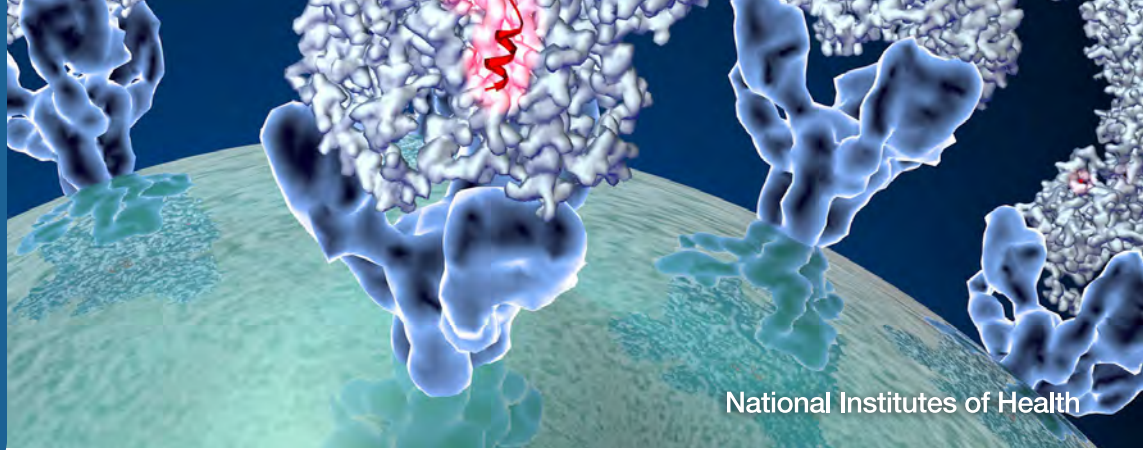


# NIH RECORD

September 21, 2018  
Vol. LXX, No. 19



National Institutes of Health

## ONE YEAR LATER

### Latest Campus Green Roof Shows Progress, Promise

BY CARLA GARNETT

*“It’s not easy being green.”* With apologies to Kermit the Frog, the latest eco-friendly roof installment on campus, at the Northwest Child Care Center, hasn’t found any difficulties yet being green. In fact, it’s quickly becoming a model for future structures.

“Green roofs are only going to become more prevalent on campus,” predicts NIH landscape architect Brandon Hartz. “Any major construction project has a good chance of having a green roof. This is due to stormwater permit requirements from the Maryland department of the



Installed in spring 2017, the green roof on the Northwest Child Care Center shows growth in June of this year.

environment. Green roofs are one of a number of stormwater mitigation solutions in an engineer’s toolbox.”

More than a year after green roof contractors installed 3 plant plugs per square foot—54,000 plugs total—on top of the

NWCCC at the corner of Center Drive and Convent Drive, the plants are thriving with about 50 percent coverage. About 17 different sedums and 9 other flowering perennials—26 different plant species—are growing in the space.

According to a 24-month contract, a professional green roof company visits every 6-8 weeks to measure progress of the plants and coverage, weed the area and watch for any signs of trouble. Evidence of tree saplings, for instance, poses a danger as “strong roots could damage the integrity of the roof’s water-proofing system,” Hartz said. Birds and other wildlife could inadvertently plant tree seed via their droppings. So far, so good on that front, however.

From the bottom up, the roof consists of

SEE **GREEN ROOF**, PAGE 4



Inn events charm kids this summer; see p. 12.

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New tanks seen from Bldg. 10’s 14th floor

### Water Tanks Fill to Serve Campus Needs

BY RICH MCMANUS

Since most NIH’ers are never going to go back there, let’s talk a little about the two giant water tanks recently constructed on the south side of campus.

The one closest to the south border is called the Industrial Water Supply System, or IWSS. It exists primarily to provide the campus Central Utility Plant (CUP) with

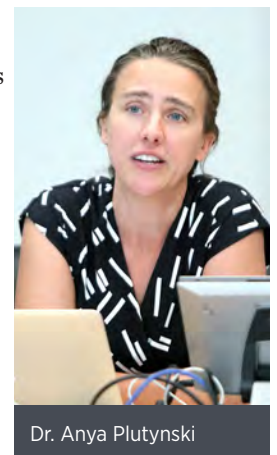
SEE **WATER TANKS**, PAGE 6

## LESSONS OF TCGA

### Philosopher Ponders Lessons, Unknowns of Mapping Cancer Genome

BY DANA TALESNIK

Delving into the genetics of cancer can seem an endless challenge. Despite all its complexity, there’s been great progress thanks to advances in sequencing technologies. Over the past decade, cancer genome sequencing studies have uncovered many new cancer genes, pathways and targets. Still, much remains unknown. This begs the question: Can there



Dr. Anya Plutynski

SEE **MAPPING**, PAGE 8



### Research Partnerships Support Minority-Serving Institutions

Here's one way for NIH institutes and centers to support research growth at minority-serving institutions and promote scientific collaborations.

At a recent workshop at Meharry Medical College in Nashville, staff from NIAID, NHLBI, NIGMS and NIMHD offered their expertise and research-funding guidance.

The workshop included participants from the Meharry-Vanderbilt Alliance. Active since 1999, this partnership between Meharry and Vanderbilt University Medical Center supports collaborative initiatives and fosters community engagement.



Dr. James E.K. Hildreth, president of Meharry Medical College, at the recent workshop

Inspired by this example, Diane Adger-Johnson, workshop organizer and NIAID health science program officer, explained, "Using the Meharry-Vanderbilt Alliance as a model, we plan to encourage similar partnerships between organizations. A research-intensive institution and a minority-serving institution (MSI) in the same city or state could share expertise and resources."

As an initial step, NIAID will invite interested research-intensive and MSI organizations to forge new partnerships. To help with this process, Adger-Johnson summarized, "We will bring the workshop, resources, tools and experts to the MSI. That is similar to what we already do for regional seminars, but here we add the strong focus on forging alliances through collaborative spaces. We also plan to invite Vanderbilt staff to help explain how a strong partnership can work."

Adger-Johnson predicts workshops for other regions in 2019 and 2020 to promote research partnerships. She encourages other NIH institutes and centers to join NIAID in this activity and consider this approach with their research-intensive and MSI communities.

For more information, contact her at [dadger@niaid.nih.gov](mailto:dadger@niaid.nih.gov).

