Researchers are looking deep into the circuitry of the brain to understand how stress affects synapses and even molecules, and that may yield therapies for ills ranging from Alzheimer’s disease and alcoholism to post-traumatic stress disorder, speakers said at the annual Philip Hauge Abelson Advancing Science Seminar.

At the day-long conference, 10 prominent neurobiologists, psychologists, and genetics researchers demonstrated that the cutting-edge science of stress has moved far past the general notion that stress is a pervasive but superficial complaint. Researchers at the forefront today are pinpointing the molecular mechanisms by which stress leads to poor health.

These data will help researchers develop new drugs to treat stress-related disorders, but they also underscore stress’s importance as a risk factor for disease and a major cause of illness and death around the world, said Harvard Provost Steven E. Hyman at the close of the conference.

“We need to be really rigorous with ourselves about what the mechanisms are, because it is not easily and broadly accepted in society and by policy-makers that negative experience or stress gets internalized in a way that leaves indelible or very difficult-to-erase traces in the body that affect health,” said Hyman.

The new biology of stress suggests that not all stress is unhealthy, and the evolutionary benefits of short-term stress are clear, said keynote speaker Robert Sapolsky, the John A. and Cynthia Fry Gunn Professor of Neurology and Neurological Sciences at Stanford University. Stressful situations can prompt a surge of energy, a flood of hormones, and quick thinking—all of which probably evolved as a way to allow us to evade and outsmart our ancient predators, he said.

This stress response might be harnessed to enhance immunity during vaccination and surgery, said Firdaus Dhabhar of the Institute for Immunity, Transplantation and Infection at Stanford University. Dhabhar and colleagues have shown that the hormones produced during the stress of knee surgery can strengthen the immune response and promote recovery up to a year later.

Sapolsky’s decades-long field studies of baboon troops in Kenya illustrate the host of disorders that can occur when stress continues for a long time. The baboons “spend 3 hours a day getting the calories they need,” said Sapolsky. “That means they have 9 hours a day to be god-awful terrible to some other baboon.” Lower-ranking baboons that bear the brunt of this behavior tend to have higher blood pressure, less “good” cholesterol, lower levels of white blood cells, insulin resistance, and suppressed sperm production, his studies show.

“I think it’s important to realize that in some cases [stress] is protective, but if you push the signal too long, then it becomes deleterious,” said Richard I. Morimoto, director of the Rice Institute for Biomedical Research at Northwestern University. Morimoto discussed stress’s effects at the molecular level and its implications for neurodegenerative disorders such as Huntington’s and Alzheimer’s disease.

Many of the speakers focused on the neurochemical changes induced by stress, particularly among children. Martha J. Farah, director of the Center for Cognitive Neuroscience at the University of Pennsylvania, shared data from several studies suggesting a link between the stress of childhood poverty and diminished functioning in areas of the brain necessary for language, memory, and self-control.

The brain’s “stress axis” of hormonal response by the hypothalamic, pituitary, and adrenal glands can be altered by nurturing, at least according to rat-rearing studies. The amount of stimulation newborn rats receive can affect the sensitivity of the stress axis, said Darlene Francis, an assistant professor of neuroscience, psychology, and public health at the University of California, Berkeley. “Differences in the stress-axis may then render populations more vulnerable—or resilient—to the slings and arrows of life,” she explained.

Other researchers are looking for ways to harness the brain’s response to stress to treat diseases such as alcoholism, where some preliminary studies suggest that manipulating anti-stress hormones can relieve the symptoms of alcohol dependence, said Markus Heilig of the National Institute on Alcohol Abuse and Alcoholism.

The molecular mechanisms of how the brain creates, stores, and recalls memories might be an apt treatment target for post-traumatic stress disorder, according to several speakers.

In the future, “we might have a patient retrieve a memory, give a drug or some other manipulation that blocks the re-storage of the memory, and as a result, maybe weaken or dampen the emotional impact of that memory,” explained Joseph LeDoux, Henry and Lucy Moses Professor of Science at the Center for Neural Science at New York University.

The “Science, Stress, and Human Health” seminar was planned in honor of Philip Abelson, who served as editor of the journal Science for 22 years, and then as senior advisor to AAAS until shortly before his death, at the age of 91, in 2004. Recordings from the seminar are available at www.aaas.org/go/abelson.

—Ginger Pinholster and Becky Ham

**SCIENCE DIPLOMACY**

**Pickering: Science Can Defuse Global Conflicts**

The United States is locked in a challenging conflict with Iran over nuclear proliferation fears. Economic competition and environmental issues inject tension into the U.S.-relationship with China. Some analysts fear a sequel to the U.S.-Russia Cold War. But former U.S. Ambassador Thomas Pickering, in a talk at AAAS, suggested a common tool for addressing each conflict: science diplomacy.

