Forty-Third Annual Briefing NEW HORIZONS IN SCIENCE

October 23 through October 26, 2005
Omni William Penn Hotel
Pittsburgh, Pennsylvania

CASW Council for the Advancement of Science Writing, Inc.

Ben Patrusky, Executive Director, CASW

Program by:
Paul Raeburn, Program Director, CASW

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Saturday, October 22
10:00 a.m. to 5:30 p.m.

NASW ANNUAL WORKSHOPS (See NASW program for details.)

7:00 p.m. to 10:00 p.m.

NASW RECEPTION AT CARNEGIE MUSIC HALL
Buses depart Omni at 6:30 p.m.

Sunday, October 23
8:00 a.m. to 9:00 a.m.

NASW BUSINESS MEETING

9:15 a.m. to 10:45 a.m.

NASW ANNUAL WORKSHOPS (See NASW program for details.)

12:30 p.m. to 2:00 p.m.

JOINT CASW-NASW LUNCH
Pick a table with a topic of interest and have lunch with a scientist.

New Horizons in Science briefing

Sunday, October 23
2:30 p.m. to 5:30 p.m.

NEW ATTACK ON CANCER.
Wm. Kevin Kelly, D.O., Associate professor of medicine, Yale Cancer Center, Yale University, New Haven, CT

For decades, researchers have investigated how tumor genes are different from those of normal cells, to try to find that magic, vulnerable spot in the DNA at which a tumor's growth can be stopped cold. Progress has been slow, and the findings are complicated. Now researchers are trying something new. They're looking not at DNA, but at how it's transcribed into RNA and proteins in tumors. DNA is normally wound up like a ball of yarn, and it must open up to be transcribed. If researchers can interfere with that process, the reasoning goes, they can modify the harmful signals coming from the tumor cells, thus altering the growth of the tumor. Studies of substances that control the winding and unwinding of DNA have led to the discovery of a new class of anticancer agents that modify transcription. These drugs are now in advanced clinical trials, with the first results scheduled to be reported later this year. And that's only part of the story. The drugs also show promise in other diseases such as Huntington's disease, arthritis, and cardiovascular and lung disease.

THE IMMUNE SYSTEM'S NEW PLAYER
Ira Mellman, Ph.D., Professor and chairman, Department of Cell Biology, Yale University, New Haven, CT

It's probably the most important question in immunology: How does the body distinguish self from non-self? Some years ago, Ralph Steinman at Rockefeller University found a new cell he thought was essential for the immune system to recognize foreign invaders: the dendritic cell. The theory was widely dismissed, but Steinman was tenacious, and he was ultimately proved right. Before the immune system can recognize foreign proteins, those proteins must be broken down into smaller pieces—that's the job of dendritic cells. Researchers have now found that these cells are present in nearly every tissue of the body, waiting, like sentinels, for signs of trouble. New research is showing that dendritic cells help cancer tumors evade detection by the immune system, a finding that has led to the development of new cancer vaccines. Dendritic cells also play a key role in autoimmune diseases, such as lupus and arthritis, and they are the major conveyor of the AIDS virus throughout the body. If that isn't enough, research on dendritic cells is leading to new vaccines against bioterrorism threats.

6:30 p.m. to 8:30 p.m.

WELCOME RECEPTION
Carnegie Mellon's Entertainment Technology Center. Buses depart Omni at 6:15.

Monday, October 24
8:30 a.m. to 11:30 a.m.

NEURAL CONNECTIONS
Marcel Just, Ph.D., D.O. Hebb Professor of psychology, Carnegie Mellon University.

Researchers are turning their diagnostic tools on the part of the brain that often seems to play the subsidiary role—the white matter. This fatty substance does for the processing centers of the brain what modems do for computers—it connects them so they can work together. New brain imaging studies of the white matter are revealing what's connected to what, and showing what happens when communications break down. When that happens, thinking lacks coherence—separate parts of the brain do not work properly together. That's one of the characteristics of autism. Which raises intriguing questions: Could a deficiency in the white matter have something to do with autism? And what happens when we're doing two things at once, like driving and talking on a cell phone? Researchers who asked subjects to operate a driving simulator while their brains were being scanned have some interesting new answers.

COMPUTER SECURITY.
Thomas Longstaff, Ph.D., Deputy Director for Technology, CERT, Software Engineering Institute, Carnegie Mellon University.

