

nih record



ABOVE • NIH Bicycle Commuter Club members tidy up a nearby bike path. See story on p. 12.

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NIBIB Fifth Anniversary Celebrates Innovative Interdisciplinary Research

The last astronaut to walk on the moon, a former U.S. surgeon general and a Nobel Prize winner were among those who helped NIBIB celebrate its fifth anniversary May 31 and June 1. The scientific program, "Changing the World's Health Care Through Biomedical Technologies" at Lister Hill Auditorium highlighted the critical role NIBIB



NIBIB director Dr. Roderic Pettigrew presents the NIBIB Landmark Achievement Award to M. Joan Dawson, wife of the late Dr. Paul Lauterbur.

plays in leading interdisciplinary research to develop innovative technologies that improve health care. The audience was welcomed and the day's program was introduced by the current and first NIBIB director Dr. Roderic Pettigrew.

The event began with a dinner the evening before the symposium. In opening remarks, former U.S. Surgeon General David Satcher said, "Integrating bioimaging and bioengineering will be critical to research in the future and to the new medical paradigm." Indeed, "NIBIB is at the forefront of a lot of what we must do to face the changing medical paradigm," which includes an aging population, increa-

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Dr. Joan Roughgarden takes issue with Darwin.

Up with Diversity Talk on Evolution Sheds New Light On Darwinian Theory

By Sarah Schmelling

Dr. Joan Roughgarden is so bold an evolutionary biologist, she's willing to take on Charles Darwin. "I invite you to consider the

possibility that the whole sexual selection theory should be junked, lock, stock and barrel," she said about one of the famous naturalist's tenets to an NIH audience recently. "And we should rethink sex, gender and sexuality from the ground up."

This idea may dismay some people, she conceded during her talk, part of a four-speaker lecture series on Evolution and Medicine sponsored by NIGMS. But she believes challenging the long-held theory can be viewed positive-

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Harvard's Dr. Roger Pitman at STEP forum

Brave Neuro World Forum on Neuroethics Breaks New Ground

By Belle Waring

The recent Staff Training in Extramural Program (STEP) forum, "Emerging Ethical Issues in Neuroscience Research,"

gave the crowd in Lister Hill Auditorium a chance to join in—and hash out—neuroethics history in the making.

"We are all learning about the brain, but the mind remains an enigma," said moderator Dr. Ruth Fischbach, director and cofounder of the Center for Bioethics at Columbia University.

Neuroethics is a specialty in progress—an emerging field with critical implications for clinical research and treatment, medical edu-

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The NIH Record is published biweekly at Bethesda, MD by the Editorial Operations Branch, Office of Communications and Public Liaison, for the information of employees of the National Institutes of Health, Department of Health and Human Services. The content is reprintable without permission. Pictures may be available upon request. Use of funds for printing this periodical has been approved by the director of the Office of Management and Budget through September 30, 2007.

NIH Record Office
Bldg. 31, Rm. 5B41
Phone (301) 496-2125
Fax (301) 402-1485

Web address
<http://www.nih.gov/nihrecord/>

Editor
Richard McManus
rm26q@nih.gov

Assistant Editor
Carla Garnett
cg9s@nih.gov

Staff Writers
Jan Ehrman
je48b@nih.gov

Sarah Schmelling
ss1116y@nih.gov

Belle Waring
bw174w@nih.gov

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NIH Sailing Association Open House

The NIH Sailing Association invites everyone to its open house on Saturday, July 28 from 10 a.m. to 3 p.m. at the Selby Bay Sailing Center in Mayo, Md. There will be demonstration sails for adults in the club's 19-ft. Flying Scot sailboats. Fall sailing classes begin Aug. 22; this is a good chance to preview the boats and meet the members. You can also join NIHSA, sign up for the 6-week adult sailing class, learn about club racing and check out the club's social calendar. There will also be food, drinks and beer for just \$5 per person. For directions visit www.recgov.org/sail.



NCCAM Welcomes New Council Members

Six new members joined the National Advisory Council for Complementary and Alternative Medicine in June. Gathering at the recent meeting were NCCAM acting director Dr. Ruth Kirschstein (front, l) and NCCAM deputy director Dr. Margaret Chesney (front, r) joined by (second row, from l) Dr. Lori Arviso Alvord of Dartmouth Medical School, Dr. Martin Goldrosen, acting director of NCCAM's Division of Extramural Activities and director of its Office of Scientific Review; (third row, from l) Dr. Margery Gass of the University of Cincinnati, Dr. Frank Torti of Wake Forest University School of Medicine and Dr. Stephen Barnes of the University of Alabama at Birmingham; and at rear (from l) Dr. Fabio Cominelli of the University of Virginia and Dr. Sheldon Cohen of Carnegie Mellon University.

Four Named to NEI Advisory Council

Four new members were recently named to the National Advisory Eye Council. They are:

Dr. Mae Gordon, professor, department of ophthalmology and visual sciences and the division of biostatistics, Washington University School of Medicine. She is principal investigator and director of NEI-supported clinical studies including the Ocular Hypertension Treatment Study, a clinical trial that showed the safety and efficacy of medical treatment in reducing the risk of glaucoma in ocular hypertension.

Dr. Douglas H. Johnson, professor of ophthalmology at the Mayo Clinic in Rochester, Minn. In addition, he is a clinician-scientist with an active clinical practice in glaucoma.

