BIG PICTURE

SPRING 2021

The View from Lewis College

Inventing the Impossible

A Bug's Life

Advancing the Fight Against COVID-19

ILLINOIS TECH | Lewis College of Science and Letters

BIG PICTURE

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and other correspondence
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Informing the future: New worlds of possibility at the intersection of science, humanity, and technology

Lewis College of Science and Letters was formed on June 1, 2020, and houses the departments of Biology, Chemistry, Food Science and Nutrition, Humanities, Physics, Psychology, and Social Sciences.

Illinois Institute of Technology, also known as Illinois Tech, is a private, technology-focused research university offering undergraduate and graduate degrees in engineering, science, architecture, business, design, human sciences, applied technology, and law.

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GREETINGS FROM THE DEAN

Lewis College of Science and Letters plays an integral role in the mission of the university.

We provide the basic foundations in communications, the sciences, critical thinking, and global citizenship necessary for success in today's society. At the same time, our faculty and students are engaged in cutting-edge research addressing pressing problems of the world, be it pest control in Michigan, the mysteries of the universe, or our ongoing pandemic.

The year 2021 marks the 20th anniversary of Professor of Chemistry Rong Wang's career at Illinois Tech, where she has developed an active lab with several health-related projects on the frontier of scientific advancement, including the development of technology for a smart toothbrush and the utilization of silk cocoons from silkworms to restore pelvic floor tissue in women. The Department of Physics has this year built upon its close working relationships to the area's quantum science laboratories through its hire of our newest faculty member, Assistant Professor Rakshya Khatiwada, who holds a joint appointment with the physics department and FermiLab and is developing Illinois Tech's first-ever quantum computing course for undergraduates. In the humanities, Associate Professor of History Mar Hicks has been recognized for their contributions to the national discussion of ethical considerations in artificial intelligence, landing on a list of "100 Brilliant Women in AI Ethics," and has just published their second book. And in social sciences, Associate Professor of Political Science Daniel Bliss is taking advantage of our fertile backyard—the city of Chicago— for his studies through his contribution to an upcoming book on the successes and failures of our city's mayors.

Our students and alumni have also been hard at work. Their research projects range from the mitigation of cutworms devouring corn and dry bean plants in the Midwest, to body image differences in women, and from gut microbiomes to bioanalytics and dreams of NASA. Looking at our alumni, we see that this wide range of interests and skills carries on after graduation, into careers in the food industry, nuclear safety, communications, and emergency management.

Of course, the rapidly evolving COVID-19 pandemic created a need for research on various fronts, and Lewis College remains engaged through multiple projects. Leading advancements in COVID-19 treatment, Professor of Biology David McCormick has developed a drug now on its way to FDA approval. Psychology professors Nicole Legate and Arlen Moller, meanwhile, have focused on attitudes toward social distancing in an international context.

As I sat down to write this letter I realized that it was a year ago today that the World Health Organization declared that the novel coronavirus disease, COVID-19, was officially a pandemic. On March 23, 2020, Illinois Tech moved classes online, and most of our instruction has been virtual since. It has been a challenging year for our country and our world in many ways. We have dealt with sickness and loss, social isolation, and uncertainty. Financial resources have been stretched to the breaking point. Children have had their educations disrupted, and parents have coped with balancing work and caregiving. For me, it has made even clearer the relevance of the education and research we carry out at Illinois Tech. Now, with spring, I believe there is a light at the end of the tunnel. I wish for all of you a happier and healthier year in 2021.

Christine L. Himes
Dean, Lewis College of Science and Letters

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ON THE COVER

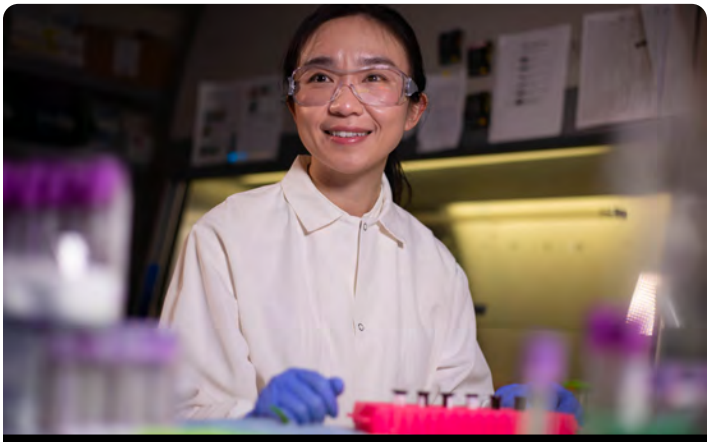
Professor of Chemistry Rong Wang extracts and purifies the protein fibroin from the cocoons of silkworms, which are used to generate silk-carbon nanotube composite fibers that help restore pelvic floor tissue in women.

