

Illinois State University

ISU ReD: Research and eData

Redbird Scholar

Research and Sponsored Programs

Fall 2022

Redbird Scholar, Volume 8 Number 1

Illinois State University

Follow this and additional works at: https://ir.library.illinoisstate.edu/rsp_redscholar



Part of the [Higher Education Commons](#)

Recommended Citation

Illinois State University, "Redbird Scholar, Volume 8 Number 1" (2022). *Redbird Scholar*. 15.
https://ir.library.illinoisstate.edu/rsp_redscholar/15

This Book is brought to you for free and open access by the Research and Sponsored Programs at ISU ReD: Research and eData. It has been accepted for inclusion in Redbird Scholar by an authorized administrator of ISU ReD: Research and eData. For more information, please contact ISUReD@ilstu.edu.

ILLINOIS STATE UNIVERSITY

REDBIRD

SCHOLAR

Volume 8, Number 1

Fall 2022



Critter Cuisine

In her new book, Dr. Gina Hunter challenges readers to explore why humans did, do, and should eat insects. (Page 6)



ILLINOIS STATE UNIVERSITY
REDBIRD
 SCHOLAR

Editor-in-chief
 Kevin Bersett, MBA '17

Lead designer
 Michael Mahle

Designers
 Lawrence Lair
 Sean Thornton '00, M.S. '17
 Evan Wallis '06,

Photographer
 Lyndsie Schlink '04, M.S. '21

Production coordinator
 Tracy Widergren '03, M.S. '15

Writers
 Tyler Emken
 Ela Messina
 John Moody
 John Twork, M.S. '12

Magazine board

Dr. Craig C. McLaughlan
Associate vice president for Research and Graduate Studies

Brian Beam, M.S. '94, MBA '10
Executive director of University Marketing and Communications

Dr. Gina Hunter
Director of the Office of Student Research

Eric Jome
Director of Media Relations

Dr. Jonathan Lackland
Director of Governmental Relations

Dr. Noelle Selkow
Director of the Graduate School

Jason Wagoner
Senior director of Research and Sponsored Programs

Your feedback is welcome. Send letters to the editor, comments, suggestions, story ideas, Ask a Redbird Scholar questions, and Redbird media submissions to *Redbird Scholar* Editor-in-Chief Kevin Bersett at kdberse@IllinoisState.edu or Campus Box 3420, Normal, IL, 61790-3420. Bersett can also be reached by phone at (309) 438-4329 and through Twitter at @ISUResearch. To fill out a survey on each issue, visit IllinoisState.edu/RedbirdScholar.

23-21335 This document is available in alternate formats upon request by calling University Marketing and Communications at (309) 438-8404.

Illinois State University, as an equal opportunity/affirmative action employer, complies with all applicable federal and state laws regarding affirmative action, nondiscrimination, and anti-harassment. Illinois State University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, national origin, sexual orientation, order of protection, gender identity and expression, ancestry, age, marital status, disability, genetic information, unfavorable military discharge, or status as a veteran in employment, educational programs and activities, or admissions. Inquiries or complaints may be addressed by contacting the director of the Office of Equal Opportunity and Access by email at EqualOpportunity@IllinoisState.edu, by calling (309) 438-3383, or by mailing to the office at Illinois State University, Campus Box 1280, Normal, IL 61790.

Redbird Scholar
 Volume 8, Number 1—Fall 2022, a free magazine
 Published biannually
 Office of the Associate Vice President
 for Research and Graduate Studies
 Campus Box 4000
 Normal, IL 61790-4000

IllinoisState.edu/RedbirdScholar

IO

Dr. Mahua Biswas (right) is creating the building blocks of future technology by researching the tiniest of particles in her nano lab.

Departments

- I Redbird media
- 3 Q&A: Dr. Antony Joseph
- 5 Grant and research news
- 22 Student Research



Follow @ISUResearch on Facebook, Instagram, and Twitter. We also invite you to publicize scholarly activities on campus using the hashtag #RedbirdScholar.



6 Edible insects

In her book, *Edible Insects: A Global History*, Dr. Gina Hunter takes a deep dive into the past, present, and future role of insects as human food. Hunter challenges her readers to see insect consumption as something more than a quirk or a feat seen on an extreme eating show, and as something practiced by people around the world.

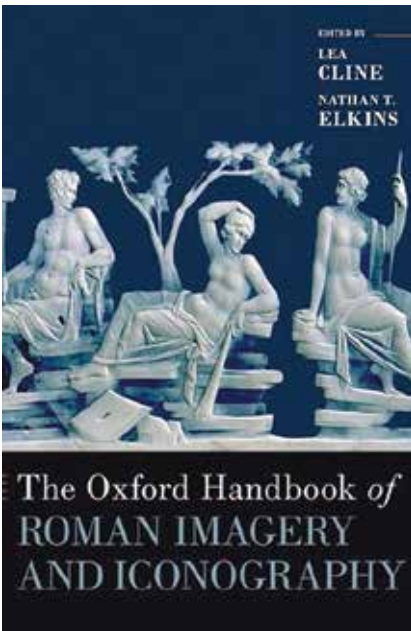
I4 Closing the COVID learning gap

Students across Illinois have had their learning disrupted by the coronavirus pandemic. Illinois State University is leading a statewide tutoring initiative to help students reconnect with school and get back up to speed in the classroom.

I8 Health kick

Obesity and fitness can be predictors of young people's future health and wellness. Dr. Kelly Laurson uses a variety of methods to research how children can get a jump on disease decades ahead of a diagnosis.

Redbird media

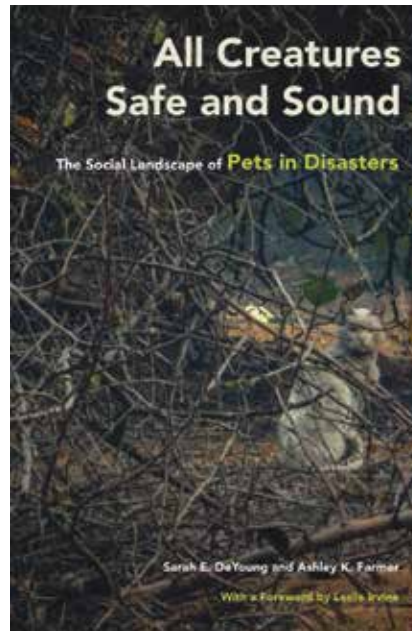


Oxford Handbook of Roman Imagery and Iconography

Co-edited by Dr. Lea K. Cline, associate professor, Wonsook Kim School of Art (Oxford University Press, 2022)

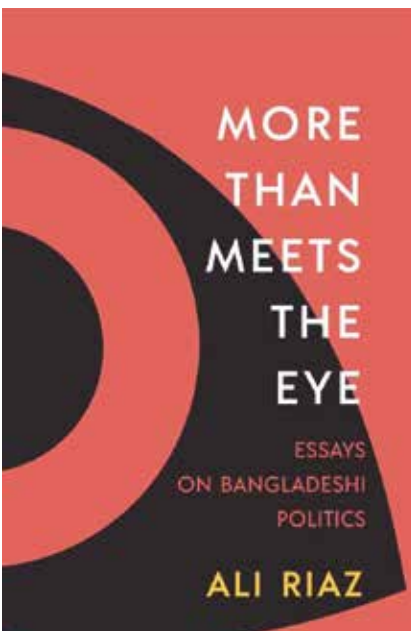
All Creatures Safe and Sound: The Social Landscape of Pets in Disasters

Co-authored by Dr. Ashley Farmer, assistant professor, Department of Criminal Justice Sciences (Temple University Press, 2021)



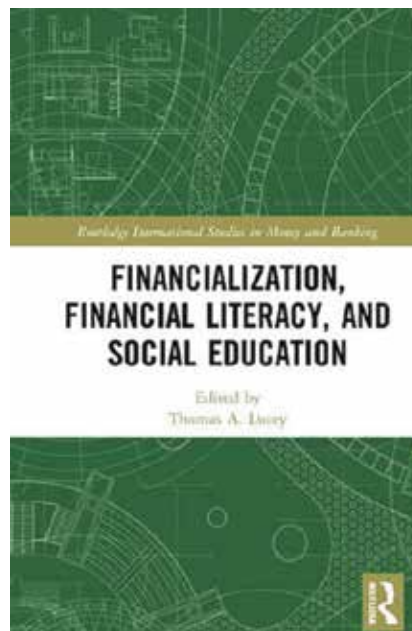
A Compassionate Vision for Elementary Social Studies: A Holistic View

By Dr. Thomas A. Lucey, professor, School of Teaching and Learning (Routledge, 2021)



Financialization, Financial Literacy, and Social Education

Edited by Dr. Thomas A. Lucey, professor, School of Teaching and Learning (Routledge, 2021)



More Than Meets The Eye: Essays on Bangladeshi Politics

By Dr. Ali Riaz, Distinguished Professor, Department of Politics and Government (Unnayan Shamannay, 2022)

Books, audio and video recordings, and mobile applications created by Illinois State University faculty, staff, and students are eligible for inclusion in this section. Submit entries to kdberse@IllinoisState.edu.