Dr. M. Christine McGahan, head of the department of molecular biomedical sciences at North Carolina State University. Continuously funded by NEI for 25 years, she has scientific expertise in ocular pharmacology and lens biochemistry.

Dr. Val C. Sheffield, director of the University of Iowa interdepartmental research program in human molecular genetics and director of the department of pediatrics in the division of medical genetics. He has continually received grant funding from NIH and has more than 200 publications in peer-reviewed journals.



NEI director Dr. Paul Sieving (l) welcomes new council members (from l) Dr. M. Christine McGahan, Dr. Mae Gordon and Dr. Val Sheffield.

'Felix the Helix' Introduces DNA to Elementary Students

By Maggie McGuire

The 250 five-, six- and seven-year-olds gathered in the Oyster Bilingual School cafeteria hushed in the expectation of a visitor to be introduced at their morning assembly on May 29. With an air of celebrity and accompanied by six friendly helpers, an amusing new children's character took the stage. Forty minutes later, the students celebrated their new knowledge of genetics by singing along to the *DNA Song* with Felix the Helix.

Felix is the featured performer in a National Human Genome Research Institute youth outreach performance. It debuted at the Oyster School on Calvert St., NW, after months of planning by Melissa Meredith, genetics fellow, and Hailey Edwards, a post-baccalaureate trainee with the Medical Genetics Branch's Gahl lab. The main goals of the production are to promote interest in science and to teach that all living things have DNA; this amazing molecule is the blueprint for what makes people unique and needs to be protected. Five other members of the Gahl lab joined Felix's supporting cast.

"We wanted to do something that would get children interested in science as an active topic, and I think it's important for children to learn about genetics at an early age," Meredith said.

This isn't her first time in a costume (that's her behind Felix's sunglasses). Meredith did a similar youth outreach project at the Mayo Clinic and played Henry the Hand to teach kids the importance of hand washing. When she came to NHGRI 2 years ago, she formed the idea for Felix the Helix, but the concept didn't get off the ground until Edwards joined the Gahl lab and expressed a similar interest.

The two made the costume themselves, constructing the character out of a nylon kiddie play tunnel and repurposed pool noodles.

Their labor drew giggles from the crowd as Felix lumbered onto the stage wearing his clown shoes and a big, red smile.

Angelica Garcia, another post-baccalaureate trainee, escorted Felix and translated part of the presentation into Spanish. Garcia said of DNA education for young children, "It's hard to understand, so we try to break it down into simpler terms."

In the morning's first activity, an instruction manual of DNA—with some help from the rows of children dressed in bright summer dresses



Felix the Helix (second from r, and really NHGRI's Melissa Meredith) joins a genome institute cast onstage at the Oyster Bilingual School cafeteria. The ensemble taught kids about science and DNA.

and shorts—pointed out how a person fit together (demonstrated comically by geneticist Mike Kaiser). The next interactive element brought an eager group of audience members to the stage, each holding an A, T, C or G on colored paper. Staff scientist Heidi Dorward helped participants find their buddies—A's with T's, C's with G's—to form a double-stranded DNA model. Geneticist Wendy Introne explained how the DNA folded and wound around to form a Slinky-like double helix.

In a question-and-answer activity, the young audience delivered enthusiastic, unanimous responses. Does a soccer ball have DNA? "No!" Does a flamingo have DNA? "Yes!"

The last and arguably most important lesson of the day came from geneticist Tom Markelow with his explanation of how ultraviolet rays from the sun can harm DNA—and the children's new friend Felix. Sunscreen and hats were encouraged as ways to fight off the evil UV rays.

"Even if you're a child, you can understand danger. Understanding that there is a reason for using sunscreen can help, even at a young age," Meredith said.

She and the rest of the Felix team reprised their show at Deer Park Elementary School in Centreville, Va., on June 13. With help from teacher evaluations from the Oyster Bilingual School, they honed their messages and improved their techniques. The Felix team has also been invited back to Oyster to perform in its summer program.

Alexa Barrett, an Oyster school kindergartener, got more than one thing out of her Felix experience. "I know the A goes with the T and the G goes with the C," she recited as she fingered her new bracelet, a pipe-cleaner-and-bead creation that turned color in the sun. It was a tool the Felix team handed out to illustrate that UV rays affect DNA. ●

EVOLUTION

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ly. “It means we are in a time when we can do some research that pertains to the foundational structure of evolutionary biology.”

Roughgarden, a Stanford University professor who published a widely discussed book on this subject—*Evolution’s Rainbow*, in 2004—said

she had no criticism with “the rest of Darwin,” and that “there’s just one particular topic on which I feel he is mistaken.” But because sexual selection is so tied to the way people view gender and sexuality, she said, her views are considered controversial.

“We would have hoped that by taking a scientific look at gender and sexuality, we may find some clarity to settle these troubled times,” she explained, adding that instead, the scientific community still has difficulty confronting the diversity in gender and sexuality found among animals. So in her book, and in this lecture, she made a case for a new approach.

When Darwin first developed his theory on sex roles called sexual selection in 1871, Roughgarden said, it was originally posed about a specific issue: the traits on tails of peacocks, called ornaments. But it so motivated him, he began to apply his ideas to the larger animal world. “Males of almost all animals have stronger passions than females,” Darwin wrote, while “the female...with the rarest exceptions, is less eager than the male...she is coy.” Females, he explained, also choose mates that are “well-armed and attractive,” and therefore females breed the traits that males exhibit.

