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MORGRIDGE
INSTITUTE FOR RESEARCH

FALL 2021

A SPECIAL REPORT FOR
SUPPORTERS OF THE
MORGRIDGE INSTITUTE
FOR RESEARCH

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BRAD'S UPDATE

Greetings from Madison!

It's been a whirlwind summer and early fall here at the Morgridge Institute. We safely welcomed back more of our scientists, researchers, and employees into the building. We are certainly not back to normal, but I think we're starting to see what this "new normal" is.

Of course, there have been setbacks with the delta variant. But we are not moving backward. We know how to operate safely. The vaccines are highly effective, and they're working.

In the face of the incredible human and economic toll of the pandemic, we recognize we're among the lucky ones who were able to keep pushing science forward. We directed our research wisely and realized that our expertise could serve society in this critical time. As a result, we'll come out of this as better, more compassionate scientists.

Moreover, our scientists proved their remarkable adaptability to remain productive and resilient. That work was — and continues to be — made possible by you, our donors. **I cannot thank you enough for the trust you've placed in us.**

THANK YOU
for being a donor
and supporter of the
Morgridge Institute
for Research.

In this report, you can read about the research milestones made possible this year. In particular, you'll see several efforts to redouble the fight against cancer on pages 4 and 5. Two of these initiatives come out of the Melissa Skala Lab and use novel imaging techniques to home in on more effective, fast, and informative tools for testing cancer drugs.

I also hope you enjoy seeing the new faces at the institute on pages 6-7. That includes Tim Grant, an investigator in virology and research computing specializing in cryo-electron microscopy, and Ashley Cortes Hernandez, who joined the Discovery Outreach team to support science programs for underrepresented students and families.

As much as we celebrate the science community here, it's clear we still have a lot to do. Society has imparted scientists with a high level of trust and support, and with that, we must consistently demonstrate that we are here to serve people and do what's right for humanity.

On page 10, you can read an editorial I wrote in *The Hill*. In it, I called on more scientists to step out from behind the bench and seize this moment. All of us in science must connect with the American public, share our knowledge clearly, and most of all, listen to peoples' issues and concerns.

And that brings me fittingly to Ernest "Ernie" Micek, who you can read about on page 12. Ernie was a Morgridge Institute trustee, board chair, entrepreneur, and friend. He was a tireless advocate for science and education and played a pivotal role in creating the institute. Unfortunately, Ernie passed away in Oct. 2020 at the age of 84, but his legacy continues with his advice to "always do the right thing."

Of course, this report is just a sampling of the incredible discovery, outreach, and education happening here. We depend on a community of supporters like you. Thank you for making a difference.

I hope you are healthy, happy, and hopeful as you read this report.

Brad Schwartz, M.D.
Chief Executive Officer
Morgridge Institute for Research

P.S. Your voice matters. If you have any questions about the stories in this report, please don't hesitate to contact me at giving@morgridge.org

YOUR SUPPORT MATTERS

You play an important role in pushing science forward. Thanks to private support from donors like you, the Morgridge Institute is working to improve human health. We can't do this work without you—THANK YOU.

Here's a look at some of the milestones made possible by you.



Fast and informative: Measuring drug responses for cancer

Biologists are particularly interested in organoids—tiny three-dimensional cellular assemblies grown in a lab. Cancer organoids are particularly helpful since they mimic the source tumor and can be a testing ground for treatment and therapy.

Dan Gil, an alumnus of the Melissa Skala Lab, and colleagues developed a novel way to image how cancer responds to drug treatments. Using cancer organoids, the scientists applied their technique, called redox imaging, to see just how the organoids responded to drugs in a non-destructive, fast, and informative way.



“This is an important step to bring this technology to the clinic in a usable, cost effective way. We hope this can guide treatment choices for more patients,” said Skala.

Serving up summer science

For the second year, the Summer Science Workshop Series helped students and teachers.

The virtual workshop was a six-week online course where high school students (and a small group of middle school students) and science teachers logged on weekly to meet with scientists from the Morgridge Institute and UW–Madison.