The Q & A

with **Dr. Antony Joseph**

By Kevin Bersett

Deafening: Researcher examines how wartime blasts damage service members' hearing

For more than a decade, Dr. Antony Joseph has been investigating hearing loss suffered by military members exposed to combat explosions. Joseph, an occupational-research audiologist in the Department of Communication Sciences and Disorders, began researching the topic while he served as an audiologist and commander in the U.S. Navy. Joseph has worked with colleagues at the Naval Health Research Center to compile and analyze the blast-related auditory injury database (BRAID), which comprises information from nearly 17,000 Navy and Marine personnel who experienced combat injuries during the wars in Iraq and Afghanistan.

Joseph's team has largely been supported by \$1.2 million in Department of Defense grants. The researchers want to better understand how to identify, diagnose, and treat blast-related hearing loss in the military. He has also published papers examining the relationship between hearing loss and other health problems, such as post-traumatic

stress disorder (PTSD) and insomnia.

Joseph received his Doctor of Audiology at Central Michigan University and his Ph.D. at Michigan State University. He arrived at Illinois State in 2015, where he is now a tenured associate professor.

In the following Q&A, conducted last spring, Joseph discussed his blast-related studies and the impact his research is having on veterans.

How did you get involved in this research on hearing loss due to blasts?

During my Navy career, I had an opportunity to deploy in 2008–2009 and see what service members were complaining most about when they were injured. One of their concerns that rises to the very top is hearing-related issues.

In 2011, I was approached by Dr. Andy MacGregor, and we decided to form a team, which led to development of the BRAID database. The plans for this database were actually to expand it to the entire military, but

we were only able to gain access to Navy and Marine Corps audiometric data. It took us about a year and a half to construct the database, and we ended up with almost 20,000 service members who had been exposed to blasts who had deployed to Operation Iraqi Freedom and Operation Enduring Freedom.

While I was stationed in San Diego, I managed what is one of the largest, if not the largest, hearing conservation programs in the military. I saw a lot of data, and that's where a lot of the research questions came from that we ultimately used in the blast studies, questions about what kinds of audiometric configurations do you get, what things can we do as clinicians to expedite early identification of auditory injuries and health problems associated with blast injury and hearing loss.

I saw in one of your studies that 75% of all combat injuries in your database were due to blasts. How does a blast exactly affect somebody's hearing?

Some of the studies we've published have identified that blasts can affect hearing in a variety of ways. It's dependent on the individual, and it is also dependent on the blast and their orientation to the explosion. It's dependent on their lifestyle and health, the climate, and how stressed or fatigued they are. The distance from and orientation to the blast wave are important as well. All of these things can determine the outcome of auditory injury when exposed to loud impulsive noises, such as blasts.

When a blast occurs again, depending on the proximity there is a very intense but briefly formed sound wave. Some people liken it to a very loud clap, but it has a lot of power to it. And that raw power and heat passes through the body typically. It can damage the peripheral auditory system from the part of the ear you can see, all the way up to the nerve that funnels sound information to your brain. Blast energy is powerful enough to rupture the eardrum and break apart hair cells in your ear.

The sound wave is massive. It can also be accompanied by a heat wave that passes through the brain tissues. From this, the central and higher system of the auditory mechanism can also be affected.

What we've seen is that a large percentage of people do not get an audiometric-threshold hearing loss. So, I do a hearing test, and your result may look as if you're fine. But the individual is still complaining, 'I can't hear clearly.' A hearing test may look unremarkable, but an auditory problem might be reflected through an electrophysiologic test or an assessment of central auditory processing. And we know that those issues can create problems hearing background noise and hearing when conditions aren't really all that good for communication. So, blast exposure can produce problems that cannot be seen in a typical hearing test, but

audiologists may need to conduct additional diagnostic tests to examine other facets of the auditory system.

What are the most common hearing injuries that you are seeing from blasts? For example, I saw one of your studies focused on tinnitus (ringing in the ears).

Our research team tends to concentrate on hearing loss and tinnitus. We have a tendency to concentrate on whether or not the hearing loss is affecting the low-pitch range, or the high-pitch range, or a combination of those two. We aim to help



clinicians look at the hearing test data, and then determine if the service member needs access to further care. Do they need more definitive evaluation? Do they need to go to a surgeon? And if someone's ears are ringing, to what extent are they ringing? Is it ringing once a year, once a day? Is it constant? Is it intermittent?

We're trying to get clinicians better information to be able to manage individuals in a timely fashion. Because we know if we can get to some of these problems early, we can often reduce the effects of a

communication disorder, maintaining your ability to communicate with your loved ones, family, and co-workers.

The study you asked about was published in the *Military Medicine Journal*. One of the things we looked at was tinnitus and self-rated health from individuals who have tinnitus subsequent to deployment and combat blast injury. Those individuals have a tendency to rate their overall health lower than people who do not have tinnitus. So, we realize that if you rate your health lower, we should be concerned about mental health

as well. Clinicians should pay attention to individuals who have tinnitus to determine if they need mental health support, if they need other levels of support to cope with it.

One of your studies examined the link between PTSD and hearing loss. Can you explain a little bit about what that study was about and what you found?

In that study, we found an association between PTSD and hearing loss subsequent to a blast injury. Individuals who have hearing loss in both ears after that type of exposure are far more likely to have PTSD

than individuals who have no hearing loss or even hearing loss in one ear.

Clinicians need to be aware of the fact that when a service member who is blast-injured has hearing loss in both ears, they should ask themselves, ‘Do I need to be thinking about working them up for PTSD?’ You need to definitely be looking at an evaluation for PTSD and at that patient’s mental health. We published our findings in 2020 in *BMC Public Health*.

Were you able to discover why there might be a link between those two—hearing loss and PTSD?

There’s quite a bit of things like depression and anxiety that are associated with hearing loss, particularly sudden hearing loss. Likely the case is that if you have hearing loss of both ears, you probably were exposed to a significant blast and exposed to more trauma.

Can you talk about the insomnia paper as well? What did you find?

To further investigate the impact of blast exposure on mental health and sleep, we collaborated with Dr. Rachel Markwald, one of the top investigators of sleep science. We discovered an association between insomnia and hearing shift, which is very interesting.

In terms of a hearing shift and insomnia, you are twice as likely to have insomnia when you suffer a hearing shift in combat. Being exposed to something traumatic, such as a blast, can result in auditory problems, which can contribute to difficulty sleeping. So, it’s not just the event that happened, but it’s the subsequent health issues that come about.

We are recommending that service members who have suffered a hearing shift, as a result of being exposed to blast, should be questioned by their medical providers

about their ability to get rest. In most cases, clinicians already inquire about sleep when there’s a tinnitus complaint, but they really need to think about those with hearing shift as well.

Do you think your research is making an impact on veterans who are suffering from hearing loss?

Yes. I do get contacted by a number of physicians, audiologists, and veterans about our work. People get referred to me by other audiologists. And many of them actually want to be a part of our studies.

A plug in for our clinic (Eckelmann-Taylor Speech and Hearing Clinic) here as well. We do see a lot of veterans here. Of course, as you know, ISU is a veteran-friendly campus. That’s one of the things that drew me to ISU as well. We try to help our students get the perspective of a military person and include VA work in their training. I’m hoping our research will continue to get veterans calling and inquiring and wanting to know more about their auditory health.

My lab, ISU, and all of us in this community want veterans to feel the love and empathy for people who have been injured by blast as a result of serving the country. We are trying to learn more, investigate further, and ultimately improve the way our current and future doctors manage their presenting concerns.

Are there any other studies I haven’t mentioned that you would like to talk about?

We published a population attributable risk paper in 2018. In that study, we were the first to show that in a community of individuals who have been blasted, we could attribute about 63–65% of the hearing loss to blast. A service member is twice as likely to get a hearing loss when injured by a blast as opposed to not injured by a blast. They were more than twice as

likely to get a high-pitch (high-frequency) hearing loss and twice as likely to get a low-pitch (low-frequency) hearing loss. That study was published in the *American Journal of Epidemiology*.