Photo: Olivia Dimmer

ILLINOIS TECH
Lewis College of Science and Letters

PUBLICATION NEWS

GUT CHECK



Xuhuiqun "Sissi" Zhang works with a human plasma sample like those used in her study in the Center for Nutrition Research.

A study led by Illinois Institute of Technology researcher and alumna **Xuhuiqun "Sissi" Zhang** (Ph.D. FDSN '20) has found that young and middle-aged adults with prediabetes have an altered gut microbiome composition, which is associated with reduced concentrations of select bioactive microbial metabolites and impaired metabolic health, as well as potential risk for diseases.

Zhang, who works as a research scientist at Illinois Tech's Center for Nutrition Research, published a paper on her team's findings in the journal *Nutrients* in 2020.

"We aimed to understand if adults with prediabetes have specific gut microbiota profiles that may affect the [ability] to metabolize bioactive (poly)phenols, [which are naturally occurring organic compounds], and [whether their gut microbiota profiles correlate] with impaired metabolic biomarkers," Zhang says.

The researchers used a process called whole genome shotgun metagenomic sequencing to characterize the gut microbiome composition of young and middle-aged adults with prediabetes and insulin resistance, as well as metabolically healthy study participants. They measured fasting glucose and insulin, fasting lipids profile, blood pressure, and body composition of 36 participants to assess their metabolic health status. Targeted quantitative metabolomic analysis of blood and urine samples collected over 24 hours were used to examine microbial (poly)phenolic metabolites in response to study participants' consumption of a (poly)phenol-rich red raspberry test drink.

The most significant feature of the altered gut microbiome composition present in adults with prediabetes was enriched *Ruminococcus gnavus*, a proinflammatory bacterial species associated with Crohn's disease. The researchers also found evidence of depleted *Bifidobacterium bifidum*, a common probiotic species that helps maintain gut homeostasis. Individuals with prediabetes have also been found to have impaired gut microbiome function.

"In the next step [of our research], we would like to explore if nutritional strategy would improve cardio-metabolic health through shaping the gut microbiome," Zhang says.

CATCHING FIRE

Associate Professor of History **Mar Hicks** has recently been named one of the 100 Brilliant Women in AI Ethics and has also just published their second book.

The "brilliant women" recognition came from Women in AI Ethics, "a global initiative with a mission to increase recognition, representation, and empowerment of women in [Artificial Intelligence] Ethics," according to its website. The initiative is sponsored by the Social Good Fund, a California-based nonprofit.

"It's a great honor to be named to this list, which includes both women and nonbinary people this year," Hicks says. "The people on this list are luminaries in STEM and humanities fields whose research focuses on questions of socially responsible AI and ethical technology."

Hicks collaborated with three other scholars of information studies and the history of technology to co-edit *Your Computer Is on Fire* (MIT Press, March 2021), a collection of essays.