This theory—of the “passionate” male and the “coy” female—still holds sway today, Roughgarden noted. Scientists have recently argued that males try to spread their genes by being promiscuous, while females, because their eggs are harder to produce and therefore more valuable, are more choosy in an effort to find genetically superior males.

The problem with this “narrative,” Roughgarden said, is that “once you start taking data from more and more species, these generalizations emerge as no longer true. There are lots of species where the males aren’t passionate and the females aren’t coy.”

Nonetheless, the theory “continues to have a life of its own, in spite of the need to revise the

empirical claims it was supposed to explain in the first place.” Now, she said, this idea that started out specifically explaining the traits of one species has extended to become “a system of evolutionary sex, gender and sexuality,” with all kinds of interconnected propositions. Because of this, testing one small piece of the theory “puts us in the position of having to take a fairly radical stance...saying you have to change the whole system from top to bottom.”

One can start to revisit the ideas behind this system by looking at the many “problematic species” for sexual selection theory, Roughgarden said. Fish, for example, are often both male and female—switching from one to the other or being both simultaneously. Other species of animals exhibit sex-role reversal. In seahorses, when eggs are cared for, this work is done by males: females, in fact, deposit their eggs into a male’s pouch making the male, in effect, pregnant. And even though the male “gamete,” the sexual reproductive cell or sperm, is much smaller than the female’s, it is the male that provides more parental investment, again contradicting ideas of sexual selection.

Another issue Roughgarden cites is the number of “templates” per sex. According to Darwin, there is one template for each sex—the passionate male and coy female. But there are many species that have multiple templates for both males and females. One seabird in Europe includes males with three different types of “ruffs” or collars and mates in different ways; females prefer to lay eggs with pairs of males with different ruffs. This means there are actually three male templates in this species.

Then there is the issue of homosexual mating. Roughgarden said there are 300 species of vertebrates in which homosexual mating is known. “This is a very clear phenomenon,” she said, explaining that, of these species, there are few generalizations that can be made. In some, just males engage in homosexual mating; in others, just females. In others, just a few animals engage in it and in still others, all animals of the species do.

All of which points to “a whole panoply of phenomenology that lies outside of the Darwinian narrative,” she said, a tip-off that there’s a “big problem” with the theory. Providing many other examples of how sexual selection is “falling apart,” Roughgarden then outlined the replacement theory she has been working on with colleagues in her lab, which they call social selection. The basic distinction between theories is that under sexual selection, behavior is considered to be a “mating system,” she said. “There-



Roughgarden outlined where her ideas diverge from Darwin’s theory of sexual selection.

fore, natural selection arises from differences in mating success. And in this narrative, females are a limiting resource for males, males compete for mating opportunities and females choose males for genes.

“Our alternative...envisions that social behavior is actually an offspring-rearing system. It’s not all about getting mates, it’s about producing young. And therefore, natural selection arises from differences in success at rearing young.”

In this theory, males and females negotiate “bargains and side-payments” with each other to maximize offspring production—as opposed to genetic quality—and to control the offspring-rearing social infrastructure. Each of the researchers in Roughgarden’s lab is working on different projects to advance data on this theory. One, for example, is trying to determine the evolutionary force leading to gametes being different sizes; another is considering “cooperative game theory,” and a third is looking at side-payments between birds that increase numbers of eggs.

Roughgarden is proud of these researchers who are “taking a lot of heat,” choosing to work on a controversial topic with risk to their careers. She concluded by urging the audience to see the new work in a positive light.

“Sexual selection theory at the moment is acting as a mental straitjacket on us...and I just hope people can appreciate that if we get away from it, we’re better off,” she said. “It’s not as if this is hurting evolution. It’s helping evolution by, first of all, making it more accurate, and also by just making it more fun because we have new ideas to think about.

“This is not something to be alarmed about,” she added. “It is really a fabulous opportunity.”



About to enjoy cake at the recent DCPD event were (from l) Dr. Karen Hofman, director, Division of Advanced Studies and Policy Analysis; DCPD senior editors Dr. Dean Jamison and Dr. Joel Breman; and Dr. Roger Glass, FIC director.

Fogarty Celebrates Success of Disease Control Project

Fogarty International Center director Dr. Roger Glass welcomed global health colleagues on June 11 to the first anniversary event, “The Disease Control Priorities Project: Implementing the Research Agenda,” at the Natcher Center.

The purpose of the meeting was to review the key messages of the DCPD and highlight its impact on health policy and programs in developing countries. DCPD’s two landmark publications—the second edition of *Disease Control Priorities in Developing Countries* (DCP2) and *Global Burden of Disease and Risk Factors*—have led to major advances in the health care system of many countries, including China, India and Mexico. These experiences were reviewed by Drs. Depei Liu, vice president, bureau of international cooperation, Chinese Academy of Engineering; Prabhat Jha, Canada research chair of health and development, University of Toronto; and Julio Frenk, senior fellow, Bill and Melinda Gates Foundation, and former minister of health, Mexico.

“This meeting was a great opportunity for FIC to enable the NIH community to learn about best buys in public health from key DCPD editors and authors. It was especially gratifying to hear how this work has already impacted major organizations and policymakers,” said Dr. Karen Hofman, director, Division of Advanced Studies and Policy Analysis, FIC.