We published a report in the *International Journal of Audiology* in 2020. We tend to think in audiology that all noise-induced hearing losses result in a notched audiogram where patients have good hearing in the low-pitch range but have hearing loss in the form of a dip in the high pitches. That forever has been a marker for noise exposure, and it still is. But what our study revealed was that blast injury can produce other patterns of hearing loss. This is good clinical information. We try to get clinicians to understand that you shouldn’t rule out a blast-related, noise-induced hearing loss, because the audiometric pattern doesn’t look exactly like one that might have been caused by industrial noise.

What’s next in your research?

Hopefully, sometime this year, we have another publication coming out on tinnitus. We have another paper that we hope will publish this year about who’s going to get a hearing shift in combat settings. We have a predictive model that individuals with more severe hearing loss are at-risk for more hearing shift than those without hearing loss. Specifically, we discovered that there are tones audiologists and physicians need to pay attention to before deploying those with a pre-existing hearing loss. Chances are, if they’re exposed to a blast, they’re going to experience a hearing shift. I’m very excited about that study. We have been able to produce some papers that present some novel and clinically useful data.

Grant and research news

College of Engineering takes step forward

Illinois State's new College of Engineering took another big step forward last spring when the Board of Trustees approved the creation of the University's seventh college. This move follows the Illinois Board of Higher Education's approval of the engineering program earlier in the year.

Dr. Craig C. McLauchlan, associate vice president for research and graduate studies, said the college will fundamentally impact how the University approaches research and innovation going forward.

"The approval of the College of Engineering is huge, game-changing," he said. "It's going to dramatically change the scope and scale of what we do."

Dr. Aonover Tarhule, vice president for Academic Affairs and provost, hopes a founding dean will be at Illinois State by spring 2023. Once the dean is hired, nationwide searches will begin for other roles within the college, including department chairs, an associate dean, and a diversity officer.

Additionally, Tarhule will lead a committee composed of current Illinois State faculty who will work with a consulting firm to ensure that a curriculum is in place by the time the first cohort of engineering students arrive on campus in fall 2025.

The College of Engineering will comprise two departments, the Departments of Electrical Engineering and Mechanical Engineering, and offer degrees in electrical engineering, mechanical engineering, and general engineering.

The University will house the college in the to-be renovated John Green Building.

The program is being designed with an equity lens to help close long-standing gaps in enrollment, retention, and graduation of underrepresented and underserved students in the engineering field. Scholarships will be available, with approximately \$500,000 allocated each year to attract students. Half of that amount will be designated to support traditionally underserved and underrepresented students.

Interdisciplinary team receives \$1.3 million grant for STEM education effort

Faculty and staff in the Department of Technology, School of Teaching and Learning, and the National Center for Urban Education received \$1.3 million grant from the National Science Foundation (NSF) to fund the SUPERCHARGE (STEM-based University Pathway Encouraging Relationships with Chicago High Schools in Automation, Robotics and Green Energy) project.

The four-year SUPERCHARGE project will involve collaboration with Chicago Public Schools and community-based organizations in four Chicago neighborhoods.

Cohorts of 20 students, or SUPERCHARGE Scholars, from each of the partnering high schools, will meet after school once per week to engage in educational activities related to robotics, automation, and renewable energy.

Ian Freeman named Goldwater Scholar in Physics

Ian Freeman, an Honors Program student majoring in physics, computational physics, and mathematics at Illinois State University, has been named a 2022-2023 Barry Goldwater Scholar.

The award is one of the most prestigious national scholarships in the fields of science, technology, engineering, and mathematics (STEM).

ISU researchers receive Innovation Network grants

The Illinois Innovation Network (IIN) has awarded nearly \$240,000 in seed grants to eight research teams through its Sustaining Illinois program, according to a news release from the University of Illinois System.

Two Illinois State professors are part of research teams that received funding: Dr. Rebekka Darner, director of Illinois State's Center for Mathematics, Science, and Technology and associate professor of Biological Sciences, for "Career/switch: gamified energy career exploration," and Dr. Matt Aldeman, associate professor of Technology, for "Designing equitable and sustainable STEM education with renewable technologies (DESSERT)."

ISU summer camp promotes cybersecurity education

In July Illinois State's School of Information Technology hosted a summer camp to allow high school students the chance to explore cybersecurity as an education and career path.

The GenCyber program, funded by the National Security Agency and National Science Foundation, strives to provide a solution to the shortage of skilled cybersecurity professionals in the U.S. Dr. Sumesh J. Philip, an associate professor of cybersecurity, received a \$149,000 grant from the program to bring the GenCyber summer camp to Illinois State.



Bug Grub

REDBIRD ANTHROPOLOGIST
INVESTIGATES PAST, PRESENT, AND
FUTURE OF INSECTS AS HUMAN FOOD

BY ELA MESSINA

To an entomologist, an insect is an invertebrate animal with a segmented body, six legs, and one or two sets of wings. To those unfamiliar with entomology, an insect might just be something to swat at with a rolled-up newspaper. To Dr. Gina Louise Hunter, an insect is a tasty snack and a gateway to exploration.

“Insects are and have always been an important human food source, and they are not just sustenance, but are relished by people across the world,” Hunter said.

Hunter is the director of the Office of Student Research and an associate professor in the Department of Sociology and Anthropology. She is also a cultural and food anthropologist, whose current research focuses on foodways and food systems.

In her book, *Edible Insects: A Global History* (Reaktion Books, 2021), she explores the past, present, and future role of insects in diets around the world. In addition to personal anecdotes and more than a dozen insect recipes for readers to try on their own, the publication offers insight into the origins of some insect consumption practices and provides information on the presence of insects in diets across the world today.

Insects are intentionally consumed by an estimated 2 billion people worldwide, yet the potential of insects as food failed to gain traction until recently in Western countries like the U.S., Hunter said.

When her research began in 2016, she set out to apply questions of food anthropology to edible insects, seeking out the answers to questions as they came to her: “What is the history of insect as food? How many insects have been domesticated, and why aren’t more insects domesticated? Why don’t we think of insects as a staple food?”

But before her research could officially proceed, she had to first tackle the basics of entomology.

“Bugs are hard,” Hunter said. “I had to buy an entomology textbook and sit down and learn about insects. It took a while to learn about insect life cycles, classification, and the primary orders of edible insects.”

Once she understood more about the subject, her research began.

The use of insects as sustenance dates to the dawn of humanity. Prehistoric evidence of the practice can be found in many places: from 40,000-year-old Paleolithic cave paint-



Dr. Gina Hunter

ings to archaeological evidence of insect consumption, including coprolites (fossilized feces).

Despite being central to the human diet all those years ago, insect consumption is now referred to as entomophagy, a term Hunter finds detrimental to understanding more about the hundreds of cultural groups who eat insects as a regular part of their diet, in some cases, as a delicacy.

“Entomophagy sounds like a disease,” Hunter remarked. “It just has the sound of something that’s not good.”

Exploring insect consumption as something more than a quirk or feat seen on an extreme eating show meant investing time and care into the practice—so Hunter tried her hand at raising insects of her own.

With three plastic bins and a few adult and pupae-stage darkling beetles obtained by mail order, Hunter created a mealworm microranch in her mudroom. Despite being squeamish in the past when handling bugs, she found herself growing fond of her home-raised mealworms.

When she had raised enough larvae for a meal, she gathered her mealworms and placed them in the freezer to “put them to sleep.” After a quick wash and brief boil in salted water, Hunter sautéed the larvae and added a touch of salt and pepper before trying them: “Crispy, chewy, nutty.”

Her goal in raising mealworms was to learn more about the potential of home-raised insect food, but the larger project led her to think deeply about her relationship to insects, as critters and as food.

“It was a lot of self-reflection,” Hunter said. “Is this going to gross me out? Can I be open to eating all the kinds of foods that I’m being approached with?” I thought I might be repelled, but thinking about eating insects and learning about them made me more curious.”

In 2017 she traveled to Oaxaca, Mexico, with Dr. Maria Luisa Zamudio-Mainou, the executive director of the University’s National Center for Urban Education. In addition to trying what would become her favorite insect dish—escamoles, or the larvae and pupae of an ant native to Mexico and the Southwest United States, fried with chilies, garlic, and onions—her travels gave her an opportunity to participate in a culture that celebrates insects as food.

“I wanted to travel to a place where I could experience insects as an ordinary part of the cuisine,” Hunter said.

For Hunter, confronting the cultural bias against insects, and overcoming some hesitancy of her own, involved gaining perspective.

