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AI 'VIRTUALLY OMNIPRESENT'

Former NIH'er Horvath Explains Why Machines Won't Replace Doctors

BY CARLA GARNETT

If it feels like computers control almost everything these days and that soon we'll all have to visit "Doctor Bot" to cure what ails us, then the recent Clinical Center Grand Rounds talk "It's an Artificial Intelligence (AI) World and We Are All Just Living in It" by the Association of American Medical College's Dr. Keith Horvath, may offer some reassurance.

"AI is virtually omnipresent," he admitted. "It's already telling us what to watch, what to listen to, how to get from place to place and what to buy [and its reach] continues to expand."

Dr. Keith Horvath

To illustrate AI conquering new territory, Horvath described what he called the "mood watch," a device designed to absorb speech intonations and provide the wearer with social clues about the speaker's disposition or temperament. The high-tech wristband could help people with conditions such as Asperger's syndrome.

"The general AI of science fiction movies is still a ways away," Horvath reported. It's specific AI—exemplified by machines such as IBM's Deep Blue chess master computer of

SEE **HORVATH**, PAGE 4

'FAIR'-MINDED

Hahnel Argues for Making Data as Open as Possible

BY ERIN WALKER

Speaking virtually from London to a group of more than 120 NIH employees at a recent NIH Data Science Town Hall sponsored by the Office of Data Science Strategy, Dr. Mark Hahnel said, "To get the most out of science, research data needs to be as open as possible, as closed as necessary."

Dr. Mark Hahnel

For Hahnel, "open as possible" means data that is published openly and

SEE **HAHNEL**, PAGE 8

CORRALLING COVID

Behavioral Science Can Help Increase Social Mitigation Adherence

BY ERIC BOCK

The CDC has recommended that, in response to the global coronavirus pandemic, everyone wash their hands often, stay at least 6 feet away from other people, wear face coverings in public and stay home if they're sick, said Dr. William Riley. Adhering to these mitigation strategies is critical to slowing the spread of Covid-19.

Dr. William Riley

Just telling people to follow these recommendations, however, won't persuade them

SEE **RILEY**, PAGE 6

OLDEST ACTIVE SCIENTIST

Life, Longevity of Tabor Celebrated

Dr. Herbert Tabor, the world's foremost authority on the enzymatic pathways of polyamines, died on Aug. 20. He served 77 years at the National Institutes of Health, the oldest active NIH scientist ever. He was, until his death at age 101, a senior investigator in NIDDK's Laboratory of Biochemistry and Genetics, where he had served as lab chief until 1999.

Dr. Herb Tabor in 2005

"His death is such a great loss for the NIH and broader scientific community of

SEE **TABOR**, PAGE 10

Everyone can help keep NIH cyber safe. See p. 3.

ALSO THIS ISSUE

Federal Employee Viewpoint Survey Is Open Sept. 21-Nov. 2

The 2020 Federal Employee Viewpoint Survey (FEVS) will be open Monday, Sept. 21 through Nov. 2. The survey gives eligible federal employees an annual opportunity to provide confidential feedback about their work satisfaction, leadership and work/life balance. This year, the survey will include an extensive section on the impact of Covid-19.

Last year, more than 11,000 employees took the survey. Results from FEVS are communicated to NIH and IC leadership as soon as they become available and are used to develop specific programs and resources aimed at making NIH and its institutes and centers a better place to work. Each IC has designated representatives who focus on communicating FEVS results to staff and are tasked with conducting actionable plans to ensure NIH continues to be employees' leader of choice when it comes to employee engagement.

NIH has posted all 2019 IC-specific FEVS results to a public FEVS website (https://hr.nih.gov/workforce/fevs/2019-fevs-survey-results) in order to enhance leadership accountability and open up conversation about how NIH can provide a safe, effective and engaging workplace for all employees.

FEVS is administered by the Office of Personnel Management and will be available to full- and part-time permanent, non-seasonal employees, on-board on or before Oct. 26, 2019. Currently, contractors are not eligible for FEVS participation.

For more information, visit https://hr.nih.gov/workforce/fevs or email NIHFEVS@nih.gov.

What Have You Noticed in Nature?

Our formerly hurried lives—with long, traffic-filled commutes—may have prevented us from noticing a lovely sunrise or sunset, a post-storm giant rainbow or roaming wildlife. As many NIH'ers continue to work from home, or for those back in their labs with a quicker commute, what have you noticed outside that might have escaped you before? Perhaps you've spotted a family of deer, baby turtles, a colorful bird or butterfly, which seem to be out in greater abundance these days.

In 2018, baby bluebirds recorded near Safra Lodge

PHOTO: JENNIFER WATSON

The *NIH Record* wants to see your photo. We will publish the most remarkable images we get. Send your photo (high-resolution color digital image) with a brief caption to rm26q@nih.gov or cg9s@nih.gov.

NCI at Frederick Internship Program Wins Presidential Honor

The National Cancer Institute in Frederick, Md., has won a Presidential Award for Excellence in Science, Mathematics and Mentoring for its Werner H. Kirsten Student Internship Program.

Now 30 years old, the Kirsten program each year brings to NCI's Frederick campus a cadre of high school students, who spend a summer, followed by their senior year, working in government and contractor laboratories and offices. A hallmark of the program, NCI's only year-long immersion opportunity for high schoolers, is the close involvement of

Mentor and mentee work together on a project with a GeneAmp PCR System 9700.

mentors, who work one-on-one with students to develop their research, analytical and writing skills.

More than 1,200 students have gone through the Kirsten program, which also includes discussions, seminars, poster presentations and journal clubs.

More than 80 percent of Kirsten graduates, the majority of whom are women, have continued onto careers in STEM fields, and 100 percent of Kirsten graduates completed a minimum of a bachelor's degree, with many pursuing higher academic achievements.

The award, which is administered by the National Science Foundation, "recognizes the critical role mentors play outside the traditional classroom setting in the academic and professional development of the future STEM workforce," said the White House announcement.

In their comments, the award review panel cited "the efforts of this program to effect change in the community" and the "scope and capacity of this program to create impact on a national level" in giving the program its highest marks of excellence.

The internship program is named for Dr. Werner H. Kirsten, who served as associate director of the NCI at Frederick in the 1980s and 1990s.

"It truly is the mentors who are the heart and soul of the Kirsten program," said program manager Marsha Nelson Duncan. "They generously offer our students some of the most precious commodities: their time, their wisdom and their guidance. Several generations of students are the better for it."

Because of the coronavirus pandemic, the Kirsten program is at present on hiatus, save for a handful of students working remotely. Thanks to the continuing commitment of so many mentors, its return will be eagerly anticipated by the program's mentors, as well as Kirsten students and the partner school systems.

ORWH Hosts Webinar on Social Determinants of Health, Disease Outcomes

The Office of Research on Women's Health recently hosted an online panel discussion titled "Improving Chronic Disease Outcomes Through Approaches that Address Social Determinants of Health."

The webinar was part of ORWH's Understudied, Underrepresented and Underreported (U3) Women's Health Lecture Series. Dr. Marie Lynn Miranda of the University of Notre Dame and Dr. Leah H. Rubin of Johns Hopkins University, a former scholar in the NIH Building Interdisciplinary Research Careers in Women's Health program, gave lectures. A moderated Q&A session followed.