### Disability Employment Awareness Events Announced

NIH will celebrate National Disability Employment Awareness Month during October. The Office of Equity, Diversity and Inclusion will host several events throughout the month:

- Kick-Off on Thursday, Oct. 11 from 1 to 2:30 p.m. in Lipsett Amphitheater, Bldg. 10, featuring



### NIH Hosts HHS Leadership Retreat

HHS Secretary Alex Azar II (above) held a retreat for 65 senior leaders in the department on Aug. 23 in Wilson Hall, Bldg. 1. Guest speakers included Gen. (ret.) Daniel Allyn, 35th vice chief of staff of the U.S. Army, who discussed the characteristics of effective leaders of large organizations, and Prof. Ron Adner of the Tuck School of Business at Dartmouth College, author of *The Wide Lens: What Successful Innovators See That Others Miss*. At middle, NIH director Dr. Francis Collins (l) shares a light moment with Scott Rowell, HHS assistant secretary for administration. Below, NIH principal deputy director Dr. Lawrence Tabak (l) welcomes the group to NIH.

PHOTOS: CHIA-CHI CHARLIE CHANG



Crystal Emery

keynote speaker Crystal Emery, founder and CEO of URU The Right to Be, Inc.

A producer, author and filmmaker known for producing narratives aimed at creating a more equitable society on a variety of platforms, Emery has triumphed over two chronic diseases as a quadriplegic.

- Reasonable Accommodation Program on Thursday, Oct. 18 from 1 to 4 p.m. at Natcher Conference Center, featuring a guest panel, breakout training sessions on Entellitrak and section 508 and accessibility vendors providing tools and products for accessibility needs.

For more information, contact David Rice at [David.Rice@nih.gov](mailto:David.Rice@nih.gov).

## HUMAN ELEMENT KEY

## Results Alone Don't Always Attract Science Press

BY GREG LAVINE

When *Washington Post* reporter Sarah Kaplan evaluates a science pitch, she wants something more. She talked to attendees at an annual retreat for the NIAMS Intramural Research Program recently about how a human element can make a big difference.

Kaplan recalled her story about three curious graduate students working under cover of darkness on a secret project. The young scientists at the California Institute of Technology had a running debate over whether jellyfish sleep.

Taking matters into their own hands, they went to their laboratory after hours to gather data. The effort produced a science paper proving that jellyfish sleep.

"I might not have covered this story had it not been the story of the people involved with it," Kaplan explained.

She offered tips on how to pitch stories to science reporters, including:

- Lose the jargon. When aiming a story for the public, avoid insider terms.
- Don't oversimplify. Readers can digest complex ideas if they are explained using plain language.
- Make it visual. Graphics and photos help draw in readers.
- Put it in context. Explain how a finding fits into a field's bigger picture.
- Tell the story behind the science.

A human element behind a finding can connect readers to the science.

If a reporter is interested in a story, it is helpful for experts to know that not all science writers have a scientific background. Kaplan studied international affairs and came to science writing while working on the *Post's* night shift. She discovered that many scientists stayed up late and were willing to talk.

The challenge can be getting scientists to speak plainly.

"My editor always tells me to pretend



NIAMS researcher Dr. Sarthak Gupta does a practice interview with *Washington Post* reporter Sarah Kaplan, who was a keynote speaker at the annual retreat for the NIAMS Intramural Research Program.

PHOTO: GREG LAVINE

you're talking to a really precocious 14-year-old," Kaplan said. "A 14-year-old is smart and can pick up on ideas pretty fast, but also doesn't necessarily have the vocabulary or



*"My editor always tells me to pretend you're talking to a really precocious 14-year-old."*

-SARAH KAPLAN



background knowledge an adult who is a specialist might have."

Dr. Sarthak Gupta, an NIAMS researcher, came on stage to test drive that advice with a practice interview. Gupta works on sex differences in autoimmune diseases such as lupus.

"Tell me about the most recent experiments you've worked on," Kaplan asked.

"We wanted to assess whether there are actually any differences in gene expression

profiles..." Gupta began.

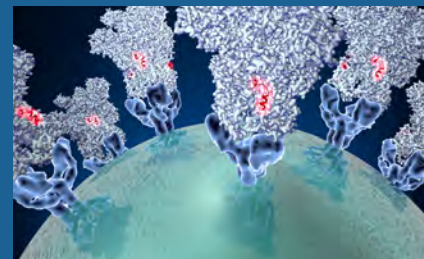
Kaplan quickly interrupted with "...and gene expression is?"

After a few halting attempts at a definition, he laughed. Gupta shared how hard he found it to define something his colleagues take for granted.

Kaplan said she is energized talking to scientists, who are often excited to share their research.

"There's a lot of commonality between scientists and journalists," she said. "We're [both] trying to get at the truth. We're [both] trying to understand how the world works and why the world works the way it does."

Sometimes the smallest question, like whether jellyfish sleep, can be just enough to bring journalists and scientists together. **R**



ON THE COVER: Coronavirus spike protein structure. Illustration shows a viral membrane decorated with spike glycoproteins; highlighted in red is a potential neutralization site, which is a protein that might be used as a target for vaccines to combat coronaviruses such as MERS-CoV.

IMAGE: DAVID VEESLER, UNIVERSITY OF WASHINGTON, NIH FUNDING FROM NIGMS

### The NIH Record

Since 1949, the *NIH Record* has been published biweekly by the Editorial Operations Branch, Office of Communications and Public Liaison, National Institutes of Health, Department of Health and Human Services. For editorial policies, email editor or phone (301) 496-2125.

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These plants have thrived in the campus's newest green roof environment: (top, from l) October Skies aster; sedum aizoon stonecrop, with winged tenant; chives; (below, from l) John Creech stonecrop; fuldaglut stonecrop and orange stonecrop.



## Green Roof

CONTINUED FROM PAGE 1

a layer of waterproofing over the top of the building, a protection board, a root barrier, a drainage board, 1-inch water retention element or mineral wool and 4 inches of green roof granular media visible to passersby. As blooming occurs, that material becomes obscured by vegetation.

“What makes these green roofs really beautiful is the diversity of plant material that can grow up there,” Hartz said. Already blooming are October Skies (aromatic aster), chives, ice plant, geranium and several colorful varieties of sedum, including creeping stonecrop in red, green and yellow.

“The great thing about sedum plants, too,



In May 2017, the green roof atop the Northwest Child Care Center was barely worth the title, just getting underway.

PHOTOS: BRANDON HARTZ

is that if branches of it fall off or get knocked off the main plant for whatever reason, those branches will just reroot and a new plant will grow in that area,” Hartz explained.

In 2007, NIH installed its first green roof (and one of Montgomery County's first) at the Gateway Center. At the NWCCC roof,

### NIH's Eco-Friendly Toppers

Below are the campus's green roofs that have shallow soil profiles.