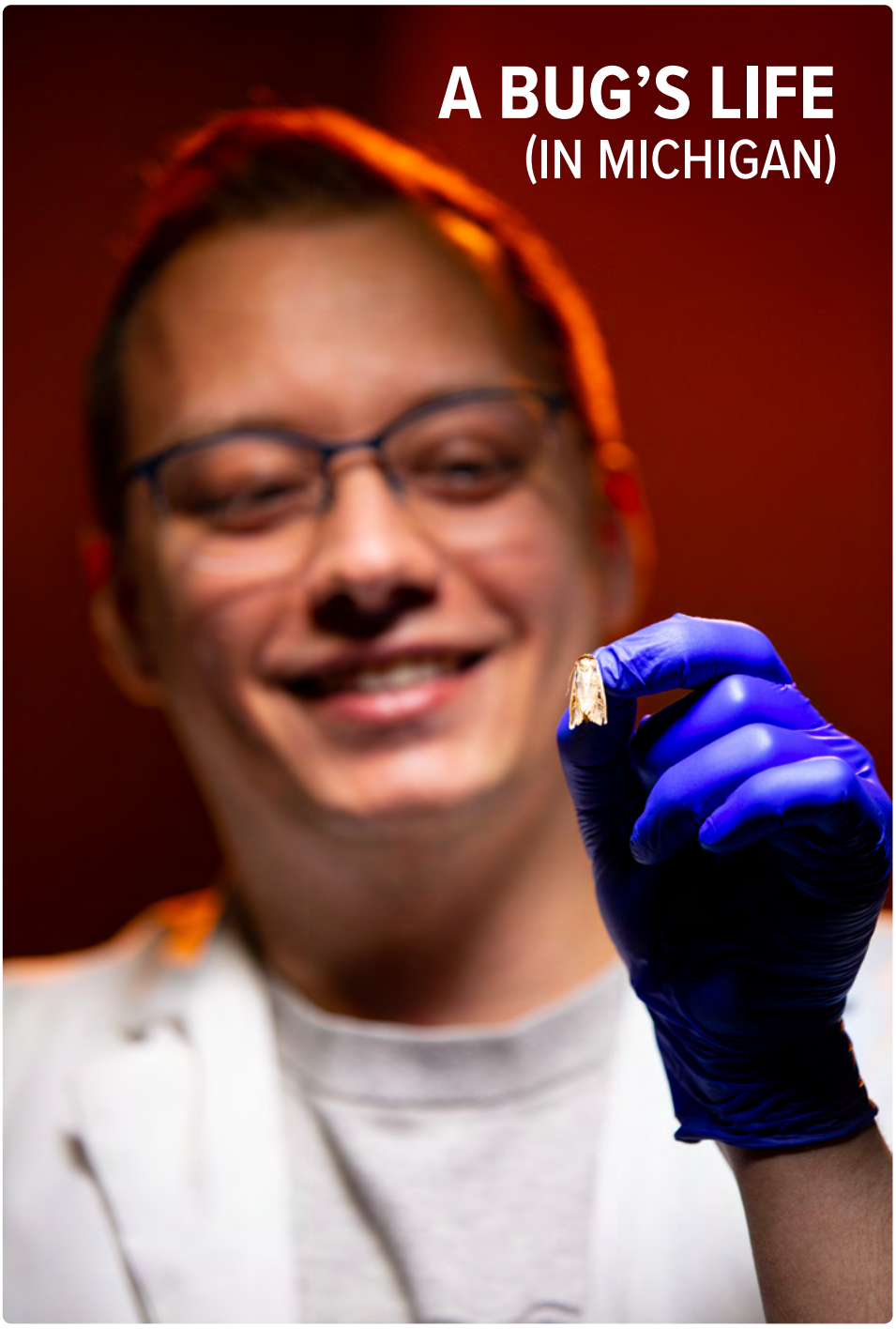
"[The book] trains a spotlight on the inequities and marginalization that our technological infrastructures have taken for granted—and intensified—as they've scaled," Hicks says. "The essays in it help us understand how we can learn from this history to avoid replicating destructive patterns over and over again."

Hicks's first book, *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing* (MIT Press, 2018), received several awards including the prestigious Herbert Baxter Adams Prize from the American Historical Association.

Hicks is now at work on a book about the "hidden histories" of electronic computing.

"It teaches us new historical lessons by illuminating histories that have not yet been told," Hicks says. "These examples give us new conceptual tools for understanding how we got into some of the technological messes we're currently dealing with, as well as how we can get out."

A BUG'S LIFE (IN MICHIGAN)



Dakota Bunn uses phase contrast microscopy to examine Nosema spores, a type of spore-forming unicellular parasite, in the western bean cutworm. He hopes to better understand the frequency of the infection in the moths and how it could affect them and their general biology.

New research from Illinois Institute of Technology biology Ph.D. student **Dakota Bunn** (Ph.D. BIOL Candidate) is providing insight into the habits of the western bean cutworm, a pest to corn and dry beans that is native to the western Great Plains but has found its way to Michigan. Bunn published his research on the activities of the cutworm in the February 2021 issue of *Environmental Entomology*, in a paper titled "Contribution of Larvae Developing on Corn and Dry Beans to the Adult Population of Western Bean Cutworm in Michigan."

The cutworm, which is actually a type of moth, is now present in 25 states and four Canadian provinces. Corn and dry bean farmers in Michigan have separate methods of pest management for dealing with the cutworm: a naturally occurring soil bacterium called *Bacillus thuringiensis* (Bt) is used to alter the genetic makeup of corn, helping the crop to develop its own insecticidal properties, while a liquid insecticide is applied to the leaves of the dry bean plants.

"When using these techniques, we have to be conscious of resistance development, so normally a portion of each field is not treated to keep treatment susceptibility in the pest population," Bunn says. "We wanted to know if the moths that fed on beans as larvae were interacting with the moths that fed on corn as larvae, and if these crops could be used as a type of co-refuge for each other."

Bunn and his colleagues captured moths over two summers in central Michigan, froze them, and then conduced a stable carbon isotope analysis on their wings and heads, which revealed whether the adult moths fed on corn beans in the larval state.

"Overall, we found that very few moths that we captured developed on dry beans, and almost all moths that we captured developed on corn," Bunn says. "We were able to determine that corn and beans are not suitable as co-refuges, and that mainly adults that developed on corn are contributing to the next generation of western bean cutworm in Michigan."

Bunn says the findings underscore the need to continue to closely monitor the cutworms' resistance to the insecticide used for corn.

