

Google Wants to Do What?

BY RICH MCMANUS

Does it comfort you to know that it took countless hours of human ingenuity and expertise for the Google search engine to return hundreds of thousands of hits for your query about “best digital pens” in only 30-80 milliseconds?

The audience that turned out recently in Lipsett Amphitheater for the first talk in a new series on data science may have needed a search engine simply to decode the language of guest speaker Dr. Andrew Moore, dean of the School of Computer Science at Carnegie Mellon University.

He spoke of planet scale data systems, entity stores, decorated entities, fact

stores, knowledge graphs, the ingestion of unstructured facts and the “architecturing” of big systems. It was a relief to hear him say, “We always need a human-in-the-loop to make sure the system isn’t screwing up or hallucinating.”

Moore, who may be presiding over the most esteemed computer science faculty in the United States, is also an émigré from Google; he once served as vice president of engineering at Google Pittsburgh, where he was responsible for the retail segment.

He came to NIH to learn how best to harness burgeoning mountains of medical data so that the public may one day be able to use search engines to get useful information about their health.

In computer parlance, that’s known as query-to-result. “I foresee being able to ask medical questions on behalf of ourselves, our friends and our families,” said Moore.

SEE **MOORE**, PAGE 4



Dr. Andrew Moore explores challenges of applying Big Data to health.



Hero dog, hero people. CFC 2015 starts, p. 12.

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‘Feds Feed Families’ Program Exceeds Goal

During the 3-month Feds Feed Families campaign, which ended Oct. 2, NIH staff donated 26,315 pounds of nonperishable food. This exceeded the goal of 20,000 pounds by more than 30 percent.

This is the 5th year NIH has participated in Feds Feed Families, the government-wide food drive designed to provide food to local communities during the summer months. Each year, under Office of Research Services leadership, the program has increased its donation collection to benefit local people in need.

The program has become an NIH community operation. This year, each IC named a representative. In addition, NHGRI, OHR, NIDA and the Clinical Center co-sponsored the campaign, with each group hosting “Fill the Truck” events and helping to promote the program NIH-wide.

NIH outposts outside of Maryland

SEE **FFF CAMPAIGN**, PAGE 6



NICHD 5K Highlights Infant Mortality Research

BY MEREDITH DALY

A crisp, sunny day greeted more than 160 NIH fresh-air enthusiasts Oct. 15 for NICHD’s 6th annual 5K, aimed at highlighting research into infant mortality. Some came to run, more walked and one faithful

SEE **FOOTRACE**, PAGE 8

Credit Union Offers Visa Cards Supporting NIH Charities

The NIH Federal Credit Union is offering a new line of Visa credit cards that allow cardholders to choose the option of redeeming their points to make donations to the NIH charities—the Children's Inn, Friends of Patients at the NIH and Special Love/Camp Fantastic.

There are 5 new cards available, all with no annual fee and other benefits, including a rewards program in which Signature Rewards cardholders can redeem points for cash back, travel, merchandise and discounted gift cards.



"We are excited to launch our new cards with all their money-

saving features," said Steven Levin, NIHFCU's vice president of marketing & business development. "Signature cardholders will also like the sleek DNA design that these cards feature. And, of course, we are delighted to provide support of the NIH Charities through the rewards redemption program and hope to explore other ways to assist these causes through the card program in the future."

Rick Wieczorek, NIHFCU's president & CEO said, "We are thrilled to bring our new card program to the NIH workforce and the local biomedical community. There's a card option for everyone, including unique terms for NIH fellows, making it easier for them to establish credit here in the U.S."

The new credit cards are the first of several new products and services NIHFCU plans to announce through the coming year. To learn more about the new cards and special introductory offers, visit nihfcu.org/CreditCards.

Use or Donate Reminder

Don't forget to officially schedule your "use or donate" annual leave no later than Saturday, Nov. 28.

If you don't plan to use your excess annual leave balance, you should consider a donation to others in need of paid leave. Employees have two options for donating leave to colleagues who have exhausted their own leave and have a medical emergency that prevents them from working.

Consider making a donation through the NIH Leave Bank or to a participant of the Voluntary Leave Transfer Program. Both of these donations can be made in the Integrated Time and Attendance System.

If you or your supervisor have questions about "use or donate" leave, contact your administrative officer.



NCI's Dr. Amy Subar runs, bikes and swims to an age-group triathlon championship.

Subar Places First in Triathlon World Championships

NCI's Dr. Amy Subar recently won a gold medal in the sport of triathlon for women ages 60-64 at the 2015 International Triathlon Union World Triathlon Grand Final and World Championships in Chicago. She completed the 1,500-meter swim, 40-kilometer bike race and 10-kilometer run event in 2:35:32 and achieved a personal best in all three events.

Subar, a program director in NCI's Division of Cancer Control and Population Sciences and an expert in dietary assessment, has been running since she was 18. Since turning 50, she has completed one triathlon a year. Subar started training for the 2015 World Championships in January 2014 with a coach. In August 2014, she qualified at the USA Triathlon Nationals and earned a spot on Team USA to compete in the 2015 World Championships.

Nominees Sought for NIH Safety Award

The NIH "Mission First, Safety Always" Award, presented by the Office of Research Services, Division of Occupational Health and Safety, showcases personnel who have demonstrated leadership, innovation and involvement in their organization's safety culture and promoted safety in the workplace.

Nominate a colleague who has demonstrated safety leadership, with practical examples in two or more of the following areas:

- ♦ Leadership attributes that set the nominee apart from his or her peers
- ♦ Starting and/or leading a safety initiative
- ♦ Engaging peers and transforming the safety culture of the organization
- ♦ Promoting safety as an important part of your program
- ♦ Working to correct unsafe or unhealthful workplace conditions or hazards.

Submit nominations by visiting the DOHS web site at <http://go.usa.gov/XPJW>. Nominations are open until Dec. 18. If you have questions, email ORSSafetyDay@mail.nih.gov or send written questions to DOHS, Bldg. 13, Rm. 3K04, MSC 5760.

NIH Holds Safe Workplaces Photo Contest

The 2015 NIH "In Focus! Safe Workplaces for All" Photo Contest, presented by the Office of Research Services, Division of Occupational Health and Safety, challenges anyone with a passion for photography to capture an image of workplace safety and health.

Winners' photos will be shared with the NIH community through ORS safety publications, pamphlets and posters. First, second and third place photographs will be framed and displayed outside the ORS director's office and featured on the DOHS web site. The winners will also receive recognition and a framed certificate from NIH leadership.

Submit your photographs by visiting the DOHS web site at <http://go.usa.gov/XEzY>.

The contest is open until Dec. 18. If you have questions, email ORSSafetyDay@mail.nih.gov or send written questions to DOHS, Bldg. 13, Rm. 3K04, MSC 5760.