The workshop was created last year during the COVID-19 pandemic to create a safe, digital alternative to explore science.

Twenty-one schools in the Wisconsin Rural Schools Alliance and seven sites in the Upward Bound program, which focuses on underrepresented and first-generation precollege students, joined the workshop.

Together, the students met with scientists and researchers who illustrated their diverse paths to scientific careers. Since 2007, the summer science experiences have helped nearly 500 students from nearly 80 state high schools.





Shedding light on a notoriously slow-growing cancer

People typically associate the most frightful cancers with their ability to grow aggressively, but neuroendocrine tumors are dangerous for the exact opposite reason: They grow so slowly, they can go undetected before it's too late.

Scientists at the Morgridge Institute and the UW–Madison Carbone Cancer Center are finding promising new ways to model this disease in the lab and measure the efficacy of different treatments.

In research published in the journal *Cancers*, the team created 3D cancer organoids that mimic the slow growth of neuroendocrine cancers. They used optical metabolic imaging to measure changes in the cancer in response to different treatment combinations.

“The majority of patients with neuroendocrine tumors are getting diagnosed when they are in later stages of the cancer,” says Amani Gillette, lead author of the paper and a researcher in Skala Lab. “Unfortunately, with the three or four chemotherapy options out there now, the tumors are very hard to treat if surgery is not an option. These chemotherapies also tend to be heavy hitters with many side effects. So better drugs are desperately needed.”

Web tool explores data for cancer research

Tumor heterogeneity—the complex microenvironment within a single tumor—remains a major challenge in cancer research. Cancer biologists use RNA sequencing technology to understand these environments, but the large, complex datasets are often difficult to navigate.

Matthew Bernstein, a Morgridge postdoctoral fellow in the Ron Stewart Bioinformatics Group, developed a new web tool that explores public RNAseq datasets to facilitate analysis for researchers.

The application called CHARacterizing Tumor Subpopulations, or CHARTS, was published in the journal *BMC Bioinformatics* and serves as a quick hypothesis testing tool, answering questions such as: Is this gene expressed in these cell types for a specific type of cancer? Or, are these cell types present in malignant or benign tumors?

CHARTS is freely available for researchers to use at charts.morgridge.org



Online Field Trips bring science to the state

For more than ten years, the Field Trip Program has brought students and teachers to Madison for a day of activity and exploration. But when the COVID-19 pandemic shuttered on-campus activity, the Discovery Outreach Team got creative.

They honed an online approach that is engaging, inspiring, and fun. And over the spring, they welcomed 28 field trips from nine school districts across Wisconsin to meet with scientists and researchers.

“If students can actually meet a scientist and hear what their favorite color is, or where they went to school—and maybe they’re from your same rural hometown—that’s the impact that we are so proud to make,” says Val Blair, senior outreach coordinator.



How do stem cells become cardiac muscle cells?

Stem cell research holds great potential for regenerative therapies and treatments to combat cardiovascular disease, which is responsible for over 30 percent of all deaths worldwide. But turning stem cells into functional cardiomyocytes—the muscle cells responsible for the contraction of the heart—is costly, labor-intensive, and highly variable.

In new research published in the journal *Nature Communications*, the Melissa Skala Lab developed a non-invasive imaging technique that can predict the efficiency of cardiomyocyte differentiation as a method of quality control. Their predictive model unveils just how human pluripotent stem cells differentiate into cardiomyocytes over a 14-day process.

“If we can predict the outcome of stem cell differentiation into cardiomyocytes at a very early stage, then we can save time, money, and speed at the manufacturing stage,” says Tongcheng Qian, lead author and assistant scientist.