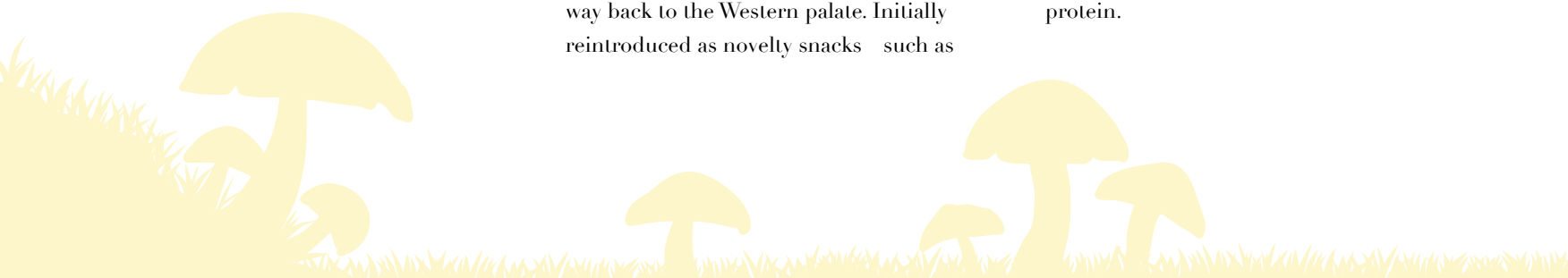
“People think bugs are disgusting, but have you seen flounder? It’s got both eyes on one side of its head,” Hunter quipped. “Lots of seafood looks weird. Many people love seafood; why not insects?”

Disgust toward insect consumption, Hunter explains, is a cultural artifact. Repeated avoidance of insects, perhaps caused by fears of contamination or potential toxicity, became a habit ingrained in those who did not rely on them for sustenance. This avoidance, paired with the common idea that intentional insect consumption is a behavior of the past, resulted in the disappearance of “creepy-crawlies” from the diets of most North Americans outside of Mexico and others in Western countries.

In recent years insects have found their way back to the Western palate. Initially reintroduced as novelty snacks — such as

ranch-flavored crickets and ants encased in cherry lollipops — insects are developing an expanding reputation as something anyone with an interest in sustainability should be turning to.

According to the Food and Agriculture Organization of the United Nations, insects produce just one gram of greenhouse gas (GHG) in the production of one kilogram of protein. Compared to beef’s 2,850 grams of GHG per one kilogram of protein, it is no surprise to Hunter that insects are often heralded as a cure-all, sustainable source of protein.



Bugs by number

Although the exact number of edible insects is unknown, Professor Yde Jongema, an entomologist at Wageningen University in the Netherlands, has maintained an up-to-date record of insect species known to be used for consumption. Currently the list contains 2,111 edible species. As explained in *Edible Insects: A Global History*, the majority of edible insect species comes from the “big five” insect orders:



Coleoptera

Known as the beetle order, this insect category includes 659 different species of edible insects.



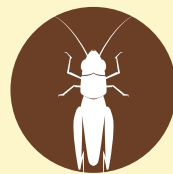
Lepidoptera

Although referred to as the butterfly and moth order, this category’s 362 edible species are primarily consumed while in the caterpillar stage.



Hymenoptera

321 species make up this order’s edible insect offerings, composed of ants, bees, and wasps.



Orthoptera

Grasshoppers, crickets, and locusts are featured in this order, which contains 278 different edible species.



Hemiptera

The order of “true bugs,” composed of insects such as stink bugs and cicadas, has 237 known edible species.

“In the popular press, I saw what I would call the celebration of insects as a solution food. Insects will solve a protein crisis. They are going to solve hunger,” Hunter said. “I do think some insect foods have potential, but they are certainly not a silver bullet solution.”

While insects do provide a hefty amount of protein and leave a much smaller environmental footprint compared with conventional protein sources like beef, there are other effects to consider before turning toward the mass production of insects.

Commercial production of insects also requires energy, feed, and clean water. And most insect production is going toward feed for other animals rather than to humans.

Additionally the expansion of wild harvested insects as a commodity could pose a threat to the practices of those who rely on them.

“It’s striking that at this time when it is harder and harder for people around the world who have been traditionally dependent on insects for food to have access to them, that they are heralded as a solution food in the West,” Hunter said. “Climate change, industrial agriculture, urbanization all of these things have made eating insects less of a possibility for rural people around the world, and yet we’re now starting to celebrate it.”

As Hunter writes in her book, “Cricket powder and other insect products are

already much like other ingredients in a global market: novel ingredients used only to create new snacks for an already overfed consumer.”

So if the promotion of insect consumption as a means for sustainable living is not Hunter’s goal, what does she want *Edible Insects*’ readers to take away?

“Be curious and explore,” Hunter said. “It’s about curiosity and thinking about where our food comes from and thinking about the impact eating has on the world. If eating insects gets you to think about where your food comes from and reflect on the impact of consumption then that’s great.”

Global food

As insects are consumed by an estimated 2 billion people around the world, there is a wide variety of options when it comes to deciding how someone might want to prepare their edible insects. Here are a few ways bugs are served around the globe, according to *Edible Insects: A Global History*:



Brazil

Although insects are not consumed by the majority of this nation’s people, many indigenous Amazonian communities regularly consume insects. One species of the leaf-cutter ant, *tanajura*, is collected and fried in lard or butter, often to be added to a version of the Brazilian dish farofa.



India

In Nagaland, a state in northeast India, edible bee, wasp, and hornet species are boiled, roasted, or fried in oil with spices such as ginger and powdered sumac. Grasshoppers might also be collected to be sundried or smoked.



Thailand

This country is often referred to as the edible insect capital of the world. There is an array of insect food enjoyed across the country. The giant water bug, *Lethocerus indicus*, can be found in sauces, or steamed and served on its own.



Zimbabwe

The most popular edible insect in Zimbabwe is the mopane worm. These are boiled in salted water, and then sun-dried, smoked, pickled, or fried. Because of the nutrition they offer, the trade in mopane worms has become a multimillion dollar industry in Zimbabwe, Botswana, and South Africa.



Dr. Mahua Biswas researches the fabrication of nanometer-scale materials.

A BIG VISION FOR TINY PARTICLES

PHYSICS PROFESSOR CREATES BUILDING BLOCKS OF FUTURE TECH IN NANO LAB

BY JOHN TWORK

You don't need a microscope to grasp the enormous impact of nanotechnology on our daily lives.

"It's the reason why a new phone is sleeker, smaller, and more efficient," said Dr. Mahua Biswas, Illinois State University assistant professor of Physics. "It's the future — nanometer scale materials provide superior optical and electrical properties compared to their bulk versions."

Biswas is fabricating these nanoscale patterned materials as building blocks for futuristic technology — thousands of times smaller than the width of a human hair follicle — through an innovative and tedious process using an atomic layer deposition tool, a spin coater, a centrifuge, and furnaces, among other tools. In her Moulton Hall laboratory, Biswas and her undergraduate student research group whip up inorganic nanostructures and nanopatterns derived from various nanostructured polymers, a substance commonly known as plastics.

The researchers meticulously document the fabrication process and the characteristics of their newly created structures, which have the potential to be utilized in emerging applications such as compact circuit boards, data storage devices, and solar cells. For specialized analysis, Biswas and her students visit Argonne National Laboratory, one of the largest federal research facilities near Chicago, where Biswas is a visiting research scientist.

"It's like a race right now for achieving better technologies," Biswas said. "Those of us in the nanotechnology field are always trying to improve by experimenting with new materials, and we want to make the technologies we're already using even better."

As an undergraduate electronic engineering major in India, Biswas was drawn to the physics of semiconductor sciences and devices. "It's the basis of all electronic devices — like transistor diodes," Biswas said. "You really need to understand the physics well and know about the materials used to make semiconductor devices. That was the part that I loved."



Dr. Mahua Biswas works with student researchers Jaydah Bell (above, left) and Chris Achammer (Page 13) in her applied nanomaterials research lab.

After spending one year working for an engineering firm, Biswas left to pursue a Ph.D. in Ireland where her supervisor was researching semiconductor physics involving zinc oxide nanostructures.

“In 2006, zinc oxide was considered as one of the most promising materials for the future semiconductor industry,” Biswas said. “The cherry on top was I was introduced to nanostructures of zinc oxide which shows superior optical properties.”

In collaboration with her supervisor, Biswas created nanostructured zinc oxide and studied the optical behavior of the material. She moved to the U.S. for postdoctoral work at the New Jersey Institute of Technology and Argonne National Laboratory before joining the faculty ranks. In fall 2020, she arrived at Illinois State.

“This job really gave me what I was searching for, because in our department, the teaching and research balance is really good,” Biswas said. “All of us in the department are doing cutting-edge research, and that is also part of the student development process because students need to get that exposure.”

Last spring, Biswas earned Illinois State a \$179,285 National Science Foundation (NSF) LEAPS-MPS grant to research nano-

structures made of nitrides using a process called sequential infiltration synthesis (SIS). She and her research group will attempt to become the first to successfully develop nanopatterns of nitrides using polymer as templates.