The event concluded with discussions on how to move the DCPD research agenda forward on non-communicable chronic diseases and to inform policymaking in developing countries using evidence-based analysis.

More information about DCPD can be found at www.dcp2.org.

NIBIB ANNIVERSARY

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Pettigrew poses with special guests Dr. Charles Townes (top, r), recipient of the 1964 Nobel Prize in physics for his discovery of the laser, and with former U.S. senator and Apollo astronaut Harrison Schmitt (bottom, l). Townes was the honored speaker at the NIBIB fifth anniversary symposium held on June 1. Schmitt, the last man to have walked on the moon, spoke at the May 31 anniversary dinner.

sing diversity and growing global interconnectedness, said Satcher.

Former U.S. senator and Apollo astronaut Harrison Schmitt, the last man to have walked on the moon, gave the evening's keynote address and described the synergies between space exploration and health care research. Schmitt, who chairs the NASA advisory council, envisioned an even stronger relationship between NASA and NIH. He described the "extraordinary science legacy" of the Apollo program and emphasized the importance of continuing to build a reservoir of young scientists, engineers and other skilled workers. "We need another Sputnik generation but one not just related to space exploration," he said.

He also provided a few lessons from the Apollo program, including what he defined as "the greatest mistake after Apollo. We made a big investment of tax dollars and then walked away," he said. "We didn't amortize our investment." Future space exploration such as travel to Mars will require improved understanding of biomedical issues such as muscle atrophy, bone loss and immune system reactions. Schmitt urged more research on these and other biomedical issues because "compared to how we do medicine on Earth, we are in the dark in space."

The evening's most poignant moment came when Pettigrew presented the inaugural NIBIB Landmark Achievement Award to magnetic resonance imaging pioneer Dr. Paul Lauterbur's widow, M. Joan Dawson, who accepted the award on behalf of the Nobel laureate. Lauterbur died in March. Visibly moved, Dawson said, "This is quite a singular moment for me. Paul was very grateful he would be receiving this award. Thank you."

Emerging Technologies

The scientific program June 1 highlighted the increasing role NIBIB plays in fostering interdisciplinary research of innovative technologies. NIH director Dr. Elias Zerhouni outlined the critical role NIBIB plays in supporting emerging technologies to quantify and measure biological systems. "NIBIB is the missing piece that needed to exist to accelerate progress across biological disciplines in the 21st century," he said. He noted that NIBIB was created to provide a home for the discovery of new technologies, techniques and approaches to solve major challenges in the health care system.

Establishing NIBIB was not easy; both the bioengineering and biomedical imaging communities struggled to gain congressional approval for formation of the institute. Some of the key players who

worked to establish the institute—Drs. C. Douglas Maynard of Wake Forest University School of Medicine, Shu Chien of the University of California, San Diego, Stanley Baum of the University of Pennsylvania School of Medicine and Robert Nerem of Georgia Institute of Technology—provided some of the history of NIBIB's creation. In addition, a few of NIBIB's unique achievements were highlighted, including the introduction of innovative programs such as the Clinical Resident Research Supplement Awards, the Quantum Projects Initiative and the Nagy New Investigator Awards.

To celebrate Lauterbur's achievements, Dr. Waldo Hinshaw, an MRI pioneer and an early colleague of his, related the key role that Lauterbur played in creating the technology. Hinshaw described him as both a conductor and mentor and noted that he was adept at gathering people to work on the new technology and fostering fellowship among them. Lauterbur understood the importance of blurring the boundaries between disciplines as evidenced by the title of his 2003 Nobel lecture, "All Science Is Interdisciplinary—From Magnetic Moments to Molecules to Men." "He was very good at convincing people that this was a technology that warranted attention," Hinshaw said.

Institute of Medicine president Dr. Harvey Fineberg praised NIBIB's swift start: "This institute has launched in such a remarkable way and opened up avenues for research that really didn't exist." After describing the "health care predicament" that includes a failure to insure all Americans, rising costs of care, deficient quality and safety and workforce shortages, Fineberg noted that "NIBIB has every opportunity to make a huge difference in these areas and to resolve these needs."

Pursuing New Ideas Despite Opposition

Reinforcing the importance of pursuing basic research and promoting novel approaches, Dr. Charles Townes, 1964 Nobel Prize winner for physics, described the path he took to develop the maser and its more famous offspring, the laser. "Really new ideas are resisted by the experts," he said. "You must convince people that basic research is a good investment."

As he refined the theory behind the laser, Townes was told repeatedly he was wasting money and should drop the project. Convinced his idea would work, he continued his research and was rewarded when graduate student James Gordon alerted him that the maser was working. Physics colleagues such as Nobel Laureates Niels Bohr and John von Neumann didn't believe Townes was on the right track, though von Neumann finally acknowledged that a working maser was

possible. Even when Townes collaborated with his brother-in-law Arthur Schalow, a researcher at AT&T Bell Laboratories who thought the lab would benefit from the patent, AT&T patent lawyers initially balked because they doubted light could be useful for communications. Townes and Schalow wrote the patent themselves, noting how an optical maser could be used in communications; a patent was granted on behalf of Bell Labs in 1960.

“There was no basic new idea in the maser. All the physics was known before. You have to bring ideas together in the right way,” Townes said. He described different lasers and their uses and said he had not foreseen biomedical applications.