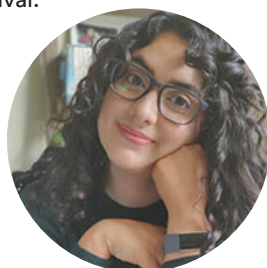


Welcoming Ashley Cortes Hernandez

Ashley Cortes Hernandez joined the Discovery Outreach team as an assistant outreach coordinator. Cortes Hernandez, a 2020 graduate of master's program in biochemistry at UW–Madison, is bringing her Latinx representation to make science, technology, engineering and math (STEM) fields more accessible to underrepresented communities

She is assisting with youth programs at the institute including Saturday Science, field trips, summer camps, and the Wisconsin Science Festival.

“I wanted to pursue outreach after graduate school because I wanted to be part of a community that brought STEM to a broader audience and made it accessible to everyone,” Cortes Hernandez says. “I really just took the plunge and I am so lucky to be part of such an amazing team that gets to do just that every day.”



Cortes Hernandez, who grew up in Puerto Rico, was drawn to the youth outreach aspects of her position. She notes that her own career in STEM would have been a lot more accessible through youth programs—and she hopes to do that for children and families at the Morgridge Institute.

THANK YOU

You've made a difference for scientists, educators, researchers and students.

Your donations provide critical resources that help scientists working on cutting-edge research and supporting educators who bring science to communities around Wisconsin.



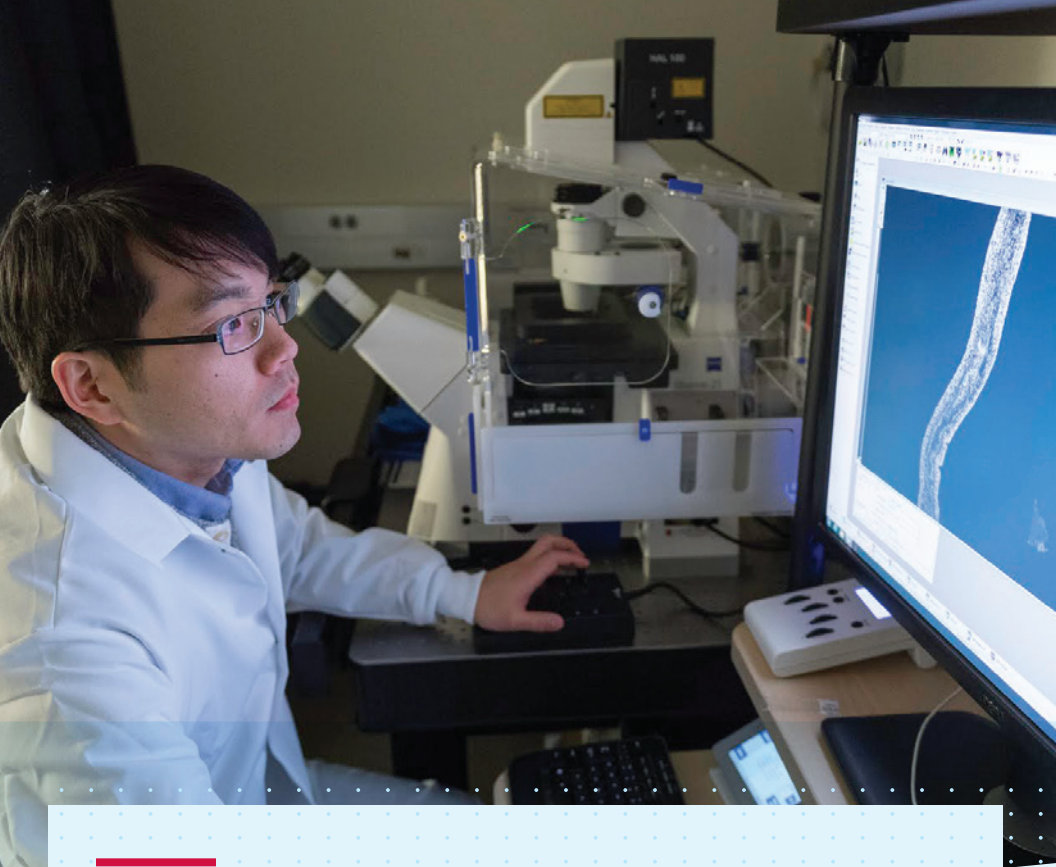
Mapping molecules at the atomic-level

Powerhouse new tools such as cryo-electron microscopy give scientists a way to define the structures of molecules at high resolution.