NIH Supports Three 2015 Nobel Laureates

NIH funding has supported three of the 2015 Nobel Prizes, two in chemistry and one for the economic sciences prize.

Two of the three scientists who shared the chemistry prize are long-time grantees—Dr. Paul Modrich of Howard Hughes Medical Institute and Duke University School of Medicine and Dr. Aziz Sancar of the University of North Carolina at Chapel Hill. The prize honored the mapping, at a molecular level, of how cells repair damaged DNA and safeguard genetic information.

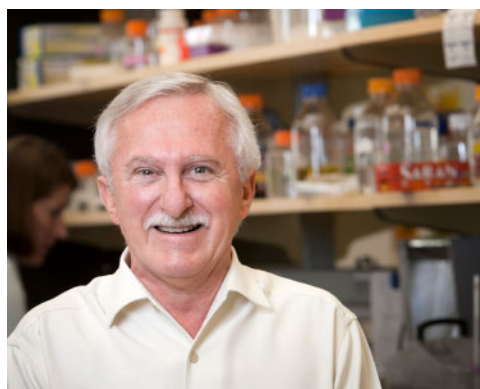
The Royal Swedish Academy of Sciences said the laureates' work on DNA repair "has provided fundamental knowledge of how a living cell functions." The third chemistry laureate is Dr. Tomas Lindahl of the Francis Crick Institute and Clare Hall Laboratory, Hertfordshire, U.K.

Thousands of spontaneous changes to a cell's genome occur on a daily basis. Additionally, radiation, free radicals and carcinogenic substances can also damage DNA. To keep the information in the genetic instruction book from degrading, a range of molecular systems monitors and repairs DNA, using processes the three scientists helped map out.

"This basic understanding about cell function has led to the discovery of the causes of genetic conditions associated with cancer and is being used to develop new cancer treatments," said NIH director Dr. Francis Collins. "NIH is proud to have supported this work."

The National Institute of General Medical Sciences has supported Sancar's work since 1982 and has continuously supported Modrich's work since 1972. Sancar has also received support from the National Institute of Environmental Health Sciences, while the National Cancer Institute has also funded Modrich.

The prize in economics went to National Institute on Aging grantee Dr. Angus Deaton of Princeton University. His research has focused on measuring poverty among the elderly in the U.S., the influence of income and inequality on health and mortality in high, middle and low income countries, as



The 2015 Nobel laureates whose work has been funded by NIH are (from top) Dr. Angus Deaton of Princeton University; Dr. Paul Modrich of Duke University; and Dr. Aziz Sancar of the University of North Carolina at Chapel Hill. NIH has now funded a total of 148 Nobel prize winners.

PHOTOS (FROM TOP): DENISE APPLEWHITE, PRINCETON; DUKE UNIVERSITY; MAX ENGLUND, UNC SCHOOL OF MEDICINE

well as the role of work in the decline of health at older ages.

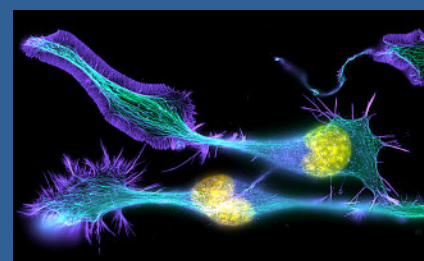
His more recent funded work focused on the measurement of subjective well-being, a self-reported quality of life index. Deaton has examined the impact of the financial crisis on well-being in the U.S. as well as how subjective measures of well-being vary

across people in different societal groups and in different countries. His research has been published in high-profile medical and economics journals such as *PNAS*, *The Lancet* and the *American Economic Review*.

"The National Institute on Aging is proud to have supported Dr. Deaton's work for more than 20 years," said NIA director Dr. Richard Hodes. "His work has examined how circumstances including income inequality and early childhood nutrition influence health and subjective well-being across the life course in the United States and around the world."

Deaton has also received support from the Fogarty International Center.

The 2015 prizes bring the total number of Nobel laureates supported by NIH, either intramurally or extramurally, to 148. **R**



ON THE COVER: Developing mouse nerve cells have a nucleus (yellow) surrounded by a cell body, with long extensions called axons and thin branching structures called dendrites.

IMAGE: TORSTEN WITTMANN, UCSF

The NIH Record

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The *NIH Record* is recyclable as office white paper.

NIH National Institutes of Health
Turning Discovery Into Health

“That’s what I’m most excited about.

“Thousands of human years of expertise have gone into optimizing search engines,” he said. The effort has relied on many inputs, including “taking advantage of the wisdom of crowds,” with a goal of better results pages.

Moore is not one of those people who quake at Moore’s (no relation) law—computer processors double in complexity about every 2 years—fearing that one day computers will be smarter than people. But he is able to explain to you quite clearly why that ad for a Gibson electric guitar keeps following you from page to page as you surf the Internet. And why two different people who plug in the exact same search terms on their PCs get different results.

People who use the web generate “click streams”—billions of data points that provide a context for their next search. There are machines out there that learn your tastes, because as a web cruiser, that’s all you’re

★ ★ ★

“What is edible underwear? Is it clothing or food?”

—DR. ANDREW MOORE

★ ★ ★

doing—leaving hints. Advertisers, such as music stores, gobble that evidence up.

But Moore thinks the world needs more than sophisticated ads, so he is now in academia, where a data scientist is free to wonder, “What is edible underwear? Is it clothing or food?” That’s an example of the need for a human in the loop, he said, and number 5 on his Top 5 topics in 21st century computing.

“The world is going to throw you all kinds of ambiguity,” he said, noting that the market for pet Halloween costumes now tops \$100 million a year. “The challenge of ontology creation is that you can’t be static.”

Data scientists are fond of the term stack, and Moore’s “top of the stack” may explain why he visited NIH: “You cannot do data science in its own right. Some kind of action is needed, such as providing data that will influence clinical practice.”



Moore says he is not concerned, at least for the next 100 years, about the possibility of downloadable human consciousness, as depicted in films such as *Transcendence*. He thinks computers are incredibly non-smart compared with humans in general, with respect to adaptability, ability to survive and improvise in real life. “But they are vastly smarter than us in specific areas like arithmetic, chess and scheduling.”

PHOTOS: ERNIE BRANSON

Moore says the world is veering away from desktop query. “The end is in sight for that kind of use of the Internet,” he said. “We like handheld devices...There is a huge bet being made on the company side, where question-answering is crucial.” Apple’s Siri and Microsoft’s Cortana are examples of this trend. People will begin to use their devices to negotiate on their behalf, he predicted.

Moore said there is widespread academic work internationally in his field as applied to public health, and offered several examples.