Displaying his own creativity and inventiveness, Dr. Ralph Weissleder, director of the Center for Molecular Imaging Research, Harvard Medical School, gave attendees a look into the future of personalized medicine. Referring to NIBIB as the “clock that makes our lab tick,” he discussed an emerging optical imaging technique that uses near-infrared light to detect early lung cancers in animals. Because of its high spatial resolution and detection sensitivity, the technique “will have tremendous implications for biomedical research,” said Weissleder.

In another technique, multiple biological processes are imaged simultaneously using nanoplateforms with multiple channels. Weissleder and his group have created a nuclear magnetic resonance “lab on a chip. We can multiplex and phenotype rare cells in real time,” he said. “In less than a minute we can profile blood.” The chip will be able to test for cancer and diabetes and has the potential to be left in tumor beds, providing feedback on therapeutics.

A key challenge facing researchers in regenerative medicine is the inability to expand cells outside the body. Inadequate biomaterials and blood supplies have made it all but impossible to grow viable cells and cell networks.

Over the last 5 years, Dr. Anthony Atala, director of the Institute for Regenerative Medicine, Wake Forest University School of Medicine, has pioneered new methods to successfully grow cells outside the body. This work shows great promise for treating a wide array of disorders. His group has engineered many tissue types and some organs, including tracheas, vaginas and bladders. Atala emphasized that his lab’s success is a result of a multidisciplinary approach that encompasses the work of some 400 researchers over 18 years.

Interdisciplinary Success

Successful endeavors in medicine and biology often benefit from input from other disciplines.

Discussing the training of young scientists, Rensselaer Polytechnic Institute President Shirley Ann Jackson noted that NIBIB provides the critical linkage of the physical sciences with the biological sciences and highlights the promise of interdisciplinary work. She challenged the audience to “think more broadly about what interdisciplinary research means” and stressed the need to develop modeling techniques to study living systems in real time. “We are a long way from being able to model living systems. It will take intellects of many in different fields” to achieve this, she said.

A panel of four young investigators described their paths to their current positions and noted the importance of NIBIB in filling the gap created by the closing of the Whitaker Foundation. “NIBIB stepped in and saved us from financial ruin,” panelist Dr. Joe Tien of Boston University explained, adding that “NIBIB is more willing to fund high-risk work than other sources of research support.”

Work across disciplines has meant great progress for NIBIB’s first grantees, Drs. James Duncan and Dennis Spencer of Yale University. Their team approach, which combines physics, engineering and clinical applications, has improved epilepsy surgery outcomes. In addition, their work has created new techniques to map the brain’s electrical network during surgery and to investigate brain structure, function and biochemistry.

Establishing NIBIB Was Not an Easy Accomplishment

The birth of NIBIB, like many births, was not swift. In the late 1960s, a bill was introduced in Congress to establish a National Institute of Biomedical Engineering, but it went nowhere. The imaging research community lacked a unified voice and an advocacy group. In 1978, the conjoint committee on diagnostic radiology promoted an increase in federal funding for radiological research. “This was the first effort at lobbying by the academic radiological community,” said Dr. Stanley Baum, University of Pennsylvania School of Medicine. The group was the forerunner of the Academy of Radiology Research (ARR), an alliance of 22 professional societies in radiology and imaging. ARR was started in 1995 to increase support for imaging research and work toward establishing a new institute at NIH.

The mid- to late-1990s was a fertile time for cultivating support for an NIH institute dedicated to bioengineering and bioimaging. Then National Cancer Institute director Dr. Richard Klausner was interested in imaging and wanted to explore how it could make an impact on research. Baum and past ARR president Dr. C. Douglas Maynard contacted Dr. Elias Zerhouni and other members of ARR who, along with a group of engineers and scientists, developed a white paper on *in vivo* molecular and cellular imaging for Klausner. In addition, a congressionally requested study of bioengineering research at NIH led to formation of the Bioengineering Consortium (BECON). The consortium provided a focus for bioengineering at NIH and helped prepare the future of this emerging area.

The final year of the Clinton administration was pivotal in NIBIB’s creation. Now strong and speaking with a single voice, the bioengineering community, through ARR and the American Institute for Medical and Biological Engineering (AIMBE), intensified their efforts. Through letter-writing campaigns, face-to-face meetings with House and Senate members and testimony on the Hill, they were able to get both chambers to pass a bill creating NIBIB by the end of 2000. The President signed the bill into law on Dec. 29, 2000. The transition to a fully operational institute would take another year. NIBIB received its first budget appropriation in February 2002.

The tenacity of several individuals meant success in the quest for an institute dedicated to biomedical imaging and bioengineering. Former ARR Executive Director Edward Nagy, who died unexpectedly in 2006, “was the driving force,” in getting NIBIB established, said Baum. Other individuals who played integral roles in the establishment of NIBIB were Maynard, Baum, Drs. Shu Chien, Robert Nerem, Charles Putnam, Nick Bryan and Leonard Holman. “We wouldn’t be here if it weren’t for the role of the giants who preceded us,” noted AIMBE president and National Academy of Engineering member Dr. John Watson.



NEUROETHICS

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Participants in the recent STEP forum on neuroethics included Dr. Laurie Zoloth (l) and Dr. Judy Illes.

cation and human rights. The field is so new that scholars and scientists are still working out a definition, variously cited as a brain-based philosophy; a discipline that queries the social issues of disease; and a bioethical subspecialty confronting new technology.