But identifying exactly where these molecules reside within an ocean of structures inside a cell—and exactly how they interact with their neighbors—remains unknown.

Morgridge Investigator Tim Grant is part of a new project supported by the Chan Zuckerberg Initiative (CZI) that hopes to create a three-dimensional map that aligns molecules in their proper neighborhoods within a cell.

“The ultimate goal of this project is to make a precise atomic-level map of a cell,” Grant says. “That’s something that scientists basically don’t have at the moment. We know what these structures look like, but we often don’t know how they are positioned in relation to one another and how they are interacting.”



Cell atlas of tropical disease parasite may hold key for new treatments

Jayhun Lee, a former postdoctoral researcher and alumnus of the Phil Newmark Lab, was the lead author in a study that outlines the first-ever cell atlas of the tropical parasite schistosome. This discovery could provide new alternatives for fighting schistosomiasis, a neglected tropical disease that impacts more than 200 million people globally.

The findings, published in the journal *Nature Communications*, identified 13 distinct cell types within the worm at the start of its development into a dangerous parasite, including new cell types in the nervous and muscular systems. The atlas provides an instruction manual for better understanding the worm's biology to enable research into vaccines and treatments.

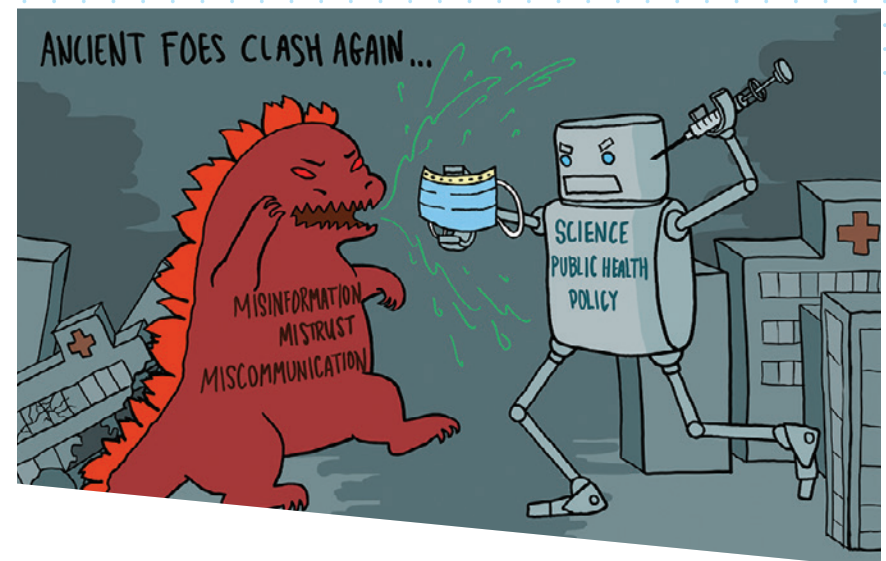
Top prizes in ethics cartooning contest address COVID-19 and more

Five prizes were awarded in the fourth annual Morgridge Institute Ethics Cartooning Contest, which invites participants to make a cartoon on any ethical issue related to biomedical research.

The COVID-19 pandemic served as a major influence on the competition this year.

Alyssa Wiener, a first-year postdoctoral research fellow and general surgery resident at the UW–Madison School of Medicine and Public Health, took this year's top prize. Her winning cartoon explores the ethical and existential challenge of communicating scientific findings to society in order to effect practical change.

"This challenge can sometimes escalate to the proportions of an 'epic battle' with tremendous collateral damage, as I think is the case with the COVID-19 pandemic response," says Wiener. "Just as comics function on both an emotional and intellectual level, I hope we can communicate the scientific process and research findings in an impactful but accurate manner."



