

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

*November 2 through November 6, 1986  
College Station Hilton, College Station, Texas*

**CASW** *Council for the  
Advancement of  
Science  
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Jerry Bishop, Science Writer, Wall Street Journal  
Ben Patrusky, Science Program Director, CASW

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*Sunday, November 2*  
*6:30 p.m. to 9:00 p.m.*

Registration and Welcome Reception  
College Station Hilton

*Monday, November 3*  
*8:30 a.m. to 11:30 a.m.*

#### GENE REPLACEMENT THERAPY

C. Thomas Caskey, M.D., Director and Professor of Molecular Genetics, Institute for Molecular Genetics, Baylor University College of Medicine, Houston, Texas

W. French Anderson, M.D., Chief, Laboratory of Molecular Hematology, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland

Protocols for the first trials of gene therapy for human diseases will be submitted to NIH in the very near future. The initial efforts, using a retroviral vector to deliver a normal gene, will center on attempts to correct immune-system defects involving cells that originate in the bone marrow. The speakers will discuss the latest advances that have suddenly made clinical trials so imminent and so highly promising—and what, in the long run, the therapeutic outlook is for many of the other 3,000 known genetic diseases that afflict mankind.

#### GERM-LINE GENE TRANSFER IN MAMMALS

Duane C. Kraemer, D.V.M., Ph.D., Professor of Veterinary Physiology and Pharmacology, College of Veterinary Medicine, Texas A&M University, College Station

The idea is to introduce foreign genes into fertilized eggs as a means of enhancing the productivity of farm animals. But current methods, involving insertion of DNA by direct injection, turn out to be quite inefficient. Only about one of 200 pig or one of 1,000 sheep embryos containing deliberately introduced foreign DNA produce offspring in which the injected gene is expressed. Several far more promising approaches are currently under investigation, including: DNA delivery to the target site via liposomes; fertilization of eggs with "transformed" sperm; and electroporation (electrically driven diffusion of DNA through pores of a fertilized egg).



*Monday, November 3*  
*2:30 p.m. to 5:30 p.m.*

**ANTI-IDIOTYPE ANTIBODIES:  
THE TOMORROW IN DISEASE CONTROL**

Ronald C. Kennedy, Ph.D., Assistant Scientist, Department of Virology and Immunology, Southwest Foundation for Biomedical Research, San Antonio, Texas

In response to attack by foreign invaders, or antigens, the immune system produces neutralizing (idiotype) antibodies—along with antibodies to these antibodies (so-called anti-idiotypic antibodies having the same geometric configuration as the antigens). These anti-idiotypes play a major role in regulating the immune response. Newly acquired knowledge about idiotypic/anti-idiotypic reactions opens the way to the development of novel vaccines and new treatment strategies for a host of human diseases.

**'GUINEA PIG' ECONOMICS**

John H. Kagel, Ph.D., Professor of Economics, University of Houston, Houston, Texas

Raymond C. Battalio, Ph.D., Professor of Economics, Texas A&M University, College Station, Texas

For the most part, economics has been a descriptive and theoretical science. Of late, however, researchers have been seeking to put their study of market forces and economic behavior on a sounder scientific—i.e. predictive—footing. Toward that end they have taken to conducting controlled experiments under laboratory conditions, both in humans and lab animals. Not only are these efforts breathing new life into the "dismal science," but they also have begun to produce some pragmatic results.

*6:00 p.m.*

Hospitality Suite Open.

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

#### THE NEW GOLD RUSH

Ed T. C. Spooner, Ph.D., Professor of Geology, University of Toronto,  
Toronto, Ontario, Canada

In recent years, earth scientists have significantly increased their knowledge about nature's way of manufacturing gold. That, in turn, has much to say about how—and where—gold gets deposited in and about the planet. Given the political turmoil in South Africa, which currently accounts for about 50 percent of the world's supply, this new wisdom is being put to practical test as latter-day, high-tech prospectors intensify their search for new lodes.

#### SPLITTING WATER WITH SUNLIGHT

John O'M. Bockris, D.Sc., Distinguished Professor of Chemistry,  
Texas A&M University, College Station, Texas

Fossil fuels are not forever. What then? One virtually inexhaustible, nonpolluting source is hydrogen—if some cost-efficient way could be developed to tear water molecules apart. Recent technological advances suggest that the day may be close at hand. Using solar energy alone to split water, researchers have achieved conversion efficiencies that bring hydrogen to the brink of commercial competitiveness with gasoline.



*Tuesday, November 4*  
*2:30 p.m. to 5:30 p.m.*

#### MUON-CATALYZED 'COLD' FUSION

Steven Earl Jones, Ph.D., Assistant Professor of Physics and Astronomy, Brigham Young University, Provo, Utah

In five years of intensive research, muon-catalyzed fusion has gone from being little more than a scientific curiosity to a potential means of providing clean fusion energy. It derives from an idea first proposed by Soviet physicist André Sakharov and others in the late 1940s. The novel strategy involves pelting cold hydrogen gas with subatomic particles called muons. Recent experiments have proved highly encouraging. New, more extensive trials are just about to commence.

#### WAS EINSTEIN RIGHT?

Clifford M. Will, Ph.D., Professor of Physics, McDonnell Center for Space Physics, Washington University, St. Louis, Missouri

Thus far, Einstein's theory of general relativity has passed every experimental challenge flung its way. But so central is it to our understanding of how the cosmos works that the testing game is far from over. Slated for an early '90s space-shuttle mission, for example, is the Stanford gyroscope experiment designed to measure effects predicted by theory but yet to be observed. There are also plans to develop advanced tests of the nature of gravity over very short distances to see if there's merit to recent speculation about the putative "fifth force." Its existence could affect the equivalence principle, which lies at the very core of Einstein's landmark theory.