A data scientist at the University of Pittsburgh has taken advantage of breakthroughs in the science of parsing facial expressions, he reported, which can yield a measure of predictability in peoples’ social affect. Imagine tracking a college population for signs of depression—you could get a snapshot of campus mood by monitoring the sound of laughter, or speed of students’ movement, all of which is predictive, Moore said.

Another researcher is mapping the eye movements of new readers to determine the origins of cognition.

But whether the field is health or the Amazon.com warehouse, the basic computing building block is the entity, or named entity, which becomes a node in a knowledge graph encompassing any concept from business, science, administration, entertainment—any topic.


“There is a massive hierarchy of them, and they are all interrelated,” Moore said.

Valiant efforts have been made to build global entity stores, which must be somewhat like the challenges faced by the first makers of dictionaries. Success stories include GIS, or geographic information systems, which are massive accumulations of fact that may one day be capable of guiding driverless cars; UMLS (Unified Medical Language System) codes, pioneered at NIH; Cyc, an enormous accumulation of facts cataloging everyday items; Freebase, which

Moore said is used in-house at Amazon; and Schema.org, which he said is the largest and most successful tagging solution for structured data.

“All of these, along with Facebook, Twitter and Yelp, are trying to become repositories of known human fact,” Moore said.

He finished his talk with warnings about a possible dystopian future in which there would be stock, single answers to questions, or massive invasions of privacy if people divulge too much personal information.

But overall, Moore seemed to be a good human to have in the loop as the future bears down on us; you can see for yourself at <http://videocast.nih.gov/summary.asp?Live=17064&bhpc=1>. 

NINR Study Needs Cancer Survivors

NINR seeks people who completed radiation therapy for cancer to participate in a study. Some people have persistent clinically significant fatigue after receiving radiation therapy. Researchers want to test whether the medication ketamine can reduce this fatigue. Study procedures take place at the Clinical Center. Study-related tests and medication are provided at no cost. Travel costs will be reimbursed in accordance with NIH guidelines. For more information, call the Office of Patient Recruitment, 1-866-444-2214 (TTY 1-866-411-1010). Refer to study 15-NR-0037.

Murray To Present Latest 'Global Burden of Disease' Findings

The Fogarty International Center will host a presentation on Wednesday, Nov. 18 by Dr. Christopher J.L. Murray, who leads the Global Burden of Disease research project, the largest and most comprehensive effort to date to measure and visualize health trends worldwide. His talk, "New Insights from the Global Burden of Disease 2013 Study," will be held at 11 a.m. in Masur Auditorium, Bldg. 10.



Dr. Christopher Murray

PHOTO: IHME


Murray will discuss the latest findings from the Global Burden of Diseases, Injuries and Risk Factors Study (GBD), focusing on four papers recently published in *The Lancet*. Key points are related to child and adult mortality; communicable,

maternal, neonatal and nutritional disorders; non-communicable diseases; injuries and risk factors.

GBD 2013 expands the methodology, datasets and tools used in the prior update, GBD 2010, which Murray addressed during an NIH visit 2 years ago.

A physician and economist, Murray is a professor of global health and director of the Institute for Health Metrics and Evaluation (IHME) at the University of Washington. He is a founder of the Global Burden of Disease, which he describes as a systematic, scientific effort to quantify the comparative magnitude of health loss due to diseases, injuries and risk factors by age, sex, geography and over time. GBD is a collaboration that involves more than 1,000 researchers in over 100 countries assembling the world's data.

The IHME aims to provide the most accurate and comprehensive population health information to create a strong foundation for strategic decision-making. In addition to collecting data, IHME develops methods to understand it and trains the next generation of data scientists.

For more information, visit <http://bit.ly/MurrayLecture2015>. 

UNTIL JAN. 2016

CC Exhibit Showcases Decorated Lunch Bags

BY ERIC BOCK

For years, Dr. Bob Weisberg ate lunch with a group of his fellow scientists every Thursday. He unpacked each of his lunches from a brown paper bag, which his wife, Judy, had decorated to spur conversations beyond science. The bags commemorated milestones such as anniversaries, birthdays and holidays and marked important events, or depicted pigs—their favorite animal. After removing his lunch, he passed the bag around the table for everyone to see.

A sampling of the bags is now on display on the 5th floor of the Clinical Center. The exhibit, titled "Lunch Bags from My Heart: Memoirs of a Marriage," features 14 decorated sacks.

Weisberg was an "NIH lifer," according to his wife. He headed the section on microbial genetics in NICHD's Laboratory of Molecular Genetics. Although he retired in 2008, he continued to work as a scientist emeritus at NCI's Laboratory of Molecular Biology until his death in 2011.

Judy realized that scientists love to talk about science, but she also believed that a break to consider other matters would enliven their lunchtime.

So she sent her decorated bags to the lab with her husband so he and his colleagues could talk about something other than work. She had started years earlier, with her children's lunch bags. When they outgrew her decorations, she switched to her husband's lunch bags. She personalized each one with newspaper clippings, cartoons or notes and stickers.

She did this, however, on one condition: that Bob tell her what the group had talked about at lunch. And each day, he brought the used bag home and recounted the lunch table conversation.

Dr. Susan Gottesman, co-chief of the Laboratory of Molecular Biology, regularly ate with Bob after Lambda Lunch seminar series meetings (a prokaryotic interest group). She said the bags were "entertaining and fun to look at"—a high point of her week.

The exhibit almost didn't happen. Years ago, Judy didn't know what to do with all the bags that had piled up over time. She thought she'd burn them in the fireplace. At the last minute, the Weisbergs' daughter Eve persuaded Judy to rescue them.

After suffering a back injury, Judy decided to make a memoir of her years with Bob, featuring the saved lunch bags. While she recovered, she scanned every bag on a computer—418 in all. The result was a 700-page book depicting the bags, front and back.

At first, Judy thought she'd share her work only with friends and family. However, one of her neighbors, an artist, suggested that she display some representative bags at the Penn Place Gallery in Garrett Park, the town where she lives.

After a successful run there, the exhibit can now be seen until January 2016 at the Clinical Center. The venue has special meaning for Judy, because it was here in 1969 that Bob had his first NIH job. She is honored to share a glimpse of her family tradition, in hopes that it will provide some pleasant diversion for patients and staff.





Katrina Matten has incorporated a bike service to gather donations for the Feds Feed Families campaign at NIAID's Rocky Mountain Laboratories. Matten, Biosurety Program manager at RML, has coordinated the campaign since 2011 and collected more than 3,500 pounds of food, including an RML-record of 1,000 pounds this year. Donations from RML go to food banks in Hamilton and Darby, Mont.

FFF Campaign

CONTINUED FROM PAGE 1

enthusiastically took part in the campaign, as well. NIDDK in Arizona participated for the first time this year. NIEHS in North Carolina, led by Monya Brace, donated 3,830 pounds, and Rocky Mountain Labs (RML) in Montana collected more than it ever has—1,700 pounds. RML coordina-

loaned space to store all donations before they were wrapped and weighed by ORF staff in the Clinical Center.

