductivity). Recently, investigators have succeeded in opening up another window, at 100 millionths of a degree Kelvin, the coldest temperature ever recorded in the lab and about a million times colder than the coldest "natural" temperature (the 3 degrees K of deep space). There's little doubt that something wholly unpredicted will soon come to light.

Wednesday, November 8
2:00 p.m. to 3:30 p.m.

THE WORLD OF THE ULTRA-SMALL

Harold Craighead, Ph.D., Director, National Nanofabrication Center, and Professor, Applied and Engineering Physics, Cornell University, Ithaca, NY

Technology developed for chip manufacture is now being applied to the micromachining of mechanical devices — crankshafts, valves, springs, levers, nozzles — the size of dust particles, and the nanofabrication of far-tinier quantum devices (measuring nanometers, billionths of a meter, and visible only to scanning tunnel microscopy) that manifest new, quite bizarre optical and electronic properties. In the offing: gnat-sized robots; a new order of high-density silicon chip (with mechanical and electronic components sharing the same ultra-tiny piece of real estate); chips based on materials other than silicon.

3:45 p.m. to 5:00 p.m.

OPTIONAL TOURS

An opportunity to get an intimate, hands-on look at supercomputers, gene guns, animal models (artificial and otherwise) and high-energy particle accelerators.

6:30 p.m.

GALA RECEPTION AND DINNER: "A RENAISSANCE EVENING"

Hosted by Cornell University at the Biotechnology Building on campus and featuring a truly special repast produced by students from the world-renowned School of Hotel Administration.

*Thursday, November 9
8:30 a.m. to 11:30 a.m.*

THE COMING AGE OF MEGAWATT ELECTRONICS

Henry H. Kolm, Ph.D., Senior Scientist (Emeritus), MIT National Magnet Laboratory, and Chairman, EML Research, Inc., Kaman Corporation, Hudson, MA

The milliwatt electronics age, which brought us the information revolution, is about to be followed by the megawatt age, which promises to be equally revolutionary. The most dramatic application: electromagnetic launchers for boosting heavy payloads into space at acceptable cost. Modest beginnings have been made. Experimental armor-penetrating rail guns have outperformed chemical guns. And the first electromagnetic catapult was delivered to the Navy in January, 1989. A closely related linear motor could usher in a new era in transportation, featuring a magnetically levitated system capable of transporting 25,000 passengers per hour in a continuous stream at more than 200 miles per hour over guideways built alongside interstate highways.

SOCIOBIOLOGY: A NEW LOOK

Stephen T. Emlen, Ph.D., Professor of Animal Behavior, Cornell University, Ithaca, NY

When sociobiological theory was first proposed, it stirred up enormous controversy. To opponents, animal social behavior, given its extraordinary variability and complexity, appeared to contradict evolutionary (i.e. genetic) explanations that smacked of rigid determinism. In recent years, researchers seeking to understand the social strategies of animals have taken a new tack, combining the tools of economics with the rules of natural selection. Organisms are now seen as fitness maximizers, as making behavioral "decisions" based on "assessment" of the costs vs. benefits of available options. As a result of this new approach, many once-puzzling, highly intricate social interactions are starting to make Darwinian sense.

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