“All the research already happening with nitrides nanopattern growth involves high temperatures,” Biswas said. “Let’s say you want to make an LED (light-emitting diode). A nitride is a very good LED material. You’ll want to make it on a substrate, which is flexible—most likely polymer, a plastic. That’s very difficult currently, because the current methods the industry is using for growing nitrides need a high temperature, which isn’t compatible with any soft substrates like polymers.” This is just one aspect of the difficulties in utilizing small-scale nitride materials for emerging technologies.

Using a low-temperature method, the Biswas group will deposit nitride into a template made of nanopatterned polymer.

“Not many groups are doing low-temperature nitride growth because it’s very difficult to do, but that’s the challenge we are taking on,” Biswas said. “In my proposal, I showed why I think it’s possible.”

The Biswas group will be aided in its research by a state-of-the-art electron microscope purchased through an NSF grant (see sidebar) for which Biswas served as the principal investigator. Known as a field emission scanning electron microscope (FESEM), the instrument takes images of nano-sized objects and enables users to detect intimate details and properties.

“We used to have to travel to Urbana-Champaign to image our samples, which is not at all productive,” Biswas said. “Now, we can make something, go to the next room to image it, and see, ‘OK, this is not working, let’s try the next condition.’ So that’s a huge thing in terms of productivity and student involvement.”

Undergraduate students have played a significant role in Biswas’ lab. During summer 2021, physics students Amelia Korveziroska and Marcos Perez ’22 drove to campus nearly every weekend to make silicon nanoparticles for a project sponsored by an Office of Student Research undergraduate grant.

Their samples were initially characterized under an optical beam in Associate Professor of Physics Dr. Uttam Manna’s lab and sent to University of Chicago researchers who are studying optical trapping. Perez likened the concept of trapping to a science fiction movie.

“You know how they have tractor beams that can lift someone off the ground into the UFO? So, you can basically make tractor

“WE WANT
TO MAKE THE
TECHNOLOGIES WE’RE
ALREADY USING EVEN
BETTER.”

beams but for really small things,” Perez said. “You can make light move physical objects.”

University of Chicago researchers use lasers in their efforts to trap and manipulate nanoparticles, including those created by Korveziroska and Perez. Biswas said they are in the process of writing a manuscript on that work.

“From day one, these two students were really motivated,” Biswas said. “They wanted to do it. Now, you look at how much they are doing and how much they are contributing.”

Perez and Korveziroska co-authored an article with Biswas that appeared in the *Journal of Applied Physics*. They have also presented their research at the American Physical Society conference and the American Chemical Society conference, both in Chicago.

“Actually being here in the lab, papers being published, and the possibility that things I’ve made could maybe one day influence tomorrow – sometimes it’s amazing to think about,” said Korveziroska, a junior physics engineering major who aspires to work for NASA. Over the summer, she participated in a Research Experiences for Undergraduates (REU) program at the Harvard-Smithsonian Center for Astrophysics.

Biswas credits Perez and Korveziroska for helping her establish Illinois State’s nanomaterials lab, which she aims to grow with her NSF grant.

“I would like to have a vibrant experimental research group for a really long time in the department,” Biswas said. “Students will get exposed to this research. And for doing that, I always need to come up with new research ideas to keep getting funding to do these projects and to continue successfully publishing papers.”

Staying steps ahead of cutting-edge technology pushes Biswas to envision the future. Her previous work with sequential infiltration synthesis to make nano patterns for magnetic materials was utilized in developing Western Digital memory storage devices.

“But the early-stage research we’re doing now is considered as the fundamental research for developing a technology,” Biswas said. “The device you have right now – scientists did research for that decades earlier. So, the research we’re doing now – you’ll probably see the result in another 20 years.

“That’s what we do as fundamental researchers. We try everything, and then we give the best to industry.”

And that nanotechnology, the best of the best, perhaps produced in Biswas’s lab might end up in your pocket someday.



MAGNIFYING RESEARCH

Nanoparticles are so tiny that a specialized electron microscope is required for magnification. Until now, that involved compiling samples at Illinois State University and driving an hour off campus to perform an analysis.

Thanks to a \$403,900 National Science Foundation grant for which Illinois State Assistant Professor of Physics Dr. Mahua Biswas was the principal investigator, the once-lengthy trip has been shortened to a quick walk. Planned to be installed in Moulton Hall, a state-of-the-art field emission scanning electron microscope (FESEM) takes images of nano-sized objects of different kinds and magnifies otherwise undetectable details and properties.

Research possibilities reach across fields for students and faculty, with the following units planning on utilizing the electron microscope: Department of Physics; Department of Chemistry; School of Biological Sciences; Department of Geography, Geology, and the Environment; Department of Technology; and University Galleries.

“This grant will change the long-term future of research on campus across departments,” Biswas said.

As students are trained on the FESEM, they will be empowered to take further ownership of their research projects. Biswas said she is also in contact with local educators interested in utilizing the electron microscope to expand learning opportunities for K-12 students.

ISU is leading \$25 million tutoring program created to close COVID learning gap

by Kevin Bersett





To say the coronavirus (COVID-19) pandemic interrupted the daily routine of education across the United States would be putting it lightly. Schools have switched from in-person instruction to remote learning and back again as the number of coronavirus cases have waxed and waned. Many parents held their children out of in-person classes for the entirety of the 2020-2021 school year due to understandable concerns about placing unvaccinated students together in close quarters. These disruptions have left a noticeable mark, statistically and anecdotally, on students.

Last fall the Illinois State Board of Education (ISBE) reported drops of nearly 17 and 18 percent, respectively, in the number of students meeting grade-level standards in English language arts and math between 2019 and 2021. The *Chicago Tribune* noted that one in five Illinois students were chronically absent during the 2020-2021 school year, a 21 percent increase from 2019.

Illinois State's College of Education (COE) is leading the Illinois Tutoring Initiative, a \$25 million federally funded program created to close the learning chasm created during the pandemic by offering high-impact tutoring at schools across the state.

"What we learned through COVID is that face-to-face, personal contact with

students really impacts their ability to gain new content," said Tutoring Initiative Director Dr. Christy Borders. "And so we call it learning disruption rather than learning loss, because part of that is thinking about, 'Well, did they really move backward or was their learning paused?' What we want to do with high-impact tutoring is take them from where they're at and get them moving forward again. High-impact tutoring is one of the only research-based interventions that has shown impacts in both reading and math across multiple grade levels."

The University is the central office for the Illinois Tutoring Initiative in partnership with the Governor's Office, the ISBE, the Illinois Board of Higher Education, and the Illinois Community College Board. ISU is one of six regional hiring institutions, along with Governor's State University, Illinois Central College, Northern Illinois University, Southeastern Illinois Community College, and Southern Illinois University.

Borders is at the epicenter of this daunting two-year endeavor. The former director of ISU's Cecilia J. Lauby Teacher Education Center and her colleague Kim Champion were tasked with creating the novel tutoring program, with an initial goal to provide math and reading tutors to thousands of students, in grades three through eight. This effort is requiring the University and its partners to screen, hire, train, and place tutors in schools most impacted by the pandemic.

Champion, the program's Institutional Partner Office coordinator, hopes the Tutoring Initiative will benefit students and teachers alike: "The COVID outbreak has revealed and widened existing educational disparities. High-impact tutoring is evidence-based in responding to students' individual needs and proven



"The COVID outbreak has revealed and widened existing educational disparities. High-impact tutoring is evidence-based in responding to students' individual needs and proven to accelerate learning."

**Institutional Partner
Office Coordinator
Kim Champion**

to accelerate learning."

Illinois State was chosen as the lead agency because of a plan put forward in summer 2021 by then COE Dean Dr. Jim Wolfinger, which was based in part on the Cecilia J. Lauby Teacher Education Center's creation of an e-tutoring program during the pandemic. That smaller-scale program placed Illinois State teacher candidates as online tutors for families and students across the state.

Funding for the Tutoring Initiative was released in fall 2021, and tutors began working in some schools the following March. In those few short months, Bor-

ders worked with colleagues across the University to develop an evidence-based approach known as high-impact tutoring.

The program—inspired by research conducted at Brown University’s Annenberg Institute—is designed for tutors to meet one-on-one or with groups of no more than three students for one hour, three times a week for eight to 14 weeks. Lessons are tied to what students are

ing program, create the online training modules, and develop processes that allow tutors to receive feedback. The fellows also created a system for collecting data at the different tutoring sites.

“Now they are preparing to identify additional research studies that they may conduct as part of it,” Borders said. “The research team’s sole purpose is program evaluation and determining outcome

get the workforce in place and we have the tutors engaged. Our challenge in terms of research is to learn from this situation and do better with what we understand about tutoring. There’s a hole in the research literature in my opinion.”