- Gateway Center Bldg.
- Visitor Parking Garage
- NIH Library Terrace
- Northwest Child Care Center
- Bldg. 35A
- Electrical substation (between Bldgs. 37 and 40)

future greenery was planted in a scattershot fashion, so if one thing didn't bloom as expected, its thriving neighbor could provide coverage in the area. That way, fewer chances for bare spots overall.

In 2009, the NIH Library opened its 4,400-square-foot green roof terrace, which has a 1,200-gallon cistern undergirding it. It's by far the largest on campus. Several other more modest stormwater management solutions also reside on NIH grounds, near the Lister Hill Auditorium for instance and beneath a few campus parking lots.

Aside from the beauty year round of the green roofs, the practical purposes for the environmentally kind installations have become more obvious as well.

“They're more resilient than grass to drought conditions and they do not have to be mowed every week,” Hartz concluded. “We'd always have to deal with drainage of stormwater in one way or another, but with green roofs you have the advantage of an aesthetic view. Also, with green roofs, the roots of the plants will actually help filter out pollutants from the water...It makes the natural processes visible. It's not just a functional landscape, but it's also a beautiful landscape. It does double duty in that way.” **R**

## Hispanic Heritage Month Recognizes Directors Volkow, Pérez-Stable

NIH is commemorating Hispanic Heritage Month Sept. 15-Oct. 18 with the theme “Hispanics: One Endless Voice to Enhance Our Traditions.” This year's theme will allow Americans to reflect on countless ways in which Hispanics and Latino Americans contribute to the nation's successes



Honorees Dr. Nora Volkow (above) and Dr. Eliseo Pérez-Stable



through arts and humanities, innovation and entrepreneurship and science and engineering.

During the month-long celebration, NIH honors two institute directors of Hispanic and Latino heritage who have set a standard of leadership, innovation and excellence in the biomedical research community that is recognized internationally. Dr. Nora Volkow, director of the National Institute on Drug Abuse, has helped change the way the world views addiction and its mechanisms by using imaging technologies to study the brains of people with substance use disorders.

NIH is also recognizing Dr. Eliseo Pérez-Stable, director of the National Institute on Minority Health and Health

Disparities, for focusing on improving the health of racial and ethnic minorities and underserved populations through direct patient care, education and science including the promotion of diversity in the biomedical research workforce.

The month is also a reminder that Hispanic and Latino culture has contributed immeasurably to our celebrated diversity well beyond scientific institutions, enriching all areas of American life. For more information, visit <https://www.edi.nih.gov/> and learn more about this year's Hispanic Heritage campaign.





### McCarthy To Present NINR Director's Lecture, Sept. 25

On Tuesday, Sept. 25, Dr. Ann Marie McCarthy will present the third 2018 NINR Director's Lecture, from 1 to 2 p.m. in Lipsett Amphitheater, Bldg. 10. In her presentation,

"Distraction in Action: Helping Children Cope with Painful Procedures," McCarthy will describe her research trajectory and current program of research, which focuses on children with chronic health conditions. The lecture will be followed by an opportunity for questions and discussion.

McCarthy is a professor and associate dean for research at the University of Iowa College of Nursing, with secondary appointments in the colleges of medicine and public health. For more than 20 years, her primary program of research has focused on cognitive-behavioral interventions to assist children in coping with painful procedures, with an emphasis on the use of distraction.

Data from more than 1,000 families and the use of data-mining techniques contributed to the development of a predictive model of child level of distress and parental distraction coaching ability. The Distraction in Action Tool includes the predictive model along with individualized coaching information and educational materials.

McCarthy has been on the research committees for the National Association of Pediatric Nurse Practitioners and the National Association of School Nurses and was a board member of the Midwest Nursing Research Society. She is founding president of the Institute of Pediatric Nursing and is co-chair of the Council for the Advancement of Nursing Science 2018 State of the Science Congress planning committee.

The NINR Director's Lecture series is designed to bring the nation's top nurse scientists to NIH to share their work and interests with a transdisciplinary audience. The event is free and open to the public. For more information and to register, visit [www.ninr.nih.gov/directorslecture](http://www.ninr.nih.gov/directorslecture).

## Bax Wins Welch Award in Chemistry

FIRST HERE SINCE 1991

Dr. Adriaan Bax, chief of the biophysical nuclear magnetic resonance spectroscopy section in NIDDK's Laboratory of Chemical Physics, is the 2018 recipient of the Robert A. Welch Award in Chemistry. Only one other NIH scientist has ever won this award—Dr. Earl Stadtman in 1991.

Bax is responsible for transforming nuclear magnetic resonance (NMR) spectroscopy into a powerful and accessible tool to study the structure, function and dynamics of biological macromolecules. His work has greatly advanced understanding of how biology works at the molecular level, providing new insights into pathogenic mechanisms in AIDS, Parkinson's and other human diseases.

"I am extremely grateful to receive this enormous award," said Bax. "It is obviously a great personal honor, but I also am particularly excited as it recognizes the fundamental importance of the work carried out by our entire biological NMR community."

Bax has spearheaded multidimensional NMR techniques that have become fundamental to the study of protein structure and dynamics. He introduced NMR methodology that relies on stable isotopes to unravel the complexities of biological macromolecules and made it possible to precisely measure the orientations of chemical bonds by using liquid crystals. His lab continues to develop techniques to make NMR more precise, so that scientists can better understand the structure of molecules, how molecules acquire their structures and how changes in their structures affect their function.

Recently, Bax and his team developed an NMR experiment that allows observation of protein folding at an atomic level in real time. This methodology could help identify novel pathways and molecular targets for treating degenerative diseases believed to be caused by protein misfolding.

"Dr. Adriaan Bax's body of work is stunning in its depth and impact and he continues to make discoveries that improve our understanding of the human body," said NIDDK director Dr. Griffin Rodgers. "I'm delighted that he's being honored with the Welch Award for his many contributions to chemistry—and to public health."

The Welch Award in Chemistry, named for its benefactor Robert Alonzo Welch, aims to foster and encourage basic chemical research and to recognize the value of chemical research contributions for the benefit of humankind.