Several new features were introduced this year. The program web site was updated to function as a one-stop shop listing events and box locations. In addition, ORS and Eurest Dining Services worked together to develop the “NIH Fighting Hunger Voucher Program” at select cafeterias. Patrons of

• • •

*“This has been a spectacular year for NIH’s participation...
I could not have asked for better camaraderie.”*

—TIM TOSTEN

• • •

tor Katrina Matten even used a bicycle to collect items on campus and biked them to the food bank.

Friendly competition was also the name of the game this year. NHGRI in Bldg. 31 challenged staff to “Fill the Director’s Conference Room” and stuffed three donation boxes in a just a few weeks. NIAMS staff at 6701 Democracy collected more than 2,000 items by organizing a competition between floors.

OALM staff provided the means of collecting all donations on the Bethesda campus and other leased facilities in Maryland. Woodrow “Spike” Harrison and Terrance Coates collected all items in those locations, which totaled over 10,000 pounds. NIMH

the cafeterias were generous and donated a total of \$3,528 toward the purchase of 5,000 pounds of food.

“This has been a spectacular year for NIH’s participation in the Feds Feed Families Program,” said Tim Tosten, associate director for program and employee services, ORS, whose office led the effort. “I could not have asked for better camaraderie and partnerships across the NIH. We were able to help hundreds of families through our generous donations, many of whom will be staying at the Safra Family Lodge and the Children’s Inn at NIH. Thanks again to all who participated and we look forward to continued success in 2016.”—Corey Welcher **R**

Update for Campus Bird Watchers, Enthusiasts

No one keeps a more watchful eye on campus flora and fauna than Lynn Mueller, landscape architect with the Office of Research Facilities. Here is his latest report from the field:

Unfortunately, 2015 was another disappointment in attracting bluebirds to nest on the campus. Just about every trail had some early spring nesting activity, but the birds, for whatever reason, were unable to follow through and successfully lay eggs. We had about a dozen bluebird nest starts. Moving many of the boxes late last spring did lower the number of invasive sparrows but did not entirely keep them away.



Once again we had a high number of house wrens—an estimated 99 fledglings. Chickadee numbers were down slightly to 18 fledged. Our greatest success was with tree swallows, who have been replacing bluebirds. We had a good estimate of 58 young tree swallows that flew away. Our highest density of tree swallows was around the stormwater pond behind the National Library of Medicine. Every house was occupied with swallows or chickadees. The plastic purple martin house was replaced with a standard aluminum house and another colony of martins moved in during the first week of April. The first house was re-occupied with 8 of the 12 apartments used. An unknown number of young from both houses left for Central America in late July.

We had one mysterious incident in June when the house along the bike path had a railing bent and a young bird killed. We had to lower the house and remove the dead bird. All others seemed to be okay. Maybe a hawk did it?

As NIH’ers know, the purpose of the 106 bluebird houses is to attract insect-eating songbirds to help control campus insect pests. Since we started the trails in 2001, we have nearly eliminated all insecticide spraying. We only sprayed some holly inside the Clinical Research Center courtyards with horticultural oil for spider mites back in July. We had another year of not having to spray any insecticides other than those few holly.

The purple martins and tree swallows cleaned up the mosquitoes at the pond. Our campus has become well-balanced with birds and beneficial insects taking out the “bad” bugs.

Last fall, we spread thousands of milkweed seeds over many of our open no-mow meadows. Some germinated this spring; maybe next year we’ll have some nice, mature patches to attract Monarch and other butterflies. You may have seen some of the signs ORF put up—“Monarch Butterfly Sanctuary” and “Pollinator Meadow.” Only a few Monarchs were seen on campus this summer, so that number can certainly improve. **R**

Study in Mice Shows How Brain Ignores Distractions

In a study of mice, scientists discovered that a brain region called the thalamus may be critical for filtering out distractions. The study, published in *Nature* and partially funded by NIH, paves the way to understanding how defects in the thalamus might underlie symptoms seen in patients with autism, attention deficit hyperactivity disorder and schizophrenia.

"We are constantly bombarded by information from our surroundings," said Dr. James Gnadt, program director at the National Institute of Neurological Disorders and Stroke. "This study shows how the circuits of the brain might decide which sensations to pay attention to." Thirty years ago, Dr. Francis Crick proposed that the thalamus "shines a light" on regions of the cortex, which readies them for the task at hand, leaving the rest of the brain's circuits to idle in darkness.

"We typically use a very small percentage of incoming sensory stimuli to guide our behavior, but in many neurological disorders the brain is overloaded," said Dr. Michael Halassa, the study's senior author and an assistant professor at New York University's Langone Medical Center. "It gets a lot of sensory input that is not well-controlled because this filtering function might be broken."

Researchers Identify Potential Alternative to CRISPR-Cas Genome Editing Tools

An international team of CRISPR-Cas researchers has identified three new naturally occurring systems that show potential for genome editing. The discovery and characterization of these systems is expected to further expand the genome editing toolbox, opening new avenues for biomedical research. The research, published Oct. 22 in the journal *Molecular Cell*, was supported in part by NIH.

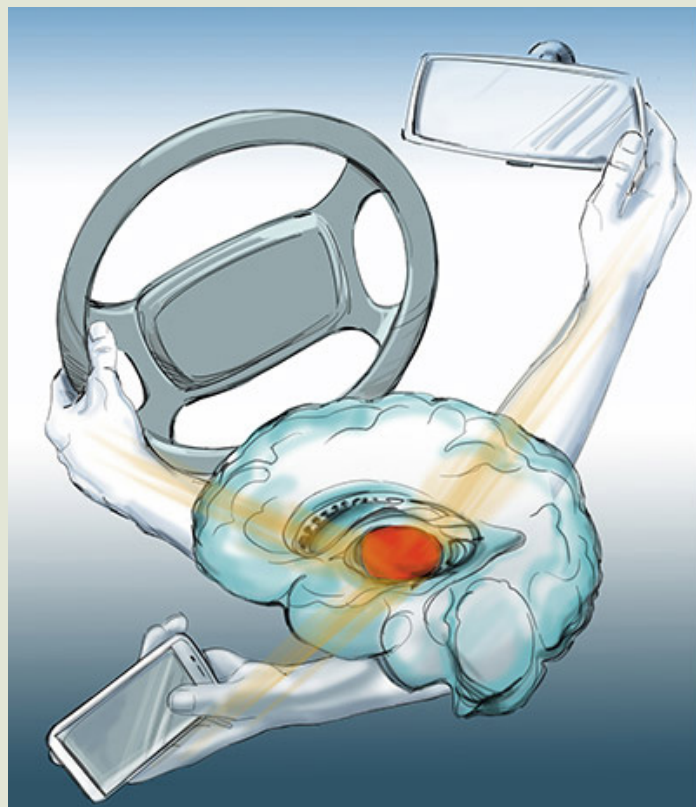
"This work shows a path to discovery of novel CRISPR-Cas systems with diverse properties, which are demonstrated here in direct experiments," said Dr. Eugene Koonin, senior investigator at the National Center for Biotechnology Information, National Library of Medicine. "The most remarkable aspect of the story is how evolution has achieved a broad repertoire of biological activities, a feat we can take advantage of for new genome manipulation tools."