There are many studies that show tutoring students who struggle is advantageous, rather than not tutoring them, Barrett said. However, there is not much known about the characteristics of great tutoring and how to help people become better tutors. “If we could hire all perfect tutors, that’d be great. I don’t think we can,” Barrett said. “So our research comes from, What are we going to do to support the tutors?”

The program plans to use a process called “lesson study” to help tutors collaborate and study important ideas about teaching mathematics and literacy, Barrett said.

“My research history here at ISU has been about how we can help kids and teachers grow. So this is a natural for me to want to know how can we help tutors grow,” he said. “It’s a long-term investment because it might not immediately fix the tutors. Hopefully, we’re contributing to the knowledge base so that four or five years from now somebody can look at a paper and say, ‘Let’s set that up so that we start our tutors growing right at the beginning, and then over time, we’ll have a stronger workforce.’”

Tutors are paid \$50 per hour. They are also compensated for their training, travel, and prep work. Successful candidates only need a clean background check and a high school diploma or the equivalent.

“We’re trying to remove the barriers that would prevent someone from taking a high-intensity position,” Borders said.



“Some people may think that anybody can tutor—just go to meet a kid at the library and go through their homework. This isn’t that, and so we want to be able to pay well for the hard work involved in high-impact tutoring.”

Tutoring Initiative Director Dr. Christy Borders

learning in the classroom.

Eight Illinois State faculty members from the Departments of Math (Dr. Jeffrey Barrett), Psychology (Drs. Gary Cates and Shenglian Wu), and Special Education (Drs. Carrie Anna Courtad and Jeongae Kang), and the School of Teaching and Learning (Drs. Courtney Hattan, Deborah MacPhee, and Steve Mertens) served as research fellows to design the tutor-

statements for how students and tutors are doing in the initiative.”

Some research fellows will assess the overall effectiveness of the tutoring programs. Others like Barrett, a professor of mathematics education, focus on narrower questions. He is examining how to guide, support, and develop math tutors.

“It’s a challenge to get the workforce in place,” Barrett said. “Let’s assume we



"The tutoring is just a fantastic added piece of support. It can build that relationship with that adult. The students can ask questions that maybe they don't feel comfortable in class asking, and can get clarification, understanding, and confidence to get back in the classroom and feel on par with the rest of their peers."

**Eighth grade teacher
Diane Gallucci '96,
M.S.E. '01**

"Some people may think that anybody can tutor — just go to meet a kid at the library and go through their homework. This isn't that, and so we want to be able to pay well for the hard work involved in high-impact tutoring."

Illinois State University students began tutoring eighth graders like Fischer Killian in math last spring at Bloomington Junior High School. Killian offered a blunt assessment of remote learning during the pandemic.

"It was terrible," Killian said.

Killian took his courses online from home the previous year. Speaking through a Spider-Man-branded face covering, he talked about the haphazard and boring nature of the lessons and how easily he could duck out of class. He was clear about what he hopes to get out of the tutoring sessions. "Human interaction, which is something I really need."

Diane Gallucci '96, M.S.E. '01, an eighth-grade teacher who is coordinating the tutoring program at the junior high, thinks the tutors will assist teachers in closing the learning gap and help meet the students' needs.

"I think our staff does a fantastic job of teaching and trying to bridge those gaps that are there. The tutoring is just a fantastic added piece of support. It can build that relationship with that adult. The students can ask questions that maybe they don't feel comfortable in class asking, and can get clarification, understanding, and confidence to get back in the classroom and feel on par with the rest of their peers."





GETTING THE JUMP ON DISEASE

ONE REDBIRD SCHOLAR IS MEASURING CHILDREN'S HEALTH NOW IN ORDER TO PREVENT PROBLEMS LATER

BY JOHN MOODY

“A jump can tell you a lot.” That’s how Dr. Kelly Laurson, M.S. ’05, professor in the School of Kinesiology and Recreation at Illinois State University, describes a segment of his research.

Laurson specializes in children’s health and helping them, their parents, and teachers identify and be aware of telltale signs of the potential for problems later in life. He conducts research on factors, such as obesity and fitness, that are predictors for future health and wellness outcomes in young people. Integral to this research is measuring children’s aerobic capacity and strength to determine their connection to chronic disease, specifically high blood pressure and osteoporosis.

“For example, on a recent project we were focused on osteoporosis, low-bone density, which is an issue later for people in their 50s, 60s, and 70s,” Laurson said. “The vast majority of bone density is gained in adolescence, those junior high and high school years. It peaks in the late 20s or early 30s and starts to erode from there. The more you start with, the lower risk of osteoporosis later. We figured out that a person’s muscular power is related to how strong their bones are.”

Laurson’s method for checking for children’s risk factors was straightforward.

“We measured their vertical jump – how high they could jump,” he said. “And we measured them in the broad jump – how

far they could jump. My work is mainly on creating those standards; those are the values that define healthy or unhealthy, when a kid is measured.”

In addition to measuring jumping ability, Laurson uses several other tests during his research. He conducts plank testing that is tied to core lean mass; checks cardio metabolic rates; and examines handgrip strength. He will use a treadmill to measure aerobic capacity to determine peak oxygen consumption. And he’s used a bioelectrical impedance assessment to estimate percentage of body fat to determine the risk for metabolic syndrome, which can lead to heart disease, diabetes, stroke, and other issues.

Each test is designed to reveal information about specific aspects of an individual’s health. Laurson said the science has moved well beyond the days when everyone was required to complete a mile run in physical education (PE) class in elementary school. He praised today’s grade-school teachers who work daily with the youth his work serves.

“I’ve worked with some great physical education teachers,” Laurson said. “We’re hoping that we can offer a teachable moment to teachers to show kids that their muscles are all attached to bones, and the stronger your muscles are, then the stronger your bones will be.”

Laurson said the goal of his research is to create standards so that parents, teachers, and students can get health-related



Dr. Kelly Laurson uses a number of methods to measure the health of children. He tests their jumping ability, has them run on treadmills, and uses a DXA scanner to take low-dose X-rays to observe their skeleton and soft tissue.

feedback. While he has collaborated with colleagues at Illinois State since he joined the faculty in 2008, he has also worked with researchers in Poland, Hungary, and, closer to home, in Texas. Most of his recent research has been in partnership with The Cooper Institute, a well-known fitness research center based in Dallas. Laurson helped create the modern version of Cooper's Fitness-Gram Assessment, a physical fitness battery used to develop new standards for body composition and aerobic capacity standards. These standards are used in physical education classes around the country and beyond, in pediatric clinics, and by researchers who specialize in evaluating the fitness and health of children.

"I don't just measure kids in the Bloomington-Normal area," Laurson said. "I've done some data analyses from some pretty cool places, which allows me to extend my reach."

Laurson relies on technology and uses a DXA scanner — also called a dual energy X-ray absorptiometry machine — in his work.

"It's a low-dose X-ray that enables us to see skeleton and soft tissue," he said. "We can use it to measure lean muscle mass and fat mass and bone mass. We have one in the department, which is a great research and teaching tool for us."

In general terms Laurson said his work focuses on childhood fitness and physical activity, adding that there are two pieces to that work.

"Children's health is the focus, with prevention of chronic diseases being a major part of my work," he said. "The second piece is the numbers of it, the data analysis."

It's been a productive couple of years for Laurson as he's been a co-author on 10 research studies and journal articles since 2020. He has presented just as many times at conferences in roughly the same time frame.

Dr. Dale Brown, professor of exercise physiology at Illinois State, said Laurson's work is recognized nationally and internationally. Beyond that, Laurson has demonstrated the ability to connect with his students and his peers.

"Kelly is a great teacher, researcher, and colleague," Brown said. "His passion for research and scholarship gives him a unique ability to mentor and guide students through the scholarship and research process."

"Students and colleagues seek him out, given his exceptional ability in research design, management of data sets, experience in data analytics and navigating statistical analyses."

A native of rural Centerville, Iowa, Laurson, 41, played football and tennis in high school. After earning a bachelor's degree in health promotion and exercise science from Central College in Iowa, he completed a master's degree in exercise physiology and kinesiology at Illinois State.

"All throughout undergrad and into my master's degree, I was convinced I wanted to be a strength-and-conditioning coach and work with athletes, but I sort of fell out of love with it," Laurson said. "Once I was done with my master's — which is so fast, just a

“When somebody has spent 40 years developing a disease, it’s pretty hard to get them to change their lifestyle. A person is a lot more malleable at age 8.”

DR. KELLY LAURSON

year or so I didn’t know what to do, so I contacted Dale Brown, who had been my advisor, and asked him if there was anything I could do.”