Miranda's lecture, "Assessing Residential Segregation's Role in Shaping Health and Well-Being," characterized national and local population patterns as they pertain to race, educational

attainment, health care availability and other factors correlated with health.

Rubin's lecture, "Social Determinants of Central Nervous System Dysfunction in Research and Clinical Practice: A Lesson from HIV," described cognitive problems and mental health issues associated with HIV infection.

ORWH's lecture series has been designed to stimulate interest in the complex issues affecting the health of women, including the influences of community attributes.

To view the video recording of the webinar, visit https://www.youtu.be/eK0-j9AzBGU.

ATTACKS ARE RELENTLESS

Protecting NIH from Cyber Attacks—How You Can Help

BY JOTHI DUGAR

Picture this: You open your NIH laptop in the morning and find an email asking you to provide your NIH login credentials for verification purposes. You pause to think—would NIH really send me an email like this? You hit the Report Phishing button in Outlook, sending the email for security review. Next, you open a Word document containing an RFP you're preparing for a new virtual collaboration tool. You ping your information systems security officer (ISSO) to ask for an update on the security review process—your ISSO tells you that everything is on track for your deadline and assures you that her team will make sure the tool will keep your program's data safe. You switch back to Outlook where you draft an email to a colleague and attach a PDF containing sensitive information. Before hitting send, you make sure to encrypt the email so that the PDF can't fall into the wrong hands.

This is the vision that the NIH Cyber Safety Awareness Campaign has for each of us—the seamless integration of cyber-safe attitudes and behaviors into all of our roles, from scientist to administrator.

The headlines around cybersecurity in health care are sobering: each and every day, high-profile health organizations around the world are being targeted by cyber criminals who seek to steal data, disrupt operations and pursue financial gain at the expense of patients, staff and science. NIH is not immune from these types of attacks. In fact, more than 98 percent of email to NIH servers is blocked because it contains dangerous malware or spam. This amounts to more than 23 million malicious emails a day.

Jenny Spicer (l) and Jennifer Morgan Gray show their support for cybersecurity.

The reality is that as cyber threats and actors become more sophisticated and aggressive, organizations like NIH are increasingly vulnerable. The good news is that each one of us, regardless of our role, has the power to help keep NIH safe by practicing cyber safety on a daily basis. As NIH director Dr. Francis Collins noted last December, "Cyber safety is not solely the responsibility of staff in information technology, security or privacy functions. It is the concern of the whole NIH community."

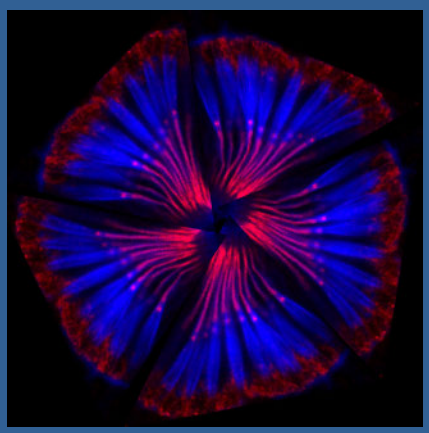
If you're feeling uncertain about what cyber safety means for your role, the NIH Cyber Safety Awareness Campaign is here to help. The campaign, an Optimize IT Security initiative, has a website (https://ocio.nih.gov/InfoSecurity/Pages/CyberSafety.aspx) that is constantly being updated with new, easy-to-understand one-pagers on a variety of cyber safety topics such as phishing and acquisitions. The website also provides contact information for security and privacy staff who can help answer your questions and publishes new stories each month about real-life cyber safety incidents that have happened at NIH. The campaign invites you to bookmark the site and share it with your colleagues.

Also involved in the Cyber Safety Awareness Campaign are (from l) Uzma Cheema, Esther Ohrt, Madeline Cowan, Eric Kokuma and Jothi Dugar.

The campaign also hosts a variety of engaging events each week, providing interactive presentations at all-hands meetings, professional affiliation and networking events and more. If you'd like staff to present to your audience or if you feel your group would benefit from receiving monthly cyber safety emails with helpful tips and real-life stories, email Jothi.Dugar@nih.gov.

For NIH'ers who are ready to deepen their commitment to cyber safety at NIH, the campaign invites you to join the NIH Cyber Champion Program, a network of engaged employees at all levels and across all roles who are committed to improving adoption of cyber-safe behaviors at NIH. By becoming a Cyber Champion, you'll join a cadre of more than 40 volunteers who have already stood up to embrace their commitment to cyber safety by spreading the word through their own networks.

Regardless of your title, IC or function, you are an essential part of NIH's security posture. Your daily decisions regarding cyber safety matter and they can be the deciding factor between keeping NIH safe and exposing us to cyber risk. By learning more about cyber safety at NIH, you are making a meaningful commitment to protect our people and our science from cyber threats.



ON THE COVER: *Fruit Fly Hearing Organs. Five different fruit fly hearing organs are arranged to form a flower in this image. A protein, NompA (red), attaches the hearing units to the exoskeleton. Human genes and hearing organs are similar to those in fruit flies. This allows researchers to use fruit flies to identify new genes and gene regulators involved in hearing and deafness in humans.*

IMAGE: TONGCHAO LI, BAYLOR COLLEGE OF MEDICINE, WITH SUPPORT FROM NIDCD

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Editor: Rich McManus
Rich.McManus@nih.gov

Associate Editor: Carla Garnett
Carla.Garnett@nih.gov

Staff Writers:
Eric Bock • *Eric.Bock@nih.gov*
Dana Talesnik • *Dana.Talesnik@nih.gov*

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NIH National Institutes of Health
Turning Discovery Into Health

Horvath

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the 1980s and 1990s—that is growing more effective and quickly having an impact on medicine in the U.S. and around the world.

"In the past, AI has had a lot of hype and promise, but in many cases that has been cooled by an 'AI winter' in which the promise has not been achieved," he said. "Where we are right now is at another peak of that hype cycle. Is another winter to follow? We'll see."

Currently serving as AAMC's senior director of clinical transformation, Horvath, a former clinical investigator at NIH who was director of cardiothoracic surgery research at NHLBI and chief of cardiothoracic surgery for NIH's Heart Center at Suburban Hospital, gave at least five reasons robots won't replace physicians.

Primarily, he said, advances in AI should never be viewed as tech versus human.

"Humans and machines together can excel in different ways that individually they cannot," Horvath pointed out. "The two combined can accomplish what neither of them can do alone."

Secondly, physicians have a non-linear working method that easily adapts to ever-changing conditions and quickly evolving situations. That dexterity is still difficult to teach to a computer.

Next, competent digital technologies need competent professionals. "The ability for humans to override the machine is key," Horvath noted.

Also, he said, there are tasks that algorithms and robots can't complete.

Most importantly, AI cannot replace empathy. "As we all know, the first thing in caring for the patient is caring for the patient," he emphasized.

Horvath described areas of medicine and clinical research where machine learning, a component of AI, already has made significant inroads. For example, he said, it plays a major role in automated imaging disciplines—radiology, ophthalmology, dermatology and pathology. Machine learning can also be applied to tasks involving signal processing, such as electrocardiography and audiology, and in jobs where integration with other datasets helps clinical workflow.

★★★

"Humans and machines together can excel in different ways that individually they cannot. The two combined can accomplish what neither of them can do alone."