Enzymes from the CRISPR system are revolutionizing the field of genomics, allowing researchers to target specific regions of the genome and edit DNA at precise locations. "CRISPR" stands for clustered regularly interspaced short palindromic repeats, which are key components of a system used by bacteria to defend against invading viruses. Cas9—one of the enzymes produced by the CRISPR system—binds to the DNA in a highly sequence-specific manner and cuts it, allowing precise manipulation of a region of DNA. Enzymes such as Cas9 provide researchers with a gene-editing tool that is faster, less expensive and more precise than previously developed methods.

The three newly characterized systems share some features with Cas9 and Cpf1, a recently characterized CRISPR enzyme, but have unique properties that could potentially be exploited for novel genome editing applications. This study highlights the diversity of CRISPR systems, which can be leveraged to develop more efficient, effective and precise ways to edit DNA.

Prevalence of Marijuana Use Among U.S. Adults Doubles Over Past Decade

The percentage of Americans who reported using marijuana in the past year more than doubled between 2001-2002 and 2012-2013, and the increase in marijuana use disorder during that time was nearly as large. Past year marijuana use rose from 4.1 percent to 9.5 percent of the U.S.



The brain's attentional spotlight: Scientists mapped out the brain circuitry that helps mice focus.

IMAGE: DR. MICHAEL HALASSA, NEW YORK UNIVERSITY LANGONE MEDICAL CENTER

adult population, while the prevalence of marijuana use disorder rose from 1.5 percent to 2.9 percent, according to national surveys conducted by the National Institute on Alcohol Abuse and Alcoholism.

"Based on the results of our surveys, marijuana use in the United States has risen rapidly over the past decade, with about 3 in 10 people who use marijuana meeting the criteria for addiction. Given these increases, it is important that the scientific community convey information to the public about the potential harms," said NIAAA director Dr. George Koob.

Data about marijuana use was collected as part of NIAAA's National Epidemiologic Survey on Alcohol and Related Conditions, a series of the largest epidemiological surveys of their kind. In total, 79,000 people were interviewed on alcohol use, drug use and related psychiatric conditions during the 2001-2002 and 2012-2013 surveys.

The analysis appeared in the Oct. 21 issue of the *Journal of the American Medical Association Psychiatry* and was led by Dr. Bridget Grant of NIAAA's Laboratory of Epidemiology and Biometry.

The marked increase in marijuana use and marijuana use disorder shown in the study is a significant change from prior results. Earlier NIAAA research found that marijuana use remained stable at about 4 percent of the U.S. population between 1991-1992 and 2001-2002, while abuse and dependence rose from 1.2 percent to 1.5 percent.

Based on the current study, approximately 30 percent of people who used marijuana in the past year met criteria for marijuana use disorder during 2012-2013.

Footrace

CONTINUED FROM PAGE 1

“roller,” NICHD’s Rodney Rivera, pulled his two youngest daughters in a wagon.

Dr. Tonse Raju, chief of NICHD’s Pregnancy and Perinatology Research Branch, was ready to walk in his Cubs baseball cap. The event not only facilitates exercise among NIH staff, he said, it also generates goodwill about a key component of NICHD’s mission.

“Infant mortality is the pulse of a nation,” Raju said. “There is a huge disparity between African-American babies who are twice as likely to die as white babies.”

While scientists know the statistics, more public awareness benefits everyone, he said. “Healthy habits, exercise, promoting breastfeeding and safe infant sleep practices advance public health and [educate] us all as a society.”

Dr. Della Hann, associate director for extramural research at NICHD, fired up participants on the lawn outside Bldg. 1: “NICHD is strongly committed to research around infant mortality,” she said. “We all want babies and their families to thrive.”

Hann thanked the many supporters, especially those from outside NIH. There was a group of runners from the American Congress of Obstetricians and Gynecologists (ACOG) and the Society for Maternal Fetal Medicine. The National



The winner of the 5K run was Dan Konzman, a post-bac researcher at NHGRI. He was training for the Marine Corps Marathon.

PHOTOS: MARTÍN CASTILLO

For Quoc Arcomona, a network manager at NICHD, the run was a warm-up, one of many he did to prepare for the Marine Corps Marathon Oct. 25. He ran the marathon as part of a fundraiser for the Children’s Inn at NIH.

“He does 5Ks for breakfast,” teased his colleague Laura Bowers. Arcomona, Bowers and Carl Ryan Tucker, all contrac-

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“This is a great way to stay fit and active and show our support for the NIH mission.”

—RACHEL GANDELL TETLOW

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Healthy Start Association provided information at the event.

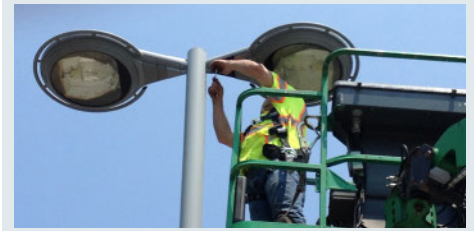
“This is a great way to stay fit and active and show our support for the NIH mission,” said Rachel Gandell Tetlow of ACOG, who also is chair of the Friends of NICHD.

Deborah Ngan and Nicole Spears, both scientific program analysts with NCATS, were running their first 5K. “I like that it raises awareness about infant mortality and brings the NIH community together,” Ngan said.

tors with Occam Solutions, which provides IT support to NICHD, were among the early birds to finish, after a loop around the perimeter of NIH.

The first runner back was Dan Konzman, a post-bac researcher with NHGRI, who also was training for the Marine Corps Marathon. He completed the course in under 21 minutes.

“This was a significant run for me since it was the first 5K I have ever won,” he said. “In fact, it’s the first race I’ve ever won.” **R**



Campus To Benefit from New LED Outdoor Lighting

There are nearly 1,400 outdoor lighting fixtures on the NIH campus.

Properly illuminating the campus can be a time-consuming venture when you consider that there are 20 different types of fixtures, many old (shown above) and not providing adequate or uniform lighting. Add the expense of constantly repairing and maintaining these inefficient, outdated fixtures and replacing old wiring and it was clear that NIH needed to make a major change.