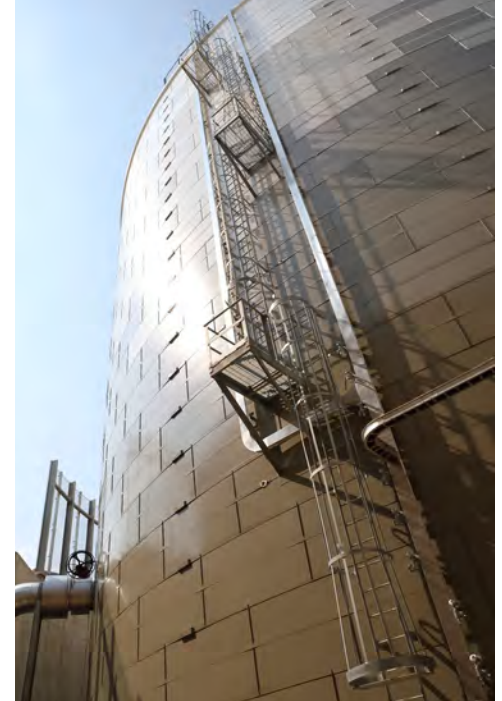


### APAO Solicits Awards Nominations

The NIH Asian & Pacific Islander American Organization (APAO) will continue its tradition of honoring employees in the NIH Asian Pacific American community for their achievements. Nominations are being solicited for four categories through Oct. 22. The categories are Scientific Achievement—for scientists/researchers who have made significant accomplishments in biomedical research; Leadership Excellence—for non-scientists and scientists who exemplify leadership excellence by example, mentorship and empowerment of

Asian and Pacific Americans to promote diversity and support the overall mission of NIH; Young Investigator—to recognize achievements by visiting fellows, clinical fellows and research fellows who have spent fewer than 7 years at NIH; and Kuan-Teh Jeang Distinguished Service—for an APAO member who has made an outstanding contribution or demonstrated continual high-quality service to the NIH Asian Pacific American community. Nominees must work or have worked (within the previous year) at NIH. Awardees will be honored at the NIH APAO Awards Ceremony in December in Wilson Hall, Bldg. 1.

Submit a one-page narrative/statement to support why you think an individual deserves recognition and include a CV of the nominee. You may nominate different individuals for the appropriate award category. A review committee composed of members from APAO and non-members representing several ICs and former award recipients will evaluate all nominations. Submit nominations electronically no later than COB Oct. 22 to Dr. Shioko Kimura, awards committee chair, [kimuras@mail.nih.gov](mailto:kimuras@mail.nih.gov). For more details, ask for the two-page awards nomination manual.



At left, the IWSS is flanked by a massive concrete retaining wall, with parking lot 42 adjacent to it. At right is the TESS exterior, featuring the temperature sensors. Data from these sensors are used to calculate the thermocline level in the tank—the contents' temperature at different heights within the cylinder.

## Water Tanks

CONTINUED FROM PAGE 1

about 4 days of water in the event of an emergency. It holds 5 million gallons; daily water use at the CUP averages 1.2 million gallons.

It offers insurance, given that the local water authority has many old pipes that occasionally rupture. A major break several years ago once threatened campus safety. The IWSS will also provide makeup water to the utility plant chillers, cooling towers and boilers during a regional outage.

The tank's principal feature is a massive retaining wall separating the IWSS from parking lot 41. Just below the wall is a new surface parking lot—lot 42—with space for some 250 cars. One day, a multi-level garage is projected to rise from the plateau. The IWSS is due to come online late this year.

The larger and more complicated

tank—the Thermal Energy Supply System, or TESS—is basically a thermos, said Dr. Farhad Memarzadeh, director of the Division of Technical Resources (DTR), Office of Research Facilities.

discharge it during the day. The TESS began operations on Aug. 6.

Both tanks are abutted by small unoccupied pump houses that are operated remotely. Each features power vaults, to run the electric

• • •

*“With a modest incremental investment, we have made these not only very functional, but [also] aesthetically pleasing so that they complement the beauty of our campus.”*

-DR. FARHAD MEMARZADEH

• • •

Topping out at 8 million gallons, the TESS stores chilled water manufactured by 12 massive chillers at the CUP across the street. The idea is that you fill it up with cold water at night, when electrical costs are low (due to lower night-time power demand) and

pumps, and the pumps themselves. The enclosures are pleasantly air-conditioned, because even electrical equipment prefers to stay cool in summer's heat.

Fun facts:

- The water in the IWSS is treated to



INSIDE THE PUMP HOUSES (from l): Water pumps in the TESS; the electrical vault supplying power to the TESS; and water pumps inside the IWSS. The pump houses outside both tanks are unoccupied and are operated remotely from the Central Utility Plant.





At left, in the CUP control room are (from l) Brad Moss, ORS/ORF communications; Dr. Abdul Bhuiyan, chief of the Utility Systems Design and Technical Service Branch; engineer Allan Buller-Jarrett; C-shift supervisor Milton England; Dr. Farhad Memarzadeh, director of the Division of Technical Resources, ORF; and Dr. Don Guan, chief, Utilities Engineering Branch. At right is the array of chillers in the CUP.

PHOTOS: CHIA-CHI CHARLIE CHANG



prevent bacterial growth that would foul pipes and valves. DTR also weekly tests for planktonic microbial population and monthly checks for *Legionella* in its chilled water cooling towers.

- It takes about 4 days to fill the IWSS. The TESS can fill in anywhere from 8 to 18 hours, depending on the flow rate.

- Remote-controlled robots can patrol either tank, if needed, to search for flaws, “just like an undersea robot,” said Dr. Abdul Bhuiyan, chief of DTR’s Utility Systems Design and Technical Service Branch.

- The CUP is one of the largest central utility plants in the country. Over 34 million data points are collected and analyzed daily using 1 million advanced calculations from about 5,000 continuously running analyses. This compares with only 480 data points recorded manually in 2013. As Memarzadeh says, “We can’t manage what we can’t measure and we can’t make improvements without data.”

- From the time DTR began managing the CUP

in FY 2014 to the present, cost of energy and water has been reduced by over \$50 million to date despite cooler winters and hotter summers.

- Memarzadeh says CUP uses a highly advanced mathematical modeling-based artificial neuron network in conjunction with time series forecasting using

Holt-Winters exponential smoothing and machine-learning to weave such factors as 96-hour heating and cooling load and commodity prices. Based on the results of these models, DTR establishes a specific procurement plan for natural gas.

- Memarzadeh, who has been at NIH for 27 years, notes that his division’s *Design Requirements Manual (DRM)* for biomedical laboratories and animal research facilities—available on the ORF website and translated in many languages—gets one of the most internet hits at NIH. The 1,000-page *DRM* is the only detailed design requirements and guidance manual of its kind. In order to provide guidance and standards that represent the best practices in facility design, DTR assembled more than 200 professionals from industry, academia and government to help with this manual.