-DR. KEITH HORVATH

★★★

Types of machine learning include supervised, unsupervised and reinforcement.

An example of supervised machine learning would be cancer detection from MRI results, where the machine has "learned" mapping from a tagged dataset.

In unsupervised machine learning, Horvath explained, the machine is fed "massive datasets to sort through and make diagnoses or come up with predictive analytics." Examples would be sepsis or identifying research subjects for different trials.

Reinforcement training is a hybrid that combines the other two.

There's no question that computers can search through more datasets faster than humans, Horvath said, but speed and efficiency may not always translate to accuracy.

"Sometimes machines still get it wrong," he noted, "especially without being assisted or prompted by human guidance."

To illustrate, Horvath showed two 4-by-4 grids of similar images in which the computer was unable to distinguish between the pictures.

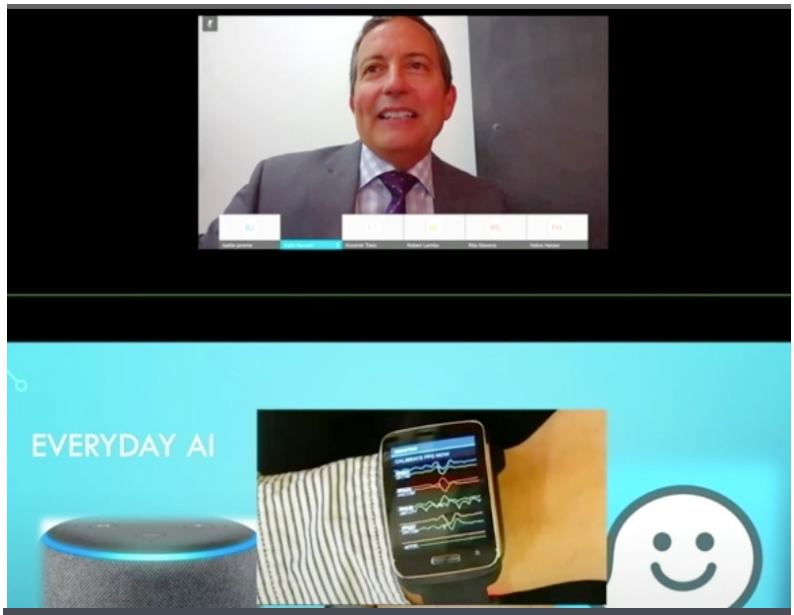
"It couldn't tell the difference between a parrot and guacamole, or between a Chihuahua and a blueberry muffin," he pointed out. "Part of that has to do with needing human expertise to understand better."

AI's journey to this point has not been without pitfalls, Horvath said. Information overload remains a genuine concern.

"We've gotten through the data tsunami of 2005 to 2016 being generated by electronic health records [EHRs], smartphones and wearable devices," he said. "Industry lined up to figure out how to fix that in the last few years. So, there's been a fusion of that idea."

In essence, companies collaborated to find ways to use and model the wealth of data. "This has been buoyed by the 100 percent adoption of EHRs," Horvath pointed out. "In the next few years, we're going to see commercialization of this.

"That will allow AI to enhance the treatment capabilities we have and make them more personalized and specific to potentially combine with other types of data such as home or genomic," he predicted. "Then we'll get to the point where AI applications are embedded in all of our clinical and investigative workflows."



To illustrate AI's ever-expanding reach, Horvath described a "mood watch" device (shown above) that is designed to absorb speech intonations and provide the wearer with social clues about the speaker's temperament.

Horvath also addressed the double-edged sword of EHRs.

On the one hand, he said, "AI feeds on data, which is critical for delivering evidence-based health care and developing any of the AI algorithms."

U.S. consumers use approximately 3 petabytes—3 million gigabytes, or 39 years of high-definition television video—of internet data every minute of every day.

EHRs have been called both a "wellspring of data" and a "cesspool of data," Horvath said. It's much easier to put data into systems than to get data out.

A lot of folks have a lot riding

Physicians who use AI will most likely replace physicians who don't employ the technology, Horvath predicts.

on perfecting EHR functionality. Horvath recalled that the HITECH Act passed more than a decade ago has twice—in 2009 and 2014—infused $36 billion into the effort to adopt EHRs into practice nationwide. And although acceptance is now nearly universal in the medical community, there have been significant side effects.

"A lot of physicians now feel that they're data entry clerks and not patient care folks," Horvath reported.

He said despite such issues, AI's promise remains manifold—to increase efficiency and decrease costs by shifting human labor to the more complex tasks, to identify workflow optimization strategies, to reduce medical waste by strengthening coordination of care, eliminating over-treatment or low-value care and automating highly repetitive processes that are largely administrative and to allow the physician to focus on actual care.

Basically, Horvath concluded, AI means more time available and less infrastructure required. "Time is essential to the quality of care patients receive," he noted. "And, better work/life balance for clinicians is critical to success for everybody...AI is not going to replace physicians, but physicians who use AI are going to replace physicians who don't, and that may be the cautionary tale."

ORWH Syndicates '7 Steps to Manage Stress and Build Resilience'

The Office of Research on Women's Health used a placement service to provide editors of online and print publications with an article titled "7 Steps to Manage Stress and Build Resilience." The article has reached an online audience of more than 213 million readers through more than 1,100 outlets. Print circulation has yet to be reported.

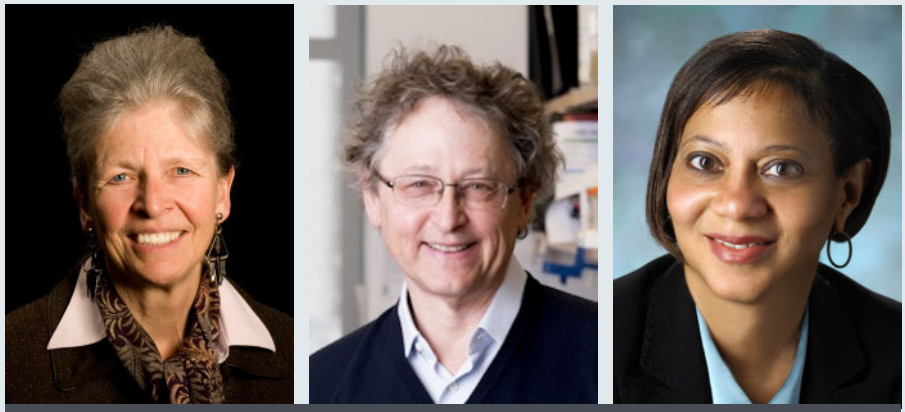
The article has obtained significant coverage across the country and has been featured in the 10 largest U.S. media markets. The article was a collaborative effort with input or review from NIH/OBSSR, NIMH, NCCIH, Ethics, OGC and HHS. The article is available at https://orwh.od.nih.gov/in-the-spotlight/all-articles/7-steps-manage-stress-and-build-resilience.

ALBEIT REMOTELY

NIH Director's Wednesday Afternoon Lecture Series Resumes

The 2020-2021 NIH Director's Wednesday Afternoon Lecture Series (WALS) kicks off a new season on Wednesday, Sept. 23 with Dr. Joan Steitz, Sterling professor of molecular biophysics and biochemistry and Howard Hughes Medical Institute investigator at Yale University. Her talk is titled "Viral Noncoding RNAs: Approaching Answers." Noncoding ribonucleic acids (RNAs) play pivotal roles in the regulation of gene expression but exhibit a diversity of functions whether encoded by cellular or viral genomes. For her lecture, the most recent high-resolution X-ray structures will be discussed.