Brown got Laurson involved in a heart rate assessment project that the department was integrating into local schools with the help of physical education teachers. The idea was for PE teachers at the elementary, middle, and high school levels to learn how to use heart monitors so they could assess their students as part of class. Laurson taught the teachers how to use the heart rate monitors, which were strapped around a student’s chest and hooked up to a watch.

“It’s neat for a child to see their heart rate go up and understand that when they exercise it goes up, and it goes down when they rest,” Laurson said. “My thesis was that heart rates are different during varying athletic activities. For example, running is different on the heart rate than volleyball, which would be intermittent.”

Laurson went on to pursue a Ph.D. in the biological basis of physical activity before returning to Illinois State as a faculty member. He is grateful to work in a supportive environment.



“At a place like ISU, you get to pick your own targets,” Laurson said. “I’m free to pursue the research that I’m most interested in.”

Laurson’s work has been recognized on campus with a number of awards: RISE to the COVID Challenge Recognition in 2020, CAST Outstanding Researcher Tenured Category in 2015, Jorndt Student/Faculty Research Award in 2014, and the University Research Initiative Award in 2013.

Laurson said the important message to impart when working with children on their physical fitness is that it’s much easier to prevent a disease like osteoporosis at the age of 13 than to fix it at age 60.

“It is possible but not as easy to fix it later,” Laurson said. “When somebody has spent 40 years developing a disease, it’s pretty hard to get them to change their lifestyle. A person is a lot more malleable at age 8.”

Student research



Holly Filsinger curated an Office of Research and Graduate Studies lecture series last school year.

Graduate student's virtual lecture series explored how we engage with photographs and technology

By Tyler Emken

Graduate student Holly Filsinger's virtual lecture series, "Experiencing Images: How the Visual Shapes Our World," gave her a unique opportunity last school year to share her natural curiosity and passion for research with the Redbird community.

"The topic and the theme of the series was related to a lot of the research I was

doing and things that I've been interested in that have taken place across many different disciplines at ISU," Filsinger said.

The Jamestown, New York, native is studying visual culture and researching cultural and generational trauma in contemporary art. Filsinger began developing the series in February 2021 after seeing a

call for proposals for a lecture series curated by a graduate student on the Milner Library website.

The series, which was supported by the Office of Research and Graduate Studies, featured distinguished speakers who explore individual and collective engagement with photography. The series

dealt with themes of civic spectatorship, surveillance, and the construction of race; image production and representation; and trauma and memory.

Filsinger hosted two speakers in fall 2021. Dr. John Louis Lucaites, a professor emeritus of rhetoric and English at Indiana University, presented “A Museum Without Walls: Photo Exhibitions and Civic Spectatorship,” and “White Sight: Visual Politics of Whiteness,” was presented by Dr. Nicholas Mirzoeff, a writer and professor of media, culture, and communication at New York University. Filsinger also hosted lectures and a panel discussion in the spring semester, including a virtual presentation by visual artist Cecil McDonald Jr. and a talk with multimedia artist Cannupa Hanska Luger.

“These topics are relevant to everyone in some form,” Filsinger said. “When we start to self-reflect on the images we take and consume, we start to walk through the world differently.”

Filsinger intentionally kept the topics of discussion broad so that the presenters felt they could speak openly about their experiences and give the audience the opportunity to relate those experiences to their own lives.

“It’s a very specific process how you go about reaching out to people and communicating what you want from them while also leaving them space for interpretation,” Filsinger said.

To start producing speakers for the series, Filsinger initially turned to her own scholarship and highlighted a few potential names she felt could best speak on some of the selected topics. She sought guidance from University Galleries Director and Chief Curator Kendra Paitz, MBA ’06, M.A.’11, with whom she conducted an independent study. Paitz helped Filsinger with contacting speakers, marketing the events, and converting them to an online

format due to the coronavirus (COVID-19) pandemic.

“It’s been really great working with a student who is making it happen,” Paitz said. “The range of speakers and topics she has been able to bring in has been great.”

Filsinger said Assistant Professor Dr. Byron Craig, in the School of Communication, helped her identify potential speakers, form ideas for lecture topics, and made sure she kept pushing forward.

“It is a real pleasure to work with Holly. She is extremely intelligent, wants to address every single detail, and works tirelessly to ensure what she visualizes comes to fruition,” Craig said.

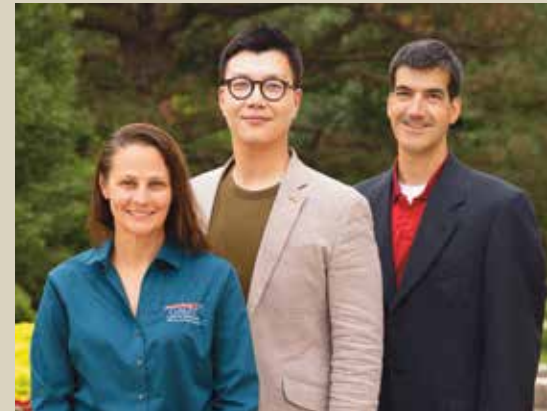
Filsinger also supported the research of her peers by collaborating with the organizers of Illinois State’s Image of Research competition. Several of the speakers from the lecture series served as judges and Filsinger herself took part in a panel discussion in a workshop for the competition to help answer questions about what makes a compelling image and encapsulates research visually.

Paitz notes that Filsinger’s work with the series and as a researcher was noticed by Illinois State faculty, who are consistently impressed with the connections she has been able to make on campus and across the country.

“We talk a lot about individualized attention and our roots as a teaching university, and I think this series exemplifies that,” Paitz said. “A student is realizing her ambitious goal of organizing a yearlong fully funded speaker series, and faculty and staff across multiple units are providing funding, support, and assistance.”

The series was hosted by Illinois State University Wonsook Kim School of Art and was supported and co-sponsored by the Office of Research and Graduate Studies; University Galleries of Illinois

State University; the School of Communication; the Department of English; the Department of History; the Department of Sociology and Anthropology; and the Women’s, Gender, and Sexuality Studies Program.



Drs. Rebekka Darner, Jin Jo, and Matt Aldeman

Dr. Matt Aldeman, associate professor of Technology; Dr. Rebekka Darner, director of the Center for Mathematics, Science, and Technology and associate professor of biology education; and Dr. Jin Jo, professor of Technology, are hosting the 2022–2023 Research Speaker Series. This series, which is sponsored by the Office of Research and Graduate Studies and the Department of Technology, is focused on sustainability and renewable energy.

The Energy for a Sustainable Future Seminar Series is highlighting research taking place across multiple disciplines and institutions to create broad solutions to the complex societal problem of energy resilience.

Half of the series sessions are being offered virtually through Zoom. These online sessions focus primarily on genetics and agriculture-related solutions to optimizing off-season pennycress. The other half of the sessions bring experts to campus where they present in person on sustainable and renewable energy.

Virtual learning in the palm of your hand

By *Ela Messina*

Anyone who has played a game with a Nintendo Wii controller or felt their phone buzz in their hand when pressing an icon is familiar with haptic feedback: the use of touch to communicate with users. A research group at Illinois State is using that concept to introduce hands-on learning in a virtual reality setting.

By creating an immersive virtual reality (VR) experience, Assistant Professor of Technology Dr. Isaac Chang and engineering technology (ET) students Alex Diffor, Jordan Osborne, and Jake Weihe have been investigating how the sense of touch affects learning.

Diffor, a double-major in engineering technology and graphic communication, felt virtual learning during the coronavirus (COVID-19) pandemic exposed a weak point in existing distanced-learning options.

“Not being in the classroom is a big setback for those of us who need to learn in that physical environment,” Diffor, of Normal, said. “VR gives us the chance to try to connect the dots in between conceptual skills and our hands, increasing the ability to learn outside the classroom.”

To test whether VR and haptic learning can effectively mimic a true hands-on experience, students participating in the research project have been tasked with building a chair, both in real life and in VR. Performance is being measured by data collected on speed and accuracy of assembly. Pre- and post-test surveys provide insight into users’ individual experiences.

“In the simulation you’ll go through all the steps of how to build the chair



Engineering technology majors Jake Weihe, Alex Diffor, and Jordan Osborne (left to right) are working with fellow student Jake Weihe and Dr. Isaac Chang to implement haptic feedback into VR learning experiences. (Photo was taken during the COVID-19 face-covering mandate.)

in virtual reality by interacting with the pieces and being able to play around with them in the environment just as if we were at home, learning how to work a machine in the Turner (Hall) labs,” said Weihe. “After the simulation is done, we’ll give the participant the actual chair to see how well they remember the building steps and perform the procedure in real life.”

The haptic glove is rigged with sensors that will provide feedback linked to actions performed in a VR environment.

The research team has been adapting the VR experience to include haptic feedback by having participants use a pair of gloves rigged with sensors. By referencing existing haptic gloves and utilizing open-source input, Osborne has already constructed a prototype of the glove.