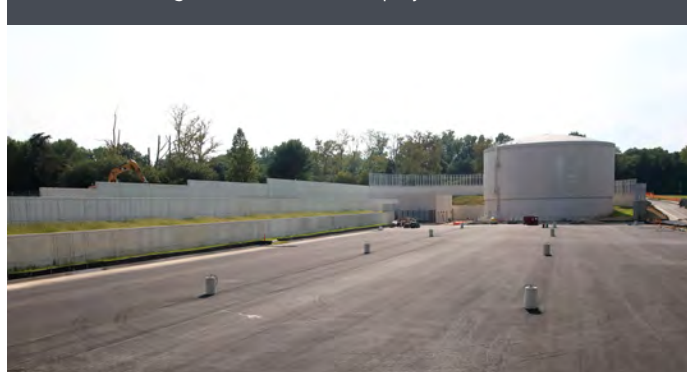
“It’s basically the guideline for the rest of the world, even though we are not a regulatory agency,” observes Brad Moss of ORS/ORF communications.

Although landscaping around each of the tanks is not yet complete, plantings are anticipated to “soften the hardscape” sometime this fall, said Allan Buller-Jarrett, project officer in DTR who works on the IWSS.

Both tanks are also clad in ornamental pre-cast concrete with natural stone accents. “With a modest incremental investment,” said Memarzadeh, “we have made these not only very functional, but [also] aesthetically pleasing so that they complement the beauty of our campus.” **R**



Above is the CUP control center, with a wall of monitors relaying system performance information. Below is new parking lot 42, with the IWSS in the background. It restores parking that was taken away from lot 41 during various construction projects.



## Mapping

CONTINUED FROM PAGE 1

ever really be a complete cancer genome?

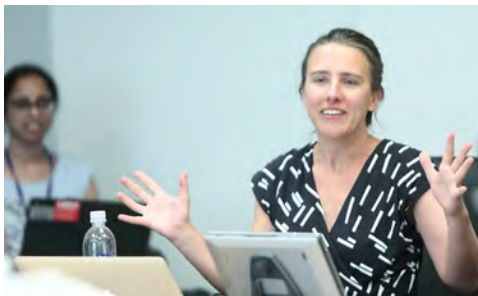
Dr. Anya Plutynski is exploring this conundrum as a follow-up to her new book *Explaining Cancer*, which probes the trajectory of cancer, classification, risk and what constitutes progress in cancer research. Plutynski, a philosophy professor and director of graduate studies in philosophy at Washington University in St. Louis, discussed her new research project at a recent NHGRI History of Genomics and Molecular Biology lecture.

“Cancer genomics is discovery science,” said Plutynski, “confirming and deepening our understanding of what we already knew, but also raising many questions, suggesting novel hypotheses and forcing refining and reframing of goals.”

A “complete” cancer genome doesn’t, and cannot, exist, posits Plutynski. “Cancer genomes are samples of dynamic, heterogeneous classes of disease processes,” she said. Can sequencing account for the massive, potentially infinite number of variations and mutations of the disease? And, from a practical standpoint, what sample size would be truly representative?

Plutynski didn’t have to go far to find experts on this topic. She recently interviewed cancer genomics researchers at Washington University School of Medicine in St. Louis to learn more about the outcomes of The Cancer Genome Atlas (TCGA). Dr. Timothy Ley, who studies acute myeloid leukemia, and Dr. Ramaswamy Govindan, who specializes in lung cancer, were researchers with TCGA, an NCI-NHGRI initiative launched in 2006 that mapped genomes of lung, brain and ovarian cancers. Participating cancer centers across the country ultimately characterized the genomics of more than 11,000 tumors from 33 cancer types.

Over the course of TCGA, which concluded this year, researchers benefited from increased sequencing speed and decreasing costs of sequencing the whole genome. As time went on, researchers learned even more with many more patients recruited and better biopsies and analytic tools. One heralded accomplishment was a more comprehensive molecular understanding of breast cancer.



Plutynski thinks a “complete” cancer genome does not and cannot exist.

PHOTOS: CHIA-CHI CHARLIE CHANG

At the same time, there was confusion over how to compare and interpret the data in this new, quickly changing field.

At first, researchers had to learn how to rapidly align and analyze whole genome data and how to compare a tumor with a matched normal genome, Ley told Plutynski. Ley led a team at Washington University’s Genome Institute that sequenced the first cancer genome using massively parallel sequencing. Those results were published in 2008 as a blueprint, though admittedly, he wasn’t sure how to interpret what his team had found without a lot more data from other patients.

As technology advanced and new knowledge emerged, open-ended goals and targets continued to change. Some researchers pursued larger sample sizes. Govindan argued that more samples didn’t necessarily yield more information. Well-designed clinical studies with appropriately collected samples are more important than just a random collection of tumor specimens, he said.

“There was an expectation that larger sample sizes increased the power to detect mutations,” said Plutynski. “Subsequently, [researchers] tried to refine their analyses, taking heterogeneity into account.”

Before and after TCGA, researchers have had to manage their expectations. Ley said he thought when all the mutations were assembled, they could better assess risk and better decide how to treat each patient. But it didn’t work out that way. Clonal heterogeneity complicated things.

The mutation rate per cancer, and heterogeneity in mutation processes across and within cancers, was an ongoing challenge that affected analysis, including the rates of false positives, said Plutynski. Researchers also had to account for the mounds of extra-genomic information; tumors don’t exist in a vacuum but are surrounded by, and

interact with, all kinds of cells and fluids in the body.

“They found more complexity than expected,” said Plutynski. But thanks to technological advances and improved data-sharing, she said, “researchers are starting to understand how everything interacts over time.”

In discussions with Ley and Govindan, Plutynski learned of some other lessons and challenges confronted by TCGA researchers. It’s important to look not only at patients with newly diagnosed tumors, but also at resistant and relapsed tumors, they said. Researchers also must address the constraint of taking tumor samples at one point in time.

“If we’re taking samples for targeted genes,” she asked them, “are you also looking at these genes after chemotherapy?” That’s happening now and it holds great promise, they said.

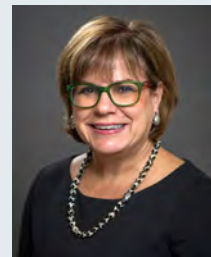
The end of TCGA was really a beginning, a framework to inspire further discussion about cancer, changing treatment options and future genomic studies, said Plutynski. TCGA data provided a critical reference point, Govindan told Plutynski, so that researchers could know what new questions to ask going forward. **B**

### Ramirez Tapped for Next NIMHD Talk

Dr. Amelie Ramirez, professor and interim chair of epidemiology and biostatistics and director of the Institute for Health Promotion Research at UT Health-San Antonio, will present the next NIMHD Director’s Seminar Series on Thursday, Oct. 4 at 11 a.m. in Lipsett Amphitheater, Bldg. 10. She will speak on “Engaging U.S. Latinos in Community Advocacy for Health Equity.”