STUDENTS ON THE RISE

RESEARCHING BODY IMAGE IN BLACK AND WHITE WOMEN

Now on the brink of defending her dissertation, Illinois Institute of Technology clinical psychology Ph.D. candidate **Talissa Dorsaint** is preparing to share her findings on the body image experiences of Black and white women. Dorsaint, a graduate student researcher in Associate Professor of Psychology Alissa Haedt-Matt's Eating Behaviors Lab, collected data from 400 United States women online, 200 Black and 200 white. Participants completed questionnaires pertaining to body dissatisfaction and disordered eating, and were randomly exposed to either 10 images of thin Black and white bodies or 10 images of curvy Black and white bodies.

"Our research is showing that body ideals have changed drastically in the last 10 years, and that's why I'm focusing on curvaceous body ideals," Dorsaint says. "It seems as though, culturally speaking, in Western society we've stepped away from the thin body ideal. We can see that in celebrity culture, specifically with athletes such as Serena Williams in a classic athletic body. We also see changes in bodies in a more curvaceous way—thinking about your Kim Kardashians and Beyoncés, and even considering how beauty standards have changed in terms of plastic surgery. We're noticing that there's more of a desire for that body type."

Dorsaint says existing research has tended to show that Black women experience body dissatisfaction with limited explanation as to why.

"That was always compared against the thin ideal, which comes from sort of a white societal standard of what it means to be thin," she says. "I thought it would be a good idea to look into additional body ideals that might better fit [Black women's] experiences so as to explain what's been happening in the research for the last few years."

Dorsaint is still processing the data from her study, but hypothesizes that Black women exposed to a curvy body ideal will report larger increases in body dissatisfaction than white women exposed to the same ideal. Going forward, she hopes to publish this research in an academic journal. As a student in the clinical psychology Ph.D. program, Dorsaint has also been recognized for her commitment to diversity and inclusion; she received the program's inaugural Social Justice Award in 2020 after founding both the program's student-led diversity committee and the Chicagoland Diversity Committee Network, which brings clinical psychology Ph.D. students in Illinois together to discuss best practices for their programs' diversity committees.

SKY'S THE LIMIT

Third-year student **Diana Csercse** is the first-ever Illinois Institute of Technology student to enroll in the new Bachelor of Science in Bioanalytical Chemistry program, which itself is the first program of its kind in the United States. A native of Brasov, Romania, Csercse is now gaining hands-on experience in an Analytical Method Development Lab course.

"This is an important lab because we are able to directly experience the equipment and work through the data analysis," Csercse says. "We have worked with gas chromatography, high-performance liquid chromatography, ultraviolet-visible spectrometry, and atomic spectrometry machines. We write extensive reports to finish off the experience."

Csercse is also making valuable connections at Illinois Tech, including with industry experts who visit her classes as guest speakers. One guest in particular—a bioanalytical chemist working at NASA—made a potentially life-changing impression on Csercse.

"[The fact that she worked for NASA] gave me chills," Csercse says. "I didn't know it was possible to be a chemist and work for NASA. I should've known, but it was almost an unreachable goal in my brain. When we spoke, she not only gave me her email to connect with her, but she applauded me. She said, 'NASA looks for people like you: someone who will make their way up and introduce themselves. She showed me it is possible."

Csercse says she plans to find a laboratory job upon graduation and work her way up in the field.

"I do dream big, with one ultimate goal, and that is to work for NASA," she says.

INVENTING THE **IMPOSSIBLE**

By Linsey Maughan

What if your toothbrush could detect a gum infection, helping to prevent the need for dental surgery? Or if cocoons from silkworms could help restore vital tissue in the female body? These are just two of the latest scientific advancements underway in Professor of Chemistry **Rong Wang's** research lab.

A clinical sample of thin-sectioned pelvic floor tissue is fixed on a glass surface for the nanoscopic study of collagen fibrils' structure and biomechanics to determine the stage of prolapse.

"We make basic science useful in practical applications for improving the quality of life," says Wang, who is celebrating 20 years of teaching and research at Illinois Institute of Technology this year. "I always tell my students that I partner with them to explore new areas and find solutions by invention. I love to see the sparkles in my students' eyes. Seeing them defend their thesis with great confidence is fulfilling."

Originally from China, Wang studied physics as an undergraduate at Jilin University in Changchun, China, and then studied chemistry as a doctoral student at the University of Tokyo. After completing her Ph.D., Wang conducted biology research as a post-doc at Los Alamos National Laboratory in New Mexico. Her diverse roots remain evident in the broad perspective she brings to the research projects taking place in her lab today.

"I love the idea of tackling a biological problem with chemical and physical approaches, so my research is quite interdisciplinary," Wang says. "I am particularly excited about learning from natural biological processes, then tailoring functional materials and inventing new methods for early disease diagnosis, prevention of disease progression, and effective treatments."