Additional talks this fall include the annual William E. Paul Lecture with Dr. Michel C. Nussenzweig on Oct. 7 and the annual Rolla E. Dyer Lecture with Dr. Lisa Cooper on Oct. 28.



Leading off the year's Wednesday Afternoon Lecture Series are (from l) Dr. Joan Steitz of Yale, Dr. Michel Nussenzweig of the Rockefeller University and Dr. Lisa Cooper of Johns Hopkins Center for Health Equity.

Nussenzweig, the Zanvil A. Cohn and Ralph M. Steinman professor at the Rockefeller University, will discuss his work that's leading to new antibody-based therapies for infections by HIV, the novel SARS-CoV-2 coronavirus and other viruses.

Cooper directs the Johns Hopkins Center for Health Equity, where she and her team work with stakeholders from health care organizations and communities in the United States and Africa to implement rigorous clinical trials and identify interventions that alleviate racial and income disparities in social determinants and health outcomes.

The fall WALS lectures will be held most Wednesdays, 3-4 p.m., and can be viewed live online at videocast.nih.gov. The lectures will also be archived for later viewing.

To view the full list of speakers this year, visit http://wals.od.nih.gov. You can see the entire 2020-2021 Wednesday Afternoon Lecture Series schedule there, as well as download the season's poster.

For any questions or requests, contact Jacqueline Roberts at robertsjm@od.nih.gov.

Riley

CONTINUED FROM PAGE 1

to do it, said Riley, director of NIH's Office of Behavioral and Social Sciences Research. He spoke at a recent NIH Adherence Network Distinguished Speakers program webinar. Rather, health officials must use several strategies to encourage behavioral change.

One of the most important strategies, he said, is for public health officials to communicate credible and trustworthy information quickly, honestly and repeatedly. These officials must also refresh their messaging campaigns periodically to maintain adherence and acknowledge how hard it is to follow the CDC's recommendations over time.

Exemplars of this approach include NIAID director Dr. Anthony Fauci, White House coronavirus response coordinator Dr. Deborah Birx and U.S. surgeon general Dr. Jerome Adams, Riley noted.

Next, public health should be treated as a collective issue, not an individual one. For example, those who are more likely to have milder cases of the disease must still change their behavior because they can still spread the virus to higher-risk populations.

"Being able to increase that sense of group identity and the idea that we're all in it together is an important component of what we need to do," Riley explained.

Before people can take concrete steps to reduce transmission, they must know how they can contribute. However, although knowledge is a necessary condition, it is seldom a sufficient one. To encourage people to change their behavior, officials must promote specific actions, like handwashing.

Research on handwashing has shown that reminding people to wash their hands can increase adherence, Riley said. Mass media handwashing campaigns have shown to be effective. When people know better when to handwash, they are more likely to do it.

Asking people to put up a sign in their bathroom that reminds them to wash their hands or putting a label with a handwashing reminder inside face coverings can help increase the frequency of handwashing after people use the bathroom or remove their mask.

"Simple prompts can lead to a more conditioned response over time," he noted.

Most research on increasing handwashing adherence has been done in hospital systems and in developing countries where diarrheal diseases are common. Lessons can be adapted from this research to population-level handwashing adherence, reported Riley.

> *"Being able to increase that sense of group identity and the idea that we're all in it together is an important component of what we need to do."*
>
> -DR. WILLIAM RILEY

Physical-distancing measures are important tools for preventing the spread of Covid-19. During the 1918 influenza pandemic, such measures were introduced. Back then, said Riley, there was no research on its effectiveness and no one studied physical distancing as a means of slowing disease spread, or on whether people would adhere to distancing recommendations.

Physical distancing is, of course, easier for people who can work remotely, he noted. Those who cannot telework and must go to a physical workplace are regularly exposed to conditions where they can contract the virus.

While avoiding physical contact is effective, officials must be aware that physical distancing can affect people's mental health. People are social animals who like to be around each other and develop physical connections. One challenge for officials is developing alternatives to in-person socializing that allow people to feel the benefits of physical proximity without being close to one another.

Another challenge is getting more people to wear face coverings. Riley said studies of health care workers have shown that availability of masks, training on how to use them correctly, whether other workers wear them and organizational support for wearing masks all influence face mask use. Other predictors include the perceived risk and seriousness of a disease.

Finally, asking people to stay home if they're sick does not guarantee that they will do so. About 40 percent of U.S. workers don't have paid sick leave.

"If you ask someone to stay home but the result of having to stay home is that you lose pay, in all likelihood people will still go to work under those circumstances," Riley said.

Without paid sick leave, employees are three times more likely to forego medical and preventive care, including influenza vaccinations. Guaranteeing paid sick leave can reduce the spread of contagious diseases.

"We haven't done enough research on adherence to mitigation strategies," Riley said, "We need to get a better sense of how we can improve how well people adhere to such strategies."

NIH is funding research on adherence to mitigation strategies and the social, behavioral and economic impacts of the pandemic.

Some preliminary findings may influence our response to the current pandemic, but, "it'd be really nice to have solid data about improving adherence for things like physical distancing, face mask use and handwashing in a future epidemic that will probably come along—hopefully many, many years after most of us are long gone," Riley said.

Gopal Named NCI Center for Global Health Director

Dr. Satish Gopal is the new director of the Center for Global Health (CGH) at the National Cancer Institute. A medical oncologist and physician-scientist, he is dedicated to helping people with cancer in low-resource settings, including sub-Saharan Africa, where he spent almost a decade caring for and learning from patients with lymphoid and HIV-associated malignancies. He will now lead CGH and work across the NCI and NIH communities to support innovative research that addresses key scientific issues in global cancer control and leverages unique scientific opportunities afforded by global collaboration.

Dr. Satish Gopal
PHOTO: MARLEEN VAN DEN NESTE, EM PHOTOGRAPHY

Gopal joins NCI from the University of North Carolina, where since 2012 he led the Cancer Program for UNC Project-Malawi, a clinical research collaboration between UNC and the Malawi Ministry of Health. His international experience, which also includes a former Fogarty International Research Scientist Development Award and service as associate chair of the NCI-sponsored AIDS Malignancy Consortium, will enhance CGH's role in advancing global cancer research. Gopal also highly values CGH's role in supporting cancer research training, promoting the integration of current scientific knowledge in global cancer control and engaging key partners in global cancer control.

Sharing his thoughts on the future of CGH, Gopal understands that "the global cancer burden is enormous; about two-thirds of cancer deaths occur each year in low- and middle-income countries, and that's increasing." He is hopeful that NCI can play a key role in addressing cancer as a truly global public health problem and believes that "studying cancer everywhere should benefit cancer patients everywhere."

The current times present unique and unprecedented opportunities and challenges, particularly amid major disruptions to cancer research and control from the ongoing Covid-19 pandemic. In Gopal's view, these events have reinforced the importance of global scientific collaboration, the need to learn from one another and to address new and unanswered questions as a global community.—**Doug Perin**

Brown To Give Virtual Mendelson Lecture on Alcohol, Adolescents

Dr. Sandra A. Brown will deliver a virtual presentation of the 2020 Jack Mendelson Honorary Lecture on Tuesday, Sept. 22 at 1:30 p.m. Her talk is titled "Discerning Risks and Effects of Alcohol in the Midst of Adolescent Development." Details about how to view the virtual lecture are available at www.niaaa.nih.gov.