Ramirez has 30 years of experience conducting behavioral and communication projects to reduce cancer, increase screening rates and clinical trial participation, prevent tobacco use and improve healthy lifestyles among U.S. Latinos. She currently directs the Salud America! national multimedia program to empower its network of 200,000 community leaders to drive healthy policy and system changes to promote health and support for Latino families.

Sign language interpreters will be provided. Individuals with disabilities who need reasonable accommodation should call Edgar Dews at (301) 402-1366 or the Federal Relay at 1-800-877-8339.







A study in worms shows that stress prior to sexual maturity prevents normal neuronal wiring.

IMAGE: DAZ2D/GETTY

## Stress Wracks Worm Nerves, Leaving Lasting Memories

Scientists stunted the puberty of male worms by starving them before they underwent sexual maturation. In a study funded by NINDS, the scientists suggested that stress from starvation even days before sexual maturation prevented normal changes in the wiring patterns of key neuronal circuits, which caused adult male worms to act immature.

“We found that environmental stress can permanently and profoundly impact the connectivity of a developing nervous system,” said Dr. Oliver Hobert of Columbia University, a senior author of the study published in *Nature*.

Hobert’s lab studies the nervous system of tiny see-through worms called *Caenorhabditis elegans*, or *C. elegans*. Previously, scientists in his lab showed how sexual maturation genetically reprograms and reshapes the wiring patterns of some neuronal circuits in male worms, making them different from their hermaphrodite mating partners.

In this study, Emily Bayer, a graduate student in the lab, discovered that exposure to stress, specifically starvation, before maturation can interrupt the rewiring program in males leaving the adult worms with immature circuits. Her results also suggested that these responses to stress were, in part, controlled by serotonin, a neurotransmitter associated with depression in humans.

“Exploring how genes and the environment shape the nervous system is critical to understanding how circuits break down to cause a variety of neurological disorders,” said Dr. Jill Morris, NINDS program director.

Initially, Bayer stressed out immature worms when she accidentally left some animals unattended for a few weeks. This caused the worms

to pause their normal growth and enter what scientists call a “dauer state.”

“Basically, if immature worms sense stress of any kind they can temporarily halt their normal growth for months and then restart it when the stress passes,” said Hobert. “This temporary freeze in the growth process is the dauer state.”

Eventually, Bayer returned the worms to their normal environment and let them grow into adults. After examining the nervous systems of stressed worms, she noticed something unusual. Normally, some of the neuronal connections in the males’ tails are eliminated, or pruned, during sexual maturation. Instead, she found that immature connections in the stressed worms remained.

Follow-up experiments suggested that this was strictly caused by starvation and no other forms of stress—such as heat—could have caused the dauer state.



A study finds that asthma patients with a specific genetic profile exhibit more intense symptoms after exposure to traffic pollution.

IMAGE: LSOPHOTO/ISTOCK

## Genetics and Pollution Drive Severity of Asthma Symptoms

Asthma patients with a specific genetic profile exhibit more intense symptoms following exposure to traffic pollution, according to researchers at NIEHS and collaborators. The study appeared online in *Scientific Reports*.

The research team, made up of scientists at NIEHS and Rice University, also found that asthma patients who lack this genetic profile do not have the same sensitivity to traffic pollution and do not experience worse asthma symptoms. The work brings scientists closer to being able to use precision medicine, an emerging field that intends to prevent and treat disease based on factors specific to an individual.

Co-lead author Dr. Shepherd Schurman of NIEHS said the results are based on genetic variation, the subtle differences in DNA that make each person unique. He further added that to understand the concept, one should think of human genes, which are made up of DNA base pairs A, C, G and T, as written instructions for making proteins.

“All humans have the same genes, in other words the same basic instructions, but in some people one DNA base pair has been changed,” Schurman said. “This common type of genetic variation is called a single nucleotide polymorphism, or SNP, and it can alter the way proteins are made and make individuals more or less prone to illness.”

## Clinical Trial Testing Topical Cream Plus Influenza Vaccine in Progress

A phase 1 clinical trial examining whether a topical cream can enhance the immune response conferred by a “pre-pandemic” influenza vaccine is underway at Baylor College of Medicine in Houston. Investigators are evaluating whether imiquimod cream, which is commonly used to treat genital warts and certain skin cancers, can boost the body’s immune response to an H5N1 influenza vaccine.

The trial is enrolling 50 healthy adults ages 18-50 years. Baylor is one of the vaccine and treatment evaluation units (VTEUs)—a network of clinical research sites that can rapidly enroll large volunteer cohorts to evaluate experimental vaccines against infectious diseases. VTEUs are funded and managed by NIAID.

H5N1 is an avian influenza virus that causes severe respiratory illness in birds. In rare circumstances, humans have contracted H5N1 influenza through direct or indirect contact with infected birds, such as poultry.

Infections in people can be serious and deadly—the World Health Organization reported 860 cases of H5N1 influenza, 454 of them fatal, from 2003 through July 20. H5N1 influenza currently does not spread easily from human to human. However, like all influenza viruses, the virus undergoes constant genetic changes and it is possible that it may become more easily transmissible and cause a pandemic.

Participants in the VTEU trial will receive an H5N1 vaccine that was designed for use in a potential pandemic. The vaccine, developed with some NIAID support, is made from an inactivated, or “killed,” influenza virus. After the vaccine was approved by the Food and Drug Administration in 2007, it was added to the National Pre-pandemic Influenza Vaccine Stockpile.



Participants gather for the NHLBI Center for Translation Research and Implementation Science's first Saunders-Watkins Leadership Workshop on Health Inequities and Implementation Research.

PHOTO: REBECCA ROPER

## 'PARTNERING FOR HEALTH EQUITY'

### First Saunders-Watkins Workshop Focuses on Early-Stage Investigators

BY MARIE PLAISIME, HELEN COX, MELISSA GREEN PARKER

NHLBI's Center for Translation Research and Implementation Science recently hosted its first Saunders-Watkins Leadership Workshop on Health Inequities and Implementation Research, which focused on professional development for early-career researchers. The 2-day workshop brought together more than 50 junior faculty and postdoctoral fellows from across the United States.