THE FUTURE OF TOOTHBRUSHING

In 2020 Wang, along with a multidisciplinary team of 15 other faculty members from Illinois Tech and the University of Illinois at Chicago College of Dentistry, began work toward the development of a saliva-based point-of-care sensor device that will enable the detection of early signs of periodontitis, a serious gum infection that can result in dental surgery for a patient if not treated early. The Centers for Disease Control and Prevention reports that nearly 50 percent of adults have some form of periodontal disease.

"Periodontitis often progresses without noticeable symptoms, leaving patients to seek professional care only after the periodontium is considerably destroyed," Wang says. "Due to its multifactorial nature, periodontitis cannot be effectively diagnosed by a single biomarker or a set of markers in one category. Therefore, there is a clinical need to develop a sensor device that measures an array of periodontitis-associated biomarkers in saliva for frequent and longitudinal monitoring."

Wang and her colleagues will work to develop novel sensor modalities capable of detecting a variety of chemicals in saliva. The sensors will be placed in a microfluidic device—also referred to as a "lab-on-a-chip"—that will be placed inside a toothbrush that will send low-power signals and communication to clinicians using technologies such as Bluetooth and Linux. Data collected from human subjects will inform how machine-learning models are built. The team has received funding support from the Pritzker Institute of Biomedical Science and Engineering via the Exploratory Initiative Program, enabling researchers to begin the work of developing sensor modalities. It continues to develop proposals for additional funding from the federal government and other sources.

"By integrating research advances in sensing elements, microfluidics, communications, data analysis, and artificial intelligence, we would ultimately like to develop a Smart Total Oral Care system that can be used for unobtrusive,

accurate, and real-time saliva-based self-monitoring for health care," Wang says. "Such a device will assist in the modern clinical advancements, such as teledentistry and telemedicine, by which the number or duration of onsite clinical visits will be reduced with such quantitative data in hand. New commercial products can be developed based on the biosensor, such as smart toothbrushes and wearable oral devices similar to nightguards."

Additional Illinois Tech faculty members involved in the project include Assistant Professor of Biomedical Engineering Abhinav Bhushan; Gladwin Development Chair Assistant Professor of Computer Science Yan Yan; Industry Associate Professor of Information Technology and Management Jeremy Hajek; and from the Department of Chemistry, professors Richard Guan, Ishaque Khan, and Yuanbing Mao, Research Professor John Green, and Associate Professor of Chemistry David Minh.

PELVIC FLOOR RESTORATION—WITH SOME HELP FROM SILKWORMS

Additional research ongoing in Wang's lab includes a project utilizing cocoons from silkworms to support the regeneration and restoration of pelvic floor tissue in women to help treat pelvic organ prolapse. Prolapse occurs when muscles and tissue in the female body weaken and can no longer hold pelvic organs including the uterus, bladder, and rectum in place. Wang says the silk material can help revive the function of fibroblasts—cells that help make up the structural framework of tissue—through an in vitro electrical stimulation process. A cell-imbedded fiber matrix can be injected or applied as an internal bandage or implant, and can be repeatedly used to stimulate the cells' renewal through a medicated electrical-stimulation process. The matrices degrade in approximately 20 days and should be replaced by native tissue.

"The use of autologous [patient's own healthy] cells to treat, for example, connective tissue wounds or disorders, is relatively safe and simple," Wang says, "effectively avoiding complications in other approaches, such as immunological rejection of cells derived from other individuals; complicated control of isolation, expansion, and differentiation conditions of stem cells; or heterogeneity between cells of the same type but from different origin."

> **"I am particularly excited about learning from natural biological processes, then tailoring functional materials and inventing new methods for early disease diagnosis, prevention of disease progression, and effective treatments."**
>
> **–Rong Wang**

The project began with the use of spider silk proteins, but the team later replaced them with silkworm silk proteins, which Wang says are "abundant and cheap" and have proven effective for use in cell stimulation. The cocoon research is funded by a $440,000 grant from the National Institutes of Health; collaborators on the project include Anne Sammarco at Rush University Medical Center and Margot Damaser at Cleveland Clinic Lerner Research Institute. The team is also developing flexible, transparent silk films for potential use as corneal scaffolds, contact lens material, and scaffolds for gum healing.

Beyond smart toothbrushes and silk-inspired tissue rejuvenation, Wang and her student researchers are also collaborating on a project with the United States Food and Drug Administration aimed at understanding foodborne virus adhesion to different surfaces. FDA Staff Scientist Carol Shieh is the principal investigator; Wang is the co-PI. They received a $50,000 grant from the FDA through October 2021. Wang and her lab have so far supported the project through research determining the design of a surface's chemical composition and nanostructure, which she says helped informed options for ways to control viral adhesion and transmission to and from food contact surfaces.