Carnegie Mellon University is home to the CERT program, created in 1988 after the first Internet worm crawled into our computers. Since then, it has been a focal point for incident reporting, training, research, and the prediction of future risks. We will get an update on CERT's activities around the world, and learn how it is responding to changing threats and technologies. Find out about the threats facing you right now, and how these threats may reside inside your computer without your knowledge. Finally, learn how you—and your readers—can work with CERT to reduce the chances of becoming a victim of these ever-changing threats.

UNDERSTANDING AGING.
Laura J. Niedernhofer, M.D., Ph.D., Assistant professor, Department of Molecular Genetics and Biochemistry, University of Pittsburgh.

The development of cancer tumors might not seem to be closely related to normal aging. Quite the opposite: cancer cells have a kind of malevolent youthful vigor that enables them to grow indefinitely. Researchers working on the idea that cancer arises from the failure of DNA repair mechanisms tried an experiment: they knocked out a gene that was crucial in DNA repair. People missing this gene have a 200-fold increased risk of a certain kind of skin cancer. But when the researchers knocked out the gene in young mice, the mice quickly succumbed to rapid, premature aging, complete with gray hair and whiskers. The effort to understand the links between DNA repair and aging might not keep us alive forever. But it could lead to a stem-cell-based treatment able to "repair" aging. You might survive to attend New Horizons in 2099. (We make no promises.)

Monday, October 24

2:30 p.m. to 5:30 p.m.

NEW PERSPECTIVES ON ANGER.
Jennifer Lerner, Ph.D., Estella Loomis McCandless Associate Professor, Department of Social and Decision Sciences, Department of Psychology, Carnegie Mellon University.

How does anger affect judgment and decision making? How long does “negative energy” from an angry encounter linger, influencing how we behave afterwards? New studies that blend biological, cognitive, and behavioral measures of anger are upsetting many of the things we thought we knew about our emotions. Psychologists have long believed, for example, that anger is bad for us. Now, evidence suggests that in some circumstances, anger might be a useful thing—an adaptive response to a difficult situation. The research deepens our understanding of the mind more broadly, addressing fundamental questions about the interaction between emotions and thought. The presentation will include an exciting new finding that has not yet been published.

FAMILIES AND WEALTH
Dalton Conley, Professor of sociology and public policy, New York University, and director of NYU’s Center for Advanced Social Science Research.

How equitable and open is American society? What role do parenting, education and economic opportunity have in determining a child’s economic and occupational outlook? The application of rigorous scientific methods to these questions is providing unusual answers, revising thinking about the importance of birth order, sibling relationships, and even appearance. These methods have recently led to the surprising finding, for example, that being overweight has a deleterious effect on a woman’s chances of getting married, the earning power of her husband, and whether or not she will stay married. But being overweight has no effect on men’s chances of marrying successfully. The data are now being used to assess the economic and occupational consequences of such things as low birthweight or being a middle child.

VIRTUAL CELLS
Jeremy Gunawardena, Ph.D., Director, Virtual Cell Program, Department of Systems Biology, Harvard Medical School, Boston, MA

The world wide web was designed to be open and available to anyone. That allowed it to become a vast, almost-living thing that has grown in ways nobody could have foreseen. Biology is now poised for a similar revolution, building upon the increasing number of newly sequenced genomes. Much has been done to simulate cell processes and pathways on computers, but until now, nobody has found a way for biologists to swap their models, combine them, and share the knowledge. A new universal biological computer language, akin to the language that spawned the web, is about to be made freely available to anyone who wants it. While computer-simulated experiments will not replace the wet lab, dropping simulated receptors and proteins into simulated test tubes could transform and accelerate research with real test tubes.

Monday, October 24
6:30 p.m. to 9:30 p.m.

CASW ANNUAL RECEPTION AND DINNER

Presentation of the Victor Cohn Prize for Excellence in Medical Science Reporting

Featured speaker: Lawrence M. Krauss, chairman of the Department of Physics at Case Western University and author of *The Physics of Star Trek*, and the new book *Hiding in the Mirror: The Mysterious Allure of Extra Dimensions, from Plato to String Theory and Beyond*, which will be published in October.

Tuesday, October 25
8:30 a.m. to 11:30 a.m.