The workshop's theme, "Partnering for Health Equity," aligned with priorities of the HHS Office of Minority Health and the 2018 theme for National Minority Health Month. Several agency partners participated, including representatives from the Health Resources and Services Administration, the Federal Communications Commission, the Department of Veterans Affairs and the Army.

Dr. Marcella Nunez-Smith, director, Equity Research and Innovation Center, Yale School of Medicine, chaired the workshop. In continuing efforts to stimulate the next generation of health-inequity researchers, the workshop primarily aimed to provide mentorship, share guidance and foster early-stage investigator career success in heart, lung, blood and sleep-related research.

In addition to interacting with prominent implementation research scholars, workshop participants enjoyed numerous opportunities to network with each other and NIH staff. Participants also delivered presentations, either oral or poster, highlighting their efforts in this field.

The workshop featured the 2nd annual Dr. Elijah Saunders and Dr. Levi Watkins, Jr. Memorial Lecture, which is named for two prominent cardiovascular specialists/visionaries who dedicated their lives to minimizing inequities in health.

Dr. Eliseo Pérez-Stable, director of the National Institute on Minority Health and Health Disparities, delivered the lecture. He made the point that scientific inquiry "allows researchers to understand present outcomes and reduce health disparities."

During his welcome address, Dr. Gary Gibbons, director of the National Heart, Lung, and Blood Institute, shared his commitment to excellence and reflected on the impact of the mentoring he received by both Saunders and Watkins. Additionally, he charged participants to "sow seeds into the next generation."

The workshop also featured remarks by Commissioner Mignon L. Clyburn of the FCC and NIH chief officer for scientific workforce diversity Dr. Hannah Valentine, who affirmed "diversity promotes creativity, innovation and collaboration."

In closing, Nunez-Smith encouraged workshop attendees to honor the legacies of Saunders and Watkins and to "carry their charge, live into the legacy, strive to contribute high-quality, high-impact scholarship and achieve equity domestically and around the world."

For more information about the workshop, email [melissa.greenparker@nih.gov](mailto:melissa.greenparker@nih.gov) or [Helen.Cox@nih.gov](mailto:Helen.Cox@nih.gov). Archived videos of previous lectures can be found at <https://go.usa.gov/xQMFh> and <https://go.usa.gov/xRWHT>.

## Taylor Retires After 27 Years of Federal Service

BY JULI ROSE

Dr. Fred Taylor, leader of NIGMS's Division for Research Capacity Building, recently said farewell to a distinguished career at NIH. One of his many accomplishments was helping develop the Institutional Development Award (IDeA), a program that builds research capacity in states that historically have had low levels of NIH funding.

Raised in an Italian family in Sacramento, Taylor's youth included surfing in the California sun, playing soccer and contributing time to his church. When he entered St. Mary's College of California, he studied theology and biology. He graduated with a degree in biology and ultimately pursued a master's degree in biological sciences at California State University, Sacramento.



Dr. Fred Taylor

With one master's degree in tow, Taylor developed his interest in cardiovascular physiology and human adaptation to the space environment at a NASA-supported laboratory at the University of Texas Health Science Center at Dallas. He went on to receive another master's degree in systems physiology and a Ph.D. in physiology and then received postdoctoral training in pharmacology at the University of Texas Health Science Center at San Antonio.

Taylor's early research focused on how the nervous system controls heart function. Later, he studied how the human body regulates blood flow to control body temperature and performance capacity. His goal was to understand how interventions such as exercise affect blood flow in skin and muscle in extreme environments.

Taylor devoted subsequent years to the Naval Medical Research Institute (NMRI). As a director, he conducted field and laboratory research with Navy saturation divers and special operations forces (Navy SEALs, Air Force Special Operations). Working with these teams in extreme environments, he investigated how to enhance work capacity and cold tolerance.

During Taylor's time at NMRI, he also met his wife, Elaine. Taylor recalls that a colleague made a video that included footage of Taylor. The colleague happened to show the video to his sister-in-law, Elaine. On noticing Taylor in the video, Elaine asked, "Who's that weird guy?" Taylor's colleague brought the two together and the rest is history.



In 1998, Taylor transitioned from NMRI to NIH's former National Center for Research Resources, where he stayed for 13 years. His accomplishments with IDeA continued when the program transferred to NIGMS in 2011.

"My work at NIH has fulfilled me in a special way," he said. "I not only got to satisfy my goals as a scientist in trying to establish an outstanding research agenda to address the health needs of the country, [but also] I served my needs as a person by helping people find their way into science and build research communities that engage in new ideas."

Dr. Rashada Alexander, a program director at NIGMS, describes Taylor as honest, practical and always willing to share his insights. She adds, "One of Fred's biggest contributions to NIH is two-way empowerment. His support and advocacy for research capacity building has empowered our stakeholder and research community to obtain resources and then to do tremendous things with those resources. He's also empowered NIH as an agency to expand how we consider the research enterprise and ensure that it reaches and affects the people in the farthest corners of this nation."

## Commissioned Corps Holds 2018 Promotion Ceremony

Each year, NIH celebrates the achievements of PHS Commissioned Corps officers. This year's promotion ceremony was held recently at Natcher Conference Center. Radm. Richard Childs, NHLBI clinical director, provided the welcome, speaking about the creation of the PHS 220 years ago.

PHS is one of the United States' seven uniformed services and the only one in the world dedicated to public health.

Corps officers fill essential public health leadership and service roles within the Department of Health and Human Services and certain non-HHS federal agencies such as the Federal Bureau of Prisons, Department of Homeland Security, National Park Service, to name a few.

Eighteen officers were promoted this year. Rev.

Ellen Swinford led the invocation and benediction. Childs thanked families, friends and colleagues of the newly promoted officers for their unwavering support. As the promoted officers walked on stage, their family and some of their children and friends participated in the official changing of the shoulder boards to reflect the officers' new rank. The



NIH officers recently promoted in the PHS Commissioned Corps

That's a lasting legacy."

"Fred's enthusiasm for our capacity building programs was contagious," said NIGMS director Dr. Jon Lorsch. "He did extraordinary things to build communities among researchers as well as foster collaboration among NIH staff and extramural scientists. He was masterful at speaking to Congress and others about the importance of research capacity building. Fred has been an extremely important mentor to me. We will all miss him very much."

Taylor intends to spend his retirement enjoying the ocean, gardening, reading and learning to play the piano. In addition, he'll continue his activities with the Knights of Columbus and hopes to do more volunteer and community work with his wife.