PUSHING SCIENCE FORWARD

WHY SCIENTISTS MUST STEP OUT FROM BEHIND THE BENCH

America's scientific community faces a historic opportunity to prove its value to society, thanks to the unprecedented role that President Biden has assigned to science in his administration.

President Biden has laid out a vision for elevating the importance of science in this country, but his administration cannot do this alone.

All scientists need to help find ways to educate Americans about the benefits and the mission of science. We need to make sure they understand the scientific method and how that has led to discoveries that changed our world.

Not since the end of World War II has science been more important to the future of our country. Problems from global warming to devastating new diseases cannot be solved without major contributions from scientists. Moreover, new challenges to America's position as the world's economic leader from countries such as China will heighten the importance of scientific research in this country.

The first order of business is to step out from behind our microscopes and Petri dishes and engage the American public in more transparent and inclusive ways. It no longer should be considered sufficient for us to spend our days talking only to each other. Connecting with people will require scientists to become better listeners as well.

Many scientists assume that people should listen to them because they are "experts," but our society always has had a deep suspicion of people who act as if they're smarter than others. We need to build bridges with society that supports our endeavors.

Trust is built at a personal level and there are many opportunities for scientists to engage with people in places such as community groups or Boys and Girls Clubs. Although a scientist may reach fewer people with such interactions, the impact on each person can be greater. We have great stories to tell of the incredible things science has achieved, from breakthroughs in health to new materials. And so often the best discoveries came by accident.

Let's face it, America's scientific community long has been marked by petty squabbling and infighting. The struggle for money and who gets credit for a discovery has hurt the public's perception of our work and does not serve the interests of the nation.

It is not at all uncommon for program officers at federal agencies to discourage grant recipients from pursuing a particular line of research because it doesn't fall within their area of responsibility, or out of concern for who might get credit. The councils of leading scientists who have tremendous sway at places such as the National Institutes of Health need to reinforce that such a narrow attitude can stand in the way of science delivering what society expects of us.

President Biden has delivered a call to action. We scientists need to rally around this amazing opportunity to deliver to society what it expects from us. It's time to stop worrying about parochial, narrow interests and think about what's good for the country.

This story was
originally published
in *The Hill*.

By Brad Schwartz



FEARLESS SCIENCE STARTS HERE

We're not afraid to explore uncharted research. The next big advances in human health will come from a fundamental understanding of human biology.

That's why the Morgridge Institute supports scientists who fearlessly advance human health in the fields of bioethics, bioinformatics, biomedical imaging, metabolism, virology, regenerative biology, and research computing in collaboration with the University of Wisconsin-Madison.

**THANK YOU
FOR BEING
PART OF THIS
SCIENTIFIC
COMMUNITY.
WE TRULY
COUNT ON
DONORS LIKE
YOU.**



HONORING ERNIE MICEK: 'ALWAYS DOING THE RIGHT THING'

TRUSTEE LEAVES A LEGACY

In 2012, you could probably find Ernest “Ernie” S. Micek making the two-and-a-half-hour drive into Madison, Wis., from his home in southeast Minnesota.

Micek wasn’t a scientist or a researcher. He was retired, but you’d hardly know it.

A few years before, he had wrapped a 42-year career at Cargill, Inc., a global food corporation headquartered in the Midwest, where he served as president, CEO, and chairman, leading many global trade efforts and serving under both Presidents Bush and Clinton.

But in 2012, Ernie had a new job: get the Morgridge Institute up and running. The institute was only a few years old, with just a handful of scientists occupying a sprawling new research facility. And the institute needed a chief executive officer.

So Micek, then in his 70s, made the frequent drives to Madison. He chaired the institute’s Board of Trustees and worked hand-in-hand with leadership at the Wisconsin Alumni Research Foundation (WARF).

Over the next two years, Micek helped recruit Jim Dahlberg, an emeritus UW–Madison professor of biomolecular chemistry, as the institute’s interim CEO, and then Brad Schwartz as the permanent CEO in 2013. Together, they paved a new path forward to launch an innovative biomedical research institute in partnership with UW–Madison.