*7:00 p.m.*

#### THE ANNUAL CASW BANQUET

Presentation of the 1986 National Association of Science Writers Science-in-Society Journalism Awards.

*Wednesday, November 5*  
*8:30 a.m. to 11:30 a.m.*

#### WHO WROTE THE BIBLE?—THE SEQUEL

Richard E. Friedman, Ph.D., Professor of Hebrew and Comparative Literature, University of California, San Diego, La Jolla, California

Five years ago at the New Horizons Briefing, the speaker drew some startling conclusions regarding the authorship of the Bible. Since then, an array of new discoveries—archeological, linguistic and literary—have been made that go a long way toward confirming his original speculations. The current corpus of knowledge includes identification by name of individuals who had a direct hand in its composition, specific details about when they lived and why they wrote what they did, and a photograph of the signature of one of the authors.

#### THE INNER UNIVERSE: QUARKS, LEPTONS AND GAUGE BOSONS

Christopher T. Hill, Ph.D., Theoretical Physics Department, Fermi National Accelerator Laboratory, Batavia, Illinois

Advances over the past decade have brought us tantalizingly close to a profound new understanding of the fundamental building blocks of nature (quarks and leptons) and the basic principle that seems to underlie all known interactions (the principle of gauge invariance). Experiments scheduled for the current generation of particle generators (e.g. the Fermi Tevatron) and the proposed Superconducting Supercollider (SSC) are expected to go a long way toward narrowing the gap in our knowledge. The challenge of incorporating gravity into this unified framework has led to the invention of a new genre of theories known as "superstrings." These theories suggest new avenues for understanding the instant of cosmic creation.



*Wednesday, November 5*  
*2:30 p.m. to 5:30 p.m.*

#### THE LARGE-SCALE STRUCTURE OF THE COSMOS

J. Richard Bond, Ph.D., Associate Professor, Canadian Institute for Theoretical Astrophysics, University of Toronto, and Associate Professor of Physics, Stanford University, Stanford, California

The dilemma, in brief, is this: Observations made within the past year suggest that there's too much structure to the universe—too much in the sense that what's now known to be there (over regions measuring thirty to hundreds of millions of light years) defies all theoretical efforts to account for it. That even applies to the recently introduced, much-heralded inflationary theory, which appeared to be doing such a splendid job of explaining how, after the Big Bang, the universe got to be the way it is. The speaker will propose some possible ways out of this vexing conundrum.

#### ULTRATHIN SEMICONDUCTORS

David A. B. Miller, Ph.D., AT&T Bell Laboratories, Holmdel, New Jersey

Fabrication technology is now so advanced that semiconductor layers only a few atoms thick can be routinely fashioned. These ultrathin structures have opened the way to study of totally new physical phenomena, such as the Nobel Prize-winning quantum Hall effect, the manufacture of the world's fastest transistors, and development of optical switching devices based on the so-called quantum-confined Stark effect. Given this sophisticated semiconductor-growing capacity, the power to make an almost unlimited number of new devices and the discovery of a variety of new effects, scientists now stand at the threshold of what looks to be yet another new era of electronic wizardry.

*7:00 p.m.*

#### SPECIAL RECEPTION

We're journeying, courtesy of Texas A&M, to Green Branch Center, a gracious retreat just a few miles outside College Station—there to sample some legendary Texas hospitality. Transportation will be provided. We'll depart from the Hilton at 6:30 p.m.



*Thursday, November 6*  
*8:30 a.m. to 11:30 a.m.*

#### NEW WINE/OLD BOTTLES

A special session designed: to put fresh perspective on scientific issues that have received heavy media play but have not panned out quite the way initial stories suggested; and to highlight new developments that appear to represent major shifts in long-prevailing scientific dogma.

#### TUMOR NECROSIS FACTOR/CACHECTIN: THE DOUBLE-EDGED PROTEIN

Anthony Cerami, Ph.D., Professor and Head, Laboratory of Medical Biochemistry, The Rockefeller University, New York, New York

With the discovery of tumor necrosis factor and the subsequent development of gene-splicing techniques to produce the protein in abundance, medical specialists thought they were on the trail of an important new treatment for cancer. Last year researchers found TNF to be identical to cachectin, a hormone released by certain white blood cells in response to bacterial infection. In sufficient quantity, cachectin can cause severe weight loss and lethal shock. As a result, there's now serious concern about its cancer-fighting future. The agent's major value may ultimately lie in helping scientists get a better handle on how the body fights off infectious diseases.

#### REGENERATING TISSUE IN THE CENTRAL NERVOUS SYSTEM

Albert J. Aguayo, M.D., Professor of Neurology, McGill University, Head, Neurosciences Unit, Montreal General Hospital, Montreal, Canada

Prevailing wisdom says that damaged neurons cannot regenerate in the brain and spinal cord. Maybe so—in the normal course of things. But through a series of ingenious stratagems, scientists are finding ways to circumvent this biological constraint. One approach plays off the fact that axons, the threadlike extensions of neurons, can regrow in peripheral nerves. The idea is to transplant the peripheral environment to the brains of experimental animals. At last report, this approach has made it possible for the severed optic nerve to regrow along the transplanted channel to the region in the brain to which it normally connects. The question now is whether function—vision—can be restored.