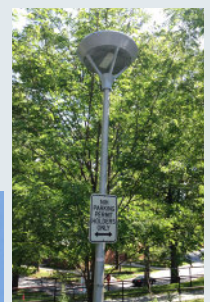
The Office of Research Facilities, Division of Facilities Stewardship, Electrical and Energy Branches came up with a plan to improve the situation. Just like the transformation happening in homes around the world, ORF is introducing new light-emitting diode (LED) technologies and designs (shown below), allowing NIH to improve lighting efficiency and uniformity across campus.

The project uses an energy savings performance contract offered by a local utility company. Working with lighting designers and other ORF staff, the group designed and specified new LED fixtures to replace all street, parking lot and pathway lighting.

The new fixtures use between 30 and 70 percent less electricity individually, with the entire system being 40 percent more efficient. Walking or driving around campus, you will notice the difference. Street lighting levels have more uniformity for better visual aesthetics and pedestrian safety. Walk and pathway lighting has been superseded by lighting with no wasted upward light, minimized glare and increased energy efficiency.

On an annual basis, the project is estimated to save NIH some \$68,000 in electricity costs, \$66,000 in operation & maintenance savings and earn \$68,485 in utility rebates for energy efficiency. The project is 75 percent complete and is expected to be finished before the end of the year.

LED fixtures that are more reliable, energy efficient and aesthetically pleasing, yet offering tremendous cost savings to NIH—an enlightening idea.





NCATS director Dr. Christopher Austin (l) and NINDS director Dr. Walter Koroshetz are 2015 NAM members.

IC Directors Named to NAM

An NIH institute director and center director are among 70 new members elected to the National Academy of Medicine, formerly the Institute of Medicine. Dr. Christopher Austin, director of the National Center for Advancing Translational Sciences, and Dr. Walter Koroshetz, director of the National Institute of Neurological Disorders and Stroke, were named new NAM members Oct. 19.

Election to the academy is considered one of the highest honors in the fields of health and medicine and recognizes individuals who have demonstrated outstanding professional achievement and commitment to service. The new members were named at the inaugural annual meeting at the National Academy of Medicine and the 45th year since the establishment of the Institute of Medicine.

“Our newly elected members represent the brightest, most influential and passionate people in health, science and medicine in our nation and internationally,” said NAM president Dr. Victor Dzau. “They are at the top of their fields and are committed to service.”

NAM works alongside the National Academy of Sciences and National Academy of Engineering to provide independent, objective analysis and advice to the nation and conduct other activities to solve complex problems and inform public policy decisions.

NIMHD’s Maddox Retires

BY GERDA GALLOP-GOODMAN

At age 5, Dr. Yvonne Maddox knew she wanted to be a doctor. Although she had no idea what they did, she knew doctors were respected and revered. A series of life events led her down a path of medical research rather than clinical medicine, but the little girl’s dream came true—she became a cardiovascular physiologist.

Recently, Maddox retired from NIH after nearly 30 years of distinguished service, having earned the respect and admiration of her colleagues along the way.

She has no plans to slow down or take it easy,

however. She recently became vice president for research at the Uniformed Services University of the Health Sciences. In addition, she is an NIH collaborating scientist, maintaining a campus office as part of her ongoing effort to advance research by developing partnerships between NIH, Walter Reed National Military Medical Center and USUHS.

“Yvonne made so many contributions to NIH during her tenure, I’ve lost count,” said NIH director Dr. Francis Collins. “She always brought tremendous energy, insight and commitment to every challenge she took on. We miss her dearly and I’m glad she’s only across the street.”

With a Ph.D. in physiology from Georgetown University, Maddox came to NIH in 1985 as an NIGMS health science administrator and soon after was named chief, physiological sciences section.

She served in many NIH leadership positions over the years. In April 2014, Maddox was appointed acting NIMHD director following Dr. John Ruffin’s retirement. Before that, she was NICHD deputy director (1995-2014). She also served as acting NIH deputy director from January 2000 to June 2002 and co-chaired the first NIH Strategic Plan to Reduce and Ultimately Eliminate Health Disparities.

Among numerous accomplishments at NIMHD, Maddox conceptualized a scientific planning process in collaboration with other institutes and centers to define a vision that will guide development of the science of health disparities research.

“Yvonne provided steady leadership for the institute at a critically important time,” said Dr. Joyce Hunter, NIMHD deputy director. “I know that she will bring much enthusiasm and passion to her new career and I wish her much success.”

On behalf of NIMHD, she fostered collaborations with such organizations as the American College of Surgeons and the National Hispanic Medical Association. Maddox convened an American Indian/Alaska Native Research Forum—the first of its kind at NIH—to provide researchers an opportunity to highlight studies and share challenges in

conducting culturally appropriate health research within American Indian/Alaska Native communities.

“What Dr. Maddox has done over more than four decades has transformed our thinking about the need to eliminate health disparities and to focus on the production of scientists from all backgrounds,” said Dr. Freeman Hrabowski, III, president, University of Maryland, Baltimore County. “Most important, she represents one of the best examples of inclusive excellence that America has produced.”

During her 19 years as NICHD deputy director, Maddox also served as acting director of the National Center for Medical Rehabilitation Research and director of the Division of Extramural Research.

“Few people have served NIH in so many ways, or as selflessly, as Yvonne Maddox,” said former NICHD director Dr. Alan Guttmacher. “Whether as program officer at NIGMS, longtime deputy director of NICHD, acting deputy director of NIH, or acting director of NIMHD, Yvonne used her intelligence, incredible interpersonal skills and indefatigability to move forward missions for which her passion was both obvious and infectious.”

In addition, Maddox led a number of federal and international efforts to improve maternal and child health, including the NICHD Safe to Sleep campaign, the federal SIDS/sudden unexpected infant death working group and the NIH Down Syndrome Consortium.

As a 2013 recipient of the NIH Director’s Award for mentoring, Maddox highly valued mentorship and often credited mentors as vital to her own career advancement. This includes everyone from school teachers who saw her potential early to the late Dr. Ruth Kirschstein, who helped recruit Maddox to NIH and took her under her wing when Kirschstein was NIGMS director.

Maddox received many honors and awards, including both the Presidential Distinguished and Meritorious Executive Rank Awards and the HHS Secretary’s Award. She also is an inductee in medicine to the Historical Black College and Universities Hall of Fame and a recipient of the American Academy of Physical Medicine and Rehabilitation Distinguished Public Service Award and the Alpha Kappa Alpha Sorority Flame Award. Recently, she received the 2014 National Caucus on Arthritis and Musculoskeletal Health Disparities’ Vanguard Award for Scientific Leadership in Health Disparities.