Brown is an internationally recognized scientist whose research has substantially increased our understanding of how alcohol and other substances affect adolescent development and how the impact of alcohol and other substances contribute to outcomes that persist into adulthood. Her pioneering research has yielded important information on the neurocognitive consequences and developmental trajectories associated with adolescent substance use and their implications for prevention and treatment.

Dr. Sandra A. Brown

Brown currently serves as vice chancellor for research and distinguished professor of psychology and psychiatry at the University of California, San Diego, where she has played major roles in establishing and spearheading two major nationwide research consortia that are investigating the neurobiological and behavioral changes that occur during adolescence and into emerging adulthood.

Since 2012, Brown has co-directed the NIAAA-supported National Consortium on Alcohol and Neurodevelopment in Adolescence, a longitudinal study investigating the effects of alcohol use on brain and behavioral development in more than 800 adolescents ages 12-21.

Since its launch in 2015, she has served as co-principal investigator of the Adolescent Brain Cognitive Development (ABCD) Study, which is the largest long-term study of brain development and child health in the United States. Supported by NIDA, NIAAA, NCI and other NIH institutes/offices and federal partners, the ABCD Study is tracking the biological and behavioral development of about 12,000 9 to 10-year-olds into early adulthood to increase our understanding of the many factors that can enhance or disrupt a young person's life trajectory.

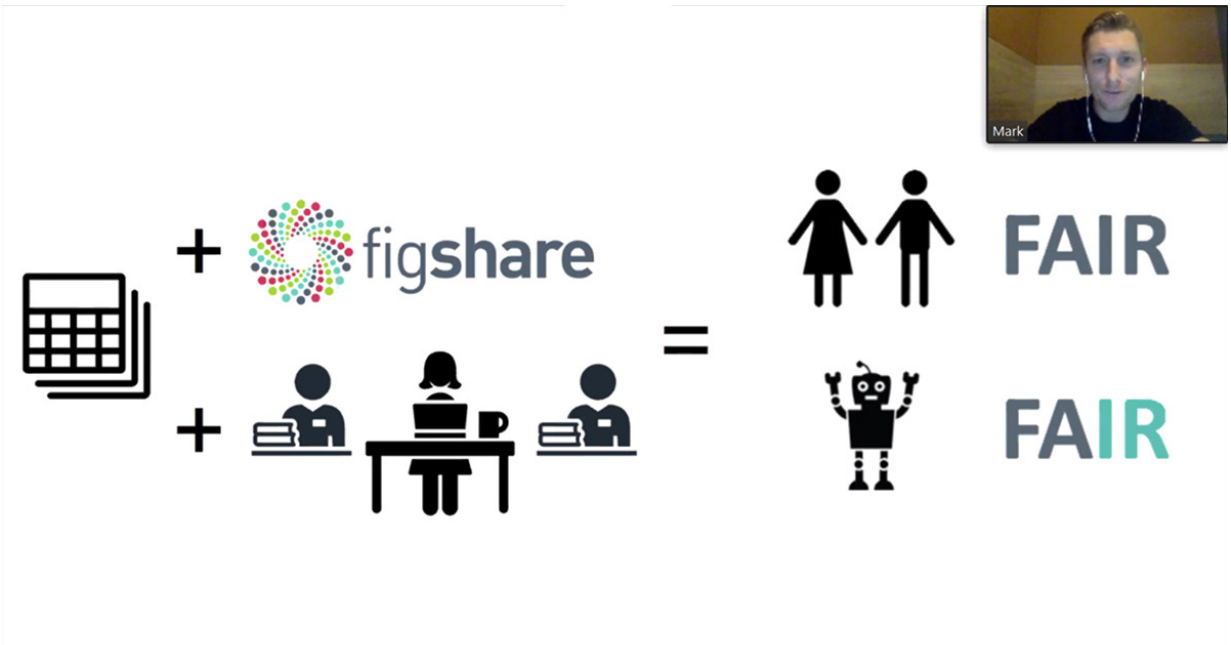
NIAAA established the lecture series as a tribute to Dr. Jack Mendelson, who made remarkable contributions to the field of clinical alcohol research. Honorees have made substantial contributions toward increasing our understanding of the effects of alcohol on health and well-being and improving the diagnosis, prevention and treatment of alcohol-related problems.

Pandemic Product Gains Prizes

When the *Record* asked readers to talk about projects they'd pursued during lockdown, one new NIH'er literally shared volumes.

"Over the coronavirus break, my fourth book won two gold medals for best in animals/pets non-fiction. *The Story of Rex of White Way, The Blizzard King, for Young Readers* won gold in a global eLit competition in May 2020," noted Jim Cheskawich, OD. "On Aug. 16, *Rex* won a second gold medal in Dan Poynter's global eBook contest. [My] books have collectively won 6 golds, 3 silvers and a Maxwell as best single breed book.

"My writing career began in human resources, where I wrote job descriptions and narrative evaluation statements, vacancy announcements, SOPs, and even resumes. I retired the first time as the Department of Labor's Mine Safety and Health Administration HR director. I am pleased to be back with NIH working in HR as part of our team."



Hahnel describes the importance of people in making data FAIR (findable, accessible, interoperable, reusable) for both humans and machines. He spoke at a recent NIH Data Science Town Hall.

Hahnel

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well-described. It also means educating researchers on the importance of data-sharing and the tools available to them.

"Given today's technology, academia should be moving further, faster," he said. "To get there, we need open research data."

Hahnel founded generalist data repository Figshare in 2011 while finishing his Ph.D. in stem cell biology at Imperial College London. The company was born out of his personal need for a place to store his research output. He quickly realized he wasn't the only researcher who needed a place to publicly share data that had no other designated repository.

"I wanted to allow scientists and researchers like me to get credit and recognition for all their work," Hahnel explained.

Fast forward to today, and Hahnel is a vocal advocate for open data and open research. He's also been a partner for the past year on a project with NIH.

The ODSS launched a 1-year pilot project with Figshare in July 2019 to see how NIH-funded researchers would use a generalist repository when they had no other logical place to store their data.

"We all agree that researchers should use subject-specific repositories whenever possible," Hahnel said. "But there isn't always a suitable repository available. In those cases, a generalist repository—be it Figshare or another—is an excellent way to share data."

A goal of the pilot project was to help researchers implement the FAIR principles, which state that data should be findable, accessible, interoperable and reusable—by humans and machines.

"FAIR is a great example of how we can get closer to 'open as possible,'" Hahnel said. "Publishing datasets in a repository without some level of curation can get you to FAIR for humans, but you'll rarely get there for machines.

"This pilot gave us an opportunity to test the idea that we need people curating and improving the data when it is added to a repository to make it FAIR for machines."

The result was more discoverable data thanks to more descriptive titles and metadata.

"Truly FAIR data for humans and machines takes more than just data and technology," Hahnel said. "You need people in the mix working with researchers and checking files."

As a result of the pilot, NIH plans to continue finding opportunities to better engage with and educate the biomedical research community on the value of effective data management and FAIR data-sharing.

What will Hahnel and his team take forward from the pilot?