Neuroethics, said Fischbach, encounters several burgeoning fields at once: psychopharmacology; brain imaging; regenerative neurology, including stem cell therapy; brain/computer interfaces such as robotics; neurogenetics; and deep brain stimulation (DBS), which uses electrodes to stimulate brain tissue.

Consider two patients, both treated with DBS. The first, with Parkinson's disease, showed remarkable improvement. The second, with depression, became suicidal until the electrodes were adjusted by a mere tenth of a centimeter. Luckily, it did the trick. But what if it hadn't?

Any treatment can be risky, with unintended consequences, and when the locus of therapy is the brain, said Fischbach, we must be circumspect: "It's not what you *can* do; it's what you *should* do." She continued: "We may have to reign in the technological imperative"—the notion that technology has a life of its own, and that whatever can be done therefore must be done. This is where neuroethics can, and should, break new ground and establish new guidelines, "especially to protect vulnerable patients," said Fischbach.

Panelists tackled four distinct, contentious topics. The first speaker, Dr. Laurie Zoloth of Northwestern University, posed the central questions that neuroscience shares with philosophy: How are we human? Do we have free will? What is our responsibility to one another?

These questions, so intrinsic to our being, reflect the need for policy regulations, Zoloth said. Some interventions can alter the self, so

for consent to be informed, we will need to ask, "Which 'self' is consenting?" We need to ask about the question of justice: could neurotechnologies make certain injustices in the health care system worse by allowing enhancement for some and not for others? And what of religious issues? Neuroscience touches on "the nature of the soul" and on the question of moral choice and free will. Are moral gestures for good or evil choices just neuronal firings?

"Bioethics begins after the Holocaust, at the trials in Nuremberg, when life-and-death decisions about human worth were based merely on biological characteristics," explained Zoloth, "and we thus fear the idea that biology determines the worth of the self. Such an idea could be carried wholesale into neuroscience." Could neurologically applied technologies be used to undermine our resistance to evil? Could they be used for war, by a techno-state? If the brain is reduced to a parts list, can we put it back together?

Stanford's Dr. Judy Illes, exploring the intersection of neuroimaging with ethical behavior, called her approach "very pragmatic," and, given that the Neuroethics Society was formed only a year ago, urged an early and complete integration of ethics into neuroscience.

"Are we scholars or reformers? Both," Illes said. She cautioned against nonclinical applications such as functional imaging (fMRI) used in lie detection, and warned of products hawked to parents fearful that their children aren't excelling in school. Such commercial uses create tension between the academy and industry: "We really are in a brave neuro world and we need to pay attention," she said. The culture of imaging has changed, since "there is meteoric growth. The press tracks the growth. And the press is not as cautious as we'd like in statements like 'the brain can't lie' and 'brain scans reveal how you think.'"

She described how, after the Virginia Tech rampage, a reporter asked her: "Why didn't somebody use fMRI to detect brain pathology in this killer?" Illes continued: "Clearly, this technology is not ready for that type of application, but in the public image it is, and I got the sense from the reporter that we had failed her. It was important to defuse that, and I think that is one of our obligations as we move forward."

Harvard Medical School's Dr. Roger Pitman described his own brush with the media concerning his work with post-traumatic stress disorder (PTSD) patients. He was surprised, he said, at how his research was characterized. "The science is preliminary," he stressed. "We

aren't even sure it will be used. I wish we had 5 percent of the power the press says we have."

Pitman used the drug propranolol "as a secondary [PTSD] preventive measure" on 41 subjects who had experienced serious trauma. The question was whether the drug, given within 6 hours of the precipitating incidents, would prevent debilitating memories.

After 3 months, those who'd received it had significantly less physiological evidence of PTSD than the control subjects, who had gotten placebos.

"Yes, it does open ethical issues," said Pitman, "but it is not going to wipe out memory so that soldiers can go out and kill civilians." It doesn't cause amnesia, he emphasized; rather, it blocks stress hormones from potentiating memories. He also described ongoing studies using propranolol that showed the drug weakening the conditioned fear response, with a greater effect in females than in males.

During Q&A, Pitman said that many institutional review boards had looked at whether harm was done by making patients relive the trauma, since certain studies used scripts reprising the original events. "The great majority of patients do better," he said, although about 1 percent do worse.

The last speaker, the University of Pennsylvania's Dr. Jonathan Moreno, promoted the interrelation of national security with neuroscience. "I'm a DARPA booster because I'm a realist," said Moreno, who has written extensively about the Defense Advanced Research Projects Agency, the main research and development arm of the Department of Defense. He outlined the CIA's post-WWII use of LSD in human subjects and other "PsiOps"; DARPA studies using honeybees to detect explosives; as well as efforts to keep soldiers alert for more than 4 hours in combat situations. Citing NIMH studies on using drugs such as modafinil as amphetamine alternatives, he said, "Just saying no to DARPA funding is not the right answer."

Other questions tackled issues of interrogation, cognitive enhancement and how to prevent brain-mapping data being used in self-incrimination. Nobody, it seemed, wanted to wake up inside *The Matrix*.

Philosopher Zoloth brought it all home: "Decisions that used to be medical matters are now matters for Congress to debate. This is a profound change: now all science is political science." ■



Before and after photos tell the story: At left, Carlton Smith in January; at right, in June he won 1st place in a men's novice heavyweight competition.