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Chemistry Ph.D. fourth-year student Elwin Clutter examines cell response to aligned fibers and electrical stimulation through a microscope.

FACULTY UPDATES

ADVANCING THE FIGHT AGAINST COVID-19

Since fall 2020, IIT Research Institute (IITRI) has performed preclinical efficacy and safety studies of several dozen novel agents designed to prevent or treat COVID-19—among them, an inhaled recombinant protein to prevent COVID-19 infection. The inhaled therapy will soon advance to the United States Food and Drug Administration for approval and, if approved, will advance to clinical trials led by the National Institutes of Health.

David McCormick, a professor of biology and president and director of IITRI, is leading the project. In September, McCormick received $597,893 from the National Cancer Institute to perform a research project titled "Inhalation Studies of Recombinant Human Angiotensin-Converting Enzyme 2."

"Angiotensin-converting enzyme 2 (ACE2) is the receptor molecule to which SARS-CoV-2, the coronavirus responsible for COVID-19, binds in human cells," McCormick says. "The idea is that administration of this molecule by inhalation will provide non-cellular targets in the respiratory tract to which the virus will bind, thereby reducing virus binding to ACE2 on the surface of lung cells. Reduced binding of the virus to the cell will reduce viral infectivity and disease severity."

McCormick and his team conducted two safety assessments of inhaled ACE2 in fall 2020. Endpoint evaluations in both studies have been completed, and final study reports were submitted to the NCI in March. These reports will become part of a larger submission to the FDA to support approval of the clinical trial, which could begin within 30 working days of submission.

Since October 1, 2020, IITRI has been awarded more than $7.8 million in funding for other COVID-19 research projects. Funders include the U.S. Department of Defense, the U.S. Department of Health and Human Services Biomedical Advanced Research and Development Authority, and nearly 30 biotechnology and small pharma companies. McCormick says the work involves evaluation of the efficacy of biotherapeutics and small-molecule therapeutics, as well as preclinical toxicology and pharmacology studies.

"Although the rollout of COVID-19 vaccines has begun, many millions of people have not been vaccinated and remain at risk of the disease," he says. "Development of safe and effective agents to prevent and/or treat COVID-19 has the potential to save thousands of lives."

Funding for the inhalation study reported in this article was supported by National Cancer Institute contract 75N91019D00013 (Task Order 75N91020F00002). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NCI.

UNDERSTANDING SOCIAL DISTANCING DEFIANCE

New research from associate professors of psychology **Nikki Legate** and **Arlen Moller** has engaged 27,190 people from 89 different countries to explore the motivation behind social-distancing practices. Legate and Moller collected data from April to September 2020, inspired by a call for projects from the Psychological Science Accelerator, a network of labs around the world, to use psychological science to help solve global problems related to COVID-19. Legate and Moller's study participants included members of the labs as well as individuals those labs recruited.

"The mission of this project is to find universally effective ways of motivating people to engage in social distancing around the world, and to see whether there are unintended costs of using common motivational strategies like shaming and pressuring people," Legate says.

Study participants were randomly assigned one of three conditions: an autonomy-supportive message that inspired reflective choices, a controlling message about social distancing that was forceful and shaming, or no message at all. Afterward, participants were asked about their intentions to socially distance, or not, as well as their motivations. Legate and Moller found that the controlling message increased likelihood of defiance as well as controlled motivation, or a feeling of social distancing only because one has to. They aim to publish this research with a top peer-reviewed journal in the next couple of months.

"Informing more effective public health messaging can save lives, not just in the context of social distancing, but for promoting lots of other health behaviors, too," Moller says.

EVALUATING RAHM EMANUEL

Associate Professor of Political Science **Daniel Bliss** is co-authoring a book chapter about former Chicago mayor Rahm Emanuel for a new book on Chicago's mayors, forthcoming from University of Illinois Press in early 2023, titled *Modern Mayors of Chicago: From Harold Washington to Lori Lightfoot.* Bliss, whose first book is *Economic Development and Governance in Small Town America: Paths to Growth* (Routledge, 2018), says his new research points to a complex mix of strengths and weaknesses in Emanuel's performance as mayor.

"What you have is a mayor who was certainly a more adept manager of finances and infrastructure than his predecessor had been, and also much more clued in on trends of economic development," Bliss says. "But at the same time, he had very serious difficulty with the human resources side of the city, with some very significant personnel failures and very low morale with both the police department and the teachers, [and] significant cuts in city spending that fell disproportionately on severely disadvantaged people, such as sharp cutbacks in mental health provision."