"It changed my mind that we need to be checking metadata for all our clients," Hahnel said. "I don't know how it's going to scale, so that's an interesting challenge to try to solve.

"We're also going to keep educating as many people as we can on tools and best practices to improve their data-sharing."

The pilot project is now archived at https://nih.figshare.com/, with the data still discoverable and reusable.

To learn more about the NIH Figshare project, visit https://datascience.nih.gov/data-ecosystem/exploring-a-generalist-repository-for-nih-funded-data.

NIDDK's Gorden Honored

Dr. Phillip Gorden, NIDDK director emeritus, is the recipient of the Endocrine Society's 2021 Fred Conrad Koch Lifetime Achievement Award for his exceptional accomplishments in the field of endocrinology. Gorden, who served as NIDDK director from 1986 to 1999 and is now a section chief in the Diabetes, Endocrinology and Obesity Branch, has contributed significantly to research advances in diabetes and disorders of the insulin receptor and insulin resistance. Under his leadership, NIDDK expanded its clinical research portfolio and led initiatives that have helped shape current practice. The award will be presented at the Endocrine Society's annual meeting in March.

Rivera To Give 'Mind the Gap' Webinar, Sept. 30

The NIH Office of Disease Prevention will host a Methods: Mind the Gap webinar on Wednesday, Sept. 30 at 2 p.m. Dr. Daniel E. Rivera will discuss optimizing behavioral mobile health (mHealth) interventions using control systems engineering. The presentation will build on aspects of the June 2019 webinar, "Using Control Systems Engineering to Optimize Adaptive Mobile Health Interventions."

Control systems engineering is a broadly applicable field that considers how to adjust system variables over time to improve targeted outcomes. It is responsible for diverse consumer products such as cruise control, the home thermostat and the artificial pancreas. It is receiving increasing attention in mHealth as a means to design and optimize behavioral interventions for physical activity, smoking cessation and obesity.

The talk will establish the relevance of control engineering to mHealth using two interventions currently under development—Just Walk, to promote walking in sedentary adults, and Healthy Mom Zone, for managing gestational weight gain in overweight/obese pregnant women. Both interventions are predicated on a novel experimental design known as the Control Optimization Trial, which takes advantage of *a priori* information available to the user to facilitate modeling (accomplished via system identification) and integrates it with controller design. Rivera will discuss his experience in advancing these concepts within a team science environment as well as the contrast between control systems engineering and machine learning approaches, such as reinforcement learning.

Dr. Daniel E. Rivera

A professor of chemical engineering in the School for Engineering of Matter, Transport and Energy at Arizona State University, Rivera received a B.S. degree in chemical engineering from University of Rochester, an M.S. degree in chemical engineering from University of Wisconsin and a Ph.D. in chemical engineering from California Institute of Technology. His research interests span the topics of dynamic modeling using system identification, robust process control and applications of control engineering to problems in supply chain management and behavioral medicine. In 2007, he received a Mentored Quantitative Research Career Development Award from the National Institute on Drug Abuse to examine how dynamical systems and control engineering approaches can be used to optimize interventions for the prevention and treatment of drug abuse.

Registration is required; visit https://prevention.nih.gov/education-training/methods-mind-gap/optimizing-behavioral-mhealth-interventions-using-control-systems-engineering-control-optimization. The webinar will be recorded and available on the ODP website within approximately 1 week.

The webinar series explores research design, measurement, intervention, data analysis and other methods of interest in prevention science. For more information, visit https://prevention.nih.gov/mindthegap.

NINR workshop panelists included Dr. Mary-Frances O'Connor, associate professor, director of clinical training, psychology department, University of Arizona. Also participating was Dr. Steve Cole, professor of medicine and psychiatry and biobehavioral sciences, UCLA School of Medicine.

NINR Explores Role of Genes, Social Environment on Health

While it has long been recognized that social environment can influence risk, manifestation and trajectory of disease and associated symptoms, the underlying biological mechanisms remain understudied. NINR recently partnered with colleagues across NIH to host the "Genomic Response to the Social Environment: Implications for Health Outcomes" workshop, which examined this research area.

The trans-disciplinary event provided a platform to address the relationship among genomics (epigenomics, gene expression, microbiome, telomeres), social environmental factors and both positive and negative health outcomes. Researchers from around the country delivered presentations on a diverse set of topics that crosscut diseases, populations and the lifespan.

Presenters talked about changes at the cellular level that occur when disease processes are altered by environmental or social adversity. Much of this leads to inflammatory gene expression, which has negative health impacts. However, the flip side is that research has also shown that improving well-being, for example by finding greater purpose in life, can have a positive impact on health by reducing inflammatory genes and increasing positive gene expression.

A recording of the full workshop is available at https://videocast.nih.gov/watch=37955.

NINR was supported by the NIH Office of Disease Prevention and the NIH Office of Behavioral and Social Sciences Research for the workshop.

VOLUNTEERS

NHLBI Seeks CHIP Patients

NHLBI seeks patients with clonal hematopoiesis of indeterminate potential (CHIP). Patients with CHIP have a genetic mutation that has been associated with blood cancer. The study will look at CHIP and try to determine its relationship to blood cancers and heart disease. The study will also try to discover other new organs or diseases that may be linked with CHIP. There is no charge for study-related tests, medications or procedures. Travel assistance may be provided. For more information about study 19-H-0139, call 866-444-2214 or (800) 877-8339 TTY/ASCII. Read more online at https://go.usa.gov/xpYyx.

CCUS Patients Sought

NHLBI seeks patients with clonal cytopenia of undetermined significance (CCUS). Patients with CCUS have low blood counts and a normal bone marrow exam but more advanced genetic testing shows the presence of a genetic mutation that is likely causing the low counts. The study will look at CCUS and try to determine its relationship to blood cancers and heart disease. The study will also try to discover other new organs or diseases it may be linked with. There is no charge for study-related tests, medications or procedures. Travel assistance may be provided. For more information about study 19-H-0139, call 866-444-2214, (800) 877-8339 TTY/ASCII or visit https://go.usa.gov/xpYyx.

At left, Tabor and Dr. Sanford Rosenthal sit in front of an oxygen metabolism apparatus in their laboratory at NIH in 1944. **PHOTO: ASBMB** At right, Tabor in his lab during a 2019 oral history interview **PHOTO: CLAIRE JOHNSON**

Tabor

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a warm, humble, insightful and imaginative man. Dr. Tabor was truly loved and respected by everyone who worked with him, at the NIH and beyond," said Dr. Griffin Rodgers, NIDDK director, and Dr. Michael Gottesman, NIH deputy director for intramural research, in a message to all NIH staff after Tabor's death.

Tabor and his wife, Celia—also an NIH physician-scientist—revealed the many functions served by polyamines, organic compounds that interact with DNA, RNA and proteins. The Tabors demonstrated that polyamines are required for growth of most organisms; protect against oxidative damage, elevated temperatures and environmental insults; and help maintain mitochondria and the fidelity of protein biosynthesis. The Tabors lived in housing on the NIH campus and raised four children.

"He was a consummate scientist to the very end, working remotely during the pandemic on research papers with NIH colleagues. Aside from leaving a profound scientific legacy, he was the last living voice of the NIH's formative years, having arrived in 1943 to the then recently created Bethesda campus," said the note from Rodgers and Gottesman.