“Dr. Maddox always rose to the top ranks of leadership in any organization fortunate to have her commitment,” said former NICHD director Dr. Duane Alexander. “Fulfilling all her leadership roles required long work days, usually beginning at 5 a.m. and frequently not ending until 9 p.m., when she would return from her long commute from NIH to her home in Upper Marlboro, where she lives with her husband Charles and raised their son Jonathan. Dr. Maddox had a huge and beneficial influence on NIH, its science, programs and people and we wish her well as she takes her remarkable capabilities to the USUHS.”



Dr. Yvonne Maddox (l), shown in 2003 with longtime mentor Dr. Ruth Kirschstein

PAISED FOR OPENNESS

Rockey Bids Farewell to NIH, Begins New Venture

BY MANJU SUBRAMANYA

The trademark ladybug toys that filled her corner office in Bldg. 1 are gone. So is Dr. Sally Rocky, the Ohio State University entomologist who rose to become NIH deputy director for extramural research. She left to take a new position Sept. 14.

But not without leaving a trail of goodwill and respect—garnered over her 10-year tenure at NIH—from outside scientists conducting NIH-funded research.

“As deputy director for extramural research during a very difficult era, she was the voice of an underfunded agency speaking to a research community desperate for funding,” said Dr. Howard Garrison, public affairs director at the Federation of American Societies for Experimental Biology (FASEB). “She kept us informed of good news and bad and actively sought feedback from the community NIH serves.”

In that role and as director of the NIH Office of Extramural Research (OER), Rocky was responsible for setting and implementing grants policy, ensuring compliance and integrity, managing the electronic processing of grant applications—in essence, steering NIH’s research grant portfolio. With over 80 percent of NIH’s \$30.3 billion annual budget going towards funding medical research

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“Sally has been stellar in every possible way,” but her enduring legacy will be “the unprecedented transparency she brought to the whole process. Rock Talk revolutionized the way people looked at OER.”

—DR. LAWRENCE TABAK

...

worldwide through grants, OER and Rocky carried a huge responsibility.

“Under Rocky’s leadership, OER has become a phenomenally open organization. She communicates personally through her blog, often anticipating issues and sometimes reacting to it,” Garrison said of Rocky’s *Rock Talk* blog, which he described as a must-read for scientists, administrators and policy people. “It is marvelous. In my 20 years at FASEB, I haven’t experienced anything like this.”

Dr. Lawrence Tabak, NIH principal deputy director, noted that “Sally has been stellar in every possible way,” but her enduring legacy will be “the unprecedented transparency she brought to the whole process.”

“*Rock Talk* revolutionized the way people looked at OER,” Tabak said. “It [peeled back the curtain and] taught NIH it is okay to do that.



Dr. Sally Rocky accepts the gift of an electric guitar from NIH director Dr. Francis Collins at her retirement party Sept. 16 in Natcher Bldg.

PHOTO: BILL BRANSON

“She is very creative, engaging, highly intelligent and able to engage people at all levels,” he said. “Her departure is an enormous loss for NIH.”

Rocky came to NIH in 2005, becoming OER’s acting director in late 2008. Just months into her tenure, the American Recovery and Reinvestment Act swept into NIH like a tidal wave, bringing tons of money on its crest but also demanding a skillful

few minorities in the sciences. Solutions include broadening training experiences for graduate students, higher stipends for postdoctoral researchers and a better system to gather data on NIH-funded trainees.

Rocky’s passion for biology came from her mother, who loved the outdoors. Armed with a Ph.D., Rocky joined the Department of Agriculture and soon led its extramural research competitive program.

Despite a demanding career, Rocky has always found time to play bridge, attend a book club and sing herself hoarse at Bruce Springsteen concerts (nearly 60 and counting).

“She is one of the few people who can weave in the Redskins, the Ravens, Bruce Springsteen and effort-reporting into a single conversation,” Bonham said.

After nearly 30 years in government, Rocky is headed to the Foundation for Food & Agriculture Research in

Washington, D.C., as its first executive director. The nonprofit aims to bring together private and public support for innovative agricultural research.

Any parting advice?

“My successor has to be very attuned to the issues happening at the ICs and the extramural community and think about the end results of the policies we develop,” she said. “That outward look is very important.

“Leaving is bittersweet,” Rocky concluded. “I am proud of OER and all we have done for NIH and our biomedical research community. Everyone here works very hard and is dedicated to the idea of public service, as I am. I have so enjoyed working with [NIH director Dr.] Francis [Collins] and Larry and had a great time in leadership.

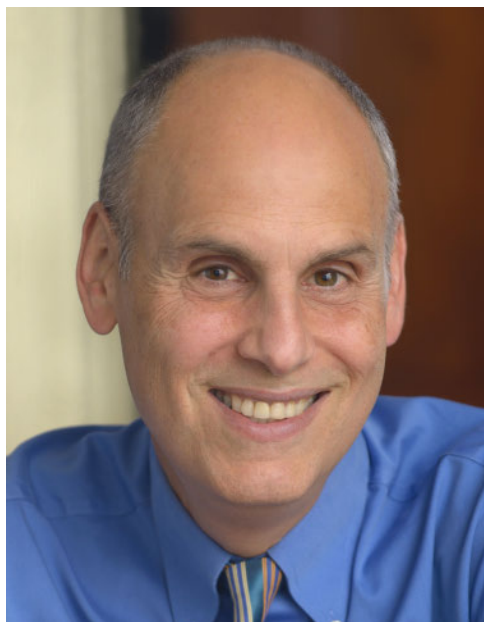
“I have loved my time at NIH and couldn’t imagine a job as rewarding. I’m really going to miss NIH and everyone here.”

Guttmacher Retires as NICHD Director

Dr. Alan Guttmacher, director of the National Institute of Child Health and Human Development, retired from his position Sept. 30. He led NICHD for nearly 6 years.

“Alan possesses a rare combination of brilliance, impeccable scientific acumen, a lightning-quick wit and an inspiring sense of humanity,” said NIH director Dr. Francis Collins. “I am truly sorry to see him retire from NIH, but I am deeply grateful for his enormous contributions to this agency and to advancing medical research.”

Guttmacher was appointed NICHD director in 2010, after serving as the institute’s acting director the previous year. Among his many accomplishments, he championed the development of a scientific



Dr. Alan Guttmacher, NICHD director, retired after leading the institute for nearly 6 years.

vision for the institute, soliciting the advice and counsel of scientists and public health experts from several disciplines to identify the most promising scientific opportunities across NICHD's mission areas. He also launched the Human Placenta Project, a collaborative research initiative aimed at improving understanding of the placenta and its role in health and disease.

Guttmacher began his NIH career as a special assistant to Collins when Collins was director of the National Human Genome Research Institute. Guttmacher became deputy director of NHGRI in 2002 and acting director in 2008.