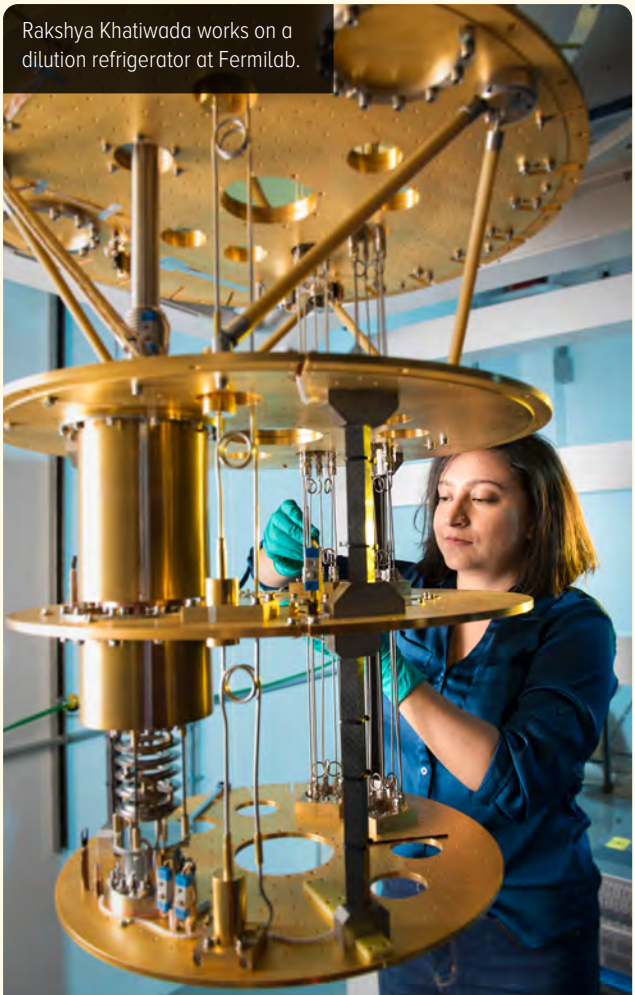
Dick Simpson, a professor of political science at the University of Illinois at Chicago and a former Chicago alderman, is editing the book. Bliss's co-author for the chapter on Emanuel is Kari Lydersen, author of the Emanuel-themed book *Mayor 1%: Rahm Emanuel and the Rise of Chicago's 99%* and a journalism instructor at Northwestern University.

HEAD IN THE STARS

As young girls growing up in Kathmandu, Nepal, **Rakshya Khatiwada** and her sister would climb atop the roof of their family home, gaze up into the night sky full of stars, and "formulate ideas about how the universe worked," Khatiwada says. The two preferred this activity over watching television. They also both grew up to earn doctorates in physics.

Khatiwada is now the newest faculty hire in the Department of Physics, having joined Illinois Institute of Technology in August 2020 with a joint appointment as an assistant professor at Illinois Tech and an associate scientist at Fermilab. She holds bachelor's degrees in physics and mathematics from Linfield University and a Ph.D. in physics from Purdue University. She completed a postdoc at the University of Washington in Seattle before joining Fermilab for her second postdoc.

Today, Khatiwada is engaged in quantum information science research, an area Illinois Tech is expanding into with her help. Quantum information science combines computing and sensing with quantum mechanics, a core physics theory regarding the physical properties of atoms and subatomic particles. Khatiwada is serving as a principal investigator on a $4.5 million, five-year project under the Quantum Science Center led by Oak Ridge National Laboratory, one of five national quantum initiative centers funded by the Department of Energy to bring together national labs, industries, and academia to work on quantum science research. The project involves quantum sensors that are used for both fundamental science and quantum computing. Fermilab is a partner in the Quantum Science Center.



Rakshya Khatiwada works on a dilution refrigerator at Fermilab.

"The project's goal is to use state-of-the-art electronics developed at Fermilab to control and read out a large array of novel quantum sensors and devices, which have application in quantum computing and detector development for dark matter physics, among other areas," Khatiwada says. "Right now, we are in the process of finalizing the specifications of a cryostat, a dilution refrigerator, which is the test-stand that will house the large array of quantum sensors and devices. We are also trying to design the details of the interesting novel sensors we want to work with."

Khatiwada's additional research involves ultra-low-noise particle detectors and the use of quantum sensors and devices for the detection of dark matter, which makes up more than five times the matter content of the known universe.

"This is not ordinary matter like you, me, people, planets, and stars are made of," Khatiwada says. "Mostly this research is motivated by the fundamental question of trying to understand the universe."

Khatiwada has several Illinois Tech undergraduate and graduate students working on her projects at Fermilab and looks forward to working with more. She is also leading the effort to develop a new quantum computing course that will be offered to Illinois Tech's undergraduates in the spring of 2022.