In a 2019 oral history interview, Tabor described arriving at the Bethesda campus. "The NIH was a small place then...Here I am, a young fellow just out of school, and what do I do? I receive orders to report to the commanding officer. So, I go up to Bldg. 1—to show how different things were then—and I go into the NIH director's office and say: 'Here I am.'"

Tabor was born in New York City on Nov. 28, 1918, in the midst of the flu pandemic. He grew up during the Great Depression and attended public schools. He received his undergraduate degree from Harvard University in biochemical science in 1937 and medical degree from Harvard in 1941.

Tabor's oldest son, Dr. Edward Tabor, recalled, "My father was dedicated to working at the lab bench up until the last year of his life and he spent time every day at the bench. When I was growing up, he and my mother worked together in the evenings and weekends, writing papers about their own work, writing scientific review articles and working on editing the journal as well as several volumes in the *Methods in Enzymology* series. Their example was a way of teaching and I learned a lot about a life in science just by watching how much they enjoyed the work they did together."

Tabor's influence went beyond his family and NIH.

During an internship at Yale New Haven Hospital in 1942, Tabor saw both the clinical and biochemical worlds. This included the first clinical use in the country of penicillin, a drug that would prove crucial in saving the lives of soldiers fighting in what would soon be labeled World War II. He assisted in the first administration of penicillin in the United States, curing a deadly case of streptococcal septicemia.

In 1943, during WWII, Tabor entered the Public Health Service and became the sole medical officer on the USCGC Duane, a Coast Guard cutter that sailed between the U.S. and England, guarding convoys bringing supplies to the British Isles. After one battle at sea, when the Duane sank a German submarine and captured its crew, Tabor provided medical care to rescued Allied sailors whose ship had just been sunk by the submarine as well as to captured German sailors.

As that year wound down, Tabor was transferred to NIH, working under the supervision of Dr. Sanford Rosenthal, chief of the Laboratory of Pharmacology and Toxicology at the National Institute of Arthritis and Metabolic Diseases, now called the National Institute of Diabetes and Digestive and Kidney Diseases. Together they studied electrolyte changes in burns and traumatic shock and determined how to treat such injury using saline instead of plasma, as plasma was in short supply.

No summary of Tabor's achievements is complete without note of his leadership of the *Journal of Biological Chemistry*. He joined the *JBC* editorial board in 1961, became associate editor in 1968, and editor-in-chief in 1971, a position he held until 2010. Tabor oversaw the journal's expansion from 1,000 to 4,500 published articles per year and he was the moving force behind its transition to online publishing in 1995. He also created the *Minireview Compendium*, a yearly compilation of all short reviews published in the *JBC*.

Tabor celebrates his 70th year of federal service with NIDDK director Dr. Griffin Rodgers in 2013. For the occasion, former President Barack Obama wrote a letter thanking Tabor for his "extraordinary commitment... to advancing science through public service."

PHOTO: BILL BRANSON

In 2011, in honor of Tabor's scientific and editorial legacy, the *JBC* established the Dr. Herbert Tabor Young Investigator Awards to recognize early-career first authors of standout *JBC* papers for their creativity and scientific excellence. Similarly, the Dr. Herbert Tabor Research Award from the American Society for Biochemistry and Molecular Biology (ASBMB), established in 2004, honors senior investigators.

"Herb left a legacy like none other in *JBC's* history," said Dr. Lila Gierasch, editor-in-chief of *JBC*. "Were it not for Herb, I don't know what the journal, and the molecular bioscience he helped it shepherd, would look like today."

Tabor's honors are many. He received the Arthur S. Flemming Award in 1956; received the PHS Meritorious Service Medal in 1970; was elected to the American Academy of Arts and Sciences in 1971; was elected to

The Tabors on the side of their house on the NIH campus during a spring lunch break, 1967

PHOTO: ASBMB

the National Academy of Sciences in 1977; received the Hillebrand Prize from the American Chemical Society in 1986; and he and Celia received the William C. Rose Award from the ASBMB in 1994. In honor of his 100th birthday, Montgomery County proclaimed Nov. 28, 2018, as Dr. Herbert Tabor Day.

Dr. Urs Ruegg, who worked at NIH in the 1970s, recalls staying briefly with the Tabors in their campus home in later years. "I will always remember how in the mornings, a bag with manuscripts that were assembled the day before arrived on their front porch with a big noise. At about 6 a.m., Herb would go and get that bag, in which there were about 50 bundles of papers, and decided which co-editor or associate editor would get which manuscript for further handling and review. I was always very impressed with this activity and the intensity of the way Herb talked and carried out science."

Tabor was a prolific mentor of other scientists. One of many mentees is Dr. Reed Wickner, who trained under Tabor and succeeded him as chief of the Laboratory of Biochemistry and Genetics in 1999.

"Dr. Tabor taught me how to do science, and his devotion to science set a standard for me to aspire to," Wickner said. "His gentle sincerity combined with forthright critical thinking made him a leader throughout his career."

Tabor is survived by four children—Edward, Marilyn, Richard and Stanley—as well as 10 grandchildren and 6 great-grandchildren.

The ongoing Covid-19 pandemic has limited the family's ability to hold memorial services. In lieu of flowers, donations are welcome in Tabor's name to the Children's Inn at NIH.

Ancient Dog Species May Teach Us About Human Vocalization

In a study published in *PNAS*, researchers used conservation biology and genomics to discover that the New Guinea singing dog, thought to be extinct for 50 years, still thrives. Scientists found that the ancestral dog population still stealthily wanders in the Highlands of New Guinea. This finding opens new doors for protecting a remarkable creature that can teach biologists about human vocal learning.

The New Guinea singing dog can also be utilized as a valuable and unique animal model for studying how human vocal disorders arise and finding potential treatment opportunities.

The study was performed by researchers at NHGRI, Cenderawasih University in Indonesia and other academic centers.

The New Guinea singing dog was first studied in 1897, and became known for its unique and characteristic vocalization, able to make pleasing and harmonic sounds with tonal quality. Only 200-300 captive New Guinea singing dogs exist in conservation centers, with none seen in the wild since the 1970s.

Photograph of a Highland Wild Dog taken in Indonesia

IMAGE: ANANG DIANTO, PTFI PAPUA PROVINCE, INDONESIA

"The New Guinea singing dog that we know of today is a breed that was basically created by people," said Dr. Elaine Ostrander, NIH distinguished investigator and senior author of the paper. "Eight were brought to the United States from the Highlands of New Guinea and bred with each other to create this group."

According to Ostrander, a large amount of inbreeding within captive New Guinea singing dogs changed their genomic makeup by reducing the variation in the group's DNA. Such inbreeding is why the captive New Guinea singing dogs have most likely lost a large number of genomic variants that existed in their wild counterparts. This lack of genomic variation threatens the survival of captive New Guinea singing dogs. Their origins, until recently, had remained a mystery.

Another New Guinea dog breed found in the wild, called the Highland Wild Dog, has a strikingly similar physical appearance to the New Guinea singing dogs. Considered to be the rarest and most ancient dog-like animal in existence, Highland Wild Dogs are even older than the New Guinea singing dogs.