“We have the five fingers and the palm,” said Osborne. “On each spot, we have these little black discs, which are vibrational motors, and those are going to be connected to a computer linked to the VR environment.”

For participants, this means holding a tool in the virtual landscape will offer a similar physical sensation as holding a tool in real life. This tool will allow participants to build up muscle memory and tool familiarity that can be applied to real laboratories.

“The assembly process isn’t really focused on the furniture building,” Chang said. “It’s replicating what an engineering technology student would encounter in a lab setting.”

A grant from the Office of Student Research’s Undergraduate Research Support Program (USRP).

The USRP grant, along with funding from the Department of Technology, supported the research. The three students presented their preliminary research at The Association of Technology, Management, and Applied Engineering (ATMAE) Annual Conference held last fall in Orlando, Florida.

Undergraduate student research unites theatre and math

By Ela Messina

An average weekday for an undergraduate student may include attending classes, grabbing some lunch, or studying before an exam. For Chris Turner a typical Tuesday might just mean a trip to space alongside 40 sixth graders, of course.

In spring 2021 Turner, a theatre teacher education major and math minor from Lombard, received an Undergraduate Student Research Program grant (renamed the FIREbird grant) for his research on the effects of theatre arts integration. This teaching approach engages students by bringing theatrical elements into the classroom.

“My research was based in creative drama,” Turner said. “Instead of doing a play, where you have the audience on one side and the performers on the other, you mix it up and everybody imagines this fake world together.”

A frequent destination for Turner’s in-class imagination sessions was outer space. The variables at play in a trip to space offered stimulating material he could use in the subject of his teaching: math.

“Math seemed like a really good place for arts integration to come in because a lot of people don’t enjoy math, or they aren’t confident in math. A lot of people don’t really understand why they’re learning math, and that’s really a challenge for elementary math teachers,” Turner said.

Turner investigated the effects of arts integration by studying how students’ feelings of motivation, perception, and enjoyment affect the learning process. In other words, Turner’s work asked participants to reflect on the question: “How do I feel when I study math?”



Chris Turner

Research literature that Turner examined early in his project pointed to a correlation between enjoying math and understanding the subject. This highlighted the potential positive impacts incorporating theatrical practices could have on student learning.

In December 2021 Turner led sixth-grade math classes at the Metcalf School using lesson plans that included story drama and scene development as theatrical techniques that would aid in translating course material.

“We’d start with drawing a rocket ship. So everyone comes up and draws a single rocket ship, but then we’d need to create it with blocks in real life and all the angles need to match up. Then we need to figure out, ‘Do we have enough fuel to get where we’re going?’” Turner said. “So we would just go through the imagined world, and the math presented itself.”

After the lessons, the students were asked to evaluate their learning experience on a 1-5 Likert scale, rating their confidence, motivation, and enjoyment of math as well as their perceived value of the subject during the arts-integrated lesson. “One” indicated that the student strong-

ly disagreed that the lesson improved a given aspect of their learning while a “5” indicated they strongly agreed the lesson improved their learning.

Survey results from the 40 students showed a strong correlation between the arts-integrated lesson and a positive student experience, with mean ratings for confidence, motivation, value, and enjoyment being 3.40, 3.90, 4.00, and 4.65, respectively.

The high ratings in value and enjoyment for the students confirmed Turner’s initial beliefs: “Everybody can learn math. It’s just about opportunity and effort.”

Dr. Jimmy Chrismon, an assistant professor of theatre teacher education, was the faculty advisor for Turner’s work. Chrismon was proud to see the end result of Turner’s efforts.

“As a teacher of teachers, it’s really cool to see your students succeed and come out the other end having learned something and being a better teacher for it,” Chrismon said. “And I just think the world of Chris. He’s a wonderful human being on top of being extremely intelligent and creative. So to see all those worlds of his (theater and math) collide at the end of this project that was something he was so passionate about, as a teacher, there’s no greater thing.”

While the confirmation of his hypothesis was a rewarding experience for Turner, his favorite part of the research was seeing students get creative with their learning.

“I just had this experience with a student where, when we all went to space, the student was looking around and just said, ‘There’s Mars.’” Turner said. “You could see it in his eyes, he was seeing Mars.”



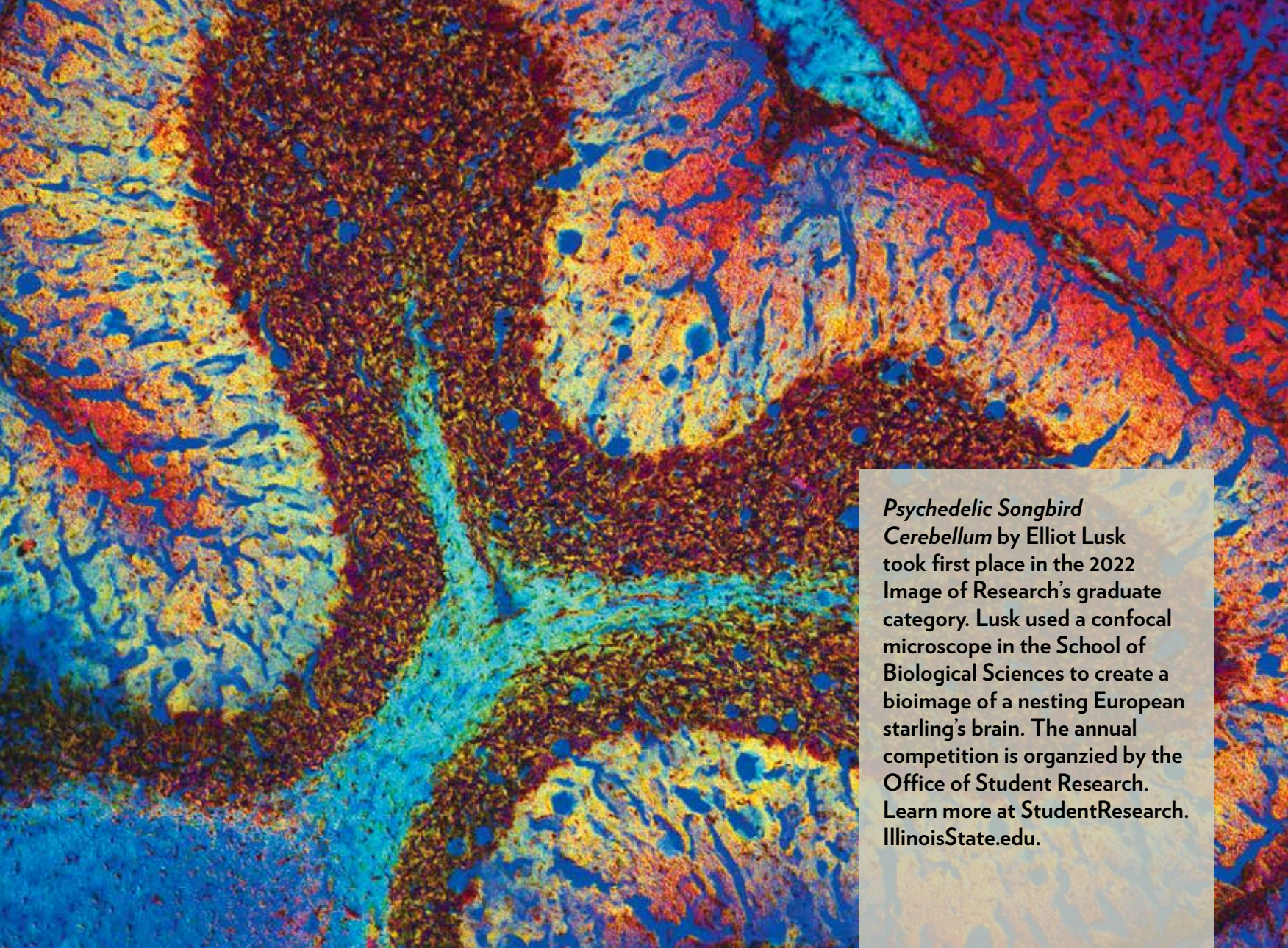
**ILLINOIS STATE
UNIVERSITY**

Illinois' first public university

**Office of the Associate Vice President
for Research and Graduate Studies**

Campus Box 4000

Normal, IL 61790-4000



*Psychedelic Songbird
Cerebellum* by Elliot Lusk
took first place in the 2022
Image of Research's graduate
category. Lusk used a confocal
microscope in the School of
Biological Sciences to create a
bioimage of a nesting European
starling's brain. The annual
competition is organized by the
Office of Student Research.
Learn more at [StudentResearch.
IllinoisState.edu](http://StudentResearch.
IllinoisState.edu).