ALUMNI SUCCESSES

MEAT INDUSTRY ROCK STAR

In a facility located in Chicago's historic stockyards district, **Liang Bennett** (BCHM '15, M.S. FST '16) is putting her Illinois Institute of Technology food safety training to good use, overseeing all regulatory compliance for Chicago Meat Authority (CMA), a meat-processing company working with hundreds of meat buyers and producers. With the title "technical assurance manager," Bennett supervises quality assurance and food safety and serves as a liaison to the federal government.

"I am the main point of contact for government agencies such as the United States Department of Agriculture's Food Safety and Inspection Service," Bennett says. "I also oversee our research and development team for any new product development."

Prior to joining CMA in 2018, Bennett worked with raw and ready-to-eat foods, bakery operations, coffee, confections, and the beverage industry. In 2019 she was recognized by the North American Meat Institute (NAMI) and the International Production & Processing Expo as one of 30 people under age 30 demonstrating exceptional leadership in the meat industry. She was also named one of 10 Leaders of Tomorrow by the Food Marketing Institute and NAMI during their Annual Meat Conference in 2020.

"I love what I do," Bennett says. "The meat industry is incredibly fast-paced, and there are so many learning opportunities here. I enjoy seeing a project through from start to finish and being able to walk across all of the processing steps, from examining raw material integrity, determining quality and food safety parameters, and scaling up pilot plant trials to full-blown plant runs, to finished product packaging and testing. Being able to hold the finished product and understand I had a part in its inception is pretty incredible."

Liang Bennett uses a caliper to measure the thickness of a steak per Chicago Meat Authority's quality inspection procedures.

BUILDING BRAND AWARENESS

As a communications specialist at GoodMorning.com, one of Canada's largest independent online mattress retailers and fastest-growing companies, **Brook Bell** (HUM '16) says every day is an adventure.

"As an independent company, we built everything from the ground up," he says. "We are constantly researching, testing, and vetting the latest trends and figuring out what our own best practices are."

Bell, who now lives in Edmonton, Alberta, Canada, handles offsite review management, onsite review moderation, moderation of social media profiles, and more in his current role.

"I am passionate about understanding our brand's audience—what they love, who they follow, who they find to be influential to make meaningful content and messaging that they connect with," he says. "I will forever pursue the challenge to build brand awareness, trust, and a brand's reputation with consumers in the ever-changing media landscape, regardless of the medium (traditional, web, social media, etc.)."

Bell plans to continue on in communications and hopes to advance to a manager or director position in the future. Outside of work, he says he enjoys going for runs and spending time with his girlfriend and his dog, a shorkie named Jenny.

RADIATION SAFETY PRO

Since graduating with his master's degree in health physics, **Sandor Demeter** (M.S. HP '16) has applied his subject matter expertise to his work in multiple areas. An associate professor of radiology at the University of Manitoba in Winnipeg, Canada, he has published academic research related to health physics, including studies on economics and radiation protection in medical settings, the effects of radiation, and more. He also runs his own nuclear medicine clinical practice and serves on multiple committees related to radiation and nuclear safety, including the Canadian Nuclear Safety Commission and the International Commission on Radiological Protection.

Demeter says he loves that the field of health physics offers a blend of both physics and biology.

"From subatomic particle physics to policies to protect workers, the public, and the environment, health physics offers a stimulating and rewarding career path," he says.

Olurotimi "Timi" Akindele (PS '15) got his first taste of public service work while serving as president of the Student Government Association and the African Student Association at Harold Washington College, where he attended college before transferring to Illinois Institute of Technology.

"That experience shaped and developed my keen interest and admiration for public administration, public policy, and political science," he says. "So when I applied for admission to Illinois Tech, I already had a major to target and a degree of choice to earn."

Akindele was born in Jos, Nigeria, and spent his childhood there; then his family moved to Chicago, where Akindele attended high school and college. After graduating with his B.S. in political science in 2015, Akindele earned a master's in communication and management at Northwestern University. He worked in consulting before joining the Federal Reserve Bank of Chicago, where he helped advance industry relations and stakeholder engagement, and then the United States Department of Commerce, where he managed a U.S. Census Bureau recruitment team and helped recruit, organize, and develop census workers.

Today, Akindele works as an emergency management specialist for the Federal Emergency Management Agency, part of the U.S. Department of Homeland Security, where he implements disaster plans, policies, guidance, and initiatives.

"The workload specifically covers communicating and collaborating with other federal, state, and local agencies, volunteer organizations, and faith-based organizations to assist communities and disaster survivors with emergency recovery planning, disaster-assistance programs, and case status updates," he says.

In terms of future plans, learning is at the core of Akindele's priorities.

"I was taught the advantage of knowledge—that the most successful people are the ones who have the best information," he says. "So my future career goal is to become more knowledgeable—to evolve in the right direction and become the best version of myself."

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