Among Guttmacher's areas of expertise was the development of new approaches for translating genomics into better ways of diagnosing, treating and preventing disease. He came to NIH from the University of Vermont, where he directed the department of pediatrics' Vermont Regional Genetics Center and Pregnancy Risk Information Service. He also served as medical director of the Vermont Newborn Screening Program, founded Vermont's only pediatric intensive care unit and co-directed the Vermont Cancer Center's Familial Cancer Program.

In retirement, Guttmacher plans to move back to Vermont with his wife and remain active in issues of reproductive health and children's well-being.

Dr. Catherine Y. Spong, formerly NICHD deputy director, became acting director on Oct. 1. She has held several leadership positions during her 20-year career at NICHD, including director of extramural research and chief of the Pregnancy and Perinatology Branch. She is an internationally recognized researcher and board-certified in obstetrics and gynecology and maternal-fetal medicine. **R**

Have a question about some aspect of working at NIH? You can post anonymous queries at www.nih.gov/nihrecord/index.htm (click on the Feedback tab) and we'll try to provide answers.

Feedback: Which IC won the Take a Hike registration competition? We never got the results.

Response from the Office of Research Services:

The competition was part of our original Take a Hike Day activities when we started in 2008. ORS awarded trophies and recognition to the small and large ICs with the most Take a Hike Day registrants. As a result of the demand from ICs for the Office of Research Services, Division of Amenities and Transportation Services to focus on expanding Take a Hike Day to off-campus locations, we discontinued what was known as the HealthierFeds competition in 2012.

We are now in our third year of the off-campus expansion; currently, 30 percent of employees who participate in Take a Hike Day do so off-campus. As a result, we are looking at making changes to the Take a Hike event that may include a return to the HealthierFeds competition. We will be announcing updates to Take a Hike Day 2016 as we get closer to the event. If you have any further questions, reach out to Chris Gaines at (301) 451-3631 or gainesc@mail.nih.gov.

Feedback: When there is an unexpected event, such as the water main break that occurred on Oct. 13, that negatively impacts the evening commute, why doesn't ORS allow employees to leave their cars parked at NIH overnight and take public transit home? I understand why there is a general prohibition against leaving cars parked on campus overnight, but some

flexibility in this rule would help all NIH employees who drive to work.

Response from ORS: Thank you for your inquiry about allowing employees to leave their cars parked at NIH overnight when there is an unexpected event. Yes, we do agree that such exceptions to the overnight parking policy can be made for specific, extreme events, such as the water main break that recently occurred on Rockville Pike at Cedar Lane. Although not initially noted on the first day of the event, this exception was granted and subsequently noted in global emails to the NIH community.

We would like to take this opportunity to remind the NIH community about the policy on overnight parking of personally owned vehicles (POVs) on campus. General Parking at NIH is on a first-come, first-serve basis, thus overnight parking is not permissible except under certain circumstances. Uncontrolled overnight parking would interfere with giving everyone a fair advantage in finding a parking space when needed, as the limited amount of available parking would be occupied by vehicles left in excess of 24 hours. Additionally, overnight parking hampers overnight maintenance, cleaning, snow removal and ongoing construction projects.

Only vehicles owned or leased by the government or employees on official government travel are allowed to park in excess of 24 hours on the campus. For employees on official travel, their POV must display the appropriate overnight permit, issued by the NIH Parking Office. Information on how to obtain an overnight permit can be found at www.ors.od.nih.gov/pes/dats/parking/Pages/Overnight-Parking.aspx.

NIGMS Director Tours IDeA Site With West Virginia Senator

NIGMS director Dr. Jon Lorsch recently joined U.S. Sen. Shelley Moore Capito (R-WV) and scientists from West Virginia University (WVU) and Marshall University to discuss biomedical research in West Virginia. Much of this work is supported by NIGMS's Institutional Development Award (IDeA) program, which builds research capacity by supporting basic, clinical and translational research, faculty development and infrastructure improvements in states that historically have had low levels of NIH funding.

West Virginia is one of 23 states plus Puerto Rico to receive IDeA program funding. Among the research areas that a network of universities in the state are focusing on are the detection and treatment of cancer and the causes and effects of stroke.

In addition to tours of research centers, the visit featured talks by IDeA-supported scientists and students. "I was extremely impressed with what I saw, particularly the cooperation among institutions," said Lorsch. "This leverages taxpayer funds for biomedical research and should serve as a model for research happening across the country."



Visiting a WVU laboratory are (from l) NIGMS director Dr. Jon Lorsch; Dr. William Petros, interim director of the WVU Mary Babb Randolph Cancer Center; Sen. Shelley Moore Capito (R-WV); and Dr. Elena Pugacheva, assistant professor of microbiology at WVU.

2015 Combined Federal Campaign Kicks Off

Beautiful fall weather, the chance to meet face-to-face with charity representatives and a local talent all made for an excellent turnout Oct. 7 for the Combined Federal Campaign's annual kickoff event, hosted this year by the National Institute on Deafness and Other Communication Disorders.

NIDCD organizers welcomed hundreds of NIH'ers to a tent set up in front of Bldg 1. Staff from several nonprofits well-known to the NIH community such as the Children's Inn, Friends of Patients at the NIH and the Foundation for the NIH stood side-by-side with representatives from groups such as A Wider Circle, Doctors Without Borders USA, American Red Cross, College Bound and Hero Dogs, Inc. Everyone brought messages to share with potential supporters.

NIDCD Executive Officer Timothy Wheelers emceed the kick-off, which featured musical talents Margot MacDonald and NIH's own a capella group Nerds in Harmony. The latter sang the *National Anthem* as the St. John's College High

School color guard presented the colors. With her lush, indie pop-driven vocals, MacDonald sang *The Book of Love*.

Following opening remarks by NIDCD director Dr. James Battey and NIH deputy director for intramural research Dr. Michael Gottesman, Howard Rosenblum, CEO of the National Association of the Deaf, spoke about how donations have helped those who are deaf or hard-of-hearing.

"There are 48 million deaf and hard-of-hearing people across America," said Rosenblum. "We help them succeed in many different ways—we made it possible for the Redskins' football stadium to caption their announcer. We also made it possible for online [streaming], such as Netflix, to be 100 percent captioned."

This year's goal for NIH's CFC effort is \$2.2 million, which accounts for nearly half of the \$5 million goal set for the entire Department of Health and Human Services. The deadline to donate to your favorite charities is Dec. 15. Visit www.cfc.nih.gov for more information, links to finding a charity or making a donation.



Counterclockwise, from I: NIH'ers visit charity tables to learn about their missions; NIH's Nerds in Harmony performs the *National Anthem*; keynoter Howard Rosenblum speaks; Margot MacDonald sings *The Book of Love*; and NIDCD director Dr. James Battey gives opening remarks.

PHOTOS: ERNIE BRANSON