Buses depart the Omni for Carnegie Mellon campus at 8 a.m.

ENERGY, CLIMATE AND NUKES
Amory B. Lovins, Chief executive officer, Rocky Mountain Institute, Snowmass, CO.

In recent months, the price of oil has climbed to levels far beyond what many analysts would have predicted. Global warming is increasingly being recognized as a potentially huge threat to the economy. And recent events in Iran and North Korea have reinvigorated old fears about the dangers of nuclear proliferation. These problems are usually considered separately. But new studies suggest that it might be possible to address all three problems—oil, climate and proliferation—at once, and do so at a profit. And, as a bonus, it appears that the solution might be achievable with public policy tweaks that do not require new laws, thus bypassing potential Congressional roadblocks.

ADOLESCENT DECISION MAKING
Beatriz Luna, Ph.D., Associate professor of psychiatry and psychology, Laboratory of Neurocognitive Development, Western Psychiatric Institute and Clinic, University of Pittsburgh Medical Center.

Adolescents are prone to taking risks and making bad decisions, sometimes with tragic consequences. They are also at the age when schizophrenia, depression, bipolar disorder and substance abuse are most likely to appear. What is happening in the brain in this tumultuous period? We know the brain continues to mature during adolescence, as unnecessary neuronal connections are pruned and others are strengthened. Using eye-movement tasks that test working memory and response inhibition, researchers are uncovering, in animals and humans, the brain systems that support voluntary control of behavior—often a problem for adolescents. The studies have shown that while adolescents can show adult-like control of behavior in a

controlled environment, they work very hard to do it. Certain brain regions are overtaxed, explaining why adolescents can sometimes act like adults, but cannot do so consistently.

BRAINS AND GENES
Ahmad Hariri, Ph.D., Director, Developmental Imaging Genomics Program, Department of Psychiatry, University of Pittsburgh School of Medicine.

For years, researchers have tried to discover the genes that contribute to mental illness, with little success. And they've made even less progress in understanding how particular genetic variants affect the biology of the brain. Now researchers have the techniques in hand to answer that question. They've found, for example, that people with a genetic variation related to anxiety—not an anxiety gene—process emotional information differently compared to those without the variant, and they've already found a significant difference in a part of the brain related to fear. The work in humans—which correlates amazingly closely with work in animals—is helping to tease out the relationships between brain disorders and genetics, all with the aim of devising better treatments for these illnesses. Interestingly, it is also showing how common the genetic variations related to mental illness are. Does that mean they also serve some useful purpose?

Noon

Lunch on campus.

1:30 to 5:30 p.m.

FIELD TRIPS AND CAMPUS TOURS

Wednesday, October 26
8:30-11:30

TOXICS AND DISEASE INHERITANCE
Michael K. Skinner, Ph.D., Director and Professor, Center for Reproductive Biology, School of Molecular Biosciences, Washington State University, Pullman, WA.

Earlier this year, researchers reported that the pollutants known as endocrine disruptors have the ability to cause damage not only in those exposed to them, but in their offspring—for multiple generations. These pollutants alter so-called epigenetic processes, such as methylation of DNA, which affects gene expression. When this disruption occurs in sperm cells, the sperm can become permanently reprogrammed—passing on the defect to future generations. Further studies have led to an entirely new disease paradigm, involving such illnesses as cancer, kidney dysfunction, and autoimmune diseases. The research has implications not only for treatment of disease, but for a new understanding of evolutionary biology.

INFANT THINKING

David Rakison, D. Phil., Associate professor, Department of Psychology, Carnegie Mellon University.

One of the most important things we learn as infants is how to differentiate between living and non-living things. Learning to make this distinction is believed to be one of the crucial steps in children's development of a mental representation of the world. We'll see how experiments with weird toys—chimeras with the legs of an elephant and the "head" of a bulldozer—are helping to explain how infants begin to understand the properties of animate and inanimate objects. Another important development in early cognition is predator avoidance—an ability with obvious evolutionary implications. Why, for example, do so many people recoil at the sight of a snake or a spider, yet have no such reaction to a gun, which is far more deadly? Preliminary evidence suggests that we harbor a specific evolutionary mechanism that alerts us to the presence of dangerous animals—but not to non-threatening animals or more recent technological threats.

Contributors

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