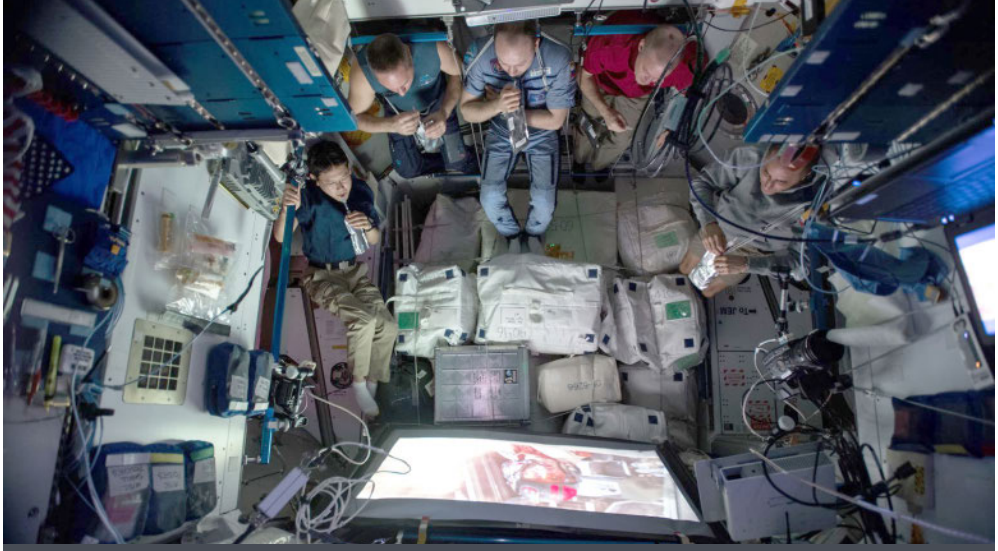
Researchers previously hypothesized that the Highland Wild Dog might be the predecessor to captive New Guinea singing dogs, but the reclusive nature of the Highland Wild Dog and lack of genomic information made it difficult to test the theory.

In 2016, in collaboration with the University of Papua, the New Guinea Highland Wild Dog Foundation led an expedition to Puncak Jaya, a mountain summit in Papua, Indonesia. They reported 15 Highland Wild Dogs near the Grasberg Mine, the largest gold mine in the world.

A follow-up field study in 2018 allowed researchers to collect blood samples from three Highland Wild Dogs in their natural environment as well as demographic, physiological and behavioral data.

"By getting to know these ancient, proto-dogs more, we will learn new facts about modern dog breeds and the history of dog domestication," Ostrander said. "After all, so much of what we learn about dogs reflects back on humans."

The researchers also aim to study New Guinea singing dogs in greater detail to learn more about the genomics underlying vocalization (a field that, to date, heavily relies on birdsong data). Since humans are biologically closer to dogs than birds, researchers hope to study New Guinea singing dogs to gain a more accurate insight into how vocalization and its deficits occur, and the genomic underpinnings that could lead to future treatments for human patients.



Above, movie night aboard the International Space Station. Right, Marsha Ivins aboard the space shuttle in 2001. Ivins spoke at the annual NIAMS intramural retreat. Below, Bangkok at night, with the green lights of fishing boats off its shore, as viewed from the ISS. Bottom, ISS acoustic jam session. The "drum" is a repurposed solid waste container.

PHOTOS: NASA

NIAMS Intramural Staff Experience Life in Space—Virtually

BY ALISA ZAPP MACHALEK

On May 30, 2020, for the first time in nearly a decade, NASA astronauts blasted into space in an American-made rocket launched from U.S. soil. Former astronaut Marsha Ivins knows just what they experienced—the jolt of accelerating to 17,500 m.p.h. in under 10 minutes, then floating, weightless, more than 250 miles above.

A veteran of five spaceflights and now an independent engineering consultant, Ivins logged more than 1,300 hours in space. She presented a keynote address recently at the annual retreat for the NIAMS Intramural Research Program.

In her talk, titled "A Short Story of Human Spaceflight," Ivins captivated her Webex audience with a speedy run-through of NASA highlights. She began with the 1961 flight of Alan Shepard (the first American in space), then described progress made by the Mercury, Gemini and Apollo missions, along with personal anecdotes and historic footage. The narrative culminated with photos of the International Space Station (ISS) and its current crew—three NASA astronauts and two Russian cosmonauts—including the two Americans who had arrived via their SpaceX vehicle just days earlier.

Ivins spent much of her talk focusing on the exhilaration—and weirdness—of weightlessness.

"It's so much fun [and] it's so hard to get [the] hang of," she said. "It's so crazy to go places headfirst, go down a ladder headfirst, look at people upside down. I never got tired of that."

Photos and videos of herself and others aboard the ISS visually reinforced her words and provided intimate insight into the daily lives of space travelers. For example, without gravity, water doesn't flow. Instead, it forms flexible balls. To bathe, astronauts smear one body part at a time with baseball-sized blobs of water, then add liquid soap. Human waste is handled based on its form. Solid waste is sealed in plastic. Liquid waste is recycled into drinking water ("making tomorrow's coffee out of today's coffee").

Those aboard the ISS follow a rigorous schedule that includes maintaining the space station; running experiments in botany, biology, human physiology and engineering; and exercising 2 hours a day to ward off the loss of muscle and bone mass (of particular interest to the NIAMS audience). But they also have a bit of time to relax. Popular entertainment options include watching movies on a wide-screen TV, or jamming with acoustic guitars, pipes and a clean, never-used solid waste can repurposed into a drum.

Ivins showed a photo of an area of the station called the cupola. With its wrap-around windows, the cupola is a favorite spot for taking selfies and "watching the world go by," she said. "We go around the Earth every 90 minutes. For 45 minutes we see daylight and for 45 minutes we see night... So, 16 times a day we see the sun rise and 16 times a day we see the sun set."

Ivins's talk included a kaleidoscopic tour of Earth from above, featuring more than 150 photos taken by orbiting astronauts. Some images highlighted the many colors of our home—the turquoise waters of the Caribbean, the red soil of Australia's outback, the curving green glow of our atmosphere. Others featured familiar cities or recognizable land masses, such as Italy's boot or Florida's sock. The last few photos revealed the impact of humans—smog above Beijing, residue outlining the BP oil spill, a squiggly red line marking the artificially illuminated boundary between India and Pakistan.

Questions after the talk featured insatiable curiosity about life on the space station, including:

- How do you wash your clothes? (You don't—you wear them until they are "loosely connected clothing molecules," and then throw them away or use them like bubble wrap to protect hardware and experiments returning to Earth.)
- People sweat when they exercise, and you store human waste for months. Does it stink up there? (Not too bad.)
- When will we land on Mars? (Likely not before 2030.)

A question that elicited one of the most interesting answers came from the 8-year-old son of a NIAMS investigator: "Where does the oxygen come from?" The answer: In part, from wastewater. Liquid waste can be either recycled or put into a Russian device that breaks it into oxygen and hydrogen. The oxygen is released into the cabin and the hydrogen is "thrown overboard." The Russians also have a candle-like device that releases oxygen when it burns. Resupply crafts bring tanks of nitrogen, which is combined with oxygen to create a breathable mixture.

Ivins ended her talk by reminding Earth-dwellers of the vastness of space. She described a simple exercise that drove the lesson home: On a clear night, go outside and raise a thumb at the sky, holding it out at arm's length.

"This is a portion of sky that would be obscured by your thumb," she said, displaying a black expanse shot through with pinpricks of white and gold. "Each point of light in this picture is not a star," she said. "Each point of light is a galaxy. Wrap your brain around that."