“Ernie was a key player in changing the spirit and goals of the Morgridge Institute,” recalls Dahlberg. “He always made sure we were doing things the right way. Importantly, Ernie was also a great mentor to me. He was somebody that I was very happy to have as a friend.”



“Ernie was always there. You could call him on a moment’s notice,” recalls Carl Gulbrandsen, former managing director at WARF. “He knew how to roll his sleeves up and really get the job done.”



Soon, a permanent memorial will be developed and installed in the Discovery Building to honor Micek's decade of service to the institute, WARF, and the university. Micek, at 84, passed away peacefully in Oct. 2020 following a long illness, but his connections and contributions live on.

"He believed that scientific advancement was a way to improve the quality of life," says Stephanie Luetkehans, Ernie Micek's daughter. "When I think about my father, I think about optimism. He was always very interested in innovation. And I feel like innovation was something that was carried out in many different ways in his life."

Micek was born and raised on a small farm outside of Arcadia, Wis., in the rocky hills of southwestern Wisconsin.

He collected tractors, primarily Farmall tractors from the 1940s and 50s, and many in red. (One small collectible tractor is still on Dahlberg's desk today.)

Family was central in Micek's life. They enjoyed semi-annual get-togethers on the shore of the Mississippi River that brought children and grandchildren home from across the country.

He earned a Bachelor of Science in chemical engineering from UW-Madison in 1959. He served as a founding member of the Morgridge Institute Board of Trustees (2006-2014), where he led as chair from 2011-14 and a seven-year term on the WARF Board.

Micek is survived by his wife Sally; children Scott, Stephanie, Jennifer, Mollie; 10 grandchildren, and one great-granddaughter.



YOUR LIFE, YOUR LEGACY

A legacy gift makes it possible for you, your loved ones, and the Morgridge Institute to all benefit. An estate gift is a powerful and meaningful way to honor your life and make a difference in science, outreach, and education.



Your generosity can help the next generation of scientists, researchers, and educators working at the forefront of science and medicine. You and your financial advisor can create a lasting impact that suits your needs as well as supports the Morgridge Institute's mission to improve human health, spark a scientific curiosity, and serve society.

We're here to help. If you have any questions, or have included the Morgridge Institute in your estate plans, please contact us. We want to ensure your lasting impact meets your financial goals.



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TOP HONORS

Donors like you ensure world-class scientists and researchers continue pathbreaking biomedical research and outreach. Thank you for supporting basic research that will improve human health.



Alumnus awarded prestigious fellowship with U.S. Treasury

Amritava Das, an alumnus of the Morgridge Postdoctoral Fellowship program, earned a prestigious AAAS Science & Technology Policy Fellowship and landed the first-ever placement at the U.S. Department of the Treasury. The prestigious award will help Das use his engineering and bioscience training to explore the connections between science, national security, and finance.

Raja awarded the 'Women Scientist Award' for achievements in bioinformatics

Kalpana Raja, a postdoctoral research associate in the Ron Stewart Bioinformatics Group, received the 2019 Women Scientist Award for her meritorious and significantly outstanding scientific contributions. The annual award comes from the Society for Bioinformatics and Biological Sciences, a nonprofit professional society based in India, that supports the advancement and development of bioinformatics across interdisciplinary science fields.



Morgridge alumna receives NIH Director's New Innovator Award

Tania Rozario, a 2020 alumna of the Phil Newmark Lab at Morgridge, received a National Institutes of Health Director's New Innovator Award for high-risk, high-reward research she is pursuing. The \$2 million award will help Rozario, an assistant professor at the University of Georgia, continue studying the remarkable regenerative capacity of flatworms that cause parasitic diseases.





“We are often asked, ‘Why don’t you just work on the important viruses?’ But the lesson of the last 100 years is: Everything is important. Nearly every time the world has been hit with a new viral plague, it’s been from a class of viruses that had not previously been linked to serious human disease.”

– PAUL AHLQUIST, DIRECTOR,
JOHN W. AND JEANNE M. ROWE CENTER FOR RESEARCH IN VIROLOGY



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