OER's Smith Loses Weight, Reaps Big Rewards

By Anita Greene

At 316 pounds with approximately 50 percent body fat in January 2007, Carlton Smith faced a harsh reality. A task leader for program and grants management in the NIH Office of Extramural Research, he realized that if he didn't do something about his weight, he would need to begin prescription drugs to ward off several medical problems. Instead, he decided on a natural approach to take charge of his health: lose weight and exercise on a regular basis.

After about 2 months, results began to show. Smith, however, needed additional motivation to continue. For the first time in his life, he decided to enter a bodybuilding competition. On June 9, he competed in the 2007 National Physique Committee Natural East Coast Tournament of Champions Bodybuilding and Figure Competition. The event was held at the University of the District of Columbia.

Transformation Begins

Although Smith had competed in weightlifting competitions over the years, bodybuilding contests were something he considered but never actually pursued. His regimen to prepare for the competition consisted of rigorous cardio and weight training in the gym for no less than 4 hours daily, 6 to 7 days a week, and a high-protein/low-calorie diet averaging about 1,800 calories.

Training for the contest proved to be just the boost Smith needed to transform his body and improve his health. He used the preparation to stay focused on losing weight and achieving a long-term goal. By the date of the contest, Smith's weight had gone from 316 pounds to his competitive weight of 238, which put him in the heavyweight class. Most important, his body fat index went from 50 percent to between 10 and 12 percent.

Reaping Results

Smith won 1st place in the men's novice heavyweight competition and was up for the 1st place-overall award in the category until his body started to cramp, preventing him from taking the stage for the competition's final pose.

"Despite the results, I feel like a winner in every category of the competition and in my life," Smith said. "I managed to lose a lot of weight and drastically reduce my health risks while competing in something that has been a dream of mine for a long time. I just celebrated my daughter's elementary school graduation a few days after the competition, and believe it or not, I feel younger than her right now. I committed to something important and made life-changing results. I feel like I am 10 years old again."

Easy on the Eyes

Here's some food for thought or, actually, for vision. Omega-3 polyunsaturated fatty acids—found in fish—have been shown to protect against the development and progression of retinopathy, a deterioration of the retina, in mice.



A dish of fish contains omega-3 polyunsaturated fatty acids, which have been shown to protect against the development and progression of retinopathy in mice.

Appearing in the July issue of *Nature Medicine*, the study including this finding was a collaborative effort by researchers from several groups, including NEI and NIAAA. They said the results—which showed that mice with higher amounts of omega-3 had a nearly 50-percent decrease in retinopathy—are important because they help support findings from a number of human studies on diet and retinal disease. They also identify low-cost and widely available nutrient-based treatment approaches that may

aid future research on diseases that damage retinal blood vessels and nerve cells. These findings could also help physicians treat babies with retinopathy of prematurity, an eye disease of prematurely born infants.

Estrogen Therapy and Calcium Plaque

Recent results from a sub-study of the Women's Health Initiative (WHI), which is sponsored by NHLBI, show that younger postmenopausal women who take estrogen-alone hormone therapy have significantly less buildup of calcium plaque in their arteries—considered a marker for future risk of coronary artery disease—compared to their peers who didn't take hormone therapy. Published in a June issue of the *New England Journal of Medicine*, the results can offer some reassurance to women who have had a hysterectomy and would like to use hormone therapy on a short-term basis to ease menopausal symptoms. However, Dr. Elizabeth Nabel, director of NHLBI, stressed that these findings don't alter current recommendations that when using hormone therapy for such symptoms, it should only be taken at the smallest dose and for the shortest time possible.

Hormones and Autism

According to an NICHD-funded study, boys with autism and autism spectrum disorder had higher levels of growth hormones in comparison to boys who do not have autism. The researchers, whose findings were published online in *Clinical Endocrinology*, say the higher hormone levels might explain the greater head circumference seen in many children with autism. Earlier studies have shown that many children with autism have very rapid head growth early in life, leading to proportionately larger head circumference than children who do not have autism. They also reported that future studies could investigate whether the higher levels of growth hormones seen in children with autism could be directly related to development of the condition itself.

The Surgical Option

A new study supported by NIAMS shows that surgery provides significantly better results than non-surgical alternatives for degenerative spondyloisthesis with spinal stenosis. This condition, in which cartilage breakdown between the vertebrae of the spine causes one vertebra to slip over another below, often leads to low-back pain and affects 6 times as many women as men. Published in May in the *New England Journal of Medicine*, the research should be of interest to physicians, who generally advise non-surgical options before resorting to surgery. Researchers say this study, part of a 5-year Spine Patients Outcomes Research Trial, will help physicians and patients make more informed choices when faced with decisions over the treatment of back conditions.

Skill-Building Leads to Protection

Participating in a brief skill-building program on practices for reducing exposure to sexually transmitted diseases and HIV not only improved the self-reported protective behaviors of a group of inner-city black women for up to 1 year, but also decreased their risk of acquiring an STD. This comes from a study in the June issue of the *American Journal of Public Health* conducted as part of "Sister to Sister: The Black Women's Health Project," funded by NINR. The report showed that in a 12-month follow-up after the nurse-led interventions, women who participated in a behavioral skill-building program—as opposed to an information-only intervention—reported a higher proportion of condom use during sexual intercourse over the previous 3 months and, compared to a control group, were less likely to test positive for an STD. —compiled by Sarah Schmelling



The phone numbers for further information about the studies below are 1-866-444-2214 (TTY 1-866-411-1010) unless otherwise noted.