Recalling the lessons of his nearly 40-year diplomatic career as ambassador to Russia, Israel, and four other countries, Pickering said that shared interests in science and technology can help the United States build a productive relationship with its strongest competitors and foes while damping the possibility of more volatile confrontations.

“If you look around the world, despite what is certainly a serious decline in U.S. … popular-
To defuse mounting tensions with Russia, Pickering recommended a strategy that has been successful in the U.S. relationship with China—building a positive agenda of cooperative efforts instead of focusing solely on negative policies. “We can sit down—as we must—and figure out those long series of questions in which we have a common interest,” he said.

When Pickering served as U.S. ambassador to India in the early 1990’s, “the one set of questions that we worked on—that was the one bright star in U.S.-India relations—was our science cooperation,” he said. “Indians still value it very highly.”

Pickering listed disarmament, nonproliferation, energy, climate change, development, health, food, water, and immigration as worldwide diplomatic issues that cannot be resolved “without good science and without the work of science.”

“In the contemporary world, science and diplomacy have to be intimately connected,” said Norman Neureiter, director of the AAAS Center for Science, Technology and Security Policy. “As Colin Powell said, ‘Diplomacy is the front line of national security.’ When the talking stops, that’s when the shooting starts. In a nuclear world, that can be really serious.”

The 7 October event was cosponsored by the AAAS Center for Science, Technology and Security Policy and the new AAAS Center for Science Diplomacy.

—Molly McElroy and Becky Ham

ETHICS

AAAS and Academies Launch Ambitious Research Integrity Site

In the wake of several prominent research scandals and a recent study suggesting that scientific misconduct often goes unreported, a new Web site from the National Academies and AAAS offers a comprehensive resource on research integrity.

Drawn from a variety of multimedia sources, the site is one of the few online portals to offer regularly updated information on misconduct and integrity across scientific disciplines.

“It’s a documentation of what the community and others are trying to do to preempt misconduct and to react to it effectively when it does occur,” said Mark S. Frankel, director of the AAAS Scientific Freedom, Responsibility and Law Program.

Topics from the use of animals in research to data sharing are explored through the site’s links to recent literature, news stories, teaching guides, conference information, and research guidelines from public and private research institutions. The site also acknowledges the “global nature of science and the worldwide search for research collaborators” by including extensive links to international materials, said Frankel.

As a resource that can be regularly updated, the site has “tremendous potential,” said Richard Bissell, executive director for policy and global affairs at the Academies’ National Research Council. “Rather than being a fixed book on the shelf, it can draw on new specific challenges in research ethics, which are often technological.”

Bissell said research scandals such as the stem cell fraud committed by South Korean scientists and data suppression by some industry-funded researchers has brought scientific misconduct into sharp relief for policy-makers and the public. In June, a survey of researchers funded by the U.S. National Institutes of Health estimated that 1000 cases of scientific misconduct go unreported each year.

One of the site’s strengths, said Frankel, is that it can serve as a hub to Web sites from government agencies and other institutions that have “case studies, role-playing exercises, syllabi, and teaching materials” specific to the issues faced by the researchers.

The site, at www.aaas.org/go/integrity, was funded in part through an endowment established by an anonymous AAAS member to promote honesty in scientific research, especially through collaboration between AAAS and the National Academies.

—Becky Ham

COMUNICATION

AAAS Names Science Journalism Awards

An ambitious series on memory and the brain, a look at whether research supports widespread use of anti-cholesterol medications, and a broadcast account of the contentious battle over intelligent design in Dover, Pennsylvania, are among the winners of the 2008 AAAS Science Journalism Awards.

Large newspaper—(Circulation >100,000): Terry McDermott, Los Angeles Times, for “Chasing Memory” (series), 19 to 22 August 2007.

Small newspaper—(Circulation <100,000): Kara Platoni, East Bay Express, for “In Search of Life” (series), 4 July and 11 July 2007.


Yoon Shin-Young of South Korea is the first international winner of the children’s award since it was introduced in 2005.

The awards, established in 1945, are sponsored by Johnson & Johnson Pharmaceutical Research & Development, L.L.C. Winners in each category will be awarded $3000 and a plaque. The winners will pick up their plaques at a reception at the AAAS Annual Meeting in Chicago in February.

—Earl Lane

2009 ELECTION

A Call for Nominations

AAAS members may suggest nominees (including themselves) for president-elect and the Board of Directors for election in the fall of 2009. For a list of this year’s candidates, see AAAS News & Notes in the 26 September 2008 issue of Science; for a list of current Board members, go to www.aaas.org/aboutaaas/organization/board.shtml.

Please send the suggested nominee’s curriculum vitae no later than 29 December to Gretchen Seiler, AAAS Executive Office, 1200 New York Avenue, N.W., Washington, DC 20005. Suggested nominees will be considered by the AAAS Committee on Nominations at their winter meeting.