He notes, "I've always been a planner, and so far in my life, I can't think of one thing I've planned that's actually occurred. What I tell young people who ask me for advice is, don't be worried. You're not gonna be able to control everything. Just follow the currents in your life and make the best of your opportunities."

ceremony ended with recognition of newly retired officers and new calls to active duty officers.

NIH officers were promoted in these categories:

**Medical**—promoted to captain: Brian Kit, Jill Long; promoted to commander: Julia Hutter; promoted to lieutenant commander: Nathan Boggs

**Nurse**—promoted to captain: Robyn Bent, Hyejeong Bolan, Michael Krumlauf, Megan Startzell; promoted to commander: Janice Oparah, Ashleigh Sun; promoted to lieutenant commander: Neil Barranta, Brenda Holbrook, Alexander Ross, Melissa Spencer, Stacy Yung

**Engineer**—promoted to captain: Gretchen Cowman

**Environmental Health**—promoted to captain: Derek Newcomer

**Health Services**—promoted to captain: Ulgen Fideli.—Theresa Yu

## Volunteers Needed for Energy Study

NIDDK seeks healthy normal weight men, 18-35, to participate in a research study. Doctors want to learn how the body burns energy at different temperatures. Participants will have a 17-day inpatient stay in the metabolic clinical research unit of the Clinical Center with weekends off. Compensation is provided. For more information, call the Office of Patient Recruitment, 1-866-444-2214 (TTY 1-866-411-1010) or email PRPL@cc.nih.gov. Read more at <https://go.usa.gov/xUmVp>. Refer to study 13-DK-0200 cohort 2.

## Healthy Volunteers Needed

Vaccine Research Center researchers seek healthy volunteers, 18-60 years old, for a study evaluating the dosage of two investigational products that target HIV. Compensation is provided. There is no risk of infection. For more information, call 1-866-833-5433, email [vaccines@nih.gov](mailto:vaccines@nih.gov) or visit [niaid.nih.gov/about/vrc](http://niaid.nih.gov/about/vrc).

## Opioid-Dependent Volunteers Sought

NIAAA seeks volunteers who are dependent on opioids such as heroin, hydrocodone, fentanyl, methadone or oxycodone and are receiving or not receiving treatment for their addiction. The purpose of this study is to learn how opiate use disorder affects dopamine signaling in the brain. This is not a treatment study for addiction. Call the Office of Patient Recruitment, 1-866-444-2214 (TTY for the deaf or hard of hearing 1-866-411-1010). Refer to study 17-AA-0114. Learn more online at <https://go.usa.gov/xNvcz>.

## FEEDBACK

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

**Feedback:** Stairway rails and doors (especially around door bar) are disgustingly dirty in most buildings, especially 10 and 13. Is there any way they can be cleaned at least once every few months? For an Institute of Health, this sure goes against the grain.

### Response from the Office of Research

**Facilities:** Every effort is made to keep the hand rails and door knobs clean. With as many staff members and visitors on campus every day as NIH hosts, you can imagine the challenge. If you believe an aspect of a building's interior is being missed during routine cleaning, don't hesitate to contact the ORF Maintenance Line on (301) 435-8000 or <https://58000.nih.gov> and the issue will be addressed. This is the quickest and most effective route to have any facility maintenance issue resolved.

## Inn Celebrates ‘Christmas in July,’ and Siblings Day

PHOTOS: JEN FORESTER

Children staying at the Children’s Inn at NIH received a special surprise recently: a summertime shopping spree with Santa Claus and a dozen motorcycle officer elves from the Montgomery County Police Department and NIH.

After greetings and photos with St. Nick, 33 children and their families boarded 2 buses decorated on the inside with red and silver snowflakes destined for Target in nearby Gaithersburg. Santa and his motor elves then escorted the buses with sirens blaring through Bethesda rush-hour traffic.

At the store, children using donated \$50 gift cards paired up with police officers to get help shopping for toys. Children and cops dashed through the aisles to find the perfect dolls, clothes, collectible cars, board games, costumes and more. Among them was Luna Beltran Plata, 4, who is receiving treatment at NIH, her sister, Dania, 7, and their parents who enjoyed the chance to celebrate a special summertime Christmas during their extended stay at the inn.

“It was awesome,” Luna’s mom, Yury Plata Martinez of Mexico, said of the event when interviewed by Fox5’s Gary McGrady. “We feel like superstars, like rock stars.”

Santa and his motorcycle officers later escorted the children to a local pizza buffet for dinner.

“This was the third annual Children’s Inn’s Christmas in July, and our children and families had such a great time,” said Stephanie Feinberg, the inn’s family program assistant. “Santa and the officers make this event absolutely unique, and we’re grateful to our donors, the Montgomery

County Police Department and the NIH police officers for giving our families the VIP treatment.”

### Sibling Day Celebrates Relatives

When a child is seriously ill, his or her siblings take on a special helper role, supporting their sick brothers or sisters in often untold ways. Sibling Day, celebrated every year by NIH and the Children’s Inn, highlights the contributions of healthy siblings—and cousins—and allows them to gain a greater understanding of the procedures their ill siblings undergo at the Clinical Center.

After icebreaker games at the inn, a group of seven siblings and cousins of sick children, accompanied by inn and CC staff, made their way up the hill to the hospital.

A visit to the virtual reality lab was a highlight for many of the youngsters. The lab, set up for medical purposes, looks like a gamer’s dream. To the children’s delight, staff brought life below the sea to virtual life for Sibling Day participants who enjoyed testing the headsets and walking across the ocean floor.

Super sibs also had the chance to learn about CAT scans and, using a model CAT scan machine, test what it’s like to have a scan done. Every one of the siblings and cousins volunteered to enter the noisy white pipe—a procedure many of their sick siblings go through during their visits to NIH.

For Dania, 7, from Mexico, the best part of the day was learning about phlebotomy and blood analysis in the hospital’s laboratory medicine section.

“I learned how blood is taken from the arm,” said Dania in Spanish, her native language. “Because they always do that to my little sister, and I was always wondering what they are doing.”



Houssam Merehb, 11, and his mom, Fawzieh Merehb pose with Montgomery County Police Officer Andrew Martinez while shopping for gifts as part of the Children’s Inn’s Christmas in July celebration.



Above, two siblings of children being treated at NIH learn about blood components and how blood is analyzed at the Clinical Center during Sibling Day. Below, Dania Beltran Plata, 7, smiles with Audrey McMaster, Children’s Inn intern.



Daniel Beltran and Yury Plata Martinez and their daughters, Dania, 7, and Luna, 4, take a selfie with Santa, a.k.a. Montgomery County Police Officer Robert “Bobby” Ladany.