ADHD Genetics Study

Take part in an NIH study seeking to identify the genes that contribute to ADHD (attention deficit hyperactivity disorder).

Muscular Leg Pain?

If it is caused by blocked arteries and it occurs with activity but improves with rest, call NIH for more information on a new study.

Have Enlarged Gums?

Do you have enlarged gums and are you taking dilantin, cyclosporine or calcium channel-blockers? Take part in an NIH study.

HIV+ Volunteers Needed

HIV+ volunteers off anti-HIV medications, CD4+ count 300 or greater, needed for research study at NIH. Compensation is provided.

Adults with Neurofibromatosis

Adults with neurofibromatosis type 1 are asked to consider participating in NIH studies. All study-related tests are provided at no cost.

Do You Have Ankylosing Spondylitis?

Consider volunteering for an NIH research study. Compensation is provided.

Panic Disorder Treatment Study

The anxiety disorders research lab at American University seeks individuals who experience panic attacks to participate in a 7-week psychotherapy treatment study. Participants must be 18 or older and have experienced panic symptoms for more than 1 month. The initial assessment to determine qualification may take 1-3 hours. Qualified volunteers may be eligible for compensation. For more information call (202) 885-1729.

Neck Pain Study Needs Volunteers

Are you a healthy individual with or without neck pain? If you are between the ages of 18 and 65, you may be eligible to participate in an NIH neck pain study and receive a comprehensive cervical musculoskeletal examination without compensation. This is a 3-month natural history study, not a treatment study. For more information, email neckpainstudy@gmail.com or call (301) 496-4733. Refer to study 02-CC-0245.



NIAAA director Dr. Ting-Kai Li (r) welcomes four new members to the institute's council. Shown are (from l) Dr. R. Adron Harris, Dr. Peter M. Monti, Dr. Cindy L. Ehlers and Arthur T. Dean.

Four Appointed to NIAAA Council

Four new members were recently named to the National Advisory Council on Alcohol Abuse and Alcoholism. They are:

Arthur T. Dean, chairman and CEO of Community Anti-Drug Coalitions of America (CADCA). In his role at CADCA, Dean has responsibilities for providing strategic direction, diversifying and increasing funding, leading the board of directors and overseeing operations and personnel.

Dr. Cindy L. Ehlers, associate professor of neuropharmacology at Scripps Research Institute in La Jolla, Calif. She is a leading researcher in the study of genes that influence alcohol dependence, with a focus on investigating protective and risk factors in Native Americans and other minorities.

Dr. R. Adron Harris, director of the Waggoner Center for Alcohol and Addiction Research at the University of Texas. A distinguished alcohol researcher, he is scientific director for studies on the neurobiology of excessive alcohol consumption within the multi-center Integrative Neuroscience Initiative on Alcoholism supported by NIAAA.

Dr. Peter Monti, professor of medical sciences and director of the Center for Alcohol and Addiction Studies at Brown University. He is also a senior career research scientist for the Department of Veterans Affairs.

NIH Gets Bike to Work Day Award; Bike Club Does Trail Maintenance

Officials from the Metropolitan Washington Council of Governments and the Washington Area Bicyclists Association on June 25 honored NIH Bicycle Commuter Club members with the award for regional employer with the highest employee Bike to Work Day participation.

NIH had 324 employees, contractors and volunteers who registered at one of three Bike to Work Day pit stops: Bldg. 1, Rockledge and Executive Blvd. Many other NIH'ers attended other WABA pit stops and identified NIH as their employer during registration. NIHBC's awards are on display in the NIH Fitness Center.

Several members of the club also devoted the evening of June 15 to their first trail maintenance work date of the summer. Starting at the intersection of Beach Drive and Cedar Lane, the group pruned overgrowth and shoveled mud to clean up the sidewalk over Rock Creek, the path under the Beltway and the paved path that winds behind the Elmhirst Park neighborhood and reconnects with Cedar just before Rockville Pike.

Since many NIH employees use the area, the club hopes to adopt the section of road and trail to formalize its efforts to protect and maintain clean, safe and pleasant cycling venues.

NIHBC will hold more work dates in areas near campus one Friday each month through the fall: July 20, Aug. 17, Sept. 21 and Oct. 19.



Above:

Frequent summer rains flood the Cedar Lane path with debris and mud, which can leave less pavement accessible for cyclists, pedestrians and joggers. NIMH's Ellen Condon and NCI's Bill DeGraff shovel mud back to the edge of the path.

Right:

Condon uses a power saw to trim plants overhanging a Cedar Lane bike path.

Below:

NIH Bicycle Commuter Club President Angela Atwood-Moore (c) recently accepted an award from the Washington Area Bicyclist Association for NIH's participation in Bike to Work Day. Joining her are (from l) Glen Harrison, safety education and program coordinator for WABA; Nicholas Ramfos, director of Commuter Connections at the metro Council of Governments (COG); Travis Covington, COG intern; and Douglas Franklin, COG marketing specialist. Ramfos said COG is "very proud" to present NIH with the award; Harrison noted that WABA "appreciates NIH's support and enthusiasm" for bike commuting.

PHOTOS: MICHAEL SPENCER

